Surveying Oregon's Streams "A Snapshot In Time"

Welcome to *Surveying Oregon's Streams "A Snapshot In Time"*, the Oregon Department of Fish and Wildlife's Aquatic Inventory Project Training Manual for Stream Habitat Surveys. In this manual you will find a number of useful tools to help you plan and implement a stream habitat survey.

Read the introduction and use the lesson plans to start the training process. Survey methods, a training slide show and script, data sheet masters, tools for implementing both the training and the survey, a data interpretation package, volunteer management tools, a list of references, and a glossary round out the package.

Consider the following helpful hints:

1. One complimentary "rite-in-the-rain" field manual, complete with intermediate survey, riparian survey, and photo record methods, is included with the training package. More are available for trained surveyors. Contact Kim Jones at 541-757-4263 x 260 or Patty Bowers at 541-573-1703 for information about obtaining additional copies of the field manual.

2. As a suggestion, pull pages H-17 and H-18, Habitat Unit References 1 and 2, and H-19 and H-20, Reach and Habitat Unit Code Sheets to use as masters. Make enough copies for each team to use in the field portion of the training session or during the actual habitat survey. Place each set of pages (H-17 and H-18, H-19 and H-20) back to back. Laminate with heavy-duty laminating film to produce two waterproof guides for field use.

3. The slides and script (Section G) are cross-referenced by number. The accompanying gray slide labels are also cross-referenced. Apply the numbered slide label to the slide with the same number and place in a slide carousel. Use the script to proof the order of slides. Slides were chosen to represent the broadest possible range of conditions encountered in a survey, but feel free to substitute localized slides if they work better for your situation.

4. ODFW's Volunteer Council is updating its *Volunteer Guide* (tentatively scheduled for completion during summer 1999). Some of the form updates were not available at press time. Get in touch with your nearest Volunteer Progam Contact (see page J-3) for updated materials including a copy of the *Volunteer Guide*.

We hope this training manual is useful as you prepare for stream habitat surveys. Please contact Kim Jones (541-757-4263 x 260) or Patty Bowers (541-573-1703) with suggestions or questions.

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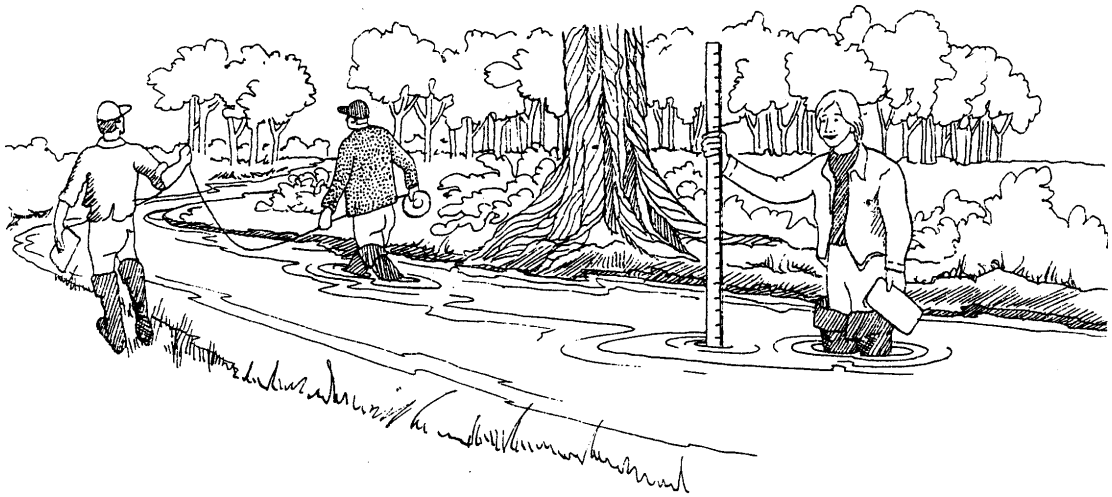

Adapted from original artwork by Sandra Noel, *Adopting A Stream A Northwest Handbook*, Adopt-A-Stream Foundation, 1988.

AQUATIC INVENTORY PROJECT
Training Materials
and
Methods For
Stream Habitat Surveys

OREGON DEPARTMENT OF FISH AND WILDLIFE

Salmon-Trout Enhancement Program
and
Aquatic Inventory Project
Natural Production Program

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Aquatic Habitat Inventory

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Habitat Survey

Here's What It's All About!

The Oregon Plan for Salmon and Watersheds is a call to all Oregonians, whether they live in a city, in a suburb, or on a farm, to join the effort to save our salmon and protect our rivers. It represents commitments on behalf of government, organizations, and private citizens from all areas of the state. While the plan began as an effort to address a decline in coastal salmon it has expanded to represent a comprehensive statewide approach for watershed protection that includes improvements in water quality and fish populations.

As a result, Oregonians from all walks of life are focused on watersheds — their uplands, waterways, and fish. Restoration and recovery efforts are taking place in nearly every major watershed. Everyone is “getting their feet wet” — government agencies, businesses, private landowners, educators, students, and individuals. Everyone wants to help, but few know where to begin.

Restoration efforts can be futile without a thorough assessment of a stream's existing habitat conditions. A watershed or stream's potential for recovery also needs evaluation. This is where the Aquatic Inventory Project comes into the picture. What is a third order stream? Do you know how to measure active channel width? What is the stream’s pool to riffle ratio? Is large woody debris present? How much shade is available to the stream? These questions and more are answered through an aquatic habitat inventory — an assessment tool for streams. Aquatic habitat inventories are coordinated through the Oregon Department of Fish and Wildlife's (ODFW) Aquatic Inventory Project and the Salmon-Trout Enhancement Program.

The Aquatic Inventory Project began in 1989 with sponsorship provided by ODFW''s Restoration and Enhancement Program. Drafting of stream survey methods and implementation of field work began in 1990. Methods found in this manual are the result of project staff experience and cooperative efforts with Oregon State University, forest industry, and US Forest Service Pacific Northwest Research Lab scientists. Members of the Umpqua Basin Fisheries Restoration Initiative and the Oregon Forest Industry Council also provided review and consultation.

Aquatic habitat inventory surveys collect basic information about existing stream habitat. Data collected by trained volunteers and other crews help biologists determine factors limiting natural fish production, identify habitat protection and restoration needs, and provide information for fish management plans and policies. Watershed councils also use habitat survey information to prepare watershed assessments and action plans.

With training and oversight provided by Oregon Department of Fish and Wildlife personnel, volunteers, schools, and other groups can undertake an aquatic habitat inventory. The training benefits educators, watershed council members, landowners, and others interested in learning more about stream survey methods. Participants receive both classroom and field experience during the training segment.

Methods described in this training packet are designed for compatibility with other stream habitat inventory and classification systems (Rosgen, 1985, Frissell et. al., 1986, USFS Region 6 Level II Inventory, 1992, and others). Compatibility is achieved by systematically identifying and measuring valley and stream features. The resulting measurements and relationships are then summarized into unifying valley and channel types.

Here's What You'll Find:

Lesson Plans	Detailed lesson plans help the trainer develop a well-rounded training experience with the aquatic habitat inventory process. The checklist approach is a step-by-step system from planning to implementation.
Preparing For The Survey	Consider the following items when preparing for a survey: time commitment, equipment, pre-survey homework, maps, safety, and other details.
Survey Level Comparison	To help you determine the level of intensity for your survey, look over the survey comparison page.
Basic Level Survey Methods	Basic level surveys are designed for school groups and specific watershed information needs without the rigor of higher level surveys.
Slide Show And Script	The slide show and script are coordinated with the Intermediate Level survey methods.
Intermediate Level Survey Methods	The Intermediate Level Survey is the preferred level for STEP volunteers and watershed councils. Training is required.
Riparian Zone Survey Methods	Riparian zone survey methods are used to obtain detailed information about the riparian zone.
Photo Record Survey Methods	To document changes in streams over time use the Photo Record Survey methods while completing the habitat survey.
Tool Box	The toolbox contains a number of helpful items for the trainer and the surveyor — quality control checklists, field references, evaluation form, private property and landowner contact information, and more.
Volunteer Management Tools	Information and masters for required and optional volunteer program management responsibilities are found in this section.
Interpretation Guide	Use this guide to interpret the graphs and reports of the stream survey data analysis. Access to the stream survey data analysis package is also presented.
Resources	This section includes contact numbers for ODFW fish districts, STEP Biologists, watershed councils, and Aquatic Inventory Project personnel plus emergency contact information for environmental concerns.
Literature Cited	The bibliography includes the technical references cited within the document.
Glossary	A list of key terms and their definitions isfound at the end of the package.

Preparing For The Survey

Conducting a stream survey includes gathering general information from maps and other sources and direct observation of stream characteristics in the field. A number of preparations must take place before going to the field. Use the suggestions, ideas, and helpful hints on the next several pages to help you prepare.

VOLUNTEER INVOLVEMENT

Salmon-Trout Enhancement Program volunteers have completed many miles of habitat surveys contributing large amounts of data to the Aquatic Inventory Project's statewide data base. More information is needed to identify habitat protection and restoration needs in local watersheds. To complete a survey as an ODFW volunteer, you must complete the following requirements.

1. For quality control and consistent application of methods, a training session, including both classroom and field instruction, is required before volunteers conduct an intermediate or advanced level aquatic habitat inventory.

2. Do not enter private property along the stream without either verbal or written permission for access, even if it is not posted. The trainer will supply a form to use as a landowner contact record. If you enter private property without permission, you are trespassing and are liable for any problems that arise.

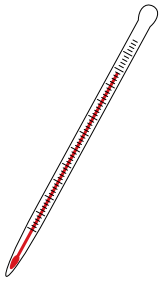
3. A "State of Oregon Conditions Of Volunteer Service" agreement must be submitted by each participant. It includes important personal property and medical insurance information, assigned duties, and emergency contact information. The trainer supplies and explains the agreement.

EQUIPMENT CHECK LIST

<u>In Storage Box</u>:

- ❒ Atlas (*Oregon Atlas and Gazetteer* -DeLorme Mapping $16+)
- ❒ USGS Topographic Maps (7.5 minute quad, 1:24,000 scale, 11 inches = 4 miles required for each stream segment. These maps show buildings, elevations, waterways, and roads. USGS maps are often available at local sporting goods stores. Road map coverage by county or fire district, or basin maps from Oregon Water Resources Department are also useful.)

- ❒ Camera/Film (dateback version preferred ~ $225)
  (several rolls of color slide film ~ $10 each)
- ❒ Clinometer (Sunto instruments $125, for making channel exposure measurements)
- ❒ Clipboards (fiberback $2, and/or metal $20)
- ❒ Compass ($35, some are also available with clinometer and UTM grid lines)
- ❒ Data Forms/File Box (ODFW provides waterproof forms - may include habitat unit data sheet, riparian form, photo record form and reach sheet, file box $5)
- ❒ Waterproof "Code Sheet" (ODFW provides)
- ❒ Fiberglass Measuring Tape (60 meter Kesson $65)
- ❒ Field Book (“Rite in the Rain” Line Rule or Level $3)
- ❒ Flagging Tape (four rolls blue and white stripe $8, required for marking beginning, intermediate, and end points of survey.)
- ❒ Survey Methods and Instructions (ODFW provides)
- ❒ Thermometer (Pocket Celsius scale $10)
- ❒ Vest (optional-Filson Cruiser Vest $45 each)
- ❒ Storage Box (Rubbermaid Action Packer $20)
- ❒ Pencils, Sharpie, Waterproof Permanent Marker ($3)



<u>Other</u>:

- ❒ Depth Staff (2 meters long, marked every 5 centimeters, also serves as a sturdy walking stick.)
- ❒ Hip Boots (non-slip soles of felt or studded "corkers" advised, $60-90 x 2)
- ❒ Chest Waders ($70-110 x 2)
- ❒ Wading Shoes (non-slip soles of felt or studded "corkers" advised, $45-75 x 2)
- ❒ Personal Day Pack (for lunch and other extras, vest works well, too.)
- ❒ Polarized Sunglasses
- ❒ Rainwear plus snag and thorn-proof clothing appropriate for the weather
- ❒ First Aid Kit (in vehicle or readily available)
- ❒ Personal Safety Packs (to carry while in field)

Any equipment borrowed from ODFW must be returned upon completion of the survey.

TIME COMMITMENT

Participation in the aquatic habitat inventory can occur at three different levels — basic, intermediate, and advanced. The lowest level of complexity is the basic survey. The intermediate survey is moderately complex and requires special training. The most complex survey is the advanced level. Additional training and coordination with ODFW Fish Research staff is required for the advanced level survey.

If specific stream reach information is needed, the project supervisor may request only certain portions of a survey, for example, a pool frequency survey.

The time commitment required for each level of aquatic habitat inventory varies with training, experience, access, terrain, weather conditions, stream conditions, and other factors. A well-trained, conscientious surveyor may average 1/2 to 2 miles per day depending on the factors above.

Use the table below to estimate time necessary for each inventory step assuming the Intermediate Level habitat inventory is conducted.

Inventory Step	Time To Complete	Per Unit
Identify and prioritize streams	**0.5 days**	**all streams**
Determine survey reaches	**15 minutes**	**survey reach**
Describe and mark survey reaches on maps	**30 minutes[A]**	**survey reach**
Complete header forms	**30 minutes**	**survey reach**
Collect field inventory data	**10 hours**	**60 - 80 habitat units**
Proof data forms (in the field)	**5 minutes**	**20 habitat units**
Describe survey reach characteristics	**15 minutes**	**survey reach**
Label and organize slides	**1.5 hours**	**36-exposure roll**
Proof data forms (in the office)	**30 minutes**	**100 habitat units**
Photocopy and file inventory forms	**1 hour**	**survey reach**
Enter data - Header data	**3 minutes[B]**	**survey reach**
- Habitat data	**1 hour[B]**	**30 - 60 habitat units**
- Riparian data	**1 hour[B]**	**60 - 90 habitat units**
Proof entered data	**1 hour**	**100 150 habitat units**
Print reports	**3 minutes**	**one report**
Obtain color copies of key photo points	**variable**	**survey reach**
Prepare binder and organize reports	**1 - 2 hours**	**1 stream basin**

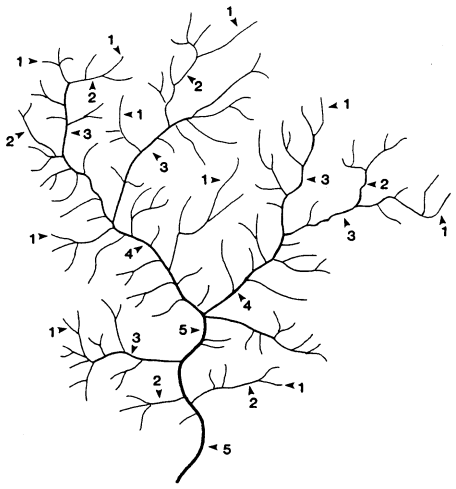
[A] Add 1 to 2 days per stream if crews ground-truth and flag survey reaches prior to survey.
[B] The time it takes to complete data entry depends largely on the experience and skill of data entry personnel; these are gross estimates only.
[C] Source: Overton, C. K., Wollrab, S. P., Roberts, B. C., Radko, M. A., 1997. Ri/R4 (Northern/Intermountain Regions) Fish and Fish Habitat Standard Inventory Procedures Handbook, Gen. Tech. Rep. INT-GTR-346. Ogden, UT: Intermountain Research Station

Basin Information:

Gather basin information prior to and during the course of the survey. Most map work and landowner access permission is completed prior to field work. Survey crew members should note additional relevant comments in their field books and on the data sheets. Following are examples of useful basin information.

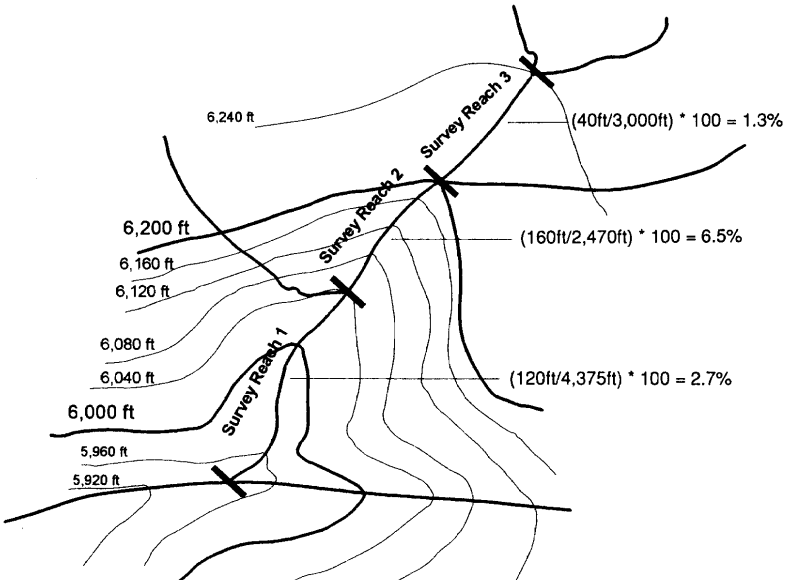
1. Basin name. Use the name of the large river which commonly describes a region. For example, use McKenzie R as the basin name for Lookout CR, not Willamette R or Columbia R.

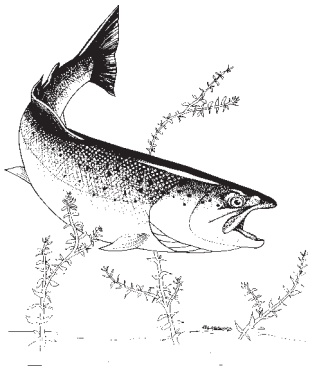
2. Stream name. Use a standardized system for the name followed by descriptors of forks etc. Examples: Alsea R, Drift CR, Lobster CR, E FK. Spell out descriptive or non-standard types such as Branch, Slough, or Swale. Spell out compass direction only for larger streams and when the usage is common, such as North Umpqua. Use the same name format on all data sheets.



3. Stream order. Note stream order for each tributary surveyed. This is determined from blue line tributaries (perennial and intermittent streams) shown on USGS 7.5 minute topographic maps. The smallest channels in a watershed have no tributaries and are called **first-order streams**. When two first-order streams join, they form a **second-order stream**. When two-second-order channels join, a **third-order stream** is formed, and so on. See figure at left. First- and second-order channels are often small, steep, or intermittent. Orders six or greater are large rivers.

4. Elevation. Using the topographic map, note elevation (in meters) at the stream mouth and at the upstream end of the survey. Also calculate changes in topographic slope or gradient ("rise" or change in elevation divided by "run" or distance x 100 = % slope).





5. Stream Flow. Note location of USGS or other gaging stations. Record all locations and stage heights of any gaging station, marked bridge, or staff gauge.

6. Riparian Vegetation. Describe general community structure and size composition of riparian vegetation. Identify by separate census or sample in each basin.

7. Fish. Describe fish species and stocks present, management concerns, and linkage to other databases or research projects.

8. Flow Regulation: Describe existing or proposed dams and diversions influencing the basin and stream segment.

9. Land Use/Ownership. Provide a general description of land use and ownership in the basin (e.g. managed timber, rural residential, agricultural, livestock grazing).

10. Contacts. Note names, addresses, and phone numbers of key people to contact with respect to survey. Include ODFW district biologists, interested private individuals, landowners contacted for access, etc.

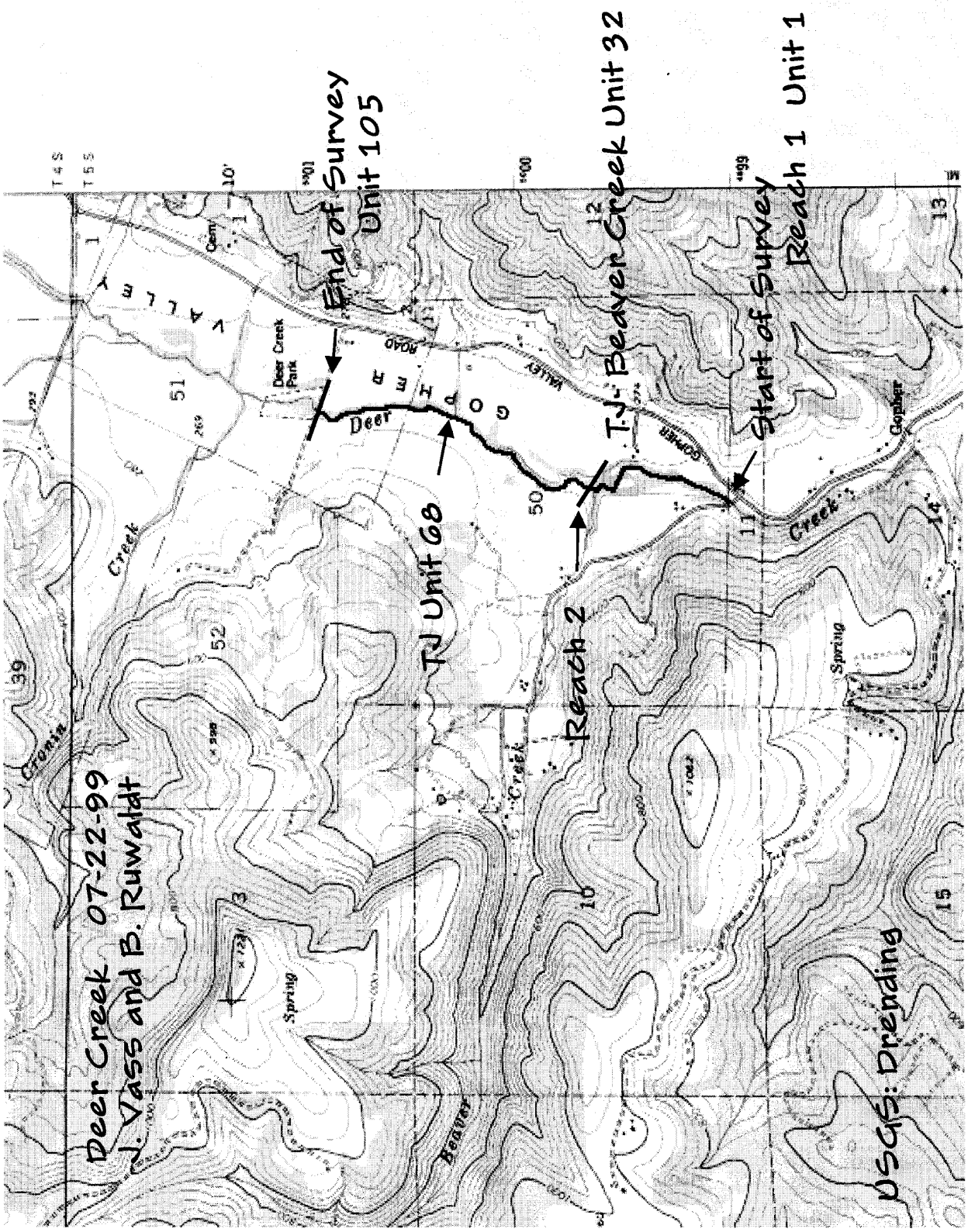
General basin information helps group and classifiy streams and provides details for the final stream reports.

Map Work:

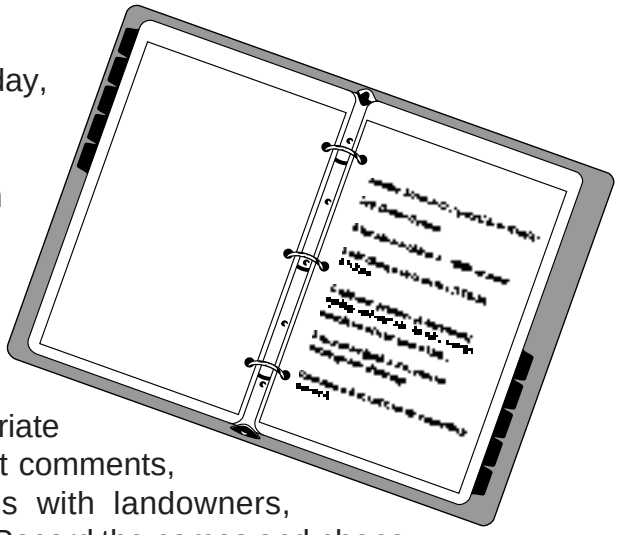
Do not go into the field without maps, especially a topographic map! Data that cannot be linked to the maps is essentially useless. Use the maps to orient to the stream and to identify the location of reach changes, named tributaries, roads, and bridge crossings. Mark all reach changes and important features on the map. Write the appropriate habitat unit number on the map when you make a reach change or pass named tributary junctions, bridges, and other landmarks. Clearly mark where you start and end the survey and photo point locations. Accurate maps and a good cross-reference between landmarks on the map and data collected are required to integrate the surveys with Geographic Information System (GIS) technology. Refer to the resources section for an example of field entries on a topographic map. You may want to also obtain a basin or watershed map. It is helpful to understand how the survey stream fits into the bigger picture of the watershed.

To reduce problems if a field map is lost or ruined, take photo copies of the topographic map to the field. Use waterproof (rite-in-the-rain) paper if possible. Leave the original map in the vehicle or at the office. At the end of the day, transfer notations from the copy to the original map.

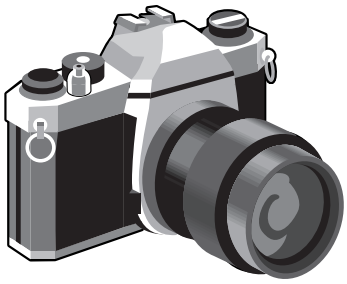
Map Example:


Deer Creek 07-22-99
J. Vass and B. Ruwalt
End of Survey
Unit 105
TJ Unit 60
Reach 2
T.J. Beaver Creek Unit 32
Start of Survey
Reach 1 Unit 1
USGS: Drewding
Deer Creek Park
Deer Creek
Beaver Creek
Spring
Creek
VALLEY
T4S
T5S

Field Book:



Make a careful log of your activities. Each day, record the date and name of the stream where you worked. Enter the approximate distance covered and number of hours spent working on the stream. Make a separate entry for travel time to and from the site. Write a paragraph or so of general description for each stream reach. Provide specific details about riparian zone descriptions, land use, or factors that influence fish populations. This is the appropriate place to express your opinions. Other relevant comments, sketches of complex features, conversations with landowners, suggestions, complaints, etc. are often useful. Record the names and phone numbers of people you contact as you complete the survey. Always cross-reference notes with a specific page of survey data.



Photographs:

A good photographic record of the stream survey provides additional information and documentation. Take pictures that typify reach changes, riparian zones, and other stream characteristics described in the survey instructions. A camera with the date-back feature enabled is preferred. **For each photograph, record the habitat unit number, date, time, and a description of the subject on the Photo Record form provided with your data sheets.**

Safety:

✓ Consider safety at all times.

✓ Watch for slippery stream bottoms, undercut banks, waterfalls, and fast flowing areas. Log jams can be unstable, so walk around them. Avoid wading in fast water and water above your knees. Use a wading staff or other device to help keep your balance and felt soles or cleats to reduce slipping. If flows are too high or a route is questionable in terms of your safety, avoid it until it is no longer threatening or find an alternative route. Get out of the woods if conditions are windy and trees or branches are falling.

✓ Always work with a "buddy", especially in rough, inaccessible terrain or where accidental injury is more likely to occur. Leap-frogging and shuttling a vehicle saves walk-back time, especially when tired at the end of a long survey day.

✓ Avoid drinking water from a stream unless it is filtered or treated.

✓ Know the symptoms and treatment for hypothermia. Prepare for unpredictable weather before you start out on the survey. Keep a well-supplied first aid kit, extra food and a change of warm clothing and footware in the vehicle. Carry a small personal safety pack while in the field, including a lighter, fire starter, a candle, and emergency food and water if working in isolated areas.

✓ Avoid foul smelling areas, spills of unknown substances, or containers of hazardous or unidentified materials. To report locations, contact emergency response agencies. See Resources section for contact information.

✓ Always have a plan in case of an emergency. Carry emergency phone numbers for police and ambulance. Always let someone know where you are going and when you are due to return. Plan to finish your work well before dark.

✓ Learn how to use a compass before you go into the field.

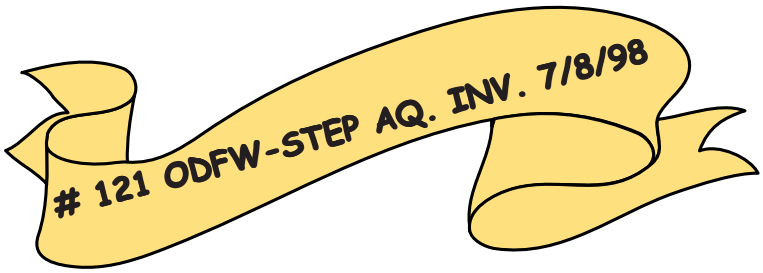
Other General Instructions:

✓ **Obtain permission to cross or survey on private property**. See Tool Box section for landowner contact information.

✓ Always complete the survey from downstream to upstream. **Use right and left directions as if you were looking upstream**.

✓ **Surveys are usually conducted during summer or low flow conditions**. To make valid comparisons between streams, surveys are completed during the same type of flow conditions.

✓ **Hang a strip of plastic flagging at each reach change, named tributary junction, and at other selected units.** With a waterproof marker, label the flagging with the unit number, date, and "ODFW-STEP AQ.-INV.". These flags mark specific reaches and units for fish sampling and link units and locations for repeat habitat surveys. It also provides a system for quality control and unit verification. Remove flagging at the end of the survey unless needed for further survey work.



✓ **Be alert for the presence of fish or spawning areas (redds) in the stream.** In some areas, spawning can occur at any time of the year. Do not walk on the redds.

✓ **Refer to the code sheet, glossary or reference drawings as needed.** Habitat unit identification is sometimes difficult. The "toolbox", glossary and inventory methods contain definitions and drawings which will solve most problems.

Survey Level Comparison

Basic Level Survey	Intermediate Level Survey	Advanced Level Survey
Basic level surveys are designed specifically for school groups and specific watershed information needs (i.e. pool frequency survey) without the rigor of higher level surveys. Training is recommended, but not required.	Intermediate level surveys are designed to capture a snapshot of the existing stream habitat conditions. This level of survey **requires** a classroom and field training session. Data analysis and interpretation must be conducted in close coordination with ODFW STEP/Aquatic Inventory Project personnel.	Advanced level surveys are designed for research quality data. This level requires extensive training and supervision through ODFW Aquatic Inventory Project. **For more information refer to Resource Contact section.**

Survey Attributes

	Basic	Intermediate	Advanced
Physical Features Of Basin	■	■	■
Legal Description		■	■
UTM Zone/Coordinates		■	■
Active Channel Width/Height	■	■	■
Valley Width Index	■	■	■
Valley Form		■	■
Channel Form		■	■
Flood Prone Width/Height		■	■
Terrace Height/Width			■
Streamside Vegetation		■	■
Land Use		■	■
Water Temperature	■	■	■
Flow	■	■	■
Sketches		■	■
Slow Water Habitat Unit Types (1)	■		
Slow Water Habitat Unit Types (9)	Optional	■	■
Fast Water Habitat Unit Types (4)	■		
Fast Water Habitat Unit Types (7)	Optional	■	■
Steps & Special Cases (11)	Optional	■	■
Channel Types		■	■
Percent Flow		■	■
Measured Unit Parameters	■	■	
Estimated Unit Parameters			■
Measured Unit Parameters Every 10th Unit			■
Measured Channel Dimensions Every 10th Unit			■
Measured Depth Of All Units	■	■	■
Measured Depth Of Pool Tail Crest			■
Percent Slope		■	■
Channel Shade		■	■
Percent Substrate Distribution		■	■
Boulder Count		■	■
% Actively Eroding Bank		■	■
% Undercut Banks			■
Large Woody Debris Tally	■	■	
Detailed Wood Sheet			■
Comment Codes Section	■	■	■
Notes Section	■	■	■
Riparian Survey		Optional	■
Photo Record		■	■

■ Included In Survey □ Not Included In Survey

Surveying Oregon's Streams
"A Snapshot In Time"

AQUATIC INVENTORY PROJECT

A Lesson Plan
And
Checklist For The Trainer

OREGON DEPARTMENT OF FISH AND WILDLIFE

Salmon-Trout Enhancement Program
and
Aquatic Inventory Project
Natural Production Program

GETTING STARTED . . . . . A Few Things To Think About

The Oregon Plan for Salmon and Watersheds is a call to all Oregonians, whether they live in a city, in a suburb, or on a farm, to join the effort to save our salmon and protect our rivers. It represents commitments on behalf of government, organizations, and private citizens from all areas of the state. While the plan began as an effort to address a decline in coastal salmon it has expanded to represent a comprehensive statewide approach for watershed protection that includes improvements in water quality and fish populations.

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Restoration efforts can be futile without a thorough assessment of a stream's existing habitat conditions. A watershed or stream’s potential for recovery also needs evaluation. This is where the Aquatic inventory Project comes into the picture. What is a third order stream? Do you know how to measure active channel width? What is the stream’s pool to riffle ratio? Is large woody debris present? How much shade is available to the stream? These questions and more are answered through an aquatic habitat inventory — an assessment tool for streams. Aquatic habitat inventories are coordinated through the Oregon Department of Fish and Wildlife's (ODFW) Aquatic Inventory Project and the Salmon-Trout Enhancement Program.

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With training and oversight provided by Oregon Department of Fish and Wildlife personnel, volunteers, schools, and other groups can undertake an aquatic habitat inventory. The training benefits educators, watershed council members, landowners, and others interested in learning more about stream survey methods. Participants receive both classroom and field experience during the training segment.

Goals of this training and subsequent surveys are:

- to obtain quantitative information about stream habitat conditions throughout Oregon
- educate survey participants as to the habitat inventory process and its applications
- encourage volunteer involvement in future restoration activities that may result from the habitat inventory data, and
- *change forever the way a participant looks at a stream!*

The accompanying lesson plans are designed to help the trainer develop a well-rounded training experience. The checklist approach reduces detail omissions and guides the trainer from planning to implementation.

Different participant skill levels require different levels of training. The lesson plans address this need. Use the lesson plans as a guide in your planning process, including some components and eliminating others based on the group receiving the training. Be creative and innovative in your approach, but keep some basic things in mind.

• The concepts, definitions, and techniques we use on a daily basis may be quite unfamiliar to the general public, the source of most of our volunteers. To evaluate a volunteer's understanding of the inventory methods and to ensure the quality of the survey data, it is necessary to go beyond the classroom and spend some time with participants in the field. There is a vast amount of information to absorb during the training, but most surveyors soon reach a comfort level with the complex range of data.

• When working with volunteers, either in a training mode or during a survey, repeatedly emphasize that quality, not quantity is the primary concern. Individuals, students, and small groups with an appropriate background and a strong desire to learn the process, and who are willing to commit to a disciplined effort for an extended period of time, produce the most reliable data. Aquatic habitat information is clearly in the forefront of many of today's watershed management decisions. It is important that data of questionable quality is not introduced into agency data bases.

• Clearly define the project's objective before undertaking a survey with volunteers. Volunteers need to know the project's ultimate goals and objectives to develop a commitment to the effort. Develop a clear job description so volunteers can assess their qualifications for the project. Selectively recruited, well-trained, committed volunteers make a difference.

• ***Some volunteers may not be suited for quantitative stream surveys, but they may be exceptional at another type of project.*** Look for opportunities to include these folks in other efforts. Individuals, small local groups, and students may derive significant educational benefits from experiencing this training, even if they are not qualified for higher level survey work. Or, if they do complete a survey, their survey results may provide data of general value for local records, but may not be suitable for entry into statewide data bases.

If data from the habitat survey is part of a monitoring plan, maintain contact with the potential end user while the data is gathered. In addition, if the data is destined for the statewide Aquatic Inventory data base, establish contact with Aquatic Inventory Project personnel.

• ***With watershed assessments and action plans for restoration work underway in countless communities, knowledge of local problems and ownership in local solutions can make a big difference.*** Watershed councils, soil and water conservation districts, city and county governments, industries, landowners, and individual homeowners are all interested in working together. Local volunteers from these sources can provide a great start with baseline aquatic habitat surveys.

• ***Have fun and good luck!***

GET READY ..... A Simple Guide To Planning

A. **Training Request** (Check, List Information)

- ❒ ODFW Fish District Request (List)
  _____
- ❒ Other Agency Request (List)
  _____
- ❒ Watershed Council Request (List)
  _____
- ❒ Volunteer Request - includes schools (List)
  _____

Requests may come across your desk via a formal written form or may be generated by a phone call or casual conversation.

If this is a school group, consider which is more important when designing your training— developing an educational process or <u>data quality</u> or both.

B. **Goals and Objectives For Training** (Check, List)

- ❒ Watershed Assessment
- ❒ Habitat Protection and Restoration Opportunities
- ❒ Determine Available Spawning Or Rearing Habitat
- ❒ Learn About Stream Processes
- ❒ Other _____

C. **Determine Which Survey Protocol To Use** (Check)

- ❒ Basic
- ❒ Intermediate (Recommended)
- ❒ Advanced (Research Quality)

D. **Information Needed For Training** (List, Attach)

- ❒ Stream Name(s) and Location (include Map)
  _____
  _____
- ❒ Stream Background Including Historical Aspects (Attach - Refer To During Training Session)
- ❒ Fish Species In Basin
  _____
- ❒ Landowner Contact Information
  _____
  _____
- ❒ Permission For Private Property Access (Attach Written Copies If Available)
- ❒ Contact Local Fish District (Confirm Site, In-water Work Times, Permits, Etc.)

County tax lot maps obtained from the County Assessor's office are the best source of landowner contact information.

If necessary , prepare a letter to landowner(s) requesting permission for access. Include who is doing the survey, when it will occur, and the objectives (see example in references).

Keep a record of all your landowner contacts (see form in references).

Plan to share copies of your data and analysis with the landowner if requested.

E. **Potential Recruitment Pool** (List, Include Contact Information)

❒ Local Volunteer Organizations (civics clubs, conservation organizations sportsmen's clubs, schools, and others)

_____
_____
_____

❒ Landowners

_____
_____
_____

❒ Other Individuals (include a local person to help with local recruiting)

_____
_____
_____

❒ Watershed Council

_____
_____
_____

❒ SWCD

_____
_____
_____

❒ Fish District Personnel

_____
_____
_____

❒ Other Agency Personnel

_____
_____
_____

F. **Recruit Volunteer(s) To Help With Registration, Photos, Equipment, General Assistance, Some Instruction** (List, Include Contact Information)

_____
_____
_____
_____
_____

Assign someone to assist with sign-in on the day of the training. This individual makes sure liability forms are signed, name tags made, and can help you with dozens of other important tasks.

A "team-teaching" approach works well for this training. Other agency personnel, watershed council members closely associated with the survey stream, landowners, or volunteers can provide valuable insight and assistance at the training.

GET SET ..... Lay Out The Ground Work

A. **Set The Date** (List)

❒ _____

B. **Determine The Location** (List/Contact Information)

❒ Classroom Session

_____

❒ Field Session

_____

Send participants a map to the classroom training site AND to the field training site (if different than the classroom location).

Make sure the classroom site is accessible for disabled persons.

C. **Training Equipment Needs** (Check and List Information)

❒ Classroom Session

_____ Slide Projector/Spare Bulb
_____ Carousel With Slides
_____ Overhead Projector (Optional)
_____ Projector Screen
_____ Extension Cords (50' - 100')
_____ Sign-In Sheet(s)
_____ Name Tags/Marker Pens
_____ Handouts #/Each ____
_____ Instruction Packets
_____ Liability Release Forms
_____ Data Sheets
_____ Evaluation Forms
_____ Volunteer Time Sheets
_____ Others _____
_____ Maps
_____ Easel, Pads, Marker Pens
_____ Masking Tape
_____ Duct Tape (To Secure Cords)
_____ Extra Writing Tools
_____ Clipboards
_____ Extra Paper For Notes

❒ Field Session

_____ Data Sheets/Clipboards
_____ Writing Tools Plus Extras
_____ Maps/Gallon Ziploc Bags
_____ Instruction Manuals (Methods)
_____ Code Sheet/Unit Sketches
_____ Metric Measuring Tape
_____ Flagging/Perm. Marker (3)
_____ Waders or Hip Boots
_____ Depth Measuring Stick
_____ Clinometer/Compass
_____ Thermometers (3)
_____ Camera/Film/Batteries
_____ First Aid Kit
_____ Backpack or Field Vest

Notes: _____
_____
_____
_____
_____

Test projector/slide carousel prior to training day.
A white wall or white sheet will work fine if a projector screen is not available.
Copy field data sheets and field maps on "rite-in-the rain" paper .
Maps can be laminated for classroom instruction if you plan to reuse the same maps for future training sessions.
Take a few extra instruction manuals to the field.
Prepare at least one field equipment set-up as an example. A field vest works great for this. Attach clinometer and compass to vest.

D. **Plan/Outline The Presentation** (Attach)

General Overview:

❒ Set The Stage: (Provide Background Information)

_____ What: What is a stream survey?
_____ Who: Who uses information from a stream survey?
_____ How: How is stream survey information used?
_____ Why: Why is a stream survey necessary?
_____ Where: Where will the stream survey occur?

❒ State Project's Purpose, Goals, Objectives, Related Issues
❒ Describe How Volunteers Fit In
❒ Describe Training Necessary To Make Project Successful
❒ Clarify General Volunteer Program Policies

_____ Volunteer Liability Release (Required)
_____ Volunteer Time Reporting
_____ Harrassment Free Workplace
_____ Corrective Action Policy
_____ Volunteer Identification Protocols
_____ Access Permission Required
_____ Expected Behaviors On The Job
_____ Clarify Limits To Assignment

Emphasize that COMMUNICATION is a key component of this project. Surveyors must practice good communication skills with each other, supervisors, and most importantly, with landowners.

Job Specific:

❒ Break Job Into Parts
FocusTraining On Skills/Protocols Necessary For Each Part
(Depending on the group, you may not use all three parts noted below.)

_____ Habitat Unit Information
_____
_____

_____ Reach Information
_____
_____

_____ Riparian Information
_____
_____

Safety Training:

❒ Examine Risks Associated With Project/Plan Safety Training Around Risks

_____ What Could Go Wrong?
_____
_____
_____
_____

_____ How Could It Be Prevented?
_____
_____
_____
_____

_____ What Should Supervisor Do In Emergency?
_____
_____
_____
_____

_____ What Should Volunteer Do In Emergency?
_____
_____
_____
_____

❒ What Is The Chain Of Command/Contact Information For The Project (List)
_____
_____
_____
_____

❒ Safety Review Checklist (See Volunteer Forms)

Other Things To Consider When Designing The Training:

_____ Begin With An Ice-Breaker (introductions, activity)
_____ Plan The Session To Accommodate Different Learning Styles (visual, auditory, kinetic) - Make Enjoyable For All Learners.
_____ Utilize A Variety Of Techniques (individual activities, hands-on, audio-visual, small group, large group, role-playing, problem-solving)
_____ Determine and Utililize Participants' Experience Where Possible
_____ Have Participants Fill Out Necessary Forms Before Actually Starting Training (liability release, medical coverage, emergency contact information, etc.)

Provide a completed stream survey job description form to each trainee so they are aware of the physical requirements of the job as well as all other expectations. (See sample in "Tool Box" section.)

Alert surveyors to possibility of hazardous waste materials. If observed, note extent from a distance and report immediately. Do not jeopardize personal safety.

Set up a safety check system for volunteers going into the field without agency supervision. One suggestion is to have the volunteers call in when leaving for the field, providing survey location, names of individuals participating, and expected time of return. Volunteers must then call in again upon their return. Keep emergency contact information readily available. Make sure volunteers know the procedures to follow in case of an emergency.

_____ Review/Re-Review Record Keeping (time sheets, data sheets)
_____ Provide Uniform or Identification Items
_____ Review Volunteer Uniform/Identification Policies
_____ Provide Means For Participants To Evaluate Training And Experience
_____ Provide Time For Debriefing and Bringing Closure To Training
_____ Tell Participants What Comes Next

Depending on the group, plan for 2 - 3 hours of classroom time and 2 - 4 hours of field time. Don't forget to allow for lunch and travel time if field site is a different location than classroom.

Provide enough time for participants to complete evaluation form before they leave. Do not expect a high return from mail-in evaluations.

E. **Set The Agenda/Assign Time Estimates/Allow Time For Questions** (Attach)

❒ Classroom Session

❒ Field Session

F. **Begin Actual Volunteer Recruitment From Recruitment Pool List** (Item "E", page 4 In "Get Ready" Section) **and Develop Procedure For Confirmation** (Check,List)

❒ Letter (List Recipients, Attach Copy)
_____
_____

❒ Phone (List)
_____
_____

❒ Newsletter Article (List, Attach Copy)
_____
_____

❒ Flyer (List Recipients, Attach Copy)
_____
_____

❒ In Person (List plus Contact Information)
_____
_____

G. **Prepare Training Packet/Props** (Attach Copy)

❒ General Agency Information and/or Volunteer Handbook
❒ Program Background
❒ Rationale For Project
❒ Cooperators/Landowners
❒ Background On Species, Habitat, Other Information

- ❒ Participant Job Description
- ❒ Corrective Action Procedures For Volunteers
- ❒ Other Policies (Uniform Policy for Volunteers, ADA, Harrassment Free Workplace, Etc.)
- ❒ Protocol or Methods Manual For Project
- ❒ Names and Phone Numbers Of Key People (Project Supervisor, Research Support Person,Other Volunteers, etc.)
- ❒ Directions and Maps
- ❒ Data Sheets
- ❒ Evaluation Forms
- ❒ Laminated Color Photos (Or Slides) of Fish Species Surveyors Are Likely To Encounter
- ❒ Other _____

H. **Confirm Arrangements** (Check)

- ❒ Location Availability/Accessibility (Training and Field)
- ❒ Times
- ❒ Staff/Volunteer Assistants
- ❒ Materials/Equipment Ready
- ❒ Lunch Arrangements, If Necessary
- ❒ Other _____
  _____
  _____
  _____

Revisit the sites if necessary, to confirm set-up options, safety factors, and equipment provided at the site.

Check in with individual(s) who are confirming participant attendance so you know how many materials to bring, how many vehicles to plan for transportation to field site, and to express appreciation for their help.

GO ..... Make It Happen!

A. **Arrive Well Ahead Of Starting Time** (Check)

- ❒ Start Time _____
- ❒ Post Signs Through Community To Training Site(s)
- ❒ Post Directional Signs From Parking Lot To Room
- ❒ Room Unlocked
- ❒ Prepare Room For Training

B. **Room Set-Up** (Check)

- ❒ Set-Up and Test Audio-Visual Equipment, Including Projection Screen
- ❒ Locate Room Controls (lights, heat, window coverings)
- ❒ Extension Cords Secured Against Tripping
- ❒ Display Field Equipment Examples (Optional)
- ❒ Suitable Room Arrangement (To Fit Training Procedure)
- ❒ Handouts And Other Materials Ready and In Sufficient Quantity (Volunteer Paperwork, Methods, Data Sheets)
- ❒ Agenda Posted In Highly Visible Location
- ❒ Sign-In Sheet and Registration Materials Ready
- ❒ Name Tags/Markers Ready
- ❒ Liability Release Forms Ready and Available
- ❒ Training Session Evaluation Forms Ready and Available
- ❒ Prepare Refreshments Table

B. **Assign Someone To Staff Registration Table/Sign-in** (List name and responsibilities)

- ❒ _____

B. **Post Agenda In Highly Visible Location And Stick To It** (Check)

- ❒ Classroom Session
- ❒ Field Session

C. **Go Over Agenda And "Housekeeping" Information At Beginning** (Check,List)

- ❒ Location of Rest Rooms, Non-Smoking Areas _____
- ❒ Location of Phones _____
- ❒ Location of Water and Other Refreshments _____

Check numbers to call in case of emergency. In some communities "911" is not the appropriate number to call.

❒ Lunch Logistics

_____

❒ Travel Logistics to Field Session

_____

❒ Clarify How Participants Can Obtain Feedback Or Further Information

_____

❒ Encourage Questions and Assign Time For Questions If Necessary
❒ Other _____

D. **Classroom Session Presentation Order** (Check, Add Notes)

Introduction:

❒ Opening Comments/Introduction/Welcome (use a "hook" to get started)

❒ Aquatic Habitat Inventory Background
_____ What Is A Stream Survey?
_____ Who Uses Stream Survey Information?
_____ How Is Stream Survey Information Used?
_____ Why Is A Stream Survey Necessary?
_____ Where Will The Stream Survey Occur?

❒ Project's Purpose, Goals, Objectives, Related Issues - Personalize

❒ Describe How Volunteers Fit In

❒ Describe Required Training

❒ Clarify All Required Volunteer Program Policies
_____ Volunteer Liability Release (Explain It)
_____ Volunteer Time Reporting
_____ Harrassment Free Workplace
_____ Corrective Action Policy
_____ Volunteer Identification Protocols
_____ Access Permission Required
_____ Expected Behaviors On The Job
_____ Clarify Limits To Assignment

Ask participants to introduce themselves to the group and express why they want to be part of this training process.

Make the introduction personal for you and volunteers. Help them connect to the stream. This may require some homework, but personal "ownership" in the activity is important.

Use dramatic slides, personal experiences, or other ideas to "hook" participants into survey objectives.

Remember — habitat surveys may be just as important to future fish distribution surveys as they are for identifying future habitat restoration sites.

If working in the forest, be sure to check out fire precaution levels before leaving for the field - this may translate to no smoking requirements.

Standard Information:

❒ Maps and Equipment (Provide Examples)
- _____ Locate Stream On Map
- _____ Mark Start/End Points
- _____ Mark Preliminary Reach Breaks (Adjust In Field)
- _____ Determine Legal Description (township, range, section, 1/4)

❒ Basic Instructions (Provide Examples)
- _____ Maintain A Log
- _____ Map Accessible At All Times
- _____ Work Upstream To Complete Survey
- _____ Field Marking of Start/Stop Points and Reach Changes
- _____ Watch For Spawning Fish/Redds
- _____ Use Glossary, Code Sheet, and Reference Sketches

Slide Show and Methods:

❒ Habitat Unit Information (Basic or Intermediate Unit Survey Data Sheets)
- _____ Refer to Methods Manual For Order and Content

❒ Other Habitat Unit Attributes
- _____ Refer to Methods Manual For Order and Content

❒ Reach Information (Separate Reach Data Sheet Plus Top Of Habitat Unit Data Sheet)
- _____ Refer to Methods Manual For Order and Content

❒ Riparian Data Sheet
- _____ Refer to Methods Manual For Order and Content

❒ Photo Record Data Sheet
- _____ Refer to Methods Manual For Order and Content

❒ Data Analysis - What Does It All Mean?
- _____ Refer To "Interpretation Guide" Section For Details

The amount of time spent with mapping will vary with the experience of the group. Assess ahead of time, if possible.

Mapping segment may require use of overhead projector.

Consider a trip to the County Assessor's office to obtain land ownership information as another training session. Each county maintains and stores its land ownership information in various ways. It is time well spent to research this beforehand and provide specific information and examples at the training session.

Spawning fish can be encountered any month of the year so watch carefully for redds or other evidence of spawning.

Teach the habitat unit information first, then present the reach information. Even though the methods manual is in reverse order, it is easier for participants to understand the smaller context of pools and riffles before broader perspectives of reaches. Remember —you are presenting a huge amount of information. Use as many techniques as possible to make it digestible and understandable.

❒ Data Sheet Practice/Review (Include Reach/Habitat Unit/Riparian/Photo)
_____ Show Slides As A Practice "Quiz"
_____ Fill Out Data Sheet During "Quiz"

❒ Equipment Introduction/Review
_____ Show and Describe Equipment Items
_____ Discuss Appropriate Safety Considerations For Equipment

Prepare a slide "quiz" (comparable to the survey location) so participants can practice their new knowledge before going to the field.

Provide an <u>extra</u> data sheet for participants to fill in answers to the "quiz" as you go. It helps to know <u>how</u> to "fill in the blanks" before going to the field.

E. **Field Session Presentation Order** (Check, Add Notes)

❒ Arrange For Car Pool to Field Session Location
❒ At Site, Revisit Safety Issues
_____ Wading Safety
_____ Streamside Walking Safety
_____ Buddy System
_____ Location of First Aid Materials
_____ What To Do In Case Of Emergency
❒ Prepare Reach Description As A Group
❒ Practice Several Habitat Unit Calls As A Group
❒ Practice Riparian Area Data Collection As A Group
❒ Describe Photo Record Process As A Group
❒ Assign Groups To Stream Locations
❒ Monitor Group Progress Throughout Time Allotted
❒ Meet At Assigned Location At End of Survey Practice Period
❒ Discuss/Compare Data Collections
❒ Provide Opportunity For Questions
❒ Provide Opportunity For Written/Oral Evaluations
❒ Prepare Group For The Next Step
❒ Describe Future Activities, Data Analysis Procedures, Trip To County Assessor's Office, Etc.

Divide participants into groups of two or three to practice the habitat unit portion of the survey.

Some groups will be more skilled than others. Plan to have more that one experienced person available to work with the groups as they encounter interpretation problems.

<u>Do not under-estimate the value of thank-you notes</u>. Send them to staff and volunteers who assisted, landowners providing access, and anyone else you want to recognize.

F. **Follow-Up**(Check, List)

❒ Prepare and Send Any Required Follow-Up Materials To Participants
_____
_____

❒ Prepare and Send Appropriate Thank-You Notes
_____
_____

❒ At The End Of The Training Day, Ask Participants To Provide Evaluation Of Program Including Ease of Survey Completion, Training Effectiveness, Suggestions For Improvements, And Other Comments.

Optional
Assessor's Office Field Trip

A. **Contact County Assessor's Office To Set Up Field Trip** (Check)

- ❒ Arrange Arrival Time _____
- ❒ Discuss Items To Cover, Prepare List
- ❒ Can Personnel Provide Instruction?

B. **Prepare Participants For Field Trip** (Check)

- ❒ Announce Time and Location of Field Trip (provide map, directions as needed, car pool)
- ❒ Divide Group Into Teams Of Two
- ❒ Assign Each Team A Stream Segment
- ❒ Each Team's Assignment Prior To Field Trip
  _____ Determine Township, Range, Section
- ❒ Bring Maps (Or Copies) Of Assigned Area

C. **Meet At Field Trip Site** (Check)

- ❒ Assessor's Office Provides Instruction
- ❒ Each Team's Assignment During Field Trip
  _____ Determine Land Ownerships (based on tax lot information) For Stream
  _____ Obtain Landowners' Mailing Addresses
  _____ Obtain Plat Map For Stream Segment
- ❒ Allow Time For Questions From Participants

D. **Follow-Up After Field Trip** (Check)

- ❒ Review/Discuss Assessor's Office Procedures
- ❒ Talk With Local District Fish Biologist and Local Watershed Council
- ❒ Discuss Protocol For Landowner Contacts
  _____ Remind Participants Of Responsiblities As Volunteers
  _____ Maintain Pleasant, Courteous, Friendly Manner At All Times
  _____ If Desired, Landowner May Have Copy Of Report When Completed
  _____ Encourage Landowner To Call Supervisor (provide name/number) If Asked Questions You Cannot Answer About Survey
  _____ If Difficult Situation Is Encountered, Remind Landowner You Are A Volunteer But Can Provide Number To Call. Do Not Get Into An Argument.
  _____ Avoid Unnecessary Repeat Visits To Landowners
- ❒ Discuss Example Of **Permission For Access** Letter
- ❒ Discuss And Recommend Use Of **Landowner Contact Record** Form
- ❒ Send A Thank-You Letter To Landowner Following The Survey

Make sure stream assignment is a stream needing a survey. Make it relevant to work participants are expected to do.

In some areas, landowners are especially sensitive about anyone from the "government" doing work on their land. Encourage volunteers to be courteous, respectful, and positive even if a landowner denies access.

Remind volunteers they are agents of the state. Their opinions can be interpreted or misunderstood as policy. If asked questions about hunting or angling regulations or department rules and policies, ask volunteers to respond only if they know the information is accurate. Otherwise, refer people to existing printed information at nearest ODFW office.

Surveying Oregon's Streams
"A Snapshot In Time"

AQUATIC INVENTORY PROJECT

Basic Level Methods For Stream Habitat Surveys

OREGON DEPARTMENT OF FISH AND WILDLIFE

Salmon-Trout Enhancement Program
and
Aquatic Inventory Project
Natural Production Program

Aquatic Habitat Inventory
Basic Level Stream Survey
REACH INFORMATION

Information gathered in the following steps identifies, describes, and evaluates specific habitat types and conditions throughout a reach. Complete the data sheet header before beginning the survey. Check and record reach information before and during the course of the survey. Changes in reach characteristics help verify survey locations and identify reach and stream segments within the basin. Each stream or named tributary should be considered and recorded as a separate survey, with its own reach information at the top of the data sheet. The following sequence (# 1 - 11) corresponds to the reach variables listed at the top of the **"Basic Stream Survey"** data sheet.

ODFW-STEP - BASIC STREAM SURVEY PAGE 1 OF 1

DATE: 6-26-98 REACH NUMBER: 1

STREAM: Dune Creek ACW: 8.2 m

BASIN: Green River VALLEY WIDTH INDEX: (*Circle one*)
1 (>1 to <2.5) 2.5 to 4 >4

USGS MAP: Sand Quad FLOW (*Circle one*): DRY PD LF MF HF BF FLOOD

START AT: Confluence with Green River VEGETATION: DM/S

END AT: Hwy 36 bridge crossing CREW: Mary Smith / Joe Johnson

1. **Date**. Include day, month, and year.

2. **Stream**. Use a standardized system of the name followed by descriptors of forks etc. Examples: Alsea R, Drift Cr, Lobster Cr, E Fk. Spell out descriptive or non-standard types such as Branch, Slough, or Swale. Spell out compass direction in names only for larger streams and when the usage is common such as North Umpqua. Use the same name format on all data sheets. Do not invent names -- use "unnamed trib #1", etc. or local names.

3. **Basin**. Use the name of the large river commonly used to describe a region. For example, use McKenzie R for Lookout Cr, not Willamette or Columbia.

4. **Map**. Record the name of the 7.5 minute USGS topographic quad map or specific details about any other topographic map you are using.

5. **Start At/End At**. Record the beginning and end of the survey section on each data sheet. Where possible, begin and end the survey at an identifiable **permanent landmark**. Use common landmarks such as tributary junctions, bridges or other crossings, nearby house, etc. Do not use flagging as the **only** reference to mark the beginning or end point of your survey. Any other information that pinpoints survey locations (i.e. GPS UTM coordinates) is valuable. **Clearly mark the beginning**

and end of the survey, all reach changes, photo points, and important features on the map. Also record the habitat unit number that occurs at both the beginning and end of the reach.

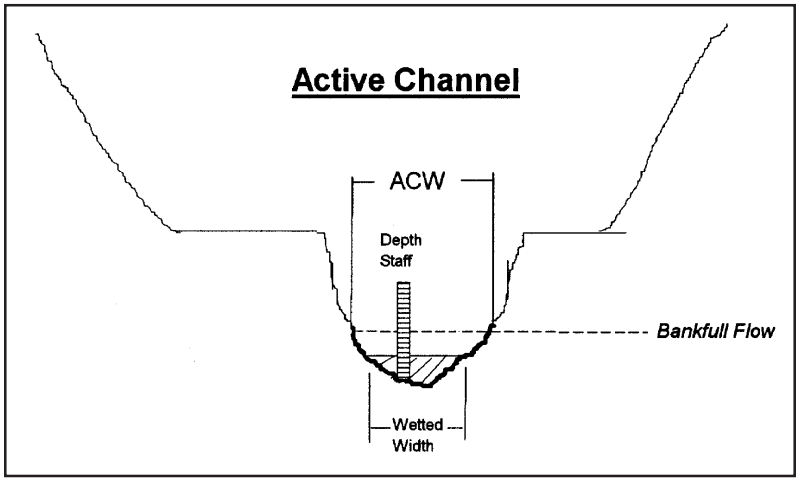
Accurate location information and comments help biologists interpret the data.

6. **Page:Of**. List the page number of the data sheet for each reach. You may have more than one page of unit information for a single reach. **If a reach changes, start a new data sheet**.

7. **Reach Number:** A reach is a length of stream defined by some common characteristic. A reach may simply be the section surveyed. More frequently, reaches are defined by the distance between named tributaries, by major changes in valley and channel form, vegetation, or by changes in land use or ownership. A reach is composed of any number of units. Consequently, you may end up with more than one page of habitat unit information for a single reach. Number the reaches consecutively. List the page number of the data sheet for each reach in the upper right corner of the survey form. **Always start a new page and new reach number when any one of the main reach categories in the header of the data sheet changes significantly**.

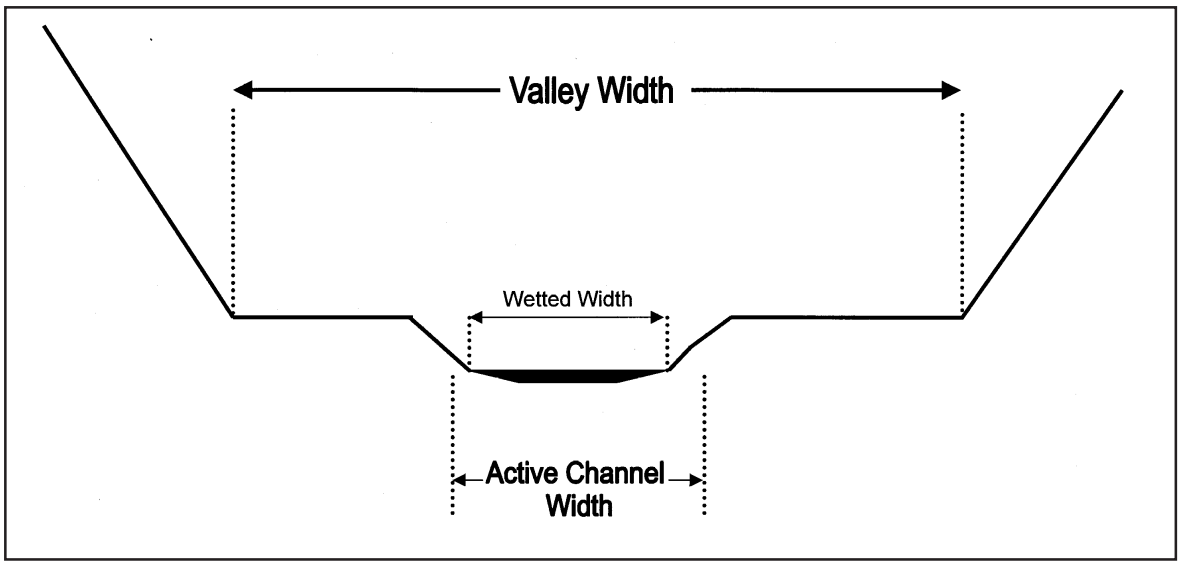
Assigning a reach number to a collection of habitat unit data insures that a continuous record of information is established.

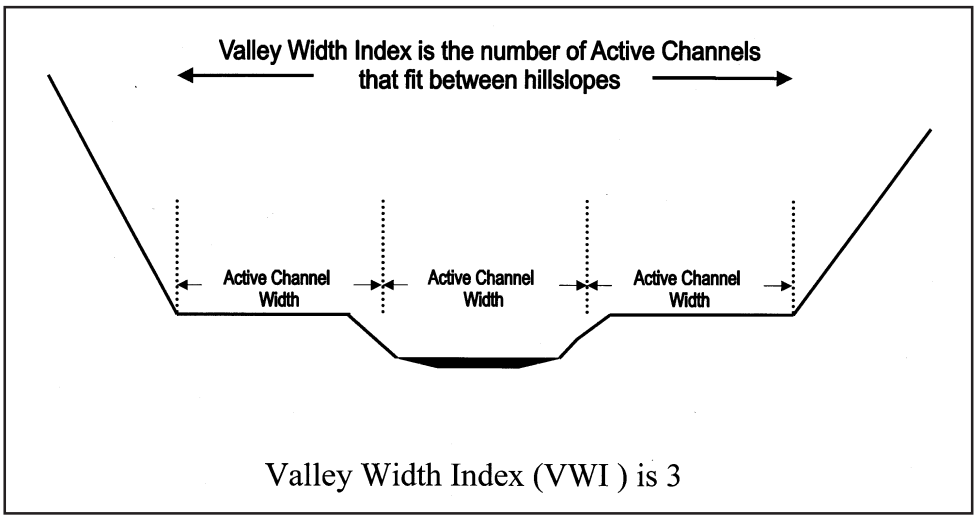
8. **Active Channel Width (ACW)**. Active channel width is the distance across the channel at average annual "bankfull" flow. Bankfull flow is the high water mark that occurs on average about every 1.5 years. **Active channel width is the most important measurement and definition to learn prior to completing the survey. A number of other measurements are based on active channel width.** Active channel width is identified by a representative change in vegetation, bank slope, or high water mark. Measure the active channel width several times throughout the reach. Record the average active channel width only once for the entire reach. In a multi-channel situation, add the width of all active channels across the valley for a cumulative ACW. If the active channel width is consistently different, start a new reach.



Active channel width provides a reference to stream size regardless of flow level at the time of the survey. It is the scale used to evaluate all stream and valley characteristics. For example, this information is used to estimate valley width index and determine appropriate types of enhancement efforts.

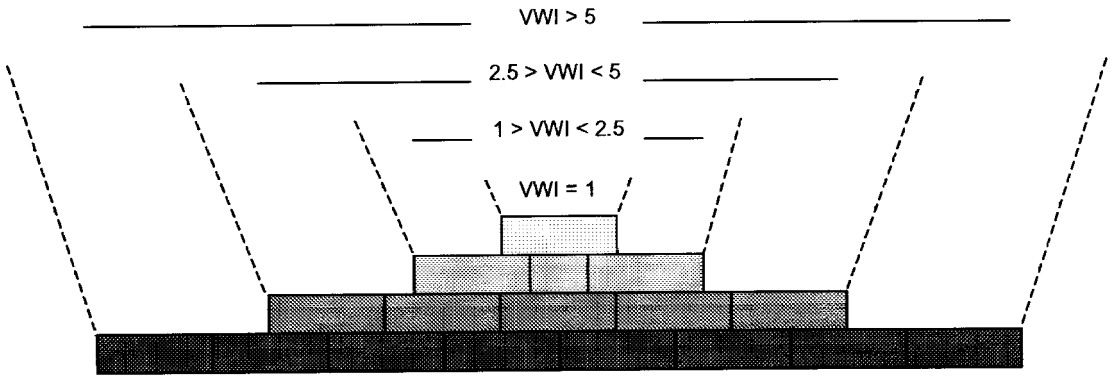
9. **Valley Width Index (VWI)**: The valley width index is the number of active channel widths that will fit between the hillslopes across the valley floor. It is estimated for the reach by dividing the average *active channel width (ACW)* into the average *valley floor width (VFW)*. Mark the appropriate estimate: 1, more than 1 but less than 2.5, 2.5 to 4, or more than 4.





Valley Width Index (VWI) is 3

* *Do not start a new reach for minor changes in valley width index (VWI). However, always start a new reach when the valley width index changes as shown in the sketch below.*



Valley width index (VWI) gives us additional information about the cross-sectional shape of the valley (valley form). It reflects the potential for the stream to migrate back and forth across the valley floor and its ability to create complex lateral habitats. This information helps biologists design appropriate restoration treatments.

10. **Flow**. Describe streamflow conditions. Best observed in riffles. If a gaging station is present, record the stage height.

Flow is one of the most variable stream conditions. Habitat quality varies with streamflow. A record of the streamflow conditions on the day of the survey is critical for interpretation and application of the survey data.

DR	**DR**y. Dry section of stream separating wetted channel units.
PD	**P**u**D**dled. Nearly dry channel, but with sequence of small isolated pools less than one channel width in length or width.
LF	**L**ow **F**low. Surface water consistently flowing across no more than 75 percent of the active channel surface. Consider other general indicators of low flow conditions.
MF	**M**oderate **F**low. Surface water flowing across 75 to 90 percent of the active channel surface.
HF	**H**igh **F**low. Stream flowing completely across active channel surface but not at bankfull.
BF	**B**ankfull **F**low. Stream flowing at the upper level of the active channel bank.
FF	**F**lood **F**low. Stream flowing over banks onto low terraces or flood plain.

11. **Streamside Vegetation**: Describe the types of streamside vegetation (riparian area) in each reach. The width of this "green zone" may be variable. Generally consider the vegetation observed in the area within one active channel width on either side of the channel to represent the riparian zone. Note if significant variations occur on either side of the stream. Simply describe in words or use the two letter codes noted below.

The first letter identifies the plant community based on the dominant forms. The second letter of the code refers to the age (stage of development) of shrubs and trees in the riparian area.

Example: riparian areas with 8 - 10 year old alder = **DY**

Separate entries for the dominant and the understory communities may be appropriate in some areas (i.e. **CM/G** in ponderosa pine/grass communities). When possible, record vegetation types not normally found in a typical wetted riparian habitat. Note species if known.

