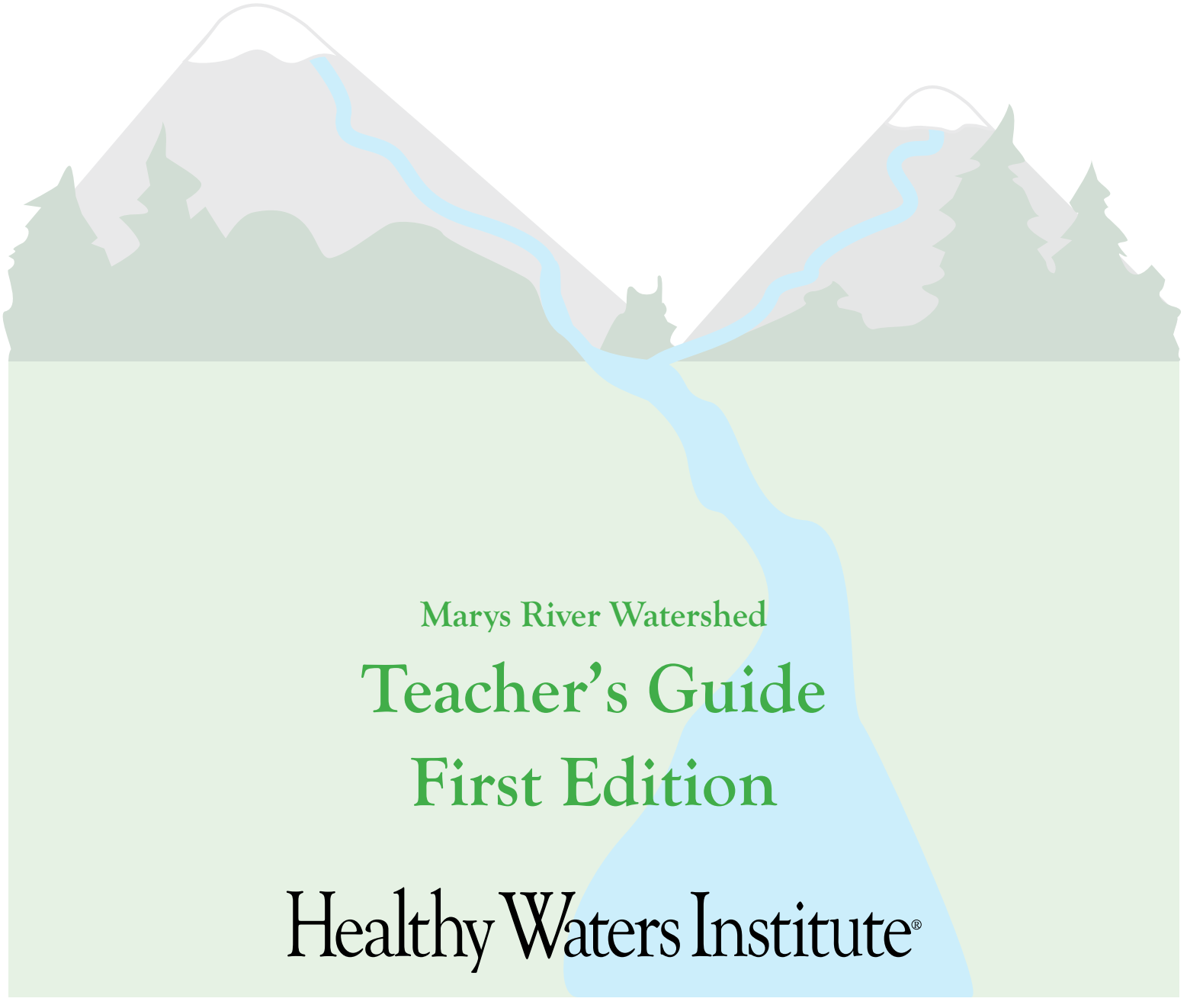
Hometown Waters



Marys River Watershed

Teacher's Guide

First Edition

Healthy Waters Institute®

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Introduction to Hometown Waters

Middle/High School Watershed Education Program of the *Healthy Waters Institute*® (*HWI*)

"A watershed is that area of land, a bounded hydrologic system, within which all living things are inextricably linked by their common water course and where, as humans settled, simple logic demanded that they become part of a community."

— John Wesley Powell

RATIONALE

Despite Oregon's reputation as a progressive state with a history of strong environmental leadership, the long-term prognosis for our freshwater ecosystems is grave. A recent national sampling shows Oregon's freshwater systems to be less supportive of aquatic life, less able to provide fish safe for human consumption, and more chemically unsafe to swim as compared to the national average. Though there are many local, state, and federal agencies and organizations currently working on-the-ground to improve the health of our home waters, restoration without stewardship is futile. Current efforts can be undone in a single generation if our youth do not understand the value of healthy rivers and streams.

Streams and rivers work like veins and arteries. The health of the water they carry is dependent on the health of the ecosystems and regions through which they flow. Healthy water is an indicator of a healthy watershed. In order to permanently achieve healthy waters in Oregon, we must take meaningful steps today to engage students statewide in the long-term stewardship of our watersheds. By forging a connection between students and their local watersheds through authentic educational experiences, rooted in relevant, experiential and place-based learning, *HWI* seeks to improve watershed health statewide by engaging students in region-specific field experiences and stewardship projects that benefit their home waters.

We all live in a watershed and it is therefore vital that we work together to reach all students in all areas, regardless of their geographic, ecologic, economic and demographic differences. Through the strength of partnerships, *HWI* seeks to build community interest in and support for conservation by bringing together a diverse group of volunteers, teachers, school administrators, students and local partners to educate the next generation of watershed stewards.

GUIDING PRINCIPLES

HWI relies on a set of assumptions to guide our efforts in working to ensure the future health of Oregon's rivers and streams. These guiding principles are considered throughout *HWI* program development and in support and implementation of partner programs and activities.

1. Water is our most valuable resource.
2. Students are future stewards of watershed health.
3. Authentic educational experiences, rooted in relevant, experiential and place-based learning, holistically prepare and empower our students in becoming future stewards.
4. Supporting increased connections between schools and communities will result in a young citizenry better equipped to understand and address community issues in informed and innovative ways, contributing to Oregon's overall livability.

WATERSHED EDUCATION

HWI develops, delivers and brings together watershed education programs, activities and partners that will help move youth from students to stewards. *HWI* considers the following local watershed concepts essential in preparing students for watershed stewardship:

1. Outdoor Ethics
2. Climate
3. Geography
4. Geology
5. Vegetation
6. Fish
7. Wildlife
8. History
9. Demographics
10. Water
11. Economy
12. Ecology
13. Local partners

HWI works with schools, teachers and local partners to maximize student experience with the following concepts as they relate to local watershed education:

Outdoor Ethics – Interaction with the natural world:
- Responsibility for stewardship or care of the land
- Respect for the land and all its resources at all times and on all occasions
- Consideration of impact on the environment

Climate – Long-term weather pattern of the local watershed, including:
- Temperature
- Precipitation
- Wind

Geography – Study of the local watershed and its features, inhabitants and phenomena:
- Physical – processes and patterns in the natural environment
- Human – processes and patterns of human interactions shaping the local environment
- Environmental – spatial aspects of interactions between humans and the natural world
- Techniques – including mapping and GIS

Geology – Study and science of solid matter in the local watershed including:
- Rocks
- Soil
- Processes that shape the matter

Vegetation – Plant life of local watershed:
- Upland Forests
- Riparian
- Grasslands

Fish – With regard to the study of local:
- Native Species
- Non-Native Species
- Hatcheries, barriers to migration, other local issues

Wildlife – With regard to the study of local:
- Native Species
- Non-Native Species
- Habitat locations, endangered species, other local issues

History – With regard to the study of local:
- Native Inhabitants
- Settlement of watershed

Demographics – Population characteristics of local watershed

Water – With regard to the study of local:
- Watershed zoning
- Domestic water supplies
- Water treatment
- Regional hydrology
- Water use

Economy – The role of water in local economy with regard to:
- Products
- Services
- Agriculture

Ecology – The interaction among organisms and between organisms and their environment

Eco-Art – Study of the aesthetics of local watershed characteristics through:
- Streamside sketching
- Journal making
- Creative writing
- Photography
- Painting

Local Partners – It is essential for students to identify and get to know community partners in order to learn from them and get involved in local projects

PURPOSE

Hometown Waters (HW) was designed to help students move from home and school grounds out into the larger watershed unit. HW provides an interdisciplinary approach to watershed education, and opportunity to discover all aspects related to home watersheds through the inquiry process.

HW works to create a watershed-as-home concept by placing students in a web of awareness that will help them understand how water moves through their watershed, how the actions of the citizens of the watershed affect the water, and how each student's life is touched by the water as it moves through their watershed.

The success of HW in connecting students to their local watersheds is dependent on local resources including experts, community partners and existing educational materials. Each community holds the key to unlocking and connecting students with the local watershed. This program is not about *HWI* curriculum. It's about connecting the right people and the right opportunities to help our students develop a greater understanding of and connection to the watershed in which they live. In order for students to truly develop a sense of place, communities need to come together to collectively offer resources and to support teachers in integrating meaningful watershed activities into school curriculum.

HWI's role in HW is to share resources and successes between partners, teachers, schools and students. From its inception, *HWI* has been a collaborative effort, and is reliant on strong partnerships with schools, watershed councils, state and federal agencies, local governments, landowners, citizens, soil and water conservation districts, conservation groups, and others. *HWI* Regional Education Coordinators, Assistants and staff work to enhance delivery of water education and ensure that stewardship projects undertaken by classrooms are meaningful to the community.

Acting as a connector and catalyst, *HWI* seeks to strengthen existing partnerships and form new connections between entities seeking to engage students in hands-on watershed education. By uniting education, community, and stewardship, *HWI* takes an active role in cultivating the next generation of watershed stewards.

OBJECTIVES

The goal of HW is for students to develop a greater awareness and deeper understanding of their local watershed. The objectives are based on watershed features as integral components in fostering a watershed-as-home concept.

Students participating in HW should be able to:

1. Name the watershed (and sub-basin if appropriate) in which they reside.
2. Identify the headwaters and mouth of their home watershed.
3. List major factors influencing the nature of the water in their watershed.
4. Describe the eco-regions and/or primary plant associations in their watershed.
5. Describe personal water use and where that water ultimately comes from and goes within their watershed system.
6. Describe the historical condition of their watershed (pre-European influence) and name ways the watershed has changed over time.
7. Identify wild and domestic creatures that live in their watershed.
8. Name the most important crops, products, and/or services produced in their watershed and describe how water is essential for the economy.
9. Become familiar with organizations involved in restoration, conservation, and/or management of their watershed and know how they can personally get involved to make a difference.

HW TOOLKIT

The following tools are the building blocks of HW:

1. Virtual Watershed Tour
2. Regional Watershed Information
3. Watershed Inventory

4. Programs & Activities
5. WebQuest
6. Service Learning/Extended Application
7. Community Sharing

Stringing these tools together as a packaged program offers students repeat opportunities to learn about their watershed through a variety of disciplines and formats. The progression of these tools takes students from a basic level introduction to their local watershed through in-depth examinations of aspects that both pique their curiosity and satisfy classroom goals. Built-in to this package is flexibility in timing, topic and delivery, much of which will be determined by students, teachers and available local resources. We strongly encourage all teachers and partners to share their use of these tools and activities with *HWI*. *HWI* will continue to share materials through our website. We hope to see the collection of adapted and added ideas continue to grow and serve as inspiration for others in connecting students with their home waters.

SUPPORT FROM HWI

HWI will assist schools incorporating watershed education by offering:

- Educational materials
- Teacher grants – up to $500
- Student grants – $200 maximum for high school students
- Travel and substitute teacher reimbursement
- Networking opportunities with diverse community partners
- Student scholarships – four $1500 awards for juniors and seniors
- Publications – healthy waters kids and journal
- Website – resources, opportunity for students to share projects
- Assistance in developing student summits
- Trainings, workshops and consultation

SYMBOLS FOR COMMON CURRICULUM GOALS

At the beginning of each Hometown Waters activity, teachers will find a symbol that corresponds to the 5th grade Common Curriculum Goals (CCG) and benchmarks that are aligned with that activity. Hometown Waters integrates an interdisciplinary approach for students to more holistically learn about the water cycle and connect to their home waters; therefore, teachers will find cross-curricular CCGs and benchmarks.

The CCGs and benchmarks that can be achieved through comprehensive delivery of Hometown Waters program materials and activities are as follows:

SYMBOL GUIDE FOR BENCHMARK CATEGORIES


Science Inquiry


Science & Technology


English Language Arts


Earth & Space Science


Life Science


Science in Personal and Social Perspectives


Physical Science


Social Science


Mathematical Problem Solving


Geography


Measurement

Healthy Waters Institute®

2008/09 TEACHER GRANT APPLICATION

Oregon Trout

The Healthy Waters Institute (HWI) seeks to connect every student with their home waters. Through meaningful outdoor educational experiences and commitment to local communities, we will cultivate citizens capable of maintaining the health of waters statewide. HWI is a provider of tools, programs and services that help teachers and students connect with their local waters through community-based projects.

HWI offers grants to help teachers engage students with their home waters. Grants up to $500 may be used to pay for field trip transportation costs, substitutes, equipment, rentals, or other relevant science education tools and/or services. HWI encourages teachers to submit grant requests following the guidelines below. One role of the local HWI Regional Education Coordinator is to assist teachers in the grant application process; HWI encourages teachers to contact their local REC for more information and for assistance in creating a project that helps connect students with their home waters.

PILOT RESOURCE POOL GRANTS

Submissions:
- Individual grants up to $500
- Teachers may submit more than one request
- Open ended submission period

To Be Used For:
- Transportation
- Substitutes
- Equipment
- Rentals
- Other science education tools and services

Who Can Apply:
- Teachers within the pilot watersheds
- Salmon Watch teachers
- Other teachers with projects that further the HWI mission.

How To Apply:
- Submit the completed Grant Application Form to your Regional Education Coordinator for consideration (see sidebar).

Additional Requirement:
- Successful applicants are required to submit a final report (with photos) for use on-line or in HWI journal

Traci Price
Director, Healthy Waters Institute
Oregon Trout
65 SW Yamhill St. Suite 300
Portland, OR 97204
503.222.9091 x 25
traci@ortrout.org
www.healthywatersinstitute.org

Information about other HWI watersheds:

Kim Carson
Regional Education Coordinator
Oregon Trout
230 S 3rd St, Suite 202
Corvallis OR 97333
541.753.4280
kim@ortrout.org

Sarah Oakley
Regional Education Coordinator
Oregon Trout
65 SW Yamhill St. Suite 300
Portland, OR 97204
503.222.9091 x 20
sarah@ortrout.org

Kolleen Yake
Regional Education Coordinator
Oregon Trout/Upper Deschutes Watershed Council
700 NW Hill Street
Bend, OR 97709
541.382.6103 x 33
kolleen@ortrout.org

Healthy Waters Institute®

2008/09 TEACHER GRANT APPLICATION

Oregon Trout

Date _____ Phone _____

School _____ Fax _____

Address _____ Name _____

_____

_____ Email _____

Watershed:

☐ Johnson Creek ☐ Marys River ☐ Upper Deschutes ☐ Other _____

List names of teachers/ leaders who will participate in project: _____

_____

_____

YOU MAY ATTACH A SECOND SHEET FOR MORE SPACE TO ANSWER THE FOLLOWING QUESTIONS.

Project Description (maximum 250 words):

Explain, by dollar amount and item, how grant funds will be spent?

Who/how many will benefit from the grant?

How does the project fit into the overall goals of HWI? (maximum 250 words)

If the project is on-going, how will it be funded in the future?

List other sources of funding for the project:

If you are mailing this form, please send it to your Regional Education Coordinator (contact information on previous page) or to our main office:

HEALTHY WATERS INSTITUTE
65 SW YAMHILL, SUITE 300
PORTLAND, OREGON 97204
(503) 222-9091 x20 Fax (503) 222-9187

Healthy Waters Institute®

2008/09 STUDENT GRANT APPLICATION

Oregon Trout

The Healthy Waters Institute (HWI) seeks to forge a lifelong, caretaking bond between students and their local watersheds ensuring the health of Oregon's rivers and streams for generations.
Students across Oregon are participating in valuable stewardship and research projects that benefit their home communities and the health of their local watersheds. HWI is committed to supporting and promoting the efforts of engaged students recognizing their role as citizens, equipped to understand and address community issues in informed and innovative ways.

HWI offers grants to help students participate in watershed projects. Grants up to $200 may be used to pay for transportation, equipment, rentals or other relevant tools and/or services. All Oregon high school students are eligible. Grants will be awarded to students who propose projects benefiting the health of an Oregon watershed. Projects include but are not limited to research, monitoring, creative arts, and public awareness. Projects do not have to be directly affiliated with an HWI program or staff member.

STUDENT GRANTS

Submissions:

- Individual grants up to $200
- Students may submit more than one request
- Submissions accepted on a rolling basis

To Be Used For:

- Transportation
- Equipment
- Rentals
- Other project tools and services

Who Can Apply:

- All Oregon high school students

How To Apply:

- Submit the completed Grant application form and signed letter of support from a teacher on-line (www.healthywatersinstitute.org), to a Regional Education Coordinator (if applicable) or by mail.

Additional Requirement:

- Successful applicants are required to submit a final report with documentation (photos, video, newspaper articles, original or images of products created) for use on-line or in HWI publications.

Traci Price
Director, Healthy Waters Institute
Oregon Trout
65 SW Yamhill St. Suite 300
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Kolleen Yake
Regional Education Coordinator
Oregon Trout/Upper Deschutes Watershed Council
700 NW Hill Street
Bend, OR 97709
541.382.6103 x 33
kolleen@ortrout.org

Healthy Waters Institute®

2008/09 STUDENT GRANT APPLICATION

Oregon Trout

Date _____ Phone _____

School _____ Fax _____

Address _____ Name _____

_____

_____ Email _____

Watershed:

☐ Johnson Creek ☐ Marys River ☐ Upper Deschutes ☐ Other _____

List names of supporting teachers. You MUST include a signed letter of support from at least one teacher.

_____

_____

YOU MAY ATTACH A SECOND SHEET FOR MORE SPACE TO ANSWER THE FOLLOWING QUESTIONS.

Project Description (type of project, timeline, location). _____

_____

_____

_____

Impact—how will the project be shared with the watershed or community? _____

_____

_____

_____

Personal Statement—how does this project relate to personal/career goals? _____

_____

_____

_____

Budget—how will the grant be used? _____

_____

_____

_____

List other partners and organizations invovled in your project.

_____

_____

_____

REMEMBER: Successful applicants are required to submit a final report with documentation (photos, video, newspaper articles, original or images of products created) for use on-line or in HWI publications.

