

# Oregon's watershed council program

*"A long pull, and a strong pull, and a pull all together."*  
— Charles Dickens

## What are local watershed councils?

Watershed councils are locally organized, voluntary, non-regulatory groups established to improve the condition of natural resources in the state's watersheds. In Oregon, nearly 90 recognized councils are engaged in a wide range of watershed work.

The 1995, the Oregon legislature unanimously passed House Bill 3441 to provide guidance on the formation of watershed councils. However, House Bill 3441 makes it clear that formation of a council is a local government decision, with no state approval required. Watershed councils are required to represent the interests in the basin and be balanced in their makeup. Watershed councils offer local residents the opportunity to independently evaluate watershed conditions and identify opportunities to restore or enhance conditions. Through the councils, partnerships between residents, local, state, and federal agency staff and other groups are developed. Through these partnerships and the resulting integration of local efforts, the state's watersheds are protected and enhanced.

## How local watershed councils are formed

Establishment of a council is a local government decision made by a city, county, water supply, or sewer district. In practice, recognition of councils has been by formal letter, resolution, or order, usually from a county commission. Two primary guidelines are provided by the legislation: (1) that the watershed council be a voluntary, local group and (2) that the council represent a balance of interested and affected persons within the

watershed. Watershed councils are composed of people from the local communities. They represent local knowledge and understand the local community and its complexities.

Some watershed councils form as non-profit corporations or adopt other formal organizational structures while others organize as informal groups. Many councils work closely with local soil and water conservation districts, council of governments, and resource conservation and development districts.

## The role of local watershed councils

Watershed councils work across jurisdictional boundaries and across agency mandates to look at the watershed in its entirety. The primary purpose of the watershed council is to address watershed conditions from ridgetop to ridgetop. The council also plans and implements projects to protect or improve natural resources, educates people about watershed conditions and functions, and monitors changes in the watershed.

The council is a forum to bring local, state, and federal land management agencies together with local property owners and private land managers. It provides local people with a voice in natural resource management that can significantly influence watershed management decisions. Councils can also be a tool that watershed management decision makers use to disseminate information to the public, gauge local sentiment on specific management issues, and coordinate a broad-based review of management plans.

Watershed councils do not have any specific authority or ability to regulate land or water use.

They work as an advisory body but also undertake specific restoration, education, and monitoring projects. As a group that is recognized by local government, they incur no more or less liability to local governments than any other locally appointed advisory group (e.g., planning commission, design review board, etc.).

### **Local watershed councils and the Oregon plan**

Local watershed councils are an essential part of The Oregon Plan. The Oregon Plan originally had two components: the Coastal Salmon Restoration Initiative, which deals with recovering coho salmon runs in coastal basins, and the Healthy Streams Partnership, which deals with improving water quality statewide to meet federal Clean Water Act standards. A third component addressing the restoration of potentially threatened steelhead trout has been added to The Oregon Plan and it is envisioned that eventually the plan will become a comprehensive approach to sustaining watershed health to meet the habitat requirements of all species.

Watershed councils, working through their local networks and relying upon technical expertise from local, state, and federal agencies, are compiling and analyzing data on current watershed conditions and developing prioritized work plans to solve natural resource problems. They are monitoring watershed conditions, tracking the

effects of restoration work, and providing data to a centralized repository so that the overall effect of The Oregon Plan can be quantified. Watershed councils are also working hard to provide information and raise public awareness about watershed health issues. Helping people realize that they have an individual role and responsibility for the state's natural resources will, in the long run, help ensure the future viability of our watersheds.

### **Local watershed councils and GWEB**

The Governor's Watershed Enhancement Board (GWEB) was directed by the 1995 Oregon legislature to support the work of local watershed councils. GWEB provides grant funds for activities that benefit the state's watersheds, provides technical assistance through its member agencies, and administers funding for implementation of The Oregon Plan. When evaluating applications for grant funds, GWEB gives preference to projects that are proposed or endorsed by watershed councils. Councils may also apply to GWEB for funding for coordinator salaries and council administrative costs. GWEB provides informational materials to councils, sponsors workshops for council members, and has developed a watershed assessment manual to provide uniform protocols for assessing current watershed conditions.



# Watershed councils in Oregon

Active watershed councils as of June 1999.

## **Applegate R WS Council**

2816 Upper Applegate Rd  
Jacksonville OR 97530  
Phone: (541) 899-8036

## **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) 967-5927 ext 117  
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  
Phone: (541) 332-4772  
Fax:

## **Elk-Sixes R WS Council**

PO Box 666  
Gold Beach OR 97444  
Phone: (541) 247-2755  
Fax: (541) 247-8058

## **Euchre Cr WS Council**

PO Box 666  
Gold Beach OR 97444  
Phone: (541) 247-2755  
Fax:

## **Evans Cr WS Council**

2360 Pine Grove Rd  
Rogue River OR 97537-9609  
Phone: (541) 582-0062  
Fax:

**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  
Phone: (541) 296-6178  
Fax: (541) 296-7868

**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) 565-3216  
Fax: (541) 565-3430

**Gerking Canyon WSC**

PO Box 405  
Moro OR 97039  
Phone: (541) 565-3216  
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  
Phone: (541) 947-6003  
Fax:

**Grande Ronde Model WS**

10901 Island Ave  
La Grande OR 97850  
Phone: (541) 962-6590  
Fax: (541) 962-6593

**Grass Valley WS Council**

PO Box 405  
Moro OR 97039  
Phone: (541) 565-3216  
Fax: (541) 565-3430

**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 RWSC**

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) 937-3351  
Fax: (541) 937-3351

**Malheur WS Council**

2925 SW 6th Ave Ste 2  
Ontario OR 97914  
Phone: (541) 889-2588 ext 115  
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) 265-9195  
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) 782-2219  
Fax:

**Mohawk WS Partnership**

28750 Fox Hollow Rd  
Eugene OR 97405  
Phone: (541) 683-1155  
Fax: (541) 465-6483

**N Fk John Day WS Council**

PO Box 95  
Monument OR 97864  
Phone: (541) 934-2141  
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) 738-8188  
Fax: (503) 738-8188

**Nestucca WS Council**

PO Box 255  
Hebo OR 97122  
Phone: (503) 842-2240  
Fax:

**Netarts Bay WS Council**

6385 Tillamook Ave  
Bay City OR 97107  
Phone: (503) 377-4000  
Fax: (503) 377-4010

**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  
Phone: (541) 565-3216  
Fax: (541) 565-3430

**Port Orford WS Council**

PO Box 1327  
Port Orford OR 97465  
Phone:  
Fax:

**Powder Basin WS Council**

3990 Midway Dr  
Baker City OR 97814  
Phone: (541) 523-7121  
Fax: (541) 523-2184

**Pringle Cr WS Council**

Pub Wrks 555 Liberty St SE  
Salem OR 97301  
Phone: (503) 588-6211  
Fax: (503) 588-6025

**Pudding River WS Council**

PO Box 55  
Scotts Mills OR 97375  
Phone: (503) 873-6146  
Fax:

**Rickreall WS Council**

Polk County Courthouse  
Dallas OR 97338  
Phone: (503) 623-9237  
Fax: (503) 623-6009

**S Coast WS Council**

PO Box 666  
Gold Beach OR 97444  
Phone: (541) 247-2755  
Fax: (541) 247-8058

**S. Santiam WS Council**

33630 McFarland Rd  
Tangent OR 97389  
Phone: (541) 967-5927 ext 120  
Fax: (541) 928-9345

**Sandy Basin WS Council**

PO Box 868  
Sandy OR 97055  
Phone: (503) 630-2382  
Fax: (503) 630-2341

**Scappoose Bay WS Council**

34017 Slavens Rd  
Warren OR 97053  
Phone: (503) 229-5988  
Fax:

**Siuslaw WS Council**

PO Box 422  
Mapleton OR 97453  
Phone: (541) 268-3044  
Fax: (541) 268-3044

**Skipanon WS Council**

523 Turlay Rd  
Warrenton OR 97146  
Phone: (503) 861-3669  
Fax:

**SW Coos WS Council**

Rt 1 Box 1370a  
Bandon OR 97411  
Phone: (541) 347-9584  
Fax:

