USDA United States Department of Agriculture
Natural Resources Conservation Service

Version 3 / 2019

# STEPS for small acreage rural living in OREGON

## Tools and Resources to Design a Customized Land Management Strategy for Your Small Acreage Property

MANAGEMENT PLAN BLVD.

SOIL ASSESSMENT LN.

HEALTHY HABITAT RD.

# TABLE OF CONTENTS

## Getting Started


1 Introduction to the STEPS Workbook

3 Set Your Land Management Goals

5 Map Your Property

7 Inventory Your Resources


## Completing the Worksheets


9 Completing Your STEPs Worksheets

- 11 Forest Assessment
- 21 Grazing Assessment
- 29 Irrigation Assessment
- 37 Manure Assessment
- 45 Soil Assessment
- 53 Stream Assessment
- 63 Weed Assessment
- 71 Wildlife Assessment

79 Glossary

87 Contacts and Acronyms

92 Acknowledgements

In accordance with Federal civil rights law and U.S. Department of Agriculture (USDA) civil rights regulations and policies, the USDA, its Agencies, offices, and employees, and institutions participating in or administering USDA programs are prohibited from discriminating based on race, color, national origin, religion, sex, gender identity (including gender expression), sexual orientation, disability, age, marital status, family/parental status, income derived from a public assistance program, political beliefs, or reprisal or retaliation for prior civil rights activity, in any program or activity conducted or funded by USDA (not all bases apply to all programs). Remedies and complaint filing deadlines vary by program or incident.

Persons with disabilities who require alternative means of communication for program information (e.g., Braille, large print, audiotape, American Sign Language, etc.) should contact the responsible Agency or USDA's TARGET Center at (202) 720-2600 (voice and TTY) or contact USDA through the Federal Relay Service at (800) 877-8339. Additionally, program information may be made available in languages other than English.

To file a program discrimination complaint, complete the USDA Program Discrimination Complaint Form, AD-3027, found online at How to File a Program Discrimination Complaint (**www.ascr.usda.gov/filing-program-discrimination-complaint-usda-customer**) and at any USDA office or write a letter addressed to USDA and provide in the letter all of the information requested in the form. To request a copy of the complaint form, call (866) 632-9992. Submit your completed form or letter to USDA by: (1) mail: U.S. Department of Agriculture, Office of the Assistant Secretary for Civil Rights, 1400 Independence Avenue, SW, Washington, D.C. 20250-9410; (2) fax: (202) 690-7442; or (3) email: **program.intake@usda.gov.**

USDA is an equal opportunity provider, employer, and lender.

# INTRODUCTION
## to the STEPS Workbook

**STEPS FOR SMALL ACREAGE, RURAL LIVING ON SMALL ACREAGES IN OREGON**
Is a comprehensive tool designed to help small acreage landowners evaluate the condition of their property and identify methods for managing and enhancing the land. The following steps will help you navigate this workbook to develop an effective land management plan.

### STEP 1: Complete the Land Management Goals Worksheet

This worksheet was developed to help focus your efforts. Each goal includes common management considerations that you may need to address. Space is provided to add additional items specific to your unique production.

### STEP 2: Develop a Baseline Map

Use the worksheet provided to develop a map of your property to aid in envisioning the results of your management plan.

### STEP 3: Inventory your Resources

This will provide the foundation information for your land to use as a reference as you work through the other worksheets.

### STEP 4: Complete the STEP Worksheets for Your Operation

Each worksheet contains a set of questions to help you assess conditions and evaluate how your management decisions affect natural resources. Select and then complete the set of worksheets relevant to your acreage.

### STEP 5: Identify the Options and Actions Right for You

On each worksheet, you will find management options, information resources, and contact information. You may find you can make improvements on your own, or you may decide to obtain professional assistance for more intensive treatments, such as structural or engineered practices. Whatever options you choose, each section of the STEPs packet will help you find more information and assistance.

# SET LAND
## management goals

The worksheets in this packet will help you identify strategies to maintain and improve the natural resources on your property. To begin, develop a vision of how you want your land to look in the coming years. Whether you want to improve conditions or maintain the land as it is, establishing a plan will help you make good decisions both now and in the future. This is the first step to a successful land management strategy that is right for you, your family and your property.

Instructions: First, record your vision for the land in the coming years. Include what you want the property to look like and how you plan to use the land. Then, identify the specific land management goals that relate to your overall vision. For goals you have checked, identify the relevant outcomes for your acreage from the corresponding list or add your own in the space provided.

**VISION FOR THE LAND IN 5-10 YEARS**

**Example:** The water in our stream is clean and provides habitat for native fish. Blackberries and weeds have been eliminated and/or controlled on our property. We have established a productive pumpkin patch in the northeast field. We are able to keep and graze four horses while protecting the condition of our pastures and streams.

_____

_____

_____

_____

| | Goals | Outcomes |
|---|---|---|
| ❑ | Improve or maintain the aesthetic beauty of the property and quality of life | • Selected land uses are carried out in a sustainable manner that helps maintain a desirable quality of life<br>• Plant and animal pests are kept in check<br>• Healthy plant communities and a scenic landscape are maintained<br>• Excess water from heavy rains does not damage structures, roads, streambanks, livestock or crops; runoff does not convey contaminants to ground and surface waters<br>_____<br>_____ |
| ❑ | Keep healthy horses, cattle or other livestock on the property | • Animals are healthy with proper diet and conditions<br>• Animals have plenty of high-quality forage to graze<br>• Streams are protected from animal waste and trampled streambanks<br>• Manure is properly handled and does not present a hazard to people, water bodies or animals<br>• Livestock odors are managed appropriately for the area<br>_____<br>_____ |

***Goals/Outcomes Worksheet*** continued →

*Vision for the Land continued*

| | Goals | Outcomes |
|---|---|---|
| ❑ | Maintain healthy soil to support plants and animals, as well as natural water and nutrient cycles | • The soil is fertile and contains a healthy mix of organic matter to support plant growth<br>• Healthy plant communities provide cover at the appropriate times of year<br>• Soil erosion is controlled<br>• Animals are rotated among pastures to prevent heavy traffic and overuse causing soil compaction and poor water infiltration<br>_____<br>_____ |
| ❑ | Protect the quality and quantity of water in local streams, groundwater sources, and other water bodies | • Streambanks are protected from erosion with thick, diverse streamside vegetation<br>• Fertilizer and pesticide applications are applied properly to keep chemicals out of water bodies<br>• Landowners with an irrigation right use only the water needed at the appropriate time to optimize plant health and conserve stream water<br>• Irrigation systems are maintained and updated for maximum efficiency<br>• Natural floodplains, wetlands and unpaved natural areas are utilized to recharge groundwater supplies and act as buffers for water runoff<br>_____<br>_____ |
| ❑ | Provide healthy habitats for native wildlife | • Natural cover and nesting habitat for desired wildlife species are provided by a variety of plants<br>• Food and water sources are available year-round<br>• Fish have plenty of clean, cool water to support migration, spawning and rearing<br>• Fish screens protect aquatic species from irrigation intakes<br>• Wildlife is not threatened by human activity, roadways or domestic pets<br>_____<br>_____ |
| ❑ | Other | _____<br>_____<br>_____<br>_____<br>_____<br>_____ |

**Congratulations!** You have completed the first step in developing a customized land management strategy. As you work through the following *STEPs Worksheets*, keep these goals and outcomes in mind and look for activities that will help you address these priorities.

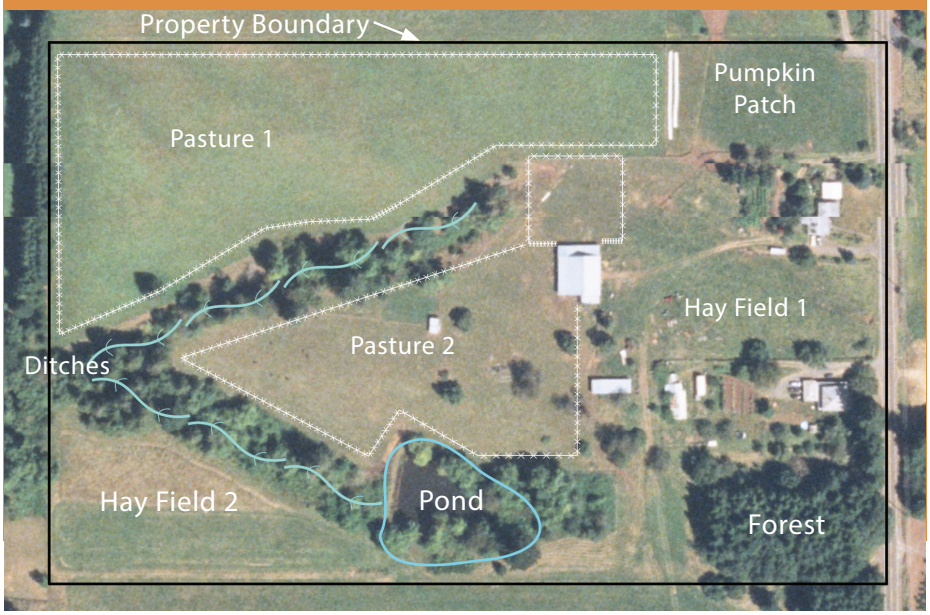
# MAP
## your property

The next step in a customized land management strategy is to inventory the features of your property on a land use map. The example below illustrates the types of features to include when developing a map of your property. The base image of the schematic is from Web Soil Survey, a free online natural resource information system. Web Soil Survey is available for public use at: **http://websoilsurvey.nrcs.usda.gov.**

To create your own map, download a map image from the Web Soil Survey or any other map source. Various websites provide resources to generate and print maps for free. If you prefer, you may create your own schematic by hand. A template is provided on the following page.

Next, mark the fields, structures, land forms, water bodies, problem areas, and other notable uses and features, including historic and/or archaeological sites. If you draw your own map, sketch the property's main features on the following page. The map you create will serve as your reference point for planning future activities, such as the placement of fences or trees. Keep the map as a record of your baseline or starting point. As you implement changes, be sure to update your property map.

**Site:** Breezy Hills Farm **Date**: Sept. 2018




## Using Web Soil Survey

You can do much more than generate a map with Web Soil Survey. Go to the ***Suitabilities and Limitations for Use*** section under the Soil Data Explorer tab. The information available here includes:

- **Land Classification:** Maps and reports for Farmland Classification to identify areas of prime farmland or Capability Class (a ranking of soil suitability for cropland).
- **Vegetative Productivity**: Maps and reports of expected crop yields for a variety of crops, including hay and pasture.
- **Building Site Development**: Maps and reports with information on soil limitations for home sites.
- **Soil Properties and Qualities:** Information on depth to seasonal high water tables as well as flooding and ponding frequency.

## MAP YOUR PROPERTY

**Instructions:** Print and attach your property map here, or create your own schematic using the template provided below. As you make improvements to your property, be sure to attach updated maps or add features to your original image.

**Legend:** *Common symbols to use for hand-drawn maps*

**Site:** _____ **Date:** _____

| | | | |
|---|---|---|---|
| Fence | Stream | Manure Storage | Pasture |
| Property Boundry | Pond | Forest | Field Number |
| Cropland | Well | Slope | |

N

# INVENTORY
## your resources

Now that you have mapped your property, use the worksheet on the following page to capture more detailed information about each section of your property, including the land use, size, soils, plants, problems, and general observations about current conditions. An example of a completed worksheet based on the sample property mapped in the previous section is provided below.

*Use the directions below to complete the following worksheet:*

**Field:** List each section of your property.

**Acres:** List the approximate size of each section of your property.

**Land Use:** List the major land use for each section of your property (i.e. hay, pasture, crops, wetland).

**Land Characteristics:** Describe the natural resources present on your land. Be sure to include soil information. Look up soil types using the ***Web Soil Survey*** website: **http://websoilsurvey.nrcs.usda.gov**. Information is also available on soil suitability, limitations, properties, and reports for your area. For further information, consult the ***Web Soil Survey*** home page, or contact your local USDA Natural Resources Conservation Service (NRCS) or Soil and Water Conservation District (SWCD) office.

**Opportunities:** Record any opportunities to make improvements. Make note of all natural resource concerns, seasonal problems, eyesores, maintenance hassles or production issues.

**Site:** *Breezy Farms* **Date:** *October 2018*

**Field:** *Pasture # 1* **Acres:** *5 acres* **Land Use:** *Pasture*

**Land Characteristics:** *Map indicates a clay surface layer with 8-15% slopes and a slow intake rate for water*

**Opportunities:** Natural Resource Maintenance & Others *Correct Uneven Grazing; Improve poor grass stands, decreasing invasive species and weeds; Muddy areas on south side*

EXAMPLE

***Resource Worksheet*** continued →

**Site:** _____ **Date:** _____

**Field:** _____ **Acres:** _____ **Land Use:** _____

**Land Characteristics:** _____

**Opportunities:**
Natural Resource
Maintenance & Others

**Field:** _____ **Acres:** _____ **Land Use** _____

**Land Characteristics:** _____

**Opportunities:**
Natural Resource
Maintenance & Others

**Field:** _____ **Acres:** _____ **Land Use** _____

**Land Characteristics:** _____

**Opportunities:**
Natural Resource
Maintenance & Others

**Field:** _____ **Acres:** _____ **Land Use** _____

**Land Characteristics:** _____

**Opportunities:**
Natural Resource
Maintenance & Others

# COMPLETING
## your STEPS worksheets

Now that you have established your land management goals and inventoried your property, you are ready to complete the steps worksheets.

As you begin going through the worksheets and answering the questions provided, you will begin to assess conditions on your land and learn about a number of management options. Keep in mind that the alternatives provided are general in nature. The distinct features of your land — and the specific uses and goals you have for it — make each section unique.

As you begin to identify actions that may be appropriate, consider whether you can make improvements on your own. Many options will require specific considerations pertaining to the unique geography, hydrology, plants, wildlife, and other features and conditions on your property. Some of these activities may require technical expertise. Sources for more information and assistance are listed in each section.

In addition, you should know that regulations and permit requirements vary depending on location, land use, and other factors. As a landowner, it is important to learn about the regulations applicable in your area. As you move forward with your land management goals, remember that an abundance of information and assistance is available through natural resource agencies, organizations and businesses.

The following worksheets are available to complete. Select the worksheets that best fit your operation:

- ❑ **FOREST ASSESSMENT**
- ❑ **GRAZING ASSESSMENT**
- ❑ **IRRIGATION ASSESSMENT**
- ❑ **MANURE ASSESSMENT**
- ❑ **SOIL ASSESSMENT**
- ❑ **STREAM ASSESSMENT**
- ❑ **WEED ASSESSMENT**
- ❑ **WILDLIFE ASSESSMENT**

# FOREST ASSESSMENT

With proper management, you can maintain healthy forestland on your property. Forests can be managed for a single use, such as timber production, or for multiple uses, such as wildlife habitat, recreation, livestock grazing and/or timber production. To help you manage your forestland, you need to decide which of these uses are important to you. You likely have a primary use planned that will guide your overall management and decision-making processes. If secondary and tertiary uses are also important to you, allow these to guide your decisions as well. This worksheet will help you ensure that the vegetation and ecosystems on your forestland function properly for the land uses you have identified.

