Index

A

Adaptive management, **6-37**, 9-32
Aggradation
  regression functions, 7-55
Agriculture
  vegetative clearing, 3-14
  hypothetical condition and restoration response, 8-83
  instream modifications, 3-14
  irrigation and drainage, 3-15
  restoration, 8-83
  sediment and contaminants, 3-15
  soil exposure and compaction, 3-15
Alternatives
  design, 5-17
  restoration alternatives, **5-17**
  supporting analyses, 5-25
Aquatic habitat, 2-59
  subsystems, 2-59
Aquatic vegetation, 2-63

B

Backwater
  computation, *7-24*
  effects, *7-23*
Bank stability, 7-57
  bank erosion, 8-45
  bank stability check, 8-44
  charts, 7-60
  critical bank heights, 7-60
  protection measures, 8-46
  qualitative assessment, 7-57
  quantitative assessment, 7-59
Bank stabilization, 8-45, 8-61
  anchored cutting systems, 8-64
  geotextile systems, 8-65
  trees and logs, 8-66
Bank restoration, 8-61
  inspections, 9-23
Bankfull discharge, **1-17**, 7-10
  field indicators, 7-10
Benthic invertebrates, 2-64
  benthic rapid bioassessment, 7-82
Beaver
  ecosystem impacts, *8-26*
  impact of dams, 2-58
  transplanting, *8-26*
Biological diversity
  complexity, 7-78
  evaluating indices, 7-84
  in developing goals and objectives, 5-6
  Index of Biotic Integrity, 7-79
  measures of diversity, 7-79
  spacial scale, 7-79
  standard of comparison, 7-83
  subsets of concern, 7-79
Buffers, 8-11
  forested buffer strips, 8-89
  multispecies riparian buffer system, *8-81*
  requirements, 8-90
  urban stream buffers, *8-12*

C

Channel, **1-12**,
  equilibrium, 1-13
  scarp, **1-12**
  size, 1-13
  thalweg, **1-12**
Channel form, 1-26
  anastomosed streams, **1-27**
  braided streams, **1-27**
  predicting stable type, 8-30
Channel incision, 1-20
Channel slope, **2-22**
  longitudinal profiles, 2-22
Channel cross section, 2-23
  composite and compound cross sections, 7-23
  field procedures, 7-24
  site/reach selection, 2-23, 7-23
Channel evolution models, **7-30**
  advantages of, 7-34
  applications of geomorphic analysis, 7-37
  limitations of, 7-36
Channel-forming (or dominant) discharge, **1-16**, 7-3, 7-8
  determining from recurrence interval, 7-4, 7-12
  determining from watershed variables, 7-15
  mean annual flow, 7-15
Channel models, 8-40
  computer models, 8-41
  physical models, 8-41
Channel restoration, 8-28
  dimensions, 8-32, 8-37
  inspection, 9-23
  maintenance, 9-26
  moving beds, known slope, 8-38
  moving beds, known sediment concentration, 8-39
  reconstruction procedures, 8-28
  reference reach, **8-33**
  shape, 8-43
Channel roughness, 2-24
  formation of aquatic habitat, 2-25
  in meandering streams, 2-25
Channel stability
  bank, 7-50
  bed, 7-51
  local, 7-51
  systemwide, 7-51
Channel widening, 7-60
  predictions, 7-62
Channelization and diversions, 3-8
  restoration design, 8-79
CompMech (compensatory mechanisms), 7-92
  use with PHABSIM, 7-92
Conditions in stream corridor, 4-19
  causes of impairment, 4-23
  condition continuum, *4-22*
  management influence, 4-26
Conduit function, 2-82
Connectivity and width, **2-79,** 8-4, 8-17
  reference stream corridor, 8-7
  restoration design, 8-20
Conservation easements, *6-7*
Contouring, 9-13
Cost components and analysis, 5-21
  benefits evaluation, 5-29
  cost-effectiveness analysis, **5-26**
  data requirements, 5-21
  decision making, 5-28
  estimations, 6-29
  incremental cost analysis, **5-27**
Cross section surveys, 7-53
Cultural resources, 9-8