**Ten Mile Basin Partnership**

PO Box L  
Lakeside OR 97449  
Phone: (541) 759-2414  
Fax: (541) 759-4752

**Tillamook WS Council**

6385 Tillamook Ave  
Bay City OR 97107  
Phone: (503) 377-4000  
Fax: (503) 377-4010

**Tryon Cr Partnership**

6039 SW Knights Bridge  
Portland OR 97219  
Phone: (503) 244-0641  
Fax:

**Tryon Cr WS Council**

10750 Boones Ferry Rd  
Portland OR 97219  
Phone: (503) 823-5596  
Fax:

**Tualatin WS Council**

1080 SW Baseline Bldg B Ste B-2  
Hillsboro OR 97123  
Phone: (503) 648-3174 ext 116  
Fax: (503) 681-9772

**U Chewaucan WS Council**

PO Box 67 Ranger Dist  
Paisley OR 97636  
Phone: (541) 943-3114  
Fax:

**U Klamath WS Council**

2316 S 6th Ste C  
Klamath Falls OR 97601  
Phone: (541) 882-5409  
Fax: (541) 882-5409

**U Nehalem WS Council**

16747 Timber Rd  
Vernonia OR 97064  
Phone: (503) 429-2401  
Fax: (503) 429-2401

**U Rogue WS Council**

PO Box 1128  
Shady Cove OR 97539  
Phone: (541) 878-3800  
Fax: (541) 878-3800

**U South Frk John Day Basin**

Izee Rt Box 750  
Canyon City OR 97820  
Phone: (541) 477-3828  
Fax:

**Umatilla Basin WS Council**

PO Box 1551  
Pendleton OR 97801  
Phone: (541) 276-2190  
Fax: (541) 276-8130

**Umpqua Basin WS Council**

1758 NE Airport Rd  
Roseburg OR 97470  
Phone: (541) 672-6507  
Fax: (541) 440-3424

**Walla Walla WS Council**

PO Box 68  
Milton OR 97862  
Phone: (541) 938-7086  
Fax: (541) 938-6639

**Williams Cr WS Council**

PO Box 94  
Williams OR 97544  
Phone: (541) 846-9175  
Fax:

**Winchuck WS Council**

11243 Winchuck River Rd  
Brookings OR 97415  
Phone: (541) 469-5462  
Fax:

**Yamhill WS Council**

2200 W 2nd St  
Mcminnville OR 97128  
Phone: (503) 472-6403  
Fax: (503) 472-2459

**Young's Bay WS Council**

Rt 1 Box 990  
Astoria OR 97103  
Phone: (503) 325-8609

# Metric conversion

## 14.2

*"There is measure in all things."*  
— Horace

### Length

Symbol	When you know	Multiply by	To find	Symbol
in	inches	2.5	centimeters	cm
ft	feet	30	centimeters	cm
yd	yards	0.9	meters	m
mi	miles	1.6	kilometers	km

### Area

Symbol	When you know	Multiply by	To find	Symbol
in <sup>2</sup>	square inches	6.5	square centimeters	cm <sup>2</sup>
ft <sup>2</sup>	square feet	0.09	square meters	m <sup>2</sup>
yd <sup>2</sup>	square yards	0.08	square meters	m <sup>2</sup>
mi <sup>2</sup>	square miles	2.6	square kilometers	km <sup>2</sup>
	acres	0.4	hectares	ha

### Mass (weight)

Symbol	When you know	Multiply by	To find	Symbol
oz	ounces	28	grams	g
lb	pounds	0.45	kilograms	kg
	short tons (2,000 pounds)	0.9	tonnes	t

### Volume

Symbol	When You Know	Multiply by	To find	Symbol
tsp	teaspoons	5	milliliters	ml
Tbsp	tablespoons	15	milliliters	ml
fl oz	fluid ounces	30	milliliters	ml
c	cups	0.24	liters	l
pt	pints	0.47	liters	l
qt	quarts	0.95	liters	l
gal	gallons	3.8	liters	l
ft <sup>3</sup>	cubic feet	0.03	cubic meters	m <sup>3</sup>
yd <sup>3</sup>	cubic yards	0.76	cubic meters	m <sup>3</sup>

Temperature (exact)				
Symbol	When You Know	Multiply by	To find	Symbol
°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

Length		
Symbol	Unit	Number of meters
km	kilometer	1,000
hm	hectometer	100
dkm	decameter	10
m	meter	1
dm	decimeter	0.1
cm	centimeter	0.01
mm	millimeter	0.001

Capacity		
Symbol	Unit	Number of liters
kl	kiloliter	1,000
hl	hectoliter	100
dcl	decaliter	10
l	liter	1
dl	deciliter	0.1
cl	centiliter	0.01
ml	milliliter	0.001

Area		
Symbol	Unit	Number of square meters
km <sup>2</sup>	square kilometer	1,000,000
ha	hectare	10,000
a	are	100
ca	centare	1
cm <sup>2</sup>	square centimeter	0.0001

Temperature Celsius scale	
°C	degree Celsius
0°C	freezing point of water
100°C	boiling point of water

Mass (weight)		
Symbol	Unit	Number of grams
t	metric ton or tonne	1,000,000
kg	kilogram	1,000
hg	hectogram	100
dkg	decagram	10
g	gram	1
dg	decigram	0.1
cg	centigram	0.01
mg	milligram	0.001

Volume		
Symbol	Unit	Number of grams
cm <sup>3</sup> (or cc)	cubic centimeters	0.000001

Source: This chart is reprinted with permission from the *Project Learning Tree Supplementary Activity Guide for Grades K-6* (Washington, D.C.: American Forest Institute, 1977).



# Hot links

## 14.3

*"Knowledge is of two kinds. We know a subject ourselves, or we know where we can find information upon it."*  
— Samuel Johnson

**W**ebsites are amazing sources of information. But, they are also very dynamic. The following websites were active as of June 1999. These sources may help students locate information useful in their watershed studies.

### Water cycle

Water Cycle Index

[http://www-k12.atmos.washington.edu/k12/pilot/water\\_cycle/index.html](http://www-k12.atmos.washington.edu/k12/pilot/water_cycle/index.html)

An educational module of water cycle activities.

The Hydrologic Cycle

<http://agen521.www.ecn.purdue.edu/AGEN521/icon.html>

Designed for a college course this site includes some good graphics.

NASA's Observatorium—The Hydrologic Cycle

<http://www.observe.ivv.nasa.gov/nasa/earth/hydrocycle/hydro2.html>

An attractive site on water and atmosphere.

NSF Geosciences Unidata Integrated Earth Information Server

<http://atm.geo.nsf.gov/>

Climatic information, including instructional materials

Oregon Climate Service

<http://www.ocs.orst.edu/>

Information on weather and climate in Oregon.

USDA NRCS Weather and Climate Data

[http://www.ftw.nrcs.usda.gov/climate\\_data.html](http://www.ftw.nrcs.usda.gov/climate_data.html)

A source of information on past and current weather and climate.

### Watersheds

Surf Your Watershed

<http://www.epa.gov/surf/>

This US Environmental Protection Agency (EPA) site provides maps and other information for individual watersheds nationwide.

Watershed Internet Resource Links (For the Sake of the Salmon)

<http://www.4sos.org/rvwtrshd.html>

A good list of internet links.

Office of Wetlands, Oceans and Watersheds  
<http://www.epa.gov/OWOW/>  
The EPA office that is responsible for wetlands, oceans, and watersheds.

Portland Regional Watershed Information  
<http://www.upa.pdx.edu/CWSP/WATSHED/region.htm>  
Want to know what's happening in Portland's watersheds? Look here.

Welcome to the Oregon Plan for Salmon and Watersheds  
<http://www.oregon-plan.org/>  
The Oregon Plan is the State of Oregon's effort to restore salmon, trout, and other aquatic resources to productive and sustainable levels.

Locally Organized Watershed Councils In Oregon  
<http://www.oregon-plan.org/supplement12-97/st-14e03.html>  
Watershed Councils are a good place to get involved with others in improving our watersheds.

The Watershed Management Council  
<http://watershed.org/wmchome/>  
The Watershed Management Council is non-profit educational organization dedicated to the advancement of the art and science of watershed management

USDA-NRCS Conservation Programs  
<http://www.nrcs.usda.gov/NRCSProg.html>  
The Natural Resources Conservation Service works to improve conservation and management of private lands.

The Sturgeon General's Website (Environment Canada)  
<http://www.sturgeongeneral.org/>  
Lots of information on watersheds and fisheries in the Pacific West.

River Network  
<http://www.teleport.com/~rivernet/>  
River Network's mission is to help people organize to protect and restore rivers and watersheds.