In a healthy forest, the larger overstory trees, smaller understory trees, and ground vegetation are all in good condition. The distribution of vegetation and the number of trees per acre will differ depending on where you property is located within the state. Soil type, precipitation, temperature, tree species and your land use objectives are also factors that affect the density and distribution of vegetation on your forestland.

## STEP 1: Identify The Tree Species On Your Forestland

Instructions: Conduct a basic assessment of your forestland by answering the following questions. If you identify management needs and/or issue that may require professional assistance, refer to the last page of this assessment for a list of resources.

1. There are many references to help you identify tree species present in Oregon. Refer to the Common Trees of the Pacific Northwest page on the Oregon State University website at: **http://oregonstate.edu/trees.**

*Select all that are present:*

- ❑ Douglas-fir
- ❑ Ponderosa pine
- ❑ Grand fir
- ❑ Western hemlock
- ❑ Western larch
- ❑ Bigleaf maple
- ❑ Red alder
- ❑ Oregon white oak

*Others (list):*

_____

_____

_____

_____

2. Your local natural resources contact may suggest additional sources of information for identifying tree species. List other tree identification sources and forestry websites below for future reference.

_____

_____

_____

_____

## STEP 2: Determine The Types Of Trees Your Soil Will Support

Refer to the Web Soil Survey (**http://websoilsurvey.nrcs.usda.gov**), described earlier in the ***Map Your Property*** section to complete the following worksheet. Please, note forest productivity data may not be available in Web Soil Survey for some properties due to the lack of forest site data during the initial survey.

### 1. Describe the soils present on your property.

*After you delineate your property in Web Soil Survey, click the "Soil Map" tab. On the left-hand side of the screen, you will see a list of the soils present on your land. Click on a soil name to view the description, which will provide information on the soil's properties, qualities, and major land uses.*

### 2. Record the site index values for the trees found on each soil.

*Next, click on the "Soil Data Explorer" tab. On the left-hand side of the screen, you will see a list of the soils reports available to you. Under "Vegetative Productivity," select "Forest Productivity," then click "View Soil Report." Scroll down to the bottom right-hand side of the screen to view the site index values for relevant tree species. The site index value gives you the average height trees will attain at a given age (either 50 or 100 years) on a specific soil. Generally, a higher site index value means the soils can support more trees per acre. The value allows you to compare the growth potential for trees on different soils. The site index will also help you evaluate you current stand.*

### 3. List the trees identified to manage for on your property.

*On the same table with the site index values, you will see a column titled "Trees to Manage." The species listed here are preferred for planting, seeding or natural regeneration on the respective soils.*

### 4. Record any additional information.

## STEP 3: Evaluate The Health Of Your Trees

Record any indications of possible tree health problems by answering the questions below. For any YES answer, provide a description in the space provided.

☐ No ☐ Yes

**Dead Trees/Plant Matter:** Are there dead or dying branches in the tree canopy and/or discolored leaves or needles?

☐ No ☐ Yes

**Evidence of Insect Attack:** This may include signs of white or pink pitch tubes on the bark, brown sawdust at the base of the tree, dead sections of a tree canopy, and/or large amounts of green needles on the ground.

☐ No ☐ Yes

**Witches Brooms:** Are there thick masses of dense foliage in the tree canopy?

☐ No ☐ Yes

**Dead/Forked Treetops:** Do trees have forked tops, dead tops with new leaders (dominant upright stems) developing or dead tops with no new leader?

☐ No ☐ Yes

**Weeds:** Are there any native or non-native plants that are overcrowding or dominating the plant community?

## STEP 4: Research and Apply Management Options to Improve Tree Health

*If you answered "yes" to any of the health problems identified on the previous page, consider applying the following management options:*

**Dead Trees/Plant Matter:**

- ☐ Remove dead trees
- ☐ Designate areas for wildlife habitat
- ☐ Other: _____

**Insect Attack:**

- ☐ Cut infected trees
- ☐ Cut trees adjacent to infected trees to prevent spread
- ☐ Other: _____

**Witches Brooms:**

- ☐ Prune infected branches
- ☐ Remove infected trees and plant with more persistent stock
- ☐ Other: _____

**Dead/Forked Treetops:**

- ☐ Remove deformed or injured trees
- ☐ Maintain trees for wildlife
- ☐ Other: _____

**Weeds:**

- ☐ Spray or mow weeds
- ☐ Plant trees and maintain planting
- ☐ Other: _____

## STEP 5: Complete The Forest Stand Inventory

*1. Do you know the density of the forest stand (the number of trees per acre)?*

☐ Yes ☐ No

*2. Do you know the average diameter of the trees on your forestland?*

☐ Yes ☐ No

*If you answered "No" to either of the above questions, complete the following worksheet. Discuss your results with a professional forester in your area. The information you collect here will help you assess proper management practices.*

☐ **A. Establish a fixed plot size.** *A fixed plot can be any size, but should be large enough to be representative of the entire stand. Round plots are the easiest to lay out; the plot radius depends on the size of the plot.*

1. Determine a plot size and the corresponding radius measurement (e.g. 11.8 foot radius for 1/100 acre, 16.6 foot radius for 1/50 acre or 20 foot radius for 1/35 acre).
2. Consider using a 1/35 acre plot. The radius is 20 feet and is a manageable size.
3. Locate a representative plot within your forestland. Establish a plot center point and mark with a stake.
   a. Affix a measuring tape (or string) to the stake and measure out 20 feet, or the length of your plot radius. Holding the measuring tape, walk around the circle maintaining the radial length from the center point. You will have to maneuver the tape around the trees when you count the trees in your plot.
   b. Another way to layout a round plot is to make an "X" with the plot center being the center of the "X". Measure out 20 feet (or your radius) from the center in an "X" pattern to determine the circle's edge. Mark the edges with a stake or flagging; these are the arcs of the circle.

**Plot size**: _____

*Example: 1/100 acre plot, 11.8 inch radius*

☐ **B. After establishing a plot, count the number of trees within the plotted area.**

*Count only the trees that are greater than 4 feet in height.* **Number of Trees**: _____

*Example: 5 trees*

☐ **C. Compute the number of trees per acre.**

**Number of trees per acre**: _____

*inverse of the plot size * number of trees counted*

*Example: (100/1) * 5 = 500 trees per acre*

☐ **D. Record the average tree diameter.** *Measure the diameter of all the trees that are taller than 4.5 feet and have a diameter of 3 inches or more in the established plot. Measure the diameter of the trees at 4.5 feet above the ground.*

**Average Tree Diameter**: _____

*Calculate by taking the sum of all diameters measured divided by the number of trees measured.*

**EXAMPLE:**

| Number of Trees | Diameter |
|---|---|
| 1 | 5.0" |
| 2 | 6.1" |
| 3 | 3.0" |
| 4 | 4.6" |
| 5 | 9.0" |

**Average by totalling the diameters**

5.0 + 6.1 + 3.0 + 4.6 + 9.0 = 27.5

**Divide by total trees**

27.5/ 5 = 5.54

**Average Diameter = 5.54"**

## STEP 6: Implement Management Practices To Reduce Risk Of Wildfire

*Is wildfire a source of concern on your property?*

☐ No ☐ Yes

*If YES, consider the following management options:*

- ☐ Reduce brush quantity
- ☐ Thin overstocked stands
- ☐ Prune lower tree branches
- ☐ Reduce tree material on the forest floor
- ☐ Establish permanent firebreaks
- ☐ Contact the Oregon Department of Forestry at least 15 days prior to beginning any forest management activities

## STEP 7: Complete The Forestland Enhancement Worksheet On The Following Page

*Complete each field of the accompanying Woodland Enhancement Worksheet. Use the guide below to complete each section.*

Field: Indicate each section of your property

Deadline: Indicate a deadline for completing your goals.

Goal: List goals for each section of your property

Action: Describe methods for achieving your goals. Include a list of the resources and assistance you may need to achieve your goals

**Field:** *SW forest* **Deadline:** *June 2018*

**Goal:** *Restore plant diversity*

**Action:** *Plant trees including diverse understory species*

EXAMPLE

***Forestland Enhancement Worksheet*** continued →

**Field:** _____ **Deadline:** _____

**Goal:** _____

**Action:** _____

**Field:** _____ **Deadline:** _____

**Goal:** _____

**Action:** _____

**Field:** _____ **Deadline:** _____

**Goal:** _____

**Action:** _____

**Field:** _____ **Deadline:** _____

**Goal:** _____

**Action:** _____

**Field:** _____ **Deadline:** _____

**Goal:** _____

**Action:** _____

**Field:** _____ **Deadline:** _____

**Goal:** _____

**Action:** _____

| TIP: 1 | Improve Your Woodlands |
|---|---|

- ✓ Maintain diverse tree ages.
- ✓ Thin tree stands periodically to prevent overcrowding.
- ✓ Design, construct and maintain roads to provide drainage, prevent erosion and reduce costs. Ensure roads are located far from stream edges.
- ✓ Control competing vegetation and protect seedlings from grazing until established.
- ✓ When using chemicals for control, obtain the necessary permits. Avoid spraying neighboring vegetation and surroundings. Be sure to select the correct chemical for the type of vegetation and follow all label directions.
- ✓ Dispose of large amounts of slash (logging debris) to reduce the risk of fire. Pruning trees may also reduce fire hazards, while improving the stand.

## Gather Additional Information and Assistance

- ✓ Oregon Department of Forestry (ODF):
  **www.oregon.gov/ODF**
- ✓ ODF Private Forests Program:
  **www.oregon.gov/ODF/Working/Pages/default.aspx**
- ✓ Oregon State University Extension Service:
  **http://extensionweb.forestry.oregonstate.edu**
- ✓ Know Your Forest
  **http://www.knowyourforest.orgh**
- ✓ Natural Resources Conservation Service (NRCS):
  **www.or.nrcs.usda.gov**

**NOTES:**

# GRAZING ASSESSMENT

With good management, your pasture can produce vigorous grass stands with sufficient forage for the type and number of livestock you keep. The amount and quality of forage will depend on how you manage your land for grazing. Livestock will graze less in areas containing plants not palatable as forage; areas too far from water and mineral supplements; or areas too large in size to encourage even use of the entire unit. With proper management, you can control how and where your animals graze, and as a result, improve both plant conditions and herd health. For example, many livestock owners fence large pastures into smaller units. Animals can then be rotated through the pastures on a planned schedule that gives forage time to rest and regrow vigorous stands. With rotational grazing, you also have the opportunity to inspect animals more frequently and are often able to detect health problems in the herd earlier. At the same time, the soil will benefit from less erosion and damage from heavily used areas. Controlling livestock movement also results in better distribution of manure as plant fertilizer and reduces the risk of water contamination from concentrated nutrients in runoff.

**STEP 1:** Complete The Following Grazing Assessment

Instructions: The following questions will help you conduct a basic self-assessment of your grazing management. Answer the questions below to identify areas where you may be able to improve grazing with pasture management strategies.

*1. On pastures and grazed lands, how many of the plants are grazed by livestock, as compared to plants that livestock do not touch?*

| | | |
|---|---|---|
| ❑ | More than 80% | You are managing for uniform grazing use and likely have a healthy mix of plants. |
| ❑ | 50% to 80% | Grazing may be slightly improved with additional water points, smaller grazing units, and targeted placement of salt or mineral supplements. |
| ❑ | 20% to 50% | Grazing would likely be improved by incorporating additional watering points, smaller grazing units, and/or targeted placement of salt or mineral supplements. |
| ❑ | Less than 20% | Consider replanting with forage species that are more suited to your livestock. Also, consider adding additional water points, smaller grazing units, and/or targeted placement of salt or mineral supplements. |

*2. Do you have a problem with livestock eating or coming into contact with noxious plants, invasive or undesirable plants?* Check all that apply.

| | | |
|---|---|---|
| ❑ | Noxious weeds | Consider control measures as recommended by a licensed pesticide consultant. Change management practices to favor desired plants. |
| ❑ | Invasive plants | Consider control measures as recommended by a licensed pesticide consultant. Change management practices to favor desired plants. |
| ❑ | Undesirable plants | Consider improving grazing uniformity. Replanting with more desirable species and adding additional watering points, smaller grazing units, and/or targeted placement of salt or mineral supplements may help. |

***Grazing Assessment*** continued →

**Grazing Assessment** *(cont.)*

*3. At the beginning of the grazing season, usually in April, how tall is the forage on your pasture?*

| | |
|---|---|
| ☐ More than 8 inches | If the forage is leafy, this is a good height to begin grazing. If stems are present in the spring, you may consider earlier management activities, such as clipping, haying or increasing grazing to leave 4-8 inches of leafy materials at the end of the season. |
| ☐ 4 — 8 inches | Try to allow the forage to reach 8 inches in height before grazing. |
| ☐ Less than 4 inches | Consider allowing more time without grazing in the latter half of the growing season to encourage better regrowth of leaves and roots. This will improve the vigor of your grass stand in the spring. |

*4. During the grazing season in spring and summer, how tall is the forage when you typically decide to move livestock to graze a different area?*

| | |
|---|---|
| ☐ More than 8 inches | Consider extending the grazing time in the pasture, reducing the size of the pasture, grazing with more animals or use one or more pastures for hay to increase grazing intensity. |
| ☐ 4 — 8 inches | A height of 4 - 8 inches may be preferable when you remove livestock from the pasture. |
| ☐ Less than 4 inches | Consider reducing the grazing time and/or animal numbers, enlarging the grazed area, or adding supplemental feed. |

*5. When grazing is finished at the end of the season, usually in October, how tall is the forage?*

| | |
|---|---|
| ☐ More than 8 inches | Consider clipping, haying or increasing grazing earlier in the season to achieve an 8-inch forage height. |
| ☐ 4 — 8 inches | If forage is under 8 inches in height, consider ending grazing earlier to allow for regrowth. |
| ☐ Less than 4 inches | Defer grazing in the latter half of the growing season to encourage plant regrowth. |

*6. Do you rotate livestock regularly between pastures or do they graze on a single pasture continuously?*

| | |
|---|---|
| ☐ Continuous | Consider dividing livestock into several groups and rotating them between pastures. You may need to subdivide existing pastures. Rotational grazing allows plants to re-establish leaf and root systems. |
| ☐ Rotated | Allow for 4 to 8 inches of plant height (mostly leaves) prior to grazing to improve forage quality and plant health. |

*7. How would you describe the condition of your livestock?*

| | |
|---|---|
| ☐ Underweight/ unhealthy | Work with your veterinarian to determine the causes. If poor animal health is associated with grazing conditions, contact a professional for help. |
| ☐ Healthy | Maintain your grazing system and re-assess animal health if changes occur. |

## STEP 2: Consider Additional Grazing Improvements

*As you review your responses on the Grazing Assessment in Step 1, consider implementing one or more of the following actions to improve grazing conditions for your animals while protecting the soil, water and plants on your grazed land.*

- ☐ Add permanent or temporary fencing to control grazing patterns and movement of livestock
- ☐ Balance grazing pressure with plant growth by rotating animals among pastures based on the number of animals, height of grasses and timing of scheduled grazing
- ☐ Replant pastures with more desirable forage species
- ☐ Add or develop sources of water for livestock
- ☐ Reduce the number of animals on your land
- ☐ Graze less and increase the amount of feed you purchase
- ☐ Secure additional pastureland
- ☐ Implement a fertilizer program

## STEP 3: Complete the Grazing Enhancement Worksheet on the Following Page

*Using the guide below, complete the Grazing Enhancement Worksheet.*

Field: Indicate each section of your property

Deadline: Indicate a deadline for completing your goals

Goal: List your goals for each section of your property

Action: Describe methods for achieving your goals and include a list of the resources and assistance you may need to achieve your goals

**Field:** *SW pasture* **Deadline:** *January 2018*

**Goal:** *Manage weeds*

**Action:** *Implement a weed management plan*

EXAMPLE

***Grazing Enhancement Worksheet*** continued →

**Field:** _____ **Deadline:** _____

**Goal:** _____

_____

**Action:** _____

_____

**Field:** _____ **Deadline:** _____

**Goal:** _____

_____

**Action:** _____

_____

**Field:** _____ **Deadline:** _____

**Goal:** _____

_____

**Action:** _____

_____

**Field:** _____ **Deadline:** _____

**Goal:** _____

_____

**Action:** _____

_____

**Field:** _____ **Deadline:** _____

**Goal:** _____

_____

**Action:** _____

_____

**Field:** _____ **Deadline:** _____

**Goal:** _____

_____

**Action:** _____

_____

## TIP: 1 Implement a Rotational Grazing System

The process of moving livestock among multiple pastures is known as rotational grazing. Rotational grazing improves pasture health by encouraging forage regrowth.

