United States Department of Agriculture
Natural Resources Conservation Service

FINAL WATERSHED PLAN AND ENVIRONMENTAL ASSESSMENT FOR THE LOWER GUNNISON PROJECT

United States Department of Agriculture
Natural Resources Conservation Service

In Cooperation With
Colorado River Water Conservation District
Bureau of Reclamation
Bureau of Land Management

MARCH 2018

Final Watershed Plan and Environmental Assessment for the Lower Gunnison Project Colorado

Lead Agency: U.S. Department of Agriculture, Natural Resources Conservation Service, Colorado (USDA-NRCS)

Cooperating Agencies: U.S. Department of Interior**,** Bureau of Reclamation (Reclamation) and U.S. Department of Interior**,** Bureau of Land Management (BLM)

Sponsoring Local Organization (SLO): Colorado River Water Conservation District (River District)

Authority: This Watershed Plan and Environmental Assessment (Plan-EA) has been prepared under the Authority of the Watershed Protection and Flood Prevention Act of 1954 (Public Law [P.L.] 83-566) and the Regional Conservation Partnership Program (RCPP), authorized by Subtitle I of Title XII of the Food Security Act of 1985 (the 1985 Act), as amended by Section 2401 of the Agricultural Act of 2014 (the 2014 Act). The Plan-EA has been prepared in accordance with the National Environmental Policy Act (NEPA) of 1969, P.L. 91-190, as amended (42 U.S. Code [U.S.C.] 43221 et seq.).

Abstract:

The Lower Gunnison Project will improve agricultural water management within four subwatersheds which are irrigated with water from the Lower Gunnison River (defined as the reach from Morrow Point Dam to the confluence with the Colorado River) and its tributaries. The Lower Gunnison Project will also implement watershed protection measures in those subwatersheds that reduce the contribution of salts and selenium to the Lower Gunnison and subsequently to the Colorado River.

The project will include modernization of infrastructure and construction of automated regulation structures. Project installation cost is estimated to be $15,448,153, of which $9,308,213 will be paid by the Sponsor and other funding sources. The estimated amount to be paid through USDA-NRCS P.L. 83-566 funds is $6,139,940. This document is intended to fulfill requirements of the NEPA and to be considered for authorization of P.L. 83-566 funding.

Comments: USDA-NRCS has completed this Final Plan-EA in accordance with the NEPA and USDA-NRCS guidelines and standards. Reviewers should provide comments to NRCS during the allotted Final Plan-EA review period.

To submit comments, send via U.S. Mail to:

NRCS Colorado State Office
Denver Federal Center Building 56, Room 2604
Attention: Randy Randall
P.O. Box 25486 DFC
Denver, Colorado 80225

Or e-mail to randy.randall@co.usda.gov

Non-Discrimination Statement:

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Watershed Agreement
between the
Colorado River Water Conservation District
(Referred to herein as the sponsor)
and the
Natural Resources Conservation Service,
U.S. Department of Agriculture
(Referred to herein as NRCS)

Whereas, application has heretofore been made to the Secretary of Agriculture by the sponsor for assistance in preparing a plan for works of improvement for the Lower Gunnison River Basin, State of Colorado, under the authority of the Watershed Protection and Flood Prevention Act, as amended (16 U.S.C. Sections 1001 to 1008, 1010, and 1012); and

Whereas, the responsibility for administration of the Watershed Protection and Flood Prevention Act, has been assigned by the Secretary of Agriculture to NRCS; and

Whereas, there has been developed through the cooperative efforts of the sponsor and NRCS a watershed project plan and environmental impact statement (or environmental assessment) for works of improvement for the Lower Gunnison River Basin, State of Colorado, hereinafter referred to as the watershed project plan or plan, which plan is annexed to and made a part of this agreement;

Now, therefore, in view of the foregoing considerations, the Secretary of Agriculture, through NRCS, and the sponsor hereby agrees on this watershed project plan and that the works of improvement for this project will be installed, operated, and maintained in accordance with the terms, conditions, and stipulations provided for in this plan and including the following:

1. Term. The term of this agreement is for the installation period and evaluated life of the project (50 years) and does not commit NRCS to assistance of any kind beyond the end of the evaluated life.

2. Costs. The costs shown in this plan are preliminary estimates. Final costs to be borne by the parties hereto will be the actual costs incurred in the installation of works of improvement.

3. Real Property. The sponsor will provide assurance that subrecipients or any landowner with who it contracts has acquired or has legal access to such real property as will be needed in connection with the works of improvement.

4. Cost-share for Watershed Project Plans. The following table will be used to show cost-share percentages and amounts for watershed project plan implementation. (You may need to add columns for subcontractors)

Cost-share Table for Watershed Operation or Rehabilitation Projects					
Works of Improvement	**NRCS**		**Sponsor**		**Total**
Cost-sharable Items	**Percent**	**Cost**	**Percent**	**Cost**	**Cost**
List measures by purpose and rate of assistance.[1/]					
Multipurpose Structure No. 1 [Clipper Re-Reg Pond]	99%	$264,285	1%	$2,000	$266,285
Channels [Canal Piping]	30%	$3,860,282	70%	$9,209,730	$13,070,012
Floodplain Easements (0 Acres)	N/A				
Land Treatment Measure [SCADA]	91%	$499,874	9%	$48,483	$548,357
Mitigation	N/A				
Real Property Acquisition Cost	N/A				
Relocation [2/]	N/A				
Sponsors Engineering Costs	N/A				
Subtotal: Cost-Sharable Costs	33%	$4,624,441	67%	$9,260,213	$13,884,654
Non-Cost-Sharable Items [3/]					
NRCS Technical Assistance/Engineering	100%	$1,515,499			$1,515,499
Project Administration [4/]	N/A				
Water, Mineral and Other Resource Rights [5/]	N/A				
Permits [5/]	N/A				
Real Property Rights [5/]	N/A				
Relocation, Beyond Required Decent, Safe, Sanitary [6/]	N/A				
Non-Project Costs			100%	$48,000	$48,000
Subtotal: Non-Cost-Share Costs	97%	$1,515,499	3%	$48,000	$1,563,499
Total:	40%	$6,139,940	60%	$9,308,213	$15,448,153

Cost-share Table for Watershed Operation or Rehabilitation Projects					
Works of Improvement	**NRCS**		**Sponsor**		**Total**
Cost-sharable Items	**Percent**	**Cost**	**Percent**	**Cost**	**Cost**

1/ Installation costs explanatory notes:
(a) List each multiple-purpose measure separately. Specific cost items and joint costs of multiple-purpose measures will be shown as separate line item entries. Single-purpose measures may be grouped by kind if the rate of assistance is the same for each measure or group.
(b) For watershed protection enduring measures, the following footnote should be included: 1/ The cost-share rate is the percentage of the average cost of installing the practice in the selected plan for the evaluation unit. During project implementation, the actual cost-share rate must not exceed the rate of assistance for similar practices and measures under existing national programs.
2/ Relocation payments and assurances explanatory notes:
(a) Includes replacement in kind, and payments necessary to meet decent, safe, and sanitary provisions. Enter the total estimated relocation assistance payment from table 1. Percentages for cost sharing will be based upon the cost-share rate of the project purpose requiring the relocation. The relocation assistance advisory services cost is to be included when computing the cost sharing percentages. These percentages are to be used for the life of the project regardless of future changes or supplements.
(b) If the planned project measures will not cause the displacement of any person, business, or farm operation under present conditions, show cost sharing percentages, place $0 1/ in "Estimated Relocation Payment Costs," and footnote the column as follows: 1/ Investigation of the watershed project area indicates that no displacements will be involved under present conditions. However, in the event that displacement becomes necessary at a later date, the cost of relocation assistance and payments will be cost-shared in accordance with the percentages shown.
3/ If actual non-cost-sharable item expenditures vary from these figures, the responsible party will bear the change.
4/ The sponsors and NRCS will each bear the costs of project administration that each incurs. Sponsor costs for project administration include relocation assistance advisory service.
5/ The sponsors will acquire with other than Watershed Protection and Flood Prevention Act funds, such real property as will be needed in connection with the works of improvement. The value of real property is eligible as in-kind contributions toward the sponsors' share of the works of improvement costs. In no case will the amount of an in- kind contribution exceed the sponsors' share of the cost for the works of improvement. The maximum cost eligible for in-kind credit is the same as that for cost sharing.
6/ Relocation payments for the cost of improvements beyond decent, safe and sanitary requirements is a non-project cost ineligible for assistance under the act.

5. Water and Mineral Rights. The sponsor will provide assurance that landowners or resource users have acquired such water, mineral, or other natural resources rights pursuant to State law as may be needed in the installation and operation of the works of improvement.

6. Permits. The sponsor will obtain and bear the cost for all necessary Federal, State, and local permits required by law, ordinance, or regulation for installation of the works of improvement whether directly or indirectly.

7. NRCS Assistance. This agreement is not a fund-obligating document. Financial and other assistance to be furnished by NRCS in carrying out the plan is contingent upon the fulfillment of applicable laws and regulations and the availability of appropriations for this purpose.

8. Additional Agreements. A separate agreement will be entered into between NRCS and the sponsor before either party either directly or indirectly initiates work involving funds of the other party. Such agreements will set forth in detail the financial and working arrangements and other conditions that are applicable to the specific works of improvement.

9. Amendments. This plan may be amended or revised only by mutual agreement of the parties hereto, except that NRCS may deauthorize or terminate funding at any time it determines that the sponsor or any of its subrecipients or subcontractors has failed to comply with the conditions of this agreement or when the program funding or authority expires. In this case, NRCS must promptly notify the sponsor in writing of the determination and the reasons for the deauthorization of project funding, together with the effective

date. Payments made to the sponsor or recoveries by NRCS must be in accordance with the legal rights and liabilities of the parties when project funding has been deauthorized. An amendment to incorporate changes affecting a specific measure may be made by mutual agreement between NRCS and the sponsor having specific responsibilities for the measure involved.

10. Prohibitions. No member of or delegate to Congress, or resident commissioner, may be admitted to any share or part of this plan or to any benefit that may arise therefrom; but this provision may not be construed to extend to this agreement if made with a corporation for its general benefit.

11. Operation and Maintenance (O&M). The sponsor will be responsible for the operation, maintenance, and any needed replacement of the works of improvement by actually performing the work or arranging for such work, in accordance with an O&M agreement. An O&M agreement will be entered into before Federal funds are obligated and will continue for the project life (50 years). Although the sponsor's responsibility to the Federal Government for O&M ends when the O&M agreement expires upon completion of the evaluated life of measures covered by the agreement, the sponsors acknowledge that continued liabilities and responsibilities associated with works of improvement may exist beyond the evaluated life.

12. Emergency Action Plan. Prior to construction, the sponsor must prepare an emergency action plan (EAP) for each dam or similar structure where failure may cause loss of life or as required by state and local regulations. The EAP must meet the minimum content specified in NRCS Title 180, National Operation and Maintenance Manual (NOMM), Part 500, Subpart F, Section 500.52, and meet applicable State agency dam safety requirements. The NRCS will determine that an EAP is prepared prior to the execution of fund obligating documents for construction of the structure. EAPs must be reviewed and updated by the sponsors annually.

13. Nondiscrimination Provisions. The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, SW., Washington, DC 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

By signing this agreement the recipient assures the Department of Agriculture that the program or activities provided for under this agreement will be conducted in compliance with all applicable Federal civil rights laws, rules, regulations, and policies.

14. Certification Regarding Drug-Free Workplace Requirements (7 CFR Part 3021). By signing this Watershed Agreement, the sponsor is providing the certification set out below. If it is later determined that the sponsor knowingly rendered a false certification, or otherwise violated the requirements of the Drug-Free Workplace Act, the NRCS, in addition to any other remedies available to the Federal Government, may take action authorized under the Drug-Free Workplace Act.

Controlled substance means a controlled substance in schedules I through V of the Controlled Substances Act (21 U.S.C. Section 812) and as further defined by regulation (21 CFR Sections 1308.11 through 1308.15);

Conviction means a finding of guilt (including a plea of *nolo contendere*) or imposition of sentence, or both, by any judicial body charged with the responsibility to determine violations of the Federal or State criminal drug statutes;

Criminal drug statute means a Federal or non-Federal criminal statute involving the manufacturing, distribution, dispensing, use, or possession of any controlled substance;

Employee means the employee of a grantee directly engaged in the performance of work under a grant, including (i) all direct charge employees, (ii) all indirect charge employees unless their impact or involvement is insignificant to the performance of the grant, and (iii) temporary personnel and consultants who are directly engaged in the performance of work under the grant and who are on the grantee's payroll. This definition does not include workers not on the payroll of the grantee (e.g., volunteers, even if used to meet a matching requirement, consultants or independent contractors not on the grantees' payroll, or employees of subrecipients or subcontractors in covered workplaces).

Certification:

A. The sponsor certifies that it will or will continue to provide a drug-free workplace by—

(1) Publishing a statement notifying employees that the unlawful manufacture, distribution, dispensing, possession, or use of a controlled substance is prohibited in the grantee's workplace and specifying the actions that will be taken against employees for violation of such prohibition.

(2) Establishing an ongoing drug-free awareness program to inform employees about—

  (a) The danger of drug abuse in the workplace.

  (b) The grantee's policy of maintaining a drug-free workplace.

  (c) Any available drug counseling, rehabilitation, and employee assistance programs.

  (d) The penalties that may be imposed upon employees for drug abuse violations occurring in the workplace.

(3) Making it a requirement that each employee to be engaged in the performance of the grant be given a copy of the statement required by paragraph (1).

(4) Notifying the employee in the statement required by paragraph (1) that, as a condition of employment under the grant, the employee must—

  (a) Abide by the terms of the statement; and

  (b) Notify the employer in writing of his or her conviction for a violation of a criminal drug statute occurring in the workplace no later than 5 calendar days after such conviction.

(5) Notifying the NRCS in writing, within 10 calendar days after receiving notice under paragraph (4)(b) from an employee or otherwise receiving actual notice of such conviction. Employers of convicted employees must provide notice, including position title, to every grant officer or other designee on whose grant activity the convicted employee was working, unless the Federal agency has designated a central point for the receipt of such notices. Notice must include the identification numbers of each affected grant.

(6) Taking one of the following actions, within 30 calendar days of receiving notice under paragraph (4)(b), with respect to any employee who is so convicted—

(a) Taking appropriate personnel action against such an employee, up to and including termination, consistent with the requirements of the Rehabilitation Act of 1973, as amended; or

(b) Requiring such employee to participate satisfactorily in a drug abuse assistance or rehabilitation program approved for such purposes by a Federal, State, or local health, law enforcement, or other appropriate agency.

(7) Making a good faith effort to continue to maintain a drug-free workplace through implementation of paragraphs (1), (2), (3), (4), (5), and (6).

B. The sponsor may provide a list of the sites for the performance of work done in connection with a specific project or other agreement.

C. Agencies will keep the original of all disclosure reports in the official files of the agency.

15. Certification Regarding Lobbying (7 CFR Part 3018)

A. The sponsor certifies to the best of its knowledge and belief, that—

(1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the sponsor or any of the subrecipients or subcontractors, to any person for influencing or attempting to influence an officer or employee of an agency, Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

(2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned must complete and submit Standard Form LLL, “Disclosure Form to Report Lobbying,” in accordance with its instructions.

(3) The sponsor must require that the language of this certification be included in the award documents for all sub-awards at all tiers (including subcontracts, sub-grants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients must certify and disclose accordingly.

B. This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by 31 U.S.C. Section 1352. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

16. Certification Regarding Debarment, Suspension, and Other Responsibility Matters—Primary Covered Transactions (7 CFR Part 3017).

A. The sponsor certifies to the best of their knowledge and belief, that they and their principals and any subrecipients and subcontractors—

(1) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency;

(2) Have not within a 3-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State, or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;

(3) Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State, or local) with commission of any of the offenses enumerated in paragraph A(2) of this certification; and

(4) Have not within a 3-year period preceding this application/proposal had one or more public transactions (Federal, State, or local) terminated for cause or default.

B. Where the primary sponsor is unable to certify to any of the statements in this certification, such prospective participant must attach an explanation to this agreement.

17. Clean Air and Water Certification.

(Applicable if this agreement exceeds $100,000, or a facility to be used has been subject of a conviction under the Clean Air Act (42 U.S.C. Section 7413(c)) or the Federal Water Pollution Control Act (33 U.S.C. Section 1319(c)) and is listed by EPA, or is not otherwise exempt.)

A. The project sponsoring organization's signatory to this agreement certifies as follows:

(1) Any facility to be utilized in the performance of this proposed agreement is (____), is not (_X_) listed on the Environmental Protection Agency List of Violating Facilities.

(2) To promptly notify the NRCS-Assistant State Conservationist for Partnerships prior to the signing of this agreement by NRCS, of the receipt of any communication from the Director, Office of Federal Activities, U.S. Environmental Protection Agency, indicating that any facility which is proposed for use under this agreement is under consideration to be listed on the Environmental Protection Agency List of Violating Facilities.

(3) To include substantially this certification, including this subparagraph, in every nonexempt sub-agreement.

B. The project sponsoring organization's signatory to this agreement agrees as follows:

(1) To comply with and to require all subrecipients and subcontractors to comply with all the requirements of section 114 of the Clean Air Act as amended (42 U.S.C. Section 7414) and section 308 of the Federal Water Pollution Control Act (33 U.S.C. Section 1318), respectively, relating to inspection, monitoring, entry, reports, and information, as well as other requirements specified in section 114 and section 308 of the Air Act and the Water Act, issued there under before the signing of this agreement by NRCS.

(2) That no portion of the work required by this agreement will be performed in facilities listed on the EPA List of Violating Facilities on the date when this agreement was signed by NRCS unless and until the EPA eliminates the name of such facility or facilities from such listing.

(3) To use their best efforts to comply with clean air standards and clean water standards at the facilities in which the agreement is being performed.

(4) To insert the substance of the provisions of this clause in any nonexempt sub-agreement.

C. The terms used in this clause have the following meanings:

(1) The term "Air Act" means the Clean Air Act, as amended (42 U.S.C. Section 7401 et seq.).

(2) The term "Water Act" means Federal Water Pollution Control Act, as amended (33 U.S.C. Section 1251 et seq.).

(3) The term "clean air standards" means any enforceable rules, regulations, guidelines, standards, limitations, orders, controls, prohibitions, or other requirements which are contained in, issued under, or otherwise adopted pursuant to the Air Act or Executive Order 11738, an applicable implementation plan as described in section 110 of the Air Act (42 U.S.C. Section 7414) or an approved implementation procedure under section 112 of the Air Act (42 U.S.C. Section 7412).

(4) The term "clean water standards" means any enforceable limitation, control, condition, prohibition, standards, or other requirement which is promulgated pursuant to the Water Act or contained in a permit issued to a discharger by the Environmental Protection Agency or by a State under an approved program, as authorized by section 402 of the Water Act (33 U.S.C. Section 1342), or by a local government to assure compliance with pretreatment regulations as required by section 307 of the Water Act (33 U.S.C. Section 1317).

(5) The term "facility" means any building, plan, installation, structure, mine, vessel, or other floating craft, location or site of operations, owned, leased, or supervised by a sponsor, to be utilized in the performance of an agreement or sub-agreement. Where a location or site of operations contains or includes more than one building, plan, installation, or structure, the entire location will be deemed to be a facility except where the Director, Office of Federal Activities, Environmental Protection Agency, determines that independent facilities are collocated in one geographical area.

18. Assurances and Compliance.

As a condition of the grant or cooperative agreement, the sponsor assures and certifies that it is in compliance with and will comply in the course of the agreement with all applicable laws, regulations, Executive orders and other generally applicable requirements, including those set out below which are hereby incorporated in this agreement by reference, and such other statutory provisions as a specifically set forth herein and that it will require all subrecipients and subcontractors to comply.

State, Local, and Indian Tribal Governments: OMB Circular Nos. A-87, A-102, A-129, and A-133; and 7 CFR Parts 3015, 3016, 3017, 3018, 3021, and 3052.

Nonprofit Organizations, Hospitals, Institutions of Higher Learning: OMB Circular Nos. A-110, A-122, A-129, and A-133; and 7 CFR Parts 3015, 3017, 3018, 3019, 3021 and 3052.

19. Examination of Records.

The sponsor must give the NRCS or the Comptroller General, through any authorized representative, access to and the right to examine all records, books, papers, or documents related to this agreement, and retain all records related to this agreement including those documents that might be held or retained by any subrecipient or subcontractor for a period of three years after completion of the terms of this agreement in accordance with the applicable OMB Circular.

20. Signatures

Colorado River Water Conservation District
Sponsor

By Eric Kuhn

Title General Manager

201 Centennial, Suite 200
Glenwood Springs, CO 81601
Address Zip Code

Date December 12, 2017

The signing of this agreement was authorized by a motion of the Colorado River Water Conservation District governing body at a meeting held on __ December 8, 2017_____.

Dan Birch
Deputy General Manager

201 Centennial, Suite 200
Glenwood Springs, CO 81601
Address Zip Code

Date: December 12, 2017

Natural Resources Conservation Service
U.S. Department of Agriculture
Approved by:

Clint Evans
State Conservationist, NRCS
Denver, Colorado

Date: December 12, 2017

Table of Contents

WATERSHED AGREEMENT ..... **III**
SUMMARY (OMB FACT SHEET) ..... **XX**
INTRODUCTION ..... **XXVII**
CHAPTER 1 – PURPOSE AND NEED FOR ACTION **1-1**
1.1 PURPOSE OF THE PROJECT 1-1
1.2 NEED FOR THE PROJECT 1-1
1.3 PROBLEMS AND OPPORTUNITIES 1-2
1.3.1 Problems 1-2
1.3.2 Opportunities 1-3
CHAPTER 2 – SCOPE OF THE PLAN-EA **2-1**
2.1 AGENCY, TRIBAL, AND PUBLIC OUTREACH 2-1
2.1.1 Scoping Phase 2-1
2.1.2 Draft Plan-EA Public Review Phase 2-2
2.2 IDENTIFICATION OF RESOURCE CONCERNS 2-5
CHAPTER 3 – AFFECTED ENVIRONMENT **3-1**
3.1 SOILS AND GEOLOGY 3-1
3.1.1 North Fork 3-3
3.1.2 Crawford 3-5
3.1.3 Uncompahgre 3-6
3.1.4 Bostwick Park 3-7
3.2 WATER 3-8
3.2.1 North Fork 3-13
3.2.2 Crawford 3-17
3.2.3 Uncompahgre 3-20
3.2.4 Bostwick Park 3-25
3.3 AIR QUALITY 3-28
3.4 VEGETATION 3-28
3.4.1 Vegetation Communities and Habitat 3-28
3.4.2 Wetlands and Riparian Areas 3-34
3.4.3 Special Status Plant Species 3-39
3.4.4 Invasive Species 3-44
3.5 WILDLIFE 3-45
3.5.1 Terrestrial Wildlife 3-45
3.5.2 Terrestrial Special Status Wildlife Species 3-53
3.5.3 Fish and Amphibians 3-58
3.6 HUMAN ENVIRONMENT 3-63
3.6.1 Cultural and Historic Resources 3-63
3.6.2 Land Use and Recreation 3-69

3.6.3 Scenic Beauty and Visual Resources 3-71
3.6.4 Socioeconomics 3-74
CHAPTER 4 – ALTERNATIVES 4-1
4.1 ALTERNATIVES FORMULATION 4-1
4.2 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED STUDY 4-1
4.3 ALTERNATIVES CONSIDERED FOR DETAILED STUDY 4-2
4.3.1 Proposed Action 4-2
4.3.2 No Action 4-12
4.3.3 Comparison of Alternatives 4-12
CHAPTER 5 – ENVIRONMENTAL CONSEQUENCES 5-1
5.1 SOILS 5-1
5.1.1 Proposed Action 5-1
5.1.2 No Action 5-3
5.1.3 Cumulative Impacts 5-4
5.2 WATER 5-4
5.2.1 Proposed Action 5-4
5.2.2 No Action 5-14
5.2.3 Cumulative Impacts 5-14
5.3 AIR QUALITY 5-16
5.3.1 Proposed Action 5-16
5.3.2 No Action 5-17
5.3.3 Cumulative Impacts 5-17
5.4 VEGETATION 5-17
5.4.1 Vegetation Communities and Habitat 5-17
5.4.2 Wetlands and Riparian Areas 5-22
5.4.3 Special Status Species 5-26
5.4.4 Invasive Species 5-32
5.5 WILDLIFE 5-35
5.5.1 Terrestrial Wildlife Communities 5-35
5.5.2 Terrestrial Special Status Wildlife Species 5-44
5.5.3 Fish and Amphibians 5-56
5.6 HUMAN ENVIRONMENT 5-62
5.6.1 Cultural and Historic Resources 5-62
5.6.2 Land Use and Recreation 5-67
5.6.3 Scenic Beauty and Visual Resources 5-68
5.6.4 Socioeconomics 5-73
CHAPTER 6 – CONSULTATION, COORDINATION AND PUBLIC PARTICIPATION 6-1
6.1 PUBLIC PARTICIPATION 6-1
6.2 AGENCY COORDINATION 6-1
6.3 TRIBAL COORDINATION 6-2

CHAPTER 7 – THE PREFERRED ALTERNATIVE 7-1
7.1 SELECTION OF THE PREFERRED ALTERNATIVE 7-1
7.2 RATIONALE FOR THE PREFERRED ALTERNATIVE 7-1
7.3 MEASURES TO BE INSTALLED 7-2
7.3.1 Project Components 7-2
7.3.2 Avoidance, Minimization, and Mitigation Measures 7-3
7.4 ECONOMIC AND STRUCTURAL INFORMATION 7-7
CHAPTER 8 – REFERENCES 8-1
CHAPTER 9 – LIST OF PREPARERS 9-1
CHAPTER 10 – DISTRIBUTION LIST 10-1
CHAPTER 11 – ACRONYMS, ABBREVIATIONS, AND SHORT-FORMS 11-1
CHAPTER 12 – INDEX 12-1

Appendices

APPENDIX A Comments and Responses
APPENDIX B Project Maps
APPENDIX C Support Maps
APPENDIX D Investigation and Analysis
APPENDIX E Supporting Information for Biological Resources and Cultural Resources

Figures

Figure I-1. Location of Proposed Project. xxx

[Project Maps referenced in Chapter 4 are located in Appendix B, Project Maps; supporting figures referenced in Chapters 3 and 5 are located in Appendix C, Support Maps]

Photographs

Photograph I-1. Typical On-Farm Irrigation System. xxix
Photograph 1.5-1. Typical Unlined Irrigation Canal with Vegetation Supported by Seepage. 1-4
Photograph 1.5-2. Typical Irrigation Headgate Structure. 1-5
Photograph 4.3-1. Typical Off-Farm Unlined Irrigation Canal in Mancos Shale Geology. 4-4
Photograph 4.3-2. Example of Big Gun Sprinkler Irrigation System. 4-5
Photograph 4.3-3. SCADA Water Level Sensors Within and Above a Canal. 4-5
Photograph 4.3-4. SCADA Installed on a Headgate. 4-6
Photograph 4.3-5. Radio Tower for Use with Telemetry Stations. 4-11

Tables

Table I-1. Size of Subwatersheds (in Acres) by County. xxx
Table 2.2-1. Summary of Resource Concerns. 2-5
Table 3.1-1. Recognized Farmland Designations in the North Fork Subwatershed. 3-4
Table 3.1-2. Recognized Farmland Designations in the Crawford Subwatershed. 3-5
Table 3.1-3. Recognized Farmland Designations in the Uncompahgre Subwatershed. 3-6
Table 3.1-4. Recognized Farmland Designations in the Bostwick Park Subwatershed. 3-7
Table 3.2-1. Selenium Mobilization Potential by 12-Digit HUC. 3-11
Table 3.2-2. Salinity Mobilization Potential by 12-Digit HUC. 3-12
Table 3.2-3. Active Streamflow Gaging Stations Operating in the North Fork Gunnison River Watershed, January 2017. 3-15
Table 3.2-4. Summary of Water Rights in North Fork Subwatershed. 3-17
Table 3.2-5. Active Streamflow Gaging Stations in the Crawford Subwatershed, January 2017. 3-18
Table 3.2-6. Summary of Water Rights in Crawford Subwatershed. 3-20
Table 3.2-7. 12-Digit HUCs Included within the Uncompahgre Subwatershed. 3-21
Table 3.2-8. Active Streamflow Gaging Stations Operating in the Uncompahgre Subwatershed, January 2017. 3-23
Table 3.2-9. Summary of Water Rights in Uncompahgre Subwatershed. 3-25
Table 3.2-10. Active Streamflow Gaging Stations in the Bostwick Park Subwatershed, January 2017. 3-26
Table 3.2-11. Summary of Water Rights in Bostwick Park Subwatershed. 3-28
Table 3.4-1. Vegetation Communities Expressed by Total Project Area and by Subwatershed. 3-30
Table 3.4-2. Agency Riparian Definitions. 3-36
Table 3.4-3. Wetland and Aquatic Resource Types in the North Fork Subwatershed. 3-37

Table 3.4-4. Wetland and Aquatic Resource Types in the Crawford Subwatershed. 3-37
Table 3.4-5. Wetland and Aquatic Resource Types in the Uncompahgre Subwatershed. 3-38
Table 3.4-6. Wetland and Aquatic Resource Types in the Bostwick Park Subwatershed. 3-38
Table 3.4-7. ESA-Protected Plant Species Occurring (X) or Potentially Occurring (P) in the Subwatersheds. 3-39
Table 3.4-8. Presence (X) of BLM Sensitive Plant Species by Subwatershed. 3-40
Table 3.4-9. BLM Sensitive Plant Species Dismissed from Further Analysis. 3-41
Table 3.5-1. Elk and Mule Deer Ranges in the Project Area, Expressed as Percentages of each Subwatershed. 3-47
Table 3.5-2. Migratory Bird Species of Concern Occurring or Potentially Occurring in the Subwatersheds. 3-50
Table 3.5-3. ESA-Protected Wildlife Species Potentially Occurring in the Subwatersheds. 3-54
Table 3.5-4. BLM Sensitive Wildlife Species Potentially Occurring in the Subwatersheds. 3-55
Table 3.5-5. BLM Sensitive Wildlife Species Dismissed from Further Analysis. 3-56
Table 3.5-6. Federally Protected Fish Species in the Subwatersheds. 3-59
Table 3.5-7. Designated Critical Habitat for the Colorado River Endangered Fishes. 3-60
Table 3.5-8. BLM Sensitive Fish and Amphibian Species with Potential Range in the Subwatersheds. 3-61
Table 3.6-1. Cultural Resource Sites in the North Fork Subwatershed. 3-67
Table 3.6-2. Cultural Resource Sites in the Crawford Subwatershed. 3-67
Table 3.6-3. Cultural Resource Sites in Uncompahgre Subwatershed. 3-68
Table 3.6-4. Cultural Resource Sites in Bostwick Park Subwatershed. 3-69
Table 3.6-5. Percentage of Land Use Category by Subwatershed. 3-69
Table 3.6-6. Percentage of Land Ownership by Subwatershed. 3-70
Table 3.6-7. Distribution of Subwatersheds by County. 3-74
Table 3.6-8. Agricultural Statistics by County. 3-74
Table 3.6-9. Population Characteristics by County, State, and U.S. (2015 Census). 3-75
Table 3.6-10. Ethnicity by County, State, and U.S. (2015 Census). 3-76
Table 3.6-11. Race by County, State, and U.S. (2015 Census). 3-76
Table 3.6-12. Labor Force Characteristics (2015). 3-77
Table 3.6-13. Employment by Industry (2015). 3-77
Table 3.6-14. Income and Poverty Rates (2015). 3-78
Table 4.3-1. North Fork Project Components. 4-7
Table 4.3-2. Crawford Project Components. 4-8
Table 4.3-3. Uncompahgre Project Components. 4-9
Table 4.3-4. Bostwick Park Project Components. 4-9

Table 4.3-5. Summary and Comparison of Alternative Plans. 4-13

Table 5.2-1. Canal Seepage Rates Reported for the Uncompahgre Valley. 5-5

Table 5.2-2. Summary of Salt Reduction Results from East Side Uncompahgre Valley. 5-6

Table 5.2-3. Annual Salinity Loadings from the Subwatersheds, from Reclamation Salt Loading Overview. 5-6

Table 5.2-4. Estimated Water Budget for Hypothetical 200-Acre Irrigation Field, Converting from Flood Irrigation to Sprinkler Irrigation. 5-7

Table 5.2-5. Water Quality Impacts from Proposed Action in North Fork Subwatershed. 5-10

Table 5.2-6. Estimated Seepage Prevention Using Reported Uncompahgre Valley Seepage Rates. 5-11

Table 5.2.7. Estimated Seepage Prevention Using Fire Mountain Canal Seepage Rates. 5-11

Table 5.2-8. Water Quality Impacts from Proposed Action in Crawford Subwatershed. 5-12

Table 5.2-9. Water Quality Impacts from Proposed Action in Uncompahgre Subwatershed. 5-12

Table 5.2-10. Water Quality Impacts for the Bostwick Park Subwatershed. 5-13

Table 5.4-1. Summary of BMPs and Compliance Measures for Wetlands and Riparian Areas. 5-25

Table 5.4-2. Preliminary Effects Determinations for Federally Protected Plants in the Project Area. 5-27

Table 5.4-3. Anticipated Impacts to BLM Sensitive Plant Species in the Project Area. 5-29

Table 5.4-4. Preliminary Effects Determinations for Federally Protected and BLM-Sensitive Plants for Project-specific Components in the North Fork Subwatershed. 5-30

Table 5.4-5. Preliminary Effects Determinations for Federally Protected and BLM-Sensitive Plants for Project-specific Components in the Crawford Subwatershed. 5-30

Table 5.4-6. Preliminary Effects Determinations for Federally Protected and BLM-Sensitive Plants for Project-specific Components in the Uncompahgre Subwatershed. 5-31

Table 5.4-7. Preliminary Effects Determinations for Federally Protected and BLM-Sensitive Plants for Project-specific Components in the Bostwick Park Subwatershed. 5-31

Table 5.5-1. Terrestrial Wildlife Impacts Resulting from Subwatershed Improvements. 5-37

Table 5.5-2. Preliminary Effects Determinations for Federally Protected Terrestrial Wildlife Species and Critical Habitats. 5-46

Table 5.5-3. Anticipated Impacts to BLM Sensitive Terrestrial Wildlife Species. 5-48

Table 5.5-4. Preliminary Effects Determinations for Federally Protected Terrestrial Wildlife and Critical Habitats for Project-specific Components in the North Fork Subwatershed. 5-50

Table 5.5-5. Preliminary Effects Determinations for Federally Protected Terrestrial Wildlife and Critical Habitats for Project-specific Components in the Crawford Subwatershed. 5-51

Table 5.5-6. Preliminary Effects Determinations for Federally Protected Terrestrial Wildlife and Critical Habitats for Project-specific Components in the Uncompahgre Subwatershed. 5-52

Table 5.5-7. Preliminary Effects Determinations for BLM Sensitive Terrestrial Wildlife in the in the Uncompahgre Subwatershed. 5-53

Table 5.5-8. Preliminary Effects Determinations for Federally Protected Terrestrial Wildlife and Critical Habitats for Project-specific Components in the Bostwick Park Subwatershed. 5-54

Table 5.5-9. Preliminary Effects Determinations for Federally Protected Fish and Amphibians.....5-58

Table 5.5-10. BMPs and Compliance Measures for Fish and Amphibians. 5-61

Table 5.6-1. Previous Cultural Resource Data Intersecting Projects in the North Fork Subwatershed.....5-63

Table 5.6-2. Previously Recorded Cultural Resources Intersecting Projects in the North Fork Subwatershed.....5-63

Table 5.6-3. Newly Recorded Cultural Resources in the North Fork Subwatershed.....5-63

Table 5.6-4. Previous Cultural Resource Data Intersecting Projects in the Crawford Subwatershed.....5-64

Table 5.6-5. Newly Recorded Cultural Resources in the Crawford Subwatershed. 5-64

Table 5.6-6. Previous Cultural Resource Data Intersecting Projects in the Uncompahgre Subwatershed.....5-65

Table 5.6-7. Previously Recorded Cultural Resources Intersecting Projects in the Uncompahgre Subwatershed.....5-65

Table 5.6-8. Newly Recorded Cultural Resources in the Uncompahgre Subwatershed.....5-65

Table 5.6-9. Newly Recorded Cultural Resources in the Bostwick Park Subwatershed. 5-66

Table 5.6-10. Estimated Average Annual NED Costs of Proposed Action (FY 2017 Dollars, 2.875% Discount Factor).....5-74

Table 5.6-11. Estimated Average Annual NED Benefits of Proposed Action (FY 2017 Dollars, 2.875% Discount Factor).....5-76

Table 5.6-12. Comparison of NED Benefits and Costs (FY 2017 Dollars, 2.875% Discount Factor). 5-77

Table 7.3-1. Summary of Project Components.....7-2

Table 7.4-1. Summary and Comparison Table. 7-8

Table 7.4-2. Estimated Installed Cost (FY 2017 Dollars).....7-8

Table 7.4-3. Estimated Average Annual NED Costs (FY 2017 Dollars, 2.875% Discount Factor).....7-11

Table 7.4-4. Estimated Average Annual Watershed Protection Damage Reduction Benefits (FY 2017 Dollars, 2.875% Discount Factor).....7-11

Table 7.4-5. Comparison of NED Benefits and Costs (FY 2017 Dollars, 2.875% Discount Factor).....7-13

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Summary (OMB Fact Sheet)

Summary Watershed Plan – Environmental Assessment
for
Lower Gunnison Project
Delta, Gunnison, Montrose, and Ouray Counties, Colorado
Third Congressional District
Authorization: Watershed Protection and Flood Prevention Act of 1954, as authorized by Public Law 83-566 Stat. 666, as amended (16 U.SC. Section 1001 et seq.), and the Regional Conservation Partnership Program, as authorized by Subtitle I of Title XII of the Food Security Act of 1985, as amended by Section 2401 of the Agricultural Act of 2014
Sponsor: Colorado River Water Conservation District
Proposed Action: The Lower Gunnison Project is a large agricultural water efficiency project. The project will improve the watershed by coordinating, expanding, and integrating off-farm irrigation conveyance systems and efficiency improvements in a scalable way. The project will include construction of automated, monitored regulation structures, modernization of infrastructure, and implementation of on-farm irrigation system and soil practices.
Purpose and Need for Action: The purposes of the Lower Gunnison Project are to improve Agricultural Water Management by increasing overall irrigation efficiency, by converting existing flood irrigation systems to pressurized irrigation systems, and to improve Watershed Protection by reducing salinity and selenium concentrations in the Colorado River Basin. An overall goal of the Lower Gunnison Project is to improve water quality and comply with Colorado Water Quality Standards, the Colorado River Basin Salinity Control Act, and the Gunnison Basin Selenium Management Program, by reducing selenium and salt loading by piping irrigation laterals or canals and installing high efficiency irrigation systems to greatly reduce seepage and deep percolation into saline shale-derived soils (River District 2015). Through improved water use efficiency, the project meets several of the identified Critical Conservation Area (CCA) needs of the Colorado River Basin by addressing issues of insufficient water, water quality degradation, soil quality degradation, and inadequate habitat for fish and wildlife.
Purposes for which the project is planned: The project will address two of the eight purposes listed in Title 390, National Watershed Program Manual (NWPM), Part 500, Subpart A, Section 500.3. Agricultural Water Management (Purpose 5) will be addressed through modernization of infrastructure and construction of automated regulation structures to conserve and improve water quality. The project will also address Watershed Protection (Purpose 2) through various irrigation improvement measures that will conserve soil and fish and wildlife habitats.
Need for action: High salinity and selenium concentrations in the Colorado River Basin, including the Lower Gunnison River Basin, reduces the quality of water available to users. Demand for water is expected to increase, as the population in the Colorado River Basin increases. Both naturally occurring contaminants (salt and selenium) and contaminants from human activities such as agriculture and mining,

in addition to evaporation from reservoirs, contribute to higher levels of salinity. Increased salinity reduces crop yields and reduces the value of the rivers as habitat for wildlife and threatened and endangered species. Another problem in the Colorado River Basin is the inefficiency of flood irrigation systems. These systems use more water because water is lost to seepage and evaporation, and recovery tailwater is created.

The Proposed Action involves an integrated approach to increasing efficiency of agricultural water use. The project would take steps to reduce seepage and deep percolation of agricultural waters and to decrease associated salt and selenium loading and water loss. Additional project opportunities include better managed river diversions for farm use and increased agricultural production.

Preferred alternative/plan: The Proposed Action would convert existing flood irrigation practices to pressurized systems by replacing open canals with pipes. In addition, the project would include installation of Supervisory Control and Data Acquisition (SCADA) systems to improve control of water diversions and flows.

Project measures: The Proposed Action will:

- convert approximately 45,000 feet of open, earthen canals and ditches to enclosed pipe (pressurized where appropriate), and
- incorporate smart headgate diversion control structures and SCADA systems.

Resource Information:

Latitude and Longitude. Coordinates for each subwatershed in the project area are provided below:

	Latitude	Longitude
North Fork	38.828968	-107.7011
Crawford	38.727522	-107.641647
Bostwick Park	38.419792	-107.638755
Uncompahgre	38.583434	-107.964379

Eight-Digit Hydrologic Unit Numbers: 14020002, 14020004, 14020005, 14020006

Climate and topography: The watershed primarily lies within the Southern Rocky Mountain physiographic province. Elevations range from about 4,900 feet at Delta to about 6,590 feet near Crawford Reservoir.

The climate of the Colorado and Gunnison River Valleys include cold but calm winters, and generally moderately warm summers. Annual precipitation ranges from about 8 inches at Delta to more than 20 inches near Somerset. The watershed receives drainage from portions of the Grand Mesa, the West Elk Mountains and the northern San Juan Mountains; therefore, there is a dramatic increase in precipitation with altitude such that the semi-arid climate of the Lower Gunnison River changes rapidly to a continental temperate climate in upper elevations.

Watershed size (acres): The total watershed size is 317,780 acres within four distinct subwatersheds; of this total, 110,874 acres are irrigated.
Land uses (acres): The primary land uses across the four subwatersheds are comprised of: 156,929 acres classified as Agriculture; 14,087 acres classified as Residential/Other Development; 22,397 acres classified as Grasslands; and, 45,587 acres classified as Forested. Land use categories are described in **Section 3.6.2** of this Plan-EA.
Land ownership—Private (%), State-Local (%) Federal (%) Land ownership across the four subwatersheds are: Private 87.3% (277,333 acres) State-Local 1.2% (3,910 acres) Federal 11.5% (36,536 acres)
Population and demographics: Project components are proposed to occur within Delta, Gunnison, and Montrose Counties, Colorado. The populations of both Delta and Montrose Counties have experienced declines (4 percent and 1 percent) between 2010 and 2015 while Gunnison County grew by about 5 percent over the same period. The population of the state of Colorado has grown by 8 percent between 2010 and 2015 (USCB 2015). The counties in the project area contain a greater percent of persons identifying as non-Hispanic or Latino than the state average. In Montrose County the number of persons identifying as Hispanic or Latino exceeds the national level but is just below the state percentage. Unemployment is higher in Delta and Montrose Counties than the state average whereas Gunnison is below the Colorado unemployment rate. Incomes in all of the counties within the project subwatersheds, are below incomes for the state of Colorado. The percent of persons living below the poverty level in Gunnison County is comparable to but above the state number. Both Delta and Montrose County have higher levels of poverty than the state.
Resource concerns identified through scoping: Resource concerns discussed in scoping comments include salinity, selenium and climate change. All scoping comments that were received are summarized in **Section 2.1.2** of this Plan-EA.
Alternative plans considered: Two alternatives are analyzed in full as reasonable alternatives in this Plan-EA: the Proposed Action and No Action alternatives. A brief discussion of alternatives considered but dismissed is located in **Section 4.2** of this Plan-EA.
Components of each alternative: The Proposed Action would include the implementation of water efficiency upgrades, as described above. The No Action assumes that the project components described in **Tables 4.3-1** through **4.3-4** of this Plan-EA would not occur.
Mitigation measures: For the known project components, NRCS would not require habitat replacement for the loss of artificial wetland and riparian habitat wetlands created by irrigation infrastructure. Thus, the statutory funding for projects performed under this Plan-EA would not require habitat replacement. The long-term loss of artificial local wetland and riparian habitat resulting from canal and ditch conversions would be offset by gains in water quality and habitat function in the project area's natural riverine systems. Minor, adverse impacts to three historic canals. Acceptable treatment for the adverse effects has been determined and agreed upon by all consulting parties.

Project costs	PL 83-566 funds		Other funds		Total	
	$6,139,940	40%	$9,308,213	60%	$15,448,153	100%
Relocation: Not Applicable						
Real property rights: Not Applicable						
TOTAL COSTS: $15,448,153						
Project benefits: For the Lower Gunnison Project, the Proposed Action includes optimization techniques for irrigation water conveyance, piping of canals and laterals, and installation of SCADA systems, in conjunction with expanded implementation of soil health practices such as minimum till and cover crops. Conversion of the open canals to pipelines would reduce salinity and selenium concentrations carried by seepage water and reduce regular operations and maintenance for the canal operators. Additionally, implementation of SCADA systems would reduce travel time to sites for regular monitoring. Additional on-farm benefits exist but were not monetized.						
Number of direct beneficiaries (Onsite – Offsite): In the four subwatershed project area, it is estimated by the project sponsor that there may be up to approximately 15,000 individual agricultural producers. It is estimated that 10–20 percent may participate in the Lower Gunnison Project either directly or via their water providers (e.g., company, district or association) (River District 2015).						
Other beneficial effects in physical terms: Long-term, minor to major, beneficial impacts to agricultural water availability, water quality, soil quality, and fish and wildlife habitat would result from implementation of the Proposed Action.						
Benefit to Cost Ratio (authorized rate): 2.4						
Benefit to Cost Ratio (current rate): 2.4						
Net beneficial effects (NED): The Benefit Categories calculated for the Proposed Action are: Avoided Salinity Reduction: $719,755 Average Annual Cost Avoidance Benefit: $337,193 Average Annual Benefit to Producers: $125,335 Operations and Maintenance Savings – Piping: $37,713 Reduced Travel Costs - SCADA: $67,745 Total benefit, average annual: $1,287,742						
Period of analysis: 50 Years						
Project life: 50 Years						
Environmental effects, impacts: Approximately 21.4 total acres of soil would be disturbed during construction. Soil impacts would be minor, short-term and adverse impacts during construction activities. Moderate, long-term and beneficial impacts to soil resources from reduction of erosion and sedimentation issues associated with the current irrigation systems. Water impacts would be major, long-term, and beneficial. Implementation of the project components						

would result in an estimated 5,961 tons/yr of salinity reduction and 267.3 lb/yr of selenium reduction. This data is presented in tables 5.2-5 through 5.2-10. Approximately 21.4 total acres of vegetation would be cleared during construction of project-specific components. Construction impacts to vegetation and wildlife would be minor, adverse, and short-term . Moderate, beneficial, long-term impacts to wetlands, riparian and fish habitat would occur from improvements in water quality. Cultural resource impacts would be minor and adverse impacts, as a result of adverse impacts to three historic canals. Acceptable treatment for the adverse effects has been determined and agreed upon by all consulting parties. With implementation of compliance and best management practices, impacts to other environmental or social resources would be minor to negligible.
Major conclusions: Major, beneficial impacts to water quality by reduced selenium and salinity loading would be realized by the project as described immediately above.
Areas of controversy Controversial Issues: Not Applicable
Issues to be resolved: Not Applicable
Evidence of Unusual Congressional or Local Interest: There appears to be wide support for this initiative.
Is this report in compliance with executive orders, public laws, and other statues governing the formulation of water resource projects? Yes ✓ No___

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Introduction

Background

The U.S. Department of Agriculture, Natural Resources Conservation Service, Colorado (USDA-NRCS) and the Colorado River Water Conservation District (River District) are engaged in complementary and compatible activities related to providing financial and technical assistance to agricultural and forest producers through provisions of the Regional Conservation Partnership Program (RCPP). Partnership activities include efforts to encourage conservation of natural resources through technical and financial assistance which may be provided by both parties to the agreement.

RCPP is a voluntary conservation program that establishes specific parameters for working with eligible partner entities to provide financial and technical assistance to producers and landowners of eligible land. The assistance provided through this cooperative agreement enables producers and landowners to install and maintain conservation activities to address priority natural resource concerns. The Secretary of Agriculture has delegated the authority for administration of RCPP to the Chief of NRCS who is Vice President of the Commodity Credit Corporation. The River District has submitted a request for NRCS program assistance to address priority natural resource concerns in the Lower Gunnison Basin.

For the purpose of this RCPP project, the Lower Gunnison Basin subwatersheds are generally defined as the Gunnison River and several of its significant tributaries below Morrow Point Dam to the confluence of the Colorado River near Grand Junction and includes portions of Montrose, Delta, and Gunnison Counties. The River District is an eligible partner entity and meets statutory requirements of RCPP to carry out activities specified in this agreement and work with eligible program participants to help implement conservation activities on eligible lands as defined in this agreement.

NRCS is the lead federal agency for conservation on private land. In carrying out this role, NRCS provides voluntary conservation planning, technical and financial assistance to farmers, ranchers, and other landowners to address the natural resource concerns on the Nation's private and nonfederal land.

NRCS is able to deliver RCPP assistance to the Lower Gunnison Project through the authorities and rules of the following programs:

- Environmental Quality Incentives Program (EQIP);
- Regional Conservation Partnership Program (Section 2401 of Public Law [P.L.] 13-79);
- Watershed Protection and Flood Prevention Act (P.L. 83-566).

EQIP is a voluntary program that provides financial and technical assistance to agricultural producers to plan and implement conservation practices (NRCS 2017d). The authorities of the Watershed Protection and Flood Prevention Act are also eligible to be used for the Lower Gunnison Project, as it is located within the Colorado River Basin Critical Conservation Area (CCA). CCAs are designated by the Secretary of Agriculture and represent an opportunity for many stakeholders to come together at a regional level to address common natural resource goals while maintaining or improving agricultural productivity. NRCS's overall goal for the Colorado River Basin CCA is to improve water quality and

quantity in the Colorado River Basin by addressing water quality degradation, insufficient water, soil quality degradation, and inadequate habitat for fish and wildlife (NRCS 2017e).

This Watershed Plan and Environmental Assessment (Plan-EA) has been prepared by the NRCS to assess and disclose the potential impacts of the Lower Gunnison Project, which is intended to comprehensively improve water use efficiency by coordinating, expanding, and integrating off-farm irrigation conveyance systems and on-farm application efficiency improvements in a scalable way within the Lower Gunnison Basin. NRCS is the lead federal agency for this Plan-EA and is responsible for review and issuance of a decision in accordance with the National Environmental Policy Act (NEPA).

This Plan-EA has been prepared in accordance with applicable Council on Environmental Quality (CEQ) regulations implementing NEPA at 40 Code of Federal Regulations (CFR) 1500–1508, USDA's NEPA regulations (7 CFR Part 650), NRCS Title 190 General Manual Part 410, and the NRCS National Environmental Compliance Handbook Title 190 Part 610 (May 2016). The Plan-EA also meets the guidelines of the NRCS National Watershed Program Manual (NWPM) (NRCS 2015) and the NRCS National Watershed Program Handbook (NRCS 2014).

This Plan-EA serves to fulfill the NEPA and NRCS environmental review requirements of the Proposed Action, as described in **Section 4.3.1**. Should any project component of the Proposed Action deviate from its description in **Section 4.3.1**, a project component-specific Environmental Evaluation (EE) will need to be completed and documented on a NRCS CPA-52 worksheet. Any future NRCS RCPP funding obligated to the project sponsor for the Lower Gunnison Project will undergo its own independent NEPA review. However, that NEPA review may be tiered from this Watershed Plan.

The Bureau of Reclamation (Reclamation), the Bureau of Land Management (BLM) and the River District, as the Sponsoring Local Organization (SLO), are cooperating agencies on this Plan-EA. This Plan-EA also conforms with BLM and Reclamation planning considerations, including the Salinity Control Program, as administered by Reclamation and authorized by P.L. 98-569 and the Salinity Control Act, P.L. 93320 (Reclamation and USFWS 2007).

Project Overview

The Lower Gunnison Project is a large agricultural water efficiency project focused on the Gunnison River and its tributaries. The project addresses natural resource concerns by implementing a locally coordinated comprehensive strategy of maximizing agricultural water use efficiency through system-wide optimization techniques for irrigation water conveyance, including the construction of monitored, automated, re-regulation structures; modernization of aging irrigation water delivery infrastructure including the construction of enclosed canals and laterals and installation of Supervisory Control and Data Acquisition (SCADA) systems; and implementation of locally adapted, on-farm high efficiency irrigation systems (see **Photograph I-1**) in conjunction with expanded implementation of soil health practices (e.g., minimum till, cover crops, etc.).

Credit: River District

Photograph I-1. Typical On-Farm Irrigation System.

NRCS RCPP funding would be applied to water management upgrades that address water quality degradation, insufficient water, soil quality degradation, or inadequate habitat for fish and wildlife within four approved project subwatersheds. The participating water conservancy districts and the water user association in each of the four subwatersheds are (see **Figure I-1**):

1) Bostwick Park Water Conservancy District, southeast of Montrose
2) Crawford Water Conservancy District, near Crawford
3) North Fork Water Conservancy District, near Paonia and Hotchkiss
4) Uncompahgre Valley Water Users Association, located primarily between Montrose and Delta.

NRCS RCPP funding can be applied to water management upgrades throughout the four subwatersheds on either privately owned lands or BLM- or Reclamation-managed lands. The four subwatersheds were identified by the River District in collaboration with water users in the Gunnison River basin and meet the definition of a watershed as outlined in the NRCS's NWPM (NRCS 2015). To meet this definition, subwatersheds may be planned together if they are all a component of a larger watershed and do not exceed a combined total of 250,000 acres (NRCS 2015). The size of each of the four subwatersheds by county, and the amount of irrigated acreage in each of the four subwatersheds which make up the project area, are summarized below in **Table I-1.**

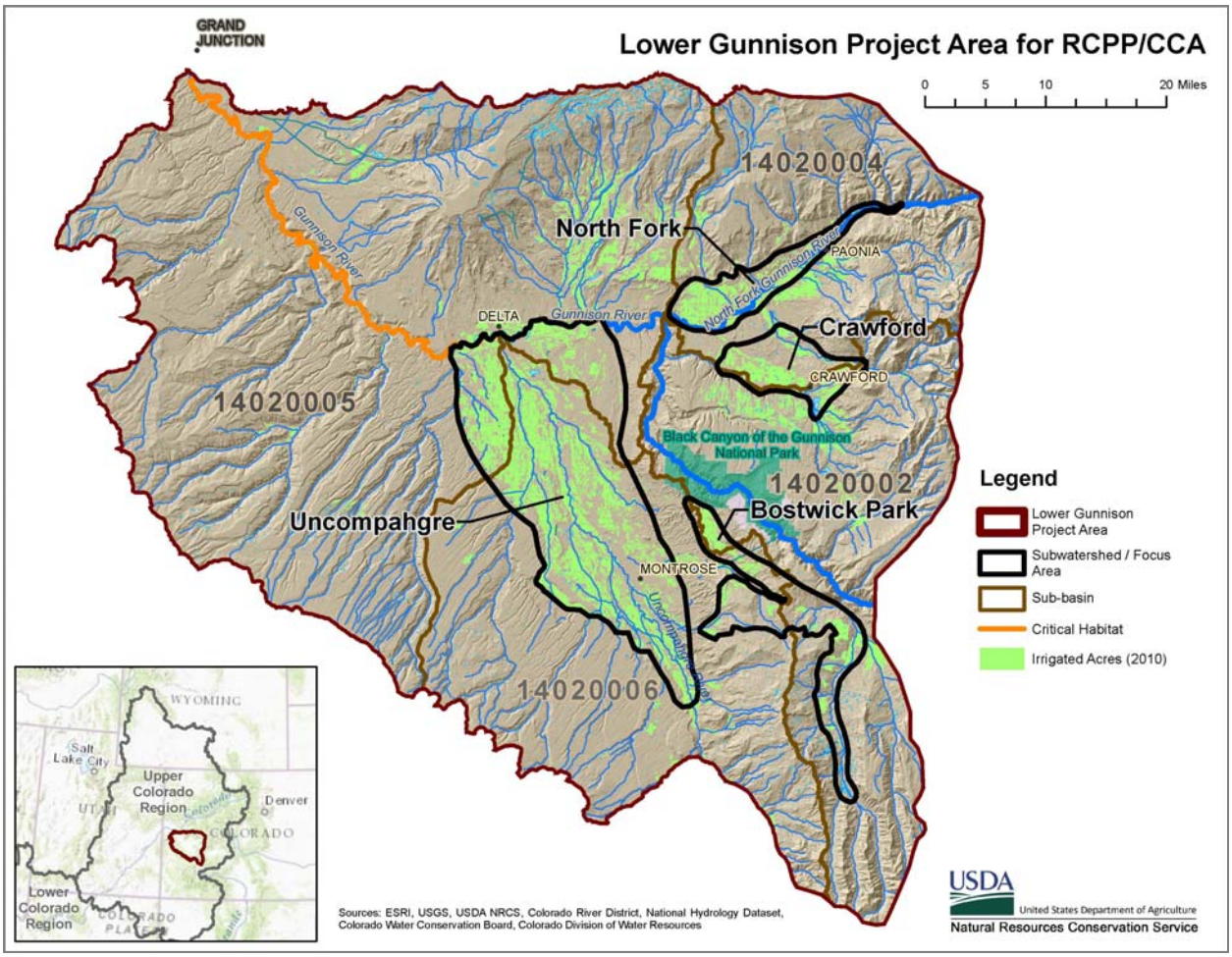

Figure I-1. Location of Proposed Project.

Table I-1. Size of Subwatersheds (in Acres) by County.

Subwatershed	Delta County	Gunnison County	Montrose County	Ouray County	Total Size of Sub-watershed	Total Amount of Irrigated Land in Subwatershed*
North Fork	30,443	310	—	—	30,753	12,220
Crawford	29,639	—	29	—	29,669	9,274
Uncompahgre	57,591	—	144,738	1,135	203,464	80,002
Bostwick Park	—	5,220	48,674	—	53,894	9,378
Total	***117,673***	***5,530***	***193,441***	***1,135***	***317,780***	***110,874***
*CDSS 2010						

The Lower Gunnison Project was cooperatively developed over a 9- to 12-month period using a project prioritization and selection process that included input meetings with over 30 interested partners. The project development process identified:

- Areas within the lower Gunnison Basin watershed where RCPP CCA natural resource concerns exist, including water quality degradation (e.g., selenium and salinity); wildlife habitat degradation; and soil health degradation;
- Willing and able partners that met the statutory definition of an eligible entity to receive P.L. 566 Watershed Authority funding;
- Highest priority irrigation improvement projects that addressed at least two or more of the CCA natural resources concerns;
- Highest priority delivery system projects that also enabled on-farm irrigation system efficiency improvements that also address natural resource concerns;
- Highest priority planning and implementation projects that increased the ability of partners to implement system improvements to address agricultural and natural resource improvements in the future; and
- Ability to leverage RCPP funds with other partner funding sources to expand the scope, size and benefits of proposed Lower Gunnison Project components.

Baseline water quality data in the Lower Gunnison Basin has been collected as part of the Lower Gunnison Basin Water Quality Monitoring Program the for over 30 years, due to concerns identified under the Clean Water Act (CWA) and Endangered Species Act (ESA). The Lower Gunnison Basin Water Quality Monitoring Program collects data at both short-term/reconnaissance and long-term trend monitoring sites throughout the basin. This includes tributary sites and those on the main stem of the Gunnison River, which serves as critical habitat to several federally endangered fish species. The long-term trend monitoring site for the Gunnison River is located at Whitewater, Colorado, upstream of where the Gunnison joins the Colorado River near Grand Junction. This site is also the compliance point for the Gunnison Basin Selenium Management Program, which is the conservation measure being implemented by Gunnison Basin water users and the U.S. Bureau of Reclamation (Reclamation) under the Aspinall Unit Re-Operations Record of Decision (ROD) for the benefit of aquatic endangered fish species. This site will serve as the single evaluation point for the Lower Gunnison Project as it integrates the beneficial impacts associated with the upstream project improvements.

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Chapter 1 – Purpose and Need for Action

1.1 Purpose of the Project

The goals of the Lower Gunnison Project are to comprehensively improve agricultural water use efficiency by converting existing flood irrigation systems to pressurized irrigation systems and to improve water quality by reducing salinity and selenium concentrations in the Colorado River Basin.

The project will address two of the eight purposes listed in Title 390, NWPM, Part 500, Subpart A, Section 500.3. Agricultural Water Management (Purpose 5) will be addressed through modernization of infrastructure and construction of automated regulation structures to conserve and improve water quality. The project will also address Watershed Protection (Purpose 2) through various irrigation improvement measures that will conserve soil and fish and wildlife habitats.

The project directly addresses multiple CCA resource concerns in the Colorado River Basin, including:

- Water Quality Degradation: Excessive salts (and selenium) in surface waters and ground waters;
- Insufficient Water: Inefficient use of irrigation water;
- Soil Quality Degradation: Concentration of salts and other chemicals; and
- Inadequate Habitat for Fish and Wildlife: Habitat degradation.

The project would help irrigators use water more efficiently and reduce the amount of salts and selenium carried in the Colorado River and its tributaries. The Lower Gunnison Project would boost water use efficiency through improvements in the way water is delivered to crops and by reducing the extent of flood irrigation in favor of more efficient irrigation practices such as sprinkler and other irrigation systems (River District 2015; Reclamation 2016).

An overall goal of the Lower Gunnison Project is to improve water quality and comply with Colorado Water Quality Standards, the Colorado River Basin Salinity Control Act, and the Gunnison Basin Selenium Management Program, by reducing selenium and salt loading by piping irrigation laterals or canals and installing high efficiency irrigation systems to eliminate seepage and deep percolation into saline shale-derived soils (River District 2015). Replacement of flood irrigation systems with closed pipe and sprinkler systems greatly reduces water loss to seepage and evaporation. Increased water use efficiency also helps growers be more productive and sustainable and enhances aquatic habitat by increasing flows and improving water quality. Improving soil health directly benefits/improves nutrient and water holding capacity of the soil, thereby improving efficiency and reducing deep percolation (River District 2015).

1.2 Need for the Project

The waters of the Lower Gunnison Basin flow into the Colorado River, which provides water to over 40 million people, delivers water to Mexico pursuant to a 1944 Treaty and irrigates over 5.5 million acres of land (Reclamation 2012). Demand for water is expected to increase, as the population in the Colorado River Basin increases. High selenium and salinity concentrations in the Colorado River Basin, including the Lower Gunnison River Basin, reduces the quality of water available to users. Both naturally occurring

contaminants (salt and selenium) and contaminants from human activities such as agriculture and mining, in addition to evaporation from reservoirs, contribute to higher levels of salinity. Increased salinity reduces crop yields and reduces the value of the rivers as habitat for wildlife and threatened and endangered species. Dissolved selenium concentrations in water from the Gunnison River near Grand Junction during 1975–2016 ranged from 1 to 25 µg/L (Mayo and Leib 2012). Dissolved solids concentrations in water from the Gunnison River near Grand Junction during 1965–2016 ranged from 179 to 2,750 mg/L, and dissolved solids loads ranged from 329 to 23,534 tons per day (tons/d). Another problem in the Colorado River Basin is the inefficiency of flood irrigation systems. These systems use more water because water is lost to seepage and evaporation, and recovery tailwater is created.

The Colorado River Basin Salinity Control Act of 1974 (P.L. 93-320) directed the Department of the Interior to establish salinity control programs to enhance and protect the quality of water in the Colorado River available for use in the United States and in Mexico. In 1995, amendments to the Act (P.L. 104-20) created the Basin Salinity Control Program, administered by Reclamation, and in 2008, P.L. 110-246 established the Basin States Program for salinity control activities. Under these regulations, the NRCS and Reclamation solicit new projects to reduce salt levels, evaluate applications for cost effectiveness, and award cost-share grants to landowners, water right holders, ditch companies and irrigation districts to construct salinity control projects.

Much of the selenium reduction accomplished in the Lower Gunnison River basin to date is a result of salinity control projects completed by programs such as the Colorado River Basin Salinity Control Program. Canal piping projects have been prioritized to a certain extent where irrigation occurs on soils derived from the Mancos Shale in the Uncompahgre subwatershed, and serve to address multiple purposes of water conservation, water quality, salinity, and selenium reduction. The River District has provided water resource planners with the ability to target areas with high potential for increasing irrigation system efficiencies, while at the same time reducing deep percolation associated with selenium and salinity mobilization (River District 2010). Subwatersheds have been prioritized by the River District by 12-digit hydrologic unit code (HUC-12) for high salinity and selenium potential in the Lower Gunnison River Basin (River District 2010).

The Proposed Action involves an integrated approach to increasing efficiency of agricultural water use. The project would take steps to reduce seepage and deep percolation of agricultural waters and to decrease associated salt and selenium loading and water loss by piping approximately 45,000 feet of open, earthen canals and ditches to enclosed pipe and incorporating smart headgate diversion control structures and SCADA systems. Implementation of the project components would result in an estimated 5,961 tons/yr of salinity reduction, 267.3 lb/yr of selenium reduction, and 2,188 acre-ft/yr of water seepage prevention. Additional project opportunities include better managed river diversions for farm use and increased agricultural production.

1.3 Problems and Opportunities

1.3.1 Problems

As described above, increasing salinity and selenium concentrations in the Colorado River Basin, including the Lower Gunnison River Basin, reduces the quality of water available to users. Demand for water is expected to increase, as the population in the Colorado River Basin increases. Both naturally

occurring contaminants (salt and selenium) and contaminants from human activities such as agriculture and mining, in addition to evaporation from reservoirs, contribute to higher levels of salinity. Increased salinity reduces crop yields and reduces the value of the rivers as habitat for wildlife and threatened and endangered species.

Another problem in the Colorado River Basin is the inefficiency of flood irrigation systems. These systems use more water because water is lost to seepage and evaporation, and irrigation tailwater is created. Reclamation's 2016 SECURE Water Act Report (Reclamation 2016) identifies the upcoming challenges that the Colorado River Basin could likely face. Average temperatures in the Colorado River Basin are projected to increase by 5 to 6 degrees Fahrenheit (°F) during the twenty-first century, with slightly greater increases projected in the upper Colorado Basin. Additional potential problems in the Colorado River Basin include:

- Spring and early summer runoff reductions could translate into less water supply for meeting irrigation demands and adversely impact hydropower operations at reservoirs.
- Warming could also lead to significant reservoir evaporation, increased agricultural water demands, and increased losses during water conveyance and irrigation.
- Growing demands in the Colorado River system, coupled with the potential for reduced supplies due to climate change, may put water users and resources relying on the Colorado River at risk of prolonged water shortages in the future.

1.3.2 Opportunities

The River District is proposing an integrated approach to increasing efficiency of agricultural water use as the Lower Gunnison Project. The project would take steps to reduce seepage and deep percolation of agricultural waters and to decrease associated salt and selenium loading and water loss. Additional project opportunities include better managed river diversions for farm use, increased agricultural production, and improved flows and riparian habitat improvements. In order to meet these opportunities, the Lower Gunnison Project proposes four types of improvements:

- Off-farm: conversion of open canals (see **Photograph 1.5-1**) to enclosed, piped systems;
- Near-farm: addition of storage ponds and controls to regulate water delivery together with conversion of open laterals to piped systems;
- On-farm: conversion of flood-based systems to sprinklers and drip irrigation systems, improvements to soil health practices;
- Addition of smart headgate diversion control structures (see **Photograph 1.5-2**) and SCADA systems to better integrate irrigation systems.

SCADA systems are computer systems that gather and analyze real time data. SCADA systems improve operation efficiency through remote monitoring and control and can minimize unnecessary over delivery or loss of water due to management spills, and create additional available water supplies to extend the growing season or to respond to other resource needs (River District 2015).

The Lower Gunnison Project would also assist agricultural producers in the area with complying with the Selenium Management Program, a conservation measure that is described in the Gunnison Basin Programmatic Biological Opinion (USFWS 2009) and as required as part of the re-operation of Reclamation's Aspinall Unit. The Aspinall Unit of the Colorado River Storage Project is a federally owned reservoir system that controls a significant portion of the water resources in the Lower Gunnison Basin.

Credit: River District

Photograph 1.5-1. Typical Unlined Irrigation Canal with Vegetation Supported by Seepage.

Credit: NRCS

Photograph 1.5-2. Typical Irrigation Headgate Structure.

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Chapter 2 – Scope of the Plan-EA

The scoping process followed the general procedures contained in the NRCS National Watershed Program Handbook (NRCS 2014) and the NRCS NWPM (NRCS 2015). Both NRCS procedures and NEPA regulations (40 CFR 1500–1508) require that the NRCS use a scoping process early in the planning process to identify issues, concerns, and potential impacts that require detailed analysis.