## Uplands

National Agricultural Library: Water Quality Information Center  
<http://www.nal.usda.gov/wqic/>  
A starting point for information of the connections between agriculture and water quality.

USDA-NRCS Soils Data  
[http://www.ftw.nrcs.usda.gov/soils\\_data.html](http://www.ftw.nrcs.usda.gov/soils_data.html)  
Background information on soil and its management.

USDA-NRCS Plants Data  
[http://www.ftw.nrcs.usda.gov/plants\\_data.html](http://www.ftw.nrcs.usda.gov/plants_data.html)  
Background information on the importance and management of plants.

Backyard Conservation (NRCS)  
<http://www.nhq.nrcs.usda.gov/CCS/Backyard.html>  
Information from NRCS to help improve conservation at the backyard level.

PLANTS National Database Home Page  
<http://plants.usda.gov/plantproj/plants/index.html>  
A site with basic botanical information on an incredible number of plants.

Riparian Areas (Oregon State University Extension Service, Malheur Experiment Station)  
<http://www.primenet.com/~mesosu/riparian.htm>  
Basic information on the importance of riparian areas.

Riparian Resources Home Page  
<http://quarles.unbc.ca/nres/ackerman/riparian-res.htm>  
A Canadian list of internet resources and links on riparian topics.

Riparian Communities and Related Topics: An Annotated Bibliography  
<http://www.npwrc.usgs.gov/resource/LITERATR/RIPARIAN/RIPARIAN.HTM>  
A searchable database from USGS listing articles on various aspects of riparian management.

Classification and Management of Montana's Riparian and Wetland Sites  
<http://www.rwrp.umt.edu/ClassDocs/toc.html>  
A look at how to describe and manage riparian and wetland sites.

## Riparian areas

Fact Sheets: Functions and Values of Riparian Areas  
<http://www.magnet.state.ma.us/dfwele/river/rivfstoc.htm>

Basic information on the importance or riparian areas and how they work.

Wetland and Riparian Links US Bureau of Reclamation  
<http://www.usbr.gov/ecology/linkslow.html#wetlands>  
A source of other places to go for information.

Riparian Topics Bibliography  
[http://glinda.cnrs.humboldt.edu/wmc/rip\\_bib/rip\\_index.html](http://glinda.cnrs.humboldt.edu/wmc/rip_bib/rip_index.html)  
A huge bibliographic database on riparian topics.

## Hydrology

Oregon Water Resources Department (WRD)  
<http://www.wrd.state.or.us/>

Includes information on water rights, precipitation and streamflow data, and predictions of water availability.

The River Continuum Concept

<http://www.oaa.pdx.edu/cae/programs/sti/pratt/rcc.html#mid>

An illustrated explanation of the river continuum concept.

Hydrology Web Home Page

<http://terrassa.pnl.gov:2080/EESC/resourcelist/hydrology.html>

Hydrology resources for everyone from professionals to kids.

IRN's RiverBasics

<http://www.irn.org/basics/basic.html>

International Rivers Network's links to understanding rivers.

National Water Quality Inventory (US EPA)

<http://www.epa.gov/OWOW/305b/>

Information on water quality across the US.

Monitoring Water Quality, from US EPA

<http://www.epa.gov/OWOW/monitoring/>

Oregon Department of Environmental Quality (DEQ)

<http://waterquality.deq.state.or.us/wq/>

The Department of Environmental Quality (DEQ) is the state agency responsible for protecting Oregon's public water for a wide range of uses.

US EPA's Nonpoint Pollution Control Program

<http://www.epa.gov/OWOW/NPS/>

Includes information on the Clean Water Act, nonpoint source pollution control programs, and links to related sites.

Environmental Contaminants Encyclopedia

<http://www.aqd.nps.gov/toxic/index.html>

Information on specific pollutants from the National Park Service.

## Water quality

Christy's Very Basic Web Page

<http://www.mwsc.edu/~cjj4684/>

Links to water quality web sites.

Internet Resources Related to Water Quality

<http://www.soils.agri.umn.edu/research/mn-river/doc/links.html>

Links to water quality resources.

## **Aquatic organisms**

The Aquatic Ecology Page

<http://www2.netdoor.com/~pinky/aquatic.htm>

Links to internet resources on aquatic life and ecology.

Internet Resources: Salmon and Watersheds (Oregon Sea Grant)

<http://seagrant.orst.edu/links/salmsites.html>

More links to internet resources on watersheds and salmon from Oregon Sea Grant.

For the Sake of the Salmon

<http://www.4sos.org>

This site includes a variety of valuable pages, including teacher resources, internet links for many subjects, and lists of publications.

The BC Salmon Page

<http://www.canfisco.com/bc-salm2.html>

The story of salmon in British Columbia.

Does something smell fishy?

<http://www.cco.caltech.edu/~salmon/fishes.html>

Information and links on various salmon species.

National Marine Fisheries Service

<http://www.nmfs.gov/>

The agency responsible for recovery of salmon in the Pacific Northwest under the Endangered Species Act.,

Fisheries Links, US Bureau of Reclamation

<http://www.usbr.gov/ecology/linkslow.html#fisheries>

Links to fisheries organizations.

Hot Topics: Salmon

<http://seagrant.orst.edu/hot/salmon.html>

The opening page of Oregon Sea Grant's salmon site.

Salmon Preservation: A Case Study in Successful Environmental Conflict Resolution

<http://www.cyberlearn.com/online.htm>

A look at the complex set of interacting factors that have influenced declining salmon populations.

Aquatic Invertebrates

[http://education.lanl.gov/resources/ntep95/Aquatic\\_Insects/Waterbugs.html](http://education.lanl.gov/resources/ntep95/Aquatic_Insects/Waterbugs.html)

Includes web pages on insect identification and classroom insect activities.

## **Teaching resources**

Educating Young People About Water

<http://www.uwex.edu/erc/ywc/index.html>

Global Rivers Environmental Education Network

<http://www.econet.apc.org/green/>

American Rivers, Northwest Office, Salmon Day Curriculum

<http://www.amrivers.org/nw-curricl.html>

National Wildlife Federation, Environmental Education

<http://www.nwf.org/nwf/education/index.html>

California Environmental Education  
<http://ceres.ca.gov/education/>  
An incredible collection of links and resources

National Teacher Enhancement Program  
<http://www.education.lanl.gov/RE-SOURCES/NTEP95/>  
Ideas for teaching units on terrestrial and aquatic insects, mammals, and birds

Materials for Teachers  
[http://www.4sos.org/teach\\_mat/teachers.html](http://www.4sos.org/teach_mat/teachers.html)  
A list of curricula and other materials from For the Sake of the Salmon.

Alaska Aquatic Educational Resources  
[http://www.state.ak.us/local/akpages/FISH.GAME/sportf/geninfo/aq\\_ed/aeindex.htm](http://www.state.ak.us/local/akpages/FISH.GAME/sportf/geninfo/aq_ed/aeindex.htm)

Selected Internet Resources in the Geosciences and Related Fields, with an Emphasis on the Pacific Northwest  
<http://glinda.cnrs.humboldt.edu/wmc/geolinks.html#hydro>  
Lots of information on geosciences, including hydrology.

University of California Museum of Paleontology  
<http://www.ucmp.berkeley.edu/>  
A wealth of resources for science teachers, including a glossary of ecological terms (<http://www.ucmp.berkeley.edu/glossary/glossary.html>)

Unit Conversion Calculator  
<http://www.omnis.demon.co.uk/conversn/convjvsc.htm>  
Need to convert gallons to cubic feet? Here's your site!

Online Maps from USGS  
[http://edcwww.cr.usgs.gov/glis/hyper/guide/1\\_dgr\\_demfig/index1m.html](http://edcwww.cr.usgs.gov/glis/hyper/guide/1_dgr_demfig/index1m.html)  
Download USGS maps from the Internet.

## Other resources

USGS Biological Resources Division  
<http://www.nbs.gov/>

Glossary of Water Quality Terms  
<http://www.wqa.org/WQIS/Glossary/GlossHome.html>

The EnviroLink Library  
<http://library.envirolink.org/>  
“The most comprehensive resource of environmental information available on the Internet.”

# Curriculum resources

14.4

*"The whole art of teaching is only the art of awakening the natural curiosity of young minds for the purpose of satisfying it afterwards."*  
— Anatole France

## Videos

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### ***Birth of a Salmon***

Department of Fisheries and Oceans  
Communications Branch  
Suite 400-555 West Hastings St.  
Vancouver, BC V6B5G3  
(604) 666-1847

**6 minutes, 1976, e-j-s**

The complex workings of salmon embryology are simplified and beautifully photographed in this short presentation.