If you are mailing this form, please send it to your Regional Education Coordinator (contact information on previous page) or to our main office:

HEALTHY WATERS INSTITUTE
65 SW YAMHILL, SUITE 300
PORTLAND, OREGON 97204
(503) 222-9091 x20 Fax (503) 222-9187

Getting Started

1. LOCAL PARTNERS

The first step in connecting students to their home waters is finding out who in your community can provide and support watershed education in and out of the classroom. Contact a *HWI* Regional Education Coordinator or get in touch with your local Watershed Council, Soil & Water Conservation District or Natural Resource agency or organization. Talk with other teachers in your school – find out what local groups they are working with. See the chart on the next page for some ideas.

2. RECOMMENDED RESOURCES

In the event that local watershed educational programs and partners are scarce, we recommend keeping the following guides on hand:

- The Streamkeeper's Field Guide: Watershed Inventory and Stream Monitoring Methods, Adopt-A-Stream Foundation (http://www.streamkeeper.org/catalog/books.htm)
- The Stream Scene: Watersheds, Wildlife and People, Oregon Department of Fish & Wildlife (http://www.oregon.gov/OPSW/archives/streamscene/StreamScene.pdf)
- Project WET Curriculum and Activity Guide, Project WET (http://www.projectwet.org/wetguide.htm)
- The Ecology Field Guide, Wolftree, Inc. (http://www.beoutside.org/)
- Create you own "Regional Reading" list – find non-fiction, fiction, essays, natural history, myths, legends, and poetry about your watershed region. Build a regional library for your classroom.

3. HW TOOLKIT

Collect and develop tools to teach your students about their local watershed. You can find some of these through *HWI*. If *HWI* does not have tools for your specific watershed, you will be able to find templates of each tool which you can adapt to incorporate regionally specific information for your watershed. Adapting tools can be a great student project! The local partners you've identified probably have the information you need. We encourage you to share new materials with *HWI* so they can be made available to a larger network of partners.

4. PLAN AHEAD

- Invite local experts and *HWI* staff to share information with your class
- Talk about a Service Learning or Independent Project with your students – what kind of watershed project are they interested in?
- Make nature journals with your students to be used for observing outside, drawing, homework assignments and writing down thoughts, ideas and inspirations! (The use of recycled and/or natural materials is strongly encouraged!)

WATERSHED INFORMATION

Adapted from The Streamkeeper's Field Guide

	Source	Outdoor Ethics	Climate	Geography	Geology	Vegetation	Fish	Wildlife	History	Demographics	Water	Economy	Ecology
Colleges & Universities	Departments of: Biology, Botany, Ecology, Entomology, Environmental Studies, Fisheries, Geology, Natural Resources, Wildlife, Zoology	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Local Agencies	Libraries/Internet: City, County	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Cities: Departments of Public Works, Public Health, Planning			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Counties: Departments of Public Works, Planning, Public Health, Government Councils, County Extensions, Conservation Districts, River Basin Teams		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Indian Tribes: Fish & Wildlife Departments, Tribal Councils	✓		✓	✓	✓	✓	✓	✓		✓	✓	✓
Regional	Watershed Councils, Soil & Water Conservation Districts, River Conservation Groups, Water Districts			✓	✓	✓	✓	✓	✓		✓	✓	✓
State Agencies	Department of Fish & Wildlife					✓	✓	✓	✓		✓		✓
	Department of Forestry					✓		✓	✓				✓
	Department of Environmental Quality		✓			✓	✓	✓			✓		✓
	Department of Natural Resources, Lands, etc.				✓	✓	✓	✓	✓	✓	✓		✓
	Department of Ecology			✓	✓	✓	✓	✓	✓		✓		✓
	Department of Social and Health Services						✓		✓	✓	✓	✓	
Federal Agencies	Bureau of Land Management			✓		✓		✓					
	Forest Service					✓	✓	✓	✓				✓
	Environmental Protection Agency					✓		✓			✓		✓
	Fish & Wildlife Service						✓	✓	✓		✓		✓
	Army Corps of Engineers					✓	✓	✓	✓		✓		
	National Resource Conservation Service			✓	✓	✓	✓	✓		✓	✓		✓
	Soil Conservation Service				✓	✓	✓	✓		✓			✓
	National Marine Fisheries		✓				✓	✓	✓		✓		✓
	Geological Survey				✓	✓			✓				
	National Weather Service		✓										

Virtual Watershed Tour

VIRTUAL WATERSHED TOUR

A virtual tour is a general education tool used to introduce students and the general public to their home watershed. Students can research, compile and create their own virtual watershed tour for their area, the process for creating the tour gives students and opportunity to unearth a wealth of watershed information, history, photos and data with which to create a visual and informative tour of their home watershed. This tool offers a glimpse into watershed imagery and the opportunity to communicate information about the geography, hydrology, ecology, history, and community land and water use issues in your watershed. Powerpoint presentations are the ideal format rich with images as opposed to text. Tours should be approximately 35-45 minutes in length.

Options for content include:

1. Tracing the watershed path from headwaters to mouth.
2. Focusing on watershed features: geology, hydrology, historical land use, current land use, exceptional or interesting features—(i.e. petroglyphs, spouting horns, waterfalls)
3. Providing a comprehensive overview of the featured watershed. Names of watershed, major tributaries, counties, and other locators should be used.
4. Covering local land use as a major factor in watershed health in more depth than geology or basic hydrology. Land uses and impacts often reveal patterns - the upper reaches may be impacted by forestry, followed by agricultural impacts slightly lower in the system, with urban development and impacts from industry in the valley floors.
5. Imparting a strong "what you can do" or "what's being done by people who care" theme to give viewers a sense of actions they can take to improve their watershed.

Virtual Watershed Tours can be created through a variety of means. Photos and information can be collected and compiled from local archives and partners; digital cameras can capture what you want to present. Putting together a tour is a great student project!

Regional Watershed Information

REGIONAL WATERSHED INFORMATION

Regional Watershed Information should be integrated into all activities. Creating a document to keep it all in one place is an effective tool to use as a reference for teaching to a variety of concepts.

Regional information should include:

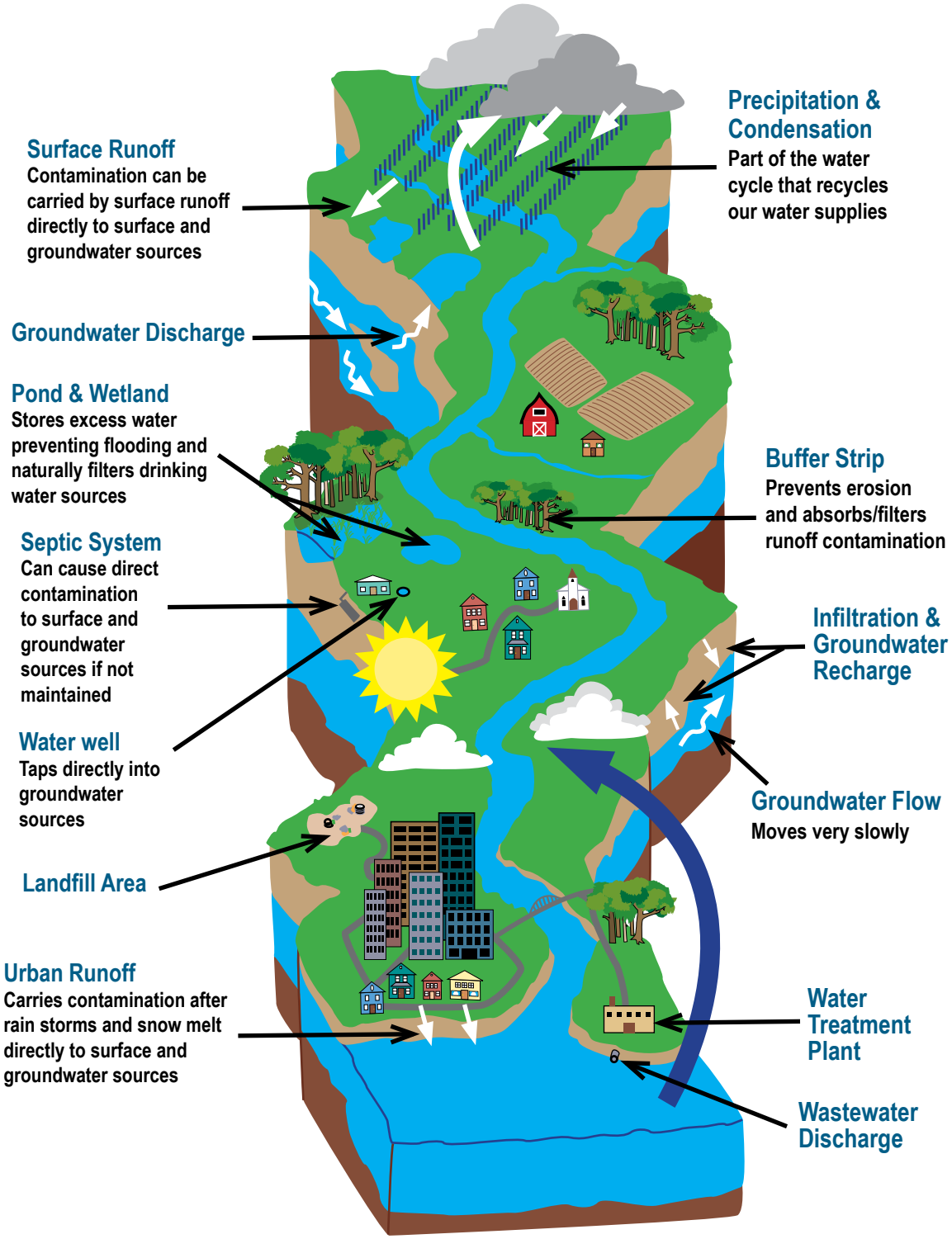
1. Watershed boundaries
2. Headwaters: a written description of the headwaters should include basic hydrology, land use/management, and recharge.
3. Primary watershed issues of concern.
4. Eco-region and/or plant association group maps.
5. History: 1-2 pages describing settlement, European settlement, land use patterns (specifically natural resource extraction activities), historic vegetation, water management (including significant dam implementation and other channel modifications), and the history of regional native fish declines.
6. Wildlife (ODFW wildlife habitat maps might work well for this).
7. Economy: ½ page overview.

Regional information can be compiled through a variety of resources. Students are also a great resource for this project!

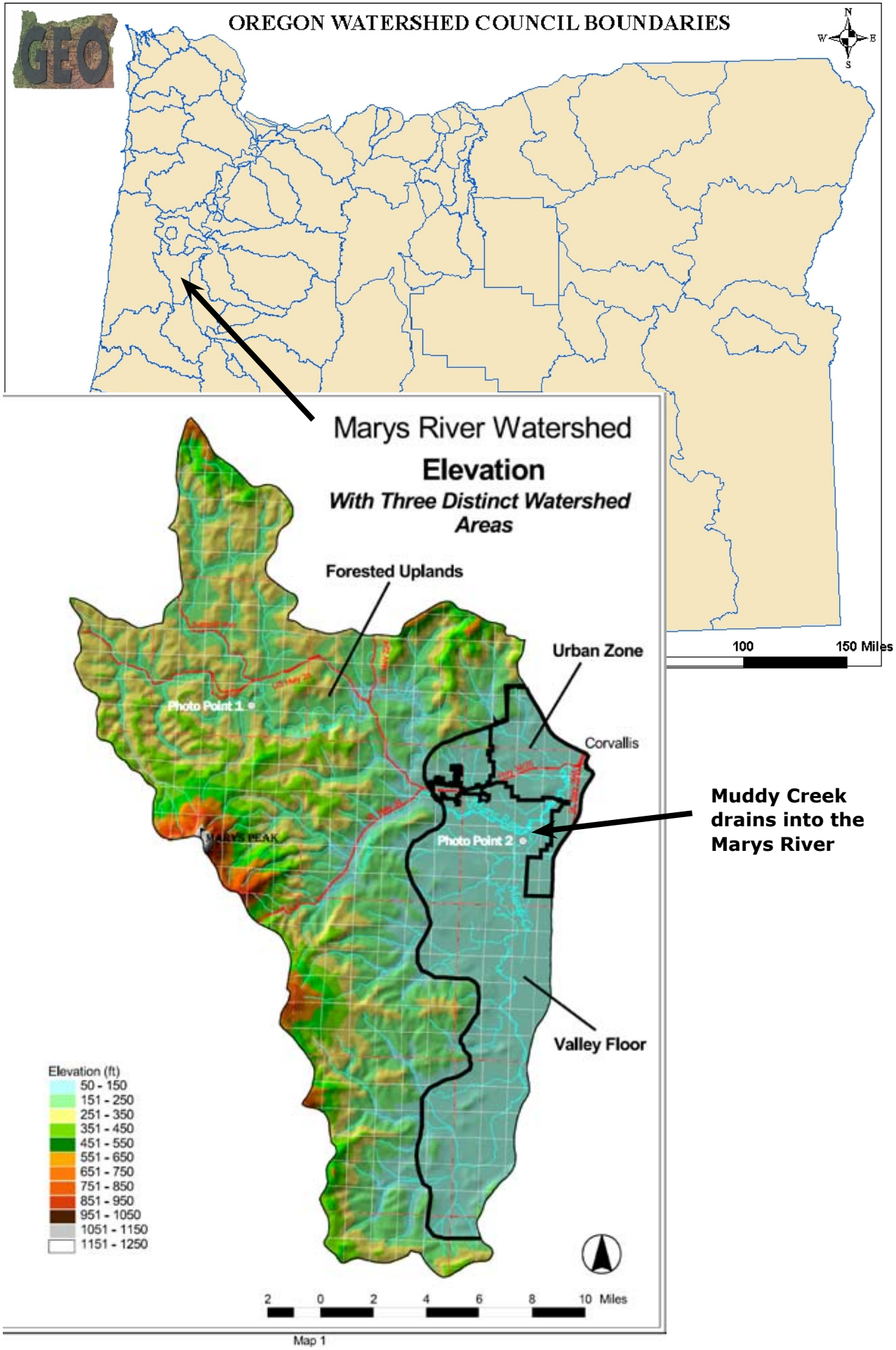
Check out *HWI*'s website (www.healthywaters.org) to find regional information about your watershed. If we do not have information for your region use the following template to create your own regional watershed information. Feel free to add or delete sections as needed.

We encourage you to share your watershed information with *HWI* so we can make it available for others through our website.

Marys River Watershed
Regional Information



A watershed is the *entire* area, from ridgetop to ridgetop, which drains into a river or stream. Plans in Oregon, such as the *Oregon Plan for Salmon and Watersheds*, are collective efforts to restore watersheds and recover native fish populations. These plans consider the ongoing condition of each region's watershed basins. Are conditions stable, declining or improving over time? The way we use our land, our decisions, directly influence the water quality in our state.


OREGON WATERSHED COUNCIL BOUNDARIES
N
W
E
S
100
150 Miles
Marys River Watershed
Elevation
With Three Distinct Watershed Areas
Forested Uplands
Urban Zone
Photo Point 1
Corvallis
Photo Point 2
MARYS PEAK
Muddy Creek drains into the Marys River
Valley Floor
Elevation (ft)
50 - 150
151 - 250
251 - 350
351 - 450
451 - 550
551 - 650
651 - 750
751 - 850
851 - 950
951 - 1050
1051 - 1150
1151 - 1250
2 0 2 4 6 8 10 Miles

Map 1

THE MARYS RIVER WATERSHED, A SUB-BASIN OF THE WILLAMETTE WATERSHED

Life is tied to rivers, and Oregon has many. We are surrounded by life, and we depend on rivers for our own. Understanding their health in the Willamette Valley, we see pressures. Increasing population means we must try more than ever to understand what we do to make rivers healthy or unhealthy if we are to insure our own health. We look to signs such as fish presence and others to see how our rivers are doing. Land stewardship involves sound response to human impacts and making responsible decisions.

Let's look at the Willamette Valley, with the Willamette River that flows north along its broad path, from its headwaters near Eugene to its confluence with the Columbia River at Portland. It travels 187 miles to drain and carry water through and away from Oregon's largest river valley. The river and surrounding land defines an ecoregion framed on both sides by peaks that we are all familiar with, the Coast Range to the west, the Cascades to the east. High in these mountains, where birds fly and black bear and mountain lions still roam, flow the headwaters of westslope and eastslope draining rivers, very different in character due to earth changes that formed them, geologic events. Our planet sheds water, our soils and rivers collect, carry and transports it.

Each stream and river is a carrier, sorter, and transporter for the basins that surround them. It is also home to many aquatic insects, fish and others. We and others drink from it. The Marys River helps drain the west side of this big valley, the Coast Range Mountains the high ridge tops that gravity feed water down. There are others as we imagine the ocean to our left driving north, five river watersheds that drain the west side of this Willamette River Basin. Not many white peaks, unless we find Marys Peak, or look east. There we see many white peaks, the high ridges of the Cascade Mountains, with other watersheds that drain them. Flying above this valley like the 30 species of migrating geese, swans, ducks, shorebirds, wading birds that depend on our Willamette Valley wetlands to winter, we could add up all the square miles of land that is drained by all these rivers, all these basins. Starting in your own back yard, zoom out, to one mile, then more, until you get up to 11,500 square miles in the Willamette River basin. Zoom out again to see the state of Oregon covering 96,000 square miles. Now zoom back in to these 310 square miles that are here around you in the Marys River Watershed. Your small towns, your own backyard. The water that flows through our places, all of it, carries life and health, or its opposite, toxicity and disease. We all matter, all water matters, and from ridge top to ridge top, we are all part of this story.

MARYS RIVER WATERSHED HEADWATERS

Where are we? Do you know our roads? I-5 is easy. How about 99W? The Marys River Watershed includes part of the Hwy 99 W corridor. 99W almost defines the eastern border of the watershed, running parallel to the Willamette River. I always sense the Willamette River as I drive 99W every day, off to my right if going north, left if going south. We orient our lives to rivers, mountaintops; they make sense of our world of right or left, up or down. Roads are like rivers; they also carry and transport life. Our lives in a world with a lot of concrete, many cars, make many worldwide impacts. Often, roads flow much like rivers, copying or paralleling their paths, as rivers were the first highways to navigate densely forested lands and open prairies. Highways 20 and 34 pass through the hilly terrain of the Coast Range, going west to higher ground, past several sources of the Marys River headwaters. Have you heard of Benton County? Most of the Marys River Watershed is within the Benton County USGS quad. But Benton County is bigger than the Marys River Watershed, and has parts of other watersheds too. While 95% of the Marys River Watershed is in Benton County, only 43% is occupied by the watershed. You may have heard of the Luckiamute and the Long Tom, neighboring rivers that drain watersheds to the north and south. They also have headwaters in the coast range.