D

Dams
  as a disturbance, 3-7
  best management practices, 8-77
  effects on stream corridors, 8-77
  Glen Canyon Dam spiked flow experiment, *3-9*
  removal, 8-78
Data analysis and management, 7-72
  costs, 6-30
Degradation
  regression functions, 7-54
Design, **8-1**
Discharge, **1-16**
  continuity equation, **7-17**
  design discharge for restoration, 8-29
  measurement, 7-25
Drainage, for implementation, 9-11
Dynamic equilibrium, I-1, **2-86**
Disturbance, 2-87, 3-1
  Arnold, MO flood, *3-5*
  biological, 3-6, 7-96
  broad scale, *3-3*
  causal chain of events, 3-1
  chemical, 3-6
  natural disturbances, 3-3
  physical, 3-6

E

Ecological Restoration, ***I-3***
Ecosystem
  internal/external movement model, 1-3
  stream-riparian, 2-53
  relationship btw. terrestrial/aquatic ecosystems, 2-75
  river floodplain, 2-53
Effective discharge, **1-17** , 7-13
Erosion, **2-15**, 2-27,
  control of, 2-27, 9-4
Environmental impact analysis, 5-30
Eutrophication, **2-73**

Evaluation, **6-34**, 6-41
baseline characterization, **9-29**
effectiveness monitoring, 9-32
fish barrier modifications, *9-36*
human interest, 9-38, 9-46
implementation monitoring, 9-32
parameters, 9-32
performance evaluation, **9-29**
reference sites, 9-35
risk assessment, **9-29**
trend assessment, **9-29**
validation monitoring, 9-32
Evaporation, *2-6*
Evapotranspiration, **2-7**
Exotic species, 3-10
control, 8-79
salt cedar, *3-12*
Western U.S., *3-11*

F

Fauna
aquatic fauna, 2-63
beaver *(see Beaver above)*
benthic invertebrates, 2-63
birds, 2-57
fish, 2-65
habitat features, 2-56
mammals, 2-58
mussels, 2-67
reptiles and amphibians, 2-57
Fencing, 9-20
Filter and barrier functions, 2-84
edges, 2-85
Fish, 2-65
barriers, 8-75, 9-36
bioindicators, 7-83
feeding and reproduction strategies, 2-66
managing restoration, 9-46
species richness, 2-65
Floodplain, **1-12**
hydrologic floodplain, **1-18**
topographic floodplain, **1-18**
flood storage, 1-18
lag time, **1-18**
lateral accretion, **2-26**
stability, 2-24
vertical accretion, **2-26**
Floodplain landforms and deposits, 1-19
backswamps, **1-19**
chute, **1-19**
clay plug, **1-19**
meander scroll, **1-19**
natural levees, **1-19**
oxbow, **1-19**
oxbow lake, **1-19**
restoration of microrelief, 8-8
splays, **1-19**
Flood-pulse concept, 1-21
Flow
allowable velocity check, 8-48, 8-51
allowable stress check, 8-48, 8-51
baseflow, **1-14,** 2-13
daily mean streamflow, *7-6*
ecological impacts, 2-15
ephemeral streams, **1-16**
effluent or gaining reaches, **1-16**
impact on fauna, 2-68
influent or "losing" reaches, **1-16**
intermittent streams, **1-16**
mean annual flow, **7-15**
peak flow, *7-6*
perennial streams, **1-16**
stormflow, **1-14**
sources of data, *7-6*
uniform flow, ***7-20***
Flow duration, **2-14**
flow duration curve, *7-3*
Flow frequency, **2-14, 7-4**
flood frequency analysis, 7-4, *7-7*
low-flow frequency analysis, 7-7
Food patches, 8-25
Forests and forestry
buffer strips, 8-89
managing restoration, 9-42
site preparation, 3-17
transportation, 3-17, 8-88
tree removal, 3-16
Functions, ***2-78***
barrier, ***2-78***
conduit, 1-8, ***2-78***
filter, ***2-78***
habitat, ***2-78***
sink, ***2-78***
source, ***2-78***
Funding,
organization, 4-9
restoration implementation, 6-2