2.1 Agency, Tribal, and Public Outreach

2.1.1 Scoping Phase

Federal, state, and local agencies and representatives, as well as area non-governmental organizations (NGOs), received an invitation to the scoping phase of the Plan-EA. Advertisements announcing the scoping period and associated scoping meeting were also placed in five local and regional newspapers.

Tribal consultation was conducted in accordance with the National Historic Preservation Act (NHPA) of 1966 and Executive Order (EO) 13175, *Consultation and Coordination with Indian Tribal Governments*, to maintain the NRCS' government-to-government relationship between Native villages and tribes via a letter to two Indian tribes. NRCS sent a letter to the Ute Mountain Ute Tribe and the Southern Ute Indian Tribe, requesting input and notifying them of the scoping process. The Ute Mountain Ute tribe responded and requested that they be consulted during the planning phase of the Lower Gunnison Project.

The 30-day scoping period for this project began on November 18, 2016, and closed on December 19, 2016.

2.1.1.1 Scoping Meeting

The NRCS hosted a scoping meeting on Thursday, December 1, 2016, at the Chamber of Commerce at 1519 E Main St A, in Montrose, Colorado. The NRCS, Reclamation, and River District staff gave a presentation from 5:30 p.m. to 6:30 p.m. to describe the need for the project, the purpose and components of the project, the NRCS and Plan-EA process, how to get involved, and the project schedule. The River District provided four large maps of project components. The meeting was attended by 37 people, excluding contractor and project representative staff.

Discussions and questions following the presentation at the scoping meeting were related to these topics:

- The structure of the federal funding programs and interaction with other federal agencies (specifically including the BLM) on funding and on regulatory approvals and permits;
- The relationship of the proposed project to existing State of Colorado programs administered by the Colorado Water Conservation Board (CWCB) and other agencies;
- How far downstream project effects will be tracked and the relationship of the proposed project to other water supply and water quality management programs in the Colorado River basin both in Colorado and also downstream;
- How the study area is defined and how the four subwatersheds were selected;

- The types of on-farm irrigation systems that would be covered; and
- The relationship of the Lower Gunnison Project in context with projects and programs put forward by the Gunnison River Basin Roundtable as part of Colorado's Water Plan and the State's on-going water planning program including the Statewide Water Supply Initiative.

2.1.1.2 Scoping Comments

During the scoping phase, seven comments regarding the project were received. These comments were received from four individuals, one federal agency (BLM), one tribe (Ute Mountain Ute) and one state agency (Colorado Department of Public Health and Environment [CDPHE], Water Quality Control Division). Commenters generally supported the Lower Gunnison Project. Comments included these items:

- Investigating and highlighting areas of higher selenium loading risk in the planning areas and then prioritizing water use efficiency improvements in areas with high selenium loading risk;
- Considering the effects of climate change on the whole system. The plan needs to project changes in flows and timing of available water so the system is planned for tomorrow's conditions, not today's;
- Request for the Plan-EA's purpose and need statement to quantify the improvement in efficiency that would be achieved by the project;
- Avoiding any new irrigation on previously unirrigated land to the greatest extent possible. These areas tend to generate high selenium loading;
- Working with farmers to always apply irrigation water at evapotranspiration levels to minimize selenium and salt loading. Overall support for focusing on on-farm water application efficiency improvements;
- Request from Ute Mountain Ute Tribe to be informed of project details and to be consulted during the planning phase, and well before any ground-disturbing activities, on this and future projects located on Tribal Ancestral Lands;
- If the project would reduce or eliminate 'tail water' from reentering the river, concern about resulting salinity increase in the soil over time as a result of a decrease in potentially beneficial flushing and/or dilution that is associated with tail water runoff; and
- Request for similar projects and planning in downstream basins so that the project's positive effects in Lower Gunnison Basin are not negated by actions downstream.

2.1.2 Draft Plan-EA Public Review Phase

Following scoping, the Draft Plan-EA was prepared and made available to the public for review and comment. The Draft Plan-EA public review phase is the second formal step in engaging and soliciting public, agency, and tribal participation in the NEPA process. The Notice of Availability of the Draft Plan-EA and announcement of the associated public meeting was published in five local and regional

newspapers and disseminated via press release by NRCS. NRCS made the Draft Plan-EA available to the public on its website at: https://www.nrcs.usda.gov/wps/portal/nrcs/detail/co/programs/farmbill/rcpp/?cid=nrcseprd1326262 and provided hardcopies at two local libraries within the project area.

Federal, state, and local agencies and representatives, as well as area NGOs and all other contacts on the project mailing list, received a postcard announcing the availability of the Draft Plan-EA and an invitation to the associated public meeting. The 30-day review and comment period for the Draft Plan-EA extended from July 5, 2017 to August 7, 2017.

The Draft Plan-EA review period was used to gather input from interested parties on the alternatives and resources analyzed in the document. Comments received on the Draft Plan-EA were considered during development of the Final Plan-EA.

2.1.2.1 Draft Plan-EA Public Meeting

The public meeting on the Draft Plan-EA was held on Monday, July 17, 2017, from 4:30 p.m. to 7:00 pm. The public meeting was held at the Montrose County Fairgrounds, Friendship Hall Pioneer Room, 1001 North Second Street, in Montrose, Colorado. The NRCS, the River District, and HDR gave a presentation from 5:30 p.m to 6:30 p.m. to describe the project, discuss the alternatives and resources analyzed, provide a summary of the findings of the Draft Plan-EA, and to describe how to submit comments. The River District provided large maps of project components. The meeting was attended by 37 people, excluding contractor and project representative staff.

2.1.2.2 Comments on the Draft Plan-EA

Four comment letters on the Draft Plan-EA were received during the review period. These letters were received from one individual, one federal agency (two sets of comments were received from BLM staff in the same transmittal), and one NGO (Trout Unlimited). These letters contained information and input that was sorted into four topic categories that were considered in the Final Plan-EA. Comments received that directly informed the content of the Final Plan-EA included, but are not necessarily limited to, comments on special status species and impacts to big game during winter construction, coldwater fisheries, procedures for permits on BLM lands, and NRCS funding mechanisms for modernization of irrigation systems, as described below.

2.1.2.2.1 Special Status and Wildlife Species in Project Area

BLM provided additional information on the specific locations in the Uncompahgre subwatershed where bighorn sheep have the potential to occur. BLM clarified that the species of bighorn sheep is Rocky Mountain bighorn (not desert bighorn). These clarifications are reflected in Chapters 3 and 5 of the Final Plan-EA.

BLM expressed a concern that project activities also could have direct and indirect impacts on clay-loving wild buckwheat on previously disturbed ground in the Uncompahgre subwatershed, since the species has been documented growing on and near ditch cleaning spoil piles. BLM recommended that the Final Plan-EA describe a process to identify and mitigate impacts to this species, especially for future projects that may be tiered to this Plan-EA. USFWS current modeled range mapping for clay-loving wild buckwheat is shown on **Figure 3.4-10 in Appendix C**, and the Final Plan-EA adds the requirement to screen future

project components against the USFWS-modeled range. For projects falling within suitable habitat, including previously disturbed ditch banks, a technical consultation with USFWS (and BLM, if BLM lands are involved) would be triggered and the need for physical survey and mitigation measures would be determined at that time.

Construction of project-specific components during winter months could impact big game on severe winter range and winter concentration areas. BLM requested a stronger analysis of impacts to big game in severe winter range and winter concentration areas as mapped by Colorado Parks and Wildlife (CPW). BLM requested that the Final Plan-EA state that the project proponent would request project-long exceptions to the BLM's timing limitations in order to complete construction during winter months. Additional analysis was added to the Final Plan-EA for project-specific components falling within big game winter concentration areas and severe winter range. **Table 5.5-1** of this Final Plan-EA now includes the requirement for the project proponent to request a project-long exception to BLM's timing limitations when a project would occur during winter months in a big game winter concentration area or severe winter range on BLM lands.

2.1.2.2.2 Permitting of Facilities on BLM Lands

BLM commented that they would need to conduct additional site-specific NEPA in order to make decisions regarding any future ROW needs and that "any communication facility on Flat top would need to be first co-located within existing authorized communication facilities (sub-leased from existing lease holders). No BLM authorization is required for co-location. If co-location is not possible, then new communication site lease would be required for new facility and NEPA and cost recovery would be required." Additionally, BLM noted that activities on BLM managed public lands should be in compliance with the Federal Land Policy and Management Act of 1976 (FLPMA).

NRCS recognizes that the project proponent would have to comply with the FLPMA and pursue a new lease agreement and/or new ROW with BLM, if any proposed project component is located outside of existing leased area or permitted ROW on BLM managed lands. The FLPMA provides the BLM with discretionary authority to grant lease agreements and ROWs on lands they administer, taking into consideration impacts on natural and cultural resources. In granting leases or ROWs, the BLM must endeavor to "minimize damage to scenic and esthetic values and fish and wildlife habitat and otherwise protect the environment" through avoidance or mitigation (FLPMA Title V).

2.1.2.2.3 NRCS Funding Mechanisms

One individual noted that EQIP funding does not cover the electrical components needed to operate a pivot irrigation system. The EQIP Program is outside of the scope of this Plan-EA, but NRCS appreciates the comment on extending the contracts to cover the provision of electricity to modernized irrigation systems.

2.1.2.2.4 Coldwater Fisheries

A representative of Trout Unlimited commented that not the Project would "not only improve habitat for critical species on the Gunnison and Colorado Rivers but should also be used as a tool to improve habitat for local rivers and streams. The same tools that are applied to increase irrigation efficiency are also necessary for sustaining and restoring fisheries that play a vital role in the economy of the Lower Gunnison, and implementing innovative water conservation projects that can be used to address local and

regional water supply issues." Additional text was added to **Sections 3.5.3** and **5.5.3** clarifying the status of native fish species in the project area and potential beneficial impacts of the Proposed Action. The NRCS looks forward to continuing to work collaboratively with conservation organizations such as Trout Unlimited going forward.

2.2 Identification of Resource Concerns

Based on the input received during the scoping phase, several resource concerns were identified. **Table 2.2-1** provides a summary of resource concerns and their relevancy to the Proposed Action. Resource items determined to not be relevant have been eliminated from detailed study, and those resources determined to be relevant have been carried forward for analysis.

Table 2.2-1. Summary of Resource Concerns.

Resource	Relevant to the Proposed Action?		Justification
	Yes	No	
SOILS			
Soil and Geologic Characteristics	X		Geologic formations and soils in the subwatersheds support agricultural practices and contribute to elevated salinity and selenium concentrations within the subwatersheds.
Upland Erosion	X		Upland erosion of soils high in salt and selenium can contribute to increased water salinity.
Stream Bank Erosion	X		Stream bank erosion can contribute salt and selenium to river water.
Sedimentation	X		Sedimentation could increase temporarily during construction activities, and is discussed under the soils erosion section.
Prime and Unique Farmland	X		Prime and unique farmlands are present in the project area. Increased water use efficiency could have beneficial effects on these lands.
WATER			
Surface Water Quality	X		Construction activities could impact surface water quality due to erosion and sedimentation, while operation of the project could result in beneficial long-term effects by reducing salt and selenium loading in river water.
Hydrology	X		Reduced seepage and more efficient irrigation practices could affect hydrology.
Groundwater	X		Reduced seepage could affect groundwater quality.
Floodplain Management	X		Localized short-term adverse effects on floodplains could occur during construction activities.
Water Rights	X		Public concern regarding water rights and how they may be impacted by potential reductions in water use due to increases in water use efficiency.
Wild and Scenic Rivers		X	No wild or scenic rivers exist within or directly adjacent to the project subwatersheds.
Coastal Zone Management Areas		X	No coastal zones occur within or near the project subwatersheds.

Table 2.2-1. Summary of Resource Concerns.

Resource	Relevant to the Proposed Action?		Justification
	Yes	No	
AIR			
Air Quality	X		Implementation of the Lower Gunnison Project would include some air quality emissions from the proposed construction and maintenance activities.
VEGETATION			
Vegetation Communities and Habitat	X		Construction and operation of project components could impact vegetation communities and habitat.
Wetlands and Riparian Areas	X		Construction and operation of project components could impact wetlands and riparian areas.
Special Status Species	X		Includes discussion of potential impacts on Threatened and Endangered Species and BLM Sensitive Species.
Invasive Species	X		Existing seed and plant parts of noxious weeds and other invasive species could be spread during construction or could be carried into the project area on construction equipment and delivered to newly disturbed soils.
WILDLIFE			
Wildlife Communities	X		Construction and operation of project components could impact wildlife.
Fish	X		Construction and operation of project components could impact fish.
Coral Reefs		X	There are none present in or near the subwatersheds.
Essential Fish Habitat		X	No essential fish habitat is present in the subwatersheds.
Special Status Species	X		Construction and operation of project components could impact special status species, including potential impacts on Threatened and Endangered Species, migratory birds, bald and golden eagles, and BLM Sensitive Species.
HUMAN ENVIRONMENT			
Cultural and Historic Resources	X		Proposed construction activities could result in both direct and indirect impacts on archaeological and historic resources.
Environmental Justice		X	EO 12898, *Federal Actions To Address Environmental Justice in Minority Populations and Low-Income Populations*, requires all federal agencies to identify and address disproportionately high and adverse human health or environmental effects of their programs and policies on minorities and low-income populations and communities. Although the project area has elevated levels of both minority and low-income populations relative to the state of Colorado, neither the Proposed Action nor its alternative are anticipated to disproportionately impact these populations due to the minimal changes to the physical and human environment anticipated to result from project implementation.
Land Use	X		The project could have impacts to land use in the subwatersheds.
Typical Recreation	X		Some recreational activities could be impacted from construction of project components; recreation is assessed within the land use section.
Scenic Beauty and Visual Resources	X		Impacts to visual resources could occur from construction and operation of project components.

Table 2.2-1. Summary of Resource Concerns.

Resource	Relevant to the Proposed Action?		Justification
	Yes	No	
Public Health and Safety		X	During construction, all applicable federal and state safety regulations would be followed by construction workers. No effects on public health and safety are anticipated from any of the proposed construction activities.
Socioeconomics	X		The proposed project involves an expenditure of public funds and an evaluation of the effects of providing NRCS funding is included.
National Economic Development (NED)	X		This is required by the Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies (P&G). An assessment of adding NRCS funding to the proposed project was completed in order to maximize the potential net benefits that could accrue in the planning area.
OTHER CONCERNS (Identified by Cooperating Agencies or the Public)			
Geologic Risks/ Minerals		X	There are no unique geologic features, minerals, or oil and gas resources in the project area that would be impacted by the Proposed Action or its alternative. Likewise, there are no risks from geologic hazards, such as faulting or slope instability, that would affect the project.
Paleontology		X	The project would not impact any areas with a high potential for fossil yield, as indicated by BLM data.
Wilderness Areas and Characteristics		X	No designated wilderness, Wilderness Study Areas, or Areas of Critical Environmental Concern occur in or near the subwatersheds. Additionally, no areas with wilderness characteristics are found in or near the project subwatersheds.
Lands and Realty		X	No changes in land ownership or rights-of-way (ROWs) are associated with the project alternatives.
Range Management	X		A discussion of range management is included under the land use section.
Noise		X	Proposed construction activities could temporarily increase the ambient noise level in the surrounding areas; however, all applicable federal, state, and local ordinances and regulations would be followed. As a result, noise impacts would be considered negligible.
Transportation/Access		X	The project alternatives would not have lasting impacts to transportation or access in the project areas and would not impact any ROWs.
Wastes (Hazardous or Solid)		X	Construction activities associated with the Proposed Action would generate construction debris waste, which would require proper disposal. Recycling and/or reuse of all discarded materials would be encouraged whenever possible. Any non-hazardous construction debris or other solid waste that could not be reused or recycled is anticipated to be disposed of by a contractor at a landfill. If portable restrooms were brought on site for employee use during the construction period, they would be provided by a private contractor. Therefore, the impact of waste generated from the proposed project would be negligible and is not analyzed further in this Plan-EA.
Climate Change	X		Anticipated increases in temperature and changes in river flow and other resources will be evaluated with respect to the project and the no action alternative under the respective water and biological resources sections.

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Chapter 3 – Affected Environment

3.1 Soils and Geology

Regional Geological Characteristics

The geology of the region is a complex mix of sedimentary formations, primarily including the Mancos Shale, Mesaverde, and Wasatch formations, which were uplifted by the tectonic forces associated with the creation of the Rocky Mountain and then interrupted by igneous materials (NRCS 1967).

The primary geologic formations present in the Delta-Montrose area primarily include sedimentary rocks of Cretaceous age, such as the Burro Canyon, Dakota Sandstone, and Mancos Shale formations, and unconsolidated sediments of Quaternary age. The primary lower Gunnison Basin geological formation resulted when the region was inundated by a vast interior sea sometimes called the interior cretaceous seaway (USGS 2014).

The Uncompahgre uplift borders the southwest portion of the Uncompahgre River Valley; here, the uplift dips to the northeast forming an inclined plateau feature. The plateau surface is primarily formed by the Dakota Sandstone and contains the overlying Mancos Shale. The Mancos Shale is covered by surficial alluvial and eolian deposits of the Pleistocene age and the Holocene age, and its deposits consist of gravelly alluvium and colluvium on the terraces and alluvium on the floodplains of the higher ordered (i.e., larger) streams (NRCS 1967). The high, planar features of the Bostwick Park subwatershed were created by early Pleistocene gravel deposits associated with the ancestral Gunnison River system, predating the modern Uncompahgre River (CGS 2008).

Farmland Designations

The four subwatershed units encompassing the project area are well-known for their contributions to state agriculture. The climate of the Colorado and Gunnison River Valleys include cold but calm winters, which are favorable for growing grapes, apples, peaches, pears, and apricots (CCC 2017).

The primary soil units underlying the subwatersheds for the project area were identified with NRCS soil mapping (NRCS 2017a). The soils in the project area are a mixture of non-prime farmland, prime farmland, farmland of local importance, farmland of statewide importance, and farmland of unique importance (NRCS 2017a; NRCS 2017b).

Prime Farmland. According to the USDA, prime farmland is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops. Prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, an acceptable salt and sodium content, and few or no rocks. Within the prime farmland designation, soils can be further classified as:

- prime farmland if irrigated;
- prime farmland if irrigated and drained;
- prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season; and

- prime farmland if irrigated and the product of I (soil erodability) x C (climate factor) does not exceed 60.

Farmland of Unique Importance. Unique farmland is land other than prime farmland that is used for the production of specific high-value food and fiber crops such as citrus, tree nuts, olives, cranberries, fruits, and vegetables. With the combination of soil quality, growing season, moisture supply, temperature, humidity, air drainage, elevation, and aspect needed for the land to produce sustainable high yields of these crops under proper management.

Farmland of Statewide Importance. Land that does not meet the criteria for prime and unique farmland is considered to be "farmland of statewide importance." This land includes areas of soils that nearly meet the requirements for prime farmland, and when managed correctly, will produce economically high yields of crops.

Farmland of Local Importance. Land that is not identified as having national or statewide important is considered to be "farmland of local importance" for the production of food, feed, fiber, forage, and oilseed crops. This land designation is definable by the appropriate local agencies and may include tracts of land that have been designated for agriculture by local ordinance.

Salinity and Selenium

Salinity and selenium are naturally occurring and prevalent in the lower Gunnison River Basin, and are known to cause water quality impairments to streams and rivers downstream (Whittig et al. 1983; Selenium Management Program 2011). Salinity is generally defined as the concentration of dissolved mineral salts or dissolved solids in water.

Selenium is a naturally occurring trace nonmetal element, common in marine sedimentary rocks. Coal and organic-rich fine-grained sediments (e.g., claystone and shale) tend to have high selenium concentrations (Adriano 2001) and are also associated with volcanic input, such as bentonite claystones and shale containing volcanic ash (Kulp and Pratt 2004). The Mancos Shale formation contains high levels of selenium as a result of the unique conditions during the Cretaceous period and has been a large contributor to selenium loading of the Lower Gunnison waterways (Whittig et al. 1983; Selenium Management Program 2011).

Selenium is an essential micronutrient for organisms, but at high concentrations it can be toxic. It bioaccumulates in aquatic food chains, and can cause deformities and reproductive issues in birds and fish (Lemly 2002). Complexes of selenium, including selenium in an oxidized state as selenite or selenate, can be soluble when complexed as a salt, and thus readily transported as dissolved ions by groundwater and surface water in the aquatic environment (USGS 2014). Due to this mobility, selenium transport is accelerated by irrigation practices. As ground and surface waters move through selenium-rich soils, selenium oxidizes and can move through the watershed (Selenium Management Program 2011). Similarly, when selenium-rich waters are stored in lakes or reservoirs, evaporation can greatly concentrate the element to high levels (Batzer and Baldwin 2012; Leib et al. 2012).

Farmers and ranchers in the Lower Gunnison Basin, in particular including the Uncompahgre subwatershed area, have flood irrigated for over 100 years, which in this arid and saline environment has resulted in continual salt loading to the downstream Colorado River. The Gunnison River Basin annually

contributes approximately 1.1 million tons of salinity to the Colorado River (Leib 2008). Unlined irrigation canals and laterals allow some irrigation water to seep into the ground. These irrigation canals have been identified as potential sources of seepage, which can contribute to salinity loading (Reclamation 1982). Salinity and selenium concentrations can increase as water seeping through soils concentrates salts at the surface due to capillary action; subsequently, these salts can readily move to and through the aquatic ecosystem during flood irrigation and storm events (Moore 2011).

Erosion and Sedimentation

Soil erosion is a naturally occurring process that refers to the loss of topsoil by the forces of wind and water (NRCS 2017c). Soil compaction, low organic matter, loss of soil structure, poor internal drainage, salinization and soil acidity are soil degradation issues that can accelerate the soil erosion process (NRCS 2011).

While erosion is a natural process, anthropogenic activities can accelerate soil erosion rates 10 to 40 times (NRC 2010). Unsustainable agricultural practices including overstocking and overgrazing, deep plowing, lack of crop rotation, monocropping, pesticide and herbicide applications, and planting across contour instead of along it, are the greatest contributors to the global increase in erosion rates (NRC 2010). Studies on erosion suggest that increased precipitation and intensities associated with climate change will lead to greater rates of erosion (Goudie 2001).

Soil erosion is considered to be the leading cause of water pollution due to the effects of excess sedimentation. The sediments act as pollutants as well as being carriers for other pollutants such as excess nutrients, chemicals such as pesticides and herbicides, and heavy metals (Da Cunha 1991).

Streambank erosion can have a number of causes including geologic, climatic, vegetative, and hydraulic which may work independently or in an interrelated manner (USDA 2017). However, direct anthropogenic activities such as channelization, confinement, or realignment, and denuding of riparian vegetation are the major factors in streambank erosion (USDA 2017).

Water-induced soil erosion is a pervasive issue within irrigation ditches and canals and consequently, increases sediment loading into waterways. Sedimentation within irrigation canals and ditches may cause both issues with water quantity and quality. Capacity losses in irrigation conveyance systems can be substantial although a comprehensive study of capacity losses has not yet quantified these impacts (NRCS 1995).

3.1.1 North Fork

3.1.1.1 Soils and Geology

Geology of the subwatershed is dominated by Cretacious-, Tertiary-, and Quaternary-aged formations, with the upper subwatershed exhibiting prominent outcrops of the Mesaverde Group which is capped by Tertiary lava flows of the Grand Mesa (Schaffrath 2012). In the lower elevations, the geology is dominated by Mancos Shale capped with Quaternary-aged glacial and gravel deposits (many of the gravels containing lavas from the Grand Mesa) (USGS 2014).

Soil map units within the North Fork subwatershed are predominantly of Agua Fria-Sarton origin. These soils are deep and moderately deep, nearly level to steep, well-drained, gravelly loam and stony loam that is formed in outwash alluvium derived from igneous rock (NRCS 2017a).

The predominant soil map units in the North Fork subwatershed are categorized as Agua Fria stony loam, 3 to 12 percent slopes, Agua Fria clay loam, 1 to 6 percent slopes, and Agua Fria clay loam, 1 to 6 percent slopes. These soil types occur on mesas, terraces, and fan landforms. The parent material is cobbly, stony outwash alluvium derived from basalt and the soils are well-drained. Agua Fria stony loam, 3 to 12 percent slopes, soil has a Farmland of Unique Importance classification while Agua Fria clay loam, 1 to 6 percent slopes, soils is considered prime farmland if irrigated (NRCS 2017a).

3.1.1.2 Prime and Unique Farmland

Within the North Fork subwatershed, nearly 20,000 acres or 65 percent of the study area has soils which are classified by the NRCS as being prime or of statewide or unique importance. 7,338 acres or approximately 24 percent of soils are considered to be farmlands of unique importance and another 3,113 acres or 10 percent of the soils are considered farmland of statewide importance. Other prime farmland designations total an additional 31 percent if those soils are irrigated (NRCS 2017a) (**Table 3.1-1**).

Table 3.1-1. Recognized Farmland Designations in the North Fork Subwatershed.

NRCS Farmland Designation	Approximate Acreage within subwatershed	Approximate Portion of the subwatershed (percent)
Farmland of Unique Importance	7,338	24
Farmland of Statewide Importance	3,113	10
Prime Farmland if Irrigated	8,428	27
Prime Farmland if Irrigated and Drained	300	1
Prime Farmland if irrigated and either protected from flooding or not frequently flooded during the growing season	804	3
Total	**19,983**	**65**
Source: NRCS 2017a		

3.1.1.3 Salinity and Selenium

The North Fork subwatershed contributes approximately 8 percent of the selenium loading in the Gunnison River basin (Reclamation 2006). The underlying Dakota Sandstone, Burro Canyon Formation, and Mancos Shale largely influence the background selenium levels and salinity loads in the North Fork Gunnison River (Richards et al. 2014). Irrigation practices such as flooding can exacerbate the levels (Moore 2011).

3.1.1.4 Erosion and Sedimentation

Within the North Fork subwatershed, the sedimentary materials within the Wasatch Formation are geologically young and loosely consolidated, causing a high erodibility and producing naturally high sediment loads in the local waterways. Additionally, the alluvial terraces and floodplains, the predominant depositional landform in the basin, also contribute to the river's high sediment load (NFRIA 2000).

Sediment loading within the subwatershed is partly caused by the local topography, consisting of steep slopes and small landside events from side canyons. Diversion dams trap a significant amount of sediment which is then released during high-flow events (NFRIA 2000).

3.1.2 Crawford

3.1.2.1 Soils and Geology

Soil map units within the Crawford subwatershed are predominantly of Kech-Progresso origin. These soils are shallow and moderately deep, gently sloping to steep, well-drained loams that were formed in alluvium and residuum derived from sedimentary rock (NRCS 2017a).

Kech-Progresso loams, 3 to 15 percent slopes, occur on ridges and hill landforms and are formed from alluvium derived from sandstone and shale. Killpack silty clay loam soils, 3 to 12 percent slopes, occur on fan landforms from shale parent material. Both soil types have unweathered bedrock as shallow as 19 inches below ground surface and are well-drained (NRCS 2017a).

3.1.2.2 Prime and Unique Farmland

Within the Crawford subwatershed, 11,254 acres or approximately 39 percent of the study area has soils which are classified by the NRCS as being prime or of statewide or unique importance. 1,046 acres or approximately 4 percent of the soils are considered to be farmlands of unique importance and 6,504 acres or nearly 22 percent of the soils are considered farmland of statewide importance. Other prime farmland designations total an additional 13 percent if those soils are irrigated (NRCS 2017a) (**Table 3.1-2**).

Table 3.1-2. Recognized Farmland Designations in the Crawford Subwatershed.

NRCS Farmland Designation	Approximate Acreage within subwatershed	Approximate Portion of the subwatershed (percent)
Farmland of Unique Importance	1,046	4
Farmland of Statewide Importance	6,504	22
Prime Farmland if Irrigated	3,028	10
Prime Farmland if Irrigated and Drained	589	2
Prime Farmland if irrigated and either protected from flooding or not frequently flooded during the growing season	87	0.5
Total	**11,254**	**39**
Source: NRCS 2017a		

3.1.2.3 Salinity and Selenium

The Creeks within the Crawford subwatershed – Smith Fork, Cottonwood, Clear Fork, Muddy, Alkali, and Iron – drain across large Mancos Shale mud fans, most likely contributing to the high salinity and selenium loads downstream in the Gunnison River (WSE/WSCC 2016; Richards et al. 2014). Irrigation practices including flood and seepage issues can further increase these levels (Moore 2011).

3.1.2.4 Erosion and Sedimentation

Similar to the North Fork subwatershed, the Crawford subwatershed's sedimentary materials within the Wasatch Formation and overlying the Mancos Shale are loosely consolidated, highly erodible, and produce naturally high sediment loads in the local waterways (WSE/WSCC 2016).

3.1.3 Uncompahgre

3.1.3.1 Soils and Geology

The major soil units for the Uncompahgre subwatershed include Montrose-Delta complex, 0 to 2 percent slopes and Mesa clay loam, 0 to 2 percent slopes. Together, they comprise nearly 25 percent of the subunit area.

Montrose-Delta complex soils, 0 to 2 percent slopes, are silty clay loams formed from alluvium derived from calcareous shale. These well-drained soils occur on stream terraces. Mesa clay loam soils, 0 to 2 percent slopes, are predominantly clay loam soils that occur on stream terraces. These well-drained soils are formed from alluvium derived from sandstone. Both soil series are considered prime farmland, if irrigated (NRCS 2017a).

3.1.3.2 Prime and Unique Farmland

Within the Uncompahgre subwatershed, 120,332 acres or 60 percent of the study area has soils which are classified by the NRCS as being prime or of statewide or unique importance. 5,466 acres or approximately 3 percent of the soils are considered to be farmlands of unique importance and 14,707 acres or approximately 7 percent of the soils are considered farmland of statewide importance. Other prime farmland designations total nearly 50 percent if those soils are irrigated (NRCS 2017a) (**Table 3.1-3**).

Table 3.1-3. Recognized Farmland Designations in the Uncompahgre Subwatershed.

NRCS Farmland Designation	Approximate Acreage within subwatershed	Approximate Portion of the subwatershed (percent)
Farmland of Unique Importance	5,466	3
Farmland of Statewide Importance	14,707	7
Prime Farmland if Irrigated	95,117	47
Prime Farmland if Irrigated and Drained	245	< 1
Prime Farmland if Irrigated and either protected from flooding or not frequently flooded during the growing season	4,797	2
Total	**120,332**	**60**
Source: NRCS 2017a		

3.1.3.3 Salinity and Selenium

The Uncompahgre subwatershed contributes at least 40 percent of the selenium loading in the Gunnison River basin, a much larger portion than the other subwatersheds, although all flow over the Mancos Shale. This is mainly due to irrigation practices which contribute a vast majority (approximately 90 percent) of

the selenium load that is mobilized by groundwater (Reclamation 2006; UWP 2013). The west side of the Uncompahgre subwatershed is not as significant of a source of selenium, and the west side does not have the exposures of Mancos Shale compared to the east side.

3.1.3.4 Erosion and Sedimentation

While the Mancos Shale in the Uncompahgre subwatershed does provide a substantial amount of fine sediment, much of the subwatershed's soils are alluvial deposits which contain relatively course, unconsolidated materials (UWP 2013); both fine sediment and course materials can be transported in the local waterways.

3.1.4 Bostwick Park

3.1.4.1 Soils and Geology

The largest soil unit for the Bostwick Park subwatershed is Bigblue-Unnamed-Myersgulch, very stony complex soils, 3 to 30 percent slopes. The Bigblue component is a clay loam soil that occurs on complex landslide landforms and is formed from Cretaceous landslide deposits derived from calcareous shale. The soil is well-drained (NRCS 2017a).The Unnamed component is also from Cretaceous landslide deposits from calcareous shale, and is somewhat poorly drained. The Myersgulch component is very stony. It occurs on complex landslide deposits from igneous, metamorphic, and sedimentary parent material, and is well-drained (NRCS 2017a).

3.1.4.2 Prime and Unique Farmland

Within the Bostwick Park subwatershed, 4,389 acres or approximately 8 percent of the study area has soils which are classified by the NRCS as being prime or of statewide or unique importance. 2,598 acres or approximately 5 percent of the soils are considered to be farmlands of unique importance and 5 acres or less than 1 percent of the soils are considered farmland of statewide importance. Other prime farmland designations total an additional 3 percent if those soils are irrigated (NRCS 2017a) (**Table 3.1-4**).

Table 3.1-4. Recognized Farmland Designations in the Bostwick Park Subwatershed.

NRCS Farmland Designation	Approximate Acreage within subwatershed	Approximate Portion of the subwatershed (percent)
Farmland of Unique Importance	2,598	5
Farmland of Statewide Importance	5	<1
Prime Farmland if Irrigated	1,762	3
Prime Farmland if Irrigated and Drained	24	<1
Prime Farmland if Irrigated and either protected from flooding or not frequently flooded during the growing season	0	0
Total	**4,389**	**8**
Source: NRCS 2017a		

3.1.4.3 Salinity and Selenium

The Bostwick Park subwatershed contributes a relatively small selenium load to the overall watershed (Reclamation 2006). Underlain by the Mancos Shale soils and outcrops, the Bostwick Park subwatershed contributes salinity to the Lower Gunnison Basin via groundwater drainage and transport to both the Uncompahgre and Red Rock Canyon Creek drainages (Butler and Leib 2002).

3.1.4.4 Erosion and Sedimentation

Similar to the other subwatersheds, the Bostwick Park subwatershed's sedimentary materials within the Wasatch Formation and overlying the Mancos Shale are loosely consolidated, highly erodible, and produce naturally high sediment loads in the local waterways (CGS 2008).

Over half of the subwatershed is comprised of soils with high slopes (NRCS 2017a) which can increase the rate of sedimentation within the subwatershed.

3.2 Water

The Gunnison River is a major tributary to the Colorado River, with headwaters in the Rocky Mountains. It joins the Colorado River at Grand Junction, flowing onward through Utah, Arizona, California, and then on to Mexico and the Gulf of California. In the 1960s, concerns regarding high dissolved solids concentrations (salinity) in water of the Colorado River crossing into Mexico resulted in a 1973 amendment (Minute 242) to the 1944 Water Treaty between the United States and Mexico (DeMarsay 1991); this was followed by the Colorado River Basin Salinity Control Act of 1974 (P.L. 93-320) (Dregne 1975). The Salinity Control Act was promulgated to reduce salinity concentrations in the Colorado River Basin, as written in Title II, Sec. 202(2): *"The Secretary is authorized to construct, operate, and maintain measures and all necessary appurtenant and associated works to reduce the seepage of irrigation water from irrigated lands … into the groundwater and thence into the Colorado River. Measures shall include lining of canals and laterals, and the combining of existing canals and laterals into fewer and more efficient facilities."* Numerous canal piping projects have been undertaken to reduce salinity in the Colorado River Basin (Reclamation 2017a).

Hydrology and Water Quality

Water draining from irrigation projects in the Upper Colorado River Basin, particularly irrigation projects on Cretaceous-age shale, have been shown to contribute high salinity (dissolved solids) and selenium concentrations to the river system (Seiler et al. 2003; Engberg 1996; Naftz 1996; Butler 1996; Butler et al. 1996). These and other studies resulted in a nationwide effort by the National Irrigation Water Quality Program (NIWQP) to determine sources of selenium in federal irrigation projects (Seiler et al. 2003; Engberg 1999). With information linking selenium to irrigation on Cretaceous shales such as the Mancos Shale, NIWQP was tasked with determining how to remediate selenium in the Upper Colorado River Basin (Reclamation 2017b). Through data collection and collaboration, it was realized that salinity control projects serve the purposes of conserving water, controlling salinity, and also controlling selenium in irrigation drainage in the Upper Colorado River Basin (Mayo and Leib 2012). Trends of decreasing salinity and selenium concentrations and loads in the Gunnison and Colorado Rivers have been documented by the U.S. Geological Survey (USGS; Butler 1996; Butler and Leib 2002; Mayo and Leib 2012; Schaffrath 2012). The decreasing trends are likely related to investment in agricultural efficiency projects that decrease deep percolation, contributing to reductions in salt and selenium loads (Leib and

Bauch 2008; Mayo and Leib 2012). Urban development and recreation (for example, golf courses) also contribute selenium and salinity to the watershed; therefore, the gains achieved in reducing agricultural loads may be offset by increased selenium and salinity loads due to urbanization (Moore 2011).

Where irrigation occurs on the Mancos Shale, distribution of dissolved selenium in groundwater of the North Fork is affected by the aqueous geochemical environment of the shallow groundwater systems that are composed of alluvium and shale residuum. The highest selenium concentrations can occur in wells completed in alluvium overlying Mancos Shale, and the lowest concentrations can be in terrace deposits receiving irrigation recharge (Wright and Butler 1993). Groundwater in shale residuum can have low or high selenium concentrations, depending on the oxidation-reduction conditions and the presence of dissolved nitrate (Wright 1999).

Selenium concentrations increase as water is concentrated by evaporation but may decrease if freshwater is available to dilute contaminants (Engberg 1996; Seiler et al. 2003). The evaporation index (EI) is an indicator of aridity which is calculated by dividing the annual free-water-surface evaporation (FWSE) by the annual precipitation. An EI value greater than 2.5 indicates arid to semi-arid climatic conditions. The NIWQP established guidelines for where Cretaceous shales occur in the western United States and where EI values are greater than 2.5, and selenium concentrations might be of concern in irrigation water (Seiler et al. 2003). NIWQP identified the Lower Gunnison River basin as an area with high susceptibility for selenium contamination and an EI greater than 2.5. For example, in the Lower Gunnison Project area, by superimposing contours of annual precipitation and evaporation (**Appendix C, Figure 3.2-1**), the annual evaporation for the lower Uncompahgre subwatershed near Delta is 50 inches, and the annual precipitation is 8 inches, for an EI value of 6.25. However, in the upper Crawford and North Fork watersheds, due to higher altitudes and orographic effects of the nearby mountains, the EI values are less than or equal to 2.5; therefore, according to the NIWQP guideline, these areas would not be of concern for selenium contamination in irrigation water. On the other hand, the Selenium Management Program (USGS 2014) was designed to reduce selenium concentrations throughout the lower Gunnison River Basin, and to address three primary objectives: (1) achieve compliance with the State of Colorado aquatic-life standard for dissolved selenium of 4.6 micrograms per liter (µg/L) in the Gunnison River at Whitewater, Colorado; (2) reduce selenium concentrations to improve water-quality conditions to assist in the recovery of endangered species in the Gunnison and Colorado Rivers (primarily Colorado pikeminnow and razorback sucker in critical habitat from Delta to Whitewater, Colorado; and (3) support continued water uses in the basin (USGS 2014).

A study was conducted by the USGS in Montrose Arroyo (within the Uncompahgre subwatershed) to determine the effects of canal lining and piping on selenium and salinity reductions (Butler 2001). For piping and lining of 8.5 miles of canals and laterals, selenium loads were reduced by 194 pounds per year, and salinity loads were reduced by 1,980 tons per year (Butler 2001). The geology of the Montrose Arroyo is different than other parts of the Uncompahgre subwatershed; therefore, it is difficult to transfer these results to other subwatershed focus areas. The Butler (2001) report does, however, confirm that piping and replacement of earthen-lined canals can have direct and immediate water-quality benefits.

Colorado water quality standards have been established by the CDPHE Water Quality Control Commission (CDPHE 2016a). As noted above, the chronic (long-term exposure) selenium standard for aquatic life is 4.6 µg/L, while the acute (short-term exposure) standard for dissolved selenium is 18.4

µg/L (CDPHE 2016a). While there are no enforceable U.S. standards for salinity or dissolved solids, the U.S. Environmental Protection Agency (USEPA) secondary drinking water standard for total dissolved solids (TDS) is 500 milligrams per liter (mg/L; USEPA 2017a), and the recommended agricultural standard to prevent high salinity hazard is an electrical conductivity (EC) of 1,000 microSiemens per centimeter (µS/cm) (U.S. Salinity Laboratory 1954). In addition, the Salinity Control Act and Plan of Implementation specifies that salinity must not exceed 879 mg/L at Imperial Dam (Pillsbury 1981).

The overall water quality conditions and watershed health of the Lower Gunnison River Basin can be measured at the USGS streamflow gaging station on the Gunnison River near Grand Junction (site number 09152500). Dissolved selenium concentrations in water from the Gunnison River near Grand Junction during 1975–2016 ranged from 1 to 25 µg/L (Mayo and Leib 2012). Elevated selenium concentrations contribute to degraded water-quality conditions for endangered fish species in the Colorado River basin (Seiler et al. 2003; USFWS 2009). Dissolved solids concentrations in water from the Gunnison River near Grand Junction during 1965–2016 ranged from 179 to 2,750 mg/L, and dissolved solids loads ranged from 329 to 23,534 tons per day (tons/d).

Much of the selenium reduction accomplished in the Lower Gunnison River basin is a result of salinity control projects completed by programs such as the Colorado River Basin Salinity Control Program. Canal piping projects have been prioritized to a certain extent where irrigation occurs on soils derived from the Mancos Shale in the Uncompahgre subwatershed (**Appendix C, Figure 3.2-2**), and serve to address multiple purposes of water conservation, water quality, salinity, and selenium reduction. The River District has provided water resource planners with the ability to target areas with high potential for increasing irrigation system efficiencies, while at the same time reducing deep percolation associated with selenium and salinity mobilization (River District 2010). Subwatersheds have been prioritized by the River District by 12-digit hydrologic unit code (HUC-12) for high salinity and selenium potential in the Lower Gunnison River Basin (River District 2010). These high-priority selenium and salinity HUC-12 subwatersheds are shown in **Figures 3.2-3** and **3.2-4 in Appendix C**, and the ranked high-priority subwatersheds are listed in **Tables 3.2-1** and **3.2-2**.

Table 3.2-1. Selenium Mobilization Potential by 12-Digit HUC.

Selenium Rank	HUC-12	HUC Name
1	140200060604	East Mesa
2	140200060606	Outlet Uncompahgre River
3	140200050113	*No Name*
4	140200060605	Loutsenhizer Arroyo
5	140200050501	Petrie Mesa-Gunnison River
6	140200060405	Montrose Arroyo
7	140200050114	Dry Gulch-Gunnison River
8	140200060303	Beaton Creek- Uncompahgre River
9	140200060403	Happy Canyon Creek
10	140200060402	Dry Cedar Creek
11	140200060407	City of Montrose-Uncompahgre River
12	140200040503	Reynolds Creek-North Fork Gunnison River
13	140200050105	Fruit Growers Reservoir-Gunnison River
14	140200021203	Iron Creek
15	140200060302	Onion Creek-Uncompahgre River
16	140200060401	Horsefly Creek
17	140200021202	Muddy Creek
18	140200060406	Outlet Cedar Creek
19	140200050104	Peach Valley
20	140200040504	Cottonwood Creek
21	140200060603	Lower Spring Creek
22	140200050205	Lower Roubideau Creek
23	140200021204	Crawford Reservoir
Source: River District 2010		

Table 3.2-2. Salinity Mobilization Potential by 12-Digit HUC.

Salinity Rank	HUC-12	HUC Name
1	140200050113	No Name *(Sunflower Drain USGS site)*
2	140200060605	Loutsenhizer Arroyo
3	140200060606	Outlet Uncompahgre River
4	140200050104	Peach Valley
5	140200050501	Petrie Mesa-Gunnison River
6	140200060405	Montrose Arroyo
7	140200060604	East Mesa
8	140200060402	Dry Cedar Creek
9	140200050114	Dry Gulch-Gunnison River
10	140200060403	Happy Canyon Creek
11	140200060406	Outlet Cedar Creek
12	140200050505	Wells Gulch-Gunnison River
13	140200060603	Lower Spring Creek
14	140200021203	Iron Creek
15	140200040407	Miller Creek
16	140200021204	Crawford Reservoir
17	140200050102	Outlet Currant Creek
18	140200040503	Reynolds Creek - NFG
19	140200040504	Cottonwood Creek
20	140200050103	Lawhead Gulch
21	140200050205	Lower Roubideau
22	140200060407	City of Montrose - Unc R
23	140200021205	Middle Smith Fork
Source: River District 2010		

Implementation of measures to improve endangered species habitat and water quality, according to the U.S. Fish and Wildlife Service (USFWS) Programmatic Biological Opinion (USFWS 2009), are required to be evaluated at multiple points throughout the Gunnison River watershed, including the Gunnison River at Delta, Colorado (USGS 09144250), and at the outlet for the watershed of the Gunnison River near Grand Junction, Colorado (USGS 09152500). After its confluence with the Colorado River at Grand Junction, the river flows into Utah where the selenium water-quality standard is 4.6 µg/L, and the proposed Total Maximum Daily Load (TMDL) goal is 49 pounds per day (lb/d) (Utah DEQ 2014).

The Gunnison River at Delta streamflow gaging station is located upstream from the confluence with the Uncompahgre River, and, therefore, represents a measure of watershed activities between the Gunnison Gorge and Delta. The Uncompahgre River at Delta streamflow gaging station (USGS 09149500) represents a measure of watershed activities in the Uncompahgre River basin, and is described in **Section 3.2.3.1** of this Plan-EA. **Figure 3.2-5 in Appendix E** illustrates data obtained for the Gunnison River at Delta, including daily average streamflow discharges and the concentrations and loads of selenium and dissolved solids. **Figure 3.2-6 in Appendix E** presents these datasets for the Gunnison River near Grand

Junction. As shown in the figures, daily average streamflow discharges for the Gunnison River at Delta between 1976 and 2016 ranged from 268 to 13,520 cubic feet per second (ft^3/sec). Daily average streamflow discharge for the Gunnison River near Grand Junction during 1935–2016 ranged from 80 to 22,500 ft^3/sec. Dissolved selenium concentrations in water from the Gunnison River at Delta between 1987 and 2016 ranged from 0.5 to 13 µg/L, while dissolved selenium loads (concentration multiplied by discharge and a 0.0053978 conversion factor) ranged from 5.8 to 119 lb/d. In comparison, dissolved selenium concentrations in water from the Gunnison River near Grand Junction between 1975 and 2016 ranged from 1 to 25 µg/L, and dissolved selenium loads ranged from 15 to 187 lb/d. Concentrations of dissolved solids in water from the Gunnison River at Delta between 1976 and 2016 ranged from 49 to 1,507 mg/L, and dissolved solids loads ranged from 56 to 1,635 tons/d. In comparison, dissolved solids concentrations in water from the Gunnison River near Grand Junction between 1965 and 2016 ranged from 179 to 2,750 mg/L, and dissolved solids loads ranged from 329 to 23,534 tons/d. While these minimum and maximum values indicate differences between the two sites, and that salinity and selenium loads enter the river from tributaries between Delta and Grand Junction, about 93 percent of the salinity and selenium enter the Lower Gunnison River from upper basin areas, including the Uncompahgre subwatershed (CDPHE 2011).

Floodplains

Flood hazard areas are categorized by the Federal Emergency Management Agency (FEMA) and identified on Flood Insurance Rate Maps. Special flood hazard areas are defined as areas that have a one percent or greater chance of being inundated by a flood event in any given year. The one-percent annual chance flood is also referred to as the base flood or 100-year flood (FEMA 2017).

Water Rights

According to Colorado water law, a water user has the right to use the waters of the state, and the rights are based on the prior appropriation system where *"first in time, first in right"* is the deciding factor for a water right (WaterInfo.org 2017). Agricultural irrigation accounts for 92 percent of all water diverted in Colorado and 95 percent of all water actually consumed (Browning and Bushong 1992). Agricultural water rights are legally assigned a point of diversion, a flow rate or water quantity, and a ranking of priority from the most senior rights (earliest date) to the more recent or junior rights. Many irrigation diversions (for example, a headgate on a stream) can be assigned to an individual or private user; however, many of the water rights and irrigation diversions are assigned to special irrigation districts, and many of the irrigation districts include federally constructed irrigation systems.

In 1973, the Colorado legislature recognized the need to "correlate the activities of mankind with some reasonable preservation of the natural environment" and passed Senate Bill 97 creating the State's Instream Flow Program. This program, one of the first of its kind, vested the CWCB with exclusive authority to create and enforce minimum flow rates for the purposes of protecting the environment to a reasonable degree, protecting streamflow through a reach of stream rather than at just a single point, and protecting water levels in natural lakes (CWCB 2017).

3.2.1 North Fork

The North Fork of the Gunnison River subwatershed (HUC 14020004) flows through both Gunnison and Delta Counties, Colorado. The North Fork begins at the confluence of Anthracite and Muddy Creeks

downstream from Paonia Reservoir, and flows 33 miles through the towns of Paonia and Hotchkiss, confined by a valley of multiple river terraces that run parallel to the river (NFRIA 2010). The valley is flanked by the Grand Mesa on the north and west, and by the West Elk Wilderness area on the east and south. The North Fork watershed drains approximately 969 square miles, and has 33,000 irrigated acres (Reclamation 2017d). Authorized in 1956 as part of the Colorado River Storage Project (completed in 1962), Paonia Reservoir was constructed by Reclamation. The operation and maintenance of the Paonia Project was assumed by the North Fork Water Conservancy District in June, 1962, although it was soon thereafter transferred by contract to the Fire Mountain Canal and Reservoir Company (Reclamation 2017e).

3.2.1.1 Hydrology and Water Quality

The North Fork is located on the margin of the Colorado Plateau and Southern Rocky Mountain physiographic provinces (Fenneman 1931). Elevations range from 5,100 feet at the outlet of the subwatershed near Lazear to about 6,120 feet near Somerset, Colorado. Annual precipitation ranges from about 9 inches near Lazear to more than 20 inches near Somerset. The North Fork drains the southern flank of the Grand Mesa, which rises to over 10,800 feet; therefore, there is a dramatic increase in precipitation with altitude such that the semi-arid climate of the Lower Gunnison River changes rapidly to a continental temperate climate in the upper North Fork with average snowfall amounts of 44 inches at Somerset (WeatherDB.com 2017a).

Water-quality samples have been collected by numerous agencies and entities, including the USEPA (USEPA 2017b), the CDPHE (CDPHE 2017a), and the USGS (USGS 2017b). The lower reaches of the North Fork Gunnison River are affected by irrigation drainage from soils derived from the Mancos Shale, which contributes selenium and dissolved solids concentrations to the system (NFRIA 2010). The NIWQP studies correlated decreasing selenium concentrations in irrigation drainage with altitude and precipitation (Seiler et al. 2003; Engberg 1996). While selenium concentration in water from Cottonwood Creek ranges from 4 to 13 µg/L, the selenium concentrations from the North Fork Funnison River near Lazearrarely exceed the dissolved selenium standard of 4.6 µg/L, and selenium loads are not as great as other subwatersheds at lower altitudes within the Lower Gunnison River Watershed.

Figure 3.2-7 in Appendix E illustrates data obtained for the North Fork Gunnison River near Lazear, including streamflow discharges and the concentrations and loads of selenium and dissolved solids. **Figure 3.2-8 in Appendix E** presents these datasets for Cottonwood Creek.

Streamflow Discharge

There are five active USGS streamflow gaging stations in the North Fork Gunnison River where real-time data are being collected (USGS 2017b). In addition, the USGS has collected historical flow and water-quality data at 264 sites within the North Fork watershed. The Colorado Division of Water Resources Division 4 (Gunnison River Basin) operates five discharge measuring sites within the North Fork and tributaries including streams, flumes, and canals (**Table 3.2-3**).

Table 3.2-3. Active Streamflow Gaging Stations Operating in the North Fork Gunnison River Watershed, January 2017.

Agency	Station Number	Station Name
USGS	9134100	NORTH FORK GUNNISON RIVER BELOW PAONIA, CO
USGS	9136100	NORTH FK GUNNISON RIVER ABOVE MOUTH NR LAZEAR, CO
USGS	9132095	ANTHRACITE CREEK ABOVE MOUTH NEAR SOMERSET
USGS	9134000	MINNESOTA CREEK NEAR PAONIA, CO
USGS	9132500	NORTH FORK GUNNISON RIVER NEAR SOMERSET, CO
DWR	MUDBPRCO	MUDDY CREEK BELOW PAONIA RESERVOIR
DWR	LELAHICO	HIGHLINE DITCH ON LEROUX CREEK NEAR LAZEAR
DWR	LRASMICO	LEROUX CREEK ABOVE CARL SMITH RESERVOIR
DWR	NORLUXCO	NORTH FORK GUNNISON RIVER BELOW LEROUX CREEK
DWR	OAKMSACO	OVERLAND DITCH AT OAK MESA

For the North Fork Gunnison River above mouth near Lazear (USGS 09136100), streamflow discharges during 1962-2016 ranged from 38 to 4,010 ft^3/sec, with a median discharge of 187 ft^3/sec (**Appendix E, Figure 3.2-7**). Most of the watershed yield comes from snowmelt runoff during March-June of each year.

Impaired Waters (303d list)

By definition, an impaired water does not meet the standards associated with its assigned use classification (CDPHE 2011). From Section 303(d) of the CWA, the list of impaired water bodies is referred to as the "303(d) List." The mainstem of the North Fork and several tributaries are categorized as 303(d) Impaired Waters for protection of aquatic life (CDPHE 2016a; USEPA 2017c). Selenium is listed as the cause of impairment in the mainstem and tributaries Leroux, Hubbard, Minnesota, and Terror Creeks.

Selenium concentrations and loads

The North Fork contributes approximately 8 percent of the total selenium load to the Lower Gunnison River Basin (CDPHE 2011). For the North Fork near Lazear, dissolved selenium concentrations in water during 1991–2016 ranged from 0.47 to 6 µg/L, with the highest concentrations occurring during fall and winter low-flow conditions. For the mouth of the North Fork, dissolved selenium loads ranged from 0.65 to 11 lb/d, with the greatest selenium loads occurring during snowmelt runoff.

Cottonwood Creek is used to irrigate acreage within the Crawford Water Conservancy District; however, the stream flows northwest from the Crawford area and discharges into the North Fork near Hotchkiss, Colorado. Dissolved selenium concentrations in water from Cottonwood Creek (USGS 09134200) collected during 1999–2000 ranged from 4 to 13 µg/L, with the highest concentrations occurring during fall or winter low-flow conditions. Dissolved selenium loads during 1999–2000 ranged from 0.16 to 0.49 lb/d, with the greatest selenium loads occurring during irrigation season.

Dissolved solids concentrations and loads

For the North Fork near Lazear, dissolved solids concentrations in water during 1962–2016 ranged from 117 to 1,516 mg/L, with the highest concentrations occurring during fall and winter low-flow conditions. For the mouth of the North Fork, dissolved solids loads ranged from 12 to 179 tons/d, with the greatest dissolved solids loads occurring during snowmelt runoff.

Although data were not continuously collected, dissolved solids concentrations in water from Cottonwood Creek (USGS 09134200) collected during 1976–2000 ranged from 1,000 to 4,713 mg/L, with the highest concentrations occurring during fall or winter low-flow conditions. Dissolved solids loads during 1976–2000 ranged from 7.3 to 75 tons/d, with the greatest loads occurring during irrigation season.

3.2.1.2 Groundwater

Groundwater flow in the North Fork Gunnison River watershed occurs as a combination of shallow percolation through terrace gravels (recharged by irrigation and net precipitation) and deep groundwater flow along faults and preferential pathways of higher hydraulic conductivity (Cunningham et al. 1996). Significant springs occur at the contact of the terrace gravels and the Mancos Shale near the North Fork Gunnison River, and several fish hatcheries use water from these terrace deposit springs. Smaller warm mineralized springs occur at cross-strike faults (Austin Springs, Lawhead Gulch, Sulphur Gulch, and Doughty Springs) where groundwater moves upward from deep sources. Cross-strike faults also may function as conduits for downward percolation of groundwater from shallow irrigation recharge and from perennial streams that traverse a length of a cross-strike fault (for instance, Currant Creek and Leroux Creek) (Cunningham et al. 1996).

3.2.1.3 Floodplains

Along the floor of the North Fork Valley near Hotchkiss, areas adjacent to the river are categorized as Flood Zone AE, which are areas that statistically have a 1 percent probability of flooding every year, and where predicted flood water elevations above mean sea level have been established. Properties in Zone AE are considered to be at high risk of flooding under the National Flood Insurance Program (NFIP).

3.2.1.4 Water Rights

In the North Fork Gunnison River, there are nine different types of water rights (**Table 3.2-4**). Irrigation ditches have the greatest number of points of diversion (discrete places where water is diverted for beneficial use) with 270 points, and springs have the second greatest number of diversions with 127 points (**Table 3.2-4**).

Table 3.2-4. Summary of Water Rights in North Fork Subwatershed.

Water Right Type	Number of Points in North Fork Subwatershed
Ditch	270
Pipeline	24
Power Plant	1
Pump	21
Instream Flow	1
Reservoir	98
Seep	6
Spring	127
Well	92
Total water rights in subwatershed	**640**
Source: CDSS 2017.	

In the North Fork Gunnison River, there are number of instream flow rights, many in the headwaters (for example, Terror Creek, Hubbard Creek, North Fork below Paonia Reservoir, and upper Leroux Creek). However, the only instream flow right that lies within the boundary of the North Fork subwatershed boundary is the instream flow reach in lower Terror Creek.

3.2.2 Crawford

The Crawford subwatershed (containing parts of HUC-12 140200021206, 140200040508, 140200040504, 140200021205, and 140200021204) is located in southeastern Delta County, Colorado. The primary stream draining the area is the Smith Fork, which has its confluence with the mainstem Gunnison River near Lazear, Colorado. The Smith Fork Project was developed by Reclamation as part of the Colorado River Storage Project, and is operated by the Crawford Water Conservancy District (Reclamation 2017c). Features of the project include Crawford Dam and Reservoir, Smith Fork Diversion Dam, Smith Fork Feeder Canal, Aspen Canal, and other facilities. The subwatershed has about 9,970 acres of mostly irrigated pasture and alfalfa (URS 2013).

3.2.2.1 Hydrology and Water Quality

The Crawford subwatershed is located in the Southern Rocky Mountain physiographic province (Fenneman 1931). Elevations range from 5,844 feet at the outlet of the subwatershed southwest of Lazear to about 6,590 feet near Crawford Reservoir. Annual precipitation ranges from about 10 inches near Lazear to about 16 inches near the upper Smith Fork. The Smith Fork drains parts of the West Elk Mountains, which rise to over 12,700 feet at Mount Gunnison. There is a dramatic increase in precipitation with altitude such that the semi-arid climate of the Lower Gunnison River changes rapidly to a continental temperate climate in the upper Smith Fork with average annual snowfall of 74 inches at Crawford, Colorado (WeatherDB.com 2017b).

The Crawford subwatershed has a storage reservoir and network of canals that divert irrigation water from the headwaters of the Smith Fork, and deliver water outside of the natural hydrological basin into Cottonwood Creek, Alum Gulch, and other tributaries to the North Fork Gunnison River near Hotchkiss. In addition, water from the Smith Fork and Crawford Reservoir is diverted and delivered into the Grand View Canal, and irrigated lands off of the Grand View Canal system drain into Alum Gulch (HUC 140200040508), where the geologic setting is comprised mainly of the Dakota and Morrison Formations. There are limited exposures of Mancos Shale in the Alum Gulch drainage; therefore, with a median selenium concentration of 1.3 µg/L in water from Alum Gulch (USGS 384434107432701), selenium concentrations have not exceeded the chronic standard of 4.6 µg/L (Richards et al. 2014). On the other hand, water from Alum Gulch contains high salinity concentrations, with median salinity loads of 9,690 tons/yr. Water from the Smith Fork also is diverted at the Needle Rock Ditch, and several other canals including the Clipper and Aspen Canal systems, into the Cottonwood Creek drainage (HUC 140200040504), which is underlain by the Mancos Shale. Selenium concentrations in water from Cottonwood Creek near the mouth (USGS 09134200) ranged from 4 to 13 µg/L, with a median selenium concentration of 7.0 µg/L (Richards et al. 2014), which is greater than the chronic standard of 4.6 µg/L (CDPHE 2017a).

Figure 3.2-9 in Appendix E illustrates data obtained for Smith Fork near Lazear, including streamflow discharges and the concentrations and loads of selenium and dissolved solids. **Figure 3.2-8 in Appendix E** presents these datasets for Cottonwood Creek.

Streamflow Discharge

There are two active USGS streamflow gaging stations in the Crawford subwatershed where real-time data are being collected (**Table 3.2-5**; USGS 2017b). In addition, the USGS has collected historical flow and water-quality data at 264 sites within the Smith Fork watershed. As of March 2017, the Colorado Division of Water Resources does not operate any streamflow discharge measuring sites within the Crawford subwatershed (DWR 2017).

Table 3.2-5. Active Streamflow Gaging Stations in the Crawford Subwatershed, January 2017.

USGS Station Number	Station Name
09129550	CRAWFORD RESERVOIR NEAR CRAWFORD, CO (LAKE)
09129600	SMITH FORK NEAR LAZEAR, CO

For the Smith Fork near Lazear (USGS 09129600), monthly average streamflow discharges collected during 1976–2016 ranged from 0.07 to 1,010 ft^3/sec. Most of the watershed yield comes from snowmelt runoff during March-July of each year.

Impaired Waters (303d list)

There are no reaches in the Smith Fork that are categorized as 303(d) Impaired Waters (CDPHE 2016a; USEPA 2017c).

Selenium concentrations and loads

For the Smith Fork near Lazear, dissolved selenium concentrations in water during 2012–2016 ranged from 0.73 to 2.6 µg/L, with the highest concentrations occurring during late winter or early spring conditions. For the mouth of the Smith Fork, dissolved selenium loads ranged from 0.01 to 0.43 lb/d, with the greatest selenium loads occurring during snowmelt runoff.

The Smith Fork Project provides water for irrigated acreage in the Cottonwood Creek drainage, which is outside of the Smith Fork hydrological basin, discharging into the North Fork Gunnison River near Hotchkiss. Dissolved selenium concentrations in water from Cottonwood Creek (USGS 09134200) collected during 1999-2000 ranged from 4 to 13 µg/L (USGS 2017d), with the highest concentrations occurring during fall or winter low-flow conditions. Dissolved selenium loads during 2012–2016 ranged from 0.01 to 0.43 lb/d, with the greatest selenium loads occurring during snowmelt runoff.

Dissolved solids concentrations and loads

For the Smith Fork near Lazear, dissolved solids concentrations in water during 1976–2016 ranged from 50 to 3,986 mg/L, with the highest concentrations occurring during fall and winter low-flow conditions. For the Smith Fork at Lazear, dissolved solids loads ranged from 0.4 to 45 tons/d, with the greatest dissolved solids loads occurring during snowmelt runoff.

Dissolved solids concentrations in water from Cottonwood Creek (USGS 09134200) collected during 1976–2000 ranged from 1,000 to 4,713 mg/L, with the highest concentrations occurring during fall or winter low-flow conditions. Dissolved solids loads during 1976–2000 ranged from 7.3 to 75 tons/d, with the greatest loads occurring during irrigation season.

3.2.2.2 Groundwater

Groundwater flow in the Smith Fork watershed occurs as a combination of valley bottom aquifers and regional bedrock subsystems (Kolm and van der Heijde 2013). The valley bottom aquifers follow the streams and river systems and are moderately to highly permeable. The aquifers are recharged by infiltration from precipitation, by leaking irrigation canals and ditches, and by irrigation return flow.

The regional bedrock subsystems in the Smith Fork area include Cretaceous sandstones and Tertiary intrusive rocks (Kolm and van der Heijde 2013). The bedrock units are variably saturated based on location and proximity to recharge area. The Dakota Sandstone and Burro Canyon aquifer is partially saturated in the recharge area north of the Smith Fork, as evidenced by the springs in the Alum drainage. Groundwater flows laterally downdip to the north as an unconfined or water table system, and becomes part of the regional confined groundwater flow system after passing under the Mancos Shale at Alum Creek. The groundwater flow direction in the regional bedrock systems is from south to north, and the Smith Fork appears to be a losing stream reach, contributing recharge to the regional bedrock aquifer. (Kolm and van der Heijde 2013).

According to Colorado law, every well put into use since May 8, 1972 that diverts groundwater must have a well permit (Water Colorado 2017). Wells for “household use” only are classified as exempt wells and therefore do not require a water right. Commercial wells and large agricultural wells require a water right. There are about 142 exempt wells in the Crawford subwatershed. In addition, there are about five oil and gas wells in the subwatershed, but they have been plugged and abandoned (DWR 2017).

3.2.2.3 Floodplains

The Crawford subwatershed is included in FEMA Flood Zone D, and Flood Zone X. Flood Zone D indicates that the area has not been mapped by FEMA, and Flood Zone X indicates minimal flood threat (FEMA 2015).

3.2.2.4 Water Rights

In the Smith Fork, there are 10 different types of water rights (**Table 3.2-6**), and a total of 272 water rights. Irrigation ditches have the greatest number of points of diversion with 147 points, and springs have the second greatest number of diversions with 65 points (**Table 3.2-6**).

Table 3.2-6. Summary of Water Rights in Crawford Subwatershed.

Water Right Type	Number of Points in Crawford Subwatershed
Ditch	147
Exchange Plan	1
Pipeline	6
Power Plant	1
Pump	4
Instream Flow	1*
Reservoir	36
Seep	1
Spring	65
Well	10
Total water rights in subwatershed	**272**

*Instream flow right is upstream from subwatershed, but may affect reservoir operations
Source: CDSS 2017

There are no instream flow rights within the Crawford subwatershed boundary; however, there is an instream flow terminus point just inside of the subwatershed boundary on the Smith Fork (CDSS 2010).

3.2.3 Uncompahgre

The Uncompahgre subwatershed contains parts of 20 12-digit HUCs (**Table 3.2-7**), and is located in Delta, Montrose, and Ouray Counties, Colorado. The primary streams draining the area are the Uncompahgre River, Spring Creek, Dry Creek, Loutsenhizer Arroyo, Cedar Creek, and Roubideau Creek (**Appendix C, Figure 3.2-1**). In the northeast portion of the subwatershed are Peach Valley Arroyo, and the "Unnamed drainage" HUC 140200050113 described by the River District (2010) as ranking number one for salinity potential and number three for selenium potential. The Uncompahgre River Valley is a principally agricultural area where irrigation water is supplied by diversion from the Gunnison River through the Gunnison Tunnel and by water from the Uncompahgre River and its tributaries. About two-thirds of the 89,000 irrigated acres of the Uncompahgre Project are located west of the Uncompahgre River on a series of terraces separated by small valleys that were eroded by tributaries of the Uncompahgre River (Butler et al. 1996). The terraces consist of stream deposits and outwash remnants

that have relatively low soluble salt content. Irrigated areas east of the Uncompahgre River compose about 34 percent of the project area and consist of soil formed primarily from weathered Mancos Shale (Butler et al. 1996).

Table 3.2-7. 12-Digit HUCs Included within the Uncompahgre Subwatershed.

HUC-12	HUC Name
140200050501	Alkali Creek-Gunnison River
140200060303	Middle Uncompahgre River
140200060401	Happy Canyon Creek-Uncompahgre River
140200060402	Happy Canyon Creek-Uncompahgre River
140200060403	Happy Canyon Creek-Uncompahgre River
140200060404	Happy Canyon Creek-Uncompahgre River
140200060405	Happy Canyon Creek-Uncompahgre River
140200060406	Happy Canyon Creek-Uncompahgre River
140200060407	Happy Canyon Creek-Uncompahgre River
140200050104	Tongue Creek-Gunnison River
140200050113	Tongue Creek-Gunnison River
140200050114	Tongue Creek-Gunnison River
140200050205	Roubideau Creek
140200060503	Dry Creek
140200060504	Dry Creek
140200060505	Dry Creek
140200060603	Lower Uncompahgre River
140200060604	Lower Uncompahgre River
140200060605	Lower Uncompahgre River
140200060606	Lower Uncompahgre River

3.2.3.1 Hydrology and Water Quality

The Uncompahgre subwatershed is located in the Southern Rocky Mountain physiographic province (Fenneman 1931). Elevation of irrigated areas in the Uncompahgre Project ranges from about 4,900 feet at Delta to about 5,900 feet near Colona. Annual precipitation ranges from about 8 inches at Delta to about 12 inches near the Ouray County line. The Uncompahgre River drains the northern San Juan Mountains that rise to over 14,000 feet.

In 1901, the State of Colorado began building the 5.8-mile-long Gunnison Tunnel from the Gunnison River to supply more water to the Uncompahgre Valley. Because of insufficient funding, the State could not complete the tunnel, and the newly established United States Reclamation Service completed construction of the Gunnison Tunnel in 1909 and a diversion dam on the Gunnison River in 1912. The Uncompahgre Project, as it was later called, included existing and new canals and laterals. Taylor Park Reservoir was built as part of the Uncompahgre Project in 1937 to supply the project with a dependable water supply. Operation and maintenance of the Uncompahgre Project was transferred from Reclamation to the Uncompahgre Valley Water Users Association in 1932. The Gunnison Tunnel is decreed through

Colorado water court for a capacity of 1,300 ft^3/sec; however, the carrying capacity of the tunnel has been determined to be about 1,150 ft^3/sec (Clark and Simonds 1994). The South Canal connects to the Gunnison Tunnel outlet, and conveys water to the Uncompahgre River where it is conveyed down the Uncompahgre River to the headgate for the Montrose and Delta Canal, the largest canal on the west side of the project.