Starting this story, we begin in the headwaters. Several cool headwater streams of the Marys River Watershed are doing their work beyond where many humans live or commonly go, flowing rather fast from upland forests in the Coast Range. The highest headwaters begin the water journey to

the Pacific Ocean on the lofty Marys Peak at 4,200 feet elevation. Others start along the path of the coast range ridges going north and south along the west boundary of our watershed. Some start lower in the foothills. A basin is like a big bowl that draws water down to the bottom, with many high points that feed into it to contain all the water that falls into the sub-basin of the Marys River. You've seen headwater streams flow, down the sides of slopes as rain falls or snow melts, merging with others to make wider streams and channels. It is when they flow year long that they get placed in a stream continuum with assigned orders. Flowing and merging, first and second, third and forth-order streams merge together and leave the foothills of the Coast Range down into the valley, a different landscape.

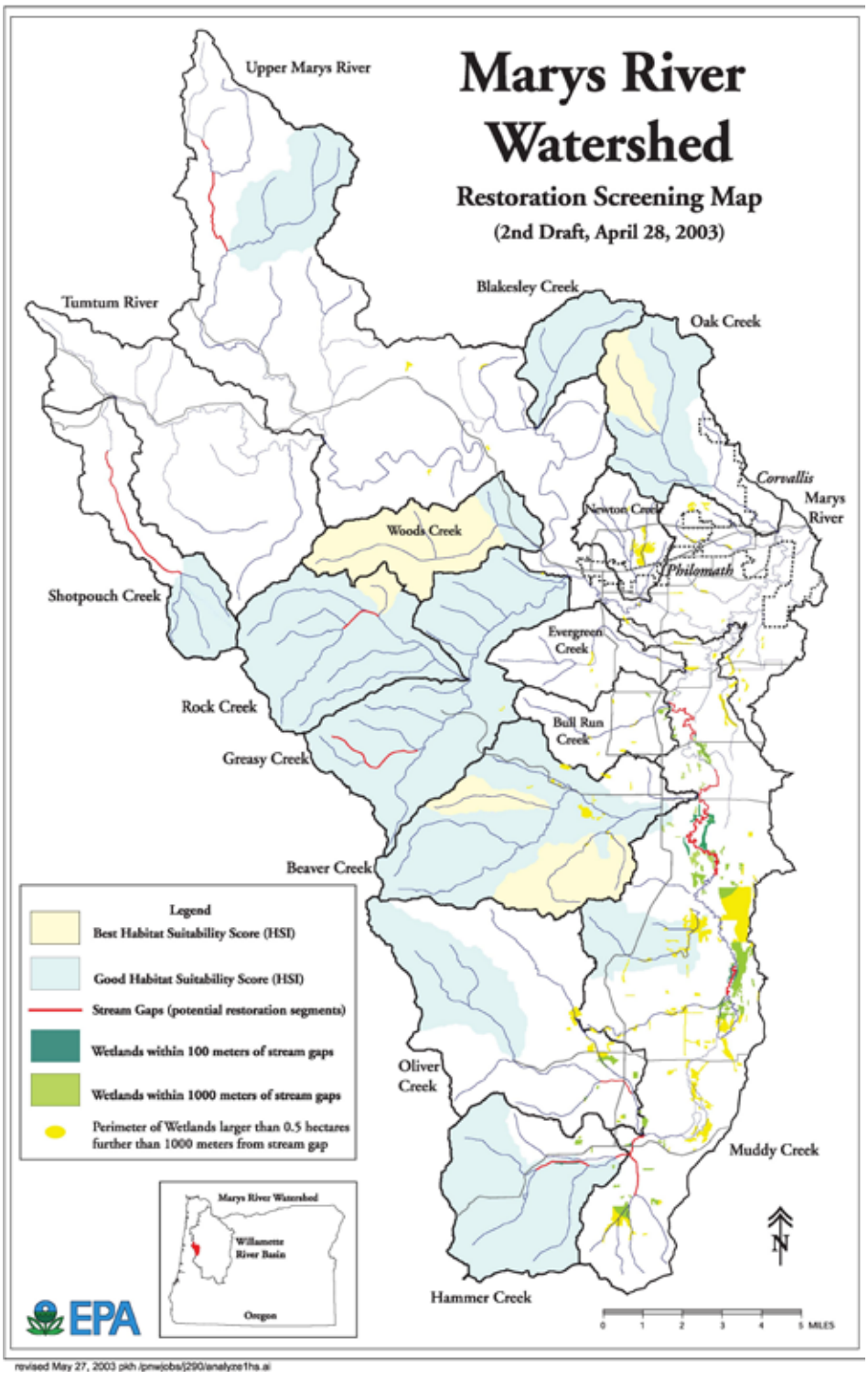
Agriculture, homes, cities, trees are familiar sites, as the water slows down, increases in volume, and gets warmer, the slopes becoming more gradual. These creeks flow into the eastward bound Marys River which can get as wide as 60 feet across in some sections (averages 30 feet across) or the northward bound Muddy Creek until they get to an area halfway between Philomath and Corvallis. There the Muddy Creek flows into the Marys River five miles upstream from the mouth of the Willamette, where this combined water join together at this confluence. There it changes direction, flowing north until it meets the great Columbia River. Finally it flows mostly east until it ends its long journey to the Pacific Ocean at Astoria. Several anadromous fish species, including steelhead and Coho salmon, follow this route to the ocean if the distance seems long to you. They perform this feat of migration between salt and fresh water every year, as adult fish swim upstream from the Pacific Ocean, juveniles downstream from freshwater spawning gravels.

HYDROLOGY

The word hydrology comes from the Greek root "hudor" which means "water" and "logos" which means study. Hydrology is the study of the movement, distribution and quality of water throughout the earth. The hydrologic cycle describes the constant movement of water, above and below the surface of the ground. To study watersheds, we must look at how water moves through the system.

Marys Peak is one of the only coastal peaks that have occasional snow on its peak. Most of our water comes from the atmosphere in the form of rain and a little snow. As a result, streams and rivers have sustainable high flows in the winter when it rains more, and periods of low flows in the summer, after the rain stops. There is no melting snow pack, unlike the peaks of the Cascades. This creates some problems for aquatic life, as crops need water right about the time when the rains stop. When it rains, some of the water ends up in streams and rivers. Most of it is stored, held or used, by soils, plants, wildlife, by us. Upland forests, valley floor and urban areas all hold, collect or drain water.

Marys River and Muddy Creek are the two main water collectors, transporters in the Marys River Watershed. Stream gradient is defined by the degree or angle of a slope. The difference in stream gradient between the Marys River and Muddy Creek results in water flow and water quality differences between the two sub-basins. The Marys River drains the upland forest areas and has a steep gradient throughout most of its 20-mile pathway to the valley floor near Philomath. Muddy Creek and its tributaries flow steeply from their Coast Range headwaters for only a few miles before flattening out on the floor of the Willamette Valley. Looking at the amount of water that flows through the Marys River and during what months, we conclude that large and steep areas drain water in flashy patterns, water shedding off of slopes, creating high peak flows in the winter that continue to provide a steady flow of water into the spring as the rains persist. As rains stop, there is a period of low flow, primarily from July through October, with negative effects on water quality and stress on fish populations. Muddy Creek flows through low-gradient, agricultural lands and responds less to high flow flashes as water is absorbed more by soils and plants and moves more slowly. The highest peak flow occurs in January and low flows begin as early as May. The low-flow period extends from June through October. These low flows impact irrigation needed for agriculture as well as aquatic habitat.



MARYS RIVER WATERSHED SUB-BASINS

There are 24 total sub-basins within the Marys River Watershed. The 14 sub-basins shown on this map help to focus efforts on restoration.

Sub-Basins with streams that drain into Marys River

Newton Creek
ShotPouch Creek/Tum Tum River
Rock Creek/Greasy Creek
Woods Creek
Blakesley Creek

Sub-Basins with streams that drain into Muddy Creek

Evergreen Creek
Bull Run Creek
Beaver Creek
Oliver Creek
Hammer Creek

Flooding in the Marys River Watershed is a primary concern in the lower valley floor part of the watershed. Flood waters during the 1996 flood event shows flooding along Marys River and Greasy Creek upstream of Philomath. Most flooding, however, occurred downstream of Philomath and below the confluence with Muddy Creek. In addition to receiving drainage waters from the larger watershed, these downstream areas may experience localized flooding from runoff generated by impervious areas (concrete) within Corvallis and Philomath. With no dams for flood control on the Marys River, floodplain management will be an important watershed issue as urban development continues to expand into historical floodplain areas. It only floods during the rainy period.

Small creeks that flow into the Marys River are: Norton Creek, the Tum Tum River, Blakesley Creek, Oak Creek, Squaw Creek, Wren Creek, Gellatly Creek, LaBare Creek, Read Creeks, Shotputch Creek, Bark Creek, Lasky Creek, Mulkey Creek, Newton Creek, Woods Creek, and Greasy Creek. Adding up stream miles, the total length of the Marys River with its tributaries is about 41 miles, draining 181 square miles out of the total area of 310 square miles of watershed area or about 58%. (A little more than half). Muddy Creek drains about 42% of the Marys River Watershed. During high-flow periods of winter discharge Muddy Creek adds as much as two-thirds of water volume even though it drains less than half of the Marys River Watershed. Some of the tributaries of Muddy Creek are: Evergreen Creek, Bull Run Creek, Beaver Creek, Reese Creek, Oliver Creek, Gray Creek, and Hammer Creek. The total length of Muddy Creek and its tributaries is 32 miles covering 129 square miles. Adding up the small sub-basins with the creeks and rivers that give them their names, altogether, the Marys River watershed has 24 sub-basins totaling 311 miles of channel length and covering 310 square miles. The Marys River is a fifth-order river.

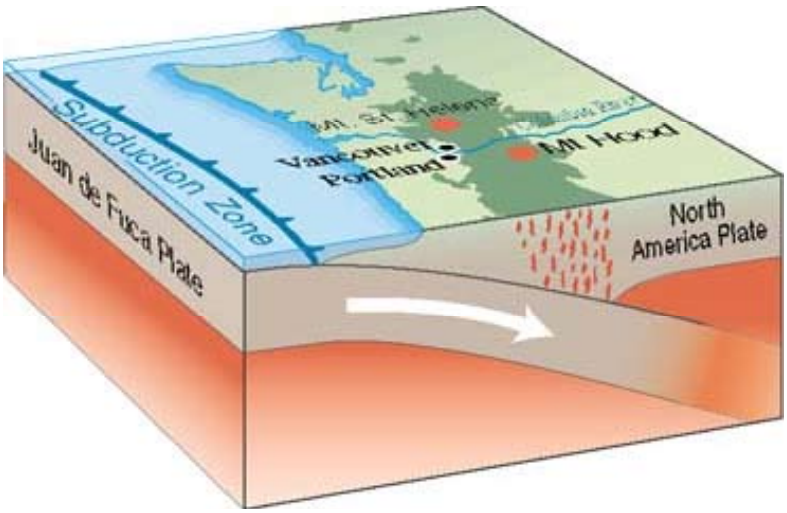
Many log ponds, reservoirs and lakes are within the watershed area. Each has historical significance, and most have resulted from human interactions with the land and streams. Clemens Log Ponds are a local destination for many student groups who live in the Philomath area. Some have seen where beavers have helped create these ponds and an interesting wildlife habitat. Newton Creek was held back and contained, the sites around Clemens pond an evolving restoration and education area of focus. The Corvallis Reservoir supplies water to many Marys River Watershed residents. Clemons log pond, Corvallis reservoir, Crystal Lake, Hobin log pond, Knight Reservoir, Larson log pond, Peak log pond and Watkins pond are all within the Marys River Watershed.

GEOLOGY

Geology comes from the Greek root "ge" meaning earth, logos meaning "speech," geology to talk about the earth, about rocks, soils and other physical properties. Visually, the Willamette Valley has two main physical features, mountains and flat valleys. If one were to drive the Hwy 20 route to the Pacific Ocean through part of the Marys River Watershed, few rock outcrops would be seen. Yet under the deep layers of forest soils lies the sea-floor basalt that formed the bedrock floor of the ocean and soft mudstones and sandstones deposited on the basalt. Along reaches of the Marys River and its tributaries, scoured river bottoms expose this bedrock in many places, smooth large slabs, and black to dark gray in color. (Slippery to walk on in rubber boots.)

The North American Continent and the Pacific Ocean floor have been on a slow motion collision course for about 200 million years. The entire Oregon Coast Range is over a convergent tectonic margin, where the Juan de Fuca Plate (ocean floor) is being sub-ducted beneath the North American Plate. Rigid crust about 60 miles thick floats on hot rocks the consistency of modeling clay underneath the crust at the earth's interior. Pressure keeps the interior rocks from melting, but rifts where the ocean floor pulls apart create openings where basalt flows up, cools and solidifies. New ocean floor made of solidified basalt and layers of sediment moves landward, sinking under the lighter continental crust of the Oregon coast. About 25 million years ago, old sediment layers once on the ocean floor uplifted in slabs. (The Marys River used to be a fairly large river that flowed to the ocean, but split in half as the coast range grew. The modern Yaquina River used to be part of the Marys River, with geologic evidence to prove it.) The newer sediment of coastal plains, shelf and seafloor, too light to sink, ground and scraped off under the forming mountain, making it

grow. Over time, the sediment on the uplifted mountains eroded until bedrock was exposed on the mountain peaks. Meanwhile, wherever coastal mountain ranges are forming, volcanic chains are created about 100 miles inland. The underlying basement rock of basalt flows that used to cover the seafloor sink lower and lower until they get about 60 miles down. As it gets lower, it melts, and partly returns to the surface through volcanoes. This explains why the Cascade Mountains are made of younger volcanic rock, while the Coast range is made of older basalt (60 million years old) sedimentary rock. Coast Range Peaks in Benton County include: Marys Peak at 4,097 feet, Alesea Summit at 1,203 feet, Flat Mountain 2,600 feet, Green Peak at 2,697 feet.



Cascadia Subduction Zone

About 2 million years to 10,000 years ago, the Willamette Valley was a large lake, as high as 400 feet above sea level. A geologic event called the Missoula Floods filled the valley floor with water. A river in Idaho was blocked by an ice dam during a glacial ice age, creating a lake behind it, ancient Lake Missoula. As the water got higher, the Canadian Ice Sheet dam started to float. Eventually the dam broke through, releasing 60 years of accumulated water. A huge flood swept across eastern Washington and filled the Columbia River Gorge to its brim. The water drained into the valley for over a week and left a layer of silt 4 inches thick. This dam plugging, river blocking, lake filling, dam breaking cycle repeated itself about 40 times, resulting in 30 feet of Willamette Silt that makes the soils so rich for agriculture. It covers the lower slopes of the valley to an altitude of about 330 feet, creating the rich farmland of the valley floor. Layers of clay, sand and silt make up many of the soil types found in the valley.

Driving into the valley, one follows rivers that meander back and forth across floodplains, periodically flooding and leaving behind deposits of mud, sand and gravel, often referred to as alluvial terraces. The terraces highest and furthest away from the main channel are usually the oldest. The meanders of streams and rivers are dynamic and continually changing. Alluvial terraces are mostly in the eastern part of the watershed, the meanders of Muddy Creek suggesting that it was much larger and wider at one time.

SOILS

Our soils are also essential for life. The Marys River Watershed has many soil types with underlying geologic mixtures of parent material. Sedimentary material makes up most or all of the soils of the Marys River Watershed. Soils are grouped into **8 soil classes** based on how threatening the risk for erosion, soil wetness and flooding. When a new soil is discovered, it is named after where it was first observed and mapped, maybe after a nearby town or geographic feature. The Willamette silt was first observed close to Woodburn, and is called the "Woodburn Series." Soils with the same name or series have similar "profiles." A profile describes the horizons or layers that extend down to the parent material that has not been changed by leaching. Phases describe characteristics that make soils behave in certain ways such as slope, stoniness, and so on. This affects it's suitability for certain land management practices, such as farming or timber growing. Soils are also defined by climate. The Willamette Valley floor soils have the same climate, which consists of about 40 inches of precipitation, an average annual air temperature of 53 degrees F, and a frost-free season of about 180 days.

The valley's flood plain is at 190 feet, while Marys Peak as it 4,097 ft. Due to the rain shadow af-

fects the precipitation increases to 120 inches per year at higher elevations, increasing to over 60 inches at 800 to 1000 feet. Water, temperature, soil types and plants are interrelated and affect one another. Native plants prefer certain combinations of three variables, lying dormant in a seed bank. If invasive species are not present, native plants can even help to correctly identify soils. The City of Corvallis is on top of highly productive silt loam, including Woodburn, Willamette, Dayton, Concord and Amity soils. All of these soils are prime agricultural soils, and now underlie urban centers. The City of Philomath was also built on sloping silt loam, highly productive forestry soils including Amity, Dayton, Witham and Willamette soils. Future development will have to be considered when thinking about where to pour concrete.