G

Geomorphic assessment, **7-26**
Geomorphology, **2-15**
Goals and Objectives, 5-12, 5-14
desired future conditions, **5-3**, 5-12
responsiveness, ***5-14***
restoration constraints and issues, **5-7**
restoration goals, **5-12**
restoration objectives, **5-13**
scale considerations, 5-3
self-sustainability, ***5-14***
tolerance, ***5-14***
value, ***5-14***
vulnerability, ***5-14***
Grazing
loss of vegetative cover, 3-18
physical impacts, 3-19
restoration, 8-90, 9-43
Greentree reservoirs, 8-24
Ground water
aquifer, **2-10**
aquitards, **2-10**
capillary fringe, **2-10**
confined aquifer, **2-11**
pellicular water, **2-10**
phreatic zone, **2-11**
recharge area, **2-11**
springs, seeps, **2-11**
unconfined aquifer, **2-11**
vadose zone, **2-10**

H

Habitat Evaluation Procedures (HEP), 7-87
Habitat functions, 2-78
edge and interior, *2-81,* 8-21
Habitat Recovery *(instream)*, 8-70
procedures, 8-71
Hydraulic geometry
channel planform, 7-47
hydraulic geometry curves Salmon River, 7-43
hydraulic geometry theory, **7-41**, 8-36
meander geometry, *7-47,*7-48, *7-49*
regime formulas, *7-49*
regime theory, *7-44*
regional curves, 7-44
relations based on mean annual discharge, 7-41
stability assessment, 7-44
Hydrologic cycle, **2-3**
Hydrologic unit cataloging, 1-9

I

Indicator species, **7-76**
aquatic invertebrates habitat evaluation procedures, 7-78
riparian response guilds, 7-78
selecting indicators, 7-77
Infiltration, **2-8**
infiltration capacity, **2-8**
infiltration rate, **2-8**
porosity, **2-8**
Implementing restoration, 6-2
construction, 9-12
emergency maintenance, **9-26**
flow diversion, 9-14
minimizing disturbance, 9-4
plant establishment, 9-15
remedial maintenance, **9-26**
scheduled maintenance, **9-26**
site preparation, 9-3, 9-10
staging areas, 9-4
work zone, 9-3
Inspection, 9-21
Instream Flow Incremental Methodology (IFIM), *5-24,*7-88,

Instream structures, 8-72
design, 8-72
engineered log jams, *9-30*
inspection, 9-23
Interception, 2-4
precipitation pathways, 2-5
Irrigation, 9-20

L

Landscape scale, **1-7**
in goals and objective development, 5-5
Land use
design approaches for common effects, 8-76
developing goals and objectives, 5-3
summary of disturbance activities, 3-26
Log jams, engineered, 9-30
Longitudinal zones, 1-24
Longitudinal profile, 2-23, 8-43
adjustments, 2-23

M

Managing restoration, 9-40
Manning's equation, **7-17**
direct solution for Manning's n, 7-18
Froude number, ***7-21***
indirect solution for Manning's n, 7-19
Manning's n in relation to bedforms, *7-21*
Monitoring, 6-22
acting on results, 6-37
dissemination of results, 6-39
documenting and reporting, 6-38
inspection, 9-21
monitoring plan, 6-23, *6-25*, **6-29**, 6,33
performance criteria, **6-24**
level of effort, 6-31
parameters, and methods, 6-26
target conditions, 6-26
types of data, 6-31
Montgomery and Buffington classification system, 7-29
Mining
altered hydrology, 3-19
contaminants, 3-20
reclamation, 8-96
soil disturbance, 3-20
vegetative clearing, 3-20
Mulches, 9-19

N

Nest structures, 8-25

O

Oak Ridge Chinook salmon model (ORCM), 7-92
Organic material, 2-73
autochthonous, **1-30**, 2-73
allochthonous, **1-30**, 2-73
heterotrophic, **1-30**
Organizing restoration
advisory group, **4-4**
boundary setting, 4-3
commitments, 6-10
contractors, 6-10
characteristics of success, 6-17
decision maker, **4-4**
decision structure, 4-10
dividing responsibilities, 6-4, 6-6
documentation, 4-13
information sharing, 4-12
permits, 6-13
schedules, 6-12
scoping process, 4-3
sponsor, **4-4**
technical teams, 4-5, 6-8
tools, 6-3
volunteers, 6-8
Overland flow, **2-11**
depression storage, **2-11**
Horton overland flow, **2-12**
surface detention, **2-12**