The east side of the Uncompahgre subwatershed is affected by irrigation drainage from the Mancos Shale, which contributes selenium and dissolved solids concentrations and other constituents to the hydrochemical system (Butler et al. 1996; Butler and Leib 2002). The west side of the subwatershed contains soils derived from sandstones of the Uncompahgre Plateau, and the agricultural productivity of the west side is much greater than the east side due to better quality soils (Stewart et al. 1993; Butler et al. 1996). Among the highest-ranking selenium and salinity priority subwatersheds (**Figures 3.2-3** and **3.2-4 in Appendix C**), three are located on the east side of the Uncompahgre Valley: (1) East Mesa, (2) Loutsenhizer Arroyo, and (3) "Unnamed" HUC 140200050113. The East Mesa subwatershed HUC 140200060604 drains partly into Loutsenhizer Arroyo and partly to the Uncompahgre River. The Unnamed HUC is located in the northeastern part of the Uncompahgre subwatershed, and drains into the Gunnison River just upstream from Delta. There is a USGS data collection site called Sunflower Drain at the outlet for Unnamed HUC; therefore, for the purposes of this report, the Unnamed HUC is referred to as Sunflower Drain. Loutsenhizer Arroyo and Sunflower Drain are described in this report as examples of some of the highest selenium and dissolved solids concentrations in the Lower Gunnison Project Area.

Figure 3.2-10 in Appendix E illustrates data collected for the Uncompahgre River at Delta, including streamflow discharges and the concentrations and loads of selenium and dissolved solids. **Figure 3.2-11 in Appendix E** presents these datasets for Loutsenhizer Arroyo below North River Road near Delta, and **Figure 3.2-12 in Appendix E** presents data for the Sunflower Drain at Highway 92 near Read.

Streamflow discharge

There are seven active USGS streamflow gaging stations in the Uncompahgre subwatershed (USGS 2017c). In addition, the USGS has collected historical flow and water-quality data at 475 sites within the subwatershed. The Colorado Division of Water Resources Division 4 operates eight discharge measuring sites within the Lower Uncompahgre River watershed (DWR 2017). Active streamflow gaging stations operating in the Uncompahgre subwatershed are listed in Table 3.2-8.

Table 3.2-8. Active Streamflow Gaging Stations Operating in the Uncompahgre Subwatershed, January 2017.

Agency	Station	Station Name
Delta County, Colorado		
USGS	9149500	UNCOMPAHGRE RIVER AT DELTA, CO
Montrose County, Colorado		
USGS	383926107593001	LOUTSENHIZER ARROYO AT HWY 50 NEAR OLATHE, CO
DWR	SOUCANCO	SOUTH CANAL NEAR MONTROSE
DWR	SOUCANCO	SOUTH CANAL NEAR MONTROSE
DWR	UNCOLACO	UNCOMPAHGRE RIVER NEAR OLATHE
DWR	ABCLATCO	ABC LATERAL
DWR	FAIRVWCO	FAIRVIEW INLET OFF THE SOUTH CANAL NEAR MONTROSE
DWR	UNCUPSCO	UNCOMPAHGRE RIVER UPSTREAM OF SOUTH CANAL
DWR	UNCBRGCO	UNCOMPAHGRE RIVER AT UNCOMPAHGRE ROAD BRIDGE
DWR	WSTTUNCO	WEST CANAL TUNNEL
Ouray County, Colorado		
USGS	9146020	UNCOMPAHGRE RIVER NEAR OURAY, CO
USGS	9146200	UNCOMPAHGRE RIVER NEAR RIDGWAY, CO
USGS	9147000	DALLAS CREEK NEAR RIDGWAY, CO
USGS	9147025	UNCOMPAHGRE RIVER BELOW RIDGWAY RESERVOIR, CO
USGS	9147500	UNCOMPAHGRE RIVER AT COLONA, CO

For the Uncompahgre River at Delta (USGS 9149500), monthly average streamflow discharges collected between 1938 and 2016 ranged from 51.8 to 2,542 ft^3/sec (**Appendix E, Figure 3.2-10**). Most of the watershed yield comes from snowmelt runoff during March–July of each year.

For the Loutsenhizer Arroyo below North River Road near Delta (USGS 383946107595301), daily average streamflow discharges collected during 2014–2016 ranged from 7.1 to 171 ft^3/sec (**Appendix E, Figure 3.2-11**). Most of the discharge yield comes during irrigation season.

For the Sunflower Drain at Highway 92 near Read (USGS 384551107591901), intermittent streamflow measurements determined during water-quality events between 1991 and 2003 ranged from 1.6 to 120 ft^3/sec (**Appendix E, Figure 3.2-12**). Additional records are available for June through December 2016. Most of the discharge yield comes during irrigation season.

Impaired Waters (303d list)

There are a number of stream reaches in the Uncompahgre subwatershed that are categorized as 303(d) Impaired Waters (CDPHE 2016c), as illustrated on **Figure 3.2-13 in Appendix C**.

Selenium concentrations and loads

For the Uncompahgre River at Delta, dissolved selenium concentrations in water between 1990 and 2016 ranged from 4 to 26 µg/L, with the highest concentrations occurring during late winter or early spring conditions. Dissolved selenium loads ranged from 3.7 to 58 lb/d, with the greatest selenium loads occurring during irrigation season.

For Loutsenhizer Arroyo near Delta, dissolved selenium concentrations in water between 1991 and2016 ranged from 14 to 345 µg/L, with the highest concentrations occurring during late winter or early spring conditions. Dissolved selenium loads ranged from 4.1 to 48 lb/d, with the greatest selenium loads occurring during irrigation season, except for one high-load event in March 2010.

For the Sunflower Drain, dissolved selenium concentrations in water between 1991and 2003 ranged from 6 to 228 µg/L, with the highest concentrations occurring during late winter or early spring conditions. Dissolved selenium loads ranged from 0.7 to 8.8 lb/d, with the greatest selenium loads occurring during irrigation season.

Dissolved solids concentrations and loads

For the Uncompahgre River at Delta, dissolved solids concentrations in water between 1958 and 2016 ranged from 221 to 2,555 mg/L, with the highest concentrations occurring during fall and winter low-flow conditions. Dissolved solids loads ranged from 137 to 3,492 tons/d, with the greatest dissolved solids loads occurring during the irrigation season.

For Loutsenhizer Arroyo, dissolved solids concentrations in water between 1991 and 2016 ranged from 159 to 5,090 mg/L, with the highest concentrations occurring during fall and winter low-flow conditions. Dissolved solids loads ranged from 32 to 747 tons/d, with the greatest dissolved solids loads occurring during the irrigation season.

For the Sunflower Drain, dissolved solids concentrations in water between 1991 and 2003 ranged from 593 to 8,190 mg/L, with the highest concentrations occurring during fall and winter low-flow conditions. Dissolved solids loads ranged from 22 to 269 tons/d, with the greatest dissolved solids loads occurring during the irrigation season.

3.2.3.2 Groundwater

Groundwater in the Uncompahgre subwatershed occurs in shallow systems consisting of (1) Mancos Shale residuum, (2) alluvium overlying Mancos Shale, (3) terrace deposits in the western Uncompahgre Project area, and (4) artesian sandstone aquifers on the western side of the Uncompahgre subwatershed. The hydrogeologic settings, general lithologic descriptions, and general hydrogeologic characteristics of these groundwater-flow systems are described in Butler et al. (1996). Although the shallow aquifer systems might not have historically contained appreciable quantities of water in their natural (pre-irrigation) state, irrigation now provides substantial quantities of water for the existence of a water-table system in the shallow unconsolidated materials. The shallow groundwater systems generally discharge to local drains, streams, and rivers. Hydrogeologic characteristics differ greatly over short distances in the shallow system because of the differences in composition of alluvium (which include paleochannels consisting of gravels and cobbles) and the differences in weathering and fracturing of the Mancos Shale (Butler et al. 1996).

There are more than 1,500 exempt ("household use") wells in the Uncompahgre subwatershed. In addition, there are about 30 plugged and abandoned oil and gas wells in the subwatershed (CDSS 2017).

3.2.3.3 Floodplains

The Uncompahgre subwatershed has portions of FEMA Flood Zone AE, Flood Zone D, and Flood Zone X. The areas directly adjacent to the river are categorized as Flood Zone AE, which indicates an area that could be inundated by 1 percent annual chance flooding (100-year flood). In addition, valley bottoms of several tributaries (Spring Creek, Dry Creek, and Roubideaux Creek) are categorized as 0.2 percent annual flood hazard (500-year flood).

3.2.3.4 Water Rights

In the Uncompahgre subwatershed, there are 11 different types of water rights (**Table 3.2-9**), and a total of 1,234 water rights. Irrigation ditches have the greatest number of points of diversion with 518 points, and springs have the second greatest number of diversions with 287 points (**Table 3.2-9**).

Table 3.2-9. Summary of Water Rights in Uncompahgre Subwatershed.

Water Right Type	Number of Points in Uncompahgre Subwatershed
Ditch	518
Ditch system	1
Exchange Plan	2
Pipeline	24
Power Plant	3
Pump	68
Instream Flow	1*
Reservoir	164
Seep	10
Spring	287
Well	156
Total water rights in subwatershed	**1,234**

*Black Canyon of Gunnison River
Source: CDSS 2017

There are no instream flow rights within the Uncompahgre subwatershed boundary.

3.2.4 Bostwick Park

The Bostwick Park subwatershed is located in Montrose and Gunnison Counties, Colorado, and contains parts of eight 12-digit HUCs (140200020901, 140200020902, 140200020905, 140200020906, 140200060404, 140200060406, 140200060604, and 140200021103). Approximately 17.4 percent of the Bostwick Park subwatershed is irrigated, totaling 9,378 acres. Water is stored in Silver Jack Reservoir and conveyed via the Cimarron Canal to Bostwick Park (**Figures 3.2-3** and **3.2-4 in Appendix C**). The

Bostwick Park project was developed by Reclamation as part of the Colorado River Storage Project. The hydrogeologic setting of Bostwick Park is somewhat different from the other three subwatersheds in the Project area because Tertiary lava flows and ash flow tuffs and alluvial sediments derived from ash flows overlie the Mancos Shale (Dickinson 1966; Kellogg et al. 2004). Red Rock Creek drains the irrigated area of Bostwick Park; however, some drainage flows to the southwest into upper Loutsenhizer Arroyo. Early sampling in the mid-1990s showed selenium concentrations as high as 1,700 µg/L in water in upper Loutsenhizer Arroyo below Bostwick Park (Butler and Leib 2002); however, samples from irrigation drainage in Bostwick Park itself did not show extremely high selenium concentrations. In addition, increasing selenium concentrations and loads are indicated from the upper to lower reaches of Red Rock Canyon (near confluence with the Black Canyon), indicating deep percolation of irrigation water through the Mancos Shale.

3.2.4.1 Hydrology and Water Quality

The Bostwick Park subwatershed is located in the Southern Rocky Mountain physiographic province (Fenneman 1931). Elevation of irrigated areas ranges from about 6,780 feet at the northern end of Bostwick Park to about 8,900 feet near Silver Jack Reservoir, and the downstream site of Red Rock Canyon near the mouth (deep in the Black Canyon) is at an altitude of 6,020 feet. Annual precipitation ranges from about 12 inches near Bostwick Park to about 25 inches near Silver Jack Reservoir.

Streamflow discharge and concentrations and loads of selenium and dissolved solids are presented on **Figure 3.2-14 in Appendix E**.

Streamflow discharge

There are two active USGS streamflow gaging stations within the Bostwick Park subwatershed (**Table 3.2-10**). In addition, the USGS has collected historical flow and water-quality data at about five sites within the Bostwick Park subwatershed. There are no streamflow gaging stations operated by the Colorado Division of Water Resources within the subwatershed.

Table 3.2-10. Active Streamflow Gaging Stations in the Bostwick Park Subwatershed, January 2017.

Station	Station Name
Gunnison County, Colorado	
09125800	SILVER JACK RESERVOIR NEAR CIMARRON, CO
09126000	CIMARRON RIVER NEAR CIMARRON, CO

For the Red Rock Canyon, intermittent streamflow discharge measurements during 2001–2005 ranged from 0.9 to 12 ft^3/sec.

Impaired Waters (303d list)

There are several stream reaches in the Bostwick Park subwatershed that are categorized as 303(d) Impaired Waters, mostly in the upper Cedar Creek area (**Appendix C, Figure 3.2-13**).

Selenium concentrations and loads

For Red Rock Canyon near the boundary of the Black Canyon of the Gunnison National Monument (National Park Service [NPS] boundary), selenium concentrations during 2003–2005 ranged from 10.4 to 28.6 µg/L, with the highest concentrations occurring during late winter or early spring conditions. Dissolved selenium loads ranged from 0.13 to 0.6 lb/d, with the greatest selenium loads occurring during irrigation season.

For the Red Rock Canyon at the mouth, selenium concentrations ranged from 18.5 to 78.8 µg/L, with the highest concentrations occurring during late winter or early spring conditions. Dissolved selenium loads during 2001–2005 ranged from 0.3 to 1.3 lb/d, with the greatest selenium loads occurring during both the irrigation and fall/winter low-flow periods. The increase of selenium concentrations and loads are noticeable between Red Rock Canyon at the NPS boundary and Red Rock Canyon at the mouth.

Dissolved solids concentrations and loads

For the Red Rock Canyon near the NPS boundary, dissolved solids concentrations in water during 2003–2005 ranged from 521 to 1,000 mg/L, with the highest concentrations occurring during fall and winter low-flow conditions. Dissolved solids loads ranged from 1.41 to 2.7 tons/d, with the greatest dissolved solids loads occurring during the fall and winter low-flow season.

For Red Rock Canyon at the mouth, dissolved solids concentrations in water during 2001–2005 ranged from 625 to 821 mg/L. Dissolved solids loads ranged from 1.7 to 2.2 tons/d.

3.2.4.2 Groundwater

There is little information regarding groundwater in Bostwick Park. There are about 100 exempt ("household use") wells in the Bostwick Park subwatershed. In addition, there are two plugged and abandoned oil and gas wells in the subwatershed.

3.2.4.3 Floodplains

The Bostwick Park subwatershed has only small portions of FEMA Flood Zone AE in upper Cedar Creek, which indicates an area that could be inundated by 1 percent annual chance flooding (100-year flood).

3.2.4.4 Water Rights

In the Bostwick Park subwatershed, there are seven different types of water rights (**Table 3.2-11**), and a total of 156 water rights. Irrigation ditches have the greatest number of points of diversion with 65 points, and springs have the second greatest number of diversions with 60 points (**Table 3.2-11**).

Table 3.2-11. Summary of Water Rights in Bostwick Park Subwatershed.

Water Right Type	Number of Points in Bostwick Park Subwatershed
Ditch	81
Pipeline	3
Pump	4
Instream Flow	5
Reservoir	21
Spring	68
Well	9
Total water rights in subwatershed	**191**
Source: CDSS 2017	

There are instream flow rights within the Bostwick Park subwatershed boundary along the Cimarron River downstream from Silver Jack Reservoir. Silver Jack Reservoir is a source of water storage for the Bostwick Park subwatershed.

3.3 Air Quality

The National Ambient Air Quality Standards (NAAQS) established by the USEPA under the Clean Air Act specify limits for criteria air pollutants. Criteria pollutants include carbon monoxide, particulate matter, ozone, sulfur dioxide, lead, and nitrogen. If the levels of a criteria pollutant in an area are higher than the NAAQS, the airshed is designated as a nonattainment area. Areas that meet the NAAQS for criteria pollutants are designated as attainment areas.

Review of USEPA air quality data indicates that the entire project area, which includes portions of Delta, Gunnison, Montrose, and Ouray Counties, is in attainment for all criteria pollutants (USEPA 2016a).

3.4 Vegetation

3.4.1 Vegetation Communities and Habitat

The four subwatersheds of the project area lie mostly within the sedimentary basins, benchlands, and shale salt-shrub deserts of the Colorado Plateaus Ecoregion, transitioning or reaching into the sedimentary mid-elevation woodlands and shrublands of the Southern Rockies Ecoregion foothills to the east in the North Fork and Crawford subwatersheds, and to higher elevation subalpine woodlands and forests of Southern Rockies in the south part of the Bostwick Park subwatershed (**Appendix C, Figure 3.4-1**).

In the project vicinity, the Colorado Plateaus Ecoregion (Chapman et al. 2006) is characterized by relatively warm and dry summers, cold winters without persistent snowpack, and less than approximately 15 inches of precipitation annually. Soils derived from the Mancos Shale Formation support irrigated croplands and semi-desert salt-tolerant shrublands in the broad river valleys and low terraces of the Gunnison, Uncompahgre, and North Fork Gunnison Rivers. On surrounding higher benchlands, bench breaks and low foothills, the vegetation communities of sagebrush shrublands, pinyon-juniper woodlands

and mixed montane shrublands thrive on steeper, rockier soils. Many basin and benchland transition areas in the region contain sparsely vegetated, distinctive Mancos Shale badlands or "adobe hills." The riparian corridors of perennial streams typically feature cottonwood woodlands and forests with semi-native understories containing significant components of invasive herbaceous and shrub species.

The Southern Rockies Ecoregion in the project vicinity is characterized by a temperate semi-arid climate of moderately warm summers, and cold winters with persistent snowpack. Precipitation at the lower elevation is about 15 inches annually, whereas in the high mountains annual precipitation can exceed 40 inches. High elevation snowpack provides a critical water source for the valleys in the project area's subwatersheds, where streams whose headwaters are in the Southern Rockies are diverted for agricultural irrigation. From the lower elevations of this ecoregion, mixed montane shrublands and pinyon-juniper woodlands on steep slopes grade into higher elevation montane and subalpine conifer and aspen woodlands and forests with interstitial meadows and parks. In some areas, rock outcrops and steep canyons interface with the high desert country of the Colorado Plateaus to the west. Soils are derived from sedimentary (Tertiary and Cretaceous) limestone, siltstone, shale, and sandstone (Chapman et al. 2006). The riparian corridors of perennial streams typically feature cottonwood or mixed cottonwood-conifer communities at lower elevations, conifer-aspen associations at mid- to subalpine elevations, and wet meadows and willow carrs in the alpine zone.

In the landscape context, the interface of the Colorado Plateaus and Southern Rockies ecoregions provides important habitat and range for big game and a variety of other wildlife species, both common and rare (**Section 3.5**). In the local context, the climate and soil properties of the shale lowlands of the project area provide conditions that support several rare and endemic plant species found nowhere else in the world (see Special Status Species, **Section 3.4.3**). Vegetation communities, in combination with geological formations and soil types, elevation, water resources, and landforms, can be significant predictors of presence of rare plants and wildlife species.

The National Land Cover Dataset (NLCD), a 30-meter resolution (landscape scale) raster coverage created by satellite imagery interpretation, was used to characterize the spatial distribution of vegetation communities across the project area (USGS 2011). The NLCD identifies a total of 41 landcover classes across the four subwatersheds of the project area. To improve the utility of the NLCD for display and discussion purposes on the programmatic scale, geographic information system (GIS) software was used to consolidate the NLCD landcover classes into 10 vegetation communities based on similarity and habitat relevance. **Table 3.4-1** lists the vegetation communities in order of prevalence in the project area (the four subwatersheds combined). **Figures 3.4-2** through **3.4-5 in Appendix C** depict the spatial distribution of vegetation communities in each of the four subwatersheds.

Note that the resolution of the NLCD limits its capability for mapping small, patchy, or discontinuous narrow linear vegetation features such as rocky outcrops or certain wetlands and riparian areas. **Section 3.4.2** describes the project area's wetlands and riparian areas using other higher-resolution datasets.

Table 3.4-1. Vegetation Communities Expressed by Total Project Area and by Subwatershed.

Vegetation Community	Percent of the Project Area (Subwatersheds Combined)	Percent of Subwatershed			
		North Fork	Crawford	Uncompahgre	Bostwick Park
Irrigated Agricultural Land	49.7%	56.2%	40.4%	58.2%	19.1%
Semi-Desert Shrubland	19.1%	8.1%	19.6%	25.2%	2.0%
Pinyon-Juniper Woodland	10.7%	19.9%	23.1%	6.2%	15.5%
Sagebrush Shrubland	6.6%	3.1%	10.5%	1.4%	26.1%
Mixed Mountain Shrubland	4.9%	0.7%	2.8%	<0.1%	26.8%
Developed and Disturbed Land	4.4%	3.2%	0.3%	6.2%	0.1%
Riparian Woodland or Forest	2.5%	7.9%	2.2%	2.1%	1.0%
Montane or Subalpine Woodlands or Forest	1.3%	0.1%	<0.1%	--	7.8%
Open Water and Emergent Wetland	0.5%	0.4%	0.9%	0.5%	0.6%
Bedrock and Cliff	0.2%	0.4%	0.2%	<0.1%	0.9%
Total	**100%**	**100%**	**100%**	**100%**	**100%**

The following narratives briefly describe each vegetation community and its habitat value in the project area (in order of prevalence of the vegetation community in the project area). The scientific names of plants mentioned in the text are provided in **Table E-2 of Appendix E**. Unless other citations are provided, the following narratives are based on the Colorado Natural Heritage Program (CNHP) natural heritage assessments for the region (Lyon and Williams 1998; Lyon et al. 1999). **Sections 3.4.1.1** through **3.4.1.4** present descriptions of vegetation and habitat within each subwatershed.

Irrigated Agricultural Land (49.7 percent of the project area)

Irrigated agricultural lands are the most prevalent vegetation community across the project area (**Table 3.4-1**; also **Figures 3.4-2** through **3.4-5 in Appendix C**). According to the Colorado Decision Support System data developed by the CWCB and the Colorado Division of Water Resources, approximately 55 percent of irrigated agricultural land in the project area is grass pasture/grass hay meadows, 19 percent is corn, 14 percent is alfalfa, 10 percent is dry beans and small grains, 1.5 percent is fruit orchards, and less than 1 percent is vegetables (CDSS 2010). Irrigated agricultural land generally occupies the relatively flat, broad valley bottoms and low benches and broad mesas of the subwatersheds. These areas were once occupied by mosaics of riparian woodlands, semi-desert shrublands, and sagebrush, and remnants of these communities are still present throughout. Irrigated agricultural land in the project area provides habitat for a variety of wildlife species, such as migrating and wintering areas for songbirds, greater sandhill cranes, and Canada geese; hunting grounds for raptors; and winter range for big game. Irrigated agricultural areas and associated irrigation infrastructure attract amphibians and reptiles. Hay and grain crops are attractive to ground-nesting birds and loss of eggs, nests, and birds can occur if harvests correspond with nesting seasons. Irrigated grass pastures adjacent to large sagebrush shrubland patches are important to brooding sage-grouse.

Semi-Desert Shrubland (19.1 percent of the project area).

This vegetation community is the most abundant native plant association in the project area (**Table 3.4-1**; also **Figures 3.4-2** through **3.4-5 in Appendix C**), and is found throughout the lower elevations, distributed across low hills adjacent to the flatter valley bottoms that are mostly converted to agricultural use. This community thrives on Mancos Shale-derived soils with low moisture capacity, and is dominated by salt-tolerant shrubs such as shadscale, mat saltbush, broom snakeweed, budsage, spiny horsebrush, winterfat, and black sagebrush. The shrub canopy is open and relatively low in stature, with an understory of galleta, Indian rice grass, saltgrass, bottlebrush squirreltail, prickly pear, and other native grasses and forbs, and a high percentage of bare ground and biological soil crusts. This vegetation community also includes areas of tall semi-desert shrublands dominated by greasewood, fourwing saltbush, or rubber rabbitbrush on relatively flat clayey soils in drainage bottoms or low river terraces, with saltgrass and sea-blight in the relatively sparse understory. Non-native annual mustards and downy brome may be common in the understory, especially in Delta County in the north part of the Uncompahgre subwatershed, in Peach Valley and the west part of California Mesa. Shale badland areas (Mancos Shale hills locally referred to as "adobes") are an important component of this community. The soils of the adobe hills are mostly barren, saline, and have low permeability, but harbor microhabitats with populations of endemic rare plants adapted to unique conditions (see **Section 3.4.3**). Overall, the semi-desert shrubland community provides habitat for a variety of reptiles, burrowing rodents, and migratory songbirds including horned lark, loggerhead shrike, and lark sparrow. It is also the preferred habitat of several special-status plant and wildlife species in the project area, including clay-loving wild buckwheat, Colorado hookless cactus, Colorado desert parsley, white-tailed prairie dog, and burrowing owl. Approximately 36 percent of the semi-desert shrubland community in the project area occurs on BLM lands.

Pinyon-Juniper Woodland and Shrubland (10.7 percent of the project area)

Pinyon-juniper communities are typically co-dominated by pinyon pine and Utah juniper and occur on sandy or rocky shallow soils. Juniper is more drought tolerant and usually dominant on lower elevation drier sites, and pinyon tends to be more cold tolerant and dominant at higher elevations. The trees in this community are short and often widely spaced. The shrub understory can range from nearly absent in closed canopy or extremely rocky woodlands, to dense assemblages of tall saltbushes, sagebrush, or mixed mountain shrubs. This community occupies mid-elevation areas between semi-desert shrub zone and the mixed mountain shrub zone. It provides habitat for a variety of reptiles, small mammals, woodland dependent birds, and important thermal cover and hiding for wintering and migrating big game. The pinyon-juniper woodland and shrubland community is the most prevalent native vegetation community in the North Fork and Crawford subwatersheds (**Table 3.4-1**; also **Figures 3.4-2** and **3.4-3 in Appendix C**). More than 19 percent of this community in the project area occurs on BLM lands.

Sagebrush Shrubland (6.6 percent of the project area)

In the project area, the sagebrush shrubland community includes low-elevation sagebrush shrublands, and mid-elevation sagebrush shrublands and shrubsteppe. The low elevation communities are dominated by Basin big sagebrush, Wyoming big sagebrush, and black sagebrush. Other shrubs present may include rubber rabbitbrush, antelope bitterbrush, and tall saltbush species. In undisturbed stands of this land cover type, tall sagebrush species are typically dominant, native forbs and grasses are relatively sparse, and patches of bare ground or biological soil crusts are common throughout. Disturbed areas may have a

weedy understory. The mid-elevation expressions of this community, such as those found in the Bostwick Park subwatershed, have a more open shrub canopy of Wyoming big sagebrush and mountain sagebrush, an understory of native grasses and forbs, and can be mixed with mountain shrub species. Both types of sagebrush communities provide habitat for a variety of sagebrush-dependent birds, including Gunnison sage-grouse, a species protected by the ESA. Sagebrush shrublands are also an important component of big game winter range. Sagebrush is the third most prevalent native vegetation community in the project area, and a significant part of the Bostwick Park subwatershed landscape (**Table 3.4-1**; also **Figures 3.4-2** through **3.4-5 in Appendix C**). Nearly 16 percent of this community in the project area is found on BLM lands.

Mixed Mountain Shrubland (4.9 percent of the project area)

The mixed mountain shrubland community (**Table 3.4-1**; also **Figures 3.4-2** through **3.4-5 in Appendix C**) contours with the topography of the project area between the range of about 7,000 feet and 9,000 feet, typically extending into pinyon-juniper woodlands below and sub-alpine forests above. The lower elevation expressions of mixed mountain shrublands feature a diverse mix of shrubs, including mountain mahogany, Utah serviceberry, snowberry, cliff fendlerbush, chokecherry, Gambel oak, sagebrush, and rabbitbrush. At higher elevations, Gambel oak is typically dominant. Understory native grasses and forbs are typically abundant. Mixed mountain shrublands provide important transition range for big game, productive fall forage areas for black bear, and breeding and migratory habitat for a variety of shrubland birds. About 5 percent of this community type in the project area occurs on BLM land.

Developed and Disturbed Land (4.4 percent of the project area)

Developed and disturbed land is characterized by a prevalence of built structures, long-term disturbances, or impervious surfaces. This class captures the cities of Delta and Montrose, the towns of Olathe, Crawford, Paonia, and Hotchkiss, as well as certain road corridors and farm headquarters areas throughout the project area, especially in the Uncompahgre subwatershed (**Appendix C, Figure 3.4.-4**).

Riparian Woodland or Forest (2.5 percent of the project area)

The riparian woodland or forest community in the subwatersheds (**Table 3.4-1**; also **Figures 3.4-2** through **3.4-5 in Appendix C**) includes low elevation, mid-elevation, and high elevation wooded riparian types. At low elevations in the subwatersheds, Fremont cottonwoods or mixed Fremont and narrowleaf cottonwoods dominate the community, with understories of three-leaf sumac and coyote willow, often mixed with salt cedar and Russian olive. Good examples are found along the lower elevation reaches of the North Fork and Uncompahgre Rivers. At mid-elevations, this community is dominated by narrowleaf cottonwoods, sometimes with components of boxelder. Silver buffaloberry, strapleaf willow, hawthorn, and Rocky Mountain juniper grade into the understory at mid-elevations. Good examples are found in the mid-elevation reaches of the North Fork, Cimarron, and Uncompahgre Rivers. As elevations increase into the upper montane and subalpine zones, aspen, blue spruce, and Douglas-fir grade into this community, and narrowleaf cottonwoods are less common. Upper montane riparian understories are characterized by thinleaf alder, redosier dogwood, Utah serviceberry, or snowberry. Subalpine riparian understories include thinleaf alder, redosier dogwood, Drummond's willow, and cow parsnip. The upper montane type is found on the Cimarron River in the south part of the Bostwick Park subwatershed. The lower elevation segments of this habitat are most prevalent in the subwatersheds. Excellent hiding cover, long productive season, and proximity to water make this land cover type attractive to big game and many species of birds

during all seasons. Tall snaggy cottonwoods are preferred nest sites of red-tailed hawks, great-horned owls, and great blue herons, and are favored by bald eagles for winter roosts. The western yellow-billed cuckoo, a species protected under the ESA, breeds in the lower elevation segments of this habitat. Proposed critical habitat for this species is mapped along the North Fork, Gunnison, and Uncompahgre Rivers in the project area (see **Section 3.5**). About 1.6 percent of this vegetation community in the subwatersheds is mapped on BLM lands.

Montane or Subalpine Woodlands or Forest (1.3 percent of the project area)

This vegetation community (**Table 3.4-1**; also **Figures 3.4-2** through **3.4-5 in Appendix C**) is a mosaic of subalpine forests and woodlands with interstitial subalpine meadows. The dominant tree is aspen, but Douglas-fir, subalpine fir, and Engelmann spruce are also mixed with aspen, or present as mixed conifer stands. The understory contains mixed mountain shrubs and montane forbs and grasses at lower elevations in aspen-dominated stands, and dwarf blueberry, mountain lover, Oregon grape, elk sedge, meadowrue at higher elevations in conifer-dominated stands. This community represents about 11 percent of Bostwick Park subwatershed, in the area of Silver Jack Reservoir. It is absent in the Uncompahgre subwatershed, and less than 4 acres are mapped in the Crawford and North Fork subwatersheds combined. This community type provides summer range for big game, nesting habitat for raptors such as the northern goshawk, and potential habitat for lynx, a species protected by the ESA. Less than 0.5 percent of this community type occurs on BLM lands in the project area.

Open Water and Emergent Wetland (0.5 percent of the project area)

Significant open water in the project area includes the Gunnison, North Fork, and Uncompahgre Rivers, Crawford and Silver Jack reservoirs, Connected Lakes, and Sweitzer Lake. Emergent wetlands are indicated by the NLCD along seasonally wet old meander scars along the Uncompahgre, North Fork, and Smith Fork Rivers. The combined mapping of open water and emergent wetlands captured by the NLCD in the project area is shown on **Figures 3.4-2** through **3.4-5 in Appendix C**. Water-loving graminoid species such as Baltic rush, cattails, softstem bulrush, and three-square bulrush characterize these wetlands. Numerous ponds, small streams, and irrigation ditches in the project area, and their fringe wetlands, are largely unmapped due to the resolution of the NLCD (for further characterization of wetlands and surface waters in the project area, see **Section 3.4.2**). Open water and emergent wetlands are habitat for amphibians and certain reptiles, several species of migratory songbirds, fishes, muskrat, beaver, and a host of waterbirds. Approximately 1.3 percent of the open water and emergent wetland community in the subwatersheds occurs on BLM lands.

Bedrock and Cliff (0.2 percent of the project area)

This cover type (**Table 3.4-1**; also **Figures 3.4-2** through **3.4-5 in Appendix C**) includes exposed bedrock and cliffs throughout the subwatersheds, as well as the steep and deeply gullied badlands that fall to the west of Bostwick Park. About 32 percent of the mapped areas of this community in the project area falls on BLM land. Cliffs and outcrop environments in certain contexts provide nest sites for raptors such as prairie falcon, peregrine falcon, and golden eagle, and roost sites for bats.

3.4.1.1 North Fork

The North Fork subwatershed encompasses the North Fork of the Gunnison River Valley from just upstream of the Fire Mountain Canal diversion on the North Fork River near Somerset in Gunnison

County, to the west edge of Rogers Mesa in Delta County. The varied topography and vegetation communities in the subwatershed range from low elevation montane riparian shrublands, woodlands, and forests along the relatively broad valley of the North Fork River, to irrigated agricultural lands, sagebrush shrublands, and semi-desert shrublands on the surrounding low river terraces, to pinyon-juniper woodlands and mixed montane shrublands on terrace breaks and foothills along the north edge of the valley (**Appendix C, Figure 3.4-2**). More than 56 percent of the subwatershed is irrigated agricultural lands (**Table 3.4-1**), consisting mostly of hay meadows and pastures (CDSS 2010).

3.4.1.2 Crawford

The Crawford subwatershed encompasses the Smith Fork River Valley from near the Little Coal Creek confluence north of Saddle Mountain, west across Crawford and Grandview mesas. The south boundary of the subwatershed takes in Crawford Reservoir, then follows the south rim of Smith Fork canyon to the west edge of Grandview Mesa. The north boundary crosses through semi-desert shrublands and badlands north of Grandview Mesa, passes through Cottonwood Mesa, and takes in much of the Cottonwood Creek drainage and Missouri Flats (**Appendix C, Figure 3.4-3**). More than 40 percent of the subwatershed is irrigated agricultural lands, consisting mostly of pasture and hay ground (CDSS 2010). Pinyon-juniper woodlands and semi-desert shrublands make up most of the remainder of the vegetation communities. Prominent landmarks include Young Peak, rising north above the Town of Crawford, and Needle Rock, a distinctive volcanic plug between Missouri Flats and the Smith Fork River in the east part of the subwatershed.

3.4.1.3 Uncompahgre

The Uncompahgre subwatershed encompasses the Uncompahgre River Valley from just south of Colona in Ouray County, north through Montrose County, to the Gunnison River confluence in Delta County. It is roughly bounded on the west by the eastern toe-slopes of the Uncompahgre Plateau, and on the east by semi-desert shrublands and adobe hills that transition to pinyon-juniper woodlands on the rim of the Black Canyon (**Appendix C, Figure 3.4-4**). Approximately 58 percent of the subwatershed is in irrigated agricultural lands (**Table 3.4-1**), consisting primarily of a combination of hay crops and corn or grains (CDSS 2010). Most of the remainder lands are in semi-desert shrublands.

3.4.1.4 Bostwick Park

The Bostwick Park subwatershed encompasses Bostwick Park, Upper Bostwick Park, Shin Park, and Kinikin Heights in Montrose County in its north end, wraps around the east side of Diehl Point, and continues up the Cimarron River Valley in Gunnison County to the Silver Jack Reservoir area in its south end. Approximately 19 percent of the subwatershed is in irrigated agricultural lands (**Table 3.4-1**), mostly consisting of hay meadows and pastures (CDSS 2010). The remainder is in a diverse array of vegetation communities, ranging from pinyon-juniper woodlands and semi-desert shrublands at the lower elevations in the north end, to sagebrush and mixed mountain shrublands at mid-elevations throughout the central portion, to montane and subalpine woodlands, forests and meadows in the higher elevations in the south end (**Appendix C, Figure 3.4-5**).

3.4.2 Wetlands and Riparian Areas

The four subwatersheds within the project area contain numerous aquatic resources, including wetlands, seeps, springs, lakes, ponds, and ephemeral, intermittent, and perennial streams, as well as riparian areas.

Wetland definitions vary by government agency, but the U.S. Army Corps of Engineers (USACE) administers and enforces Section 10 of the Rivers and Harbors Act of 1899 and Section 404 of the CWA. Many waterbodies and wetlands are waters of the United States and are subject to the USACE's regulatory authority.

Section 404 of the CWA defines wetlands as "those areas inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions" (USEPA 2015a).

NRCS defines wetlands as land that has:

- A predominance of hydric soils;
- Is inundated or saturated by surface or groundwater at a frequency and duration sufficient to support a prevalence of hydrophytic vegetation typically adapted for life in saturated soil conditions; and
- Under normal circumstances supports a prevalence of such vegetation" [16 U.S.C. § 3801 (a)(27)].

Reclamation defines a wetland as "An area characterized by periodic inundation or saturation, hydric soils, and vegetation adapted for life in saturated soil conditions. Any number of tidal and nontidal areas characterized by saturated or nearly saturated soils most of the year that form an interface between terrestrial and aquatic environments; including freshwater marshes around ponds and channels, and brackish and salt marshes" (Reclamation 2015).

The BLM defines wetlands as "areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support and which, under normal circumstances, do support a prevalence of vegetation typically adapted for life in saturated soil conditions" (BLM 1992).

Riparian areas occur as narrow bands within the flood zones of rivers, on islands, sand or cobble bars, and along streambanks. They can also form along major canals or ditches. Each federal agency has a unique definition of a riparian area, as shown in **Table 3.4-2**.

Table 3.4-2. Agency Riparian Definitions.

Agency	Riparian Definition
USEPA	Riparian areas are defined as transition areas between terrestrial and aquatic ecosystems (USEPA 2015b).
NRCS	Riparian areas are ecotones that occur along watercourses or water bodies. They are distinctly different from the surrounding lands because of unique soil and vegetation characteristics that are strongly influenced by free or unbound water in the soil. Riparian ecotones occupy the transitional area between the terrestrial and aquatic ecosystems. Typical examples would include perennial and intermittent stream banks, floodplains, and lake shores" (USDA-NRCS 2010).
BLM	Riparian areas are a form of wetland transition between permanently saturated wetlands and upland areas. These areas exhibit vegetation or physical characteristics reflective of permanent surface or subsurface water influence. Lands along, adjacent to, or contiguous with perennially and intermittently flowing rivers and streams, glacial potholes, and the shores of lakes and reservoirs with stable water levels are typical riparian areas (BLM 1992).
Reclamation	Living on or adjacent to a water supply such as a riverbank, lake, or pond. Of, on, or pertaining to the bank of a river, pond, or lake (Reclamation 2015).

Wetlands and riparian areas play a principal role in the ecology of a watershed, such as water storage, water filtration, and biological productivity (USEPA 2016b). The combination of shallow water, high levels of nutrients, and primary productivity is ideal for the development of organisms that form the base of the food web and feed many species of fish, amphibians, and insects (CNHP 2013). Approximately 48 percent of the CPW Tier 1 (priority) vertebrate species depend on wetland and aquatic habitats. In a recent analysis of the state's biodiversity, 41 percent of at-risk vertebrate species were wetland and aquatic dependent (Rondeau et al. 2011).

Freshwater emergent wetlands commonly occur in poorly drained areas such as low-lying depressions. Emergent wetlands in the four subwatersheds are commonly dominated by cattails, giant reeds, spike rushes, bulrushes, sedges, and rushes. Precipitation, shallow groundwater, and irrigation return flows are the primary water sources. Riverine wetlands, another common aquatic resource type in the study area, typically support riparian areas adjacent to perennial or intermittent streams and are sustained by surface water and shallow groundwater or overbank flooding during spring runoff or after monsoonal storm events. Freshwater forested/shrub wetlands are commonly dominated by Drummond's willow, coyote willow, thinleaf alder, and red-osier dogwood (Lyon and Williams 1998). Riparian areas at lower elevations typically contain an overstory of narrowleaf or Fremont's cottonwood and coyote willow or skunkbush sumac. With increasing elevation, the cottonwoods of riparian zones are replaced by aspen and Douglas fir. The scientific names of plants mentioned in the text are provided in **Table E-2 of Appendix E**.

Wetlands and riparian areas are susceptible to land-use activities that affect water quality or hydrologic regimes. In the following sections, wetlands and other aquatic resources found within the four subwatersheds are summarized in accompanying tables according to landownership; information is based on existing National Wetland Inventory (NWI) data.

3.4.2.1 North Fork

Table 3.4-3 shows the wetland and other aquatic resource types in the North Fork subwatershed, which includes a total of 30,753 acres (**Appendix C, Figure 3.4-6**). Aquatic resources make up approximately 6.0 percent of the total acreage of the subwatershed; with wetlands (freshwater emergent and freshwater forest/shrub types) accounting for approximately 3.0 percent of the subwatershed and other aquatic resources (freshwater ponds, lakes, and rivers) accounting for approximately 3.0 percent of the subwatershed.

Table 3.4-3. Wetland and Aquatic Resource Types in the North Fork Subwatershed.

Wetland/Aquatic Resource Type1	BLM (Acres)	Private (Acres)	Local (State/County/City Recreation Lands) (Acres)	Other (Acres)	Forest Service (Acres)	Total (Acres)*
Freshwater Emergent Wetland	7.8	620.0	0.0	4.7	0.0	**632.5**
Freshwater Forested/ Shrub Wetland	2.9	277.9	0.0	5.7	0.0	**286.5**
Freshwater Pond	1.0	67.6	0.0	1.9	0.0	**70.4**
Lake	0	0	0.0	0	0.0	**0**
Riverine	34.3	799.7	0.0	9.6	0.0	**843.6**
Subwatershed Total*	**46.0**	**1,765.2**	**0.0**	**21.9**	**0.0**	**1,833.1**

Source: NWI Dataset: freshwater emergent wetlands, freshwater forested/shrub wetland, freshwater pond, lake, riverine
*Totals may differ due to rounding.

3.4.2.2 Crawford

Table 3.4-4 shows the wetland and other aquatic resource types in the Crawford subwatershed, which includes a total of 29,669 acres (**Appendix C, Figure 3.4-7**). Aquatic resources make up approximately 6.6 percent of the total acreage of the subwatershed; with wetlands (freshwater emergent and freshwater forest/shrub types) accounting for approximately 3.8 percent of the subwatershed and other aquatic resources (freshwater ponds, lakes, and rivers) accounting for approximately 2.8 percent of the subwatershed.

Table 3.4-4. Wetland and Aquatic Resource Types in the Crawford Subwatershed.

Wetland/Aquatic Resource Type[1]	BLM (Acres)	Private (Acres)	Local (State/County/City Recreation Lands) (Acres)	Other (Acres)	Forest Service (Acres)	Total (Acres)*
Freshwater Emergent Wetland	37.9	1,014.2	0.0	0.0	0.0	**1,052.1**
Freshwater Forested/ Shrub Wetland	15.5	71.3	0.0	0.0	0.0	**86.7**
Freshwater Pond	8.9	60.5	0.0	0.0	0.0	**69.4**
Lake	10.8	362.4	0.0	0.0	0.0	**373.2**
Riverine	80.9	294.8	0.0	0.0	0.0	**375.7**
Subwatershed Total*	**153.9**	**1,803.2**	**0.0**	**0.0**	**0.0**	**1,957.1**

Source: NWI Dataset: freshwater emergent wetlands, freshwater forested/shrub wetland, freshwater pond, lake, riverine.
*Totals may differ due to rounding

3.4.2.3 Uncompahgre

Table 3.4-5 shows the wetland and other aquatic resource types in the Uncompahgre subwatershed, which includes a total of 203,464 acres (**Appendix C, Figure 3.4-8**). Aquatic resources make up approximately 4.0 percent of the total acreage of the Uncompahgre subwatershed; with wetlands (freshwater emergent and freshwater forest/shrub types) accounting for approximately 2.4 percent of the subwatershed and other aquatic resources (freshwater ponds, lakes, and rivers) accounting for approximately 1.5 percent of the subwatershed.

Table 3.4-5. Wetland and Aquatic Resource Types in the Uncompahgre Subwatershed.

Wetland/Aquatic Resource Type1	BLM (Acres)	Private (Acres)	Local (State/County/City Recreation Lands) (Acres)	Other (Acres)	Forest Service (Acres)	Total (Acres)*
Freshwater Emergent Wetland	80.1	4,392.2	21.0	0.0	0.0	**4,493.3**
Freshwater Forested/ Shrub Wetland	2.9	410.2	28.6	0.0	0.0	**441.8**
Freshwater Pond	21.5	310.8	11.4	0.0	0.0	**343.7**
Lake		188.5		0.0	0.0	**188.5**
Riverine	212.1	2,373.3	36.8	0.0	0.0	**2,622.3**
Subwatershed Total*	**316.7**	**7,675.0**	**97.8**	**0.09**	**0.0**	**8,089.5**

Source: NWI Dataset: freshwater emergent wetlands, freshwater forested/shrub wetland, freshwater pond, lake, riverine.
*Totals may differ due to rounding

3.4.2.4 Bostwick Park

Table 3.4-6 shows the wetland and other aquatic resource types in the Bostwick Park subwatershed, which includes a total of 53,894 acres (**Appendix C, Figure 3.4-9**). Aquatic resources make up approximately 3.7 percent of the total acreage of the subwatershed; with wetlands (freshwater emergent and freshwater forest/shrub types) accounting for approximately 1.9 percent of the subwatershed and other aquatic resources (freshwater ponds, lakes, and rivers) accounting for approximately 1.8 percent of the subwatershed.

Table 3.4-6. Wetland and Aquatic Resource Types in the Bostwick Park Subwatershed.

Wetland/Aquatic Resource Type1	BLM (Acres)	Private (Acres)	Local (State/County/City Recreation Lands) (Acres)	Other (Acres)	Forest Service (Acres)	Total (Acres)*
Freshwater Forested/ Shrub Wetland	3.6	728.0	4.6	0.0	59.8	**796.0**
Freshwater Emergent Wetland	0.8	127.3	2.6	0.0	109.1	**239.8**
Freshwater Pond	0.9	95.1	0.6	0.0	24.6	**121.2**
Lake	0.0	27.7	0.0	0.0	302.4	**330.1**
Riverine	31.5	423.0	31.5	0.0	34.8	**520.8**
Subwatershed Total*	**36.8**	**1401.2**	**39.3**	**0.0**	**530.6**	**2,007.9**

Source: NWI Dataset: freshwater emergent wetlands, freshwater forested/shrub wetland, freshwater pond, lake, riverine.
*Totals may differ due to rounding

3.4.3 Special Status Plant Species

Special status plants in the project area include plants protected under the ESA and plants recognized as Sensitive Species by BLM. This discussion does not extend to special status plants on state-owned lands, or to federal lands in the project area other than BLM or Reclamation lands, since no programmatic or project-specific activities are proposed to occur on those areas.

For each future specific project proposed under this Plan-EA, the following lists of special status species must be confirmed and updated as necessary to reflect the current legal status or BLM status of plant species in the vicinity of the specific project.

Federally Protected Plants

The following table (**Table 3.4-7**) presents plants protected under the ESA that occur or potentially occur within the four subwatersheds. The list was generated using the USFWS Environmental Conservation Online System Information for Planning and Conservation (IPaC) in January 2017, and a follow-up informal technical consultation with a BLM Uncompahgre Field Office (UFO) Biologist (Holsinger, pers. comm.) to confirm presence and absence of each species by subwatershed. The UFO actively maintains a spatial dataset of special status species for the UFO and Gunnison Gorge National Conservation Area, and provided data and local knowledge informing the following discussion. No designated critical habitats for plant species with ESA protection are present within any of the four subwatersheds.

Table 3.4-7. ESA-Protected Plant Species Occurring (X) or Potentially Occurring (P) in the Subwatersheds.

Species	Legal Status	North Fork	Crawford	Uncompahgre	Bostwick Park	Habitat
Clay-loving wild buckwheat *Eriogonum pelinophilum*	Endangered	P	P	X	--	Mancos Shale-derived calcareous soils, usually in swales and bottoms in adobe hills. Associated with semi-desert shrublands in southcentral Delta County and the eastern part of the Uncompahgre Valley in Montrose County. Elevation 5,220-6,400 feet. Critical habitat has been designated, but does not occur within the four subwatersheds.
Colorado hookless cactus *Sclerocactus glaucus*	Threatened	P	--	X	--	Alluvial terraces and Mancos Shale formation (adobe hills) in the Gunnison and Colorado river valleys in Delta, Mesa, Montrose, and Garfield Counties. Associated with semi-desert shrublands. Elevation 4,600-7,130 feet. USFWS has not designated critical habitat for this species.

Two ESA-protected plant species occur in the project area: clay-loving wild buckwheat and Colorado hookless cactus. Most of the documented range for clay-loving wild buckwheat occurs in the Uncompahgre Valley east of the Uncompahgre River, with a significant portion lying within the Uncompahgre subwatershed. Most of the documented range of Colorado hookless cactus lies outside the project area, but high potential exists for its presence in suitable habitat across the north part of the Uncompahgre Valley. Please refer to **Appendix E** for detailed descriptions of these species.

Figure 3.4-10 in Appendix C maps the USFWS-modeled range and CNHP Potential Conservation Areas (PCAs) across the project area where documented occurrences of clay-loving wild buckwheat and Colorado hookless cactus are present or were historically present. Note that although **Figure 3.4-10 in Appendix C** depicts a PCA containing clay-loving wild buckwheat intersecting a small area of the Bostwick Park subwatershed, Holsinger (pers. comm.) confirmed that the documented range of clay-loving wild buckwheat does not extend into the Bostwick Park subwatershed. See the subwatershed-specific sections (**Sections 3.4.3.1** through **3.4.3.1-4**) for more information about the ranges of special status species.

BLM Sensitive Plants

A listing (**Table 3.4-8**) of subwatershed BLM Sensitive plants was compiled from the current list of BLM Sensitive Species of the UFO (BLM 2015a) and the Gunnison Field Office entries from BLM's Statewide List of Sensitive Species (BLM 2015b). Several plants on the BLM Sensitive Species lists were dismissed from further analysis based on lack of habitat or range in the project area. Species assignments for these two tables were confirmed with a UFO BLM Biologist (Holsinger pers. comm.), who maintains a spatial dataset of special status species for the UFO and Gunnison Gorge National Conservation Area, and provided data and local knowledge informing the following discussion.

Table 3.4-8. Presence (X) of BLM Sensitive Plant Species by Subwatershed.

Species	North Fork	Crawford	Uncompahgre	Bostwick Park	Habitat
Colorado desert parsley *Lomatium concinnum*	X	X	X	X	Mancos Shale-derived soils (adobe hills and flats), often on rocky or pebbly substrates. Most often associated with semi-desert shrub communities dominated by shadscale, but also occurs with greasewood, sagebrush, or scrub oak. Elevation 5,500-7,000 ft.
Uncompahgre ("good neighbor") bladderpod *Physaria vicina* *(Lesquerella vicina)*	--	--	X	X	Mancos Shale-derived soils at the ecotone between pinyon-juniper woodland and salt desert scrub, or sandy soils derived from Jurassic sandstones with sagebrush. Endemic to east part of Montrose County and north part of Ouray County, with most documented populations occurring in the Uncompahgre Valley. Elevation 5,705 - 7,536 feet.

Two BLM Sensitive plant species, Colorado desert parsley and Uncompahgre bladderpod, occur in the project area. Colorado desert parsley is found locally in appropriate habitat in all four subwatersheds, whereas Uncompahgre bladderpod is documented only from the Uncompahgre and Bostwick Park subwatersheds. Please refer to **Appendix E** for a complete description of these species.

Figure 3.4-11 in Appendix C maps the CNHP PCAs across the project area where documented occurrences of Colorado desert parsley and Uncompahgre bladderpod are present or were historically present. Many of the PCAs intersect with BLM lands. Several additional occurrences of Colorado desert parsley are mapped by BLM (but not depicted on **Figure 3.4-11 in Appendix C**) in Peach Valley in the northeast part of the Uncompahgre subwatershed, and on private lands in the North Fork subwatershed (Holsinger pers. comm.).

Several BLM sensitive plant species on the UFO and Gunnison Field Office were eliminated from further analysis (**Table 3.4-9**) because their documented ranges lie outside the four subwatersheds, or no suitable habitat is present within the subwatersheds.

Table 3.4-9. BLM Sensitive Plant Species Dismissed from Further Analysis.

Species Dismissed from Further Analysis	BLM Field Office	Rationale for Dismissal from Further Analysis
Colorado buckwheat *Eriogonum coloradense*	Gunnison	Documented in northeast Gunnison County, southwest Pitkin County, and Chaffee, Park, and Saguache counties. A high elevation plant (above 8,700 feet). Not documented within or near the four subwatersheds.
Crandall's rockcress *Boechera crandallii (Arabis crandallii)*	Gunnison Uncompahgre	In limestone chip-rock and stony areas, ridges, and steep hill slopes, sometimes in open windswept places. Primary association is sagebrush, but also associates with ponderosa pine, bitterbrush, and mountain mahogany. Ladyman (2005) cites occurrences in Delta, Gunnison, and Montrose counties (without location references or voucher information). Holsinger (pers. comm.) has no records in the UFO and indicated BLM will not require analysis for the project area.
Grand Junction milkvetch *Astragalus linifolius*	Uncompahgre	In rocky soil on dry hillsides, in drainages, and along benches of perennial streams; often on the Chinle and Morrison Formations with pinyon-juniper and sagebrush. Endemic to Montrose County, west Delta County, and southern Mesa County; populations concentrated along the eastern and north sides of the Uncompahgre Plateau. Documented in the Roubideau Creek PCA (Lyon et al. 1999) and historically in the Escalante State Wildlife Area near the northwest part of the Uncompahgre subwatershed (Holsinger pers. comm.). Holsinger (pers. comm.) has no records of this species in the four subwatersheds and indicated BLM will not require analysis for the project area.
Gunnison milkvetch *Astragalus anisus*	Gunnison	Documented only in the upper Gunnison Basin in Gunnison County. Not documented within or near the four subwatersheds (CNHP 2013, Holsinger pers. comm.).
Naturita milkvetch *Astragalus naturitensis*	Uncompahgre	Known only from Mesa, western Montrose, Dolores, San Miguel, and Montezuma counties. Not documented within or near the four subwatersheds (Holsinger pers. comm.).
Paradox breadroot *Pediomelum aromaticum*	Uncompahgre	Known only from extreme western Montrose and Mesa counties. Not documented within or near the four subwatersheds (Holsinger pers. comm.).

Table 3.4-9. BLM Sensitive Plant Species Dismissed from Further Analysis.

Species Dismissed from Further Analysis	BLM Field Office	Rationale for Dismissal from Further Analysis
Paradox Valley (Payson's) lupine *Lupinus crassus*	Uncompahgre	Known only from western Montrose County. Not documented within or near the four subwatersheds (Holsinger pers. comm.).
Rolland's bulrush *Trichophorum pumilum*	Gunnison	A high-elevation (above 9,300 feet) plant in rich fen wetlands. Not documented within or near the four subwatersheds. Populations are documented in western Park County (CNHP 2013).
Sandstone milkvetch *Astragalus sequiflorus*	Uncompahgre	Known only from extreme western Montrose County. Not documented within or near the four subwatersheds (Holsinger pers. comm.).
San Rafael milkvetch *Astragalus rafaelensis*	Uncompahgre	Known only from western Montrose and Mesa counties, on the west edge of the Uncompahgre Plateau. Not documented within or near the four subwatersheds (Holsinger pers. comm.).
Skiff milkvetch *Astragalus microcymbus*	Gunnison	Known only from the upper Gunnison Basin in Gunnison County. Not documented within or near the four subwatersheds (Holsinger pers. comm.).

3.4.3.1 North Fork

There are no documented occurrences of the ESA-protected clay-loving wild buckwheat or Colorado hookless cactus in the North Fork subwatershed (Holsinger pers. comm). The nearest area of documented occurrences of clay-loving wild buckwheat lies about 3 miles west of the subwatershed, in and around designated critical habitat in the Lawhead Gulch area (**Appendix C, Figure 3.4-10**). CNHP (Lyon and Williams 1998) checked for, but did not locate, an historic occurrence of Colorado hookless cactus in the Sulphur Mine PCA, adjacent to (and outside of) the west boundary of the North Fork subwatershed (**Appendix C, Figure 3.4-10**). If Colorado hookless cactus is present in the Sulphur Mine PCA, it would represent the eastern extents of the species' range. The nearest known recent occurrence of Colorado hookless cactus lies about 4.7 miles west-by-northwest of the subwatershed on the toe slope of Redlands Mesa near Payne Siding Road (Reeder, pers. observation; not depicted on **Figure 3.4-10 in Appendix C**). Due to the presence of the nearby documented historic occurrence at Sulphur Mine PCA, the toe slopes of Rogers Mesa in the west end of the subwatershed, in the areas of Stingley Gulch, Allen Gulch, Big Gulch, and the North Fork Gunnison River canyon, have been considered to be potential suitable habitat (where vegetated with low semi-desert shrublands) for Colorado hookless cactus.

The BLM Sensitive Species Colorado desert parsley is documented in the subwatershed in several locations (CNHP 2013; Holsinger pers. comm.) in association with semi-desert shrublands, sagebrush, and mixed mountain shrublands. A small but dense population is on private land in the east part of the subwatershed (**Appendix C, Figure 3.4-10**) on the north side of Cedar Hill near the town of Paonia, both up-gradient and down-gradient of the Stewart Ditch alignment. Other smaller occurrences not pictured on **Figure 3.4-11 in Appendix C** are documented on private lands south of Bell Creek (Holsinger pers. comm.). A few occurrences near J75 Road and Scenic Mesa Road on BLM land along the south edge of the subwatershed are part of the Hotchkiss Hills PCA population that extends southeast into the Crawford subwatershed (**Appendix C, Figure 3.4-11**). CNHP (Lyon and Williams 1998) documented a poor-

quality occurrence of Colorado desert parsley in the Sulphur Mine PCA, adjacent to (and outside of) the west boundary of the North Fork subwatershed (**Appendix C, Figure 3.4-11**).

3.4.3.2 Crawford

There are no documented occurrences of the ESA-protected clay-loving wild buckwheat or Colorado hookless cactus in or near the Crawford subwatershed (Holsinger pers. comm; CNHP 2013). The Crawford subwatershed lies outside the current known range of either species.

The BLM Sensitive Species Colorado desert parsley is documented in the Crawford subwatershed in several locations (CNHP 2013; Holsinger pers. comm.), in association with semi-desert shrublands. CNHP (Lyon and Williams 1998) identified one of Delta County's highest quality and largest populations on a combination of private and BLM lands in the northwest part of the subwatershed (**Appendix C, Figure 3.4-11**), and designated the Hotchkiss Hills PCA to encompass its extents. Significant potential habitat is present for Colorado desert parsley in this subwatershed on BLM lands north of Crawford and between the towns of Hotchkiss and Crawford. A few small occurrences (not pictured on **Figure 3.4-11 in Appendix C**) were observed in 2016 during a rare plant survey on BLM lands just east of the Hotchkiss Hills PCA (Reeder, pers. observation). Colorado desert parsley is not anticipated to occur south of the Smith Fork drainage in the Crawford subwatershed.

3.4.3.3 Uncompahgre

As illustrated on **Figures 3.4-10** and **3.4-11 in Appendix C**, the Uncompahgre subwatershed has many documented occurrences of the ESA-protected clay-loving wild buckwheat and Colorado hookless cactus, as well as several areas with occurrences of the BLM Sensitive Colorado desert parsley and Uncompahgre bladderpod. Clay-loving wild buckwheat and Colorado desert parsley appear to be limited in range to that part of the subwatershed east of the Uncompahgre River; however, any suitable habitat across the valley has a good chance of hosting either plant.

Several additional occurrences of all four special status species are mapped by BLM (but not depicted on **Figures 3.4-10** and **3.4-11 in Appendix C**) in Peach Valley in the northeast part of the Uncompahgre subwatershed, and one additional occurrence of Colorado hookless cactus is documented by BLM (but not depicted on **Figure 3.4-10 in Appendix C**) on the west edge of the Uncompahgre subwatershed upgradient of the CQ Lateral in a regional power transmission alignment (Holsinger pers. comm.). The small remnant populations of clay-loving wild buckwheat on low terraces near the Uncompahgre River suggest that other small remnants might exist in the valley.

3.4.3.4 Bostwick Park

There are no documented occurrences of the ESA-protected clay-loving wild buckwheat or Colorado hookless cactus in or near the Bostwick Park subwatershed (Holsinger pers. comm.; CNHP 2013). The Bostwick Park subwatershed lies outside the current known range of either species. Although **Figure 3.4-10 in Appendix C** depicts a PCA containing clay-loving wild buckwheat intersecting a small area of the Bostwick Park subwatershed, Holsinger (pers. comm.) confirmed that the documented range of clay-loving wild buckwheat does not extend into the Bostwick Park subwatershed (note that PCA boundaries are intended to coarsely delimit a plant population with a buffer sufficient to provide for its conservation).

BLM Sensitive Colorado desert parsley and Uncompahgre bladderpod have been documented in the north end of the Bostwick Park subwatershed on BLM lands, west of the Bostwick Park mesa in areas where CNHP's PCAs intersect the subwatershed (**Figure 3.4-11 in Appendix C**). Based on regional vegetation mapping (**Figure 3.4-5 in Appendix C**) and elevations in the subwatershed, we expect the ranges of Colorado desert parsley or Uncompahgre bladderpod to be limited to the northern third of the subwatershed (roughly delimited by the south edge of Upper Bostwick Park, where the vegetation communities transition from pinyon-juniper woodlands to sagebrush and mixed mountain shrublands).

3.4.4 Invasive Species

Undesired invasive plant species (weeds) are present to some degree within every plant community across the four subwatersheds. Typically, these species are exotic (from different continents or distant ecosystems)—introduced either intentionally or escaped into native plant communities as forage plants (pasture grasses, sweetclover, redstem filaree); ground cover (crested wheatgrass); ornamental or landscaping plants (purple loosestrife, oxeye daisy, Siberian elm); or erosion control or windbreak plants (such as salt cedar and Russian olive). Other invasive species probably historically entered the area as contaminants in agricultural seed sources (downy brome [cheatgrass], jointed goat grass, field bindweed). Many species (houndstongue, common cocklebur, puncturevine) feature burs or spines which enable them to attach to wildlife, pets, people's clothing, and vehicle tires and move great distances. Others can spread seeds great distances using the wind (tumbleweed [Russian thistle], dandelion) or waterways (salt cedar).

The weeds in the region are exceedingly well adapted to our climate and soil conditions, and many can form monocultural stands due to their reproductive characteristics (for example, the rhizomatous roots of Russian knapweed, hoary cress [whitetop], and Canada thistle, or the early-season seeding of downy brome). Many weeds are not palatable to livestock or wildlife. Others are toxic to livestock, reduce agricultural productivity, and generally diminish the function of native plant communities.

The distribution of weeds across the project area is largely tied to ground disturbance and human development. Weeds typically thrive along roadsides, around residential development, in the margins of agricultural fields, in feed yards, around stock ponds, along open ditches, and in many stream corridors. Each of these types of areas has important vectors of seed transport and conditions that allow weed species to outcompete native plants. Weeds are more common in the lower elevations of the four subwatersheds.

Aside from perpetually disturbed or neglected areas near human developments, semi-desert shrubland communities and low-elevation riparian areas host the highest number of weed species and the most widespread infestations in the subwatersheds, whereas fewer weed species are adapted to higher elevation conditions and there is less disturbance and fewer vectors to spread them.

The most common weeds infringing on the lower-elevation native upland vegetation communities of the four subwatersheds include various annual mustards, the perennial mustard hoary cress, Russian thistle, kochia, halogeton, Russian knapweed, and downy brome. In low- to mid-elevation riparian areas and along ditch banks, additional weed species occur and are often dominant, including salt cedar, Russian olive, Siberian elm, and several species of thistle. The more common weeds in higher-elevation montane and subalpine communities (both uplands and riparian areas) include houndstongue, scentless chamomile, oxeye daisy, various thistles, and toadflax.

In recent years, BLM found that 46 percent of sampled riparian communities, 58 percent of sampled travel routes, and 70 percent of sampled ponds in the UFO contained at least some level of exotic species (BLM 2016). Despite active county and BLM-coordinated weed control efforts in the region, there is anecdotal and trend study evidence that undesirable exotic species are increasing overall, both in numbers and distribution (BLM 2016).

When a weed has been determined to pose a substantial economic threat, it is listed as "noxious" under the Colorado Noxious Weed Act in one of three categories. "List A" weeds are designated for eradication, and are usually less common or thought to be present at levels at which eradication is possible. "List B" weeds are typically well-established and mandated for control and containment. "List C" weeds are species for which the state supports local government's management on public and private lands, but for which there is no mandate for eradication or control. The four counties in the project area have adopted noxious weed management plans (as mandated by the Act), established weed management programs, and set management priorities. BLM, as surface owner of nearly 11 percent of the project area, also participates in an integrated weed management program (BLM 2016).

Table E-1 in Appendix E presents the state-listed noxious weeds (Colorado Dept. of Agriculture 2016) currently known from and potentially occurring in the project area by county (CSU 2017; Delta County 2010; Montrose County 2011, 2017; Ouray County 2011), along with the current management priority for each weed assigned by the counties and BLM's UFO (BLM 2016). Several other exotic species mentioned elsewhere in this discussion but not on the state noxious weed list are present and troublesome in the project area, although not currently prioritized by the state. One of these, Siberian elm, is a BLM UFO weed species of concern (BLM 2016). The scientific names for the plant species mentioned in this discussion are listed in **Table E-2 in Appendix E**.

3.5 Wildlife

Wildlife in the project area (the four subwatersheds combined) includes big game, other mammals, reptiles, amphibians, fishes, and birds, including raptors, game birds, waterbirds, and migratory songbirds. An overview of wildlife habitat is presented in **Section 3.4** (Vegetation), and species-specific habitat requirements are discussed throughout this section as appropriate. Terrestrial wildlife, including big game, other mammals, reptiles and birds are discussed in **Sections 3.5.1** and **3.5.2**. Fish and amphibians are discussed in **Section 3.5.3**. The scientific names of wildlife species mentioned in the text are provided in **Table E-3 of Appendix E**.

3.5.1 Terrestrial Wildlife

Wildlife in the project area includes habitat generalists and habitat specialists. Habitat generalists, such as mule deer or American robin, use a broad range of habitat types. Habitat specialists, such as the Gunnison sage-grouse, depend on a specific habitat type for their entire life cycle. Many species have specific requirements for nesting, hibernation, and other life functions—for example, peregrine and prairie falcons nest on cliffs, and bats need caves or rock crevices for roosting or hibernation. Many habitat generalists are wide-ranging, such as the black bear, whose home range can cover more than 70 square miles. Other generalists such as the striped skunk often have home ranges smaller than a square mile. These characteristics, along with whether a species is rare or common, or imperiled or secure, are important considerations in assessing the effects of proposed project components on wildlife (**Section 5.5**).

Big Game

Big game species in the four subwatersheds include elk, mule deer, moose, bighorn sheep, black bear, and mountain lion. Elk and mule deer are the most abundant big game in the subwatersheds, and are of high public interest and economic importance to the State of Colorado and local economies due to hunting and tourism revenues. Elk and deer generally summer in higher elevation montane and subalpine woodlands and forests; winter in the valleys in lower elevation pinyon-juniper woodlands, sagebrush shrublands, riparian corridors, and agricultural areas; and spend the majority of their seasonal transition times in mid-elevation mixed montane shrublands. Resident populations of mule deer are found in many areas across the subwatersheds.

Figures 3.5-1 and **3.5-2 in Appendix C** depict the CPW-mapped seasonal distribution of elk and mule deer across the project area. For both elk and mule deer, the North Fork, Bostwick Park, and Crawford subwatersheds provide overall winter range, significant winter concentration areas and severe winter range.[1] Of the four subwatersheds, the Uncompahgre subwatershed is the least important for elk, with only 12 percent of the subwatershed providing severe winter range and 4 percent in winter concentration areas (**Table 3.5-1**). None of the Uncompahgre, North Fork, or Crawford subwatersheds provide summer range for elk, whereas nearly half of the Bostwick Park subwatershed is elk summer range, and 16 percent is an elk production area (where calving and early rearing takes place). All four subwatersheds have large percentages of area occupied by resident populations of mule deer (**Table 3.5-1**). Mule deer are present year-round in all four subwatersheds, but most abundant during winter, especially in the Crawford, North Fork, and west part of the Uncompahgre subwatersheds, when herds move in from surrounding summer range in the mountains. Habitat quantity and quality on winter range is a limiting factor for mule deer and elk populations in the region (CPW 2014). Elk and mule deer are more vulnerable to starvation and predation during the winter months, especially during severe winters.

[1] A winter concentration area is that part of the overall range where higher quality habitat supports significantly higher animal densities than surrounding areas, and typically where densities are at least 200 percent greater than the surrounding winter range density during the same period in the average five winters out of ten. Severe winter range is the area where 90 percent of the individuals are located when the annual snowpack is at its maximum and/or winter temperatures are at a minimum in the two worst winters out of ten.