Knowing the vegetation status at the time of the survey allows biologists to interpret the history of land use and estimate the potential for recruitment of large woody debris into the stream. Some habitat projects help re-establish vegetative cover.

Vegetation Type:

N **N**o Vegetation (bare soil, rock)
B Sage**B**rush (sagebrush, greasewood, rabbit brush, etc.)
G Annual **G**rasses and herbs
P **P**erennial grasses, forbs, sedges and rushes
S **S**hrubs (willow, salmonberry, current, some alder)
D **D**eciduous trees (canopy more than 70% alder, cottonwood, maple, etc.)
M **M**ixed conifer and deciduous (about a 50:50 distribution)
C **C**oniferous Dominated (canopy more than 70% conifer)

Stage of Development (shrubs and trees only)

S **S**eedlings
P Sapling **P**oles
Y **Y**oung. Small trees. West side communities may have fully closed canopy of trees and shrubs.
M **M**ature. Large trees with sizes typical for dominant species.
O **O**ld-growth. Large trees, snags, and woody debris. Multi-layered canopy.

12. **Crew**. List names of surveyors.

Biologists often have questions when interpreting the data. Include addresses and phone numbers of surveyors in the field book.

13. **Unit Number**. As you proceed upstream, this is the order of habitat units in sequence.

Numbering habitat units provides a continuous record of habitat types in the surveyed section.

14. **Unit Type**: Habitat units are segments of the stream with similar characteristics. As a general rule of thumb for primary channel units, each is generally longer than the active channel width. Exceptions to this rule may include plunge pools, alcoves, backwater pools, and isolated pools. Habitat units are classified by channel shape, slope of the water's surface, and water velocity.

The composition and pattern of habitat unit types characterize the stream. Habitat unit identification is the basic information that indicates fish habitat potential (spawning, rearing, and cover). Comparing the numbers of slow water habitat types (pools and glides) and fast water habitats (riffles, rapids, cascades) within a stream section can indicate which habitat unit types are lacking. Habitat improvement techniques can address deficiencies.

For the purposes of the Basic Level survey, record the unit information for each unit type encountered. **Refer to the diagrams or see detailed descriptions of unit types in the Glossary section.**

***UNIT TYPES*:**

Slow Water Unit Type:

Use the following code to record slow water units (pools). If more detail is desired, use the codes noted in the optional box below.

P **P**ool

Optional: List specific pool types based on the following diagrams or descriptions in the Glossary section. Use the codes below if choosing this option.

Primary Channel Types

LP	**L**ateral scour **P**ool
SP	**S**traight scour **P**ool
TP	**T**rench **P**ool
PP	**P**lunge **P**ool
DP	**D**ammed **P**ool
BP	**B**eaver **P**ond (dammed pool formed by beavers)

Other Pool Types

AL	**A**LcoveA* (bank feature; persistent at high flow)
BW	**B**ackwater **P**ool* (channel feature; not present at all flows)
IP	**I**solated **P**ool*

*May not extend full width of channel unit (see examples).

Fast Water Unit Types:

Use the following codes to record fast water units. If more detail is desired, use the codes noted in the optional box below.

GL **GL**ide

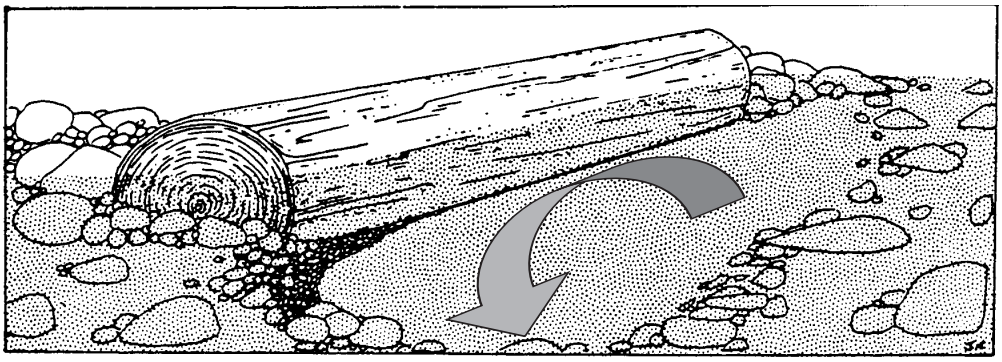
RI **R**iffle

R **R**apid

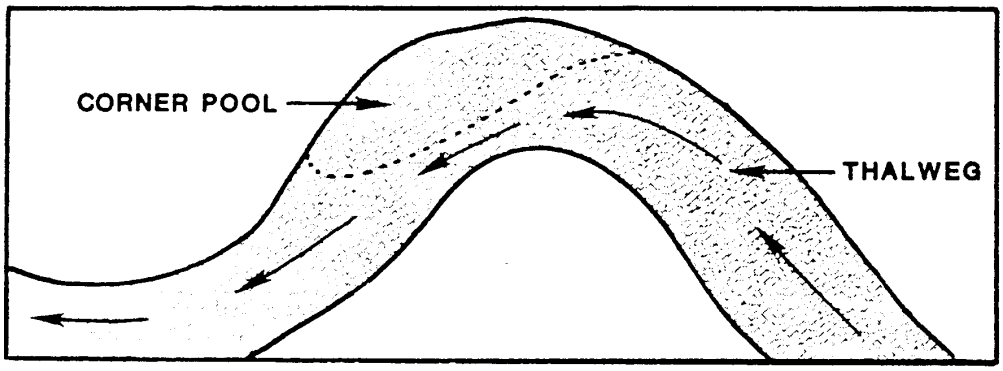
C **C**ascade

Optional: List specific fast water unit types based on the following diagrams or descriptions in the Glossary section. Use the codes below if choosing this option.

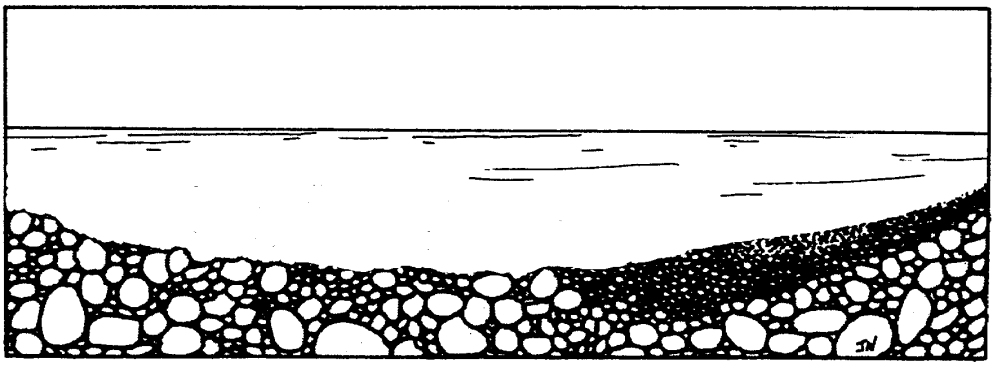
GL	**GL**ide
RI	**R**iffle
RP	**R**iffle with **P**ocket water
RB	**R**apid with protruding **B**oulders
RR	**R**apid over Bed**R**ock
CB	**C**ascade over **B**oulders
CR	**C**ascade over Bed**R**ock



LP **Lateral Scour Pool**: Formed by water against one stream bank or partial obstruction (logs, root wad, bedrock).

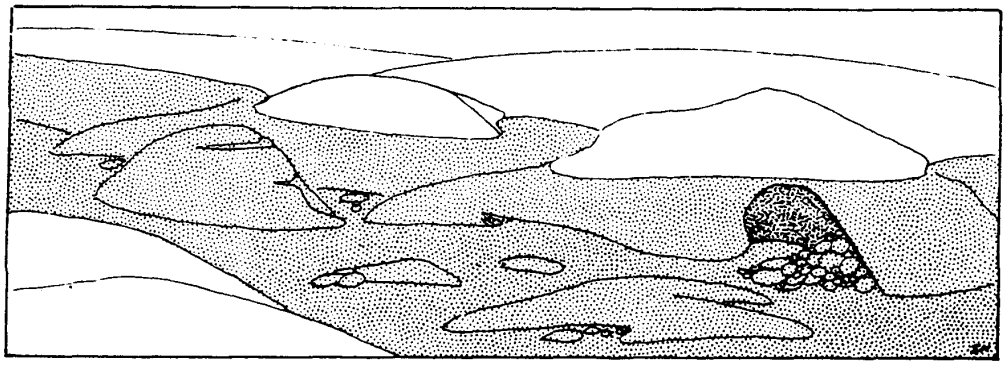


LP **Lateral Scour Pool**: Often forms corner pools in meandering lowland or valley bottom streams.

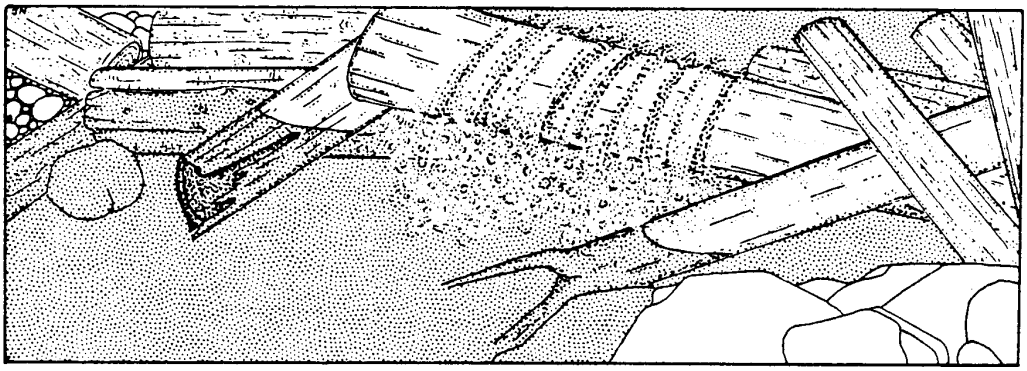


* Graphics on pages C-10 through C-13 from *Glossary Of Stream Habitat Terms*, WIlliam T. Helm, Editor, American Fisheries Society, Western Division, Bethesda, Maryland, Dec.1985.

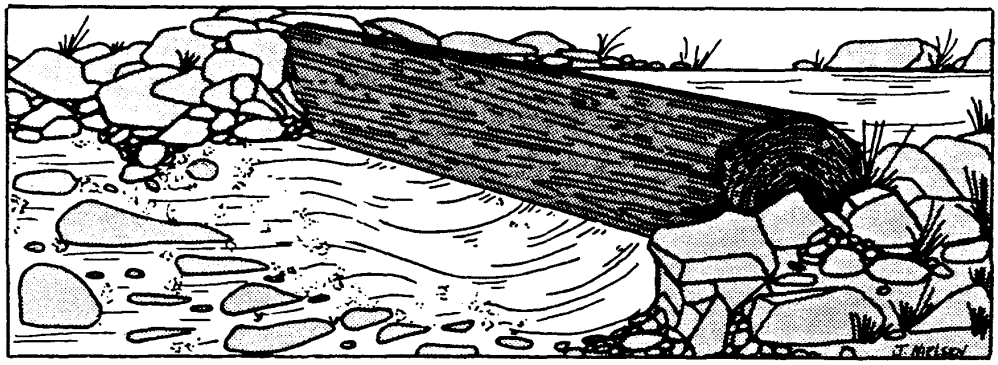
SP **Straight Scour Pool**: Formed by mid-channel scour, generally with a broad scour hole.



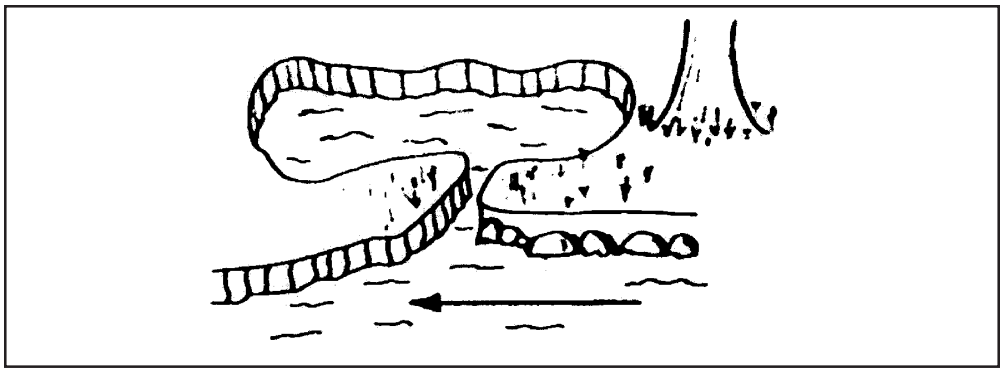
TP **Trench Pool**: A relatively long, slot-like depresssion in the stream bed, often found in bedrock-dominated channels.



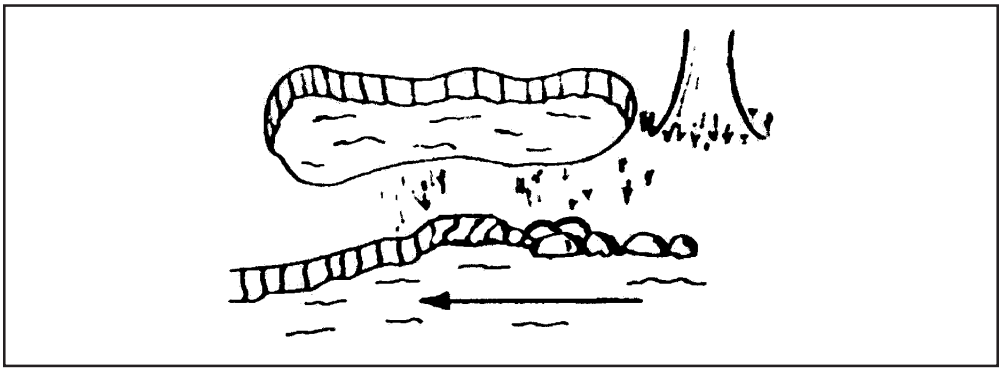
PP **Plunge Pool**: Formed by water passing over a complete or nearly complete channel obstruction (logs, boulders, bedrock).



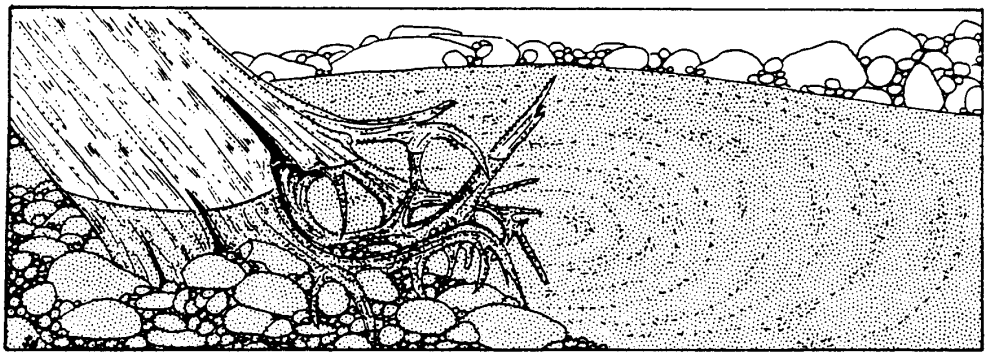
SP **Dammed Pool**: Sometimes formed by scouring under a stream obstruction, such as a log.



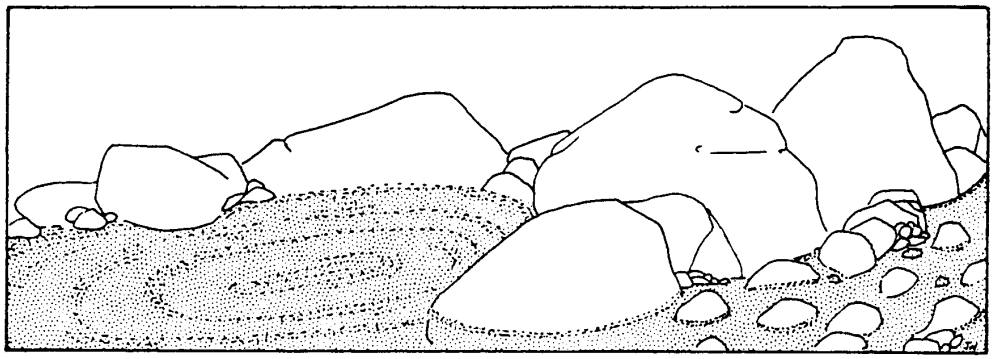
AL **Alcove**: A backwater along the shoreline; not scoured during typical high flows.



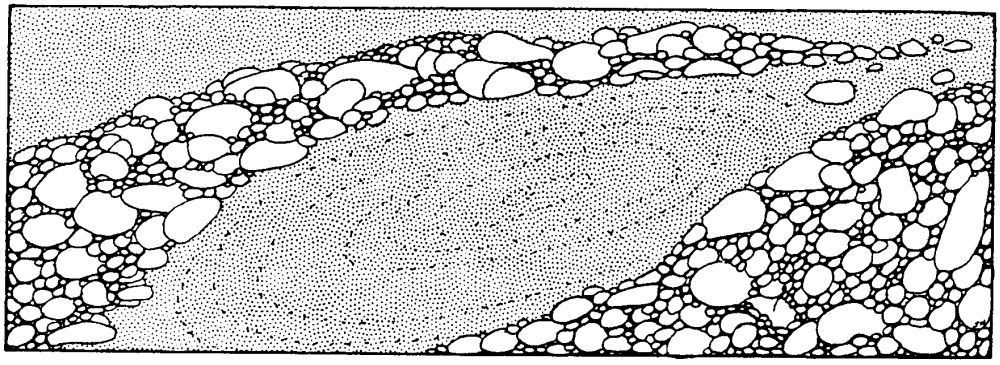
AL **Isolated Pool**: Pools formed outside the primary wetted channel, but within the active channel.



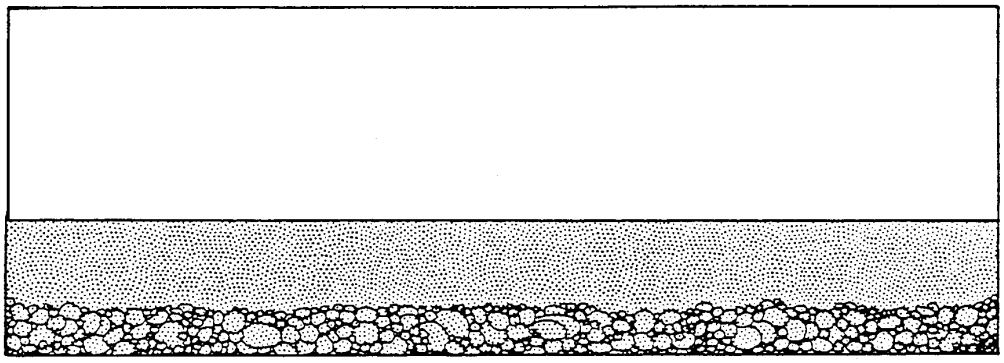
BW **Backwater Pool**: Formed along channel margins by an eddy around obstructions like boulders, root wads, woody debris, or behind gravel bars.



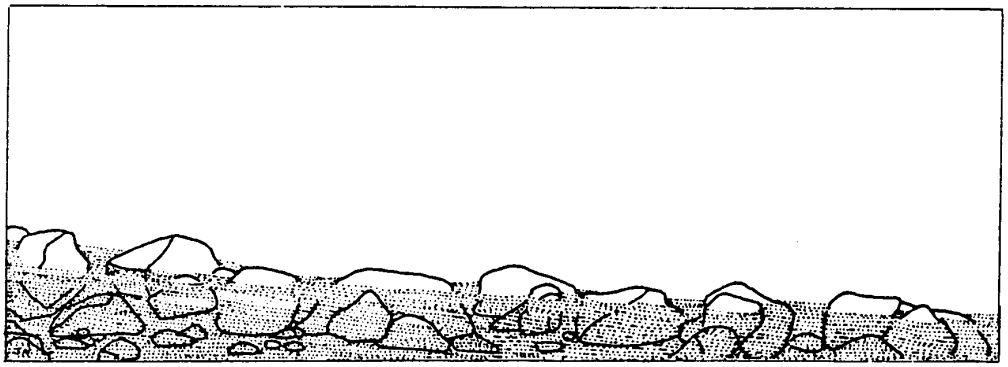
BW **Backwater Pool**: Formed along channel margins by an eddy around obstructions like boulders, root wads, woody debris, or behind gravel bars.



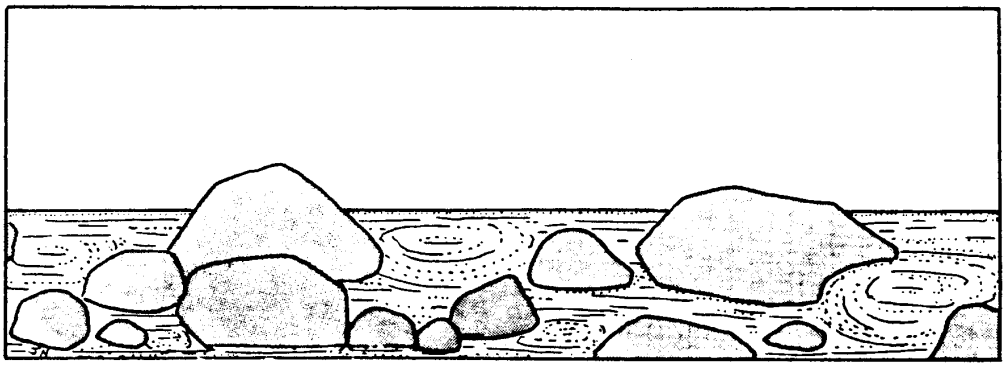
BW **Backwater Pool**: Formed along channel margins by an eddy around obstructions like boulders, root wads, woody debris, or behind gravel bars.



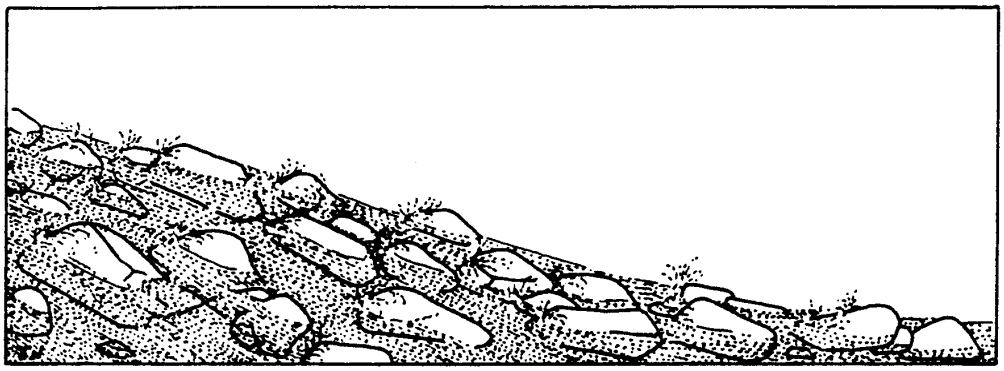
GL **Glide**: Generally uniform depth and flow with no surface turbulence, low gradient; 0 -1% slope.



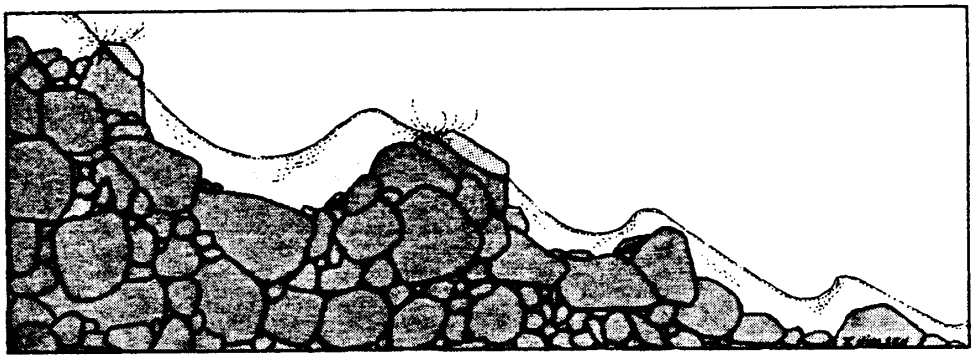
RI **Riffle**: Fast, turbulent, shallow flow over gravel or cobble substrates, low gradient; 0.5 - 2.0 % slope, rarely up to 6%, 5 - 15% of surface area with white water.



RP **Riffle With Pocket Water**: Same flow and slope as riffle, but with numerous pockets created by small boulders, wood, etc.



RB **Rapid With Protruding Boulders**: Swift, turbulent flow with chutes and hyrdraulic jumps, moderate gradient; usually 2.0 - 4.0 % slope, occasionally 7.0 - 8.0 %, 15 - 50 % of surface area with white water.

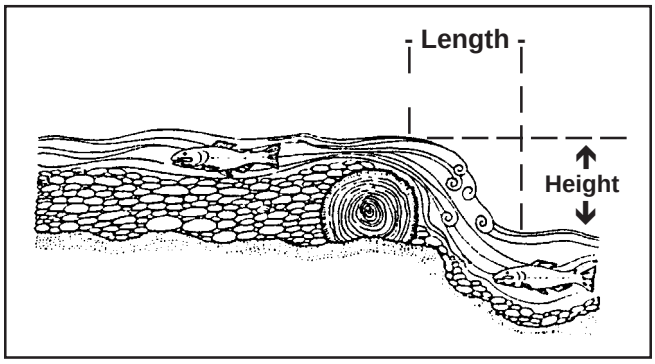


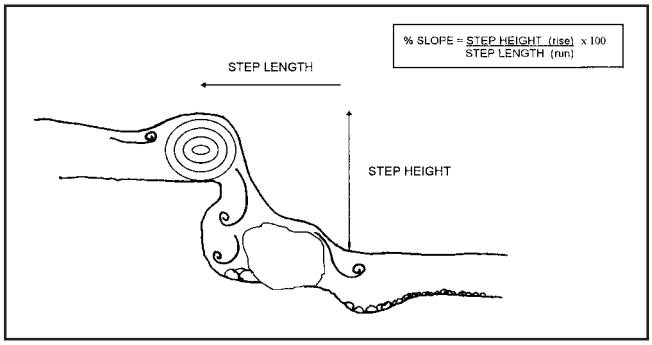
CB **Cascade Over Boulders**: Fast turbulent flow, step-pool structure, 30 - 80 % white water, high gradient, usually 3.5 - 10.0 % slope, sometimes greater.

Optional: Special Cases

The following special cases do not fit the general definition of channel units because they are usually much shorter than the channel width. However, they are important discrete breaks in channel gradient. Steps can separate adjacent units of the same type (e.g., a series of steps and pools). ***Record the height of the step (from the water's surface) in the note column****. As a general rule of thumb, a step habitat unit must have a minimum height of 0.3 meters (12 inches — note step over face of cobble bar below is an exception).*

SB **S**tep over **B**oulders
SR **S**tep over Bed**R**ock (include hardpan and clay steps)
SL **S**tep over **L**og(s), branches, or beaver sticks.
SC **S**tep over face of **C**obble bar (can be less than 0.3 meters in height)
SS **S**tep created by **S**tructure (culvert, weir, dam, gabion)
SD **S**tep over Beaver **D**am





CC **C**ulvert **C**rossing. Stream flowing through culvert. Record as for other unit types, record the drop from the lip of the culvert to the water's surface, diameter, and shape of culvert in the note column.

DU **D**ry **U**nit. At low flow conditions you may find channels composed of pools or other unit types separated by areas of subsurface flow. Record the length and other variables for the dry areas. Measure the active channel width and record in the wetted width column with a corresponding entry in the note column. Leave the depth column blank.

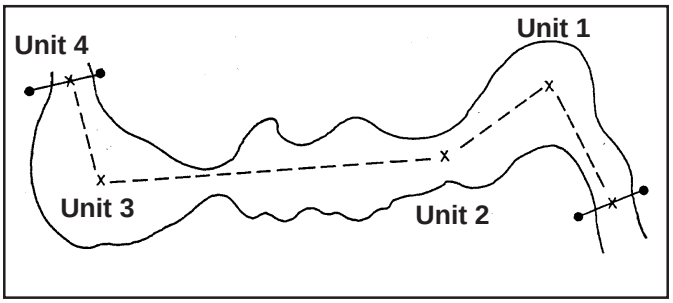
PD **P**uddled: Nearly dry channel but with sequence of small isolated pools less than one channel width in length or width.

DC **D**ry **C**hannel. Section of the main channel or side channel that is completely dry at time of survey. Record all unit data, use active channel width for width. A very long dry channel should be treated as a separate reach.

MX **M**i**X**ed units. Record code for units not surveyed in stream section where access is not allowed.

15. **Length**. Estimate or measure the length of each habitat unit . Indicate measurement units (meters or feet). Changes in the slope of the water's surface, velocity, and channel shape help identify the beginning and end of each unit.

Subdivide very long fast-water units into segments, usually no more than 30 meters (100 feet). It is acceptable to have back-to-back channel units of the same type. Long units are usually divided at points where the stream changes direction. When a long unit makes a corner in the stream, create a new unit at the corner. This is called the "line of sight" rule. Do not subdivide pools.



16. **Width**. Measure the <u>average width</u> of the wetted channel.

17. **Depth**. Determine the maximum depth in pools, and average depth in all other habitat units. Measure as carefully as possible in pools. Probe the bottom with the depth staff to find the deepest point. Small differences in pool depth are significant.

Depth information is a key part of unit identification and data analysis. Pool depth reflects the potential quality of the pool. Average depth of glides and riffles indicates the channel cross section.

23. **Large Woody Debris**. Tally the number of each woody debris type found in each habitat unit. To be counted, a wood piece should average 15 centimeters (6 inches) or greater in diameter measured 2 meters from the largest end (use depth staff as a measuring tool) and 3 meters (10 feet) or longer in length. If numbers or size of root wads are significant, make comment in the notes section.

The presence of woody debris in the stream is important to fish habitat. It helps stabilize the streambed, traps gravels, creates pools and resting areas, affords hiding places, and fosters insect production. Large woody debris information helps to evaluate effects on fish habitat and channel structure and allows comparisons between streams.

Use the following information to classify wood pieces found in each habitat unit.

S	**S**mall	Diameter > 15 cm; > 3 meters	or	> 6", Length > 10'
M	**M**edium	Diameter > 30 cm; > 6 meters	or	> 12", Length > 20'
L	**L**arge	Diameter > 60 cm; > 10 meters	or	> 24", Length > 35'

24. **Comment Codes:** Use coded comments to identify important features. Enter as many codes as appropriate. Use a slash (/) to show whether comment applies to left or right bank (examples, BC/ - for the left bank, BK/CE for both banks, or - /CS for the right bank). Identify other observations in notes column.

Comments combined with the survey's continuous record of stream length helps biologists locate potential problems, enhancement sites, or unique features. It is also an internal check to verify survey section locations and other observations.

BC **B**ridge **C**rossing. Record road name or number in note.

BD **B**eaver **D**am. Helps to identify steps created by beavers.

BK **B**ug **K**ill. Patches of insect or diseased tree mortality.

BV **B**ea**V**er Activity (beaver den, cut trees, etc.)

CC **C**ulvert **C**rossing. Same as Bridge Crossing except the stream passes through a culvert. Record road name or number.

CE **C**ulvert **E**ntry. Tributary entering through culvert. Record diameter, length, slope, and drop if passage capacity is suspect.

CS **C**hannelized **S**treambanks. Rip-rap or other artificial bank stabilization and stream control.

DJ **D**ebris **J**am (large accumulation of woody debris).

EX Livestock **EX**closure.

FC **F**ence **C**rossing.

GS **G**aging **S**tation.

HS Artificial **H**abitat **S**tructure. Describe type, gabion, log weir, cabled or uncabled etc.

MI **MI**ning.

PA **P**otential **A**rtificial Barrier. Potential artificial or human created barrier to upstream or downstream migration of fish. Document with photos and notes.

PN **P**otential **N**atural Barrier. Potential natural barrier to upstream or down stream migration of fish. Document with photos and notes.

RF **R**oad **F**ord. Road that crosses within the active channel of the stream, no bridge).

SB **S**treamside **B**uffer (Record approximate width, speciescomposition, and stand density in note column. Do this once only for each stretch of streamside buffer, not for every unit.)

SD **S**creened **D**iversion (pump or canal). Give some indication of capacity.

SS **S**pring or **S**eep. Usually small amounts of flow (<5% of total flow) directly entering from hillslope. For large springs, estimate the contribution to flow.

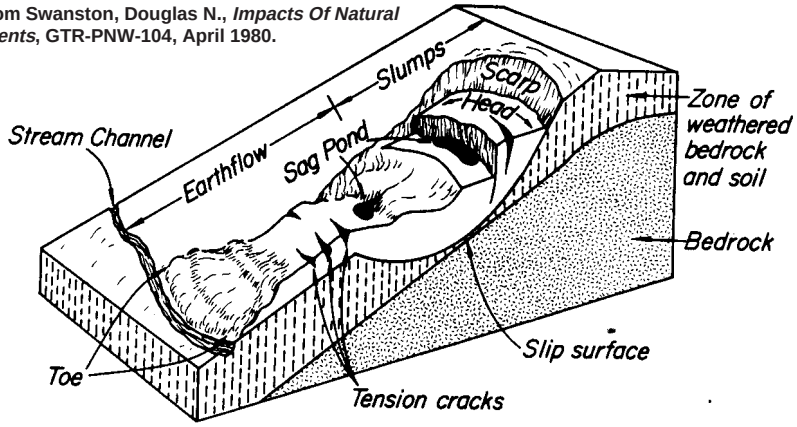
TJ **T**ributary **J**unction with named and unnamed tributaries.

UD **U**nscreened **D**iversion (pump or canal). Give some indication of capacity.

WL **W**ild**L**ife use of stream or riparian zone (note species)

Mass Failures: Mass failures are large earth movements, not general bank erosion. Use a two-part code. The first letter identifies the type of mass failure. The second letter evaluates the apparent activity of the failure. (Example: IA = inactive debris avalanche on right bank.)

From Swanston, Douglas N., *Impacts Of Natural Events*, GTR-PNW-104, April 1980.



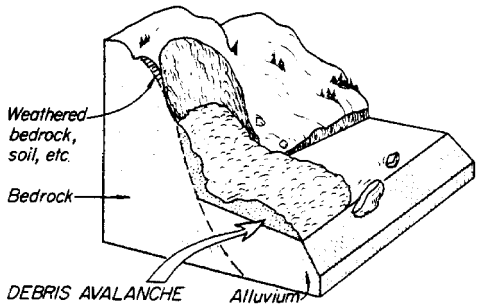
Type:

E **E**arthflow: general movement and encroachment of hillslope upon the channel, somewhat lumpy in appearance.

L **L**andslide: failure of locally adjacent hill slope. Usually steep and broad with exposed soils.

A **A**valanche: failure of hillslope along a small, steep tributary. Flowing, intermittent (seasonal) or ephemeral (spring-like flow) channels that contribute soils and debris, generally chute-like in appearance.

From Swanston, Douglas N., *Impacts Of Natural Events*, GTR-PNW-104, April 1980.



Condition:

A **A**ctive: contributing material now.

I **I**nactive: evidence that material moved during previous winter or high flows.

S **S**tabilized: vegetated scars, no evidence of recent activity.

25. **Notes:** Include additional information that describes the habitat unit, comment code, riparian vegetation, etc. Include additional comments in your field book. Include a sketch of the cross section if it is significantly different from the example types. Add any pertinent additional information or items of interest (fish or wildlife - especially reptiles and amphibians - observed, evidence of spawning activity, evidence of pollution or illegal dumping, description of channel structure, etc.). Also indicate land ownership if known.

P	**P**rivate	**BL**	**B**ureau of **L**and Management
M	**M**unicipal	**SF**	**S**tate **F**orest
C	**C**ounty	**NF**	**N**ational **F**orest
T	**T**ribal	**WA**	**W**ilderness **A**rea
GN	**G**ree**N**way	**US**	**US** Fish and Wildlife Service
FW	Oregon Department of **F**ish & **W**ildlife		

If you want to get creative, do it in the notes section rather than in the basic data fields. This spot provides an opportunity to free lance any other interesting information. These notes are provided to biologists along with all the other data.

ODFW-STEP - BASIC STREAM SURVEY

PAGE 1 OF 1

DATE: 6-26-98

REACH NUMBER: 1

STREAM: Dune Creek

ACW: 8.2 m

BASIN: Green River

VALLEY WIDTH INDEX: (*Circle one*)
1 (>1 to <2.5) 2.5 to 4 >4

USGS MAP: Sand Quad

FLOW (*Circle one*): DRY PD LF MF HF BF FLOOD

START AT: Confluence with Green River

VEGETATION: DM/S

END AT: Hwy 36 bridge crossing

CREW: Mary Smith / Joe Johnson

Indicate measure units (m = meters, ft = feet)

UNIT #	UNIT TYPE	LENGTH (m)	WIDTH (m)	DEPTH (m)	LARGE WOODY DEBRIS COUNT S	M	L	COMMENT CODE	NOTE
1	RI	14	4	0.3		I			confluence with Green Riv
2	GL	8	5	0.5	II				Temp = 14.5°C
3	SB	6	4	0.4	III			PN	Potential barrier
4	PP	4	7	0.8		II			Nice habitat
5	CC	10	6	0.2	I			BC	No drop, 3 submerged Height = 2m, Diam. = 1.5m, galvanized metal
6	LP	11	6	0.9					Fish!
7	RB	17	5	0.5		II			
8	RI	26	3	0.4				TJ	unnamed tributary
9	RP	15	4	0.6	I				
10	SP	12	6	0.8	I	I	II	DJ	
11	RI	9	4	0.4		I			
12	RP	14	5	0.5			I	BC	Hwy 36, End of Survey

OREGON Fish & Wildlife

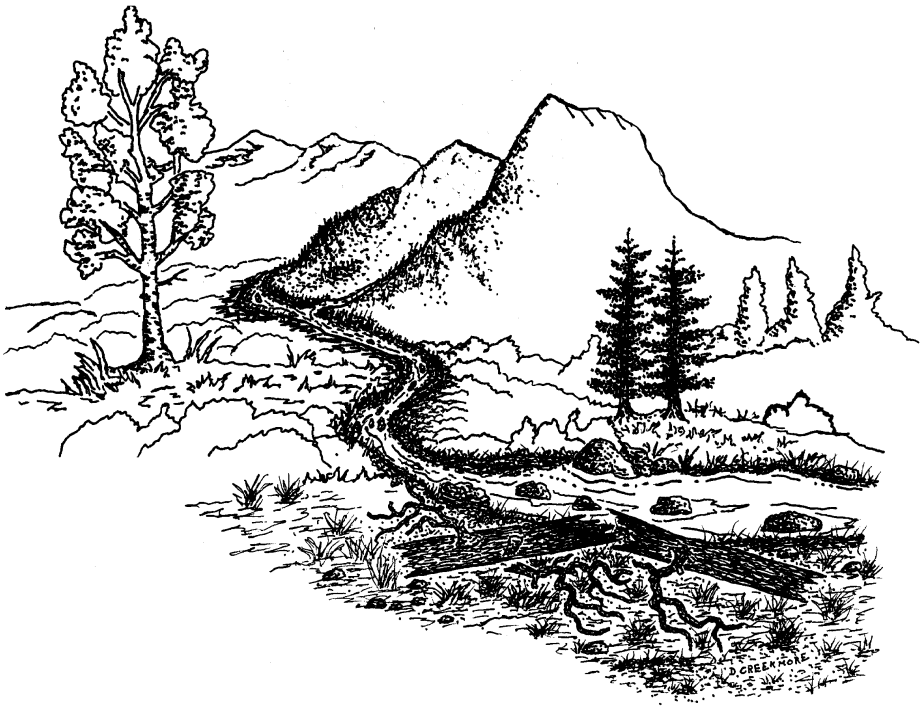
OREGON FISH & WILDLIFE Salmon-Trout Enhancement Program

WOOD: S = 15 cm diameter x 3 m length OR 6 inch diameter x 10 ft length
M = 30 cm diameter x 6 m length OR 12 inch diameter x 20 ft length
L = 60 cm diameter x 10 m length OR 24 inch diameter x 35 ft length

Surveying Oregon's Streams
"A Snapshot In Time"

AQUATIC INVENTORY PROJECT

Intermediate Level Methods For Stream Habitat Surveys



OREGON DEPARTMENT OF FISH AND WILDLIFE

Salmon-Trout Enhancement Program
and
Aquatic Inventory Project
Natural Production Program

Aquatic Habitat Inventory
Intermediate Level Stream Survey
REACH INFORMATION

Record reach information on the **"Reach Data"** sheet prior to and during the course of the survey. Changes in reach characteristics help verify survey locations and identify reach and stream segments within the basin classification system. Each stream or named tributary should be considered and recorded as a separate survey, with its own reach information. The following sequence corresponds to the reach variables on the **"Reach Data"** sheet.

1. **Date**. Include day, month, and year.

2. **Stream**. Use a standardized system of the name followed by descriptors of forks etc. Examples: Alsea R, Drift Cr, Lobster Cr, E Fk. Spell out descriptive or non-standard types such as Branch, Slough, or Swale. Spell out compass direction in names only for larger streams and when the usage is common such as North Umpqua. Use the same name format on all data sheets. Do not invent names -- use "unnamed trib #1", etc. or local names.

3. **Basin**. Use the name of the large river commonly used to describe a region. For example, use McKenzie R for Lookout Cr, not Willamette or Columbia.

4. **Map**. Record the name of the 7.5 minute USGS topographic quad map or specific details about any other topographic map you are using.

5. **Legal Description**. Record the legal description of each reach starting point in your field book and on the reach form. If using a Global Positioning System (GPS) unit, also record the UTM coordinates. Use the following example as the format for a legal location description: T10S R5W Sec22 QtrSE.

6. **Reach Number:** A reach is a length of stream defined by some common characteristic. A reach may simply be the section surveyed. More frequently, reaches are defined by the distance between named tributaries, by major changes in valley and channel form, vegetation, or by changes in land use or land ownership. A reach is composed of any number of units. Consequently, you may end up with more than one page of habitat unit information for a single reach. Number the reaches consecutively. **Always start a new page and new reach number when any one of the main categories on this data page changes significantly**. Circle the variable that resulted in the reach change.

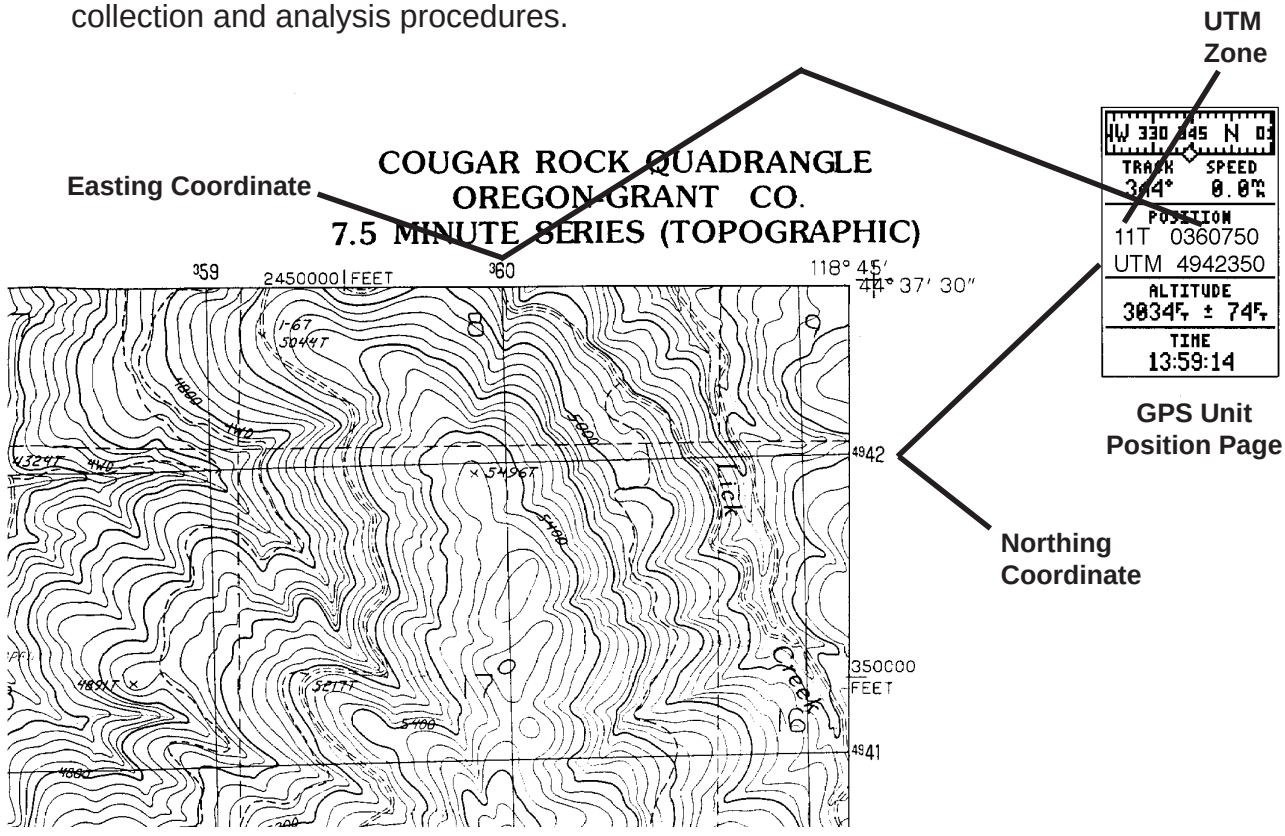
Assigning a reach number to a collection of habitat unit data insures that a continuous record of information is established.

7. **UTM Zone**. If using a global positioning system (GPS) unit, record the Universal Transverse Mercator (UTM) zone for the area. Generally, most of Eastern Oregon is in Zone 11 and most of Western Oregon is in Zone 10.

8. **Start At/End At**. Record the beginning and end of the survey section on each data sheet. Where possible, begin and end the survey at an identifiable **permanent landmark**. Use common landmarks such as tributary junctions, bridges or other crossings, nearby house, etc. Do not use flagging as the **only** reference to mark the beginning or end point of your survey. Any other information that pinpoints survey locations is valuable. **Clearly mark the beginning and end of the survey, all reach changes and important features on the map**. Also record the sequential habitat unit number that occurs at both the beginning and end of the reach.

   If using a GPS unit, record the easting and northing UTM coordinates at the beginning of the reach and do the same at the end of the reach. When reading the numbers from your GPS unit, the top number is the **easting coordinate** and corresponds to small numbers along the top of your USGS quad map. The bottom number is the **northing coordinate** and corresponds to similar numbers along the side of your USGS map. If you were to draw a line from the easting mark and a line from the northing mark, where the two lines intersect should be your location. Occasionally "real-time" corrections must be made with special computer software to more accurately pinpoint the location on a map.

   Most GPS units provide a way to change from latitude/longitude readings to UTM coordinates in the navigation set-up instructions found in the user's manual. Many agencies, including ODFW, routinely use UTM coordinates to standardize their data collection and analysis procedures.



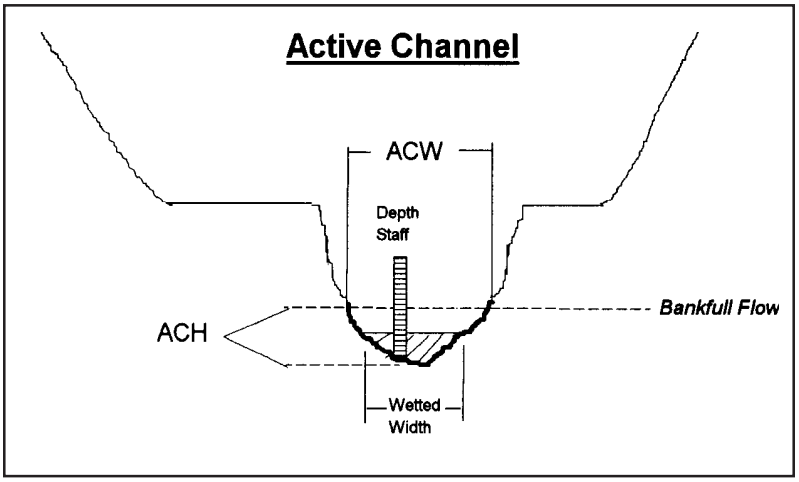
Accurate locations and related comments help biologists interpret the data.

9. **Photo Number and Time**. Take a photograph that shows the stream AND riparian area at the beginning of each reach change. Record the exposure number and the time in this section and on the photo record sheet.

   * ***Use metric system measurements if possible, otherwise note units used.***

10. **Active Channel Height (ACH)**. Determine the average depth (not the deepest part) of a representative fast water unit or pool tailout. Then measure the vertical distance from that point in the streambed to the top of the active channel (the height at bankfull flow). Measure active channel width (ACW) at the same places you measure the active channel height (ACH). Measure the active channel height several times throughout the reach. Record the average active channel height only once for the entire reach.

11. **Active Channel Width (ACW)**. Active channel width is the distance across the channel at average annual "bankfull" flow. Bankfull flow is the high water mark that occurs on average about every 1.5 years. **Active channel width is the most important measurement and definition to learn prior to completing the survey. A number of other parameters are based on active channel width.** Active channel width is identified by a representative change in vegetation, bank slope, or high water mark. Measure the active channel width several times throughout the reach. Record the average active channel width only once for the entire reach. In a multi-channel situation, add the width of all active channels across the valley for a cumulative ACW. If the active channel width changes significantly, start a new reach.



Active channel width provides a reference to stream size regardless of flow level at the time of the survey. It is the scale used to evaluate all channel and valley characteristics. For example, this information is used to estimate valley width index and determine appropriate types of enhancement efforts.

NOTE: The next three steps move the survey context from a larger perspective (valley) to a smaller perspective (channel) based on the value obtained for average active channel width (ACW) within the reach.

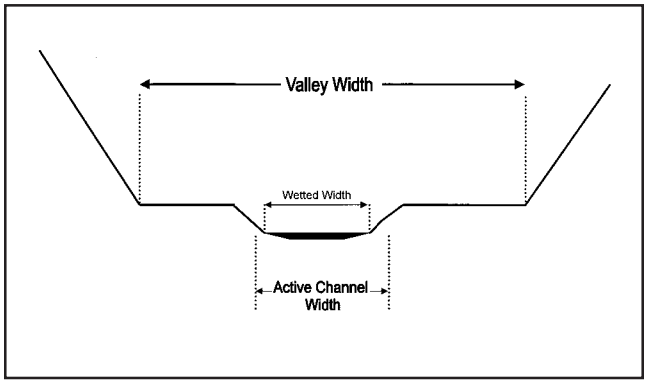
Consider that the valley contains the stream channels and the channels contain the stream. The next three steps are:

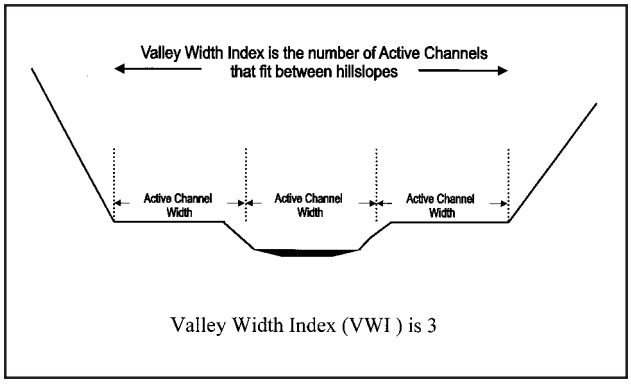
Valley Width Index (VWI) — defines narrow valley floor or broad valley floor based on active channel width.

Valley Form — Characterizes cross-sectional valley shape based on valley floor width (VFW), either broad or narrow, and adjacent land forms.

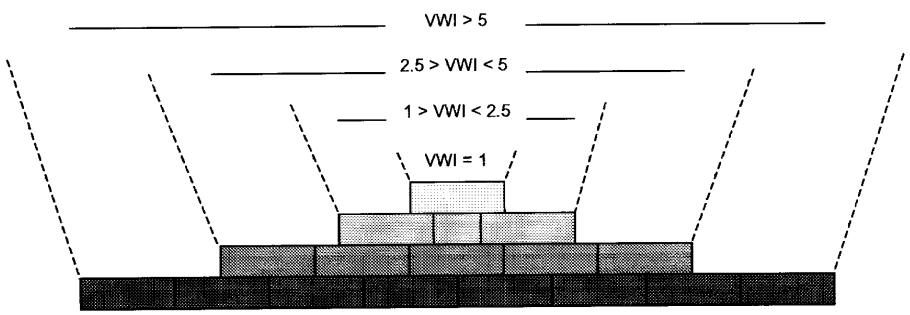
Channel Form — Characterizes channel structure and cross-sectional channel shape within either broad or narrow valleys.

12. **Valley Width Index (VWI)**: The valley width index is the number of active channel widths that will fit between the hillslopes across the valley floor. It is estimated for the reach by dividing the average *active channel width (ACW)* into the average *valley floor width (VFW)*. Mark the appropriate estimate: 1, > 1 - 2.5, 2.5 - 4, or > 4.





** Do not start a new reach for minor changes in valley width index (VWI). However, always start a new reach when the valley width index changes as shown in the sketch below.*



Valley width index (VWI) gives us additional information about the cross-sectional shape of the valley (valley form). It reflects the potential for the stream to migrate back and forth across the valley floor and its ability to create complex lateral habitats. This information helps biologists design appropriate restoration treatments.

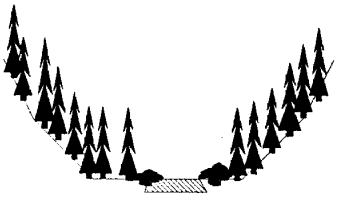
13. **Valley Form**. Valley form, or shape, is generally described as a cross section of the landforms across the valley. It is based on the valley floor width, either broad or narrow, and is described by the valley width index (VWI). There are two valley form types.

1. A NARROW valley floor is less than 2.5 times the stream's active channel width (ACW).

2. A BROAD valley floor is greater than 2.5 times the stream's active channel width (ACW).

Valley Forms Within A **Narrow Valley Floor** (VWI < 2.5)

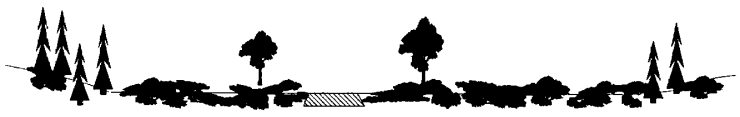
SV **S**teep **V**-Shaped valley or bedrock gorge (side slopes > 60°).
MV **M**oderate **V**-Shaped valley (side slopes > 30°).
OV **O**pen **V**-Shaped valley (side slopes < 30°).



Valley Forms Within A **Broad Valley Floor** (VWI > 2.5)

CT **C**onstraining **T**erraces. Terraces typically high and close to the active channel. Terrace surface is unlikely to receive flood flows.
MT **M**ultiple **T**erraces. Surfaces with varying height and distance from the channel. High terraces may be present but they are generally too far from the channel to have any impact.
WF **W**ide-Active **F**loodplain. Significant portion of valley floor influenced by annual floods. Any terraces present do not restrict the lateral movement and expansion of the channel.

Valley Form and Channel Form are related and can only occur in certain combinations. Possible combinations are shown in the Toolbox.

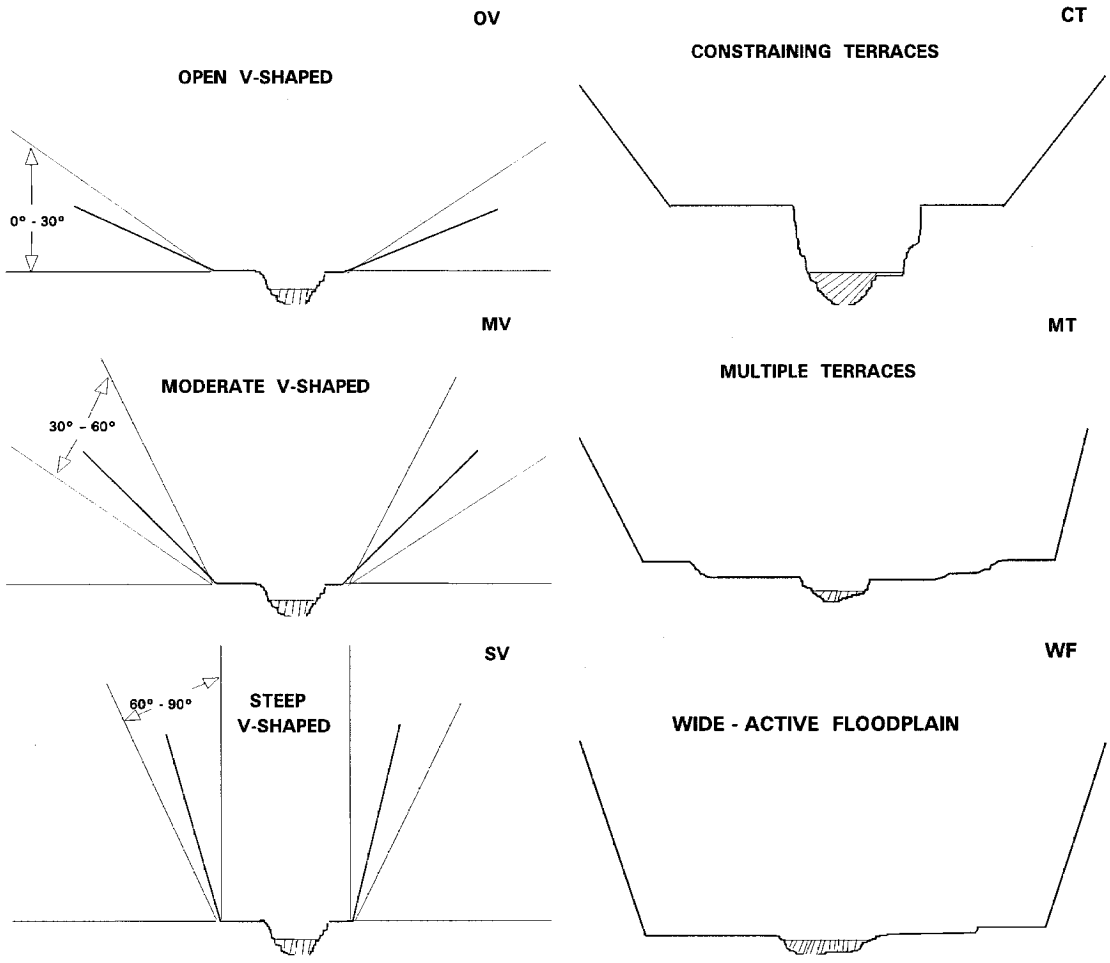


Channel form and valley form are closely related. Together they can provide clues about stream gradient (slope), expected habitat unit types and characteristics, and the relationship of the stream to the riparian zone.

VALLEY FORM

NARROW VALLEY FLOOR
VWI < 2.5

BROAD VALLEY FLOOR
VWI > 2.5



14. **Channel Form**. The channel is where the stream resides. The shape, or form, of a channel is closely related to valley form because it is affected by the adjacent hillslopes, terraces, and flood plains.

To determine channel form, look again at the relationship between active channel width (ACW) and valley floor width (VFW). Are you in a wide or narrow valley floor type? Remember:

NARROW valley floor types have a valley width index (VWI) less than 2.5.

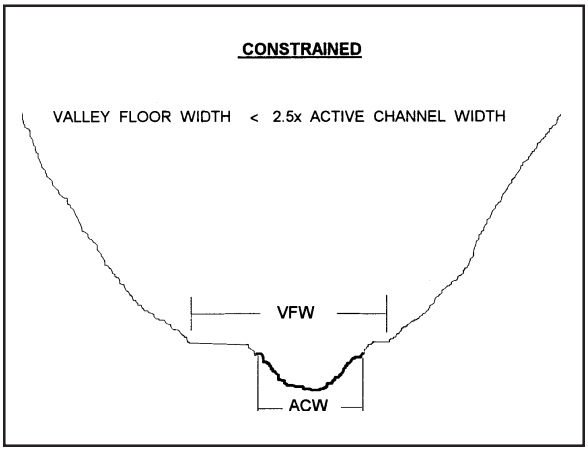
BROAD valley floor types have a valley width index (VWI) greater than 2.5.

Now, look at the various land forms next to the stream channel to complete the classification. From the following descriptions, choose the code which best fits the channel form found within the reach. *Refer to the Valley and Channel Classifications page in the Appendix for definitions, allowable combinations, and examples.*

NARROW valley floor types (VWI < 2.5) are always constrained, or limited, as there is little room for the stream to wander back and forth across the valley floor.

BROAD valley floor types (VWI > 2.5), on the other hand, can be constrained or unconstrained, depending on how landforms or land use practices have affected the stream channel. Unconstrained channel forms have the ability to migrate back and forth across a broad valley floor, but roadways, dikes, terraces, or hillslopes on either side of the channel may keep the stream constrained, or confined, within its channel even if the valley floor is very broad.

***Channel constraint* occurs when land forms next to the stream restrict the side to side movement of the channel. In constrained channels, stream flows associated with all but the largest flood events are confined to the existing channel.**



Channel Forms Within
Constrained (Narrow) Valley Floor Types —

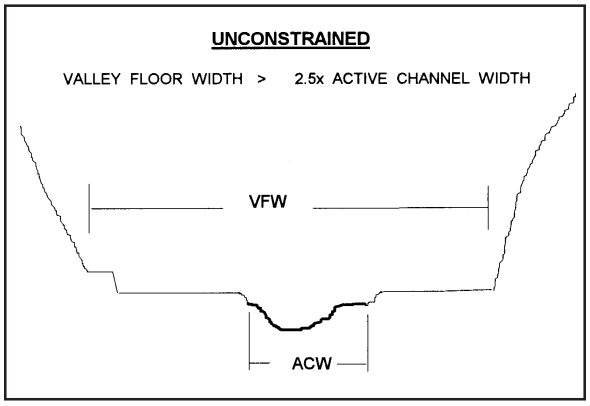
Narrow valley floor types have a width less than 2.5 times the active channel width (ACW) and are always constrained. Channel form is defined by the constraining feature.

CB **C**onstrained by **B**edrock (bedrock gorge)
CH **C**onstrained by **H**illslope
CF **C**onstrained by alluvial **F**an

Channel Forms Within **Broad Valley Floor Types** —

Broad valley floor types have a width greater than 2.5 times the active channel width (ACW). The channel, however, may be either unconstrained or constrained depending on the height and position of the landforms adjacent to the stream.

Unconstrained Channel Form. Low terraces, overflow channels, and flood plains next to the active channel.



US **U**nconstrained-predominantly **S**ingle channel.

UA **U**nconstrained-**A**nastomosing (several complex, interconnecting channels)

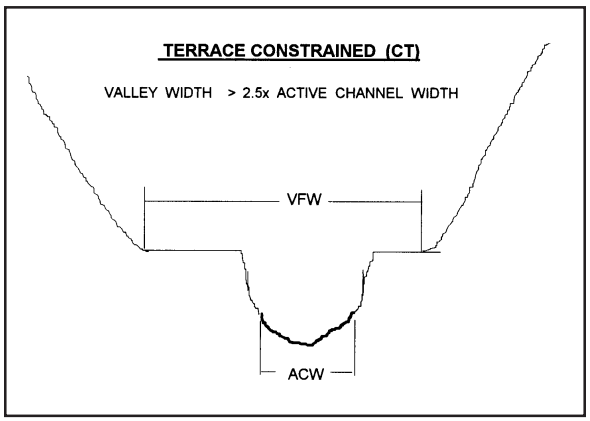
UB **U**nconstrained-**B**raided channel (numerous, small channels often flowing over alluvial deposits)

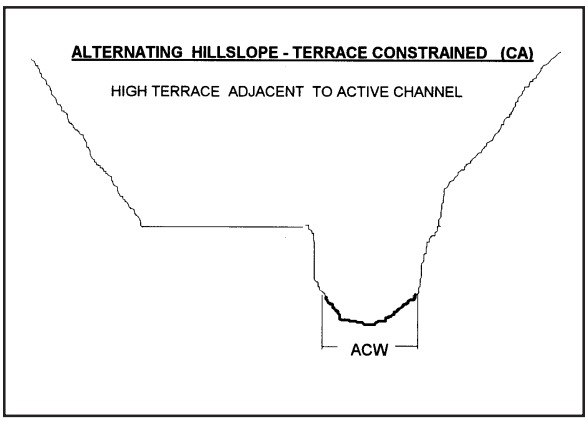
Constrained Channel Form. Adjacent landforms (terraces, hillslopes) are not part of the active flood plain.

CT **T**errace **C**onstrained. (flood prone width < 2.5 times the active channel width)

CA **C**onstrained by **A**lternating terraces and hillslope. Same rule for terrace height but the channel may meander across the valley floor. The stream channel is confined by contact with hillslopes and high terraces.

CL **C**onstrained by **L**and use (road, dike, landfill)





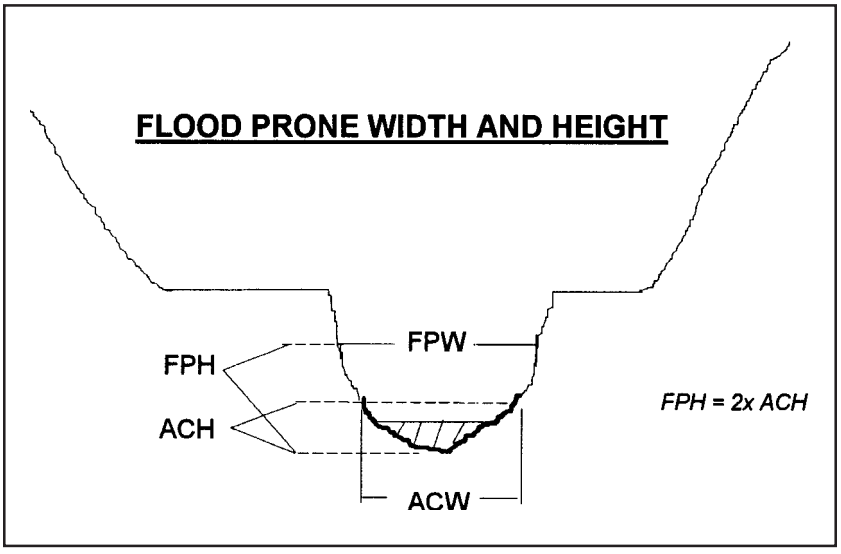
15. **Land Form**. Describe the landform next to the active channel margin on the left and right sides (looking upstream).

HS **H**ill**S**lope
HT **H**igh **T**errace (above flood zone, height > 10% ACW)
LT **L**ow **T**errace (within flood zone, height < 10% ACW)
AF **A**lluvial **F**an
FP **F**lood **P**lain
RF **R**oad **F**ill (Rip-Rap)
WM **W**etlands-**M**eadow
BR **B**ed **R**ock
O **O**ther (make note in comment column)

Identification of land forms is easier if you look at the types and age classes of vegetation on different surfaces. Young grasses, herbs, and small shrubs typify a low terrace subject to frequent disturbance by floods. The age of the trees indicates the age and stability of the terrace.

Land form indicates what feature is found immediately adjacent to the stream on either side and provides clues as to its effect on the stream. It also provides evidence for the channel form and valley form classifications.

16. **Flood Prone Height (FPH)**: Double the active channel height to obtain the flood prone height measurement. Record this number to the nearest 0.1 meter. Flood prone height is the maximum channel depth during a flood event that occurs approximately once every 50 years.



17. **Flood Prone Width (FPW)**: Flood prone width is the width of the valley floor covered by flood waters during a flood which occurs approximately once every 50 years. Measure the total distance <u>across</u> the channel and valley at the height indicated by the flood prone height measurement. A clinometer will help determine a level line extending across the channel at floodprone height. If the measurement connects with a terrace or hillslope reasonably close to the stream, record the actual distance to the nearest 0.1 meter. If the measurement extends far across a valley, estimate the distance. Make these measurements several times throughout the reach. Record the <u>average</u> flood prone width only once for the entire reach.

Based on historic gage station readings, flood prone height (FPH) and flood prone width (FPW) provide a clear representation of the "big event" (approximately once every fifty years) flooding potential of a stream in a particular reach. Landform also provides clues to this potential, but without the numerical designations.

18. **Streamside Vegetation**: Describe the types of streamside vegetation (riparian area) in each reach. The width of this "green zone" may be variable. Generally consider the vegetation observed in the area within one active channel width on either side of the channel to represent the riparian zone. Note if significant variations occur on either side of the stream. Simply describe in words or use the two letter codes noted below.

    The first letter identifies the plant community based on the dominant forms. The second letter of the code refers to the age (stage of development) of shrubs and trees in the riparian area.