P

Physical Habitat Simulation Model (PHABSIM), 7-88
time series simulations, 7-91
use with CompMech, 7-92
Physical structure
corridor, **1-3**
patch, **1-3**
matrix, **1-3**
mosaic, **1-3**
Pools and riffles, **1-28**, 2-22
riffle spacing, 8-43
Problem/opportunities identification, 4-16
baseline data, **4-17**
community mapping, 4-17
data analysis, 4-19
data collection, 4-16
historical data, **4-17**
problem/opportunity statements, **4-27**
reference condition, **4-20**
reference reach, **4-20**
reference site, **4-20**
Proper Functioning Condition (PFC), 7-39
Public outreach, 4-12
tools, 4-13

Q

Quality assurance and quality control
costs, 6-29
restoration planning, 5-8
sampling, 7-73

R

Rapid bioassessment, 7-80
Reach file/National Hydrography Dataset, 1-9
Reach scale, 1-10
in developing goals and objectives, 5-7
Rehabilitation, ***I-3***
Recovery, ***2-87***
Recreation, 3-21
restoration design, 8-97
Regional hydrological analysis, 7-15
Regional scale, 1-6
Rehabilitation, ***I-3***
Resistance, ***2-87***
Resilience, ***2-87***
in Eastern upland forests, *3-4*
Restoration, I-2, ***I-3***
Riffles *(see Pools and riffles)*
Risk assessment, 5-29
River continuum concept, 1-30
Riverine Community Habitat Assessment and Restoration Concept Model (RCHARC), 7-91
Rosgen stream classification system, 7-29
Runoff, **2-11**
Quick return flow, **2-13**

S

Salmonid population model (SALMOD), 7-93
Sampling
automatic, 7-65
chain of custody, 7-70
discrete versus composite, 7-66
field analysis, 7-67
field sampling plan, **6-30**
frequency, 7-63, 6-32
grab, 7-65
labeling, 7-69
laboratory sample analysis, **6-30**
manual, 7-65
packaging and shipping, 7-70
preparation and handling, 7-69
preservation, 7-69
site selection, 7-64
timing and duration, 6-32
Saturated overland flow, **2-13**
Scarp, **1-12**
Schumm
classification system, 7-29
equation, 2-21
Sediment
ecological and water quality impacts, 2-26
Sediment control, 9-4
hay bales, 9-5
silt fence, 9-5
Sediment deposition, **2-15**
Sediment sampling
analysis, 7-71
collection techniques, 7-71