Table 3.5-1. Elk and Mule Deer Ranges in the Project Area, Expressed as Percentages of each Subwatershed.

Range Type by Species	North Fork	Crawford	Uncompahgre	Bostwick Park
Elk				
Winter Range	97%	100%	14%	87%
Winter Concentration Area	36%	24%	4%	52%
Severe Winter Range	96%	99%	12%	32%
Migration Corridor	--	1%	--	--
Resident Population Area	--	--	--	4%
Summer Range	--	--	--	48%
Summer Concentration Area	--	--	--	3%
Production Area (Calving)	--	--	--	16%
Mule Deer				
Winter Range	100%	100%	65%	83%
Winter Concentration Area	61%	36%	13%	39%
Severe Winter Range	97%	99%	55%	22%
Concentration Area	35%	70%	32%	--
Resident Population Area	98%	100%	84%	16%
Summer Range	99%	100%	--	98%

CPW (2016) maps the overall range of moose in the east part of the North Fork subwatershed, and in the south part of the Bostwick Park subwatershed. In the Bostwick Park subwatershed, CPW has mapped priority habitat, summer range, and a concentration area in the area of Silver Jack Reservoir (CPW 2016). CPW defines moose concentration areas as that part of the range where densities are at least 200 percent greater than the surrounding range density during the same period in the average five summer seasons out of ten. There were no records of breeding populations of moose in Colorado until their introduction to the state in 1978 (Armstrong et al. 2011). Moose favor forest edges near water. Bighorn sheep occur peripherally in the North Fork and Crawford subwatersheds and are discussed in **Section 3.5.3** (Special Status Species).

The black bear is a wide-ranging opportunistic omnivore with a relatively large territory size requirement. In the subwatersheds, it is most often associated with montane shrublands, mesic drainages, and riparian areas, where acorns, nuts, and berries are plentiful. CPW (2016) maps black bear summer concentration areas across the majority of the Bostwick Park subwatershed, and in the east extents of the North Fork and Crawford subwatersheds. Black bear fall concentration areas cover most of the south part of the Bostwick Park subwatershed (CPW 2016). Black bears hibernate in winter, beginning as early as October, in rock shelters or excavations under shrubs (Armstrong et al. 2011). Mountain lion, like black bear, are widely distributed, wide-ranging, and have large territory size requirements. They are relatively uncommon throughout all four subwatersheds, favoring rough terrain and following the migratory patterns of mule deer, their primary prey (Armstrong et al. 2011).

Other Mammals

Other mammals in the subwatersheds include bobcat, coyote, red fox, yellow-bellied marmot, porcupine, badger, weasels, mountain and desert cottontail rabbits, white-tailed jackrabbit, raccoon, striped and spotted skunks, ringtail, and several species of mice, ground squirrels, chipmunks, woodrats, voles, and bats. Small mammals particularly associated with wetlands or riparian areas in the subwatersheds are beaver and muskrat, and less commonly, river otter and mink (Armstrong et al. 2011).

Reptiles

Common reptiles in the subwatersheds include bullsnake, western terrestrial garter snake, smooth green snake, sagebrush lizard, fence lizard, plateau striped whiptail (a lizard), short-horned lizard, and collared lizard (Hammerson 1999). Reptiles are more abundant and diverse in the lower elevations of the subwatersheds, and most often associated with semi-desert shrublands, sagebrush shrublands, pinyon-juniper woodlands (and less commonly with montane shrublands and woodlands). Many prefer rocky ground or canyon topography. The bullsnake is a habitat generalist and feeds on rodents and other small mammals, bird eggs, and nestlings. The western terrestrial garter snake is often found in any habitat near flowing or non-flowing water where amphibian, small fishes, or small rodent prey is present. The smooth green snake feeds mainly on insects in grassy riparian areas, but is also found away from water in montane shrublands. The lizard species generally prefer sparse vegetation at ground level, easy access to sunlight, rocky areas for basking and hiding, areas with rodent burrows, or patches of soft soil for burrowing. Each of these reptile species hibernates between approximately October and April in burrows, under rocks or other objects, or in rock crevices.

Birds

Up to 240 species of birds occur or potentially occur in the project area as residents or annual visitors (Lambeth and Reeder 2009), including raptors, game birds, waterbirds, and songbirds. Riparian and wetland vegetation communities host the highest number of species throughout the year, whereas the cliff and bedrock vegetation community has the lowest number. In the upland vegetation types, the mid- to high-elevation forests and woodlands support more bird species during spring, summer, and fall, whereas pinyon-juniper woodlands and lower-elevation shrublands support more bird species during winter than other vegetation types (Lambeth and Reeder 2009).

Raptors in the four subwatersheds include eagles, falcons, hawks, and owls. The most ubiquitous raptors in the area are the red-tailed hawk and American kestrel. Other common raptors occurring in a variety of habitat types include the northern harrier, great-horned owl, golden eagle, Cooper's hawk, peregrine falcon, and prairie falcon. Turkey vultures are also fairly common, especially around canyon woodlands, but are rare breeders in the region. Bald eagles are fairly common winter residents throughout the subwatersheds (**Appendix C, Figure 3.5-3**), concentrating along river corridors, but also foraging in croplands and shrublands for rodents and carrion. CPW (2016) maps numerous bald eagle roosts and a few recently active nest sites across the subwatersheds (**Appendix C, Figure 3.5-3**). Some raptors in the region initiate nesting as early as January (bald eagles and great-horned owls), but the majority initiate in March, depending on climate conditions. Most raptors typically fledge their young by mid-July, but some individual clutches could fledge as late as mid-August (Lambeth and Reeder 2009; CDOW 2008).

Common waterbirds (waterfowl, shorebirds) that breed in the wetland and riparian areas of the subwatersheds include mallard, green-winged teal, cinnamon teal, gadwall, bufflehead, Canada goose,

American coot, great blue heron, killdeer, spotted sandpiper, American avocet, sora, and belted kingfisher (Lambeth and Reeder 2009). Several great blue heron rookeries and goose production and wintering areas are mapped along the North Fork, Uncompahgre, Gunnison, and Cimarron Rivers in the subwatersheds (CPW 2016). The majority of waterbirds in the area begin nesting in May, although documented nest records for Canada geese and mallards occur early as March 11. The nesting season can last through August. Others that migrate or overwinter in the area include greater sandhill crane, Wilson's phalarope, lesser yellowlegs, pied-billed grebe, western grebe, bufflehead, common merganser, and white-faced ibis. Game birds occurring in some or all of the subwatersheds include wild turkey, ring-necked pheasant, and dusky grouse.

Migratory songbirds that are common breeders in the subwatersheds include common nighthawk, black-chinned and broad-tailed hummingbirds, northern flicker, a variety of flycatchers, plumbeous vireo, black-billed magpie, common raven, horned lark, a variety of swallows, mountain chickadee, pygmy nuthatch, house wren, ruby-crowned kinglet, mountain bluebird, American robin, European starling, western meadowlark, Brewer's blackbird, red-winged blackbird, yellow warbler, spotted towhee, green-tailed towhee, song sparrow, and house sparrow (Lambeth and Reeder 2009). The majority of migratory songbirds in the region nest between April and mid-July, with a few records showing nesting initiated in March for horned lark, European starling, common raven, and black-billed magpie. Several of these species overwinter in the lower elevation areas of the subwatersheds. Common spring and fall migrants include western wood peewee, chipping sparrow, vesper sparrow, white-crowned sparrow, and yellow-rumped warbler.

All migratory birds in the project area (except non-native species including introduced game birds) are protected under the Migratory Bird Treaty Act of 1918 (MBTA), which is enforced by the USFWS, and makes unlawful any "take" of a migratory bird. Further, EO 13186 of January 10, 2001 (66 Federal Register [FR] 3853–3856), regarding implementation of the MBTA, directs federal agencies "to ensure that environmental analyses of federal actions required by NEPA or other established environmental review processes evaluate the effects of actions and agency plans on migratory birds, with emphasis on species of concern." Additional protection is afforded to eagles under the Bald and Golden Eagle Protection Act of 1940.

Table 3.5-2 presents migratory bird species of concern occurring or with the potential to occur in the four subwatersheds. The table was compiled using USFWS' Environmental Conservation Online System IPaC in January 2017 and BLM's Draft Resource Management Plan and Environmental Impact Statement for the UFO (BLM 2016). Several species of concern listed in **Table 3.5-2** are protected under the ESA or considered sensitive by BLM, and are further discussed in **Section 3.5.2** (Special Status Species). Habitat notes, including nesting periods, were synthesized from Kingery 1998, Lambeth and Reeder 2009, and USFWS 2017.

Table 3.5-2. Migratory Bird Species of Concern Occurring or Potentially Occurring in the Subwatersheds.

Species of Concern	Season Present	Habitat Notes/Nesting Periods
American bittern (*Botaurus letiginosus*)	Spring/Summer	Wetlands (marshes); ground nester (no breeding records in the subwatersheds)
Bald eagle (*Haliaeetus leucocephalus*)	Fall/Winter, Rare Nester	Winters in upland areas, especially low shrublands with nearby rivers or lakes; nests in snaggy cottonwoods along forested rivers and lakes; nesting January through July
Black rosy-finch (*Leucosticte atrata*)	Winter	Open country, mountain meadows, high deserts, valleys, and plains; nests in alpine zone near rocks and cliffs (no breeding records in the subwatersheds)
Brewer's sparrow (*Spizella breweri*)	Summer	Large patches of sagebrush shrublands and shrubsteppe; nesting May through July
Brown-capped rosy-finch (*Leucosticte australis*)	Summer	Alpine meadows, cliffs, talus, high-elevation parks; nesting June 15 through August 25
Burrowing owl (*Athene cunicularia*)	Spring/Summer/ Fall	Open grasslands, low shrublands, short vegetation often in prairie dog colonies; nesting April through July
Cassin's finch (*Carpodacus cassinii*)	Year-round	Open montane coniferous forests; breeds/nests in coniferous forests; migrates through other habitat types; nesting mid-April through mid-August
Chestnut-collared longspur (*Calcarius ornatus*)	Spring Migrant	Open grasslands and cultivated fields (no breeding records in the subwatersheds)
Ferruginous hawk (*Buteo regalis*)	Fall/Winter	Open country, grasslands, shrublands, croplands; nests on cliffs and outcrops (no breeding records in the subwatersheds)
Flammulated owl (*Otus flammeolus*)	Summer	Montane and subalpine forests, including ponderosa pine, Douglas-fir, aspen, and aspen-conifer mix; nesting May through mid-August
Fox sparrow (*Passerella iliaca*)	Summer	Willow carrs and wet meadows above 7,500 feet; dense shrubby understories associated with watercourses; nesting May through July
Golden eagle (*Aquila chrysaetos*)	Year-round	Open country, grasslands, woodlands, barrens in hilly or mountainous terrain; nests on rock outcrops or large trees; nesting possible January through mid-August
Grace's warbler (*Dendroica graciae*)	Summer	Mature ponderosa pine forests; nesting May through July
Gray vireo (*Vireo vicinior*)	Summer	Pinyon-juniper woodlands and open juniper-grasslands; nesting mid-May through July
Gunnison sage-grouse (*Centrocercus minimus*)	Year-round	Large patches of sagebrush shrublands are required to complete its life cycle (listed as threatened under the ESA – see **Section 3.5.3**); nesting March through July
Juniper titmouse (*Baeolophus ridgwayi*)	Year-round	Pinyon-juniper woodlands, especially juniper; nests in tree cavities; nesting mid-April through July
Lewis's woodpecker (*Melanerpes lewis*)	Year-round	Coniferous, aspen, riparian woodland and forests, orchards, and sometimes pinyon-juniper woodlands; nesting mid-April through July
Loggerhead shrike (*Lanius ludovicianus*)	Year-round	Greasewood, saltbush shrublands, grasslands, suburban areas with scattered trees and shrubs; nesting mid-April through mid-August

Table 3.5-2. Migratory Bird Species of Concern Occurring or Potentially Occurring in the Subwatersheds.

Species of Concern	Season Present	Habitat Notes/Nesting Periods
Long-billed curlew (*Numenius americanus*)	Spring/Fall Migrant	Lakes and wetlands, and adjacent grass and shrub communities (no breeding records in the subwatersheds)
Olive-sided flycatcher (*Contopus cooperi*)	Summer	Coniferous forests and woodlands, near openings; early successional forests with standing snags; nesting June through July
Peregrine falcon (*Falco peregrinus*)	Spring/ Summer	Open country near cliff habitat, often near rivers, lakes, marshes; nests on ledges and alcoves on cliffs and crags mid-March through mid-August
Pinyon jay (*Gymnorhinus cyanocephalus*)	Year-round	Pinyon-juniper woodlands; nesting late February through mid-August
Prairie falcon (*Falco mexicanus*)	Year-round	Open country in mountains, steppe, or prairie; winters on cultivated fields; nests on cliffs or embankments; nesting mid-March through July
Mountain plover (*Charadrius montanus*)	Rare Spring/Fall Migrant	High plains, cultivated fields, desert scrublands, often in association with heavy grazing (no breeding records in the subwatersheds)
Sage thrasher (*Oreoscoptes montanus*)	Summer	Sagebrush and semi-desert shrublands; nests in or beneath dense shrubs; nesting May through July
Short-eared owl (*Asio flammeus*)	Winter	Forages in treeless terrain (grasslands, shrublands, wetlands), but may roost in trees in snowy conditions (no breeding records in the subwatersheds)
Snowy plover (*Charadrius alexandrines*)	Rare Spring Migrant	Sparsely vegetated sand flats with greasewood, saltgrass (no breeding records in the subwatersheds)
Swainson's hawk (*Buteo swainsoni*)	Rare Summer Resident	Grasslands, cultivated lands, lowland riparian woodlands; nests in a variety of trees, shrubs, or utility poles; nesting mid-April through mid-August
Veery (*Catharus fuscescens*)	Possible Summer Resident	Moist dense willow carrs or thickest of alders or cottonwood saplings along montane rivers or streams (no breeding records in the subwatersheds)
Virginia's warbler (*Vermivora virginiae*)	Summer	Gambel oak shrublands, mixed montane shrublands, pinyon-juniper woodlands; brushy cover for ground nests; nesting mid-May through mid-August
Western grebe (*Aechmophorus occidentalis*)	Spring/Fall Migrant	Open water with marshy shoreline; occasional breeder in the subwatersheds; nesting mid-May through August
Western yellow-billed cuckoo (*Coccyzus americanus*)	Summer	Cottonwood riparian forests and woodlands with shrubby understories (listed as threatened under the ESA with proposed critical habitat – See **Section 3.5.3**); nesting mid-June through August
Williamson's sapsucker (*Sphyrapicus thyroideus*)	Summer	Feeds almost exclusively in coniferous trees; nests in aspen and mixed conifer-aspen forest; nesting May through mid-August
Willow flycatcher (*Empidonax trailii*)	Summer	Riparian and moist shrubby areas; winters in shrubby openings with short vegetation; nesting June through July

3.5.1.1 North Fork

The North Fork subwatershed encompasses severe winter range and extensive winter concentration areas in the North Fork Valley for elk and mule deer herds migrating from summer range on Grand Mesa and the West Elk Mountains (**Figures 3.5-1** and **3.5-2 in Appendix C**). Resident populations of mule deer occur throughout the subwatershed, with a major concentration area on Rogers Mesa, in the west end (**Appendix C, Figure 3.5-2**). Roger's Mesa is mostly in irrigated hay, pasture, and fruit orchards, with low-density residential development. Land use and movement patterns of both elk and deer on Rogers Mesa are affected by areas of big-game crop-protection fencing, especially north of Highway 92. With the combination of mule deer resident population and winter deer and elk migrants, the highest numbers of mule deer and elk occur in the North Fork subwatershed in winter. Black bear and mountain lion are expected to be present seasonally at low densities throughout the subwatershed. The variety of small mammals, reptiles, and amphibians described in **Section 3.5.1** are expected to occur throughout the subwatershed in suitable habitats. The array of birds described in **Section 3.5.1** as well as migratory birds of concern described in **Table 3.5-2** could all reasonably be expected to occur in the subwatershed in suitable habitats, with the exception of Gunnison sage-grouse and brown-capped rosy-finch.

3.5.1.2 Crawford

Nearly the entire Crawford subwatershed encompasses severe winter range, and approximately one-quarter of the subwatershed provides winter concentration areas for elk and mule herds migrating from summer range in the West Elk Mountains (**Figures 3.5-1** and **3.5-2 in Appendix C**). Resident populations of mule deer occur throughout the subwatershed, with a major concentration area on Grandview and Crawford mesas and in the upper Smith Fork drainage (**Appendix C, Figure 3.5-2**). Black bear and mountain lion are expected to be present seasonally at low densities throughout the subwatershed. The variety of small mammals, reptiles, and amphibians described in **Section 3.5.1** are expected to occur throughout the subwatershed in suitable habitats. The array of birds described in **Section 3.5.1** as well as migratory birds of concern described in **Table 3.5-2** could all reasonably be expected to occur in the Crawford subwatershed in suitable habitat, with the exception of western yellow-billed cuckoo.

3.5.1.3 Uncompahgre

Elk winter range and severe winter range extends into the west and south edges of the Uncompahgre subwatershed (**Appendix C, Figure 3.5-1**), accounting for about 14 percent of the subwatershed's total area (**Table 3.5-1**). The subwatershed also encompasses parts of elk winter concentration areas around Colona and between Roubideau Creek and California Mesa and for wintering animals coming off the Uncompahgre Plateau or the Cimarron Ridge area. Mule deer are year-round residents throughout more than 80 percent of the subwatershed, and concentrate west of the Uncompahgre River in the river corridor and farmlands, and southeast of Montrose in the Montrose Arroyo area (**Appendix C, Figure 3.5-2**). These same resident concentration areas provide severe winter range and winter concentration areas for mule deer migrating off the Uncompahgre Plateau and Cimarron Ridge areas. Black bear and mountain lion are expected to be present seasonally at low densities throughout the subwatershed. The variety of small mammals, reptiles, and amphibians described in **Section 3.5.1** are expected to occur throughout the subwatershed in suitable habitats. The array of birds described in **Section 3.5.1** as well as migratory birds of concern described in **Table 3.5-2** could all reasonably be expected to occur in the Uncompahgre

subwatershed in appropriate habitat, with the exception of brown-capped rosy-finch, Grace's warbler, Williamson's sapsucker, and flammulated owl.

3.5.1.4 Bostwick Park

The Bostwick Park subwatershed encompasses elk summer range, elk production areas around Diehl Point and between Cimarron Ridge and High Mesa, and parts of small resident population areas between the Black Canyon and Bostwick Park (**Appendix C, Figure 3.5-1**). Approximately 52 percent of the subwatershed is mapped as an elk winter concentration area, and 32 percent is mapped as severe winter range (**Table 3.5-1)**. The subwatershed encompasses overall summer and winter ranges for mule deer, with smaller areas of severe winter range and winter concentration areas for animals migrating from the Gunnison Gorge and Black Canyon rim (**Appendix C, Figure 3.5-2**). Small resident populations occur in Upper Bostwick Park, the Shinn Park and Squaw Hill areas, and the Cimarron and Little Cimarron River confluence area. Moose priority habitat and a moose concentration area are mapped in the Silver Jack Reservoir area in the south part of the subwatershed. Black bear and mountain lion are expected to be present seasonally at low densities throughout the subwatershed. The variety of small mammals, reptiles, and amphibians described in **Section 3.5.1** are expected to occur throughout the subwatershed in suitable habitats. The array of birds described in **Section 3.5.1** as well as migratory birds of concern described in **Table 3.5-2** could all reasonably be expected to occur in the subwatershed in appropriate habitat, with the exception of western yellow-billed cuckoo.

3.5.2 Terrestrial Special Status Wildlife Species

Special status wildlife species with the potential to be affected by the Proposed Action are animals protected or proposed for protection under the ESA and their designated or proposed critical habitats, and animals and insects recognized as Sensitive Species by BLM. Under the implementing regulations (50 CFR 402) of the ESA, federal agencies must review their actions and determine whether the action may affect federally listed and proposed species or proposed or designated critical habitat. Species and critical habitats proposed for protection under the ESA are not federally protected, however potential impacts to these elements are being considered by this Plan-EA so that these elements have been adequately analyzed should USFWS finalize the proposed rulings. This discussion does not extend to special status wildlife on state-owned lands, or to federal lands in the project area other than BLM or Reclamation lands, since no programmatic or project-specific activities are proposed to occur on those areas. Special status fish and amphibians are discussed in **Section 3.5.3**.

For each future specific project proposed under this Plan-EA, the following lists of special status species and critical habitats designated or proposed under the ESA must be confirmed and updated as necessary to reflect the current legal status or BLM status of wildlife in the vicinity of the specific project.

ESA-Protected Terrestrial Wildlife and Critical Habitat

Table 3.5-3 presents the three federally protected bird species, one federally protected mammal species, one mammal proposed for federal protection, and their respective proposed or designated critical habitats, potentially occurring in the four subwatersheds. This list was developed using USFWS' IPaC in January 2017. To confirm presence or absence of each ESA-protected species by subwatershed, a follow-up informal technical consultation was held with a UFO BLM Biologist (Holsinger pers. comm.). The UFO actively maintains a spatial dataset of special status species for the UFO and Gunnison Gorge National

Conservation Area, and provided data and local knowledge informing the following discussion. Spatial range mapping datasets maintained by CPW (2016) and other resources were also consulted, as cited. Descriptions of these species and their respective habitats are provided in **Appendix E**.

Table 3.5-3. ESA-Protected Wildlife Species Potentially Occurring in the Subwatersheds.

Element	Occurrence in Subwatershed[1]			
	North Fork	Crawford	Uncompahgre	Bostwick Park
Gunnison sage-grouse *(Threatened)*	--	P	D	D
Gunnison sage-grouse Designated Critical Habitat	--	6.4% of subwatershed	0.8% of subwatershed	57% of subwatershed
Mexican spotted owl *(Threatened)*	--	--	--	--
Mexican spotted owl Designated Critical Habitat	--	--	--	--
Western yellow-billed cuckoo *(Threatened)*	D	--	D	--
Western yellow-billed cuckoo Proposed Critical Habitat	7.6% of subwatershed		2% of subwatershed	
Lynx *(Threatened)*	--	--	--	P
Lynx Potential Habitat (not a legal status)		--		9% of subwatershed
Wolverine *(Proposed Threatened)*	--	--	--	--

[1]."--" indicates no documented occurrence; "D" indicates documented occurrence within last 10 years; "P" indicates potential to occur based on historic range or potentially suitable habitat

BLM Sensitive Wildlife Species

BLM Sensitive wildlife includes those species found on BLM lands for which BLM has the "capability to significantly affect the conservation status of the species through management" and the species is at risk of population decline or dependent on specialized or unique habitat (BLM 2016). BLM administers about 11 percent of the lands within the four subwatersheds.

Table 3.5-4 presents BLM Sensitive wildlife with potential to occur in each of the four subwatersheds. The list was compiled using the current list of BLM Sensitive Species of the UFO (BLM 2015a) and the Gunnison Field Office entries from BLM's Statewide List of Sensitive Species (BLM 2015b). Species appearing on **Table 3.5-4** either have documented occurrences in, or the potential to occur in, the subwatersheds. Several BLM Sensitive Species lists have been dismissed from further analysis in this Plan-EA based on lack of habitat or range in the subwatersheds (**Table 3.5-5**). Species assignments for these two tables were confirmed with a UFO BLM Biologist (Holsinger pers. comm.), who maintains a spatial dataset of special status species for the UFO and Gunnison Gorge National Conservation Area and provided data and local knowledge. Descriptions of these species and their respective habitats are provided in **Appendix E**.

Table 3.5-4. BLM Sensitive Wildlife Species Potentially Occurring in the Subwatersheds.

Species	BLM Field Office	North Fork	Crawford	Uncompahgre	Bostwick Park
MAMMALS					
Gunnison's prairie dog *Cynomys gunnisoni*	Gunnison Uncompahgre	--	--	--	X
White-tailed prairie dog *Cynomys leucurus*	Uncompahgre	X	X	X	X
Spotted bat *Euderma maculatum*	Uncompahgre	X	X	X	X
Fringed myotis *Myotis thysanodes*	Uncompahgre	X	X	X	X
Townsend's big-eared bat *Corynorhinus townsendii*	Uncompahgre	X	X	X	X
Rocky Mountain bighorn *Ovis canadensis*	Uncompahgre	X	X	X	--
BIRDS					
Bald eagle *Haliaeetus leucocephalus*	Gunnison Uncompahgre	X	X	X	X
Golden eagle *Aquila chrysaetos*	Gunnison Uncompahgre	X	X	X	X
Peregrine falcon *Falco peregrines*	Gunnison Uncompahgre	X	X	X	X
Northern goshawk *Accipiter gentilis*	Gunnison Uncompahgre	X	X	X	X
Ferruginous hawk *Buteo regalis*	Gunnison Uncompahgre	X	X	X	X
Burrowing owl *Athene cunicularia*	Gunnison Uncompahgre	X	X	X	X
Brewer's sparrow *Spizella breweri*	Gunnison Uncompahgre	X	X	X	X
REPTILES					
Midget faded rattlesnake *Crotalus viridis concolor*	Uncompahgre	X	--	X	--

BLM Sensitive Wildlife Species Dismissed from Further Analysis

Several BLM sensitive wildlife species in the UFO (including the Gunnison Gorge National Conservation Area) and Gunnison Field Office resource areas were eliminated from further analysis (**Table 3.5-5**) because their documented ranges lie outside the four subwatersheds, or no suitable habitat is present within the subwatersheds.

Table 3.5-5. BLM Sensitive Wildlife Species Dismissed from Further Analysis.

Species Dismissed from Further Analysis	BLM Field Office	Rationale for Dismissal from Further Analysis
Allen's (Mexican) big-eared bat *Idionycteris phyllotis*	Uncompahgre	Only known from the west end of Montrose County in the UFO Resource Area (Holsinger pers. comm.).
Great Basin silverspot butterfly *Speyeria nokomis nokomis*	Uncompahgre	The nearest documented silverspot colony in the UFO area is in Unaweep Canyon in Mesa County. No populations are documented or expected in the subwatersheds (Holsinger pers. comm.).
Kit fox *Vulpes macrotis*	Uncompahgre	Semi-desert shrublands, sagebrush shrublands, and shrubby margins of pinyon-juniper woodlands. Denning tends to occur in bottoms of steep-walled washes, and occasionally among rock outcrops and below rimrock. Historic range in Colorado is the Gunnison and Colorado River drainages below about 6,000 feet. Nearest recently documented population (prior to the year 2000) in the subwatersheds was in Peach Valley near the city of Delta. That population is considered extirpated (Holsinger pers. comm.).
Desert bighorn sheep *Ovis canadensis nelsoni*	Uncompahgre Gunnison	No CPW-mapped occurrences were identified where project activities would occur (CPW 2016).
Longnose leopard lizard *Gambelia wislizenii*	Uncompahgre	Records are from extreme west and southwest Colorado (Hammerson 1999). No populations are documented or expected in the subwatersheds (Holsinger pers. comm.).
Black swift *Cypseloides niger*	Gunnison	Nests in niches and ledges on rock walls near waterfalls or dripping water, or less commonly near the entrances of wet caves (Wiggins 2004). Over 100 nest colony sites have been identified in Colorado, concentrated in the San Juan Mountains and Rocky Mountain National Park. No nest colonies are documented within the subwatersheds, and no suitable nesting habitat is known in the subwatersheds.

3.5.2.1 North Fork

The only ESA-protected wildlife species expected in the North Fork subwatershed (**Table 3.5-3**) is the western yellow-billed cuckoo (threatened). The subwatershed also encompasses proposed critical habitat unit 56: CO-3 (North Fork Gunnison River, Delta County) for this species (**Appendix C, Figure 3.5-5**). Surveys for western yellow-billed cuckoos conducted during the summers of 2008, 2011, and 2015 detected cuckoos in the North Fork River corridor near the towns of Paonia and Hotchkiss, with one confirmed breeding record in Hotchkiss near the confluence of the North Fork and Leroux Creek, the Hotchkiss sewage lagoon and its relatively noisy pumphouse (Beason 2012; Beason pers. comm.). Survey detections in 2015 occurred in the subwatershed between June 9 and August 15, with the August 15 detection being a fledgling (Beason pers. comm.). Proposed critical habitat for yellow-billed cuckoo follows the forested riparian corridor of the North Fork Gunnison River for approximately 20 miles, from near Bowie in the northeast part of the subwatershed to the area of the Hotchkiss National Fish Hatchery (**Appendix C, Figure 3.5-5**). It also takes in about 1.5 mile of the Roatcap Creek drainage upstream of its confluence with the North Fork, as well as about 1.7 miles of cottonwood forests along the south edge of Hansen Mesa and up Short Draw near the town of Hotchkiss. Approximately 7.6 percent (2,327 acres) of the subwatershed is mapped as proposed yellow-billed cuckoo habitat (**Table 3.5-3**).

BLM Sensitive wildlife species expected or with the potential to occur in the North Fork subwatershed are white-tailed prairie dog, the bat species listed in **Table 3.5-4**, Rocky Mountain bighorn sheep (only the extreme west end in the North Fork canyon), the raptors listed in **Table 3.5-4**, Brewer's sparrow, and the midget faded rattlesnake. Only 4.9 percent of the North Fork subwatershed is BLM land.

3.5.2.2 Crawford

No ESA-protected terrestrial wildlife species are expected to occur in the Crawford subwatershed (**Table 3.5-3**), although the subwatershed encompasses designated critical habitat for Gunnison sage-grouse (**Appendix C, Figure 3.5-4**). The Crawford subwatershed lies northeast of documented occupied range of the Crawford population Gunnison sage-grouse on Fruitland Mesa. Designated critical habitat is mapped on approximately 6.4 percent (about 1,900 acres) of the subwatershed (**Table 3.5-3**) around the area of Crawford Reservoir, and it is classed by USFWS as "potential/unoccupied." A small amount (less than 8 acres) of mapped potential lynx habitat intersects the far east part of the subwatershed (**Appendix C, Figure 3.5-6**), on the lower northwest-facing slopes of Saddle Mountain's north peak. This area is on a steep slope of mixed mountain shrublands, and does not represent suitable primary or secondary habitat for lynx. No documented occurrences of lynx are known from the area and any individual in the area would be considered a transient or dispersing individual.

BLM Sensitive Species expected in, or with the potential to occur in, the Crawford subwatershed are white-tailed prairie dog, the bat species listed in **Table 3.5-4**, Rocky Mountain bighorn sheep (only the extreme west end in the Smith Fork canyon), all raptors listed in **Table 3.5-4**, and Brewer's sparrow. Approximately 21 percent of the Crawford Fork subwatershed is BLM land.

3.5.2.3 Uncompahgre

ESA-protected terrestrial wildlife species expected in, or with the potential to occur in, the Uncompahgre subwatershed (**Table 3.5-3**) are the Gunnison sage-grouse (threatened) and the western yellow-billed cuckoo (threatened). The subwatershed also encompasses designated critical habitat for Gunnison sage-grouse (**Appendix C, Figure 3.5-4**) and proposed critical habitat unit 57: CO-4 (Uncompahgre River, Delta, Montrose, and Ouray Counties) for western yellow-billed cuckoo (**Appendix C, Figure 3.5-5**). Proposed critical habitat for yellow-billed cuckoo comprises approximately 2 percent (4,109 acres) of the subwatershed (**Table 3.5-3**). It follows the forested riparian corridor of the Uncompahgre River for approximately 46 miles, from the south boundary of the subwatershed to the Gunnison River confluence near the city of Delta, and takes in the forested riparian corridor of the Gunnison River extending about 3 miles upstream and 1 mile downstream of the confluence (**Appendix C, Figure 3.5-5**). Surveys for western yellow-billed cuckoos conducted between 2008 and 2011 at limited locations in the Uncompahgre Valley yielded no cuckoo detections (Beason pers. comm.). One informal record of a cuckoo exists for 2009 near the Uncompahgre River in the subwatershed (Beason pers. comm.).

Documented occurrences and suitable habitat for Gunnison sage-grouse are limited to the south end of the subwatershed where critical habitat is mapped (**Appendix C, Figure 3.5-4**). Designated critical habitat comprises approximately 0.8 percent (1,601 acres) of the subwatershed in the Sims Mesa area west of the Uncompahgre River (classed as "occupied") and in an additional isolated area east of the Uncompahgre River south of Dry Cedar Creek (classed as "potential/unoccupied"). Birds in this area belong to the Cerro Summit-Cimarron-Sims Mesa population, which extends northeast to Bostwick Park.

BLM Sensitive Species expected in, or with the potential to occur in, the Uncompahgre subwatershed are white-tailed prairie dog, all bat species listed in **Table 3.5-4**, all raptors listed in **Table 3.5-4**, Brewer's sparrow, and the midget faded rattlesnake. Rocky Mountain bighorn sheep have the potential to occur in appropriate habitat near the north and northwest boundaries of the subwatershed. Approximately 10.6 percent of the subwatershed is BLM land.

3.5.2.4 Bostwick Park

ESA-protected terrestrial wildlife species expected in, or with the potential to occur in, the Bostwick Park subwatershed (**Table 3.5-3**) are the Gunnison sage-grouse (threatened) and lynx (threatened). Approximately 57 percent (about 30,650 acres) of the subwatershed encompasses occupied and potential/unoccupied critical habitat for the Cerro Summit-Cimarron-Sims Mesa Gunnison sage-grouse population (**Appendix C, Figure 3.5-4**). Nearly 9 percent of the subwatershed is mapped as potential lynx habitat (**Appendix C, Figure 3.5-6**), most of which is peripheral to core habitat areas of primary and secondary habitat.

BLM Sensitive Species expected in, or with the potential to occur in, the potential project areas of the Bostwick Park subwatershed are white-tailed prairie dog, Gunnison's prairie dog (only in east of Highway 50 near the confluence of the Cimarron and Little Cimarron Rivers), the bat species listed in **Table 3.5-4**, all raptors listed in **Table 3.5-4**, and Brewer's sparrow. Approximately 7.8 percent of the subwatershed is BLM-managed land.

3.5.3 Fish and Amphibians

Fish and amphibians are found throughout the North Fork, Crawford, Uncompahgre, and Bostwick Park subwatersheds. Fish species primarily occur in the larger streams and rivers such as the Uncompahgre River, the North Fork of the Gunnison River, and the Gunnison River as well as their smaller perennial tributaries, such as the Cimarron River and Smith Fork. Fish also occur in a number of lakes, including Crawford Reservoir, Sweitzer Lake, and numerous small lakes and ponds. Tributary ephemeral and intermittent streams in the four subwatersheds offer limited habitat for fish species. Native stream-dwelling fish species that occur in the study area include bluehead sucker, flannelmouth sucker, roundtail chub, speckled dace and mottled sculpin. Salmonid species include rainbow trout, brook trout, brown trout, native greenback (GB)-lineage cutthroat trout, and Colorado (CO)-lineage cutthroat trout. Non-native, warm water fishes such as smallmouth and largemouth bass, green sunfish, black crappie, bluegill, channel catfish, northern pike, longnose dace, white suckers, and common carp migrate to the local streams from nearby reservoirs and ponds, or from the Colorado River drainage. Non-native fish compete with native fish for food and space; some non-native species prey on native fish. The Lower Gunnison Basin, as described in the Watershed Plan, is home to populations of wild and native trout that are valued recreation and economic resources and important indicators of the health of riparian ecosystems.

Wetlands, ponds, lakes, streams, rivers, and ditches in the four subwatersheds provide potential breeding grounds for numerous amphibian species. The three most common amphibians in the four subwatersheds are tiger salamanders, which typically occur in wetland or riparian habitats; and Woodhouse's toad and western chorus frog, both of which are widespread and common throughout their range. Other species that are known to occur or have historically occurred in the study area include great basin spadefoot toad, bullfrog, and northern leopard frog (Lyon and Williams 1998).

3.5.3.1 Federally Protected Species

According to the USFWS Environmental Conservation Online System IPaC tool, there are five federally listed fish species that should be considered in analysis of the project area, as shown in **Table 3.5-6**. Descriptions of these species are provided in **Appendix E**. IPaC does not recommend inclusion of any federally listed amphibian species in the analysis of the project area.

Table 3.5-6. Federally Protected Fish Species in the Subwatersheds.

Species[1]	Legal Status[2]	Documented Range within North Fork[3]	Documented Range within Crawford[3]	Documented Range within Uncompahgre[3]	Documented Range within Bostwick Park[3]
Bonytail chub *Gila elegans*	E	N	N	N	N
Colorado pikeminnow (*Ptychocheilus lucius*)	E	N	N	N, H	N
Greenback cutthroat trout (*Oncorhynchus clarki*)	T	N	N	N	N
Humpback chub (*Gila cypha*)	E	N	N	N	N
Razorback sucker (*Xyrauchen texanus*)	E	N	N	Y[4]	N

[1] This species list was compiled using USFWS Environmental Conservation Online System IPaC.
[2] Status explanation for species listed under the federal ESA or the Colorado Nongame, Endangered, or Threatened Species. Conservation Act: E = Federally or state-listed as endangered; T = Federally or state-listed as threatened
[3] Y = yes; N = no; H = historic; P = potential (CNHP 2015). Species without documented range in the subwatershed have been eliminated from further analysis.
[4] The documented range for razorback sucker includes the Gunnison River and its 100-year flood plain from the confluence with the Uncompahgre River to Redlands Diversion Dam.

Designated Critical Habitat

Critical habitat has not been designated for the greenback cutthroat trout. Critical habitat for the bonytail chub, Colorado pikeminnow, humpback chub, and razorback sucker was designated in 1994 under one rule, as shown in **Table 3.5-7** (USFWS 1994). According to the IPaC tool, there is designated critical habitat for the Colorado pikeminnow and the razorback sucker along the Gunnison River downstream from its confluence with the Uncompahgre River; this portion of critical habitat lies within the Uncompahgre subwatershed. The designated critical habitat includes the floodplain of the confluence of the Uncompahgre and Gunnison Rivers within the Uncompahgre subwatershed.

Table 3.5-7. Designated Critical Habitat for the Colorado River Endangered Fishes.

Species	Critical Habitat Location Description*
Bonytail chub	Upper Colorado River Basin: portions of the Colorado, Green, and Yampa Rivers Lower Colorado River Basin: Colorado River
Colorado pikeminnow	Upper Colorado River Basin: portions of the Colorado, Green, Yampa, White, Gunnison, and San Juan Rivers Lower Colorado River Basin: none designated
Humpback chub	Upper Colorado River Basin: portions of the Colorado, Green, and Yampa Rivers Lower Colorado River Basin: Colorado and Little Colorado Rivers
Razorback sucker	Upper Colorado River Basin: portions of the Green, Yampa, Duchesne, Colorado, White, Gunnison, and San Juan Rivers Lower Colorado River Basin: portions of the Colorado, Gila, Salt, and Verde Rivers
Source: USFWS 1994 *Upper Colorado River Basin includes portions of Colorado, New Mexico, Utah, and Wyoming. Lower Colorado River Basin includes portions of Arizona, California, and Nevada (USFWS 1994)	

Three primary constituent elements (PCEs) were used in determining critical habitat for the four Colorado River endangered fishes, as described below: (USFWS 1994)

(1) Water – each species requires water of sufficient quantity and quality that is delivered in accordance with the specific hydrologic regime required for each species' particular life cycle.

(2) Physical Habitat – portions of the Colorado River system that are inhabited or potentially habitable by each species throughout their life cycle, including river channels, bottom lands, side channels, secondary channels, oxbows, backwaters, and other areas within the 100-year flood plain of designated waterways.

(3) Biological Environment – includes appropriate food supply, predation, and competition for each listed species.

In addition to these three PCEs, additional selection considerations were used to evaluate critical habitat areas for the razorback sucker. These five additional selection considerations include (1) presence of known or suspected wild spawning; (2) areas with suitable nursery habitat or where juveniles have been collected; (3) areas presently occupied by the species that show potential for species reestablishment; (4) areas of water required for rangewide distribution and diversity; and (5) areas that need special management or protection to ensure species survival and recovery (USFWS 1994).

3.5.3.2 BLM Sensitive Species

The UFO of the BLM maintains a list of fish and amphibian species that have been identified as sensitive species (BLM 2015c). **Table 3.5-8** lists these species and their potential to occur in each subwatershed. Descriptions of these species and their respective habitats are provided in **Appendix E**.

Table 3.5-8. BLM Sensitive Fish and Amphibian Species with Potential Range in the Subwatersheds.

Species[1]	Documented Range within North Fork[2]	Documented Range within Crawford[2]	Documented Range within Uncompahgre[2]	Documented Range within Bostwick Park[2]
Colorado river cutthroat trout (*Oncorhynchus clarki pleuriticus)*	Y	Y	N	Y
Bluehead sucker (*Catostomus discobolus*)	Y	Y	Y	Y
Flannelmouth sucker (*Catostomus latipinnis*)	Y	Y	Y	Y
Roundtail chub (*Gila robusta*)	Y	Y	Y	Y
Canyon treefrog (*Hyla arenicolor*)	Y	Y	Y	Y
Northern leopard frog (*Rana pipiens*)	Y	Y	Y	Y

[1] BLM's UFO Sensitive Species List (Reclamation 2015).
[2] Y = yes; N = no; H = historic; P = potential (CNHP 2015). We have eliminated species without documented range in the subwatershed from further analysis.

3.5.3.3 Project Area Fisheries

Federally Listed Warm Water Fish and Native Fishery Below Delta

The Gunnison River downstream from the Uncompahgre River confluence retains a healthy reproducing population of native fish, in part due to the Redlands Diversion, located 3 miles upstream of the confluence with the Colorado River, which served as a fish barrier to the movement of non-native (predatory) fish for nearly 100 years (Reclamation 2008). Fish passage was provided around the Redlands Diversion in June 1996.

Two of the four warm water, federally listed fish species associated with the Colorado River watershed are known to occur or have been documented in the lower Gunnison River, downstream from Delta, Colorado and downstream of the four subwatersheds. These include the Colorado pikeminnow and the endangered razorback sucker. Thirty-three Colorado pikeminnow and one razorback sucker were collected in the Redlands fish passage during 2016. In addition, 33 bonytail chub were documented ascending the fish passageway at the Redlands Diversion Dam on the Gunnison River in 2016 (32 of these fish were stocked by Ouray National Fish Hatchery Grand Valley Unit in 2016 (CRRP 2016).

The fish trap at the Redlands Diversion Dam also documented captures of native bluehead sucker and flannelmouth sucker , white (hybrid) suckers and roundtail chub (CRRP 2016). Nonnative fish captures included channel catfish, white sucker, gizzard shad, black bullhead, smallmouth bass and green sunfish.

North Fork Fishery

Figure 3.4-6 in Appendix C illustrates the fisheries in the North Fork subwatershed. Tributaries to the North Fork of the Gunnison River and the North Fork mainstem are cold water streams. Cold water releases from Paonia Reservoir regulate streamflow within the subwatershed. However, aquatic habitat in the North Fork is limited throughout the watershed due to agricultural activity, land development, road construction, gravel mining, and other anthropogenic activities. Overall, instream aquatic habitat in the subwatershed is limited by morphological responses in the stream to anthropogenic activities (NFRIA 2000).

Brown and rainbow trout are the most common game fish species (NFRIA 2000). Cutthroat and brook trout are less common but are known to occupy habitat in the subwatershed. Other native species include mottled sculpin, longnose dace, speckled dace, flannelmouth sucker, bluehead sucker and roundtail chub. Northern pike and green sunfish have escaped Paonia Reservoir and have been captured in the stream.

Crawford Fishery

Fisheries in the Crawford subwatershed are shown in **Figure 3.4-7 in Appendix C**. The mainstem of the Smith Fork in the Crawford subwatershed is listed as a cold water fishery by the CDPHE Water Quality Control Division (CDPHE 2016b). The upper reach of the mainstem—above the confluence with Little Coal Creek—supports rainbow trout, cutthroat trout, cutbows (cutthroat trout hybridized with rainbow trout), and brown trout. Colorado River cutthroat trout occupy Second Creek, a tributary to the Smith Fork.

Downstream of this mainstem there is limited water availability throughout much of the growing season (May through October). Limited streamflow results in increasing water temperature, limiting habitat suitability for native species. In addition to greatly reducing in-stream flow, the Feeder Canal and Clipper Canal stream diversions (**Figures 3.2-9 and 3.4-9 in Appendix C**) act as barriers to fish migration and movement (WSE/WSCC 2016).

The Crawford Reservoir on the Smith Fork is located in the Crawford subwatershed and managed by Reclamation to benefit irrigation, fish and wildlife, and flood control (Reclamation 2008). Crawford Reservoir is classified as a warm water fishery containing yellow perch, black crappie, channel catfish, largemouth bass, common carp and rainbow trout (CPW 2016). Northern pike and common carp, illegally introduced in the mid 1990's, impacted the fishery for many years due to predation, particularly to largemouth bass and rainbow trout populations. Removal efforts in 2014 and 2015 were effective at reducing northern pike numbers and the expected result is a more balanced fishery (CPW 2016). The spillway/outlet of Crawford Reservoir may inadvertently be releasing non-native fish in the Smith Fork drainage, a potential detriment to native species (WSE/WSCC 2016). According to the 303(d) list, Crawford Reservoir is not attaining the aquatic life use designation due to impairment from low dissolved oxygen (CDPHE 2016b).

Uncompahgre Fishery

Fisheries in the Uncompahgre subwatershed are shown in **Figure 3.4-8 in Appendix C**. The lower reach of the Uncompahgre River from the Colorado State Highway 90 bridge in Montrose to the Gunnison River is considered a warm water fishery and has the potential to provide limited habitat for the Colorado pikeminnow and the razorback sucker. The Uncompahgre River from Colona to the confluence is a low gradient stream with high sinuosity. Channel morphology is dominated by riffle-run complexes with few

pools (UWP 2013). Channel substrate is dominated by sand and gravel. Streamflow in the Uncompahgre River between the town of Olathe and city of Delta is typically low during the growing season due to irrigation diversions. Irrigation return flows from agricultural activities contain higher levels of selenium, negatively impacting water quality. Aquatic habitat generally suffers due to low flows, increased water temperatures, increased selenium concentrations and historic anthropogenic modifications to the channel and riparian zone.

Bostwick Park Fishery

Fisheries in the Bostwick Park subwatershed are shown in **Figure 3.4-9 in Appendix C**. The Bostwick Park subwatershed includes a storage reservoir on Cimarron Creek called Silver Jack Reservoir, which is operated by Reclamation under the Bostwick Park Project. Silver Jack Reservoir stores water to benefit irrigation, recreation, fish and wildlife, and flood control (Reclamation 2008). The cold water fishery below Silver Jack Reservoir supports brown trout, rainbow trout and cutthroat trout.

3.6 Human Environment

3.6.1 Cultural and Historic Resources

Cultural History of the Lower Gunnison Project Area

Colorado's Office of Archaeology and Historic Preservation (OAHP) and the Colorado Council of Professional Archaeologists (CCPA) have produced a set of prehistoric and historic contexts to guide research and management of the state's cultural resources. These documents provide a framework of regional contexts and themes. The prehistoric context section covers the period from 11,500 B.C. to A.D. 1881 and the Historic Period section covers regional history from the 1700s to the 1960s. The Lower Gunnison project area falls within the Northern Colorado River Basin (Reed and Metcalf 1999) and Mountain (Mehls 1984) study areas.

Prehistory of the Lower Gunnison Project Area

The cultural prehistory of the Northern Colorado River Basin is divided into four major eras or stages: Paleoindian, Archaic, Formative, and Protohistoric. These eras are subdivided into recognized cultural periods, traditions, or phases. The first humans in the Lower Gunnison project area were likely Paleoindian people who arrived during the last ice age (Pleistocene epoch, ca. 2.58 mya – 11.5 kya) and hunted large Pleistocene mammals (like mammoth) before they became extinct in the early part of the Holocene epoch. The following Archaic era is characterized by the adaptations of humans to the warmer, dryer climate of the Holocene. These climate changes are reflected in a greater reliance on plant foods and a wider variety of medium and small prey animals. The Formative era is defined by the appearance of ceramics in the archaeological record reflecting a less mobile lifestyle and the introduction of horticulture. The Protohistoric era is categorized by a return to a much more mobile lifestyle that relied on the horse, an animal introduced by the Spanish.

Paleoindian Era (11,500 to 6400 B.C.)

In general the Lower Gunnison project area was cooler and wetter during the Late Pleistocene and Early Holocene than it is today (Thompson et al. 1993). Now-extinct megafauna including mammoth, sloth, horse, bison, sheep, and musk ox were present during the Paleoindian era (Reed and Metcalf 1999:56). It is possible that evidence for four different Paleoindian stone tool traditions could be present in the Lower

Gunnison project area. In order from oldest to youngest, these are the Clovis, Goshen, Folsom, and Foothill-Mountain stone tool traditions. In general, these traditions reflect smaller dispersed groups of people that did not stay at any one camp for any extended period of time. Paleoindian people are recognized in the archaeological record by their large projectile points that were delivered to targets on the ends of throwing spears and later on the end of shorter spears or darts thrown with a spear thrower called by archaeologists an *atlatl*, which is the Aztec word for this tool. These projectile points were used primarily to hunt large mammals that had become extinct by the end of the Pleistocene.

Archaic Era (6400 to 400 B.C.)

By the middle Holocene (ca. 6400 B.C.) in the Lower Gunnison project area, humans were adapting to a changing climate that resulted in significant shifts in the distribution of plants and animals. The changes in human adaptation that define the transition from the Paleoindian era to the Archaic era reflect these changes in the environment of the Lower Gunnison project area. The Archaic era is recognized in the archaeological record by changes in mobility, technology, and subsistence. One of the major changes observed in the archaeological record of the Archaic era is the increased use of formal housing structures. Projectile points are more variable in form in the Archaic era, and the large unnotched points of the Paleoindian period are replaced by smaller corner and side-notched forms. Archaeologists also observe a significant increase in grinding stones during the Archaic era, which is interpreted as representing the use of a larger variety of plants for food. Toward the end of the Archaic era, archaeologists observe an increase in the reliance on small seeds and the energy invested in processing them, and the first evidence of growing corn.

Formative Era (400 B.C. to A.D. 1300)

Evidence of a greater number and variety of tools in the archaeological record of sites in the Lower Gunnison project area dating to the Formative era suggests longer occupations or repeated use over time. The dart and atlatl are replaced by the bow and arrow during this time, which is reflected in the replacement of dart points in the archaeological record with much smaller corner-notched projectile points. A much greater reliance on the growing of food is reflected in the increased evidence for maize-based horticulture in the archaeological record. Groups of farmers occupied the Colorado Plateau throughout western Colorado and into the surrounding states. The three main cultural traditions identified during this period are Anasazi, Freemont, and Gateway. Although the Anasazi are not thought to have lived in the Lower Gunnison Project area, it would not be unusual to find Anasazi artifacts at sites dating to this time period. These three Formative groups constructed complex dwellings that were grouped into small hamlets all the way up to villages where hundreds of people lived year round. Artifacts and features that are emblematic of this period are two-handed *manos* and trough *metates* for more efficient grinding of large quantities of corn and high quality ceramic vessels for cooking and storing food and water.

Protohistoric Era (A.D. 1300 to 1881)

The Protohistoric era is a highly dynamic time between the established horticultural practices of the Formative era, and the emigration of the Ute into the area after A.D. 1200. After A.D. 1300 the Anasazi moved south from the Four Corners area to New Mexico and Arizona. By A.D. 1300 the Gateway tradition peoples either had emigrated out of the area, or had changed their cultural practices sufficiently that archaeologists are unable to identify their sites as Gateway tradition. The Fremont tradition contracted in area around A.D.1250, but still endured as an identifiable archaeological culture in

northwestern Colorado until A.D.1500 (Reed and Metcalf 1999:146). In the Project Area, the trend towards permanent or semi-permanent settlement seen in the early Formative era ends at the beginning of the Protohistoric era, with a shift back to highly mobile hunter-gatherer groups heavily reliant on bow and arrow technology. The more formal ceramic traditions of the Formative are replaced by the production of utilitarian brown ware ceramic artifacts. The Ute are identified archaeologically by the appearance of characteristic Uncompahgre Brown Ware ceramics, which are usually accompanied by un-notched Cottonwood triangular projectile points and Desert side-notched points. After A.D. 1650, the archaeological record of the Ute reflects the shift to a mobile equestrian lifestyle after contact with the Spanish, and the end of the Protohistoric era in the Project Area is marked by the expulsion and restriction of the Ute to reservation lands in the 1880s.

Post-Contact History

This section discusses the European and Euro-American activities in the Northern Colorado River Basin beginning with the early explorations of the late eighteenth century and ending with industrial and recreation developments of the mid twentieth century. Much of this discussion has been compiled from the historic contexts developed by the OAHP (Mehls 1984) and CCPA (Church et al. 2007).

Early Exploration (1761 to 1859)

The first recorded European expedition into the Colorado River Valley was from 1761 to 1765 when Juan de Rivera led a group north from Santa Fe in what was then New Spain to explore the mountains and valleys north of what is now the Town of Durango, Colorado, in an unsuccessful search for silver. The group was followed in 1776 by Fray Silvestre Velez de Escalante who passed through the area in search of an overland route to Monterey, California (Athearn 1992). The Spanish never found precious metals in Colorado and did not participate to any significant extent in the fur trade that led to the detailed exploration of Colorado by American and British trappers. American interest in Colorado grew with the acquisition of the northern portion of the state with the Louisiana Purchase of 1803. On their return from the Pacific Coast in 1806, the Lewis and Clark Expedition encountered fur-trapping parties coming from the United States. The first documented fur trapping expeditions to the Northern Colorado River Basin were an expedition including Ceran St. Vrain that came north from Santa Fe in 1825 and a party led by Henry Fraeb that trapped the upper reaches of the Colorado River during 1830 and 1831 (Chittenden 1902). The famous trapper Antoine Robidoux left an inscription west of the Lower Gunnison project area near the Utah border in 1837. Many of the experienced trappers were hired as guides by early government expeditions to the area including the expeditions by John C. Fremont (1842, 1843, 1845, 1848, and 1853) and John W. Gunnison (for whom the Gunnison River is named) in 1853.

Sites dating to early exploration and fur trade in the mountain region are rare. Mountain men and early explorers often used Native American trails and camping methods, making it difficult to distinguish one group from another (Mehls 1984:4). The same trails were also used by later groups and often formed the basis of modern transportation routes, which has further obscured evidence of their presence. Traps, trapping equipment, guns, and cutting tools are often the only archaeological evidence left of this early period (Horn et al. 2007:294).

Irrigation Agriculture

Western surface water rights originated in California during the Gold Rush of 1849 and the concept was exported to Colorado during the 1859 Gold Rush. The first miner to use water from a stream was given

the right to use that water over any miner who arrived later. The next miner to arrive and use water was given the right to use water over anyone arriving later, but must defer to anyone with an older water claim. This system of surface water rights was named the Doctrine of Prior Appropriation or the First-in-Time, First-in-Right doctrine. The Doctrine of Prior Appropriation was adopted into the Colorado Constitution in 1876. Water user preference was also established in the state constitution in the order of domestic, agricultural, and industrial. Further, water rights may be bought, sold, inherited, moved from one place to another, or changed from one type of use to another provided the change does not injure other water rights (Holleran 2005).

Knowing what cultural resources have already been recorded in each of the subwatersheds is an indicator of what cultural resources may be encountered during the cultural resource survey of the proposed project elements. Cultural resources that have either been listed on the National Register of Historic Places (NRHP) or have been recommended as eligible for listing on the NRHP will require treatment of any adverse effect resulting from impacts due to project activities and construction. Any cultural resources that have been recommended as requiring additional information before a recommendation of NRHP eligibility can be made are also treated as eligible for inclusion in the NRHP until demonstrated through further work that they are not eligible. There are many named historic irrigation ditches within the Lower Gunnison project area that could potentially be impacted through the proposed or future actions, and named irrigation features in most parts of the State (including the Lower Gunnison project area) are very likely to be eligible for inclusion in the NRHP and therefore would require treatment for any adverse effect that was a result of project activities and construction. Sites that have officially been determined not eligible or are recommended as not eligible for inclusion in the NRHP do not require further consideration of project effects. Isolated finds consist of a limited number of artifacts or isolated features that represent limited human activity and are generally considered not eligible for inclusion in the NRHP. The previously recorded and potential cultural resources in each of the subwatershed are documented below.

3.6.1.1 North Fork

A file search at the OAHP for the North Fork subwatershed documented a total of 114 previously recorded cultural resources. Of these, 92 are sites and 22 are isolated finds (**Table 3.6-1**). There are 23 prehistoric cultural resources, including seven prehistoric sites and 16 isolated finds. Three prehistoric sites—5DT126 (open camp), 5DT127 (open lithic), and 5DT1546 (sheltered camp)—are determined officially eligible for listing in the NRHP. This subwatershed contains 91 previously documented sites and isolates containing historical components (85 sites and 6 isolated finds). Historical sites include three Centennial Farms (5DT1010, the Hotchkiss Ranches; 5DT1223, the Cribb-Leitzinger-Hallenbeck Farm; and 5DT1996, the Valley Homestead). Six architectural sites (5DT1375, Paonia First Christian Church; 5DT1533, the Mathews/Berg Residence; 5DT1769, the Hotchkiss Methodist Episcopal Church; 5DT50, the Hotchkiss Hotel; 5DT528, the Curtis Hardware Store; and 5DT1049, the Hotchkiss Homestead) are listed in the NRHP. Two sites, 5DT444 (Bruce Estate) and 5DT527 (First National Bank of Paonia), are listed in the Colorado State Register of Historic Properties. The Hotchkiss Bridge (5DT274) was officially delisted from the NRHP in 1994. Two historical sites (5DT1723, 5DT 1955) were listed as officially needs data, and one historic site, 5DT89, was field recommended as needing additional data before an NRHP eligibility recommendation can be made. In addition to these sites, there are a total of 22 previously recorded historical linear sites and segments of linear sites in the subwatershed, including one road, three railroads and 18 named irrigation canals and laterals.

Table 3.6-1. Cultural Resource Sites in the North Fork Subwatershed.

North Fork	No Assess	Field Needs Data	Officially Needs Data	Field Not Eligible	Officially Not Eligible	Field Eligible	Officially Eligible	Listed	Total
Prehistoric Sites	1	1	--	1	1	--	3	--	**7**
Historical Sites	5	1	3	23	24	2	17	(10) NRHP=6 State=2 CF=2	**85**
Total	**6**	**2**	**3**	**24**	**25**	**2**	**20**	**10**	**92**

3.6.1.2 Crawford

A file search at the OAHP for the Crawford subwatershed has documented a total of 72 previously recorded cultural resources. Of these, 44 are sites and 28 are isolated finds (**Table 3.6-2**). There are 29 prehistoric cultural resources, including seven prehistoric sites and 22 isolated finds. No prehistoric sites are recommended or officially determined eligible for listing to the NRHP, three sites require additional data before a recommendation of NRHP eligibility can be made, and one site recorded in 1981 has not been evaluated for NRHP eligibility. Of the 43 previously documented historical sites and isolates (37 sites and 6 isolated finds), one historical architectural site (Crawford School, 5DT502) is listed in the Colorado State Register of Historic Properties. One irrigation canal segment (5DT1594.1) was officially determined eligible for listing in the NRHP, and one segment of the Grand View Canal (5DT1780.1) and two segments of the Spurlin Mesa Lateral of the Crawford Clipper Ditch (5DT1811.1 and 5DT1811.2) were field-recommended as supporting the eligibility of their respective resources. In addition to these sites, there are 11 previously recorded historical linear sites, all of them named irrigation canals and laterals.

Table 3.6-2. Cultural Resource Sites in the Crawford Subwatershed.

Crawford	No Assess	Field Needs Data	Officially Needs Data	Field Not Eligible	Officially Not Eligible	Field Eligible	Officially Eligible	Listed	Total
Prehistoric Sites	1	2	1	1	2	--	--	--	**7**
Historical Sites	1	2	--	7	21	1	4	1 (State)	**37**
Multi-component Sites	--	--	--	--	--	--	--	--	**0**
Total	**2**	**4**	**1**	**8**	**23**	**1**	**4**	**1**	**44**

3.6.1.3 Uncompahgre

A file search at the OAHP for the Uncompahgre subwatershed documented a total of 787 previously recorded cultural resources. Of these, 597 are sites and 190 are isolated finds (**Table 3.6-3**). There are 243 prehistoric cultural resources, including 103 prehistoric sites and 140 isolated finds. No prehistoric sites have been listed on the NRHP or Colorado State Register of Historic Properties, but 7 prehistoric sites have been determined officially eligible for listing in the NRHP, and 14 have been recommended as

eligible for listing. This subwatershed has 522 previously documented sites and isolated finds containing historical components (472 sites and 50 isolated finds). Historical cultural resources include 17 sites listed in the NRHP, 8 sites listed in the Colorado State Register of Historic Properties, 1 Local Landmark, and 5 Centennial Farms. In addition to these sites, there are a total of 118 previously recorded historical linear sites and segments of linear sites in the subwatershed, including 9 roads, 13 railroads and 96 named irrigation canals and laterals. There are 22 multi-component sites. Of these, one site is listed in the NRHP (5MN5), and five are officially eligible for listing in the NRHP.

Table 3.6-3. Cultural Resource Sites in Uncompahgre Subwatershed.

Uncompahgre	No Assess	Field Needs Data	Officially Needs Data	Field Not Eligible	Officially Not Eligible	Field Eligible	Officially Eligible	Listed	Total
Prehistoric Sites	3	2	2	21	54	14	7	--	**103**
Historic Sites	12	8	4	163	138	38	78	31 NRHP=17 State=8 CF=5 Local =1	**472**
Multi-component Sites	--	3	--	3	10	--	5	1 (NRHP)	**22**
Total	**15**	**13**	**6**	**187**	**202**	**52**	**90**	**32**	**597**

3.6.1.4 Bostwick Park

A file search at the OAHP for the Bostwick subwatershed documented a total of 260 cultural resources. Of these, 153 are sites and 107 are isolated finds (**Table 3.6-4**). There are 180 prehistoric cultural resources, including 91 prehistoric sites and 89 isolated finds. Eight prehistoric sites have been determined officially eligible for listing to the NRHP, one has been recommended eligible for listing in the NRHP, and two sites requires additional data collection before a recommendation of NRHP eligibility can be made. There are 67 previously documented historical cultural resources, including 51 sites and 16 isolated finds. Historical cultural resources include two Centennial Farms, five sites listed in the NRHP, one site that is officially eligible for inclusion in the NRHP, and seven sites that are recommended eligible for inclusion in the NRHP. In addition to these sites, there are a total of 18 previously recorded historical linear sites and segments of linear sites in the subwatershed, including four roads, seven railroads, six named irrigation canals and laterals, and one electrical transmission line. There are eight multi-component resources, including six sites and two isolated finds. Of these, two are recommended eligible for listing in the NRHP. Five paleontological resources are also documented in the subwatershed, all of which are recommended not eligible for inclusion in the NRHP.

Table 3.6-4. Cultural Resource Sites in Bostwick Park Subwatershed.

Bostwick Park	No Assess	Field Needs Data	Officially Needs Data	Field Not Eligible	Officially Not Eligible	Field Eligible	Officially Eligible	Listed	Total
Prehistoric Sites	2	1	9	9	61	1	8	--	**91**
Historical Sites	3	1	1	7	23	7	2	7 NRHP=5 CF=2	**51**
Multi-component Sites	--	--	--	1	3	2	--	--	**6**
Palehistoric Sites	--	--	--	5	--	--	--	--	**5**
Total	**5**	**2**	**10**	**22**	**87**	**10**	**10**	**7**	**153**

3.6.2 Land Use and Recreation

3.6.2.1 Land Use

Land uses in the subwatersheds primarily include farmland, ranch and pasture land, forested lands, grasslands, and residential/developed lands (USGS 2011). **Table 3.6-5** shows the percentage of the primary land use categories in the watershed area by subwatershed.

Agriculture uses include forage for livestock (primarily cattle), field and sweet corn, onion, beans, small grains, and orchards (River District 2015). The ranch and pasturelands category groups include lands that may be used for dryland grazing and includes sagebrush shrublands and semi-desert shrublands. Grasslands include mixed mountain shrublands and open water/emergent wetlands. The forest category includes montane or subalpine woodlands/forest, pinyon-juniper woodlands, and riparian woodlands/forests. Residential and developed lands include urban and rural residences, as well as associated infrastructure such as water and utility lines and roadways. The project area is generally sparsely populated, except for those areas on the margins of cities and towns with higher population density occurs, including Delta, Montrose, and the towns of Hotchkiss and Crawford (USGS 2017a). Rural residences typically include parcels of associated farmable land approximately 10 acres or larger in size to accommodate agriculture, primarily raising forage for cattle feed and animal husbandry. On publically owned or managed lands, ranchers can lease federal land from the Forest Service and BLM for livestock grazing (River District 2015).

Table 3.6-5. Percentage of Land Use Category by Subwatershed.

Subwatershed	Land Use Type by Percent			
	Agriculture	Residential/ Developed	Grasslands	Forest
North Fork	55.8	3.2	5.2	27.5
Crawford	40.2	0.3	5.1	25.5
Uncompahgre	57.8	6.4	2.3	8.2
Bostwick Park	19.0	0.1	27.1	23.9

BLM-managed lands are located within all the subwatersheds; portions of BLM-managed lands within the subwatersheds lie within either the UFO or Gunnison Field Offices of the BLM, but mostly within the UFO. For this project, the UFO is the lead BLM office. According to the BLM statewide land classification, other land ownership within the four watersheds includes U.S. Forest Service, NPS, Local (State Wildlife Areas and Crawford State Park), and Other (National Fish Hatchery). Refer to **Table 3.6-6** for a breakdown of land ownership in each subwatershed (BLM 2017).

Table 3.6-6. Percentage of Land Ownership by Subwatershed.

Subwatershed	Private, Percent	BLM, Percent	Forest Service, Percent	NPS, Percent	Local, Percent	Other
North Fork	95	5	—	—	—	<1
Crawford	77	23	—	—	—	—
Uncompahgre	89	11	—	—	1	—
Bostwick Park	84	8	5	<1	3	—

Approximately 39,416 acres of grazing allotments on BLM-managed lands occur within the four subwatersheds (including 1,671 acres within the North Fork subwatershed, 9,513 acres within the Crawford subwatershed, 21,255 acres within the Uncompahgre subwatershed, and 6,977 acres within the Bostwick Park subwatershed). There are no designated Wilderness Areas or Wilderness Study Areas within the four subwatersheds. However, two BLM Areas of Environmental Concern are located within the subwatersheds; 83.5 acres of the Needle Rock Outstanding Natural Area lies within the Crawford Subwatershed and 212.6 acres of the Fairview Research Natural Area lies within the Uncompahgre subwatershed. Project activities would not occur on or affect lands owned by the US. Forest Service, NPS, local, or other entities. Therefore, these lands are not discussed further.

3.6.2.2 Recreation

Recreational resources are those places or amenities set aside or used as parklands, beaches, trails (e.g., hiking, skiing, bicycling, and equestrian), recreational fields, open spaces, aesthetically pleasing landscapes, and a variety of other locales. National, state, and local jurisdictions typically have designated land areas with defined boundaries for recreation. Other less-structured activities, such as cross-country skiing, are performed in broad, less-defined locales. A recreational setting might consist of natural or human-made landscapes and can vary in size from a roadside monument to a designated sport area to a multimillion-acre wilderness area. For the purpose of this analysis, only outdoor recreation resources are described.

Recreation opportunities on privately owned land include municipal parks, team sports, hunting, fishing, and floating on inflatable tubes in irrigation canals. Tubing in irrigation canals is not authorized and poses a safety risk, particularly when crossing over low head dams, check dams, and other structures within the irrigation canals. The Stewart Ditch access road which runs parallel along the ditch's north side through Paonia is a popular walking route for local residents having permissions to utilize the easement. Similarly, limited portions of Fire Mountain Canal are also utilized by local residents for walking, running, and horseback riding. These are privately owned access points and not open to the public.

Also included in recreational opportunities on private land are recent developments in "farm stays." Farm stays aim to give overnight visitors a genuine farm experience as opposed to a bed and breakfast. Activities may include cheese-making, picking vegetables for dinner, butchery classes, and shoeing horses (Colorado Come to Life 2017). Farm stays are offered within the project area (Gunnison River Farms 2017; Mesa Winds Farm and Winery 2017).

Recreation on BLM-managed lands includes hiking, camping, fishing, horseback riding, hunting, mountain biking, off-highway vehicles, rock climbing, water recreation, and winter sports (BLM 2017).

The Black Canyon of the Gunnison National Park is located east of the Bostwick Park subwatershed with a small portion of the Park located within the northern tip of the subwatershed. The National Park hosts a variety of recreational activities including hiking, fishing, kayaking, rock climbing, wildlife viewing, and scenic drives.