### ***The Bull Trout Story – A Living Legend***

Portland General Electric  
Attention: Diane Bricker  
Environmental Services Department  
121 SW Salmon Street  
Portland, OR 97204  
(503) 464-8526

**17 minutes, 1992, j-s-c-a**

Many of our bull trout populations have reached a critical point. With habitat protection, enhancement efforts, and good stewardship, they can make a comeback. This video describes a comeback story, gives information on the bull trout's life cycle and distinguishing characteristics.

### ***Cascade Watershed: The Sandy River Basin***

Northwest Film and Video Center  
1219 SW Park Avenue  
Portland, OR 97205  
(503) 221-1156

**21 minutes, 1987, video, j-s-c-a**  
**Rental: \$20.00**

The Sandy River, a major tributary of the Columbia River, springs from Sandy and Reid Glaciers on Oregon's Mt. Hood and travels its 57-mile channel from wilderness to urban development. Advanced students in Experiential Biology at Cleveland High School investigated the varied wildlife and habitats of the river and consulted with professional biologists and representatives from environmental organizations to produce this excellent visual introduction to the study of watersheds.

### ***The Coho Salmon Puzzle***

Washington Department of Natural Resources  
9701 Blomberg Street SW  
Olympia, WA 98504  
(360) 902-1609

**20 minutes, 1989, videotape, s-c-a**  
**nominal fee for duplication**

This well-produced videotape explores the history and habitats of coho salmon throughout a large river basin. It focuses on the interrelationships of spawning and rearing habitats and on the importance of floodplains, wetlands, and tributaries as winter habitats.

### ***Fishing is Fun***

Department of Fisheries and Oceans  
Communications Branch  
Suite 400-555 West Hastings St.  
Vancouver, BC V6B5G3  
(604) 666-1847

**12 minutes, 1987, videotape, e-j-s**

Second in trilogy narrated by children. The intrinsic as well as the extrinsic aspects of sport fishing are examined through a young boy's experience.

Part 1: A Good and Careful Harvest

Part 3: Silver Swimmers

### ***A Good and Careful Harvest***

(Commercial Fishing)

Department of Fisheries and Oceans  
Communications Branch  
Suite 400-555 West Hastings St.  
Vancouver, BC V6B5G3  
(604) 666-1847

**12 minutes, 1987, videotape, e-j-s**

Part one of a trilogy, narrated by children. A young girl and boy discuss the gear and operations of commercial salmon boats (gillnetter, seiner, troller).

Part 2: Fishing is Fun

Part 3: Silver Swimmers

### ***Healthy Watersheds***

Publication Orders  
Extension & Station Communications  
Oregon State University  
422 Kerr Administration Building  
Corvallis, OR 97331-2119  
(541) 737-2513

**20 minutes, 1994, color videotape, e-j-s-c-a**  
**\$20.00 (includes shipping/handling). Order #VTP 019**

This video takes viewers to the Cascade Mountains of Central Oregon where students from nearby towns learn to analyze their local watersheds. It examines all parts of a watershed, including streams, stream life, soils, vegetation, wildlife, and humans. It emphasizes the interdependence of a

watershed's individual elements and the consequences of removing or damaging even one of the elements. The video demonstrates a variety of watershed survey techniques and discusses their importance in managing various resources.

### ***Life Cycle of the Anadromous Salmonid***

Contact: Jeff Self  
Washington Elementary School  
3322 Dolbeer Street  
Eureka, CA 95503  
(707) 441-2547  
(707) 441-3323 (FAX)

**20 minutes, 1988, j-s-c-a**  
**\$20.00**

This is an excellent video about the salmon life cycle with beautiful photography and an easy to follow narrative.

### ***Macroinvertebrates and the River Continuum***

Oregon Department of Fish and Wildlife  
PO Box 59  
Portland, OR 97207  
(503) 872-5264

**20 minutes, 1990, j-s-c-a**  
**\$8.00 plus \$2.50 s/h. Call for order form.**

Includes instructions for sampling aquatic invertebrates, discusses the river continuum, and the relationship of aquatic invertebrates to fish populations. This video is designed to be used with *The Stream Scene: Watersheds, Wildlife and People*.

### ***Oregon's Natural Resources: Here Today—Here Tomorrow***

Governor's Watershed Enhancement Board  
255 Capitol St. NE 3<sup>rd</sup> Floor  
Salem, OR 97310-0203  
(503) 378-3589 ext. 825

**11 minutes, 1998, videotape, j-s-c-a**

Fifty years ago, Soil and Water Conservation Districts across Oregon joined the Natural Resources Conservation Service to



demonstrate voluntary conservation practices that private landowners could use to conserve and protect our state's precious soil, water, animal, plant, and air resources. As the challenge to care for our resources grew, the State of Oregon created the Governor's Watershed Enhancement Board as a means to support watershed restoration and also launched a community-based approach to watershed restoration through local watershed councils. This video illustrates the success of locally led efforts to offer resource solutions. It is also available at local extension offices and most state agency libraries.

### ***Return of the Salmon***

Videotape Orders  
Oregon Sea Grant Communications  
ADS 402  
Oregon State University  
Corvallis, OR 97331  
1-800-375-9360 or 541-737-2716

**30 minutes, 1995, videotape, j-s-c-a,  
\$25.00 purchase, \$5.00 rental, Order #  
ORES-U-V-95-001**

Knowledgeable observers from the Northwest give their views on the effects and meaning of the salmon decline. The complex factors contributing to the salmon decline are shown, including habitat loss and damage, overfishing, the inadequacy of hatcheries, and unfavorable ocean conditions. The video concludes with coastal residents describing how they are taking action to restore the salmon.

### ***Silver Swimmers***

Department of Fisheries and Oceans  
Communications Branch  
Suite 400-555 West Hastings St.  
Vancouver, BC V6B5G3  
(604) 666-1847

**12 minutes, 1987, videotape, e-j-s**

Third in a trilogy of videos narrated by children. A young native Indian boy observes

and comments on the traditional and modern day fishing and preserving methods.

Part 1: A Good and Careful Harvest

Part 2: Fishing is Fun

### ***Storm Drain Marking Program***

Contact your local STEP Biologist to borrow a copy of this videotape.

**2.5 minutes, 1990, videotape, j-s-c-a**

The video discusses the scope and purpose of the storm drain marking project as part of British Columbia's Salmonid Enhancement Program, but it is applicable anywhere. The storm drain marking program shows how volunteers can mark storm drains to alert people to the harm common household products can cause fish. It is an excellent way for students, especially elementary schools, to get involved in salmonid enhancement projects and create public awareness.

### ***Strangers in Our Waterways***

Publication Orders  
Extension & Station Communications  
Oregon State University  
422 Kerr Administration Building  
Corvallis, OR 97331-2119  
(541) 737-2513

**28 minutes, 1994, videotape, j-s-c-a  
\$30.00, order# VTP 023**

Goldfish, carp, largemouth bass, brown trout, zebra mussels, mysis shrimp, aquarium plants. What do all these seemingly unrelated organisms have in common? In their native waters, these organisms are benign. But when transplanted to other waters, they may cause problems for native organisms. These problems may lead to an unbalanced ecosystem, affecting many other organisms and species – including humans. This video reveals how the introduction of non-native organisms – fish, shellfish, and even aquarium plants – have affected native organisms in and around our waterways. While there are no easy solutions to the

problem, there are ways to avoid making it worse. This video explores research to help reduce or prevent negative impacts of non-native species.

### ***Way of a Trout***

Trout Unlimited  
1500 Wilson Blvd, #310  
Arlington, VA 22209  
(703) 284-9421

**30 minutes, color videotape, j-s-c-a  
\$30.00 plus shipping**

This video covers a year in the life of a trout and the many pitfalls a fish must face throughout its life.

### ***We All Live Downstream***

Publication Orders  
Extension & Station Communications  
Oregon State University  
422 Kerr Administration Building  
Corvallis, OR 97331-2119  
(541) 737-2513

**29 minutes, 1996, color videotape, j-s-c-a  
\$30.00, order # VTP 021**

This educational video examines Oregon's Tualatin River, a waterway that struggles to survive under pressure from nonpoint source pollution. Its subject matter has implications for most every watershed in the country. Like many fresh water surface and groundwater supplies across our nation, the Tualatin absorbs pollution from a variety of sources. The video covers how local residents and government officials are trying to reduce nonpoint source pollution. It also offers tips to help each of us play an active role in cleaning up our nation's drinking water supplies.