    Example: riparian areas with 8 - 10 year old alder = **DY**

    Separate entries for the dominant (DOM) and the understory (UNDER) communities may be appropriate in some areas (i.e. **CM/G** in ponderosa pine/grass communities). When possible, record vegetation types not normally found in a typical wetted riparian habitat. Note species if known.

Knowing the vegetation status at the time of the survey allows biologists to interpret the history of land use and estimate the potential for recruitment of large woody debris into the stream. Some habitat projects help re-establish vegetative cover.

Vegetation Type:

N **N**o Vegetation (bare soil, rock)
B Sage**B**rush (sagebrush, greasewood, rabbit brush, etc.)
G Annual **G**rasses and herbs
P **P**erennial grasses, forbs, sedges and rushes
S **S**hrubs (willow, salmonberry, current, some alder)
D **D**eciduous trees (canopy more than 70% alder, cottonwood, maple, etc.)
M **M**ixed conifer and deciduous (about a 50:50 distribution)
C **C**oniferous Dominated (canopy more than 70% conifer)

Stage of Development (shrubs and trees only)

S **S**eedlings
P Sapling **P**oles
Y **Y**oung. Small trees. West side communities may have fully closed canopy of trees and shrubs.
M **M**ature. Large trees with sizes typical for dominant species.
O **O**ld-growth. Large trees, snags, and woody debris. Multi-layered canopy.

19. **Land Use**. Record the primary (PRIM) land use occurring on the terraces and hillslopes beyond the riparian zone for each side of the stream. Code secondary (SEC) land use where appropriate (i.e. **PT/ HG** = Partial cut Timber/Heavy Grazing).

AG **AG**ricultural crop or dairy land.
TH **T**imber **H**arvest. Active timber management including tree felling, logging, etc. Not yet replanted.
YT **Y**oung Forest **T**rees. Can range from recently planted harvest units to stands with trees up to 15 cm dbh.
ST **S**econd growth **T**imber. Trees 15-30 cm diameter at basal height (dbh) in generally dense, rapidly growing, uniform stands.)
LT **L**arge **T**imber (30-50 cm dbh)
MT **M**ature **T**imber (50-90 cm dbh)
OG **O**ld **G**rowth Forest. Many trees with 90+ cm dbh and plant community with old growth characteristics.
PT **P**artial cut **T**imber. Selection cut or shelterwood cut with partial removal of large trees. Combination of stumps and standing timber. If only a few live trees or snags in the unit, describe in note column.
FF **F**orest **F**ire. Evidence of recent charring and tree mortality.
BK **B**ug **K**ill. Eastside forests with > 60% mortality from pests and diseases. Enter bug kill as a comment on the unit sheet when it is observed in small patches.
LG **L**ight **G**razing Pressure. Grasses, forbs and shrubs present, banks not broken down, animal presence obvious only at limited points such as water crossings. Cow pies evident.
HG **H**eavy **G**razing Pressure. Broken banks, well established cow paths. Primarily bare earth or early successional stages of grasses and forbs present.
EX **EX**closure. Fenced area that excludes cattle from a portion of range land.
UR **UR**ban
RR **R**ural **R**esidential
IN **IN**dustrial
MI **M**ining
WL **W**etLand
WA **W**ilderness **A**rea
NU **N**o **U**se identified.

Land use comments provide evidence of factors affecting the stream and its riparian zone.

20. **Water Temperature**. Record the stream temperature in degrees Celsius at each reach change or a minimum of once per page of habitat unit data. Also record the time the temperature was taken.

    At named tributary junctions, record the stream temperature just above the tributary and in the tributary. Identify and record each temperature on the appropriate habitat unit line in the notes column.

Instantaneous water temperature measurements provide information about stream conditions that may affect fish populations.

21. **Flow**. Describe streamflow conditions. Best observed in riffles. If a gaging station is present, record the stage height.

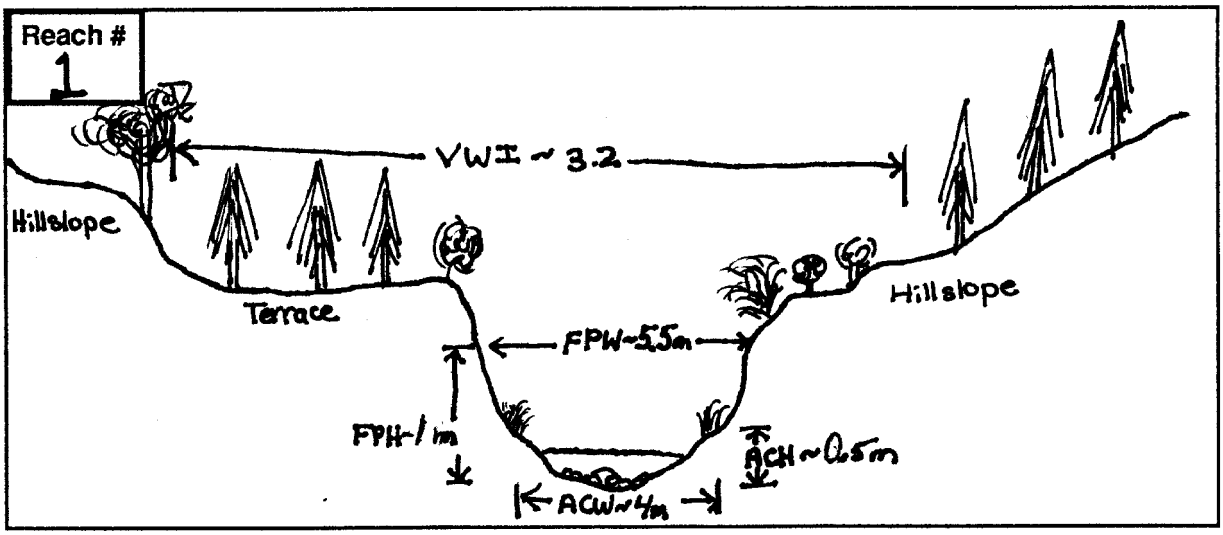
Flow is one of the most variable stream conditions. Habitat quality varies with streamflow. A record of the streamflow conditions on the day of the survey is critical for interpretation and application of the survey data.

DR	**DR**y. Dry section of stream separating wetted channel units.
PD	**P**u**D**dled. Nearly dry channel, but with sequence of small isolated pools less than one channel width in length or width.
LF	**L**ow **F**low. Surface water consistently flowing across no more than 75 percent of the active channel surface. Consider other general indicators of low flow conditions.
MF	**M**oderate **F**low. Surface water flowing across 75 to 90 percent of the active channel surface.
HF	**H**igh **F**low. Stream flowing completely across active channel surface but not at bankfull.
BF	**B**ankfull **F**low. Stream flowing at the upper level of the active channel bank.
FF	**F**lood **F**low. Stream flowing over banks onto low terraces or flood plain.

22. **Reach Notes**. This space is reserved for comments, names of tributaries, and land ownership. Abbreviate by ownership code or use names of forest, timber companies, ranches, etc., when known.

P **P**rivate
M **M**unicipal
C **C**ounty
T **T**ribal
GN **G**ree**N**way
FW Oregon Department of **F**ish and **W**ildlife
BL **B**ureau of **L**and Management
SF **S**tate **F**orest
NF **N**ational **F**orest
WA **W**ilderness **A**rea
US **US** Fish and Wildlife Service

23. **Sketch**. Make a sketch of the channel and valley cross section in the box provided. Identify the reach number in the box. Label and provide approximate dimensions of important features. See example.



HABITAT UNIT DATA

Information gathered in the following steps describes and evaluates specific habitat types and conditions throughout the reach. Complete the data sheet header before beginning the survey. If you have completed the reach information on the back of the data sheet, some of the header information may be repeated.

ODFW-STEP - INTERMEDIATE LEVEL SURVEY - HABITAT UNIT DATA PAGE 1 OF 2

DATE: 6-18-98
STREAM: Toad Creek
BASIN: Wash Creek
MAP: Toad town
LEGAL DESCRIPTION: 14S - 36E - 6NE
START: mouth of Toad Creek
END: Right tributary Junction with Sea Creek
ACTIVE CHANNEL WIDTH: 4m
REACH NUMBER: 1
CREW: Jane Doe, Bill Johnson

1. **Date**. Include day, month, and year.

2. **Stream**. Use a standardized system of the name followed by descriptors of forks etc. Examples: Alsea R, Drift Cr, Lobster Cr, E Fk. Spell out descriptive or non-standard types such as Branch, Slough, or Swale. Spell out compass direction in names only for larger streams and when the usage is common such as North Umpqua. Use the same name format on all data sheets. Do not invent names -- use "unnamed trib #1", etc. or local names.

3. **Basin**. Use the name of the large river commonly used to describe a region. For example, use McKenzie R for Lookout Cr, not Willamette or Columbia.

4. **Map**. Record the name of the 7.5 minute USGS topographic quad map or specific details about any other topographic map you are using.

5. **Legal Description**. Record the legal description of each reach starting point in your field book. If using a Global Positioning System (GPS) unit, also record the UTM coordinates. Use the following example as the format for a legal location description: T10S R5W S22 SE.

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Accurate location information and comments help biologists interpret the data.

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Active channel width provides a reference to stream size regardless of flow at the time of the survey. It is the scale used to evaluate all stream and valley characteristics. For example, this information is used to estimate valley width index and determine appropriate types of enhancement efforts.

9. **Page:Of**. List the page number of the data sheet for each reach. You may have more than one page of unit information for a single reach. **If a reach changes, start a new data sheet**.

10. **Crew**. List names of surveyors.

Biologists often have questions when interpreting the data. Include addresses and phone numbers of surveyors in the field book.

ODFW-STEP - INTERMEDIATE LEVEL SURVEY - HABITAT UNIT DATA PAGE 1 OF 2

DATE: 6-18-98 LEGAL DESCRIPTION: 14S-36E-6NE REACH NUMBER: 1

STREAM: Toad Creek START: mouth of Toad creek

BASIN: Wash Creek END: Right tributary Junction with Sea Creek CREW: Jane Dee

MAP: Toad town ACTIVE CHANNEL WIDTH: 4m Bill Johnson

UNIT #	UNIT TYPE	CHANL TYPE	% FLOW	UNIT CHARACTERISTICS LENGTH	WIDTH	DEPTH	SLOPE %	SHADE L/R	PERCENT SUBSTRATE DISTRIBUTION S/O	SND	GRVL	CBLE	BLDR	BDRCK	BLDR COUNT	% AE	WOOD S	M	L	COMMENT CODES	NOTES
1	LP	00	100	42.5	5.4	0.7	0	25/40	20	30	20	35	5	5	62	20	1		WT		
2	CC	00	100	16.4	3.0	0.2	1.5	90/90	5	35	25	25	10	–	12	10		11		BC	Hwy 92, Step up = 1.0m
3	RI	00	100	26.4	2.0	0.24	2.0	40/25	10	30	40	20	–	5	8	25			1		
4	RP	01	60	30.1	2.5	0.32	2.0	50/20	10	10	25	40	35	10	30	5		11		TJ/	unnamed TJ
5	RI	11	40	26.4	2.8	0.2	6	60/70	5	25	25	35	15	–	14	10	1				
6	SL	00	100	0.4	4.5	0.15	–	40/35	10	30	30	45	10	5	4	5		11	1		Height = 1.6m
7	TP	00	100	15.3	3.4	1.0	0	40/35	15	10	10	15	5	55	6	15	WT	1	WT	DJ	Large jam, no fish passage
8	CB	00	100	12.4	3.9	0.25	5.0	45/25	10	10	15	35	40	–	8	15		11	1		
9	RI	00	100	18.9	2.3	0.30	1.5	40/30	5	15	45	35	20	10	10	5	11	1			
10	RB	00	100	20.1	2.1	0.20	4.0	70/20	5	15	25	30	15	10	15	5	11		11	TJ	unnamed TJ

11. **Unit Number**. As you proceed upstream, this is the sequential order of habitat units.

> ***Numbering habitat units provides a continuous record of habitat types in the surveyed section.***

12. **Unit Type**. Habitat units are segments of the stream with similar characteristics. As a general rule of thumb for primary channel units, each is generally longer than the active channel width. Exceptions to this rule may include plunge pools, alcoves, backwater pools, and isolated pools. Habitat units are classified by channel shape, slope of the water's surface, and water velocity.

> ***The composition and pattern of habitat unit types characterize the stream. Habitat unit identification is the basic information that indicates fish habitat potential (spawning, rearing, and cover). Comparing the numbers of slow water habitat types (pools) and fast water habitat types (glides, riffles, rapids, cascades) within a stream reach can indicate which habitat types are lacking. Habitat improvement techniques can address deficiencies.***

For the purposes of the Intermediate Level survey, record the unit information for each of the unit types encountered. **Refer to the diagrams or see detailed descriptions in the Definitions section of the Appendix**.

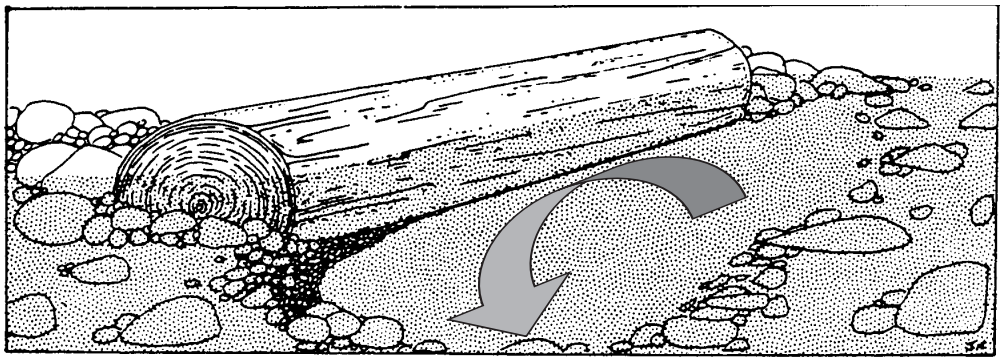
SPECIFIC UNIT TYPES:

Primary Channel Types

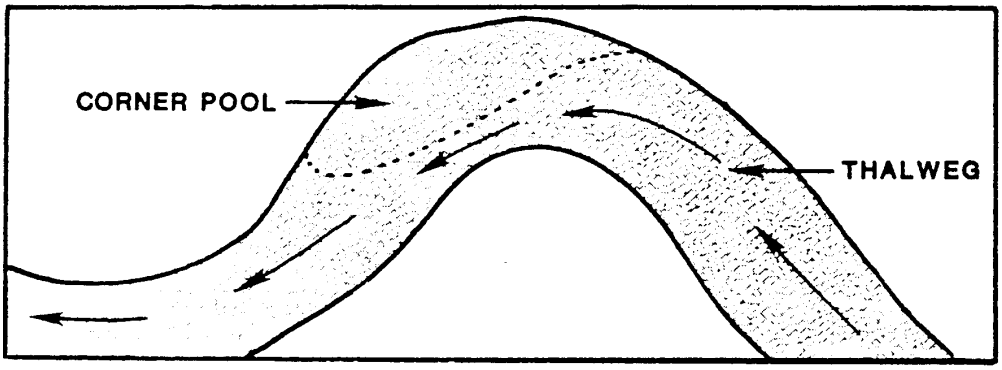
LP **L**ateral scour **P**ool
SP **S**traight scour **P**ool

Other Pool Types

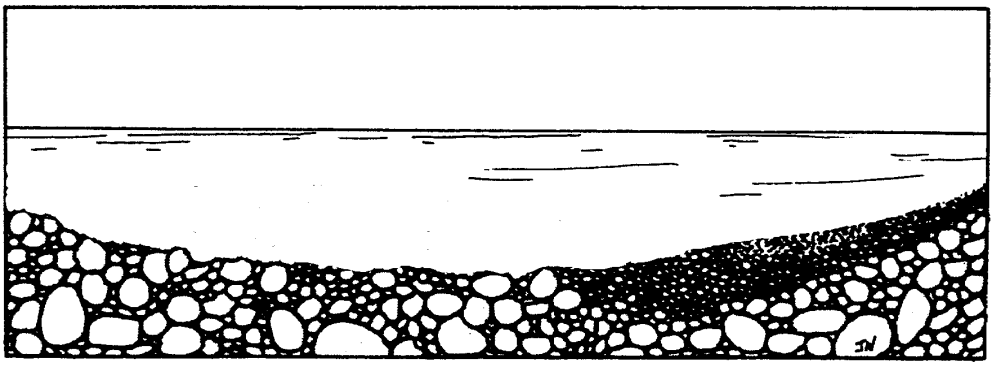
AL **A**Lcove* (bank feature; persistent at high flow)



LP **Lateral Scour Pool**: Formed by water against one stream bank or partial obstruction (logs, root wad, bedrock).

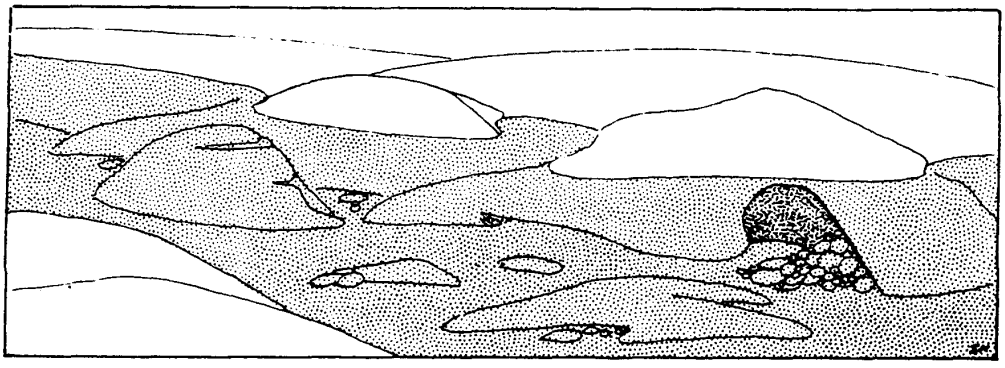


LP **Lateral Scour Pool**: Often forms corner pools in meandering lowland or valley bottom streams.

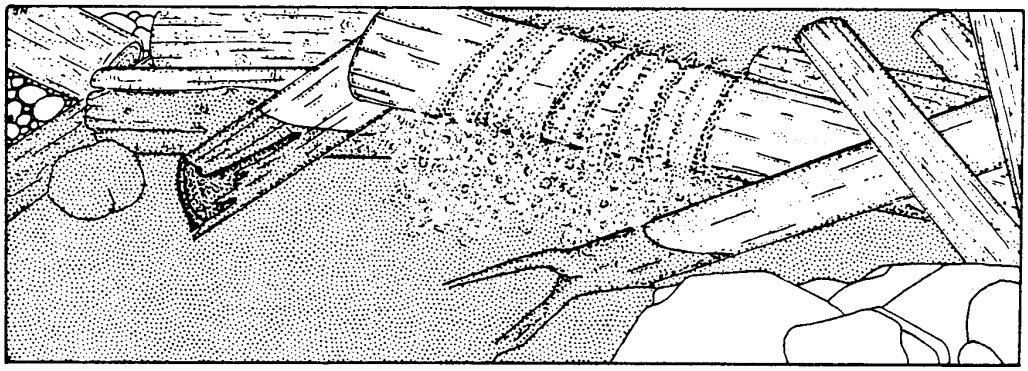


* Graphics on pages D-19 through D-22 from *Glossary Of Stream Habitat Terms*, WIlliam T. Helm, Editor, American Fisheries Society, Western Division, Bethesda, Maryland, Dec.1985.

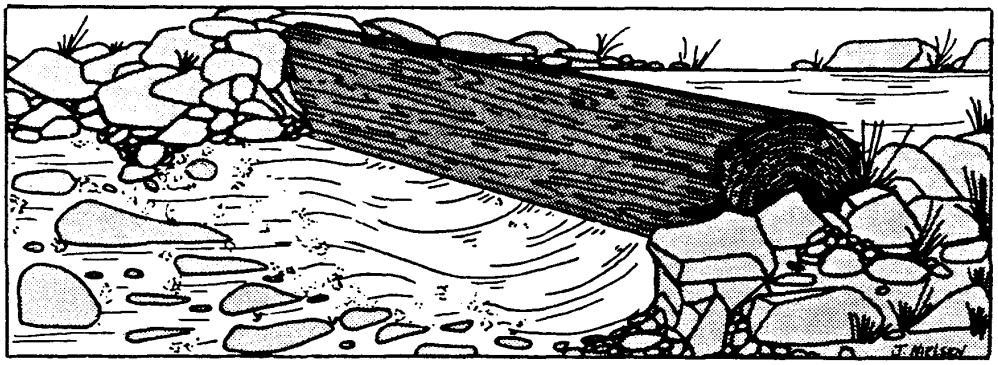
SP **Straight Scour Pool**: Formed by mid-channel scour, generally with a broad scour hole.



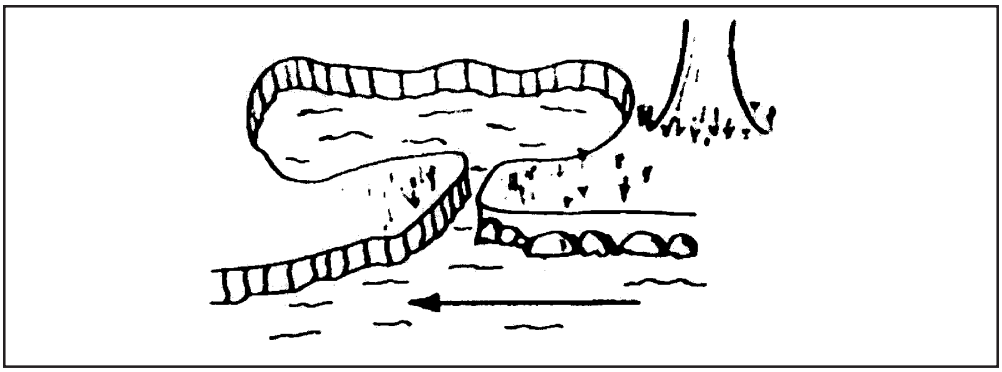
TP **Trench Pool**: A relatively long, slot-like depresssion in the stream bed, often found in bedrock-dominated channels.



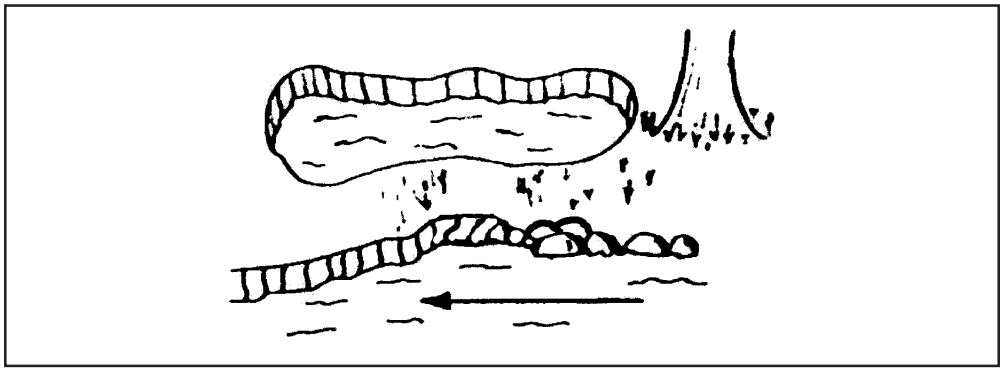
PP **Plunge Pool**: Formed by water passing over a complete or nearly complete channel obstruction (logs, boulders, bedrock).



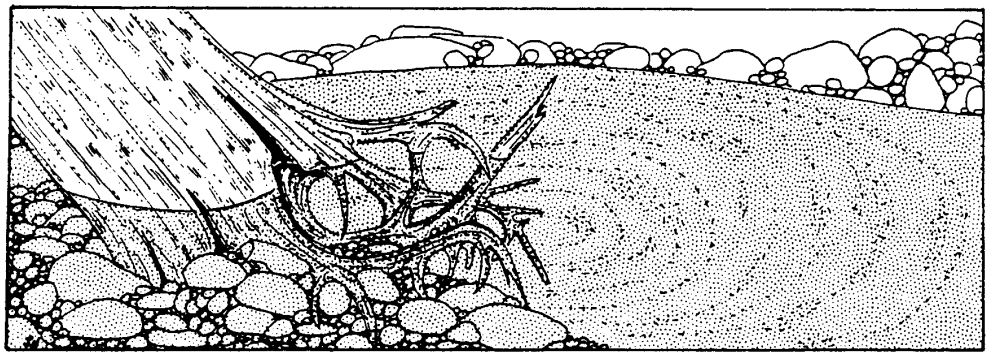
SP **Dammed Pool**: Sometimes formed by scouring under a stream obstruction, such as a log.



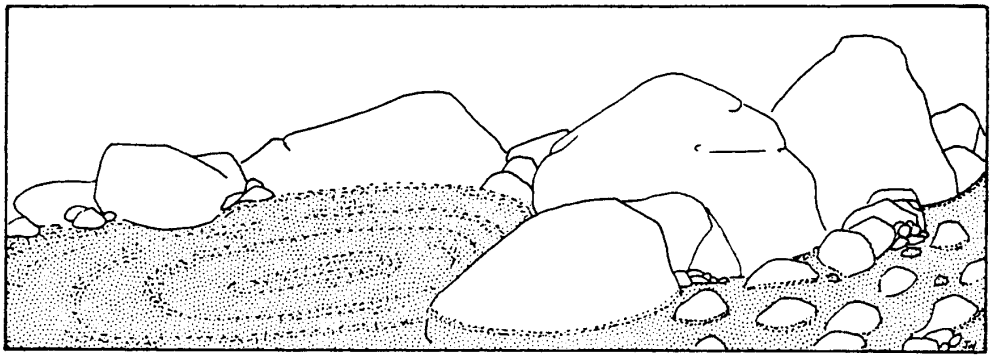
AL **Alcove**: A backwater along the shoreline; not scoured during typical high flows.



AL **Isolated Pool**: Pools formed outside the primary wetted channel, but within the active channel.



BW **Backwater Pool**: Formed along channel margins by an eddy around obstructions like boulders, root wads, woody debris, or behind gravel bars.



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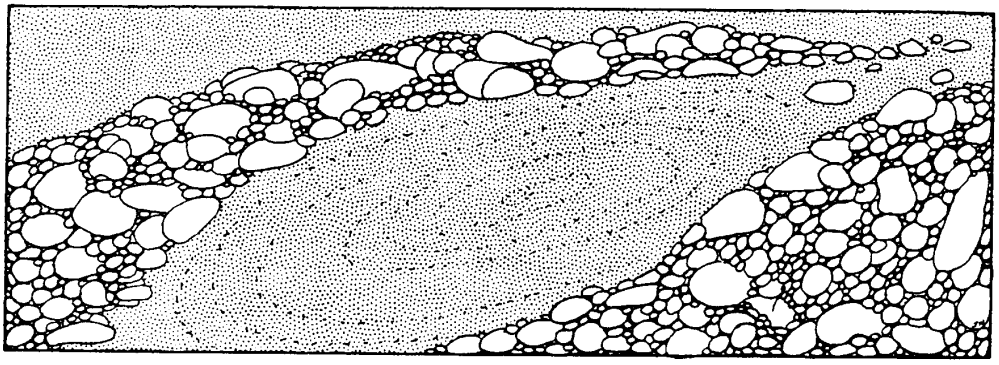
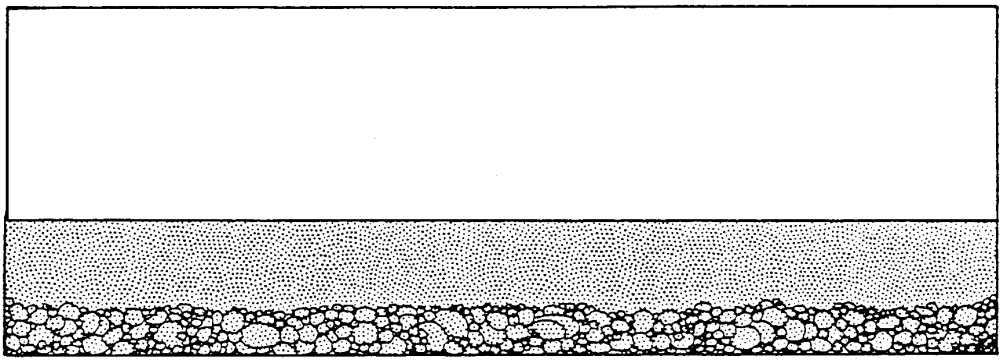
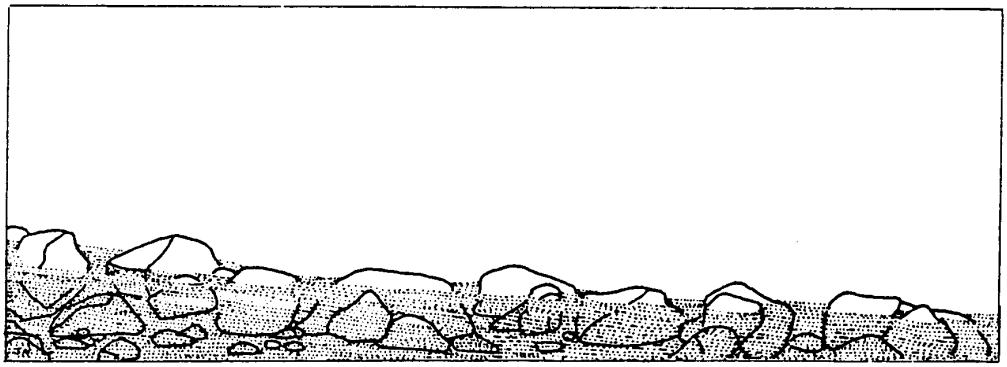


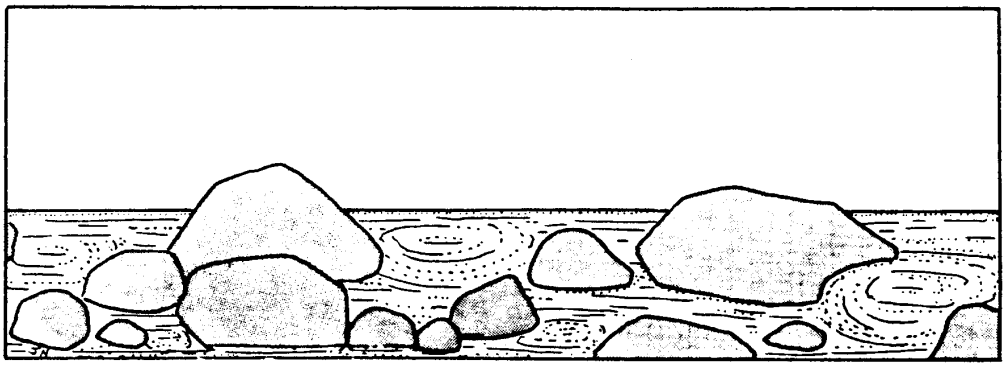
BW **Backwater Pool**: Formed along channel margins by an eddy around obstructions like boulders, root wads, woody debris, or behind gravel bars.



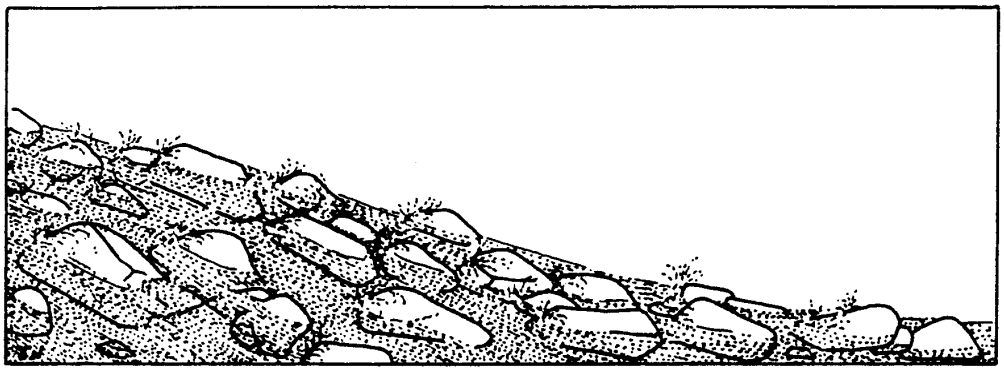
GL **Glide**: Generally uniform depth and flow with no surface turbulence, low gradient; 0 -1% slope.



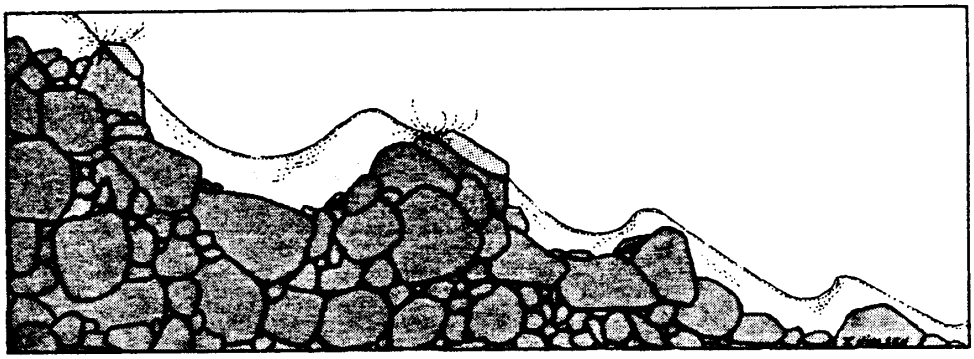
RI **Riffle**: Fast, turbulent, shallow flow over gravel or cobble substrates, low gradient; 0.5 - 2.0 % slope, rarely up to 6%, 5 - 15% of surface area with white water.



RP **Riffle With Pocket Water**: Same flow and slope as riffle, but with numerous pockets created by small boulders, wood, etc.



RB **Rapid With Protruding Boulders**: Swift, turbulent flow with chutes and hyrdraulic jumps, moderate gradient; usually 2.0 - 4.0 % slope, occasionally 7.0 - 8.0 %, 15 - 50 % of surface area with white water.



CB **Cascade Over Boulders**: Fast turbulent flow, step-pool structure, 30 - 80 % white water, high gradient, usually 3.5 - 10.0 % slope, sometimes greater.

TP **T**rench **P**ool
PP **P**lunge **P**ool
DP **D**ammed **P**ool
BP **B**eaver **P**ond (dammed pool formed by beavers)

BW **B**ackwater **P**ool* (channel feature; not present at all flows)
IP **I**solated **P**ool*

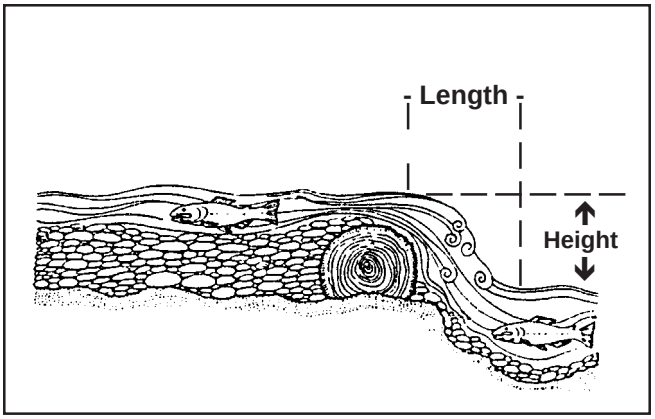
*Not necessarily full width channel units.

GL **GL**ide

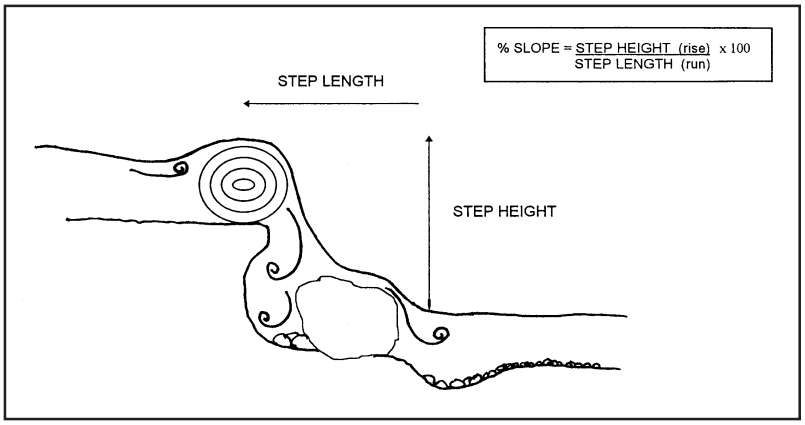
RI **R**iffle
RP **R**iffle with **P**ocket water

RB **R**apid with protruding **B**oulders
RR **R**apid over Bed**R**ock

CB **C**ascade over **B**oulders
CR **C**ascade over Bed**R**ock



SPECIAL CASES:



The following special cases do not fit the general definition of channel units because they are usually much shorter than the channel width. However, they are important discrete breaks in channel gradient. Steps can separate adjacent units of the same type (e.g., a series of steps and pools). ***Record the estimated height of the step (from the water's surface) in the note column. The length of a step is the horizontal distance from where the water starts over the top to where it hits****. As a general rule of thumb, a step habitat unit must have a minimum height of 0.3 meters (note step over face of cobble bar below as an exception). Do not measure slope for step habitat units.*

SB **S**tep over **B**oulders
SR **S**tep over Bed**R**ock (include hardpan and clay steps)
SL **S**tep over **L**og(s), branches, or beaver sticks.
SC **S**tep over face of **C**obble bar (can be less than 0.3 meters in height)
SS **S**tep created by **S**tructure (culvert, weir, dam, gabion)
SD **S**tep over Beaver **D**am

CC **C**ulvert **C**rossing. Stream flowing through culvert. Record as for other unit types, record the drop from the lip of the culvert to the water's surface, diameter, and shape of culvert in the note column.

DU **D**ry **U**nit. At low flow conditions you may find channels composed of pools or other unit types separated by areas of subsurface flow. Record the length and other variables for the dry areas. Measure the active channel width and record in the wetted width column with a corresponding entry in the note column. Leave the depth column blank.

PD **P**uddled: Nearly dry channel but with sequence of small isolated pools less than one channel width in length or width.

DC **D**ry **C**hannel. Section of the main channel or side channel that is completely dry at time of survey. Record all unit data, use active channel width for width. A very long dry channel should be treated as a separate reach.

MX **M**i**X**ed units. Use this code when access is not allowed on a specific stream reach.

13. **Channel Type**. Use the channel ordering code based on size and location characteristics. Channel type orders the sequence of single, multiple, and side channels.

It is very important that the primary channel be identified with the proper code. This information is used in a critical step of the data analysis to calculate channel length and sinuosity.

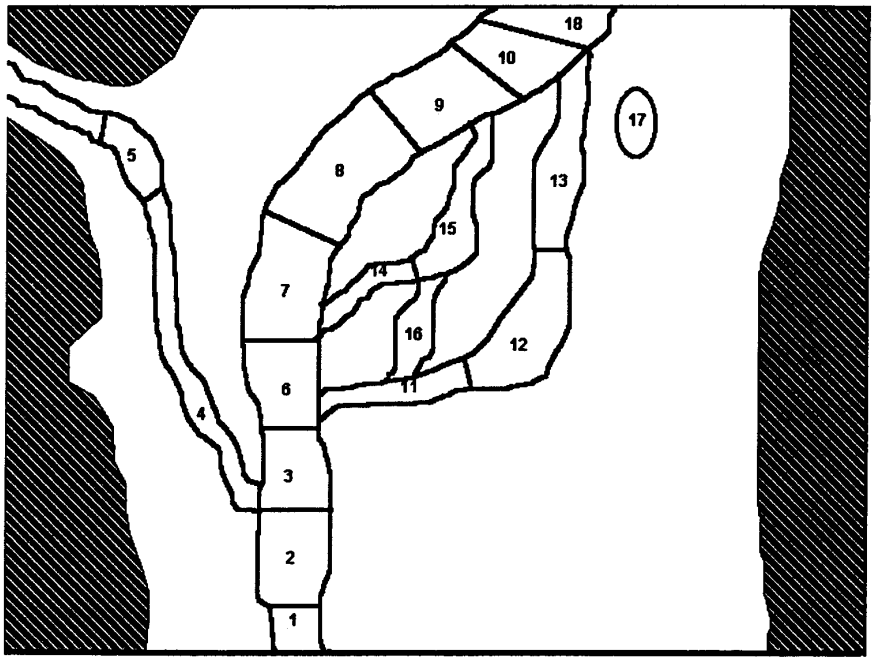
This inventory considers the stream as the system of all channels that transport water down the drainage. The intention is to survey and quantify all aquatic habitats located within the valley floor. All active channels and unit types are classified with a channel code and an estimate of the percent of total flow carried.

00 No Multiple Channels (all flow in one channel)
01 Primary Channel (of multiple channel reach or in the unit where a tributary enters the channel)
02 Secondary Channel (of multiple channel reach)
03 Tertiary Channel (of multiple channel reach)
Continue pattern for 04, 05, 06 level channels.

10 Isolated Pools, Alcoves, or Backwater Pools.

11 Primary channel of valley floor tributary. If the tributary has a name, write it in the note column.
12 Secondary channel of valley floor tributary.

* Numbers indicate order of channel survey.

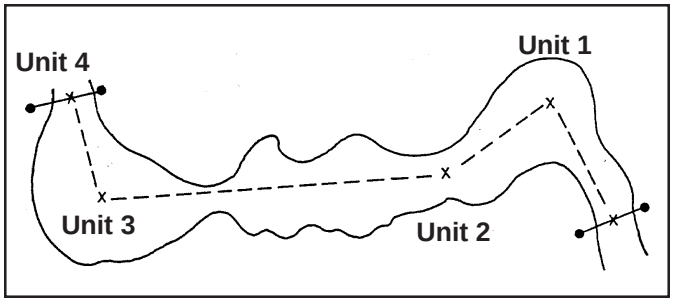


UNIT NUMBER	UNIT TYPE	CHANNEL TYPE	% FLOW
1	RI	00	100
2	LP	00	100
3	RB	01	90
4	RI	11	10
5	PP	11	10
6	RI	01	90
7	CB	01	80
8	RB	01	80
9	RI	01	90
10	LP	01	90
11	RI	02	10
12	LP	02	10
13	RB	02	10
14	RI	03	10
15	RP	03	10
16	RI	04	5
17	IP	10	0
18	CB	00	100

14. **Percent Flow**. Visually estimate the relative amount of flow in the channel, in each channel where multiple channels occur, or the contribution to total flow from a tributary. As a rule of thumb, consider channel type 00 as 100% flow.

This is difficult to measure accurately. In the past, crews have tended to overestimate the contribution from tributaries. Do not worry about balancing your totals for flow to 100 percent. The information is used only to identify the relative contribution or distribution of flow from each channel.

15. **Length**. Estimate or measure the length of each habitat unit . Record all units of measurement in metrics. Changes in the slope of the water's surface, velocity, and channel shape can help you identify the beginning and end of each unit.



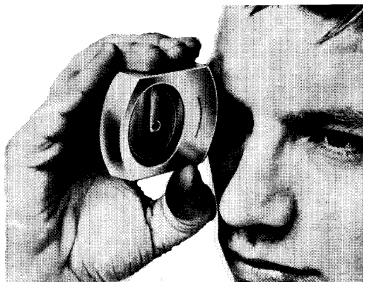
Subdivide very long fast-water units into segments, usually no more than 30 meters. It is acceptable to have back-to-back channel units of the same type. Long units can usually be divided at points where the stream changes direction. When a long unit makes a corner in the stream, create a new unit at the corner. This is called the "line of sight" rule. Do not subdivide pools.

16. **Width**. Measure the <u>average width</u> of the wetted channel.

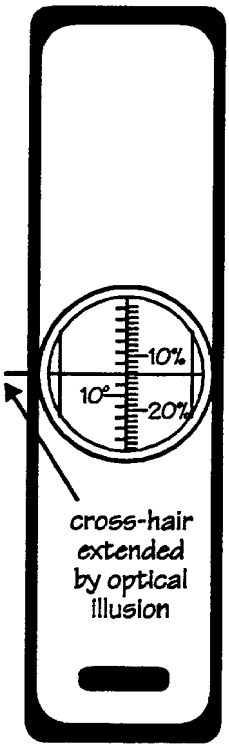
17. **Depth**. Determine the maximum depth in pools, or average depth in glides and riffles. Measure as carefully as possible in pools. Probe the bottom with the depth staff to find the deepest point. Small differences in pool depth are significant.

Depth information is a key part of unit identification and data analysis. Pool depth reflects the potential quality of the pool. Average depth of glides and riffles indicates the channel cross section.

18. **Percent Slope**. Use a clinometer to measure the percent slope of the unit. Use the scale on the right side of the clinometer's viewfinder. Shoot a straight line along the stream, not across meanders.



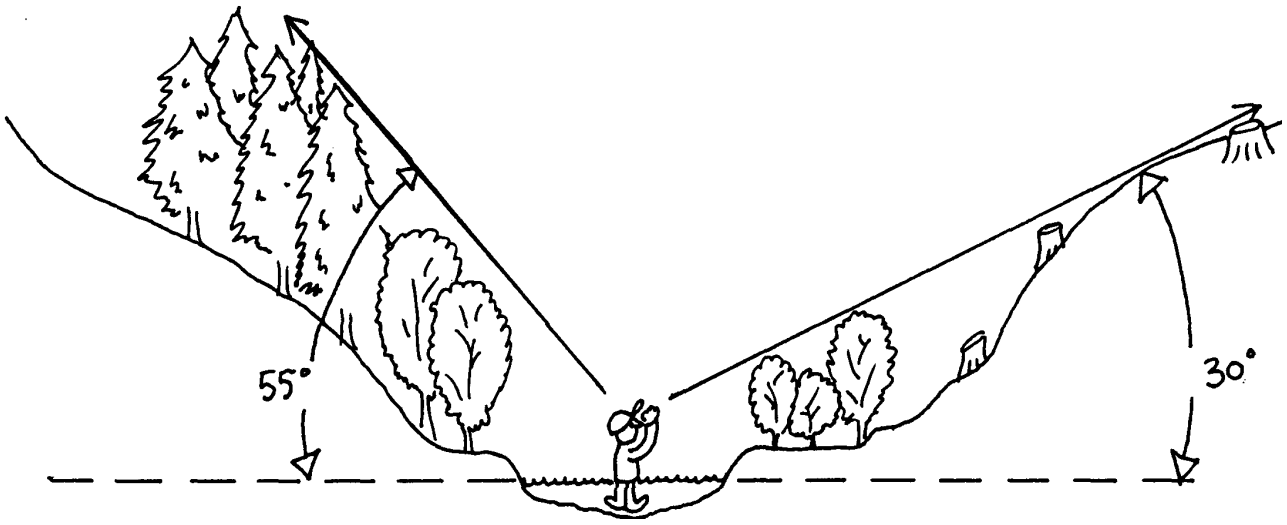
This measurement shows the percent change in elevation over the length of the unit.



19. **Channel Shade**. (Shade L/R on data sheet). Measured with the clinometer as the <u>degrees</u> (left side scale) above horizontal to the top of riparian vegetation or land forms. Channel exposure is measured perpendicular to the channel unit on the left and right banks (see diagram). Measure the left bank first and the right bank second.

This measurement combines topographic shading and canopy closure to provide an index of shade and potential solar input to the habitat unit.

CHANNEL SHADE MEASUREMENT METHOD
(Use of the clinometer to estimate topographic and vegetative shading.)



20. **Percent Substrate Distribution**. For each habitat unit, record the estimated percent abundance of each of the six potential size classes of substrate material. Estimate the amount of each size class relative to the total wetted area of the habitat unit. Round off each class to the nearest 10 percent.

Substrate data provides information about potential amounts and quality of spawning and rearing habitat, turbidity (i.e., silt overloads), and streamflow.

S/O	**S**ilt **/**Fine **O**rganic Matter (stays suspended when disturbed)
SND	**S**a**ND** (quickly settles to the bottom when disturbed)
GRVL	**GR**a**V**e**L** (pea to baseball; 1/8" to 2 1/2")
CBLE	**C**o**B**b**LE** (baseball to bowling ball; 2 1/2" to 10")
BLDR	**B**ou**LD**e**R** (larger than a bowling ball, >10")
BDRCK	**B**e**DR**o**CK** (solid rock)

Do not worry about totaling your estimates to 100 percent as this will be done during analysis. Fine sediment that covers and embeds gravel and cobble should be part of your estimate. A thin layer of fine material over bedrock or boulders should not be included.

21. **Boulder Count**: Count all boulders greater than 18 inches (0.5 meter) in average diameter extending above the water's surface. Include boulders along the margin of the wetted channel if they are in contact with the water. In dry units and dry channels make an estimated boulder count by including boulders with sizes and orientation similar to those counted in wetted units of the same stream.

Boulders contribute to fish habitat quality by increasing the habitat complexity. Boulder counts verify habitat unit definitions, provide additional reach information, and indicate something about the geology of the area.

22. **Percent Actively Eroding Bank:** Estimate the total percent of distance on both sides of the habitat unit (up to 100%) that is actively eroding at the active channel height. Active erosion is defined as currently eroding, recently eroding, or collapsing banks that may show exposed soils and rocks, evidence of tension cracks, active sloughing, or superficial vegetation that does not contribute to bank stability.

Eroding bank percentages indicate channel stability, sediment sources, and riparian condition immediately adjacent to the stream. This information may identify areas where bank and riparian protection are appropriate.

23. **Large Woody Debris**. Tally the number of each woody debris type found in each habitat unit. To be counted, a wood piece must have some part of its length within the active channel and should average 15 centimeters (6 inches) or greater in diameter measured 2 meters from the largest end (use depth staff as a measuring tool) and 3 meters (10 feet) or longer in length. If numbers or size of root wads are significant, make comment in the notes section.

The presence of woody debris in the stream is important to fish habitat. It helps stabilize the streambed, traps gravels, creates pools and resting areas, affords hiding places, and fosters insect production. Large woody debris information helps to evaluate its effects on fish habitat and channel structure and allows comparisons between streams.

Use the following information to classify wood pieces found in each habitat unit.

S	**S**mall	Diameter > 15 cm; > 3 meters	or	> 6", Length > 10'
M	**M**edium	Diameter > 30 cm; > 6 meters	or	> 12", Length > 20'
L	**L**arge	Diameter > 60 cm; > 10 meters	or	> 24", Length > 35'

24. **Comment Codes:** Use coded comments to identify important features. Enter as many codes as appropriate. Use a slash (/) to show if the comment applies to the left or the right bank (example, TJ / --, or BK / CE, or -- / CS). *Record other observations in the notes column or the field notebook.*

Comments combined with the survey's continuous record of stream length allow biologists to locate potential problems, enhancement sites, or unique features. It is also an internal check to verify survey section locations and other observations.

BC **B**ridge **C**rossing. Record road name or number in notes column.

BD **B**eaver **D**am. Helps to identify steps created by beavers.

BK **B**ug **K**ill. Patches of insect or diseased tree mortality.

BV **B**ea**V**er Activity (beaver den, cut trees, etc.)

CC **C**ulvert **C**rossing. Same as Bridge Crossing except the stream passes through a culvert. Record road name or number.

CE **C**ulvert **E**ntry. Tributary entering through culvert. Record diameter, length, slope, and drop if passage capacity is suspect.

CS **C**hannelized **S**treambanks. Rip-rap or other artificial bank stabilization and stream control.

DJ **D**ebris **J**am (large accumulation of woody debris).

EX Livestock **EX**closure.

FC **F**ence **C**rossing.

GS **G**aging **S**tation.

HS Artificial **H**abitat **S**tructure. Describe type, gabion, log weir, cabled or uncabled etc.

MI **MI**ning.

PA **P**otential **A**rtificial Barrier. Potential artificial or human created barrier to upstream or downstream migration of fish. Document with photos and notes.

PN **P**otential **N**atural Barrier. Potential natural barrier to upstream or down stream migration of fish. Document with photos and notes.

RF **R**oad **F**ord. Road that crosses within the active channel of the stream, no bridge).

SB **S**treamside **B**uffer (Record approximate width, species composition, and stand density in note column. Do this once only for each stretch of streamside buffer, not for every unit.)

SD **S**creened **D**iversion (pump or canal). Give some indication of capacity.

SS **S**pring or **S**eep. Usually small amounts of flow (<5% of total flow) directly entering from hillslope. For large springs, estimate the contribution to flow.

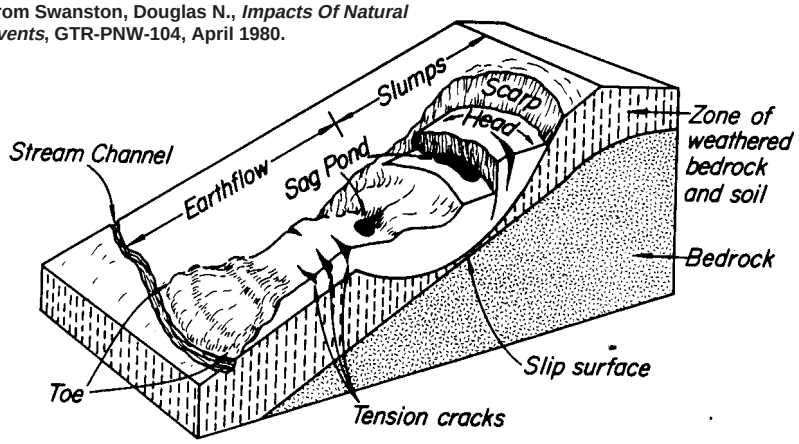
TJ **T**ributary **J**unction with named and unnamed tributaries.

UD **U**nscreened **D**iversion (pump or canal). Give some indication of capacity.

WL **W**ild**L**ife use of stream or riparian zone (note species)

Mass Failures: Mass failures are large earth movements, not general bank erosion. Use a two-part code. The first letter identifies the type of mass failure. The second letter evaluates the apparent activity of the failure. (Example: / IA = inactive debris avalanche on right bank - remember to use the slash to indicate left or right banks.)

From Swanston, Douglas N., *Impacts Of Natural Events*, GTR-PNW-104, April 1980.



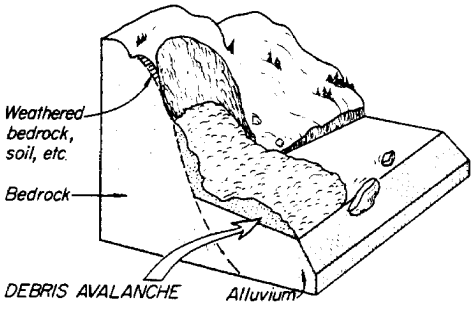
Type:

E **E**arthflow: general movement and encroachment of hillslope upon the channel, somewhat lumpy in appearance.

L **L**andslide: failure of locally adjacent hill slope. Usually steep and broad with exposed soils.

A **A**valanche: failure of hillslope along a small, steep tributary. Flowing, intermittent (seasonal) or ephemeral (spring-like flow) channels that contribute soils and debris, generally chute-like in appearance.

From Swanston, Douglas N., *Impacts Of Natural Events*, GTR-PNW-104, April 1980.



Condition:

A **A**ctive: contributing material now.
I **I**nactive: evidence that material moved during previous winter or high flows.
S **S**tabilized: vegetated scars, no evidence of recent activity.

25. **Notes:** Include additional information that describes the habitat unit, comment code, riparian vegetation, etc. Include additional comments in your field book. Include a sketch of the cross section if it is significantly different from the example types. Add any pertinent additional information or items of interest (fish or wildlife - especially reptiles and amphibians - observed, evidence of spawning activity, evidence of pollution or illegal dumping, description of channel structure, etc.). Also indicate land ownership if known.

P **P**rivate
M **M**unicipal
C **C**ounty
T **T**ribal
GN **G**ree**N**way
FW Oregon Department of **F**ish and **W**ildlife
BL **B**ureau of **L**and Management
SF **S**tate **F**orest
NF **N**ational **F**orest
WA **W**ilderness **A**rea
US **US** Fish and Wildlife Service

If you want to get creative, do it in the notes section rather than in the basic data fields. This spot provides an opportunity to free lance any other interesting information. The notes are provided to biologists along with all other data.

OREGON DEPARTMENT OF FISH AND WILDLIFE
Salmon-Trout Enhancement Program - Fish Natural Production

Aquatic Habitat Inventory Project
INTERMEDIATE LEVEL SURVEY

REACH DATA

Reach # 1

DATE: 7-18-99

STREAM: Trout Creek

BASIN: Willamette River

MAP: Opal Canyon

LEGAL DESCRIPTION:
T 11S R 14E SEC 26 QTR NW

UTM ZONE 10T

START AT: Opal Creek confluence
Habitat Unit # 1
UTM Easting: 7268432
UTM Northing: 0757616

END AT: HWY 34 Bridge
Habitat Unit # 43
UTM Easting: 7269481
UTM Northing: 0757428

PHOTO # / TIME: # 16 / 09:30

LAND FORM: L HT R HT

ACTIVE CHANNEL HEIGHT: 0.6m

FLOOD PRONE HEIGHT: 1.2m

ACTIVE CHANNEL WIDTH: 7.2m

FLOOD PRONE WIDTH: 10.4m

VALLEY WIDTH INDEX: 1 ____ >1 - < 2.5 ____ 2.5 - 4 ✓ > 4 ____

VALLEY FORM: TC

VEGETATION: DOM DM UNDER G

CHANNEL FORM: TC

LAND USE: PRIM MT SEC RR

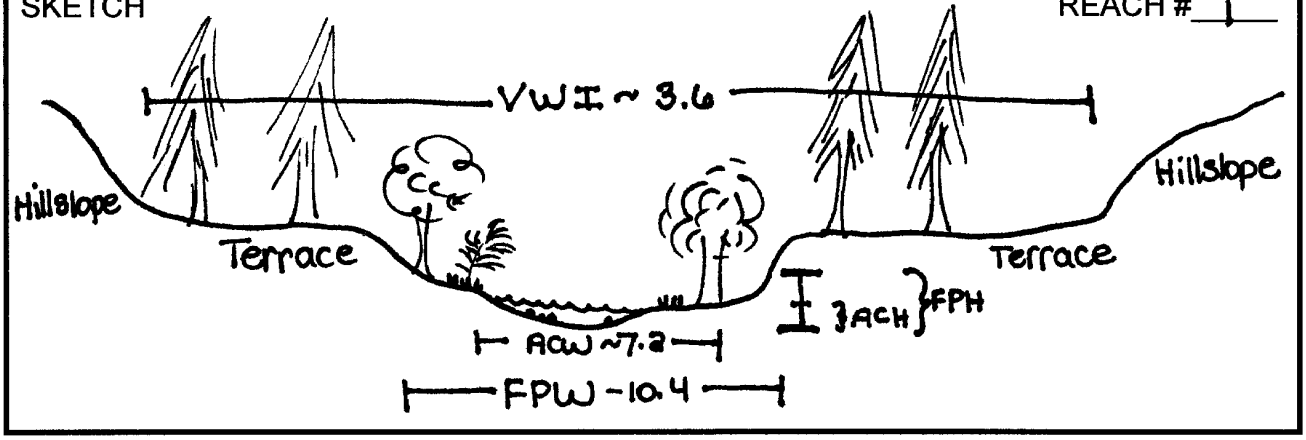
FLOW: DRY ____ PD ____ LF ____ MF ✓ HF ____ BF ____ FLOOD ____

WATER TEMP / TIME: 10 (C or F) / 10:41

REACH NOTES: P - Western Timber Co.

SKETCH

REACH # 1



ODFW-STEP - INTERMEDIATE LEVEL SURVEY - HABITAT UNIT DATA

DATE: 6-18-98
STREAM: Toad Creek
BASIN: Wash Creek
MAP: Toad town
LEGAL DESCRIPTION: 14S - 36E - 6NE
START: mouth of Toad Creek
END: Right tributary Junction with Sea Creek
ACTIVE CHANNEL WIDTH: 4 m
REACH NUMBER: 1
CREW: Jane Dee, Bill Johnson

UNIT #	UNIT TYPE	CHANL TYPE	% FLOW	UNIT CHARACTERISTICS LENGTH	WIDTH	DEPTH	SLOPE %	SHADE L/R	PERCENT SUBSTRATE DISTRIBUTION S/O	SND	GRVL	CBLE	BLDR	BDRCK	BLDR COUNT	% AE	WOOD S	M	L	COMMENT CODES	NOTES
1	LP	00	100	42.5	5.4	0.7	0	25/40	20	30	20	35	5	5	62	20	1		IIII		
2	CC	00	100	16.4	3.0	0.2	1.5	90/90	5	35	25	25	10	-	12	10		II		BC	Hwy 92, Step up = 1.0m
3	RI	00	100	26.4	2.0	0.24	2.0	40/25	10	30	40	20	-	5	8	25			1		
4	RP	01	60	30.1	2.5	0.32	2.0	50/20	10	10	25	40	35	10	30	5		II		TJ/	unnamed TJ
5	RI	11	40	26.4	2.8	0.2	6	60/70	5	25	25	35	15	-	14	10	1				
6	SL	00	100	0.4	4.5	0.15	-	40/35	10	30	30	45	10	5	4	5		II	1		Height = 1.6m
7	TP	00	100	15.3	3.4	1.0	0	40/35	15	10	10	15	5	55	6	15	IIII	1	IIII	DJ	Large jam, No fish passage
8	CB	00	100	12.4	3.9	0.25	5.0	45/25	10	10	15	35	40	-	8	15		II	1		
9	RI	00	100	18.9	2.3	0.30	1.5	40/30	5	15	45	35	20	10	10	5	II	1			
10	RB	00	100	20.1	2.1	0.20	4.0	70/20	5	15	25	30	15	10	15	5	II		II	TJ	unnamed TJ
								/													
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SUBSTRATE:
S/O SILT AND ORGANIC MATTER (stays suspended)
SND SAND (settles to bottom when disturbed)
GRVL GRAVEL (pea to baseball)
CBLE COBBLE (baseball to bowling ball)
BLDR BOULDER (larger than a bowling bowl)
BDRCK BEDROCK (solid rock)

"BLDR COUNT" = BOULDERS WITH DIAM > 0.5 m
WOOD: S = 15 cm diameter x 3 m length
M = 30 cm diameter x 6 m length
L = 60 cm diameter x 10 m length

Surveying Oregon's Streams
"A Snapshot In Time"

AQUATIC INVENTORY PROJECT

Riparian Zone Methods For Stream Habitat Surveys

OREGON DEPARTMENT OF FISH AND WILDLIFE

Salmon-Trout Enhancement Program
and
Aquatic Inventory Project
Natural Production Program

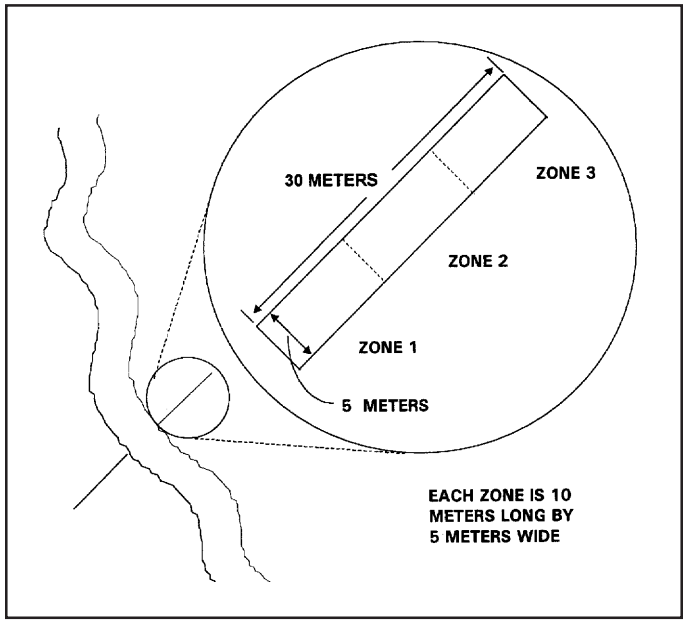
Aquatic Habitat Inventory
Intermediate Level Stream Survey

RIPARIAN ZONE INFORMATION

Riparian zone inventory information provides additional detail about the species composition, abundance, and size distribution of riparian zone vegetation.

This riparian inventory is a modified belt transect extending across the riparian zone perpendicular to the stream channel on each side.

Complete a riparian inventory transect at least once every thirty units (once per unit page) and at the beginning of all reaches. At a minimum, complete a riparian transect at least once in every kilometer. Begin the transect exactly where the new unit or new reach starts. Do not select a starting point elsewhere in the unit because of ease of access or to get a "better" sample. Mark the location of each transect on the 7.5 minute topo map. Discuss transect spacing with your field supervisor if you have questions.

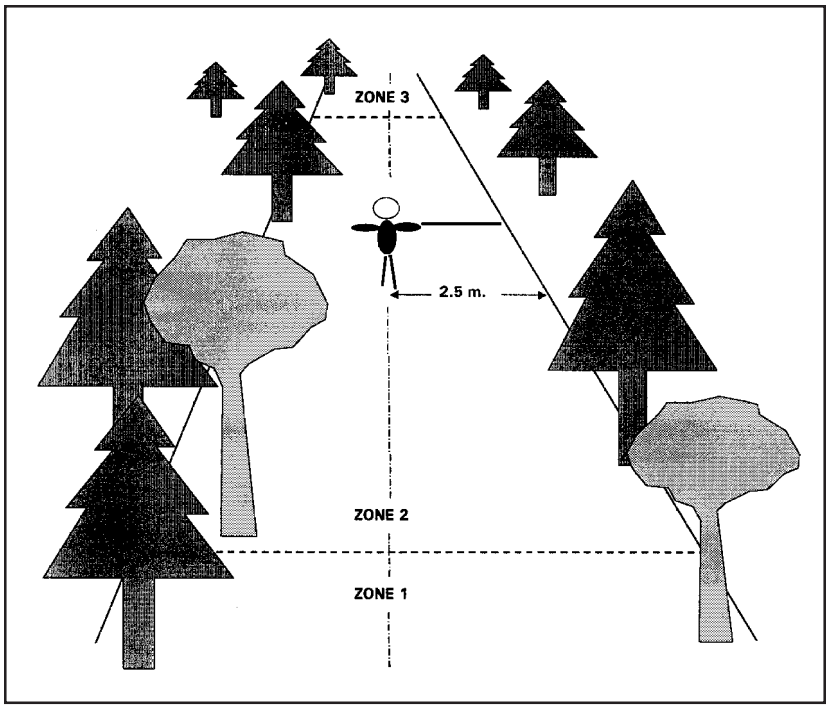


Riparian transects begin at the margin of the active channel or where the first riparian trees start, whichever comes first. The transect extends 30 meters (100 feet) perpendicular to the stream on each side of the channel. The transect is 5 meters (15 feet) wide and subdivided into three sections, each ten meters (33 feet) in length.

One member of the survey crew extends the tape measure out from the stream channel. The other crew member follows and uses the depth staff to determine if trees are within the area to be counted. Count any tree that can be touched with the depth staff extended from either side of the body (practice the reach required to measure a 5 meter band).

Once the crew is proficient with the method, they may visually estimate the section dimensions and size classes of trees. There is no need, for example, to try and walk through 30 meters of blackberry brambles to measure the diameter of one or two alder trees. Likewise, it is not necessary to climb steep slopes to measure tree diameters.

NOTE: For more information about riparian assessments in urban areas contact the Oregon Division of State Lands (503)-378-3805 x 238 for a copy of the *Urban Riparian Inventory & Assessment Guide, A Tool For Oregon Land Use Planning*, 1998.



Complete the following entries on the riparian inventory form:

1. **Unit Number**. Use the number of the habitat unit where the transect is established.

Use the number of the habitat unit where the transect begins to insure that the riparian data remains associated with the habitat unit data in the proper sequence.

2. **Side**. Mark left or right side of the channel, looking upstream. To maintain consistency, try to always do the left side first and the right side second.

The riparian zones on either side of a stream can be vastly different. Recording the data separately for each provides biologists with an indication of this variability.

3. **Zone**. Separately record the data for each subdivision of the riparian transect.

Zone 1	0	-	10 meters
Zone 2	10	-	20 meters
Zone 3	20	-	30 meters

As you move away from the stream, the vegetation structure can change dramatically. Recording the data separately for each subsection provides specific information about these changes in vegetation and the subsequent change in stream influence.

4. **Surface**. Note the surface features observed within the zone. If more than one type is observed enter more than one code, listing the largest first (i.e., LT/IP)

FP	**F**lood**P**lain
LT	**L**ow **T**errace
HT	**H**igh **T**errace
HS	**H**ill**S**lope
SC	**S**econdary **C**hannel
TC	**T**ributary **C**hannel
IP	**I**solated **P**ool or unconnected valley wall channel.
WL	**W**et**L**and bog or marsh with no obvious channel.
RB	**R**oad **B**ed
RG	**R**ailroad **G**rade
RR	**R**ip **R**ap

5. **Slope**. Using the clinometer, record the percent (%) slope of the dominant surface in the zone.

The slope of the terrain often changes quickly as you move away from the edge of the stream. This provides clues as to how water influences the riparian species as well as how the riparian vegetation affects the stream.