**STEP 1:** Fence pastures into smaller units. Ensure water is available in each section.

**STEP 2:** Rotate animals on a planned schedule that allows forage time to rest and regrow (roughly 30 days for irrigated pastures and three months for non-irrigated pasture). Beginning stands should be between 6” to 8” in height.

**STEP 3:** Move livestock to another pasture when grass height is reduced below 4 inches.

### Benefits of Rotational Grazing:

- Maintains healthy grass stands
- Improves ability to monitor livestock health
- Reduces erosion and soil damage
- Improves manure distribution and reduces the risk of water contamination from concentrated nutrients in runoff

## TIP: 2 Manage Overgrazing

Overgrazing occurs when more than 50 percent of the plant’s leaf volume is removed in one rotation (see Table 1). Overgrazing stops root growth and reduces grass production. Pay special attention to areas close to water where livestock tend to graze more heavily.

To improve grazing distribution, consider the following management options:

- Install additional water sources, such as a stock tank or nose pump. *(Be sure to check on your water rights prior to installation.)*
- Add additional tanks and pumps rather than allow livestock to drink from creeks and rivers. This will protect streambanks and maintain streamside grasses and shrubs.

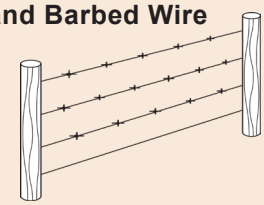
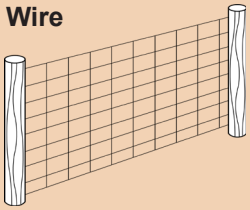
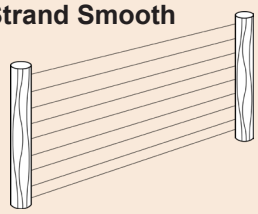
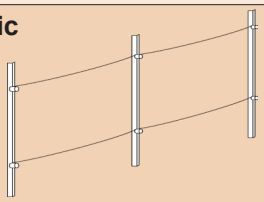
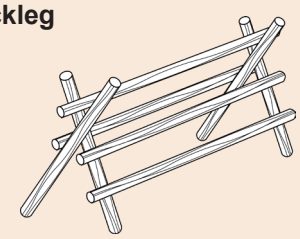
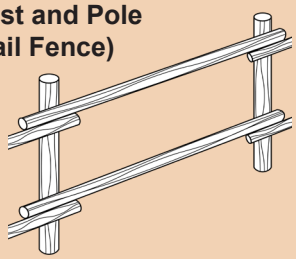
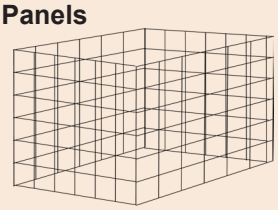
**Overgrazing Assessment Chart**

| % Grass Plant Removed | | % Root Growth Stopped |
|---|---|---|
| 10% | → | 0% |
| 20% | → | 0% |
| 30% | → | 0% |
| 40% | → | 0% |
| 50% | → | 2-4% |
| 60% | → | 50% |
| 70% | → | 78% |
| 80% | → | 100% |
| 90% | → | 100% |

**Table 1:** Impact of grazing on root growth

*TIPS* continued →

**TIP: 3** Selecting the Best Fence for Your Pasture

| Fence Type | Advantages | Disadvantages |
|---|---|---|
| **4-Strand Barbed Wire**  | ✓ Good for cattle control | ✓ May cause injury to animals<br>✓ Labor and materials cost is high<br>✓ Periodic maintenance required |
| **Woven Wire**  | ✓ Good for sheep control<br>✓ Discourages predators | ✓ Unsafe for wildlife<br>✓ Labor and materials cost is high<br>✓ Moderate maintenance is necessary |
| **4-10 Strand Smooth Wire**  | ✓ Good for horses<br>✓ Good for wildlife<br>✓ 8-10 strand will contain large, exotic animals | ✓ Labor and materials cost is high<br>✓ Periodic maintenance required |
| **Electric**  | ✓ Good for establishing pasture rotation program on small acreages<br>✓ Lightweight and portable<br>✓ Relatively inexpensive | ✓ Weathers poorly<br>✓ May not exceed lengths over 1,000 feet<br>✓ Requires regular maintenance<br>✓ Requires solar or electric power source |
| **Jackleg**  | ✓ Aesthetically appealing<br>✓ Durable<br>✓ Withstands heavy snow<br>✓ Good in areas where it is hard to dig or drive posts<br>✓ May be adapted to marshy, wet areas<br>✓ Low maintenance | ✓ High labor and materials cost |
| **Post and Pole (Rail Fence)**  | ✓ Durable in many areas<br>✓ Withstands heavy snowfall<br>✓ Low maintenance | ✓ High labor and materials cost<br>✓ Less durable in high rainfall areas |
| **Hog Panels**  | ✓ May be formed into small, portable pen<br>✓ Inexpensive and easy to construct<br>✓ Good for establishing rotational grazing | ✓ Appropriate for only a few small animals<br>✓ High labor - should be moved once or twice each day |

***TIPS*** continued →

## Gather Additional Information and Assistance

- ✓ *Oregon State University Extension Service*
  **http://smallfarms.oregonstate.edu/**
- ✓ *Soil and Water Conservation District*
  **www.oacd.org/**
- ✓ *Natural Resources Conservation Service (NRCS)*
  **www.or.nrcs.usda.gov**

**NOTES:**

# IRRIGATION ASSESSMENT

You can improve the health of your plants, help keep local water supplies clean, and save water, energy and money by managing how water is used during irrigation. Keep in mind that the right balance of water for plants creates a healthy crop or pasture. According to the U.S. Geological survey, irrigation to produce our nations food and fiber, accounts for the largest use of fresh water in the United States, totalling 137 billion gallons used each day. You can save water and help keep your streams and groundwater clean by adjusting the way you irrigate. Irrigation Water Management (IWM) is a term for irrigation strategies landowners and farmers employ to help them save water, conserve energy and reduce the amount of contaminants entering water supplies, ultimately improving plant health. This worksheet will help you determine which irrigation water management strategies may fit the conditions on your property.

## STEP 1: Assess Your Current Irrigation Practices

Instructions: Complete the following worksheet to identify where you may be able to improve irrigation effectiveness and efficiency. This information will also be useful if you choose to work with a natural resource professional to develop a detailed irrigation plan.

*1. Do you irrigate only when plants need water, rather than on a regular schedule?*

❑ No ❑ Yes

If "no," be aware that scheduling regular irrigation by the calendar is less effective than watering according to actual plant needs. The weather, plant size and age, plant variety and condition, rooting depth, soil type and soil moisture available at a given time all affect how much and how often you need to water. Generally speaking, the greatest water use is in the middle of the growing season or when plants are growing rapidly and nearing maturity. Young, developing plants use less water as do mature plants. Water use by perennial crops like grass and pasture is different from those crops that mature within the season. Current crop water use information is available from AgriMet (**www.usbr.gov/pn/agrimet/**). Over-watering can reduce plant quality by drowning roots, stressing plants, causing plant diseases, reducing nutrient uptake, and leaching nutrients and pesticides away from the root zone and into water supplies where they may be harmful. Applying only the amount of water needed will result in healthier plants that will be more resistant to disease and pests.

*Consider the following STEPs to determine when to irrigate:*

❑ **GATHER information to help you time irrigation application with:**

- ✓ Crop water use information from AgriMet **(www.usbr.gov/pn/agrimet/)**, historical evapotranspiration data **(http://extension.oregonstate.edu/catalog/pdf/em/em8530.pdf)**, and/or on-site weather monitoring equipment.
- ✓ Crop observations

***Irrigation Assessment*** continued →

- ❑ **ASSESS soil moisture by feel or by using field probes or other instruments**
  - ✓ Soil-probe and estimating soil moisture by feel and appearance **https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs144p2_051845.pdf.**
  - ✓ Soil moisture sensors
  - ✓ Estimate soil moisture youtube: **www.youtube.com/watch?v=B8hRPziKkAY**

. ❑ **ADJUST your irrigation schedule according to seasonal changes**.

*2. Does your system irrigate in a uniform manner across the entire area so that there are no areas that are too dry or too wet?*

❑ No ❑ Yes

*If "no," be aware that properly functioning irrigation equipment that applies water in a uniform manner will have a tremendous impact on irrigation efficiency and plant health. When sprinklers and nozzles deliver water to the ground evenly, you can avoid creating areas that become too wet while others remain too dry.*

*When equipment delivers water unevenly, it is difficult to determine when and how much to water. This fact is true for areas irrigated by all irrigation systems—sprinkler, drip, and surface. If you do not know whether your irrigation system delivers water evenly across the entire area, you can easily conduct an irrigation system field test, as described in Tip 3 on page 33.*

*3. Do you inspect your irrigation system (sprinklers, nozzles, pumps, hoses, etc.) to ensure it is functioning properly?*

❑ No ❑ Yes

*If "no," be aware that you may be able to reduce water use, chemical applications, and energy needs simply by keeping your irrigation equipment in good repair. A useful tool to help you conduct a more thorough evaluation of your irrigation system is the Irrigation System Walk-through Inspection Analysis, publication number PNW 293 developed by the Pacific Northwest Extension (Oregon, Idaho and Washington) This is found online at:*

**http://ir.library.oregonstate.edu/jspui/bitstream/1957/15996/1/pnw293.pdf**

*Potential problems to look for, include*:

- ❑ Pressure that is too low or too high
- ❑ Nozzles that are mismatched or improperly sized
- ❑ Plugged nozzles
- ❑ Spray deflection or other obstruction to the flow of water
- ❑ Drip line with plugged emitters and uneven water distribution
- ❑ System leaks - including sprinklers, gaskets, fittings and pipes
- ❑ Ditches with dense grass and/or weed growth and poor water control structures

**STEP 2:** Complete the Irrigation Enhancement Worksheet on the following page

*Use the guide below to complete each section of the Irrigation Enhancement Worksheet.*

Unit: Indicate each irrigated section of your property

Deadline: Indicate a deadline for completing your irrigation goals

Goal: List your goals for each irrigated section of your property

Action: Describe methods for achieving your goals and included a list of the resources and assistance you may need to achieve your goals

**Unit:** *SW field* **Deadline:** *January 2018*

**Goal:** *Improve water efficiency*

**Action:** *Determine irrigation schedule based on plant needs*

EXAMPLE

***Irrigation Enhancement Worksheet*** continued →

**Unit:** _____ **Deadline:** _____

**Goal:** _____

_____

**Action:** _____

_____

**Unit:** _____ **Deadline:** _____

**Goal:** _____

_____

**Action:** _____

_____

**Unit:** _____ **Deadline:** _____

**Goal:** _____

_____

**Action:** _____

_____

**Unit:** _____ **Deadline:** _____

**Goal:** _____

_____

**Action:** _____

_____

**Unit:** _____ **Deadline:** _____

**Goal:** _____

_____

**Action:** _____

_____

**Unit:** _____ **Deadline:** _____

**Goal:** _____

_____

**Action:** _____

_____

## TIP: 1 Determine Your Soil Texture

✓ Irrigation management depends on the texture of your soil. Sandy soils drain water quickly and do not store much water for plant use after irrigating. Clay soils, however, tend to drain poorly and can become waterlogged.

✓ How does the soil feel when wet?

- ❑ **Silky Smooth ⟶ SILT**
- ❑ **Coarse and gritty ⟶ SAND**
- ❑ **Sticky ⟶ CLAY**
- ❑ **Combination of all of the above ⟶ LOAM**

## TIP: 2 Determining When And How To Irrigate

✓ ***When do I need to irrigate?***

Irrigate when the soil moisture drops to about 50 percent of its water-holding capacity in the top 2 feet of soil. Check the moisture content by squeezing several handfuls of soil taken at depths of 6 inches, 12 inches and 18 inches. Irrigate before the soil at 18 inches begins to crumble in your hand, since most of the plants' roots are above 18 inches.

✓ ***How long should I irrigate?***

In general, irrigate sand soils for short periods (2-3 hours) and clay soils for longer periods (9-12 hours). Ask your farm supply store or local NRCS office to recommend the correct size spray nozzle for your soil type and your irrigation system. When it rains, see if the rain has gone deeper than the soil surface before considering it a source of water for the plants you are growing.

## TIP: 3 Conducting An Irrigation System Field Test

❑ Sprinkler System

1. Place "catch cans" in different spots within the irrigated area. Empty tuna cans or other similar containers work well; just be sure that the catch cans you use are all the same size. Also, be sure to conduct the test only when the wind speed is less than 8 mph to ensure accurate results.
2. Place the catch cans evenly across the area you are evaluating. The number of cans needed depends on the size of the area. Generally, you will want to use as many as possible, placing them in a five-foot by five-foot grid.
3. Run your irrigation system for the usual amount of time. Note which catch cans receive water from more than one sprinkler or nozzle.
4. After irrigating, compare the water level in the different catch cans to identify where adjustments are needed.
5. At this time, you may also want to dig small holes in the ground in different areas or use a soil probe to evaluate soil moisture levels. You may notice areas where the soil has absorbed more or less water than others. If so, you might decide to adjust your irrigation system to account for the different soils.

***TIPS*** continued →

*Conducting an Irrigation System Field Test (Cont.)*

❑ Drip Irrigation System

Measure the amount of water delivered from each of several emitters and compare the results. Also, probe the soil to determine the depth of infiltration in areas around the field.

❑ Surface Irrigation System

Determine the uniformity of application for a surface irrigation system by probing the soil after irrigating to measure the depth of infiltration. Include measurements at regular intervals throughout the field to determine the uniformity of application.