### **Resources available from STEP biologists**

Contact your local STEP biologist for more information about the following resources.

**Surveying Oregon's Streams "A Snapshot In Time," Aquatic Inventory Project Training Materials and Methods For Stream Habitat Surveys:** slide presentation and field training, contact your local STEP biologist.

**Introduction to STEP:** slide presentation, contact your local STEP Biologist to schedule a presentation about Oregon's Salmon-Trout Enhancement Program.

## Maps/equipment/ supplies

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### ***Pacific Northwest Watersheds Map***

Timothy Colman, Publisher  
Good Nature Publishing Company  
1904 Third Avenue #415  
Seattle, WA 98101  
1-800-631-3086

### ***Oregon Drainage Basin Maps***

Oregon Water Resources Department  
Commerce Building  
158 12th St. NE  
Salem, OR 97310  
1-800-624-3199  
[www.wrd.state.or.us/publication/pdfs/publist99.pdf](http://www.wrd.state.or.us/publication/pdfs/publist99.pdf)  
(pages 6-8 map choices, page 9, order form)

### ***Aquascope***

Seaview Underwater Viewer  
Item #2027, \$18.99  
Marine Wholesalers  
619 S. 600 W.  
Salt Lake City, UT 84101  
(801) 355-2940

### **Water Quality Test Kits**

Hach Co., Inc.  
PO Box 389  
Loveland, CO 80539-9986  
1-800-227-4424

Cole-Palmer  
72245 North Oak Park Avenue  
Chicago, IL 60648  
1-800-323-4340

CHEMetrics, Inc.  
Route 28  
Calverton, VA 22106  
1-800-356-3072

LaMotte Chemical Products Co.  
PO Box 329  
Chestertown, MD 21620  
1-800-344-3100

### **D-Frame Nets**

Wards Natural Science Establishment  
5100 West Henrietta Rd  
PO Box 92912  
Rochester, NY 14692-9012  
1-800-962-2660

### **Temperature Data Loggers**

Onset Computer Corporation  
PO Box 3450  
Pocasset, MA 02559-3450  
(508) 759-9500

## **Posters**

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### **Salmon Life Cycle Posters**

Eight posters showing the life stages of a salmon.  
\$18.00 set. 20% surcharge for non-BCTF  
members Catalog available upon request

BCTF (British Columbia Teacher's Federation)  
Lesson Aids  
#100 – 550 W. 6<sup>th</sup> Avenue  
Vancouver, BC V5Z 4P2  
(604) 871-2181

### **Trout, Salmon, and Char of North America**

\$10.95 plus shipping. Catalog available upon  
request

Ed Lusch  
Windsor/Nature Discovery LLC  
1000 S. Bertelson #14  
Eugene, OR 97402  
1-800-635-4194

### **Salmon Come Back**

Full color migrating salmon design with black  
border. Created for Adopt-A-Stream by artist  
Sandra Noel. 18"×24", \$12.00.

Adopt-A-Stream Foundation  
600 128<sup>th</sup> Street SE  
Everett, WA 98208

### **Acid Rain Posters**

**\$2.75 plus shipping**

*Clearing*  
Environmental Learning Center  
19600 S. Molalla Avenue  
Oregon City, OR 97045  
(503) 657-8400

### **A Stream Continuum**

Shipping and handling charges only (\$4.00) for  
educators. All others \$10 plus shipping and  
handling.

Oregon Chapter  
American Fisheries Society  
PO Box 722  
Corvallis, OR 97339  
(541) 753-0442

### **Pacific Salmon Life Cycle**

Nominal fee for shipping and handling.

Fritz Kraus  
Alaska Department of Fish and Game  
333 Raspberry Road  
Anchorage, AK 99518  
(907) 267-2265

### **Salmon Alphabet Poster**

A full color poster, 48 x 80 cm, with illustrated salmon words from A to Z. \$10 plus 20% surcharge for non-BCTF members.

BCTF Lesson Aids  
#100 – 550 W. 6th Avenue  
Vancouver, BC V5Z 4P2  
(604) 871-2181

### **Pacific Salmon of North America Poster**

Timothy Colman, Publisher  
Good Nature Publishing Company  
1904 Third Avenue #415  
Seattle, WA 98101  
1-800-631-3086

## Miscellaneous

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### **Egg to Fry Display**

A wooden display rack holding four securely mounted glass vials. Salmon eggs, eyed eggs, alevins, and fry development stages are preserved in the vials.

**\$22 plus 20% surcharge for non-BCTF members**

BCTF Lesson Aids  
#100 – 550 W. 6th Avenue  
Vancouver, BC V5Z 4P2  
(604) 871-2181

### **Stuffed Dissection Fish**

An excellent fabric likeness of a coho salmon. All internal parts are attached with velcro and easily removed. Excellent resource for fish dissections with any salmonid species. \$275 Canadian plus shipping.

Pacific Seam Works  
3731 Winston Cr.  
Victoria, BC V8X 1S2  
(250) 388-3730  
corrine@pinc.com

### **Puppets**

Five, well-made stylized sock puppets of the salmon life cycle stages (egg, alevin, fry, adult, spawner)

**\$45 plus 20% surcharge for non BCTF members.**

BCTF Lesson Aids  
#100 – 550 W. 6th Avenue  
Vancouver, BC V5Z 4P2  
(604) 871-2181

### **Games**

#### ***Upstream Racers—An Educational Board Game***

Includes a colorful game board, rules, die, pawns and predator capture canisters plus 20 pages of related learning activities.

**\$18 plus 20% surcharge for non BCTF members.**

BCTF Lesson Aids  
#100 – 550 W. 6th Avenue  
Vancouver, BC V5Z 4P2  
(604) 871-2181

### **Insect Reference Books**

Merritt and Cummins, *An Introduction to the Aquatic Insects of North America*, Kendall Hunt Publishing Company, 1984. (Can be obtained from Oregon State University Bookstore, 1-800-595-0357).

Needham and Needham, *A Guide to the Study of Freshwater Biology*, Holden-Deay, Inc., 5<sup>th</sup> Edition, 1962. (Available from OSU Bookstore).

Pennak, Robert, *Fresh Water Invertebrates of the United States*, 2<sup>nd</sup> Edition, Wiley Publishing Company, 1978.

Lubell, Winifred and Cecil, *Exploring A Brook: Life in the Running Water*, Parents Magazine Press, New York, 1975.

McCafferty, W. Patrick, *Aquatic Entomology: The Fisherman's and Ecologists' Illustrated Guide to Insects and Their Relatives*, Jones and Barlett Publishers, Massachusetts, 1981.

# Related curricula

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\* Denotes good sources of Activity Extensions.

## ***Adopting a Stream: A Northwest Primer***

Steve Yates, \$9.95, University of Washington Press, PO Box 50096, Seattle, WA 98145-5096

Filled with information on habitat needs, water quality, and salmonids, this book tells how school, community, or sports groups can restore a nearby creek...and in the process learn much about biology, ecology, economics, and the effects of watershed activities on our streams.

## ***Adopting a Wetland: A Northwest Guide***

Steve Yates, \$5.00, Adopt-A-Stream Foundation, PO Box 5558, Everett, WA 98206

An ideal resource for schools, community groups, and individuals interested in restoring and/or protecting their neighborhood wetland areas. Information is in simple terms. Guide provides introduction to wetland plants. Information on marsh life, wetland types and identification, their values and benefits, mitigation and legislative issues, developing an action plan, etc., as well as technical appendixes on wetland plants and wildlife, scientific classification and a basic observation checklist.

## \* ***Aquatic Project WILD***

\$5.00 plus shipping and handling. Oregon Department of Fish and Wildlife, PO Box 59, Portland, OR 97207, (503) 872-5264.

Developed by Western Regional Environmental Education Council. Contains many excellent, interdisciplinary water-related activities for grades K-12.

## ***Aquatic Resources Education Curriculum***

C. Boyd Pfeiffer and Mark Sosin, \$25 + \$4 s/h, Future Fisherman Foundation, 1033 N. Fairfax St., Suite 200, Alexandria, VA 22314, Call 703-519-9691 for order form or 847-364-1222 for credit card or purchase order.

Contains information on teaching fishing techniques, water safety, and aquatic life. Units include A Fishing Primer; Becoming A Better Angler; Understanding Fish and Their Environment; Water Resources For Our Future; and Careers.