6. **Canopy Closure**. Estimate the percent canopy closure by looking up while standing in the middle of the zone. Include the influence of both conifer and hardwood species. Estimate within broad categories (15% - 20% increments).

Canopy closure influences the amount of shading provided to the stream and resulting stream temperatures.

7. **Shrub Cover**. Estimate the percentage of ground cover provided by shrubs. Include blackberry, salmonberry, devils club, willow, sage, etc. Include small trees (seedlings and samplings less than 8 feet high) in shrub cover. Estimate within broad categories (15% - 20% increments).

Shrub cover indicates the potential for stream stability, erosion points, and other information important for restoration decisions.

8. **Grass and Forb Cover**. Estimate the percentage of ground cover provided by grasses, ferns, moss, herbs, sedges, rushes, etc. Estimate within broad categories (15% - 20% increments).

✯ Note other ground cover(s) and the percentage of each in the notes column (i.e. grass = 10%, shrubs = 10%, gravel from roadbed = 80%). Grass and forbs, along with shrub cover, should equal no more than 100%.

Grasses and forbs are important soil stabilizers along the edge of a stream. Extended areas with a low percentage of ground cover indicate high erosion potential and restoration work may be necessary.

9. **Tree Group**. Note each tree type — conifer or hardwood.

Conifers are cone-bearing, soft wood trees, and are usually evergreen. Hardwood trees, with a few exceptions, lose their leaves each fall. Each has a valuable role within the riparian zone, contributing wood and organic matter to the stream system and adding stability to the soil and channel banks.

10. **Count**. Tally the number of standing trees by size class for both hardwoods and conifers. Be sure your tallies are in the appropriate classification. Tree diameters are measured in centimeters for the following size classes:

3 cm	-	15 cm	or	1 inch	-	6 inches
15 cm	-	30 cm	or	6 inches	-	12 inches
30 cm	-	50 cm	or	12 inches	-	20 inches
50 cm	-	90 cm	or	20 inches	-	35 inches
> 90 cm			or	> 35 inches		

Counting the number of standing trees provides an idea of wood recruitment to the stream as well as the potential for riparian shading at that site.

11. **Riparian Note**. Use the optional "riparian note" column to record comments that describe tree species. the plant community, large woody debris, or characteristics of snags or old stumps. Note also the presence or absence of large down wood in the riparian zone. Also record any riparian photo numbers and times in this column.

Notes are always provided to biologists along with all other data and sometimes contain the most useful information when making management decisions.

ODFW - STEP RIPARIAN SHEET

PAGE: 1 OF: 1

STREAM: Dune Creek
BASIN: Green River

DATE: 06/26 → 27/98 NAME: Mary Smith / Joe Johnson

UNIT NUMBER	SIDE	ZONE	SURFACE	SLOPE (%)	CANOPY CLOSURE	SHRUB % COVER	GRASS/FORB % COVER	TREE	COUNT (DIAMETER AT BREAST HEIGHT) 3-15cm 1-6 in	15-30cm 6-12 in	30-50cm 12-20 in	50-90cm 20-35 in	90+cm >35 in	RIPARIAN NOTE
30	LEFT	1	LT	5	10	40	50	CONIFER	—					
								HARDWOOD		II	I			Alder, Fern
		2	HT	15	0	80	20	CONIFER	—					small meadow
								HARDWOOD	—					
		3	HS	30	40	60	20	CONIFER		II	I	I		Downed 0.6 x 15 m
								HARDWOOD		II	I			oak
	RIGHT	1	HS	25	20	60	30	CONIFER		I	I			Perennial Grasses
								HARDWOOD	III					
		2	HS	35	40	70	15	CONIFER		I	I	I		15% rocks
								HARDWOOD	I	II				cottonwoods
		3	HS	30	30	90	5	CONIFER			II	III		Hemlock
								HARDWOOD	I		III			Vine maple
60	LEFT	1	HT	15	80	30	40	CONIFER		II				Douglas Fir
								HARDWOOD	IIII	IIII	II			30% fir needles
		2	HS	40	30	75	15	CONIFER		II		I		Devils Club
								HARDWOOD		I	I			sword fern
		3	HS	30	20	65	10	CONIFER		II				cedar
								HARDWOOD	I		I			
	RIGHT	1	HS	10	70	80	20	CONIFER	—					
								HARDWOOD	IIII III	IIII	II			Alder
		2	HS	45	25	75	25	CONIFER		II	I			Spruce, Douglas Fir
								HARDWOOD	II	I				Alder
		3	HS	50	40	60	30	CONIFER		I	II	I		Douglas Fir, Hemlock
								HARDWOOD		II				

OREGON Fish & Wildlife

OREGON FISH & WILDLIFE Salmon/Trout Enhancement Program

Shrub + Grass/Forb cover values should equal no more than 100 %

Surveying Oregon's Streams
"A Snapshot In Time"

AQUATIC INVENTORY PROJECT

Photo Record Methods For Stream Habitat Surveys

OREGON DEPARTMENT OF FISH AND WILDLIFE

Salmon-Trout Enhancement Program
and
Aquatic Inventory Project
Natural Production Program

Aquatic Habitat Inventory
Intermediate and Basic Level

PHOTO RECORD

Some of the most convincing evidence for documenting changes in streams over time can be presented through the proper use of photography. A good stream survey photographic record includes pictures that show reach changes, riparian zones, and other stream characteristics described in the survey instructions.

A camera with a date-back feature is preferred. If possible, for long term accuracy and consistency, use the same camera, lens size, and film type for subsequent duplications. Record this information in the field notebook and on the photo record sheet.

When possible, include some permanent physical feature (trees, large rocks, background hills, fence panels, etc.) within the frame of the photograph. Include a frame of reference (depth staff, clipboard, or other items) within the photo for scale. Mark the photo location on the map and, if necessary, add a brief sketch of the photograph's field of view to the field notebook.

Always label the film canister with the stream name, basin name, date, and fish district. If using film mailers, record the number on the front of the mailer envelope on the data sheet.

Always photograph and record the following situations on the Photo Record.

Reach changes — stream and riparian area at the beginning of each reach change.

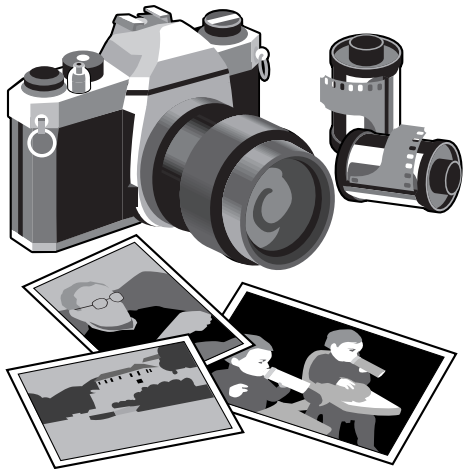
Barriers or potential barriers — step units, culverts, etc.

Tributary Junctions

Riparian transects — specify left or right side of stream in description

Unusual or noteworthy stream morphology (debris jams, landslides, others)

End of the survey section



Complete the header of the data sheet by filling in the stream name, basin name, fish district, crew member names, roll number, and film mailer number (if appropriate). Then complete the following entries on the photo record form:

1. **Photo Number**. This number is already on the data sheet. Be sure to transfer this number to the appropriate place on the habitat unit data sheet as a cross reference.

2. **Unit Number**. Use the number of the habitat unit in which the photographed feature is located.

> ***Using the number of the habitat unit containing the photographed feature and cross referencing the photograph number to the habitat unit data sheet insures that the photographic data remains associated with the appropriate unit data and in the proper sequence.***

3. **Date**. Include day, month, and year.

4. **Time**. Record the time of the photograph. If using a camera with a dateback feature, set the feature to show date and time. Then use the time shown on the camera.

> ***Date and time information are additional cross reference points for photographs taken with a date-back type camera. The date and time can also provide clues to potential shading provided by riparian vegetation.***

5. **Description**. As the photographs are taken, carefully record the reach number, habitat unit type (RI, PP, CB, etc.), frame of reference item, and any other notes to clarify the intent of the photograph. Also note interesting natural or unnatural conditions and any other factors pertinent to the site including conditions existing upstream or downstream of the photo site.

> ***It is helpful to know the objective when viewing the photographs at a later time, especially if the viewer was not involved in the initial process. Cross-referencing with reach number and habitat unit type provides one more measure of accuracy in matching the photograph with the appropriate stream location.***

PHOTO RECORD: ODFW - STEP AQUATIC INVENTORY

STREAM: Dune Creek
BASIN: Green River
DISTRICT: Northeast

CREW: Mary Smith / Joe Johnson
ROLL #: 1
MAILER #: 63425

PHOTO	UNIT	DATE	TIME	DESCRIPTION
1	1	6·26·98	08:38	Reach 1, RI, confluence with Green River, depth staff for reference
2	4	6·26·98	09:12	Reach 1, Step over bedrock, potential barrier
3	8	"	09:40	Reach 1, LP, Reach Photo, clipboard on right
4	17	"	10:30	Reach 1, RI, Mary in foreground, spawning habitat
5	24	"	11:12	Reach 1, RB, TJ/
6	25	"	11:17	Reach 1, RI, Miner's Creek confluence w/ Dune CrK
7	26	"	11:26	Reach 2, LP, Reach photo
8	30	"	12:43	Reach 2, left riparian, depth staff for reference
9	30	"	12:50	Reach 2, right riparian, clipboard for reference
10	41	"	13:33	Reach 2, culvert crossing
11	53	6·27·98	08:09	Reach 2, PP formed by habitat structure
12	60	"	09:43	Reach 2, Left riparian
13	60	"	09:43	Reach 2, right riparian
14	83	"	11:16	Reach 2, RP, End of Survey
15				
16				
17				
18				
19				
20				
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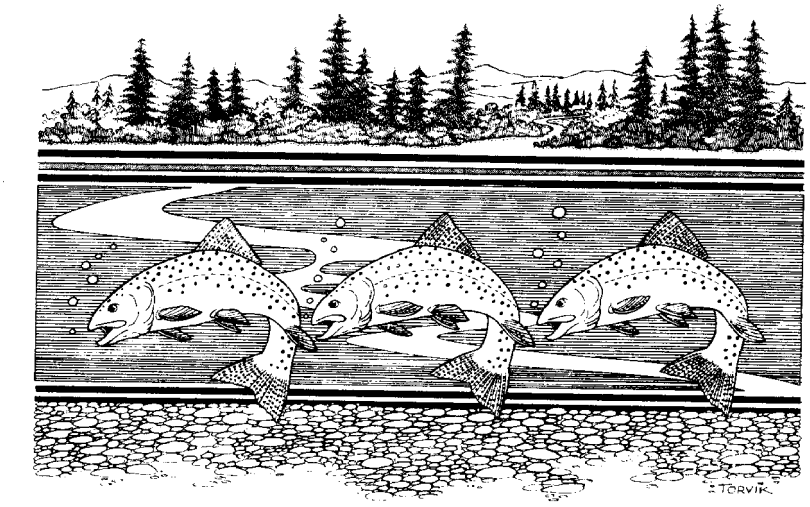
Surveying Oregon's Streams
"A Snapshot In Time"

AQUATIC INVENTORY PROJECT

Slide Show Script For Intermediate Level Stream Habitat Surveys



OREGON DEPARTMENT OF FISH AND WILDLIFE

Salmon-Trout Enhancement Program
and
Aquatic Inventory Project
Natural Production Program

Aquatic Habitat Inventory

Intermediate Level Methods

Slide Show Training Script

The following script corresponds to the slides included with the training materials. Break the slide show into segments to reduce information overload.

1. The Oregon Plan

The Oregon Plan for Salmon and Watersheds represents commitments on behalf of government, organizations, and private citizens from all areas of the state to help save our salmon and protect our rivers. While the plan began as an effort to address a decline in coastal salmon it has expanded to represent a comprehensive statewide approach for watershed protection including improvements in water quality, stream habitat, and fish populations.

2. Watershed Overview

Over the past several years, clean water and salmon issues have brought the discussion of watershed health into the limelight. Consequently, Oregonians from all walks of life are focused on watersheds. Restoration and recovery efforts are taking place in nearly every major watershed in Oregon. Everyone wants to help, but few know where to begin.

3. Volunteers Doing Restoration Work

Successful watershed restoration efforts depend on a thorough assessment of many factors prior to designing the project. The Oregon Department of Fish and Wildlife's **Aquatic Habitat Inventory Project** can help establish criteria on which to base restoration efforts. An *aquatic habitat inventory* documents existing stream habitat characteristics to determine habitat conditions and evaluates potential recovery of the system.

4. Project Requirements

An *aquatic habitat inventory* is a detailed collection of data about a stream's physical characteristics. Inventory methods address multiple use concepts plus quantify the character and quality of aquatic habitats. The inventory methods are compatible with other agency protocols and the results may become part of ODFW's statewide Aquatic Inventory Project data base. Data in this system helps biologists assess factors limiting fish production, identify habitat protection and restoration needs, and provide information for fish management plans and policies.

5. STEP Logo

With training and oversight provided by ODFW's Research section and/or Salmon-Trout Enhancement Program (STEP) biologists, volunteers, watershed council members, landowners, and school groups can complete an aquatic habitat inventory.

6. Equipment

"Tools of the trade" for an aquatic habitat inventory include maps, camera and film, clipboard, flagging, measuring tape, thermometer, and a field notebook. Other personal equipment includes

hip boots or chest waders (with traction devices recommended), a day pack, polarized sunglasses, and a first aid kit.

7. Stream Surveyor in Deep Water

Surveys are completed in all kinds of weather and water conditions. You must consider safety at all times. Because the streambed can be very slippery and uneven, a wading staff is helpful. Always work with a buddy. Avoid drinking water from a stream unless it is treated or filtered and watch out for hypothermia if you fall in. Always have a change of warm clothing and footwear available.

8. Map

Do not go into the field without some basic knowledge of the area and appropriate maps. Data that cannot be linked to the maps is essentially useless. Use the maps to orient to the stream and to identify the location of reach changes, named tributaries, roads, and bridge crossings. Mark all reach changes, photo points, and important features on the map. Clearly mark where you stop and start the survey.

9. Flagging Picture

Hang a strip of plastic flagging at each reach change, tributary junction, and at other selected units. Label it with the reach and unit number, date, and your affiliation. These flags help others locate specific reaches and units for quality control checks, follow-up fish sampling, and repeat surveys. Always consider returning to the sites to remove the flagging at the end of a survey. Flagging is not critical if there are no plans for follow-up surveys. Taking a GPS (global positioning system) reading at the "flagging" points is a good idea and an alternative to using flagging. Consult with private landowners about the use of flagging on their property.

10. Habitat Unit Data Sheet

Information about the different components of stream habitat is gathered and recorded on the Habitat Unit Data Sheet.

11. Stream View Of Multiple Habitat Units

A *habitat unit* is a relatively uniform length of stream classified by its slope, flow, and streambed characteristics. As a general rule of thumb, for a habitat unit to be categorized as a distinct unit type, it should be longer than the active channel is wide. Specific details about measuring active channel width will be covered later in the training session.

In this slide you can see a riffle in the foreground, followed by a step over log, a pool, and a rapid in the background.

Always work upstream when you conduct the survey. Consider right and left directions as you are facing upstream. Number each habitat unit consecutively as you work your way upstream.

———————————————-

Now, let's look at the different types of habitat units you might encounter. Follow along with your copy of the Habitat Unit Data sheet and corresponding instructions found in the intermediate level methods manual starting on page D-16. You probably noticed this is in reverse order from the manual, and that's by design. To start this process, it is easier to understand the smaller context of pools and riffles and other habitat units, then move to the "big picture" perspective of a reach.

12. “Corner” Pool Graphic

To fit the definition of a pool, the slope of the water’s surface in the unit must be zero.

There are several different kinds of pools classified generally by the form of the streambed and stream flow characteristics.

Lateral scour pools (LP) are commonly called “corner pools” and are often found in meandering lowland or valley bottom streams. Note the point marked “thalweg” in this slide. The “thalweg” is the line of maximum velocity or the path of the stream that follows the deepest part of the channel. As water moves around the outside of a curve or around an obstruction such as a boulder, it must speed up to get around whatever is in its path. This increased velocity scours or digs pools during high flows, providing excellent feeding and rearing habitat for fish during low flow periods.

13. Lateral Scour Cross-Section Graphic

A lateral scour pool (LP) is formed by flow directed against the stream bank or against a partial barrier in the stream. The cross section of a lateral scour pool is not symmetrical. It generally shows a deep scour section next to the bank with smaller substrate types along the shallower opposite side of the stream.

14. Lateral Scour Pool

Although it is difficult to see the deep scour on the right and the gradation of substrate on the left, these traits are typical of lateral scour pools. Remember that “lateral” means side, so watch for signs of scour along the edges of the stream, either going around a corner or near debris associated with the edge.

15. Straight Scour Pool Graphic

A straight scour pool (SP) is formed by scour occurring close to the middle of the channel.

16. Straight Scour Pool

The deepest portion of a straight scour (SP) is near the middle of the channel with shallower areas on either side. A straight scour pool is usually very symmetrical when viewed in cross section.

17. Trench Pool Graphic

A trench pool (TP) is best characterized by a U or V-shaped cross-section. It is usually flanked by bedrock on both sides of the stream.

18. Trench Pool

Trench pools (TP) are often very long and narrow with most of their length composed of bedrock substrate. Flow is often very slow in a trench pool.

19. Plunge Pool Graphic

Plunge pools (PP) are formed by water pouring over a complete or nearly complete channel barrier. The barrier can be logs, boulders, bedrock, or a combination of these.

20. Plunge Pool

Plunge pools (PP) frequently do not meet the general rule of thumb for classification (that is, longer than the active channel is wide), but should be distinguished from other habitat units because they offer important habitat for fish and other aquatic organisms. The depth of a plunge pool transitions from a shallow area at the lower end to the deepest scour at the upper end. The substrate in the bottom of a plunge pool can vary from fine sediments to large cobble or even an occasional boulder.

21. Dammed Pool Graphic

Water that is dammed up behind some form of channel obstruction is called a dammed pool (DP).

22. Dammed Pool

A dammed pool (DP) can be formed by rock landslides or debris jams that are either natural or human-caused. Sometimes a dammed pool might be a “push-up” dam used to divert water for irrigation. The water can be very deep and lack a scour area. Dammed pools are often associated with lots of fine sediment in the substrate.

23. Beaver Dam Pool

A beaver dam pool (BP) is a unique type of dammed pool formed by a beaver dam. To get an idea about the amount of beaver activity on your stream, separate these pools out from the other types of dammed pools.

24. Alcove Graphic

Alcoves, backwaters, and isolated pools are special types of habitat units (subunits) in that their length may not always be as long as the active channel width. They are however, usually easy to identify and are important habitat types. All three are formed by eddy scour flow near some form of obstruction or debris along the side of the stream or by incoming tributary flow.

Alcoves (AL) are off-channel habitat types inset within the adjacent floodplain or terrace and are the most protected type of subunit pool. Alcoves usually maintain some connection to the main channel.

25. Alcove

The substrate in an alcove (AL) is typically sand and organic matter. Alcoves are formed during extreme high flow events or by beaver activity. Additional scouring does not usually occur during normal high flows.

26. Backwater Pool Graphic

Backwater pools (BW) are created by eddies on the downstream side of obstructions like large boulders, root wads, or woody debris along channel margins.

27. Backwater Pool

Backwater pools (BW) are important fish habitat. They are within the active channel at most flows, with scouring usually occurring at high flows. The substrate is usually sand, gravel, and cobble.

28. Isolated Pool Graphic

Pools formed outside the average summer wetted channel, but within the general bounds of the active channel are called isolated pools (IP). Isolated pools are often associated with gravel bars or isolated oxbows.

29. Isolated Pool

Although this slide shows a rather large and dramatic example, isolated pools (IP) may dry up or be dependent on inter-gravel flow during late summer. The substrate varies. Do not classify pooled or perched water in bedrock depressions as isolated pools.

30. Glide Graphic

A glide (GL) is a habitat unit of generally uniform depth and flow with little or no surface turbulence or white water. With a zero to 1% slope, glides are intermediate between a pool and a riffle. Glides are considered non-turbulent fast water units

31. Glide

Glides (GL) are usually deeper than riffles and may have some small scour areas. Glides are distinguished from pools by their uniformity and lack of habitat complexity.

32. Riffle Graphic

Riffles (RI) are fast, turbulent, shallow areas over submerged or partially submerged gravel and cobble substrate. Riffles are typically wider than other habitat units in a particular stream and have a uniform cross section.

33. Riffle

At least 5% - 15% of the surface area of a riffle (RI) shows white water or surface turbulence. The slope of a riffle usually ranges between 0.5% - 2%, and rarely up to 6%. Riffles are important habitat for aquatic insects which provide food for fish.

34. Riffle With Pockets Graphic

A riffle with pockets (RP) has the same flow and slope characteristics of a riffle, but with numerous small pools or pockets scoured out by flow around small boulders, wood, or other stream characteristics.

35. Riffle With Pockets

In a riffle with pockets (RP), twenty percent or more of the total habitat unit area is composed of small pools usually associated with boulders or the largest substrate in a small stream. These small pockets associated with boulders provide excellent hiding cover and feeding stations for fish.

36. Rapid With Boulders Graphic

A rapid with boulders (RB) is characterized by swift, turbulent flow swirling around boulders. It may also include chutes and some hydraulic jumps.

37. Rapid With Boulders

At moderate to high flow, about 15 % - 50% of the stream's surface is white water in a rapid with boulders (RB). Individual boulders, boulder clusters, and partial cobble bars make up the substrate in this unit type. The slope is usually between 2% - 4%, but occasionally up to 7% or 8%.

38. Rapid Over Bedrock Graphic

A rapid over bedrock (RR) is swift, turbulent, "sheeting" flow over smooth bedrock.

39. Rapid Over Bedrock

Rapids over bedrock (RR) are sometimes called chutes. There is little or no exposed substrate and the slope can range from moderate at 2% to very steep at 30%. Rapids over bedrock can also have a large amount of white water.

40. Cascade Over Boulders Graphic

Cascades over boulders (CB) are steep habitat units, ranging from 3.5% to 10% in slope. Water flow is fast and turbulent with many hydraulic jumps, strong chutes, and eddies.

41. Cascade Over Boulders

White water covers 30% - 80% of the surface area of a cascade over boulders (CB). Most of the exposed substrate is composed of boulders in clusters, partial bars, or step-pool sequences.

42. Cascade Over Bedrock

A cascade over bedrock (CR) has the same flow characteristics as a cascade over boulders, but the structure of the unit comes from a sequence of bedrock steps.

43. Step Over Boulders

There are several "special situations" in our habitat unit classification system. The first of these are steps. Steps are usually classified as subunits because they are usually much shorter than the active channel width. They are important, however, because they provide discreet breaks in the slope of the channel. The slope of a step can range from 10% to greater than 100%. As a result, steps are sometimes barriers to fish passage. Steps can be 12 inches (0.3 of a meter) in height or more like a waterfall. Most are usually fifteen feet (five meters) or less in height.

Steps are classified by the type of structure forming the step, such as logs, artificial structures like gabions, or beaver dams. A plunge pool is commonly the habitat unit below a step. Steps can also separate adjacent units of the same type, for example a series of steps and pools.

The first example is a step over boulder (SB). A row or cluster of boulders spanning the channel creates a step over boulder (SB).

44. Step Over Bedrock

A step over bedrock (SB) includes hardpan and clay steps, as well as bedrock.

45. Step Over Log

A step over log (SL) includes channel-spanning logs or branches that effectively create a pour over. Only include naturally created step over logs in this category.

Record the estimated height of the step (from the water's surface) in the notes column. The length of the step is the horizontal distance from where the water starts over the top to where it hits below. A graphic covers this in more detail later in the slide show.

46. Step Over Cobble Bar

As a general rule of thumb, a step habitat unit must have a minimum height of 12" or more (0.3 meters). The one exception to this minimum height rule is a step over cobble bar (SC).

A step over cobble bar (SC) is sometimes hard to identify, but watch for a long row of cobble which makes a nearly vertical break in the slope of the stream. Although this is a rather large-scale example of a cobble bar, note that its length from right to left is less than the active channel width. You would measure the length of this step over cobble bar from right to left and the width from the top to the bottom in this slide.

NOTE TO INSTRUCTOR: Point out these measurement points on the slide.

47. Step Over Structure - Log Wier With Boulders

A step over structure (SS) includes artificial dams or weirs made of logs, rocks, or gabions. Remember, the step must meet the minimum height rule of 12 inches (0.3 meter).

48. Step Over Structure - Culvert

A step over structure (SS) also includes steps created by a culvert.

Under certain conditions, any of the step units described above can potentially block upstream fish passage for juvenile or adult fish. Always take a photograph of any step that appears to block fish passage and record the information on the photo record sheet. Also mark the photo site on your map. Measure the height of all step over structures created by culverts. Record this information as well as the presence, or lack of, a suitable plunge pool below the culvert in the notes column.

49. Step Over Beaver Dam

A beaver dam creates our last example of a step. A step over beaver dam (SD) is easy to recognize, but somewhat more difficult to measure. Always make a special effort for safety when working around beaver dams or any of the steps, especially when the step is quite high or if the pools above and below the steps are deep.

50. Culvert Crossing

Several other "special case" habitat unit types can influence fish distribution.
First of these is a culvert crossing (CC). Treat the portion of the stream flowing through the culvert as a separate unit. Record all of the usual data for a unit. If the culvert has a metal bottom, record the substrate as a mix of what is surrounding the culvert.

In the notes column or your field book record the height from the culvert lip to the stream surface. This is called the “drop”. Also measure and record the culvert diameter, material it is composed of, and the shape of the culvert. Don’t forget to take a picture of any culvert that appears to be a potential barrier for either juvenile or adult fish passage. A drop of as little as six inches can be a barrier to upstream movement of juvenile fish. If there is no drop, make a notation of “submerged” in the notes column. Remember, if a drop is present it should also be recorded as a step over structure (SS) habitat unit type before moving on to the next unit.

51. Dry Unit

A dry unit (DU) is a dry section of stream that separates wetted channel units. Typical examples of dry units include riffles with subsurface flow or portions of side channels separated by large isolated pools.

Record the length, active channel width, and all other variables for the dry areas.

52. Puddled

A puddled (PD) unit is a nearly dry unit with a sequence of small isolated pools less than one channel width in length or width.

53. Dry Channel

A dry channel (DC) is a section of the main channel or side channel that is completely dry at the time of the survey. Record all unit data. Use the active channel width as the unit width.

NOTE TO THE INSTRUCTOR: This is a good place to pause for a break, allow time for questions, and discuss what remains to be covered.

54. Coho Use Of Side Channels Graphic

Now that we have covered all of the habitat unit types, let’s look at our inventory with a little bigger perspective. Remember that a stream is a system of all channels that transport water down the drainage. Consequently, it is important to categorize and collect data from all of the aquatic habitats — in all of the channels — across the valley floor as shown in this graphic.

55. Channel Types Graphic

Channel typing is an important part of the inventory because different species and life history stages of fish may use the habitat types within the side channels differently.

To distinguish one channel from another, we assign channel ordering codes based on location and the sequence in which they are surveyed. For example, if all of the flow is in one main channel, use the code **00** and note **100%** in the “percent flow” column. When a tributary or secondary channel joins the main channel, the main channel is then coded as **01**. If the new channel is a tributary, code it’s channel as **11**, write its name in the notes column, and collect data from at least two or three habitat units as you walk up the tributary. If the new channel is a side channel, code it as **02** and survey all of its habitat units until it rejoins the main channel. Isolated pools, alcoves, and backwater pools are coded as **10**.

Don't forget to estimate the contribution of flow from each channel type and record it as a percentage (%) in the proper column. This is difficult to measure accurately, but estimates give us an idea of the relative amount of flow provided by the tributary or how flow is distributed in multiple channel situations.

Refer to the sketch in the methods manual to clarify the coding and sequencing of habitat units in a multiple channel portion of the stream.

The most important thing to remember when channel typing is to be sure the main channel is identified with the proper code. This information is used in a critical step of the data analysis.

56. Aerial View of Channel Types and Percent Flow

Practice what you learned in the previous slide by applying it to this aerial photograph of a multiple channel site.

NOTE TO INSTRUCTOR: Use a pointer and assist trainees with proper coding of the channels. **Another good way to teach channel typing is to draw a multi-channel "stream," big enough to walk in, on the floor with chalk. Then, while walking through it like a "stream," the trainees can practice their coding and get a better feel for multi-channel situations encountered on a real stream.**

57. Habitat Unit Measurements

Length, width, and depth are measured for each habitat unit. It is preferred to have all units of measurement in metrics, but if you choose to use English measurements, be sure to note it on the data sheets. Above all, be consistent in whatever system you choose.

58. "Line Of Sight" Graphic

If a unit is very long, subdivide it into segments, usually no more than 100 feet (30 meters) in length. Sometimes the best way to break a long riffle is when it goes around a corner in the stream. This is called the "line of sight" rule.

To obtain the width of a habitat unit, measure the average width of the wetted channel.

Measure the maximum depth in pools and average depth in all other units. Measure as carefully as possible in pools, probing for the deepest point with the depth staff. Small differences in pool depth are significant.

59. Clinometer Scale

A clinometer is a special tool that allows the surveyor to measure slope. The clinometer has two scales — the percentage scale on the right side of the clinometer's viewfinder and the degrees scale on the left side.

60. Measuring Percent Slope With A Clinometer

To determine the slope of the habitat unit ask your survey partner to stand at the wetted edge of the stream at the top of the habitat unit while you stand at the wetted edge at the bottom of the unit. Using the scale on the right side of the clinometer's viewfinder, sight in on a point that would be at

your eye level on the depth staff. Determine and mark this point before measuring the slope. Read the slope on the percent scale (right side) of the clinometer and record it on the data sheet.

61. Measuring Slope Of Step Graphic

Measuring slope on a step is a bit different**.** For better accuracy, take direct measurements with the depth staff or tape measure rather than using the clinometer. Percent slope for a step is determined by dividing the step height (rise) by the step length (run) and multiplying by 100. For example if the step height (rise) is 0.80 meters and the step length (run) is 1.6 meters, the slope is 50%.

For each step habitat unit, record the height measurement in the notes column. As long as the height measurement is recorded, you can calculate the slope later.

62. Measuring Channel Shade

Streamside shade is important to maintain low water temperatures and to moderate daily temperature fluctuations, both of which are important to fish and other aquatic organisms. To get an idea of the amount of solar radiation the stream receives each day, a measurement called channel shade is made for each habitat unit. This measurement actually combines the effects of shading from the canopy and the surrounding hillsides.

While standing in the middle of the stream perpendicular to stream flow, use the clinometer to find the angle (in degrees) upward to the feature which creates the shade on either side of the stream. Shade may be provided by trees or other vegetation (vegetative shading), or by terraces, cliffs, or hillslopes adjacent to the stream (topographic shading). Read the left-hand scale in the clinometer's viewfinder to measure the slope in degrees. Measure the left bank first and the right bank second and record both readings in the "shade" column on the data sheet separated by a slash. During the data analysis, the shade measurements are converted to percent open sky for each habitat unit.

63. Silt

Another key characteristic to evaluate for each habitat unit is the bottom material or substrate. Substrate data provides information about the amount and quality of spawning and rearing habitat, turbidity levels, and stream flows.

Silt and fine organic material are the smallest and finest forms of substrate. Silt and organic matter are natural components of stream systems. However, excessive amounts of these small particles can clog the gravel and cobble areas required by spawning salmon and trout and aquatic insects on which fish depend for food. Silt and organic material generally stay suspended for a time when disturbed, quickly clouding the water. Fine sediment that covers and embeds gravel and cobble should be included in an estimate for silt.

64. Flocculents

Flocculents are very fine organic matter, much like silt, that settle on the substrate surface. Do not include flocculents in your substrate estimate, as their presence varies with flow and rarely contributes to embeddedness. Be sure to distinguish between silt and fine organic material. For example, in this slide do not count the layer of organic material on the boulders.

65. Sand

Although still quite small, sand grains are slightly larger than silt particles. It is often difficult to distinguish the silt and organic portion of the fine sediments from the sand portion. The primary difference is that sand particles, because they are slightly larger are not transported as easily downstream. Sand particles tend to settle to the bottom fairly quickly if disturbed. Yet, sand has essentially the same embedding effect upon gravel and cobble as silt.

66. Gravel

Gravel substrate is defined as particles that are from pea to baseball-sized or about 1/8 inch to 2 1/2 inches in diameter. Gravel is required for salmon and trout to spawn successfully. Different kinds and sizes of fish require different sizes of gravel. And, for the developing young to survive, the gravel must be free of silt and fine organic material.

The amount of spawning gravel not embedded by fine sediments is a key factor affecting the distribution and reproductive success of salmon and trout within the stream.

Gravel particles also absorb some of the energy of flowing water as they are transported downstream. The transport of gravel during various seasonal flows is a dynamic process that continually reshapes habitat within the stream.

67. Cobble

Cobble is described as baseball to bowling ball-sized or about 2 1/2 inches to 10 inches in diameter. Small cobble is also used by fish for spawning substrate. Fine sediments affect cobble, but because of their larger size, cobble is not moved downstream as easily as gravel. Spaces between cobbles serve as homes for aquatic insects and can even shelter small fish.

68. Boulder

Boulders are larger than bowling balls, or greater than 10 inches in diameter.
Boulders increase a stream's ability to withstand erosion during high winter flows, or unusual flood events. Large boulders are not easily moved, and may require extremely high flows to be transported downstream. This slide shows examples of both large and small boulders.

Large boulders provide protective cover for fish, as well as resting and feeding sites through the formation of pocket pools. Fish spend little energy holding in the pocket water associated with boulders and can easily feed in faster waters nearby. Such boulder-formed pockets are also important winter habitat, shelter areas from high flows, and prime habitat for aquatic insects.

69. Bedrock

Bedrock is solid rock. Bedrock substrates usually offer little resistance to the energy of water flowing downstream. Reduced friction over bedrock can result in higher flow velocities, especially in steep stream sections.

It is generally very hard for juvenile salmon and trout to use bedrock substrate in fast water units because they spend most of their energy trying to avoid being washed downstream. However, trench pools formed in bedrock provide calm, cool waters for fish to rear.

For each habitat unit, record the estimated percent abundance of substrate types within the wetted area of the habitat unit. Round off each substrate class estimate to the nearest 5 or 10 percent. If necessary, make notes in your field book or the notes column to further describe your estimates. Don't worry if the estimates don't add up to 100% as that can be adjusted in the analysis process.

70. Boulder Count

As mentioned earlier, boulders contribute to fish habitat quality by increasing the available habitat for fish. They also tell us something about the geology of the region.

Count all of the boulders greater than 18 inches (0.5 meter) in average diameter that extend above the water's surface. Do not include fully submerged boulders. Be sure to include boulders found at the margin of the wetted channel. When counting boulders, make sure each one is in contact with the water. For this reason, the boulder count will vary with flow levels. If the unit is dry, make an estimated boulder count by including boulders with sizes and orientation similar to those counted in wetted units. The boulder count data is translated into the running average of boulders per 100 meter length of stream.

71. 50% Percent Actively Eroding Bank

"Actively eroding" means that flowing water is removing material from the stream banks. Actively eroding banks are usually composed of fine sediments and are not stabilized by any vegetation that may be present. Actively eroding banks may slowly contribute material to the stream or collapse in large chunks.

Eroding banks may indicate unstable channels, sediment sources, and conditions of the riparian area adjacent to the stream. It also helps us identify areas where bank and riparian protection are appropriate. Remember that "active erosion" is not all bad, as it is necessary for gravel recruitment for downstream spawning beds.

For each habitat unit, estimate the percent of distance that is actively eroding at the active channel height (bankfull height). This estimate should be a total percentage for both banks, in other words, one total number, not a separate percentage for each bank.

72. Large Woody Debris Count

Woody debris is important for fish habitat. It helps stabilize the streambed to trap substrate, creates pools, resting areas, and hiding places, and contributes to aquatic insect production. Large key pieces of wood are generally not washed downstream and, as a result, anchor other pieces of wood.

Tally the number of each woody debris size group (small, medium, or large) found with at least some part within the active channel of each habitat unit. Refer to the methods for the three size classes. Do not count wood pieces less than 6 inches (15 centimeters) in diameter measured about 6 feet (2 meters) from the largest end and a total length shorter than 10 feet (3 meters).

If a number of large root wads are part of the woody debris, make a comment in the notes section. If you can easily tell that the wood pieces have been artificially placed, mention it in the notes column and use habitat structure (HS) in the comment code column.

73. Bridge Crossing

Comment codes help define important features associated with a specific habitat unit. They also allow biologists to locate potential problems, restoration sites, or unique features.

Use the letters BC to note a bridge crossing. Record the road name and number in the notes column. Also mark the unit number on the topo map. Describe the type of bridge (steel, wood, etc.) in the notes column.

74. Beaver Dam

Use BD to note beaver dam. Add the height measurement and any unusual observations or interesting information to the notes column. Also note if the beaver dam is washed out or if recent activity is not observed.

75. Bug Kill

Patches of insect-damaged or diseased and dying trees adjacent to the stream are noted with BK.

76. Beaver Activity

Use BV to note beaver activities such as a beaver den or freshly cut branches near the banks of the habitat unit.

77. Culvert Crossing

Use the code CC to note a culvert crossing habitat unit. Record the road name and number in the notes column. Also note and record if the culvert has baffles (to slow down the flow for fish) or is associated with weirs.

78. Culvert Entry

Mark CE if a tributary or other water source enters the habitat unit through a culvert. Also record the diameter, length, slope, and drop of the culvert, especially if you suspect that fish passage may be a problem.

79. Channelized Streambank — Car Body Riprap

Any habitat unit with riprap (car bodies in this case) or other artificial bank stabilization or stream control on either bank should be coded as CS. Note which bank (left or right) is stabilized.

80. Channelized Streambank — Artificial Bank Stabilization

Artificial bank stabilization techniques include concrete, boulder riprap, juniper bundles, rocks, or other materials. Although artificial bank stabilization does not automatically imply added material, in the notes column record what, if any, additional material is used for stabilization.

81. Debris Jam

Code a large accumulation of woody debris that partially or completely blocks a stream channel and obstructs flow as DJ.

82. Livestock Exclosure/Fence Crossing

If the habitat unit is part of a livestock exclosure, mark the code as EX. Where the fence crosses the stream, mark that habitat unit with an additional code FC.

83. Gaging Station

A gaging station is noted as GS in the comments column. If the gauge is readable, record the water level in the notes column.

84. Artificial Habitat Structure - Log Weir

Mark HS for any artificial habitat structure in the habitat unit and describe its type (gabion, log weir, cabled or uncabled large woody debris, etc.) in the notes column.

85. Mining

Note any mining activity as MI. Describe any detais in the notes column or in your field book.

86. Potential Artificial Barrier - Diversion

Document any potential artificial or human-created barrier, like this diversion dam, that may restrict upstream or downstream migration of fish. Take photos and make notes in the field book or notes column. Be sure to record the height. Also record PA in the comments column.

87. Potential Natural Barrier - Waterfall

Do the same procedure for any potential natural barrier and code it as PN in the comments column.

88. River Ford

If a road crossing occurs through the stream within the habitat unit, code it as RF for river ford.

89. Screened Diversion

A screened pump or canal, which prevents the uptake of fish, is coded as SD for a screened diversion. If known, provide some idea of capacity such as diameter of the pump or channel in the notes column.

90. Spring or Seep

Small amounts of flow (< 5% of total flow) from an adjacent stream bank are coded as SS for springs or seeps. If the spring is large, estimate the amount it is contributing to the total flow of the stream. Note which side of the stream channel the spring occurs on. Take a temperature reading and note the time of day. Record another stream temperature upstream and beyond the influence of the spring.

Springs or seeps may be hard to recognize along the edges in some of the more vegetated areas. Watch for wetland plants, like rushes or sedges, that are often associated with a wet, undefined channel area.

91. Tributary Junction

When an additional stream with a defined channel enters the main channel from the side, it is called a tributary junction. A tributary can be either named or unnamed on a topographic map. If there is no name on your map, don't make one up. Instead use unnamed trib-1 or unnamed trib-2 as names. Use TJ as the comment code for the unit where the tributary enters. Use a slash to indicate whether it enters from the right or left side of the stream.

Measure and record the tributary's active channel width and temperature, as well as an estimate of the percent flow it is contributing to the main channel. Record the temperature of the habitat units in the main channel above and below the tributary junction.

92. Unscreened Diversion

An unscreened diversion, either pump or canal, is noted as UD. If known, provide some indication of the diversion's capacity. Walk along the canal for a short distance in case the screen is located further down the canal.

93. Wildlife — Salamander

If wildlife other than fish (mammals, birds, reptiles, and amphibians) is observed, note WL in the comments column and the species, if known, in the notes column.

94. Earthflow

Sometimes large earth movements have occurred along the edges of the stream. These mass failures are the result of unstable soils, excessive moisture, or other activities that have undermined the hillslope's ability to maintain its structure.

Use a two part code to identify these mass failures. The first letter identifies the type of earth movement and the second indicates the current status of the movement.

Earthflows are a general intrusion of the hillslope into the stream channel. Earthflows are somewhat lumpy in appearance because of the gradual movement of the soil. Some of the plant cover may remain, although trees may be "jack-strawed" over the stream. This earthflow would be coded as ES because it is stabilized.

95. Landslide

A landslide usually occurs on a steep hillslope. It is typically quite broad and the soils are exposed. How would you code this example of a landslide? (LA)

96. Avalanche

A debris avalanche is a failure of the hillslope along a small, steep tributary. It is usually chutelike in appearance, much like a snow avalanche down a chute on a high mountain slope. Considerable soil, vegetation, and other debris are contributed to the stream channel as a result of a debris avalanche. How would you code this example of an avalanche? (AI)

This completes the comment codes portion of the habitat unit data sheet. Remember, codes are used to identify important features associated with habitat units in your survey. Enter as many

codes as appropriate for each habitat unit. Separate items that apply to the left bank (looking upstream) from those for the right bank with a slash (/).

If you want to get creative, do it in the notes section rather than in the basic data fields. The notes column or your field book provide an opportunity to free lance any other interesting information about the habitat unit in question or about a particular stretch of stream.

NOTE TO INSTRUCTOR: This is another good point for a break!

97. Fish Using Habitat

Now that you've had a "fish's-eye view" of the habitat variations within a stream, let's look at a stream from a broader perspective — a reach! Follow along with your copy of the Reach Data Sheet and corresponding instructions found in the methods manual, starting on page D-3.

98. Reach Data Sheet

Record reach information on the Reach Data Sheet prior to and during the course of the survey. Sometimes the Reach Data Sheet may be found on the back of the Habitat Unit Data Sheet, other times it may be a separate page. Each stream or named tributary should be considered and recorded as a separate survey, with its own reach information.

A reach may simply be the section surveyed. The conventional definition of a reach is a length of stream defined by some common characteristic with a minimum length of about three eights of a mile (or 600 meters). Reaches are defined by major changes in valley and channel form, changes in vegetation type, changes in land use, or land ownership. A reach can have any number of habitat units, but always start a new reach number when any one of the main categories on the reach data page changes significantly. For example, if the valley form changes from a broad floodplain to a narrow v-shaped valley, start a new reach. Also start a new reach at major tributary junctions, such as those named on a topographic map. Number the reaches consecutively — 1, 2, 3, etc. Assigning a reach number to a collection of habitat unit data insures that a continuous record of information is established for your stream. When starting a new reach sheet, circle the variable that resulted in the reach change.

Fill in the current date and the name of the stream for your survey using the standardized naming system described in your methods manual. Do not invent names. If there is no name on the map, use the words "unnamed tributary #1", or local names if appropriate.

Also fill in the appropriate name of the basin or watershed for your stream.

99. Topo Map With Reach Breaks

Record the name of the 7.5 minute U. S. Geological Survey topographic quad map or specific details about any other topographic map you use.

Also record the legal description, township, range, section, and quarter section of each reach starting point in your field book and on the reach form. On this map you can see the notations for townships 4 and 5 south as well as section numbers marked in red.

If using a global positioning system (GPS) unit, also record the UTM coordinates. Most GPS units have a way to change from latitude/longitude readings to UTM (or Universal Transverse Mercator) coordinates. UTM units are preferred because it is much more difficult to locate latitude and

longitude on a quad map. Many agencies now routinely use UTM coordinates to standardize their data collection and analysis procedures.

Also note the UTM zone provided by the GPS unit. Generally speaking, most of Eastern Oregon is in Zone 11 and most of Western Oregon is in Zone 10.

100. UTM Coordinates From A Topo Map

Clearly describe the starting and end points of your survey on the data sheet. For example, **Start At**: forest road 47 crossing on Emigrant Creek or **End At**: mouth of Johnson Creek. Enter the starting or ending habitat unit number in the appropriate space. Enter the starting UTM easting and northing coordinates from your GPS unit at the beginning of the reach and do the same at the end of the reach. We will talk more about the use of a GPS unit in the field portion of the training.

NOTE TO INSTRUCTOR: You may use the following paragraph if you wish, but it may be easier to do this portion in the field.

When reading the numbers from your GPS unit, the top number is the easting number and corresponds to small numbers along the top of your USGS quad map. The bottom number is the northing coordinate and it corresponds to similar numbers along the side of your USGS map. Draw a line from the easting mark and a line from the northing mark. Where the two lines intersect should be your location. Many of the newer compasses now include UTM which may also help you narrow down the location on the map.

Clearly mark the beginning and end of the survey, all reach changes and important features on the map. Where possible, begin and end the survey at an identifiable permanent landmark such as a bridge crossing or tributary junction.

Take a photograph that shows the stream and riparian area at the beginning of each reach change. Record the exposure number and the time on the Reach Data Sheet and on the photo record sheet.

101. Active Channel Height/Width Graphic

Active channel width (ACW) is the most important definition to learn before starting a stream survey. Active channel width provides a reference to stream size regardless of flow at the time of the survey. It is the scale used to evaluate all stream (specifically habitat unit calls) and valley characteristics.

Active channel width is the distance across the channel at average annual bankfull flow. Bankfull flow is the high water mark that you would most often notice and that occurs on average about every one and a half years.

You will measure active channel height (ACH) at the same place you measure active channel width. Active channel height is the vertical distance from the streambed to the top of the active channel.

102. Measuring Active Channel Width/Height

To know where to measure the active channel width look for a change in the vegetation, bank slope, or high water mark. Measure the active channel width several times throughout the reach, but record the average active channel width only once for the entire reach. In multi-channel situations, add the widths of all the active channels to obtain one number. If the active channel width changes significantly, start a new reach.

The water portion of the active channel height is an average depth, not the deepest part, of a representative fast water unit or pool tailout. As with active channel width, only record the average active channel height once for the entire reach.

103. Wetted Width, Active Channel Width, and Valley Width Graphic

A number of the following descriptions are based on the relationship between wetted width, active channel width, and valley floor width. We normally think of the wetted width, that part of the stream channel covered by water, as the most important part of a stream. But when doing a stream survey we need to look at a broader perspective, especially with respect to what the water does in high flow situations. Any restoration efforts must be able to withstand high flow as well as low flow conditions. Looking outside of the wetted channel provides us with a way to evaluate the potential for restoration work in a given stretch of stream.

104. Valley Width Index — VWI = 3 Graphic

The valley width index is the ratio of the active stream channel width to the valley floor width (VFW). It is estimated for the entire reach by dividing the average active channel width into the average valley floor width. In this example, three active channel widths will fit across the valley floor width, so the valley width index is 3.

105. Narrow Valley Floor Photo (VWI < 2.5)

What is your estimate of the valley width index in this slide? (VWI = 1.5 - 2) Because the VWI is less than 2.5 active channel widths, this is a narrow valley floor type.

106. Broad Valley Floor Photo (VWI > 2.5)

What is your estimate of the valley width index in this slide? (VWI = > 4) Because the VWI is greater than 2.5 active channel widths, this is a broad valley floor type.

107. Valley Form Graphic (3 narrow forms and 3 broad forms)

The next determination for the reach is valley form. Valley form or shape is generally described as a cross section of the landforms across the valley. It is based on the width of the valley floor, either broad or narrow, as described by the valley width index (VWI).

You will choose the code which best fits the description for valley form.

Valley forms possible in a narrow valley (VWI less than 2.5) include SV for steep v-shaped valleys (side slopes greater than 60°), MV for moderate v-shaped valleys (side slopes 30° - 60°), or OV for open v-shaped valleys (side slopes less than 30°).

Valley forms possible in a broad valley (VWI greater than 2.5) include CT where high, close terraces keep the stream within the channel, MT where varying heights of multiple terraces restrict how far the stream will move onto the floodplain, and WF which is a wide, active floodplain that does not restrict the movement of annual flood waters.

108. Constrained Channel Form Graphic

The channel is where the stream resides. The shape or form of a channel is closely related to the valley form because it is affected by the adjacent hillslopes, terraces, and floodplains. To determine channel form, we must look again at the relationship between the active channel width and the valley floor width. Remember that narrow valley floor types are less than 2.5 times the active channel width and broad valley floor types are greater than 2.5 times the active channel width.

Once you know the valley floor type, look at the various landforms next to the stream channel to complete the classification. Enter the appropriate two-letter code from the descriptions provided in your methods manual.

This graphic demonstrates a constrained channel. Channels in narrow valley floor types (VWI < 2.5 ACW) are always constrained or limited because there is very little room for the stream to wander back and forth across the valley floor.

109. Constrained By Hillslope Photo

Channel forms possible in a narrow valley are CB constrained by bedrock, CF constrained by an alluvial fan, or CH constrained by hillslope as shown in this photo. Regardless of stream size, the adjacent landforms dictate these channel form calls.

110. Unconstrained Channel Form Graphic

Channel form in broad valley floor types (VWI > 2.5 ACW) is either constrained or unconstrained depending on how terraces, hillslopes, or land use practices have affected the stream channel.

This graphic demonstrates an unconstrained channel form. Unconstrained channels have lots of room to move across a broad valley floor.

111. Unconstrained Single Channel

An unconstrained single main channel in a broad valley form is coded as US.

112. Unconstrained Braided

If the channel is unconstrained, but shows numerous small interconnecting channels or braids, code the channel form as UB.

113. Terrace Constrained

Roadways, dikes, channelization, terraces, or hillslopes on either side of the channel in a broad valley floor situation can confine the stream within its channel so that even major flood waters do not have an opportunity to connect with the flood plain. A terrace constrained channel form like this is coded as CT. As a side note, if the road's influence along the stream extended for more than a quarter of a mile, this channel form would be coded as CL (constrained by land use).

114. Alternating Hillslope-Terrace Constrained Graphic

If the stream channel is confined by contact with alternating hillslopes and high terraces code the channel form as CA.

Once you have noted the appropriate valley form and channel form, also make a note of the major landform on each side of the active channel margin in this reach. Landform indicates the feature found immediately adjacent to the stream. You will choose from hillslope, high or low terraces, alluvial fans, flood plain, road fill, wetlands-meadow, bedrock, or other. Check your methods manual on page D-11 for more details.

115. Flood Prone Height and Width Graphic

Flood prone height and flood prone width provide a cle1ar indication of the “big event” flooding potential of the stream within a particular reach. Landform provides the same clues to this potential, but without the numerical designations.

Flood prone height is the maximum channel depth during a flood event that occurs approximately once every 50 years. Double the active channel height to obtain the flood prone height measurement. Record this number to the nearest 0.25 of a foot (or 0.1 meter).

Flood prone width is the width of the valley floor covered by floodwaters during a flood which occurs approximately once every 50 years. Measure the total distance across the channel and valley at the height indicated by the flood prone height measurement. If necessary, a clinometer can help you level the line of measurement across the channel.

If the measurement connects with a terrace or hillslope reasonably close to the stream, record the actual distance to the nearest 0.25 foot (or 0.1 meter). If the measurement extends far across a valley, estimate the distance. Make these measurements several times throughout the reach, but record the average flood prone width only once for the entire reach.

116. No Vegetation

The status of the streamside vegetation at the time of the survey helps biologists look at the land use history and the potential for recruitment of large woody debris into the stream. It also provides information about stream shading, bank stability, erosion potential, and other factors affecting stream banks.

Looking at the vegetation within one active channel width on either side of the channel, use the codes to describe the status of the riparian zone. Comment in the notes section if known exotic plant species are observed in any of the following categories.

The code for this slide would be N for no vegetation.

117. Sagebrush

Use B to code for sagebrush, greasewood, rabbit brush, and other types of arid-lands shrubbery.

118. Annual Grasses and Herbs

Annual grasses and herbs are coded with a G.

119. Perennial Grasses

Use a P to code for perennial grasses, forbs, sedges, and rushes.

120. Shrubs

S codes for small willow, salmonberry, current, alder or other shrubs.

121. Deciduous Trees

When coding for shrub and tree vegetation types, consider a two-part code. The first letter is the vegetation type and the second letter indicates the age of the trees. See the code sheet on page D-13 of your methods manual for age-specific vegetation codes. For example, a riparian area with 8 - 10 year old alder is coded as DY.

Deciduous trees lose their leaves each year. To use the code D for a deciduous-dominated riparian zone, the canopy should be more than 70% alder, cottonwood, maple, or other deciduous riparian species. What is the two-part code for this slide? (DY)

In some cases, more detailed information about the riparian area is needed. Another part of the inventory process includes use of special methods and an associated form to record this data. Check with your supervisor to see if this form is necessary for your work.

122. Mixed Conifer and Deciduous

If the species distribution is about 50% conifer, or cone-bearing trees, and 50% deciduous trees, use the code M for mixed conifer and deciduous.

123. Conifer Dominated

If the riparian canopy is more than 70% conifer trees (spruce, pine, fir, larch), mark the code as C for conifer-dominated.

Separate entries for the dominant and understory plant communities is sometimes appropriate. For example, riparian areas in a mature ponderosa pine/grass community would be coded as CM for the dominant species and G for the understory species.

If you know the major species of plants in the reach, note them in your field book or on the reach notes line. Also, when possible, note vegetation types that are not typically found in a wetted riparian habitat.

124. Land Use Practices — Timber Harvest

Land use practices adjacent to the stream and on the hillslopes have a significant impact on the streams draining a watershed. Noting these land use practices helps biologists identify areas where changes in management may be the most effective restoration measures.

A number of land use codes are found on page D-13 of your methods manual. Refer to these codes when you are evaluating this portion of the reach data. Considering the reach as a whole, record the primary land use occurring on the terraces and hillslopes beyond the riparian zone. Also code the secondary land use where appropriate. How would you code this land use? (TH)

125. Land Use Practices — Urban Stream

Here is another example. How would you code this land use? (UR)

Instantaneous water temperature measurements provide information about stream conditions on the day of the survey that may affect fish populations. Record the stream temperature in degrees Celsius or Fahrenheit at each reach change or at a minimum of once per page of habitat unit data. Also record the time the temperature was taken.

Tributary input can dramatically affect stream temperature, so it is also a good idea to record the stream temperature just upstream from a named tributary junction and in the tributary itself. Identify and record each temperature on the appropriate habitat unit line in the notes column.

126. Dry Section

Flow is one of the most variable stream conditions within a reach. Habitat quality varies with streamflow. A record of the streamflow conditions during the survey is critical for interpretation and application of the survey data.

Mark “dry” if the reach is a dry section of stream. Sometimes long dry sections are separated by wetted channel units.

127. Puddled Section

If the channel is nearly dry but still contains a series of small isolated pools, mark PD for “puddled”.

128. Low Flow

If the surface water is consistently flowing across less than 75% of the active channel’s surface, mark LF for “low flow”.

129. Moderate Flow

MF or “moderate flow” means that the surface water is flowing across 75 to 90% of the active channel’s surface.

130. High Flow

If the stream is flowing completely across the active channel’s surface, but not quite at bankfull, mark HF for “high flow”.

131. Bankfull Flow

Mark BF for “bankfull” flow if the stream is flowing at the upper level of the active channel’s banks.

132. Flood Flow

If the stream is flowing over the banks onto low terraces or the flood plain, mark FF for “flood flow”.

Add names of tributaries, land ownership, or other comments in the reach notes section. Refer to the ownership codes on page D-15 of your methods manual.

Complete the Reach Data Sheet by sketching the general channel and valley cross section for your reach in the box provided at the bottom of the data sheet. Label and provide approximate dimensions of important features. Examples are provided on page D-15 and D-32 of your methods manual.

133. Longitudinal Profile Graphics — Elevation, Shade, Silts, Pools

So, now we've got a lot of data. What do we do with all of it?

Once the data has been entered into the appropriate data bases and run through the analysis programs, different levels of information is presented graphically to portray the conditions of the stream.

For example, sequences of reaches with length and slope measurements from consecutive habitat units is displayed as a stream profile graph. Stream profile graphs show a longitudinal profile of the elevation of the stream channel (above mean sea level) over the length of the surveyed distance. This produces a continuous picture of the gradient, or slope, of the stream. High and low gradient stream reaches can be picked out at a glance which helps biologists to quickly locate restoration opportunities.

Positioned over the stream profile are the significant features associated with the stream channel which may include reach breaks, bridges, road crossings, culvert crossings, tributary junctions, mass failures, and debris jams. Other habitat parameters are also applied to the stream profile graph to show, in a "snapshot" format, where concentrations of pools are found, where high concentrations of silts are found, where shade is plentiful, or dozens of other graphical representations of the data collected.

134. Habitat Bar Graphs Graphic — Habitat Unit Comparisons In Two Reaches

Habitat bar graphs allow visual comparisons of the relative amounts of different habitats within and between specific stream reaches. The graphs provide clues about the stream's ability to support fish during various life stages.

Reach 1 in this slide has more scour pools than reach 2, yet it retains a mixed diversity with riffles and glides. Habitat diversity provides juvenile fish refuge and aquatic insect production. Because of the numerous fast water units (riffles, rapids, and cascades) in reach 2, it is easy to see that the slope of the stream is fairly steep, limiting its use to fish species which prefer faster water.

135. Reach Level Report Graphic

A quantitative summary of the reach level data is presented in a report for quick reference and comparison of the reach parameters.

136. Habitat Unit Summary Report Graphic

A quantitative summary of the habitat data for each reach is organized by habitat type and their averaged characteristics, such as length, width, depth, substrate, boulders, and wood.

When comparing reaches within a stream, changes in valley and channel characteristics in the reach report should correspond to habitat variations in the habitat summary.

137. GIS Application Of Habitat Data

So far, we have looked at data tables and graphs as a means of presenting the data you have collected. Geographic Information System (GIS) applications provide an alternative means of presenting habitat data with the use of maps. The habitat data is linked to a digital map for visual reference and presentation of the analysis. Particular attributes, such as depth of pools, can be geographically highlighted.

138. Additional Survey Needs

Once the basic habitat survey is completed, other survey needs are usually evident. Temperature monitoring, cross-section profiles, spawning gravel inventories, and fish distribution surveys are often used to collect additional information about specific streams.

139. Flying Salmon In Ocean

Remember that a stream survey is only a snapshot of habitat conditions in fresh water at one point in time in the life cycle of salmon or trout species. But having that snapshot allows us to look at the stream as a whole to evaluate where and when adaptive management changes would be effective, undertake restoration measures where feasible, and provide the most suitable conditions possible for Oregon's fish species to prosper and reproduce.

Without the basic information provided by the Aquatic Habitat Inventory we are only second-guessing. We can no longer afford to second-guess as more and more species are added to threatened and endangered lists.

Lots more information is available to help you with your survey as well as a field portion for this training. The key to success with these surveys is practice, ask questions, and practice again.

140. Credits

The Aquatic Inventory Project Training Packet and Slide Show was produced in April of 1999 by the Oregon Department of Fish and Wildlife's Aquatic Inventory Project and Salmon -Trout Enhancement Program (STEP). Funding was provided by the Oregon Department of Fish and Wildlife, ODFW Restoration and Enhancement Board, Federal Aid in Sport Fish Restoration Program, and Governor's Watershed Enhancement Board.

Aquatic Habitat Inventory

Volunteer Job Description Example

ODFW Use Only Project # ____99 - 16_____	OREGON Fish & Wildlife	**VOLUNTEER JOB DESCRIPTION AND PROJECT PROPOSAL**

KEY CONTACT: _____John Cochran_____ **PHONE:** _____541-555-6830_____

TITLE:_____District Fish Biologist_____ **SUPERVISOR:**_____Same_____

PROGRAM: **STEP, Fish Habitat Inventory**

PROJECT LOCATION: ____Deep Creek Watershed_____
(Complete location information below for STEP Projects-attach map or sketch with project location(s) noted.)

Name of Stream(s) or Lake(s) ____Deep Creek_____ River System __Crooked__

Nearest Community ____Prineville_____

STARTING DATE: _____June 15, 1999_____ **ENDING DATE:** _____July 15 or sooner_____

TIME REQUIREMENT: MINIMUM _____2 weeks_____ **MAXIMUM**_____4 weeks_____

NUMBER OF VOLUNTEERS NEEDED: Two Per Tributary

PURPOSE OR PRODUCT:
Collect basic information about existing stream habitat. Data collected by trained volunteers helps biologists determine factors limiting natural fish production, identify habitat protection and restoration needs, and provides information for fish management plans and policies.

SPECIFIC VOLUNTEER DUTIES:
1. Review and become familiar with aquatic habitat inventory methods.
2. Obtain landowner contact information from County Clerk's office and organize it for supervisor.
3. Confirm landowner access permission.
4. Contact local ODFW office daily before going into field and reporting in on return for safety concerns.
5. Collect and record habitat data by following aquatic habitat inventory protocol.
6. Record information on unit survey data sheets, reach data sheets, photo record sheets. and riparian data sheets.
7. Record survey location and details on maps.
8. Photograph survey sites.
9. Proof and organize data in preparation for data analysis
10. Complete volunteer time sheet.

DESCRIPTION OF QUALIFICATIONS REQUIRED (Complete appropriate additional items on back):
ODFW Aquatic Habitat Inventory Training is required. Ability to collect and record data clearly and accurately. Ability to climb and walk on slippery substrates during inclement weather. Ability to work with others, including state and federal agencies and landowners.

TRAINING PROVIDED:

JOB: Aquatic habitat inventory training session

SAFETY: Stream safety-slippery substrate, deep pools with drop-offs, tree limbs in eye, poison oak, snake bite, barbed wire fences, work in teams, liability issues (complete "Conditions Of Volunteer Service" form)
(Attach appropriate safety checklist)

EQUIPMENT REQUIRED:
BY DEPARTMENT: Data sheets and clipboard, writing tools, field notebook, maps, gallon ziploc bags, survey methods manual, code sheet/unit sketches, metric measuring tapes, depth staff, compass, clinometer, GPS unit, camera with film, flagging with sharpie marking pen, thermometer, first aid kit
BY VOLUNTEERS: Waders or hip boots with felt bottoms or cleats, rain gear with hat, clothing appropriate for weather, polarized sunglasses, wading staff, personal first aid kit, water bottle, snacks, day pack, extra set of clothes.

EVALUATION RESPONSIBILITY: STEP Biologist, local fish district biologist, research staff

KEY CONTACT SIGNATURE: John Cochran **DATE:** __4-16-99____

WW97/Vol. Guide/Job Dec and ProjProposal/1-20-99/SWWD/sks

PHYSICAL REQUIREMENTS OF THIS JOB — Mark all that apply in the appropriate frequency column. Add comments where appropriate.

	NOT REQUIRED	RARELY 1% OR LESS	OCCASIONALLY 1 % - 33 %	FREQUENTLY 34 % - 65 %	CONTINUALLY 66 % - 100 %	COMMENT ON TYPE OF ACTIVITY & IF ACCOMMODATIONS COULD BE MADE
PHYSICAL FACTORS						
Sitting		√				travel to site in vehicle
Standing					√	
Walking					√	slippery stream bottom, 1 - 2 miles daily
Crouching			√			
Kneeling &/or crawling			√			
Stooping				√		under and through brush across stream
Twisting		√				
Climbing					√	steep stream banks, over rocks
Balancing					√	wading in flowing water
Leg/foot use					√	
Reaching				√		
Handing &/or grasping					√	measuring tape, writing tool, depth staff
Fingering/feeling		√				dialing phone, some computer entry
Pushing/pulling						
Lifting/carrying					√	depth staff, clipboard, pack, other gear
USE OF SENSES						
Talking					√	Communicate with partner and landowners
Hearing					√	
Vision					√	
Smell						
ENVIRONMENTAL FACTORS						
Works indoors			√			prep work and organizing data
Works outdoors					√	in all forms of weather
Safety equipment					√	nonslip soles on waders, personal first aid pack
Exposures					√	sun, wind, cold, precipitation
MENTAL FACTORS						
Interaction with others					√	work with a partner, landowner contacts
Deadlines/shiftwork/flexibility			√			July 15 deadline
Highly repetitive work					√	survey protocols
Attention to detail					√	record data accurately
Other psychological demands						
Other (in any category)						

Aquatic Habitat Inventory Training Workshop

Surveying Oregon's Streams
A Snapshot In Time

Oregonians from all walks of life are focused on watersheds — their uplands, waterways, and fish. Restoration and recovery efforts are taking place in nearly every major watershed. Everyone is "getting their feet wet" — government agencies, businesses, private landowners, educators, students, and individuals. Everyone wants to help, but few know where to begin.

Restoration efforts can be futile without a thorough assessment of a stream's existing habitat conditions and evaluation of a watershed or stream's potential for recovery. What is a third order stream? Do you know how to measure active channel width? What is the stream's pool to riffle ratio? Is large woody debris present? How much shade is available to the stream? These questions and more are answered through aquatic habitat inventory surveys.

Aquatic habitat inventory surveys collect basic information about existing stream habitat. Data collected by trained volunteers and other crews help biologists determine factors limiting natural fish production, identify habitat protection and restoration needs, and provide information for fish management plans and policies.

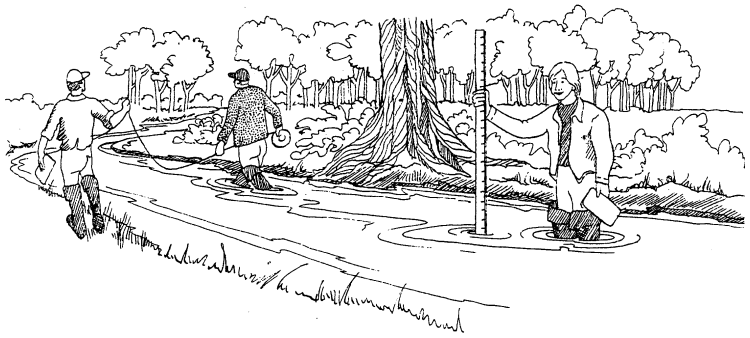
With training and oversight provided by Oregon Fish and Wildlife personnel, volunteers, schools, and other groups can undertake an aquatic habitat inventory. This training will benefit educators, watershed council members, landowners, and others interested in learning more about stream survey methods. Participants receive both classroom and field training during the one day workshop. Pre-registration is required.

We guarantee you won't look at a stream the same way again!

Date:

Time:

Location:



Cost: Free of charge, pre-registration is required

Equipment: Bring lunch, drinking water, waders or hip boots with non-slip felt soles, wading staff (optional, but recommended), hat, rain gear, camera, notepad, and wear clothing appropriate for the weather.

To Register Contact:

Aquatic Habitat Inventory
Training Workshop

Trainer's Equipment Checklist

Use the following lists to prepare equipment for the training session.

CLASSROOM SESSION

_____ Slide Projector/Spare Bulb
_____ Carousel With Slides
_____ Overhead Projector (Optional)
_____ Projector Screen
_____ Extension Cords (50' - 100')
_____ Sign-In Sheet(s)
_____ Name Tags/Marker Pens
_____ Handouts #/Each _____
_____ Instruction Packets
_____ Liability Release Forms
_____ Data Sheets
_____ Evaluation Forms
_____ Volunteer Time Sheets
_____ Others _____
_____
_____ Maps
_____ Easel, Pads, Marker Pens
_____ Masking Tape
_____ Duct Tape (To Secure Cords)
_____ Extra Writing Tools
_____ Clipboards
_____ Extra Paper For Notes
_____ _____
_____ _____
_____ _____
_____ _____
_____ _____

FIELD SESSION

_____ Data Sheets/Clipboards
_____ Writing Tools Plus Extras
_____ Maps/Gallon Ziploc Bags
_____ Instruction Manuals (Methods)
_____ Code Sheet/Unit Sketches
_____ Metric Measuring Tape
_____ Flagging/Perm. Markers (3)
_____ Waders or Hip Boots
_____ Depth Measuring Stick
_____ Clinometer/Compass
_____ Thermometers (3)
_____ Camera/Film/Batteries
_____ First Aid Kit
_____ Backpack or Field Vest
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NOTES:

_____
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Aquatic Habitat Inventory

Training Session

Sign-In Sheet

#	NAME	WORK PHONE	HOME PHONE	Liability Release √
1				
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25				

Aquatic Habitat Inventory Training Workshop
Training Evaluation

Please complete the following evaluation and return it to the instructor at the end of the training session. Your suggestions for improvements are applied to future stream survey training sessions.