Eight Soil Classes:

- The main valley floor terraces, which are level to nearly **level**, with well to moderately well drained soil that can hold water well. It is very productive soil, and is very good for most agricultural and urban uses, which compete for these soils. (A)
- The **gently or strongly sloping** soils of the terraces and foothills with slight to moderate erosion hazard. Also very productive soils with a wide range of uses from intense and diverse agriculture to less intensive pasture and hay, Christmas tees, wine grapes and plantation forestry. (B)
- **Steeply sloping** soils of old terraces and foothills with high hazards for erosion. Marginal for most agricultural crops because of steep slopes, lack of irrigation water and soil erosion potential. Good for grapes and Christmas trees. (C)
- Level to nearly **level** soils of the **floodplains** that floods occasionally with slight to moderate risk of erosion that supports diverse agriculture. (D)
- **Hydric** soils are poorly drained on broad flat terraces and depressions, floodplains and potential wetlands and riparian areas. (E)
- **Very strongly sloping** gradients great for high productivity forestland and high risk for agricultural practices. (F)
- High erosion risk not suited for agriculture with **steeply sloping** gradients. (G)
- Unproductive forest soils on **very steep** slopes with severe limitations for forest management. (H)

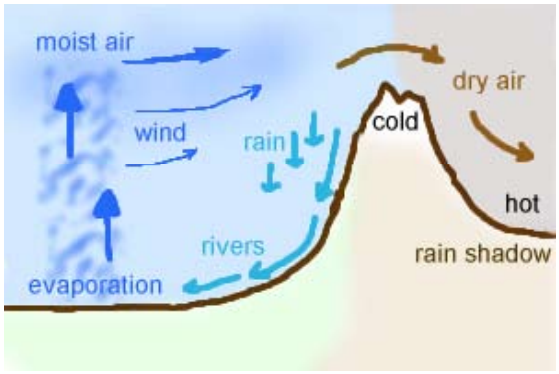
Soil Series	Soil Classes	Soil Type	Slope/ Elevation *(in feet)*	Native plants *(where soils are not cultivated)*	Average air temp	Average precipitation *(in inches)*	Frost-free season *(in days)*
Abiqua	A , B Valley terraces, flat and sloping	Silty, clay loam	250-450	Douglas-fir, oak, shrubs, grasses	52-54 F	40-60	165-210
Amity	A Valley, flat terraces	Silt loam	200-300	Annual and perennial grasses, shrubs, widely spread oak trees	52-54 F	40-45	165-210
Apt	C, F Steeply sloping foothills, mountains	Silty, clay loam	750-1000	Douglas-fir, alder, maple, vine maple, salal, hazel nut, oceanspray, brackenfern	48-50 F	60-90	160-190
Bashaw	E Level terraces and depressions	Silty, clay loam	200-300	Ash, Oregon white oak, wild rose, poison-oak, rushes, sedges and grass	52-54 F	40-60	165-210
Bellpine	B,C Sloping terraces and foothills	Silty, clay loam	300-800	Doug-fir, oak, snowberry, trailing blackberry, poison oak, brackenfern	52-54 F	40-60	165-200
Briedwell	B,C Sloping terraces and foothills	Gravelly loam					
Camus	D Valley floodplains	Gravel, sandy loam	190-300	Ash, cottonwood, Doug-fir, blackberry, annual weeds, grass	52-54 F	40-45	165-210
Chehalis	D Valley floodplains	Silty, clay loam	190-300	Doug-fir, ponderosa pine, ash, bigleaf maple, oak, vines and shrubs	52-54 F	40-45	165-210
Cloquato	D Valley floodplains	Silt loam	190-300	Doug-fir, bigleaf maple, cottonwood, Oregon white oak, ash, vine maple, wild blackberry, vines, shrubs, and grass	52-54 F	40-45	165-210

Coburg	D Valley floodplains	Silty, clay loam	190-300	Grass, scattered Doug-fir and oak	52-54 F	40-45	165-210
Concord	E Valley terraces and depressions	Silt loam	200-300	Rushes, sedges, wild blackberry, hazelnut, annual grasses, Oregon white oak	52-54 F	40-45	165-210
Consor	E Valley terraces and depressions	Silty, clay loam	190-300	Oregon white oak, ash, hawthorn, rose, sedges, rushes, grass	52-54 F	40-45	165-210
Dayton	E Valley terraces and depressions	Silt loam	200-300	Oregon white oak, shrubs, grasses	52-54 F	40-45	165-210
Dixonville	B, C Sloping terraces and foothills	Silty, clay loam	350-1000	Annual grasses, weeds, scattered poison-oak, Oregon white oak, wild rose	52-54 F	40-60	165-210
Dupee	B Sloping terraces, foothills	Silt loam	300-600	Doug-fir, oak, poison-oak, blackberry, fern	52-54 F	40-60	165-200
Hazellair	B, C Sloping terraces and foothills	Silt loam, complex	300-500	Oregon White oak, grass, poison-oak, wild rose	52-54 F	40-45	165-210
Honey-grove	C, F Steeply sloping terraces, uplands	Silty, clay loam	750-1000	Doug-fir, bigleaf maple, fern salal, oceanspray, hazelnut,	48-50 F	60-90	160-190
Jory	B, C Sloping terraces and foothills	Silty, clay loam	400-1200	Doug-fir, grand fir, Oregon white oak, poison-oak, snowberry, grass, fern	52-54 F	40-60	165-200
Malabon	A Valley, flat terraces	Silty, clay loam	190-300	Oak, grass, blackberry, poison-oak, other shrubs	52-54 F	40-45	165-210

Marty	F Strongly sloping uplands	Gravelly loam	800-3,000	Doug-fir, alder, some hemlock, noble fir at higher elevations	46-50 F	60-120	150-190
McAlpin	A Valley flat terraces	Silty, clay loam	250-450	Douglas fir, white fir, shrubs, grass	52-54 F	40-45	165-210
McBee	D Valley floodplains	Silty, clay loam	190-300	Doug-fir, ash, wild rose, snowberry, blackberry, grass	52-54 F	40-45	165-210
Nehalam	D Valley floodplains	Silt loam	400-700	Doug-fir, western red cedar, alder, shrubs, fern	48-50 F	60-90	160-190
Newberg	D Valley floodplains	Loam	190-300	Doug-fir, ponderosa pine, cottonwood, shrubs, grass	52-54 F	40-45	165-210
Peavine	F Strongly sloping uplands	Silty, clay loam	750-1,100	Doug-fir, bigleaf maple, alder, salal, hazelnut, oceanspray, brackenfern	48-50 F	60-90	160-190
Philomath	B,C Sloping terraces and foothills	Silty clay	350-1000	Oregon white oak, grass, wild rose, poison-oak	50-53 F	40-60	165-210
Pilchuck	D Valley floodplains	Silty loam	190-300	Doug-fir, ponderosa pine, cottonwood, shrubs, grass	52-54 F	40-45	165-210
Price	B Sloping terraces foothills	Silty, clay loam	400-1,800	Doug-fir, grand fir, Oregon white oak, bracken-fern, trailing blackberry, snowberry, poison-oak	49-55 F	40-60	165-200
Price-Ritner	C Steeply sloping old terraces and foothills	Complex	Mountain-sides	Doug-fir, grand fir, Oregon white oak, bracken-fern, trailing blackberry, snowberry, poison-oak	49-54 F	40-60	165-200

Ritner-Price	F Strongly sloping uplands	Complex	600-1,800	Doug-fir, bigleaf maple, Oregon white oak, brackenfern, trailing blackberry, hazelnut, poison-oak			
Salem	A Valley flat terraces	Gravelly loam	250-300	Douglas-fir, ponderosa pine, maple, oak, poison oak,blackberry	52-54 F	40-45	165-210
Slickrock	F Strongly sloping uplands	Gravelly loam	850-2,500	Doug-fir, hemlock, alder, understory vine maple, sword fern, salal, brackenfern	46-50 F	60-120	145-190
Veneta	B Sloping terraces, foothills	Silt loam	300-500	Oregon white oak, Doug-fir, shrubs, grass	52-54 F	40-45	165-210
Waldo	E Valley terraces and depressions	Silty, clay loam	250-450	Tussock, sedge, willow, ash and grass	50-52 F	40-60	165-210
Wapato	E Valley terraces and depressions	Silty, clay loam	190-300	Willow, ash, tussock, sedge, grass	52-54 F	40-45	165-210
Willamette	A, B Valley flat and sloping terraces	Silt loam	200-300	Grass, hazel-nut, wild black-berry, Douglas-fir, Oregon white oak	52-54 F	40-45	165-210
Winchuck	B Sloping terraces, foothills	Silt loam	400-700	Doug-fir, hem-lock, alder, western red cedar, under-story of shrubs and fern	48-50 F	60-90	160-190
Witham	B Sloping terraces, foothills	Silty, clay loam	250-450	Oregon white oak, Doug-fir,wildrose, poison-oak, snowberry, grass	52-54 F	40-60	165-210
Woodburn	B Sloping terraces, foothills	Silt loam	200-300	Native grass, hazelnut, poison-oak, wild black-berry, Doug-fir, Oregon white oak	52-54 F	40-45	165-210

CLIMATE



The unique climate of the Marys River watershed is the result of Marine west coast winds and the barrier affect of the coast range. As westerly Pacific marine come over the range, a rain shadow occurs, the west of the mountain getting more rain than the east. The coast range thwarts the path of the moisture laden marine air moving in from the Pacific, and forces it to rise as it moves eastward. The resulting cooling and condensation produces some of the heaviest annual rainfalls in the United States along the higher western slopes, (as much as 120 inches per year at the peak) and reduces the available moisture in the air. The Willamette valley (as much of 60 inches per year above 800 to 1000 feet) has a much more stable climate and significantly less rain than the coastal region of the state. Flooding occurs only during the rainy season due to the lack of snow pack. This rain shadow affect happens again as the easterly winds rise over the Cascades, losing more water, causing eastern Oregon to get even less rain. The climate in the Marys River watershed can be described as mild while still having seasons. Its climate is relatively free of extremes in temperatures and growing seasons are long, with an abundance of rain through most of the year. Mild wet winters are contrasted with hot and dry summers, much like a Mediterranean climate. (Grapes grow well in some parts of the valley as they do in Italy.) The average temperature, precipitation and frost-free season changes with elevation, but below is the monthly weather summary for the City of Corvallis. 75% of the precipitation falls from October to March. The lowest temperature occurs in December, the highest in August. The month with the highest level of precipitation was January, the lowest July. Most precipitation is due to rain, little to snow, resulting in the lack of snow pack with exception of Marys Peak and occasionally lower peaks. CORVALLIS WATER BUREAU, OREGON (351877)

PERIOD OF RECORD MONTHLY CLIMATE SUMMARY

Period of Record : 7/ 1/1948 to 12/31/2005

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	45.4	49.6	54.4	59.2	65.8	71.7	78.8	79.5	74.3	63.3	51.1	44.8	61.5
Average Min. Temperature (F)	32.8	33.7	35.8	38.1	42.6	47.6	50.6	50.6	50.6	47.6	41.2	36.5	40.8
Average Total Percipitation (in.)	12.50	9.09	7.86	4.19	2.64	1.36	0.35	0.71	1.59	4.45	10.06	12.70	67.51
Average Total Snow Fall (in.)	3.6	2.3	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	1.1	7.6
Average Snow Depth	1	1	0	0	0	0	0	0	0	0	0	0	0

HISTORY

The valley was the destination of choice for the emigrants on the Oregon Trail in the 1840's as it was known to be a productive agricultural area. Settlers probably liked the more accessible, flatter ground of the western slopes, which were preferred travel routes. 70% of Oregon's population now lives here, changing the watershed dramatically through time.

When the settlers arrived, the ancient Kalapuya Indian people lived here. The word Willamette

(pronounced wil-LAM-et) means spilled water in the Kalapuya Indian language, and originally referred to the Willamette Falls at Oregon City. The Kalapuya managed the land to rid it of unwanted plants. Plants such as Douglas-fir and poison oak, were considered weeds, while oak, camas and huckleberries were preferred. The use of fire for vegetation management, termed "pyroculture, " involved periodic broadcast burning over large areas of the landscape to control unwanted plants. This active land management practice left an open valley of oak savannas, rich grassland prairies, wetlands, and trees in the streamside areas for the early explorers to come upon.

Forcing out the Kalapulya along with waves of disease epidemics brought dramatic changes to the Willamette Valley. The end of the Kalapuyan practice of using fire turned oak woodlands to conifer forests. Preferred plants shifted to the weeds of former days, Douglas-fir taking over as a climax succession plant, timber used for housing. Farms filled the valley, along with mosaics of wheat fields and other crops, the aerial checkerboard patterns that define American landscapes. Fences were a Europeon phenomenon, as was property ownership, and the valley was sliced into units and parts. By the 1930's, the landscape features of the Marys River Watershed had changed dramatically. Lands that were historically grass prairies, oak savannas, wetlands, and riparian forests had been converted to farmlands and to a lesser extent, other land uses. Human population within the watershed increased, with urban centers in Corvallis and Philomath, increasing dramatically. The stream habitat, especially along the main stem of the Marys River, had been negatively impacted by log drives, woody debris removal, bank stabilization and loss of riparian forests. The downfall for wildlife and diversity was the cost of rapid change.

DEMOGRAPHICS

I do not have accurate population figures for the Marys River Watershed, but refer to the population of Benton County which is estimated at about 80,000. It should be noted, however, that only 43% of Benton County is occupied by the watershed. Population trends show rapid growth rates between 1860 and 1880, (doubling in 20 years) 1930 and 1960, 1960 and 2006 (doubling in 46 years) The population has increased steadily since 1960, and it is projected that it will continue to climb at about the same rate. By 2040, there should be about 105,000 people in Benton County. Most of the population growth from 1960 to 2005 was concentrated in the cities, while rural growth also increased rapidly. In 1930, 54% of the population still lived outside of the cities.

Year	Population in Benton County
2040 projection	105,000
2006 estimate	79,061
2000	78,153
1990	70,811
1980	68,211
1970	53,776
1960	39,165
1930	6,555
1880	6,403
1860	3,074

Population increases in the Marys River Watershed are consistent with projections for the Willamette Valley, which has the fastest-growing human population of all of the ecoregions in Oregon. The is due to the fact that three largest urban areas centers are within it, Portland, Salem and Eugene. The 2050 population in the Willamette Valley is projected to be approximately 4 million, which is nearly double the 2000 population. About 96 percent of the Willamette Valley ecoregion is privately owned, and there is more and more pressure on rural development. Voluntary cooperative approaches to conservation management are essential for oak woodlands, grasslands, wetlands, riparian and aquatic habitats. Preserving the best and conserving the rest seems like the best management approach as we face steep population growth.

LAND USE

84% of the Marys River Watershed is privately owned (compared to 96% of the Willamette Valley) leaving only about 16% of the land that is publicly owned. For this reason, voluntary and cooperative approaches to conservation management are essential for habitats that are disappearing,

including oak woodlands, grasslands, wetlands, riparian and aquatic habitats. This is essential, as most of the land is used for production purposes. The landscape in the upland forest is a mix of second growth forests and small farms and residences. The valley floor was originally a mix of forests, open prairies and seasonal wetlands, and is now agriculture and urban. 56% of the watershed is used for cropland and 25% for forestry. Urban land takes up 8% of the watershed, as does pasture, hay and the Finley Wildlife Refuge. Forestry and agriculture dominate the land use in the rural parts of Benton County, but are much less important for income to most of the population. Most of the employment is in services, government (local, state and federal), manufacturing (other than lumber and wood products), and trade. Lumber and wood products is the only industry that has declining employment levels.

The current watershed resembles conditions after 1930. The Willamette Valley Project of 1936 brought in the era of intensive natural resource management in the Willamette Basin for social and economic advancement, with little focus on water quality concerns. This program prioritized: Hydraulic control of the entire basin through the building of dams and storage reservoirs; agricultural land use designed to encourage more effective farming practices; and forest strategy to encourage the sustained yield of forest resources. Restoration efforts today are counteracting some of the negative impacts of these changes in the watershed.

ISSUES OF CONCERN

96% of the Willamette Valley and 84% of the Marys River Watershed is publicly owned. Land use changes, invasive species, disruption and disturbance of fire and flooding cycles, barriers to fish and wildlife movement along passable corridors and barriers to voluntary conservation all place a great deal of stress on the natural resources of the area. The Marys River and its tributaries provide spawning and rearing habitat for Cutthroat trout and Pacific lamprey and is home for many other wildlife species.

Population increases in the Marys River Watershed as elsewhere in the larger Willamette Basin, is a continued concern, rural land pressures increasing for slated development. The Willamette Basin has the fastest-growing human population in Oregon and is the densest. The population is expected to almost double by 2050. This creates more pressure on natural resources, and development plans must factor in conservation, weighing social and economic development against environmental quality concerns. Several state and federal initiatives including the United States Fish and Wildlife (USFW) Partners program, provides initiatives and incentives for property owners to restore and/or protect strategy habitats.

A history of domestic sewage issues in the early 1900's, continue today, the Willamette River a supplemental source of drinking water. Rock Creek Watershed was historically protected through the purchase of homestead acres by the US Forest Service and the city of Corvallis. Sources for the treatment of drinking water for the City of Corvallis have changed over time, beginning with Rock Creek Treatment Facility until 1949, followed by the Taylor Treatment Plant. The Taylor Treatment Plant was built to treat water pulled from the Willamette River, augmenting the Rock Creek Watershed supply in the summer months. In 1956 the Rock Creek treatment facility near Philomath was replaced with a treatment plant on Marys Peak. Today, the Taylor Plant is Corvallis' primary supply, treating 3–16 million gallons of water per day, while the Rock Creek Facility is secondary, providing 3–4 million gallons of water per day. Over allocation of water for irrigation continues to be a concern.

Cropland erosion, fertilizer and pesticide applications, grazing, mass erosion and surface erosion from forest land and roads, affect the rivers and its tributaries. Testing for temperature, dissolved oxygen, summer bacteria levels, chlorophyll a, pH and sedimentation are common parameters for water quality. The Marys River Watershed is in relatively healthy condition, but there are concerns. In some portions of the rivers and streams, water quality monitoring has shown water temperatures not suitable for anadromous fish such as Cutthroat trout. Low flow due to irrigation and loss

of riparian buffers are some of the root causes for these low temperatures. Barriers to fish passage due to culvert problems have necessitated the replacement of several culverts. Large log placement affects sinuosity and pooling, supporting a watershed that contains essential, high-quality salmonid habitat. Logging practices in the 1800's scoured gravel from streams and dislodged large logs.

WATER QUALITY

In addition to water for drinking and consumption, there are many beneficial uses for water in the Marys River Watershed. Water is often tied to economics and jobs that depend on water. These jobs include: Fishing, hydroelectric power, industrial water supply, irrigation for farming, livestock watering, private and public domestic water supply, water contact recreation, wildlife, hunting and fishing, fishing management, stream and river conservation, preservation and education. Water also adds beauty and enjoyment, fish passage, boating and transportation, fish habitat. 75% of all water use in the Willamette Basin comes from surface sources, the streams and rivers of the Marys River watershed receiving water drained from many areas with potential problems: Point sources from sewage treatment or industrial outfalls, runoff from cropland erosion, fertilizer and pesticide applications, grazing, mass erosion and surface erosion from forestland and roads, all contribute to the problems. A point source of pollution is a single identifiable localized source of water pollution. The Clean Water Act requires each state to develop a list of waters that do not meet state standards for water quality. The Marys River is on the water quality (303d) list for flow modification, bacteria and temperature from the mouth to Greasy Creek.

The parameters used to screen water quality include bacteria, temperature, nutrients, sediment and conductivity (turbidity), dissolved oxygen, pH and Alkalinity. Specific from the Marys River Watershed Council can provide some of this detailed information. Problems in Muddy Creek and Marys River include high phosphorus concentrations, low dissolved oxygen, and high bacteria counts. Non point source or diffusion of pollution is identified as the problem, as no one point source cause can be strictly to blame. Without identified point sources, all land use practices should be investigated, focusing on issues such as the loading of streams of organic matter and phosphorus. Increased summertime flow could have beneficial effects on water quality. Current consumption of water for consumptive use is 142 cfs as compared to 11 cfs for in-stream fish and wildlife. Increasing water quantity also dilutes high concentrations of pollutants.

SPECIFICS FROM THE MARYS RIVER WATERSHED COUNCIL

The Marys River Watershed Phase 1 water quality report done in 2002 indicated overall water quality is fair to good with some identified concerns. The lower regions of the basin were too warm for cold water fish, while streams draining the upper reaches are sufficient to support resident trout species. (temperature, dissolved oxygen) Nutrient concentrations were generally low, some reaching the streams from upland sources, but not widespread. E. coli numbers were higher downstream of Philomath than upstream, suggesting a possible source of bacterial contamination in the central Philomath area. Nutrient concentrations were high in the Muddy Creek basin, the valley agricultural area. Coliform bacteria (E. coli standard) were present throughout the basin, but not high enough to severely affect beneficial use. Fecal coliform bacteria were high throughout the watershed. Highest levels are in the Upper Muddy Creek. Chronic turbidity does not appear to be a problem, measured turbidity generally low. Three sites sampled for the phase 1 study appear to be adversely affected with respect to water quality. Upper Muddy Creek and lower Muddy Creek show evidence of nutrient inputs from agricultural activity and effects of a possible source of bacterial contamination. Lower Muddy Creek had depressed dissolved oxygen levels suggesting a high organic load to the stream. Oak Creek is adversely affected by high levels of bacterial content.