3.6.3 Scenic Beauty and Visual Resources

Visual resources are a composite of basic topography, geologic features, water features, vegetative patterns, man-made features, and land uses that typify an area and influence the visual appeal that an area might have to viewers. Although scenic quality of a given landscape is subjective, that quality is derived from several objective characteristics. These characteristics include the diversity of elements comprising the landscape; the degree of harmony or order of landscape elements; focal points that naturally draw attention; and unique visual or aesthetic characteristics that may not be seen or experienced elsewhere. Scenic quality is a measure of visual appeal based on the visual elements of landform, vegetation, water, and color, as well as scarcity or uniqueness, cultural modification, and the influence of adjacent scenery. Visual sensitivity is a measure of public concern for scenic quality and considers the types of viewers, amount of use, public interest, and land use (BLM 1986a).

North Fork

The North Fork subwatershed is a narrow agricultural region along the North Fork of the Gunnison River with agricultural, residential, and community development around and between surrounding hills. Where visible, the North Fork of the Gunnison River and tributary drainages are seen as a strip of riparian vegetation, including dense stands of cottonwood. Agricultural activities vary across the length of the subwatershed with more pastoral elements predominant to the east near Paonia, and greater cropland and agricultural diversity to the west around Hotchkiss and Rogers Mesa, the main agricultural producing region. Around Paonia, viewsheds are complex and organic (i.e., containing naturally occurring forms that are irregular and asymmetric). Surrounding mountains constrain the horizontal extent of development and provide a rugged background in most views. Undulating hills and mesas within the subwatershed produces soft, curvilinear edges along pastures, orchards, and roads. Residences and commercial buildings are somewhat dense, with generally 15 to 25 buildings/clusters of buildings per square mile; however, uneven topography, vegetated drainages, and residential plantings limit visibility of these features, except from higher elevations with good views of the valley. Jumbo Mountain is a dominant visual feature east of Paonia and the subwatershed boundary.

West toward Hotchkiss, the river valley widens and opens to the south. Views are broader and the agricultural landscape takes on an ordered appearance with gridded roads and utilities, shelterbelts, evenly distributed homes, and sharp contrasts between adjacent fields. Along the north edge of the subwatershed,

steeply rising hills clearly define the edge between rural development and the native landscape. This transition is more gradual south of Hotchkiss where pastures and cropland gradually descend into tablelands and mesas.

The BLM manages visual resources in accordance with its Visual Resource Management (VRM) system, which provides a framework to categorize landscapes into classes of visual resources, determine management objectives, and evaluate the degree of contrast between existing landscapes and proposed management plans or projects. The North Fork subwatershed largely overlaps BLM Scenic Quality Rating Unit (SQRU) 10, Paonia Valley, with some overlap of SQRUs 2 (Stevens Gulch), 11 (Jumbo Mountain), and 23 (Grand View Mesa). The Paonia Valley SQRU was rated as having medium scenic quality, high visual sensitivity, and a VRM Class II objective, which aims to "preserve the existing character of the landscape," allowing for limited management activity and low levels of change to the characteristic landscape that do not attract attention (BLM 2009).

Crawford

The Crawford subwatershed contains expansive views of gently rolling terrain, dissected with drainages, that gives way to foothills in the east, mesas to the north, south, and west. Youngs Peak, a low rounded mountain, is centrally located within the subwatershed. Needle Rock, a prominent volcanic tower, is another distinctive topographic feature at the eastern edge of the subwatershed. Crawford Reservoir and the Crawford State Recreation Area are in the south part of the subwatershed. Water levels in the reservoir can vary seasonally. Vegetation within the subwatershed varies distinctively between managed pasture and cultivated fields through most of the area and native saltbush scrub or pinyon-juniper cover along drainages, isolated landforms, and margins. Settlement is generally dispersed with 5 to 10 residences per square mile that are visible but not predominant in most views. Agricultural areas are strongly horizontal and, in heavily managed pastures and cultivated fields, geometrically patterned.

The Crawford subwatershed overlaps four BLM SQRUs: Unit 23 (Grand View Mesa), Unit 26 (Youngs Peak), Unit 27 (Needle Rock), and Unit 28 (Crawford Reservoir Valley). These areas are rated as having low to medium scenic quality and medium to high visual sensitivity and are largely managed for Class III and Class IV objectives, which provide for moderate to high levels of change to the characteristic landscape (BLM 2009).

Uncompahgre

The Uncompahgre subwatershed is a broad north-south trending agricultural valley surrounded by foothills and mountains. Within the valley, the landscape is characterized by agricultural vegetative patterns integrated with features of built environment, such as homes, agricultural buildings, roads, and utility lines. Although individual agricultural fields may be homogenous in color and texture, adjacent fields typically vary in crop-type and stage of growth, creating geometric patterns of varying colors, textures, and height. Roads, fences, ditches, and utility lines follow grid patterns that accentuate the geometric character of the agricultural fields. The density of the built environment reflects population density with generally 5 to 10 residences or farms per square mile outside of the population centers at Delta and Montrose. Shelterbelts, vegetated drainages, and isolated trees around residences are frequently in the foreground, interrupting the horizontal character of agricultural fields as well as the silhouettes of more distant mountains. From the valley interior, the mountains are visible as low masses with moderate definition and low visual 'weight.' On the east edge of the valley, heavily dissected badlands with eroded

slopes and light gray to tan soils contrast sharply with the muted greens of native juniper vegetation or the bright greens of adjacent crop and pastureland. Opposite the badlands, the Uncompahgre Plateau rises gently to the west. Surface waters in the subwatershed consist primarily of the Gunnison River and irrigation ditches. The river is visually defined from most points by the accompanying belt of trees and shrubs. Agricultural ditches are generally narrow and visible only where they parallel or are perpendicular to roads.

The majority of the Uncompahgre subwatershed overlaps the BLM's SQRU 22, Greater Delta/Montrose Valley, which was rated as having medium scenic quality, low visual sensitivity, and a VRM Class III objective, which allows for moderate change to the characteristic landscape (BLM 2009). The remainder of the subwatershed is in an area outside of the BLM's visual resource inventory.

Bostwick Park

Visual resources in the Bostwick Park project area vary along this long and narrow subwatershed. Bostwick Park proper, in the northwest part of the subwatershed, is strongly pastoral with broad fields between hills and canyon lands along the north and northeast boundaries to the edge of a steep bench to the southwest. This bench drops off sharply and extends the viewshed outward to the Uncompahgre Plateau. The built environment is generally limited to dirt and gravel roads, small power lines, and isolated buildings partnered with sparse vegetative plantings. Foothills to the north and northwest have a coarse cover of pinyon-juniper cover that contrasts with light tan soils.

A large section of the subwatershed between Bostwick Park and Cimarron is natural landscape with limited modification. The landscape is characteristic of benches and mesas with diagonal, complex, and rounded forms. Vegetative cover is native grassland and shrub-scrub with sagebrush, saltbush, Mormon tea, grasses, and winterfat with isolated patches of juniper and pinyon pine. Public access in this area is generally limited to Highway 50, where steep and rugged terrain often limits views to a narrow area along the roadway. Broader views are available from trails to the summit of Squaw Hill.

South of Cimarron, the subwatershed features a narrow strip of rolling pastures along the Cimarron River that quickly give way to surrounding foothills and mountains, with Cimarron Ridge as the high point. The forms of the landscape are organic, with sinuous edges between roads, field boundaries, and upright vegetation along the Cimarron River. Upriver, to the south, the Cimarron River is a feature element as it winds through rugged, mountainous terrain, with good views available from superior positions on higher elevation roads. Except for several residences within agricultural areas, the built environment is limited to roads, fences, and occasional camps and cabins.

The Bostwick Park subwatershed partially overlaps three BLM SQRUs: Unit 33, Southeast Montrose Hills; Unit 34, Waterdog Foothills; and Unit 35, Cimarron Valley. Unit 33 is rated as having low scenic quality, medium visual sensitivity, and a VRM objective of Class IV, which provides for high levels of change to the landscape. Units 34 and 35 are rated as having medium to high scenic quality, high visual sensitivity, and a VRM objective of Class II, which aims to "preserve the existing character of the landscape," allowing for limited management activity and low levels of change to the characteristic landscape that do not attract attention (BLM 2009).

3.6.4 Socioeconomics

Socioeconomics for the project area can be assessed at the state and regional (county) scale. For this study, the socioeconomic considerations are presented for the primary counties where the subwatersheds are located (Delta, Gunnison, and Montrose Counties), as well as the state of Colorado. The amount of each subwatershed located within the counties are shown in **Table 3.6-7**. Because no project components are planned within Ouray County and due to the small amount of the county in the project area, Ouray County is not analyzed further in the Socioeconomics section of this Plan-EA.

Table 3.6-7. Distribution of Subwatersheds by County.

County	North Fork	Crawford	Uncompahgre	Bostwick Park
Delta	99%	99.9%	28.3%	—
Gunnison	1%	—	—	9.7%
Montrose	—	0.1%	71.1%	90.3%
Ouray*	—	—	0.6%*	—
*Because no project components are planned within Ouray County and due to the small amount of the county in the project area, Ouray County will not be analyzed further in this section of the report.				

The following sections and tables present the current status of key social and economic indicators for the study area including: agricultural production, population demographics, and employment income and poverty.

3.6.4.1 Agricultural Statistics

Table 3.6-8 presents summarized agricultural information for each county from the 2012 USDA Census of Agriculture (USDA 2012). The top crop item produced in all three counties by acreage is forage (defined as all hay and haylage, grass silage, and greenchop). In Delta County, the next two largest crops produced are corn for grain and silage. In Montrose County, corn for grain, dry edible bean, corn for silage, and harvested vegetables were the remaining top crops.

Table 3.6-8. Agricultural Statistics by County.

	2012	2007	Percent Change
Delta County			
Number of Farms	1,250	1,294	-3%
Land in Farm (acres)	250,761	252,530	-1%
Average Size of Farm (acres)	201	195	3%
Market value of products sold	$55,639,000	$46,800,000	19%
Crop Sales	42%	—	—
Livestock Sales	58%	—	—
Average per Farm	$44,511	$36,167	23%

Table 3.6-8. Agricultural Statistics by County.

	2012	2007	Percent Change
Gunnison County			
Number of Farms	244	217	12%
Land in Farm (acres)	190,243	176,679	8%
Average Size of Farm (acres)	780	800	-3%
Market value of products sold	$12,986,000	$10,731,000	21%
Crop Sales	14%	—	—
Livestock Sales	86%	—	—
Average per Farm	$53,222	$49,450	8%
Montrose County			
Number of Farms	1,128	1,045	8%
Land in Farm (acres)	329,653	321,056	3%
Average Size of Farm (acres)	292	307	-5%
Market value of products sold	$103,221,000	$67,160,000	54%
Crop Sales	33%	—	—
Livestock Sales	67%	—	—
Average per Farm	$91,508	$64,268	42%
Source: USDA 2012			

3.6.4.2 Population demographics

Table 3.6-9 below presents the total population with percent breakdowns for gender and age for each county, the state of Colorado, and the United States for comparison from the 2015 U.S. Census (USCB 2015). The populations of both Delta and Montrose Counties have experienced declines (4 percent and 1 percent) between 2010 and 2015 while Gunnison County grew by about 5 percent over the same period. The population of the state of Colorado has grown by 8 percent between 2010 and 2015 (USCB 2015).

Table 3.6-9. Population Characteristics by County, State, and U.S. (2015 Census).

Population Criteria		Delta County	Gunnison County	Montrose County	Colorado (State)	United States
Total Population		30,442	16,408	41,471	5,540,545	323,127,513
Gender	Pct Female	49.9%	46.2%	49.1%	49.8%	49.2%
	Pct Male	50.1%	53.8%	50.9%	50.2%	50.8%
Age	Pct Under 18	20.6%	17.5%	22.3%	23.0%	22.9%
	Pct 65 and older	24.1%	11.5%	21.8%	13.0%	14.9%
Source: USCB 2015						

Ethnicity and race are shown for the study area in **Table 3.6-10** and **Table 3.6-11** below. The counties in the project area contain a greater percent of persons identifying as non-Hispanic or Latino than the state average. In Montrose County the number of persons identifying as Hispanic or Latino exceeds the national level but is just below the state percentage.

Table 3.6-10. Ethnicity by County, State, and U.S. (2015 Census).

Population Criteria		Delta County	Gunnison County	Montrose County	Colorado (State)	United States
Total Population		30,442	16,408	41,471	5,540,545	323,127,513
Hispanic or Latino	Number	4,658	1,542	8,502	1,180,136	56,870,442
	Percent	15.3%	9.4%	20.5%	21.3%	17.6%
Non-Hispanic or Latino	Number	25,784	14,866	32,969	4,360,409	266,257,071
	Percent	84.7%	90.6%	79.5%	78.7%	82.4%
Source: USCB 2015						

The population of all three counties is predominantly white with all other races accounting for between and 8 and 13 percent of the population.

Table 3.6-11. Race by County, State, and U.S. (2015 Census).

Population Criteria		Delta County	Gunnison County	Montrose County	Colorado (State)	United States
Total Population		30,442	16,408	41,471	5,540,545	323,127,513
White	Number	28,889	15,456	39,024	4,847,977	249,131,313
	Percent	94.9%	94.2%	94.1%	87.5%	77.1%
African American	Number	244	82	332	249,325	42,975,959
	Percent	0.8%	0.5%	0.8%	4.5%	13.3%
Asian	Number	274	148	373	177,297	18,095,141
	Percent	0.9%	0.9%	0.9%	3.2%	5.6%
American Indian or Alaska Native	Number	426	427	788	88,649	3,877,530
	Percent	1.4%	2.6%	1.9%	1.6%	1.2%
Native Hawaiian or Pacific Islander	Number	30	0	124	11,081	646,255
	Percent	0.1%	0.0%	0.3%	0.2%	0.2%
Identified Two or more Races	Number	578	295	829	160,676	8,401,315
	Percent	1.9%	1.8%	2.0%	2.9%	2.6%
Source: USCB 2015						

3.6.4.3 Employment, Income and Poverty

Table 3.6-12 below demonstrates labor force characteristics for the counties and Colorado. Unemployment is higher in Delta and Montrose Counties than the state average whereas Gunnison is below the Colorado unemployment rate.

Table 3.6-12. Labor Force Characteristics (2015).

Indicator	Delta County	Gunnison County	Montrose County	Colorado (State)
Labor Force	13,603	9,835	19,514	2,828,529
Employed	12,829	9,547	18,525	2,718,698
Unemployed	774	288	989	109,831
Unemployment Rate	5.7%	2.9%	5.1%	3.9%
Source: USBLS 2017				

Table 3.6-13 summarizes employment by industry classification. The primary sectors of employment in all three counties include: "Retail Trade," "Finance and Insurance, and real estate and rental and leasing," "Professional, scientific, management, administrative and waste management services," "Educational services, and health care and social assistance," and "Public administration." Delta County has a higher rate of employment in the seasonal category "Agriculture, Forestry, Fishing and Hunting, and Mining." Gunnison County has nearly one-quarter of its employment in "Arts, entertainment, and recreation, and accommodation and food services."

Table 3.6-13. Employment by Industry (2015).

Employment Sector	Delta County	Gunnison County	Montrose County	Colorado (State)
Agriculture, Forestry, Fishing and Hunting, and Mining	2,210	282	1,821	117,335
Construction	988	1,105	2,067	227,533
Manufacturing	653	179	1,480	158,294
Wholesale Trade	191	118	526	120,156
Retail Trade	1,752	1,180	2,661	331,683
Transportation and warehousing, and utilities	223	208	902	106,181
Information	203	135	230	84,571
Finance and Insurance, and real estate and rental and leasing	1,381	1,401	2,267	404,641
Professional, scientific, management, administrative and waste management services	1,216	1,307	2,023	569,864
Educational services, and health care and social assistance	1,598	608	2,396	397,062
Arts, entertainment, and recreation, and accommodation and food services	1,122	2,749	1,747	378,316
Other services, except public administration	959	779	1,440	188,889
Public administration	2,441	2,107	3,183	478,690
Source: USBEA				

Household income and persons living below the poverty level are summarized in **Table 3.6-14** (USBLS 2017). Information is presented for two income indicators: median household income and per capita income. Incomes in all three counties, are below incomes for the state of Colorado. The percent of persons living below the poverty level in Gunnison County is comparable to but above the state number. Both Delta and Montrose County have higher levels of poverty than the state.

Table 3.6-14. Income and Poverty Rates (2015).

Indicator	Delta County	Gunnison County	Montrose County	Colorado (State)
Median Household Income	$42,452	$48,071	$43,999	$60,629
Per Capita Income	$24,417	$25,584	$23,144	$32,217
Persons in Poverty (percent)	16%	13%	18%	12%
Source: USBLS 2017				

Chapter 4 – Alternatives

4.1 Alternatives Formulation

The process of formulating alternatives for the Lower Gunnison Project followed procedures outlined in the USDA-NRCS NWPM (NRCS 2015) Parts 500 through 506, USDA-NRCS National Watershed Program Handbook (NRCS 2014) Parts 600 through 606, and other USDA-NRCS watershed planning policies. The comments received during the scoping period were incorporated into the formulation process for the initial alternatives. Some of the initial alternatives considered were eliminated from further analysis due to incompatibility with the Purpose and Need or other critical factors. In total, two alternatives were selected by USDA-NRCS to be analyzed in the Plan-EA: the Proposed Action which entails the expenditures of NRCS funds towards water efficiency improvements as part of the Lower Gunnison Project and the No Action Alternative wherein the Lower Gunnison Project would not occur.

4.2 Alternatives Considered but Eliminated from Detailed Study

During the scoping phase of this EA, several alternatives were suggested that have been considered by the NRCS and its cooperating agencies, but ultimately were not analyzed in detail in this Plan-EA as viable alternatives. Viable alternatives should be reasonable, implementable, and should meet the Purpose and Need. Alternatives suggested during the scoping phase of this Plan-EA that are considered outside the scope of this Plan-EA include adjustments to the subwatershed boundaries to include additional irrigation systems and geographical areas. The subwatershed boundaries cannot be adjusted to include areas that are not covered in the funding authorities under which the River District has applied for federal support, because these areas lack federally developed irrigation systems.

The project purposes presented in **Section 1.1** include improving Agricultural Water Management and Watershed Protection through various irrigation improvement measures. The irrigation improvement measures proposed under this project include converting existing flood irrigation systems to pressurized irrigation systems and improving water quality by improvements to existing irrigation efficiencies. The proposed potential modifications of irrigation systems and practices tare intended to lessen the concentrations of salinity and selenium by changing the magnitude, temporal distribution and spatial characteristics of irrigation return flows into natural water bodies. On the extreme end of this spectrum is the concept to take irrigated lands completely out of production through “buy and dry” practices. “Buy and dry” programs that significantly reduce stream diversions and percolation of water through soils with naturally-occurring salts and selenium could help meet project objectives by both increasing flows in the natural system equal to the crops’ consumptive water use and by eliminating salt and selenium laden groundwater return flows. However, acquisition of water rights is not considered a reasonable alternative to the Proposed Action because it does not meet the Purpose and Need of improving Agricultural Water Management by increasing irrigation use efficiency. Further, the sponsoring entities have no statutory authorities to compel or fund participation in such a program. Removing critical water resources from agricultural lands is contrary to the objectives of the project sponsor, the River District, and would have substantial adverse economic impacts on the region.

Another alternative considered included lining the existing canals to prevent seepage, instead of converting them to pipe. This alternative was considered but ultimately eliminated because lining the existing canals would not change the amount of water lost to evaporation or maximize increases to

irrigation use efficiency. The foundation of the Lower Gunnison Project is the coordination of off-farm delivery system improvement with transitions to on-farm high efficiency irrigation systems requiring pressurized systems. Piping has a 50 year useful life with fewer operation, maintenance, and safety issues than options for lining canals.

Open canal systems require management of aquatic moss growth, present safety issues (steep, deep and slippery canal slopes) and require costly maintenance to repair buckling, heaving or cracking of linings due to shrink and swell of variable underlying soil types and due to unbalanced excess water pressure underneath the lining when canals must be quickly dewatered. Piped systems are typically more cost-effective than canal lining options for the irrigation canals in the project area. The cost ineffectiveness of the lining alternative is based upon information found in the Uncompahgre Valley Water Users Association East Side System Optimization Study (Burt and Hoffman 2014), which presents information supporting the choice of canal lining options for larger canal systems with high flows but for the types of lower flowing systems in the project subwatersheds. Additionally, several project sponsor partners have completed lining demonstration studies. A recent study was completed of a lining demonstration project on the EC Lateral in the Uncompahgre subwatershed, because this canal has had substantial delivery system losses (i.e., seepage). The EC lining demonstration study used geoweb overlying the fabric liner to address shrink/swell and an underdrain to manage the potential for uplift pressures from canal water getting under the liner. This study was similar to a lining project done by the Grand Valley Irrigation Company (GVIC) in the lower Colorado River Basin near Grand Junction, Colorado. In the GVIC study, the canal was lined with a fabric liner and then covered with shotcrete, which led to cracking due to shrink and swell of Mancos shale soils and buckling due to water getting under the fabric. As this time, lining the canals as part of the Proposed Action is not considered reasonable due to the high associated cost and greater maintenance and management requirements of these types of systems.

4.3 Alternatives Considered for Detailed Study

There are two alternatives considered for the project that were carried forward to further study in this Plan-EA: the Proposed Action and the No Action alternatives. A description of these alternatives is presented below.

4.3.1 Proposed Action

The Proposed Action consists of irrigation water efficiency upgrades as requested by the River District, and as available, to eligible producers and landowners located within the four approved project subwatersheds: Bostwick Park Water Conservancy District, Crawford Water Conservancy District, North Fork Water Conservancy District, and the Uncompahgre Valley Water Users Association (see **Figure I-1**). The four subwatershed boundaries were delineated by the River District and meet the definition of a watershed as outlined in the NRCS's NWPM (NRCS 2015). The four subwatersheds encompass native soils with high levels of naturally occurring salt and selenium. Additionally, the area is characterized by highly variable hydrological conditions that can cause water supply shortages and surpluses that can lead to overflows of ditches or lateral and/or localized flooding (River District 2015).

The Proposed Action alternative would improve irrigation practices, water quality, agricultural productivity and environmental conditions in the Lower Gunnison Basin. In general, the project would replace existing open canals with pressurized irrigation systems, which would allow for the conversion of

flood irrigation practices to high efficiency irrigation practices such as sprinklers, micro spray and drip systems. By replacing open canals and incorporating other efficiency measures, the Proposed Action would address the project's purpose to improve Agricultural Water Management and Watershed Protection, as defined in Title 390, NWPM, Part 500, Subpart A, Section 500.3.

Funding sources for the above activities would be drawn from NRCS programs, as well as programs administered by Reclamation, CWCB, Colorado State University, and other partners. Specific programs that could be utilized for funding include those administered by Reclamation (Colorado River Basin Salinity Control Program, the Colorado River Storage Project Act – Memorandum of Agreement [MOA], and the WaterSMART program), and the CWCB grants and loans programs.

The River District has as its primary partners the Uncompahgre Valley Water Users Association; three Water Conservancy Districts: North Fork, Bostwick Park, and Crawford; two Conservation Districts: Delta and Shavano; Colorado State University; No Chico Brush (an agricultural producer advocacy group), Trout Unlimited, The Nature Conservancy, local agricultural producers and the Selenium Task Force.

4.3.1.1 Subwatershed Improvements

NRCS is able to deliver RCPP assistance to the Lower Gunnison Project through the authorities and rules of the EQIP and Watershed Protection and Flood Prevention Act (P.L. 83-566) programs. The Lower Gunnison Project includes the following activities (River District 2015):

- Converting approximately 45,000 feet of canals or laterals in the four subwatersheds from open, earthen ditches (see **Photograph 4.3-1**) to enclosed pipe, pressurized where appropriate, in order to minimize off-farm delivery system losses;
- Allowing for the upgrade of a minimum of 1,000 acres of irrigated farmland throughout the project area from flood irrigation to high efficiency irrigation systems (sprinkler or micro-irrigation as shown in **Photograph 4.3-2**) with corresponding irrigation water management plans in order to eliminate groundwater deep percolation which contributes selenium and salt loading to the Gunnison and Colorado Rivers;
- Incorporating 'smart' headgate diversion control structures and SCADA systems (see **Photographs 4.3-3** and **4.3-4**) within the four subwatersheds to better manage irrigation water supplies, as appropriate and as budget allows.

Credit: River District.

Photograph 4.3-1. Typical Off-Farm Unlined Irrigation Canal in Mancos Shale Geology.

Credit: River District.

Photograph 4.3-2. Example of Big Gun Sprinkler Irrigation System.

Credit: California Polytechnic State University Irrigation Training and Research Center

Photograph 4.3-3. SCADA Water Level Sensors Within and Above a Canal.

Credit: California Polytechnic State University Irrigation Training and Research Center

Photograph 4.3-4. SCADA Installed on a Headgate.

In the four subwatershed project area, it is estimated by the project sponsor that there may be up to approximately 15,000 individual agricultural producers. Although it is estimated that the majority of these landowners are eligible for the covered programs, it is also estimated that only 10–20 percent may participate in the Lower Gunnison Project either directly or via their water providers (e.g., company, district or association) (River District 2015). As a result of the voluntary participation in the project, not all project components and project component locations are yet known.

NRCS funding would not be applied to any project components on state- or federally owned and/or administered lands within the four subwatersheds, except for some future components which may be located on BLM and/or Reclamation lands in the Uncompahgre, Bostwick and/or Crawford subwatersheds. Any potential NRCS-funded project components that would be upgraded or constructed on BLM or Reclamation lands or easements are anticipated to take place within existing ROWs. No new federal ROWs or easements are anticipated to be needed as part of the project.

Several water management upgrades which would receive NRCS funding are located on Reclamation-owned facilities, particularly those upgrades related to the Fire Mountain Canal in the North Fork subwatershed and the Phase 9 project in the Uncompahgre subwatershed. Where Reclamation is the lead agency with jurisdiction over the upgrades, NRCS would work as a cooperating agency in Reclamation's associated NEPA processes. Therefore, to avoid redundancy and overlapping NEPA processes, the Fire Mountain Canal and Phase 9 projects are not analyzed in detail in this Plan-EA.

The River District may also choose to apply for additional RCPP assistance in future funding cycles for water efficiency upgrades within the four subwatersheds. NRCS would review any future applications on

an individual basis. Future components of the Lower Gunnison Project receiving NRCS funding would likely include additional lateral piping and associated canal enclosures, and establishment and expansion of SCADA systems. This Watershed Plan may be used by the NRCS during future funding cycles if it is evident that this Plan-EA adequately documents and discloses baseline conditions; affected environment; and the magnitude, type and location of potential effects of proposed incremental project features.

4.3.1.2 Project-Specific Components

The known project-specific components receiving NRCS funding would primarily be composed of piping irrigation water and enclosing existing open canals and the installation of SCADA systems, and are outlined in the following four tables (**Tables 4.3-1**, **4.3-2**, **4.3-3**, and **4.3-4**). Other components that would receive NRCS funding are located at facilities owned by Reclamation (including the Fire Mountain Canal and Phase 9 projects) and those that are not yet fully designed. Project-specific components in each subwatershed are shown in **Figures 4.3-1** through **4.3-4 in Appendix B**.

Table 4.3-1. North Fork Project Components.

Component	Location	Description
Fire Mountain Canal Piping Project*	Segment 47: Leroux Creek to End of Canal (the canal from the Jesse Turnout on the east side of Leroux Creek to the end of the canal)	19,222 feet of solid wall fusion welded high-density polyethylene (HDPE) pipe ranging from 63” to 14” diameter will be installed in a 60-foot-wide ROW. A new siphon across Leroux Creek will be constructed at a new location in order to eliminate approximately 1.3 miles of canal. Staging areas would likely be required for storing equipment and pipe. The canal through Leroux Creek has many seeps and is difficult to maintain. This project will also remove 2,365 tons of salt annually that are contributed to the Colorado River Drainage.
SCADA	Siphon Inlet; Patterson Lateral; Leroux Creek Feeder	Each of the three SCADA systems generally includes water level sensors, buried conduit, relay antenna (telemetry equipment), solar power, and panel. Modernization and conversion of the existing direct delivery irrigation systems to a more well-timed, irrigation and producer “demand-driven” system and to integrate the improved conveyance system with automated and pressurized irrigation systems, where appropriate. Each SCADA system will occupy about 200 square feet.

Source: JUB 2016c, River District 2017

* Discrete components of the Fire Mountain Canal Piping Project in this subwatershed are funded by the NRCS and Reclamation programs. Segment 47 is funded solely with NRCS federal funds. However, Reclamation is the lead agency for other segments of the Fire Mountain Canal and the overall project will be analyzed in greater site-specific detail in Reclamation’s associated NEPA process.

Table 4.3-2. Crawford Project Components.

Component	Location	Description
Needle Rock Diversion	Easternmost portion of Needle Rock Ditch from the location of its current diversion	Headgate replacement project; 0.166 miles (879 feet) of new enclosed and pressurized pipeline to replace open ditch; SCADA system installed at headgate. The headgate replacement project would occur within the currently disturbed footprint. The pipe would be sized with a diameter of 42 inches to carry approximately 48 ft^3/sec and would be installed in a 60-foot-wide ROW.
Grandview Phase 1	The Grandview Canal project includes 311 shares from the West Clipper to be delivered on the lower end of the current West Clipper.	Piping the upper 6,700 feet of the open Grandview Canal ditch from the diversion point with 54” through 63” PVC and HDPE pipe. There would be a new division/screening structure. The pipe would be sized to carry approximately 113 ft^3/sec and would be installed in a 60-foot-wide ROW.
Clipper Re-Regulation (Re-Reg) Pond	Located on Center Clipper Ditch; to be constructed adjacent to the beginning of the Clipper piping project.	This is a regulating reservoir designed to absorb the fluctuation of demand on the piped system as irrigators turn on and off. The project would consist of a 30 acre-foot reservoir and associated inlet and outlet works. Construction would disturb about 7 acres. The exact location of this reservoir has not yet been determined. If sufficient natural clay lining is not available to prevent seepage, the pond would be lined.
SCADA	Needle Rock; Smith Fork Feeder; Crawford Grandview-Aspen Canal; Clipper Re-Reg Pond	Each of the four SCADA systems generally includes water level sensors, 1-inch buried conduit, relay antenna (telemetry equipment), solar power, and panel. Increased water use efficiency based on the modernization and conversion of the existing direct delivery irrigation systems (using an “always-on” supply-driven system), to a more well-timed, irrigation and producer “demand-driven” system and to integrate the improved conveyance system with automated and pressurized irrigation systems, where appropriate. Each SCADA system will occupy about 200 square feet.
Source: JUB 2016b, CRD 2017		

Table 4.3-3. Uncompahgre Project Components.

Component	Location	Description
GB and GB-A Laterals (part of the Phase 9 Piping Project)*	The entire GB and GB-A laterals, where they begin at the EC Lateral split.	Pipe existing open ditch laterals: 0.4 miles (2,137 feet) of the GB lateral and 3.18 miles (12,766 feet) of the GB-A lateral. The pipe would be PVC and sized with a diameter of 36 inches. The pipeline would be installed within a 60-foot-wide ROW. Staging areas would likely be required in adjacent previously disturbed areas for storing equipment and pipe. Overall, the Phase 9 Piping Project estimates a total selenium reduction range between 241-482 lbs/year; Salinity reduction estimated at 6,030 tons/year. Additionally, there would be increases in irrigation water delivery system efficiencies associated with the piping projects.
SCADA	East Canal Selig Canal Loutsenhizer Canal SCADA Radio Tower on Flat Top Hill	Each SCADA system generally includes water level sensors, buried conduit, relay antenna (telemetry equipment), solar power, and panel. Modernization and conversion of the existing direct delivery irrigation systems to a more well-timed, irrigation and producer "demand-driven" system and to integrate the improved conveyance system with automated and pressurized irrigation systems, where appropriate. Each SCADA system will occupy about 200 square feet.

Source: ITRC 2014, CRD 2017

* The Phase 9 Piping Project in this subwatershed is funded primarily by Reclamation programs. Though the GB and GB-A laterals piping project would be funded only by 2015 RCPP federal funding, Reclamation is the lead agency for the overall Phase 9 Project and the GB and GB-A laterals piping project will be analyzed in greater site-specific detail in Reclamation's associated NEPA process.

Table 4.3-4. Bostwick Park Project Components.

Component	Location	Description
West Lateral Phase 1	West Lateral starts at the end of the Vernal Mesa Canal. Approximately 1 mile of this lateral has previously been piped; below the end of the existing pipeline, the West Lateral flows for another 4 miles before it outlets excess water through the outlet ditch which flows through Red Rock Canyon and into the Gunnison River.	0.53 miles (2,801 feet) of new enclosed and pressurized pipeline to replace the open, earthen portions of the West Lateral along Bostwick Park Road. Approximately 250 feet of 30-inch-diameter HDPE water pressure pipe and the remaining 2,551 feet of 24-inch-diameter HDPE pressure pipe would be installed within a 60-foot-wide ROW. Project would also include a screening structure and a pressure-reducing station. The replaced segment of the existing canal would be abandoned. Staging areas would likely be required in adjacent previously disturbed areas for storing equipment and pipe. Constructing pipelines to replace open, earthen canals eliminates seepage that can increase salt and selenium loading from alkali soils into downstream rivers and streams, while also providing increased pressure for agricultural users who wish to convert to pressurized irrigation systems. This conversion can reduce the amount of on-farm irrigation runoff and seepage.
SCADA	Cimarron Canal Diversion	The SCADA system would generally include water level sensors, 1-inch buried conduit, relay antenna (telemetry equipment), solar power, and panel. Increased water use efficiency based on the modernization and conversion of the existing direct delivery irrigation systems (using an "always-on" supply-driven system), to a more well-timed, irrigation and producer "demand-driven" system and to integrate the improved conveyance system with automated and pressurized irrigation systems, where appropriate. The SCADA system will occupy about 200 square feet in an adjacent previously disturbed area.

Table 4.3-4. Bostwick Park Project Components.

Component	Location	Description
Source: JUB 2016a, CRD 2017		

Construction would occur during the off-irrigation season (October 31–April 1) beginning in the fall of 2017 and with an anticipated end date of 2020. The construction phase of each project component is anticipated to require one or two non-irrigation construction seasons to complete. Each off-farm proponent, as a member of the Off-Farm Team, would be required to coordinate with and implement two education or outreach activities per year (e.g., newspaper article, annual newsletter updates, on-farm demonstration, soil health cover crop tour, soil health conference, web updates, and community presentations). Monitoring of off-farm benefits would be on-going and occur through the Lower Gunnison Basin Water-Quality/Quantity Monitoring Program, which is administered by the River District in conjunction with the USGS and other stakeholder partners (River District 2015).

Pipeline installation projects would require some borrow or fill material and storage areas for pipe and other materials. These areas have not yet been identified, but it is likely that borrow and fill materials would be derived from previously disturbed areas on commercial or private property within the subwatersheds. Material storage areas would be located on commercial or private land within the subwatersheds, and would not be placed on federal land. Access to construction and storage areas would use existing disturbed access routes. If new disturbance is required for borrowing fill materials, for material storage, or for new access ways, the areas would be surveyed prior to construction to comply with requirements for protection of biological and cultural resources.

SCADA systems are proposed to be installed within each subwatershed. SCADA systems improve system efficiency through remote monitoring and data acquisition and remote control. SCADA systems are proposed to be installed on major turnouts, wasteways, and flumes throughout the subwatersheds. Remote site components of a SCADA system include a panel, site enclosure, water meters, solar power and telemetry equipment, which could be simple antennas or 10- to 20-foot high steel posts depending on the location of the equipment Telemetry stations would also be required, and would be concentration points for the SCADA communication prior to relaying the data to monitoring stations. The telemetry stations could be new installation of radio modems or could rely on satellite terminals (e.g., the Broadband Global Area Network). Telemetry stations with radio modems would require a tall radio tower, such as the 80-foot radio tower shown in **Photograph 4.3-5**. Master monitoring and control system stations would also be established at central locations within the subwatershed. Existing offices would generally be used for these monitoring stations. The SCADA systems would generally be installed on previously disturbed ground, and would not disturb native riparian vegetation. SCADA systems would not be placed in wetlands. Existing roads and ROWs would be used for access to sites, and no borrow material would be required for SCADA installation.

Credit: California Polytechnic State University Irrigation Training and Research Center

Photograph 4.3-5. Radio Tower for Use with Telemetry Stations.

A portion of the total Watershed Authority Technical Assistance funding would be used bythe River District for technical services and assistance and system modernization planning. This portion of funding has been proportionately distributed across the project subwatersheds. Project partners include but are not limited to Bostwick Park Water Conservancy District, North Fork Water Conservancy District, Crawford Water Conservancy District, Uncompahgre Valley Water Users Association, Delta Conservation District, Shavano Conservation District and Reclamation.

NRCS reserves the right and authority to reduce or discontinue program benefits to support this partner agreement based upon funds availability, changes in agency priorities, or inability of the River District to deliver resources or provisions of this agreement. EQIP program contracts and agreements obligated with producers and landowners as a result of this partnership agreement are assured of funding for the entire length of the approved contract or agreement and not subject to provisions of this partnership agreement regarding fund availability.

4.3.2 No Action

The No Action alternative assumes that with no NRCS funds, implementation of the components of the Lower Gunnison Project would likely not occur in the reasonably foreseeable future. Specifically, without NRCS funding, large-scale off-farm irrigation delivery system improvements and needed modernization activities associated with the Lower Gunnison Project in the four subwatersheds may still occur, but other scarce, and oftentimes highly competitive, funding sources would need to be found. Limited funding may restrict projects to economically inefficient, smaller scale construction phases, with not all phases being fully implemented.

The improvement projects identified under the Proposed Action in **Tables 4.3-1** through **4.3-4** were identified and prioritized in terms of cost effective benefits relative to the four natural resource concerns identified in the description of the Colorado River CCA. Without NRCS funding, these high priority improvement projects would not occur in the foreseeable future, but may be implemented with other funding sources in the future. Therefore, for purposes of this Plan-EA, the No Action is the near-term continuation of the status quo, including the continuation of inefficient water use and associated conditions of insufficient water availability, degraded water quality, poor soil conditions, and impaired aquatic habitats.

4.3.3 Comparison of Alternatives

A summary comparison of the Proposed Action and No Action alternatives is presented in **Tables 4.3-5**.

Table 4.3-5. Summary and Comparison of Alternative Plans.

	Item or Concern	Alternative 1 Proposed Action	Alternative 2 No Action
NED Account	**Total Cost**	$14,496,937	$13,786,308
	Annual Benefits	$1,287,742	$885,064
	Annual Costs	$550,131	$337,193
	Annual Net Benefits	$745,298	$547,871
	Annual Remaining Flood Damage	Not Applicable	Not Applicable
Environmental Quality (EQ) Account	**Soil and Sedimentation**	Minor, short-term and adverse impacts to about 21.4 acres of soil during construction activities. Moderate, long-term and beneficial impacts to soil resources from reduction of erosion and sedimentation issues associated with the current irrigation systems.	Continuation of status quo for reasonably foreseeable future without realized benefits of Proposed Action.
	Prime Farmland	No Impacts to amount of farmlands classified as prime; however, irrigation of farmlands could become more efficient.	No Impacts to amount or location of amount of classified farmlands for reasonably foreseeable future
	Water - Surface - Quality - Surface - Quantity - Ground Water - Quantity - Waters of US - Floodplain Management - Wetlands	Major, long-term, beneficial impacts to water quality. Minor to negligible impacts to other water resources. Implementation of the project components would result in an estimated 5,961 tons/yr of salinity reduction, 267.3 lb/yr of selenium reduction, and 2,188 acre-ft/yr of water seepage prevention. These data are presented in tables 5.2-5 through 5.2-10.	Delayed onset of benefits with piping implementation (salinity and selenium reduction). No realization of benefits from SCADA systems.
	Air	Negligible, short-term impacts during construction. No long-term impacts.	No Impacts for reasonably foreseeable future
	Plants - Invasive Species - Riparian Areas	Minor, adverse, short-term impacts to about 21.4 acres of vegetation during construction. Moderate, beneficial, long-term impacts to wetlands and riparian habitat from improvements in water quality.	No Impacts for reasonably foreseeable future

Table 4.3-5. Summary and Comparison of Alternative Plans.

	Item or Concern	Alternative 1 Proposed Action	Alternative 2 No Action
	Animals - Fish Habitat - Wildlife Habitat - T&E Species	Minor, adverse, short-term impacts to about 21.4 acres of wildlife habitat during construction as approximately 45,000 linear feet of existing open ditches will be converted to enclosed pipeline (pressurized where appropriate). Moderate, beneficial, long-term impacts to fish and aquatic species habitat from improvements in water quality.	No Impacts for reasonably foreseeable future
	Flood Damages	No Impacts	No Impacts
	Historic, Cultural, and Scientific Resources	Negligible short- and long-term impacts following implementation of all applicable Best Management Practices (BMPs).	No Impacts for reasonably foreseeable future
	Portable Water Supply	No Impacts	No Impacts
	Public Health and Safety	No Impacts	No Impacts
	Recreation	Negligible, short-term impacts during construction. No long-term impacts.	No Impacts for reasonably foreseeable future
Other Social Effects (OSE) Account	**Visual Resources**	Negligible, short-term impacts during construction. No long-term impacts.	No Impacts for reasonably foreseeable future
	Tribal, religious, sacred, or cultural site	Minor, adverse impacts to three historic canals. Acceptable treatment for the adverse effects has been determined and agreed upon by all consulting parties.	No Impacts

Chapter 5– Environmental Consequences

5.1 Soils

Protection of unique geological features, minimization of soil erosion, and the siting of project components in relation to potential geologic hazards are considered when evaluating potential effects of a Proposed Action on geological resources.

Effects on geology and soils would be significant if they would alter the lithology, stratigraphy, and geological structures that control groundwater quality, distribution of aquifers and confining beds, and groundwater availability; or change the soil composition, structure, or function (including prime farmland and other unique soils) within the environment.

5.1.1 Proposed Action

Soils and Geology

Under the Proposed Action Alternative, soils would be disturbed, vegetation would be cleared, and backfilling and grading would occur. The project components analyzed in this Plan-EA would require clearing and disturbance of about 21.4 acres of soils (about 0.01 acres in the North Fork subwatershed, 17.5 acres in the Crawford subwatershed, 0.02 acres in the Uncompahgre subwatershed, and 3.9 acres in the Bostwick Park subwatershed). Clearing, compaction and construction of soils would increase erosion and sedimentation potential. Plans for controlling erosion and sediment would be developed and implemented during construction of the enclosed canals and laterals to contain soil and runoff onsite, and would reduce potential for adverse effects associated with erosion and sedimentation and transport of sediments in runoff.

The Proposed Action would directly disturb about 21.4 acres of soils. Soil disturbance on steep slopes has the potential to result in excessive erosion due to instability of the disturbed soils and high runoff energy and velocity (NRCS 2014). Construction BMPs would be implemented to minimize soil erosion; therefore, no significant adverse impacts on the soils would be anticipated. BMPs could include installing silt fencing, straw wattles, or geotextile filters; applying water to disturbed soil to prevent wind erosion; and revegetating disturbed areas as soon as possible after disturbance, as appropriate.

Under the Proposed Action alternative, topsoil would be segregated from subsoil prior to excavation and backfilling. Following pipe installations, the subsoil would be replaced first and topsoil then would be replaced on the ground surface. The disturbed area (approximately 21.4 acres) would then be reseeded with hay or pasture seed mixes, or returned to the land tenant for row crop farming, depending on land owner preference. As appropriate, upland seed mixture would be used in non-cultivated areas. Backfilled ditches and other disturbed areas would also be reseeded with an appropriate seed mixture.

Clearing of vegetation could result in short-term increases in soil erosion and sediment transport to nearby waters; however, BMPs would be implemented to minimize impacts from erosion and sedimentation, as described below in **Section 5.1.1.3**.

Long-term impacts could occur due to compaction of soils under the weight of vehicles and other construction equipment; however, BMPs would be implemented to reduce the impact of compaction.

These could include aeration, mechanical loosening of compacted soil, or adding low-density organic matter to the soil following construction. Contractors would be required to follow standard BMP and compliance measures to quickly contain any leaks or spills occurring from construction vehicles or activities. If applicable under 40 CFR Part 112, a spill response plan would be prepared in advance of construction by the contractor for areas of work where spilled contaminants could flow into water bodies.

Farmland and Unique Farmland

Under the Proposed Action, installation of the buried pipelines and backfilling of irrigation ditches in addition to the installation of the SCADA systems would cause temporary disturbance to about 21.4 acres of agriculturally important lands including farmlands of unique importance and prime farmlands. No farmlands would be permanently removed from production as a result of the Proposed Action. Construction of the Proposed Action would occur during the non-growing season to prevent disruption of normal farming operations.

No long-term adverse impacts would be expected to any federal- or state-level farmland designations. Short-term, negligible to minor impacts to agriculturally important soils would be expected during construction but adherence to BMPs would minimize these impacts. There would be long-term beneficial impacts on farmlands due to improved irrigation water quality and quantity.

Salinity and Selenium

Under the Proposed Action, the installation of the buried pipelines would minimize water contact with the Mancos Shale-derived soils which will reduce salinity and selenium loading in the Lower Gunnison River basin, resulting in long-term beneficial impacts to soils.

Erosion and Sedimentation

Erosion may occur on disturbed and cleared areas within the project boundary during precipitation events. Under Section 402 of the CWA, a National Pollutant Discharge Elimination System (NPDES) Storm Water General Permit for Construction Activities is required for construction activities that disturb more than 1 acre and discharge pollutants to surface waters. Proper BMPs would be installed to prevent and control soil erosion and a Storm Water Pollution Prevention Plan (SWPPP) will be developed by the contractor and submitted to the CDPHE Office of Environment Water Quality Control Division.

Soil disturbance and grading associated with construction of the Proposed Action would have short-term, negligible to minor adverse impacts on soils. Construction may cause a less than significant short-term increase in the rates of erosion and sedimentation within the subwatershed. However, in the long term, soil erosion and sedimentation from irrigation water conveyance would be greatly reduced where buried pipeline would replace open canals.

5.1.1.1 Subwatershed Improvements

Improvements within the North Fork, Crawford, Uncompahgre, and Bostwick Park subwatersheds would result in impacts similar to those stated above for soils, farmlands, salinity, and erosion. Short-term impacts would be expected from clearing of vegetation as soil erosion and sedimentation could occur. Long-term adverse impacts would be expected from compaction of soils under the weight of vehicles and other construction equipment.

Long-term beneficial impacts to soils would be expected from the diminished water contact with the Mancos Shale-derived soils, as discussed in Section 5.2.1.

5.1.1.2 Project-Specific Components

Short- and long-term adverse and beneficial impacts to soils and geology would be similar to those stated above from implementation of the proposed project-specific components, including pipeline installation and SCADA systems.

5.1.1.3 Compliance and Best Management Practices

Design features and BMPs that would be applied during the proposed project are described below. During construction, work crews would carry spill cleanup kits, and in times of burn bans or wildfire concerns, each crew would have a fire suppression kit. Construction stormwater plans and measures that meet local, state, and federal guidelines and intent would be developed and implemented during construction and revegetation activities.

The following BMPs would be implemented as part of the Proposed Action to reduce and mitigate impacts to soils:

- Compaction, grading and clearing activities will be minimized to the extent practicable.
- During construction, topsoil would be saved and then redistributed after completion of construction activities.
- Straw wattles, silt curtains, cofferdams, dikes, straw bales, or other suitable erosion control measures would be used to minimize soil erosion and prevent soil erosion from entering water bodies during construction.
- Disturbed areas would be smoothed, shaped, contoured and reseeded to as near their pre-project conditions as practicable.
- Lands previously in agricultural production would be returned to agricultural production following construction.
- For project-specific components that would disturb an acre of soil or more, the project coordinator or contractor would submit a Stormwater Management Plan (SWMP) to CDPHE for approval to reduce potential impacts of sedimentation on water bodies.

5.1.2 No Action

Under the No Action Alternative, there would be no effect on the size or distribution of prime farmlands, farmlands of statewide importance, or farmland of unique importance in the North Fork, Crawford, Uncompahgre, or Bostwick Park subwatersheds. Farmlands in the Proposed Action area would continue to produce as in the past. However, salinity and selenium loading from irrigation seepage water in contact with Mancos Shale-derived soils in the current irrigation system would also continue as it has in the past, further diminishing soil health and agricultural productivity. Under the No Action Alternative erosion and sedimentation issues associated with the current irrigation systems would continue, resulting in long-term adverse impacts on soil resources.

5.1.3 Cumulative Impacts

Actions with the potential for cumulative effects on local geology and soils in the four subwatersheds would include existing and future Gunnison Basin Selenium Management projects, existing and future NRCS irrigation improvement projects, infrastructure development, livestock grazing, and residential development. Each of these activities could result in soil erosion or degradation of soil health; however, erosion control and reclamation would be required for most of these activities to reduce direct, indirect, and cumulative soils impacts.

Ground-disturbing activities and movement of construction vehicles and equipment during the Proposed Action would contribute to a minor short-term disturbance and loss of soils. These impacts would be incremental to other regional effects occurring as a result of increased residential and industrial development, and ongoing agricultural land uses. Soil effects in the long term would be considered to be cumulatively incremental and minor.

5.2 Water

5.2.1 Proposed Action

Canal piping projects serve multiple purposes to conserve water, reduce selenium concentrations and loads, and reduce salinity concentrations and loads. During the past 20–25 years, there has been concerted efforts to reduce agriculture-related selenium and salinity loads in the Lower Gunnison River watershed (USGS 2014). Canal piping and on-farm modernization have proven to be effective, as shown by trends of decreasing selenium and salinity concentrations and loads in the Gunnison River (Butler 1996; Mayo and Leib 2012).

5.2.1.1 Subwatershed Improvements

Irrigation field application efficiency for flood and furrow irrigation might be as high as about 60 percent, with 50 percent considered a fairly good irrigation efficiency for a surface irrigation system (FAO 2017). However, sprinkler systems can improve irrigation efficiency to about 75 percent (FAO 2017). Arnold (2011) investigated deep percolation beneath a field irrigated by flood irrigation, and compared the results to deep percolation beneath a field irrigated by center-pivot sprinkler. For the study site on the eastern high plains of Colorado, Arnold (2011) calculated that deep percolation beneath the flood-irrigated field was 8.8 inches per year, and deep percolation beneath the sprinkler-irrigated field was 2.7 inches per year, for a 69 percent decrease of deep percolation. Groundwater-table rise beneath the flood irrigated field ranged from 0.2 feet to 2.1 feet, while water-table rise beneath the sprinkler-irrigated field ranged from 0.2 feet to 0.4 feet (Arnold 2011).

Estimates of Water Conservation

The Proposed Action would result in conservation of water by reducing losses due to seepage from unlined canals and by improving efficiency of water usage through SCADA systems, as described below.

Irrigation ditches and canals are known to have conveyance losses (Fipps 2000). When releasing irrigation water from storage reservoirs, conveyance losses are commonly added to the water quantities requested to fulfill the needs of irrigation, which is sometimes called the duty (or flow) of water required to overcome system inefficiencies. Studies of conveyance losses have been done in the Uncompahgre

subwatershed by Reclamation (1982) and the USGS (Richards et al. 2014) (**Table 5.2-1**). Seepage loss rates ranged from 1.3 to 12.7 gallons per day per square feet of canal surface, and the average seepage loss rate is 5.25 gal/ft^2/d (**Table 5.2-1**). Thus, seepage loss rate multiplied by canal length and wetted perimeter provides total seepage loss, which can be expressed as acre-feet per year.

Table 5.2-1. Canal Seepage Rates Reported for the Uncompahgre Valley.

Soil Type	Seepage Loss Rate, gal/ft^2/d
Undisturbed shale[1]	1.97
Reworked shale soils[1]	1.51
Clay[2]	12.72
Weathered Mancos Shale[2]	1.27
Dakota Formation, silty clay[2]	10.60
Mancos Shale average[2]	3.43
Average	**5.25**

[1] Reclamation 1982
[2] Richards et al. 2014

For the four Lower Gunnison subwatersheds, canal slopes were determined using maps, and open channel calculations were done to determine the wetted perimeter of each canal in the Proposed Action. Wetted perimeter was multiplied by seepage loss rate and length of piped or replaced canal to determine the amount of water conserved. For the purposes of this report, the seepage losses are considered to be zero after the canals or ditches have been piped.

Recent innovations in low-voltage sensors and data communications combined with advances in Internet technologies offer opportunities for the development and application of real-time management systems for agriculture (Evans et al. 2013). SCADA is a system of computers and wireless network connections used to display and control water system operations. SCADA systems for agricultural water conservation have been implemented throughout the United States in conjunction with automated headgate operations; however, very few studies have documented the actual amount of water saved from agricultural water conservation efforts (Clemmons and Allen 2005). When implemented properly in irrigation districts, SCADA can lead to improved water delivery service to farms, more effective operations, reduced spill (and therefore reduced diversions), and in some cases reduced costs of labor and energy (Freeman and Burt 2009). Water savings from the use of SCADA systems generally range from about 7 to 10 percent (Temido et al. 2014).

Estimates of Selenium and Salinity Load Reductions

The ITRC (2014) report for irrigation modernization in the Uncompahgre Valley describes methods to reduce off-farm seepage losses, and the report provides estimates of total salt reduction for modernization and replacement of canals on the east side of the Uncompahgre subwatershed. Since the ITRC report was funded by Reclamation, input parameters were derived partly through technical help from Reclamation (ITRC 2014). The ITRC report shows estimates of total salt reduction for replaced canals on the east side of the Uncompahgre subwatershed for a given length of canal replaced (for example, Loutsenhizer, EC

Lateral, Selig, and East Canals). For the east side Uncompahgre, the total salt reduction ranged from 852 to 978 tons per year per mile of canal replaced, with a median value of 948 tons/yr/mi (**Table 5.2-2**). The report also estimated total selenium reduction of replaced canals; however, the ITRC report fixes the Se/salt ratio at 0.06, and this ratio can vary widely from basin to basin.

Table 5.2-2. Summary of Salt Reduction Results from East Side Uncompahgre Valley.

Canals in East Side Uncompahgre Valley	Modernized Length, ft	Abandoned Length, ft	Total Canal Length Modernized or Replaced, ft	Anticipated Total Salt Reduction, tons/yr	Salt Reduction per mile of pipe, tons/yr/mi
Lower Loutsenhizer Canal Pipeline	30,624	7,712	38,336	6,672	919
EC Lateral Pipeline	28,090	211	28,301	4,569	852
Lower Selig Canal Pipeline	72,864	1,670	74,534	13,808	978
East Canal Pipeline	56,074	0	56,074	10,378	977
				Median	**948**
Source: ITRC 2014					

For this Plan-EA, information was provided by Reclamation regarding total annual salt loading from the four focus subwatersheds (Reclamation 2017d). Using Reclamation's total off-farm salt load divided by irrigated acres provides an estimate of salt load per acre. Using the east side of the Uncompahgre as a reference, the other subwatersheds are assigned a salt-correction ratio, which is applied to salt seepage prevention calculations in the three other watersheds. This accounts for differences in total salt loading from the different subwatersheds. The salt-correction ratios range from 0.25 to 0.42 (**Table 5.2-3**).

Table 5.2-3. Annual Salinity Loadings from the Subwatersheds, from Reclamation Salt Loading Overview.

Subwatershed	Off-Farm, tons/yr[1]	Irrigated Acres[2]	Off-Farm, tons/acre/yr	Ratio to East Uncompahgre
Uncompahgre, East Side	134,000	22,128	6.06	—
North Fork	64,027	13,016	4.92	0.81
Smith Fork	32,910	9,970	3.30	0.55
Bostwick and Shinn Parks	12,129	3,523	3.44	0.57

[1] J. Sottilare, U.S. Bureau of Reclamation, Grand Junction, Colorado, email communication, March 2017.
[2] Colorado Division of Water Resources (CDSS 2010)

The ratio of selenium to salt loading (Se/salt ratio) is used to anticipate selenium reductions relative to anticipated salt reductions resulting from canal piping projects. The Se/salt ratio varies from basin to basin, and depends on many different factors. With the availability of historical water-quality samples, the Se/salt ratio can be calculated for each subwatershed. For example, in water samples collected from Red Rock Canyon (outlet for Bostwick Park), the Se/salt ratio varies from 0.14 to 0.66, with a median value of 0.29. In contrast, in water samples collected from Sunflower Drain in the Uncompahgre Valley, the Se/salt ratio varies from 0.007 to 0.155, with a median value of 0.038.

For this report, the stream outlets of the four subwatersheds are being used as points of measure for the effects of canal replacement projects, and historical water-quality samples are available for the stream sites. Salt and selenium prevention calculations were applied to the historical water-quality data, as though the canal replacement had been completed at the time of sample collection. Salt seepage-prevention values were derived using parameters from the ITRC (2014) report and data from Reclamation (2017d). The salt seepage-prevention values were multiplied by the actual Se/salt ratio for historical water-quality samples for each subwatershed outlet, and the median salt and selenium seepage prevention values are shown below.

Methodologies employed to estimate salt, selenium, and water conservation benefits are subject to uncertainty. It should be recognized that these estimates are provided to be the independent basis for the economic analyses later in this report.

Groundwater

No groundwater resources would be extracted or consumptively used as part of this project; however, piping of irrigation canals and laterals may have an effect on seeps and springs associated with canal leakage. In addition, on-farm improvements, such as conversion from flood irrigation to sprinkler systems, could affect groundwater levels and dissolved constituent concentrations and loads.

Arnold (2011) documented that the groundwater table does not rise as much beneath a sprinkler-irrigated field compared with a flood-irrigated field, which provides less dilution for groundwater. Therefore, selenium and salinity concentrations in groundwater beneath a field converted from flood irrigation to sprinkler irrigation may increase. In contrast, the selenium and salinity loads (concentration times deep percolation rate) from the field would decrease. As part of this Plan-EA, spreadsheet modeling using parameters from Arnold (2011) illustrates that conversion of a hypothetical 200-acre field from flood irrigation to sprinkler irrigation would reduce selenium and salinity loads by about 30 percent (see **Table 5.2-4**.

Table 5.2-4. Estimated Water Budget for Hypothetical 200-Acre Irrigation Field, Converting from Flood Irrigation to Sprinkler Irrigation.

	Groundwater throughflow (deep percolation), inches/yr	Groundwater throughflow (deep percolation), acre-feet/yr
Deep percolation from flood irrigation	8.8	147
Deep percolation from sprinkler irrigation	2.7	45
Deep percolation prevention, acre-feet per year		**102**
Source: Arnold 2011		

Prevention of deep percolation would mean less groundwater recharge, and less groundwater recharge in the Mancos Shale means less mobilization of selenium and salinity; however, it also means loss of recharge to aquifers that may be used for domestic and agricultural purposes, whether through the use of water from springs or pumping of groundwater from wells. Determining which springs or aquifers that could possibly be impacted by the proposed project components would require a detailed hydrologic analysis, which is beyond the scope of this Plan-EA.

Floodplains

Within the Lower Gunnison River Basin, the canal piping projects, in general, will be located in upland areas, and will not affect any 100-year or 500-year floodplains. However, there may be projects that require headgate restoration or modification to meet intake requirements of an enclosed pipeline to convey irrigation water. These diversion modification projects may occur within the 100-year floodplain, and streams may need temporary re-routing or cofferdams for construction of the new diversion structures. In cases where temporary re-routing or cofferdams are needed, modifications could result in minor, short-term changes to the floodplain. Many of the SCADA platforms will likely be constructed within the 100- or 500- year flood plain. These structures would not permanently alter the floodplain.

In the Crawford subwatershed, the Needle Rock Ditch would be modified to convey water from its diversion structure at the Smith Fork through a pipeline to irrigated lands. The design would include replacement of the diversion structure (JUB 2016b), which would likely require construction in the stream channel.

Water Rights

As stated in **Section 3.2**, agricultural irrigation accounts for 92 percent of all water diverted in Colorado and 95 percent of all water actually consumed (Browning and Bushong 1992). As much as 30 to 35 percent of the water diverted is lost as ditch seepage before the water ever reaches the field. Replacing unlined irrigation ditches with piping prevents seepage losses; however, ditch piping and water conservation raise a number of complicated legal issues. Water characterized as "wastewater" is treated differently from groundwater return flows. Wastewater is considered by the courts to be water which remains on the surface and within the control of the original appropriator after its initial application or use (Browning and Bushong, 1992). In contrast, groundwater return flows are waters which have percolated into the ground. While ditch losses are considered to be "wasted" water, over many years the water may find its way downgradient to springs or streams where humans, livestock, and wildlife have historically used the water. Under the "no injury" rule in Colorado water law, junior appropriators have the legal right to the continuation of stream conditions as they existed at the time of their appropriations (see *Orr v. Arapahoe Water & Sanitation Dist., 753 P.2d 1217, 122, Colo. 1988*).

One well-established consequence of the no injury rule is that downstream water rights are entitled to a continuation of historic groundwater return flows if an irrigation water right is changed to a new use or place of use (see *Rominiecki v. Mcintyre Livestock Corp., 633 R2d 1064, 1067-68, Colo. 1981*). When a water right is changed to a new use, water must be left in the stream in order to maintain the historic flows in the stream and timing of irrigation return flows. Although less frequently tested in the courts, if a ditch is lined, the historic amount of ditch loss might be required to be left in the stream for use by downstream appropriators. Colorado cases that have applied the "no injury" rule have typically involved return flows from irrigated fields, not ditches; however, downstream appropriators may be entitled to a continuation of ditch seepage (or, if the ditch were lined, to have a like amount of water left in the stream), if this seepage historically has been relied on by them to help satisfy their water rights (Browning and Bushong 1992).

On the other hand, Colorado courts have held that once water is applied for irrigation, groundwater return flows that start back toward the stream are not subject to independent appropriation (*Ft. Morgan Reservoir & Irrigation Co v. McCune, 206 P. 393, Colo. 1922,* in Browning and Bushong 1992). Water not absorbed into the earth and collected in a ditch is wastewater, but the land owner has the right to the

full use of all of the water; hence, a downstream appropriator has no right to reliance on surface wastewater. In contrast, irrigation return flows which result in groundwater seepage cannot be recaptured and must be allowed to return to the stream system (see *City of Boulder v. Boulder & Left Hand Ditch Co., 557 P.2d 1182, Colo. 1976*). The distinction between wastewater and seepage may not have been stated explicitly by the Colorado Supreme Court; however, the rulings imply that water percolating into the earth has left the grasp of the appropriator, while water flowing on the surface is more readily quantifiable and controllable (Browning and Bushong 1992). In this manner, it can be argued that water saved by ditch piping can be analogized to wastewater because it remains on the surface and can be maintained in the physical control of the original appropriator.

Ditch easements also may be affected by canal piping projects. If the irrigation ditch is relocated or altered, there are vested easement rights of the ditch owners in the location, historic practice, and use of the ditch (Miller 2002). The Colorado Constitution and statutes embody the right of any person to obtain a ditch ROW for the conveyance of water across the lands of another person, upon payment of just compensation. Following traditional concepts of easement law, the land traversed by the ditch is often considered the "servient or burdened estate," while the land benefitted by use of the ditch is considered the "dominant or benefitted estate," relative to each other (Miller 2002). With relocation or moving of ditch easements, in some cases the precedent favors the owner of the original ditch, and in other cases the historical uses of the water were considered. There also have been cases in Colorado precedent as to whether the same principle applies to situations where the burdened estate owner sought to pipe, culvert, modify, or improve the ditch, but not relocate it. It could be argued that any change in the nature or character of the easement was an interference with the vested rights of the dominant estate holder. Therefore, piping or culverting what was historically an open ditch interfered with the vested rights of the dominant estate holder (Miller 2002). However, this concern was not raised during either the scoping period or public review period of the Draft Plan-EA.

While the water itself belongs to the State, a water right in Colorado is considered to be real property, which in many cases can be sold or transferred. To file a claim for the beneficial use of waters of the State of Colorado, a property owner must obtain a water right through the water court, which is called adjudication of the water right. Associated with the water right is a diversion structure, spring, or well, with an accurate location, specified quantity of the water right (frequently expressed as flow), and the stated beneficial use (for example, domestic, agriculture, commercial, or industrial). If an appropriator feels that their water rights have been in some way injured (such as a reduction in flow), then an injury claim would be filed through the State water courts.

The piping of ditches and laterals under the Proposed Action may affect some springs and seeps that were established after construction of the ditch or lateral. It is possible that land owners may have adjudicated the water right consisting of a seep or spring affected by a leaking canal. However, this concern was not brought up during the scoping phase of this review process. **Figure 5.2-2 in Appendix C** shows locations of adjudicated springs and seeps within the four subwatersheds.

In 1973, the Colorado legislature created the State's Instream Flow Program. These instream flows are adjudicated water rights which are owned by the State. There are several instream flow reaches upstream from the subwatersheds that may affect diversions into the subwatershed projects (for example, upper Smith Fork, and Cimarron River below Silver Jack Reservoir). In theory, if water conservation through

piping of canals and laterals means less duty of water is needed to reach the irrigated fields, then the water should stay in the stream, which will be beneficial for instream flow water rights in this water short system. Importantly, water saved that remains in the stream will help to achieve the objectives of the Programmatic Biological Opinion for the Lower Gunnison River (USFWS 2009).

5.2.1.2 Project-Specific Components

For the Lower Gunnison Project, the Proposed Action includes optimization techniques for irrigation water conveyance, piping of canals and laterals, and installation of SCADA systems, in conjunction with expanded implementation of soil health practices such as minimum till and cover crops. Project-specific components are described in **Tables 4.3-1** through **4.3-4**, and include canal piping, replacement of inefficient canal segments with other designs, and SCADA implementation.

5.2.1.2.1 North Fork

Proposed project components include replacement of 19,222 feet of canal, with a new siphon across Leroux Creek to eliminate approximately 1.3 miles of canal. SCADA systems will be implemented on Siphon Inlet, Patterson Lateral, and Leroux Creek feeder. Water quality impacts from the Proposed Action are shown in **Table 5.2-5**.

Table 5.2-5. Water Quality Impacts from Proposed Action in North Fork Subwatershed.

	Environmental Consequences			
Project Component	**Median Salinity seepage prevention, tons/yr**	**Median Selenium seepage prevention, lb/yr**	**Water seepage prevention from canal piping or replacement, acre-ft/yr**	**Canal spill prevention from SCADA, acre-ft/yr[1]**
Canal piping and replacement	2,804	21	1,334	--
SCADA Implementation[1]	--	--	--	range 450-4,500

[1] SCADA water savings range from one to ten percent.

Estimates of seepage prevention due to canal piping were calculated using average seepage rates from the study area (Richards et al. 2014; Reclamation 2017d). In comparison, JUB Engineers (2016a) conducted a seepage study for the Fire Mountain Canal, indicating seepage loss rate of 0.95 ft^3/sec per mile of canal. Comparison of the results in **Tables 5.2-6** and **5.2-7** suggests that seepage loss rates of the Fire Mountain Canal are higher than the average seepage loss rates from the study area, which is not surprising given that many sections of the Fire Mountain Canal are likely constructed on fractured bedrock outcrops or terrace deposits comprised of lava-sourced cobbles along the southern flanks of the Grand Mesa. These differing results provide a range of seepage prevention to be expected from the Proposed Action.

Table 5.2-6. Estimated Seepage Prevention Using Reported Uncompahgre Valley Seepage Rates.

[Trapezoidal channel; 1:1 sides; Manning's n=0.025]

Canal	Nominal discharge, ft^3/sec	Annual yield (irrigation season), acre-ft/yr	Seepage rate, gal/ft^2/d	Base width, ft	Canal slope, ft/ft	Wetted Perimeter, ft	Length of canal replaced, ft	Seepage prev-ention, acre-ft/yr
Fire Mountain Canal	135	44,985	5.25	2.5	0.002	11.8	19,222	1,334
							Total	**1,334**

Table 5.2.7. Estimated Seepage Prevention Using Fire Mountain Canal Seepage Rates.

Canal	Nominal discharge, ft^3/sec	Annual yield (irrigation season), acre-ft/yr	Seepage rate, ft^3/sec/mile	Length of canal replaced, mi	Seepage prevention, acre-ft/yr
Fire Mountain Canal	135	44,985	0.95	3.64	2,504
Source: Seepage loss study by JUB (2016a)				**Total**	**2,504**

5.2.1.2.2 Crawford

The Crawford subwatershed has a storage reservoir and network of canals that divert irrigation water from the headwaters of the Smith Fork into Cottonwood Creek, Alum Gulch, and other tributaries to the North Fork Gunnison River near Hotchkiss.

Proposed actions include piping of the easternmost portion of Needle Rock Ditch from the point of its diversion, consisting of 0.166 miles (879 feet) of new enclosed and pressurized pipeline to replace the current open ditch. The pipe would be sized with a diameter of 42 inches to carry approximately 48 ft^3/sec. The current diversion structure at Smith Fork would be replaced. The upper 6,700 feet of the open Grandview Canal ditch will be piped from the diversion point with 54 inches through 63 inch PVC and HDPE pipe. There would be a new division/screening structure. The pipe will be sized to carry approximately 113 ft^3/sec. A regulating reservoir will be installed on the Center Clipper Ditch designed to absorb the fluctuation of demand on the piped system as irrigators turn on and off. The project would consist of a 30 acre-foot reservoir and associated inlet and outlet works. SCADA will be installed at the Smith Fork Feeder, Crawford Grandview-Aspen Canal, Needle Rock Ditch, and Clipper Re-reg Pond. Each SCADA system generally includes water level sensors, buried conduit, relay antenna (telemetry equipment), solar power, and panel. Benefits include prevention of selenium loads, prevention of salinity loads, water conservation, and modernization and conversion of the existing direct delivery irrigation systems to a more well-timed, irrigation and producer “demand-driven” system. In addition, SCADA would reduce the amount of time associated with routine visits to sites. Estimated selenium seepage, salinity seepage, water seepage, and canal spill prevention for the Proposed Action within the Crawford subwatershed are shown in **Table 5.2-8**.