Classroom Session:

1. Rate the classroom session as to its quality? Explain your rating.
   ❑ excellent ❑ good ❑ fair ❑ poor

   _____

2. How well did the slides prepare you for the "real" stream? Explain your rating, for example, do we need to add more examples or take some out? Were your questions answered?
   ❑ excellent ❑ good ❑ fair ❑ poor

   _____

3. How well do the methods manual and other handouts meet your needs in explaining the stream survey protocols and serving as reference material? Explain your rating, for example, how could the manual and handouts be improved? Is the text clear and understandable? Are more examples/graphics needed? Please be specific.
   ❑ excellent ❑ good ❑ fair ❑ poor

   _____

Field Training Session:

4. Rate the streamside session as to its quality. Explain your rating, for example, how could the streamside training be improved? Was the location satisfactory for implementing the material learned in the classroom session? Please be specific.
   ❑ excellent ❑ good ❑ fair ❑ poor

   _____

General:

5. How well did this training session (both classroom and field portions) meet your expectations? Explain your rating, for example, were your questions answered?
   ❑ excellent ❑ good ❑ fair ❑ poor

   _____

6. Do you feel qualified to complete a survey after completing this training?

   ❑ yes ❑ no If no, please explain why _____

7. Further suggestions or comments regarding your experiences at this training session.

ODFW-STEP - BASIC STREAM SURVEY

PAGE _____OF_____

DATE:_____ REACH NUMBER: _____

STREAM:_____ ACW: _____

BASIN:_____ VALLEY WIDTH INDEX: (*Circle one*)
1 >1 to <2.5 2.5 to 4 >4

USGS MAP: _____ FLOW (*Circle one*): DRY PD LF MF HF BF FLOOD

START AT: _____ VEGETATION: _____

END AT: _____ CREW: _____

Indicate measure units (m = meters, ft = feet)

UNIT #	UNIT TYPE	LENGTH ( )	WIDTH ( )	DEPTH ( )	LARGE WOODY DEBRIS COUNT			COMMENT CODE	NOTE
					S	M	L		

WOOD: S = 15 cm diameter x 3 m length OR 6 inch diameter x 10 ft length
M = 30 cm diameter x 6 m length OR 12 inch diameter x 20 ft length
L = 60 cm diameter x 10 m length OR 24 inch diameter x 35 ft length

OREGON DEPARTMENT OF FISH AND WILDLIFE
Salmon-Trout Enhancement Program - Natural Production Program

Aquatic Habitat Inventory Project
INTERMEDIATE LEVEL SURVEY

REACH DATA

Reach #

DATE:_____

STREAM: _____

BASIN: _____

MAP:_____

LEGAL DESCRIPTION:
T _____ R _____ SEC _____ QTR _____

UTM ZONE _____

START AT: _____
Habitat Unit #
UTM Easting:
UTM Northing:

END AT: _____
Habitat Unit # _____
UTM Easting: _____
UTM Northing:

PHOTO # / TIME: #_____/_____

LAND FORM: L_____ R_____

ACTIVE CHANNEL HEIGHT:_____

FLOOD PRONE HEIGHT: _____

ACTIVE CHANNEL WIDTH:_____

FLOOD PRONE WIDTH:_____

VALLEY WIDTH INDEX: 1_____ >1 - < 2.5_____ 2.5 - 4_____ > 4_____

VALLEY FORM:_____

VEGETATION: DOM_____ UNDER_____

CHANNEL FORM:_____

LAND USE: PRIM _____ SEC _____

FLOW: DRY_____ PD_____ LF_____ MF_____ HF_____ BF_____ FLOOD_____

WATER TEMP / TIME:_____(C or F) /_____

REACH NOTES:_____

SKETCH REACH #

ODFW-STEP - INTERMEDIATE LEVEL SURVEY - HABITAT UNIT DATA

PAGE ______ OF _______

DATE: ______________________________________ LEGAL DESCRIPTION: _______________________ REACH NUMBER: [ ]

STREAM: ____________________________________ START: ___________________________________

BASIN: _____________________________________ END: _____________________________________ CREW: ______________________________________

MAP: _______________________________________ ACTIVE CHANNEL WIDTH: ____________________ ______________________________________

UNIT	UNIT	CHANL	%	UNIT CHARACTERISTICS			SLOPE	SHADE	PERCENT SUBSTRATE DISTRIBUTION						BLDR	%	WOOD			COMMENT	
#	TYPE	TYPE	FLOW	LENGTH	WIDTH	DEPTH	%	L / R	S / O	SND	GRVL	CBLE	BLDR	BDRCK	COUNT	AE	S	M	L	CODES	NOTES
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OREGON Fish & Wildlife

OREGON FISH & WILDLIFE Salmon-Trout Enhancement Program

SUBSTRATE:

S/O SILT AND ORGANIC MATTER (stays suspended)

SND SAND (settles to bottom when disturbed)

GRVL GRAVEL (pea to baseball)

CBLE COBBLE (baseball to bowling ball)

BLDR BOULDER (larger than a bowling bowl)

BDRCK BEDROCK (solid rock)

"BLDR COUNT" = BOULDERS WITH DIAM > 0.5 m

WOOD: S = 15 cm diameter x 3 m length

M = 30 cm diameter x 6 m length

L = 60 cm diameter x 10 m length

ODFW - STEP RIPARIAN SHEET

PAGE:_____ OF:_____

STREAM:_____

BASIN: _____ DATE:_____ NAME:_____

UNIT NUMBER	SIDE	ZONE	SURFACE	SLOPE (%)	CANOPY CLOSURE	SHRUB % COVER	GRASS/FORB % COVER	TREE	COUNT (DIAMETER AT BREAST HEIGHT) 3-15cm 1-6 in	15-30cm 6-12 in	30-50cm 12-20 in	50-90cm 20-35 in	90+cm >35 in	RIPARIAN NOTE
	LEFT	1						CONIFER						
								HARDWOOD						
		2						CONIFER						
								HARDWOOD						
		3						CONIFER						
								HARDWOOD						
	RIGHT	1						CONIFER						
								HARDWOOD						
		2						CONIFER						
								HARDWOOD						
		3						CONIFER						
								HARDWOOD						
	LEFT	1						CONIFER						
								HARDWOOD						
		2						CONIFER						
								HARDWOOD						
		3						CONIFER						
								HARDWOOD						
	RIGHT	1						CONIFER						
								HARDWOOD						
		2						CONIFER						
								HARDWOOD						
		3						CONIFER						
								HARDWOOD						

OREGON Fish & Wildlife

OREGON FISH & WILDLIFE Salmon-Trout Enhancement Program

Shrub + Grass/Forb cover values should equal no more than 100 %

PHOTO RECORD: ODFW - STEP AQUATIC INVENTORY

STREAM: _____ CREW: _____

BASIN: _____ ROLL #: _____

DISTRICT: _____ MAILER #: _____

PHOTO	UNIT	DATE	TIME	DESCRIPTION
1				
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ODFW-STEP - BASIC STREAM SURVEY

PAGE 1 OF 1

DATE: 6-26-98

REACH NUMBER: 1

STREAM: Dune Creek

ACW: 8.2 m

BASIN: Green River

VALLEY WIDTH INDEX: (*Circle one*)
1 (>1 to <2.5) 2.5 to 4 >4

USGS MAP: Sand Quad

FLOW (*Circle one*): DRY PD LF MF HF BF FLOOD

START AT: Confluence with Green River

VEGETATION: DM/S

END AT: Hwy 36 bridge crossing

CREW: Mary Smith / Joe Johnson

Indicate measure units (m = meters, ft = feet)

UNIT #	UNIT TYPE	LENGTH (m)	WIDTH (m)	DEPTH (m)	LARGE WOODY DEBRIS COUNT S	M	L	COMMENT CODE	NOTE
1	RI	14	4	0.3		I			confluence with Green Riv
2	GL	8	5	0.5	II				Temp = 14.5°C
3	SB	6	4	0.4	III			PN	Potential barrier
4	PP	4	7	0.8		II			Nice habitat
5	CC	10	6	0.2	I			BC	No drop, 5 Jumped Height = 2m, Diam. = 1.5m, galvanized metal
6	LP	11	6	0.9					Fish!
7	RB	17	5	0.5		II			
8	RI	26	3	0.4				TJ	unnamed tributary
9	RP	15	4	0.6	I				
10	SP	12	6	0.8	I	I	II	DJ	
11	RI	9	4	0.4		I			
12	RP	14	5	0.5			I	BC	Hwy 36, End of Survey

WOOD: S = 15 cm diameter x 3 m length OR 6 inch diameter x 10 ft length
M = 30 cm diameter x 6 m length OR 12 inch diameter x 20 ft length
L = 60 cm diameter x 10 m length OR 24 inch diameter x 35 ft length

OREGON DEPARTMENT OF FISH AND WILDLIFE
Salmon-Trout Enhancement Program - Fish Natural Production

Aquatic Habitat Inventory Project
INTERMEDIATE LEVEL SURVEY

REACH DATA

Reach # 1

DATE: 7-18-99

STREAM: Trout Creek

BASIN: Willamette River

MAP: Opal Canyon

LEGAL DESCRIPTION:
T 11S R 14E SEC 26 QTR NW

UTM ZONE 10T

START AT: Opal Creek confluence
Habitat Unit # 1
UTM Easting: 7268432
UTM Northing: 0757616

END AT: HWY 34 Bridge
Habitat Unit # 43
UTM Easting: 7269481
UTM Northing: 0757428

PHOTO # / TIME: # 16 / 09:30

LAND FORM: L HT R HT

ACTIVE CHANNEL HEIGHT: 0.6m

FLOOD PRONE HEIGHT: 1.2m

ACTIVE CHANNEL WIDTH: 7.2m

FLOOD PRONE WIDTH: 10.4m

VALLEY WIDTH INDEX: 1 ____ >1 - < 2.5 ____ 2.5 - 4 ✓ > 4 ____

VALLEY FORM: TC

VEGETATION: DOM DM UNDER G

CHANNEL FORM: TC

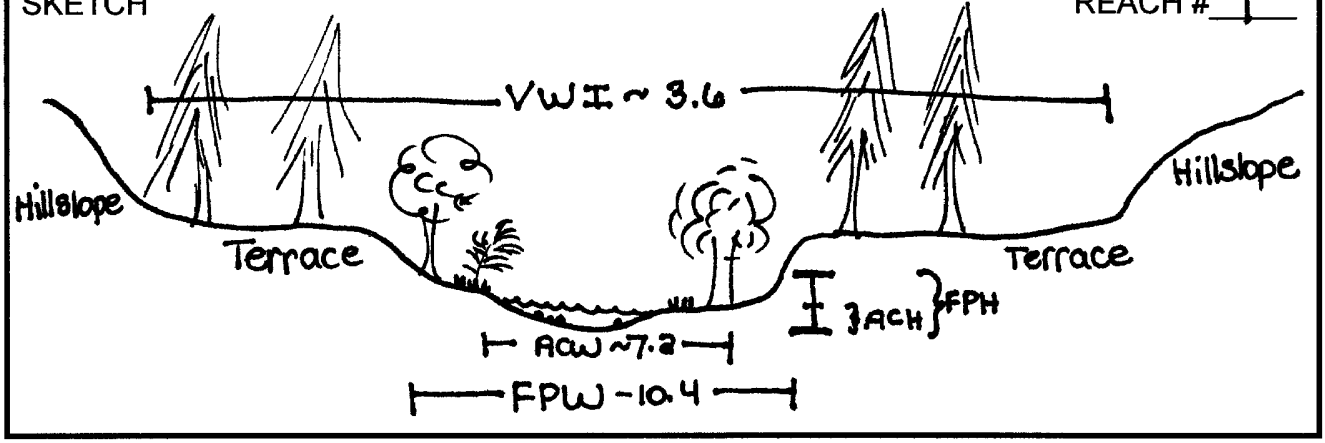
LAND USE: PRIM MT SEC RR

FLOW: DRY ____ PD ____ LF ____ MF ✓ HF ____ BF ____ FLOOD ____

WATER TEMP / TIME: 10 (C or F) / 10:41

REACH NOTES: P - Western Timber Co.

SKETCH



ODFW-STEP - INTERMEDIATE LEVEL SURVEY - HABITAT UNIT DATA

DATE: 6-18-98
STREAM: Toad Creek
BASIN: Wash Creek
MAP: Toad town

LEGAL DESCRIPTION: 14S - 36E - 6NE
START: mouth of Toad creek
END: Right tributary Junction with Sea Creek
ACTIVE CHANNEL WIDTH: 4 m

REACH NUMBER: 1

CREW: Jane Dee, Bill Johnson

UNIT #	UNIT TYPE	CHANL TYPE	% FLOW	UNIT CHARACTERISTICS LENGTH	WIDTH	DEPTH	SLOPE %	SHADE L/R	PERCENT SUBSTRATE DISTRIBUTION S/O	SND	GRVL	CBLE	BLDR	BDRCK	BLDR COUNT	% AE	WOOD S	M	L	COMMENT CODES	NOTES
1	LP	00	100	42.5	5.4	0.7	0	25/40	20	30	20	35	5	5	62	20	1		IIII		
2	CC	00	100	16.4	3.0	0.2	1.5	90/90	5	35	25	25	10	-	12	10		II		BC	Hwy 92, Step up = 1.0m
3	RI	00	100	26.4	2.0	0.24	2.0	40/25	10	30	40	20	-	5	8	25			I		
4	RP	01	60	30.1	2.5	0.32	2.0	50/20	10	10	25	40	35	10	30	5		II		TJ/	unnamed TJ
5	RI	11	40	26.4	2.8	0.2	6	60/70	5	25	25	35	15	-	14	10	1				
6	SL	00	100	0.4	4.6	0.15	-	40/35	10	30	30	45	10	5	4	5		II	I		Height = 1.6m
7	TP	00	100	15.3	3.4	1.0	0	40/35	15	10	10	15	5	55	6	15	IIII	I	IIII	DJ	Large jam, No fish passage
8	CB	00	100	12.4	3.9	0.25	5.0	45/25	10	10	15	35	40	-	8	15		II	I		
9	RI	00	100	18.9	2.3	0.30	1.5	40/30	5	15	45	35	20	10	10	5	II	I			
10	RB	00	100	20.1	2.1	0.20	4.0	70/20	5	15	25	30	15	10	15	5	II		II	TJ	unnamed TJ
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SUBSTRATE:
S/O SILT AND ORGANIC MATTER (stays suspended)
SND SAND (settles to bottom when disturbed)
GRVL GRAVEL (pea to baseball)
CBLE COBBLE (baseball to bowling ball)
BLDR BOULDER (larger than a bowling bowl)
BDRCK BEDROCK (solid rock)

"BLDR COUNT" = BOULDERS WITH DIAM > 0.5 m
WOOD: S = 15 cm diameter x 3 m length
M = 30 cm diameter x 6 m length
L = 60 cm diameter x 10 m length

ODFW - STEP RIPARIAN SHEET

PAGE: 1 OF: 1

STREAM: Dune Creek
BASIN: Green River

DATE: 06/26 → 27/98 NAME: Mary Smith / Joe Johnson

UNIT NUMBER	SIDE	ZONE	SURFACE	SLOPE (%)	CANOPY CLOSURE	SHRUB % COVER	GRASS/FORB % COVER	TREE	COUNT (DIAMETER AT BREAST HEIGHT) 3-15cm 1-6 in	15-30cm 6-12 in	30-50cm 12-20 in	50-90cm 20-35 in	90+cm >35 in	RIPARIAN NOTE
30	LEFT	1	LT	5	10	40	50	CONIFER	—					
								HARDWOOD		II	I			Alder, Fern
		2	HT	15	0	80	20	CONIFER	—					small meadow
								HARDWOOD	—					
		3	HS	30	40	60	20	CONIFER		II	I	I		Downed 0.6 x 15 m
								HARDWOOD		II	I			oak
	RIGHT	1	HS	25	20	60	30	CONIFER		I	I			Perennial Grasses
								HARDWOOD	III					
		2	HS	35	40	70	15	CONIFER		I	I	I		15% rocks
								HARDWOOD	I	II				cottonwoods
		3	HS	30	30	90	5	CONIFER			II	III		Hemlock
								HARDWOOD	I		III			Vine maple
60	LEFT	1	HT	15	80	30	40	CONIFER		II				Douglas Fir
								HARDWOOD	IIII	IIII	II			30% fir needles
		2	HS	40	30	75	15	CONIFER		II		I		Devils Club
								HARDWOOD		I	I			swordfern
		3	HS	30	20	65	10	CONIFER		II				cedar
								HARDWOOD	I		I			
	RIGHT	1	HS	10	70	80	20	CONIFER	—					
								HARDWOOD	IIII III	IIII	II			Alder
		2	HS	45	25	75	25	CONIFER		II	I			Spruce, Douglas Fir
								HARDWOOD	II	I				Alder
		3	HS	50	40	60	30	CONIFER		I	II	I		Douglas Fir, Hemlock
								HARDWOOD		II				

OREGON Fish & Wildlife

OREGON FISH & WILDLIFE Salmon-Trout Enhancement Program

Shrub + Grass/Forb cover values should equal no more than 100 %

PHOTO RECORD: ODFW - STEP AQUATIC INVENTORY

STREAM: Dune Creek
BASIN: Green River
DISTRICT: Northeast

CREW: Mary Smith / Joe Johnson
ROLL #: 1
MAILER #: 63425

PHOTO	UNIT	DATE	TIME	DESCRIPTION
1	1	6·26·98	08:38	Reach 1, RI, confluence with Green River, depth staff for reference
2	4	6·26·98	09:12	Reach 1, Step over bedrock, potential barrier
3	8	"	09:40	Reach 1, LP, Reach Photo, clipboard on right
4	17	"	10:30	Reach 1, RI, Mary in foreground, spawning habitat
5	24	"	11:12	Reach 1, RB, TJ/
6	25	"	11:17	Reach 1, RI, Miner's Creek confluence w/ Dune Crk
7	26	"	11:26	Reach 2, LP, Reach photo
8	30	"	12:43	Reach 2, left riparian, depth staff for reference
9	30	"	12:50	Reach 2, right riparian, clipboard for reference
10	41	"	13:33	Reach 2, culvert crossing
11	53	6·27·98	08:09	Reach 2, PP formed by habitat structure
12	60	"	09:43	Reach 2, Left riparian
13	60	"	09:43	Reach 2, right riparian
14	83	"	11:16	Reach 2, RP, End of Survey
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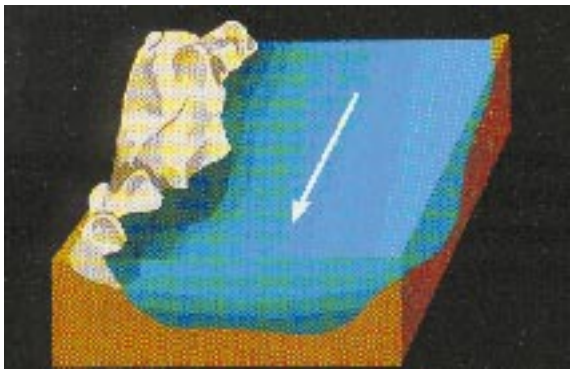
Habitat Unit Reference 1

LATERAL SCOUR (LP) - CORNER

LATERAL SCOUR POOL (LP)



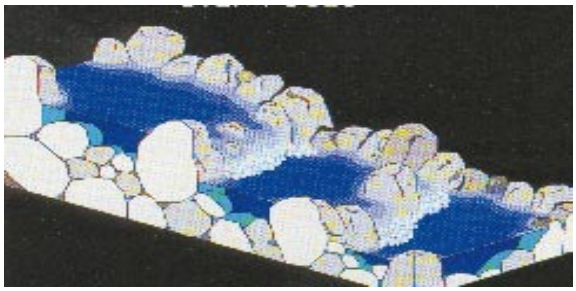
STRAIGHT SCOUR POOL (SP)

TRENCH POOL (TP)

PLUNGE POOL (PP)

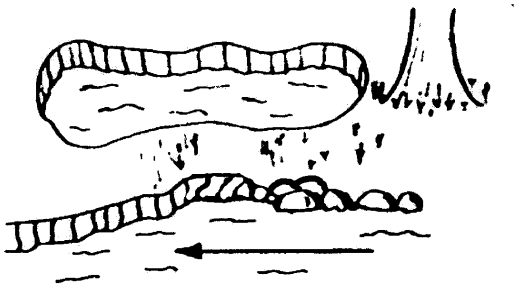
DAMMED POOL (DP)

BACKWATER POOL (BW)

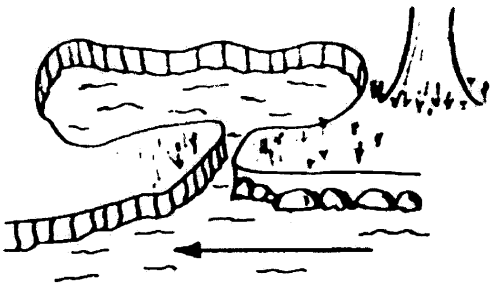


CASCADE OVER BOULDERS (CB)
(STEP-POOL SEQUENCE)

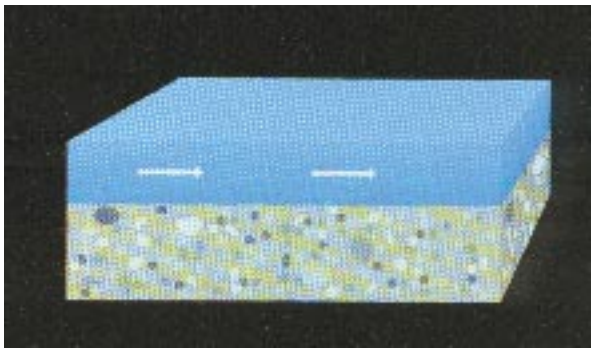
Habitat Unit Reference 2



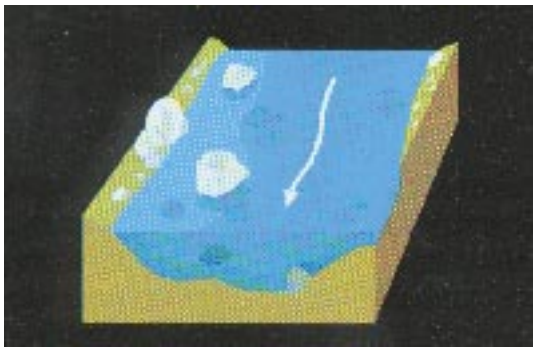
ISOLATED POOL (IP)



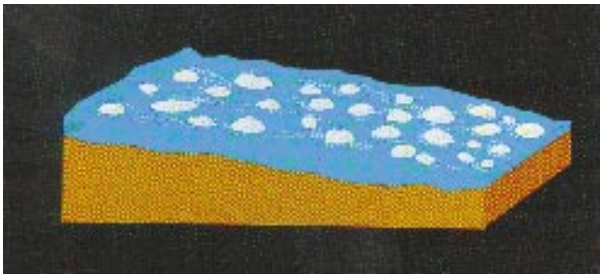
ALCOVE (AL)



GLIDE (GL)



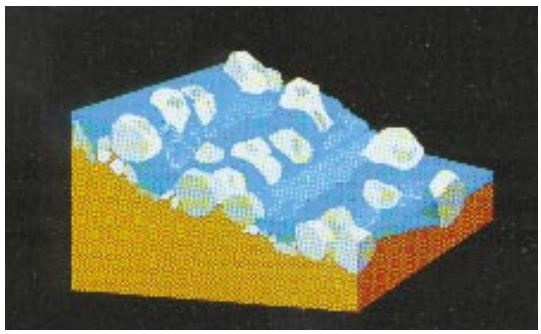
GLIDE (GL)



RIFFLE (RI)

RIFFLE WITH POCKETS (RP)

RAPID WITH BOULDERS (RB)



CASCADE OVER BOULDERS (CB)

RAPID OVER BEDROCK (RR)

Graphics from R1/R4 (Northern Intermountain Regions) *Fish and Fish Habitat Standard Inventory Procedures Handbook*, C. Kerry Overton, et.al., INT-GTR-346, May 1997, 1990.

Aquatic Habitat Inventory

REACH CODE SHEET

CHANNEL FORM

Narrow Valley *VWI less than 2.5*

- **CB** Constrained by Bedrock
- **CH** Constrained by Hillslope
- **CF** Constrained by alluvial Fan

Broad Valley *VWI greater than 2.5*

- **US** Unconstrained - predominantly Single
- **UA** Unconstrained Anastomosing
- **UB** Unconstrained Braided channel

- **TC** Terrace Constrained
- **CA** Constrained by Alternating hillslope & terrace
- **CL** Constrained by Land use

VALLEY FORM

Narrow Valley Floor

- **SV** Steep V-shaped valley (> 60°)
- **MV** Moderate V-shaped valley (> 30°)
- **OV** Open V-shaped valley (< 30°)

Broad Valley Floor

- **CT** Constraining Terraces
- **MT** Multiple Terraces
- **WF** Wide-active Floodplain

LAND FORM

- **HS** Hillslope
- **HT** High Terrace
- **LT** Low Terrace
- **AF** Alluvial Fan
- **FP** Flood Plain
- **RF** Road Fill
- **WM** Wetlands-Meadow
- **BR** Bedrock
- **O** Other (comment in Note column)

VEGETATION TYPE

- **N** No vegetation
- **B** SageBrush
- **G** Annual Grasses
- **P** Perennial grasses, forbs, etc.
- **S** Shrubs
- **D** Deciduous trees
- **M** Mixed conifers and deciduous trees
- **C** Coniferous dominated trees

Stages of Development

- **S** Seedlings
- **P** Sapling Poles
- **Y** Young
- **M** Mature
- **O** Old-growth

LAND USE

- **AG** Agricultural
- **TH** Timber Harvest
- **YT** Young Forest Trees
- **ST** Second growth Timber
- **LT** Large Timber
- **MT** Mature Timber
- **OG** Old Growth
- **PT** Partial cut Timber
- **FF** Forest Fire
- **BK** Bug Kill
- **LG** Light Grazing
- **HG** Heavy Grazing
- **EX** Exclosure
- **UR** Urban
- **RR** Rural Residential
- **IN** Industrial
- **MI** Mining
- **WL** Wetland
- **WA** Wilderness Area
- **NU** No Use

STREAM FLOW

- **DR** Dry
- **PD** Puddled
- **LF** Low Flow
- **MF** Moderate Flow
- **HF** High Flow
- **BF** Bankfull Flow
- **FF** Flood Flow

REACH NOTES

- **P** Private
- **M** Municipal
- **C** County
- **T** Tribal
- **GN** Greenway
- **FW** Oregon Department of Fish & Wildlife
- **BL** Bureau of Land Management
- **SF** State Forest
- **NF** National Forest
- **WA** Wilderness Area
- **US** US Fish and Wildlife

Aquatic Habitat Inventory

HABITAT UNIT CODE SHEET

UNIT TYPE

PP	Plunge Pool
LP	Lateral scour Pool
SP	Straight scour Pool
TP	Trench Pool
DP	Dammed Pool
BP	Beaver Pond
AL	Alcove
BW	Backwater
IP	Isolated Pool
GL	Glide
RI	Riffle
RP	Riffle with Pockets
RB	Rapid with protruding Boulders
RR	Rapid over Bedrock
CB	Cascade over Boulders
CR	Cascade over Bedrock
SB	Step over Boulders
SR	Step over Bedrock
SL	Step over Log
SC	Step over face of Cobble bar
SS	Step created by Structure
SD	Step over Beaver Dam
CC	Culvert Crossing
DU	Dry Unit
PD	Puddled
DC	Dry Channel
MX	Mix of unsurveyed habitat types

CHANNEL TYPES

00	No multiple channels
01	Primary channel
02	Secondary channel
03	Tertiary channel
10	Isolated pools, alcoves, or backwaters
11	Primary channel of valley floor tributary
12	Secondary channel of valley floor tributary

SUBSTRATE

S/O	Silt & Organic matter (stays suspended)
SND	Sand (settles to bottom when disturbed)
GRVL	Gravel (pea to baseball)
CBLE	Cobble (baseball to bowling ball)
BLDR	Boulder (larger than a bowling ball)
BDRCK	Bedrock (solid rock)

COMMENT CODES
(Use "/" to separate codes for left and right banks)

BC	Bridge Crossing
TJ	Tributary Junction (use “/”)
CE	Culvert Entry (use “/”)
SS	Spring Seep
CS	Channelized Streambanks (use “/”)
HS	Artificial Habitat Structure
DJ	Debris Jam
BD	Beaver Dam
BV	Beaver Activity
WL	Wildlife use of stream or riparian zone
SD	Screened Diversion (use “/”)
UD	Unscreened Diversion (use “/”)
GS	Gaging Station
RF	River Ford
EX	Livestock Exclosure
PA	Potential Barrier - Artificial
PN	Potential Barrier - Natural
FC	Fence Crossing

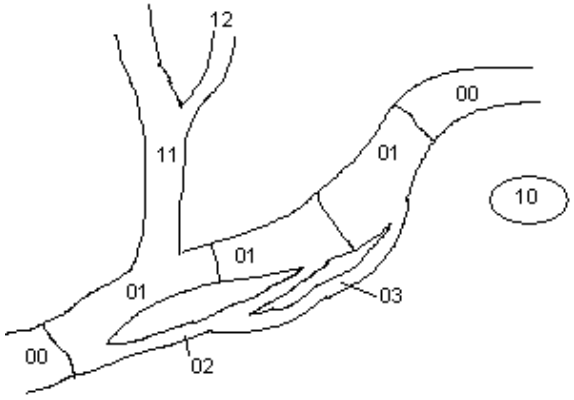
MASS FAILURES — use two letters for code
(use “/” to separate codes for left and right banks)

First letter

E	Earthflow
L	Landslide
A	Avalanche

Second letter

A	Active
I	Inactive
S	Stabilized



Channel Types Illustrated

Possible Combinations For Reaches - Channels - Valleys

Confirm that entries for channel form and valley form match the possible combinations noted below.

CHANNEL FORM	VALLEY FORM					
	VWI < 2.5			**VWI > 2.5**		
	NARROW VALLEY FLOOR TYPES			**BROAD VALLEY FLOOR TYPES**		
CHANNEL CONSTRAINED:	STEEP V	MOD. V	OPEN V	HIGH TERRACE	MULTIPLE TERRACE	FLOODPLAIN
BEDROCK	CB - SV	CB - MV	CB - OV			
HILLSLOPE	CH - SV	CH - MV	CH - OV			
ALT. HILLSLOPE TERRACE				CA - CT	CA - MT	
HIGH TERRACE				CT - CT	CT - MT	
LAND USE				CL - CT	CL - MT	CL-WF
CHANNEL UNCONSTRAINED:						
SINGLE CHANNEL					US - MT	US - WF
ANASTOMOSING					UA - MT	UA - WF
BRAIDED CHANNEL					UB - MT	UB - WF

Check the valley form description against the Valley Width Index. If it does not match, is it because the reach was not described properly, or was the ACW determined incorrectly?

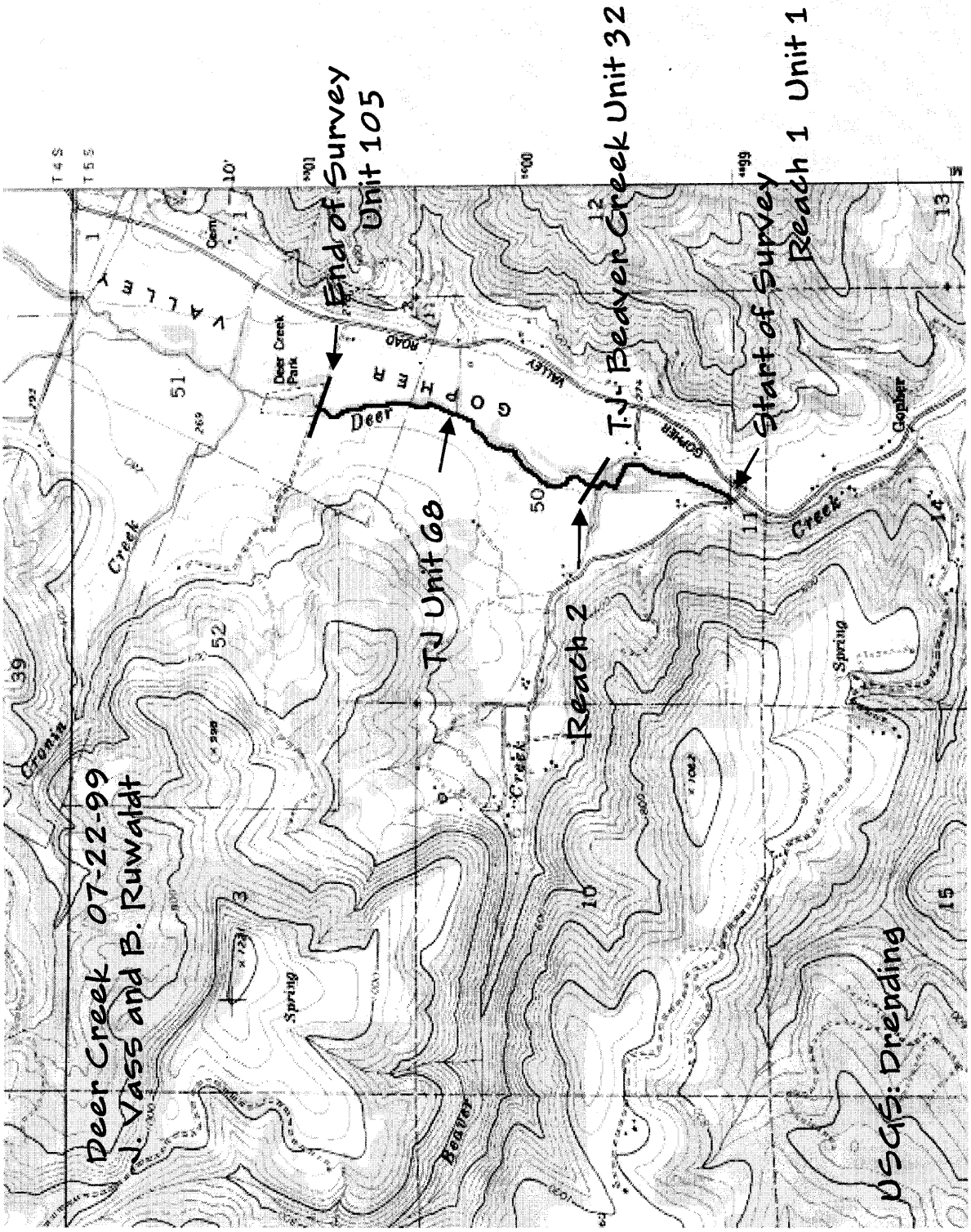
Does the terrace height work with the channel and valley form calls? Remember that a high terrace more than one ACW away from the channel on both sides is not considered constraining.

Streamside terraces are frequently present within narrow valley floors, however, remember that when VWI <2.5, it is the hillslope or bedrock that constrains the channel.

In rare cases, notably flooded bogs, multiple channel wetlands, or flooded valley bottoms due to beaver activity, the VWI = 1 but the channel is actually unconstrained. Make a note and explain.

Use the spaces on the reach form to make diagrams of the reach cross section. Label your drawings so that ambiguous or exceptional reach types can be understood.

Example Of Map Detail



Aquatic Habitat Inventory

Supervisor's Checklist

Use the following checklist to "ground truth" the survey crew's work. Collaborate with the crew regularly during the first few days to assure their familiarity, consistency, and accuracy with the survey methods. Review methods with the crew if necessary.

Maps:

- ❒ Beginning of survey marked
- ❒ End of survey marked
- ❒ Reach breaks marked
- ❒ Unit number at tributary junction marked
- ❒ Important features (i.e. falls, potential barriers, culverts) marked
- ❒ Protected in zip loc bag

Field Journal:

- ❒ Daily activities and progress noted
- ❒ Notable observations recorded
- ❒ Sketches/diagrams of notable features
- ❒ Stream summary and general impressions
- ❒ Landowner contacts

Reach Data Sheet:

- ❒ Beginning and end of reaches flagged and noted on map, flagging marked appropriately
- ❒ Reach data sheet completely filled out
- ❒ Reach characteristics consistent with reach diagram at bottom
  - Active Channel Width (ACW), Active Channel Height (ACH)
  - Flood Prone Width (FPW), Flood Prone Height (FPH)
  - Valley Width Index (VWI)
  - Channel form
  - Valley form
- ❒ Characteristics consistent with possible reach, channel, and valley combinations
- ❒ Circle reason for reach change, add tributary name if appropriate
- ❒ Legal description or UTM location information recorded appropriately
- ❒ If tributary is to be surveyed independent of main stream, use all new data sheets and start over with reach numbers
- ❒ If tributary has no name, create a simple one such as "unnamed trib #1". If the tributary is not found on the map, make a note.

Habitat Unit Data Sheet:

- ❒ Data sheet header completely filled out
- ❒ Check comment codes, also verify in note column when appropriate
- ❒ Check channel types and flow percentages
  - Record comment codes in multi-channel situations on primary channel line (01) only
- ❒ Unit type and slope should match (see definitions)
- ❒ Depth - most common depth in riffles, maximum depth in pools
- ❒ Step height measured and recorded accurately
- ❒ Flag every 20th unit, flagging marked appropriately
- ❒ Debris jam in comment codes associated with tallies in appropriate wood columns
- ❒ Wood counted only if it meets the size criteria described in methods

Riparian Data Sheet:

- ❒ Data sheet header completely filled out
- ❒ Shrub and Grass cover $\leq$ 100%
- ❒ Lay out tape perpendicular to stream, note "estimated" if tape not used
- ❒ Frequency of sampling — normally at beginning of reach and every 30th unit, more frequently if units are long

Photo Record Sheet/Camera:

- ❒ Unit number associated with photo recorded properly, cross referenced in notes on habitat unit data sheet
- ❒ Date and time recorded for each photograph
- ❒ Habitat unit type and other information in description column for each photograph
- ❒ Proper use of camera
- ❒ Date recording feature set on camera back

Basic Field Procedures Check:

- ❒ Maps marked properly
- ❒ Unit calls appropriate
- ❒ Proper use of clinometer for slope measurements
- ❒ Proper verification of length and width
- ❒ Active channel width and flood prone width measurements verified regularly
- ❒ Wood - counting proper pieces (size, location)
- ❒ Flagging at appropriate sites
- ❒ Proper coding for secondary and backwater channel units

Aquatic Habitat Inventory

Suggestions For Handling Common Survey Situations

1. Supervisor doesn't show up
   - Leave note at meeting place and on vehicle
   - Proceed with survey
   - Call supervisor at end of day - know where to locate supervisor's phone number

2. Access to private property refused
   - Skip section, make notes, take photos, mark on map
   - Create new reach for unsurveyed section. Estimate unsurveyed distance, land features, or other information. Describe in field notebook.
   - Start another new reach and a new unit above unsurveyed section

3. Landowners unavailable for permission to access
   - See # 2 above
   - Contact with landowner and permission required before starting survey
   - Only exception is if stream is on state "navigable" list - use good judgment, if unsure contact supervisor

4. Can't figure out reach call within reasonable amount of time
   - Make accurate sketch
   - Agree on channel dimensions with survey partner
   - Continue survey
   - Call supervisor at end of day
   - Fax reach sheet to supervisor

5. Left map at office (or home)
   - Go back to office (or home)
   - Locate map, make photocopies to take to field
   - Return to stream
   - Make map entries on photocopies and transfer marks to original at end of day

6. Can't physically survey section of stream
   - Skip section, make notes, take photos, mark on map
   - Create new reach for unsurveyed section. Estimate unsurveyed distance, land features, or other information. Describe in field notebook.
   - Start another new reach above unsurveyed section
   - Return later if water flow was the problem

7. Too much rain - flows coming up
   - Finish out day unless flows too high and dangerous, use good judgment, safety first
   - Call supervisor
   - Survey smaller stream in interim

8. Crew problem (personal)
   - Call supervisor

Aquatic Habitat Inventory

Quality Control Checklist

Use the following checklist to perform a quality control check on all field data sheets and when completing data entry. ***Make all corrections or notes in RED ink, do not erase.***

REACH DATA SHEET

- ❒ Reach changes occur on both reach sheet and habitat unit data sheet at same unit #
- ❒ Reach calls are consistent with valley width index
- ❒ Temperature is marked for either Celsius or Fahrenheit
- ❒ Township, range, and section are correct according to map
- ❒ Reaches are broken out properly (i.e., numerous consecutive dry units, tributary with greater than 40% flow, etc.)

HABITAT UNIT DATA SHEET

- ❒ Channel type and % flow correspond
- ❒ Pools have a slope of 0 %.
- ❒ Height measurement 0.3 meter associated with steps (no clinometer readings)
- ❒ Culvert crossing unit types have a shade of 90/90
- ❒ Shade does not exceed 90/90 on either side
- ❒ Scan unit types for **culvert crossings (CC)** - must have **CC** or **BC** in comment codes
- ❒ **Beaver Pond (BP)** or **Step Over Dam (SD)** - need a **BD** or **BV** in comment codes
- ❒ Check channel types and flow percentages
  - Record comment codes in multi-channel situations on primary channel line (01) only
- ❒ Verify all necessary comment codes are provided in notes column (i.e., WL,TJ, etc.)
- ❒ If **Debris Jam (DJ)** appears in comment codes, there must be at least one piece of wood noted in the wood columns (size does not matter). Move code to notes column if no wood is recorded for that unit - may mean DJ does not extend across entire channel.
- ❒ Substitute substrate from next upstream unit for steps with 100% S/O substrate (i.e., step over log, SL).

DATA ENTRY - Data entry errors have a major impact on accuracy of reports. Make every effort to confirm accuracy of data entry records.

- ❒ Verify unit lengths in database with the field data sheet - scroll down in the view screen with several records displayed at once.
- ❒ Complete the same procedure with unit widths.
- ❒ Make sure slope measurements are reasonable - scroll through the database (several records displayed at one time). Take note of slopes that are more than one digit (ie.20.0, may be 2.0).

Date: _____ Signed: _____

Aquatic Habitat Inventory

Surveyor's End Of The Day Checklist

- ❒ 7.5 minute USGS maps (photocopies) marked with reach breaks and all landmarks (falls, bridges, culverts with unit #) noted – all notations transferred to master map at office
- ❒ Reach data sheets completed
- ❒ Habitat unit data sheets completed, all cross referencing numbers verified
- ❒ Riparian data sheets completed, all cross referencing numbers verified
- ❒ Photo record sheets completed, all cross referencing numbers verified
- ❒ Field journals up-to-date, indicating road/stream access, other information, questions, stream description summary
- ❒ Photocopy photo record sheets and label slides
- ❒ All equipment accounted for, in good working condition, ready for next day's survey
- ❒ Verify return from the field with supervisor (safety check procedures)

Date: _____ Signed: _____

Aquatic Habitat Inventory

Environmental Observations
Appropriate Contacts

You may encounter one or more of the following situations while in the field. Use common sense and be observant. Record appropriate details and call the nearest regulatory agency as soon as possible. **Under no circumstances consider putting your safety or that of your survey partner at risk**. Discuss with your supervisor if you have questions.

SITUATION	WHO TO CALL
Illegal withdrawl or wasteful use of water	**Department of Water Resources**
Forest practices which remove streamside vegetation	**Department of Forestry**
Agriculture practices resulting in pollution	**Department of Agriculture**
Illegal fill or removal	**Division of State Lands**
Water pollution	**Department of Environmental Quality**
Pollution from confined animal feedlot	**Department of Agriculture**
Fish kills resulting from pollution	**Department of Fish and Wildlife**
☞ **To report violations on weekends after hours**	**Oregon Emergency Response (Salem)** **Phone: 1-800-452-0311**
Fish and wildlife violations	**Oregon State Police OR** **Turn.In.Poachers (T.I.P.) program** **Phone: 1-800-452-7888**
Forest fires	**Department of Forestry, Bureau of Land Management, US Forest Service, or other local fire response team**
Illegal dumping (garbage, dead animals, hazardous waste)	**Oregon State Police**

Aquatic Habitat Inventory

Private Landowner Liability and Property Rights

The following pages provide copies of the 1997 edition of the Oregon Revised Statutes (ORS) and the Oregon Administrative Rules (OAR) as they apply to private landowner liability and property rights associated with volunteer projects on private lands. The general interpretations below must not be construed as legal advice from either the Oregon Department of Fish and Wildlife or the Oregon Department of Justice.

— Public Use of Lands (ORS 105.672 - 105.696)

— Immunity From Liability For Damages Resulting From Habitat Improvement Projects (OAR 496.270)

General Interpretations Associated With Volunteer Projects On Private Lands:

- Immunity protections for landowners who allow members of the public to enter their property for recreeation purposes includes "volunteering for any public purpose project."

- The immunity protections apply to an owner of land, including holders of easements andlor rights-of-way, tenants, lessees, occupants, or any other persons in possession of the land.

- Immunity protections cover all real property, whether publicly or privately owned.

- An owner qualifies for immunity protections if they either directly or indirectly permit the person to use the land for recreational purposes. In addition, the immunity protections apply only if the owner does not charge for permission to use the land for recreational purposes.

- The immunity protections provide that an owner of land “is not liable in contract or tort for any personal injury, death, or property damage that arises out of the use of the land for recreational purposes. The liability limitation applies if the principal purpose for which the person enters the land is recreation. The liability limitation is not affected if the injury, death, or damage occurs while the person is engaged in other activities. Nevertheless, the bill does not limit the owner’s liability for intentional injury or damage to a person coming onto the property.

- Landowners do not have a duty of care or basis for liability for personal injury, death, or property damage resulting from the use of land for recreational purposes. The statutes do not give the public or the person entering the land a right to continued use of the land without the owner’s permission, and does not affect any public rights to use land for recreational purposes or woodcutting acquired before October 5, 1973.

Oregon Revised Statutes ORS 105.672 - 105.696

PUBLIC USE OF LANDS

105.672 **Definitions for ORS** 105.672 to 105.696. As used in ORS 105.672 to 105.696:

(1) "Charge" means the admission price or fee asked by any owner in return for permission to enter or go upon the owner's land.

(2) "Harvest" has that meaning given in ORS 164.813.

(3) "Land" includes all real property, whether publicly or privately owned.

(4) "Owner" means the possessor of any interest in any land, including but not limited to possession of a fee title. "Owner" includes a tenant, lessee, occupant or other person in possession of the land.

(5) "Recreational purposes" includes, but is not limited to, outdoor activities such as hunting, fishing, swimming, boating, camping, picnicking, hiking,nature study, outdoor educational activities, waterskiing, winter sports, viewing or enjoying historical, archaeological, scenic or scientific sites or volunteering for any public purpose project.

(6) "Special forest products" has that meaning given in ORS 164.813.

(7) "Woodcutting" means the cutting or removal of wood from land by an individual who has obtained permission from the owner of the land to cut or remove wood. [1995 c.456 §1]

105.675 [1971 c.780 §5; 1987 c.708 §4; repealed by 1995 c.456 §9]

105.676 **Public policy.** The Legislative Assembly hereby declares it is the public policy of the State of Oregon to encourage owners of land to make their land available to the public for recreational purposes, for woodcutting and for the harvest of special forest products by limiting their liability toward persons entering thereon for such purposes and by protecting their interests in their land from the extinguishment of any such interest or the acquisition by the public of any right to use or continue the use of such land for recreational purposes, woodcutting or the harvest of special forest products. [1995 c.456 §2]

105.677 [1973 c.732 §2; repealed by 1995 c.456 §9]

105.690 [1971 c.780 §6; repealed by 1995 c.456 §9]

105.682 **Liabilities of owner of land used by public for recreational purposes, woodcutting or harvest of special forest products.** (1) Except as provided by subsection (2) of this section, and subject to the provisions of ORS 105.688, an owner of land is not liable in contract or tort for any personal injury, death or property damage that arises out of the use of the land for recreational purposes, woodcutting or the harvest of special forest products when the owner of land either directly or indirectly permits any person to use the land for recreational purposes, woodcutting or the harvest of special forest products. The limitation on liability provided by this section applies if the principal purpose for entry upon the land is for recreational purposes, woodcutting or the harvest of special forest products, and is not affected if the injury, death or damage occurs while the person entering land is engaging in activities other than the use of the land for recreational purposes, woodcutting or the harvest of special forest products.

(2) This section does not limit the liability of an owner of land for intentional injury or damage to a person coming onto land for recreational purposes, woodcutting or the harvest of special forest products. [1995 c.456 §3]

105.685 [1979 c.434 §1; 1985 c.375 §1; repealed by 1995 c.456 §9]

105.687 [1979 c.434 §2; repealed by 1995 c.456 §9]

105.688 Applicability of immunities from liability for owner of land; restrictions. (1) Except as specifically provided in ORS 105.672 to 1105.696, the immunities provided by ORS 105.682 apply to:

(a) All public and private lands, including but not limited to lands adjacent or contiguous to any bodies of water, watercourses or the ocean shore as defined by ORS 390.605;

(b) All roads, bodies of water, water courses, rights of way, buildings, fixtures and structures on the lands described in paragraph (a) of this subsection; and

(c) All machinery or equipment on the lands described in paragraph (a) of this subsection.

(2) The immunities provided by ORS 105.682 apply only if

(a) The owner makes no charge for permission to use the land; or

(b) The owner charges no more than $20 per cord for permission to use the land for woodcutting. [1995 c.456 §4]

106.689 [1979 c.434 §3; repealed by 1995 c.456 §9]

105.691 [1979 c.434 §4; repealed by 1995 c.456 §9]

105.692 No right to continued use of land if owner of land permits use of land; no presumption of dedication or other rights. (1) An owner of land who either directly or indirectly permits any person to use the land for recreational purposes, woodcutting or the harvest of special forest products does not give that person or any other person a right to continued use of the land for those purposes without the consent of the owner.

(2) The fact that an owner of land allows the public to use the land for recreational purposes, woodcutting or the harvest of special forest products without posting, fencing or otherwise restricting use of the land does not raise a presumption that the landowner intended to dedicate or otherwise give over to the public the right to continued use of the land.

(3) Nothing in this section shall be construed to diminish or divert any public right to use land for recreational purposes acquired by dedication, prescription, grant, custom or otherwise existing before October 5, 1973.

(4) Nothing in this section shall be construed to diminish or divert any public right to use land for woodcutting acquired by dedication, prescription, grant custom or otherwise existing before October 3, 1979. [1995 c.456 §5]

105.693 [1979 c.434 §5; repealed by 1995 c.456 §9]

105.695 [1979 c.434 §6; repealed by 1995 c.456 §9]

105.696 No duty of care or liability created; exercise of care still required of person using land. ORS 105.672 to 105.696 do not:

(1) Create a duty of care or basis for liability for personal injury, death or property damage resulting from the use of land for recreational purposes, for woodcutting or for the harvest of special forest products.

(2) Relieve a person using the land of another for recreational purposes, woodcutting or the harvest of special forest products from any obligation that the person has to exercise care in use of the land in the activities of the person or from the legal consequences of failure of the person to exercise that care. [1995 c.456 §6]

105.697 [1979 c.434 §7; repealed by 1995 c.456 §9]

Oregon Revised Statutes
OAR 496.270

496.270 Immunity from liability for damages resulting from habitat improvement project; exceptions. (1) The Legislative Assembly declares that it is the policy of the State of Oregon to encourage operators, timber owners and landowners to voluntarily improve fish and wildlife habitat. In order to carry out this policy, the Legislative Assembly encourages cooperation among operators, timber owners and landowners and other volunteers.

(2) Consistent with the limitations of ORS 105.672 to 105.696, a landowner is not liable in contract or tort for any personal injury, death or property damage that arises out of the use of the land by:

(a) A volunteer conducting a fish and wildlife habitat improvement project; or

(b) A participant of a state-funded or federally funded watershed or stream restoration or enhancement program.

(3) An operator, timber owner or landowner shall not be held liable for any damages resulting from a fish and wildlife habitat improvement project done in cooperation and consultation with the State Department of Fish and Wildlife or the Governor's Watershed Enhancement Board, or conducted as part of a forest management practice in accordance with ORS 527.610 to 527.770, 527.990 and 527.992.

(4) The limitations to liability provided by subsections (2) and (3) of this section do not apply if the damages, injury or death was caused by willful, wanton or intentional conduct on the part of the operator, timber owner or landowner or by the gross negligence of the operator, timber owner or landowner. As used in this subsection "gross negligence" means negligence which is materially greater than the mere absence of reasonable care under the circumstances, and which is characterized by indifference to or reckless disregard of the rights of others.

(5) The limitation on liability provided by subsection (3) of this section does not apply to claims for death or personal injuries. [1993 c.701 §2; 1997 c.207 §1]

Note: 496.270 was enacted into law by the Legislative Assembly but was not added to or made a part of ORS chapter 496 or any series therein by legislative action. See Preface to Oregon Revised Statutes for further explanation.

Aquatic Habitat Inventory

Landowner Contacts

Page _____ of _____

Stream: ______________________ Basin: ______________________ Date: __/__/__

Township - Range: ______________________ Surveyers: ______________________

Access (Yes / No) | Plat # / Tax lot # | | Requested Report

Name: ______________________ ☐
Address: ______________________
Phone: (   )   -
Need to call before: Y N
Contacted by: ______________ Date: / /
☐ Left Message Date: / /
☐ Left Message Date: / / Spoken with: YES / NO

Name: ______________________ ☐
Address: ______________________
Phone: (   )   -
Need to call before: Y N
Contacted by: ______________ Date: / /
☐ Left Message Date: / /
☐ Left Message Date: / / Spoken with: YES / NO

Name: ______________________ ☐
Address: ______________________
Phone: (   )   -
Need to call before: Y N
Contacted by: ______________ Date: / /
☐ Left Message Date: / /
☐ Left Message Date: / / Spoken with: YES / NO

Name: ______________________ ☐
Address: ______________________
Phone: (   )   -
Need to call before: Y N
Contacted by: ______________ Date: / /
☐ Left Message Date: / /
☐ Left Message Date: / / Spoken with: YES / NO

Name: ______________________ ☐
Address: ______________________
Phone: (   )   -
Need to call before: Y N
Contacted by: ______________ Date: / /
☐ Left Message Date: / /
☐ Left Message Date: / / Spoken with: YES / NO

Name: ______________________ ☐
Address: ______________________
Phone: (   )   -
Need to call before: Y N
Contacted by: ______________ Date: / /
☐ Left Message Date: / /
☐ Left Message Date: / / Spoken with: YES / NO

Landowner Concerns (include name) : ______________________

OREGON Fish & Wildlife

OREGON FISH & WILDLIFE Salmon-Trout Enhancement Program

Include copy with data
☐ Forward copy to district biologist

(Date)

Landowner Name
Street Address
City, State, Zip

Dear _____ :

EXAMPLE LETTER

Request For PermissionTo Access Private Land

The Oregon Department of Fish and Wildlife's Aquatic Inventory Project, in cooperation with local watershed councils, is collecting and updating information from Oregon streams to assist in salmon (and other species) and watershed restoration efforts all across the state. This work is vital for documenting long-term fish population and habitat status as well as monitoring changes resulting from cooperative restoration efforts.

Our survey work encompasses streams on private, state, and federal lands. On some streams, land ownership involves all three entities. To assure a continuous record of data for _____(stream name)_____from its headwaters to its mouth, we hope you will consider cooperating with our project. The data gathered from your portion of __(stream name)_____ will be pooled with data from the entire stream to assess the overall trend of the watershed. Different land ownerships are <u>not</u> evaluated individually, although we would be happy to discuss the results of the survey from your stream segment with you.

To complete the survey a team of two well-trained surveyors will collect information on channel width, depth, substrate, woody debris, and other stream components, as well as associated riparian characteristics. Fish presence or absence surveys may follow the habitat surveys at selected sites to study the relationships between habitat conditions and fish abundance. The survey methods are scientifically sound and efficient in terms of conserving both time and money.

It is important to receive permission from as many landowners as possible to obtain a clear picture of conditions in the _____ watershed. We recognize you have no obligation to participate, but hope you will choose to join us in these efforts. Our goal in working with landowners like yourself is to assure that the surveys are not biased toward different land ownerships or stream types, but rather to assess the entire watershed based on the sum total of the survey data. We respect your rights and concerns as a landowner and do not wish to inconvenience you in any way.

If a survey crew has not already been in touch with you, you will be contacted shortly regarding access permission and to explain the survey schedule and procedures. If you have any questions about the physical habitat or fish sampling surveys, or would like to request a summary of the data obtained for the survey reach on your property, please do not hesitate to ask the survey crew, or contact me at ____(phone number)____. I would be happy to send you a copy of the completed report.

Thanks for your assistance in this important effort.

Sincerely,

This letter is only an example. Use the paragraphs appropriate to your situation or design your own letter.

R. U. Redetofish
District Biologist
Deschutes Fish District

EXAMPLE LETTER

Thank You For Access To Private Land

(Date)

Landowner Name
Street Address
City, State, Zip

Dear _____ :

On behalf of the Oregon Department of Fish and Wildlife's Aquatic Inventory Project I would like to thank you for providing access to the stream that runs through your property. With your help we now have a continuous record of survey data for _____ Creek from its headwaters to its mouth.

The information gathered on _____ Creek is part of a larger effort to assess the overall trend of the entire _____watershed. This work is vital for documenting the long-term health of the watershed, including fish population and habitat status as well as monitoring changes resulting from cooperative restoration projects.

Although different land ownerships are not evaluated individually, we would be happy to discuss the results of the survey from your stream segment with you. If you have questions about any part of the survey process, or would like to request a summary of the data obtained for the survey reach on your property, please do not hesitate to contact me at ____(phone number)____. I would be happy to send you a copy of the completed report.

Thanks once again for your cooperation in this important effort.

Sincerely,

R. U. Redetofish
District Biologist
Deschutes Fish District

This letter is only an example. Use the paragraphs appropriate to your situation or design your own letter.

Who Owns The Land?

Accessing County Land Ownership Records

Do not attempt to complete a stream survey without first obtaining permission for access from the various landowners. All land ownership information is part of the public record, and is obtained from the county tax assessor's office. Use the following check list to locate tax lot numbers, landowner contact information, and plat maps with ownerships delineated.

- ❒ Stop by the county tax assessor's office. You can also call the assessor's office and request this information, but until you know the specific procedures in your county's office, it is best to make a personal visit. (Don't hesitate to ask questions about the procedures. In most cases they will closely parallel what follows.)

- ❒ Do your homework before you go to the assessor's office. Be prepared to ask for specific township, range, and section information. Take a map or copy with you.

- ❒ Assessor's office personnel will either pull a plat map copy of the township and range you request (and sometimes a section map if available) or will refer you to the large county map books.

- ❒ Locate specific sites or reaches on the appropriate township and range map to confirm that you have the right map.

- ❒ Identify the tax lot numbers associated with your study site(s).

- ❒ Look up the tax lot numbers in the available reference books to obtain landowner names and mailing addresses. Some offices have a computer available on the counter to help you at this point in the process.

- ❒ It is often helpful to have your own copy of the plat map showing the various ownerships for the survey files (see following example). To obtain copies of the plat maps, ask for the appropriate township, range, and/or section. A stream may flow through several plat maps, so be sure to request all necessary maps. A small fee is usually charged for each map.

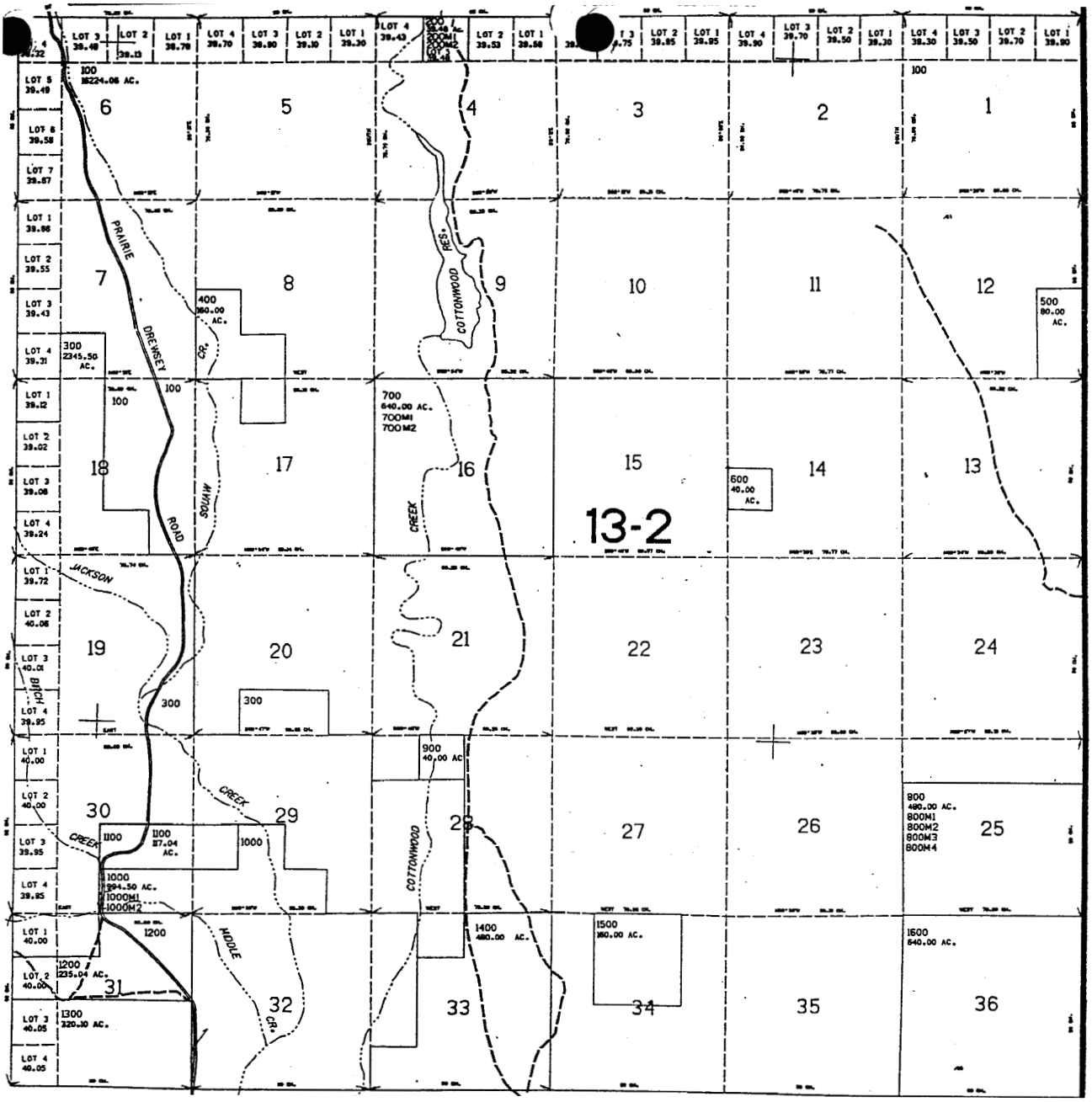
- ❒ You may find that your stream is only partially drawn in (or not drawn in at all) on the plat map. Be prepared to take the plat maps back to your work center and draw in the streams with the best information available.

- ❒ In most cases, all you need is the name and mailing address of the landowner, but most assessor's offices can also print out the tax lot landowner information from their computer files. This information includes acreage, tax assessments, market values, and other details. Be prepared to pay $0.50 per page or more.

- ❒ If possible do the map work and ownership searches for the entire project before beginning your field work. You may find that one ownership covers several tax lot numbers. This can be confusing if working with several plat maps. One suggestion is to use colored pencils to shade in the various ownerships, with a different color for each different landowner. (This process works better in less densely populated areas.) When all the map work and ownership searches are complete, organize the materials into a notebook.

Example Of Plat Map

Harney County
Township 19, Range 36



DATA ANALYSIS PACKAGE

Access the data analysis package on the Internet at

http://osu.orst.edu/dept/odfw/freshwater/inventory/index.html

This web address takes you to the Aquatic Inventory Project's website. At that site, locate and move to the STEP link.

The data analysis package includes data entry details, a report generator, and a graphic generator. Data sheet masters and other items will eventually be available at this web site. Check it often!

Questions? Use the email addresses on page one of the website or call 541-757-4263 x 260.

Surveying Oregon's Streams
"A Snapshot In Time"

AQUATIC INVENTORY PROJECT

A Guide To Interpreting Stream Survey Analysis Reports

OREGON DEPARTMENT OF FISH AND WILDLIFE

Salmon-Trout Enhancement Program
and
Aquatic Inventory Project
Natural Production Program

Aquatic Inventory Project

A *Guide To Interpreting Stream Survey Analysis Reports*

Prepared By Scott Foster, Charlie Stein, Kim Jones

> "You cannot step into the same river twice; for other waters are ever flowing"
>
> —*Heraclitus*

1.0 HOW TO USE THIS GUIDE

This guide will help the reader interpret the graphical and tabular results of the stream survey data analysis. The guide is written for an ever-widening audience of private citizens, land managers, watershed councils, students, and other parties interested in obtaining information about Oregon streams surveyed with methods developed by the Oregon Department of Fish and Wildlife. The methodology used in these surveys is a modified version of similar methods developed by Bisson, et al. (1982), and Hankin and Reeves (1988). These survey methods are most useful for small to medium-sized streams, usually those small enough to walk in using hip waders.

This guide is designed as a stand-alone document, but the user will benefit if using it in conjunction with any level (Basic, Intermediate, or Advanced) of the Aquatic Inventory Project methods manuals (Moore et al., 1998) for a more thorough understanding of data collection procedures. The best way to interpret stream survey data, however, is to join a survey crew in the process of conducting a survey. You will gain firsthand knowledge of how the data collection methods attempt to measure the quantity and quality of fish habitat.

While the ODFW stream survey methods measure many aspects of instream and streamside physical habitat, some important habitat parameters are beyond the scope of this form of survey. Those parameters include water quality, both chemical and physical, water quantity, and food production and distribution.

Each section of the stream survey report is described in detail within this guide. Part 1 interprets individual stream survey analyses, while Part 2 addresses basin summaries. Vocabulary terms are presented in **bold** type and are defined in the glossary section at the end of the training packet. Key concepts are noted in boxes. The meaning of each numerical or statistical measurement is described in relationship to stream ecology and fish habitat suitability.

GUIDE ORGANIZATION

1.0 How To Use This Guide

REACH REPORT

2.0 Valley and Channel Summary
- 2.1 Valley Characteristics and Channel Morphology
- 2.2 Channel Characteristics And Channel Dimensions

3.0 Riparian and Bank Summary
- 3.1 Land Use And Riparian Vegetation Codes
- 3.2 Bank Condition And Shade

HABITAT UNIT REPORT

4.0 Habitat Unit Summary
- 4.1 Habitat Detail
- 4.2 Habitat Summary
- 4.3 Pool Summary
- 4.4 Large Wood Debris Summary
- 4.5 Stream Summary

RIPARIAN REPORT

5.0 Riparian Zone Summary
- 5.1 Riparian Zone Veg. Sum.
- 5.2 Riparian Zone Veg. Detail

GRAPHIC PRESENTATIONS

6.0 Stream Profile Graphs
- 6.1 Shade
- 6.2 Substrate Silt, Organics, Sand
- 6.3 Substrate Gravel
- 6.4 Substrate Bedrock
- 6.5 Large Boulders/100 Meters
- 6.6 Number/Depth Of Deep Pools
- 6.7 Pieces Of Large Wood
- 6.8 Key Pieces Of Large Wood

7.0 Habitat Bar Graphs

OTHER

8.0 Additional Material
- 8.1 Cover Documents
- 8.2 Comment Summaries
- 8.3 Maps
- 8.4 Photo Sheets

9.0 Watershed Summary
- 9.1 Reach Summary Tables
- 9.2 Frequency DistributionGraphs
- 9.3 Benchmarks

Because a particular stream survey's objectives and data analysis may be very specific, certain sections in the above list may be absent from some analyses and reports.