Phase II water quality monitoring done in 2005 focused on three sites that became concerns after the Phase 1 study, which was directed toward the Marys River and Muddy Creek, conditions on Oak Creek addressed by Oregon State University. Phosphorus concentrations in Muddy Creek compare favorably with other streams and rivers, high when judged by lakes criteria, contributing to exces-

sive growth of aquatic plants, both algae and rooted vegetation. There is a statistically significant increase in phosphorus concentration from upstream to downstream Muddy Creek, likely the result of non-point source runoff, the result of either management activity or natural geologic processes. Dissolved oxygen is low in Muddy Creek with median values near 50 percent saturation, lows at 6 percent, which suggests a substantial source of oxygen demand. In contrast, levels of dissolved oxygen in Marys River indicate relatively good conditions. Temperatures in both Muddy Creek and the Marys River exceeds the current water quality standard for salmon and trout rearing and migration for salmon corridors. Low and slow velocity during the summer, especially in Muddy Creek, contribute to the warming of the stream, as does the lack of vegetative shading. Bacterial counts were much higher for samples collected during rain events than during low flows. There is not particular point source that is contributing to high phosphorus concentration, low dissolved oxygen, or high bacterial counts. Land use practices in the watershed are being addressed, in the attempt to reduce the loading to the streams of organic matter and phosphorus. Increased summertime flow may have beneficial affect. Ongoing monitoring is planned for The Marys River at Highway 34, Bellfountain Road and Avery Park and the Muddy Creek at Greenberry Road, McFarland Road near Alpine, and at the confluence with the Marys River. Parameters will include those for temperature, dissolved oxygen, phosphorus, bacteria (E. coli), specific conductance, turbidity, and chlorophyll a.

WATER QUANTITY

Over-allocation due to permitted water withdrawals is assessed in the Marys River Watershed, due to the increased demands of growing populations and water use practices. Measures are taken of the mean monthly instream flow, the instream rights (amount of flow that should be left in the stream for aquatic life and stream functions), and combined instream rights plus allocated consumptive rights (that which should be left in the stream plus that which is allocated for withdrawals). The stream is over-allocated when the combined allocation surpasses streamflow. Streamflows are excessively low in summer, which impacts aquatic resources. Water withdrawals make this problem worse. The Greenberry Irrigation District is negotiating water transport from storage in the Fern Ridge Reservoir for use on refuge farm land and wetland enhancement. Other solutions are necessary.

INSTREAM HABITAT

Spawning and rearing habitat for native species of Cuthroat trout and Pacific lamprey is influenced by water quality and quantity and riparian condition. BLM stream surveys on several low-gradient tributaries of Muddy Creek and the Marys River show that fish habitat has been degraded or is in declining condition. Most areas have been altered from their natural condition by land use practices, including agriculture, grazing, timber harvesting and residential development. Road building created the need for many culverts, many placed without accounting for fish passage considerations. Culverts that are undersized or have a drop at the outlet create barriers to fish passage. Other habitat problems include lack of woody debris, pools, off-channel habitat, and the proper substrate. Riparian habitat is in tact in many places, but dominated by hardwoods, while a deciduous/conifer forests mix are ideal for the shade and woody debris provided by conifers. Conifers persist longer and are resistant to high flows, create areas where pools can develop and traps substrate (gravel) and organic matter that is food for macroinvertebrates, enriching the stream ecosystems. Habitat conditions for Beaver Creek, Oliver Creek, Reese Creek and Greasy Creek, for example, are not functioning properly and are at risk. Substrate for spawning is habitat limiting in Reese Creek. Sediment and turbidity are concerns in the basin because excessive suspended sediment can have adverse affects on in-stream fish and aquatic invertebrate habitat. Effects of sediment can include changes to bedload size, channel shape, salmonid redd production rates, primary productivity, and pool distribution. It can also change the structure and width of stream banks and the adjacent riparian zones.

VEGETATION

The Marys River watershed includes coast range, upland zones and valley floor. The Oregon Conservation Strategy prioritizes the maintenance of natural habitat in order to benefit a wide range of organisms. "Strategy Habitats" have been identified that support large numbers of species and for the Willamette Valley include: oak woodlands, grasslands, wetlands, riparian and aquatic habitats. Native habitat restoration priorities in the Willamette Valley include: Oak woodlands and savannas, wetlands, bottomland hardwood and riparian forests, and grasslands. I have also included information on upland forests.

Loss of floodplain forest has been one of the most dramatic changes since Euro-American settlement.

Habitat Type	Plant Community	Fish and Wildlife	Invasive Species and existing threats
Upland Forests	Douglas-fir, western hemlock, grand fir (old growth timber), Big leaf maple, Pacific yew, western red cedar, noble fir, vine maple, salal, sword fern, Oregon grape, western rhododendron, huckleberries, twinflower, deerfoot vanillaleaf, Nelson's checkermallow, and oxalis	American martin, red tree vole, many bat species, American bald eagle, marbled murrelet, clouded salamander, Westslope cutthroat trout, coho salmon, steelhead, salamander slug, deer and elk herds, bear, mountain lions, other	Potential exists for native forest understory to be converted to false brome
Hardwood Forests and Riparian	Black cottonwood, willow, hardwood shrub understory of willow and red-osier dogweed "gallery forest", Oregon ash, white alder, Oregon white oak, snowberry, Bigleaf maple, down wood,	Steelhead and Coho salmon (listed), cutthroat trout, Northern-red legged frog, western pond turtle, northwestern salamander, other	River channelization and damming, urbanization, levees, revetments, decreased water channel and forest complexity, agricultural development. Carp, brown bullhead, bluegill, largemouth bass, feral cat, nutria, bullfrog, annual ryegrass, reed canary grass, Himalayan blackberry, English hawthorn, Japanese knotweed
Grasslands Wet Prairie	Black hawthorn, Oregon ash, serviceberry, willow, Nootka rose, Douglas spirea, Bunchgrass-forb matrix: serviceberry, tufted hairgrass, spike bentgrass, California oatgrass, sedges and rushes, forbs showy milkweed, Hall's aster, camas, Willamette Valley daisy, showy tarweed, Nelson's checkermallow	Songbirds such as western meadowlark, streaked horned lark and Oregon vesper sparrow, monarch butterfly, ring-necked pheasant, northern harrier, Wilson's snipe and short-eared owl, blacktail deer and elk, other	Lack of prescribed burns and invasion of exotic plants, reed canary grass, colonial bentgrass and velvet grass
Oak Savannas and Oak Forests	Oregon white oak, serviceberry, black hawthorn, poison oak, Nootka rose, Indian plum, Lemmon's needlegrass, slender wheatgrass, California brome, Blue wildrye, Roemer's fescue, Prairie Junegrass, Yarrow, Kincaid's Lupine, other forbs	Fender's blue butterfly, American Kestrel, Lewis' woodpecker, acorn woodpecker, western bluebird, white-breasted nuthatch, grasshopper sparrow, Western meadowlark, Western gray squirrel, Sharptail snake, other	Exclusion of prescribed fires, colonial bentgrass, false brome, tall oatgrass, scotch broom

FISH AND WILDLIFE

There are significant challenges in the state of Oregon in the last 150 years to maintain fish and wildlife habitats. Fragmentation and degradation of habitats have occurred along with the construction of towns and roads, and river systems have been altered. There are at least a few hundred vertebrate species and perhaps several thousand invertebrate species in the Marys River watershed. Many of these species are sensitive or endangered.

Ecologists have also long recognized that some species, by virtue of the key roles they play in the overall structure and functioning of an ecosystem, are essential to its integrity; these are known as keystone species. Trophic dynamics shows how species are interdependent. In ecology, trophic dynamics is the system of trophic levels (Greek trophē, food), which describe the position that an organism occupies in a food chain - what it eats, and what eats it. Trophic cascades occur when predators in a food chain suppress the abundance of their prey, thereby releasing the next lower trophic level from predation (or herbivory if the intermediate trophic level is an herbivore). For example, if the abundance of large piscivorous (fish eating) fish is increased in a lake, the abundance of their prey, zooplanktivorous (eats insects and other organisms) fish, should decrease, large zooplankton (insect and organism eating) abundance should increase, and phytoplankton (plants) biomass should decrease. This theory has stimulated new research in many areas of ecology, including reintroduction of the wolf in Yellowstone, and its positive relationship on riparian in-stream habitat due to declines and behavior changes in elk. Loss of plants in proximity to streams causes loss of bank stabilization and increases in water temperature, which negative impacts on fish habitats. Trophic cascades are therefore important for understanding the effects of removing top predators from food webs, as humans have done in many places through hunting and fishing activities, or habitat degradation resulting in decreases of anadromous fish such as salmon and steelhead.

In human cultures everywhere, there are plants and animals that form the contextual underpinnings of a culture, as reflected in their fundamental roles in diet, as materials, or in medicine. In addition, these species often feature prominently in the language, ceremonies, and narratives of native peoples and can be considered cultural icons. Without these "cultural keystone species," the societies they support would be completely different. An obvious example is salmon for Northwest Coast cultures of North America. Salmon has long been at the heart of the culture and livelihood of coastal dwellers. Most peoples of the Northern Pacific shore had a ceremony to honor the first return of the year. For many centuries, people caught salmon as they swam upriver to spawn. Often prominent elements of local ecosystems, cultural keystone species may be used and harvested in large quantities and intensively managed for quality and productivity. Loss of species, therefore, is also a cultural problem for biological conservation and ecological conservation.

Special mention will be made for fish species in the Marys River Watershed. Upland forest areas have fast-flowing streams that are cool and clear and flow over cobbles and gravels. These upland cold-water streams support cutthroat trout, sculpins and a variety of amphibians. Resident cutthroat trout Oncorhynchus clarki are the only native trout in the basin. They leave the small headwater streams to rear in downstream portions of larger rivers and return to spawn in headwater areas. There are many introduced species, including steelhead and Coho salmon, which are not native to the watershed. Coho salmon Orcorhynchus tshawytscha were unable to pass above Willamette Falls and did not establish populations in the Willamette basin before the late 1800's. These species have been found spawning where fish passage is unobstructed, such as in the Rock Creek system. Valley warm-water streams support peamouth, sand rollers, Oregon chub dace, and redside shiners. Oregon Chub are found only in the William Finley Wildlife Refuge.

INVASIVE SPECIES

There are many non-native, invasive species that pose a serious threat to native species through competition and predation. Non-native grasses such as reed canary grass, colonial bentgrass, velvet grass out-competes native wetland and emergent plants, and forms dense, persistent stands

along rivers and wetland prairies. Dense thickets of Himalayan (Armenian) blackberry are commonly taking over upland prairies and woodlands, preventing regeneration of native vegetation and changing the physical characteristics of the habitat type, thereby reducing food resources for wildlife. Nutrias replace native muskrats and degrade aquatic habitat. Introduced species such as bullfrog and non-native fish (bass, bluegill) prey on native fish (Oregon chub) amphibians and reptiles.

Impacts from invasive species are considered to be the most critical issue facing conservation nationwide. Hundreds of non-native species inhabit the Pacific Northwest, and new potential invasives show up annually. False brome is widespread in native habitats in Benton County, and competes in forest understories. Milk thistle is a significant threat to the native upland prairie and habitat for several listed species including the Fender's blue butterfly. There are many newly arriving species that are being established. The impacts of nonnative species are often not well understood. Containment, suppression, education and monitoring are all important to addressing the issue.

PRESERVING THE BEST, CONSERVING THE REST

The Oregon Conservation Strategy outlines six key conservation issues: Land use changes, invasive species, disruption and disturbance of regimes (fire and flooding), barriers to fish and wildlife movement, water quality and quantity, and institutional barriers to voluntary conservation. They prioritize the maintenance of natural habitat in order to benefit a wide range of organisms. "Strategy Habitats" have been identified that support large numbers of species and for the Willamette Valley include: oak woodlands, grasslands, wetlands, riparian and aquatic habitats. Historic changes in the valley altered these rare native habitats as they have been converted to farmlands and other land uses. Plants and wildlife are being monitored and managed due to dramatic habitat alterations.

Several agencies use the Oregon Conservation Strategy to drive local efforts to preserve the best and conserve the rest. Removing dams and changing culverts is one such focus. The Benton Fish Passage and Improvement Program were started in 2001 by the Benton Soil and Water Conservation District through received funding from an Oregon Watershed Enhancement Board grant. They implemented the Benton Fish Passage Inventory Program. Partners include Benton SWCD, Benton County Public Works and GIS Departments and local watershed councils, including the Marys River, Alsea, and Luckiamute. Their goal is to compile information on all fish passage barriers and fish habitat in Benton County into one GIS database in order to identify, prioritize and plan fish passage and stream restoration projects. The fish passage program obtains information from cities, county, state, federal agencies, and private landowners. This program is designed to benefit the survival of threatened and endangered fish species of Steelhead Trout, Coho and Chinook salmon, as well as, cutthroat trout that are found in the different watersheds of Benton County.

In 2005 the program and its partners adopted the policy to assess whole 6th Field subwatersheds. The benefits of this have been clear as it gives us a clearer picture of the whole system. This season their focus is the Beaver Creek subwatershed in the Marys River Watershed. They will be concentrating on Starr Creek, Duffy Creek, and Henderson (Bryant) Creek. They predict that there will be several structures added to their database with the possibility of there being opportunities for opening up more high quality habitat. A full list of partners and information on volunteer opportunities can be found at the Benton Soil and Water Conservation District website at http://www.bentonswcd.org/

Restoration projects have also included those on Blakesley and Woods Creek, two large tributaries of Marys River, which were impassable to anadromous species seeking spawning and rearing habitat upstream. Chinook, steelhead, and cutthroat trout, for example, can now can pass over 17 miles of previously blocked habitat for spawning and rearing. An irrigation dam built in the 1930s on Beaver Creek, a large tributary of Marys River, limited fish passage to over 22 miles of valuable

salmonid and resident trout habitat during low seasonal flows. Further upstream, undersized culverts blocked fish passage year round. Now anadromous and resident species have access to high quality habitat throughout the year. A local project at Newton Creek after finding cutthroat trout there, involved a recent dam removal.

Cardwell Hills is an important upland and riparian corridor connecting the Willamette Valley to the foothills of the Coast Range due to unusual terrestrial and aquatic communities that converge there. It is a high-priority sub-basin in the watershed for restoration of cutthroat trout, and also high priority for conservation and restoration of habitat for western pond turtles; sharptail snakes; Fender's blue butterflies and their host plant, Kinkaid's lupine; upland meadows; and oak woodlands and oak savannah. Much of this area was recently identified by U.S. Fish and Wildlife Service (USFWS) as critical habitat for seven federally-listed species of flora and fauna including Taylor's checkerspot butterflies, a species thought to be extinct in this region but newly rediscovered. Benton County highly values the area because of two important parks nearby, and it is considered high priority under the county's proposed Habitat Conservation Plan. Oregon Trout's Streambank restoration program recently joined the partnership in the Cardwell Hills area along Marys River and Reed Creek.

The United States Fish and Wildlife Service under their North American Wetlands Conservation Act program and Landowner Incentive Program is working with Greenbelt Land Trust and the McKenzie River Trust, OWEB and other partners to restore high quality wetland, wet prairie and bottomland forest in the Upper Willamette Valley. This program successfully links properties in the Muddy Creek floodplain. Partner Programs are the fastest growing conservation and restoration programs in the Willamette Valley probably due to the high percentage of land that is privately owned.

Table 17: Sensitive species that potentially occur or formerly occurred in the Marys River Watershed (Oregon Natural Heritage Program).