Table 5.2-8. Water Quality Impacts from Proposed Action in Crawford Subwatershed.

	Environmental Consequences			
Project Component	**Median Salinity seepage prevention, tons/yr**	**Median Selenium seepage prevention, lb/yr**	**Water seepage prevention from canal piping or replacement, acre-ft/yr**	**Canal spill prevention from SCADA, acre-ft/yr[1]**
Canal piping and replacement	195	0.30	619	--
SCADA implementation[1]	--	--	--	range 540-5,400
[1] SCADA water savings range from one to ten percent.				

5.2.1.2.3 Uncompahgre

Proposed actions include pipe 0.4 miles (2,137 feet) of the GB lateral and 3.18 miles (12,766 ft) of the GB-A lateral. The pipe would be PVC and sized with a diameter of 36-inches. SCADA systems will be installed on the East, Selig, and Loutsenhizer Canals, with a radio tower on Flat Top. SCADA systems would generally include water level sensors, buried conduit, relay antenna (telemetry equipment), solar power, and panel. Implementation of the SCADA systems would reduce fuel consumption and the amount of time associated with routine visits to sites. Efficiencies are only able to be assigned for SCADA installations on single canal systems. For this watershed, SCADA installations will be dispersed throughout different canal systems which will improve efficiencies; however, we are not able to quantify the savings (**Table 5.2-9**).

Table 5.2-9. Water Quality Impacts from Proposed Action in Uncompahgre Subwatershed.

	Environmental Consequences			
Project Component	**Median Salinity seepage prevention, tons/yr**	**Median Selenium seepage prevention, lb/yr**	**Water seepage prevention from canal piping or replacement, acre-ft/yr**	**Canal spill prevention from SCADA, acre-ft/yr[1]**
Canal piping and replacement	2,676	163	179	--
SCADA Implementation[1]	--	--	--	range 1,140-11,400
[1]SCADA water savings range from one to ten percent.				

5.2.1.2.4 Bostwick Park

The West Lateral starts at the end of the Vernal Mesa Canal, and approximately one mile of this lateral has previously been piped. Below the end of the existing pipeline, the West Lateral flows for another 4 miles before it discharges excess water through the outlet ditch which flows through Red Rock Canyon, with several diversions into the Uncompahgre Valley, and discharges into the Gunnison River. The proposed project includes 0.53 miles (2,801 feet) of new enclosed and pressurized pipeline to replace the open, earthen portions of the West Lateral along Bostwick Park Road. The pipeline would consist of approximately 250 feet of 30-inch-diameter HDPE pressure pipe, and the remaining 2,551 feet of 24-

inch-diameter HDPE pressure pipe. The project also would include a screening structure and a pressure reducing station. The existing canal would be abandoned. SCADA systems will be installed on the Cimarron Canal Diversion on the Cimarron River. Benefits include reduced selenium and salinity loads; canal piping would conserve water; and SCADA implementation also would conserve water (**Table 5.2-10**).

Table 5.2-10. Water Quality Impacts for the Bostwick Park Subwatershed.

	Environmental Consequences			
Project Component	**Median Salinity seepage prevention, tons/yr**	**Median Selenium seepage prevention, lb/yr**	**Water seepage prevention from canal piping or replacement, acre-ft/yr**	**Canal spill prevention from SCADA, acre-ft/yr[1]**
Canal piping and replacement	286	83	56	--
SCADA implementation[1]	--	--	--	range 600-6,000
1 SCADA water savings range from one to ten percent.				

5.2.1.2.5 Compliance and Best Management Practices

For canal piping, and for construction within a stream channel, permits may be required from the following agencies:

- CDPHE Stormwater Construction Permit: Coverage is required by state and federal regulations for stormwater discharged from any construction activity that disturbs at least 1 acre of land, or is part of a larger common plan of development that will disturb at least 1 acre. Discharges of water encountered during excavation or work in wet areas may require a discharge permit. If the water is discharged to waters of the State, a Construction Dewatering Discharge Permit is required. If the water is discharged to land and allowed to infiltrate, approval from the CDPHE liaison is required. (CDPHE 2017b)

- USACE: Under Section 404(f)(1)(C) of the CWA, discharges of dredged or fill material associated with construction or maintenance of irrigation ditches, or the maintenance (but not construction) of drainage ditches, are not prohibited by or otherwise subject to regulation under Section 404 of the CWA. Discharges of dredged or fill material associated with siphons, pumps, headgates, wingwalls, weirs, diversion structures, and such other facilities as are appurtenant to and functionally related to irrigation ditches are included in the exemption for irrigation ditches. Under 33 CFR 323.4(a)(1)(iii)(C)(1))(i), "[c]onstruction and maintenance of upland (dryland) facilities such as ditching and tiling, incidental to the planting, cultivating, protecting, or harvesting of crops, involve no discharge of dredged or fill material into waters of the U.S., and as such never require a Section 404 permit." The construction and maintenance of irrigation ditches and maintenance of drainage ditches may require the construction and/or maintenance of a farm road. In those circumstances, the Subsection 404(f) (1)(E) exemption for discharges of dredged or fill material associated with the construction or maintenance of farm roads applies where such related farm roads are constructed and maintained in accordance with BMPs. However, in 33 CFR 323.4(a)(6) and 40 CFR 232.3(c)(6), there must be assurance that flow and

circulation patterns and chemical and biological characteristics of waters of the U.S. are not impaired, that the reach of the waters of the U.S, is not reduced, and that any adverse effect on the aquatic environment will be otherwise minimized. Construction activities within the stream channel may be regulated by the local or regional USACE office, and consultation with USACE may be necessary if temporary stream re-routing or cofferdams are needed for construction of instream diversion structures.

5.2.2 No Action

The overall water-quality conditions and watershed health of the Lower Gunnison River Basin can be measured at the USGS streamflow gaging station Gunnison River near Grand Junction, Colorado (site number 09152500). Dissolved selenium concentrations in water from the Gunnison River near Grand Junction during 1975-2016 ranged from 1 to 25 µg/L, with an average of 5.4 µg/L which is above the chronic aquatic life standard of 4.6 µg/L (CDPHE 2016a). Elevated selenium concentrations contribute to degraded water-quality conditions for endangered fish species in the Colorado River basin (Seiler et al. 2003; USFWS 2009). Dissolved solids concentrations in water from the Gunnison River near Grand Junction during 1965-2016 ranged from 179 to 2,750 mg/L, and dissolved solids loads ranged from 329 to 23,534 tons/d. The future without project would indicate further prolonged selenium exposure to endangered fish species in the Gunnison River and continued salinity loads affecting downstream water users in the Colorado River Basin. The water quality conditions described in greater detail in **Section 3.2** would not change under the No Action Alternative.

The No Action alternative would result in continued violation of the chronic aquatic-life standard for dissolved selenium of 4.6 µg/L, and inability of the Lower Gunnison River to meet the established TMDL requirements (CDPHE 2011, 2016a). Continued failure to meet water quality standards would impair the ability to put water to beneficial use for those activities that require NPDES permits, effectively limiting economic activity in certain sectors (e.g., sand and gravel mining). The No Action alternative may result in the inability to meet expectations of the USFWS Programmatic Biological Opinion (USFWS 2009). Water losses to seepage and evaporation and deterioration of soil health would continue in the Lower Gunnison project area. In addition, the No Action alternative would not contribute to the modernization of the U.S. agricultural sector, which faces stiff international competition from foreign nation-subsidized agricultural economies.

5.2.3 Cumulative Impacts

Salinity and selenium concentrations and loads for the Gunnison River near Grand Junction have shown statistically significant downward trends over the last several decades (Leib and Bauch 2008; Mayo and Leib 2012). Through a statistical analysis of partial residuals (Mayo and Leib 2012), selenium concentrations in water from the Lower Gunnison River Basin have decreased significantly (**Appendix E, Figure 5.2-1**). Annual selenium load for the Gunnison River near Grand Junction has decreased significantly over a 22-year period, and was estimated to be 23,196 pounds in 1986 and 16,560 pounds in 2008, a 28.6 percent decrease. Kircher et al. (1984) reported downward trends in salinity load (significance level of 0.05) in water from the Gunnison River. The trends of decreasing selenium and salinity concentrations and loads are generally attributed to accomplishments by the Colorado River Basin Salinity Reduction Program, which has included canal piping, winter water programs for livestock, and on-farm improvement projects (USGS 2014). Cumulative impacts of this Watershed Plan-EA will be the

continued improvement of water-quality conditions and recovery of endangered fish species in the Lower Gunnison River Basin.

The cumulative impacts of canal piping would mean less groundwater recharge to local, shallow aquifers. With seepage occurring through the Mancos Shale, water quality of the shallow aquifers would likely be poor and the water unusable for human consumption (Wright and Butler 1993). Therefore, cumulative impacts of canal seepage prevention include reduction in the quantity of poor-quality groundwater in shallow aquifers. Since some of this canal-recharged water could percolate to streams and rivers, there would be a reduction in poor quality groundwater discharging to streams. On the other hand, springs in near proximity to the leaking canals may have been historically used by land owners along the ditch (**Appendix C, Figure 5.2-2**). Drying up of the seeps or springs could deprive the land owners of the historical use of the spring water.

Reductions in canal seepage, while reducing percolation through poor quality soils and reducing poor quality return flows to streams, could also reduce water availability to down-gradient water users if canal seepage has historically been intercepted by these users' systems; it could affect adjacent vegetation and spring flows that have ecosystem and aesthetic benefits; and, it could increase the amount of water left in streams if less water is diverted since less water will seep from canals.

Downstream water users are afforded some protection under Colorado's water law and water administration from changes in water use. If a down-gradient water user claims an injurious effect to the historic pattern of water availability to the subject water rights, that water right holder can claim injury with the Colorado Division of Water Resources. The State would need to determine if the interception of the canal seepage is legally defensible. A standard requirement in Colorado water rights is that a point, or points, of diversion must be specified. Interception of up-gradient canal seepage may or may not be included in the down-gradient water right; however, typically it is not included. The down-gradient water user may have benefited over the years from an up-gradient water user's canal seepage, but that does not necessarily mean that there is a continued legal right to benefit from it. Conversely, a down-gradient water user can be adversely affected by canal seepage passing through poor quality soils as that water is being conveyed to irrigated areas located on better quality soils. In this case, an up-gradient piping project may greatly benefit the down-gradient water user. The most economically feasible canal piping projects are typically located on off-farm systems that serve a considerable portion of an irrigation district. These larger canals provide the economies of scale needed to make these projects even marginally feasible. In locating potential projects, it is typical for an irrigation district or a larger umbrella water management agency, such as the River District, to assist in locating the canal segments that can be piped without creating turmoil within or along the delivery system by pitting water users against each other as a result of real or alleged impacts from reduced canal seepage. There is thus a strong motivation for the districts to locate systems to avoid adverse impacts to down-gradient water users.

The Proposed Action does not include any increases in irrigated acreages. Therefore, the possibility exists that the amount of water left in streams could increase in amounts that approximate the amount of water that has historically seeped from the canals. Western irrigation systems are generally termed water short, meaning that there is typically the possibility of greater crop production if a fuller water supply is available. It is unknown whether there would be more water left in the stream or whether the diversions

would equal or approximate the historic diversions, because individual farmers may choose to deliver more water to the same acreage to increase their crop yields. Colorado water law allows farmers to make these decisions as long as the water being diverted is for the purposes provided for in the water right and that it is considered beneficial in the context of current water law (meaning that it is not considered excessive in relation to the purposes of the diversion). Furthermore, water users have flexibility to vary their diversions with time and they often do vary them for reasons not solely related to crop production or water availability. For example, a farmer may reduce diversions from year-to-year based on expected crop prices, fuel and equipment costs, programs to let parcels rest and recover, etc. The Proposed Action does not include provisions that would require changes in water rights or implement constraints in the ability of the owners of existing water rights to use water with any less flexibility that they have in the past. To the degree that less water is diverted, there would be a positive effect in streamflows downstream of the diversion points and in associated riparian habitats. However, speculating the manner and degree to which farmers may change their practices strictly as a result of piping canal systems is not defensible nor would it be appropriate, given irrigators' authorities under Colorado water administration.

5.3 Air Quality

5.3.1 Proposed Action

5.3.1.1 Subwatershed Improvements

No long-term impacts are anticipated to result from the Proposed Action. Temporary localized construction impacts would result from airborne dust from excavation activities and vehicle movements on unpaved roads, as well a localized increase in emissions from construction equipment and vehicles. Delays associated with travel through construction zones, in instances where a project affects an adjacent roadway, would increase emissions from on-road vehicles.

Upon completion of construction, it is anticipated that air quality would return to pre-construction levels. Long-term operation and maintenance activities would result in isolated temporary impacts to air quality, which include airborne dust and vehicle emissions. This would be a negligible change when compared to the existing condition.

5.3.1.2 Project-Specific Components

The impacts on air quality would be the same as those described in **Section 5.3.1.1**. Greenhouse gas emissions associated with the proposed project components would consist of emissions from construction equipment and vehicles. Such emissions would be low, sporadic, and short term in the sparsely populated project areas. Current science cannot establish or quantify a cause-effect relationship between greenhouse gas emissions and climate change on a local level. Although there appears to be a cause-effect relationship at a global scale, it is not possible to connect greenhouse emissions and climate change at a local or a regional spatial scale (USGS 2008). The small scale, temporary increase in greenhouse emissions associated with the proposed project would not have a measurable effect on climate and, therefore, would be negligible.

5.3.1.3 Compliance and Best Management Practices

The CDPHE Air Pollution Control Division requires reporting of air emissions of criteria pollutants if the emissions are anticipated to be above 2 tons per year for each criteria pollutant. For the Proposed Action,

the emissions are anticipated to be well below that threshold; therefore, no reporting or permitting requirements are anticipated. Construction-related air quality impacts would be reduced through the implementation of applicable BMPs, including, but not limited to, the following:

- The application of water, other dust suppressant, or soil binder on unpaved roads and areas of ground disturbance to minimize dust entrainment;
- Use of stabilized construction entrances to minimize tracking;
- Require appropriate emission control devices on all construction equipment.

5.3.2 No Action

The No Action Alternative would result in no changes to existing air quality in the project area. Maintenance activities would continue to result in temporary impacts, including vehicle and equipment emissions and dust entrainment.

5.3.3 Cumulative Impacts

Cumulative effects to regional or local air quality may result from future construction associated with increased development. Emissions associated with proposed construction activities could have short-term adverse, cumulative impacts if they occur at the same time and in the same area as the Proposed Action. However, the regional air quality is good and the project area is in attainment for all criteria pollutants and construction activities would be localized and short-term. In addition, BMPs would be implemented to reduce construction emissions. There could be short-term, minor impacts on local and regional air quality.

5.4 Vegetation

5.4.1 Vegetation Communities and Habitat

5.4.1.1 Proposed Action

5.4.1.1.1 Subwatershed Improvements

Effects on vegetation communities and habitat resulting from incremental implementation of the proposed subwatershed improvements (described in **Section 4.3.1.1**) would be direct and indirect, short-term and long-term, as well as localized and farther-reaching.

At the subwatershed scale, converting open irrigation ditches to enclosed pipe, upgrading on-farm irrigation systems, and implementing soil health practices would result in a significant reduction of salt and selenium loading in the lower Gunnison River basin. The resulting water quality improvements would improve the health of aquatic, wetland, and riparian vegetation communities and habitat function within the natural riverine systems of the project area.

Open irrigation ditch networks (including on-farm ditches) provide ribbons of artificial wetland and riparian habitat across the landscape. Where open ditch networks are piped and artificial wetlands transition to uplands following on-farm efficiency projects, the distribution of wetlands and riparian patterns of vegetation across the landscape would change. The long-term loss of artificial local wetland

and riparian habitat resulting from ditch conversions and on-farm efficiency upgrades would be offset by gains in water quality and wetland and riparian habitat function in the project area's natural riverine systems (see **Section 5.4.2** for further discussion of impacts to wetlands and riparian areas). Construction footprints of buried pipe alignments through native upland vegetation communities would temporarily affect those communities until they are reestablished. Disturbed areas would be reseeded with approved appropriate seed mixes of native grasses, forbs, and shrubs, and eventually colonized by adjacent native plant species. Weed management would be implemented according to county standards, at a minimum.

Implementation of soil health practices and installation of SCADA systems in irrigated farmlands and developed areas are not anticipated to cause measurable long-term negative impacts on vegetation communities and habitat. Soil health practices such as use of cover crops would benefit certain wildlife species by providing forage and shelter. Due to their small footprint size and siting at previously disturbed locations and near existing irrigation infrastructure, SCADA installations would not result in appreciable vegetation or habitat loss. SCADA systems would not be installed in wetlands or in areas that would require removal of riparian vegetation.

5.4.1.1.2 Project-Specific Components

North Fork

Project-specific components in the North Fork subwatershed are described in **Section 4** and listed on **Table 4.3-1**. These include three SCADA systems and a piping project on Fire Mountain Canal. All components are situated on private lands. Reclamation is the lead agency for the Fire Mountain Canal Piping Project, which will be analyzed in Reclamation's NEPA process and not discussed further here.

The SCADA systems would be installed on previously disturbed ground (i.e., ditch banks). One SCADA site (the Patterson Lateral SCADA) lies within a large area of irrigated agricultural lands on Rogers Mesa in the west part of the subwatershed. The other two SCADA systems would be located along Fire Mountain Canal in pinyon-juniper woodlands in the west part of the subwatershed north of Rogers Mesa in the area of Leroux Creek. Each SCADA site would occupy an approximately 200-square-foot upland area of previously disturbed ground (i.e., bare ground or sparsely vegetated existing ditch bank). Minor amounts of ground and vegetation disturbance in upland previously disturbed areas would occur during setting the equipment, burying conduit, and constructing an enclosure. Access would be along existing canal access roads. Installation of SCADA systems in the North Fork subwatershed is not expected to affect native upland vegetation or natural wetlands or riparian areas. Compliance measures and BMPs would be implemented (**Section 5.4.1.1.3**). Following installation, weed management would be implemented in accordance with county standards.

Crawford

Project-specific components in the Crawford subwatershed are described in **Section 4** and listed on **Table 4.3-2**. These include the Needle Rock Diversion Project (a headgate replacement and ditch piping project), the Grandview Phase 1 Project (a diversion structure replacement and ditch piping project), the Clipper Re-Reg Pond (a 30-acre-foot reservoir), and four SCADA systems. Three of the four SCADA systems are associated with the projects listed above. The fourth SCADA will be on the Smith Fork Feeder. All components are situated on private lands.

For the ditch piping projects, the construction corridors would be approximately 30 feet on either side of the existing ditch centerlines. Access to the construction corridors would be via existing roads. Materials would be staged in the construction corridor or in irrigated meadows or previously disturbed ground along the corridor, and no borrow material would be imported to the area except from commercial sources. The headgate/diversion structures would be replaced in their current locations, and the SCADA systems would be installed at the headgate/diversion structures concurrently. The Needle Rock Diversion Project area is situated in an irrigated meadow with patches of riparian woodlands and mixed mountain shrublands. The Grandview Phase 1 Project contours through pinyon-juniper woodlands and an irrigated meadow. Based on the linear project distances and the expected construction corridor widths, the Needle Rock Diversion Project would affect approximately 1.2 acres, and the Grandview Phase 1 Project would affect approximately 9.2 acres, of vegetation communities and habitat. The majority of the affected habitat would be upland woodlands and shrublands, and irrigated meadows.

For the Clipper Re-Reg Pond, the construction footprint would occupy approximately 7 acres, spanning an existing ditch corridor vegetated with several mature cottonwoods and stands of coyote willow, and extending into and areas of bare ground with herbaceous weeds and sagebrush and semi-desert shrublands. The construction area would be accessed via an existing road.

The SCADA systems would be installed on previously disturbed ground (i.e., existing ditch banks and headgate/diversion locations) accessed via existing roads. Each SCADA site would occupy an area of approximately 200-square-feet, and minor amounts of ground and vegetation disturbance could occur in upland previously disturbed areas during setting the equipment, burying conduit, and constructing an enclosure.

For all project-specific components in the subwatershed, compliance measures and BMPs would be implemented (**Section 5.4.1.1.3**). The project construction footprints would be limited to the smallest practical area and reseeded in a timely manner (within one growing season) following construction with a seed mix consistent with the surrounding vegetation community. Affected irrigated agricultural lands would be put back into production following construction. Weed management would be implemented according to county standards.

Effects on wetland and riparian habitat for project-specific components in the subwatershed are discussed in **Section 5.4.2**.

Uncompahgre

Project-specific components in the Uncompahgre subwatershed are described in **Section 4** and listed on **Table 4.3-3**. These include four SCADA systems and a piping project on the GB and GB-A Laterals (part of the Phase 9 Piping Project). Reclamation is the lead agency for the Phase 9 Piping Project, which will be analyzed in Reclamation's NEPA process and not discussed further here.

The four SCADA systems include the East Canal and Selig Canal SCADA sites, both of which are located on private land near the headgate structures for these canals on the Uncompahgre River. Both sites are in areas with a combination of residential, light industrial, and agricultural uses. The Loutsenhizer Canal SCADA site lies on private land in an area of mixed rural-residential subdivisions and small-parcel irrigated agriculture. The fourth site is a SCADA radio tower on the BLM–managed Flat Top hill in semi-desert shrublands and adobe badland habitat, in an area where several other communications

sites and dirt access roads are located. Each SCADA site would occupy an approximately 200-square-foot upland area of previously disturbed ground (i.e., existing ditch bank or existing tower site). Minor amounts of ground and upland vegetation disturbance would be required for setting the equipment, burying conduit, and constructing SCADA enclosures. Installation of SCADA systems in the Uncompahgre subwatershed is not expected to affect native upland vegetation or natural wetlands or riparian areas. Compliance measures and BMPs would be implemented (**Section 5.4.1.1.3**) as appropriate.

Bostwick Park

Project-specific components in the Bostwick Park subwatershed are described in **Section 4** and listed on **Table 4.3-4**. These include the West Lateral Phase 1 Project and a SCADA system, both on private lands.

The proposed West Lateral Phase 1 pipeline alignment parallels Bostwick Park Road in irrigated farmland. The construction corridor for the West Lateral Phase 1 project would be approximately 30 feet on either side of the ditch centerline. Access to the construction corridor would be via Bostwick Park Road. Materials would be staged in the adjacent irrigated meadow and no borrow material would be imported to the area. Based on the linear project distance and the expected construction corridor widths, the West Lateral Phase 1 Pipeline Project would affect approximately 4 acres of irrigated agricultural land and a narrow margin of herbaceous and shrub riparian vegetation. Effects on wetland and riparian habitat for project-specific components in the subwatershed are discussed in **Section 5.4.2**.

The SCADA site is located at the Cimarron Canal headgate on the Cimarron River in the south part of the subwatershed. The SCADA site would occupy an approximately 200-square-foot upland area of previously disturbed ground (i.e., existing ditch bank). Minor amounts of ground and vegetation disturbance would be involved in setting the equipment, burying conduit, and constructing an enclosure. Access to the site would be via an existing road.

For all project-specific components in the subwatershed, compliance measures and BMPs would be implemented (**Section 5.4.1.1.3**). The project construction footprints would be limited to the smallest practical area and reseeded in a timely manner (within one growing season) following construction with a seed mix consistent with the surrounding vegetation community. Affected irrigated agricultural lands would be put back into production following construction. Weed management would be implemented according to county standards.

5.4.1.1.3 Compliance and Best Management Practices

The following BMPs would be implemented to reduce negative consequences on vegetation communities and habitat:

- Ground disturbances shall be limited to only those areas necessary to safely implement the Proposed Action.
- Vegetation removal shall be confined to the smallest portion of the Proposed Action Area necessary for completion of the work.
- Construction limits shall be clearly flagged onsite to avoid unnecessary plant loss or ground disturbance.

- Prior to construction, vegetative material shall be removed by mowing or chopping, and either hauled to a proposed staging area to be burned or chipped, or chipped and mulched onsite. Stumps shall be grubbed and hauled to a proposed staging area to be burned.
- Topsoil shall be stockpiled and then redistributed after completion of construction activities.
- Straw wattles, silt curtains, cofferdams, dikes, straw bales, or other suitable erosion control measures shall be used at the edges of ground disturbance to minimize soil erosion and prevent soil erosion from entering wetlands or water bodies during construction.
- Following construction, all disturbed areas shall be smoothed, shaped, contoured and reseeded to as near to their pre-project conditions as practicable.
- Seeding shall occur at appropriate times with weed-free seed mixes per NRCS, BLM or Reclamation instructions, as appropriate.
- Weed control shall be implemented by the project proponent to county standards (at a minimum).

5.4.1.2 No Action

Under the No Action Alternative, the artificial wetland and riparian habitat created by the network of open irrigation ditches in the subwatersheds would persist, and adjacent native upland vegetation would remain in its current condition. Wildlife dependent on wetland and riparian areas in the subwatersheds would not benefit from reductions in salt and selenium loading to aquatic systems created by conversion of open irrigated ditches to enclosed pipe and on-farm irrigation efficiency projects.

5.4.1.3 Cumulative Impacts

This cumulative impacts analysis looks 50 years into the future at vegetation community and habitat resources within the general area of the subwatersheds. Present and future activities in the analysis area affecting this resource include ongoing and future irrigation improvement projects, subdivision and residential development, infrastructure development and/or maintenance (including public and private roads and energy transmission corridors), timber harvest, firewood cutting, vegetation management activities (such as pinyon-juniper or sagebrush treatment projects and weed management programs), livestock grazing, motorized recreation, and conversion of native shrublands and woodlands to agricultural or other uses. Climate change, drought, wildfire, and wildfire suppression also will continue to affect the region's vegetation communities and habitat in the future, possibly with increasing intensity.

Subwatershed improvements would affect distribution patterns of artificially induced wetland and riparian resources on the landscape, and artificially induced wetland and riparian vegetation communities would be lost. However, these losses would be offset by gains in water quality and wetland and riparian habitat function in the project area's natural riverine systems (see **Section 5.4.2** for further discussion of impacts to wetlands and riparian areas). Negative effects on upland vegetation communities and habitat from the subwatershed improvements would be temporary and of relatively small magnitude, and would not result in a substantial contribution to cumulative area-wide impacts vegetation communities. Irrigated agricultural lands affected by the projects would be returned to irrigated production within one growing season of construction, and pipe alignments would be revegetated in a manner consistent with

surrounding native vegetation communities. Both temporary and long-term impacts would be mitigated by design features, compliance measures, and BMPs described throughout this Plan-EA.

Under the No Action Alternative, there would be no contribution to the cumulative impact on vegetation communities and habitat in the subwatersheds.

5.4.2 Wetlands and Riparian Areas

5.4.2.1 Proposed Action

Impacts to wetland and riparian habitat from the construction and operation of the Proposed Action would be both short- and long-term (more than 5 years). **Table 5.4-1** lists the BMPs and Compliance Measures that would be implemented under the Proposed Action to minimize impacts to wetland and riparian areas. Access, temporary use areas, and borrow areas would be designed to avoid impacts to wetlands, waters of the U. S., and riparian resources in the project area. SCADA equipment would be placed outside wetland or riparian areas.

Short-term impacts include potential erosion from the construction sites, access, and temporary uses areas during construction. There is the potential for spills or leaks of industrial fluids during construction which could impact wetland and riparian vegetation and soils. Construction and ground disturbance could result in the introduction or spread of invasive weeds into adjacent wetland and riparian habitats.

As stated in **Section 5.4.1**, converting open irrigation ditches to enclosed pipe and implementing soil health practices would result in a considerable reduction of salt and selenium loading in the Lower Gunnison River Basin. The resulting water quality improvements would improve the health of aquatic, wetland, and riparian vegetation communities and habitat function. Implementation of the Proposed Action would result in long-term loss of artificial wetland and riparian habitat, as ditch seepage would no longer provide wetland hydrology to adjacent areas and ditch channels and banks would no longer support a riparian environment. However, for the known project components, NRCS would not require habitat replacement for the loss of artificial wetland and riparian habitat wetlands created by irrigation infrastructure. Thus, the statutory funding for projects performed under this Plan-EA would not require habitat replacement. The long-term loss of artificial local wetland and riparian habitat resulting from ditch conversions would be anticipated to be minor to moderate. However, the long-term benefits to water quality and habitat function in the project area's natural riverine systems would be anticipated to be major.

5.4.2.1.1 Project-Specific Components

Short-term and long-term impacts of project development are discussed below by subwatershed.

North Fork

Project-specific components in the North Fork subwatershed are described in **Section 4.3.1.2** and listed on **Table 4.3-1**. These include construction of three SCADA systems and a piping project on Fire Mountain Canal. All components are situated on private lands. Reclamation is the lead agency for the Fire Mountain Canal Piping Project, which will be analyzed in Reclamation's NEPA process and not discussed further here.

Construction of the three SCADA systems has the potential to result in short-term impacts to wetlands and riparian habitats from erosion and increased potential for introduction of invasive plant species adjacent to the construction sites: potential impacts would be minimized by implementation of the BMPs and Compliance Measures listed in **Table 5.4-1**.

Crawford

Project-specific components in the Crawford subwatershed are described in **Section 4.3.1.2** and listed on **Table 4.3-2**. These include the Needle Rock Diversion Project (a headgate replacement and ditch piping project), the Grandview Phase 1 Project (a diversion structure replacement and ditch piping project), the Clipper Re-Reg Pond (a 30-acre-foot reservoir), and construction of four SCADA systems. Three of the four SCADA systems are associated with the projects listed above; the fourth SCADA will be on the Smith Fork Feeder. All components are situated on private lands.

Construction of these project components has the potential to result in short-term impacts to wetlands and riparian habitats from erosion and increased potential for introduction of invasive plant species adjacent to the construction sites. Potential impacts would be minimized by implementation of the BMPs and Compliance Measures listed in **Table 5.4-1**.

In accordance with the wetland conservation provisions of the Food Security Act, the NRCS Colorado State Biologist conducted a wetland delineation at the proposed site of the Crawford Clipper Re-Regulating Pond on July 26, 2017. The determination concluded that the proposed site for the re-regulation pond contains a "manipulated wetland." As such, construction of the re-regulation pond would not require wetland mitigation under the Food Security Act.

Uncompahgre

Project-specific components in the Uncompahgre subwatershed are described in **Section 4.3.1.2** and listed on **Table 4.3-3**. These include construction of four SCADA systems and a piping project on the GB and GB-A Laterals (part of the Phase 9 Piping Project). Reclamation is the lead agency for the Phase 9 Piping Project, which will be analyzed in Reclamation’s NEPA process and not discussed further here.

Construction of the Proposed Action has the potential to result in short-term impacts to wetlands and riparian habitats from erosion and increased potential for the spread of invasive plant species adjacent to the SCADA equipment sites, which would be minimized by the implementation of the BMPs and Compliance Measures listed in **Table 5.4-1**.

Bostwick Park

Project-specific components in the Bostwick Park subwatershed are described in **Section 4.3.1.2** and listed on **Table 4.3-4**. These include the West Lateral Phase 1 Project and a SCADA system to be placed on the Cimarron Canal Diversion. The West Lateral Phase 1 would construct 0.53 mile (2,801 feet) of enclosed and pressurized pipeline to replace the open, earthen portions of the West Lateral along Bostwick Park Road. The Phase 1 would consist of approximately 250 feet of 30-inch diameter HDPE pressure pipe and 2,551 feet of 24-inch diameter HDPE pressure pipe. The project also would include a screening structure and a pressure reducing station. The existing canal would be abandoned.

Construction of these project components has the potential to result in short-term impacts to wetlands and riparian habitats from erosion and increased potential for introduction of invasive plant species adjacent to

the construction sites. These impacts would be minimized by the implementation of BMPs and Compliance Measures listed in **Table 5.4-1**.

5.4.2.1.2 Compliance and Best Management Practices

For canal piping, and for construction within a stream channel, permits may be required from the following agencies:

- CDPHE Stormwater Construction Permit: Coverage is required by state and federal regulations for stormwater discharged from any construction activity that disturbs at least 1 acre of land, or is part of a larger common plan of development that will disturb at least 1 acre. Discharges of water encountered during excavation or work in wet areas may require a discharge permit. If the water is discharged to waters of the State, a Construction Dewatering Discharge Permit is required. If the water is discharged to land and allowed to infiltrate, approval from the CDPHE liaison is required (CDPHE 2017b).

- USACE: The replacement of an open channel with a pipe is considered an irrigation exemption under the USACE Regulatory Guidance Letter No. 07-02 Exemption for Construction or Maintenance of Irrigation Ditches and Maintenance of Drainage under Section 404 Part 323.4(a)(3) of the CWA. An irrigation ditch is defined as "a man-made feature and/or an upland swale that either conveys water to an ultimate irrigation use or place of use, or that moves and/or conveys irrigation water (e.g., "runoff" from irrigation) away from irrigated lands. Irrigation ditches may include the distribution system or parts thereof, consisting of manmade canals, laterals, ditches, siphons, and/or pipes, or pump systems." Under this exemption, no Nationwide Permit is required for the disturbance to wetlands within the irrigation project area. Construction activities within the stream channel may be regulated by the local or regional USACE office, and consultation with USACE may be necessary if temporary stream re-routing or cofferdams are needed for construction of instream diversion structures.

- USACE: A preliminary determination was provided on October 10, 2017, that the Clipper Re-Reg pond qualifies for a CWA 404(f) exemption per 33 CFR Part 323.4(a)(3) (Morse 2017). The CWA 404(f) exemption language provided by the USACE can be found in **Appendix A**. NRCS agreed with the determination of exemption on October 16, 2017.

Under the Proposed Action, the BMP and Compliance Measures (**Table 5.4-1**) would be followed to minimize potential impacts to wetland and riparian habitats.

Table 5.4-1. Summary of BMPs and Compliance Measures for Wetlands and Riparian Areas.

Pre-construction Commitments
Construction components including temporary use areas for material and equipment storage will be located outside of wetlands or riparian areas.
General Project Avoidance and Minimization
Impacts to wetland and riparian vegetation will be minimized, except where removal is necessary for completion of the work.
Work will be confined within the ROW to preserve existing vegetation and private property. The ROW will be clearly marked in the field.
All temporary use areas will be located outside marked wetland boundaries. Ground disturbance will be limited to beyond turning, parking, or storing equipment. These areas will be reclaimed, including re-seeding and weed control when construction is final.
All access will be designated on project area maps, including along the construction corridor. No cross-country travel will occur in marked wetland areas.
Erosion and Sediment Control
A SWMP will be prepared and a Construction General Permit will be obtained from the CDPHE under Section 402 of the CWA. This will cover stormwater discharges from the Project.
Stormwater structural BMPs will be installed and maintained in accordance with the SWMP prior to clearing and grubbing and ground-disturbing activities. Inspections will occur according to the CDPHE's regulations.
Water Quality Protection
Fuel, oil, hydraulic fluid, lubricants, and other petrochemicals will not be stored within 200 feet of the wetland and riparian areas and will have a secondary containment system to prevent spills. Appropriate spill clean-up materials, such as booms and absorbent pads, will be available on-site at all times during construction.
All construction equipment will be decontaminated by cleaning with high-pressure water before mobilization to the site. All wheels, tracks, undercarriages, fenders, blades, buckets, and the exterior body will be cleaned prior to entering the site to prevent releases into the aquatic environment and the spread of noxious weeds.
Construction equipment and staging will be located within approved staging areas.
Leaks that occur to equipment while working on the Project will not be allowed to continue operating until the leak is fixed. Refueling will occur a minimum of 100 feet from wetland and riparian areas.
Concrete clean-up operations (if needed) will utilize a dedicated concrete wash-out pit in an upland location. The concrete remnants in the wash-out pit will be fully removed and legally disposed of off-site upon completion of all concrete operations, or as needed for maintenance.
Straw wattles, silt curtains, cofferdams, dikes, straw bales, or other suitable erosion control measures will be used to minimize soil erosion and prevent soil erosion from entering water bodies during construction.
Site Reclamation
After all disturbed areas are reclaimed and the seed bed prepared, revegetation will include a seed mix approved by the NRCS. Certified weed-free mulch—grass hay or straw mulch—will be applied.
After any surface disturbance, proper rehabilitation procedures will be implemented to prevent the infestation of invasive riparian species.

5.4.2.2 No Action

Under the No Action Alternative, existing riparian vegetation or wetland habitat would continue to persist along the region's network of irrigation ditches. Wetland and riparian areas in the subwatersheds would not benefit from reductions in salt and selenium loading to the aquatic system created by conversion of open irrigated ditches to enclosed pipe and on-farm irrigation efficiency projects.

5.4.2.3 Cumulative Impacts

Actions with the potential to cumulatively affect wetland and riparian resources in the four sub-watersheds include existing and future Colorado River Basin Salinity Control Program projects, Gunnison Basin Selenium Management projects, existing and future NRCS irrigation improvement projects, livestock grazing, and residential and commercial development. Climate change, drought and wildfire also could impact the region's vegetative resources and natural habitat in the future. When added to past, present, and reasonably foreseeable activities, the Proposed Action would not result in significant cumulative impacts to wetlands or riparian areas.

5.4.3 Special Status Species

5.4.3.1 Proposed Action

5.4.3.1.1 Subwatershed Improvements

Plant species protected by the ESA with the potential to be affected by future subwatershed improvements and currently-funded projects are clay-loving wild buckwheat and Colorado hookless cactus. Clay-loving wild buckwheat designated critical habitat was dismissed from further analysis because it lies outside the subwatersheds. No critical habitat has been designated for Colorado hookless cactus. Background information for these species and their critical habitats is provided in **Section 3.4.3** and **Appendix E**. Subwatershed improvements are described in **Section 4.3.1.1**.

Table 5.4-2 (below) presents preliminary effects determinations for each ESA-protected plant species for each type of subwatershed improvement, assuming the improvement would take place in *the USFWS-modeled range (***Figure 3.4-10 in Appendix C***) and potential habitat* of the species. Where conditional statements in the preliminary determinations are met in **Table 5.4-2**, Consultation under Section 7 of the ESA and/or clearance surveys would be required before activities could be initiated. Note that any ground-disturbing activities ancillary to the subwatershed improvements analyzed in **Table 5.4-2**, such as creation of or widening of access roads to project areas, establishment of staging or borrow areas on non-irrigated ground, or habitat conservation or mitigation actions, could trigger a need for Section 7 Consultation and/or clearance surveys if these actions would occur in the range and potential habitat of a special status plant species.

For subwatershed improvements taking place outside a species' range or inside the species' range but not in or near suitable habitat, a finding of "no effect" would apply to the activity.

Note that ESA-protected species presented on **Table 5.4-2** are current as of the preparation date of this Plan-EA, and both the species and their potential to occur should be checked and updated as necessary during the planning phase of each subwatershed improvement.

Table 5.4-2. Preliminary Effects Determinations for Federally Protected Plants in the Project Area.

Subwatershed	SCADA	Ditch Conversion to Enclosed Pipe	Soil Health Practices	On-Farm Irrigation Efficiency Upgrades
Clay-loving Wild Buckwheat				
North Fork	No effect when project occurs on habitat and soil types not associated with the species Potential to affect if construction occurs in adobe badlands or semi-desert shrublands in USFWS-modeled range (even on ditch banks or ditch cleaning spoil piles)	No effect when project occurs on habitat and soil types not associated with the species Potential to affect if construction occurs in adobe badlands or semi-desert shrublands in USFWS-modeled range (even on ditch banks or ditch cleaning spoil piles)	No effect	No effect
Crawford	No effect when project occurs on habitat and soil types not associated with the species Potential to affect if construction occurs in adobe badlands or semi-desert shrublands in USFWS-modeled range (even on ditch banks or ditch cleaning spoil piles)	No effect when project occurs on habitat and soil types not associated with the species Potential to affect if construction occurs in adobe badlands or semi-desert shrublands in USFWS-modeled range (even on ditch banks or ditch cleaning spoil piles)	No effect	No effect
Uncompahgre	No effect when project occurs on habitat and soil types not associated with the species Potential to affect if construction occurs in adobe badlands or semi-desert shrublands in USFWS-modeled range (even on ditch banks or ditch cleaning spoil piles)	No effect when project occurs on habitat and soil types not associated with the species Potential to affect if construction occurs in adobe badlands or semi-desert shrublands in USFWS-modeled range (even on ditch banks or ditch cleaning spoil piles)	No effect	No effect
Bostwick Park	No effect	No effect	No effect	No effect

Table 5.4-2. Preliminary Effects Determinations for Federally Protected Plants in the Project Area.

Subwatershed	SCADA	Ditch Conversion to Enclosed Pipe	Soil Health Practices	On-Farm Irrigation Efficiency Upgrades
Colorado Hookless Cactus				
North Fork	No effect when installed on previously disturbed or developed ground Potential to affect if installation occurs on native ground in adobe badlands or semi-desert shrublands in USFWS-modeled range	No effect when project occurs on habitat and soil types not associated with the species Potential to affect if construction occurs on native ground in adobe badlands or semi-desert shrublands in USFWS-modeled range	No effect	No effect
Crawford	No effect	No effect	No effect	No effect
Uncompahgre	No effect when installed on previously disturbed or developed ground Potential to affect if installation occurs on native ground in adobe badlands or semi-desert shrublands in USFWS-modeled range	No effect when project occurs on habitat and soil types not associated with the species Potential to affect if construction occurs on native ground in adobe badlands or semi-desert shrublands in USFWS-modeled range	No effect	No effect
Bostwick Park	No effect	No effect	No effect	No effect

Table 5.4-3 (below) summarizes potential impacts on BLM Sensitive plant species for each type of subwatershed improvement that may occur on BLM-managed lands. As a part of the planning process for subwatershed improvements on BLM-managed lands, the BLM's UFO would be consulted for concurrence with **Table 5.4-3**, and for clearance survey requirements. All potentially ground-disturbing elements of a proposed project would be considered for potential impacts to sensitive species, including access ways, borrow sites, and material staging areas.

For subwatershed improvements taking place on BLM-managed lands outside a species' range or inside the species' range but not in or near suitable habitat, a finding of no impact / no effect would apply to the activity.

Note that BLM Sensitive Species presented on **Table 5.4-3** are current as of the preparation date of this Plan-EA, and should be checked and updated as necessary during the planning phase of each subwatershed improvement.

Table 5.4-3. Anticipated Impacts to BLM Sensitive Plant Species in the Project Area.

Subwatershed	SCADA	Ditch Conversion to Enclosed Pipe
Colorado Desert Parsley		
North Fork	No effect when installed on previously disturbed or developed ground Potential to affect if installation occurs on native ground in adobe badlands or semi-desert shrublands	No effect when project occurs on habitat and soil types not associated with the species Potential to affect if construction occurs on native ground in adobe badlands or semi-desert shrublands
Crawford	No effect when installed on previously disturbed or developed ground Potential to affect if installation occurs on native ground in adobe badlands or semi-desert shrublands	No effect when project occurs on habitat and soil types not associated with the species Potential to affect if construction occurs on native ground in adobe badlands or semi-desert shrublands
Uncompahgre	No effect when installed on previously disturbed or developed ground Potential to affect if installation occurs on native ground in adobe badlands or semi-desert shrublands	No effect when project occurs on habitat and soil types not associated with the species Potential to affect if construction occurs on native ground in adobe badlands or semi-desert shrublands
Bostwick Park	No effect	No effect
Uncompahgre ("Good Neighbor") Bladderpod		
North Fork	No effect	No effect
Crawford	No effect	No effect
Uncompahgre	No effect when installed on previously disturbed or developed ground Potential to affect if installation occurs on native ground in Mancos Shale-derived soils in semi-desert shrublands (especially at the ecotone between pinyon-juniper woodland and semi-desert shrublands) or sandy soils derived from Jurassic sandstones with sagebrush	No effect when project occurs on habitat and soil types not associated with the species Potential to affect if construction occurs on native ground in Mancos Shale-derived soils in semi-desert shrublands (especially at the ecotone between pinyon-juniper woodland and semi-desert shrublands) or sandy soils derived from Jurassic sandstones with sagebrush
Bostwick Park	No effect when installed on previously disturbed or developed ground Potential to affect if installation occurs on native ground in Mancos Shale-derived soils in semi-desert shrublands (especially at the ecotone between pinyon-juniper woodland and semi-desert shrublands) or sandy soils derived from Jurassic sandstones with sagebrush	No effect when project occurs on habitat and soil types not associated with the species Potential to affect if construction occurs on native ground in Mancos Shale-derived soils in semi-desert shrublands (especially at the ecotone between pinyon-juniper woodland and semi-desert shrublands) or sandy soils derived from Jurassic sandstones with sagebrush

5.4.3.1.2 Project-Specific Components

The following tables (**Tables 5.4-4** through **5.4-7**) present preliminary effects determinations for each ESA-protected and BLM-Sensitive plant species, for project-specific components within each subwatershed. Where rationale statements for the preliminary determinations are not met in the tables, or where determinations are other than "No effect," consultation under Section 7 of the ESA was completed with the USFWS. The USFWS concurred with each of these effects determinations in a Biological Opinion dated November 30, 2017 **(Appendix A**).

Project-specific components are described in **Section 4** and in summarized briefly in **Section 5.4.1.1**, above.

North Fork

Table 5.4-4. Preliminary Effects Determinations for Federally Protected and BLM-Sensitive Plants for Project-specific Components in the North Fork Subwatershed.

ESA-Protected Element or BLM Sensitive Species	Effect Determination	Rationale
Clay-loving wild buckwheat (endangered)	No Effect	The project-specific components are not within or near the documented range of the species
Colorado hookless cactus (threatened)	No Effect	The project-specific components are not within or near the documented range of the species or habitat at the project-specific component location is not suitable
Colorado desert parsley (BLM sensitive)	No Effect	There are no project-specific components on BLM land in the subwatershed
Uncompahgre bladderpod (BLM sensitive)	No Effect	There are no project-specific components on BLM land in the subwatershed

Crawford

Table 5.4-5. Preliminary Effects Determinations for Federally Protected and BLM-Sensitive Plants for Project-specific Components in the Crawford Subwatershed.

ESA-Protected Element or BLM Sensitive Species	Effect Determination	Rationale
Clay-loving wild buckwheat (endangered)	No Effect	The project-specific components are not within or near the documented range of the species
Colorado hookless cactus (threatened)	No Effect	The project-specific components are not within or near the documented range of the species
Colorado desert parsley (BLM sensitive)	No Effect	There are no project-specific components on BLM land in the subwatershed
Uncompahgre bladderpod (BLM sensitive)	No Effect	There are no project-specific components on BLM land in the subwatershed

Uncompahgre

Table 5.4-6. Preliminary Effects Determinations for Federally Protected and BLM-Sensitive Plants for Project-specific Components in the Uncompahgre Subwatershed.

ESA-Protected Element or BLM Sensitive Species	Effect Determination	Rationale
Clay-loving wild buckwheat (endangered)	No Effect No Effect	No clay-loving wild buckwheat was found in the site vicinity during a special status plant survey for these project-specific components
Colorado hookless cactus (threatened)	No Effect No Effect	No Colorado hookless cactus was found in the site vicinity during a special status plant survey for these project-specific components
Colorado desert parsley (BLM sensitive)	No Effect	The Flat Top Hill SCADA site is in semi-desert shrublands/adobe badlands on BLM land; no Colorado desert parsley was found in the site vicinity during a special status plant survey for this project-specific component
Uncompahgre bladderpod (BLM sensitive)	No Effect	The Flat Top Hill SCADA site is in semi-desert shrublands/adobe badlands on BLM land; no Uncompahgre bladderpod was found in the site vicinity during a special status plant survey for this project-specific component

Bostwick Park

Table 5.4-7. Preliminary Effects Determinations for Federally Protected and BLM-Sensitive Plants for Project-specific Components in the Bostwick Park Subwatershed.

ESA-Protected Element or BLM Sensitive Species	Effect Determination	Rationale
Clay-loving wild buckwheat (endangered)	No Effect	The project-specific components are not within or near the documented range of the species
Colorado hookless cactus (threatened)	No Effect	The project-specific components are not within or near the documented range of the species
Colorado desert parsley (BLM sensitive)	No Effect	There are no project-specific components on BLM land in the subwatershed
Uncompahgre bladderpod (BLM sensitive)	No Effect	There are no project-specific components on BLM land in the subwatershed

5.4.3.1.3 Compliance and Best Management Practices

The following BMPs would be implemented to reduce negative consequences on special status plants:

- Ground disturbances shall be limited to only those areas necessary to safely implement the Proposed Action.
- Vegetation removal shall be confined to the smallest portion of the Proposed Action Area necessary for completion of the work.

- Construction limits shall be flagged onsite to avoid disturbing ground outside areas that have received special status plant clearance.
- If special status plants are identified in pre-construction surveys in or near the construction corridor, weed management strategies shall prioritize the protection of special status plants (see Mui et al. 2016).
- Ensure that project staff and contractors working on site are aware of and can identify special status plant species with potential to occur in the project footprint; stop work if a special status plant species is discovered in the project footprint and notify the project manager.

5.4.3.2 No Action

Under the No Action Alternative, there would be no effect to special status plants.

5.4.3.3 Cumulative Impacts

This cumulative impacts analysis looks 50 years into the future at special status plants within the general area of the subwatersheds. Present and future activities in the analysis area affecting special status plants are similar to those described for vegetation in general in **Section 5.4.1.3**, but more strongly associated with subdivision and residential development and conversion of native shrublands to agricultural or other uses.

The subwatershed improvements and project-specific components are not anticipated to result in a substantial contribution to cumulative area-wide impacts on population trends of special status plants. None of the special status plants in the project area is associated with wetlands or riparian habitat; therefore, there would be no net loss of habitat for these species as a result of the Proposed Action. Surveys would be conducted for special status plants in appropriate habitat within and near the footprint of planned ground disturbances. Any anticipated negative impacts to special status plants would be eliminated by design features, regulatory compliance measures, and BMPs described throughout this Plan-EA.

Under the No Action Alternative, there would be no contribution to the cumulative impact on special status plants in the subwatersheds.

5.4.4 Invasive Species

5.4.4.1 Proposed Action

5.4.4.1.1 Subwatershed Improvements

The impacts of the subwatershed improvements, including SCADA installations, ditch conversions to enclosed pipe, soil health practices, and on-farm irrigation efficiency upgrades, on invasive species (including noxious weeds) would be a mix of impacts and benefits.

Because ditch conversions to enclosed pipe are anticipated to cause more ground disturbance than the other types of subwatershed improvements, they have the highest potential to introduce or spread invasive plant species, including noxious weeds. Many open irrigation ditch corridors in the subwatersheds have substantial existing infestations of non-native plants and noxious weeds. The infestations include water-

loving weeds along the ditch waterlines and in wet areas downgradient from leaking ditches, and upland weeds that thrive on dry upper ditch banks, access roads, and other nearby disturbed areas. Flowing water in the ditch systems is a vector for the continued spread of weeds. Vehicles, people, livestock, and wildlife traveling on the ditch access roads can also help weeds spread along ditch alignments. For ditches that flow through native plant communities, construction footprints are likely to extend into previously undisturbed ground, creating conditions for weeds to spread. Construction BMPs would help minimize the risk of such infestations, and ongoing weed management efforts by project proponents would be necessary during revegetation of construction alignments.

On the other hand, conversion of open ditches to enclosed pipe will remove an important vector of weed seed transport—water. In some areas, the need for maintained access roads along the buried pipe corridor would also be eliminated, lowering the potential for the continued spread of weeds. Downgradient seeps from ditches that support salt cedar, Russian olive, and herbaceous noxious weeds would be dried and the ability of the environment to support these weeds would be diminished.

Where ditches would be converted to enclosed pipe through irrigated farmland, the areas of invasive plants would likely decrease, because the ground over the newly buried pipe alignments could be irrigated and farmed with the surrounding area. On-farm efficiency upgrades would occur in irrigated farmlands, and would also eliminate some weed-dominated on-farm ditch alignments that could be incorporated into agricultural production. Areas receiving excess irrigation water adjacent to farmlands would be dried and their ability to support water-loving noxious weeds would be diminished.

Soil health practices, such as the use of cover crops, could suppress weeds from becoming established in recently cultivated fields or fallow ground.

SCADA installations would have a relatively small footprint on previously disturbed ground, and would therefore not be anticipated to contribute to the spread of invasive plants when appropriate BMPs are implemented.

The project proponents would be responsible for weed management at their respective project sites. The following weed management priorities would apply to each subwatershed improvement and project-specific component:

> Priority #1. Prevent introduction of noxious weeds and other invasive plants to intact native plant communities
>
> Priority #2. In previously disturbed area and areas with existing weed infestations, prevent introduction of new non-native species, with special attention to noxious weeds
>
> Priority #3. In areas with existing noxious weed infestations, manage and control their spread according to priorities outlined in current weed management plans for the county or counties in which the project is located.

5.4.4.1.2 Compliance and Best Management Practices

The following BMPs and Compliance Measures would be implemented to minimize the risk of invasive plant infestations and the spread of existing infestations:

- Ground disturbances shall be limited to only those areas necessary to safely implement the Proposed Action.
- Construction limits shall be clearly flagged onsite to avoid unnecessary ground disturbance.
- All equipment shall be cleaned before it is brought to the construction area, to minimize transport of new weed species to the construction area.
- All equipment shall be cleaned before it is transported to another job site, to avoid introducing weed species from the construction area to another job site.
- Straw wattles, straw bales, offsite mulch and other erosion control materials shall be free of weeds and weed seed.
- Revegetation of construction sites shall occur as soon as practicable following construction.
- Seed mixes used for revegetation shall be certified noxious weed-free seed mixes approved by NRCS (and by BLM or Reclamation for projects occurring on BLM-managed lands or Reclamation facilities, as appropriate).
- Weed control measures shall be implemented to county standards (at a minimum).

5.4.4.2 No Action

Under the No Action Alternative, there would be no effect to the status and management of invasive species in the subwatersheds.

5.4.4.3 Cumulative Impacts

Present and future activities in the analysis area that would promote the spread of invasive species include the continued maintenance and management of irrigation infrastructure (especially open ditches), subdivision and residential development, infrastructure development and maintenance (public and private roads, energy transmission corridors, timber harvest, firewood cutting, and vegetation management activities such as pinyon-juniper or sagebrush treatment projects), livestock grazing, and recreation. Climate change, drought, wildfire, and wildfire suppression also will continue to affect the region's vegetation communities and habitat in the future, making conditions for the spread of invasive plant species more favorable.

Through the use of BMPs and continued weed management programs of the project proponents, the subwatershed improvements and specific project components proposed under this Plan-EA are not expected to contribute significantly to the cumulative spread of invasive species in the subwatersheds.

5.5 Wildlife

5.5.1 Terrestrial Wildlife Communities

5.5.1.1 Proposed Action

5.5.1.1.1 Subwatershed Improvements

Effects on terrestrial wildlife communities resulting from incremental implementation of the proposed subwatershed improvements (described in **Section 4.3.1.1**) would be direct and indirect, short-term and long-term, as well as localized and farther-reaching.

At the subwatershed scale, converting open irrigation ditches to enclosed pipe, upgrading on-farm irrigation systems, and implementing soil health practices would result in a significant reduction of salt and selenium loading in the lower Gunnison River basin. The resulting water quality improvements would generally benefit wildlife by improving the health of aquatic, wetland, and riparian habitats.

Open irrigation ditch networks (including on-farm ditches) provide ribbons of artificial wetland and riparian habitat across the landscape, and a source of drinking water for wildlife. Where open ditch networks are piped and artificial wetlands transition to uplands following on-farm efficiency projects, the distribution patterns of wildlife across the landscape would change. Big game may alter their land use patterns in response to removal of these water sources and vegetation they support. Densities of smaller species dependent on wetlands or riparian habitat, especially of amphibians and certain reptiles, waterbirds, and certain small mammals, would decrease locally and shift to other more suitable habitat on the landscape. The effects of subwatershed improvements on amphibians and fish are discussed in **Section 5.5.3**.

Piping of open irrigation canals and installation of SCADA systems in large blocks of relatively undeveloped areas would potentially reduce human presence in the associated habitats, since fewer trips to maintain ditches and headgates would be necessary (one trip per day compared to two to four trips per day under the No Action alternative). This would improve seclusion opportunities for big game and other wide-ranging wildlife. Small ground-dwelling mammals and reptiles associated with surrounding upland habitats would also benefit from an increase in habitat and removal of movement barriers by the drying and piping of ditch alignments.

Several short-term direct and indirect impacts to wildlife would occur during and following project construction. Locally, movements and forage patterns of big game would be temporarily disrupted due to human presence and machinery noise. Direct impacts on big game, especially mule deer and elk, may include habitat avoidance; increased daily movements and movement rates; and higher probabilities of flight response; as well as the increased chance for injury or mortality (BLM 2016). Although big game can readily disperse across the landscape to other suitable habitat in response to disturbance, increased movement results in increased energy demands, and if these demands are not met, a reduction of survival fitness or reproductive success of individuals or herds could result. The quantity and quality of winter range is a limiting factor on mule deer and elk populations in the region (**Section 3.5.1**), and the majority of subwatershed improvements would occur in big game winter range. SCADA installations taking place in winter range are not anticipated to have measurable long-term effects on local mule deer or elk populations, due to the short duration and low level of activity involved. For pipeline construction

projects, which are of longer duration and create significant noise and disturbance, impacts to wintering mule deer and elk could result if construction occurs during winter months, especially during severe winters. For construction of non-SCADA subwatershed improvements planned in big game winter concentration areas or severe winter range on BLM land between December 1 and April 30, the project proponent would review the scope, timing, and duration of the project with BLM during the planning phase, and would be required to request project-long exceptions to BLM timing limitations. In general, completing construction of individual project components in the shortest practical timeframe would minimize direct disturbance impacts to big game.

Short-term direct impacts to migratory birds would include disturbance and displacement during construction activities. Wintering or migrating birds are not expected to be measurably affected by construction disturbance or displacement because they have the flexibility to move away from disturbances to other suitable areas. There would be no direct effect to breeding migratory songbirds or waterbirds when construction activities would occur outside the nesting season (April through July 15). For project activities involving vegetation disturbance that would occur during the nesting season, surveys for nesting birds would be conducted before vegetation-disturbing activities could begin, to prevent "take" of birds protected by the MBTA, to the extent practicable. Nesting raptor surveys would be conducted as necessary to provide clearance for construction during raptor nesting season. Construction activities in the vicinity of active raptor nests would respect CPW-recommended buffer distances (CDOW 2008), or buffer distances in another USFWS-approved guidance (if a more current guidance becomes available), or buffer distances specified by coordinating with a USFWS biologist. Roosting bald eagles during any season are protected by the Bald and Golden Eagle Protection Act, and construction activities would respect CPW recommended buffer distances (CDOW 2008) near bald eagle roosts mapped by CPW or identified during surveys.

Direct impacts to small animals, especially burrowing mammals, amphibians, and reptiles, could include mortality or displacement during construction activities, and stress from human presence and construction noise. Small animal species may experience localized reduced populations in direct proportion to the amount of habitat disturbed. Restricting ground disturbance to the smallest practical footprint for individual project components would reduce the direct loss of small burrowing animals and temporal loss of their habitat. The Proposed Action would disturb about 21. 4 acres of land (about 0.01 acres in the North Fork subwatershed, 17.5 acres in the Crawford subwatershed, 0.02 acres in the Uncompahgre subwatershed and 3.9 acres in the Bostwick Park subwatershed). Reseeding of disturbed areas would occur in a timely manner (within one growing season) and would be consistent with the surrounding vegetation community. NRCS or BLM would approve seed mixes prior to use. Weed management would be implemented according to county standards, at a minimum.

Implementation of soil health practices and installation of SCADA systems in irrigated farmlands and developed areas are not anticipated to cause measurable long-term negative impacts on wildlife. Soil health practices such as use of cover crops would benefit certain wildlife species by providing forage and shelter. Installation of SCADA systems in areas surrounded by natural habitat is anticipated to cause temporary disturbance and displacement of wildlife. Due to their small footprint size and siting at previously disturbed locations and near existing irrigation infrastructure, SCADA installations would not result in appreciable wildlife habitat loss.

Table 5.5-1 summarizes impacts to wildlife communities that would result from subwatershed improvements. BMPs or other measures are paired with each impact to reduce or eliminate negative consequences or comply with applicable laws.

Table 5.5-1. Terrestrial Wildlife Impacts Resulting from Subwatershed Improvements.

Wildlife Community	Time-frame	Impact Type	Impact Description	BMP or Measure to Comply with Applicable Laws
All	Short-term	Direct	Stress, disturbance, and displacement of wildlife in the project area due to machinery operating and human presence during construction	Minimize direct disturbance impacts by completing construction of individual project components in the shortest practical timeframe
Big game	Short-term	Direct	Stress, disturbance, and displacement of wintering big game in the project area due to machinery operating and human presence during construction	When project construction would occur in an elk or mule deer winter concentration area or severe winter range on BLM land between December 1 and April 30, the project proponent will request a project-long exception to BLM's timing limitations.
Big game	Short-term	Direct	Potential for big game animals to be trapped in pipeline trenches left open overnight during construction periods	Secure trench covers in place that are strong enough to prevent large animals from falling through, or use wildlife escape ramps
Small ground dwelling mammals, reptiles, and amphibians	Short-term	Direct	Direct mortality of small, ground-dwelling mammals, reptiles and amphibians hibernating or sheltering in the construction area; localized reduction in small animal populations in direct proportion to the amount of habitat disturbed	Limit the construction footprint to the smallest area practicable
Nesting raptors (hawks, falcons, owls)	Short-term	Direct	Potential for "take" under the MBTA (loss of eggs or young from nest abandonment) due to machinery operating and human presence during construction	Complete construction activities outside of primary raptor nesting period (April through July) If construction activities are to occur during the primary raptor nesting period, complete a nesting raptor survey and operate outside of the CPW-recommended buffer distance (CDOW 2008) or other USFWS-approved guidance for buffer distances If nesting raptors are present inside recommended buffer zones, work with the local USFWS biologist to adjust the buffer distance if warranted (i.e., if topographic or vegetative barriers protect the nesting raptors from disturbance, a shorter buffer distance may be acceptable); otherwise work must not proceed until nesting is complete (young have fledged) Cease work if a nesting raptor is discovered within a recommended buffer distance during construction and consult the local USFWS biologist for next steps

Table 5.5-1. Terrestrial Wildlife Impacts Resulting from Subwatershed Improvements.

Wildlife Community	Time-frame	Impact Type	Impact Description	BMP or Measure to Comply with Applicable Laws
Bald and golden eagles	Short-term	Direct	Potential for "take" under the MBTA (loss of eggs or young from nest abandonment) due to machinery operating and human presence during construction Potential to interfere with an eagle's "substantial lifestyle, including shelter, breeding, feeding" as defined by the Bald and Golden Eagle Protection Act of 1940 – this can include disturbance of eagles on hunting roosts and night roosts	Bald and golden eagles typically use the same nest sites year after year; consult with the local CPW or USFWS biologist for the most recent understanding of the locations of active nests and operate outside the CPW-recommended buffer distance (CDOW 2008) or other USFWS-approved guidance for buffer distances If operating inside the recommended buffer distance, operate outside the nesting season (see **Section 3.5.1**); note that bald eagles may commence nesting as early as January Maintain the CPW-recommended buffer distance (CDOW 2008) or other USFWS-approved guidance for buffer distance from CPW-mapped bald eagle roosts (see **Figure 3.5-3 in Appendix C**)
Nesting migratory birds of concern (see **Table 3.5-2**) except raptors	Short-term	Direct	Potential for "take" under the MBTA (loss of eggs or young from nest abandonment or direct destruction)	Operate outside the primary nesting period for migratory birds of concern (April 1 through July 15) If planning to operate during the primary nesting season, accomplish any vegetation clearing or grubbing prior to the primary nesting season. If planning vegetation-disturbing activities during the typical nesting season, the area must be surveyed for active nests no more than 2 weeks prior to commencement of work If active nests are found during nest surveys, establish nest buffers in coordination with the local USFWS biologist If an active nest is discovered during construction, cease work and consult the local USFWS biologist for next steps
All	Short-term	Indirect	Temporary loss of functional habitat and displacement of wildlife from the construction area until the area is revegetated	Complete timely and appropriate revegetation of the construction area (seed mixes would be approved by NRCS/BLM biologists) Limit the construction footprint to the smallest area practicable

Table 5.5-1. Terrestrial Wildlife Impacts Resulting from Subwatershed Improvements.

Wildlife Community	Time-frame	Impact Type	Impact Description	BMP or Measure to Comply with Applicable Laws
All	Long-term	Indirect	Introduction of invasive plant species to the construction area and surrounding native vegetation communities causing habitat degradation	Implement weed management practices per current county weed management plans (Montrose County 2011, 2017; Ouray County 2011; Delta County 2010; CSU 2017) Clean construction equipment prior to bringing it onsite to reduce risk of introducing weed seeds to the construction site Ensure borrow material imported to the construction area is not infested with invasive plant species Ensure seed sources for revegetation are weed-free
All	Long-term	Indirect	Decrease in localized densities and populations of wetland and riparian-dependent species, especially of amphibians, and certain reptiles, waterbirds, and certain small mammals due to conversion of artificial riparian and wetland habitat to uplands Increase in small mammals and reptiles associated with surrounding upland habitats resulting from an increase in local upland habitat and removal of movement barriers posed by open ditches Changes in distribution patterns of mule deer, elk, and other mammals in response to removal of water resource	Where other nearby surface wildlife drinking water resources are not available, potentially provide for wildlife “guzzlers” on pipe alignments
All	Long-term	Indirect	Improvement in surface water quality and wetland, riparian, and aquatic habitat health due to reduction of salt and selenium loading in the subwatershed (following conversion of open ditches to enclosed pipe and completion of on-farm irrigation efficiency upgrades) Reduced disturbance to wildlife in remote areas because of the decrease in number of trips made by maintenance personnel to maintain ditches and adjust headgates (following conversion of open ditches to enclosed pipe and installation of SCADA systems)	None needed for beneficial impacts.

5.5.1.1.2 Project-Specific Components

North Fork

Project-specific components in the North Fork subwatershed are described in **Section 4** and listed on **Table 4.3-1**. These include three SCADA systems and a piping project on Fire Mountain Canal. All components are situated on private lands. Reclamation is the lead agency for the Fire Mountain Canal Piping Project, which will be analyzed in Reclamation's NEPA process and not discussed further here.

About 200 square feet of ground and vegetation would be disturbed for each SCADA installation, for tasks such as setting the equipment, burying conduit, and constructing an enclosure. These tasks would be accomplished with hand tools or light/portable equipment (i.e., a post auger, a small trencher, a post driver). Installation would require up to two days with two workers, and workers would travel to the site in a light-duty work truck. The SCADA installations would occur during the irrigation off-season (between October 31 and April 1) between fall 2017 and spring 2019.

Installation of the three SCADA systems in the subwatershed would temporarily disturb and displace terrestrial wildlife (see **Section 3.5.1.1**) in the immediate area due to human presence and intermittent noise of portable equipment; however, the duration of each installation would be relatively short, and the nature of the activities would not be unusual for agricultural areas and regular maintenance along the irrigation system they serve. The three SCADA systems lie in severe winter range for elk and mule deer, and installations could potentially take place while wintering deer and elk are in the area. However, given the nature and duration of the typical SCADA installation, any impacts to mule deer and elk are expected to be temporary and insignificant. Impacts to breeding migratory birds of concern would be minimized since installations would take place outside the primary nesting seasons of songbirds and most raptors. Installations would have no effect on bald eagle nesting (which can begin as early as January) or roosting activities, because the sites lie well outside recommended buffer distances from documented nests and roosts (see **Section 3.5.1.1** and **Appendix E**). Once they are installed, SCADA systems operate silently and require occasional maintenance visits. The frequency of the visits would be less than normally required for traditional irrigation control systems.

Crawford

Project-specific components in the Crawford subwatershed are described in **Section 4** and listed on **Table 4.3-2**, and shown in **Appendix B, Figure 4.3-2**. These include the Needle Rock Diversion Project (a headgate replacement and ditch piping project), the Grandview Phase 1 Project (a diversion structure replacement and ditch piping project), the Clipper Re-Reg Pond (a 30-acre-foot reservoir), and four SCADA systems. Three of the four SCADA systems are associated with the projects listed above. The fourth SCADA will be on the Smith Fork Feeder. Construction of all components would be expected to take place during the irrigation off-season (between October 31 and April 1). All components are situated on private lands.