Sediment transport, **2-15**, 8-53
bed load, **2-18**
bed-material load, **2-18**, *2-19*
budget, 8-56
discharge functions, 8-55
HEC-6, 8-54
impact on habitat, 2-26
impact on water quality, 2-26
measured load, **2-19**
particle movement, 2-17
processes, 7-57
saltation, **2-17**
sediment load, **2-18**
sediment rating curve, 7-13, 8-29
stream competence, **2-16**
stream power, **2-19**, 8-52
suspended bed material load, **2-18**
suspended load, **2-18**, 2-19
suspended sediment discharge, **2-18**
tractive (shear) stress, **2-16**, 8-38, 8-48, 8-51
unmeasured load, **2-19**
wash load, **2-18**, *2-19*
Single-thread streams, 1-26
Sinuosity, **1-27**
affecting slope, 2-22
meander design, 8-34, *8-36*
Site access, 6-15, 9-4
access easement, **6-16**
drainage easement, **6-16**
fee acquisition, **6-16**
implementation easement, **6-16**
right of entry, **6-15**
Site clearing, 9-10
Species requirements, 7-86, 8-7
Specific gauge analysis, 7-52
Soil
compaction, 8-9
ecological role of, 2-51
depleted matrix, **2-49**
functions, 2-45
hydric soils, 2-48
microbiology, 2-46, 2-51, 8-9
salinity, 8-10
soil surveys, 8-9
topographic position, 2-47
type, 2-46
wetland, 2-48
Soil bioengineering, 8-23, 8-61
geotechnical engineering, 9-13
Soil moisture, 2-9
evaporation, 2-6
deep percolation, **2-9**
field capacity, **2-9**
permanent wilting point, **2-9**
relationship with temperature, 2-47
Source and sink functions, 2-86
Spatial scale, **1-3**
landscapes, **1-7**
region, **1-6**
reach, **1-10**
watershed, **1-8**
Stability (in stream and floodplain), 2-20, *2-87*
assessment, 8-44
allowable stress check, 8-48
allowable velocity check, 8-48
controls, 8-64
horizontal stability, 8-45
vertical stability, 8-44
Storm hydrograph, **1-15**
after urbanization, *1-15*
recession limb, **1-15**
rising limb, **1-15**
Stream classification, **7-26**, 7-85
applications of geomorphic analysis, 7-37
advantages, 7-27
alluvial vs. non-alluvial, **7-27**
limitations, 7-27
use in restoring biological conditions, 7-86
Stream corridor, **1-1**
adjustments, 2-21
common features, 1-12
Stream corridor scale, **1-10**
in developing goals and objectives, 5-6
Stream health
visual assessment, *7-76*
Stream instability, 7-50
bed stability, 7-51
local, 7-51
systemwide, 7-51
Stream order, **1-25**
as a classification system, 7-28
stream continuum concept, 1-30
Stream scale, **1-10**
Stream stability (balance), 1-14, 2-20
Stream system dynamics, 7-48
Substrate, 2-71
bed material particle size distribution, 7-25, 8-28
hyphorheic zone, 2-72
pebble count, **7-25**
vertical (bed) stability
Subsurface flow, **2-12**

T

Temporal scale, 1-11
Terrace, **1-20**
formation, 1-20
numbering, 1-21
Thalweg, **1-12**
profiles, *7-53*
surveys, 7-53
Transitional upland fringe, **1-12**, 1-20
Transpiration, **2-5**
Two-dimensional flow modeling, 7-90

U

Urbanization, 3-22
altered channels, 3-24. 8-97
altered hydrology, 3-23, 8-97
design tools, 8-101
habitat and aquatic life, 3-25
inspection program, 9-25
runoff controls, 8-99
sediment controls, 8-100
sedimentation and contaminants, 3-24

V

Valley form, 8-4
Vegetation
across the stream corridor, 1-21
along the stream corridor, 1-29
canyon effect, 2-54
distribution and characteristics, 2-51
flooding tolerances, 7-96, 8-22
horizontal complexity, 2-52, 8-17
internal complexity (diversity), 2-51
landscape scale, 2-53
structure, 2-55
stream corridor scale, 2-53
vertical complexity (diversity), 2-55, 8-21
zonation, *7-96*
Vegetation-hydroperiod modeling, 7-94
use in restoration, 8-23
Vegetation restoration, 8-14
existing vegetation, 8-11
inspection, 9-24
maintenance, 9-28
restoration species, 8-10
revegetation, 8-14, 9-15

W

Waste disposal, sanitation, 9-9
Water surface
energy equation, **7-21**
profile, *7-18*
slope survey, 7-24
Water temperature, 2-28
effects of cover, 2-68
impacts of surface versus ground water pathways, 2-28
impacts on fauna, 2-68
sampling, 7-68
thermal loading, 2-28

Water quality
acidity, 2-30, 2-31
alkalinity, 2-30, 2-31
biochemical oxygen demand (BOD), **2-32**
dissolved oxygen, 2-31, 2-70, *(sampling)* 7-68
iron, 2-29
metals, 2-44
nitrogen, 2-35
pH, 2-30, 2-71, *(sampling)* 7-68
phosphorus, 2-35
restoration implementation, 9-6
salinity, 2-29
toxic organic chemicals, 2-38
Watershed, **1-24**
designing for drainage and topography, 8-8
drainage patterns, 1-25
watershed scale, 1-8
Wetlands, **2-60**
functions, 2-61
hydrogeomorphic approach, **2-62**
National Wetlands Inventory, *2-61*
palustrine wetlands, **2-62**
plant adaptation, 2-49
USFWS Classification of Wetlands and Deepwater Habitats of the United States, 2-61
Width *(see Connectivity and width)*