**TIP: 4** Irrigation System Options

| Irrigation Method | Common Systems | Water Efficiency | Install Cost | Operation Cost | Typical Use |
|---|---|---|---|---|---|
| ***Micro-Drip*** | Poly Tubes, lay flat tubes with inline and online emitters. | High | High | Medium | Orchard, Vineyard, Row Crops, Nursery Crops, Landscaping, Gardens |
| ***Sprinkler Irrigation*** | Hand Lines, Wheel lines, Micro Sprinklers, Solid Set, Pivots, Pod Lines, Linears, Big Guns, Travelling Guns | Medium to High | Medium | Medium | AllAgricultural/ Nursery/ Landscape/ Garden applications |
| ***Flood Irrigation*** | Controlled Flood, Wild Flood, Gated Pipe, Siphon Tubes | Low | Medium to low | Low | All Agricultural Crops. Row Crops, Forage Crops, Rice |

## Gather Additional Information and Assistance

*Review your answers to the previous questions and identify where you may be able to make improvements to your irrigation operations. Consider seeking professional assistance to develop a detailed* ***Irrigation Water Management Plan****. If you would like additional information or assistance, contact one of the entities listed below:*

- ✓ *Oregon Soil and Water Conservation Districts*
  **www.oacd.org**
- ✓ *Natural Resources Conservation Service*
  **www.or.nrcs.usda.gov**
- ✓ *Oregon State University Extension Service*
  **http://smallfarms.oregonstate.edu/**
- ✓ *Oregon Department of Agriculture*
  **http://oregon.gov/ODA**

**NOTES:**

# MANURE MANAGEMENT

The way livestock owners manage animal manure can have a dramatic effect on the quality of surface and groundwater as well as the overall health of your animals. To effectively manage nutrients from manure, livestock owners should evaluate the concentration of animals on the property, the amount and timing of manure applications to crop fields, how manure is stored and the area's soils, slope, precipitation and water table. These and other factors contribute to decisions regarding effective animal waste management and the relationship to the soil, water, air quality, plant health and wildlife habitat—as well as to livestock and human health. This worksheet[1] can help you assess your operation and identify the next steps for successful animal waste management.

## STEP 1: Evaluate How Manure is Handled on Your Property

Instructions: Complete the following questions if you own horses, cattle, goats, sheep or other animals. Each of the assessment areas below addresses a different aspect of animal waste management. For each question that relates to your operation, select the statement that best describes practices and conditions on your land.

*1. Do you use a **Nutrient Management Plan**[2] for balanced manure application to meet crop and pasture needs?*

❑ No ❑ Yes

*Assess the needs of your operation:*

❑ **LOW:** A nutrient management plan exists and the nutrient value of the manure is considered to balance the nutrient needs of the growing crop or pasture.

❑ **MODERATE:** There is no nutrient management plan **OR** nutrients are spread evenly on the available fields during the growing season but there is no accounting system to estimate the nutrients in the manure versus the nutrient needs of the crop.

❑ **HIGH:** Nutrients (manure) are not evenly distributed (i.e. Nutrients (manure) are always applied to the same plot of land regardless of need by the crop or pasture).

***Manure Assessment*** continued →

[1] The questions in the Manure Management Assessment were adapted, with permission, from the University of Nebraska Cooperative Extension publications, EC 98-750-S, EC 98-752-S, EC 98-756-S, EC 98-758-S, EC 98-761-S, Farm*A*Syst (University of Nebraska, Lincoln, Nebraska, July 1998, 16 pages.

[2] A Nutrient Management Plan is an assessment of manure produced on a farm, how much of that manure is appropriate to apply on crops, and how to safely apply, remove or store it.

**Manure Assessment** *(cont.)*

*2. Do you conduct regular **Soil Tests**?*

❑ No ❑ Yes

*Assess the needs of your operation:*

❑ **LOW:** Soil tests are conducted every 2 to 4 years.

❑ **MODERATE:** Soil tests are conducted every 5 years.

❑ **HIGH:** Soils tests are conducted either irregularly or not at all.

*3. Are you knowledgeable about the nutrient content in manure?*

❑ No ❑ Yes

*Assess the needs of your operation:*

❑ **LOW:** Book values or manure testing is done to estimate nutrient content of the manure and the presence of pathogens and bacteria in the manure is recognized and accounted for in the manure handling system.

❑ **MODERATE:** No manure analysis or book value estimates are done to obtain the nutrient value of the manure but it is recognized that manure contains nutrients.

❑ **HIGH:** Management of manure is not based on awareness of the nutrients that could be used to fertilize plants or pathogens and bacteria that could be harmful to the environment if not managed properly.

*4. Do you keep records on manure application to fields?*

❑ No ❑ Yes

*Assess the needs of your operation:*

❑ **LOW:** Records of individual field applications for the past year are available and used in the decision making process of when and where to apply manure.

❑ **MODERATE:** Manure is being evenly distributed over the field(s) but records of manure application are not kept.

❑ **HIGH:** Manure applications are not being made and/or manure is being applied to the same spot year after year.

*5. Do you keep records of the application RATE manure is applied to fields?*

❑ No ❑ Yes

*Assess the needs of your operation:*

❑ **LOW:** A good estimate of the manure application rate based on equipment settings is available OR the manure application equipment is calibrated.

❑ **MODERATE:** Manure spreading equipment is available but application rates for manure spreading are not known or estimated.

❑ **HIGH:** Manure applications tend to kill grass or crop OR no manure application equipment is available OR manure tends to accumulate in one area (i.e. manure is never or rarely applied to the field).



***Manure Assessment*** continued →

**Manure Assessment** *(cont.)*

*6. Do you ensure fields are in good condition for manure application?*

❑ No ❑ Yes

*Assess the needs of your operation:*

❑ **LOW:** Manure is applied primarily to growing crops or pasture within several weeks prior to planting.

❑ **MODERATE:** Manure is applied in late summer or fall.

❑ **HIGH:** Manure is applied to ponded or saturated soils AND/OR applied to snow-covered or frozen fields from which runoff is common.

*7. Do you stack manure in fields or on bare soil?*

❑ No ❑ Yes

*Assess the needs of your operation:*

❑ **LOW:** Manure is never stacked on a field or bare soil OR manure is stored on an impermeable surface (i.e., concrete) and protected from rainfall events.

❑ **MODERATE:** Manure is stacked outdoors during the dry season and either land applied or covered before the start of the wet season.

❑ **HIGH:** Manure is stacked year round and susceptible to leaching during rainfall events (i.e, manure is not protected with a tarp or cover during the wet season).

*8. Do you stack manure in a feeding or holding area?*

❑ No ❑ Yes

*Assess the needs of your operation:*

❑ **LOW:** There is no surface runoff OR there is a containment storage system for all surface runoff.

❑ **MODERATE:** All feed or holding area runoff is directed to a grass filter strip. All upslope surface flows during an average rainfall event are diverted.

❑ **HIGH:** There is visible runoff from the feeding area.

*9. Do you maintain distance between manure and/or silage storage to nearest surface water source?*

❑ No ❑ Yes

*Assess the needs of your operation:*

❑ **LOW:** Greater than 300 feet OR buffer greater than 20 feet wide next to surface waters.

❑ **MODERATE:** 100 to 299 feet OR buffer 10-19 feet wide next to surface waters.

❑ **HIGH:** Less than 100 feet AND no buffer next to surface water.

***Manure Assessment*** continued →

**Manure Assessment** *(cont.)*

*10. Do you maintain distance between manure and/or silage storage to nearest well or drinking water source?*

❑ No ❑ Yes

*Assess the needs of your operation:*

❑ **LOW:** The well is more than 100 feet away AND upslope from manure storage.

❑ **MODERATE:** The well is more than 100 feet away AND downslope from manure storage.

❑ **HIGH:** The well is within 100 feet of manure storage.

*11. Are streams utilized for livestock watering?*

❑ No ❑ Yes

*Assess the needs of your operation:*

❑ **LOW:** Stock are excluded from streams and ditches. Stock water is provided in troughs AND no trough overflow/runoff enters a stream or ditch.

❑ **MODERATE:** Stock are excluded from streams and ditches. Stock water is provided in troughs where overflow may enter stream or ditch.

❑ **HIGH:** Livestock are allowed to drink directly from a stream or ditch.

## STEP 2: Evaluate Your Answers And Determine A Course Of Action

*Review your answers to the previous questions and identify areas in need of improvement. Contact your local SWCD, NRCS or OSU Extension Service office for more information and assistance on how to develop a proper manure management plan.*

## STEP 3: Complete The Manure Enhancement Worksheet On The Following Page

*Use the guide below to complete each section of the Manure Enhancement Worksheet.*

Unit: Indicate each section of your property relevant to manure management

Deadline: Indicate a deadline for completing your manure management goals

Goal: List your goals for each section of your property

Action: Describe methods for achieving your goals. Included a list of the resources and assistance you may need to achieve your goals

**Unit:** *SW field* **Deadline:** *January 2018*

**Goal:** *Reduce odor*

**Action:** *Implement a nutrient management plan*

EXAMPLE

***Manure Enhancement Worksheet*** continued →

**Unit:** _____ **Deadline:** _____

**Goal:** _____

_____

**Action:** _____

_____

**Unit:** _____ **Deadline:** _____

**Goal:** _____

_____

**Action:** _____

_____

**Unit:** _____ **Deadline:** _____

**Goal:** _____

_____

**Action:** _____

_____

**Unit:** _____ **Deadline:** _____

**Goal:** _____

_____

**Action:** _____

_____

**Unit:** _____ **Deadline:** _____

**Goal:** _____

_____

**Action:** _____

_____

**Unit:** _____ **Deadline:** _____

**Goal:** _____

_____

**Action:** _____

_____

## TIP: 1 Preventing Water Pollution

- ✓ Establish and maintain shrubs and grasses along streams and around animal confinement areas to trap and absorb pollution-laden runoff before it reaches streams or groundwater.
- ✓ Locate manure piles, corrals and other livestock confinement areas away from wells and streams. Use water gaps or off-stream stockwater tanks to minimize livestock trampling of streambanks.
- ✓ Cover manure piles to retain nutrients. Test manure for nutrients. Apply manure to pasture when plants are actively growing and can use this natural fertilizer. To avoid polluted runoff, do not spread manure on wet soils or frozen ground.

## Gather Additional Information and Assistance

*Because animal wastes have the potential to contaminate streams, certain regulations may apply to your operation. In addition, some measures to address animal waste issues require engineered solutions. If you would like to take additional steps to address issues with manure management, consider working with a natural resource professional to develop a nutrient management plan. Conservation planning assistance is available from the local SWCD, NRCS, OSU Extension Service or the Oregon Department of Agriculture, as well as through a number of private natural resource consultants.*

- ✓ *Oregon Soil and Water Conservation Districts*
  **www.oacd.org**
- ✓ *Natural Resources Conservation Service*
  **www.or.nrcs.usda.gov**
- ✓ *Oregon State University Extension Service*
  **http://smallfarms.oregonstate.edu/**
- ✓ *Oregon Department of Agriculture*
  **http://oregon.gov/ODA**

NOTES:

# SOIL ASSESSMENT

As you complete the other worksheets that relate to your property, you will see that most of your management decisions should take into account the qualities of the soil. The soil is inherently related to all other natural resources on your land. This worksheet was developed to help you identify the attributes of the soil, improve soil conditions, and make informed management decisions for your overall property.

## STEP 1: Conduct a Visual Soil Assessment

Instructions: For each distinct section of your property, answer the following questions as appropriate for your land. Select the best time for assessment and take measurements at the same time every year. Take all measurements under adequate moisture conditions (i.e., not excessively dry or wet). Certain measurements, such as soil life, earthworms, structure and tillage are affected greatly by field operations and should be assessed before major tillage. Remember, this list is not all-inclusive, so be sure to take additional notes on the condition of the soil as necessary.

| Indicator | When to Evaluate | Rating Description | | | Rating (circle one) | | |
|---|---|---|---|---|---|---|---|
| | | Low | Medium | High | Low | Med | High |
| **Available Water Holding Capacity** | Any time plants are actively growing; also when management changes | Plants are stressed immediately after rain or irrigation; soil has limited capacity to hold water; requires frequent irrigation | Crops are not the first in the area to suffer from a dry spell; soil requires average irrigation | Soil holds water well over time; deep topsoil for water storage; crops do well in dry spells; soil requires less than average irrigation | L | M | H |
| **Compaction** | When soil is moist but not wet; when roots have penetrated to tillage depth | Hard layers and tight soil; restricted root penetration; obvious hardpan; roots turned awkwardly | Firm soil; slightly restricted root penetration; moderate shovel resistance and penetration of wire flag beyond tillage layer | Loose soil; unrestricted root penetration; no hardpan; mostly vertical root plant growth | L | M | H |
| **Crop Vigor/ Appearance/Crop Disease** | When plants are actively growing and soil moisture is adequate | Stunted growth, uneven stand, discoloration, low yields | Some uneven or stunted growth, slight discoloration, signs of stress | Healthy, vigorous, and uniform stand | L | M | H |
| **Crusting** | Before planting or during active growth and when soil moisture is adequate | Soil surface seals easily; seed emergence inhibited | Some surface sealing | Soil surface has open or porous surface all season | L | M | H |
| **Earthworms/Soil Organisms** | Before planting or tillage; when soil is moist | Few worms, insects, fungi, or instances of soil life per shovel; no casts or holes | More worms, insects, fungi, or soil life per shovel; some casts or holes | Many worms, insects, fungi, and/or soil life per shovel; many casts or holes | L | M | H |

| Indicator | When to Evaluate | Rating Description | | | Rating (circle one) | | |
|---|---|---|---|---|---|---|---|
| | | Low | Medium | High | Low | Med | High |
| **Management Altered Drainage** (wetter soil surface and decreasing wetness with depth) | Late wet season; beginning of growing season | Excessive wet spots in field, ponding, root disease | Some wet spots in field and soil profile; some root disease | Water is evenly drained through field and soil profile; no evidence of root disease | L | M | H |
| **Plant Roots** | Crop is actively growing; moisture is similar for each assessment | Poor growth/ structure, brown or mushy roots; roots are mostly horizontal | Some fine roots, mostly healthy; some horizontal roots | Vigorous, healthy root system; deep roots; good color; many vertical and horizontal roots | L | M | H |
| **Salts/ Sodiums** | When soil starts to dry and weather gets hot; throughout the growing season | **Salts:** Visible salt/alkali; dead plants | **Salts:** Stunted growth; signs of leaf burn from salts | **Salts:** No visible salt, alkali or plant damage, especially after rains | L | M | H |
| | | **Sodium:** Surface seals or severe crusting; little infiltration and fluffy surface when dry; high pH | **Sodium**: Only some spots with sealed surface | **Sodium**: No crusting or fluff at surface | | | |
| **Soil/ Tilth/ Structure/ Porosity** | Soil is moist and not extremely wet or dry; after a period without soil disturbance (note the time since last tillage) | Soil clods difficult to break; crusting; tillage creates large clods; soil falls apart in hands; very powdery; few worm and root channels | Moderate porosity; some crusting; small clods; soil breaks apart with medium pressure; few aggregates; some old and new root and worm channels | Soil crumbles well; is friable, porous; many small, soft aggregates; many worm and root channels | L | M | H |
| **Surface Organic Material/ Residue** | After harvest and again before tillage/ spring planting | No visible roots or residue; very slow or rapid decomposition | Some residue | Lots of roots/ residue in many stages of decomposition | L | M | H |
| **Water Infiltration** | After rain or irrigation; evaluate crusting as soil surface dries | Water on surface for long period of time after rain or irrigation; may have crust on surface when dry | Water drains slowly after rain or irrigation; some ponding | No ponding after heavy rain or irrigation; water moves steadily through soil | L | M | H |
| **Wind/Water Erosion** | Early season before any tillage; after wind or rain events; after irrigation | Soil deposits; large gullies joined; obvious soil drifting | Some deposition; few gullies; some discolored runoff; some evidence of soil drifting | No visible soil movement; no gullies; clear or no runoff; no obvious soil drifting | L | M | H |