Construction of the non-SCADA projects would be accomplished using heavy equipment over a period of several weeks. The anticipated construction schedule for the Needle Rock headgate and piping is fall 2017 to spring 2018 with a total duration of 4 weeks. The Grandview Phase 1 construction would occur during two irrigation off-seasons. Total construction time would be about 8 months, occurring from fall 2018 to spring 2020. The Clipper Re-Reg Pond would be constructed during the irrigation off-season between fall 2017 and spring 2018 and would require a total of about 4 weeks to complete. Installation of

SCADA systems involves hand tools or light/portable equipment (i.e., a post auger, a small trencher, a post driver). Installation would require up to two days with two workers, and workers would travel to the site in a light-duty work truck. The Needle Rock SCADA would be installed in fall 2017, Smith Fork SCADA in fall 2017, Grandview Phase 1 SCADA in fall 2018, and Clipper Re-Reg Pond SCADA in fall 2017.

All project-specific components are situated in elk and mule deer severe winter range, and installations could potentially take place while wintering deer and elk are in the area. Irrigation pipeline construction projects have the potential to displace wintering mule deer and elk on severe winter range and to change their use patterns on surrounding lands, for the duration of the activity. For SCADA installations, impacts to mule deer and elk are expected to be temporary and insignificant due to the nature and duration of construction. Construction of the project-specific components would temporarily disturb and displace non-game wildlife, including wintering and migrating migratory birds, and a variety of small animals in the immediate area (see **Section 3.5.1.2**) due to human presence and noise. Big game, birds, and certain small animals have the ability to move away from disturbances to similar nearby habitat, which is extensive in the project area. Impacts to breeding migratory birds of concern would be minimized since installations would take place outside the primary nesting seasons of songbirds and most raptors, including peregrine falcons, which nest approximately 2 miles west of the Needle Rock Diversion Project site on Needle Rock. Construction would have no effect on bald eagle nesting (which can begin as early as January) or roosting activities, because the project lies well outside recommended buffer distances from documented nests and roosts (see **Section 3.5.1.2**). To protect wintering big game, pipeline construction for the Grandview Phase I and Needle Rock projects would be accomplished in the shortest timeframe possible. During construction, pipeline trenches left open overnight would be kept to a minimum and covered to reduce potential for entrainment of big game. Covers would be secured in place and strong enough to prevent large animals from falling through. Where trench covers would not be practical, dirt wildlife escape ramps would be used.

Direct impacts to small animals, especially burrowing rodents, amphibians, and reptiles, would include direct mortality and displacement during pipeline construction activities. To minimize these impacts, the construction footprint would be limited to the smallest practicable area. Several small animal species may experience reduced local populations in direct proportion to the amount of disturbed habitat. The construction corridor would be reseeded in a timely manner (within one growing season) with a seed mix consistent with the surrounding vegetation community, and weed management would be implemented according to county standards, at a minimum. Amphibians and other species dependent on wetland and riparian habitat that would be lost as a result of the project would experience a long-term loss of local habitat (see **Section 5.5.3**). Distribution patterns of big game and other wide-ranging species in the project area may change after the open ditch is piped. There are several nearby water sources that provide drinking water for wildlife, including the Smith Fork River and several seasonal ponds. The enclosed pipe and SCADA system would require fewer maintenance visits than the traditional irrigation system, affording more seclusion to wildlife in this relatively remote area of the subwatershed.

Uncompahgre

Project-specific components in the Uncompahgre subwatershed are described in **Section 4** and listed on **Table 4.3-3**. These include four SCADA systems and a piping project on the GB and GB-A Laterals (part

of the Phase 9 Piping Project). Reclamation is the lead agency for the Phase 9 Piping Project, which will be analyzed in Reclamation's NEPA process and not discussed further here.

The East Canal and Selig Canal SCADA sites are located near the headgate structures for these canals on the Uncompahgre River. Both sites are in areas with a combination of residential, light industrial, and agricultural uses. The Loutsenhizer Canal SCADA site lies in an area of mixed rural-residential subdivisions and small-parcel irrigated agriculture. The SCADA site at Flat Top Hill is located in semi-desert shrublands and adobe badland habitat, in an area where several other communications sites are located. Each SCADA site would occupy an approximately 200-square-foot upland area of previously disturbed ground (i.e., existing ditch bank). Minor amounts of ground and vegetation disturbance would be required for setting the equipment, burying conduit, and constructing an enclosure. These tasks would be accomplished with hand tools or light/portable equipment (i.e., a post auger, a small trencher, a post driver). Installation would require up to two days with two workers, and workers were travel to the site in a light-duty work truck. The SCADA installations would occur during the irrigation off-season (between October 31 and April 1), with East Canal SCADA scheduled for fall 2017, Selig Canal for fall 2018, Loutsenhizer Canal for fall 2017, and Radio Tower on Flat Top Hill SCADA for the irrigation off-season of 2018.

None of the project-specific components lies within critical winter range for elk or mule deer, with the exception of the Loutsenhizer Canal SCADA site, which lies within mule deer severe winter range. Installation of the SCADA systems in the subwatershed would temporarily disturb and displace wildlife (see **Section 3.5.1.3**) in the immediate area due to human presence and intermittent noise of portable equipment; however, the duration of each installation would be relatively short, and the nature of the activities would not be unusual for agricultural, residential, and light-commercial areas. Impacts to breeding migratory birds of concern would be minimized since installations would take place outside the primary nesting seasons of songbirds and most raptors. Installations would have no effect on bald eagle nesting (which can begin as early as January) or roosting activities, because the sites lie outside recommended buffer distances from documented nests and roosts (see **Section 3.5.1.3**). Once they are installed, SCADA systems operate silently and require occasional maintenance visits. The frequency of the visits would be less than normally required for traditional irrigation control systems.

Bostwick Park

Project-specific components in the Bostwick Park subwatershed are described in **Section 4** and listed on **Table 4.3-4**. These include the West Lateral Phase 1 Project and a SCADA system, both on private lands.

The proposed West Lateral Phase 1 pipeline alignment parallels Bostwick Park Road in irrigated farmland. The SCADA site is located at the Cimarron Canal headgate on the Cimarron River in the south part of the subwatershed. Access to the construction corridor would be via Bostwick Park Road. Materials would be staged in the adjacent irrigated meadow. Construction would be accomplished using heavy equipment and would take place during the irrigation off-season (between October 31 and April 1). The SCADA site would occupy an approximately 200-square-foot upland area of previously disturbed ground (i.e., existing ditch bank). Minor amounts of ground and vegetation disturbance would be involved in setting the equipment, burying conduit, and constructing an enclosure. These tasks would be accomplished with hand tools or light/portable equipment (i.e., a post auger, a small trencher, a post

driver). Installation would require up to two days with two workers, and would be performed out of a light-duty work truck.

Construction of the West Lateral Phase 1 piping during an approximately 4-week period from fall 2017 to spring 2018 and installation of the SCADA system during the irrigation off-season from fall 2017 to spring 2019 would temporarily disturb and displace wildlife, including wintering, resident, and migrating big game, wintering and migrating migratory birds, and a variety of small animals in the immediate area (see **Section 3.5.1.4**) due to human presence and noise. The West Lateral Phase 1 piping project lies in an elk winter concentration area, partially in elk severe winter range, and partially in a mule deer winter concentration area. Big game, birds, and certain small animals have the ability to move away from disturbances to similar nearby habitat, which is extensive in the project area. Impacts to breeding migratory birds of concern would be minimized since construction would take place outside the primary nesting seasons of songbirds and raptors. Construction would have no effect on bald eagle nesting (which can begin as early as January) or roosting activities, because the project and SCADA site lie well outside recommended buffer distances from documented nests and roosts (see **Section 3.5.1.4**). Construction would be completed in the shortest timeframe possible. During construction, pipeline trenches left open overnight would be kept to a minimum and covered to reduce potential for entrainment of big game. Covers would be secured in place and strong enough to prevent large animals from falling through. Where trench covers would not be practical, dirt wildlife escape ramps would be used.

Direct impacts to small animals, especially burrowing rodents, amphibians, and reptiles, would include direct mortality and displacement during West Lateral Phase 1 construction activities. To minimize these impacts, the construction footprint would be limited to the smallest practical area. Several small animal species may experience reduced local populations in direct proportion to the amount of disturbed habitat. The construction corridor would be reseeded in a timely manner (within one growing season) with a seed mix consistent with the surrounding vegetation community, and weed management would be implemented according to county standards, at a minimum. Amphibians and other species dependent on wetland and riparian habitat that would be lost as a result of the project would experience a long-term loss of local habitat. Distribution patterns of big game and other wide-ranging species in the project area are not anticipated to change after the open ditch is piped, due to its adjacency to Bostwick Park Road. The SCADA system would require fewer maintenance visits than a traditional irrigation system, affording more seclusion to wildlife.

5.5.1.1.3 Compliance and Best Management Practices

See **Table 5.5-1**. for a summary of wildlife community impacts resulting from subwatershed improvements, with BMPs or other measures to reduce or eliminate impacts where applicable.

5.5.1.2 No Action

Under the No Action Alternative, the wildlife communities in the project area would continue to use the artificial wetland and riparian habitat created by the network of open irrigation ditches in the subwatersheds. Wildlife dependent on wetland and riparian areas in the subwatersheds would not benefit from reductions in salt and selenium loading to the aquatic system created by conversion of open irrigated ditches to enclosed pipe and on-farm irrigation efficiency projects.

5.5.1.3 Cumulative Impacts

This cumulative impacts analysis looks 50 years into the future at wildlife resources within the general area of the subwatersheds. Present and future activities in the analysis area affecting this resource include ongoing and future irrigation improvement projects, subdivision and residential development, infrastructure development and/or maintenance (including public and private roads, energy transmission corridors), timber harvest, firewood cutting, and vegetation management activities (such as pinyon-juniper or sagebrush treatment projects and weed management programs), recreational hunting and outfitting, livestock grazing, motorized recreation, and conversion of native shrublands and woodlands to agricultural or other uses. Climate change, drought, wildfire, and wildfire suppression also will continue to affect the region's wildlife habitat in the future, possibly with increasing intensity.

The subwatersheds support important big game seasonal and year-round ranges and habitat for a variety of other wildlife, with habitat quantity and quality as limiting factors on many species. Human population growth and development in the subwatersheds in the next 50 years is anticipated to have the most dramatic effect on wildlife habitat and populations of any future activities anticipated. For instance, CPW estimates that mule deer numbers in Colorado have declined by approximately 36 percent in the past decade, to levels significantly below population objectives (CPW 2014). CPW identifies several factors contributing to the decline, namely the state's dramatic increase in human population, which has contributed to the direct loss and degradation of mule deer habitat due to housing developments, urban and suburban sprawl, and infrastructure (CPW 2014).

The subwatershed improvements would affect distribution patterns of big game and other wildlife on the landscape as a result of loss of artificial wetland and riparian resources. However, these losses could be offset by gains in water quality and wetland and riparian habitat function in the project area's natural riverine systems (see **Section 5.4.2** for further discussion of impacts to wetlands and riparian areas), and are therefore not expected to result in a substantial contribution to cumulative area-wide impacts on population trends of wildlife. Impacts would be mitigated by design features, compliance measures, and BMPs described throughout this Plan-EA.

Under the No Action Alternative, there would be no contribution to the cumulative impact on wildlife communities in the subwatersheds.

5.5.2 Terrestrial Special Status Wildlife Species

5.5.2.1 Proposed Action

5.5.2.1.1 Subwatershed Improvements

Terrestrial wildlife species and critical habitats protected by the ESA with the potential to be effected by future subwatershed improvements and project-specific components are the Gunnison sage-grouse, Gunnison sage-grouse designated critical habitat, western yellow-billed cuckoo, western yellow-billed cuckoo proposed critical habitat, and lynx. Wolverine, Mexican spotted owl, and Mexican spotted owl critical habitat were dismissed from further analysis based on lack of documented occurrences in the subwatersheds. Background information for these species and their critical habitats is provided in **Section 3.5.3**. Subwatershed improvements are described in detail in **Section 4.3.1.1**.

Table 5.5-2 (below) presents preliminary/anticipated effects determinations for each ESA-protected species and critical habitat for each type of subwatershed improvement, assuming the improvement would take place in *occupied habitat*. Where conditional statements in the preliminary determinations are not met in **Table 5.5-2**, or when determinations are other than "No effect," NRCS will complete Section 7 ESA Consultation and/or clearance surveys prior to construction activities. Note that any vegetation or ground-disturbing activities not currently planned but ancillary to the subwatershed improvements analyzed in **Table 5.5-2**, such as creation of or widening of access roads to project areas, establishment of staging or borrow areas on non-irrigated ground, or habitat conservation or mitigation actions, could trigger a need for Section 7 Consultation and/or clearance surveys if these actions would occur in the range and suitable habitat of a special status wildlife species.

NRCS completed an ESA Section 7 Programmatic Consultation with USFWS for Gunnison sage-grouse in October 2015, resulting in a Gunnison Sage-Grouse Biological Opinion (USFWS 2015) covering NRCS Farm Bill program activities in Gunnison sage-grouse habitat in Colorado and Utah. Effects determinations, consultation, coordination, and conservation measures for Gunnison sage-grouse in the project area would occur in accordance with the Biological Opinion.

For subwatershed improvements taking place outside a species' range or inside the species' range but not in or near suitable habitat, a finding of "no effect" would apply to the activity. Similarly, for subwatershed improvement activities outside proposed or designated critical habitat, there would be a finding of "no effect."

Table 5.5-2. Preliminary Effects Determinations for Federally Protected Terrestrial Wildlife Species and Critical Habitats.

ESA-Protected Element *(assumes activity would take place in occupied habitat and/or critical habitat)*	SCADA	Ditch Conversion to Enclosed Pipe	Soil Health Practices	On-Farm Irrigation Efficiency Upgrades
Gunnison sage-grouse	Installation activities may affect, and are likely to adversely affect, if they are conducted during breeding and nesting season (March 1 – July 15) within 4 miles of an active lek Installation activities may affect, but are not likely to adversely affect when conducted outside of breeding and nesting season (March 1 – July 15) in occupied habitat Likely to adversely modify habitat if structures provide hunting perches for birds of prey	Construction activities may affect, and are likely to adversely affect, if they are conducted during breeding and nesting season (March 1 – July 15) within 4 miles of an active lek Construction activities may affect, but are not likely to adversely affect when conducted not closer than 0.6 mile from an active lek outside of breeding and nesting season (March 1 – July 15) in occupied habitat	No effect, or potential beneficial effect (cover crops) with applicable conservation measures from the Gunnison Sage-Grouse Biological Opinion (USFWS 2015)	May affect, but not likely to adversely affect when conducted not closer than 0.6 mile from an active lek outside of breeding and nesting season (March 1 – July 15) in occupied habitat May adversely affect (if structures provide hunting perches for birds of prey)
Gunnison sage-grouse designated critical habitat (both occupied and potential)	No effect (assumes SCADA installation is in previously disturbed area) Likely to adversely modify habitat if structures provide hunting perches for birds of prey or collision opportunities with fences Likely to adversely modify habitat if installed within 0.6 miles of a lek site	Short-term disturbance or loss of habitat May affect, but not likely to adversely affect, if the project footprint would be revegetated to benefit sage-grouse	No effect, or potential beneficial effect (if cover crops provide brooding season forage and cover) and with applicable conservation measures from the Gunnison Sage-Grouse Biological Opinion (USFWS 2015)	No effect, if no wet and mesic swales next to occupied sagebrush patches are dried as a result of the upgrade May affect, likely to adversely affect if wet and mesic swales next to occupied sagebrush patches are dried as a result of the upgrade

Table 5.5-2. Preliminary Effects Determinations for Federally Protected Terrestrial Wildlife Species and Critical Habitats.

ESA-Protected Element *(assumes activity would take place in occupied habitat and/or critical habitat)*	SCADA	Ditch Conversion to Enclosed Pipe	Soil Health Practices	On-Farm Irrigation Efficiency Upgrades
Western yellow-billed cuckoo	No effect when installation is performed outside the breeding season Likely to adversely affect if work is performed during breeding season (June through August)	No effect when construction occurs outside the nesting season Likely to adversely affect if construction is performed during the breeding season	No effect	No effect (assumes such projects would take place on established agricultural lands not directly adjacent to breeding habitat)
Western yellow-billed cuckoo proposed critical habitat	No effect (assumes SCADA installation is in previously disturbed area or that no trees or shrubs are removed for the installation)	Short-term disturbance or loss of habitat May affect, but not likely to adversely affect, if the project footprint would be revegetated to benefit cuckoo	No effect	No effect
Lynx	Installation and operation may affect, but not likely to adversely affect (subwatersheds are in non-primary, marginal, or peripheral habitat; lynx in the area can move away from the disturbance)	Installation and operation may affect, but not likely to adversely affect (subwatersheds are in non-primary, marginal, or peripheral habitat; lynx in the area can move away from the disturbance)	No effect (no implementation of soil heath practices would be planned for potential lynx habitat)	No effect (no efficiency upgrade projects would be planned for potential lynx habitat)

Note that ESA-protected species presented on **Table 5.5-2** are current as of the preparation date of this Plan-EA, and should be checked and updated as necessary during the planning phase of each subwatershed improvement.

Table 5.5-3 (below) summarizes potential impacts on BLM Sensitive Species for each type of subwatershed improvement that may occur on BLM-managed lands, assuming the improvement would take place in *occupied habitat*. As a part of the planning process for subwatershed improvements on BLM-managed lands, the BLM's UFO would be consulted for concurrence with **Table 5.5-3**, and for clearance survey requirements.

For subwatershed improvements taking place outside a species' range or inside the species' range but not in or near suitable habitat, a finding of no impact would apply to the activity.

Note that BLM Sensitive Species presented on **Table 5.5-3** are current as of the preparation date of this Plan-EA, and should be checked and updated as necessary during the planning phase of each subwatershed improvement.

Table 5.5-3. Anticipated Impacts to BLM Sensitive Terrestrial Wildlife Species.

BLM Sensitive Species ***(assumes activity would take place in occupied habitat on BLM-managed lands)***	**SCADA**	**Ditch Conversion to Enclosed Pipe**
Gunnison's prairie dog White-tailed prairie dog	Installation activities could temporarily disturb or alarm prairie dogs within a few hundred feet Local population could be impacted if SCADA structures provide hunting perches for birds of prey where such perches do not currently exist	Construction activities could temporarily disturb or alarm prairie dogs within a few hundred feet Direct mortality could result when burrows are within the construction corridor or in ditch banks No long-term effects are anticipated; chance of beneficial effect of creating more upland prairie dog habitat once the project footprint is revegetated
Spotted bat Fringed myotis Townsend's big-eared bat	No direct effect	These bats could be expected to forage over ditches in spring, summer, and early fall, and could be displaced by construction activities overlapping with their active months Artificial riparian and wetland foraging habitat loss would be offset by water quality and habitat improvements to natural riverine systems in the project area
Bighorn sheep	Installation activities could temporarily disturb or bighorn sheep nearby SCADA installation is unlikely to occur on BLM lands in bighorn sheep habitat in the subwatersheds, which is extremely limited No long-term effects	Construction activities could temporarily disturb bighorn sheep nearby Ditch conversion is unlikely to occur on BLM lands in bighorn sheep habitat in the subwatersheds, which is extremely limited No long-term effects

Table 5.5-3. Anticipated Impacts to BLM Sensitive Terrestrial Wildlife Species.

BLM Sensitive Species *(assumes activity would take place in occupied habitat on BLM-managed lands)*	SCADA	Ditch Conversion to Enclosed Pipe
Bald eagle Golden eagle Peregrine falcon Northern goshawk Ferruginous hawk Burrowing owl	Potential direct effects during installation if site is located inside CPW-recommended buffer distances from active nests during breeding season or active bald eagle roosts (CDOW 2008) No measurable long-term effects from maintenance visits (assuming maintenance visits would be of less frequency than prior to the SCADA installation	Potential direct effects during construction if project footprint is located inside CPW-recommended buffer distances from active nests during breeding season or active bald eagle roosts (CDOW 2008) Potential disruption of foraging patterns during construction No measurable long-term effects are anticipated
Brewer's sparrow	Potential direct effects if installation occurs during breeding season (April through July15) near an active nest No effect from installation to migrating birds (would avoid the installation site) No measurable long-term effects are anticipated	Potential direct effects if construction occurs during breeding season (April through July 15) near an active nest No effect from construction to birds during spring or fall migration (would avoid the construction site) No long-term effects are anticipated; chance of beneficial effect of creating more upland nesting habitat once the project footprint is revegetated
Midget-faded rattlesnake	Potential direct effects (stress, mortality) during construction to active or hibernating individuals No measurable long-term effects are anticipated	Potential direct effects (stress, mortality) during construction to active or hibernating individuals No measurable long-term effects are anticipated

5.5.2.1.2 Project-Specific Components

The following tables present preliminary anticipated effects determinations for each ESA-protected species and critical habitat, and for BLM Sensitive Species, for project-specific components within each subwatershed. Where rationale statements for the preliminary determinations are not met in the tables, or where determinations are other than "No effect," NRCS has completed consultation under Section 7 of the ESA with USFWS. The USFWS concurred with all of the effects determinations in a Biological Opinion dated November 30, 2017 (**Appendix A**).

Note that any vegetation or ground-disturbing activities ancillary to the subwatershed improvements analyzed in **Tables 5.5-4** through **5.5-8**, such as creation of or widening of access roads to project areas, establishment of staging or borrow areas on non-irrigated ground, or habitat conservation or mitigation actions, could trigger a need for additional Section 7 Consultation and/or clearance surveys if these actions would occur in the range and suitable habitat of a special status wildlife species. BLM Sensitive Species impacts and the need for clearance surveys on BLM-managed lands would be vetted with the BLM's UFO.

North Fork

Table 5.5-4 provides preliminary/anticipated effects determinations for federally protected terrestrial wildlife species for project-specific components in the North Fork subwatershed. Where rationale statements for the preliminary determinations are not met, or where determinations are other than "No effect," NRCS has completed consultation with USFWS under Section 7 of the ESA. None of the project-specific components is located on BLM lands.

Table 5.5-4. Preliminary Effects Determinations for Federally Protected Terrestrial Wildlife and Critical Habitats for Project-specific Components in the North Fork Subwatershed.

ESA-Protected Element	Effect Determination	Rationale
Gunnison sage-grouse	No Effect	The project-specific components are not within or near the documented range of the species
Gunnison sage-grouse designated critical habitat (both occupied and potential)	No Effect	No designated critical habitat exists within the subwatershed
Western yellow-billed cuckoo	May affect, not likely to adversely affect	The installations would take place outside the breeding season (June through August) The project-specific components are not within breeding habitat of the species Individuals in the area of the project-specific components would be migrating or on foraging forays
Western yellow-billed cuckoo proposed critical habitat	No Effect	The project-specific components are not within or near the proposed critical habitat
Lynx	No Effect	There is no documentation of lynx occupying the area No lynx potential habitat is mapped in or near the project-specific component sites No suitable lynx habitat exists in the area of the project-specific component sites
Lynx designated critical habitat	No Effect	No critical habitat for lynx has been designated in Colorado. Additionally, there is no mapped potential habitat in the subwatershed

Crawford

Table 5.5-5 provides preliminary/anticipated effects determinations for federally protected terrestrial wildlife species for project-specific components in the Crawford subwatershed. Where rationale statements for the preliminary determinations are not met, or where determinations are other than "No effect," NRCS has completed consultation with USFWS under Section 7 of the ESA.

None of the project-specific components are located on BLM lands.

Table 5.5-5. Preliminary Effects Determinations for Federally Protected Terrestrial Wildlife and Critical Habitats for Project-specific Components in the Crawford Subwatershed.

ESA-Protected Element	Effect Determination	Rationale
Gunnison sage-grouse	No Effect	The project-specific components are not within or near the current documented occupied range of the species (the nearest documented occurrence is more than 6 miles from the project-specific components) The project-specific components are not within areas of suitable breeding, nesting, brooding or winter habitat for the species
Gunnison sage-grouse designated critical habitat (both occupied and potential)	No Effect May Affect, not likely to adversely affect	The Needle Rock Diversion Project and SCADA, Clipper Re-Reg Pond and SCADA, and the Smith Fork Feeder SCADA all fall outside designated critical habitat The Grandview Phase 1 Project lies partially within designated critical habitat classified as potential/unoccupied in an area not meeting PCE requirements of sage-grouse habitat outlined in the listing rule at 79 FR 69311-69363
Western yellow-billed cuckoo	May Affect, not likely to adversely affect	There are no documented occurrences of the species in the subwatershed, and individuals in the area of the project-specific components would be considered incidental (migrating or on foraging forays) The project-specific components are not within breeding habitat of the species Construction will take place outside the breeding season (June through August)
Western yellow-billed cuckoo proposed critical habitat	No Effect	The project-specific components are not within or near the proposed critical habitat
Lynx	No Effect	There is no documentation of lynx occupying the area No lynx potential habitat is mapped in the project-specific component sites No suitable habitat exists in the area of the project-specific component sites
Lynx designated critical habitat	No Effect	No critical habitat for lynx has been designated in Colorado.

Uncompahgre

Tables 5.5-6 and **5.5-7** provide preliminary/anticipated effects determinations for federally protected and BLM sensitive terrestrial wildlife species for project-specific components in the Uncompahgre subwatershed. Where rationale statements for the preliminary determinations are not met, or where determinations are other than "No effect," NRCS has completed consultation with USFWS under Section 7 of the ESA.

Table 5.5-6. Preliminary Effects Determinations for Federally Protected Terrestrial Wildlife and Critical Habitats for Project-specific Components in the Uncompahgre Subwatershed.

ESA-Protected Element	Effect Determination	Rationale
Gunnison sage-grouse	No Effect	The project-specific components are not within or near the documented range of the species
Gunnison sage-grouse designated critical habitat (both occupied and potential)	No Effect	No designated critical habitat exists in the area of the project-specific components
Western yellow-billed cuckoo	No Effect	Two of the SCADA sites are within an area of potential breeding habitat; however, the installations will take place outside the breeding season (June through August) The remainder of the SCADA sites are not within potential breeding habitat for the species
Western yellow-billed cuckoo proposed critical habitat	May affect, not likely to adversely affect (two SCADA sites) No Effect (two SCADA sites)	Two of the SCADA sites are within proposed critical habitat; however, the installations site are on previously disturbed ground in residential and light-industrial areas, and no riparian vegetation would be disturbed during the installations Two of the SCADA sites lie outside of proposed critical habitat
Lynx	No Effect	There is no documentation of lynx occupying the subwatershed No lynx potential habitat is mapped in the subwatershed No suitable lynx habitat exists in the subwatershed
Lynx designated critical habitat	No Effect	No critical habitat for lynx has been designated in Colorado.

Table 5.5-7. Preliminary Effects Determinations for BLM Sensitive Terrestrial Wildlife in the in the Uncompahgre Subwatershed.

BLM Sensitive Species	Effect Determination	Rationale
Spotted bat Fringed myotis Townsend's big-eared bat	No Effect	These bats could be expected to forage near the project component site (Flat Top Hill) in spring, summer, and early fall; SCADA installation during active months is not expected to interfere with crepuscular feeding and bats would be hibernating during winter construction No foraging habitat loss would result
White-tailed prairie dog	May effect, not likely to measurably effect	Installation activities could temporarily disturb or alarm prairie dogs within a few hundred feet Local population could be impacted if SCADA structure provides hunting perches for birds of prey where such perches do not currently exist; however, other communications facilities are in the area
Bald eagle Golden eagle	No Effect	CPW-mapped bald eagle nests or roosts are outside CPW-recommended buffer distances (CDOW 2008) from the SCADA site No known golden eagle nests exist within the CPW-recommended buffer distances (CDOW 2008) Foraging eagles have the flexibility to move to other areas of appropriate habitat in response to disturbance; the habitat at the project-specific component site is not exceptional or unique
Ferruginous hawk	No Effect	Migratory or wintering ferruginous hawks have the flexibility to move to other areas of appropriate habitat in response to disturbance; the habitat at the project-specific component site is not exceptional or unique
Burrowing owl	No Effect	Construction of the project-specific component would take place during the irrigation off-season and is unlikely to coincide with primary nesting season for the species (April through July)

Bostwick Park

Table 5.5-8 provides preliminary/anticipated effects determinations for federally protected terrestrial wildlife species for project-specific components in the Bostwick Park subwatershed. Where rationale statements for the preliminary determinations are not met, or when determinations are other than "No effect," NRCS has completed consultation with USFWS under Section 7 of the ESA.

None of the project-specific components is located on BLM lands.

Table 5.5-8. Preliminary Effects Determinations for Federally Protected Terrestrial Wildlife and Critical Habitats for Project-specific Components in the Bostwick Park Subwatershed.

ESA-Protected Element	Effect Determination	Rationale
Gunnison sage-grouse	No Effect	The project-specific components located in Bostwick Park are within designated critical habitat classified as potential/unoccupied Construction would take place outside the breeding and nesting period (March through July) The project-specific components are more than 5 miles from any potential nest sites or leks in occupied habitat The Cimarron Canal SCADA site is not within the species' documented range and contains no suitable habitat
Gunnison sage-grouse designated critical habitat (both occupied and potential)	May affect, not likely to adversely affect (Bostwick Park components)	The project-specific components located in Bostwick Park are within designated critical habitat classified as potential/unoccupied The habitat at the project-specific component locations in Bostwick Park do not currently meet PCE requirements of sage-grouse habitat outlined in the listing rule at 79 FR 69311-69363
	No Effect (Cimarron Canal SCADA)	The Cimarron Canal SCADA side does not lie within designated critical habitat
Western yellow-billed cuckoo	No Effect	There are no documented occurrences of the species in the subwatershed; activities would take place outside breeding season The project-specific components are not within or near breeding habitat of the species
Western yellow-billed cuckoo proposed critical habitat	No Effect	The project-specific components are not within or near the proposed critical habitat
Lynx	May affect, not likely to adversely affect (Cimarron Canal SCADA)	Cimarron Canal SCADA lies within mapped potential lynx habitat; however, based on the spatial arrangement of the surrounding vegetation communities and the proximity of a residential subdivision immediately to the west, the Cimarron Canal SCADA area provides marginal secondary habitat or peripheral habitat for lynx and is unlikely to be consistently occupied by the species The duration of the installation is relatively short, with relatively low levels of noise and activity
	No Effect (Bostwick Park components)	The Bostwick Park project-specific components lie outside mapped potential lynx habitat and have no suitable habitat for lynx There is no documentation of lynx occupying the Bostwick Park area
Lynx designated critical habitat	No Effect	No critical habitat for lynx has been designated in Colorado.

5.5.2.1.3 Compliance and Best Management Practices

Special status species lists should be checked and updated as necessary during the planning phase of each subwatershed improvement. For any potential impacts to special status species, clearance surveys and/or appropriate coordination with the BLM or consultation with USFWS under Section 7 of the ESA could be required before construction activities could be initiated, if it has not already been completed.

See **Tables 5.5-2** and **5.5-3** for summaries of impacts to special status wildlife species predicted for subwatershed improvements. BMPs and compliance measures for terrestrial species in general (**Table 5.5-1**) apply to special status wildlife to reduce or eliminate impacts where applicable. The following additional BMPs and measures would protect special status wildlife species and their habitat:

- When potential effects to Gunnison sage-grouse or Gunnison sage-grouse critical habitat are anticipated, apply appropriate planning / implementation conservation measures explained in the Gunnison Sage-Grouse Biological Opinion (USFWS 2015).
- Ensure that project staff and contractors working on site are aware of and can identify special status wildlife species with potential to occur in the project footprint; stop work if a federally protected special status wildlife species is discovered in the project footprint and notify the project manager.

5.5.2.2 No Action

Under the No Action Alternative, the special status wildlife species in the project area would not benefit from reductions in salt and selenium loading to the aquatic system created by conversion of open irrigated ditches to enclosed pipe and on-farm irrigation efficiency projects.

5.5.2.3 Cumulative Impacts

This cumulative impacts analysis looks 50 years into the future at special status species within the general area of the subwatersheds. Present and future activities in the analysis area affecting special status species are similar to those described for wildlife in general in **Section 5.5.1.3**. Some of the special status species also face gene-flow issues or extirpation vulnerability due to the isolation of their populations or small numbers and rarity. Climate change and human population growth (and the development that accompanies it) is likely put more pressure on special status species and their habitats in the coming 50 years than any other factor.

Distribution patterns of special status wildlife species such as BLM sensitive bats could change as a result of the loss of artificial wetland and riparian resources created by open ditches to be converted to enclosed pipe. However, these losses would be offset by gains in water quality and wetland and riparian habitat function in the project area's natural riverine systems (see **Section 5.4.2** for further discussion of impacts to wetlands and riparian areas), and are therefore not expected to result in a substantial contribution to cumulative area-wide impacts on population trends of special status wildlife. Impacts would be mitigated by design features, compliance measures, and BMPs described throughout this Plan-EA.

Under the No Action Alternative, there would be no contribution to the cumulative impact on special status wildlife species in the subwatersheds.

5.5.3 Fish and Amphibians

5.5.3.1 Proposed Action

The Proposed Action, including converting open ditches to piped deliveries, installing high efficiency irrigation systems on farms and ranches, and installing SCADA technologies to irrigation water infrastructure, should not only improve habitat for critical species on the Gunnison and Colorado Rivers but also should be used as a tool to improve habitat for local rivers and streams. The same tools that are applied to increase irrigation efficiency are also necessary for sustaining and restoring fisheries that play a vital role in the economy of the Lower Gunnison, and implementing innovative water conservation projects that can be used to address local and regional water supply issues.

Direct effects on fishes and amphibians from incremental implementation of the proposed subwatershed improvements would be localized and temporary, while indirect effects would be long-term in nature. The BMPs and Compliance Measures in **Table 5.5-10** would serve to minimize or avoid impacts to fishes and amphibians. Prior to implementation, the effects of the Proposed Action would be fully analyzed in project-specific biological assessments and evaluations (as appropriate). Potential impacts would be addressed in consultation with the USFWS, as required under Section 7 the ESA. BLM Sensitive Species would be fully analyzed in project-specific biological evaluations.

Fish

Construction of project-specific components would be limited to project area ditches and canals; no construction is proposed along project area streams or rivers. Fish, especially individual fry or juveniles, may occasionally occur in project area irrigation canals; however, they are more likely to occur in streams or rivers in the project area. Construction of the proposed subwatershed improvements would take place outside of the irrigation season, when canals would be dry and fish would not be present, therefore no direct mortality or disturbance is expected. Construction would result in a short-term increase in potential for sediment loading into project area waterways, which may temporarily impact water quality. The Proposed Action would result in long-term beneficial impacts to fish habitats, including improved water quality and availability for fish in the Lower Gunnison Basin.

Amphibians

During construction of the proposed subwatershed improvements, an increase in noise, human presence, and equipment use in the project area may result in displacement of amphibians. Adult or juvenile amphibians occupying the project area would be expected to relocate into adjacent suitable habitat during construction, however, individual mortality of eggs, larva, or adults may occur. Amphibians that may utilize burrows in the construction areas, such as the tiger salamander, may be crushed or killed during construction.

Long-term impacts of the Proposed Action would include the loss of wetland and riparian habitat along existing canals and ditches as described in **Section 5.4.2**, Wetlands and Riparian Areas. Amphibians occupying these habitat areas would either relocate to adjacent suitable habitat or could suffer morality. The potential for mortality could be greater depending on the life stage of the species; for example, amphibian eggs which are not mobile would likely not persist in areas where canals are abandoned. Construction of the proposed subwatershed improvements would result in long-term beneficial impacts to

amphibian habitats, including improved water quality and availability for amphibians in the Lower Gunnison Basin.

5.5.3.1.1 Federally Listed Fish, Amphibians and Designated Critical Habitat

Federally Listed Fish

The greenback cutthroat trout and the four Colorado River endangered fishes (bonytail chub, Colorado pikeminnow, humpback chub, and razorback sucker) utilize aquatic habitats that are downstream of the project area, therefore they have potential to be impacted by the Proposed Action.

The Gunnison River within the Uncompahgre subwatershed is included within the historic range for the Colorado pikeminnow and razorback sucker and individuals of both species have been observed downstream of the project area at the Redlands Diversion Dam on the Gunnison River (CRRP 2016). In addition, there are conservation populations of greenback cutthroat trout upstream of the project area on the Grand Mesa, Uncompahgre, and Gunnison National Forests. These three species of federally listed fish have the potential to occur in project area streams and rivers. However, based on their habitat preferences, federally listed fish species are not expected to utilize the irrigation canals or ditches in the project area. In addition, construction would take place outside of the irrigation season, when canals would be dry and fish would not be present. Construction of the subwatershed improvement projects could increase the potential for sediment entry into project area waterways. However, because these listed fish species are unlikely to occur in construction areas, the potential for direct impacts to occur is considered discountable.

Indirect impacts of the subwatershed improvements would include improved water quality and availability in downstream waterways, beneficially impacting suitable habitats for federally listed fish. **Table 5.5-9** lists the preliminary effects determinations for listed fish species and their critical habitat. Implementation of the Proposed Action may affect, but is not likely to adversely affect, the four Colorado River endangered fishes, and would have no effect on the greenback cutthroat trout. The effects of Proposed Action have been fully analyzed in a project-specific biological assessment and potential impacts have been addressed through Section 7 consultation with the USFWS, as required by the ESA. In a Biological Opinion dated November 30, 2017, the USFWS concurred with the affects determinations that threatened or endangered species are not likely to be adversely affected by the Proposed Action, except through water depletions on four endangered Colorado River fish. These water depletions have been fully addressed in Recovery Agreements prepared under the Recovery Implementation Program for Endangered Fish Species in the Upper Colorado River Basin.

Table 5.5-9. Preliminary Effects Determinations for Federally Protected Fish and Amphibians.

Species[1]	Legal Status[2]	Preliminary Effects Species Determination	Critical Habitat	Preliminary Effects Critical Habitat Determination
Bonytail chub *Gila elegans*	E	May affect, but is not likely to adversely affect	Y	Will not destroy or adversely modify
Colorado pikeminnow (*Ptychocheilus lucius*)	E	May affect, but is not likely to adversely affect	Y	Will not destroy or adversely modify
Greenback cutthroat trout (*Oncorhynchus clarki*)	T	No effect	N	NA
Humpback chub (*Gila cypha*)	E	May affect, but is not likely to adversely affect	Y	Will not destroy or adversely modify
Razorback sucker (*Xyrauchen texanus*)	E	May affect, but is not likely to adversely affect	Y	Will not destroy or adversely modify

[1] This species list was compiled using USFWS Environmental Conservation Online System IPaC.
[2] Status explanation for species listed under the federal ESA or the Colorado Nongame, Endangered, or Threatened Species. Conservation Act: E = Federally or state-listed as endangered; T = Federally or state-listed as threatened

Designated Critical Habitat

Designated critical habitat for the bonytail chub, Colorado pikeminnow, humpback chub, and razorback sucker has been identified (**Table 3.5-7**). In combination with ongoing water quality improvement efforts in the Colorado River Basin CCA, the subwatershed improvements are expected to result in positive benefits to water quality and availability in the Gunnison River, thereby improving habitat quality for the Colorado River endangered fishes within the project area and downstream. The Proposed Action is not expected to reduce the effectiveness of critical habitat for the Colorado River endangered fishes, or negatively impact the PCEs of designated critical habitat. Prior to implementation, the effects of proposed subwatershed improvements would be fully analyzed in project-specific biological assessments and potential impacts would be addressed in Section 7 consultation with the USFWS, as required by the ESA.

Federally Listed Amphibians

There are no federally listed amphibian species with the potential to occur in the project area.

5.5.3.1.2 BLM Sensitive Species

BLM Sensitive Fish

Four BLM sensitive fish species – the Colorado River cutthroat trout, bluehead sucker, flannelmouth sucker, and roundtail chub – may utilize suitable aquatic habitats within the project area. Based on their habitat preferences, these species are not expected to commonly occur in irrigation canals or ditches in the project area, although occasional use may occur – especially by fry or juvenile fish. However, construction of the Proposed Action would take place outside of the irrigation season, when canals would be dry and fish would not be present. Construction would increase the potential for sediment entry into project area waterways. The Proposed Action would result in long-term beneficial impacts to fish habitats, including improved water quality and availability. The Proposed Action may impact individual Colorado River cutthroat trout, bluehead sucker, flannelmouth sucker, and roundtail chub, but is not likely

to result in a loss of viability or cause a trend toward federal listing for these species. Prior to implementation, the effects of the Proposed Action on BLM sensitive fish would be fully analyzed in project-specific biological evaluations.

BLM Sensitive Amphibians

Two BLM sensitive amphibians, the northern leopard frog and canyon treefrog, may utilize riparian, wetland, or aquatic habitats within the project area. Construction may result habitat removal and displacement or mortality of individuals that may be present in the project area during construction. Long-term impacts to BLM sensitive amphibians from the Proposed Action would include the removal of linear wetland features along project area irrigation canals. Installation of SCADA systems would result in decreased human traffic in wetland habitat along ditches and canals; however, these wetlands are expected to be lost over time as canals are abandoned. Long-term beneficial impacts would include improved water quality and availability for amphibian habitats in the Lower Gunnison Basin. The Proposed Action may impact individual northern leopard frogs and canyon treefrogs, but is not likely to result in a loss of viability or cause a trend toward federal listing. Prior to implementation, the effects of proposed watershed improvement projects on BLM sensitive amphibians would be fully analyzed in project-specific biological evaluations.

5.5.3.1.3 Project Area Fisheries

Federally Listed Warm Water Fish and Native Fishery Below Delta

While the Proposed Action would not include the construction of project-specific components within the native fishery below Delta, long-term benefits to the fishery are expected, including decreased salinity and selenium loading in the Gunnison River downstream of the project area. In addition, increases in irrigation efficiency within the project area would likely result in increased water availability. The Proposed Action is not expected to impact species composition or utilization within the fishery.

Fisheries

Each subwatershed in the project area supports a fishery. The Proposed Action would improve water quality and availability throughout the project area; resulting in long-term benefits to the fisheries. No construction is proposed along native streams or rivers in the project area and channel morphology of streams and rivers in the project area would not be impacted by the Proposed Action. The proposed subwatershed improvements are not expected to increase anthropogenic influences in the subwatersheds. Prior to implementation, the effects of the Proposed Action would be fully analyzed in a biological assessment and in consultation with the USFWS, as appropriate.

5.5.3.1.4 Project-Specific Components

North Fork

Project-specific components in the North Fork subwatershed are described in **Section 4.3.1.2** and listed on **Table 4.3-1**. These include three SCADA systems and a piping project on Fire Mountain Canal. All components are situated on private lands. Reclamation is the lead agency for the Fire Mountain Canal Piping Project, which will be analyzed in Reclamation's NEPA process and not discussed further here.

Construction of the Proposed Action has the potential to result in short-term impacts to the fishery in the North Fork Gunnison River subwatershed, including increased potential for sediment entry into project

area waterways. The proposed activities are expected to result in long-term improvements to water quality and availability within the North Fork of the Gunnison subwatershed.

Crawford

Project-specific components in the Crawford subwatershed are described in **Section 4.3.1.2** and listed on **Table 4.3-2**. These include the Needle Rock Diversion Project (a headgate replacement and ditch piping project), the Grandview Phase 1 Project (a diversion structure replacement and ditch piping project), the Clipper Re-Reg Pond (a 30-acre-foot reservoir), and four SCADA systems. Three of the four SCADA systems are associated with the projects listed above. The fourth SCADA will be on the Smith Fork Feeder. Construction of the Proposed Action has the potential to result in short-term impacts to the fishery, including increased potential for sediment release into project area waterways. The proposed activities are expected to improve water quality and availability within the subwatershed and downstream waterways over the long-term.

Uncompahgre

Project-specific components in the Uncompahgre subwatershed are described in described in **Section 4.3.1.2** and listed on **Table 4.3-3**. These include four SCADA systems and a piping project on the GB and GB-A Laterals (part of the Phase 9 Piping Project). Reclamation is the lead agency for the Phase 9 Piping Project, which will be analyzed in Reclamation's NEPA process and not discussed further here.

Construction has the potential to result in short-term impacts during construction, including increased potential for sediment release into project area waterways. Long-term use of SCADA would result in more efficient irrigation, reduced water losses, and increased availability and quality of aquatic habitats in the subwatershed.

Bostwick Park

Project-specific components in the Bostwick Park subwatershed are described in described in **Section 4.3.1.2** and listed on **Table 4.3-4**. These include the West Lateral Phase 1 Project and a SCADA system to be placed on the Cimarron Canal Diversion.

Construction of the Proposed Action has the potential to result in short-term impacts to the subwatershed, including increased potential for sediment release into project area waterways. Pipeline and SCADA installation and use would result in decreased salinity and selenium loading within the subwatershed and would improve aquatic habitat quality and water availability within the fishery.

5.5.3.1.5 Compliance and Best Management Practices

The BMPs and Compliance Measures include in **Table 5.5-10** would be followed to minimize potential impacts to fish and amphibians.

Table 5.5-10. BMPs and Compliance Measures for Fish and Amphibians.

Pre-construction Commitments
A Biological Assessment / Biological Evaluation will be prepared to address both short-term and long-term impacts of future subwatershed improvement projects, if applicable. For all known projects described in this Plan-EA, consultation has been completed. In a Biological Opinion dated November 30, 2017, the USFWS concurred with the affects determinations that threatened or endangered species are not likely to be adversely affected by the Proposed Action, except through water depletions on four endangered Colorado River fish. These water depletions have been fully addressed in Recovery Agreements prepared under the Recovery Implementation Program for Endangered Fish Species in the Upper Colorado River Basin.
During Construction
Utilizing existing infrastructure such as headgates or cofferdams, flows will be diverted away from construction areas and BMPs will be in place to reduce the potential for sediment loading into active waterways.

5.5.3.2 No Action

Under the No Action Alternative, fish and amphibian habitat would remain in its current condition. The use of water for irrigation would continue at present rates, resulting in continued historic depletions in project area waterways and downstream. Soil conditions would not be improved and irrigation related surface runoff (tail water) would continue to infiltrate into aquatic resources, resulting in ongoing salinity and selenium loading in the Lower Gunnison Basin. Selenium exposure and salinity loading would continue to impact water quality and contribute to habitat degradation for endangered fish species in the Upper and Lower Colorado River Basins.

5.5.3.3 Cumulative Impacts

Past, present, and reasonably foreseeable future actions that may impact amphibians in the project area are similar to those described in the wetlands and riparian and wildlife sections of this Plan-EA, while actions that may impacts fishes are similar to those described in the aquatic resources section. Such actions include existing and future NRCS irrigation improvement projects, livestock grazing, and residential development. Residential development could result in conversion of irrigated agricultural or grazing rangelands, which may impact water availability and habitats for amphibians.

Each of the four subwatersheds in the project area has a watershed plan that includes strategies or projects intended to improve water quality, water quantity, and system efficiency within the subwatersheds. In addition, the Lower Gunnison Basin is included in three on-going water quality improvement programs: (1) Colorado River Basin Salinity Control Program, (2) the Upper Colorado River Endangered Fish Recovery Program, and (3) the Gunnison Basin Selenium Management Program (discussed in more detail in **Section 5.4.2.5**). The proposed construction areas and duration of disturbance under the Proposed Action are discrete and short-term, and long-term impacts are not expected to raise cumulative negative impacts to a significant level. The Proposed Action is expected to work in combination with these ongoing programs to improve fish and amphibian habitats in the Lower Gunnison Basin.

The Proposed Action will comply with all relevant federal, state and local permits (detailed in **Table 5.5-12** - BMPs and Compliance Measures for Fish and Amphibians). In combination with other past, present, and reasonably foreseeable future actions, the Proposed Action is expected to contribute to improved water quality and availability, resulting in long-term beneficial impacts to fish and amphibian habitats.

5.6 Human Environment

5.6.1 Cultural and Historic Resources

5.6.1.1 Proposed Action

5.6.1.1.1 Subwatershed Improvements

Construction associated with identified project actions has the potential to adversely affect historic resources in the project area. Converting the canals to pipelines would destroy integrity of design, materials and workmanship for either previously documented and evaluated or as yet to be documented and evaluated segments of NRHP eligible ditches and canals. Disturbance associated with the construction of the SCADA installations may impact integrity of design, setting, materials, workmanship, feeling and/or association for previously identified and unidentified cultural resources at those locations and potentially in the vicinity. To evaluate the potential impacts of the project-specific components, a cultural resource survey of these elements was conducted in July of 2017.

5.6.1.1.2 Project-Specific Components

Sites, either previously recorded or new sites recorded during the pre-construction cultural resource survey of the project elements that are recommended eligible for inclusion in the NRHP, would likely be subject to direct, indirect or cumulative adverse effect during or after the construction of the proposed Lower Gunnison project, unless impacts can be avoided. Adverse effects would include:

- Physical destruction
- Alteration through repair or maintenance
- Removal from original location
- Neglect
- Visual, audible or atmospheric changes
- Transfer, lease or sale

The pre-construction cultural resource survey for the project-specific components recommended a finding of "historic properties adversely affected" due to impacts to sites 5DT1780.6 and 5DT2094.1 in the Crawford subwatershed and site 5MN10895.1 in the Bostwick Park subwatershed as described below. SHPO has subsequently concurred with these findings. Mitigation of project effects on these resources requires that the consulting parties enter into an MOA which specifies a method of treatment for the adverse effects that is acceptable to all of the consulting parties. The fully executed MOA can be found in **Appendix A**.

North Fork

Four project components are proposed within the North Fork subwatershed. These consist of SCADA Leroux Creek Feeder, SCADA Siphon Inlet, and SCADA Patterson Lateral. No previous cultural resource surveys or sites are associated with SCADA Leroux Creek Feeder. Previous sites and surveys for the remaining project components are listed in **Table 5.6-1** and **Table 5.6-2**. The North Fork project-specific

components were surveyed for cultural resources in July 2017. The survey recorded four new segments of linear sites. These consist of two segments of the Fire Mountain Canal, one segment of the Patterson Lateral, and one segment of the Leroux Creek Ditch. NRHP eligibility recommendations are listed in **Table 5.6-3**.

Table 5.6-1. Previous Cultural Resource Data Intersecting Projects in the North Fork Subwatershed.

Project Element	Survey ID	Date	Author	Report Title
SCADA Siphon Inlet	MC.LM.R135	1996	Sullivan, Mark E. and Joseph Howell	A Cultural Resource Survey of Approximately 4,155 Acres of Bureau of Land Management Land on the Western Slope of the Colorado Rocky Mountains (97-17), Cultural Resource Inventory - UBRA Project 1996 Delta, Gunnison, Montrose, Ouray, Saguache, and San Miguel Counties, Colorado
SCADA Patterson Lateral	DT.R.R22	2013	Horn, Jonathon C.	Cultural Resource Inventory of the Slack and Patterson Lateral Ditches on Rogers Mesa Delta County, Colorado
SCADA Patterson Lateral	Unknown	2016	McDonald, Kae	Fire Mountain Canal Piping Project, A Class III Cultural Resource Inventory for the Bureau of Reclamation in Delta County, Colorado

Table 5.6-2. Previously Recorded Cultural Resources Intersecting Projects in the North Fork Subwatershed.

Project Element	Site Number	Site Type	Site Name/ Description	NRHP Eligibility	Assessment Date
SCADA Patterson Lateral	5DT1959	Irrigation Ditch	Patterson Lateral	Officially Eligible	2014

Table 5.6-3. Newly Recorded Cultural Resources in the North Fork Subwatershed.

Project Element	Site Number	Site Type	Site Name/ Description	NRHP Eligibility
SCADA Patterson Lateral	5DT1277.7	Irrigation Ditch	Fire Mountain Canal	Needs Data, Supporting
SCADA Siphon Inlet	5DT1277.8	Irrigation Ditch	Fire Mountain Canal	Needs Data, Supporting
SCADA Patterson Lateral	5DT1959.2	Irrigation Ditch	Patterson Lateral	Officially Eligible, Non-supporting
SCADA Leroux Creek Feeder	5DT2005.4	Irrigation Ditch	Leroux Creek Ditch	Needs Data, Supporting

Crawford

Seven project components are proposed within the Crawford subwatershed. These consist of the Needle Rock Diversion, SCADA Needle Rock, Grandview Canal Phase 1, SCADA Crawford Grandview-Aspen Canal, SCADA Smith Fork Feeder, Clipper Re-Reg Pond, and SCADA Clipper Re-Reg Pond. No previous cultural resource surveys or sites are associated with Needle Rock Diversion, SCADA Needle

Rock, Grandview Canal Phase 1, SCADA Crawford Grandview-Aspen Canal, or SCADA Smith Fork Feeder. No previously recorded sites are associated with the Clipper Re-Reg Pond and SCADA Clipper Re-Reg Pond, but it is intersected by one previous cultural survey (**Table 5.6-4**). The Crawford project components were surveyed for cultural resources in July 2017. The survey recorded one historic structure and four new segments of linear sites. These consist of a historic barn, one segment of the Grandview Ditch, one segment of the Smith Fork Feeder Canal, one segment of the Needle Rock Ditch, and one segment of Fruitland Mesa Road. NRHP eligibility recommendations are presented in **Table 5.6-5**. The segments of Grandview Ditch and Needle Rock Ditch would be converted from open ditches to pipelines that will be an adverse effect on the sites. Mitigation of the effects would require that the consulting parties enter into an MOA which specifies a method of treatment for the adverse effects that is acceptable to all of the consulting parties. The MOA for this undertaking has been fully executed and can be found in **Appendix A**.

Table 5.6-4. Previous Cultural Resource Data Intersecting Projects in the Crawford Subwatershed.

Project Element	Survey ID	Date	Author	Report Title
Clipper Re-Reg Pond,	MC.LM.R135	1996	Sullivan, Mark E. and Joseph Howell	A Cultural Resource Survey of Approximately 4,155 Acres of Bureau of Land Management Land on the Western Slope of the Colorado Rocky Mountains (97-17), Cultural Resource Inventory - UBRA Project 1996 Delta, Gunnison, Montrose, Ouray, Saguache, and San Miguel Counties, Colorado
SCADA Clipper Re-Reg Pond	MC.LM.R135	1996	Sullivan, Mark E. and Joseph Howell	A Cultural Resource Survey of Approximately 4,155 Acres of Bureau of Land Management Land on the Western Slope of the Colorado Rocky Mountains (97-17), Cultural Resource Inventory - UBRA Project 1996 Delta, Gunnison, Montrose, Ouray, Saguache, and San Miguel Counties, Colorado

Table 5.6-5. Newly Recorded Cultural Resources in the Crawford Subwatershed.

Project Element	Site Number	Site Type	Site Name/ Description	NRHP Eligibility
Grandview 1, Grandview 2, Grandview-Aspen SCADA	5DT1780.6	Irrigation Ditch	Grand View Ditch	Needs Data, Suporting
SCADA Smith Fork Feeder	5DT2093.1	Irrigation Ditch	Smith Fork Feeder Canal	Needs Data, Supporting
Upper Needle Rock Ditch Improvement, SCADA Needle Rock	5DT2094.1	Irrigation Ditch	Needle Rock Ditch	Needs Data, Supporting
Grandview 1, Grandview 2	5DT2095.1	Historic Road	Fruitland Mesa Road	Needs Data, Supporting
Grandview 1	5DT2096	Historic Structure	Historic Barn	Needs Data

Uncompahgre

The four project-specific components which are proposed within the Uncompahgre subwatershed and are analyzed in full in this Plan-EA consist of the SCADA East Canal, the SCADA Selig Canal, the SCADA

Loutsenhizer Canal, and the SCADA Radio Tower on Flat Top. No previous cultural resource surveys or sites are associated with SCADA East Canal. The associated sites and surveys are listed in **Table 5.6-6** and **Table 5.6-7**. The Uncompahgre project components were surveyed for cultural resources in July 2017. The survey recorded three new segments of linear sites. These consist of one segment of the Selig Canal, one segment of the East Canal and one segment of the Loutsenhizer Canal. NRHP eligibility recommendations are listed in **Table 5.6-8**.

Table 5.6-6. Previous Cultural Resource Data Intersecting Projects in the Uncompahgre Subwatershed.

Project Element	Survey ID	Date	Author	Report Title
SCADA Selig Canal	MC.R.R36	1981	Collins, Susan M., Maurice L. Albertson, R. Thomas Euler, Lewis K. Hyer and John Earl Ingmanson	Survey of Cultural Resources in the Lower Gunnison Basin Unit, Colorado River Water Quality Improvement Program Delta and Montrose Counties, Colorado
SCADA Loutsenhizer Canal	MC.R.R36	1981	Collins, Susan M., Maurice L. Albertson, R. Thomas Euler, Lewis K. Hyer and John Earl Ingmanson	Survey of Cultural Resources in the Lower Gunnison Basin Unit, Colorado River Water Quality Improvement Program Delta and Montrose Counties, Colorado
SCADA Radio Tower on Flat Top	MN.LM.NR2	1984	Rupp, Frank G.	Mountain States Telephone and Telegraph Company, Flat Top Area Right of Way
SCADA Radio Tower on Flat Top	MN.LM.NR156	1993	Fike, Richard E.	New Vector Communication Site and DMEA Power Line Access (94UB009)

Table 5.6-7. Previously Recorded Cultural Resources Intersecting Projects in the Uncompahgre Subwatershed.

Project Element	Site Number	Site Type	Site Name/ Description	NRHP Eligibility	Assessment Date
SCADA – East Canal	5MN1856	Irrigation Ditch	East Canal	Officially Eligible	1981
SCADA – Selig Canal	5MN1854	Irrigation Ditch	Selig Canal	Officially Eligible	2004
SCADA – Loutsenhizer Canal	5MN2035	Irrigation Ditch	Loutsenhizer Canal	Officially Not Eligible	2008

Table 5.6-8. Newly Recorded Cultural Resources in the Uncompahgre Subwatershed.

Project Element	Site Number	Site Type	Site Name/ Description	NRHP Eligibility
SCADA Selig Canal	5MN1854.5	Irrigation Ditch	Selig Canal	Officially Eligible, Supporting
SCADA East Canal	5MN1856.2	Irrigation Ditch	East Canal	Officially Eligible, Supporting
SCADA Loutsenhizer	5MN2035.3	Irrigation Ditch	Loutsenhizer Canal	Officially Eligible, Supporting

Bostwick Park

Two project components are proposed within the Bostwick Park subwatershed. These consist of the West Lateral Piping (Phase 1), and the SCADA on Cimarron Canal. No previous cultural resource surveys or sites are located within the project area for the West Lateral Piping (Phase 1), or the SCADA on Cimarron Canal. The Bostwick Park project components were surveyed for cultural resources in July 2017. The survey recorded three new segments of linear sites. These consist of one segment of the Cimarron Canal, one segment of the West Lateral, and one segment of Bostwick Park Road. NRHP eligibility recommendations are presented in **Table 5.6-9**. Converting the segment of West Lateral from an open ditch to a pipeline would be an adverse effect on the site. Mitigation of the adverse effect would require that the consulting parties enter into an MOA which specifies a method of treatment for the adverse effects that is acceptable to all of the consulting parties. The MOA for this undertaking has been fully executed and can be found in **Appendix A**.

Table 5.6-9. Newly Recorded Cultural Resources in the Bostwick Park Subwatershed.

Project Element	Site Number	Site Type	Site Name/ Description	NRHP Eligibility
SCADA Cimarron Canal Diversion	5GN6371.1	Irrigation Ditch	Cimarron Canal	Needs Data, Supporting
West Lateral	5MN10895.1	Irrigation Ditch	West Lateral	Needs Data, Supporting
West Lateral	5MN10896.1	Historic Road	Bostwick Park Road	Needs Data, Supporting

5.6.1.1.3 Compliance and Best Management Practices

Pursuant to 36 CFR Part 800 of the NHPA (1966, as amended in 2000), and the regulations of the Advisory Council on Historic Preservation implementing Section 106 of the NHPA (54 U.S.C. 306108), federal agencies must take into account the potential effect of an undertaking on “historic properties,” which refers to cultural resources listed in, or eligible for listing in the NRHP.

The recommendations of eligibility for all newly recorded and previously recorded sites contained within this report required consultation with the Colorado State Historic Preservation Office (SHPO), and a determination of effects were agreed upon by the consulting parties. As mentioned above, any finding of “historic properties adversely affected” required that the consulting parties enter into an MOA requiring a method of treatment for the adverse effect that is acceptable to all of the consulting parties, and the MOA would stipulate that the treatment would be successfully completed prior to the initiation of project construction. The MOA for this undertaking has been fully executed and can be found in **Appendix A**.

During construction activities, the SHPO or the BLM cultural resources staff, as applicable, will be notified if there are any inadvertent historic discoveries during construction, in accordance with applicable guidance and law.

5.6.1.2 No Action

If the "No Action" alternative is selected, there would be no requirement for consideration of cultural resources within the project area.

5.6.1.3 Cumulative Impacts

Due to both the nature of the cultural resources either known to be within the project area or predicted to be within the project area, it is assumed that adverse cumulative effects to historic properties would be related to the direct effects associated with the construction of the project. These direct effects would likely require treatment, and ultimately the NRHP eligibility of the cultural resources adversely affected by the project would be reevaluated as not eligible for inclusion in the NRHP. Any cultural resources not eligible for inclusion in the NRHP cannot be adversely affected and no further work would be necessary.

5.6.2 Land Use and Recreation

5.6.2.1 Proposed Action

Overall, the Proposed Action would benefit agricultural land use by increasing water use efficiency and soil health. The project would not result in any changes from one type of land use to another. Installation of enclosed pipes would result in temporary disturbances to land during construction. This impact would be negligible as construction activities would only occur outside of the growing season.

Implementing high efficiency irrigation systems could divert less water than current practices, and reduce groundwater deep percolation, which contributes to increased salinity and selenium levels in the downstream waters. Incorporating 'smart' headgate control structures and SCADA systems would improve operation efficiency through remote monitoring and control and could minimize unnecessary over delivery, loss of water due to management spills, and create additional available water supplies to extend the growing season or to respond to other resource needs (River District 2015). By conserving water and decreasing salinity and selenium, agricultural production may improve.

The analysis of impacts on land use and recreation is qualitative rather than quantitative, and professional judgment was used to reach reasonable conclusions as to the intensity, duration, and type of potential impact. Impacts could be temporary or short-term (e.g., delays and inconvenience caused by construction activities) or long-term (e.g., loss of recreation activity).

5.6.2.1.1 Subwatershed Improvements

Under the Proposed Action, no land ownerships would change and no subdivision of public land would occur. Therefore, no cadastral surveys are required for proposed subwatershed improvements. The overall amount of irrigated land in each subwatershed would not be impacted by the Proposed Action, and grazing allotments and easements on public lands would not be impacted. No designated Wilderness Areas or Wilderness Study Areas are located within the subwatersheds; therefore, no such lands would be impacted by subwatershed improvements.

Should any subwatershed improvements in the future be located within the two BLM Areas of Environmental Concern that are located within the subwatersheds (the Needle Rock Outstanding Natural Area within the Crawford Subwatershed and the Fairview Research Natural Area within the

Uncompahgre subwatershed), coordination with the BLM would need to occur to ensure that appropriate BMPs and compliance measures are followed.

Negligible and minor short- and long-term impacts to land use and recreational resources could occur under the Proposed Action. Short-term indirect adverse impacts may occur during construction due to increased traffic. These impacts would be short-term and negligible and because construction would occur during the winter season, there would be low potential to discourage visitors from the area. During construction, road and recreational path closures and/or detours may impact some limited recreational activities but these impacts are expected to be short-term and minor. Long-term, beneficial and minor impacts could occur from the removal of the open canals which could pose a hazard for recreational land users. However, no impacts to recreation user days, and no long-term impacts to land use or recreation are anticipated to occur.

5.6.2.1.2 Project-specific Components

Negligible and minor indirect short-term impacts to recreation could occur during construction of the project-specific components under the Proposed Action, as discussed under **Section 5.6.2.1.1**. None of the proposed project components would be located within the two BLM Areas of Environmental Concern that are located within the subwatersheds, and no impacts to recreation user days, and no long-term impacts to land use or recreation are anticipated to occur.

5.6.2.1.3 Compliance and Best Management Practices

BMPs to reduce impacts to land use and recreational resources in the project area during construction could include:

- Avoiding any needed lane closures during peak travel periods including weekends and special events to the extent practicable.
- Communicating roadway and work zone conditions to travelers via websites, prerecorded messages, and other similar mechanisms.

5.6.2.2 No Action

The no action alternative would not change land use or impact recreation in the project area.

5.6.2.3 Cumulative Impacts

Overall, the proposed project would not substantially impact land use. Crop production could increase on agricultural lands in the project area, which would be a cumulatively beneficial impact to land use as agricultural land is increasingly developed into residential and urban areas within the subwatersheds.

5.6.3 Scenic Beauty and Visual Resources

Impacts on scenic beauty and visual resources occur when project activities visually contrast with existing settings. Beneficial impacts are possible if project activities remove obtrusive or contrasting elements, such as the stabilization and reclamation of an eroded slope. Adverse impacts occur when visually pleasing elements are removed or incongruent elements are introduced. The BLM uses a Visual Contrast Rating matrix to compare the elements of form, line, color and texture and determine the degree of contrast that would result from a proposed action. These levels of contrast are:

- None – the element contrast is not visible or perceived;
- Weak – the element contrast can be seen but does not attract attention;
- Moderate – the element contrast begins to attract attention and begins to dominate the characteristic landscape; and
- Strong – the element contrast demands attention, will not be overlooked, and is dominant on the landscape (BLM 1986b).

Project visibility and viewer sensitivity influence how contrasting project activities are seen and experienced, and therefore influence the magnitude of effect. For example, projects that would have high contrast but are surrounded by dense vegetation may have less impact. BMPs minimize visual impacts by reducing visual contrast.

5.6.3.1 Proposed Action

5.6.3.1.1 Subwatershed Improvements

The subwatershed improvements under the Proposed Action would have both beneficial and adverse effects on scenic beauty and visual resources.

Canal conversions would impact scenic beauty and visual resources by removing water features from the landscape and by creating visual contrast during construction activities. On-farm upgrades and soil practices are unlikely to impact scenic beauty and visual resources. The installation of SCADA equipment could impact scenic beauty and visual resources; however, the level of impact would vary based on local settings.

Water typically has high visual weight, or a dominating effect, in a landscape due to characteristics of movement, reflectivity, and color that naturally draw attention. However, water within open canals and ditches tends to have lower visual weight than natural water features. Canal banks are often maintained and kept clear of vegetation that may otherwise make the feature more prominent. Water levels vary seasonally and the water may only be visible certain times of year or from certain positions relative to the canal or ditch. Irrigation waters tend to flow evenly without the rocks, bends, ripples, or waves that give natural water bodies their dynamic character. On the other hand, residents in the subwatersheds may have a cultural attachment to canal waters, and their relationship to agriculture, that increase the importance of water as a visual element.

As a whole, the level of contrast from canal conversions would be weak to none and would be expected to have a minor to negligible impact. Unless parallel or perpendicular to roads, canals are generally visible only at a distance where they are seen as line features that accentuate existing lines created by field edges, especially where they abut natural landscapes. Further, background landforms are often dominant features of viewsheds within the subwatersheds. These massive landforms draw the eye upward and outward, resulting in a focus on the overall view rather than individual details. Short-term impacts on scenic quality would occur during construction and until disturbed areas are replanted with crops or native vegetation, as appropriate. Movement and bright colors often associated with construction equipment would tend to draw attention during the construction period. Dust from construction activities could cause haze and diminish overall scenic quality. Ground disturbance would expose soils, which would contrast with

adjacent vegetated areas. BMPs such as dust abatement and revegetation would minimize the magnitude and duration of construction-related impacts. BMPs are discussed below in **Section 5.6.3.1.3**. Project-specific canal conversions are discussed below in **Section 5.6.3.1.2**.

On-farm upgrades and implementation of soil health practices would not be expected to impact scenic beauty and visual resources, although minor adverse and beneficial impacts are possible. On-farm upgrades would consist of high efficiency irrigation systems, including micro-irrigation or sprinkler systems. Micro-irrigation systems would generally not be visible; however, sprinkler systems could be visible and could draw attention if they are large or constructed with highly reflective materials or contrasting colors. All on-farm upgrades would be consistent with the agricultural character of the subwatersheds and the impact would be negligible. Implementation of soil health practices generally would not affect scenic beauty, except to the extent they increase crop health and diversity, which would be a beneficial impact. Agricultural landscapes derive visual quality in part from the health and vibrancy of pastures and crop fields, and also in part from the patchwork appearance that arises from variations in color and textures from field to field. These variations are caused by differences in crop types, heights, growth stage, and arrangement. Cover cropping would be an example of a soil health practice that could increase visual quality by replacing swaths of bare soil with plantings that increase the diversity of textures in the overall landscape.