REACH REPORT

OREGON DEPT. FISH AND WILDLIFE - STEP
INTERMEDIATE HABITAT INVENTORY
Report Date: 03/05/99
GREEN CREEK #956
Survey Date: 06/23/98

REACH SUMMARY

REACH 1 T17S-R9W-16NE REACH 1

UTM Zone: 10

Start: Easting 0437971 Northing 4882349
End: Easting 0437673 Northing 4883197

Valley and Channel Summary

Valley Characteristics (Percent Reach Length)

Narrow Valley Floor		Broad Valley Floor	
Steep V-shape	0	Constraining Terraces	100
Moderate V-shape	0	Multiple Terraces	0
Open V-shape	0	Wide Floodplain	0

Valley Width Index: 3.3

Channel Morphology (Percent Reach Length)

Constrained		Unconstrained	
Hillslope	0	Single Channel	0
Bedrock	0	Multiple Channel	0
Terrace	0	Braided Channel	0
Alt. Terrace/Hill	100		
Landuse	0		

Channel Characteristics

Type	Length(m)	Area (m2)	Dry Units
Primary	1,160	7,071	0
Secondary	46	107	2

Channel Dimensions(m)

Wetted		Active		Floodprone	
Width	6.0	Width	10.6		14.6
Depth	0.27	Height	0.6		1.1
		W:D ratio	17.7	Entrenchment	1.4

Stream Flow Type: MF Water Temp: 13.0
Avg. Unit Gradient: 1.2% Habitat Units/100m: 5.3

Riparian and Bank Summary

	Primary	Secondary
Land Use:	LT	MT
Riparian Vegetation:	DM	S

Bank Condition and Shade

Bank Status	% Reach Length	Shade (% of 180)
Actively Eroding	8%	Reach avg: 89%
		Range: 62-100%

Reach notes: Monitoring survey

PART A - STREAM LEVEL ANALYSES

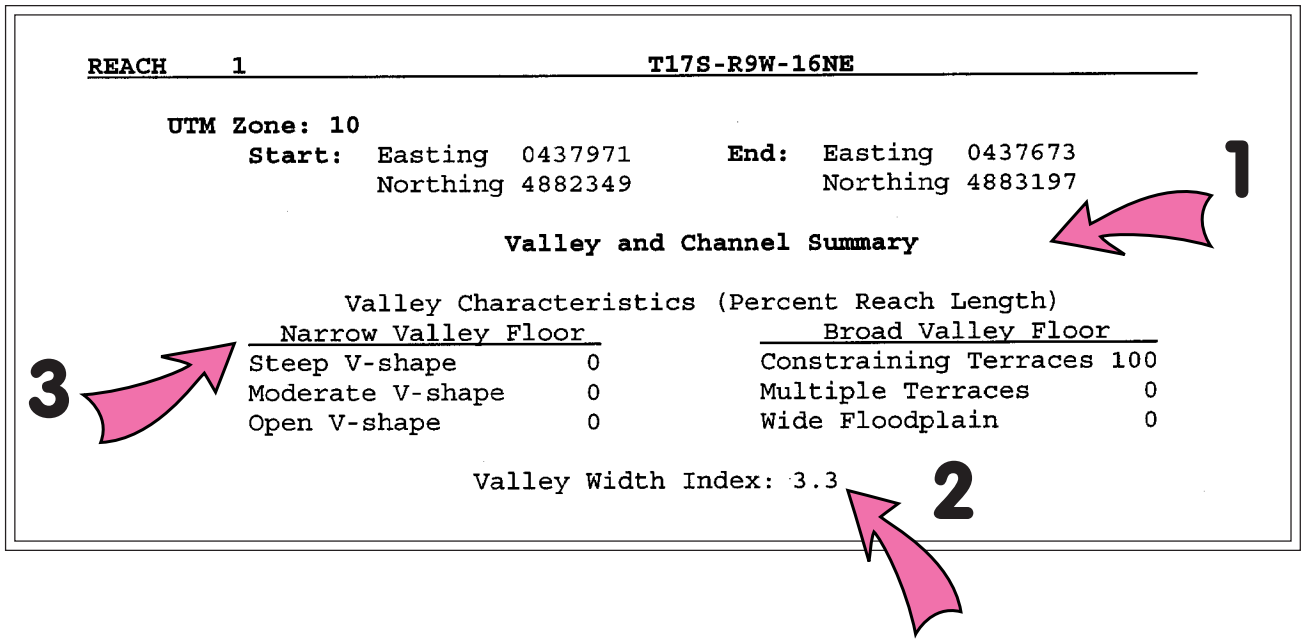
Reach Report

A Reach Summary is prepared for each reach. It describes and quantifies valley and channel characteristics, riparian vegetation, land use, bank conditions, and shade potential throughout the reach.

2.0 VALLEY AND CHANNEL SUMMARY

A discussion of the stream's valley and stream channel requires that we expand our attention beyond the stream itself, and consider the broader landscape context in which the stream exists. The valley contains the stream channels, and the channels contain the stream.

1 A Valley and Channel Summary is prepared for each reach. It describes how the stream channel fits into the valley. The Valley and Channel Summary describes characteristics of the valley such as its cross-sectional shape, and its width compared to the width of the active channel. Characteristics of the channel, such as its shape, adjacent landforms, dimensions, gradient, and amount of secondary channels, are also described.



REACH 1 T17S-R9W-16NE

UTM Zone: 10

Start: Easting 0437971 End: Easting 0437673
Northing 4882349 Northing 4883197

1

Valley and Channel Summary

Valley Characteristics (Percent Reach Length)

Narrow Valley Floor		Broad Valley Floor	
Steep V-shape	0	Constraining Terraces	100
Moderate V-shape	0	Multiple Terraces	0
Open V-shape	0	Wide Floodplain	0

3

Valley Width Index: 3.3

2

2.1 Valley Characteristics and Channel Morphology

Valley characteristics and channel morpholgy are interrelated. They provide information about how the stream fits into, and interacts with, its valley.

Active channel width (ACW) provides a reference to stream size regardless of flow level at the time of the survey. ACW is the distance across the channel at "bank full" flow. Active channel width is used to evaluate channel and valley characteristics.

Valley width index (VWI) Is the number of active channels that fit between the hillslopes across the valley floor. It reflects the potential for the stream to meander back and forth across the valley floor or to create new channels within the valley.

2

- **What it means:**

Stream channels exist within the stream valley. The stream valley can fall into one of two general functional categories: narrow valley floor or broad valley floor.

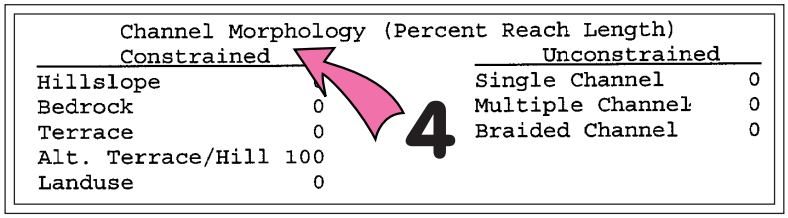
3

A narrow valley floor is less than 2.5 times the active channel width (VWI < 2.5). Steep, moderate, and open V-shapes reflect the steepness of the valley's hillslopes. Stream channels in narrow valleys are always **constrained** from lateral movement by either adjacent hillslopes or bedrock walls.

Channel constraint refers to ability of the stream to move laterally within the valley. In constrained channels, stream flows in all but the highest flood flows are confined to the existing channel. In unconstrained channels, the stream can move and meander throughout the valley over time. The height and proximity of adjacent landforms determine whether a channel is constrained or unconstrained.

A broad valley floor is greater than 2.5 times the active channel width (VWI > 2.5). Stream channels in broad valleys may be either **constrained** or **unconstrained**, depending upon the adjacent landforms. The features which constrain the lateral movement of the stream may be some combination of high **terraces** or hillslopes, or the stream may be constrained by land use features such as road beds, railways, dikes, and others. If constraining terraces or land use features are present within a valley, they must be both high and close to the stream channel to constrain its lateral movement.

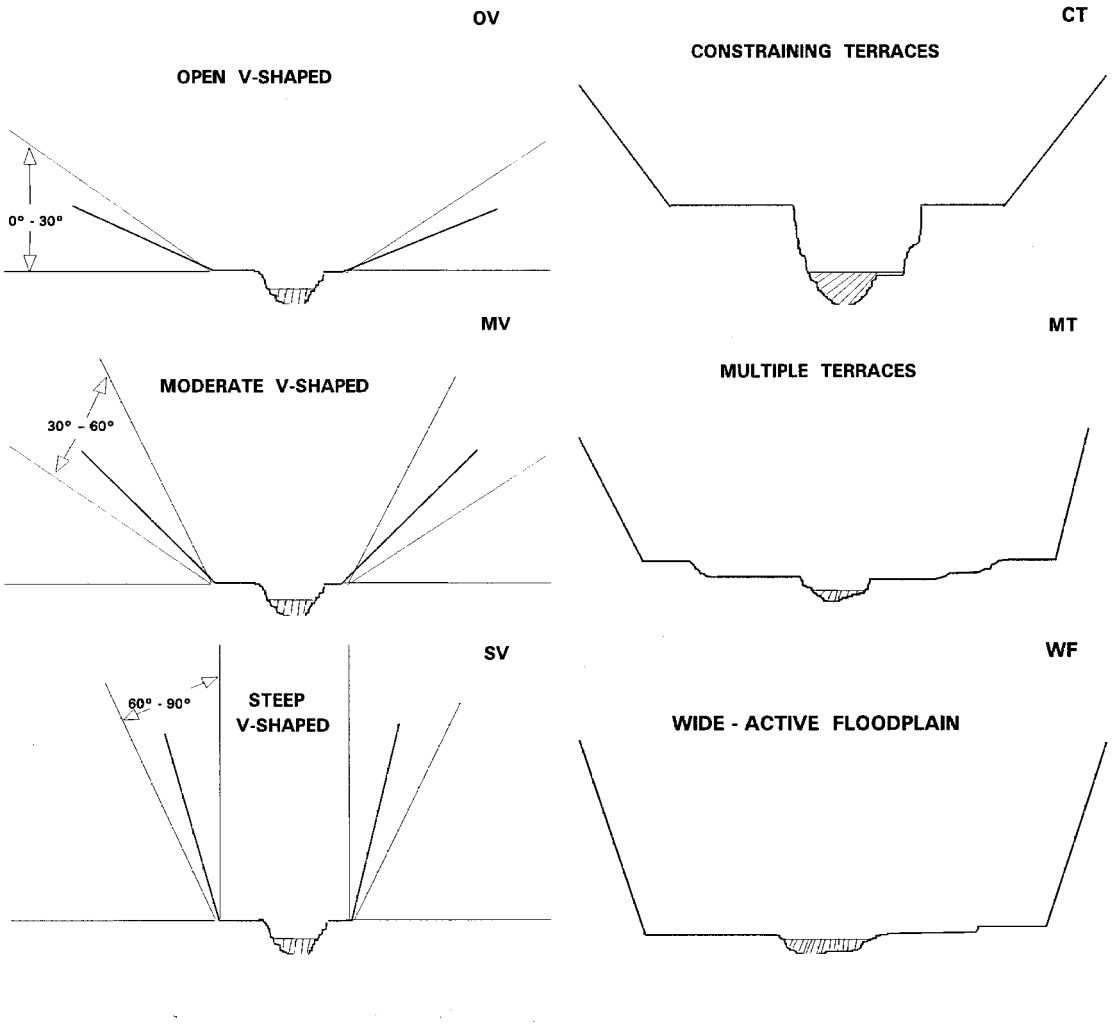
Multiple terraces vary in height and "stairstep" out away from the stream channel. A wide floodplain is an area inundated by normal winter high flows. Unconstrained channels occur where there is no high or close constraining feature, and can form as a single channel, as multiple channels that are fairly parallel to one another, or as a complex of interwoven braided channels. In unconstrained configurations, water flow is not restricted to any particular channel, and can move and meander throughout the stream valley over time.



VALLEY FORM

NARROW VALLEY FLOOR
VWI < 2.5

BROAD VALLEY FLOOR
VWI > 2.5



- **How valley characteristics and channel morphology are determined:**

The survey crew determines the valley characteristics and channel morphology primarily by visually referencing the channel and surrounding landforms as they move up the stream. US Geological Survey (USGS) topographic maps also help surveyors recognize these characteristics. The percent of the total length of the reach in each configuration is determined during data analysis and is reported in the "Valley and Channel Summary" section in the Reach Report.

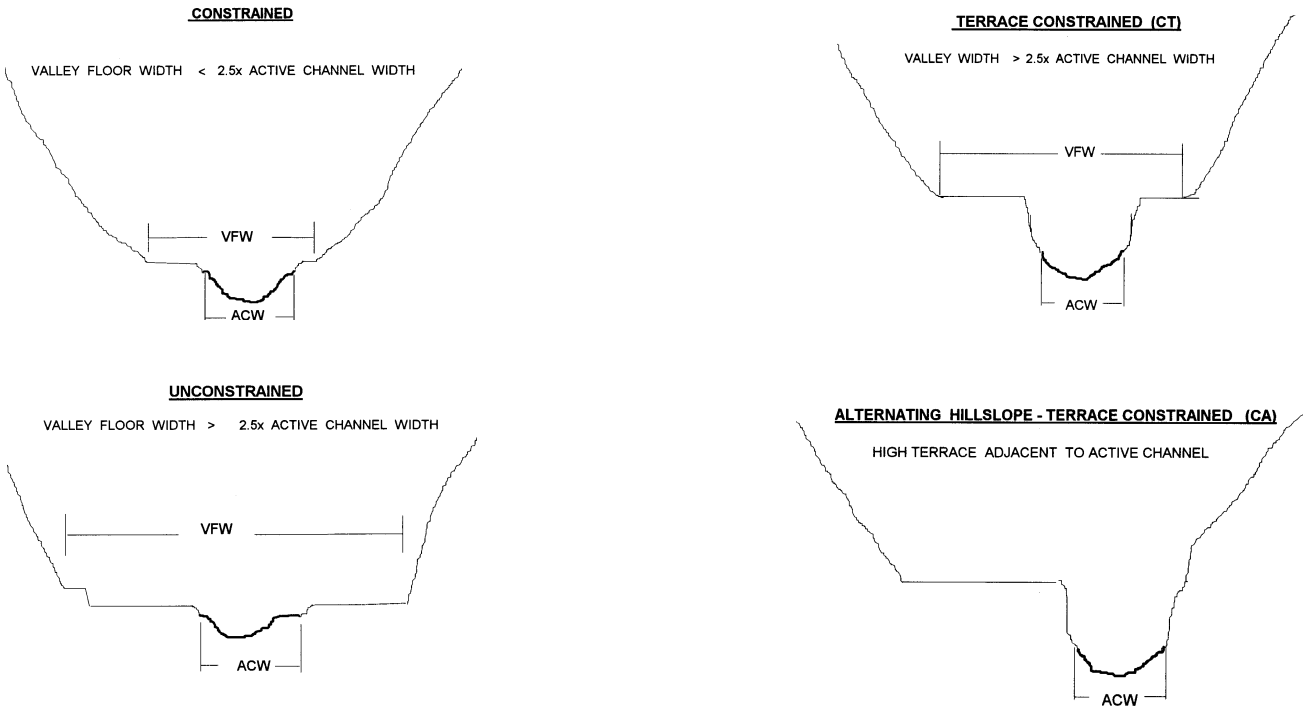
Valley characteristics and channel morphology are especially significant during high flow events. During high flows, streams may form secondary channels on broad valley floors. Secondary channels are important resting and overwintering habitat.

- **Significance for fish habitat:**

Most changes in stream channels occur during high flow events. Additional channels are formed when floodwaters flow over the tops of the terraces and find a new route. The changes allow the stream to dissipate the energy of the high flows, especially in broad valley floors. Fish are more likely to find overwintering habitat where they can escape from high velocity winter flows. S**econdary channels** help divert some of the flow and reduce the overall velocity.

Wide floodplains and unconstrained channels store great amounts of water during high flows, slowly releasing it back into the stream during the dry summer months. This **base flow** supplies water for fish habitat during dry seasons.

CONSTRAINED AND UNCONSTRAINED CHANNEL MORPHOLOGY



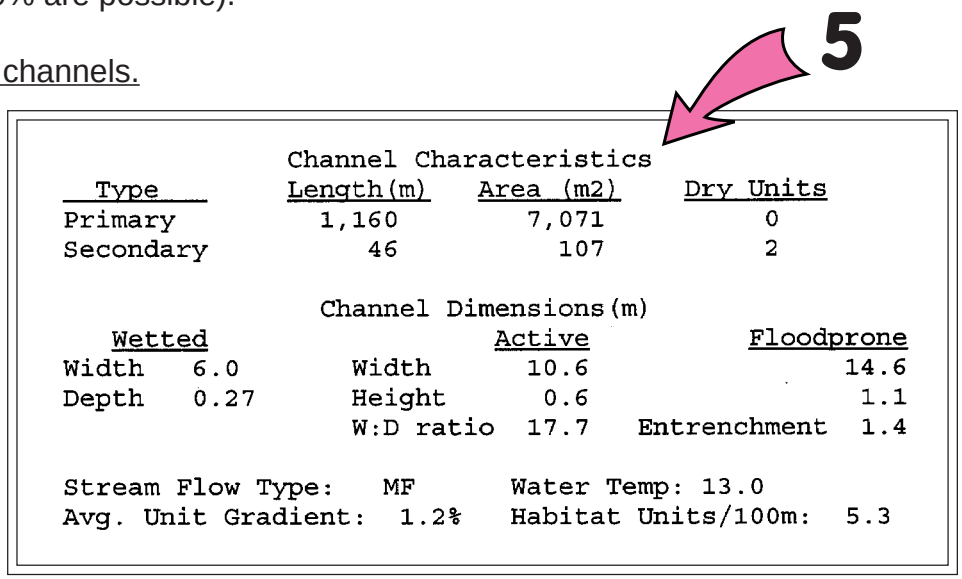
2.2 Channel Characteristics And Channel Dimensions

Channel characteristics and dimensions describe the stream with respect to the adjacent land forms. These measurements indicate the degree of channel constraint and the ability of the stream to interact with its floodplain. Interactions with floodplains enhance bank stability, secondary channel formation, riparian vegetation, and the shade it produces. These variables contribute to habitat complexity.

- **What it means:**

5 Channel characteristics and channel dimensions describe lengths, widths, depths, heights, and gradients of the stream channels and their associated floodplains. All lengths are measured in(or converted to) meters and all areas are given in square meters. Temperatures are recorded in degrees Celsius. Gradients are measured in percent slope (for example, 100% slope equals a 1.0 meter elevation gain over a distance of 1.0 meter. Slopes greater than 100% are possible).

Primary and secondary channels. The length and wetted area are summed for both the **primary channel** and all secondary channels within a particular reach. The numbers of dry units within the primary and secondary channels are also recorded.



Wetted width and depth. The average width and depth of the wetted portion of the stream channel are calculated for the entire reach.

Active channel width and height. Active channel width is the distance across the channel at average bankfull flow (the high water mark that occurs on average about every 1.5 years.) The height of the active channel is measured from the bottom of the channel to the height at bankfull flow.

Width to depth ratio. Dividing the active channel width by the active channel height determines the width to depth ratio. The width to depth ratio is an indicator of habitat quality. Relatively deep, narrow stream channels tend to provide better fish habitat than shallow wide channels.

Floodprone width and height. The average floodprone width and height are measurements indicating the height above and width beyond the stream channel that would be inundated by the highest flood event likely to occur during a 50 year period.

Entrenchment ratio. The entrenchment ratio is defined as the floodprone width divided by the active channel width. Larger entrenchment ratios indicate greater interaction between the stream and its floodplain.

Stream flow type. Stream flow type codes are shown in the following table:

TYPE	DESCRIPTION
DR	Dry.
PD	Puddled. A series of isolated pools connected by a surface trickle or subsurface flow.
LF	Low flow. Surface water flowing across 50-75 % of the active channel.
MF	Moderate Flow. Surface water flowing across 75-90 % of the active channel.
HF	High flow. Stream flowing completely across active channel, but not at bankfull flow.
BF	Bankfull flow. Stream flowing at the upper level of the active channel margin.
FF	Flood flow. Stream flowing over banks onto terraces or floodplain. Flow above floodprone height if the channel is deeply incised.

Average unit gradient. The average unit gradient represents the overall steepness of the stream channel within each habitat unit throughout the reach.

Water temperature. The water temperature designation represents the measured temperature on the day of the survey.

Habitat units/100m. The average number of habitat units per 100 meters represents the degree of fragmentation of the stream channel into different habitat types. Larger or less complex streams tend to have fewer units, while smaller or more complex streams tend to have greater numbers of units per 100 meters.

- **How channel characteristics and dimensions are determined:**

The length and width of each habitat unit is measured by the survey crew. Overall reach lengths are double-checked using USGS topographic maps. Finally, lengths and areas are calculated and summed.

The widths and heights of the active channel, floodprone areas, and first terraces are all measured by the survey crew, using a measuring tape. These measurements are known collectively as the **channel metrics**. The width to depth ratio, average unit gradient, and habitat units per 100 meters are derived during data analysis. Water temperature and stream flow are determined directly by the survey crew.

- **Significance for fish habitat**:

Primary and secondary channels. Lengths and areas of primary and secondary channels indicate the extent of potential fish habitat. Secondary channel lengths and areas indicate the amount of off-channel habitat potentially available to fish during high winter flows. The numbers of dry units provide clues to flow conditions at the time of the survey and may also indicate the effects of water withdrawals or diversions.

Wetted width and depth. The average wetted width and depth indicate the size of the stream. In general, stream channels with significant depth compared to width have a higher potential for productive fish habitat.

Active channel width and height. Comparisons of the widths and heights of the active channel and floodprone areas describe the ability of the stream to move laterally during high flow events. The active channel height and width measurements indicate the extent of flow during normal high winter flows.

Width to depth ratio. Shade from riparian vegetation, cover from undercut banks, and water temperatures in pools are all affected by the width to depth ratio. A high width to depth ratio increases the water's exposure to solar radiation, resulting in potentially higher temperatures. Uundercut banks are often reduced, affecting critical cover preferred by many salmonids.

Floodprone width and height. Floodprone height is generally two times the active channel height. A measurement across the valley floor at this height determines the lateral extent of a 50 year flood event. It also indicates whether potential fish habitat in secondary channels could be accessed or affected by flood flows.

Entrenchment ratio. The entrenchment ratio indicates the potential for the stream to interact with its floodplain. Values greater than 1.0 signify increasing floodplain interaction, which encourages development of secondary channels. Floodplain interaction may enhance stands of riparian vegetation, improve streambank stability, and increase habitat complexity.

Stream flow type. Stream flow types are affected by the amount of base flow, and in some areas, snowpack. Many headwater areas simply dry up in late summer, eliminating any use by fish at that time.

Water temperature. Water temperature is one of the most critical aspects of fish habitat. Salmonids become stressed above 18 degrees Celsius, and the incipient lethal temperature for many salmonids occurs around 24.0 degrees Celsius (75 degrees F).

Average unit gradient. The average unit gradient affects the types of habitat that can form, and the ability of various species to colonize those areas during variable seasonal flows.

Habitat units/100m. The average number of habitat units per 100 meters indicates the potential for different habitat unit types. Streams with more complex habitats have more units per 100 meters. Variety and complexity are hallmarks of good fish habitat.

3.0 RIPARIAN AND BANK SUMMARY

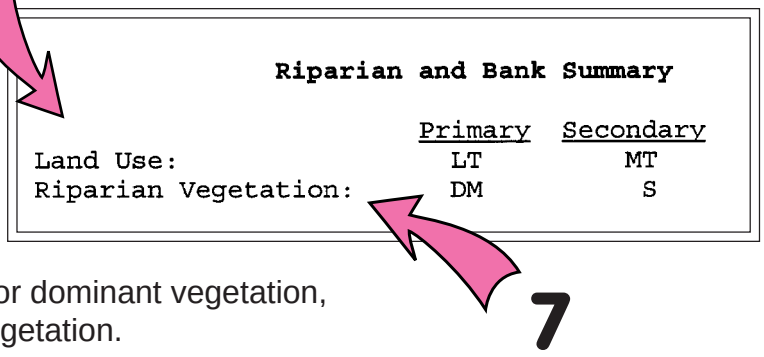
A Riparian and Bank Summary is prepared for each reach. The Riparian and Bank Summary provides a tabular summary of land use within the reach, riparian vegetation and its contribution to stream shade, and the status of bank erosion and undercutting.

3.1 Land Use and Riparian Vegetation Codes

- **What it means**:

Land use provides one type of context in which the stream and its valley exist.

6



6 Land use. Codes for land uses within the reach are included in the report. Land use describes activities beyond the riparian area, on the hillslopes, and throughout the watershed in general. Land use and riparian vegetation codes are subdivided into primary land use or dominant vegetation, and secondary use or age class of vegetation.

Land use codes are shown in the following table:

USE	DESCRIPTION	USE	DESCRIPTION
AG	Agricultural	**BK**	Bug Kill (Eastside with >60% mortality)
TH	Timber Harvest (active)	**LG**	Light Grazing
YT	Young Trees (up to 15 cm dbh)	**HG**	Heavy Grazing
ST	Second Growth Timber (15-30 cm dbh)	**EX**	Exclosure
LT	Large Timber (30-50 cm dbh)	**UR**	Urban
MT	Mature Timber (50-90 cm dbh)	**RR**	Rural Residential
OG	Old Growth (90+ cm dbh)	**IN**	Industrial
PT	Partial Timber (partial or thinned cut)	**MI**	Mining
FF	Forest Fire (recent)	**WL**	Wetland
		NU	No Use Identified

Riparian vegetation provides bank stability, shade over the channel, and large woody debris for recruitment into the stream.

7 Riparian vegetation. The riparian vegetation summary characterizes the vegetation within one active channel width on either side of the channel throughout the reach. Riparian vegetation is described with a two part code. The first letter describes the type of vegetation, while the second refers to the age of trees and shrubs in the riparian area. Riparian vegetation codes are shown in the following table:

TYPE	DESCRIPTION	AGE	DESCRIPTION
N	No vegetation.	**S**	Seedlings & new plantings.
B	Sagebrush.	**P**	Young trees or saplings, poles.
G	Annual grasses & forbs.	**Y**	Young, small trees.
P	Perennial grasses.	**M**	Mature, large, established trees with understory.
S	Shrubs and vines.	**O**	Old growth, snags, woody debris,multilayered canopy.
D	Deciduous dominated.		
M	Mixed coniferous/deciduous		
C	Coniferous dominated		

- **How land use and riparian vegetation are determined**:

Land use and riparian vegetation are determined by the survey crew by visually assessing the hillslopes and riparian zone as they conduct the survey. Conversations with landowners also help determine land uses.

- **Significance for fish habitat**:

Riparian vegetation is a key component of fish habitat. A healthy riparian canopy shades the stream channel, in many cases reducing high summer water temperatures. Healthy riparian vegetation stabilizes stream banks with the reinforcing action of interconnecting root systems. Stabilized stream banks are more likely to develop bank **undercut**, which provides important cover for fish. Stabilized stream banks are less likely to provide fine sediments, which can embed spawning gravels and, in extreme cases, fill in pools. Riparian trees also provide the majority of large woody debris (LWD) recruitment into the stream.

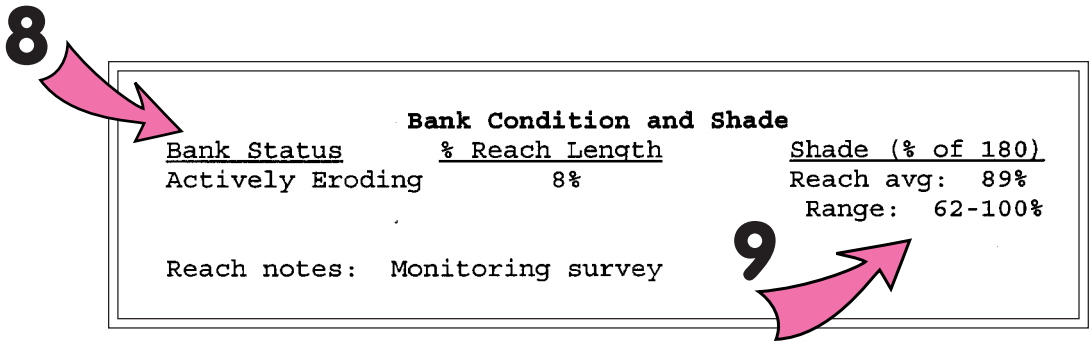
3.2 Bank Condition and Shade

Actively eroding banks are sources of silt and sand inputs into a stream. Reduced soil stability may also destabilize riparian vegetation.

Undercut banks can provide excellent cover for fish to rest or escape from predators.

- **What it means:**

Bank condition (status) is the percent of the reach length with either actively eroding banks or undercut banks.



8

Actively eroding. Material is removed by the action of flowing water on actively eroding banks. Actively eroding banks are usually composed of fine sediments and are not stabilized by vegetation. Actively eroding banks may contribute material slowly to the stream or collapse in large chunks under the force of gravity.

Undercut banks. When the wetted channel has cut underneath a vegetatively-stabilized bank, an undercut bank is formed. The horizontal surface of the bank overhangs the water. The lateral extent of the undercut may be a few centimeters up to a few meters.

9

Shade. Shade is stated as a percentage of the 180 degree arc over the stream that is shaded by either topographic features or vegetation. The average shading, as well as the range of values, is given for the reach.

- **How bank condition and shade are determined**:

The survey crew visually determines the extent of actively eroding and undercut banks in each habitat unit as they move upstream. Each bank, left and right, is apportioned 50 percent of the total. For example, if the entire length of each bank within a habitat unit was undercut, the value would be 100%. If one bank was entirely undercut, but the other bank had no undercut, the value would be 50%, and so on. The percent reach length of both actively eroding and undercut banks is determined during data analysis.

Stream shade measurements are described in Section 4.1, Percent Shade. The average percent shade and the range of values for the reach, are determined during data analysis.

- **Significance for fish habitat:**

Although bank erosion is a natural process, actively eroding banks are significant sources of silt and sand. The effects of fine sediments upon substrate embeddedness are described in Section 4.2, Percent of Substrate Silt and Organics. Actively eroding banks tend to inhibit the development of undercut banks which provide desirable habitat for salmonids. Unstable, actively eroding banks also degrade riparian vegetation.

Salmonids strongly prefer the habitat provided by undercut banks. Flow velocities are lower beneath undercut banks, creating ideal holding areas and cover from predators.

HABITAT UNIT REPORT

(Page 1)

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OREGON DEPT. FISH AND WILDLIFE - STEP **GREEN CREEK #956**
INTERMEDIATE HABITAT INVENTORY Report Date: 03/05/99 Survey Date: 06/23/98

HABITAT UNIT SUMMARY

REACH 1 **REACH 1**

HABITAT DETAIL

Habitat Type	Number Units	Total Length (m)	Avg Width (m)	Avg Depth (m)	Total Area (m^2)	Large Boulders (#>0.5m)	Substrate Percent Wetted Area S/O	Snd	Grvl	Cbbl	Bldr	Bdrk
DRY UNITS	1	6	3.5	0.00	21	0	6	11	44	22	0	17
GLIDE	11	210	6.6	0.27	1,341	38	9	15	17	9	2	48
POOL-LATERAL SCOUR	14	229	5.0	0.54	1,199	32	19	16	25	24	8	8
POOL-PLUNGE	2	27	10.6	0.60	295	5	31	15	10	3	3	39
POOL-STRAIGHT SCOUR	5	68	5.3	0.39	353	21	15	17	19	21	11	17
PUDDLED CHANNEL	1	8	3.0	0.07	24	5	6	6	31	50	6	0
RAPID/BEDROCK	2	32	8.1	0.10	266	0	0	13	8	0	0	80
RAPID/BOULDERS	1	5	1.7	0.25	9	3	5	10	10	15	55	5
RIFFLE	19	583	5.6	0.13	3,448	180	3	10	22	20	5	41
RIFFLE W/ POCKETS	1	27	6.5	0.20	178	7	5	10	10	5	5	65
STEP/BEDROCK	4	3	8.5	0.06	14	2	0	0	0	1	1	98
STEP/COBBLE	2	7	4.4	0.09	30	8	0	8	36	48	6	3
STEP/LOG	1	0	13.7	0.05	3	0	16	26	26	32	0	0
Total:	64	1,206	6.0	0.27	7,178	301	**Avg:** 9	12	20	18	6	35

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HABITAT SUMMARY

Habitat Group	No. Units	Total Length (m)	Avg Width (m)	Avg Depth (m)	Wetted Area (m^2)	Wetted Area Percent	Large Boulders Number	Large Boulders #/100m^2
Dammed & BW Pools	0	0	.	.	0	0.00	0	0.00
Scour Pools	21	325	5.6	0.51	1846	25.72	58	3.14
Glides	11	210	6.6	0.27	1341	18.68	38	2.83
Riffles	20	611	5.7	0.14	3625	50.50	187	5.16
Rapids	3	38	5.9	0.15	275	3.82	3	1.09
Cascades	0	0	.	.	0	0.00	0	0.00
Step/Falls	7	10	8.1	0.06	47	0.66	10	21.23
Dry	2	14	3.3	0.04	45	0.62	5	11.19

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POOL SUMMARY

	Total	#/km
All Pools	21	17.4
Pools ≥1m deep:	1	0.8
Complex pools (wood pieces≥3):	2	1.7
Pool frequency (channel widths/pool):	5.4	

LARGE WOOD DEBRIS

	Pieces	Pieces/100m
Small (>15cm dbh, 3m length)	67	5.6
Medium (>30cm dbh, 6m length)	15	1.2
Large (>60cm dbh, 10m length)	4	0.3
Total - all LWD classes	86	7.1

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HABITAT UNIT REPORT

(Page 2)

STREAM SUMMARY **GREEN CREEK #956**

Number Units	Total Length (m)	Avg Width (m)	Avg Depth (m)	Total Area (m^2)	Substrate Percent Wetted Area S/O	Sand	Grvl	Cbbl	Bldr	Bdrk	Total Large Boulder
64	1,206	6.0	0.27	7,178	9	12	20	18	6	35	301

14

Habitat Group	Wetted Area (m^2)	Percent
Scour Pool	1,846	25.7
Backwater Pools	0	0.0
Glide	1,341	18.7
Riffle	3,625	50.5
Rapid	275	3.8
Cascade	0	0.0
Step	47	0.7

Habitat Unit Report

4.0 HABITAT UNIT SUMMARY

Habitat unit information most directly influences the fish community. A discussion of instream habitat requires an examination of the sequence and features of habitat units in each reach.

A Habitat Unit Summary is prepared for each reach. It describes the mix of habitat types, average dimensions of the habitat units, and the amounts of substrate types, large boulders, and large woody debris. A detailed description of several important features is presented in Section 6, Stream Profile Graphs.

10

HABITAT DETAIL

Habitat Type	Number Units	Total Length (m)	Avg Width (m)	Avg Depth (m)	Total Area (m^2)	Large Boulders (#>0.5m)	Substrate Percent S/O	Snd	Grvl	Cbbl	Bldr	Bdrk
DRY UNITS	1	6	3.5	0.00	21	0	6	11	44	22	0	17
GLIDE	11	210	6.6	0.27	1,341	38	9	15	17	9	2	48
POOL-LATERAL SCOUR	14	229	5.0	0.54	1,199	32	19	16	25	24	8	8
POOL-PLUNGE	2	27	10.6	0.60	295	5	31	15	10	3	3	39
POOL-STRAIGHT SCOUR	5	68	5.3	0.39	353	21	15	17	19	21	11	17
PUDDLED CHANNEL	1	8	3.0	0.07	24	5	6	6	31	50	6	0
RAPID/BEDROCK	2	32	8.1	0.10	266	0	0	13	8	0	0	80
RAPID/BOULDERS	1	5	1.7	0.25	9	3	5	10	10	15	55	5
RIFFLE	19	583	5.6	0.13	3,448	180	3	10	22	20	5	41
RIFFLE W/ POCKETS	1	27	6.5	0.20	178	7	5	10	10	5	5	65
STEP/BEDROCK	4	3	8.5	0.06	14	2	0	0	0	1	1	98
STEP/COBBLE	2	7	4.4	0.09	30	8	0	8	36	48	6	3
STEP/LOG	1	0	13.7	0.05	3	0	16	26	26	32	0	0
Total:	64	1,206	6.0	0.27	7,178	301	**Avg:** 9	12	20	18	6	35

4.1 Habitat Detail

- **What it means:**

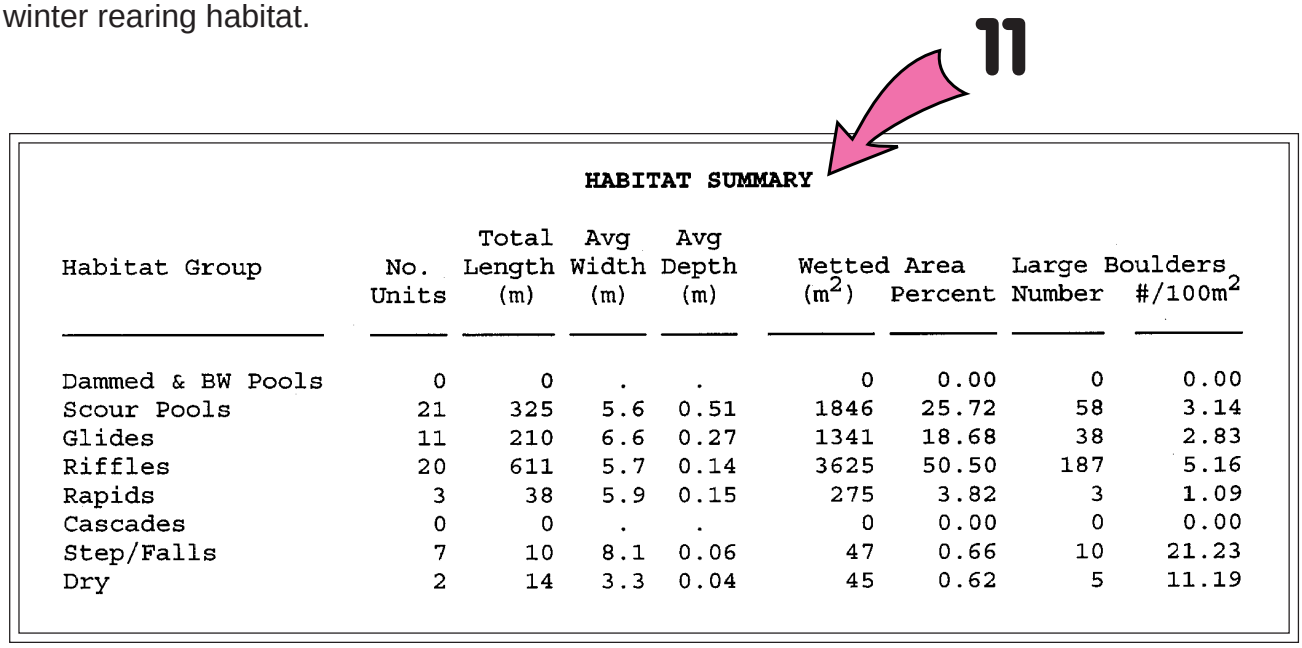
10 The report describes the types and character of habitat units observed by the survey crew. The number of each unit type, total length, average width and depth, and total area are presented. The Habitat Detail section also describes the number of large boulders counted and the substrate composition of each unit type.

- **How habitat detail is determined:**

Habitat types are described according to the slope of the water's surface, flow characteristics, and substrate. Refer to the Intermediate Level Survey Methods for more detail. Substrate types are visually estimated for each unit and large boulders are counted.

- **Significance for fish habitat:**

The number of different habitat units indicate the complexity of the reach. For example, backwater pools, alcoves, and dammed and beaver pools provide refuge habitat for fish during high flows. Depth of the units indicates the flow at the time of the survey and the potential for high quality fish habitat. Depth in both pool and fast water habitat is important for juvenile and adult fish. Each unit's substrate composition provides information about stream roughness and hydrologic complexity. Substrate also influences survival of salmonids at different life stages. High percentages of silt and sand in riffle areas may indicate poor quality spawning habitat, while cobbles and boulders in pools are important winter rearing habitat.



Habitat Group	No. Units	Total Length (m)	Avg Width (m)	Avg Depth (m)	Wetted Area (m^2)	Wetted Area Percent	Large Boulders Number	Large Boulders #/100m^2
Dammed & BW Pools	0	0	.	.	0	0.00	0	0.00
Scour Pools	21	325	5.6	0.51	1846	25.72	58	3.14
Glides	11	210	6.6	0.27	1341	18.68	38	2.83
Riffles	20	611	5.7	0.14	3625	50.50	187	5.16
Rapids	3	38	5.9	0.15	275	3.82	3	1.09
Cascades	0	0	.	.	0	0.00	0	0.00
Step/Falls	7	10	8.1	0.06	47	0.66	10	21.23
Dry	2	14	3.3	0.04	45	0.62	5	11.19

4.2 Habitat Summary

- **What it means:**

11 The Habitat Summary section groups habitat units into more general categories. Beaver pools, dammed pools, alcoves, backwaters, and isolated pools are grouped into “Dammed & BW Pools”; lateral scour, straight scour, trench pools, and plunge pools into “Scour Pools”; riffles and riffles with pockets into “Riffles”; rapid over boulders and rapid over bedrock into “Rapids”; cascade over boulders and cascade over bedrock into “Cascades”; and all step unit types into “Step/Falls”. Dry channels, puddled channels, and dry units are grouped into “Dry.” Average dimensions, wetted area, and percent of wetted area are presented. The number of large boulders in each unit type is calculated on a “per 100 meters” average. Note that the rapids, cascades, and steps usually have the largest number of boulders.

- **How a habitat summary is determined:**

Survey methods are explained in previous sections. The Habitat Summary section is a calculated summary of the Habitat Detail section.

- **Significance for fish habitat**

Significance for fish habitat is explained in the previous section, Habitat Detail. Information from the Habitat Summary section is used to create Habitat Bar Graphs, (see Section 7).

4.3 Pool Summary

- **What it means:**

12 The number and depth of pools is a measure of the pool habitat in the stream at the time of the survey. The Pool Summary characterizes the pool habitat in terms of total number of pools, pools deeper than 1 meter, pools with at least 3 pieces of associated large woody debris, and the frequency or spacing of pools. The summary also standardizes the number of pools by calculating the average the number of pools per kilometer of stream.

- **How a pool summary is determined:**

The summary is a calculation based on the number and depth of pools in the reach. Complex pools are those pools with at least three pieces of associated wood.

- **Significance for fish habitat:**

Pools, particularly deep pools, are important habitat for juvenile and adult fish. Pools provide slow water habitat, critical over-wintering habitat for some species and sometimes, the only habitat available for fish during the summer low flow period. Pools with depth and/or large wood are particularly desirable for increased space and complexity. The importance of deep pools is further discussed in Section 6.6, Number and Depth of Deep Pools.

4.4 Large Woody Debris Summary

- **What it means:**

13 Large woody debris is reported in three size catagories for each reach. Large woody debris is displayed in total pieces and as the number of pieces per 100 meters of stream channel per reach.The three length and diameter classes of wood are defined in the report.

12

POOL SUMMARY

	Total	#/km
All Pools	21	17.4
Pools ≥1m deep:	1	0.8
Complex pools (wood pieces≥3):	2	1.7
Pool frequency (channel widths/pool):	5.4	

LARGE WOOD DEBRIS

	Pieces	Pieces/100m
Small (>15cm dbh, 3m length)	67	5.6
Medium (>30cm dbh, 6m length)	15	1.2
Large (>60cm dbh, 10m length)	4	0.3
Total - all LWD classes	86	7.1

13

- **How a large woody debris summary is determined:**

Measurement and counting of large woody debris and key pieces of wood are described in Section 6.7, Pieces of Large Wood, and Section 6.8, Key Pieces of Large Wood.

- **Significance for fish habitat:**

The significance of large woody debris and key pieces of wood in fish habitat are described in Section 6.7, Pieces of Large Wood, and Section 6.8, Key Pieces of Large Wood.

Large woody debris and key pieces of wood provided by willow, cottonwood, juniper, and even aspen at higher elevations, are also important components of fish habitat in desert streams.

4.5 Stream Summary

- **What it means:**

14 The Stream Summary portion of the Habitat Unit report summarizes the habitat unit type and substrate character for the whole stream.

- **How a stream summary is determined:**

The values are calculated from the unit information obtained in all surveyed reaches.

- **Significance for fish habitat:**

The Stream Summary section provides a cursory description of the habitat across all reaches of the stream. The mix of habitat units and substrate indicates the habitat character and its suitability for different species.

STREAM SUMMARY **GREEN CREEK #956**

Number Units	Total Length (m)	Avg Width (m)	Avg Depth (m)	Total Area (m^2)	Substrate Percent Wetted Area S/O	Sand	Grvl	Cbbl	Bldr	Bdrk	Total Large Boulder
64	1,206	6.0	0.27	7,178	9	12	20	18	6	35	301

14

Habitat Group	Wetted Area (m^2)	Percent
Scour Pool	1,846	25.7
Backwater Pools	0	0.0
Glide	1,341	18.7
Riffle	3,625	50.5
Rapid	275	3.8
Cascade	0	0.0
Step	47	0.7
Dry	45	0.6

RIPARIAN ZONE REPORT

(Page 1)

15

OREGON DEPARTMENT OF FISH AND WILDLIFE - STEP HABITAT INVENTORY Report Date: 03/04/99

GREEN CREEK #956 Survey Date: 06/23/98

REACH 1 — RIPARIAN ZONE VEGETATION SUMMARY — REACH 1

Summary of Riparian Zone (0-30m) (3 transects)

Total hardwoods/1000 ft	549
Total conifers/1000 ft	0
Total conifers >20" dbh/1000 ft	0
Total conifers >35" dbh/1000 ft	0

Average number of trees in a 5-meter wide band

	Zone 1 0-10 meters		Zone 2 10-20 meters		Zone 3 20-30 meters		Zones 1-3 0-30 meters	
Diameter class (cm)	Conifer	Hardwood	Conifer	Hardwood	Conifer	Hardwood	Conifer	Hardwood
3-15cm	0.0	1.7	0.0	2.0	0.0	0.0	0.0	3.7
15-30cm	0.0	0.3	0.0	0.3	0.0	0.7	0.0	1.3
30-50cm	0.0	2.0	0.0	0.7	0.0	1.3	0.0	4.0
50-90cm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
>90cm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total/100m^2	0.0	4.0	0.0	3.0	0.0	2.0	0.0	3.0

Canopy closure and ground cover

	Zone 1 0-10 meters (%)	Zone 2 10-20 meters (%)	Zone 3 20-30 meters (%)
Canopy closure	79	89	84
Shrub cover	68	83	54
Grass/forb cover	23	15	22

Predominant landform in each zone

	Zone 1 0-10 meters	Zone 2 10-20 meters	Zone 3 20-30 meters
Hillslope	17	83	50
High terrace	67	17	0
Low terrace	0	0	0
Floodplain	0	0	0
Wetland/meadow	0	0	0
Stream channel	17	0	0
Roadbed/Railroad	0	0	50
Riprap	0	0	0
Surface slope (%)	10	29	24

RIPARIAN ZONE REPORT

(Page 2)

OREGON DEPARTMENT OF FISH AND WILDLIFE - STEP **GREEN CREEK #956**
HABITAT INVENTORY - RIPARIAN SURVEY **06/23/98**

Summary of Riparian Zone (0-30m) for all reaches (3 transects)

Summary of riparian zone (0-100ft) extrapolated to 1,000 feet along stream

Total hardwoods/1000 ft	549
Total conifers/1000 ft	
Total conifers >20" dbh/1000 ft	0

Average number of trees in a 5-meter wide band

Diameter class (cm)	Zones 1-3 Conifer	Hardwood
3-15cm	0.0	3.7
15-30cm	0.0	1.3
30-50cm	0.0	4.0
50-90cm	0.0	0.0
>90cm	0.0	0.0

Riparian Zone Report

5.0 RIPARIAN ZONE SUMMARY

This section of the report provides detail about the species composition, abundance and size distribution of riparian zone vegetation. This information correlates with the quality of fish habitat described in other portions of the report.

A Riparian Zone Summary is prepared for each reach. It summarizes the mix and sizes of general vegetation categories found in the riparian zone, calculates the average number of trees in the five-meter wide transects, and evaluates the canopy closure and ground cover with respect to predominant landforms in the riparian zone. The various vegetation categories are then extrapolated to amounts per 1000 feet of stream.

5.1 Riparian Zone Vegetation Summary

- **What it means:**

15 The Riparian Summary report describes the average conditions in the 30 meter by 5 meter transect adjacent to each side of the stream channel. It describes the number, type, and diameter of trees in three zones, each 10 meters long, extending perpendicular to the stream. It also describes the predominant landform in each zone, the slope, canopy density, and shrub and grass cover. The number of trees is expressed as the number of total trees, number of conifer trees larger than 20 inch dbh (diameter at breast height), and number of trees larger than 36 inch dbh in a 1,000 foot zone parallel to the stream, extending100 feet (30 meters) on each side of the stream.

- **How a riparian zone vegetation summary is determined:**

The riparian information is collected in the field. Each transect extends 30 meters perpendicular to the stream and is broken into 3 blocks, each 10 meters by 5 meters wide. Crews estimate the shrub and grass cover, and canopy density. The number of trees is counted and the size of trees is measured.

- **Significance for fish habitat:**

Riparian zones provide a wide range of functions important to the maintenance of high quality fish habitat. Riparian zones are the major source of recruitment for large woody debris in the channel. The trees in the riparian area also help anchor trees that fall into the stream. The canopy provides shade to maintain lower stream temperatures. The vegetation stabilizes the banks, provides habitat for terrestrial invertebrates which serve as food for salmonids, and provides nutrients and detritus to the stream. The riparian zone serves as a buffer between terrestrial and aquatic ecosystems, influencing the rate and type of materials transported to the stream system.

RIPARIAN ZONE VEGETATION DETAIL REPORT

OREGON DEPARTMENT OF FISH AND WILDLIFE - STEP
HABITAT INVENTORY Report Date: 03/04/99

GREEN CREEK #956
Survey Date: 06/23/98

RIPARIAN ZONE VEGETATION

Reach 1

Reach 1

VEGETATION DETAIL

					Cover (percent)				Diameter class (cm)					
Unit	Side	Zone	Surface	Slope	Canopy	Shrub	Grass		3-15	15-30	30-50	50-90	>90	Notes
17	LF	1	SC	10.0	50	50	20	Conifer	0	0	0	0	0	
								Hardwood	0	0	2	0	0	MAPLE, ALDER
17	LF	2	HS	30.0	90	90	10	Conifer	0	0	0	0	0	
								Hardwood	1	0	1	0	0	
17	LF	3	RB	5.0	85	30	20	Conifer	0	0	0	0	0	
								Hardwood	0	0	0	0	0	
17	RT	1	HT	15.0	90	50	50	Conifer	0	0	0	0	0	
								Hardwood	0	0	0	0	0	
17	RT	2	HS	50.0	95	60	30	Conifer	0	0	0	0	0	
								Hardwood	0	0	0	0	0	
17	RT	3	HS	35.0	95	60	35	Conifer	0	0	0	0	0	
								Hardwood	0	2	1	0	0	MAPLE
39	LF	1	HT	5.0	85	80	15	Conifer	0	0	0	0	0	
								Hardwood	4	0	1	0	0	ALDER
39	LF	2	HS	50.0	95	90	5	Conifer	0	0	0	0	0	
								Hardwood	5	0	0	0	0	
39	LF	3	RB	15.0	80	20	30	Conifer	0	0	0	0	0	
								Hardwood	0	0	0	0	0	
39	RT	1	HT	5.0	80	70	20	Conifer	0	0	0	0	0	
								Hardwood	0	0	0	0	0	
39	RT	2	HS	25.0	95	85	15	Conifer	0	0	0	0	0	
								Hardwood	0	0	1	0	0	MAPLE
39	RT	3	HS	60.0	95	85	15	Conifer	0	0	0	0	0	
								Hardwood	0	0	3	0	0	MAPLE
51	LF	1	HT	5.0	95	70	25	Conifer	0	0	0	0	0	
								Hardwood	1	1	3	0	0	ALDER
51	LF	2	HT	5.0	90	80	20	Conifer	0	0	0	0	0	
								Hardwood	0	0	0	0	0	
51	LF	3	RB	10.0	85	40	20	Conifer	0	0	0	0	0	
								Hardwood	0	0	0	0	0	
51	RT	1	HS	20.0	75	90	10	Conifer	0	0	0	0	0	
								Hardwood	0	0	0	0	0	
51	RT	2	HS	15.0	70	90	10	Conifer	0	0	0	0	0	
								Hardwood	0	1	0	0	0	
51	RT	3	HS	20.0	65	90	10	Conifer	0	0	0	0	0	
								Hardwood	0	0	0	0	0	

5.2 Riparian Zone Vegetation Detail

- **What it means:**

16 The Riparian Detail report describes the characteristics of each riparian transect. It lists the size and number of hardwood and conifer trees counted, the geomorphic surface (predominant landform), shrub and grass cover, as well as slope and canopy density. The "Notes" column may also list the dominant tree species. The survey crew documents the location of each transect on a 7.5 minute topographic map.

- **How riparian zone vegetation detail is determined:**

The information is estimated or measured by the survey crew in each of three 5 meter by 10 meter subsections within each transect. A transect is surveyed on each side of the stream at a minimum of every 30 units or 1 kilometer, whichever is shorter.

- **Significance for fish habitat:**

The riparian zone provides important material to and buffering for the stream. The detail report shows the characteristics of each subsection of each transect.

6.0 STREAM PROFILE GRAPHS

A stream profile graph represents a picture of the stream gradient along its surveyed length. Profiles provide clues to the types and characteristics of habitat expected along the stream's length.

- **What it means:**

Stream **profile** graphs depict a stream channel's change in elevation (above mean sea level) over the surveyed distance of the stream, producing a continuous picture of the stream **gradient**. On the graphs, the ratio of distance to elevation is generally 20:1, allowing reasonable comparisons of gradients from various streams or stream reaches. Low gradient stream sections have a nearly horizontal profile, while higher gradient sections have a more vertical profile. If the graph axes represent a 20:1 ratio, a diagonal profile indicates a 5% slope.

Positions of significant stream channel features are layered upon the stream profile. Key features are listed below, but others may be added if required by survey objectives.

⇒ **Reach** breaks.
⇒ Bridges, road crossings, culvert crossings.
⇒ Tributary junctions.
⇒ **Mass failures.**
⇒ **Debris jams.**

- **How are stream profile graphs determined:**

Stream profile graphs are created from measurements obtained by the survey crew as they move upstream. The crew measures the length and water surface slope of each **habitat unit** . By stringing together the length and slope measurements in a chain during data analysis, the profile graphs are produced.

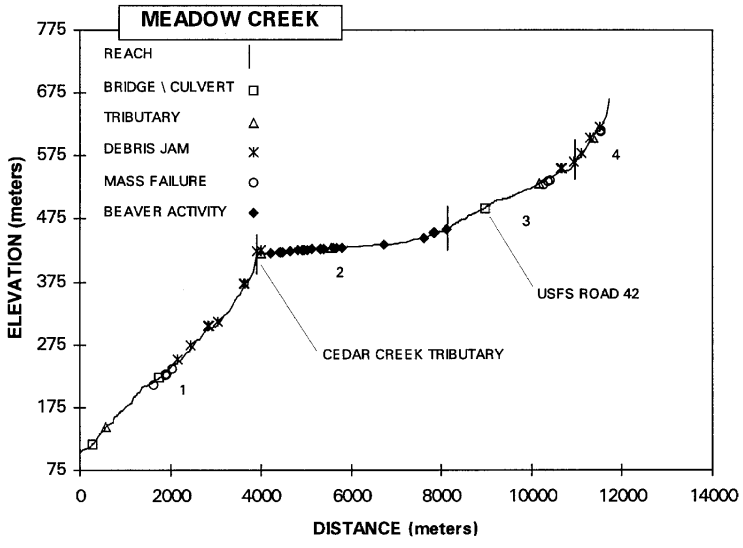


Figure 1. Stream profile graph. Note the four reaches in the survey. Note how the gradient decreases in reach 2 and then increases in reaches 3 and 4. Note the positions of tributaries and beaver activity.

- **Significance for fish habitat:**

Certain measurements obtained from the raw survey data are plotted on top of the stream profile. This produces a picture of how a habitat feature varies along the length of the stream. A scale assists the user with the quantitative value of each feature. The following list of key habitat parameters affect fish populations in stream habitats. These parameters are most often plotted on profile graphs. A detailed discussion of each follows.

- Percent **shade**.
- Percent of **substrate** composed of **silt and organics**, and sand.
- Percent of substrate composed of **gravel**.
- Percent of substrate composed of **bedrock**.
- **Large boulders** per 100 meters (running average).
- Depth of deep pools.
- Number of pieces of **large wood**.
- **Key pieces** of large wood.

6.1 Percent Shade

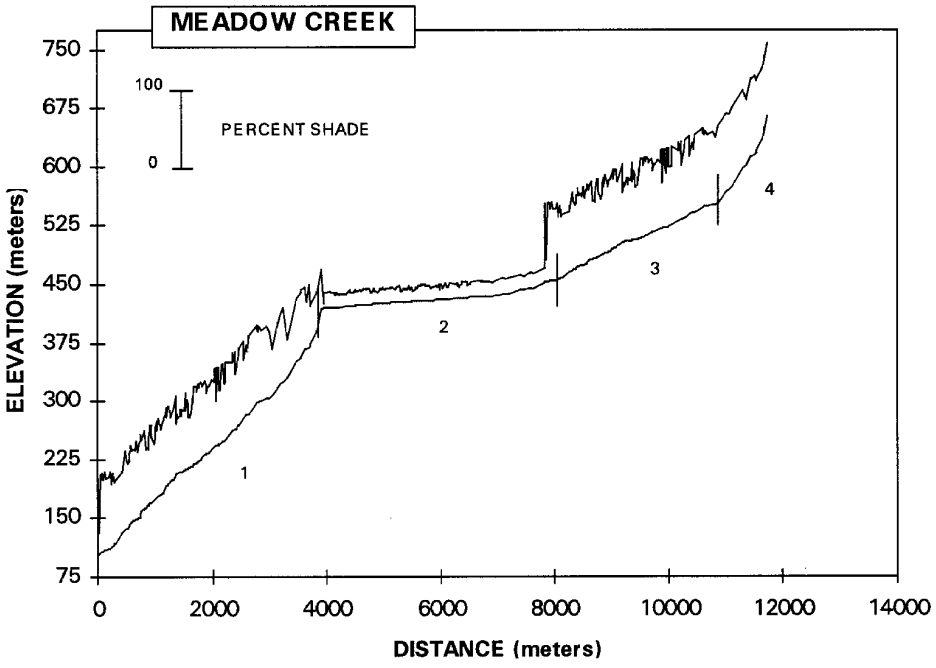


Figure 2. Percent shade plot. Areas with the highest shade percentage have the least channel exposure. Note how the shade decreases dramatically in reach 2. This may be caused by the beaver activity in the reach (see Figure 1).

Percent shade indicates the amount of vegetative or topographic cover over the stream channel. Shade helps maintain low water temperatures necessary for salmon and trout survival.

- **What it means:**

Percent shade is a measure of how much of the stream channel is shaded at the time of the survey.

- **How is percent shade determined:**

The survey crew uses a **clinometer** (an instrument that measures vertical angles) to find the angle from the center of the stream upward to the feature providing the shade on either side of the stream. Shade is provided by trees or other vegetation (vegetative shading), or by terraces, cliffs, or hillslopes adjacent to the stream (topographic shading). The angle measurements are made in each **habitat unit** during the survey. During data analysis, shade measurements are converted to percent shade for each habitat unit. Each percent shade measurement is subsequently plotted at its position along the stream profile graph to create a continuous picture of stream shading along the entire length of the survey.

- **Significance for fish habitat:**

Shade moderates instream water temperatures. This is especially true during the summer when air temperatures are high, flows are low, days are long, and the sun's high angle causes more radiant solar energy to strike the stream. Shading helps reduce overall stream temperatures and buffers daily water temperature fluctuations. High water temperatures limit fish production in watersheds, as well as upstream and downstream distribution of fish species. **Salmonids** as a group are especially sensitive to high water temperatures. The effect of stream shading upon water temperatures generally decreases as the stream widens and deepens.

6.2 Percent Of Substrate Silt, Organics, and Sand

Percent of substrate silt, organics and sand reflects the amount of silt, fine organic matter, and sand on the stream bottom. Silt, organic deposits, and sand are harmful if they cover or surround gravels used by salmon and trout for spawning.

- **What it means:**

The percent of substrate composed of silt, organics, and sand is a measure of the amount of stream bottom, or substrate, composed of the smallest particle sizes. Although calculated separately during the survey, the amount of sand particles is included with silt and organics for the purposes of this graph. Diameters of these particles range from .062 to 2.0 millimeters. Silt, organics, and sand are often referred to collectively as “fine sediments” or “fines.” Silt is easily held in suspension by flowing water, is easily dislodged from the stream bottom and banks, and clouds the water when disturbed. Fine particles of organic matter often occur with silt deposits and are grouped for purposes of the survey.

- **How is percent of substrate silt, organics, and sand determined:**

Survey crew members visually estimate the substrate amounts for each range of particle sizes. Substrate estimates are completed for each habitat unit surveyed.

- **Significance for fish habitat:**

Sand, silt and organic matter are natural components of stream systems. However,

excessive amounts of these small particles contribute to the **embeddedness** of the substrate. Embeddedness is defined as the degree to which larger particles, such as boulders, **cobble**, and gravel, are surrounded and / or covered by smaller particles. Excessive deposits of fine sediments severely restrict spawning habitat for salmonids by filling in the spaces between larger substrate particles. Newly spawned eggs often lodge in these spaces. Developing embryos and newly hatched **alevins** need these gaps between substrate particles for physical space and the delivery of well-oxygenated water (Everest, et al. 1987). Excessive deposits of fine sediments also reduce habitat for **macroinvertebrates**, such as aquatic insects, which are the primary food source for juvenile salmonids (Cummins and Klug, 1979). Silt deposits can even restrict juvenile **harborage** from high winter flows by filling in pools, especially **off-channel** pools. Because particles of silt and organic matter are easily transported by flowing water, sources of these particles, such as collapsing banks or slope failures, can affect large areas of habitat downstream from the source.

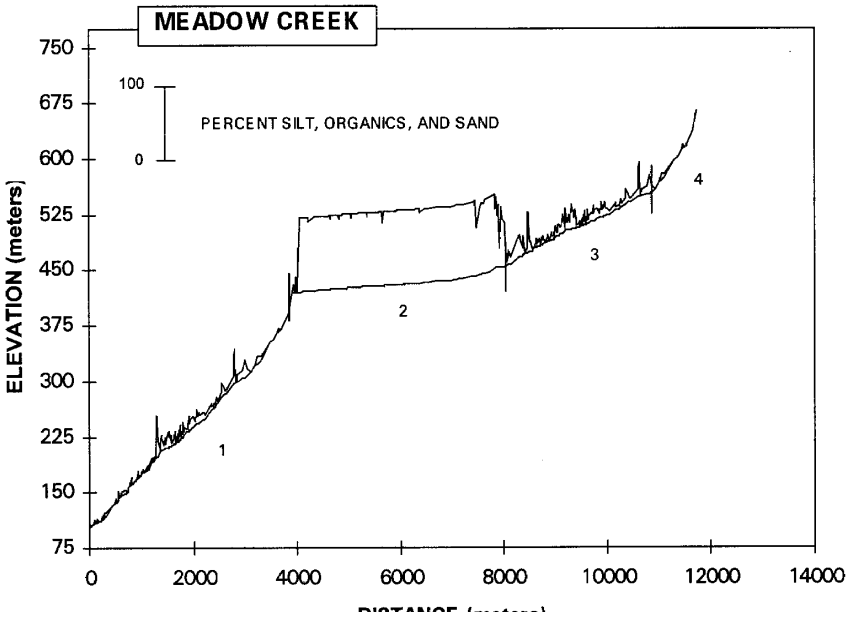


Figure 3. Silt, organics, and sand plot. Note the accumulation of fines in reach 2 where there is extensive beaver activity and a decrease in gradient.

6.3 Percent Of Substrate Gravel

Percent of substrate gravel reflects the amount of gravel in the stream bottom. Trout and salmon use gravel areas for spawning. For developing young to survive, spawning gravels must be free of silt or sand. Different species of fish need different sizes of gravel to spawn successfully.

- **What it means:**

The percent of substrate composed of gravel is a measure of the amount of the stream bottom, or substrate, composed of moderately sized particles. Gravel particles range in size from a small pea to roughly baseball-sized (diameters of 2 to 64 millimeters).

- **How is percent of substrate gravel determined:**

Survey crew members visually estimate the substrate amounts for each range of particle sizes. Substrate estimates are completed for each habitat unit surveyed.

- **Significance for fish habitat:**

All species of salmonids spawn in gravel. Each species prefers a different gravel size for spawning, thus multiple species may utilize the same area of stream habitat. For example, small resident cutthroat trout prefer small gravel sizes for spawning, while heavy, powerful Chinook salmon prefer larger gravels in which to construct their nesting sites, or **redds**. Redds are usually constructed in the downstream margins of pools, known as **tailouts,** and in riffle habitat. The availability of porous, silt-free spawning gravels affects the distribution and reproductive success of salmonids within the stream.

Gravel particles absorb some of the energy of flowing water as they are transported downstream. The transport of gravels during various seasonal flows is a dynamic process that continually reshapes habitat within the stream.

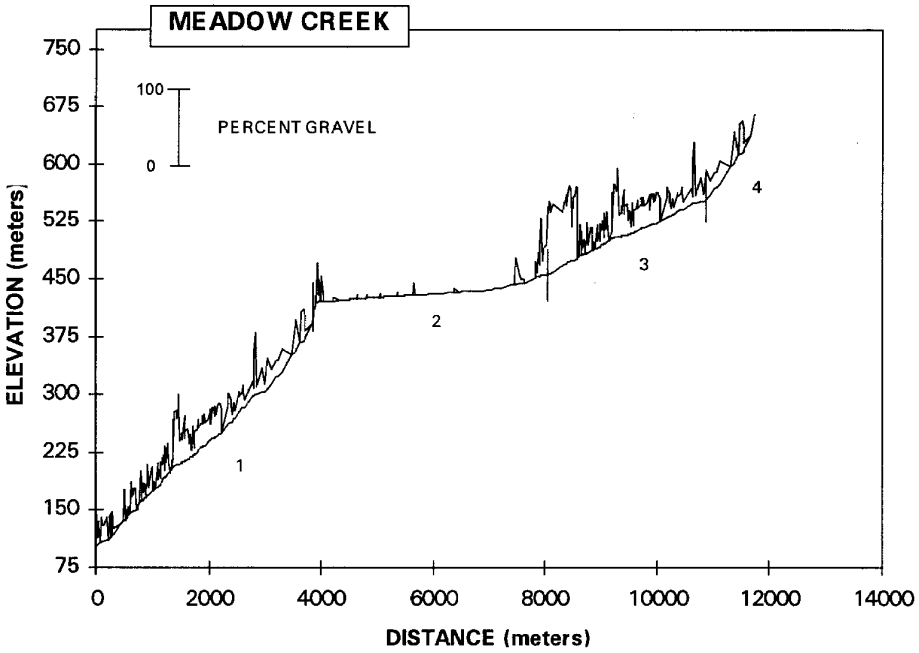


Figure 4. Percent gravel plot.

6.4 Percent Of Substrate Bedrock

Percent of substrate bedrock reflects the amount of bedrock in the stream bottom. Bedrock substrates offer low friction against flowing water. Lower friction results in higher flow velocities in steep stream channels. Trench pools may also form in bedrock areas, and can offer cool refuges for fish in the pool bottoms.

- **What it means:**

The percent of substrate composed of bedrock is a measure of the amount of the stream bottom, or substrate, composed of **igneous** bedrock, such as basalt or rhyolite, **sedimentary** bedrock, such as sandstone, shale, or conglomerates, or **metamorphic** bedrock, such as slate or schist.

- **How is percent of substrate bedrock determined:**

Survey crew members visually estimate the substrate amounts for each range of particle sizes. Substrate estimates are completed for each habitat unit surveyed.

- **Significance for fish habitat:**

Bedrock substrates offer little resistance to the energy of water flowing downstream. The lower friction over bedrock results in higher flow velocities, especially in steeper areas. Areas of high velocity flows do not offer resting areas for fish, especially for juvenile salmonids, as they must expend too much energy to avoid being washed downstream by the flow.

Some areas in very narrow valleys with predominantly bedrock substrate can form **trench pools**. Trench pools can be quite deep. The bottom of the pool provides deep water refuge for fish.