## STEP 2: Evaluate Your Soil Quality

*Review your assessment of each indicator and determine where you want to improve your land. List the targeted soil quality improvements.*

_____

_____

_____

_____

## STEP 3: Identify Soil Management Options

*For each issue you identified in your soil assessment, review the associated management options below and on the following page. Remember, soil quality is specific to the type of soil you have and the goals you have for it.*

| Problem | Cause | Management Options *(check all that apply)* | |
|---|---|---|---|
| **No Water Holding Capacity** | • Sandy Soil<br>• Compaction<br>• Low organic matter<br>• Excessive drainage<br>• Low biological activity | ❑ Reduce compaction<br>❑ Increase organic residues, diversify crop rotation<br>❑ Add animal manure | ❑ Use cover crops<br>❑ Improve conditions for earthworms/ soil life<br>❑ Avoid tillage when soil is wet |
| **Compaction** | • Working wet soil<br>• Heavy machinery<br>• Repeated tillage at the same depth<br>• Excessive animal traffic<br>• Poor aggregation<br>• Low organic matter | ❑ Avoid working wet soil<br>❑ Reduce traffic/tillage operations<br>❑ Use controlled traffic patterns<br>❑ Alter tillage depth<br>❑ Add cover crops<br>❑ Use non-compacting tillage (e.g. chisel v. moldboard) | ❑ Add organic residue<br>❑ Avoid heavy machinery<br>❑ Subsoil or rip when soil is not excessively wet or dry<br>❑ Use crop rotations<br>❑ Add animal manure |
| **Low Crop Vigor/ Appearance Crop Disease** | • Compacted layers<br>• Saturated soil<br>• Soil pathogen problems<br>• Nutrient deficiencies or imbalance<br>• Low organic matter<br>• Monoculture<br>• Low biological diversity<br>• pH levels affecting nutrient availability<br>• Use of ammonium fertilizers | ❑ Soil test and correct nutrient and pH levels<br>❑ Check for pathogens/ pests<br>❑ Reduce compaction following harvest<br>❑ Improve drainage<br>❑ Use animal manure<br>❑ Add cover crops | ❑ Use crop rotation<br>❑ Diversify cropping system |
| **Crusting** | • Excess sodium<br>• Low organic matter<br>• Low crop residues | ❑ Increase organic residues<br>❑ Reduce tillage depth<br>❑ Use animal manure | ❑ Add cover crops<br>❑ For sodium problem, apply gypsum and flush with irrigation water |

| Problem | Cause | Management Options *(check all that apply)* | |
|---|---|---|---|
| **Minimal Earthworms/ Soil Life/ Organisms** | • Low organic matter<br>• Low residues<br>• Excess pesticides or fertilizers<br>• Excess tillage<br>• Poor aeration | ❑ Increase organic residues<br>❑ Use conservation tillage | ❑ Use crop rotation<br>❑ Add cover crops |
| **Management Altered Drainage** | • Tillage pan<br>• High water table under natural conditions<br>• Poor soil structure | ❑ Subsoil to break up tillage pan<br>❑ Add cover crops to the rotation | ❑ Reduce soil disturbance<br>❑ Add high residue crops |
| **Unhealthy Plant Roots** | • Compaction<br>• Low biological activity<br>• Poor soil structure/ aggregation<br>• Nutrient imbalance<br>• Incorrect pH range | ❑ Avoid tillage when soil is wet<br>❑ Increase organic residues<br>❑ Diversify crop rotations | ❑ Reduce compaction<br>❑ Test soil and correct nutrient and pH levels |
| **Appearance of Salts/ Sodium** | • Saline or low calcium irrigation water/well<br>• Shallow water table<br>• Poor drainage<br>• Excess evaporation | ❑ Leach excess salts<br>❑ Plant deep-rooted crops<br>❑ Grow salt tolerant crops<br>❑ For sodium, get a soil test and apply gypsum, if appropriate | ❑ Increase vegetative cover to improve soil structure and lower soil temperature<br>❑ Manage irrigation water<br>❑ Improve drainage |
| **Low Soil Tilth/Structure/ Porosity** | • Low residues<br>• Low organic matter<br>• Excess tillage<br>• Fallow<br>• Compaction | ❑ Increase organic residues<br>❑ Use cover crops<br>❑ Add animal manure | ❑ Reduce number of tillage passes<br>❑ Avoid tillage when wet<br>❑ Diversify crop rotation |
| **Low Surface Organic Matter/ Residue** | • Excess tillage<br>• Residue burned off<br>• Low residue crops<br>• Too much fallow<br>• Insufficient additions of crop residue | ❑ Diversify or increase crop rotations<br>❑ Add animal manure<br>❑ Use cover crops | ❑ Use high residue crops<br>❑ Reduce tillage |
| **Low Water Infiltration** | • Compaction<br>• Surface crusting<br>• Plow pan<br>• Poor soil structure/ aggregation<br>• Excess sodium | ❑ Add organic residue<br>❑ Add animal manure<br>❑ Use cover crops<br>❑ Diversify crop rotations<br>❑ For sodium problem, apply gypsum and flush with irrigation water | ❑ Subsoil or rip when soil is not excessively wet or dry<br>❑ Minimize tillage to preserve soil structure |
| **Wind/Water Erosion** | • Lack of cover/residue<br>• Low organic matter<br>• Poor aggregation<br>• Tillage pan or compacted layer<br>• Tillage practices that move soil downslope<br>• Excessive tillage<br>• Low diversity crop rotation | ❑ Diversify crop rotations<br>❑ Reduce tillage<br>❑ Use animal manure<br>❑ Use cover crops<br>❑ Apply irrigation water management practices | ❑ Increase surface residue or roughness<br>❑ Shorten slope length<br>❑ Plant strip crops<br>❑ Use windbreaks |

## STEP 4: Complete the Soil Enhancement Worksheet on the Following Page

*Use the guide below to complete each section of the Soil Enhancement Worksheet.*

Unit: Indicate each section of your property

Deadline: Indicate a deadline for completing your goals

Goal: List your goals for each section of your property

Action: Describe methods for achieving your goals, and include a list of the resources and assistance you may need to achieve your goals

**Unit:** *SW field* **Deadline:** *January 2018*

**Goal:** *Improve crop health*

**Action:** *Add cover crops and diversify cropping system*

EXAMPLE

***Soil Enhancement Worksheet*** continued →

**Unit:** _____ **Deadline:** _____

**Goal:** _____

_____

**Action:** _____

_____

**Unit:** _____ **Deadline:** _____

**Goal:** _____

_____

**Action:** _____

_____

**Unit:** _____ **Deadline:** _____

**Goal:** _____

_____

**Action:** _____

_____

**Unit:** _____ **Deadline:** _____

**Goal:** _____

_____

**Action:** _____

_____

**Unit:** _____ **Deadline:** _____

**Goal:** _____

_____

**Action:** _____

_____

**Unit:** _____ **Deadline:** _____

**Goal:** _____

_____

**Action:** _____

_____

## TIP: 1 What's in Soil?

*Every soil is unique in that it contains a mixture of particle sizes and pore spaces that influence how it is managed. The mixture of sand, silt, and clay mineral particles in soils influence many soil functions, including how much water is held in the soil, how quickly the soil dries, the nutrients that can be held in the soil before leaching losses occur, ease and timing of tillage, and susceptibility to wind and water erosion.*

*In addition, most soils contain about 50 percent pore space, which is essentially a place for water, air, roots and living organisms to reside. All plants depend on soil organisms to decompose organic materials matter and make nutrients available.*

*A high functioning soil has a diverse population of soil organisms. Soil organisms can be favored by limiting soil disturbance, maintaining a cover of growing plants or plant residue on the soil, and by providing a diversity of crops or organic matter inputs to the soils.*

## TIP: 2 Changing Your Landscape: Rules and Regulations

*Both Oregon state laws and federal laws regulate the manipulation of natural wetland areas. Wetland soils occur in areas where water covers the soil, or is present either at or near the soil surface all year or for varying periods of time during the year. Wetland soils, also known as hydric soils, also include soils that formed under wet conditions. As such, they can be very difficult to identify, and local experts should be consulted before you alter these soils.*

*Contact your local NRCS specialist before doing any management that removes water such as tiling (drainage), filling in wet areas or adding ditches to remove water.*

## Gather Additional Information and Assistance

- ✓ *Oregon Soil and Water Conservation Districts*
  **www.oacd.org**
- ✓ *Natural Resources Conservation Service*
  **www.or.nrcs.usda.gov**
- ✓ *Oregon State University Extension Service*
  **http://smallfarms.oregonstate.edu/**
- ✓ *Oregon Department of Agriculture*
  **http://oregon.gov/ODA**

**NOTES:**

# STREAM ASSESSMENT

This assessment will help you identify potential concerns for the stream or streamside area on your property. The questions below are designed to draw your attention to items that you may be able to improve. This tool was adapted from the Oregon State University Extension *Stream* A*Syst*[1] publication.

**STEP 1:** Complete the Stream Assessment Worksheet

Instructions: Answer the questions below. For items to which you answer "Yes," read the following suggestions on how you can improve or protect your stream. A "Yes" answer does not necessarily mean there is a problem, but it can help you focus your efforts as you learn more about the particular situation and possible courses of action. You can find resources for more information or assistance in the contact list at the bottom of each section.

*1. Are there ever any signs of pollution, such as soap bubbles, oil sheen, unusual odors, manure, sewage or trash in or along the stream?*

❑ No ❑ Yes

*If YES, consider the following management options:*

- ❑ Use the *Home*A*Syst*[2] online assessment and/or the Nutrient Management worksheet in this packet to evaluate the situation.
- ❑ Have your septic system pumped and inspected. If problems with the septic system are found, make repairs.
- ❑ Work with the Oregon Department of Agriculture (ODA) to assess whether the problem requires notification of additional agencies.
- ❑ Remove trash with care. If potentially hazardous, contact the Oregon Department of Environmental Quality (DEQ).
- ❑ Contacts: septic pumping company, Oregon State University (OSU) Extension, local soil and water conservation district (SWCD), Natural Resources Conservation Service (NRCS), local watershed council, Oregon Department of Agriculture (ODA), Oregon Department of Environmental Quality (DEQ).[3]
- ❑ Fence livestock from stream.

---

[1] The Stream Condition Assessment worksheet was adapted, with permission, from the Oregon State University Extension publication, EM 8671, *Stream*A*Syst: A tool to help you examine conditions on your property* (Oregon State University, Corvallis, Oregon, June 2000, reprinted March 2001), 16 pages; available online at: https://www.wcc.nrcs.usda.gov/ftpref/wntsc/strmRest/StreamASyst2001.pdf

[2] *Home*A*Syst* is a homestead assessment system provided by the Oregon State University Extension developed to help evaluate possible risks to the groundwater and drinking water; available online at: http://wellwater.oregonstate.edu/ under "assessment tools."

[3] An acronym reference sheet along with contact information is provided in the ***Resources*** section of the STEPS Workbook.

***Stream Assessment*** continued →

**Stream Assessment** *(cont.)*

*2. Is the water green? Is there a green scum or thick, stringy, green clumps? Or, is there a heavy, dirty-brownish, slimy material coating underwater objects?*

❑ No ❑ Yes

*If YES, consider the following management options:*

❑ Determine whether nutrients from fertilizer or manure runoff are entering the stream from your property. If so, take corrective steps.
Preventative steps include:
- Ensuring the nutrients are being applied at the correct amount
- Planting herbaceous vegetation along the stream as a buffer
- Ensure that fertilizer is not being mixed near the stream

❑ Contact: SWCD, NRCS, watershed council, OSU Extension

*3. Do water withdrawals or upstream dams ever result in extremely low water levels?*

❑ No ❑ Yes

*If YES, consider the following management options:*

❑ Improve the efficiency of water use on your property.

❑ Check into financial incentives for returning allocated water to the stream.

❑ Contact: SWCD, NRCS, watershed council, Freshwater Trust

*4. Does the stream become muddy after storms and then take a long time to clear up again? Or is, the water in the stream muddier or cloudier when it leaves your property than when it enters?*

❑ No ❑ Yes

*If YES, consider the following management options:*

❑ Determine whether sediment is entering the stream from your property; look for runoff from unpaved roads, fields, severe bank erosion or other sources. When you find the problem, contact natural resource professionals to assist you.

❑ Provide natural, long-term streambank protection by planting vegetation that was historically on your site (grasses, trees, shrubs). Contact a natural resource specialist for assistance in determining this.

❑ Contact: SWCD, NRCS, watershed council, OSU Extension, FSA

***Stream Assessment*** continued →

**Stream Assessment** *(cont.)*

*5. Search for your stream in the bound copy of DEQ's 2006 303(d) database or online on the Oregon DEQ Web site at:* ***www.deq.state.or.us/wq/assessment/rpt0406/search.asp****. Does this or other data show that your stream is limited in any water quality measurements?*

❑ No ❑ Yes

*If YES, consider the following management options:*

❑ Learn more about limiting factors and the connection with activities on your land.

❑ Contact: SWCD, NRCS, OSU Extension

*6. Are there culverts, dams or other artificial structures in your portion of the stream that could block fish passage?*

❑ No ❑ Yes

*If YES, consider the following management options:*

❑ Contact ODFW for more information. If the barrier prevents fish passage, modify it according to ODFW recommendations and with assistance from natural resource specialists. Be aware that some barriers may be owned by the county or other organizations, which will need to be contacted prior to any repair.

❑ Contact: ODF, Oregon Department of Fish and Wildlife (ODFW), SWCD, NRCS, USFWS

*7. Are bridges or in-stream culverts inadequate in size, and as a result unable to handle high, overbank flood flows?*

❑ No ❑ Yes

*If YES, consider the following management options:*

❑ Measure or estimate the culvert's length and width and contact an expert to help determine the culvert size needed for that site.

❑ Contact: ODF, OSU Extension forestry agent, ODFW, SWCD, NRCS, USFWS

*8. Are any irrigation ditches, tile lines, drainage ditches or other artificial waterways connected to the stream?*

❑ No ❑ Yes

*If YES, consider the following management options:*

❑ Create grass buffer or tree/shrub corridor adjacent to the waterway that is at least 20 feet wide or more to remove contaminants before drainage water enters the stream.

❑ Screen pumps or irrigation diversions to prevent aquatic life from becoming trapped in the irrigation system. Screens must be designed according to ODFW standards. Also, irrigation ditches can be screened at the original point of diversion thereby removing the need for screens at multiple points (every landowner) along the ditch. Consider this watershed scale solution with your neighbors.

❑ Contact: SWCD, NRCS, ODFW, local irrigation district, FSA

***Stream Assessment*** continued →

**Stream Assessment** *(cont.)*

*9. Are there any berms, dikes, or riprap along the stream or has the stream been straightened?*

❑ No ❑ Yes

*If YES, consider the following management options:*

❑ With the help of a natural resource expert, determine how the structures or straightening may be affecting the condition of the stream. If a problem exists, modify as recommended by the expert.