Status abbreviations:
LE = Fed. Listed Endangered, **PE** = Fed. Proposed Endangered, **LT** = Fed. Listed Threatened, **PT** = Fed. Proposed Threatened, **C** = Fed. Candidate Species, **SoC** = Fed. Species of Concern, **SC** = State Sensitive Critical, **SV** = State Sensitive Vulnerable, **SP** = State Sensitive Peripheral, **SU** = State Sensitive, Undetermined status. Those species with no listed status are proposed by Oregon Natural Heritage Program or the Nature Conservancy as species that merit attention.
* Corvallis Chapter of the Native Plant Society of Oregon, Species of Concern

Common name	Scientific name	Fed. status	State status
REPTILES			
Northwestern pond turtle	*Clemmys marmorata marmorata*	SoC	SC
painted turtle	*Chrysemys picta*	-	SC
sharptail snake	*Contia tenuis*	-	SV
AMPHIBIANS			
Oregon spotted frog	*Rana pretiosa*	C	SC
southern seep salamander	*Rhyacotriton variegatus*	SoC	SV
tailed frog	*Ascaphus truei*	SoC	SV
Northern red-legged frog	*Rana aurora aurora*	SoC	SV/SU
Clouded salamander	*Aneides ferreus*	-	SV
BIRDS			
peregrine falcon	*Falco peregrinus*	LE	LE
bald eagle	*Haleaeatus leucophalus*	LT	LT
northern spotted owl	*Strix occidentalis caurina*	LT	LT
marbled murrelet	*Brachyramphus marmoratus*	LT	LT
Aleutian Canada goose (wintering)	*Branta canadensis leucopareia*	LT	LE
northern goshawk	*Accipiter gentilis*	SoC	SC
little willow flycatcher	*Empidonax traillii brewsteri*	SoC	SV
northern pygmy owl	*Glaucidium gnoma*	-	SC
burrowing owl	*Athene cunicularia*	-	SC
western meadowlark	*Sturnella neglecta*	-	SC
Oregon vesper sparrow	*Pooecetes gramineus affinis*	-	SC
purple martin	*Progne subis*	-	SC
common nighthawk	*Chordeiles minor*	-	SC
streaked horned lark	*Eremophila alpestris strigata*	-	SC
yellow-breasted chat	*Icteria virens*	-	SC
Lewis' Woodpecker	*Melanerpes lewis*	-	SC
pileated Woodpecker	*Dryocopus pileatus*	-	SV
western bluebird	*Sialia mexicana*	-	SV
white-tailed kite	*Elanus leucurus*	-	-
dusky Canada goose (wintering)	*Branta canadensis occidentalis*	-	-
acorn woodpecker	*Melanerpes formicivorus*	-	-
MAMMALS			
gray wolf	*Canis lupus*	LE	LE
Canada lynx	*Lynx canadensis*	C	-
white-footed vole	*Arborimus albipes*	SoC	SU
Pacific western big-eared bat	*Corynorhinus townsendii*	SoC	SC
fringed myotis	*Myotis thysanodes*	-	SV
American marten	*Martes americana*	-	SV
long-eared myotis	*Myotis evotis*	-	SU
silver-haired bat	*Lasionycteris noctivagans*	-	SU
Western gray squirrel	*Sciurus griseus*	-	SU

Table 17 (continued)			
Common name	**Scientific name**	**Fed status**	**State status**
INSECTS			
Fender's blue butterfly	*Icaricia icarioides fenderi*	PE	-
Fender's rhyacophilan caddisfly	*Rhyacophila fenderi*	SoC	-
Haddock's rhyacophilan caddisfly	*Rhyacophila haddocki*	SoC	-
Roth's blind ground beetle	*Pterostichus rothi*	SoC	-
Vertree's ceraclean caddisfly	*Ceraclea vertreesi*	SoC	-
Siskiyou chloealtis grasshopper	*Chloealtis aspasma*	SoC	-
montane bog dragonfly	*Tanypteryx hageni*	-	-
Mary's Peak ice cricket	*Grylloblatta spp.*	-	-
American acetropis grass bug	*Acetropis americana*	-	-
stink bug	*Dendrocoris arizonensis*	-	-
foliaceous lace bug	*Derephysia foliacea*	-	-
Heidemann's nabid (bug)	*Hoplistoscelis heidemanni*	-	-
Martin's water-measurer	*Hydrometra martini*	-	-
marsh ground beetle	*Acupalpus punctulatus*	-	-
potentilla root borer beetle	*Chrysobothris potentillae*	-	-
Corvallis diving beetle	*Hydroporus corvallis*	-	-
Taylor's checkerspot butterfly	*Euphydryas editha taylori*	-	-
Mulsant's small water strider	*Mesovelia mulsanti*	-	-
true fir pinalitus (bug)	*Pinalitus solivagus*	-	-
Douglas-fir platylygus (bug)	*Platylygus pseudotsugae*	-	-
Alsea ochrotrichian micro caddisfly	*Ochrotrichia alsea*	-	-
Willamette callippe fritillary butterfly	*Speyeria callippe spp.*	-	-
valley silverspot butterfly	*Speyeria zerene bremneri*	-	-
VASCULAR PLANTS			
Kincaid's lupine	*Lupinus sulphureus*	LE	LE
dotted water-flax seed	*Spirodela punctata*	LT	LT
Willamette daisy	*Erigeron decumbens*	PE	LE
three-colored monkeyflower	*Mimulus tricolor*	PT	LT
peacock larkspur	*Delphinium pavonaceum*	SoC	LE
Willamette Valley larkspur	*Delphinium oreganum*	SoC	LE
white-topped aster	*Aster curtus*	SoC	LT
tall bugbane	*Cimicifuga elata*	SoC	C
shaggy horkelia	*Horkelia congesta*	SoC	C
loose-flowered bluegrass	*Poa laxiflora*	SoC	C
Nelson's sidalcea	*Sidalcea nelsoniana*	-	C
whorled marsh-pennywort	*Hydrocotyle verticillata*	-	-
dwarf isopyrum	*Isopyrum stipitatum*	-	-
thin-leaved peavine	*Lathyrus holochlorus*	-	-
small-flowered lipocarpha	*Lipocarpha micrantha*	-	-
Bradshaw's lomatium	*Lomatium bradshawii*	-	-
Howell's montia	*Montia howellii*	-	-
meadow sidalcea	*Sidalcea campestris*	-	-
humped bladderwort	*Utricularia gibba*	-	-
narrow-leaved milkweed	*Asclepias fascicularis**	-	-
dotted water-meal	*Wolffia borealis*	-	-
showy milkweeed	*Asclepias speciosa**	-	-

Table 17 (continued)			
Common name	**Scientific name**	**Fed status**	**State status**
VASCULAR PLANTS			
Wahoo	*Euonymus occidentalis*	-	-
indian rhubarb	*Peltiphyllum peltatum*	-	-
Timwort	*Cicendia quadrangularis*	-	-
Mountain lady-slipper	*Cypripedium montanum*	-	-
adder's tongue	*Ophioglossum pusillum*	-	-
upland yellow violet	*Viola nuttalli praemorsa*	-	-
Columbia water-meal	*Wolffia columbiana*	-	-

LE = Listed Endangered PE = Proposed Endangered C = Candidate Species
LT = Listed Threatened PT = Proposed Threatened SoC = Species of Concern
Additional State Sensitive Rankings: SC = sensitive critical, S V = sensitive vulnerable, SP = sensiteve peripheral, SU = sensitive, undetermined status.
*Corvallis Chapter Native Plant Society of Oregon, Species of Concern

Table 16: Stream conditions on BLM managed lands in the Marys River Watershed (assessed using ODFW stream survey protocols).						
Sub-basin	Dominant substrate	Complex pools (%)	LWD (key pieces per mile)	Pool area (%)	Total reach area (m^2)	Total length (m)
Beaver Creek	Gravel/ Cobble	1	27 pieces	10.2	7,847	2.9
Oliver Creek	Gravel/ Cobble	2	39 pieces	12.4	16,523	4.3
Reese Creek	Silt, Sand, Organics	0	11 pieces	0.5	2,626	1.2
Greasy Creek	Gravel/ Cobble	0	13 pieces	13.3	1,728	1.1

Benton Foothills Watershed Analysis, BLM 1997

Table 12: Fish species in the Marys River Watershed with some level of sensitive status (Source: Oregon Natural Heritage Program).			
Common Name	**Scientific Name**	**Fed. status**	**Notes:**
winter steelhead	*O. mykiss*	LT	Introduced, but native status uncertain; see discussion below.
spring chinook	*O. tshawytscha*	LT	Juveniles observed in basin. Not thought to have supported spawning runs, but see discussion below.
coho salmon	*Oncorhynchus kisutch*	C	Introduced but no longer thought to occur in the basin; not thought to have been native, but see discussion below.
Oregon chub	*Oregonichthys crameri*	LE	Occurs in Grays Creek in the Finley National Wildlife Refuge.
Pacific lamprey	*Lampetra tridentata*	SoC	Found in Muddy Creek (BLM 1997) and in Oak Creek (C. Bond, pers. comm.)

SoC=Species of Concern, C=Candidate Species , LT=Listed Threatened LE=Listed Endangered

Fish Diversity and Sensitive Species

The Marys River Watershed is home to as many as 20 native and 14 introduced fish species (Table 11).

Table 11: Fish species known to have occurred in the Marys River and its tributaries.			
Native species:		Introduced species:	
Common name	**Scientific name**	**Common name**	**Scientific name**
cutthroat trout *	*Oncorhynchus clarki*	Coho salmon *	*Oncorhynchus kisutch*
Chinook salmon	*O. tshawytscha*	Steelhead * [1]	*O. mykiss*
Pacific lamprey	*Lampetra tridentata*	Brown trout *	*Salmo trutta*
brook lamprey	*L. richardsoni*	Brown bullhead	*Ameiurus nebullosus*
mountain whitefish *	*Prosopium williamsoni*	Mosquitofish	*Gambusia affinis*
redside shiner *	*Richardsonius balteatus*	Common Carp	*Cyprinus carpio*
Northern squawfish *	*Ptychocheilus oregonensis*	Yellow perch	*Perca flavescens*
leopard dace *	*Rhinichthys falcatus*	Smallmouth bass *	*Micropterus dolomieu*
speckled dace *	*R. osculus*	Largemouth bass	*M. salmoides*
largescale sucker *	*Catostomus macrocheilus*	White crappie	*Pomoxis annularis*
mountain sucker *	*C. platyrhynchus*	Black crappie	*P. nigromaculatus*
Oregon chub	*Oregonichthys crameri*	Warmouth sunfish *	*Lepomis gulosus*
sandroller *	*Percopsis transmontana*	Bluegill sunfish *	*L. macrochirus*
threespine stickleback *	*Gasterosteus aculeatus*	Pumpkinseed	*L. gibbosus*
chiselmouth *	*Acrocheilus alutaceus*		
peamouth *	*Mylocheilus caurinus*		
reticulate sculpin *	*Cottus perplexus*		
torrent sculpin *	*C. rhotheus*		
Paiute sculpin *	*C. beldingi*		
prickly sculpin	*C. asper*		

Sources:
Altman et al. 1997. Review of numerous reports.
* Personal communication, C. Hill, Fish Collection Museum, Oregon State University. Presence in Marys River Watershed established from collected specimens.
[1] Native status of steelhead is uncertain.

For more information about the Marys River Watershed:

Marys River Watershed Preliminary Assessment April 1999
http://www.blm.gov/or/districts/salem/plans/files/watershed_analyses/sdo_mrwpa/sdo_mrwpa.pdf

Marys River Watershed Phase I Water Quality Monitoring September 2002
http://www.mrwc.net/projects/images/waterqual_ph1.pdf

Marys River Watershed Phase II Water Quality Monitoring July 2005 Marys River Watershed Council

Restoring Rare and Native Habitats in the Willamette Valley http://www.ser.org/sernw/pdf/DefOWild_willamette_hab_restore_manual.pdf
ordered from website http://www.dfw.state.or.us/ **OR**
Biodiversity Partnership website at http://www.biodiversitypartners.org

The Oregon Conservation Strategy http://www.dfw.state.or.us/conservationstrategy/contents.asp

The Oregon Plan for Salmon and Watersheds http://www.oregon-plan.org

Soil Survey of Benton County Area, Oregon Benton Soil and Water Conservation District

Demographics http://www.censusscope.org/us/

Watershed Inventory

Watershed Inventories are worksheets that can be used to track student knowledge. They can be used before, during and after program participation to see how well students learned about their watershed. They are useful for in-class assignments and for generating ideas for student independent research.

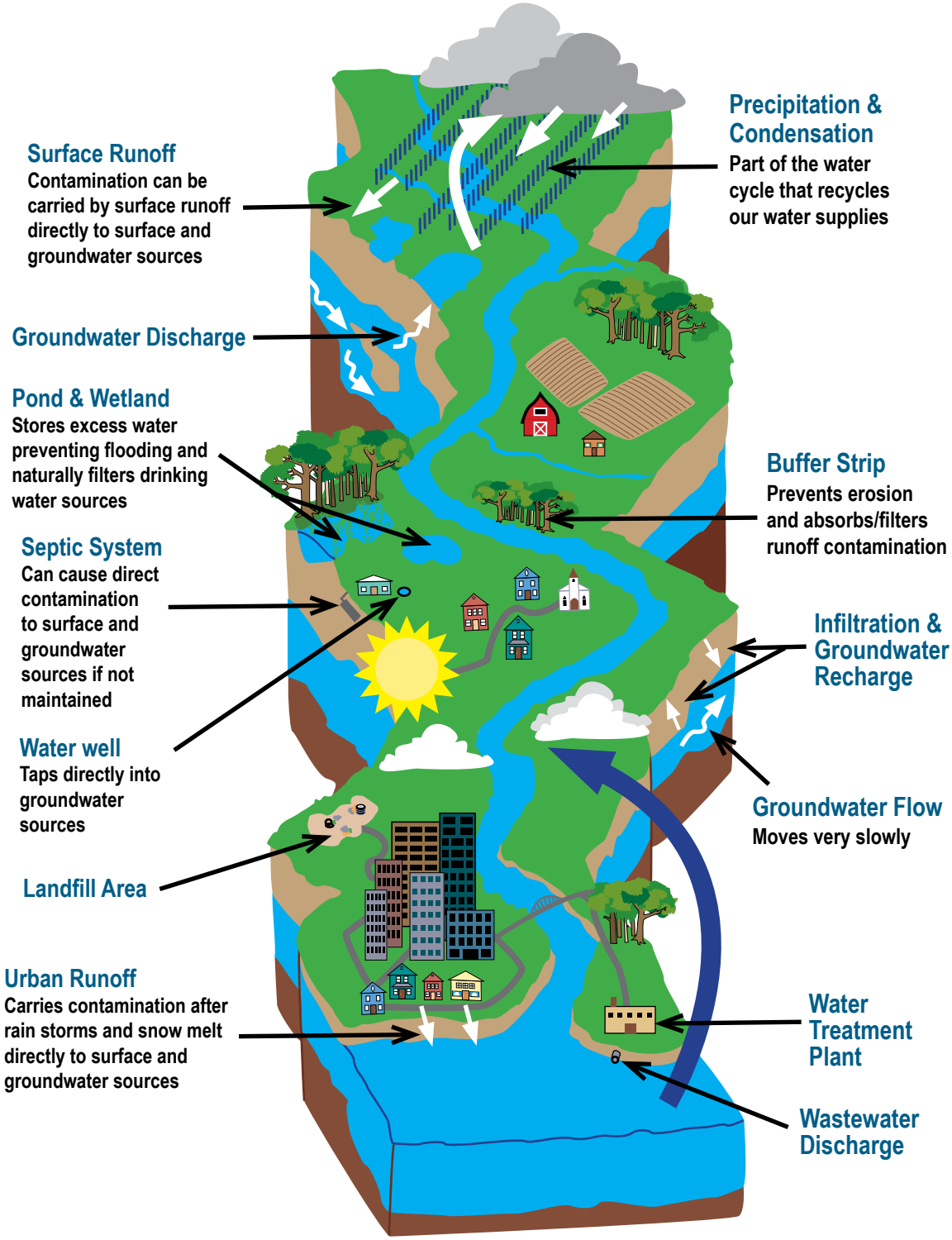
Inventories can include:

1. Basic watershed information (name, length, width)
2. Climate
3. Geology/Topography
4. Water Resources
5. Soils
6. Vegetation
7. Fish
8. Wildlife
9. History
10. Demographics
11. Land & Water Uses
12. Water Quality/Quantity Concerns
13. Areas Prone to Flooding or Drying Up

Check out *HWI*'s website (www.healthywaters.org) to find a Watershed Inventory for your region. If an inventory does not yet exist for your watershed, use the template on the following pages or *The Streamkeeper's Field Guide* "Field Procedure: Watershed Inventory" on pg.32 (student data pages 38-41). Inventories should be created with an answer key!

Please share new inventories with *HWI* so that we can make them available to others through our website.

Marys River Watershed Inventory



A watershed is the entire area, from ridgetop to ridgetop, which drains into a river or stream.

Do you know that YOU live in a watershed??

By exploring and researching to find the answers to the following questions, you will discover many exciting secrets about YOUR watershed!

MARYS RIVER WATERSHED INVENTORY

Name_____ Date_____

Basin name_____ Subbasin name_____

Watershed name_____ USGS quad(s)_____

Begins in_____ Flows through_____

Ends in_____ (towns, counties, states, regions, etc.)

Drains into_____(body of water)

Square miles_____ Approx. length_____ Width_____

CLIMATE

Average yearly precipitation_____

Most of the precipitation is in the form of_____

Most precipitation occurs in the month(s)_____

Which areas of the subbasin receive the most precipitation? _____

_____

Which areas receive the least amount of precipitation? _____

_____

Droughts most commonly occur in month(s)_____ Floods?_____

Coldest month of year:_____ Warmest month:_____ Yearly temp range:_____

GEOLOGY / TOPOGRAPHY

Describe briefly the geology that has shaped your watershed: _____

_____

_____

_____

Describe the physical characteristics of the different reaches:

	Upper	Middle	Lower
Uplands (mountains, hills, flat)	_____	_____	_____
Valley (broad, medium, narrow)	_____	_____	_____
Gradient (steep, medium, gentle)	_____	_____	_____
Channel (straight, meandering)	_____	_____	_____
Bottom (boulder, cobble, gravel, Fines)	_____	_____	_____

Predominate rock types: igneous____ sedimentary____ metamorphic____

Specific rock types that are present _____

Name the four highest peaks in the subbasin _____

_____

_____

Highest elevation point_____ Lowest point_____
(include elev and location)

Geologic activity: check the ones that happen in the Marys River Watershed.
earthquakes____ volcanic eruptions____ landslides____

WATER RESOURCES

Where do the headwaters originate for Marys River watershed (spring, glaciers, snowmelt, etc.)?

_____

Length of your closest stream_____

Names of tributaries_____

Names of lakes or reservoirs_____

Areas underlain by aquifers (if any)_____

SOILS

Predominate soil types_____

Areas with soil suitable for farming_____

Areas with soil unsuitable for development_____

Areas with potential soil erosion problems_____

VEGETATION

List the native and introduced plant species that dominate the different plant communities of your watershed:

	Native	Introduced/Non-Native
Upland Forest	_____	_____
Riparian	_____	_____
Grassland	_____	_____

Describe how historic vegetation patterns differed from current vegetation throughout the subbasin.

_____

_____

_____

Reasons for loss of native plant vegetation_____

Endangered or threatened plant species _____

_____

FISH

Native Species_____

_____

Non-native species_____

_____

Locations of fish hatcheries and species produced _____

_____

Types and locations of barriers to fish migration _____

_____

WILDLIFE

Native species _____

_____

Non-native species _____

_____

Key wildlife habitat areas _____

_____

HISTORICAL

The earliest human inhabitants were_____

_____

Describe briefly the settlement of your watershed:_____

_____

_____

_____

_____

DEMOGRAPHICS

Current watershed population _____ Projected population by 2040?_____

Watershed population 45 years ago_____ 100?_____

Areas where most of the people live_____

List towns, cities, and counties_____

_____

Name jobs that depend on the river or river use:_____

_____

What makes people want to live (or not) in your watershed? _____

_____

LAND & WATER USES

Estimate the % of your watershed zoned for each land use

Rural_____%
Urban/suburban residential_____%
Agricultural_____%
Forestry_____%
Parks/open space_____%

Public land_____% Private land_____%

Sources of domestic water supply for watershed residents _____

Areas that rely on septic tanks_____

Location of sewage treatment plants (if any) servicing watershed residents _____

_____

Altered hydrology (dams, diversions, detention systems, culverts, dikes, drained wetlands, etc.)