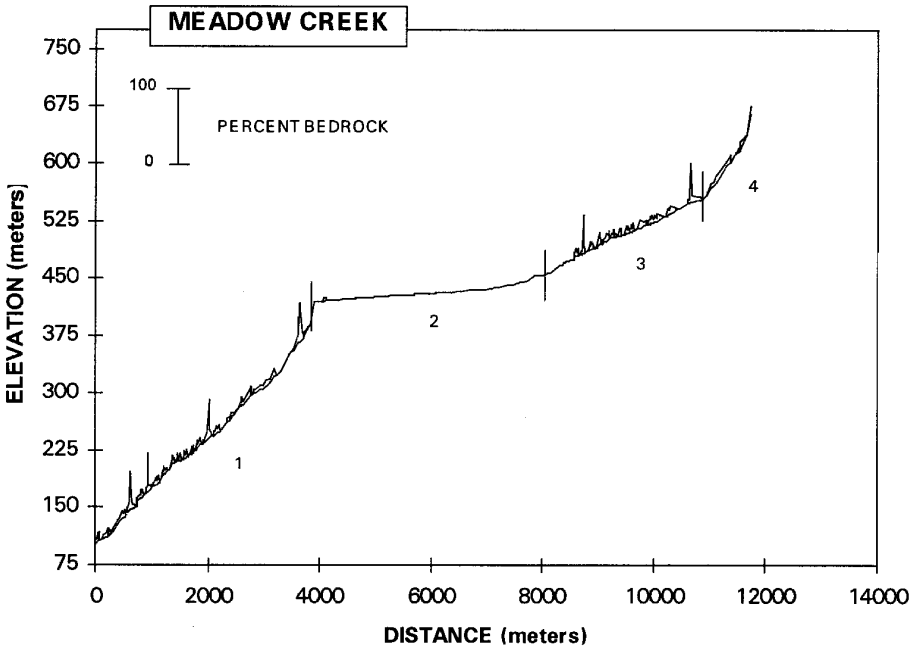


Figure 5. Percent bedrock plot. Note the increasing amounts of bedrock in the higher gradient reaches.

6.5 Large Boulders Per 100 Meters (Running Average)

Large boulders per 100 meters refers to the density of boulders with diameters of at least 0.5 meters protruding from the water's surface. These boulders provide roughness to the stream channel. Large boulders also provide resting and feeding areas for fish.

- **What it means:**

Large boulders per 100 meters (running average) refers to a count of large boulders 0.5 meters in diameter or larger that exist as part of the stream substrate and that protrude above the surface of the water at the time of the survey.

- **How is the running average for large boulders per 100 meters determined:**

All large boulders that meet the minimum size and position criteria are counted by the survey crew in each habitat unit. The running average is determined during the data analysis.

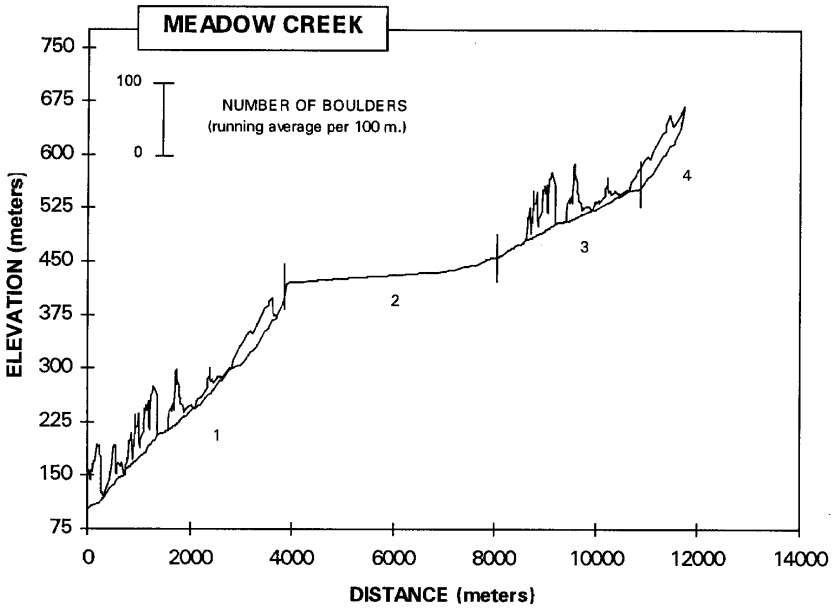


Figure 6. **Large boulders plot**. This plot is most appropriately interpreted as a trend plot, i.e., it is a general indication of the number of large boulders throughout each reach. The plot does not indicate the actual number of boulders at any given location because it is a plot of the running average.

- **Significance for fish habitat:**

Large boulders contribute significantly to "surface roughness." **Surface roughness** refers to the stream's ability to withstand the erosive force of high flows, especially during winter high flows, or unusual flood events. Surface roughness increases with the size and number of large boulders in the substrate. Large boulders are not easily moved, and may require extremely high flows for transport downstream. Upstream areas tend to have greater numbers of large boulders. Large boulders are also most common in streams flowing through narrow valleys.

Large boulders provide cover from predators, as well as resting and feeding sites for salmonids in the **pocket pools** formed in association with the boulder. Fish require little expenditure of energy to reside in pocket pools and can easily feed in faster waters nearby. Boulder-formed pockets are also used as overwintering habitat and as shelter areas from high winter or flood flows. Boulder pockets are prime habitat for aquatic macroinvertebrates, a primary food source for salmonids.

6.6 Number And Depth Of Deep Pools

Number and depth of deep pools includes pools deeper than 0.5 meter or 1.0 meter based on stream size. Pools are used by fish for resting, rearing, escaping predators, overwintering, and as cool water refuges during the summer.

- **What it means:**

Number and depth of deep pools is a measure of the maximum depth of deep pools in a stream at the time of the survey. In larger systems, deep pools are those with depths equal to or greater than 1.0 meter. In smaller systems, deep pools are those with depths of 0.5 meter or greater. The choice of which minimum depth to plot is based on active channel measurements or the overall depths of all pools in the survey.

- **How numbers and depth of deep pools are determined:**

The survey crew uses a depth staff calibrated in tenths of a meter to measure the depth at the deepest part of each pool. Occasionally, a pool is so deep, or the deepest part so inaccessible, surveyors must visually estimate the depth of the pool. On the rare occasions a large stream system is surveyed from a boat, canoe, or other craft, pool depths are determined with an electronic depth finder.

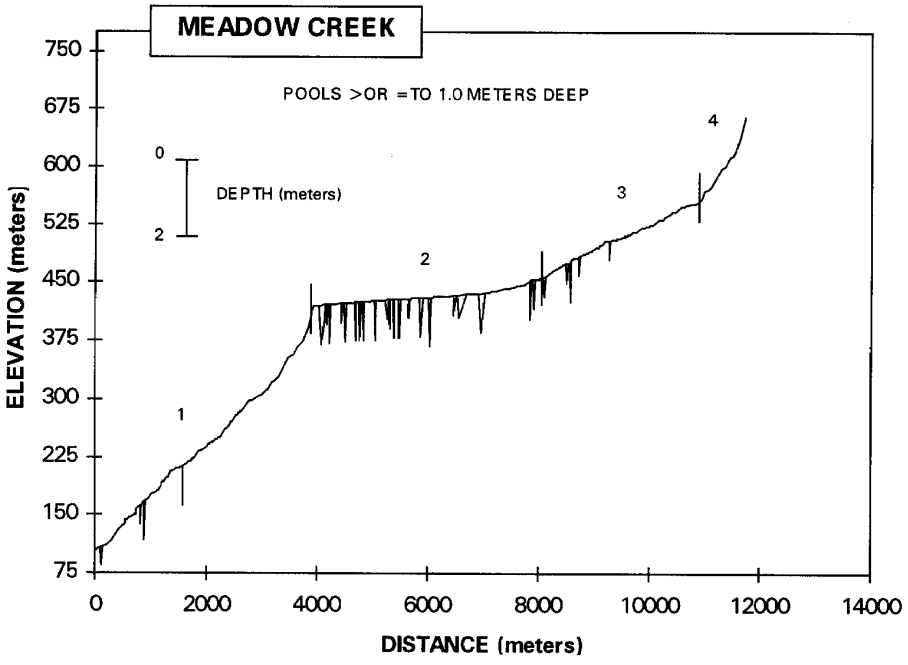


Figure 7. Pools deeper than 1.0 meter plot. Depth plots extend below the profile line, indicating the depth of the pools. Most of these pools are 1.0 to 1.5 meters deep.

- **Significance for fish habitat:**

Pool depth indicates the ability of a stream to provide critical habitat for salmonids. Pools are important resting areas for fish. It requires less energy to hold in pools. Fish also find refuge from predators in pool areas. Pools are important rearing areas for many species. Pools can be critical overwintering habitat for juvenile salmonids, and may form some of the only viable habitat during summer low flows, especially in drought years. Finally, the bottoms of pools are usually the coolest habitats in the stream, and these thermal refuges are strongly preferred by all life stages during the warm summer months. Depth enhances all of the desirable qualities of pool habitat for salmonids.

6.7 Pieces Of Large Wood

Pieces and volume of large wood refer to dead and dying trees within the stream channel. To count, the pieces must be a minimum of 15 centimeters in diameter and 3.0 meters in length, including rootwads. Large wood in the stream provides an important source of cover for fish, especially in pools. As it decomposes, large wood creates an energy source for the food chain. Wood also helps create pools and new channels.

- **What it means:**

Large woody debris refers to all pieces of wood at least 15 centimeters in diameter and 3.0 meters in length, and larger, including all rootwads. These pieces are found within the stream's active channel and are either natural or cut dead and dying trees.

- **How the pieces of large wood count is determined:**

Surveyors count each piece of large woody debris that falls within the acceptable size criterion in each habitat unit. Any piece with some portion of its length within the **active channel** is counted. Surveyors divide the large woody debris into diameter and length classes as they count. The total number of pieces for each habitat unit are summed during the data analysis. To show their distribution, large woody debris accumulations are plotted at their appropriate positions along the stream.

- **Significance for fish habitat:**

Large woody debris directly provides fish cover in all types of habitat units where it is present. It is especially effective in pools. A pool with significant amounts of large woody debris is preferred by salmonids over a pool without large woody debris. Large submerged wood with a rootwad attached provides particularly good cover for fish.

The presence of large woody debris in fast water units such as riffles and rapids creates a physical barrier around which water must flow. The scour created by such flow diversions is the driving force behind the formation and maintenance of **scour pools**, and in some cases, **plunge pools**.

Decomposition of large woody debris in the stream serves as an energy source for the growth of microorganisms, which in turn are fed upon by macroinvertebrates, the main food source for salmonid fry. Many macroinvertebrates species spend part of their life cycles on large woody debris substrate.

Large accumulations of large woody debris trap gravel and create new channels, especially during periods of high flow. This increases the diversity and complexity of fish habitat.

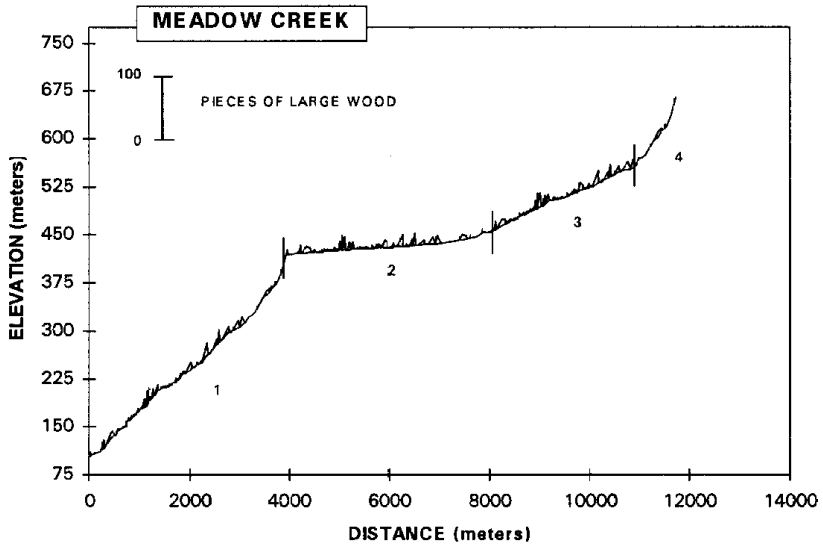


Figure 8. Large woody debris (LWD) plot. The presence of large diameter and/or very long pieces can result in significant volumes contributed by relatively few pieces.

6.8 Key Pieces Of Large Wood

Key pieces of large wood refers to downed wood within the stream channel that are a minimum of 60 centimeters in diameter and 10 meters in length. Key pieces resist downstream transport as well as anchor and retain other pieces of wood. Key pieces represents the long-term wood retention ability of the stream.

- **What it means:**

Key pieces of large woody debris are pieces with a minimum diameter of 60 centimeters and a length of 10.0 meters. These pieces are dead or dying trees, either natural or cut, occur within the stream channel. Key pieces are typically the anchor pieces around which other material is deposited and trapped.

- **How are key pieces of wood determined:**

Surveyors count each piece of large woody debris that meets the minimum size criterion in each habitat unit. Any piece with some portion of its length within the active channel is counted. Surveyors divide the large woody debris into diameter and length classes as they count. The total number of key pieces of "large" wood in each habitat unit are summed during the data analysis. To show their distribution, key pieces of large wood are are plotted at their appropriate positions along the stream.

- **Significance for fish habitat:**

In general, key pieces provide identical benefits for fish habitat as those previously described for large woody debris. The overriding value of key pieces is their resistance to transport by high winter or flood flows. Key pieces enhance fish habitat by insuring long-term retention of large woody debris within the stream.

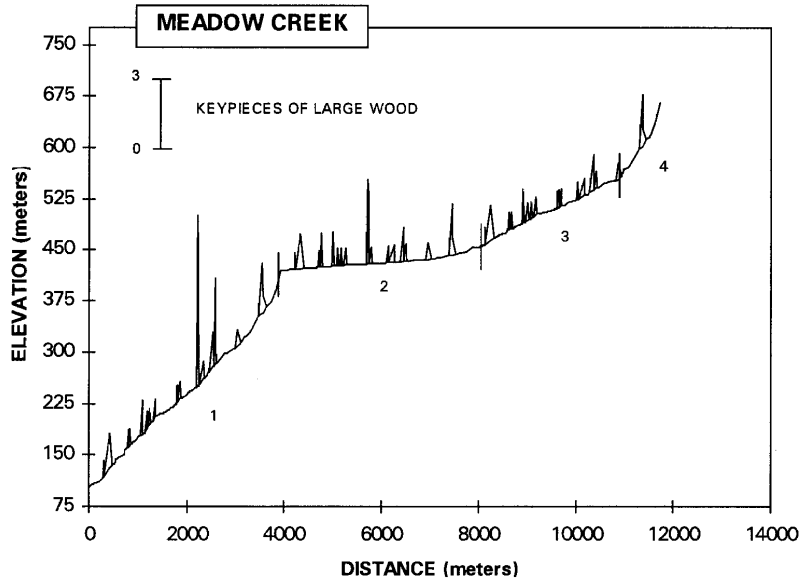


Figure 9. Key pieces of wood plot.

7.0 HABITAT BAR GRAPHS

Habitat bar graphs show the relative surface areas occupied by different types of habitat units in a stream. The graphs are an easy way to compare the extent of different habitats, and they provide clues about a stream's ability to support different life stages of fish.

- **What it means:**

The habitat bar graphs provide a graphical representation, in the form of histograms, of the total amount of wetted channel area for each major type of habitat unit within a reach. For example, the total area of riffle habitat is easily compared to the total area of cascade habitat. The habitat bar graphs subdivide habitat types into the following major groups:

⇒ **Dammed pools -** (beaver ponds, dammed pools, alcoves, backwaters, isolated pools)
⇒ **Scour pools** (straight scour, lateral scour, trench, and plunge pools)
⇒ **Glides**
⇒ Riffles
⇒ Rapids
⇒ **Cascades**
⇒ **Steps / falls**
⇒ **Dry units** and **dry channels**

- **How are habitat bar graphs determined:**

During data analysis, wetted areas for each type of habitat unit are calculated from the surveyors' measurements. The wetted area scale is plotted on the vertical or y-axis, while habitat types are aligned along the horizontal or x-axis. It is important to note that the wetted area scale is different for each reach, because the total channel area is different for each reach.

- **Significance for fish habitat:**

Habitat bar graphs create visual comparisons of the relative amounts of different habitats in a stream. This provides clues about a stream's ability to support different life stages of fish.

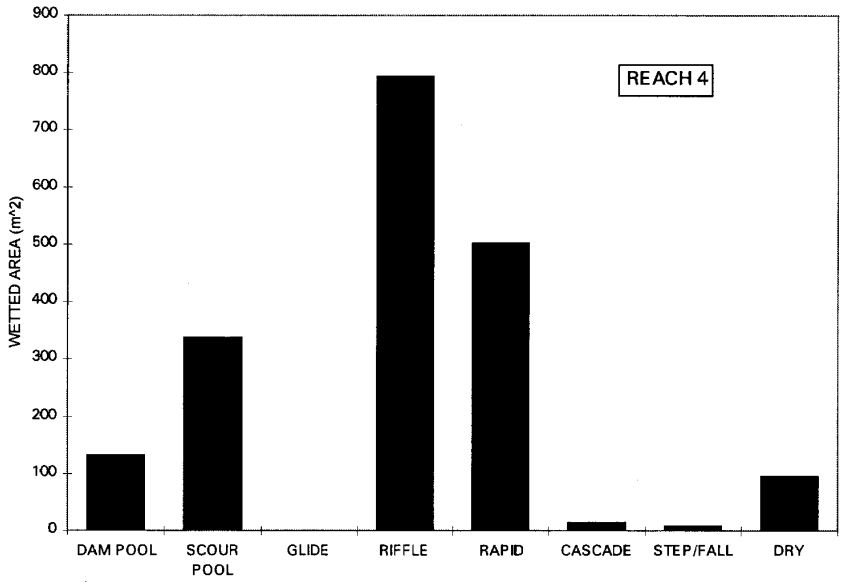


Figure 10. Habitat bar graph. Note the distribution of habitat types and their relative areas within this particular reach. The dominance of riffle and pool habitat is common in a reach with a low average gradient. High gradient streams have a higher proportion of rapids and cascades.

8.0 ADDITIONAL MATERIAL

8.1 Cover Document

The cover document briefly summarizes the predominant features of the stream and each reach. It includes basic information about the location of the survey, the watershed area and the ecoregion. The document discusses habitat character and any notable features in each reach such as habitat unit types, substrate, large wood loading, and potential barriers.

8.2 Comment Summary

The comment summary sheet lists all the comment codes and notes made by the survey crew made during the survey. Comments are listed by reach, unit number, habitat type, and distance from the beginning of the survey. The methods manual lists all potential comment codes.

8.3 Maps

Topographic maps are included with each stream survey. The maps show locations for the beginning and end of the survey, reach breaks, and important features such as potential barriers, landslides, tributary junctions, and bridge crossings.

8.4 Photo Sheets

Photo sheets show the character of each reach. Photos are also used to record important features of the stream. Each photo is tied to a location and habitat unit.

PART B – WATERSHED LEVEL ANALYSIS

9.0 WATERSHED SUMMARY

A discussion about a stream is not complete without viewing the stream in the context of its neighboring streams and its place in the watershed. Every stream reach does not have to fulfill all the life history requirements of each species in the fish community. View the reaches of a stream in a watershed as part of an interconnected web, each with different features, functions, and processes.

The Watershed Summary describes the key components of all streams surveyed within a given watershed. The summary includes information on valley and channel morphology, channel dimensions and slope, instream habitat including pools, substrate, and large wood, and riparian characteristics.

9.1 Summary Tables

The summary tables describe the habitat for each reach of stream within a watershed (Table 1). The information is compiled directly from the Reach, Habitat Unit, and Riparian Reports.

9.2 Frequency Distributions

A graphical presentation of several key components provides a comparison of values within a watershed (Figures 11A, 11B, 11C, and 11D). Each graph is a frequency distribution for a habitat variable such as shade, pieces of large wood, or percentage of pool habitat. The horizontal or x-axis displays the values of the variable and the vertical or y-axis displays the percentage of stream length with that value in the watershed. Notice both the median value and the range of values, and shape of the distribution. Determine, for example, what percentage of the stream miles in a watershed is above or below a given value. Frequency distribution charts depict the variability of a habitat feature throughout a watershed.

9.3 Benchmarks

Benchmarks provide a method for comparing values of key components. While the natural regime of a stream depends on climate, geology, vegetation, and disturbance history, it is useful to know whether the value of a habitat feature in a reach of stream is high or low. For example, knowing whether a reach has a lot of large wood debris or fine sediments is useful when evaluating the condition of aquatic habitat and its influence on the life history of fishes. Determining whether the “value” of a habitat feature is “good” or “bad” depends on the natural regime of the stream and the fish species of interest. Values for habitat features are listed as desirable or undesirable in Table 3, but the values must be viewed on a sliding scale and the watershed context must be considered.

For example, 8 pieces of large woody debris/100m may be very low for a stream in the Cascade Mountains, but extremely high for a stream in the high desert of Southeast Oregon. The stream must be viewed within the context of its natural environment.

Similarly, a reach in the Cascade Mountains may have 8 pieces of large woody debris per 100 meters, but neighboring reaches may have 25 pieces per 100 meters. Variability within a watershed reflects normal disturbance and hydrologic cycles as well as management history. Again, the natural regime of a stream is as important as the range of values within a watershed.

The components and values in the table provide a starting point for comparing the distribution of habitat features within a watershed and their importance to fish. They are only useful when placed within the natural context of the streams in a watershed and the life history diversity of fishes.

SOUTH SANTIAM BASIN:
REACH SUMMARY FOR 1997
HABITAT SURVEYS

TABLE 1

STREAM	REACH	LENGTH (m)	% AREA IN SIDE CHANNELS	GRADIENT	CHANNEL FORM*	LAND USE*	OPEN SKY % of 180	BANK EROSION %	FINES IN RIFFLES %	GRAVEL IN RIFFLES %	LARGE BOULDERS #/100m
EAST FORK PACKERS GULCH	1	514	0.8	8.2	CH	MT	12	0.4	13	34	121
EAST FORK PACKERS GULCH	2	435	0.5	4.1	US	OG	19	0.0	10	70	8
EAST FORK PACKERS GULCH	3	962	0.7	9.2	CH	OG	19	0.4	20	55	48
EAST FORK PACKERS GULCH	4	377	0.2	12.7	CH	YT	32	0.0	11	42	81
PACKERS GULCH	1	411	7.2	3.7	CH	ST	32	5.2	5	11	52
PACKERS GULCH	2	2560	0.5	3.4	CH	ST	24	7.6	5	15	46
PACKERS GULCH	3	273	3.5	4.8	CH	ST	40	2.5	5	10	61
PACKERS GULCH	4	608	1.8	6.3	CH	ST	37	0.0	5	15	49
PACKERS GULCH	5	1190	0.6	11.9	CH	ST	11	0.1	0	15	31
THOMAS FORK OF PACKERS GULCH	1	2508	1.7	12.6	CH	ST	40	67.7	23	36	32
THOMAS FORK OF PACKERS GULCH	2	312	1.0	23.5	CH	MT	39	93.6	13	26	28
SOUTH FORK PACKERS GULCH	1	3095	0.5	11.8	CH	ST	30	9.3	8	10	46
WEST FORK PACKERS GULCH	1	1493	6.1	8.0	CH	ST	23	0.0	20	35	42
WEST FORK PACKERS GULCH	2	1619	1.8	13.4	CH	ST	18	5.3	12	15	70
WHITCOMB CREEK	1	563	9.3	3.0	CH	YT	17	7.6	5	15	45
WHITCOMB CREEK	2	573	2.1	5.2	CH	YT	27	16.9	5	15	36
WHITCOMB CREEK	3	3214	3.6	11.3	CH	MT	23	23.6	10	20	97
EAST FORK WHITCOMB CREEK	1	1281	2.1	3.7	CH	YT	15	8.4	10	33	52
EAST FORK WHITCOMB CREEK	2	3188	0.7	9.7	CH	ST	17	44.3	11	27	80

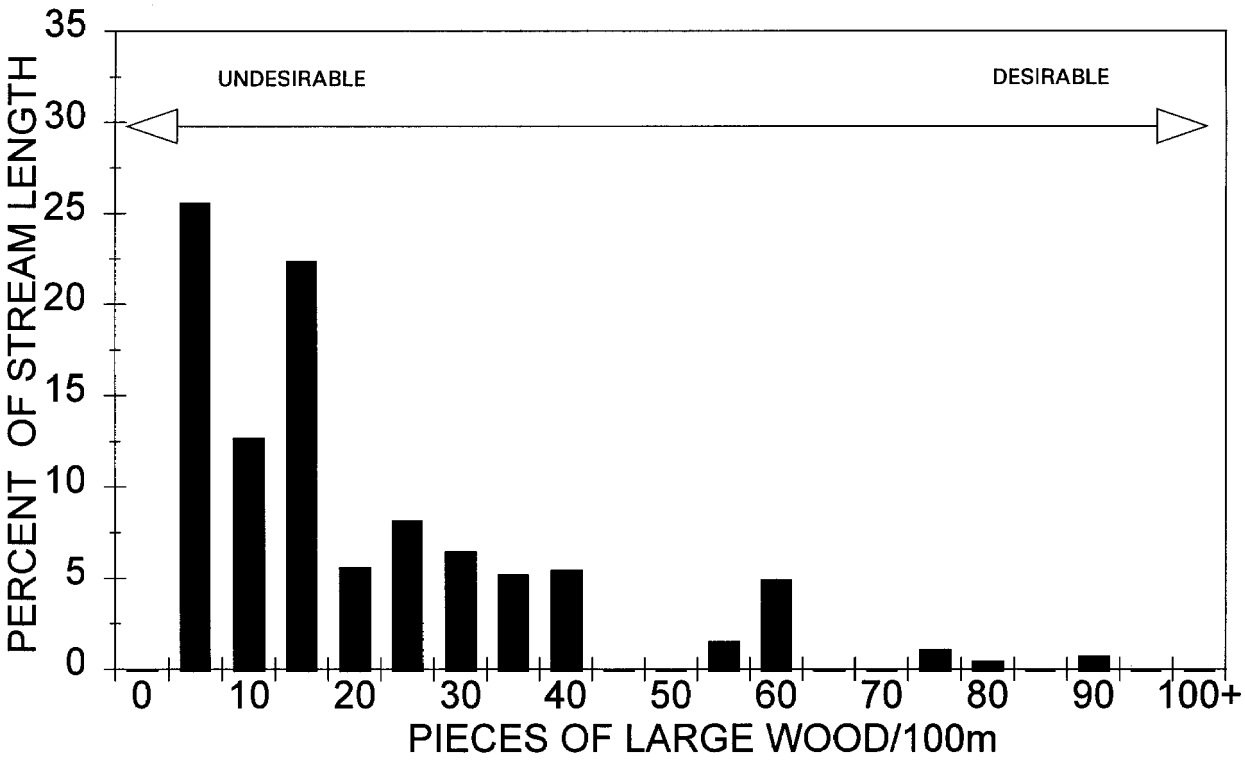
* SEE METHODS FOR DEFINITIONS

SOUTH SANTIAM BASIN:
REACH SUMMARY FOR 1997
HABITAT SURVEYS

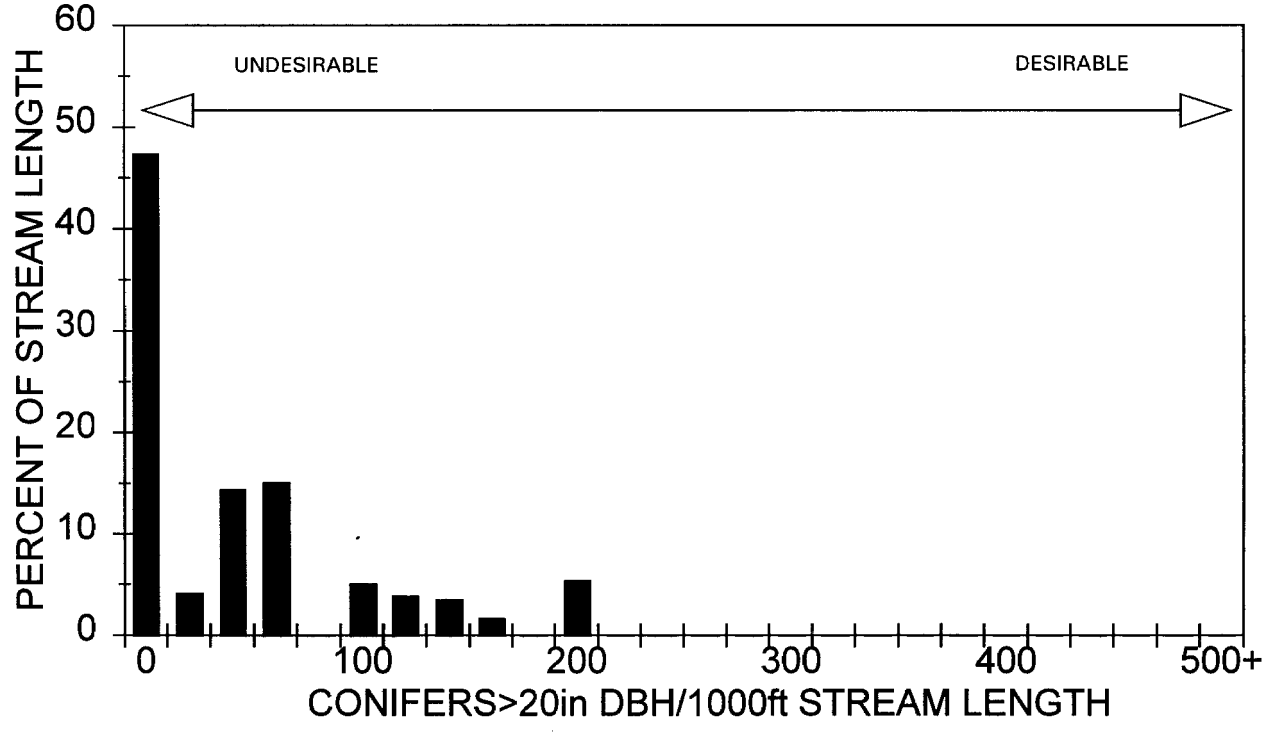
TABLE 2

STREAM	REACH	ACTIVE CHANNEL WIDTH	CHANNEL WIDTHS/ POOL	NUMBER POOLS	PERCENT POOLS	RESIDUAL POOL DEPTH (m)	WOOD DEBRIS PIECES #/100m	WOOD DEBRIS VOLUME (m3)/100m	WOOD DEBRIS KEY PIECES #/100m	DECIDUOUS TREES TOTAL/1000ft	CONIFEROUS TREES TOTAL/1000ft	RIPARIAN CONIFERS #>20in dbh /1000ft	RIPARIAN CONIFERS #>35in dbh /1000ft
EAST FORK PACKERS GULCH	1	4.8	15	8	6	0.5	17	36	1.6	823	610	61	61
EAST FORK PACKERS GULCH	2	4.3	26	4	2	0.8	31	114	7.1	1097	610	244	0
EAST FORK PACKERS GULCH	3	5.1	8	25	17	0.5	38	113	6.7	163	589	122	81
EAST FORK PACKERS GULCH	4	3.8	52	2	2	0.4	27	89	5.3	122	610	0	0
PACKERS GULCH	1	11.5	7	6	23	1.0	13	17	0.5	1341	610	0	0
PACKERS GULCH	2	9.0	6	46	28	1.0	13	15	0.1	1853	610	0	0
PACKERS GULCH	3	10.0	7	4	21	0.7	6	5	0.4	2195	1524	0	0
PACKERS GULCH	4	7.0	18	5	9	0.4	5	3	0.0	1707	549	0	0
PACKERS GULCH	5	4.4	12	23	14	0.8	27	49	0.3	1372	579	0	0
THOMAS FORK OF PACKERS GULCH	1	6.1	13	32	11	0.7	12	16	0.3	610	1097	0	0
THOMAS FORK OF PACKERS GULCH	2	4.0	27	3	7	0.7	3	9	0.0	427	305	0	0
SOUTH FORK PACKERS GULCH	1	6.9	10	44	13	1.1	8	20	0.8	772	396	41	20
WEST FORK PACKERS GULCH	1	7.8	5	40	25	0.8	14	30	1.5	1326	488	0	0
WEST FORK PACKERS GULCH	2	6.5	15	18	10	1.0	16	66	3.1	366	457	122	30
WHITCOMB CREEK	1	16.0	10	5	19	0.7	11	16	1.1	2438	122	0	0
WHITCOMB CREEK	2	11.8	10	5	16	0.7	10	22	1.4	183	305	0	0
WHITCOMB CREEK	3	8.4	16	25	11	0.7	13	35	1.7	0	671	61	30
EAST FORK WHITCOMB CREEK	1	7.4	10	18	20	0.6	15	39	2.3	1158	792	0	0
EAST FORK WHITCOMB CREEK	2	5.9	18	30	12	0.8	23	40	1.5	1158	264	61	41

NEHALEM RIVER BASIN
ECOREGION: COAST RANGE VOLCANIC



NEHALEM RIVER BASIN: VOLCANIC
CONIFERS WITHIN 100 ft OF THE CHANNEL



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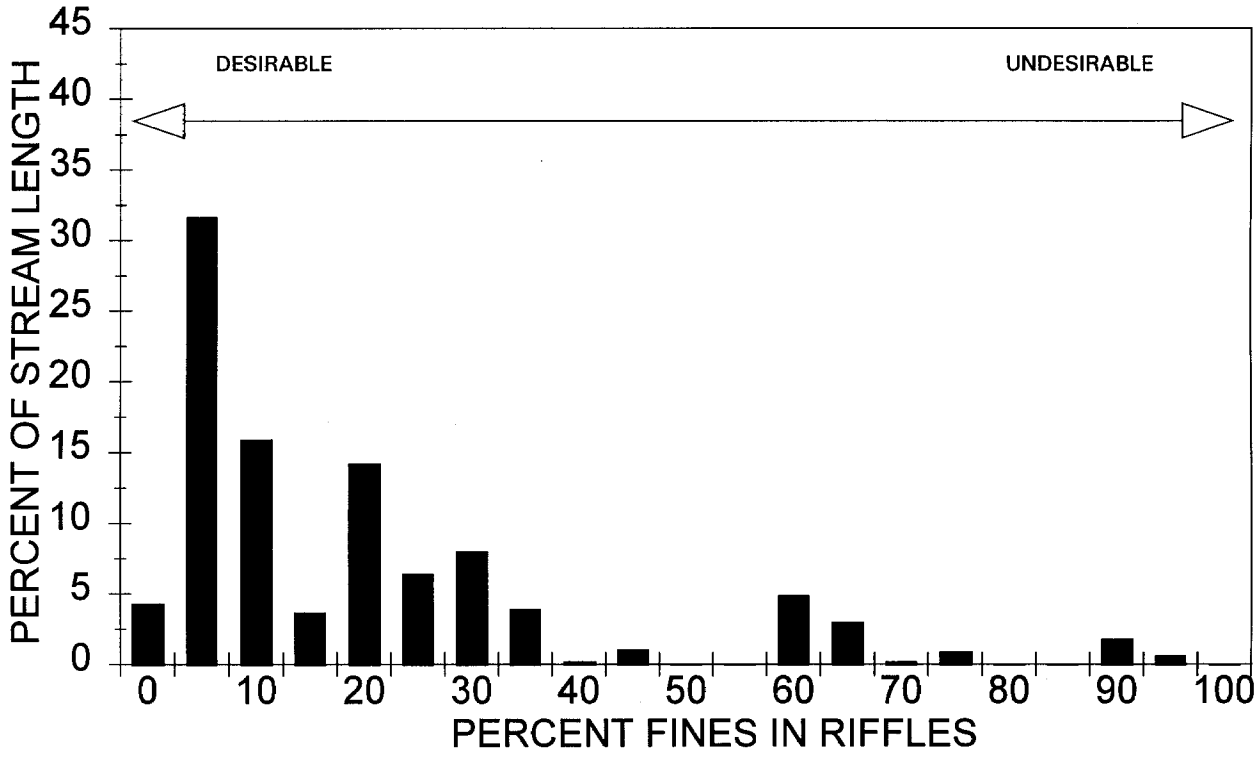
ECOREGION: COAST RANGE VOLCANIC



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ECOREGION: COAST RANGE VOLCANIC

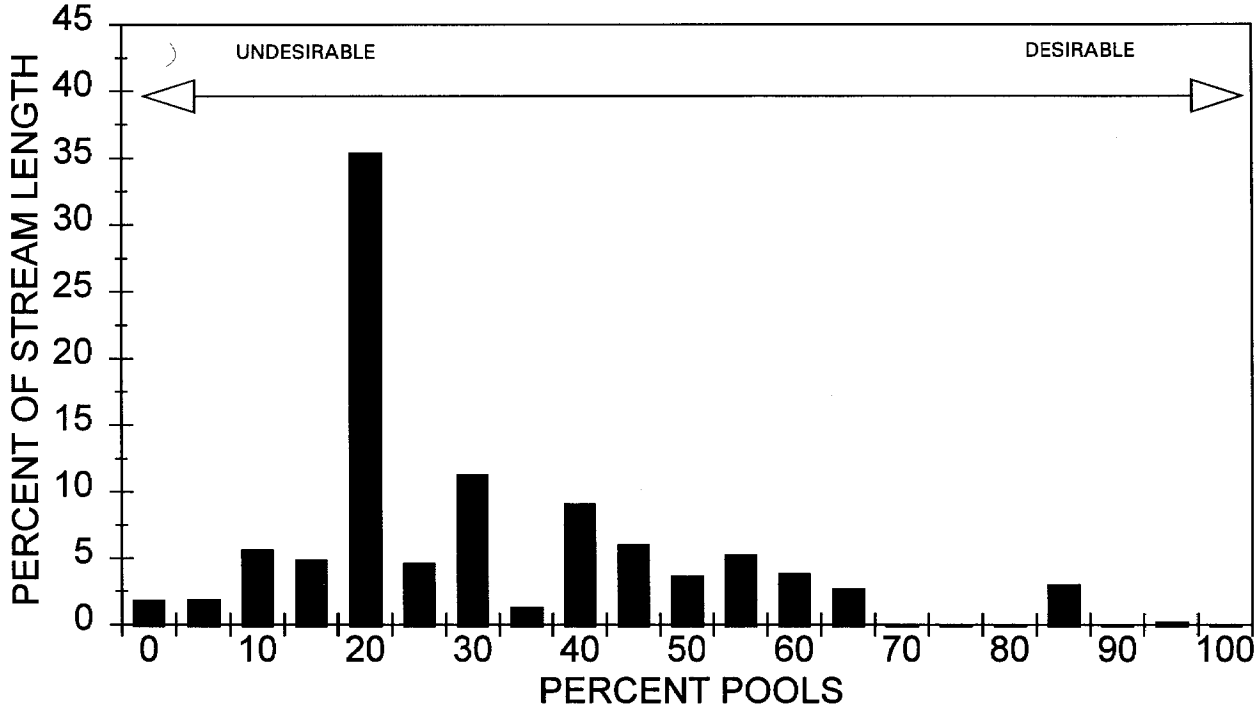


Table 3: ODFW Aquatic Inventory and Analysis Projects: Stream Channel and Riparian Habitat Benchmarks

POOLS	UNDESIRABLE	DESIRABLE
POOL AREA (% Total Stream Area)	<10	>35
POOL FREQUENCY (Channel Widths Between Pools)	>20	5-8
RESIDUAL POOL DEPTH		
SMALL STREAMS(<7m width)	<0.2	>0.5
MEDIUM STREAMS(7m and < 15m width)		
LOW GRADIENT (slope <3%)	<0.3	>0.6
HIGH GRADIENT (slope >3%)	<0.5	>1.0
LARGE STREAMS (15m width)	<0.8	>1.5
COMPLEX POOLS (Pools w/ wood complexity >3)km	<1.0	>2.5
RIFFLES		
WIDTH / DEPTH RATIO (Active Channel Based)		
EAST SIDE	>30	<10
WEST SIDE	>30	<15
GRAVEL (% AREA)	<15	35
SILT-SAND-ORGANICS (% AREA)		
VOLCANIC PARENT MATERIAL	>15	<8
SEDIMENTARY PARENT MATERIAL	>20	<10
CHANNEL GRADIENT <1.5%	>25	<12
SHADE (Reach Average, Percent)		
STREAM WIDTH <12 meters		
WEST SIDE	<60	>70
NORTHEAST	<50	>60
CENTRAL - SOUTHEAST	<40	>50
STREAM WIDTH >12 meters		
WEST SIDE	<50	>60
NORTHEAST	<40	>50
CENTRAL - SOUTHEAST	<30	>40
LARGE WOODY DEBRIS* (15cm x 3m minimum piece size)		
PIECES / 100 m STREAM LENGTH	<10	>20
VOLUME / 100 m STREAM LENGTH	<20	>30
“KEY” PIECES (>60cm dia. & 10m long)/100m	<1	>3
RIPARIAN CONIFERS (30m FROM BOTH SIDES CHANNEL)		
NUMBER >20in dbh/ 1000ft STREAM LENGTH	<150	>300
NUMBER >35in dbh/ 1000ft STREAM LENGTH	<75	>200

* Values for Streams in Forested Basins

LITERATURE CITED

Bisson, P., J. Nielsen, R. Palmasono, and E. Grove. 1982. A system of naming habitat types in small streams, with examples of habitat utilization by salmonids during low stream flow. Pp. 62-73 in N. B. Armantrout, ed. *Aquisition and utilization of aquatic habitat inventory information.* American Fisheries Society, Western Division, Bethesda, Maryland.

Cummins, K., and M. Klug. 1979. Feeding ecology of stream invertebrates. *Annual Review of Ecology and Systematics.* 10: 147-72.

Everest, F., R. Beschta, J. Scrivener, K. Koski, J. Sedell, and C. Cedarholm. 1987. Fine sediment and salmonid production: A paradox. Pp. 98-142 in E.O. Salo and T.W. Cundy, eds. *Streamside management: Forestry and fishery interactions.* University of Washington, Seattle.

Hankin, D., and G. Reeves. 1988. Estimating total fish abundance and total habitat area in small streams based on visual estimation methods. *Canadian Journal of Fisheries and Aquatic Sciences.* 45: 834-44.

Moore, K., K. Jones, and J. Dambacher. 1998. Methods for stream habitat surveys. *Oregon Dept. of Fish and Wildlife Information Report* 97-4.

Rosgen, D. L. 1994. A classification of natural rivers. Catena 22:169-199.

Working With Volunteers

Volunteers are an important source of assistance and support for the Oregon Department of Fish and Wildlife. Volunteer programs provide a unique opportunity for educating the public about the agency and its resource management activities and issues.

Working with volunteers is interesting, challenging, and fun. Volunteers come from all walks of life with a variety of backgrounds and experiences. They are usually willing to use those skills when assisting as volunteers on meaningful projects. Properly recruited, trained, and motivated volunteers increase the work force to accomplish important tasks and free up time for staff to work on other priorities. In the face of increasing resource demands and scarce funding, a well-run volunteer program makes good financial sense.

The Oregon Department of Fish and Wildlife's volunteer program is comprehensive and consistent, with guidance provided by agency-approved policies and procedures. This section contains several basic volunteer management tools, descriptions of how they are used, and form masters to use during the training and on a survey project. For more information about ODFW volunteer programs or policies consult the *Volunteer Guide* or call one of the agency's volunteer program contacts listed on the following page.

Items found in this section include:

- **Volunteer Job Description**
- **Conditions Of Volunteer Service** — required for all volunteers assisting with an aquatic habitat inventory survey
- **Who Should Sign?**
- **Volunteer Injury Coverage - Insurance Summary**
- **Volunteer Service Agreement**
- **Volunteer Project Health And Safety Review**
- **Volunteer Uniform Guidelines**
- **Volunteer Time Record**
- **Volunteer Accident Report**

Most volunteers want to do a good job and want to meet your expectations. Give them regular feedback. When they are doing the job right, tell them. Assist them if they are having problems and always treat your volunteers with respect. Most importantly, don't forget to say thanks for the work your volunteers do. People like to be thanked in many different ways. Consider this when choosing your approach and frequently recognize their efforts.

Oregon Department of Fish and Wildlife

Volunteer Program Contacts

Fish & Wildlife Host Program

7118 NE Vandenberg Ave, Covallis, OR 97330	(541) 757-4186 Ext. 229

Portland Headquarters

PO Box 59, Portland, OR 97207	(503) 872-5310
Aquatic Education	(503) 872-5264, Ext. 5359
Angler Education	(503) 872-5264, Ext. 5359
Hunter Education	(503) 872-5264, Ext. 5354
Salmon-Trout Enhancement Program (STEP)	(503) 872-5252, Ext. 5431
Wildlife Education Program	(503) 872-5264

Northwest Region, North Willamette Watershed District and North Half of the North Coast Watershed District

17330 SE Evelyn ST., Clackamas, OR 97015	(503) 657-2000
Regional Volunteer Coordinator, Clackamas	(503) 657-2000 Ext. 228
Salmon-Trout Enhancement Program (STEP) Clackamas	(503) 657-2000 Ext. 235
Salmon-Trout Enhancement Program (STEP) Tillamook	(503) 842-2741
Regional Outreach Coordinator, Clackamas	(503) 657-2000 Ext. 285

Northwest Region, South Willamette Watershed District and South Half of the North Coast Watershed District

7118 NE Vandenberg Ave, Corvallis, OR 97330	(541) 757-4186
Regional Volunteer Coordinator, Corvallis	(541) 757-4186 Ext. 229
Salmon-Trout Enhancement Program (STEP) Corvallis	(541) 757-4186 Ext. 251
Salmon-Trout Enhancement Program (STEP) Springfield	(541) 726-3515
Salmon-Trout Enhancement Program (STEP) Newport	(541) 867-4741 Ext. 253 & 250
Regional Outreach Coordinator, Corvallis	(541) 757-4186 Ext. 234

Southwest Region

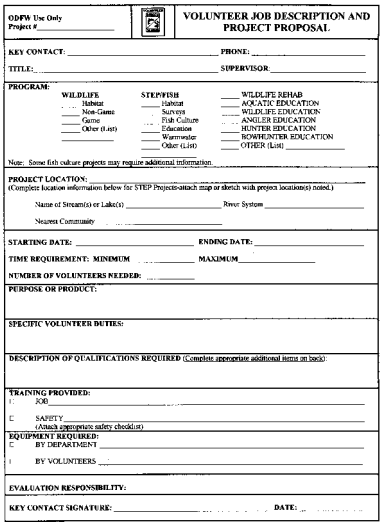
192 S Umpqua Hwy., Roseburg, OR 97470	(541) 440-3353
District Volunteer Coordinator, Roseburg	(541) 440-3353
Salmon-Trout Enhancement Program (STEP) Roseburg	(541) 440-3353
Salmon-Trout Enhancement Program (STEP) Charleston	(541) 888-5515
District Volunteer Coordinator, Charleston	(541) 888-5515
Salmon-Trout Enhancement Program (STEP) Central Point	(541) 826-8774
District Volunteer Coordinator, Central Point	(541) 826-8774
Salmon-Trout Enhancement Program (STEP) Gold Beach	(541) 247-7605
Regional Outreach Coordinator, Roseburg	(541) 440-3353

High Desert Region

61374 Parrell Rd, Bend, OR 97702	(541) 388-6363
Regional Volunteer Coordinator, Bend	(541) 388-6350 Ext. 22
Salmon-Trout Enhancement Program (STEP) Bend	(541) 388-6363 Ext. 25
Salmon-Trout Enhancement Program (STEP) Hines	(541) 573-6582
Regional Outreach Coordinator, Bend	(541) 388-6363 Ext. 224

Northeast Region

107 - 20th St., LaGrande, OR 97850	(541) 963-2138
Regional Volunteer Coordinator, LaGrande	(541) 963-2138
Salmon-Trout Enhancement Program (STEP) Bend	(541) 388-6363
Regional Outreach Coordinator, LaGrande	(541) 963-2138



ODFW Use Only
Project #_____

VOLUNTEER JOB DESCRIPTION AND PROJECT PROPOSAL

KEY CONTACT: _____ PHONE: _____

TITLE: _____ SUPERVISOR: _____

PROGRAM:

WILDLIFE	STEP/FISH	
___ Habitat	___ Habitat	___ WILDLIFE REHAB
___ Non-Game	___ Surveys	___ AQUATIC EDUCATION
___ Game	___ Fish Culture	___ WILDLIFE EDUCATION
___ Other (List)	___ Education	___ ANGLER EDUCATION
_____	___ Warmwater	___ HUNTER EDUCATION
	___ Other (List)	___ BOWHUNTER EDUCATION
		___ OTHER (List) _____

Note: Some fish culture projects may require additional information.

PROJECT LOCATION:
(Complete location information below for STEP Projects-attach map or sketch with project location(s) noted.)

Name of Stream(s) or Lake(s) _____ River System _____

Nearest Community _____

STARTING DATE: _____ ENDING DATE: _____

TIME REQUIREMENT: MINIMUM _____ MAXIMUM _____

NUMBER OF VOLUNTEERS NEEDED: _____

PURPOSE OR PRODUCT:

SPECIFIC VOLUNTEER DUTIES:

DESCRIPTION OF QUALIFICATIONS REQUIRED (Complete appropriate additional items on back):

TRAINING PROVIDED:
1. JOB _____
2. SAFETY _____
(Attach appropriate safety checklist)

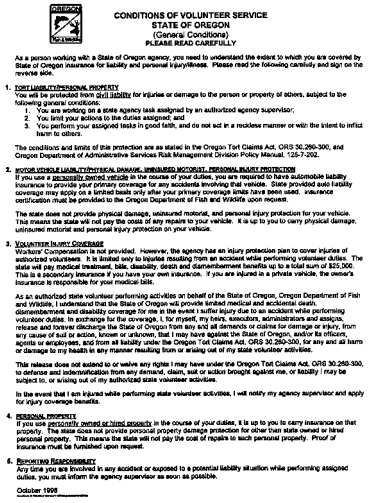
EQUIPMENT REQUIRED:
1. BY DEPARTMENT _____
2. BY VOLUNTEERS _____

EVALUATION RESPONSIBILITY: _____

KEY CONTACT SIGNATURE: _____ DATE: _____

Volunteer Job Description

Writing a clear job description is the most important aspect of volunteer recruiting, whether it is to assist with aquatic habitat surveys or to help with data entry. The job description helps the supervisor outline the project's scope and lets interested volunteers easily see if they are qualified to participate. It is also a good communication tool to convey clear job expectations and responsibilities. Find the two-page *Volunteer Job Description* form beginning on page J-11.



CONDITIONS OF VOLUNTEER SERVICE
STATE OF OREGON
(General Conditions)
PLEASE READ CAREFULLY

As a person working with a State of Oregon agency, you need to understand the extent to which you are covered by State of Oregon insurance for liability and personal injury/illness. Please read the following carefully and sign on the reverse side.

1. TORT LIABILITY/PERSONAL PROPERTY
You will be protected from civil liability for injuries or damage to the person or property of others, subject to the following general conditions:
1. You are working on a state agency task assigned by an authorized agency supervisor;
2. You limit your actions to the duties assigned; and
3. You perform your assigned tasks in good faith, and do not act in a reckless manner or with the intent to inflict harm to others.

The conditions and limits of this protection are as stated in the Oregon Tort Claims Act, ORS 30.260-300, and Oregon Department of Administrative Services Risk Management Division Policy Manual, 125-7-202.

2. MOTOR VEHICLE LIABILITY/PHYSICAL DAMAGE, UNINSURED MOTORIST, PERSONAL INJURY PROTECTION
If you use a personally owned vehicle in the course of your duties, you are required to have automobile liability insurance to provide your primary coverage for any accidents involving that vehicle. State provided auto liability coverage may apply on a limited basis only after your primary coverage limits have been used. Insurance certification must be provided to the Oregon Department of Fish and Wildlife upon request.

The state does not provide physical damage, uninsured motorist, and personal injury protection for your vehicle. This means the state will not pay the costs of any repairs to your vehicle. It is up to you to carry physical damage, uninsured motorist and personal injury protection on your vehicle.

3. VOLUNTEER INJURY COVERAGE
Workers' Compensation is not provided. However, the agency has an injury protection plan to cover injuries of authorized volunteers. It is limited only to injuries resulting from an accident while performing volunteer duties. The state will pay medical treatment, bills, disability, death and dismemberment benefits up to a total sum of $25,000. This is a secondary insurance if you have your own insurance, if you are injured in a private vehicle, the owner's insurance is responsible for your medical bills.

As an authorized state volunteer performing activities on behalf of the State of Oregon, Oregon Department of Fish and Wildlife, I understand that the State of Oregon will provide limited medical and accidental death, dismemberment and disability coverage for me in the event I suffer injury due to an accident while performing volunteer duties. In exchange for the coverage, I, for myself, my heirs, executors, administrators and assigns, release and forever discharge the State of Oregon from any and all demands or claims for damage or injury, from any cause of suit or action, known or unknown, that I may have against the State of Oregon, and/or its officers, agents or employees, and from all liability under the Oregon Tort Claims Act, ORS 30.260-300, for any and all harm or damage to my health in any manner resulting from or arising out of my state volunteer activities.

This release does not extend to or waive any rights I may have under the Oregon Tort Claims Act, ORS 30.260-300, to defense and indemnification from any demand, claim, suit or action brought against me, or liability I may be subject to, or arising out of my authorized state volunteer activities.

In the event that I am injured while performing state volunteer activities, I will notify my agency supervisor and apply for injury coverage benefits.

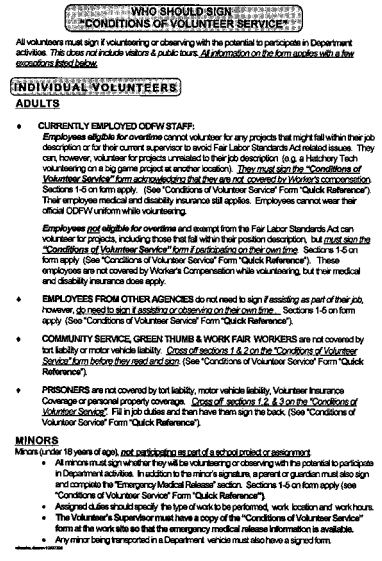
4. PERSONAL PROPERTY
If you use personally owned or hired property in the course of your duties, it is up to you to carry insurance on that property. The state does not provide personal property damage protection for other than state owned or hired personal property. This means the state will not pay the cost of repairs to such personal property. Proof of insurance must be furnished upon request.

5. REPORTING RESPONSIBILITY
Any time you are involved in any accident or exposed to a potential liability situation while performing assigned duties, you must inform the agency supervisor as soon as possible.

October 1998

Conditions Of Volunteer Service

All volunteers assisting with an aquatic habitat survey must read and sign a *Conditions of Volunteer Service* form. This document clarifies the extent and limits of coverage for tort liability, motor vehicle liability, volunteer injury coverage, and personal property coverage. The "Assigned Duties" section provides a place to outline a volunteer's responsibilities to the project. Find the two-page *Conditions of Volunteer Service* form beginning on page J-13.



WHO SHOULD SIGN CONDITIONS OF VOLUNTEER SERVICE

All volunteers must sign if volunteering or observing with the potential to participate in Department activities. *This does not include visitors & public tours. All information on the form applies with a few exceptions listed below.*

INDIVIDUAL VOLUNTEERS

ADULTS

- **CURRENTLY EMPLOYED ODFW STAFF:**
  Employees eligible for overtime cannot volunteer for any projects that might fall within their job description or for their current supervisor to avoid Fair Labor Standards Act related issues. They can, however, volunteer for projects unrelated to their job description (e.g. a Hatchery Tech volunteering on a big game project at another location). *They must sign the "Conditions of Volunteer Service" form acknowledging that they are not covered by Worker's compensation.* Sections 1-5 on form apply. (See "Conditions of Volunteer Service" Form "Quick Reference"). Their employee medical and disability insurance still applies. Employees cannot wear their official ODFW uniform while volunteering.

  Employees not eligible for overtime and exempt from the Fair Labor Standards Act can volunteer for projects, including those that fall within their position description, but *must sign the "Conditions of Volunteer Service" form if participating on their own time.* Sections 1-5 on form apply (See "Conditions of Volunteer Service" Form "Quick Reference"). These employees are not covered by Worker's Compensation while volunteering, but their medical and disability insurance does apply.

- **EMPLOYEES FROM OTHER AGENCIES** do not need to sign *if assisting as part of their job*, however, *do need to sign it assisting or observing on their own time.* Sections 1-5 on form apply (See "Conditions of Volunteer Service" Form "Quick Reference").

- **COMMUNITY SERVICE, GREEN THUMB & WORK FAIR WORKERS** are not covered by tort liability or motor vehicle liability. *Cross off sections 1 & 2 on the "Conditions of Volunteer Service" form before they read and sign.* (See "Conditions of Volunteer Service" Form "Quick Reference").

- **PRISONERS** are not covered by tort liability, motor vehicle liability, Volunteer Insurance Coverage or personal property coverage. *Cross off sections 1,2, & 3 on the "Conditions of Volunteer Service".* Fill in job duties and then have them sign the back. (See "Conditions of Volunteer Service" Form "Quick Reference").

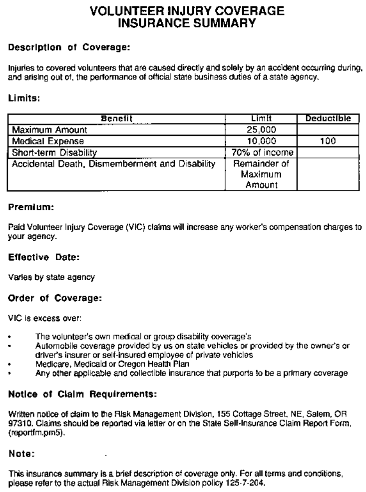
MINORS

Minors (under 18 years of age), *not participating as part of a school project or assignment*

- All minors must sign whether they will be volunteering or observing with the potential to participate in Department activities. In addition to the minor's signature, a parent or guardian must also sign and complete the "Emergency Medical Release" section. Sections 1-5 on form apply (see "Conditions of Volunteer Service" Form "Quick Reference").
- Assigned duties should specify the type of work to be performed, work location and work hours.
- **The Volunteer's Supervisor must have a copy of the "Conditions of Volunteer Service" form at the work site so that the emergency medical release information is available.**
- Any minor being transported in a Department vehicle must also have a signed form.

Who Should Sign?

Who should sign a *Conditions of Volunteer Service* form and figuring out which part of the form applies to which type of volunteers can be very confusing. *Who Should Sign?* and the accompanying *Conditions Of Volunteer Service Quick Reference* and *Student Participation* forms are used to clarify these questions. Find these four pages of information beginning on page J-15.



VOLUNTEER INJURY COVERAGE
INSURANCE SUMMARY

Description of Coverage:

Injuries to covered volunteers that are caused directly and solely by an accident occurring during, and arising out of, the performance of official state business duties of a state agency.

Limits:

Benefit	Limit	Deductible
Maximum Amount	25,000	
Medical Expense	10,000	100
Short-term Disability	70% of income	
Accidental Death, Dismemberment and Disability	Remainder of Maximum Amount	

Premium:

Paid Volunteer Injury Coverage (VIC) claims will increase any worker's compensation charges to your agency.

Effective Date:

Varies by state agency

Order of Coverage:

VIC is excess over:

- The volunteer's own medical or group disability coverage's
- Automobile coverage provided by us on state vehicles or provided by the owner's or driver's insurer or self-insured employee of private vehicles
- Medicare, Medicaid or Oregon Health Plan
- Any other applicable and collectible insurance that purports to be a primary coverage

Notice of Claim Requirements:

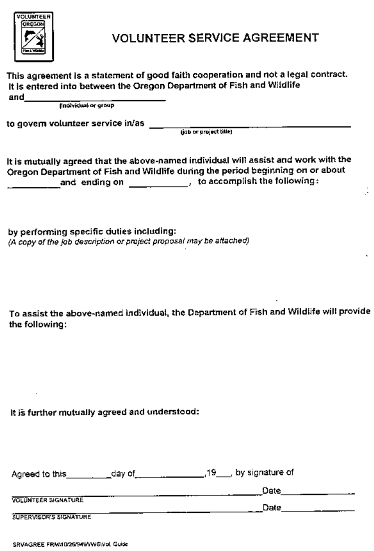
Written notice of claim to the Risk Management Division, 155 Cottage Street, NE, Salem, OR 97310. Claims should be reported via letter or on the State Self-Insurance Claim Report Form, (reportfm.pm5).

Note:

This insurance summary is a brief description of coverage only. For all terms and conditions, please refer to the actual Risk Management Division policy 125-7-204.

Volunteer Injury Coverage — Insurance Summary

The Oregon Department of Fish and Wildlife offers insurance coverage for its volunteers. To be covered by this policy, volunteers must have a current *Conditions Of Volunteer Service* form on file and meet some other criteria. This form explains ODFW's Volunteer Injury Coverage insurance options. Find the one-page document on page J-19.



VOLUNTEER SERVICE AGREEMENT

This agreement is a statement of good faith cooperation and not a legal contract. It is entered into between the Oregon Department of Fish and Wildlife and____________________
(individual or group)

to govern volunteer service in/as ____________________
(job or project title)

It is mutually agreed that the above-named individual will assist and work with the Oregon Department of Fish and Wildlife during the period beginning on or about __________and ending on __________, to accomplish the following:

by performing specific duties including:
(A copy of the job description or project proposal may be attached)

To assist the above-named individual, the Department of Fish and Wildlife will provide the following:

It is further mutually agreed and understood:

Agreed to this________day of____________,19___, by signature of

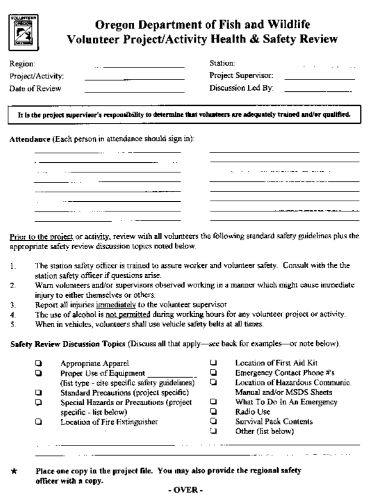
__________________________Date__________
VOLUNTEER SIGNATURE

__________________________Date__________
SUPERVISOR'S SIGNATURE

SRVAGREE FRM\10/26/94\WW6\Vol. Guide

Volunteer Service Agreement

If the survey project has sensitive issues and concerns, or if the volunteer(s) need very specific direction, consider setting up a more formal agreement. The *Volunteer Service Agreement*, in conjunction with the *Volunteer Job Description*, clearly specifies volunteer duties and responsibilites, including any limits to those duties and responsibilities. Find the one-page *Volunteer Service Agreement* form on page J-20.



Oregon Department of Fish and Wildlife
Volunteer Project/Activity Health & Safety Review

Region: __________ Station: __________
Project/Activity: __________ Project Supervisor: __________
Date of Review __________ Discussion Led By: __________

It is the project supervisor's responsibility to determine that volunteers are adequately trained and/or qualified.

Attendance (Each person in attendance should sign in):

Prior to the project or activity, review with all volunteers the following standard safety guidelines plus the appropriate safety review discussion topics noted below.

1. The station safety officer is trained to assure worker and volunteer safety. Consult with the the station safety officer if questions arise.
2. Warn volunteers and/or supervisors observed working in a manner which might cause immediate injury to either themselves or others.
3. Report all injuries immediately to the volunteer supervisor
4. The use of alcohol is not permitted during working hours for any volunteer project or activity.
5. When in vehicles, volunteers shall use vehicle safety belts at all times.

Safety Review Discussion Topics (Discuss all that apply—see back for examples—or note below).

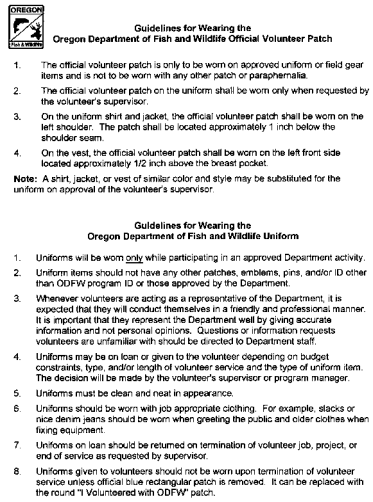
- ❑ Appropriate Apparel
- ❑ Proper Use of Equipment __________ (list type - cite specific safety guidelines)
- ❑ Standard Precautions (project specific)
- ❑ Special Hazards or Precautions (project specific - list below)
- ❑ Location of Fire Extinguisher
- ❑ Location of First Aid Kit
- ❑ Emergency Contact Phone #'s
- ❑ Location of Hazardous Communic. Manual and/or MSDS Sheets
- ❑ What To Do In An Emergency
- ❑ Radio Use
- ❑ Survival Pack Contents
- ❑ Other (list below)

★ **Place one copy in the project file. You may also provide the regional safety officer with a copy.**

- OVER -

Volunteer Project Safety Review

Volunteers are entitled to and should receive training for the same safety considerations as an employee. The *Volunteer Project Safety Review* form is a tool for documenting the safety training provided and who attended. Once the risks associated with the project are identified, use this form as a checklist to cover the details in the safety orientation/training. Find the two-page *Volunteer Project Safety Review* form beginning on page J-21.



Guidelines for Wearing the
Oregon Department of Fish and Wildlife Official Volunteer Patch

1. The official volunteer patch is only to be worn on approved uniform or field gear items and is not to be worn with any other patch or paraphernalia.
2. The official volunteer patch on the uniform shall be worn only when requested by the volunteer's supervisor.
3. On the uniform shirt and jacket, the official volunteer patch shall be worn on the left shoulder. The patch shall be located approximately 1 inch below the shoulder seam.
4. On the vest, the official volunteer patch shall be worn on the left front side located approximately 1/2 inch above the breast pocket.

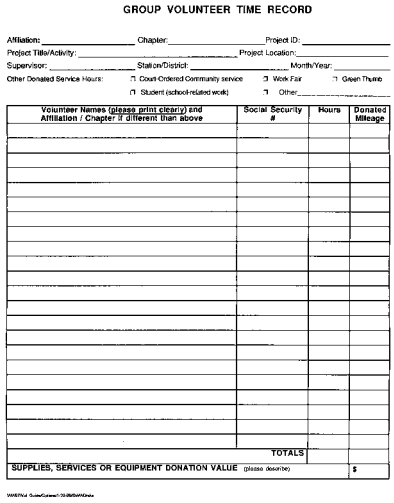
Note: A shirt, jacket, or vest of similar color and style may be substituted for the uniform on approval of the volunteer's supervisor.

Guidelines for Wearing the
Oregon Department of Fish and Wildlife Uniform

1. Uniforms will be worn only while participating in an approved Department activity.
2. Uniform items should not have any other patches, emblems, pins, and/or ID other than ODFW program ID or those approved by the Department.
3. Whenever volunteers are acting as a representative of the Department, it is expected that they will conduct themselves in a friendly and professional manner. It is important that they represent the Department well by giving accurate information and not personal opinions. Questions or information requests volunteers are unfamiliar with should be directed to Department staff.
4. Uniforms may be on loan or given to the volunteer depending on budget constraints, type, and/or length of volunteer service and the type of uniform item. The decision will be made by the volunteer's supervisor or program manager.
5. Uniforms must be clean and neat in appearance.
6. Uniforms should be worn with job appropriate clothing. For example, slacks or nice denim jeans should be worn when greeting the public and older clothes when fixing equipment.
7. Uniforms on loan should be returned on termination of volunteer job, project, or end of service as requested by supervisor.
8. Uniforms given to volunteers should not be worn upon termination of volunteer service unless official blue rectangular patch is removed. It can be replaced with the round "I Volunteered with ODFW" patch.

Guidelines For Wearing Official Uniform Items

To convey to the public that volunteers associated with the project are representatives of the agency, provide some form of official identification. Official uniform jackets, shirts, hats, or patches are appropriate. Use the *Guidelines For Wearing Official Uniform* to instruct volunteers in their proper use. Find the one-page Guidelines document on page J-19.



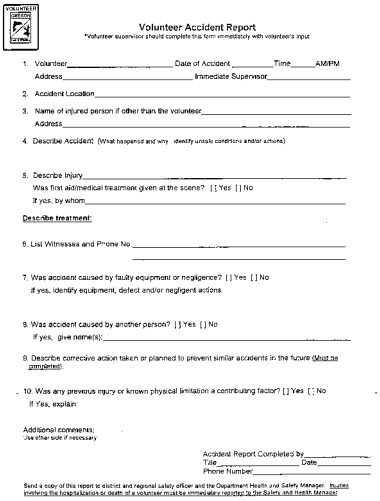
GROUP VOLUNTEER TIME RECORD

Affiliation: _____ Chapter: _____ Project ID: _____
Project Title/Activity: _____ Project Location: _____
Supervisor: _____ Station/District: _____ Month/Year: _____
Other Donated Service Hours: ☐ Court-Ordered Community service ☐ Work Fair ☐ Green Thumb ☐ Student (school-related work) ☐ Other: _____

Volunteer Names (please print clearly) and Affiliation / Chapter if different than above	Social Security #	Hours	Donated Mileage
	TOTALS		
SUPPLIES, SERVICES OR EQUIPMENT DONATION VALUE (please describe)			$

Volunteer Time Record

Track volunteer hours, donations, and mileage on either the individual or group *Volunteer Time Record*. This information is compiled and reported in various annual reports, especially those associated with federal programs. A number of grants depend on the funding match provided by volunteer contributions. Find the two versions of the *Volunteer Time Record* beginning on page J-20.