## ***California's Salmon and Steelhead: Our Valuable Natural Heritage***

\$20.00, Diane Higgins, 4649 Aster Avenue, Mckinleyville, CA 95521 (707) 839-4987.

These materials were developed for grades K-6. It is divided into sections dealing with biological aspects of salmon and steelhead and habitat needs of the various species.

## ***Clean Water, Streams, and Fish: A Holistic View of Watersheds***

Wendy Borton, et al., \$12 + \$3 s/h, Washington State Office of Environmental Education, 2800 NE 200<sup>th</sup>, Seattle, WA 98155-1418 (206) 365-3893, <http://cifl.ospi.wednet.edu>.

Focuses on human dependence and human impact on water quality of the Northwest. Covers water quality, life cycle of salmon, stream ecology, and environmental/economic tradeoffs. It is specific to Washington state, but most is applicable elsewhere.

## ***The Creek Book***

UBC Press, \$10.95 + s/h, Raincoast Book Distribution, 8680 Cambie St., Vancouver, B.C. V6P 6M9, 1-800-663-5714.

Nice drawings and descriptions of plants and animals found in this ecosystem. Some student worksheets included.

## ***Discover a Watershed: The Everglades***

Robinson, George B. and Sandra C., Lane, Jennie, \$15.95 plus shipping, The Watercourse, 201 Culbertson Hall, Montana State University, Bozeman, MT 59717-0057, (406) 994-5392

A curriculum package designed to study the Everglades ecosystem from a watershed approach. Has many applications and ideas appropriate for other watersheds.

### ***Discovering Salmon, A Learning and Activity Book***

Nancy Field and Sally Machlis, \$4.95 +s/h, Dog-Eared Publications, PO Box 620863, Middleton, WI 53562-0863, (608) 831-1410 (phone and fax) or 1-888-DOG-EARS, <http://www.dog-eared.com>

Covers life cycle, different species of salmon, river geography, predators, and hatcheries. Primarily geared to elementary students.

### **\**Earth: The Water Planet***

Jack Gartrell, et al., \$18.50 + \$4.25 s/h. Special Publications, National Science Teachers Association, 1840 Wilson Blvd., Arlington, VA 22201-3000, 703-243-7100 or 1-800-722-6782, <http://www.nsta.org>

An excellent collection of elementary/middle school water activities. The book is divided into five sections: Groundwater; Reshaping the Surface of the Earth; Raindrops Keep Falling On My Head; Water Everywhere; and Investigating the Physical Properties of Water. Each section includes readings and hands-on activities.

### ***Field Identification of Coastal Juvenile Salmonids***

WR Pollard, et al., \$12.95 + s/h, Harbour Publishing, PO Box 219, Madeira Park, BC Canada V0N 2H0, (604) 883-2730.

A guidebook designed primarily for juvenile salmonid identification in Canadian waters, but has application throughout the Northwest.

### ***Field Manual for Water Quality Monitoring***

(11th edition), Mark Mitchell and William Stapp, 2050 Delaware, Ann Arbor, MI 48103, \$19.95 + s/h order from GREEN, Catalog # WQM020, 206 S. 5th Ave., Suite 150, Ann Arbor, MI 48104, (734) 761-8142, or fax (734) 761-4951.

Manual designed for school classes, community groups, and individuals to understand and conduct nine water quality tests and determine their relationship to each other; become familiar with

sources of water pollution and potential ways to help remedy the particular problem; and understand the significance of the data collected. The instructional model has two components: The Environmental Problem Solving Component and The Action Research Component.

### ***Fish Eggs to Fry: Helping Kids Raise Fish***

Bowers, Patty, et al., Oregon Department of Fish and Wildlife, PO Box 59, Portland, OR 97207, (503) 872-5264, or call to obtain from local STEP Biologist.

This manual provides all the information an Oregon teacher would need to raise salmon or trout eggs in a classroom incubator.

### ***The Fish Hatchery Next Door***

Hastie, Bill and Bowers, Patty, Contact Aquatic Education Coordinator, Oregon Department of Fish and Wildlife, PO Box 59, Portland, OR 97207, (503) 872-5264, or contact your local Oregon hatchery.

This package will help you create a successful visit to a fish hatchery with students of all ages. Fish hatcheries play an important role in maintaining the balance between human demands and the needs of Oregon's diverse wildlife.

### ***Fish in the Floodlights***

BCTF Lesson Aids, #100-550 W. 6<sup>th</sup> Avenue, Vancouver, BC V5Z 4P2, (604) 871-2181

Nine short dramas; ideal for theme units and integrated activities.

### ***Forestry and Water Quality***

George W. Brown, OSU Bookstores, Inc., Memorial Union, Oregon State University, Corvallis, OR 97339

Up-to-date review of research describing the impacts of forest practices on the quality of water in forest streams. Originally intended for use in watershed management classes, it is now a standard reference for watershed management, forest hydrology, and environmental management.

### ***Gently Down the Stream***

James Boland, BCTF Lesson Aids, #100-550 W.  
6<sup>th</sup> Avenue, Vancouver, BC V5Z 4P2, (604)  
871-2181

This is a curriculum package developed for a fish hatchery field trip in British Columbia, but is applicable elsewhere.

### **\*Groundwater: A Vital Resource**

Cedar Creek Learning Center, free, Citizen  
Action Office, Tennessee Valley Authority,  
400 W. Summit Hill Drive, Knoxville, TN  
37902

A good collection of activities for grades 3-12 related to groundwater. Units include The Water Cycle; Water Distribution in Soils; Water Quality; and Community Impacts.

### ***How to Catch and Identify the Gamefish of Oregon***

E. A. Lusch, Frank Amato Publications, PO Box  
02112, Portland, OR 97202

A practical guide to fish identification for anglers and other interested individuals.

### ***Identification of Physical Habitats Limiting the Production of Coho Salmon in Western Oregon and Washington***

Gordon Reeves, Fred Everest, and Thomas  
Nickelson, 1989, USDA Forest Service PNW  
General Technical Report PNW-GTR-245,  
available from Gordon Reeves, PNW  
Research Station, 3200 SW Jefferson Way,  
Corvallis, OR 97331.

An important first step in attempts to increase production of salmonids by habitat manipulation is to identify limiting factors. This report provides a systematic approach for utilizing fish habitat data derived from watershed surveys to estimate the number produced for each particular life stage of coho salmon in fresh water. Quantitative measurements of the total amount of habitat present (e.g. spawning gravel, pools, riffles, glides, etc.) are coupled, through the use of a key, with the survival rate between life history stages and the amount of habitat needed per

individual at each stage to yield estimates of the potential summer population level and smolt output. In addition, variables such as gradient, summer and winter water temperatures, adult escapement, and hatchery fish introduction are addressed.

### ***Investigating Aquatic Ecosystems***

William A. Andrews, Prentice-Hall Canada, Inc.,  
Scarborough, Ontario, 1987.

A textbook with an introduction to the basic principles of freshwater ecology. Includes field and laboratory studies and thought-provoking questions.

### ***Investigating Your Environment***

USDA Forest Service, Pacific Northwest Region,  
Public Affairs, Natural Resource Education,  
Portland, Oregon, 1993 and earlier additions.

An interdisciplinary curriculum for grades 7–12, this large package contains activities to study basic environments (soil, water, forests, plants, wildlife), unique environments (built, desert, dunes, marine, pond, range, riparian, wilderness), extending your investigations, investigation spin-offs, and a thorough appendix of resources and ideas.

### ***Leapfrogging Through Wetlands***

Margaret Anderson, Nancy Field and Karen  
Stephenson, \$7.95 +s/h, Dog-Eared  
Publications, PO Box 620863, Middleton,  
WI 53562-0863, (608) 831-1410 (phone and  
fax) or 1-888-DOG-EARS, <http://www.dog-eared.com>.

This book helps young people understand the significance of wetlands in ecosystems throughout North America. Readers learn about the vast array of plant and animal life associated with wetlands. Educators will find this book an excellent companion for *WOW! The Wonders Of Wetlands* and *Project WET*.

### ***Learning to Love Streams***

Izaak Walton League of America, 1401 Wilson Boulevard, Level B, Arlington, Virginia 22209

Materials about water quality and pollution.

### ***Living in Water — An Aquatic Science Curriculum***

(3rd edition) \$23.95 + \$4 s/h, Kendall Hunt, 4050 West Mark Drive, PO Box 1840, Dubuque, IA 52004-1840, 1-800-228-0810.