_____

WATER QUALITY CONCERNS

List pollutants of concern and their potential sources (include locations if possible)

Pollutant	Point Source	Nonpoint source

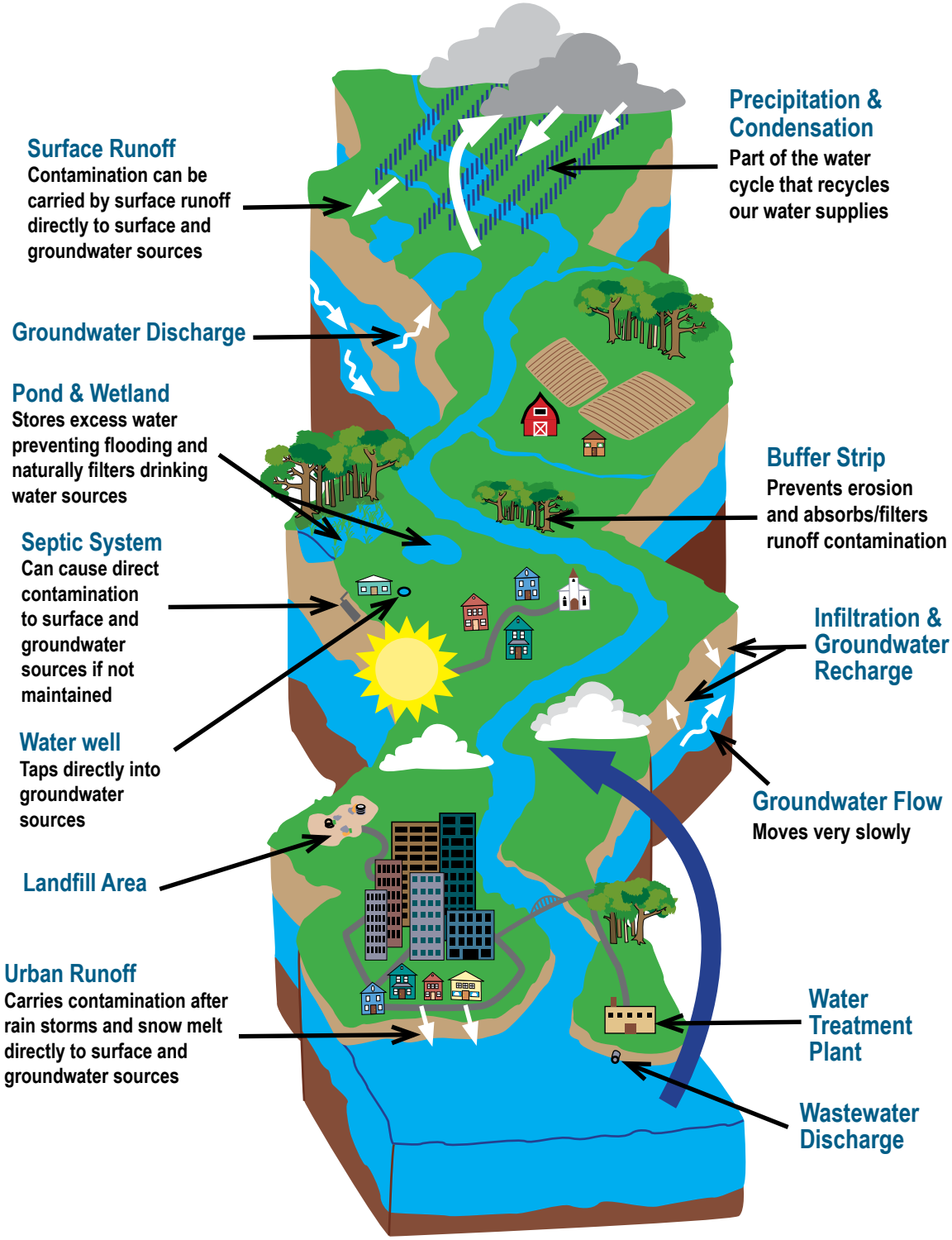
Areas prone to flooding/drying up?

_____

_____

_____

Marys River Watershed Inventory
Teacher's Edition



A watershed is the entire area, from ridgetop to ridgetop, which drains into a river or stream.

Do you know that YOU live in a watershed??

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MARYS RIVER WATERSHED INVENTORY

Name **Kim Carson, Regional Education Coordinator** Date **February 13, 2008**

Basin name **Willamette River Watershed** Subbasin name **Marys River Watershed**

Watershed name **Marys River Watershed** USGS quad(s) **Benton County**

Begins in **Coast range** Flows through **Upland forests, valley floor**

Ends in **Corvallis, Benton County** (towns, counties, states, regions, etc.)

Drains into **the Willamette River** (body of water)

Square miles **310** Approx. length **311** Width **30 feet Av**

CLIMATE

Average yearly precipitation **67 inches**

Most of the precipitation is in the form of **precipitation**

Most precipitation occurs in the month(s) **December and January**

Which areas of the subbasin receive the most precipitation? **Upland forests (rain shadow effect)**

Which areas receive the least amount of precipitation? **Valley floor**

Droughts most commonly occur in month(s) **July and August** Floods? **Dec. or Jan.**

Coldest month of year: **Jan.** Warmest month: **Aug.** Yearly temp range: **Low of 44.8 High of 79.5**

GEOLOGY / TOPOGRAPHY

Describe briefly the geology that has shaped your watershed: **The Juan de Fuca plate is being sub-ducted underneath the lighter North American plate, forming the Coast range through seafloor uplifting of old ocean floor, the Cascade Range through volcanic eruptions. The Missoula Floods filled the valley with 300 feet of silt loam.**

Describe the physical characteristics of the different reaches:

	Upper	Middle	Lower
Uplands (mountains, hills, flat)	**Steeply sloped**	**Sloped**	**Level**
Valley (broad, medium, narrow)	**Steeply sloped**	**Almost level**	**Level**
Gradient (steep, medium, gentle)	**Steep**	**Medium to gentle**	**Gentle**
Channel (straight, meandering)	**Meandering**	**Meandering**	**Straight**
Bottom (boulder, cobble, gravel, Fines)	**Cobble**	**Cobble**	**Fines**

Predominate rock types: igneous__X__ sedimentary__X__ metamorphic____

Specific rock types that are present __**Sandstone, basalt**__

Name the four highest peaks in the subbasin __**Marys Peak at 4,097 feet, Alesea Summit at 1,203 feet, Flat Mountain 2,600 feet, Green Peak at 2,697 feet, Grass Mountain at 3,562 feet, Prairie Peak at 3,412 feet**__

Highest elevation point__**4,097 feet, Marys Peak**__ Lowest point__**190 feet, Flood Plain**__
(include elev and location)

Geologic activity: check the ones that happen in the Marys River Watershed.
earthquakes____ volcanic eruptions__X__ landslides__X__

WATER RESOURCES

Where do the headwaters originate for Marys River watershed (spring, glaciers, snowmelt, etc.)?
__**Precipitation, springs**__

Length of your closest stream__**Muddy Creek**__

Names of tributaries__**Small creeks that flow into the Marys River are: Norton Creek, the Tum Tum River, Blakesley Creek, Oak Creek, Squaw Creek, Wren Creek, Gellatly Creek, LaBare Creek, Read Creeks, Shotputch Creek, Bark Creek, Lasky Creek, Mulkey Creek, Newton Creek, Woods Creek, and Greasy Creek. Some of the tributaries of Muddy Creek are: Evergreen Creek, Bull Run Creek, Beaver Creek, Reese Creek, Oliver Creek, Gray Creek, and Hammer Creek.**__

Names of lakes or log ponds__**Clemens log pond, Corvallis reservoir, Crystal Lake, Hobin log pond, Knight reservoir, Larson log pond, Peak log pond, Watkins pond**__

Areas underlain by aquifers (if any)__**Valley floor**__

SOILS

Predominate soil types__**Willamette silt and gravel (Abiqua, Amity, Apt, Bashaw, Bellpine, Briedwell, Camus, Chehalis, Cloquato, Coburg, Concord, Consor, Dayton, Dixonville, Hazellair, Honeygrove, Jory, Malabon, Marty, McAlpin, McBee, Nehalem, Newberg, Peavine, Philomath, Pilchuck, Price, Price-Ritner, Ritner-Price, Salem, Slickrock, Veneta, Waldo, Waldo, Wapato, Willamett, Winchuck, Witham, Woodburn)**__

Areas with soil suitable for farming__**Valley floor not in flood plain**__

Areas with soil unsuitable for development__**Depends on wants but consider flooding, erosion on steep slopes, agriculture and rare habitats**__

Areas with potential soil erosion problems__**Steep slopes, stream sides, flood plains, where agriculture, forestry, development and road disturbance and other human impacts have occured**__

VEGETATION

List the native and introduced plant species that dominate the different plant communities of your watershed:

	Native	Introduced/Non-Native
Upland Forest	**Doug-fir, hemlock, alder, understory vine maple, sword fern, salal, brackenfern**	**Himalayan Blackberry, False Brome, Scotch Broom**
Riparian	**Doug-fir, bigleaf maple, cottonwood, Oregon white oak, ash, vine maple, wild blackberry, vines, shrubs, and grass willow, red-osier dogwood**	**Reed Canary Grass, Japanese Knotweed**
Grassland	**Tufted hairgrass, spike bentgrass, California oatgrass, sedges and rushes, Forbs, showy milkweed, Wllamette daisy**	**Colonial bentgrass, false brome**

Describe how historic vegetation patterns differed from current vegetation throughout the subbasin.
Historic vegetation were mostly grass prairies and oak savannas with scattered conifer forests on the valley floor, and riparian areas with black cottonwood, Oregon ash, alder, bigleaf maple, willow, Douglas-fir, western redcedar and some ponderosa pine. Agriculture and urban development have changed the valley dramatically.

Reasons for loss of native plant vegetation **Invasive species, interruption of flood and fire regimes, agriculture and urban development, alterations of streams**

Endangered or threatened plant species **Kincaids Lupine, Willamette Daisy, others**

FISH

Native Species **Westslope Cutthroat Trout, Pacific Lamphrey, others**

Non-native species **bluegill, largemouth bass, others**

Locations of fish hatcheries and species produced **None**

Types and locations of barriers to fish migration **Many! Benton Soil and Watershed detailed report**

WILDLIFE

Native species _____

_____

Non-native species _____

_____

Key wildlife habitat areas _____

_____

HISTORICAL

The earliest human inhabitants were **ancient Kalapuya Indian people**

Describe briefly the settlement of your watershed: **Displacement of Kalapuya followed by emigration of Euro-American settlers, converting landss that were historically grass prairies, oak savannas, wetlands, and riparian forests to farmlands and to a lesser extent, other land uses. Human population within the watershed increased, with urban centers in Corvallis and Philomath, increasing dramatically.**

DEMOGRAPHICS

Current population of Benton County **about 80,000** Projected population by 2040? **105,000**

Watershed population 45 years ago **about 40,000** 100? **6,500**

Areas where most of the people live **Cities**

List towns, cities, and counties **Corvallis, Philomath, Summit, Burnt Woods, Harris, Wren, Flynn, Conroy, Avery, Dry Creek Dawson, Bellfountain, Barclay, Alpine, Glenbrook, Alpine, Blodgett, Eddyville**

Name jobs that depend on the river or river use: **Fishing, hydroelectric power, industrial water supply, irrigation for farming, livestock watering, private and public domestic water supply, water contact recreation, wildlife and hunting and fishing, fishing management, stream and river conservation, preservation and education**

What makes people want to live (or not) in your watershed? **Mild climate, wildlife and natural green spaces, low population, availability of jobs, family and cultural ties**

LAND & WATER USES

Estimate the % of your watershed zoned for each land use

Rural **92** %
Urban/suburban residential **8** %
Agricultural **56** %
Forestry **25** %

Public land **16** % Private land **84** %

Sources of domestic water supply for watershed residents:

Willamette River a supplemental source of drinking water. Rock Creek Watershed . Sources for the treatment of drinking water for the City of Corvallis have changed over time, beginning with Rock Creek Treatment Facility until 1949, followed by the Taylor Treatment Plant was built. The Taylor Treatment Plant was built to treat water pulled from the Willamette River, augmenting the Rock Creek Watershed supply in the summer months. In 1956 the Rock Creek treatment facility near Philomath was replaced with a treatment plant on Marys Peak. Today, the Taylor Plant is Corvallis' primary supply, treating 3–16 million gallons of water per day, while the Rock Creek Facility is secondary, providing 3–4 million gallons of water per day.

Areas that rely on septic tanks **Any area outside of urbanized areas**

Location of sewage treatment plants (if any) servicing watershed residents **City of Corvallis Public Works, Philomath Public Works**

Altered hydrology (dams, diversions, detention systems, culverts, dikes, drained wetlands, etc.)
Benton Soil and Water Conservation District detailed report.

WATER QUALITY CONCERNS

List pollutants of concern and their potential sources (include locations if possible)

Pollutant	Point Source	Nonpoint source

Areas prone to flooding/drying up?
Any area out of foothills for flooding, especially the Muddy Creek sub-basin. Areas without protective tree canopies for drying up

Programs & Activities

The purpose of HW is to connect students with their local watershed and create a watershed-as-home concept. Utilizing local resources including experts, community partners and existing educational materials, provides the most effective and efficient way of connecting students with their home waters.

It can be overwhelming and especially time consuming to make and maintain connections with local partners who are willing and able to assist in the delivery of watershed education in the classroom. If you have a Regional Education Coordinator, Natural Resource Coordinator or Community Outreach Coordinator in your school or watershed, work with them to help plan your HW schedule. *HWI* has developed some tools to help get you started working with your coordinator or on your own. We strongly request the sharing of program and activity information once you discover what works for you. This information will assist *HWI* in compiling a catalog of information that can be shared between teachers, schools and districts.

We encourage connecting with community partners as often as possible. If local watershed education program providers are scare, there are a plethora of exceptional curriculum guides you can use. All programs and activities should support authentic educational experiences, rooted in relevant, experiential and place-based learning.

The Foxfire Approach to Teaching and Learning (http://www.foxfire.org/teachi.html) can be used to guide whether a program or activity should be included in HW.
The Core Practices of the Foxfire Approach include:

- The work teachers and learners do together is infused from the beginning with learner choice, design, and revision.
- The academic integrity of the work teachers and learners do together is clear.
- The role of the teacher is that of facilitator and collaborator.
- The work is characterized by active learning.
- Peer teaching, small group work, and teamwork are all consistent features of classroom activities.
- There is an audience beyond the teacher for learner work.
- New activities spiral gracefully out of the old, incorporating lessons learned from past experiences, building on skills and understandings that can now be amplified.
- Reflection is an essential activity that takes place at key points throughout the work.
- Connections between the classroom work, the surrounding communities, and the world beyond the community are clear.
- Imagination and creativity are encouraged in the completion of learning activities.
- The work teachers and learners do together includes rigorous, ongoing assessment and evaluation.

PLANNING & TRACKING

The *HWI* Watershed Education Matrix was developed to help in planning and tracking HW programs and activities. The matrix is broken by watershed education category which is further broken down by discipline. The overarching watershed theme inherently provides a multidisciplinary approach to education. Teachers across disciplines can relate student learning to real events, features and functions found in the local watershed. When planning programs and activities, consider working in partnership with teachers from other disciplines (or other grade levels) to offer students repeat opportunities to connect with their watershed from a variety of perspectives.

Each program or activity used to connect students to their home waters should be entered into the matrix. It can be used for individual classrooms or the entire school. Entries are based on the number of hours students spend annually (school year) on a particular program or activity. The number in each box should be equal to:

(# of students) x (# of hours)

For example:

If all 6th grade students from Sunnyside Environmental School participate in a watershed mapping activity with their science teacher:

(3-6th grade classes) x (32 students in each class) x (2 hours on the activity)
3 x 32 x 2
192 hours

For this example, you would enter "192" into the box for "Watershed Mapping" – "Science". If the students were participating in a 1000 Drops mapping activity, you would list "Healthy Waters Institute" as the provider.

Detailed descriptions for each entry should used to track actual program information. Data pages have been included for your use.

A few notes:

- Keep it simple
- Use the matrix to bring partners and teachers together
- Share it with school administration as exhibition of students learning and the valuable contributions of community partners
- Include examples of how programs also satisfy standards and benchmarks
- Keep track of as much information you can about the programs – it will be invaluable to share with others
- Provide feedback to the *HWI* always and often – share completed documents, comments and questions

If you need more support for teaching students about their home watershed, or just want to keep your school informed – consider using the "Watershed Education Partnership Agreement".

USING THIS BINDER

Use this binder to keep track of your regional HW toolkit. We've included sections for each component of the toolkit along with tabs to segregate each program area. There's a worksheet at the front of every program section to keep track of local partners who can help. Add new program and activity pages as you discover them. We've included some examples to help get you started.

Let us know how you're connecting students with their home waters so we can share your ideas and accomplishments! Check in with *HWI* to find new ideas from others in the field.

PROGRAM & ACTIVITY DESCRIPTION

Teacher Name				
Email				
Discipline				
Grade Level				
Name of Activity				
Description				
Where (circle)	In-Class	Schoolyard	Outdoor Field Trip	Indoor Field Trip
Length				
Benchmarks/Standards				
Partners				
Partner Contact Info				
Where to find activity				

PROGRAM & ACTIVITY DESCRIPTION

Teacher Name				
Email				
Discipline				
Grade Level				
Name of Activity				
Description				
Where (circle)	In-Class	Schoolyard	Outdoor Field Trip	Indoor Field Trip
Length				
Benchmarks/Standards				
Partners				
Partner Contact Info				
Where to find activity				

Healthy Waters Institute®

CATALOG FOR INVITATION

Year:

School:

Address:

Contact:

Phone #:

Email:

Provider	Outdoor Ethics						Climate						Geography						Geology						Vegetation						Fish					
	Arts	*English*	*Language Arts*	*Mathematics*	*Science*	*Social Sciences*	*Arts*	*English*	*Language Arts*	*Mathematics*	*Science*	*Social Sciences*	*Arts*	*English*	*Language Arts*	*Mathematics*	*Science*	*Social Sciences*	*Arts*	*English*	*Language Arts*	*Mathematics*	*Science*	*Social Sciences*	*Arts*	*English*	*Language Arts*	*Mathematics*	*Science*	*Social Sciences*	*Arts*	*English*	*Language Arts*	*Mathematics*	*Science*	*Social Sciences*
TOTAL HOURS																																				

Wildlife						History						Demographics						Water						Economy						Ecology						Local Partners						TOTAL HOURS
Arts	*English*	*Language Arts*	*Mathematics*	*Science*	*Social Sciences*	*Arts*	*English*	*Language Arts*	*Mathematics*	*Science*	*Social Sciences*	*Arts*	*English*	*Language Arts*	*Mathematics*	*Science*	*Social Sciences*	*Arts*	*English*	*Language Arts*	*Mathematics*	*Science*	*Social Sciences*	*Arts*	*English*	*Language Arts*	*Mathematics*	*Science*	*Social Sciences*	*Arts*	*English*	*Language Arts*	*Mathematics*	*Science*	*Social Sciences*	*Arts*	*English*	*Language Arts*	*Mathematics*	*Science*	*Social Sciences*	

Watershed Education Partnership

The Healthy Waters Institute (*HWI*) seeks to forge a lifelong, caretaking bond between students and their local watershed, ensuring the health of Oregon's rivers and streams for generations. By uniting education, community, and local stewardship, *HWI* takes an active role in cultivating the next generation of watershed stewards.

Teachers, schools and community organizations throughout Oregon are actively connecting students to their local watersheds and supporting youth as they move from student to steward. Although these efforts are intricately interwoven, they are often disconnected.