The installation of SCADA systems would create some visual contrast, with the degree of contrast and dependent on local conditions. The SCADA equipment would consist of a panel, site enclosure, meters, solar power, and telemetry equipment. Telemetry stations, consisting of radio modems or satellite terminals, would be required to collect SCADA communications and transmit them to monitoring stations. Generally, the SCADA equipment would be installed within modified landscapes that are defined by residential and agricultural buildings, structures, and equipment. Although telemetry equipment could include antennae 2-3 meters in height, the vertical line of the antennae would be consistent with existing vertical lines created by utility poles, fences, street signage, and upright vegetation. In some areas, the equipment would be obscured from view by vegetation or topography. Where visible, the level of contrast would be weak and would not be expected to dominate views. Telemetry stations and monitoring stations could present increased visual contrast and may require additional visual impact assessment unless they are collocated with existing facilities. BMPs, such as the use of muted or matching colors, would reduce contrast and visual impact. With implementation of BMPs, installation of SCADA equipment would have a minor to negligible impact. Project-specific SCADA installations are discussed in **Section 5.6.3.1.2**.

5.6.3.1.2 Project-Specific Components

North Fork

Project-specific components in the North Fork subwatershed consist of the Fire Mountain Canal Piping Project and installation of SCADA equipment at up to three locations. As described in **Section 3**, the visual environment in the North Fork subwatershed varies from the constricted views of pastoral agriculture and mountain scenery around Paonia to broader views dominated by agricultural vegetative patterns and built features around and west of Hotchkiss. Site-specific impacts for the Fire Mountain Canal Piping Project will be discussed in more detail during Reclamation's NEPA process; however, the impacts would be expected to be consistent with those described for piping of laterals above in **Section 5.6.3.1.1**.

Visual impacts from the installation of SCADA systems would be consistent with the impacts described in **Section 5.6.3.1.1**. The Patterson Lateral SCADA system would be in a heavily modified agricultural area on Rogers Mesa north of Lazear and would have little to no visual contrast with existing infrastructure and agricultural structures and equipment. Two SCADA systems would be along the Fire Mountain Canal at Leroux Creek on the northern edge of Rogers Mesa. These systems would be in a more natural environment but would generally not be visible due to terrain and vegetation. Where visible, the SCADA systems would not be expected to attract attention or diminish views. BMPs would further reduce visibility of these SCADA systems.

Crawford

Project-specific components in the Crawford subwatershed consist of the Needle Rock Diversion, Grandview Phase 1, the Clipper Re-Reg Pond, and installation of SCADA systems at up to four locations. As described in **Section 3**, the subwatershed contains expansive views of gently rolling terrain and feature landforms and water features that draw attention, including Young's Peak, Needle Rock, and Crawford Reservoir. Consistent with the description in **Section 5.6.3.1.1**, impacts on scenic beauty and visual resources from the Needle Rock Diversion and Grandview Phase 1 projects would be minor to negligible. The Needle Rock Diversion project would occur adjacent to Smith Fork and in proximity to Needle Rock, a prominent geological feature. The Needle Rock headgate would be replaced, a SCADA system installed at the headgate, and 0.166 miles of open ditch would be converted to enclosed and pressurized pipeline. The headgate replacement and piping of this lateral would not be expected to have a long-term visual impact. The lateral is in a densely vegetated area along Smith Fork and is largely obscured from view. Visual impacts associated with SCADA equipment are discussed below. The Grandview Phase 1 project would pipe 6,700 feet of open ditch and would include a new division/screening structure. This section of canal is trenched on the north slope above Smith Fork. The surrounding landscape is predominately natural with juniper scrub vegetation with occasional roads and buildings. Although the large canal has moderate to high visibility, it is not a dominate feature of the landscape. The transition to underground pipe would be noticeable but would not draw attention or affect scenic quality. Construction activities at both projects would be moderately to highly visible and would have a temporary impact on scenic beauty.

The Clipper Re-Reg Pond would have moderate to strong visual contrast where it is visible, due to the tall embankment and creation of a water body. As discussed in **Section 5.6.3.1.1**, water tends to attract attention due to movement, reflectivity, and color contrast. Though the re-reg facility would have moderate to strong contrast, the facility is remote and surrounding rugged terrain would limit visibility. Therefore, the overall visual impact would be minor and would be both adverse and beneficial, as some aspects would increase visual contrast where as other elements of the project would improve scenic quality.

SCADA equipment would be installed at four locations in the Crawford subwatershed: the Needle Rock Diversion, Smith Fork Feeder, Grandview-Aspen Canal, and Clipper Re-Reg Pond. The Needle Rock Diversion and Smith Fork Feeder SCADA equipment would not be visible from most locations due to dense vegetation along the Smith Fork. The SCADA equipment on the Grandview Canal would be visible primarily from locations south of Smith Fork. Equipment at this location would be within largely natural landscapes and would present weak visual contrast that would be noticeable, but would not attract attention or diminish scenic quality. The Clipper Re-Reg Pond is similarly in a natural landscape; however, the location is remote with limited visibility and the installation of SCADA equipment would be

expected to have a negligible impact on scenic beauty. Use of BMPs would reduce visibility of the SCADA systems in the Crawford subwatershed and further reduce impacts on scenic beauty.

Uncompahgre

Project-specific components in the Uncompahgre subwatershed include the Phase 9 Piping Project (GB and GB-A Laterals) and installation of SCADA equipment at up to four locations: East Canal, Selig Canal, Loutsenhizer Canal, and Flat Top Mesa. As described in **Section 3**, the Uncompahgre subwatershed is characterized by agricultural vegetation patterns integrated with built features such as buildings, roads, and utility lines arranged primarily in geometric, gridded patterns. Site-specific impacts for the Fire Mountain Canal Piping Project will be discussed in more detail during Reclamation's NEPA process; however, the impacts would be expected to be consistent with those described for piping of laterals above in **Section 5.6.3.1.1**. Installation of SCADA equipment at the East Canal, Selig Canal, and Loutsenhizer Canal would have negligible impact, as the equipment would be located in a modified landscape and would not be expected to contrast with surrounding features or draw attention. A SCADA Radio Tower would be installed on Flat Top mesa. This tall radio tower would be highly visible; however, the tower would be collocated with existing radio towers on Flat Top mesa and would have a minor impact on scenic beauty. Use of BMPs would reduce the visual impacts of the SCADA systems, especially in areas where equipment has increased visibility.

Bostwick Park

Project-specific components in the Bostwick Park subwatershed include the West Lateral Phase 1 canal conversion and installation of SCADA systems at the Cimarron Canal Diversion. As described in **Section 3**, the visual environment in Bostwick Park varies based on location within the subwatershed. In Bostwick Park proper, the visual environment is strongly pastoral with broad views to the south and southwest and complex hills and canyon lands to the north and northeast. Visual impacts from the West Lateral Phase 1 project would be consistent with the description in **Section 5.6.3.1.1** for canal conversions. The route of the Phase 1 segment parallels Bostwick Park Road and where not currently piped is visible as a road-side ditch. The canal has little visual weight and limited visibility unless a viewer is on the adjacent road. Conversion of the canal would have a negligible long term impact. Temporary impacts would occur during construction activities.

Installation of the SCADA system at the Cimarron Canal Diversion would have a minor impact on scenic beauty and visual resources in the Bostwick Park subwatershed. The SCADA system would be adjacent to the Cimarron River in a predominately natural landscape where the Cimarron River is a feature element that naturally draws attention. The SCADA equipment would be screened from most views by dense vegetation along the river. However, the equipment would be noticeable where visible and could detract from scenic quality. Use of visual BMPs would reduce visual contrast from the SCADA equipment.

5.6.3.1.3 Compliance and Best Management Practices

Impacts on scenic quality and visual resources can be minimized through implementation of construction-related and visual resource-specific BMPs. Construction-related BMPs include: minimization of ground disturbance; restoration of disturbed surfaces; dust control/abatement; and control of invasive or non-native plants. Ground disturbance can create visual contrast when light-colored soil and subsoil is exposed that contrasts with adjacent colors. These BMPs would minimize ground disturbance and ensure restoration of the visual environment to existing conditions. Dust abatement BMPs prevent atmospheric

dust conditions that could otherwise impair views. Visual resource-specific BMPs consist of using non-reflective materials, color matching, and the use of screening. These BMPs are important for reducing visual contrast. Reflective materials and contrasting colors are highly visible and attract attention. The use of non-reflective or matte finishes that are tinted to an appropriate color based on the surroundings for SCADA equipment would reduce visual impacts. Screening, such as vegetative plantings, can help obscure built features and may be appropriate in natural landscapes.

5.6.3.2 No Action

The no action alternative would have no impact on scenic beauty or visual resources. Canals would not be converted to buried pipelines and water features would remain visible where they can be seen from roads and other viewing locations. SCADA systems would not be installed. In the North Fork subwatershed, the Wolf Park Siphon and the Wolf Park Re-Reg facility would not be built and would not have associated minor adverse and beneficial impacts on scenic quality. Long-term adverse impacts could occur if salinity were to continue to build up in agricultural soils and affect agricultural productivity and the visual quality of agricultural vegetation.

5.6.3.3 Cumulative Impacts

The Proposed Action would not be expected to contribute to cumulative impacts on scenic beauty and visual resources. Impacts from the Proposed Action would be negligible to minor. Project components would primarily occur in modified landscapes and visual contrast would be weak to none. Visual elements of the Proposed Action are consistent with the dominant agricultural quality in the subwatersheds.

5.6.4 Socioeconomics

5.6.4.1 Proposed Action

5.6.4.1.1 Demographic Effects

There would be no direct, indirect or cumulative impacts to population and demographic trends in the counties or subwatersheds from the Proposed Action. Implementation of the project would provide direct and indirect effects on employment and farm production. Short-term economic benefits would occur due to additional employment within the subwatersheds during the off-season construction of the irrigation projects. There could be long-term adverse and negligible economic impacts from reduced operations and maintenance demands, but no loss of permanent jobs is anticipated to occur.

Implementation of the projects in each sub-watershed would improve water quality and irrigation efficiency reducing farm operations costs. Farm net revenues would increase as a result of reduced farm operating costs. The findings are presented for each subwatershed below in **Table 5.6-10**.

5.6.4.1.2 National Economic Development Benefits

A NED benefit-cost analysis (BCA) has been performed to evaluate the benefits of the Proposed Action. The evaluation includes identification of the Without Project economic damages, and estimation of the NED benefits of alternatives to the identified problems. The analysis uses NRCS guidelines for the evaluation of NED benefits as outlined in the Economic and Environmental Principles and Guidelines for

Water and Related Land Resources Implementation Studies, and the NRCS Natural Resources Economics Handbook.

Economic benefits and impacts were calculated based on the expected effects of the Proposed Action and the specific project components. For the Lower Gunnison Project, the Proposed Action includes optimization techniques for irrigation water conveyance, piping of canals and laterals, and installation of SCADA systems. Conversion of the unlined canals to pipelines would reduce salinity seepage and reduce regular operations and maintenance for the canal operators. Additionally, implementation of SCADA systems would reduce travel time to sites for regular monitoring. Finally, a cost avoidance benefit would be realized from avoiding expenditure of Reclamation federal monies that would need to be allocated in order for the No Action Alternative to be implemented. All economic benefits calculated assumed that the improvements to be fully developed by 2019.

All economic damages, benefits and costs use the base fiscal year (FY) 2017 (October 2016). Benefits, and costs have been discounted and converted to an average annual, following the FY 2017 federal interest rate of 2.875 percent (USACE 2017) over a maximum allowable 50 year period of analysis (U.S. Water Resources Council 1983).

The average annual NED costs of the project components are shown in **Table 5.6-10**.

Table 5.6-10. Estimated Average Annual NED Costs of Proposed Action (FY 2017 Dollars, 2.875% Discount Factor).

Alternative	Subwatershed	Land Treatment	Project Outlays	Total Average Annual Cost
No Action	North Fork	Canal Piping Installation	$4,783,437	$116,996
	Crawford	Canal Piping Installation	$1,146,457	$28,041
	Uncompahgre	Canal Piping Installation	$7,211,791	$176,390
	Bostwick Park	Canal Piping Installation	$644,624	$15,767
	Total		$13,786,308	$337,193
Action Alternative	North Fork	Canal Piping Installation	$4,783,437	$181,522
		SCADA Implementation	$150,426	$5,708
	Crawford	Canal Piping Installation	$1,146,457	$43,506
		SCADA Implementation	$103,123	$3,913
	Uncompahgre	Canal Piping Installation	$7,211,791	$273,674
		SCADA Implementation	$322,700	$12,246
	Bostwick Park	Canal Piping Installation	$644,624	$24,462
		SCADA implementation	$134,380	$5,099
	Total		$14,496,937	$550,131

The cost avoidance benefit represents the federal monies that would need to be allocated in order for the No Action Alternative to be implemented.

Salinity benefits are in the form of avoided economic damages resulting from downstream controls necessary to reduce salinity. These benefits would be realized through the conversion of canals to pipelines thereby reducing salinity seepage. A value of $271 per ton of salt saved was identified for the Colorado River Basin from Reclamation at the downstream dams (Parker and Imperial Reservoirs) based on modeling results from the Colorado River Basin Economic Salinity Damage Model (Reclamation, 2017). This value was used along with the salinity seepage savings associated with conversion of the canals to pipeline. These benefits would not be realized under the No Action/Future Without Federal Project.

The canal operators have regular operations and maintenance costs associated with the canals to maintain their operability during the irrigation season. Maintenance items include cleaning and trash removal; spring burning, mowing, and sparying of vegetation; rodent controls; and miscellaneous repairs. These costs include materials, labor, and equipment costs; as well as travel time to the canals and project management. These costs would be avoided with the conversion to pipelines. Estimates of annual Operations and Maintenance costs were provided by the canal operators.

Finally, implementation of SCADA systems would provide operational savings to canal operators by reducing daily trips to monitoring sights. These costs include the travel time to get to and from monitoring sites. North Fork provided an estimate of trips and travel time to and from proposed SCADA locations. To estimate the value of time, USACE Appendix D Amendment #1 of ER 1105-2-100, Table D- 4: Value of Time Saved by Trip Length and Purpose was referenced. For the value of time (VOT), all of the work related trips shown were greater than 15 minutes in length, for a reference value of $8.33 in 2006 dollars. This value was adjusted to FY 2017 using a VOT of $10.71. The travel time information was combined with an hourly VOT to estimate the cost of trips. For the other canals, benefits were approximated using the North Fork information and an assumption of 3 new SCADA locations.

The summary of the estimated average annual NED benefits for the Lower Gunnison Watershed are presented below in **Table 5.6-11**. The Proposed Action provides $1.3 million in average annual benefits from avoided salinity loading, operations and maintenance savings, avoided costs, benefits to producers, and reduced travel costs.

Table 5.6-11. Estimated Average Annual NED Benefits of Proposed Action (FY 2017 Dollars, 2.875% Discount Factor).

Subwatershed	Land Treatment	Benefit Category	Average annual benefit		
			Agriculture-Related	Nonagricultural-Related	Total
North Fork	Piping	Avoided Salinity Reduction		$338,566	$338,566
		O&M Savings - Piping		$31,549	$31,549
		Cost Avoidance		$116,996	$116,996
		Producer Benefits	$8,772		$8,772
		Subtotal	$8,772	$487,111	$495,883
	SCADA	Reduced Travel Costs - SCADA		$24,195	$24,195
		Producer Benefits	$6,352		$6,352
		Subtotal	$6,352	$24,195	$30,547
		Total Subwatershed	$15,124	$511,306	$526,429
Crawford	Piping	Avoided Salinity Reduction		$23,545	$23,545
		O&M Savings - Piping		$4,173	
		Cost Avoidance		$28,041	$28,041
		Producer Benefits	$4,070		$4,070
		Subtotal	$4,070	$55,758	$59,829
	SCADA	Reduced Travel Costs - SCADA		$14,517	
		Producer Benefits	$7,622		
		Subtotal	$7,622	$14,517	
		Total Subwatershed	$11,693	$70,275	$81,968
Uncompahgre	Piping	Avoided Salinity Reduction		$323,111	$323,111
		O&M Savings - Piping		$1,391	$1,391
		Cost Avoidance		$176,390	$176,390
		Producer Benefits	$1,177		$1,177
		Subtotal	$1,177	$500,892	$502,069
	SCADA	Reduced Travel Costs - SCADA		$14,517	$14,517
		Producer Benefits	$88,504		$88,504
		Subtotal	$88,504	$14,517	$103,021
		Total Subwatershed	$89,681	$515,409	$605,090

Table 5.6-11. Estimated Average Annual NED Benefits of Proposed Action (FY 2017 Dollars, 2.875% Discount Factor).

Subwatershed	Land Treatment	Benefit Category	Average annual benefit		
			Agriculture-Related	Nonagricultural-Related	Total
Bostwick Park	Piping	Avoided Salinity Reduction		$34,533	$34,533
		O&M Savings - Piping		$601	$601
		Cost Avoidance		$15,767	$15,767
		Producer Benefits	$368		$368
		Subtotal	$368	$50,901	$51,269
	SCADA	Reduced Travel Costs - SCADA		$14,517	$14,517
		Producer Benefits	$8,469		$8,469
		Subtotal	$8,469	$14,517	$22,986
		Total Subwatershed	$8,838	$65,417	$74,255
		Grand Total	**$125,335**	**$1,162,407**	**$1,287,742**

Table 5.6-12 summarizes the average annual NED benefits and costs for the Proposed Action in the Lower Gunnison Watershed. Based on the values presented in **Table 5.6-12**, all of the increments of the proposed project components are economically justified for funding with the PL 83-566 program. Under the No Action alternative, only the avoided salinity, and producer benefits would be realized. Those benefits would not be realized until Reclamation funding is available to successfully install a fully complete and operational pipeline.

Table 5.6-12. Comparison of NED Benefits and Costs (FY 2017 Dollars, 2.875% Discount Factor).

Subwatershed	Land Treatment	Total Benefit, average annual	Total Average Annual Cost	NED Metrics	
				Benefit-Cost Ratio	Net Benefits
North Fork	Piping	$495,883	$178,986	2.8	$316,897
	SCADA	$30,547	$5,629	5.4	$24,918
Crawford	Piping	$59,829	$42,898	1.4	$16,931
	SCADA	$22,139	$3,859	5.7	$18,280
Uncompahgre	Piping	$502,069	$269,850	1.9	$232,219
	SCADA	$103,021	$12,075	8.5	$90,946
Bostwick Park	Piping	$51,269	$24,120	2.1	$27,148
	SCADA	$22,986	$5,028	4.6	$17,958
	Total	**$1,287,742**	**$542,444**	2.4	**$745,298**

5.6.4.2 No Action

Under the No Action alternative, only the pipeline would be implemented. As a result, none of the short- or long-term socioeconomic beneficial impacts associated with the SCADA systems of the Proposed Action would be realized. Additionally, Reclamation does not have a timeline for the availability of funds to complete the pipeline systems. As such, the benefits such as salinity and selenium seepage reductions would likely be substantially delayed.

5.6.4.3 Cumulative Impacts

The Proposed Action would contribute minor, beneficial cumulative impacts to area employment and income in the subwatersheds, as a result of increased crop productivity and the anticipated damage reduction benefits presented in **Table 5.6-7**. However, overall socioeconomic trends (population, demographics, and poverty) in the counties or subwatersheds that comprise the project area are not anticipated to result in cumulative impacts.

Chapter 6 – Consultation, Coordination and Public Participation

6.1 Public Participation

During the scoping period, seven comment letters were collected or received regarding the project. Five comment letters were received via email and two comment letters were provided to NRCS at the scoping meeting. Additionally, two inquiries into project materials were received. The 30-day scoping period for this project began on November 18, 2016, and closed on December 19, 2016. The scoping meeting was held December 1, 2016, in Montrose, Colorado. The scoping process and scoping comments are summarized in **Section 2.1.1**.

During the Draft Plan-EA review period, four comment letters were collected or received regarding the project. Three comment letters were received via email and one comment letter were provided to NRCS at the public meeting. The 30-day review and comment period for the Draft Plan-EA began on July 5, 2017 and closed on August 7, 2017. The Draft Plan-EA public review meeting was held on Monday, July 17, 2017, in Montrose, Colorado. The Draft Plan-EA review process and comments are summarized in **Section 2.1.2**.

6.2 Agency Coordination

Three Cooperating Agencies have provided input into this Plan-EA; they are the BLM UFO, Reclamation, and the River District. Additionally, coordinaton or consultation has been completed with the following agencies:

- Coordination with USACE was conducted to evaluate the construction and operation of the Clipper re-reg pond in relation to the CWA. Based on email communication with USACE, construction of a re-reg pond, as proposed, is an activity that would normally qualify for a CWA 404(f) exemption (33 CFR Part 323.4(a)(3)) (Morse 2017).

- Consultation with SHPO per Section 106 of the NHPA was completed. A MOA between invited consulting parties, SHPO and NRCS was developed to address adverse impacts to cultural reources.

- Consultation with USFWS per Section 7 of the ESA was completed. A Biological Assessment was prepared and submittal to the USFWS. In a Biological Opinion, the USFWS concurred with the affects determinations that threatened or endangered species in the subwatersheds are not likely to be adversely affected by the Proposed Action, except through water depletions on four endangered Colorado River fish. These water depletions have been fully addressed in Recovery Agreements prepared under the Recovery Implementation Program for Endangered Fish Species in the Upper Colorado River Basin. The following coordination and technical consultations where also conducted in support of the development of the Biological Assessment:

    - Mark Brennan, USFWS Biologist, Western Colorado Ecological Services Field Office regarding Gunnison sage-grouse and its designated critical habitat, and Mexican spotted owl.

- Nathan Seward, Wildlife Conservation Biologist, CPW, Area 16, regarding Gunnison sage-grouse.
- Ken Holsinger, Botanist, Uncompahgre Field Office, BLM, regarding Colorado hookless cactus, clay-loving wild buckwheat, and Gunnison sage-grouse.
- Kurt Broderdorp, USFWS Biologist, Western Colorado Ecological Services Field Office, regarding lynx, wolverine, and the Recovery Program for the Colorado River endangered fishes.
- Creed Clayton, USFWS Biologist, Western Colorado Ecological Services Field Office, regarding western yellow-billed cuckoo and proposed critical habitat, as well as bonytail chub, Colorado pikeminnow, humpback chub, razorback sucker and designated critical habitat
- Aimee Crittenden, USFWS Biologist, Western Colorado Ecological Services Field Office, regarding Colorado hookless cactus.
- Dara Taylor, Energy Botanist, USFWS Biologist, Western Colorado Ecological Services Field Office, regarding clay-loving wild buckwheat.
- Terry Ireland, USFWS Biologist, Western Colorado Ecological Services Field Office, regarding western yellow-billed cuckoo and proposed critical habitat.

6.3 Tribal Coordination

In accordance with EO 13175, NRCS is responsible for assessing the impacts of activities, considering tribal interests, and assuring that tribal interests are considered in conjunction with federal activities and undertakings. NRCS recognizes that tribal governments are sovereign nations located within and dependent upon the United States. NRCS has a responsibility to help fulfill the U.S. government's responsibilities toward tribes when considering actions that may affect tribal rights, resources, and assets.

Tribal consultation was conducted in accordance with the NHPA of 1966 and EO 13175 to maintain the NRCS's government-to-government relationship between Native villages and tribes via a letter to two Indian tribes: the Ute Mountain Ute Tribe and the Southern Ute Indian Tribe, requesting input and notifying them of the scoping process. The Ute Mountain Ute tribe responded and requested that they be consulted during the planning phase of the Lower Gunnison Project. Both the Ute Mountain Ute Tribe and the Southern Ute Indian Tribe were provided a copy of the Cultural Resources Survey Report for this project and were invited to be consulting parties on the MOA.

Chapter 7 – The Preferred Alternative

7.1 Selection of the Preferred Alternative

The Preferred Alternative for the project is the Proposed Alternative and is based on the ability of the alternative to meet the purpose and need for the project and provide the most beneficial impacts to environmental and social resources, as detailed in Chapter 5 of this Plan-EA.

7.2 Rationale for the Preferred Alternative

The Lower Gunnison Project is a large agricultural water efficiency project focused on the Gunnison River and its tributaries. The project addresses natural resource concerns by implementing a locally coordinated comprehensive strategy of maximizing agricultural water use efficiency through system-wide optimization techniques for irrigation water conveyance, including the construction of monitored, automated, re-regulation structures; modernization of aging irrigation water delivery infrastructure including the construction of enclosed canals and laterals; and, installation of SCADA systems.

NRCS RCPP funding can be applied to water efficiency upgrades throughout four subwatersheds in the Lower Gunnison River Basin (the North Fork, Uncompahgre, Crawford and Bostwick Park subwatersheds) on either privately owned lands or BLM- or Reclamation-managed lands. The four subwatersheds were identified by the River District in collaboration with water users in the Gunnison River basin and meet the definition of a watershed as outlined in the NRCS's NWPM (NRCS 2015). The project directly addresses multiple CCA resource concerns in the Colorado River Basin, including:

- Water Quality Degradation: Excessive salts (and selenium) in surface waters and ground waters;
- Insufficient Water: Inefficient use of irrigation water;
- Soil Quality Degradation: Concentration of salts and other chemicals; and
- Inadequate Habitat for Fish and Wildlife: Habitat degradation.

The project would help irrigators use water more efficiently and reduce the amount of salts and selenium carried in the Colorado River and its tributaries. An overall goal of the Lower Gunnison Project is to improve water quality and comply with Colorado Water Quality Standards, the The Colorado River Basin Salinity Control Act, and the Gunnison Basin Selenium Management Program, by reducing selenium and salt loading by piping irrigation laterals or canals and installing high efficiency irrigation systems to eliminate seepage and deep percolation into saline shale-derived soils (River District 2015). The Lower Gunnison Project proposes four types of improvements:

- Off-farm: conversion of open canals to enclosed, piped systems;
- Near-farm: addition of storage ponds and controls to regulate water delivery together with conversion of open laterals to piped systems; and
- Addition of smart headgate diversion control structures and SCADA systems to better integrate irrigation systems.

7.3 Measures to be Installed

7.3.1 Project Components

The known project-specific components receiving NRCS funding would primarily be composed of piping irrigation water and enclosing existing open canals and the installation of SCADA systems, and are described in **Tables 4.3-1**, **4.3-2**, **4.3-3**, and **4.3-4**, and shown in **Figures 4.3-1** through **4.3-4 in Appendix B**. A summary of the project components are included in **Table 7.3-1**.

Table 7.3-1. Summary of Project Components.

Subwatershed	Component	Description
North Fork	Fire Mountain Canal Piping Project*	19,222 feet of new pipe to replace open ditch. A new siphon across Leroux Creek will be constructed at a new location in order to eliminate approximately 1.3 miles of canal. The replaced segment of the existing canal would be abandoned.
	SCADA	3 new SCADA systems, which generally each include water level sensors, buried conduit, relay antenna (telemetry equipment), solar power, and panel.
Crawford	Needle Rock Diversion	Headgate replacement project; 879 feet of new enclosed and pressurized pipeline to replace open ditch; SCADA system installed at headgate.
	Grandview Phase 1	6,700 feet of new pipe to replace the open Grandview Canal ditch. There would be a new division/screening structure. The replaced segment of the existing canal would be abandoned.
	Clipper Re-Reg Pond	New regulating reservoir designed to absorb the fluctuation of demand on the piped system as irrigators turn on and off. The project would consist of a 30 acre-foot reservoir and associated inlet and outlet works.
	SCADA	4 new SCADA systems, which generally each include water level sensors, 1-inch buried conduit, relay antenna (telemetry equipment), solar power, and panel.
Uncompahgre	GB and GB-A Laterals (part of the Phase 9 Piping Project)**	2,137 feet of new pipe to replace the open GB lateral and 12,766 feet of new pipe to replace the open GB-A lateral. The replaced segment of the existing canal would be abandoned.
	SCADA	3 new SCADA systems, which generally each include water level sensors, buried conduit, relay antenna (telemetry equipment), solar power, and panel. Additionally, installation of a new SCADA Radio Tower.
Bostwick Park	West Lateral Phase 1	2,801 feet of new enclosed and pressurized pipeline to replace the open, earthen portions of the West Lateral along Bostwick Park Road. Project would also include a screening structure and a pressure-reducing station. The replaced segment of the existing canal would be abandoned.
	SCADA	1 new SCADA system, which generally would include water level sensors, 1-inch buried conduit, relay antenna (telemetry equipment), solar power, and panel.

* Fire Mountain Canal Piping Project in this subwatershed is funded by both NRCS and Reclamation programs; however, Reclamation is the lead agency and the project will be analyzed in greater site-specific detail in Reclamation's associated NEPA process.

** The Phase 9 Piping Project in this subwatershed is funded primarily by Reclamation programs. Though the GB and GB-A lateral piping projects would be funded by 2015 RCPP funding, Reclamation is the lead agency for the overall Phase 9 Project and the GB and GB-A lateral piping project will be analyzed in greater site-specific detail in Reclamation's associated NEPA process.

Construction would occur during the off-irrigation season (October 31–April 1) beginning in the fall of 2017 and with an anticipated end date of 2020. The construction phase of each project component is anticipated to require one or two non-irrigation construction seasons to complete. Monitoring of off-farm benefits would be on-going and occur through the Lower Gunnison Basin Water-Quality/Quantity Monitoring Program, which is administered by the River District in conjunction with the USGS and other stakeholder partners (River District 2015).

Canal closure and pipeline installation projects would require some borrow or fill material and storage areas for pipe and other materials. These areas have not yet been identified, but it is likely that borrow and fill materials would be derived from previously disturbed areas on commercial or private property within the subwatersheds. Material storage areas would be located on commercial or private land within the subwatersheds, and would not be placed on federal land. Access to construction and storage areas would use existing disturbed access routes. If new disturbance is required for borrowing fill materials, for material storage, or for new access ways, the areas would be surveyed prior to construction to comply with requirements for protection of biological and cultural resources.

SCADA systems are proposed to be installed within each subwatershed. SCADA systems improve system efficiency through remote monitoring and data acquisition and remote control. SCADA systems are proposed to be installed on several major turnouts, wasteways, and flumes in the subwatersheds. Remote site components of a SCADA system include a panel, site enclosure, water meters, solar power and telemetry equipment, which could be simple antennas or 10- to 20-foot high steel posts depending on the location of the equipment Telemetry stations would also be required, and would be concentration points for the SCADA communication prior to relaying the data to monitoring stations. The telemetry stations could be new installation of radio modems or could rely on satellite terminals (e.g., the Broadband Global Area Network). Telemetry stations with radio modems would require a tall radio tower, ranging in the order of 80-100 feet tall. Master monitoring and control system stations would also be established at central locations within the subwatershed. Existing offices would generally be used for these monitoring stations. The SCADA systems would generally be installed on previously disturbed ground, and would not disturb native riparian vegetation. SCADA systems would not be placed in wetlands. Existing roads and ROWs would be used for access to sites, and no borrow material would be required for SCADA installation.

7.3.2 Avoidance, Minimization, and Mitigation Measures

Design features and BMPs that would be applied during construction of the proposed project components to avoid and minimize impacts to environmental and social resources are described below.

Pre-Construction

- Ground disturbances shall be limited to only those areas necessary to safely implement the Proposed Action.
- Work will be confined within existing ROWs whenever possible to preserve existing vegetation and private property. The ROW will be clearly marked in the field.
- All access will be designated on project area maps, including along the construction corridor. No cross-country travel will occur in marked wetland areas.

- Construction components including temporary use areas for material and equipment storage will be located outside of wetlands or riparian areas.
- Construction limits shall be clearly flagged onsite to avoid unnecessary plant loss or ground disturbance.
- If special status plants are identified in pre-construction surveys in or near the construction corridor, weed management strategies shall prioritize the protection of special status plants (see Mui et al. 2016).
- Ensure that project staff and contractors working on site are aware of and can identify special status plant and wildlife species with potential to occur in the project footprint; stop work if a special status plant or wildlife species is discovered in the project footprint and notify the project manager.
- Prior to construction, vegetative material shall be removed by mowing or chopping, and either hauled to a proposed staging area to be burned or chipped, or chipped and mulched onsite. Stumps shall be grubbed and hauled to a proposed staging area to be burned.

During Construction

- Vegetation and topsoil removal shall be confined to the smallest portion of the Proposed Action Area necessary for completion of the work.
- During construction, topsoil would be saved and then redistributed after completion of construction activities.
- Straw wattles, silt curtains, cofferdams, dikes, straw bales, or other suitable erosion control measures would be used to minimize soil erosion and prevent soil erosion from entering water bodies during construction.
- Fuel, oil, hydraulic fluid, lubricants, and other petrochemicals will not be stored within 200 feet of the wetland and riparian areas and will have a secondary containment system to prevent spills. Appropriate spill clean-up materials, such as booms and absorbent pads, will be available on-site at all times during construction.
- Work crews would carry spill cleanup kits, and in times of burn bans or wildfire concerns, each crew would have a fire suppression kit.
- Leaks that occur to equipment while working on the Project will not be allowed to continue operating until the leak is fixed. Refueling will occur a minimum of 100 feet from wetland and riparian areas.
- All construction equipment will be decontaminated by cleaning with high-pressure water before mobilization to the site. All wheels, tracks, undercarriages, fenders, blades, buckets, and the exterior body will be cleaned prior to entering the site to prevent releases into the aquatic environment and the spread of noxious weeds.

- Concrete clean-up operations (if needed) will utilize a dedicated concrete wash-out pit in an upland location. The concrete remnants in the wash-out pit will be fully removed and legally disposed of off-site upon completion of all concrete operations, or as needed for maintenance.
- The application of water, other dust suppressant, or soil binder on unpaved roads and areas of ground disturbance to minimize dust entrainment;
- Use of stabilized construction entrances to minimize tracking;
- Require appropriate emission control devices on all construction equipment.
- During construction activities, the SHPO or the BLM cultural resources staff, as applicable, will be notified if there are any inadvertent historic discoveries during construction, in accordance with applicable guidance and law.
- Avoid any needed lane closures during peak travel periods including weekends and special events to the extent practicable.
- Communicate roadway and work zone conditions to travelers via websites, prerecorded messages, and other similar mechanisms.
- Use of non-reflective or matte finishes that are tinted to an appropriate color based on the surroundings for SCADA equipment to reduce visual impacts. Screening, such as vegetative plantings, can help obscure built features and may be appropriate in natural landscapes.

Following Construction

- Re-seeding shall occur at appropriate times with certified weed-free seed mixes per NRCS, BLM or Reclamation instructions, as appropriate.
- Weed control shall be implemented by the project proponent to county standards (at a minimum).
- Disturbed areas would be smoothed, shaped, contoured and reseeded to as near their pre-project conditions as practicable.
- Lands previously in agricultural production would be returned to agricultural production following construction.

Permits or authorizations that may be required prior to construction of project components not analyzed in full in this document are described below.

- CDPHE Stormwater Construction Permit: Coverage is required by state and federal regulations for stormwater discharged from any construction activity that disturbs at least 1 acre of land, or is part of a larger common plan of development that will disturb at least 1 acre. Discharges of water encountered during excavation or work in wet areas may require a discharge permit. If the water is discharged to waters of the State, a Construction Dewatering Discharge Permit is required. If the water is discharged to land and allowed to infiltrate, approval from the CDPHE liaison is required. (CDPHE 2017b)

- USACE: Under Section 404(f)(1)(C) of the CWA, discharges of dredged or fill material associated with construction or maintenance of irrigation ditches, or the maintenance (but not construction) of drainage ditches, are not prohibited by or otherwise subject to regulation under Section 404 of the CWA. Discharges of dredged or fill material associated with siphons, pumps, headgates, wingwalls, weirs, diversion structures, and such other facilities as are appurtenant to and functionally related to irrigation ditches are included in the exemption for irrigation ditches. Under 33 CFR 323.4(a)(1)(iii)(C)(1))(i), "[c]onstruction and maintenance of upland (dryland) facilities such as ditching and tiling, incidental to the planting, cultivating, protecting, or harvesting of crops, involve no discharge of dredged or fill material into waters of the U.S., and as such never require a Section 404 permit." The construction and maintenance of irrigation ditches and maintenance of drainage ditches may require the construction and/or maintenance of a farm road. In those circumstances, the Subsection 404(f) (1)(E) exemption for discharges of dredged or fill material associated with the construction or maintenance of farm roads applies where such related farm roads are constructed and maintained in accordance with BMPs. However, in 33 CFR 323.4(a)(6) and 40 CFR 232.3(c)(6), there must be assurance that flow and circulation patterns and chemical and biological characteristics of waters of the US are not impaired, that the reach of the waters of the US is not reduced, and that any adverse effect on the aquatic environment will be otherwise minimized. Construction activities within the stream channel may be regulated by the local or regional USACE office, and consultation with USACE may be necessary if temporary stream re-routing or cofferdams are needed for construction of instream diversion structures.

- USFWS: For any potential impacts to special status species, clearance surveys and/or appropriate coordination with the BLM or consultation with USFWS under Section 7 of the ESA would be required before construction activities could be initiated. A Biological Assessment / Biological Evaluation may need to be prepared to address both short-term and long-term impacts of the subwatershed improvement projects. Consultation with BLM and USFWS will be conducted prior to construction. If potential effects to Gunnison sage-grouse or Gunnison sage-grouse critical habitat are anticipated, apply appropriate planning / implementation conservation measures explained in the Gunnison Sage-Grouse Biological Opinion (USFWS 2015).

- SHPO: Pursuant to 36 CFR Part 800 of the NHPA (1966, as amended in 2000), and the regulations of the Advisory Council on Historic Preservation implementing Section 106 of the NHPA (54 U.S.C. 306108), federal agencies must take into account the potential effect of an undertaking on "historic properties," which refers to cultural resources listed in, or eligible for listing in the NRHP. The recommendations of eligibility for all newly recorded and previously recorded sites contained within this report would require consultation with the Colorado SHPO, and a determination of effects would be agreed upon by the consulting parties. Any finding of "historic properties adversely affected" would require that the consulting parties enter into an MOA requiring a method of treatment for the adverse effect that is acceptable to all of the consulting parties, and the MOA would stipulate that the treatment would be successfully completed prior to the initiation of project construction.

The project sponsor is responsible for complying with all BMPs and impact minimization efforts described in Chapter 5, and for obtaining and complying with any permits, should they be required.

No compensatory mitigation is anticipated to be required for the Proposed Action. For the known project components, NRCS would not require habitat replacement for the loss of artificial wetland and riparian habitat wetlands created by irrigation infrastructure. Thus, the statutory funding for projects performed under this Plan-EA would not require habitat replacement. The long-term loss of artificial local wetland and riparian habitat resulting from ditch conversions would be offset by gains in water quality and habitat function in the project area's natural riverine systems.

7.4 Economic and Structural Information

Economic analysis is provided in **Section 5.6.4** of this Plan-EA, as well as **Appendix D**. Implementation of the NED Alternative would result in an average annual benefit-cost ratio of 2.4, the result of approximately $125,335 in annual agricultural benefits and $1,162,407 in nonagricultural benefits for a total of about $1.3 million in total annual damage reduction benefit.

A portion of the total Watershed Authority Technical Assistance funding would be obligated to the River District for technical services and assistance and system modernization planning. Project partners include but are not limited to Bostwick Park Water Conservancy District, North Fork Water Conservancy District, Crawford Water Conservancy District, Uncompahgre Valley Water Users Association, Delta Conservation District, Shavano Conservation District and Reclamation.

NRCS reserves the right and authority to reduce or discontinue program benefits to support this partner agreement based upon funds availability, changes in agency priorities, or inability of the River District to deliver resources or provisions of this agreement. EQIP program contracts and agreements obligated with producers and landowners as a result of this partnership agreement are assured of funding for the entire length of the approved contract or agreement and not subject to provisions of this partnership agreement regarding fund availability.

Table 7.4-1 presents the summary of average annual NED benefits and costs for the Proposed Action in the Lower Gunnison Watershed. All of the increments of the proposed project components are economically justified for funding with the PL 83-566 program. The non-monetary benefits associated with the Proposed Action include the benefits to water quality from selenium reduction. The Lower Gunnison Selenium Reduction Taskforce identified the need to reduce up to 13,000 tons of selenium from the Lower Gunnison Watershed. Implementation of all of the piping projects under PL 83-566 funds would help to meet the environmental targets earlier than could be accomplished through Reclamation funds, if they happen at all.

Table 7.4-1. Summary and Comparison Table.

Subwatershed	Land Treatment	Total Damage reduction benefit, average annual	Total Average Annual Cost	NED Metrics	
				Benefit-Cost Ratio	Net Benefits
North Fork	Piping	$495,883	$178,986	2.8	$316,897
	SCADA	$30,547	$5,629	5.4	$24,918
Crawford	Piping	$59,829	$42,898	1.4	$16,931
	SCADA	$22,139	$3,859	5.7	$18,280
Uncompahgre	Piping	$502,069	$269,850	1.9	$232,219
	SCADA	$103,021	$12,075	8.5	$90,946
Bostwick Park	Piping	$51,269	$24,120	2.1	$27,148
	SCADA	$22,986	$5,028	4.6	$17,958
Total		**$1,287,742**	**$542,444**	2.4	**$745,298**

Table 7.4-2 shows the projected construction costs associated with the various increments of the No Action and Preferred Action Alternatives (NWPM 506.11).

Table 7.4-2. Estimated Installed Cost (FY 2017 Dollars).

	No Action	Action			
	Total Reclamation Cost	NRCS PL 83-566 Cost	Other Federal Contributions	Sponsor Cost	Total Cost
SUBWATERSHED	**Install in year 15**	**Install in year 1**			
NORTH FORK					
Pipelines Increment					
PED	$186,618	$52,626	$115,265	$18,726	$186,618
Mobilization	$115,822	$32,662	$71,538	$11,622	$115,822
Construction	$2,461,212	$694,060	$1,520,179	$246,973	$2,461,212
Site Restoration	$23,164	$6,532	$14,308	$2,324	$23,164
CM	$1,866,178	$526,260	$1,152,653	$187,264	$1,866,178
Mitigation	$130,444	$36,785	$80,569	$13,090	$130,444
Subtotal Pipeline	$4,783,437	$1,348,925	$2,954,512	$480,000	$4,783,437
SCADA Increment					
Design		$10,706	$0	$1,328	$12,034
PED		$10,706	$0	$1,328	$12,034

Table 7.4-2. Estimated Installed Cost (FY 2017 Dollars).

	No Action	Action			
	Total Reclamation Cost	NRCS PL 83-566 Cost	Other Federal Contributions	Sponsor Cost	Total Cost
SUBWATERSHED	**Install in year 15**	**Install in year 1**			
Contingency		$26,765	$0	$3,320	$30,085
Construction		$85,649	$0	$10,624	$96,273
Subtotal SCADA		$133,826	$0	$16,600	$150,426
Total North Fork Subwatershed	$4,783,437	$1,482,751	$2,954,512	$496,600	$4,933,863
CRAWFORD					
Pipelines Increment					
PED	$44,727	$42,555	$0	$2,172	$44,727
Mobilization	$27,759	$26,411	$0	$1,348	$27,759
Construction	$589,884	$561,235	$0	$28,649	$589,884
Site Restoration	$5,552	$5,282	$0	$270	$5,552
CM	$447,271	$425,548	$0	$21,723	$447,271
Mitigation	$31,264	$29,745	$0	$1,518	$31,264
Subtotal Pipeline	$1,146,457	$1,090,777	$0	$55,680	$1,146,457
SCADA Increment					
Design		$7,050	$0	$1,200	$8,250
PED		$7,050	$0	$1,200	$8,250
Contingency		$17,625	$0	$3,000	$20,625
Construction		$56,399	$0	$9,600	$65,999
Subtotal SCADA		$88,123	$0	$15,000	$103,123
Total Crawford Subwatershed	$1,146,457	$1,178,900	$0	$70,680	$1,249,580
UNCOMPAHGRE					
Pipelines Increment					
PED	$281,356	$62,362	$209,231	$9,762	$281,356
Mobilization	$174,620	$38,704	$129,857	$6,059	$174,620
Construction	$3,710,667	$822,463	$2,759,453	$128,751	$3,710,667
Site Restoration	$34,924	$7,741	$25,971	$1,212	$34,924
CM	$2,813,559	$623,621	$2,092,315	$97,623	$2,813,559

Table 7.4-2. Estimated Installed Cost (FY 2017 Dollars).

	No Action	Action			
	Total Reclamation Cost	NRCS PL 83-566 Cost	Other Federal Contributions	Sponsor Cost	Total Cost
SUBWATERSHED	**Install in year 15**	**Install in year 1**			
Mitigation	$196,665	$43,591	$146,251	$6,824	$196,665
Subtotal Pipeline	$7,211,791	$1,598,482	$5,363,078	$250,231	$7,211,791
SCADA Increment					
Design		$25,521	$0	$295	$25,816
PED		$25,521	$0	$295	$25,816
Contingency		$63,803	$0	$737	$64,540
Construction		$204,171	$0	$2,357	$206,528
Subtotal SCADA		$319,017	$0	$3,683	$322,700
Total Uncompahgre Subwatershed	$7,211,791	$1,917,499	$5,363,078	$253,914	$7,534,491
BOSTWICK PARK					
Pipelines Increment					
PED	$25,149	$21,005	$0	$4,144	$25,149
Mobilization	$15,608	$13,036	$0	$2,572	$15,608
Construction	$331,677	$277,019	$0	$54,658	$331,677
Site Restoration	$3,122	$2,607	$0	$514	$3,122
CM	$251,489	$210,046	$0	$41,443	$251,489
Mitigation	$17,579	$14,682	$0	$2,897	$17,579
Subtotal Pipeline	$644,624	$538,395	$0	$106,229	$644,624
SCADA Increment					
Design		$9,694	$0	$1,056	$10,750
PED		$9,694	$0	$1,056	$10,750
Contingency		$24,236	$0	$2,640	$26,876
Construction		$77,555	$0	$8,448	$86,003
Subtotal SCADA		$121,180	$0	$13,200	$134,380
Total Bostwick Park Subwatershed	$644,624	$659,574	$0	$119,429	$779,003
GRAND TOTAL	$13,786,308	$5,238,724	$8,317,590	$940,623	$14,496,937

The average annual NED costs of the Preferred Alternative are shown below in **Table 7.4-3** (per NWPM 506.18).

Table 7.4-3. Estimated Average Annual NED Costs (FY 2017 Dollars, 2.875% Discount Factor).

Alternative	Subwatershed	Land Treatment	Project Outlays	Total Average Annual Cost
No Action	North Fork	Canal Piping Installation	$4,783,437	$116,996
	Crawford	Canal Piping Installation	$1,146,457	$28,041
	Uncompahgre	Canal Piping Installation	$7,211,791	$176,390
	Bostwick Park	Canal Piping Installation	$644,624	$15,767
	Total		$13,786,308	$337,193
Action Alternative	North Fork	Canal Piping Installation	$4,783,437	$181,522
		SCADA Implementation	$150,426	$5,708
	Crawford	Canal Piping Installation	$1,146,457	$43,506
		SCADA Implementation	$103,123	$3,913
	Uncompahgre	Canal Piping Installation	$7,211,791	$273,674
		SCADA Implementation	$322,700	$12,246
	Bostwick Park	Canal Piping Installation	$644,624	$24,462
		SCADA implementation	$134,380	$5,099
	Total		$14,496,937	$550,131

The summary of the estimated average annual NED benefits for the Lower Gunnison Watershed are presented below in **Table 7.4-4**. The Preferred Alternative provides a total of $1.3 million in average annual benefits from avoided salinity loading, operations and maintenance savings, cost avoidance, producer benefits and reduced travel costs.

Table 7.4-4. Estimated Average Annual Watershed Protection Damage Reduction Benefits (FY 2017 Dollars, 2.875% Discount Factor).

Subwatershed	Land Treatment	Damage Category	Damage reduction benefit, average annual		
			Agriculture-Related	Nonagricultural-Related	Total
North Fork	Piping	Avoided Salinity Reduction		$338,566	$338,566
		Operations and Maintenance Savings - Piping		$31,549	$31,549
		Cost Avoidance		$116,996	$116,996
		Producer Benefits	$8,772		$8,772
		Subtotal	$8,772	$487,111	$495,883
	SCADA	Reduced Travel Costs - SCADA		$24,195	$24,195
		Producer Benefits	$6,352		$6,352
		Subtotal	$6,352	$24,195	$30,547

Table 7.4-4. Estimated Average Annual Watershed Protection Damage Reduction Benefits (FY 2017 Dollars, 2.875% Discount Factor).

Subwatershed	Land Treatment	Damage Category	Damage reduction benefit, average annual		
			Agriculture-Related	Nonagricultural-Related	Total
	Total Subwatershed		$15,124	$511,306	$526,429
Crawford	Piping	Avoided Salinity Reduction		$23,545	$23,545
		O&M Savings - Piping		$4,173	
		Cost Avoidance		$28,041	$28,041
		Producer Benefits	$4,070		$4,070
		Subtotal	$4,070	$55,758	$59,829
	SCADA	Reduced Travel Costs - SCADA		$14,517	
		Producer Benefits	$7,622		
		Subtotal	$7,622	$14,517	
	Total Subwatershed		$11,693	$70,275	$81,968
Uncompahgre	Piping	Avoided Salinity Reduction		$323,111	$323,111
		Operations and Maintenance Savings - Piping		$1,391	$1,391
		Cost Avoidance		$176,390	$176,390
		Producer Benefits	$1,177		$1,177
		Subtotal	$1,177	$500,892	$502,069
	SCADA	Reduced Travel Costs - SCADA		$14,517	$14,517
		Producer Benefits	$88,504		$88,504
		Subtotal	$88,504	$14,517	$103,021
	Total Subwatershed		$89,681	$515,409	$605,090
Bostwick Park	Piping	Avoided Salinity Reduction		$34,533	$34,533
		Operations and Maintenance Savings - Piping		$601	$601
		Cost Avoidance		$15,767	$15,767
		Producer Benefits	$368		$368
		Subtotal	$368	$50,901	$51,269
	SCADA	Reduced Travel Costs - SCADA		$14,517	$14,517
		Producer Benefits	$8,469		$8,469
		Subtotal	$8,469	$14,517	$22,986
	Total Subwatershed		$8,838	$65,417	$74,255
Grand Total			**$125,335**	**$1,162,407**	**$1,287,742**

Based on data presented in **Tables 7.4-1** through **7.4-4**, **Table 7.4-5** presents a comparison of the NED benefits and costs.

Table 7.4-5. Comparison of NED Benefits and Costs (FY 2017 Dollars, 2.875% Discount Factor).

Subwatershed	Land Treatment	NED Metrics		Included in Plan	
		Benefit-Cost Ratio	Net Benefits	NED Plan	Preferred Alternative
North Fork	Piping	2.8	$316,897	Yes	Yes
	SCADA	5.4	$24,918	Yes	Yes
Crawford	Piping	1.4	$16,931	Yes	Yes
	SCADA	5.7	$18,280	Yes	Yes
Uncompahgre	Piping	1.9	$232,219	Yes	Yes
	SCADA	8.5	$90,946	Yes	Yes
Bostwick Park	Piping	2.1	$27,148	Yes	Yes
	SCADA	4.6	$17,958	Yes	Yes
Total		2.4	**$745,298**	Yes	Yes

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Chapter 8 – References

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Chapter 9 – List of Preparers

This Plan-EA was prepared by HDR, Inc. and its subcontractors, Ecosphere Environmental Services and Rare Earth Sciences, under the direction of the NRCS and its cooperating agencies. Staff responsible for directing the preparation of the Plan-EA are listed as follows.

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Chapter 10 – Distribution List

A Notice of Availability for the Draft Plan-EA was distributed to Federal, state, local agencies, community representatives, and area NGOs. A similar notice for the Final Plan-EA and decision document will be distributed to these same contacts. The agency, representative and organizational contacts that are included on the mailing list include those listed below:

- Black Canyon Audubon Society
- Black Canyon Regional Land Trust
- Bureau of Land Management
- Bureau of Reclamation
- Chamber of Commerce
- City of Delta
- City of Montrose
- Colorado Coalition of Land Trusts
- Colorado Department of Commerce
- Colorado Department of Indian Affairs
- Colorado Department of Natural Resources
- Colorado Department of Public Health and Environment
- Colorado Department of State
- Colorado Department of Transportation
- Colorado Energy Office
- Colorado Native Plant Society
- Colorado NRCS State Office
- Colorado Open Lands
- Colorado Parks and Wildlife
- Colorado River Water Conservation District
- Colorado State Farm Service Agency
- Colorado Trail Foundation
- Colorado Water Conservation Board
- Conservation Colorado
- Curecanti National Recreation Area, Black Canyon of the Gunnison
- Delta County
- Department of Agriculture
- Ducks Unlimited
- EPA, Region 8
- Federal Aviation Authority
- Grand Mesa, Uncompahgre, and Gunnison National Forests
- Great Old Broads for Wilderness
- Gunnison County
- Gunnison County Administration
- High Country Conservation
- Montrose County
- Montrose County Farm Service Agency
- Mountain Area Land Trust
- National Forest, Gunnison Ranger District
- National Forest, Ouray Ranger District
- National Forest, Paonia Ranger District
- North American Grouse Partnership
- Office of the Governor
- Project 7 Water Authority
- Rocky Mountain Wild
- Sierra Club, Rocky Mountain Chapter
- State Historic Preservation Officer
- The Nature Conservancy
- Town of Crawford
- Town of Hotchkiss
- Town of Olathe
- Town of Paonia
- Tri-County Water Conservancy District
- Trout Unlimited
- Uncompahgre Valley Water Users Association
- United States Army Corps of Engineers
- United States Department of Agriculture Natural Resources Conservation Service
- United States Fish and Wildlife Service
- United States Geological Survey
- Upper Gunnison River Water Conservancy District
- United States House of Representatives
- United States Rocky Mountain National Forest Service
- United States Senate
- Water Information Program

In accordance with EO 13175, *Consultation and Coordination with Indian Tribal Governments*, NRCS contacted the following tribes regarding scoping, the availability of Cultural Resources Survey Report, and the Draft Plan-EA: the Ute Mountain Ute Tribe and the Southern Ute Indian Tribe.

The names of private stakeholders and members of the public who received notice of the Draft Plan-EA are not listed in this section for privacy. Both tribes and other members of the mailing list will receive notice of the availability of the Final Plan-EA and the associated decision document.

Chapter 11 – Acronyms, Abbreviations, and Short-Forms

BCA	Benefit-Cost Analysis
BLM	Bureau of Land Management
BMP	Best Management Practice
CCA	Critical Conservation Area
CCPA	Colorado Council of Professional Archaeologists
CDPHE	Colorado Department of Public Health and Environment
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CNHP	Colorado Natural Heritage Program
CPW	Colorado Parks and Wildlife
CWA	Clean Water Act
CWCB	Colorado Water Conservation Board
EA	Environmental Assessment
EC	Electrical Conductivity
EE	Environmental Evaluation
EI	Evaporation Index
EO	Executive Order
EQIP	Environmental Quality Incentives Program
ESA	Endangered Species Act
FEMA	Federal Emergency Management Agency
FFRMS	Federal Flood Risk Management Standards
FLMPA	Federal Land Policy and Management Act of 1976
FR	Federal Register
ft^3/sec	Cubic Feet Per Second
FWSE	Free-Water-Surface Evaporation
FY	Fiscal Year
GIS	Geographic Information System
GVIC	Grand Valley Irrigation Company
HDPE	High-Density Polyethylene
HUC	Hydrologic Unit Code
IPaC	Information for Planning and Conservation
lb/d	Pounds per Day
MBTA	Migratory Bird Treaty Act
µS/cm	microSiemens per centimeter
µg/L	Micrograms per Liter

mg/L	Milligrams per Liter
MOA	Memorandum of Agreement
NAAQS	National Ambient Air Quality Standards
NED	National Economic Development
NEPA	National Environmental Policy Act
NFIP	National Flood Insurance Program
NGO	Non-Governmental Organization
NHPA	National Historic Preservation Act
NIWQP	National Irrigation Water Quality Program
NLCD	National Land Cover Dataset
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NWI	National Wetland Inventory
NWPM	National Watershed Program Manual
OAHP	Office of Archaeology and Historic Preservation
PCA	Potential Conservation Area
PCE	Primary Constituent Element
PED	Planning, Engineering, Design
P.L.	Public Law
Plan-EA	Watershed Plan-Environmental Assessment
RCPP	Regional Conservation Partnership Program
Reclamation	Bureau of Reclamation
River District	Colorado River Water Conservation District
ROD	Record of Decision
ROW	Right-of-Way
SCADA	Supervisory Control and Data Acquisition
SHPO	State Historic Preservation Office
SLO	Sponsoring Local Organization
SQRU	Scenic Quality Rating Unit
SWMP	Stormwater Management Plan
SWPPP	Storm Water Pollution Prevention Plan
TDS	Total Dissolved Solids
TMDL	Total Maximum Daily Load
tons/d	Tons Per Day
U.S.C.	United States Code

USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
UFO	Uncompahgre Field Office
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VOT	Value of Time
VRM	Visual Resource Management
°F	degrees Fahrenheit

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Chapter 12 – Index

Air quality, xii, xiii, 2-6, 3-28, 5-15

Best management practices (BMPs), xvii, xviii, 4-14, 5-1, 5-2, 5-3, 5-13, 5-15, 5-16, 5-17, 5-18, 5-19, 5-21, 5-22, 5-23, 5-24, 5-30, 5-31, 5-32, 5-33, 5-36, 5-42, 5-43, 5-54, 5-55, 5-59, 5-60, 5-65, 5-67, 5-68, 5-69, 5-70, 5-71, 7-3, 7-6, 8-8, 11-1

Black Canyon of the Gunnison National Park, 3-27, 3-56, 3-71, 11-2

Bonytail chub, 3-59, 3-61, 5-56, 5-57, 6-2, 8-13

Bostwick Park subwatershed, 3-1, 3-7, 3-8, 3-25, 3-26, 3-27, 3-28, 3-32, 3-33, 3-34, 3-38, 3-40, 3-41, 3-43, 3-44, 3-46, 3-47, 3-53, 3-58, 3-63, 3-70, 3-71, 3-73, 5-1, 5-2, 5-3, 5-19, 5-22, 5-35, 5-41, 5-52, 5-59, 5-61, 5-65, 5-71, 7-1

Cimarron River, 3-28, 3-32, 3-34, 3-49, 3-53, 3-58, 3-73, 5-9, 5-13, 5-19, 5-41, 5-71

Clay-loving wild buckwheat, 2-3, 3-31, 3-40, 3-42, 3-43, 5-25, 5-30, 6-1, 6-2

Clean Air Act, ix, x, 3-28

Clean Water Act (CWA), xxx, 3-15, 3-35, 5-2, 5-13, 5-23, 5-24, 6-1, 7-6, 8-8, 8-12, 8-13, 11-1

Colorado Decision Support System (CDSS), xxix, 3-17, 3-20, 3-25, 3-28, 3-30, 3-34, 5-6, 8-3

Colorado Department of Public Health and Environment (CDPHE), 2-2, 3-9, 3-13, 3-14, 3-15, 3-18, 3-23, 3-62, 5-2, 5-3, 5-13, 5-14, 5-15, 5-23, 5-24, 7-5, 8-3, 10-1, 11-1

Colorado Division of Water Resources Division 4, 3-14, 3-22

Colorado Natural Heritage Program (CNHP), 3-30, 3-36, 3-40, 3-41, 3-42, 3-43, 3-44, 3-59, 3-61, 8-4, 8-7, 8-8, 8-11, 11-1

Colorado pikeminnow, 3-9, 3-59, 3-60, 3-61, 3-62, 5-56, 5-57, 6-2

Colorado State Register of Historic Properties, 3-66, 3-67

Colorado Water Conservation Board (CWCB), 2-1, 3-13, 3-30, 4-3, 8-3, 8-4, 10-1, 11-1

Crawford Reservoir, xxi, 3-11, 3-12, 3-17, 3-18, 3-34, 3-57, 3-58, 3-62, 3-72, 5-70

Crawford subwatershed, 3-5, 3-6, 3-17, 3-18, 3-19, 3-20, 3-28, 3-31, 3-34, 3-37, 3-42, 3-43, 3-46, 3-47, 3-52, 3-57, 3-62, 3-67, 3-70, 3-72, 4-6, 5-1, 5-8, 5-11, 5-17, 5-22, 5-35, 5-39, 5-49, 5-59, 5-61, 5-62, 5-70

Delta, xx, xxi, xxii, xxvi, xxviii, xxix, 3-1, 3-6, 3-9, 3-12, 3-13, 3-17, 3-20, 3-21, 3-22, 3-23, 3-24, 3-28, 3-31, 3-32, 3-34, 3-39, 3-41, 3-43, 3-45, 3-56, 3-57, 3-61, 3-63, 3-69, 3-72, 3-73, 3-74, 3-75, 3-76, 3-77, 3-78, 4-3, 4-11, 5-38, 5-58, 5-62, 5-63, 5-64, 7-7, 8-3, 8-4, 8-5, 8-6, 8-7, 8-9, 8-10, 10-1

Desert Parsley, 3-31, 3-40, 3-41, 3-42, 3-43, 3-44, 5-29, 5-30

Electrical Conductivity (EC), 3-10, 4-2, 4-9, 5-5, 5-6, 11-1

Endangered Species Act (ESA), xvi, xxx, 3-32, 3-33, 3-39, 3-40, 3-42, 3-43, 3-49, 3-50, 3-51, 3-53, 3-54, 3-56, 3-57, 3-58, 3-59, 5-25, 5-29, 5-30, 5-43, 5-44, 5-45, 5-47, 5-48, 5-49, 5-50, 5-51, 5-52, 5-53, 5-54, 5-55, 5-56, 5-57, 6-1, 7-6, 11-1

Evaporation Index (EI), 3-9, 11-1

Executive Order (EO) 13175, 6-2, 10-2

Federal Emergency Management Agency (FEMA), 3-13, 3-20, 3-25, 3-27, 8-5, 11-1

Federal Flood Risk Management Standards (FFRMS), 11-1

Forest Service, 3-37, 3-38, 3-69, 3-70, 8-7, 8-14, 10-1

Gunnison Field Office, 3-40, 3-41, 3-54, 3-55, 3-70

Gunnison sage-grouse, 3-32, 3-45, 3-50, 3-52, 3-54, 3-57, 3-58, 5-43, 5-44, 5-45, 5-49, 5-50, 5-51, 5-53, 5-54, 6-1, 7-6, 8-13

Hookless cactus, 3-31, 3-39, 3-40, 3-42, 3-43, 5-25, 5-29, 5-30, 6-1, 6-2

Humpback chub, 3-59, 5-56, 5-57, 6-2, 8-13

Hydrologic Unit Code (HUC), xv, 3-10, 3-11, 3-12, 3-13, 3-17, 3-18, 3-20, 3-21, 3-22, 11-1

Information for Planning and Conservation (IPaC), 3-39, 3-49, 3-53, 3-59, 5-57, 11-1

Invasive species, 2-6, 3-44, 5-31, 5-33

Iron Creek, 3-11, 3-12

Memorandum of Agreement (MOA), 4-3, 5-61, 5-63, 5-65, 6-1, 6-2, 7-6, 11-2

Migratory Bird Treaty Act (MBTA), 3-49, 5-35, 5-36, 5-37, 11-1

National Ambient Air Quality Standards (NAAQS), 3-28, 11-2

National Environmental Policy Act (NEPA), i, xxvii, 2-1, 2-2, 2-4, 3-49, 4-6, 4-7, 4-9, 5-17, 5-18, 5-21, 5-22, 5-39, 5-40, 5-58, 5-59, 5-69, 5-71, 7-2, 9-1, 11-2

National Flood Insurance Program (NFID), 3-16, 11-2

National Historic Preservation Act (NHPA), 2-1, 5-65, 6-1, 6-2, 7-6, 11-2

National Irrigation Water Quality Program (NIWQP), 3-8, 3-9, 3-14, 8-10, 8-11, 11-2

National Land Cover Dataset (NLCD), 3-29, 3-33, 11-2

National Park Service (NPS), 3-27, 3-70, 11-2

National Register of Historic Places (NRHP), 3-66, 3-67, 3-68, 3-69, 5-61, 5-62, 5-63, 5-64, 5-65, 5-66, 7-6, 11-2

North Fork subwatershed, 3-4, 3-6, 3-17, 3-33, 3-37, 3-41, 3-42, 3-43, 3-47, 3-52, 3-56, 3-57, 3-62, 3-66, 3-70, 3-71, 3-72, 4-6, 5-1, 5-17, 5-21, 5-35, 5-39, 5-49, 5-58, 5-61, 5-69, 5-72

Office of Archaeology and Historic Preservation (OAHP), 3-63, 8-8, 11-2

Paonia Reservoir, 3-14, 3-17, 3-62

Razorback sucker, 3-9, 3-59, 3-60, 3-61, 3-62, 5-56, 5-57, 6-2, 8-13

Salinity, xv, xvii, xx, xxiii, xxvii, 1-1, 1-2, 3-2, 3-3, 3-4, 3-5, 3-6, 3-8, 3-10, 3-12, 4-3, 4-9, 5-2, 5-5, 5-6, 5-10, 5-12, 5-13, 5-14, 5-25, 5-60, 5-74, 5-75, 5-76, 7-1, 7-11, 7-12, 8-5, 8-7, 8-9, 8-10, 8-11, 8-14

Scenic Quality Rating Unit (SQRU), 3-72, 3-73, 11-2

Selenium, xv, xx, xxx, 1-1, 1-3, 3-2, 3-4, 3-5, 3-6, 3-8, 3-9, 3-11, 3-15, 3-18, 3-19, 3-24, 3-27, 4-3, 5-2, 5-4, 5-5, 5-10, 5-12, 5-13, 5-25, 5-60, 7-1, 7-7, 8-5, 8-7, 8-11, 8-13

Sensitive Plants, 3-41

Sensitive Species, 3-60, 5-27, 5-29, 8-1

Smith Fork, 3-5, 3-12, 3-17, 3-18, 3-19, 3-20, 3-33, 3-34, 3-43, 3-52, 3-57, 3-58, 3-62, 4-8, 5-6, 5-8, 5-9, 5-11, 5-17, 5-22, 5-39, 5-40, 5-50, 5-59, 5-62, 5-63, 5-70, 8-10, 8-11, 8-14

Socioeconomics, xiii, 2-7, 3-74, 5-72, 9-1

State Historic Preservation Office (SHPO), 5-65, 6-1, 7-5, 7-6, 10-1, 11-2

Streamflow, xv, 3-14, 3-15, 3-18, 3-22, 3-23, 3-26, 3-63

Supervisory Control and Data Acquisition (SCADA), xv, xxi, xxiii, xxvii, 1-3, 4-3, 4-5, 4-6, 4-7, 4-8, 4-9, 4-10, 4-13, 5-2, 5-3, 5-4, 5-5, 5-8, 5-10, 5-11, 5-12, 5-13, 5-17, 5-18, 5-19, 5-21, 5-22, 5-26, 5-28, 5-30, 5-31, 5-32, 5-34, 5-35, 5-38, 5-39, 5-40, 5-41, 5-42, 5-45, 5-46, 5-47, 5-48, 5-50, 5-51, 5-52, 5-53, 5-55, 5-58, 5-59, 5-61, 5-62, 5-63, 5-64, 5-65, 5-66, 5-68, 5-69, 5-70, 5-71, 5-72, 5-73, 5-74, 5-75, 5-76, 5-77, 7-1, 7-2, 7-3, 7-5, 7-8, 7-9, 7-10, 7-11, 7-12, 7-13, 8-5, 8-11, 11-2

Total dissolved solids (TDS), 3-10, 11-2

Total Maximum Daily Load (TMDL), 3-12, 5-14, 8-3, 8-14, 11-2

U.S. Army Corps of Engineers (USACE), 3-35, 5-13, 5-23, 5-73, 5-74, 6-1, 7-6, 8-8, 8-12, 11-3

U.S. Environmental Protection Agency (USEPA), ix, 3-10, 3-14, 3-15, 3-18, 3-28, 3-35, 3-36, 8-12, 8-13, 11-3

U.S. Fish and Wildlife Service (USFWS), xxvii, 1-3, 2-3, 3-10, 3-12, 3-39, 3-40, 3-49, 3-53, 3-57, 3-59, 3-60, 5-10, 5-14, 5-25, 5-26, 5-27, 5-35, 5-36, 5-37, 5-44, 5-45, 5-54, 5-55, 5-56, 5-57, 5-58, 5-59, 5-60, 6-1, 6-2, 7-6, 8-1, 8-10, 8-13, 11-3

Uncompahgre bladderpod, 3-40, 3-41, 3-43, 3-44, 5-29, 5-30

Uncompahgre Field Office (UFO), 3-39, 3-40, 3-41, 3-45, 3-49, 3-53, 3-54, 3-55, 3-56, 3-60, 3-61, 3-70, 5-27, 5-29, 5-47, 5-48, 6-1, 8-1, 8-2, 8-6, 8-7, 11-3

Uncompahgre subwatershed, 2-3, 3-2, 3-6, 3-7, 3-9, 3-10, 3-13, 3-20, 3-21, 3-22, 3-23, 3-24, 3-25, 3-31, 3-32, 3-33, 3-34, 3-38, 3-40, 3-41, 3-43, 3-46, 3-52, 3-57, 3-58, 3-59, 3-62, 3-67, 3-70, 3-72, 3-73, 4-2, 4-6, 5-1, 5-5, 5-18, 5-19, 5-22, 5-35, 5-40, 5-50, 5-56, 5-59, 5-64, 5-67, 5-71

Water Quality Control Division, 2-2, 3-62, 5-2, 8-3

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