This is a basic hands-on aquatic science curriculum for grades 4 -6. The material provides extensive background on the basic principles and concepts of aquatic ecology, from the solubility of water and its effects on the distribution of aquatic life, to adaptations to aquatic environments, food web interactions, and the importance of aquatic research.

### ***The Magnificent Journey***

Free, Bonneville Power Administration, Public Involvement Office, PO Box 12999, Portland, OR 97212, 1-800-425-8429

This is the life story of Onco, a chinook salmon from Idaho. Contains information about habitat and threats. Poster of salmon and steelhead included.

### ***Make It Work! Rivers: The Hands On Approach to Geography***

Andrew Haslam, Two-Can Publishing Ltd, Chicago, IL 60661.

One of a four-part “Make-It-Work” series of books which use colorful realistic models and exercises to engage children in interactive hands-on projects. For ages 8 and older.

### ***OBIS Ponds and Lakes***

\$18.95, Delta Education, Inc., Box M, Nashua, NH 03061-6102, (603) 889-8899

The eight activities in this module are geared to the explorations of aquatic sites and the plants and animals that live there and their behaviors.

### ***OBIS Streams and Rivers***

\$18.95, Delta Education, Inc., Box M, Nashua, NH 03061-6102, (603) 889-8899

The eight activities in this module are designed as investigations of aquatic life in streams and rivers. Specialized activities include feeding behaviors of crawdads and water striders, and the impact of a simulated oil spill on the environment.

### ***Oregon Environmental Atlas***

Carolyn Young, \$10.00, Portland State University, Media Publications, PO Box 1394, Portland, OR 97207

Includes valuable statewide information on Oregon landforms, surface water, ground water, hydrologic cycle, uses of water, water quality, water pollutants, and related issues in addition to other environmental concerns such as air quality, solid and hazardous wastes, toxic issues, nuclear wastes, and noise pollution.

### ***The Pond Book***

UBC Press, \$10.95 + s/h, Raincoast Book Distribution, 8680 Cambie St., Vancouver, B.C. V6P 6M9, 1-800-663-5714.

Nice drawings and descriptions of plants and animals found in this ecosystem. Some student worksheets included.

### ***\*Project WET***

1001 W. Oak Street, Suite 210, Bozeman, MT 59715  
(406) 585-2236 or  
Contact Project WET Coordinator for Oregon  
Jackson Bottom Wetlands Preserve  
(503) 681-6429

Project WET is an interdisciplinary water education program intended to supplement a school's existing curriculum. The goal of the program is to facilitate and promote the awareness, appreciation, knowledge, and stewardship of water resources through the development and dissemination of classroom-ready teaching aids.



### **Project WILD**

Susan Sahnaw, Oregon Natural Resources Program  
051 Peavey Hall, OSU, Corvallis, OR 97331  
1-800-554-6984

Contains a broad range of excellent activities. Interdisciplinary and geared to environmental and conservation education emphasizing wildlife.

### **Rivers and Streams, Habitat Pac**

\$5.00, National Institute for Urban Wildlife,  
10921 Trotting Ridge Way, Columbia, MD  
21044

Includes teacher overviews, lesson plans, students worksheets and a poster.

### **Rivers Curriculum Guide**

Rivers Project Southern Illinois University, PO  
Box 2222, Edwardsville, IL 62026-2222,  
(618) 650-2000

A series of six rivers-based units written by teachers participating in the Rivers Curriculum Project funded by the National Science Foundation. The units include biology, chemistry, earth science, geography, language arts, and mathematics.

### **Salmon Below the Surface**

BCTF Lesson Aids, #100-55- W. 6<sup>th</sup> Avenue,  
Vancouver, BC, V5Z 4P2, (604) 871-2181

Seven science activities for use with *Salmonids in the Classroom*, Intermediate, also suitable for grades 8-10.

### **Salmon Kit**

\$200, Pacific Science Center, 200 2<sup>nd</sup> Avenue N.,  
Seattle, WA 98109

Includes 10 activities, 3 computer disks, filmstrips, slides, magnifying lenses, thermometers, laminated salmon cards, activity outlines and worksheets.

### **Salmonids in the Classroom — Primary Package (K-3)**

Includes video cassette and 8 life cycle posters, \$60.00 plus 20% surcharge for non BCTF members, Intermediate Package (4-7):

includes video cassette, \$70.00 plus 20% surcharge for non BCTF members, BCTF Lesson Aids, 105-2235 Burrard Street, Vancouver, BC Canada, V6J 3N9, (604) 731-8121

Primary package is a study of salmonids taught through an illustrated story of Chucky Chum. Intermediate package is divided into three units on life cycle, harvesting, and enhancement. Units cover biological aspects, salmonid habitat, the fishing experience, and salmonids in today's world. Ideas for integration in all subject areas. This is geared to British Columbia, but basic concepts are adaptable to any area.

### **Save Our Streams**

Izaak Walton League of America, 1401 Wilson  
Boulevard, Level B, Arlington, VA 22209

This packet of materials on stream care and water quality includes background information, activities, teaching guide, and guidelines for how to adopt and monitor a stream.

### **Sourcebook for Watershed Education**

Cole-Misch, et al, Global Rivers Environmental Educators Network (GREEN), 206 S. 5th Ave., Suite 150, Ann Arbor, MI 48104, (734) 761-8142 or FAX (734) 761-4951, Item # WQM080, \$29.95

This book contains strategies for program development, teaching and evaluation as well as learning activities and materials. It also focuses on providing direction to those interested in establishing or enhancing a watershed education program using an interdisciplinary, participative approach.

### **Streamkeeper's Field Guide: Watershed Inventory and Stream Monitoring Methods**

Murdoch, Tom, et al., \$29.95 + \$4.00 s/h, Adopt-A-Stream Foundation, 600-128<sup>th</sup> St SE, Everett, WA 98208, (425) 316-8592

Background information on how streams and their surrounding watersheds function, detailed methods on watershed inventory and stream

monitoring for volunteers, tips on presenting data, and stories about Streamkeepers putting watershed inventory and stream monitoring information to use in the protection and restoration of our nation's streams.

### ***The Stream Scene: Watersheds, Wildlife, and People***

Patty (Farthing) Bowers, et al. Contact Aquatic Education Coordinator, Oregon Department of Fish & Wildlife, PO Box 59, Portland, OR 97207, (503) 872-5264.

This stream ecology publication targets students in grades 6-12. Units include Water Cycle, Watersheds, Uplands, Riparian Areas, Hydrology, Water Quality, and Aquatic Organisms. Student worksheets, field data sheets, and other resources are included.

### ***Streamwalk Manual***

US-EPA, Krista Rave, Eco-081, 1200 6<sup>th</sup> Ave, Seattle, WA 98101, (206) 553-6686

A standardized, easy-to-use screening tool for monitoring stream corridor health. It is designed for use by lay people who are interested in learning more about their streams and rivers.

### ***Update!***

BCTF Lesson Aids, #100-550 West 6<sup>th</sup> Avenue, Vancouver, BC V5Z 4P2, (604) 871-2181

New and revised activities, handouts, and cooperative learning strategies for use with *Salmonids in the Classroom, Primary*.

### **\* *Water Education***

The Comprehensive Water Education Book: Daus, Donald R., et al., International Office for Water Education, Utah Water Research Laboratory, Utah State University, Logan, UT 84322-3200, (801) 797-3182 or 1-800-922-4693

Geared to grades K-6, the many excellent activities in this manual help students develop a scientific attitude about water.

### ***Watershed Restoration: Principles and Practices***

Williams, Jack, et al., \$30.00 + s/h, American Fisheries Society, Publication Fulfillment, PO Box 1020. Sewickley, PA 15143, (412) 741-5700

In straightforward, easy-to-understand language, this practical guidebook will give you an in-depth understanding of the principles of watershed restoration; how to build partnerships for a restoration program; practices and strategies for achieving restoration; what works and what doesn't; and what is in store for the future. In addition to providing the scientific, social, and policy frameworks for conducting restoration, the book spotlights how citizen groups, communities, conservation coalitions, private interests, and management agencies are working together to restore watersheds.

### ***Watershed Stewardship: A Learning Guide***

#EM 8714, Oregon State University Extension Service, Corvallis, OR 97310, \$32.00

This resource is useful for watershed group members, landowners and managers, and volunteers involved with watershed restoration. It is a 22-chapter guide that provides information about forming effective partnerships, watershed basics, watershed assessments, strategies for enhancing watershed resources, and implementing effective restoration projects.