Volunteer Accident Report
*Volunteer supervisor should complete this form immediately with volunteer's input

1. Volunteer _____ Date of Accident _____ Time _____ AM/PM
   Address _____ Immediate Supervisor _____
2. Accident Location _____
3. Name of injured person if other than the volunteer _____
   Address _____
4. Describe Accident: (What happened and why - identify unsafe conditions and/or actions)
5. Describe Injury _____
   Was first aid/medical treatment given at the scene? [ ] Yes [ ] No
   If yes, by whom _____
   Describe treatment:
6. List Witnesses and Phone No. _____
7. Was accident caused by faulty equipment or negligence? [ ] Yes [ ] No
   If yes, identify equipment, defect and/or negligent actions.
8. Was accident caused by another person? [ ] Yes [ ] No
   If yes, give name(s): _____
9. Describe corrective action taken or planned to prevent similar accidents in the future (Must be completed).
10. Was any previous injury or known physical limitation a contributing factor? [ ] Yes [ ] No
    If Yes, explain:

Additional comments:
Use other side if necessary

Accident Report Completed by _____
Title _____ Date _____
Phone Number _____

Send a copy of this report to district and regional safety officer and the Department Health and Safety Manager. Injuries involving the hospitalization or death of a volunteer must be immediately reported to the Safety and Health Manager.

Volunteer Accident Report

If a volunteer is injured in an accident, the project supervisor must fill out the Volunteer Accident Report as soon as possible. Send a copy of this report to district and regional safety officers and the Department Health and Safety Manager. Injuries involving the hospitalization or death of a volunteer must be immediately reported to the Health and Safety Manager. Find the V*olunteer Accident Report Form* on page J-26.

Volunteer Motivation And Recognition

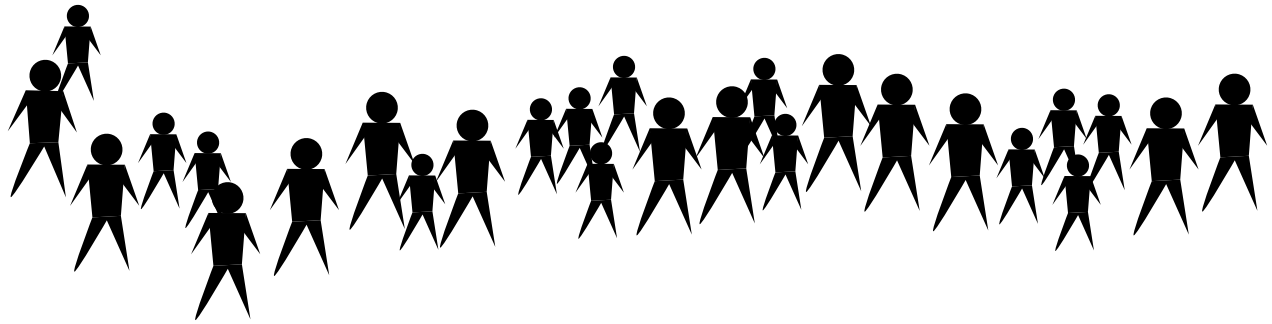
Doing meaningful work
Sufficient orientation and training to do their jobs well
Clear supervision and feedback about the quality of their work and how what they do fits into the bigger picture
Time, space, supplies, and equipment to do their work, and
Recognition for their efforts and the products of their work.

All of these are reasons why volunteers are motivated to continue as volunteers. To retain long term volunteers provide

A variety of assignments
Additional responsibility when warranted
Opportunities to assist with project planning
Choices among jobs, and
Copies of data and project results.

Provide appropriate thanks to volunteers, either tangible (small gifts or recognition items) or intangible (group recognition, new experiences, inclusion in other activities with biologists).

Always remember that regular acknowledgment of your volunteers is the most powerful and meaningful way to say "Thank You" and probably the most appreciated.



ODFW Use Only Project #_____		VOLUNTEER JOB DESCRIPTION AND PROJECT PROPOSAL

KEY CONTACT: _____ **PHONE:** _____

TITLE: _____ **SUPERVISOR:** _____

PROGRAM:

WILDLIFE	STEP/FISH	
_____ Habitat	_____ Habitat	_____ WILDLIFE REHAB
_____ Non-Game	_____ Surveys	_____ AQUATIC EDUCATION
_____ Game	_____ Fish Culture	_____ WILDLIFE EDUCATION
_____ Other (List)	_____ Education	_____ ANGLER EDUCATION
_____	_____ Warmwater	_____ HUNTER EDUCATION
	_____ Other (List)	_____ BOWHUNTER EDUCATION
	_____	_____ OTHER (List) _____

Note: Some fish culture projects may require additional information.

PROJECT LOCATION: _____
(Complete location information below for STEP Projects-attach map or sketch with project location(s) noted.)

Name of Stream(s) or Lake(s) _____ River System _____

Nearest Community _____

STARTING DATE: _____ **ENDING DATE:** _____

TIME REQUIREMENT: MINIMUM _____ **MAXIMUM** _____

NUMBER OF VOLUNTEERS NEEDED: _____

PURPOSE OR PRODUCT:

SPECIFIC VOLUNTEER DUTIES:

DESCRIPTION OF QUALIFICATIONS REQUIRED (Complete appropriate additional items on back):

TRAINING PROVIDED:

☐ JOB _____

☐ SAFETY _____
(Attach appropriate safety checklist)

EQUIPMENT REQUIRED:

☐ BY DEPARTMENT _____

☐ BY VOLUNTEERS _____

EVALUATION RESPONSIBILITY:

KEY CONTACT SIGNATURE: _____ **DATE:** _____

PHYSICAL REQUIREMENTS OF THIS JOB — Mark all that apply in the appropriate frequency column. Add comments where appropriate.

	NOT REQUIRED	RARELY 1% OR LESS	OCCASIONALLY 1 % - 33 %	FREQUENTLY 34 % - 65 %	CONTINUALLY 66 % - 100 %	COMMENT ON TYPE OF ACTIVITY & IF ACCOMMODATIONS COULD BE MADE
PHYSICAL FACTORS						
Sitting						
Standing						
Walking						
Crouching						
Kneeling &/or crawling						
Stooping						
Twisting						
Climbing						
Balancing						
Leg/foot use						
Reaching						
Handing &/or grasping						
Fingering/feeling						
Pushing/pulling						
Lifting/carrying						
USE OF SENSES						
Talking						
Hearing						
Vision						
Smell						
ENVIRONMENTAL FACTORS						
Works indoors						
Works outdoors						
Safety equipment						
Exposures						
MENTAL FACTORS						
Interaction with others						
Deadlines/shiftwork/flexibility						
Highly repetitive work						
Attention to detail						
Other psychological demands						
Other (in any category)						

CONDITIONS OF VOLUNTEER SERVICE
STATE OF OREGON
(General Conditions)
PLEASE READ CAREFULLY

As a person working with a State of Oregon agency, you need to understand the extent to which you are covered by State of Oregon insurance for liability and personal injury/illness. Please read the following carefully and sign on the reverse side.

1. TORT LIABILITY/PERSONAL PROPERTY

You will be protected from civil liability for injuries or damage to the person or property of others, subject to the following general conditions:

1. You are working on a state agency task assigned by an authorized agency supervisor;
2. You limit your actions to the duties assigned; and
3. You perform your assigned tasks in good faith, and do not act in a reckless manner or with the intent to inflict harm to others.

The conditions and limits of this protection are as stated in the Oregon Tort Claims Act, ORS 30.260-300, and Oregon Department of Administrative Services Risk Management Division Policy Manual, 125-7-202.

2. MOTOR VEHICLE LIABILITY/PHYSICAL DAMAGE, UNINSURED MOTORIST, PERSONAL INJURY PROTECTION

If you use a personally owned vehicle in the course of your duties, you are required to have automobile liability insurance to provide your primary coverage for any accidents involving that vehicle. State provided auto liability coverage may apply on a limited basis only after your primary coverage limits have been used. Insurance certification must be provided to the Oregon Department of Fish and Wildlife upon request.

The state does not provide physical damage, uninsured motorist, and personal injury protection for your vehicle. This means the state will not pay the costs of any repairs to your vehicle. It is up to you to carry physical damage, uninsured motorist and personal injury protection on your vehicle.

3. VOLUNTEER INJURY COVERAGE

Workers' Compensation is not provided. However, the agency has an injury protection plan to cover injuries of authorized volunteers. It is limited only to injuries resulting from an accident while performing volunteer duties. The state will pay medical treatment, bills, disability, death and dismemberment benefits up to a total sum of $25,000. This is a secondary insurance if you have your own insurance. If you are injured in a private vehicle, the owner's insurance is responsible for your medical bills.

As an authorized state volunteer performing activities on behalf of the State of Oregon, Oregon Department of Fish and Wildlife, I understand that the State of Oregon will provide limited medical and accidental death, dismemberment and disability coverage for me in the event I suffer injury due to an accident while performing volunteer duties. In exchange for the coverage, I, for myself, my heirs, executors, administrators and assigns, release and forever discharge the State of Oregon from any and all demands or claims for damage or injury, from any cause of suit or action, known or unknown, that I may have against the State of Oregon, and/or its officers, agents or employees, and from all liability under the Oregon Tort Claims Act, ORS 30.260-300, for any and all harm or damage to my health in any manner resulting from or arising out of my state volunteer activities.

This release does not extend to or waive any rights I may have under the Oregon Tort Claims Act, ORS 30.260-300, to defense and indemnification from any demand, claim, suit or action brought against me, or liability I may be subject to, or arising out of my authorized state volunteer activities.

In the event that I am injured while performing state volunteer activities, I will notify my agency supervisor and apply for injury coverage benefits.

4. PERSONAL PROPERTY

If you use personally owned or hired property in the course of your duties, it is up to you to carry insurance on that property. The state does not provide personal property damage protection for other than state owned or hired personal property. This means the state will not pay the cost of repairs to such personal property. Proof of insurance must be furnished upon request.

5. REPORTING RESPONSIBILITY

Any time you are involved in any accident or exposed to a potential liability situation while performing assigned duties, you must inform the agency supervisor as soon as possible.

October 1998

PLEASE READ THE REVERSE SIDE OF THIS DOCUMENT BEFORE SIGNING

(Please Print)

_____

First M Last

_____

Affiliation (if applicable)

A. Assigned Duties

Are limited to only those duties assigned by your ODFW supervisor or as listed in your volunteer job description.

_____

_____

_____

_____

_____

❑ **Yes** ❑ **No** Will drive a state vehicle as part of duties. If yes, coverage is provided under the state auto insurance coverage. Volunteer must be 18 years or older, possess a current drivers license and have a volunteer application and a 5 year driving record on file.

B. I HAVE READ AND UNDERSTAND THE ABOVE DUTIES AND THE CONDITIONS OF VOLUNTEER SERVICE.

Volunteer Signature _____ Date _____

Parent or Legal Guardian Signature _____ Date _____
(Required if volunteer is under age 18. Also see section C below

Address _____ City _____

State_____ Zip _____ Social Security # _____

Day Phone ( )_____ Evening Phone ( )_____

In case of emergency, please notify _____

Address_____ City_____ State_____ Zip _____

Day Phone ( )_____ Evening Phone ( )_____

C. FOR MINORS ONLY: EMERGENCY MEDICAL RELEASE

PARENT OR GUARDIANS'S AUTHORIZATION FOR MEDICAL CARE AND CONSENT TO AGREEMENT

READ CAREFULLY

I, _____, as parent or legal guardian, hereby grant permission for _____to do volunteer field work for the Oregon Department of Fish and Wildlife. In the event of an emergency, accident, or illness, I authorize the agency and its employees to administer emergency medical care to my child and/or, if deemed necessary, to secure emergency medical services and incur expenses for which I will be responsible for payment. My signature below hereby represents that I have read, understand, and consent to this agreement.

Signature: _____Date: _____

(Legal guardian signature required if participating person is under age 18 years.)

D. Agency Supervisor Section

Agency Supervisor _____ **Telephone ( )**_____

Station/Location _____ **Date** _____

❑ **Region/District Volunteer** ❑ **Host Volunteer** ❑ **Court-Ordered Community Service**

❑ **Work Fair** ❑ **Youth Group** ❑ **Green Thumb** ❑ **Student (shool-related work)**

October 1998 Reverse of Form for Liability and Volunteer Injury Coverage Revised 10/95

WHO SHOULD SIGN ?
"CONDITIONS OF VOLUNTEER SERVICE"

ALL VOLUNTEERS MUST SIGN IF VOLUNTEERING OR OBSERVING WITH THE POTENTIAL TO PARTICIPATE IN DEPARTMENT ACTIVITIES. ***THIS DOES NOT INCLUDE VISITORS & PUBLIC TOURS. ALL INFORMATION ON THE FORM APPLIES WITH A FEW EXCEPTIONS LISTED BELOW.***

INDIVIDUALS

Adults

- **CURRENTLY EMPLOYED ODFW STAFF:**
  Employees eligible for overtime cannot volunteer for any projects that might fall within their job description or for their current supervisor to avoid Fair Labor Standards Act related issues. They can, however, volunteer for projects unrelated to their job description (e.g. a Hatchery Tech volunteering on a big game project at another location). *They must sign the* ***"Conditions of Volunteer Service"*** *form acknowledging that they are not covered by Worker's* compensation. Sections 1-5 on form apply. (See "Conditions of Volunteer Service" Form "**Quick Reference**"). Their employee medical and disability insurance still applies. Employees cannot wear their official ODFW uniform while volunteering.

  Employees not eligible for overtime and exempt from the Fair Labor Standards Act can volunteer for projects, including those that fall within their position description, but *must sign the* ***"Conditions of Volunteer Service"*** *form if participating on their own time*. Sections 1-5 on form apply (See "Conditions of Volunteer Service" Form "**Quick Reference**"). These employees are not covered by Worker's Compensation while volunteering, but their medical and disability insurance does apply.

- **EMPLOYEES FROM OTHER AGENCIES** do not need to sign *if assisting as part of their job,* however, do need to sign if *assisting or observing on their own time .* Sections 1-5 on form apply (See "Conditions of Volunteer Service" Form "**Quick Reference**").

- **COMMUNITY SERVICE, GREEN THUMB & WORK FAIR WORKERS** are not covered by tort liability or motor vehicle liability. *Cross off sections 1 & 2 on the "Conditions of Volunteer Service" form before they read and sign*. (See "Conditions of Volunteer Service" Form "**Quick Reference**").

- **PRISONERS** are not covered by tort liability, motor vehicle liability, Volunteer Insurance Coverage or personal property coverage. *Cross off sections 1,2, & 3 on the "Conditions of Volunteer Service"*. Fill in job duties and then have them sign the back. (See "Conditions of Volunteer Service" Form "**Quick Reference**").

Minors

Minors (under 18 years of age), ***not*** participating as part of a school project or assignment.

1. All minors must sign whether they will be volunteering or observing with the potential to participate in Department activities. In addition to the minor's signature, a parent or guardian must also sign and complete the "Emergency Medical Release" section. Sections 1-5 on form apply (see "Conditions of Volunteer Service" Form "**Quick Reference")**.
2. Assigned duties should specify the type of work to be performed, work location and work hours.
3. **The Volunteer's Supervisor must have a copy of the "Conditions of Volunteer Service" form at the work site so that the emergency medical release information is available.**
4. Any minor being transported in a Department vehicle must also have a signed form.

10/07/98

GROUPS

Adults

All volunteers who are volunteering or observing with the potential to participate in Department activities must sign. *Each member of the group participating in the activity must sign a "Conditions of Volunteer Service" form before beginning the activity. If the "Conditions of Volunteer Service" form will not be kept at the project site you must have* a *list of emergency contact names and numbers at the project site.*

Minors (non-academic groups)

Before groups of minors participate in Department activities the following steps be taken:

1 Ask the adult leader if the group has tort liability, motor vehicle liability, and medical insurance coverage (most youth organizations such as scouts do). If in doubt, ask. Cross off the sections (1&3) on "Conditions of Volunteer Service" where the group's coverage exists.

2 All minors must have a parent or guardian sign the ""Conditions of Volunteer Service" form ***AND*** "For Minors Only" section.

3 All Adults present must sign the ""Conditions of Volunteer Service"" form.

4 The Volunteer Supervisor must make sure that the supervising adult has the signed "Conditions of Volunteer Service" forms on site at all times. The "For minors Only" section is a medical emergency release. This form must be at the work site where the minors are working and must accompany them , if injured to where they will receive medical emergency services.

FOR SCHOOL GROUPS AND INDIVIDUALS

Anyone doing work for the Department as part of a school program, project or assignment are **not considered volunteers**. The state considers them to be getting the primary benefit, not the agency. This includes job shadows, interns, school community service hours and school groups.

Use the following procedures when involving student(s):

- **School groups or individuals with an adult school leader**
  It is the teacher's responsibility to see that each student fulfills all school district requirements for medical insurance and field trip permission slips. ***Individual minors do not have a parent or guardian sign a liability form in this case***. Send the school representative a copy of the form "Student Participation in Oregon Department of Fish and Wildlife Activities" before the project.
- **School groups or individuals without *an adult school leader***
  If a student(s) are participating in an approved project during school time, and they are not accompanied by a school representative:

1. Cross off sections 1,2 & 3 of the "Conditions of Volunteer Service" form. (If over age 18, do not cross off section 2 and see Section V, "Driving State Vehicles" , **Volunteer Guide.**
2. Assigned duties should describe the activity as a school project, supervised by ODFW (unsupervised by a school representative) and that the School/District is responsible for medical & tort liability. List the project location and the work to be performed.
3. The parent or guardian must fill out and sign the emergency medical release located on the reverse of "Conditions of Volunteer Service" form. The emergency medical release form must be kept at the work site.

If you have further questions, call the Regional Volunteer Coordinator.

- **College Students assisting as part of a school assignment, for credit or grade.**
  Cross off sections 1 and 3 of the "Conditions of Volunteer Service" form.

10/07/98

CONDITIONS OF VOLUNTEER SERVICE FORM
QUICK REFERENCE
Tort Liability, Motor Vehicle Liability, Volunteer Insurance Coverage and Personal Property

The "Conditions of Volunteer Service" form has five sections. Depending on volunteer type, **delete the section(s) marked "cross off"** on the "Conditions of Volunteer Service" form. For example: Community Service Workers - cross off sections 1 & 2 on the "Conditions of Volunteer Service" form.

TYPE OF VOLUNTEER	Section 1 TORT LIABILITY	Section 2 MOTOR VEHICLE LIABILITY	Section 3 VOLUNTEER INJURY COVERAGE	Section 4 PERSONAL PROPERTY	Section 5 REPORTING RESPONSIBILITY
Individual volunteers (adult or minor)	yes	yes	yes	yes	yes
Currently employed ODFW staff (on own time)	yes	yes	yes	yes	yes
Employees from other agencies if assisting on their own time	yes	yes	yes	yes	yes
Non-school related groups (adult or minors) *without* their own coverage	yes	yes	yes	yes	yes
Community Service workers (court-ordered)	Cross off	Cross off	yes	yes	yes
Green Thumb	Cross off	Cross off	yes	yes	yes
Work Fare, Jobs Plus	Cross off	Cross off	yes	yes	yes
Non-school related groups (adult or minors) *with* their own coverage	Cross off	yes	Cross off	yes	yes
Prisoners	Cross off	Cross off	Cross off	yes	yes

School Groups & Individuals - *Each student (minor) must have a signed emergency medical release and the supervisor **MUST** have it at the work site.*

College student(s), or individual students, assisting as school assignment for credit or grade.	Cross off	yes	Cross off	yes	yes
School groups (minors) assisting for assignment, grade, or credit, without a school leader but with an adult ODFW staff or volunteer leader.	Cross off	Cross off	Cross off	yes	yes

School groups and individual students with an adult school leader, or job shadows and interns are NOT considered volunteers and should not sign any part of the "Conditions of Volunteer Service" form. See the "Who Should Sign?" information sheet for special instructions.

WW97/Vol. Guide/Checklistable10798/1-20-99/SWWD/sks

Student Participation in Oregon Department of Fish and Wildlife Activities

Dear

Described below is the job or project outlined for your students, the expected duties, and each party's responsibility. Please read, sign, date and return this form.

I look forward to working with you and your students.

Job Title _____ Duties _____

_____

_____

_____

It is understood that ODFW is a technical advisor only.

The school is responsible for:

- Having their own medical and tort liability insurance.
- Providing a list of all student participants to ODFW.
- Having an emergency medical authorization for each student on site.
- Directly supervising the students.

Return this form to:

_____ _____

School Representative Date

Student Participation in Oregon Department of Fish and Wildlife Activities

Dear

Described below is the job or project outlined for your students, the expected duties, and each party's responsibility. Please read, sign, date and return this form.

I look forward to working with you and your students.

Job Title _____ Duties to be performed _____

_____

_____

_____

It is understood that ODFW is a technical advisor only.

The school is responsible for:

- Having their own medical and tort liability insurance.
- Providing a list of all student participants to ODFW.
- Having an emergency medical authorization for each student on site.
- Directly supervising the students.

Return this form to:

_____ _____

School Representative Date

VOLUNTEER INJURY COVERAGE
INSURANCE SUMMARY

Description of Coverage:

Injuries to covered volunteers that are caused directly and solely by an accident occurring during, and arising out of, the performance of official state business duties of a state agency.

Limits:

Benefit	Limit	Deductible
Maximum Amount	25,000	
Medical Expense	10,000	100
Short-term Disability	70% of income	
Accidental Death, Dismemberment and Disability	Remainder of Maximum Amount	

Premium:

Paid Volunteer Injury Coverage (VIC) claims will increase any worker's compensation charges to your agency.

Effective Date:

Varies by state agency

Order of Coverage:

VIC is excess over:

- The volunteer's own medical or group disability coverage's
- Automobile coverage provided by us on state vehicles or provided by the owner's or driver's insurer or self-insured employee of private vehicles
- Medicare, Medicaid or Oregon Health Plan
- Any other applicable and collectible insurance that purports to be a primary coverage

Notice of Claim Requirements:

Written notice of claim to the Risk Management Division, 155 Cottage Street, NE, Salem, OR 97310. Claims should be reported via letter or on the State Self-Insurance Claim Report Form, (reportfm.pm5).

Note:

This insurance summary is a brief description of coverage only. For all terms and conditions, please refer to the actual Risk Management Division policy 125-7-204.

Volunteer Service Agreement

This agreement is a statement of good faith cooperation and not a legal contract. It is entered into between the Oregon Department of Fish and Wildlife and

_____

(Individual or group)

to govern volunteer service in/as _____

(job or project title)

(A copy of the job description or project proposal is attached)

It is mutually agreed that the above-name individual or group will assist and work with the Oregon Department of Fish and Wildlife during the period beginning on or about _____and ending on _____, to accomplish the following:

by performing specific duties including:

To assist the above-named individual or group, the Department of Fish and Wildlife will provide the following:

It is further mutually agreed and understood:

Agreed to this_____day of_____,19___, by signature of

_____ Date _____

VOLUNTEER SIGNATURE

_____ Date _____

SUPERVISORS SIGNATURE

Oregon Department of Fish and Wildlife
Volunteer Project Safety Review

Region: _____ Station: _____

Project/Activity: _____ Project Supervisor: _____

Date of Review: _____ Discussion Led By: _____

It is the project supervisor's responsibility to determine that volunteers are adequately trained and/or qualified.

Attendance (Each person in attendance should sign in):

_____

_____

_____

_____

_____

Prior to the project or activity, review with all volunteers the following standard safety guidelines plus the appropriate safety review discussion topics noted below.

1. The station safety officer is trained to assure worker and volunteer safety. Consult with the station safety officer if questions arise.
2. Warn volunteers and/or supervisors observed working in a manner which might cause immediate injury to either themselves or others.
3. Report all injuries immediately to the volunteer supervisor.
4. The use of alcohol is not permitted during working hours for any volunteer project or activity.
5. When in vehicles, volunteers shall use vehicle safety belts at all times.

Safety Review Discussion Topics (Discuss all that apply—see back examples—or note below):

- ❏ Appropriate Apparel
- ❏ Proper Use of Equipment _____ (list type - cite specific safety guidelines)
- ❏ Standard Precautions (project specific)
- ❏ Special Hazards or Precautions (project specific - list below)
- ❏ Location of Fire Extinguisher
- ❏ Location of First Aid Kit
- ❏ Emergency Contact Phone #'s
- ❏ Location of Hazardous Communic. Manual and/or MSDS Sheets
- ❏ What To Do In An Emergency
- ❏ Radio Use
- ❏ Survival Pack Contents
- ❏ Other (list below)

_____

_____

★ **Place one copy in the project file. Also provide the regional safety officer with a copy.**

4/99

Issues/Concerns/Hazards Raised By Volunteers (List any safety problems, hazardous conditions, training needs, or other issues raised by volunteers.)	Response Indicated (Itemize solutions to any problems listed in the first column, as discussed.)

Appropriate Apparel

- Wading/snorkeling
- Appropriate footwear
- Eye/ear/hand protection
- Dress appropriate for weather conditions

Proper Use of Equipment
(See manufacturer's handbook for proper operating instructions and safety features)

- Hydraulic cable cutter
- Chainsaw
- Shop power tools
- Woodworking equipment
- Hilti drill
- Gas-powered tools
- Farm equipment
- Flow meter

Standard Precautions

- Lifting safety
- Computer precautions
- Evacuation procedures
- Location of first aid kit & fire extinguisher
- Emergency response guidebook
- Eye wash/shower availability
- Personal safety gear
  - eye/ear/hand/foot protection
  - protective clothing
  - respirator/dust masks
- Vehicle safety/seat belts/secured load
- *Flotation devices

Netpens/Acclimation Sites/Traps

- Wear life vest*****
- Appropriate foot gear with tread
- Be aware of surroundings and others in close proximity while seining or dipping for fish. (i.e. long handled nets knocking people off balance)
- Specific safety requirements for each location are identified by the project supervisor on the front of this form.

Special Hazards or Precautions

- Tick bites/snake bites/hornet or bee stings
- Survival pack
- Compass orientation
- Boating safety
- Clean-ups
- Net deployment
- Flight safety
- Snowmobile safety
- Boat or backpacker shocker safety
- Chainsaw safety requirements
- Warning clothing/visibility
- Loaded firearms
- Volunteer allergies or health concerns
- Hazardous materials at project location

Wading Safety

- Proper wading equipment (shoes, waders, staff, flotation)
- Reading water conditions
- Wading techniques
- *Life vest

Electroshocking

- Review safety features of equipment
- Rubber gloves with extra dry gloves
- Nets with fiberglass handles
- Waders with non-slip soles
- *Flotation devices
- Communication with crew-hand signals or safe word "off"
- Proper gas mix or battery connections
- Never touch anode/cathode in operation
- Safe equipment operation (see manuf. manual)
- Hazards involved with electrofishing
- Basic emergency procedures
- Polarized sunglasses

Guidelines for Wearing The Oregon Department of Fish and Wildlife Official Volunteer Patch

1. The official volunteer patch is worn only on an approved uniform or field gear item and is not worn with any other patch or paraphernalia.
2. The official volunteer uniform patch is worn only when requested by the volunteer's supervisor.
3. The official volunteer patch is worn on the left shoulder of the uniform shirt and jacket. The patch is located approximately 1 inch below the shoulder seam.
4. The official volunteer patch is worn on the left front side of the uniform vest, located approximately 1/2 inch above the breast pocket.

Note: A shirt, jacket, or vest of similar color and style may be substituted for the uniform on approval of the volunteer's supervisor.

Guidelines for Wearing The Oregon Department of Fish and Wildlife Uniform

1. Wear official uniform items only while participating in an approved Department activity.
2. Do not wear other patches, emblems, pins, and/or ID other than ODFW program ID or those approved by the Department with ODFW uniform items.
3. When a volunteer is wearing ODFW uniform items, acting as a representative of the Department, it is expected that they will conduct themselves in a friendly and professional manner. It is important that volunteers represent the Department with accurate information and not personal opinions. Direct unfamiliar questions or information requests to Department staff.
4. Uniforms are loaned or given to the volunteer depending on budget constraints, type, and/or length of volunteer service and the type of uniform item. This decision is made by the volunteer's supervisor or program manager.
5. Uniforms must be clean and neat in appearance.
6. Wear uniforms with job appropriate clothing. For example, wear slacks or nice denim jeans when greeting the public and older clothes when fixing equipment.
7. Return loaned uniform items on termination of volunteer job, project, or end of service as requested by supervisor.
8. Remove official blue rectangular patch if uniforms are given to volunteers and worn upon termination of volunteer service. It can be replaced with the round "I Volunteered with ODFW" patch.

4/99

GROUP VOLUNTEER TIME RECORD

Affiliation: _____ Chapter: _____ Project ID: _____

Project Title/Activity: _____ Project Location: _____

Supervisor: _____ Station/District: _____ Month/Year: _____

Other Donated Service Hours: ❒ Court-Ordered Community service ❒ Work Fair ❒ Green Thumb

❒ Student (school-related work) ❒ Other_____

Volunteer Names (please print clearly) and Affiliation / Chapter if different than above	Social Security #	Hours	Donated Mileage
	TOTALS		
SUPPLIES, SERVICES OR EQUIPMENT DONATION VALUE (please describe)			$

VW97/Vol. Guide/Gptime/1-20-99/SWWD/sks

OREGON
Fish & Wildlife

INDIVIDUAL VOLUNTEER TIME RECORD

Name: _____ _____ _____ Social Security #: _____
First MI Last

Affiliation/Chapter (Optional): _____ Project ID (STEP only) : _____

Project Title: _____ Supervisor: _____

Station/District: _____ Month/Year: _____

Other donated service hours: ❒ Court-ordered Community Service ❒ Work Fair ❒ Green Thumb

❒ Student (school-related work) ❒ Other _____

Day	Activity	Project Location	Hours (record to nearest *half* hour.)	Donated Miles
			TOTALS	
SUPPLIES, SERVICES OR EQUIPMENT DONATION VALUE (please describe)				$

WW97/Vol. Guide/Indivtime/1-20-99/SWWD/sks

Volunteer Accident Report

*Volunteer supervisor should complete this form immediately with volunteer's input.

1. Volunteer_____ Date of Accident_____Time _____am/pm
   Address _____ Immediate Supervisor_____

2. Accident Location:_____

3. Name of injured person if other than the volunteer_____
   Address _____

4. Describe Accident (What happened and why: identify unsafe conditions and/or actions)

5. Describe Injury_____
   Was first aid/medical treatment given at the scene? [ ] Yes [ ] No
   If yes, by whom_____
   Describe treatment:

6. List Witnesses and Phone No. _____
   _____

7. Was accident caused by faulty equipment or negligence? [ ] Yes [ ] No
   If yes, identify equipment, defect and or negligent actions.

8. Was accident caused by another person? [ ] Yes [ ] No
   If yes, list name(s): _____

9. Describe corrective action taken or planned to prevent similar accidents in the future:

10. Was any previous injury or known physical limitation a contributing factor? [ ] Yes [ ] No
    If Yes, explain:

Additional comments: (Use other side if necessary)

Completed By_____
Title _____ Date _____
Phone # _____

10/94

Send a copy of this report to district and regional safety officer and Department Health and Safety Manager. Injuries involving hospitalization or death of a volunteer must be immediately reported to the Safety and Health Manager.

Oregon Department of Fish & Wildlife

Watershed District Structure

4/19/99
M. Hill
/home/eagle/hillm/projects/boundareis-99/boundaries99.apr

OREGON DEPARTMENT OF FISH AND WILDLIFE

FISH REGIONAL / DISTRICT PERSONNEL

* *Assistant District Biologist*
** *STEP Biologist*
*** *Technician or Biologist who assists Fish or Wildlife District or Research*
**** *Fish Habitat Biologist*
***** *Fish Research Biologist*

Last revised 3/1/99

Region	Fish District	Region / Dist. Supervisor	Biologist	Telephone	Address
NW REGION, (CLACKAMAS)	~~District Office~~	Chris Wheaton		(503) 657-2000 x225	17330 S.E. Evelyn St., Clackamas 97015
		***	Rick Rowland	(503) 657-2000 x236	
	~~Astoria Field Office~~	*	Joe Sheahan	(503) 338-0106	Rt. 1, Box 764, House No. 2, Astoria 97104
	~~North Willamette~~	Don Bennett		657-2000 x 231	17330 S.E. Evelyn St., Clackamas 97015
	~~Watershed Fish~~	*	David Liscia	657-2000 x 232	
	~~District~~	**	Dick Caldwell	657-2000 x 235	
		****	Art Martin	657-2000 x 250	
		***	Craig Foster	657-2000 x 248	
		***	Bill Day	657-2000 x 300	
		****	Jim Grimes	621-3488	18330 NW Sauvie Island Rd., Portland 97231
	~~Tillamook~~	Rick Klumph		(503) 842-2741	4909 3rd St., Tillamook 97141
		*	Keith Braun	(503) 842-2741	
		**	John Casteel	(503) 842-2741	
NW REGION, S. WILLAMETTE WATERSHED DISTRICT (Corvallis)	~~District Office~~	Dave Anderson		(541) 757-4186x224	7118 NE Vandenberg Ave., Corvallis 97330-9446
	~~Coastal Salmon~~ - Inventory	*****	Steve Jacobs	(541) 737-4263 x261	28655 Hwy. 34, Corvallis 97333
		***	Gary Susac	(541) 737-4263 x248	
		***	Julie Firman	(541) 737-4263 x249	
	~~Mid-Coast~~	Bob Buckman		(541) 867-4741x224	2040 SE Marine Science Drive., Newport 97365
		*	George Westfall	(541) 867-4741x250	
		*	Kevin Goodson	(541) 867-4741x236	
		**	William Stein	(541) 867-4741x253	
		***	Tami Wagner	(541) 867-4741x255	
	~~Scale Studies~~	*****	Lisa Borgerson	(541) 737-4263 x232	28655 Hwy. 34, Corvallis 97333
	~~Upper Willamette~~	Jeff Ziller		(541) 726-3515x26	3150 E. Main St., Springfield 97478
		*	Mark Wade	(541) 726-3515x28	
		**	Dawn Kori	(541) 726-3515x29	
		***	Dick Irish	(541) 726-3515x25	

OREGON DEPARTMENT OF FISH AND WILDLIFE

FISH REGIONAL / DISTRICT PERSONNEL

* *Assistant District Biologist*
** *STEP Biologist*
*** *Technician or Biologist who assists Fish or Wildlife District or Research*
**** *Fish Habitat Biologist*
***** *Fish Research Biologist*

Last revised 3/1/99

Region	Fish District	Region / Dist. Supervisor	Biologist	Telephone	Address
NW REGION, S. WILLAMETTE WATERSHED DISTRICT (Corvallis) {cont.}	~~Mid-Willamette~~	Steve Mamoyac		(541) 757-4186x249	7118 NE Vandenberg Ave., Corvallis 97330-9446
		**	Gary Galovich	(541) 757-4186x251	
		***	Mark Nusom	(541) 757-4186x231	
		*	Wayne Hunt	(503) 378-6925x26	4412 Silverton Rd. NE, Salem 97305-2060
		***	Tom Murtagh	(503) 378-6925x29	
	~~Wild Salmonid~~ - Prod. Monitoring	*****	Mario Solazzi	(541) 737-4263 x242	28655 Hwy. 34, Corvallis 97333
		***	Steve Johnson	(541) 867-0300 x238	2040 SE Marine Science Dr., Newport 97365-5294
		***	Jeff Rodgers	(541) 737-4263 x231	28655 Hwy. 34, Corvallis 97333
		***	Tim Dalton	(503) 842-2741	4909 3rd St., Tillamook, OR 97141
		***	Bruce Miller	(541) 888-5515	PO Box 5430, Charelston, OR 97420
	~~Willamette CHS~~	*****	Robert Lindsay	(541) 737-4263 x252	28655 Hwy. 34, Corvallis 97333
		***	Ken Kenaston	(541) 737-4263 x253	
		***	Kirk Schroeder	(541) 737-4263 x251	
MARINE	~~Program Office~~	Neil Coenen - Program Director		(541) 867-4741	2040 SE Marine Science Dr., Newport 97365
	~~Astoria~~	Terry Link		(503) 325-2462	2001 Marine Drive, Room 120, Astoria 97103
SOUTHWEST	~~Regional Office~~	Bob Mullen (Regional Super.)		(541) 440-3353	4192 N. Umpqua Hwy., Roseburg 97470
	~~Coos-Coquille~~	Paul Reimers		(541) 888-5515	P.O. Box 5430, Charleston 97420
		*	Reese Bender	(541) 888-5515	
		*	Jim Muck	(541) 888-5515	
		**	Tom Rumreich	(541) 888-5515	
	~~Lower Rogue and South Coast~~	Russell Stauff		(541) 247-7605	P.O. Box 642, Gold Beach 97444
		*	Todd Confer	(541) 247-7605	
		**	Clayton Barber	(541) 247-7605	
	~~Steelhead Population Goals~~	*****	Tom Satterthwaite	(541) 474-3145	5375 Monument Dr., Grants Pass 97526 1600 Elk Creek Rd., Trail 97541
	~~Umpqua~~	Dave Loomis		(541) 440-3353	4192 N. Umpqua Hwy., Roseburg 97470
		**	Laura Jackson	(541) 440-3353	
		*	Dave Harris	(541) 440-3353	
		****	Tom Laynes	(541) 440-3353	

OREGON DEPARTMENT OF FISH AND WILDLIFE

FISH REGIONAL / DISTRICT PERSONNEL

* *Assistant District Biologist*
** *STEP Biologist*
*** *Technician or Biologist who assists Fish or Wildlife District or Research*
**** *Fish Habitat Biologist*
***** *Fish Research Biologist*

Last revised 3/1/99

Region	Fish District	Region / Dist. Supervisor	Biologist	Telephone	Address
SOUTHWEST (cont.)	~~Upper Rogue~~	Michael Evenson		(541) 826-8774	1495 East Gregory Rd., Central Point 97502
		*	David Haight	(541) 826-8774	
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OREGON DEPARTMENT OF FISH AND WILDLIFE

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** *STEP Biologist*
*** *Technician or Biologist who assists Fish or Wildlife District or Research*
**** *Fish Habitat Biologist*
***** *Fish Research Biologist*

Last revised 3/1/99

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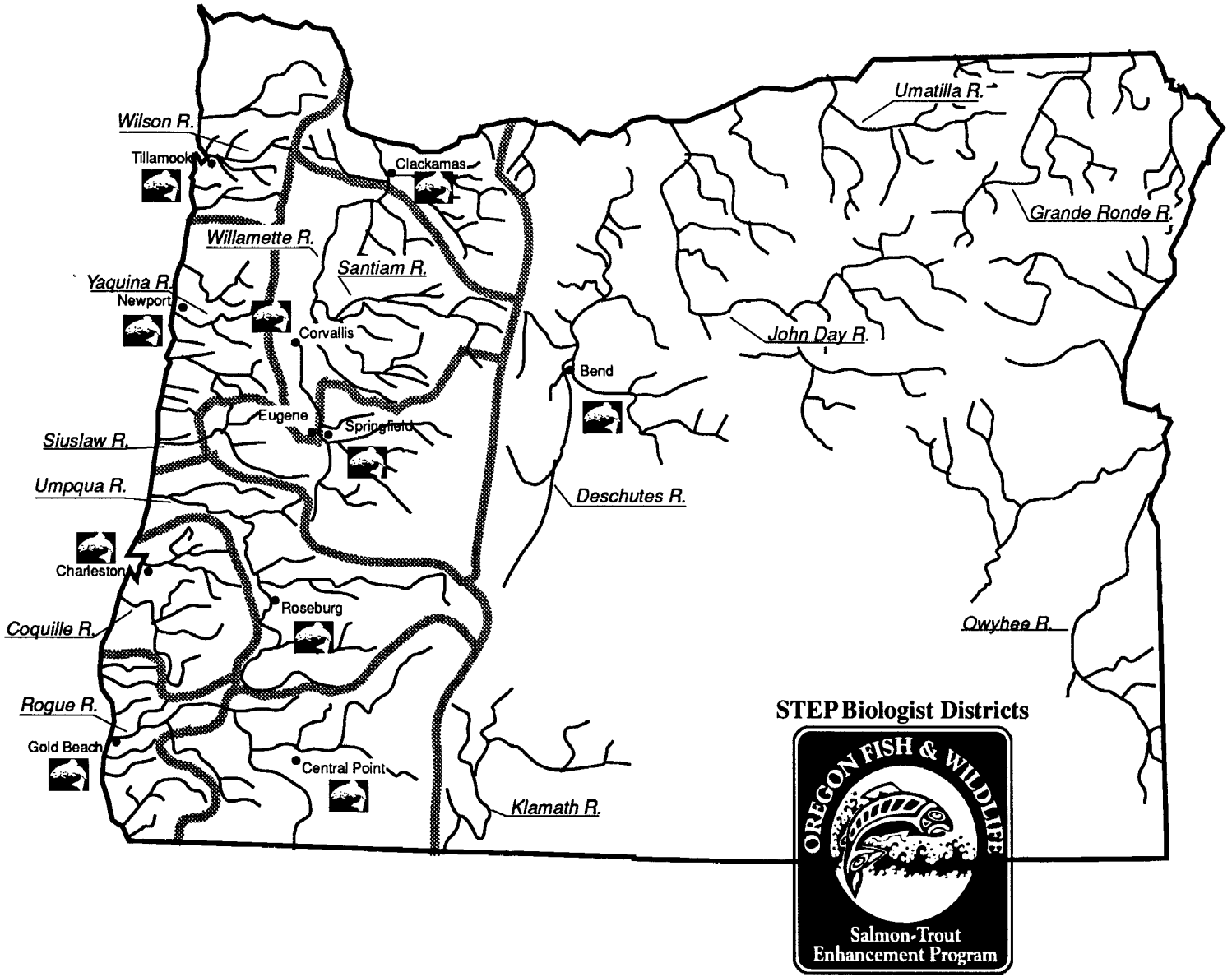
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Umpqua R.
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Roseburg
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Gold Beach
Central Point
Klamath R.
Bend
Deschutes R.
Umatilla R.
Grande Ronde R.
John Day R.
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09-Feb-99

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BAKEOVEN WS COUNCIL	2325 RIVER RD STE 3	THE DALLES	OR	97058
Phone: (541) 296-6178	Fax: (541) 296-7868			
BANKS WS COUNCIL	PO BOX 428	BANKS	OR	97106
Phone:	Fax:			
BEAR CREEK WS COUNCIL	RVCOG PO BOX 3275	CENTRAL POINT	OR	97502-
Phone: (541) 664-6676	Fax: (541) 664-7927			
BRIDGE CR WS COUNCIL	31444 WEST BRANCH ROAD	MITCHELL	OR	97750
Phone: (541) 462-3882	Fax: (541) 462-3882			
BULLY CR WS COALITION	2200 SIXTH AVE	VALE	OR	97918
Phone: (541) 473-3365	Fax:			
CALAPOOIA WS COUNCIL	33630 MCFARLAND RD	TANGENT	OR	97389-
Phone: (541) 967-5927x117	Fax:			
CHETCO WS COUNCIL	PO BOX 75	SMITH RIVER	CA	95567
Phone: (707) 487-3516	Fax:			
CLACKAMAS RBC	PO BOX 1869	CLACKAMAS	OR	97015-1869
Phone: (503) 650-1256	Fax: (503) 657-8955			
CLAGGETT CR WS GROUP	c/o 505 SANDY DR N	SALEM	OR	97303
Phone: (503) 399-5233	Fax:			
CLATSOP COORD COUNCIL	750 COMMERCIAL ST, RM 205	ASTORIA	OR	97103
Phone: (503) 325-0435	Fax: (503) 325-0459			
COLUMBIA SL WS COUNCIL	7040 NE 47TH AVE	PORTLAND	OR	97218-1212
Phone: (503) 281-1132	Fax: (503) 281-5187			
COOS WATERSHED ASSN	PO BOX 5860	COOS BAY	OR	97420
Phone: (541) 888-5922	Fax: (541) 888-6111			
COQUILLE WATERSHED ASSN	382 N CENTRAL BLVD	COQUILLE	OR	97423
Phone: (541) 396-2229	Fax: (541) 396-3963			
CROOK COUNTY WS COUNCIL	498 SE LYNN BLVD	PRINEVILLE	OR	97754-2840
Phone: (541) 447-4214	Fax:			
DESCHUTES CNTY WS COUNCIL	PO BOX 894	BEND	OR	97709
Phone: (541) 383-7146	Fax: (541) 383-7638			
ECOLA CREEK WS COUNCIL	PO BOX 368	CANNON BEACH	OR	97110
Phone: (503) 436-1739	Fax:			
ELK-SIXES R WS COUNCIL	93987 ELK RIVER RD	PORT ORFORD	OR	97465-
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ELK-SIXES R WS COUNCIL	PO BOX 666	GOLD BEACH	OR	97444
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EUCHRE CR WS COUNCIL	PO BOX 666	GOLD BEACH	OR	97444
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EVANS CR WS COUNCIL	2360 PINE GROVE RD	ROGUE RIVER	OR	97537-9609
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FAIRVIEW CR WS PLAN GROUP	2115 SE MORRISON	PORTLAND	OR	97214
Phone: (503) 231-2270	Fax: (503) 231-2271			
FIFTEEN MILE WS COUNCIL	2325 RIVER RD STE 3	THE DALLES	OR	97058
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FLORES CR/NEW R WS CNCL	PO BOX 85	LANGLOIS	OR	97450
Phone: (541) 348-9961	Fax:			
FULTON-GORDON WS COUNCIL	PO BOX 405	MORO	OR	97039-
Phone: (541) 565-3216x	Fax: (541) 565-3430			
GERKING CANYON WSC	PO BOX 405	MORO	OR	97039-
Phone: (541) 565-3216x	Fax: (541) 565-3430			
GILLIAM-EAST JOHN DAY WSC	PO BOX 427	CONDON	OR	97823
Phone: (541) 384-3768	Fax: (541) 384-2167			
GLENN & GIBSON CREEK WS	2308 PTARMIGAN ST NW	SALEM	OR	97304
Phone: (503) 362-6860	Fax:			
GOOSE LK FISHES WRKNG GRP	513 CENTER ST	LAKEVIEW	OR	97630
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GRANDE RONDE MODEL WS	10901 ISLAND AVE	LA GRANDE	OR	97850
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GRASS VALLEY WS COUNCIL	PO BOX 405 MORO	OR	97039-	
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HARNEY COUNTY WS COUNCIL	HC 71 4.51 HWY 205	BURNS	OR	97720-
Phone: (541) 573-2064	Fax:			
HOOD R WS COUNCIL	2990 EXPERIMENT STN DR	HOOD RIVER	OR	97031
Phone: (541) 386-2275	Fax:			
HUNTER CR/PISTOL R WSC	PO BOX F	GOLD BEACH	OR	97444
Phone: (541) 247-2754	Fax:			
ILLINOIS V WS COUNCIL	PO BOX 352	CAVE JUNCTION	OR	97523
Phone: (541) 592-3770	Fax:			
JOHNSON CR WS COUNCIL	525 LOGUS ST	OREGON CITY	OR	97045
Phone: (503) 239-3932	Fax: (503) 239-3946			
KLAMATH BSN WS ADV CNCL	20554 N MALIN MALIN	OR	97632	
Phone:	Fax:			
L BUTTE CR WS COUNCIL	1094 STEVENS RD	EAGLE POINT	OR	97524
Phone: (541) 826-2908	Fax:			
L COLUMBIA WS COUNCIL	12589 HWY 30	CLATSKANIE	OR	97016
Phone: (503) 728-9015	Fax:			

L NEHALEM WS COUNCIL	PO BOX 249	NEHALEM	OR	97131-
Phone: (503) 368-7424	Fax:			
L ROGUE WS COUNCIL	PO BOX 666	GOLD BEACH	OR	97444
Phone: (541) 247-2755	Fax: (541) 247-8058			
LONG TOM WS COUNCIL	751 S DANEBO AVE	EUGENE	OR	97402
Phone: (541) 683-6578	Fax: (541) 683-6998			
LOST CR WS GROUP	81868 LOST VALLEY LANE	DEXTER	OR	97431-
Phone: (541) 937-3351x	Fax: (541) 937-3351			
MALHEUR WS COUNCIL	2925 SW 6TH AVE STE 2	ONTARIO	OR	97914
Phone: (541) 889-2588x115	Fax:			
MARY'S RIVER WS COUNCIL	PO BOX 1041 CORVALLIS	OR	97339-	
Phone: (541) 758-7597	Fax: (541) 754-4252			
McKENZIE WS COUNCIL	40240 MOHAWK RVR RD	MARCOLA	OR	97454
Phone: (541) 933-3318	Fax:			
McKENZIE WS COUNCIL	PO BOX 1025	CORVALLIS	OR	97339
Phone: (541) 741-5235	Fax: (541) 766-8336			
MID COAST WS COUNCIL	344 SW 7TH ST STE A	NEWPORT	OR	97365
Phone: (541) 265-9195x	Fax: (541) 265-9351			
MID DESCHUTES WS COUNCIL	625 SE SALMON AVE #6	REDMOND	OR	97756-9580
Phone: (541) 923-8018	Fax:			
MID FK WILLAMETTE COUNCIL	PO BOX 1216	OAKRIDGE	OR	97463
Phone: (541) 782-2219x	Fax:			
MOHAWK WS PARTNERSHIP	28750 FOX HOLLOW RD	EUGENE	OR	97405
Phone: (541) 683-1155x	Fax: (541) 465-6483			
N FK JOHN DAY WS COUNCIL	PO BOX 95	MONUMENT	OR	97864
Phone: (541) 934-2141x	Fax: (541) 934-2312			
N SANTIAM WS COUNCIL	35403 FRANCIS ST	LYONS	OR	97358
Phone: (503) 897-2606	Fax: (503) 897-2606			
NECANICUM WS COUNCIL	HCR 63 BOX 950	SEASIDE	OR	97138
Phone: (503) 738-8188x	Fax: (503) 738-8188			
NESTUCCA WS COUNCIL	PO BOX 255	HEBO	OR	97122
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NETARTS BAY WS COUNCIL	6385 TILLAMOOK AVE	BAY CITY	OR	97107-
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NICOLAI-WICKIUP WS COUNCIL	RT 4 BOX 593-K	ASTORIA	OR	97103
Phone: (503) 458-6881	Fax:			
PINE HOLLOW WS COUNCIL	PO BOX 405	MORO	OR	97039
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PORT ORFORD WS COUNCIL	PO BOX 1327	PORT ORFORD	OR	97465
Phone:	Fax:			

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PRINGLE CR WS COUNCIL	PUB WRKS 555 LIBERTY ST SE	SALEM	OR	97301
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PUDDING RIVER WS COUNCIL	PO BOX 55	SCOTTS MILLS	OR	97375-
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Literature Sources

LITERATURE CITED

Bisson. P. A., J. A. Nielsen, R. A. Palmason, and E. L. Grove. 1982. A system of naming habitat types in small streams, with examples of habitat utilization by salmonids during low stream flow. Pages 62-73 *in:* N. B. Armantrout, ed. Acquisition and utilization of Aquatic Habitat Inventory Information. Western Division, American Fisheries Society, Portland OR.

Cupp, C. E. 1989. Stream corridor classification for forested lands of Washington. Hosey and Assoc. Bellevue, WA 46 p.

Everest, F. H., R. L. Beschta, J. C. Scrivener, K. V. Koski, J. R. Sedell, and C J. Cederholm. 1987. Fine sediment and salmonid production: A paradox. Pages 98-142 *In:* E. O. Salo and T. E. Cundy eds., Streamside Management: Forestry and Fishery Interactions. Contribution No. 57. Institute of Forest Resources, University of Washington, Seattle, Washington.

Frissell, C. A., W. J. Liss, C. E. Warren, and M. D. Hurley. 1986. A hierarchical framework for stream habitat classification: viewing streams in a watershed context. Environ. Manage. 10: 199-214.

Grant, G. E. 1988. Morphology of high gradient streams at different spatial scales, Western Cascades, Oregon. Pages 1-12 *in:* Shizouka Symposium on Geomorphic Change and the Control of Sedimentary Load in Devastated Streams, Oct. 13-14, 1988. Shizouka University, Shizouka, Japan.

Gregory, S. V., F. J. Swanson, and W. A. McKee. 1991. An ecosystem perspective of riparian zones. BioScience 40: 540-551.

Hankin, D. G., and G. H. Reeves. 1988. Estimating total fish abundance and total habitat area in small streams based on visual estimation methods. Can. J. Fish. Aquat. Sci. 45: 834-844.

Hawkins, C. P., J. L. Kershner, P. A. Bisson, M. D. Bryant, L. M. Decker, S. V. Gregory, D. A. McCullough, C. K. Overton, G. H. Reeves, R. J. Steedman, and M. K. Young. 1993. A hierarchical approach to classifying stream habitat features at the channel unit scale. *Fisheries* 18 (6): 3-12.

Moore, K. M., and S. V. Gregory. 1989. Geomorphic and riparian influences on the distribution and abundance of salmonids in a Cascade Mountain Stream. Pages 256-261 *in*: D. Abell, ed., Proceedings of the California Riparian Systems Conference; 1988 September 22-24, 1988; Davis, CA. Gen. Tech. Rep. PSW-110. Berkeley CA: Pacific Southwest Forest Range and Experiment Station, U.S.D.A.

Ralph, S. C. 1989. Timber/Fish/Wildlife stream ambient monitoring field manual. Center for Streamside Studies, University of Washington. Seattle, Washington.

Rosgen, D. L. 1985. A stream classification system. Pages 95-100 *in:* Riparian Ecosystems and Their Management; Reconciling Conflicting Uses. First North American Riparian Conference, April 16-18, 1985, Tucson, Arizona. USDA Forest Service. Gen. Tech. Rep. RM-120. Fort Collins, Colorado.

ADDITIONAL LITERATURE

Dambacher, J.M. and K.K. Jones. 1997. Stream habitat of juvenile bull trout populations in Oregon and benchmarks for habitat quality. Pages 353-360 in Mackay, W. C., M. K. Brewin, and M. Monita, editors. Friends of the bull trout conference proceedings. Bull Trout Task Force (Alberta), c/o Trout Unlimited Canada, Calgary.

Dolloff, C. A., H. E. Jennings, and M. D. Owen. 1997. A comparison of basinwide and representative reach habitat survey techniques in three southern Appalachian watersheds. *North American Journal of Fisheries Management* 17:339-347.

Hankin, D. G. 1984. Multistage sampling designs in fisheries: applications in small streams. Canadian Journal of Fisheries and Aquatic Sciences 41:1575-1591.

Hannaford, M. J., M. T. Barbour, and V. H. Resh. 1997. Training reduces observer variability in visual-based assessments of stream habitat. *Journal of the North American Benthological Society* 16 (4): 853-860.

Jones, K.K. and K.M.S. Moore. In Press. Habitat assessment in coastal basins in Oregon: implications for coho salmon production and habitat restoration. In Knudsen, E., editor. Proceedings of the Sustainable Fisheries Conference. North Pacific International Chapter of the American Fisheries Society. April 26-30, 1996.

Jones, K.K., and four co-authors. 1998. Status of Lahontan cutthroat trout in the Coyote Lake Basin, southeast Oregon. *North American Journal of Fisheries Management.* Expected publication in May issue.

Keller, E. A. and W. N. Melhorn. 1978. Rhythmic spacing and origin of pools and riffles. Geological Society of America Bulletin 89:723-730.

McKinney, S. P., J. O'Conner, C. K. Overton, K. MacDonald, K. Tu, and S. Whitwell. 1996. A characterization of inventoried streams in the Columbia River basin. Aqua-Talk. R-6 Fish Habitat Relationship Technical Bulletin 11, Portland, Oregon.

McIntosh, B. A., J. R. Sedell, N. E. Smith, R. C. Wissmar, S. E Clarke, G. H. Reeves, and L. A. Brown. 1994. Historical Changes in fish habitat for select river basins of eastern Oregon and Washington. Northwest Science 68 (Special Issue):36-53.

Moore, K. M. S., K. K. Jones, and J. M. Dambacher. 1997. Methods for stream habitat surveys. Oregon Department of Fish and Wildlife, Information Report 97-4, Portland, Oregon.

Reeves, G. H., L. E. Benda, K. M. Burnett, P. A. Bisson, and J. R. Sedell. 1995. A disturbance-based ecosystem approach to maintaining and restoring freshwater habitats of evolutionariy significant units of anadromous salmonids in the Pacific Northwest. American Fisheries Society Symposium 17:334-349.

Roper, B. B., and D. L. Scarnecchia. 1995. Observer variability in classifying habitat types in stream surveys. *North American Journal of Fisheries Management* 15:49-53.

Glossary

Active channel - Active channel refers to the width and depth of a stream channel at "normal" high winter flow, sometimes also known as bankfull flow. The active channel is a key measurement from which many other measurements and statistics are derived.

Alcove - An alcove is a protected type of subunit pool. Alcoves are generally found along the sides of the stream but within the active channel. Alcoves maintain their contact with the wetted portion of the stream channel.

Alevins - Alevins are newly hatched fish with a connected yolk sac. Nutrients are absorbed from the yolk sac. In salmonids, this life stage is completed within the spawning gravel.

Anadromous - Referring to fish, an anadromous species is one which spends some part of its life cycle in fresh water, and another part of its life cycle in salt water. Almost all salmon are anadromous. Some populations of trout are anadromous.

Backwater Pool - A backwater pool is found along the channel margins. It is created by eddies around boulders, root wads, or woody debris. Backwater pools are part of the active channel at most flows.

Base flow - Base flow is water input into a stream channel provided exclusively by natural groundwater recharge, swamps, or other sources of natural storage. It excludes any type of precipitation or surface runoff. Many streams rely on base flow during summer low flow conditions.

Beaver pond - A beaver pond is a special type of pool habitat unit. Beaver ponds are formed by the impoundment of water behind beaver dams. Like all pools, beaver ponds have a gradient of 0.0 percent.

Bedrock - Bedrock is the parent rock from which stream substrate particles are formed. Weathering, and the action of living organisms upon bedrock, form both stream substrates and terrestrial soils.

Cascade - A cascade is a type of fast-water habitat unit. Cascades are units with gradients of 3.5 to 10.0 percent or higher. Cascades have much surface turbulence, accompanied by high velocity flow. Many cascades are composed of step-pool sequences, which are small pools occurring between nearly vertical hydraulic jumps.

Channel metrics - Channel metrics are the measurements of height and width of the active channel, floodprone areas, and to the first terrace.

Clinometer - A clinometer is an instrument used to measure vertical angles. It is used to measure stream shading provided by vegetation or topography. It is also used with trigonometry to measure the heights of objects like buildings or trees.

Cobble - Cobble refers to medium-large particles in the stream substrate. Cobble particles range in size from baseball to bowling ball, representing diameters of from 64 to 256 millimeters.

Constrained - A stream channel is constrained when its lateral movement is inhibited or prevented from moving by landforms or structures. Constrained stream channels have a relatively fixed position over time.

Dammed pool - A dammed pool is a slow-water habitat unit. Dammed pools are formed by the impoundment of water behind natural or man-made debris dams. Like all pools, dammed pools have a gradient of 0.0 percent.

DBH - DBH refers to diameter at breast height. It is the diameter of standing timber at "breast height" or about 5 feet (1.5 meters) upwards from the base of the tree. DBH is a standard measurement used in timber surveying.

Debris jam - A debris jam is an accumulation of woody debris, gravel or other substrate, or material from a mass failure deposited in a specific location. The debris forms a blockage that the stream must flow through or around. Debris jams often occur in areas where the channel is constricted by such features as rocky outcrops. Debris jams occasionally form around man-made structures, such as bridge supports or car bodies. Debris jams usually span most of the stream channel's width. They can represent potential barriers to fish passage.

Dry unit - A dry unit is a special type of habitat unit. Dry units may have any gradient and although they may have subsurface flow, are dry at the time of the survey, . Dry units occur between wetted units.

Dry channel - A dry channel is a special type of habitat unit. Dry channels are completely dry at the time of the survey. They are found in either main or secondary channels.

Embeddedness - Embeddedness is the degree to which large substrate particles are surrounded or covered by smaller particles of silt, sand, or small gravels.

Entrenchment - Entrenchment describes the process of a stream cutting its channel downward below the level of the surrounding landforms. As entrenchment increases, a stream's ability to interact with its floodplain decreases.

Floodplain - A floodplain is a relatively wide, flat, low-lying area adjacent to the stream channel. It is inundated when the stream overflows its banks during flood flows.

Floodprone - Floodprone describes the height and width of an area above and beyond the stream channel that would be inundated by a "statistical" 50 year flood.

Fry - Fry are tiny fish that have newly emerged from the spawning gravel. Because nutrients in the yolk sac are exhausted, fry must actively seek their own food. Their diet consists of small macroinvertebrates during this life stage. Fry often school strongly, but soon engage in territorial competition.

Glide - A glide is a type of fast water habitat unit . A glides has a 0.5 percent gradient. Glides have a uniform cross-section and no surface turbulence. In contrast to pools, glides have no significant scour and deposition. In contrast to riffles, glides have no surface turbulence.

GPS - Global Positioning System. A GPS unit uses satellites to pinpoint a position on the earth's surface. GPS units are often used to note starting and ending points of reaches, important stream habitat features, and with a compass, for general land navigation.

Gradient - The gradient of a stream is the slope of the water's surface. It is the measure of a stream's steepness.

Gravel - Gravels are intermediate-sized particles found in a stream's substrate. Particles from pea to baseball (2 to 64 millimeters) in diameter are referred to as gravel. Salmonids use gravels for spawning and incubation of eggs.

Habitat unit - A habitat unit is the basic subdivision of the stream channel. Each habitat unit is characterized by a relatively similar gradient, substrate, and cross-sectional profile. Habitat units form a continuous chain from the beginning to the end of the survey. With a few exceptions, habitat units are at minimum as long as the active channel is wide. Thus, in small streams, each habitat unit may be only a few meters long, while in large streams, habitat units may be 100 or more meters long.

Harborage - Harborage is any subset of fish habitat where fish can escape from predators, avoid high flow velocities, or rest. Typical harborage areas include undercut banks, submerged root wads, bottoms of pools, or waterfall bubble curtains.

Interstitial spaces - Interstitial spaces are small spaces between objects, i.e., such as the spaces between gravels, cobbles, or boulders, or between pieces of large woody debris (LWD). These areas are used by different life stages of fish and are often key areas for aquatic insect colonizations.

Isolated pool - Pools formed outside the wetted channel but within the active channel are called isolated pools.

Key pieces - Key pieces are substantial pieces of large woody debris (LWD). Some part of the piece must lie within the active channel of the stream. Key pieces are at a minimum 24 inches (60 centimeters) in diameter and 34 feet (10.0 meters) in length.

Large boulders - Large boulders are at least 20 inches (0.5 meters) in diameter, are part of the stream's substrate, and have some part extending above the water's surface at the time of the survey.

Large wood (LWD) - Large woody debris (LWD) is a collection of wood pieces, either natural or cut, with some part of the piece within the active channel of the stream. The minimum size for counting a piece of LWD is 6 inches (15 centimeters) in diameter by 10 feet (3.0 meters) in length. The minimum length does not apply to root wads.

Macroinvertebrates - Macroinvertebrates are aquatic invertebrate organisms large enough to be seen with the naked eye. They either live within or upon the substrate, although some forms may be free-floating. Macroinvertebrates comprise the principal diet of juvenile salmonids. Typical macroinvertebrates are immature insects such as mayfly, deerfly, or caddisfly larvae or stonefly nymphs. Crustaceans, isopods, and other groups are also considered macroinvertebrates.

Mass failures - A mass failure is an area where the hillslope or terrace adjacent to the stream channel has lost its structural ability to resist the force of gravity. The area gradually or quickly moves downhill toward or into the stream channel. Types of mass failures are earthflows, landslides, and avalanches.

Microhabitats - Microhabitats are small areas used by fish or other organisms for feeding, resting, and avoiding predators.

Off-Channel - Off-channel areas are habitat units found away from and along the main channel. They include secondary channels or flood overflow channels, as well as backwater, isolated, or alcove pools. Off-channel areas are important to salmonids during different parts of their life cycles.

Open sky - Open sky is a measure of how shaded the stream is at the time of the survey. It is the percentage of the 180 degree semicircle over the stream that allows sunlight to reach the stream.

Plunge pool - A plunge pool is a type of slow water habitat unit. Plunge pools are formed by the vertical force of water plunging over an object; a boulder, piece of large woody debris, bedrock shelf, culvert, or other form of structure. The plunging action usually scours a relatively deep section of the pool at its upstream end. Like all pools, plunge pools have a gradient of 0.0 percent.

Pocket pools - Pocket pools are small pool areas within larger habitat units (i.e, riffle with pockets). They are formed by the scouring action of water accelerating around an instream obstacle, such as a boulder or a root wad.

Primary channel - The primary channel of a stream carries the majority of the stream flow. In many streams, it is the only wetted channel during the summer months. Some stream configurations, such as unconstrained braided streams, have no single primary channel.

Profile - A profile is a graph that displays the relationship between elevation rise and length of the stream. It pictorially displays the gradient of the stream.

Rapid - A rapid is a type of fast-water habitat unit. Rapids are units with moderately high gradients of 3.0 to 8.0 percent, occasionally greater. Rapids have significant surface turbulence, accompanied by high velocity flow and the formation of eddies and hydraulic jumps around the substrate.

Reach - A reach is a large subdivision of a stream determined by a fairly uniform set of valley, channel, and land use characteristics. Each reach is composed of many smaller individual habitat units.

Redds - Redds are the nesting sites where salmonids deposit and fertilize their eggs during spawning. Redds are constructed by the female (hen) in various sized gravels typical for each species.

Riffle - A riffle is a type of fast-water habitat unit. Riffles have a gradient of 1.0 to 4.0 percent. Riffles are usually shallow, with a uniform cross-section. The substrate in a riffle is generally composed of gravel or cobble. Redds are often constructed in riffle areas.

Riparian area - A riparian area is a terrestrial zone alongside the stream channel directly influenced by the water of the stream. It is sometimes called the green zone. Annual and intermittent water, a high water table, and wet soils influence vegetation and microclimate in a riparian area.

Salmonids - Members of the Salmonidae family in Oregon include Atlantic Salmon, Pacific Salmon species (Coho, Chinook, Sockeye, Chum, and Pink), Brown Trout, Rainbow Trout and Steelhead, Cutthroat Trout, and the Chars (Brook Trout, Lake Trout, and Bull Trout).

Scour pool - A scour pool is a type of slow-water habitat unit. Scour pools are formed by scouring, or removal through hydraulic forces, of substrate from the stream channel, and deposition of that material elsewhere. Deposition may occur on the sides of the pool, or at the downstream end of the pool, forming a tailout. The scoured material is often transported further downstream. The scoured area forms the pool. Scour pools are divided into two types; lateral scour and straight scour pools. They are classified according to the relative positions of scour and deposition. Lateral scour pools have scour and deposition on the sides of the pools, while straight scour pools have scour down the middle and deposition on the sides. Lateral scour pools are much more common.

Secondary channels - Secondary channels are any channels other than the main, or primary, channel of a stream.

Silt and organics - Silt and organics are the smallest substrate particle sizes, including particles from microscopic to .062 millimeters in diameter.

Step / falls - A step is a special type of habitat unit. Steps are characterized by discrete breaks in the gradient of the stream. Steps are the most vertical of the habitat units. The vertical extent of a step may range from as low as 1 foot (0.3 meter) to as high as the highest waterfall. The height of steps are usually measured instead of their gradients. Steps are usually wider than they are long. Steps can occur over a variety of objects or surfaces; from bedrock outcrops, logs, and culverts under roads.

Substrate - The substrate is the material that makes up the bottom and sides of the stream channel. Substrate is usually characterized by particle size, and if bedrock, by the parent rock type (sedimentary, igneous, or metamorphic).

Terrace - A terrace is a landform created by the deposition of material from a flowing stream, usually during high flow events. The stream subsequently cuts its channel down into the deposited material, creating terraces beside the stream channel. Terraces tend to be flat on the top.

Thalweg - Path of a stream that follows the deepest part of the channel.

Trench pool - A trench pool is a type of slow-water habitat unit. Trench pools are usually formed within a bedrock substrate. They are often deep and narrow, as the name implies. Like all pools, trench pools have a gradient of 0.0 percent.

Unconstrained - Landforms or structures do not inhibit or prevent lateral stream movement in an unconstrained stream channel. Such stream channels have a variable position on the valley floor over time.

Undercut - Undercut refers to stream banks where the wetted channel cuts laterally underneath the surface of a bank. Undercut banks are usually stabilized by the roots of vegetation. Undercuts are also known as “overhangs.”

UTM - Universal transverse mercator, part of an international map reference system. UTM readings from a global positioning device (GPS) are standard units used to pinpoint locations on a topographic map.

Valley width index (VWI)) - The valley width index is a measurement defined as the ratio of the valley width to the active channel width. In other words, the VWI represents the number of active channels that will fit across the valley floor.

Verified - Verified refers to habitat units which are measured for length and width to calibrate the units whose lengths and widths are estimated.