❑ Contact: SWCD, NRCS, USFWS,ODFW

*10. Is the channel much wider and shallower than in the past? Are gravel, sand or silt bars noticeably building? Are there high, vertical banks in straight sections? Or, are there major changes to the stream after large flow events? For example, are pools filled in, riffle areas moved, streambanks greatly eroded, or has the whole channel moved?*

❑ No ❑ Yes

*If YES, consider the following management options:*

❑ Work with an expert to determine the causes and possible solutions. Permits are needed to do this work. Do not be tempted to fix this on your own.

❑ The stream might be out of balance with the amount of water and sediment it is carrying. Ask about possible changes or restoration efforts. Keep in mind that changes might be needed up and downstream, so coordinate your efforts with neighbors.

❑ Contact: watershed council, SWCD, NRCS, neighbors, USFWS, ODFW

*11. Are there areas of bare soil along the stream that will come into contact with water during high or overbank flows?*

❑ No ❑ Yes

*If YES, consider the following management options:*

❑ Establish an appropriate riparian planting and work with a natural resource specialist to determine whether artificial protection measures are needed while plants become established.

❑ Contact: SWCD, NRCS, watershed council, Farm Services Agency (FSA)

*12. Have activities such as construction, grazing, landscaping or tilling within 35 feet of the top of the streambank disturbed permanent vegetation?*

❑ No ❑ Yes

*If YES, consider the following management options:*

❑ Identify streamside areas that need vegetation and commit to management changes in that area.

❑ If the area is grazed by livestock, develop and follow a prescribed grazing program, build off-stream watering facilities or water gaps, and establish fencing as necessary. Work with a natural resource specialist to assist you with these items.

❑ Contact: SWCD, NRCS, watershed council, OSU Extension, FSA

***Stream Assessment*** continued →

**Stream Assessment** *(cont.)*

*13. Does the vegetation along the stream have trouble surviving or reproducing?*

❑ No ❑ Yes

*If YES, consider the following management options:*

❑ Determine whether the water level has dropped or the channel has deepened. If so, roots might not be able to reach the water table.

❑ If the water level is not the problem, remove weeds or invasive plants that might be shading young trees, shrubs or competing with desired grasses. Protect young trees with tubes to prevent animals from eating them. Protect desired grasses with fences and prescribed grazing. Plant vegetation recommended for your site.

❑ Contact: SWCD, NRCS, OSU Extension, watershed council

*14. Are there large areas with plants considered to be weeds or invasives, such as blackberry, Scotch broom, reed canarygrass, English ivy, thistle, cheatgrass or others?*

❑ No ❑ Yes

*If YES, consider the following management options:*

❑ Complete the ***Weed Management Strategy worksheet*** in this packet to help you identify the most appropriate method for removing weeds. Contact your local County Weed Inspector for assistance in controlling invasive species along streams: **www.oregon.gov/ODA/PLANT/WEEDS/county_contacts.shtml.** Contact a natural resource specialist and find information on pesticide use along salmon streams at the following Web site: **www.oregon.gov/ODA/PEST/buffers.shtml.**

❑ Determine whether grazing management changes are needed.

❑ Contact: SWCD, NRCS, OSU Extension, watershed council, ODA

*15.* Does bare soil or stands of grass or other herbacious vegetation dominate the area where trees or shrubs should naturally grow? Or is there bare soil where native grasses should naturally grow?

❑ No ❑ Yes

*If YES, consider the following management options:*

❑ Identify the reason(s) for lack of vegetation and address the causes.

❑ Restore vegetation to the streamside area. Make sure to plant a combination of trees, shrubs and/or grasses suited to your location and follow through to ensure their survival.

❑ Ask about available assistance.

❑ Contact: SWCD, NRCS, watershed council, FSA

**STEP 2:** Complete the Stream Enhancement Worksheet on the Following Page

*Use the guide below to complete each section of the Stream Enhancement Worksheet.*

Unit: Indicate each section of your property with a stream

Deadline: Indicate a deadline for completing related stream goals

Goal: List your goals for these identified units on your property

Action: Describe methods for achieving your goals. Included a list of the resources and assistance you may need to achieve your goals

**Unit:** *SW stream* **Deadline:** *January 2018*

**Goal:** *Improve fish habitat*

**Action:** *Enhance riparian area by planting vegetation*

EXAMPLE

***Stream Enhancement Worksheet*** continued →

**Unit:** _____ **Deadline:** _____

**Goal:** _____

_____

**Action:** _____

_____

**Unit:** _____ **Deadline:** _____

**Goal:** _____

_____

**Action:** _____

_____

**Unit:** _____ **Deadline:** _____

**Goal:** _____

_____

**Action:** _____

_____

**Unit:** _____ **Deadline:** _____

**Goal:** _____

_____

**Action:** _____

_____

**Unit:** _____ **Deadline:** _____

**Goal:** _____

_____

**Action:** _____

_____

**Unit:** _____ **Deadline:** _____

**Goal:** _____

_____

**Action:** _____

_____

## TIP: 1 Management Practices to Improve Stream Health

- ✓ Consider protecting the stream corridor and associated wetlands from other land use activities.
- ✓ Maintain fences and manage grazing activities.
- ✓ Maintain a 15 foot wide or greater vegetated buffer next to the stream.
- ✓ Preserve healthy floodplains to slow and filter flood water.

## TIP: 2 Enhancing Riparian Areas

- ✓ Delay mowing or haying grassy areas until late July when birds have finished nesting.
- ✓ Increase the buffer width around open water. In general, studies show that widths of 50 feet trap eroded soils, 100 feet filter pollutants, and 200-300 feet provide wildlife corridors.
- ✓ Avoid applying fertilizers, herbicides and pesticides in the buffer to keep pollutants out of the water.
- ✓ Fence livestock away from streambanks to reduce erosion and protect water quality.
- ✓ Provide offstream water sources for livestock.
- ✓ Remove weeds and replace them with native plants.

## TIP: 3 Making Your Property Fish Friendly

*To thrive, fish and other aquatic organisms require specific environmental conditions:*

- ✓ Clean, cold water.
- ✓ Riparian vegetation to filter pollutants and sediment while shading and cooling the water.
- ✓ Rocks and riffles to churn and add oxygen to the water.
- ✓ Overhanging vegetation and large pieces of wood to hide under.
- ✓ Deep pools to provide colder water in the summer and unfrozen water in the winter.

***TIPS*** continued →

## Gather Additional Information and Assistance

- ✓ *Oregon Department of Agriculture (ODA)*
  **http://oregon.gov/ODA**
- ✓ *Oregon Department of Fish and Wildlife (ODFW)*
  **www.dfw.state.or.us/**
- ✓ *Local watershed council*
  **http://oregonwatersheds.org/**
- ✓ *Oregon State University Extension Service (OSU Extension)*
  **http://smallfarms.oregonstate.edu/**
- ✓ *Natural Resources Conservation Service* (NRCS)
  **www.or.nrcs.usda.gov**
- ✓ *Oregon Soil and Water Conservation Districts (SWCD)*
  **www.oacd.org**
- ✓ *Farm Service Agency*
  **https://www.fsa.usda.gov/**
- ✓ *US Fish and Wildlife Service*
  **https://www.fws.gov/**
- ✓ *Freshwater Trust*
  **https://www.thefreshwatertrust.org/**

**NOTES:**

# WEED ASSESSMENT

All landowners should be prepared to address problems with noxious and invasive weeds. No matter how you use your land, weeds can find their way onto your property. Once they do, they can spread rapidly, choke out forage for livestock and wildlife, and reduce the productivity of pastures, gardens, and crops. Because weeds are often less effective at holding the soil in place, they also contribute to soil erosion and water pollution. Many weeds are also poisonous to livestock. Complete the following assessment to begin developing your management strategy to control weeds on your property.

**STEP 1:** Familiarize Yourself with the Weeds in Your Area

*Refer to the following online resources to obtain a better understanding of the weeds in your area.*

| Site | Description | Address |
|---|---|---|
| **The Silent Invasion** | Clickable Oregon map showing potential invaders by region; includes photos and additional information | **www.opb.org/news/series.silentinvasion** |
| **Oregon Department of Agriculture Weed Page** | Weed list with pictures, profiles, grant information, contacts for assistance, and more | **http://oregon.gov/ODA/PLANT/WEEDS/** |
| **INVADERS Database** | Query by area to search weeds in your county | **http://invader.dbs.umt.edu/** |
| **Washington State Noxious Weed Control Board** | Weed identification by color, habitat, toxicity, or plant characteristics | **www.nwcb.wa.gov/search.asp** |
| **100 Most Dangerous Invaders** | Priority concerns regarding invasive plants in Oregon | **www.oregon.gov/OISC/most_dangerous.shtml** |

*List any additional sites you find in your research for future reference:*

_____

_____

_____

_____

_____

_____

_____

_____

_____

**STEP 2:** Develop a Weed Watch List

Compile a list of targeted weeds for your property. Take notes on identifying features, print photographs and attach any information that will help you identify these plants.

Species: _____ Notes: _____

Season Visible: _____

Species: _____ Notes: _____

Season Visible: _____

Species: _____ Notes: _____

Season Visible: _____

Species: _____ Notes: _____

Season Visible: _____

Species: _____ Notes: _____

Season Visible: _____

Species: _____ Notes: _____

Season Visible: _____

Species: _____ Notes: _____

Season Visible: _____

Species: _____ Notes: _____

Season Visible: _____

Species: _____ Notes _____

Season Visible: _____

## STEP 3: Inventory the Weeds on Your Property

*Carefully inspect your property for signs of weeds. Weeds often occur in areas that are highly disturbed, so check those areas closely. Be especially suspicious of plants that are prickly, thorny, hairy or that bleed milky sap, as many noxious plants will have these characteristics. Note that it is advisable to repeat a weed inventory during different seasons, as some plants are more prevalent or easily identifiable at different times of year. List known weeds below.*

## STEP 4: Create a Weed Management Strategy

Instructions: Complete the **Weed Inventory** (the first two columns of the worksheet). Then, refer to your local weed management contacts and online resources to help you assess your options. Next, complete the Management Strategy portion of the worksheet (column three). Refer to the example provided below as a guide.

**Site:** *Breezy Hills Farm* **Date:** *December 2018*

| Field: | Species Present: | Control Method & Timing: |
|---|---|---|
| *Pasture 1* | *Tansy ragwort* | *Repeated hand-pulling to remove all roots* |
| *Hay Field 1* | *Scotch broom* | *Cut mature plants, pull or dig out young plants* |

EXAMPLE

***Weed Inventory*** continued →

Site: _____ Date: _____

| Field: | Species Present: | Control Method & Timing: |
|---|---|---|
| | | |
| | | |
| | | |

| Field: | Species Present: | Control Method & Timing: |
|---|---|---|
| | | |
| | | |
| | | |

| Field: | Species Present: | Control Method & Timing: |
|---|---|---|
| | | |
| | | |
| | | |

| Field: | Species Present: | Control Method & Timing: |
|---|---|---|
| | | |
| | | |
| | | |

| Field: | Species Present: | Control Method & Timing: |
|---|---|---|
| | | |
| | | |
| | | |

| Field: | Species Present: | Control Method & Timing: |
|---|---|---|
| | | |
| | | |
| | | |

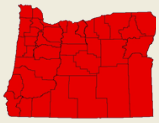
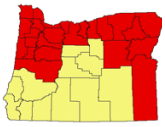
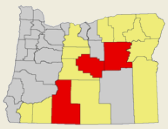
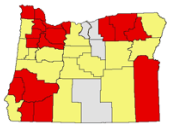
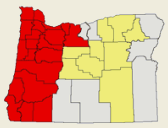
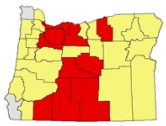
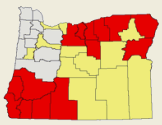
| Field: | Species Present: | Control Method & Timing: |
|---|---|---|
| | | |
| | | |
| | | |

| Field: | Species Present: | Control Method & Timing: |
|---|---|---|
| | | |
| | | |
| | | |

**TIP: 1** Weeds to Watch For

*The weeds listed here are aggressive and competitive - stealing moisture, nutrients and sunlight from other plants. Keep in mind, however that this is just a starting point for your research. Review relevant websites and talk to professionals to learn about other key species.*

Map Legend: Yellow - limited distribution, Red = abundant, Grey= unknown

| Weed | Distribution | Description |
|---|---|---|
| *Canada Thistle* |  | Perennial; blooms midsummer. Wavy margined leaves, up to 6 inches long and armed with yellowish spines. Small purple to white flowers in clusters. Extensive deep seated root system spreading horizontally. Canada thistle can be found in cultivated fields, riparian areas, pastures, rangeland, forests, lawns, gardens, roadsides, and waste areas. |
| *Field Bindweed* |  | Perennial; blooms June to September. Stems are prostrate, one to four foot long from an extensive root system that often climbs or forms dense tangled mats. Flowers bell or trumpet shaped, white to pinkish and one inch in diameter. It competes with crops for moisture and nutrients, and is difficult to remove once established. The twining nature of the plant hampers harvesting of crops, especially in orchards and vineyard. Morning Glory is closely related to Field Bindweed and causes similar resource problems. |
| *Leafy Spurge* |  | An aggressive perennial herb. Grows upright, branching, and reaches two-three feet tall with tough woody stems that exude milky white latex sap when broken. Leafy spurge is capable of invading disturbed sites, including prairies, savannas, pastures, abandoned fields and roadside areas. All parts of this plant contain a poisonous latex sap that can cause skin irritations in humans, cattle, and horses and may cause permanent blindness if rubbed into the eye. |
| *Purple Loosestrife* |  | Perennial; blooms midsummer. Grows up to 7 feet tall. Upright bushy plant. Flowers pink to purple, possessing 5-6 petals and numerous on a long spike. Its showy purple flowers crown a vigorous plant that crowds out marsh vegetation required by wildlife for food and shelter. Decreased waterfowl and songbird production has been well documented in heavily infested marshes. This former ornamental species can be found along wetlands, stream banks, and shorelines of shallow ponds. |
| *Scotch Broom* |  | Perennial; blooms April to June. Grows 3 to 10 feet tall. Evergreen shrub with many slender, erect, dark green angled branches with small, simple leaves. Seeds of Scotch broom are long-lived (50 years plus) and mature plants are prolific seed producers, establishing persistent seed banks requiring long-term management objectives. |
| *Spotted Knapweed* |  | Perennial; blooms July to August. Grows 2 to 4 feet tall. Typically forms a basal rosette of leaves in its first year and flowers in subsequent years. It has a single, thistle-like pinkish purple flower that measures up to ¾ inch in diameter. The slender, hairy stems grow in an erect and branched arrangement. It makes and secretes chemicals into the soil that kill surrounding plants (allelopathy). |
| *Yellow Starthistle* |  | Annual; flowers July to August. Grows 2 to 3 feet tall. Stems are rigid, branching, winged and covered with cottony hairs. Flower heads yellow, located on the ends of branches and armed with thorns up to 3/4 inch long. Yellow starthistle will grow wherever cheatgrass grows, in addition to growing in canyon grasslands, rangelands, pastures, edges of cropland, roadsides, and disturbed areas. Can dramatically reduce forage quantity and quality. |

***TIPS*** continued →

**TIP: 2** **Weed Control**

Weeds spread fast, so regularly look for new weed patches on your property. Act immediately to treat them by using one or more of the practices listed below. Team up with neighbors to improve effectiveness. Remember, weed control itself is not enough. It is also necessary to modify the practices that caused weeds to become established in the first place.