### **\* *Watershed Uplands Scene: Catching the Rain***

Ferschweiler, Kate, Kermit Horn, and Al Hughes, Environmental Education Association of Oregon, \$15.00, Contact Education Coordinator, Governor's Watershed Enhancement Board, 255 Capitol Street NE, Salem, OR 97310-0203, (503) 378-3589 ext. 825

This package provides a model for students to learn fundamental concepts about their local watershed while developing information-gathering, problem-solving, group interaction, and public presentation skills. Unit 1 explores the

biophysical aspects of a watershed—weather and climate, soils vegetation, and wildlife. Unit 2 introduces the human uses—urban, forestry, recreation, and agriculture, and Unit 3 provides an opportunity for students to apply knowledge and skills learned in the previous section to local land-use management issues.

### ***Wetland Walk Manual***

US-EPA, Krista Rave, Eco-081, 1200 6<sup>th</sup>  
Avenue, Seattle, WA 98101, (206) 553-6686

A standardized, easy-to-use screening tool for monitoring wetland health. It is designed to give citizens the opportunity to become partners in learning about wetlands and at the same time collect information and data which help identify trends in wetland health and location.

### **\*4-H Wetland Wonders**

Virginia Thompson, Dave Price, Connie Reid,  
Oregon State University Extension Service,  
5390 4-H Road NW, Salem, OR 97304,  
(503) 371-7920.

This curriculum guide for grades 4-5 is focused on wetlands and water quality issues. Lessons begin with the water cycle and extend through watersheds, ground water, home water uses, and wetland plants, soils, and animals.

### ***WOW! The Wonders of Wetlands***

1001 W. Oak Stree, Suite 210  
Bozeman, MT 59715  
(406) 585-2236

This curriculum package is for all educators. It contains background material for those educators preparing wetland study units. It also contains material on organizing a wetlands field trip, making inexpensive sampling equipment, and getting involved in wetland enhancement and stewardship.



# Words and water

A study of watersheds through literature

14.5

*"The love of learning, the sequestered nooks, and all the sweet serenity of books."*

— Henry Wadsworth Longfellow

To stick your hands in the river is to feel the cords that bind the earth together in one piece," writes Barry Lopez. Much as Lopez considers the river a way to bind the earth together, we can use a study of watersheds to bind together a multi-disciplinary approach to learning. A study of watersheds is not just a study in science. Watersheds stretch across state and national boundaries as well as across the disciplines, reaching through lessons of mathematics, social science, and literature to help children and adults gain a deeper understanding of our water resource and how we affect it. Incorporating literature into a study of watersheds is especially valuable. Through stories, we vicariously experience the lives of people and wildlife in a water world. Stories and analogies help us understand the importance of humans acting as stewards of the water environment.

The first requirement of a watershed study is to let students experience first hand their own watershed—outside of the classroom walls. Then, using studies across the disciplines, allow students to explore the watershed from a variety of angles. Combining literature and writing activities helps students discover how other writers feel about watershed topics. Students can then communicate their own feelings and what they learn with a number of different techniques.

Following are a few examples of elementary-level children's literature related to water, watersheds, and wildlife. Each entry lists the grade level and a brief description of the piece. Contact your local Education Service District or public library for more titles and information. Explora-

tions on the Internet may yield even more titles. For guidance in centering an entire language arts unit around watersheds, contact the Illinois Rivers Project, Southern Illinois University, PO Box 2222, Edwardsville, IL 62026-2222, phone: (618) 692-2446, fax: (618) 692-3359, e-mail: rivers@siue.edu, or website: <http://www.siue.edu/OSME/river>. Ask for ordering information about the Rivers Project Curriculum series, which includes materials for language arts, mathematics, geography, earth science, chemistry, and biology.

## ***The Adventures of Tom Sawyer***

**Gr. 4–7**

by Mark Twain, Scholastic, Inc

The American classic adventure of a boy growing up in a 19th century Mississippi River town.

## ***Argyle Turkey Goes to Sea***

**Preschool–Gr. 3**

by James E. Davis, DLM Teaching Resources

On the way to see a whale in the ocean, Argyle Turkey sees a pond, a stream, a swamp, a lake, a river, a waterfall, and finally, a whale in the bay.

Sallie Peila, Harney ESD Learning Resource Center, prepared this literature list. Many thanks for her efforts.

***Beavers Beware!*****Preschool–Gr. 3**

By Barbara Brenner, Bantam Books

A family with a house on the river finds two beavers cutting down trees and building a lodge on their dock. A Bank Street Ready-to-Read book.

***Come Back Salmon*****Gr. 3–6**

by Molly Cone, Little Brown and Co.

True story of a group of students that helped reclaim a local stream so that salmon could once again spawn there.

***Fish Eyes*****Preschool–Gr. 3**

by Lois Ehlert, Scholastic Inc.

A counting book depicting the colorful fish a child might see if he turned into a fish himself.

***Fish Is Fish*****Preschool–Gr. 3**

by Leo Lionni, Scholastic Inc.

A minnow wants to follow his tadpole friend—who becomes a frog—onto land.

***Freshwater Alphabet Book*****Preschool–Gr. 3**

by Jerry Pallotta, The Trumpet Club

A colorful alphabet book introducing some familiar and some unusual aquatic animals.

***The Hole in the Dike*****Preschool–Gr. 3**

by Norma Green, Scholastic Inc.

When a young boy in Holland sees a small trickle of water leaking through the dike, he bravely spends the night with his finger in the hole in order to save his country from a flood.

***How Many Fish?*****Preschool–Gr. 1**

by Rachel Gosset, Scholastic Inc.

Beginning readers count the fish in ponds, lakes, and streams.

***In a Small, Small Pond*****Preschool–Gr. 2**

by Denise Fleming, Scholastic Inc.

A rhyming text describes the seasonal changes in a frog's little pond.

***McElligot's Pool*****Gr. K–3**

by Dr. Seuss, Random House

A young boy fishes in McElligot's pool with high hopes.

***Over the Steamy Swamp*****Preschool–Gr. 3**

by Paul Geraghty, Harcourt Brace Jovanovich

A hungry mosquito starts a food chain in a steamy swamp as each hungry animal both preys and is preyed upon.

***Paddle to the Sea*****Gr. 3–6**

by Holling Clancy Holling, Houghton Mifflin Company

The journey of an Indian boy in a small canoe traveling from Lake Superior to the Atlantic Ocean.

***Rain Drop Splash*****Preschool–Gr. 3**

by Alvin Tresselt, Scholastic Inc.

Rain becomes a puddle, then a lake, and grows larger and larger until it reaches the sea.

***A River Ran Wild:  
An Environmental History***

**Gr. 1–4**

by Lynne Cherry, Harcourt Brace Jovanovich Publishers

An environmental history of the Nashua River, from its discovery by Indians through the polluting years of the Industrial Revolution to the ambitious cleanup that revitalized it. A Reading Rainbow book.

***A Salmon for Simon***

**Gr. K–4**

by Betty Waterton, Groundwood Books

Simon, a young Native boy, has been trying to catch a salmon all summer but when the opportunity finally arrives he must decide whether to take it home or let it go.

***Squishy, Misty, Damp and Muddy, The In-Between World of Wetlands***

**Gr. K–6**

by Molly Cone, Sierra Club Books

An introduction to the many kinds of wetlands, their importance in our lives, the plants and animals that live there, and why we must work to preserve these habitats.

***Swimmer***

**Gr. K–6**

by Shelley Gill, PAWS IV Publishing

The story of the Chinook salmon. Swimmer's journey over 10,000 miles illustrates the cycles of life for the salmon and the girl Katya, who is coming of age.

***Water Dance***

**Gr. K–6**

by Thomas Locker, Harcourt, Brace and Company

An innovative and beautiful picture book that follows water's constant dance—a poetic text and complementary paintings contain hundreds of fascinating facts about water.

***Water's Way***

**Preschool–Gr. 3**

by Lisa Westberg Peters, Scholastic Inc.

Tony watches water change from clouds to rain to frost, until it finally becomes snow, and he can try his new sled.

***What Makes it Rain? The Story of a Raindrop***

**Gr. K–3**

by Keith Brandt, Troll Associates

***Where the River Begins***

**Gr. K–3**

by Thomas Locker, Puffin Books

Two boys and their grandfather camp and hike to follow the river to its source.