- ✓ **Prevention**. Good land management will help keep desirable vegetation healthy and weeds under control. Avoid over-grazing that leaves bare spots for weeds, buy weed-free hay, plant certified seed, wash your vehicle after being in a weed-infested area, monitor your property, and respond quickly to any new weed infestations.
- ✓ **Biological.** Biological control attempts to find something in nature that can weaken or eventually kill a weed plant. Successful bio-agents include certain fungi and insects that weaken weeds by attacking seed heads and other plant parts. Bio control methods are used when eradication is not possible.
- ✓ **Mechanical.** Mow annually before weeds go to seed. Pull small patches and weeds near streams by hand.
- ✓ **Livestock Grazing.** Graze weeds before they go to seed using sheep, goats or cattle. Because livestock and wildlife can easily carry and spread seed on their coats and in their feces, avoid moving livestock from a weedy area to a weed-free area. Some weed species, if eaten, will make livestock sick.
- ✓ **Chemical Herbicides.** Herbicides can be safe and effective when properly applied. Always read the chemical label carefully and follow directions. Use chemicals away from water to avoid harming you, your animals or wildlife, and to prevent stream and groundwater pollution. Only certified pesticide applicators can use restricted herbicides. Call a farm supply store to find out about hiring custom chemical applicators. Be sure herbicides will not reach and kill desirable trees and shrubs. Dispose of leftover chemicals at hazardous waste facilities.

## Gather Additional Information and Assistance

- ✓ *King County, Weed Index*
  **http://kingcounty.gov/environment/animalsAndPlants/noxious-weeds/weed-identification.aspx**
- ✓ *Oregon Department of Agriculture Weed Page*
  Weed lists with pictures, profiles, grant information, and more
  **http://oregon.gov/ODA/PLANT/WEEDS/**
- ✓ *PNW Weed Management Handbook*
  **https://pnwhandbooks.org/weed**
- ✓ *Weed Control in Pasture, Rangeland, Forestry and Aquatic Situations*
  Oregon State University Extension
  **http://smallfarms.oregonstate.edu/weedsplants%2526pests**
- ✓ *Weeds, Poisonous Plants & Other Pests*
  Oregon State University Extension
  **http://smallfarms.oregonstate.edu/weedsplants%2526pests**

**NOTES:**

# WILDLIFE ASSESSMENT

Habitat suitability for any given species is highly dependent on where your land is located and the quality, quantity and distribution of food, water, cover, and living space. Each species has a daily and seasonal home range within which it is willing to travel to fulfill its life cycle. All of an animal's life requirements for food, cover, water, and space must be available and safely accessible within their home range to maintain or increase its population size.

The following assessment is designed to help you identify the role your land may play in the life cycle of species in your area and to evaluate ways to make your land more attractive for wildlife.

**STEP 1:** Complete the Wildlife Assessment

Instructions: Generate a species list. Navigate to the Oregon Explorer's Wildlife Viewer at: **http://oe.oregonexplorer.info/Wildlife/wildlifeviewer/**. Use the map to identify your location. Select the tab labeled "List by Place." Select your watershed and a list of species that are known to occur in that area will appear. Explore the information about each species in your area. Print this list and maintain with your plan. Create a supplementary list of wildlife you see on you land in the space below. List the date or season you see a particular species. Space is also provided for additional notes.

Species: _____ Notes: _____

Season Visible: _____

Species: _____ Notes: _____

Season Visible: _____

Species: _____ Notes: _____

Season Visible: _____

Species: _____ Notes: _____

Season Visible: _____

Species: _____ Notes: _____

Season Visible: _____

***Wildlife Assessment*** continued →

## Wildlife Assessment *(cont.)*

*2. Are there any rare species known to occur on or near your land?*

❑ No ❑ Yes ***(list below)***

_____

_____

_____

_____

*3. Do you have particular wildlife you would like to encourage or discourage from using your land?*

**Encourage**

❑ No ❑ Yes ***(list below)***

**Discourage**

❑ No ❑ Yes ***(list below)***

_____ _____

_____ _____

_____ _____

*4. Are there areas of natural vegetation on your land?*

❑ No ❑ Yes ***(list below)***

❑ Grassland Describe Condition: _____

❑ Shrubland Describe Condition: _____

❑ Woodland Describe Condition: _____

❑ Forestland Describe Condition: _____

❑ Wetland Describe Condition: _____

## Wildlife Assessment *(cont.)*

*5. Have you taken any special measures to provide for or protect wildlife on areas that are farmed or grazed?*

❑ No ❑ Yes ***(list below)***

_____

_____

_____

_____

*6. Are there water sources available and safely accessible to wildlife on or nearby your property?*

❑ No ❑ Yes ***(list below)***

_____

_____

_____

_____

*7. Do you allow your dogs and cats to roam the property freely?*

❑ No ❑ Yes

*8. Are there activities that occur on a regular basis that may disturb wildlife, such as, off-highway vehicle (OHV) use, tillage, mowing or burning?*

❑ No ❑ Yes

*9. Do you leave outside lights on at night?*

❑ No ❑ Yes

*10. Do you spray pesticides on your property?*

❑ No ❑ Yes

*11. Are there other activities that occur on your land that may disturb wildlife?*

❑ No ❑ Yes ***(list below)***

_____

_____

_____

**STEP 2:** Complete the Wildlife Enhancement Worksheet on the following page.

*Refer to the guide below to complete each section of the Wildlife Enhancement Worksheet.*

Unit: Indicate each section of your property

Deadline: Indicate a deadline for completing your goals

Goal: List your goals for each section of your property

Action: Describe methods for achieving your goals, and include a list of the resources and assistance you may need to achieve your goals

**Unit:** *SW field* **Deadline:** *January 2018*

**Goal:** *Improve upland game bird population*

**Action:** *Reduce accidental mortality due to mowing by implementing wildlife-friendly harvesting techniques. Keep cats indoors.*

EXAMPLE

**Unit:** _____ **Deadline:** _____

**Goal:** _____

_____

**Action:** _____

_____

**Unit:** _____ **Deadline:** _____

**Goal:** _____

_____

**Action:** _____

_____

**Unit:** _____ **Deadline:** _____

**Goal:** _____

_____

**Action:** _____

_____

**Unit:** _____ **Deadline:** _____

**Goal:** _____

_____

**Action:** _____

_____

**Unit:** _____ **Deadline:** _____

**Goal:** _____

_____

**Action:** _____

_____

**Unit:** _____ **Deadline:** _____

**Goal:** _____

_____

**Action:** _____

_____

## TIP: 1 Wildlife Regulations

- ✓ ***Migratory Bird Treaty Act*** – This federal law protects migratory birds, their eggs, feathers or nests from any means, manner, or attempt at hunting, pursuing, wounding, killing, possessing or transporting. Most birds are protected by this law. Consult your local U.S. Fish and Wildlife Service office for more information on which species are protected.
- ✓ ***Oregon State Laws and Administrative Rules*** – There are several state laws and administrative rules that protect, or regulate harvest of, various game and non-game species of wildlife. Consult your local Oregon Department of Fish and Wildlife office for more information.
- ✓ ***Endangered Species Act*** – This federal law protects threatened and endangered plants and animals and the habitats in which they are found. Consult your local U.S. Fish and Wildlife Service office for more information on which species are protected.

## TIP: 2 Reduce Human Impact on Wildlife Habitat

- ✓ ***Keep pets indoors or kenneled***. Cats and dogs pose a serious risk to wildlife. For more information visit: **www.abcbirds.org/abcprograms/policy/cats/**
- ✓ ***Limit off-road recreation activities***. This is particularly important during sensitive periods of the year when wildlife may be vulnerable, such as, bird nesting season and deer and elk fawning/calving or wintering season.
- ✓ ***Kill the lights at night***. Many wildlife species are active at night and the presence of lights can inhibit their ability to utilize and move through your property.

## TIP: 3 Improve Water Resources for Wildlife Use

- ✓ Establish vegetation buffers around water sources to allow wildlife to access water without being detected.
- ✓ Create water sources near natural habitat areas and away from houses, roads, and other areas of human activity.
- ✓ Provide well-designed access and escape ramps for all stock troughs. Wildlife that fall into troughs swim around the inside perimeter of the tank until they encounter something that allows them to get out. Simply placing a floating board in the trough generally will not be sufficient to prevent drowning. For more information, refer to *Water for Wildlife* at: **www.batcon.org/pdfs/water/bciwaterforwildlife.pdf**
- ✓ Place logs in ponds to provide basking and hiding cover.

## TIP: 4 Improve Agricultural Land for Wildlife Use

- ✓ Leave plots of unharvested crop, pasture, or hayland adjacent to native habitats to provide food for wildlife close to their cover.
- ✓ Manage grazing utilization provides cover, as well as forage for wildlife.
- ✓ Provide nest and/or roost structures (such as bat boxes, nest boxes for wester bluebirds, perches for raptors, etc.)
- ✓ Adjust the timing of harvest to avoid the primary nesting season for birds (approximately March 1 – July 15) if possible.
- ✓ Harvest crops in a manner that allows wildlife to escape the field (i.e., harvest fields from the inside-out or side-to-side instead of from the outside-in).
- ✓ Limit pesticide use as much as possible. Consider using Integrated Pest Management strategies to control pests. Many types of beneficial wildlife, such as bats, raptors, and owls, can be attracted to your land to assist in controlling pests. For more information, refer to the *Artificial Nesting Structures and Integrated Pest Management (IPM) and Wildlife* at: **https://www.nrcs.usda.gov/wps/portal/nrcs/detail/or/technical/ecoscience/bio/?cid=nrcs142p2_045877**
- ✓ Ensure that fences are designed to be safe for wildlife. Fences can be a major barrier to wildlife movement across the landscape. Wildlife frequently die from becoming entangled in poorly designed fences. For more information, refer to How to Build a Fence with Wildlife in Mind at **https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_007658.**

## Gather Additional Information and Assistance

- ✓ *Oregon Soil and Water Conservation Districts*
  **www.oacd.org**
- ✓ *Natural Resources Conservation Service*
  **www.or.nrcs.usda.gov**
- ✓ *Oregon Department of Fish and Wildlife (ODFW)*
  **www.dfw.state.or.us**
- ✓ *US Fish and Wildlife Service (USFWS)*
  **www.fws.gov/oregonfwo**

**NOTES:**

# GLOSSARY OF TERMS

| | |
|---|---|
| **Acid / alkaline / neutral soil** | An aspect of the soil's chemical reaction. A pH of 7 indicates the soil is neutral, neither acid nor alkaline. A pH below 7 indicates acidity, while above 7 indicates alkalinity. Most plants grow well within a pH range varying from slightly acid to slightly alkaline. |
| **Aeration** | The process of loosening or puncturing the soil to increase water and air permeability. |
| **Aggregation** | The process of sand, silt and clay coming together to form larger granules. Good aggregation is apparent in a crumbly soil with water-stable granules that do not disintegrate easily. Well-aggregated soil has greater water entry at the surface, better aeration, and more water-holding capacity than poorly aggregated soil. |
| **Annual** | A plant that completes its life cycle in one growing season or a single year. |
| **Aquifer** | A sand, gravel or rock formation capable of storing or conveying water; an underground geological formation or group of formations containing usable amounts of groundwater that may supply wells or springs. |
| **Available nutrients** | Minerals or chemicals in the soil in a form plants can absorb and use for growth. |
| **Beneficial Insect** | Insects that act as pollinators, prey on pests, or perform other useful services in the garden, as opposed to those that are considered pests; examples include green lacewings, ladybugs and praying mantises |
| **Berm** | A mound or bank of earth. |
| **Biennial** | A plant that completes its life cycle in two years. Typically, these plants grow vegetatively during the first year, then fruit and die the second year. |
| **Border** | A soil berm 15-to-18-inches tall created by tillage to keep flood irrigation water inside a portion of a pasture. |
| **Broadcast seeding** | The application of seed by hand or with the aid of a seed spreader. |
| **Buffer strip** | A narrow area of permanent vegetation often planted along the edge of a field, typically implemented to slow water flow and wind velocity, or filter sediment and chemicals from runoff. |

| | |
|---|---|
| **Buffer zone** | A neutral area that acts as a protective barrier separating two conflicting forces such as, an area that acts to minimize the impact of pollutants on the environment or public. |
| **Capability class** | A classification system that demonstrates the suitability of soils for most varieties of crops. |
| **Claypan** | A hard, compact layer in the subsoil primarily consisting of clay; separated from overlying materials by a sharply defined boundary in the soil profile. Claypans usually impede the movement of water, air and plant roots. |
| **Clay** | Also known as “heavy” soil; a soil composed of extremely small mineral particles; sticky, heavy soil that is difficult to work. Wet clay soil dries out slowly because the downward movement of water (drainage) is slow. Clay soil expands when wet and cracks when dry. |
| **Complete fertilizer** | Any organic or inorganic material, natural or synthetic, that supplies all three of the primary nutrient elements for plant growth: nitrogen (N), phosphorous (P) and potassium (K). |
| **Compost** | A soil amendment made from organic waste materials (dead leaves, etc.). Materials are stored in a manner where moisture, heat and microorganisms may break them down. |
| **Conifer** | A plant that produces cones; a plant belonging to the family Coniferae, such as pines, junipers and cedars. |
| **Cover Crops** | Species grown in order to improve soil quality, rather than to harvest something |
| **Cultural resources** | Achaeological and historic resources, as well as the historic, aesthetic and cultural elements of the environment. |
| **Deciduous** | A plant that sheds all of its leaves at a single time each year (typically autumn). |
| **Dike** | An earth ridge built to guide or hold water within prescribed limits; a small levee. |
| **Dissolved oxygen (DO)** | Oxygen dissolved in water and readily available to fish and other aquatic organisms. |
| **Diversion** | A channel to slow, divert or collect water and/or reduce runoff. |
| **Drainage** | Movement of water out of the soil profile. When this happens quickly, the soil is considered “well drained.” When this happens slowly, soil is considered “poorly drained.” |

| | |
|---|---|
| **Drip irrigation** | A system for watering at points on or just below the soil surface so that a plant's root zone is thoroughly moistened without wasting water. This is accomplished with very low pressure over a long period of time to achieve the necessary penetration. |
| **Drip irrigation** | A system for watering at points on or just below the soil surface so that a plant's root zone is thoroughly moistened without wasting water. This is accomplished with very low pressure over a long period of time to achieve the necessary penetration. |
| **Ecosystem** | A community of plants, animals and people, as well as the physical environment in which they live. |
| **Effluent** | Discharge or emission of a liquid or gas. |
| **Erosion** | The detachment and movement of soil particles caused by wind or water. |
| **Eutrophication** | Degradation of water quality due to the water's enrichment by nutrients, primarily nitrogen (N) and phosphorous (P), which results in excessive plant (principally algae) growth and decay. When levels of N:P are about 7:1, algae will thrive. Low dissolved oxygen (DO) in the water is a common consequence, resulting in a loss of aquatic organisms. |
| **Evapotranspiration (ET)** | Movement of water into the atmosphere by evaporation from the earth's surface and by transpiration from plants. |
| **Evergreen** | Plants that retain their foliage throughout the year. |
| **Fallow** | The practice of leaving land either uncropped, weed-free, or with volunteer vegetation at a time when a crop would typically be grown; the objective may be to control weeds or accumulate water and/or available plant nutrients. |
| **Floodplain** | The land bordering a stream, built up of sediments from stream flood deposits, and subject to inundation during flooding. Also, the surface of an alluvial fan subject to flash flooding from the canyon above. |
| **Fungicide** | Pesticide used to control fungi, including mold, rot and mildew. |
| **Green Manure** | Growing plants that accumulate nutrients and organic matter, which are tilled into the earth to improve soil quality; the terms green manure and cover crops are often used interchangeably |
| **Groundwater** | Water from wells and underground aquifers. |
| **Gully erosion** | The erosion process whereby water accumulates and often recurs in narrow channels and, over short periods, removes the soil from these narrow areas to considerable depths; often causes channels too deep to easily repair with ordinary farm equipment. |

| | |
|---|---|
| **Hard water** | Water that has a high dissolved mineral content. |
| **Hardpan** | A soil layer with physical characteristics that limit root penetration and restrict water movement. |
| **Heavy metals** | High density metals. In agronomic use, these include copper, iron, manganese, molybdenum, cobalt, zinc, cadmium, mercury, nickel and lead. In small quantities, these metals may supply nutrition for plants, although they become toxic when accumulated at high levels. |
| **Herbaceous** | Plants that do not have woody stems, only soft green stalks, and leaves |
| **Herbicide** | Pesticide used to control undesirable vegetation. An herbicide may be applied as a pre-emergent to prevent germination of weed seeds or as a post-emergent to kill weeds after growth. |
| **Hydrologic cycle** | The movement of water in and on the earth and throughout the atmosphere through processes such as precipitation, evaporation, runoff and infiltration. |
| **Infiltration** | The downward entry of water into the soil profile from precipitation, irrigation and runoff; also called percolation. |
| **Integrated Pest Management** | A strategy of controlling crop pests through biological methods and cultivation practices, as opposed to chemical pesticides |
| **Insecticide** | Pesticide used to control insects. |
| **Invasive species** | A non-native species. Introduction of an invasive species often results in harm to the environment. An invasive species may be a plant, animal or any other biologically viable species that enters an ecosystem beyond its native range. |
| **Irrigation** | The application of water to soil to maintain desirable soil moisture for plant growth when rainfall is insufficient. |
| **Irrigation Water Management (IWM)** | The set of irrigation strategies that landowners and growers use to save water, conserve energy and prevent contaminants from entering water supplies. |
| **Leaching** | The process by which chemicals (fertilizers, pesticides, manure, etc.) are dissolved and transported through the soil by water; the washing out or flushing of a soluble substance from an insoluble one. Gardeners leach soil with water when they want to remove excess salts (see “salinity”). In high-rainfall areas, rainwater leaches both good and harmful substances from the soil. |
| **Load** | The quantity of a substance (possibly a contaminant) entering receiving waters. |

| | |
|---|---|
| **Loam** | Soil that is rich in organic material, does not compact easily, and drains well after watering; an “ideal” garden soil; a mix of sand, silt and clay. |
| **Microclimate** | The climate of a small area or locality, as opposed to the climate of a county or state. |
| **Monoculture** | The cultivation or growth of a single crop or organism, especially on agricultural or forestland. |
| **Mulch** | Any plant residue, by-product or other suitable material that is applied to the soil surface to conserve moisture, control erosion, suppress weed growth, moderate soil temperatures, improve soil condition or assist in establishing plant cover. Examples include bark, wood chips, sawdust, straw and plastic. |
| **Nitrogen** | One of three major elements required for plant growth; the first nutrient listed in the formulation on a fertilizer label. For example, on a fertilizer label that reads “10-8-6,” 10 is the amount of nitrogen. |
| **Nonpoint source** | The entry of a pollutant into a water body from widespread or diffuse sources with no definite point of entry; the source is not a readily discernible point, like a discharge pipe. |
| **Noxious weed** | Invasive plants that harm the environment. Noxious weeds choke out crops, destroy range and pasture lands, clog waterways, affect human and animal health, and/or threaten native plant communities. |
| **N-P-K** | Shorthand for the ratio of nitrogen, phosphorus, and potassium, the three most important plant nutrients; the three numbers listed on bags of fertilizer correspond to the percentage of these nutrients contained in the product |
| **Nutrients, Available Nutrients** | Elements in the soil that can be readily absorbed and assimilated as nourishment by growing plants, e.g., nitrogen, phosphorous, iron and potassium. |
| **Nutrient Management Plan** | A plan used by landowners for assessing and managing how nutrients (commercial fertilizers and animal wastes) are utilized on their farm; it includes a determination of how much fertilizer is appropriate to apply on crops. For a livestock operation, it also includes an assessment of manure production, collection, storage and utilization. |
| **Organic matter, soil organic matter** | Dead and decaying plant or animal tissues, including leaves, roots, manure, and the bodies of insects, earthworms, and microbes; compost piles are comprised primarily of organic matter, an essential ingredient of fertile soil. The organic components in soil, including undecayed and decaying plant and animal tissues, sometimes called “humus.” |

| | |
|---|---|
| **Overstory** | The larger and taller trees that occupy a forest area and shade the young trees, brush, grass, forbs, etc. that grow below. |
| **Perennial** | A plant that lives for more than two years. The top growth may die down each winter, followed by new growth in the spring. |
| **Permeability** | A characteristic of soil that aids water movement through the soil layers |
| **Pesticide** | A chemical used to control pests, such as animals, weeds, insects and diseases. |
| **pH** | A value that indicates the acidity of the soil. The scale ranges from 0 to 14, with 0 being strongly acidic, 7 neutral, and greater than 7 alkaline or basic. |
| **Phosphorous** | One of three major elements required for plant growth; the second nutrient listed on a fertilizer label. For example, on a fertilizer label that reads "10-8-6," 8 is the amount of phosphorus. |
| **Pitch tube** | A tubular mass of resin that forms on the surface of a tree's bark as the tree attempts to "pitch out" an insect. |
| **Point source** | The release of a substance from a pipe or discrete conveyance into a water body or a water course, e.g., a wastewater treatment plant. |
| **Porosity** | The volume of pores in a soil sample (non-solid volume) divided by the bulk volume of the sample; the amount of all open spaces between the solid grains of soil. Porosity determines how much water the soil can hold. |
| **Potassium** | Essential nutrient involved in various metabolic functions in plants (abbreviated K on fertilizer products); greensand, kelp meal and wood ashes are the primary sources of organic potassium |
| **Recharge** | The periodic replacement of groundwater. |
| **Recharge area** | A land area over which precipitation infiltrates into the soil and percolates downward to replenish an aquifer. |
| **Riffle** | A rocky shoal or sandbar lying just below the surface of a waterway. |
| **Rill erosion** | An erosion process where numerous small channels, typically a few inches deep, are formed. |
| **Riparian zone** | The transition area between a water ecosystem and the adjacent upland area. These zones are identified by their soil characteristics or plant communities and include the wet areas near streams, ponds, lakes, springs and other surface waters. |
| **Runoff** | That portion of precipitation or irrigation water which fails to infiltrate the soil and instead flows over the soil surface. |

| | |
|---|---|
| **Salinity** | In agronomy, an excess of salts in the soil. Salinity can harm many plants, causing leaves to scorch and turn yellow and stunting plant growth. |
| **Sand** | A soil with comparatively large particles (more than 0.05 millimeters in diameter) that are rounded rather than flattened. Compared to clay soils, sandy soils contain much more soil and air, drain well and warm quickly. They also dry out quickly, which, if used for crops, necessitates frequent watering that washes out valuable nutrients. Also referred to as “light” soil with a “gritty” feel. |
| **Saturated zone** | A portion of the soil profile in which all large pores are filled with water. |
| **Sediment** | The soil material, both mineral and organic, that is in suspension, is being transported, or has been moved from its site of origin by erosion (by air, water, gravity, etc.). |
| **Septic tank** | A sewage disposal tank in which a continuous flow of waste materials is decomposed by anaerobic (in the absence of oxygen) bacteria. |
| **Sheet erosion** | The removal of a relatively uniform, thin layer of soil from the land surface by rainfall and largely unchanneled surface runoff (sheet flow). |
| **Silage** | A mixture of raw chopped materials such as field corn, sorghum, grass, or clover that is converted into winter feed for livestock through a process of fermentation; this feed can be stored for several years with little loss of nutrients. |
| **Silt** | An intermediate soil textural class between sand and clay. Silt consists of particles between 0.05 and 0.002 millimeters in diameter, has a smooth feel, and is not sticky when moist. |
| **Soil amendment** | Matter (organic or inorganic) that is added to soil to improve its texture, aeration, drainage and retention of nutrients or moisture. |
| **Soil profile** | The arrangement of soil horizons (layers) below the surface of the ground. |
| **Soil survey** | A detailed report on the soils in a defined area. A soil survey contains maps with soil boundaries, photos, descriptions and tables of soil properties and features. Soil surveys are used by farmers, real estate agents, land use planners, engineers and others who desire information about the soil’s properties. |
| **Soil texture** | The texture of a soil resulting from the relative proportions of the various soil separates (sand, silt and clay) it contains. |
| **Soluble** | Capable of being dissolved easily. |
| **State Historic Preservation Officer (SHPO)** | The official responsible for administering the National Historic Preservation Act and the appropriate state statutes. |

| | |
|---|---|
| **Strip cropping** | The practice of growing two or more crops in alternating strips along the land's contours, often perpendicular to the prevailing direction of wind or surface water flow to reduce erosion. |
| **Subsoil** | (noun) The stratum of weathered material that underlies the surface soil. (verb) To plow or turn up the subsoil. |
| **Systemic pesticide** | A pesticide that moves inside a pest through absorption; the movement is usually upward and outward. There are systemic insecticides, fungicides and herbicides. |
| **Taproot** | A main root that grows straight down. Dandelions have taproots, so do oak trees. Taproots can grow very deep if there is a lack of surface water. |
| **Tillage pan, plow pan** | A layer or layers in the soil which are highly compacted, hardened or very high in clay content relative to the layer immediately above. |
| **Tilth** | A qualitative measure of soil quality, based on parameters such as organic matter content, water-holding capacity, and texture |
| **Topsoil** | The fertile, biologically-active layer of soil closest to the surface; topsoil includes organic matter, humus and a plethora of microbes, earthworms, and insects. |
| **Transpiration** | The release of moisture (absorbed largely by plant roots) through leaves. Temperature and humidity affect the transpiration rate. |
| **Understory** | Any vegetation (trees, shrubs, grasses, forbs, lichens, mosses, etc.) growing under a relatively continuous cover of branches and foliage formed by the overstory. |
| **Unsaturated zone** | A portion of the soil profile that contains both air and water. Water in this zone cannot enter a well. |
| **Vole** | A small, typically burrowing, mouselike rodent with a rounded muzzle. |
| **Water right(s)** | The right to draw water from a particular source, such as a lake, irrigation canal or stream. |
| **Watershed (drainage basin)** | The land area (catchment) which captures precipitation and conveys it to a particular water body. It is bounded by ridges or "divides." A large watershed is made up of the smaller watersheds of all its tributaries. |
| **Water table** | The upper level of a saturated zone in an aquifer below the soil surface. |
| **Wellhead protection** | The practice of preventing pollutants from seeping into well water at or near any active or abandoned wells. |
| **Wetlands** | Areas that are regularly wet or flooded; areas with a water table within the root zone or standing at or above the land surface for at least part of the growing season. These areas are host to a prevalence of water-loving plants and wildlife. |

# CONTACTS & ACRONYMS

| Common Name | Official Title | Web Address |
|---|---|---|
| Conservation District | Soil and Water Conservation District | www.oacd.org |
| DEQ | Oregon Department of Environmental Quality | www.oregon.gov/DEQ |
| Extension | Oregon State University Extension Service | extension.oregonstate.edu/ |
| FSA | Farm Service Agency | www.fsa.usda.gov |
| GLCI | Grazing Lands Conservation Initiative | www.grazinglands.org/ |
| NOWC | Network of Oregon Watershed Councils | www.oregonwatersheds.org/ |
| NRCS | USDA Natural Resources Conservation Service | www.or.nrcs.usda.gov |
| OACD | Oregon Association of Conservation Districts | www.oacd.org |
| ODA | Oregon Department of Agriculture | oregon.gov/ODA |
| ODF | Oregon Department of Forestry | www.oregon.gov/ODF |
| ODFW | Oregon Department of Fish and Wildlife | www.dfw.state.or.us/ |
| OSU Extension | Oregon State University Extension Service | extension.oregonstate.edu/ |
| Oregon Heritage Commission | Oregon Parks and Recreation Dept: Heritage Programs: Oregon Heritage Commission | www.oregon.gov/OPRD/HCD/OHC/index.shtml |
| OHS | Oregon Historical Society | www.ohs.org/ |
| OWEB | Oregon Watershed Enhancement Board | www.oregon.gov/OWEB |

| Common Name | Official Title | Web Address |
|---|---|---|
| OWRD | Oregon Water Resources Department | www.oregon.gov/OWRD |
| RD | USDA Rural Development | https://www.rd.usda.gov/or |
| SHPO | State Historic Preservation Officer | www.oregon.gov/OPRD/HCD/SHPO/index.shtml |
| SWCD | Soil and Water Conservation District | www.oacd.org |
| USDA | United States Department of Agriculture | www.usda.gov |
| USGS | United States Geological Survey | www.usgs.gov |
| Watermaster | listed on the Oregon Water Resources Dept. Web site | www.oregon.gov/OWRD/offices.shtml#Region_Watermaster_Map |
| Watershed Council | Listed on the Oregon Watershed Enhancement Board Web site and the Network of Oregon Watershed Councils (NOWC) Web site | www.oregon.gov/OWEB http://www.oregonwatersheds.org/ |
| Web Soil Survey | Online soil information provided by NRCS | https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm |
| Weed Board | Listed on the Oregon Department of Agriculture Web site | www.oregon.gov/ODA/PLANT/WEEDS |

**NOTES:**

**NOTES:**

**NOTES:**

# ACKNOWLEDGEMENTS

Produced by:
**USDA NATURAL RESOURCES CONSERVATION SERVICE**

United States Department of Agriculture
Natural Resources Conservation Service

**Production & design:**
Catherine Bailey, USDA NRCS

**For more information or to request additional copies, contact:**
USDA NRCS Public Affairs
1201 NE Lloyd Blvd, Suite 900
Portland, OR 97232

**With Technical Expertise and Review by:**
Alexis Collins, Bill Cronin, Bob Gillaspy, Deborah Virgovic, Denise Troxell, Chris Hamilton, Heather Medina, Jeremy Maestas, Kathy Ferge, Louann Brant, Kathy Pendergrass, Misty Seaboldt, Meghan Walter, Teresa Morales, and Ron Raney, **USDA-NRCS**

Melissa Fery, **OSU Small Farms Extension**

**www.or.nrcs.usda.gov**

www.or.nrcs.usda.gov

**OREGON**
**United States Department of Agriculture**
**Natural Resources Conservation Service**

USDA is an equal opportunity provider, employer, and lender.