HWI requests your help in tracking participation in watershed education programs and activities. Successful tracking will result in:

- Increased communication and collaboration within schools
- Increased connections between schools and community partners
- Dynamic catalog of programs and activities accessible to teachers statewide

HWI will assist schools incorporating watershed education by offering:

- Educational materials
- Teacher grants – up to $500
- Student grants – $200 maximum for high school students
- Travel and substitute teacher reimbursement
- Networking opportunities with diverse community partners
- Student scholarships – four $1500 awards for juniors and seniors
- Publications – healthy waters kids and journal
- Website – resources, opportunity for students to share projects
- Assistance in developing student summits
- Trainings, workshops and consultation

Signing this document demonstrates agreement with the following:

"I support the work of *HWI* and local community partners in working with teachers and schools to satisfy curriculum and graduation requirements through watershed education while equipping our students with essential lifelong learning skills. I recognize the value of incorporating watershed education into my classroom. I will provide *HWI* with necessary information to support their statewide watershed education efforts."

Participating teachers, please sign below:

_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Name of School: _____

Total # of students participating in watershed education: _____

Total # of student hours on watershed education: _____

Signature of School Administration, Title:	Date:
_____	_____
_____	_____

Geography

PRACTICE READING A TOPOGRAPHICAL MAP

- Use The Stream Scene "Tour of a topo" (pg.71) with a State of Oregon Map
- Trace the watershed boundaries

CREATE YOUR OWN WATERSHED MAP

- Use The Stream Keeper's Field Guide "Creating your own Watershed Map" (pg.24)
- Compare to a real map of your watershed

ADDITIONAL ACTIVITIES

- Use regional maps of your watershed to identify the headwaters, mouth, bodies of water, ridgelines, communities, industry, highest elevation, lowest elevation, mountains, buttes, rivers, lakes and streams
- Create vocabulary lists for topographical maps
- Create writing prompts for your students
- Make 3-D Models (The Stream Scene #19 pg.41 & "What a relief" pg.91)
- Have your students create crossword puzzles and word searches
- Find your Ecological Address (The Stream Scene "A sense of place: your ecological address" pg.53)

LOCAL CONTACT

Name				
Organization/Affiliation				
Address				
Phone				
Email				
Type of Activity/Program				
Description				
Where (circle)	In-class	Schoolyard	Outdoor Field Trip	Indoor Field Trip

LOCAL CONTACT

Name				
Organization/Affiliation				
Address				
Phone				
Email				
Type of Activity/Program				
Description				
Where (circle)	In-class	Schoolyard	Outdoor Field Trip	Indoor Field Trip

LOCAL CONTACT

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Organization/Affiliation				
Address				
Phone				
Email				
Type of Activity/Program				
Description				
Where (circle)	In-class	Schoolyard	Outdoor Field Trip	Indoor Field Trip

History

- Read "The Bath" in "Easy Street" (Project WET pg.382). Brainstorm with students how they think their watershed has changed throughout history.
- Create writing prompts for your students - first person account of what it would have been like around the time of "The Bath".
- Recruit members from your local Historical Society to give a presentation to your class with pictures and stories
- WebQuest - use as a research tool for answering critical questions (Hometown Waters pg.WQ1)
- Create a mural of your watershed's historical timeline with drawings for major dates or events
- "Nature Rules" – (Project WET pg.263)
- "Old Water" – (Project WET p.171)

LOCAL CONTACT

Name				
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Email				
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Where (circle)	In-class	Schoolyard	Outdoor Field Trip	Indoor Field Trip

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Where (circle)	In-class	Schoolyard	Outdoor Field Trip	Indoor Field Trip

Water

WATER CYCLE

- Review the water cycle with your students
- Use "The Incredible Journey" (Project WET pg.161)
- Review graphs and graphing techniques

WATERSHED MODEL

- Create a simple watershed model (The Stream Scene #19 pg.41 or http://www.portlandonline.com/shared/cfm/image.cfm?id=31560)
- Find out how water moves through a watershed

STREAMFLOW

- Use "Snow way!" (The Stream Scene pg.97)
- Share your regional data (precipitation vs. streamflow) with *HWI*
- Have your students create a graph of data and compare with regions throughout Oregon

ADDITIONAL ACTIVITIES

- "Hold that raindrop" (The Stream Scene pg.117)
- Get your students to track water use at home with a "Water Tally Sheet" (http://www.nationalgeographic.com/geographyaction/rivers/ax/PDF1_WaterTally.pdf) or "Home Water Audit" (http://www.portlandonline.com/shared/cfm/image.cfm?id=31562)
- "Get the Ground Water Picture" (Project WET pg.136)
- "Water Meter" (Project WET pg.271)
- "Just Passing Through" (Project WET pg.166)

PERSONAL WATER USE

- "Water Tally Sheet" or "Home Water Audit" – what did your students discover about their water use at home? Discuss. Have students graph their results.
- Neighborhood inventory – what do your students see in their neighborhood: Wildlife, pollution, water, drains, vegetation, cars? Have them record their observations and discuss in class.
- "Common Water" (Project WET pg. 232)
- Have students write in journals about how what they can do to conserve water.
- "Every Drop Counts" (Project WET pg.307)
- "A Grave Mistake" (Project WET pg.311)

LOCAL CONTACT

Name				
Organization/Affiliation				
Address				
Phone				
Email				
Type of Activity/Program				
Description				
Where (circle)	In-class	Schoolyard	Outdoor Field Trip	Indoor Field Trip

LOCAL CONTACT

Name				
Organization/Affiliation				
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Type of Activity/Program				
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Where (circle)	In-class	Schoolyard	Outdoor Field Trip	Indoor Field Trip

LOCAL CONTACT

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Type of Activity/Program				
Description				
Where (circle)	In-class	Schoolyard	Outdoor Field Trip	Indoor Field Trip

Ecology

- Brainstorm with your students: what types of plants, animals and bugs live in your watershed?
- Are they different from other regions?
- Make some guesses and have your students research to find out

ONE DAY OUTSIDE

- Spend a day outside with your students
- Touch, smell and have your students use journals for recording observations and drawing pictures.
- Practice sensory observation (Project WET, "Stream Sense" p.195)

ADDITIONAL ACTIVITIES

- WebQuests – find and create on-line activities for identifying trees, plants, and animals. Have students discover answers for themselves and discuss in class.
- Powerpoint Presentation – create or have students create presentations about regional wildlife and plant life.
- Invertebrate Collection - Dig holes in spots around your watershed (schoolyard, home yard, forest, near creek). Plant cups in the holes to collect bugs. Identify your specimens! (Check out: http://caplter.asu.edu/explorers/protocol/arthropods/arthro.htm

LOCAL CONTACT

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LOCAL CONTACT

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Type of Activity/Program				
Description				
Where (circle)	In-class	Schoolyard	Outdoor Field Trip	Indoor Field Trip

Local Partners

IDENTIFYING AND BECOMING FAMILIAR WITH LOCAL PARTNERS

- "What's Happening?" (Project WET pg.425)
- "Humpty Dumpty" (Project WET pg.316)
- Invite community members to your class to give presentations about local restoration projects
- Have your students find out about community organizations and events they can get involved with
- Have your class develop a plan of action for getting involved in the community
- Writing – have students write in journals or for *HWI* publications and local newspapers about how they are contributing to the health of their watershed
- Finish Watershed Inventory
- "Dilemma Derby" (Project WET pg.377)
- Watershed Wheel – kids can create their own watershed - ART http://natsci.edgewood.edu/wingra/watershed/watershed_wheel.htm

LOCAL CONTACT

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Email				
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WebQuest

A WebQuest is an inquiry-oriented lesson format in which most or all of the information that learners work with comes from the web. WebQuests provide specific websites for students to explore in order to find the information they need to answer a question.

WebQuests are one more resource for teachers to use in getting their students involved in answering realistic questions about the health and local issues of their watershed. A WebQuest is also an opportunity for teachers to include technology as they are integrating regional watershed education into their curriculum.

AN EXAMPLE WEBQUEST

Students might explore the impacts of dams on rivers, specifically dams on the river in their basin.

The quest may ask students to address the following questions:

1. Do the benefits of dams outweigh the ecological costs?
2. Or do the ecological costs outweigh the benefits?

Students would be split into groups to examine the issue. Topics for investigation might include fish passage, upstream effects, downstream effects, cultural effects, benefits and reasons for the dam.

Each student is responsible for exploring their assigned topic from a given vantage point. A student might assume the role of a "Fish Biologist" and be responsible for researching their topic from that perspective. WebQuests provide specific websites to explore in order to find information.

Visit *HWI*'s website for more examples of WebQuests. If you create your own WebQuest please let us know!

Service Learning / Extended Application

Since its launch in 2005, *HWI* has witnessed engaged students assuming responsibility for the health of their watersheds through valuable stewardship projects. Projects large and small have a remarkable impact on students, giving them a profound sense of place. Though many of these efforts have revolved around inquiry-based science, it is important to note that the opportunities *HWI* seeks to encourage are by no means bound by explorations in science.

The natural world provides one of the most dynamic contexts for learning and allows students to discover the complex interactions and relationships found in every ecosystem. Recognizing the interconnectedness of these systems opens the door for limitless interpretation and expression of ideas. It is a living, breathing system full of opportunities to be awed, humbled and inspired by. The scope of projects in which students participate should, and currently do, reflect a multi-disciplinary approach in communicating our relationship to the natural world. Some students are inspired to capture the colors and textures of nature through photography and art while others are inspired to conduct research and expand their understanding of what they see.

Service Learning and Extended Applications provide students with the opportunity to become truly engaged in the maintenance and preservation of their local watershed. Students should be supported and encouraged in developing their own ideas for projects based on the information they learn through HW. Project ideas should address local issues related to watershed health.

In Service Learning and Extended Applications, students apply and extend their knowledge in new and complex situations related to their personal and career interests and post high school goals. Students extend prior knowledge through critical thinking, problem solving or inquiry in real world context.

Participation in projects offers students opportunities for:

- Enhanced awareness of their local watershed
- Connections to community organizations and partners
- Public speaking occasions
- Career related learning experience
- Recognition for the merit of their work

Qualifying experiences generally:

- Support the educational goals of the school district
- Contextualize learning
- Connect students to the community
- Promote citizenship
- Prepare students for transitions beyond high school
- Benefit all partners involved, help to meet a community need

Corvallis School District has developed tools to help teachers and students track Service Learning and Extended Learning Projects.

There resources are available on the Corvallis SD Web site:

http://www.csd509j.net/district_information/departments_and_services/extended_learning/service%20learning.html

Projects may satisfy graduation requirements for "Essential Skills" including:

- Speak and present publicly
- Applying mathematics in a variety of settings
- Using technology
- Think critically and analytically (including scientific inquiry, problem solving)

- Demonstrate civic and community engagement
- Demonstrate global literacy
- Demonstrate career related learning, personal management, teamwork, employment foundations, career development

Collections of evidence should document a student's participation in Service Learning and Extended Applications. Collections may include, but are not limited to:

- Documentation of learning through a career related learning experience
- Projects related to school, student organization, or workplace activities
- Community-based projects related to a community problem or need
- Certificate of Initial Mastery (CIM) work samples
- Research or technical reports
- Storyboards
- Artwork
- Video or audio presentations
- PowerPoint displays
- Photo collections
- CD-ROMs with multimedia presentations
- Reflection pieces
- Journals
- Internship logs
- Job shadow notebooks

Projects can range from scientific investigations to creative arts explorations. The following are examples of student projects:

1. A Day in the Life of the Columbia Pacific: several partners in 1999 pulled this project together. It included about 75 high school students from 6 different high schools being taught by local photojournalists. Students all went out on one day and took photos in these categories: 1) arts and communications; 2) business; 3) infrastructure; 4) health, safety and recreation; 5) human resources; and 6) natural resource systems. Best photos were published with help from a grant and the local newspaper in an insert.

2. Marking Our Place: Susan Cross, Bear Creek Regional Education Coordinator for *HWI* in 2005, coordinated this project. It was mostly adults with a few youth participants. It was designed to build community between naturalists and artists and to also grow a body of art and literature about the Klamath-Siskiyou. Susan matched up teams of 3 artists or writers with a naturalist and sent them out to either urban, rural, or wilderness places for a long day. The participants then were required to create some art or writing that came out of the experience.

3. State of the Watershed Reports: These were done by a number of different school groups in the late 1990's. Peter Hayes, former *HWI* director conducted one with his students in the Thornton Creek Watershed in Washington. Students went out to different locations in their watershed to collect the same data sets on the same day. The product is a snapshot of watershed health on one day in several locations. Kids might collect WQ data, EPA Streamwalk style data, and state of litter or vandalism or macroinvertebrate populations. It would be best to collect the same sets of data so kids can compare apples and apples.

TRACKING & EVALUATION

We've included a set of tools to be used for tracking and evaluating student projects. The information obtained from your students can be used to document graduation requirements or held for personal records. We encourage the use of the *HWI* tools in order to provide *HWI* with the opportunity to share the work of your students with their peers. Students throughout the state are engaging in meaningful projects and deserve recognition for the merit of their work.

Healthy Waters Institute®

INDEPENDENT/SERVICE LEARNING PROJECT

Oregon Trout

Please use this document to report independent project activity. This information will be used for tracking and evaluation purposes and may be shared as part of on-going assessment of HWI.

Date _____ Name of person reporting _____

Project Information

School _____

Address _____

_____

Teacher _____

Grade _____

# of Students _____

Total # of Hours with Students _____

Student Names

_____ _____ _____

_____ _____ _____

_____ _____ _____

_____ _____ _____

_____ _____ _____

_____ _____ _____

_____ _____ _____

_____ _____ _____

_____ _____ _____

Partners _____

_____

_____

Project Dates _____

Description _____

_____

_____

_____

_____

_____

List supporting curriculum programs or activities (ie. Salmon Watch, 1000 Drops, etc.)

_____

_____

_____

How useful was the curriculum in planning, implementing and evaluating the project?

☐ Excellent ☐ Very Good ☐ Good ☐ Fair ☐ Poor

Please report on the following if applicable to project:

_____ # stream miles worked on by students (in linear feet)

_____ # native plants planted

_____ # invasive plants removed

_____ # bags of trash collected

List any indicator, threatened or endangered species involved: _____

_____

_____

Please check all of the following skills that apply to this project:

☐ Reading
☐ Writing
☐ Speaking and presenting publicly
☐ Applying mathematics
☐ Using technology
☐ Thinking critically and analytically (scientific inquiry, problem solving)
☐ Demonstrating civic and community engagement
☐ Demonstrating career related learning
☐ Service learning

Did students have an opportunity to earn proficiency credit? (Please circle one) YES NO

Was an education grant awarded for this project? YES NO

If YES,

Was a summary submitted with photos or products? YES NO

Project Outcome _____

_____

_____

_____

_____

Additional Comments _____

_____

_____

_____

_____

_____

_____

Please return completed forms to:

OREGON TROUT
HEALTHY WATERS INSTITUTE
65 SW YAMHILL, SUITE 300
PORTLAND, OREGON 97204

Fax (503) 222-9187

Healthy Waters Institute®

STUDENT SURVEY (PRE-PARTICIPATION)

Oregon Trout

Name _____ Grade _____

School _____ Date _____

Email _____ Program or Project _____

Please circle the number that best describes what you think:

	Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree
1. I enjoy learning about the natural environment.	1	2	3	4	5
2. I am more interested in other things than nature.	1	2	3	4	5
3. I like talking with other people about environmental issues.	1	2	3	4	5
4. I am concerned about environmental problems and issues.	1	2	3	4	5
5. I am not interested in learning more about nature.	1	2	3	4	5
6. I value/appreciate the natural environment.	1	2	3	4	5
7. I would rather spend my time inside than in nature.	1	2	3	4	5
8. I don't care about issues affecting my local environment.	1	2	3	4	5
9. I think humans have the right to modify the natural environment to suit their needs.	1	2	3	4	5
10. I believe humans must live in harmony with nature in order to survive.	1	2	3	4	5
11. I think conserving natural resources is unnecessary.	1	2	3	4	5
12. I believe humans have a responsibility to solve environmental problems.	1	2	3	4	5
13. I believe that I have a personal responsibility to help the environment.	1	2	3	4	5
14. One person can't really do anything to help the environment.	1	2	3	4	5

	Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree
15. I am not interested in volunteering to care for the environment by planting trees, trash clean-ups, etc.	1	2	3	4	5
16. I would like to spend more time learning outside during school.	1	2	3	4	5
17. I conserve water at home.	1	2	3	4	5
18. I write letters to politicians about environmental issues.	1	2	3	4	5
19. I have had an internship/job with a watershed council, as a field scientist (hydrologist, botanist, etc), in stream and river restoration or with another natural resource organization.	1	2	3	4	5

Please use the following space to draw a picture of a healthy watershed or natural environment:

Healthy Waters Institute®

STUDENT SURVEY (POST-PARTICIPATION)

Oregon Trout

Name _____ Grade _____

School _____ Date _____

Email _____ Program or Project _____

Please circle the number that best describes what you think:	Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree
1. I enjoy learning about the natural environment.	1	2	3	4	5
2. I am more interested in other things than nature.	1	2	3	4	5
3. I like talking with other people about environmental issues.	1	2	3	4	5
4. I am concerned about environmental problems and issues.	1	2	3	4	5
5. I am not interested in learning more about nature.	1	2	3	4	5
6. I value/appreciate the natural environment.	1	2	3	4	5
7. I would rather spend my time inside than in nature.	1	2	3	4	5
8. I don't care about issues affecting my local environment.	1	2	3	4	5
9. I think humans have the right to modify the natural environment to suit their needs.	1	2	3	4	5
10. I believe humans must live in harmony with nature in order to survive.	1	2	3	4	5
11. I think conserving natural resources is unnecessary.	1	2	3	4	5
12. I believe humans have a responsibility to solve environmental problems.	1	2	3	4	5
13. I believe that I have a personal responsibility to help the environment.	1	2	3	4	5
14. One person can't really do anything to help the environment.	1	2	3	4	5
15. I am not interested in volunteering to care for the environment by planting trees, trash clean-ups, etc.	1	2	3	4	5
16. I would like to spend more time learning outside during school.	1	2	3	4	5

	Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree
17. I will conserve water at home.	1	2	3	4	5
18. I will write letters to politicians about environmental issues.	1	2	3	4	5
19. I would like to find an internship/job with a watershed council, as a field scientist (hydrologist, botanist, etc), in stream and river restoration or with another natural resource organization.	1	2	3	4	5

Is there anything you will do differently because of this program? _____

_____

_____

_____

Do you think this experience will impact your choices for college or career? How? _____

_____

_____

_____

Why are healthy watersheds or natural environments important? _____

_____

_____

_____

What is the one thing from this experience you will remember? _____

_____

_____

_____

Please use the following space to draw a picture of a healthy watershed or natural environment:

PRE-PROJECT TEACHER WORKSHEET: SERVICE-LEARNING

Project Title: _____

Teacher: _____ Ph. #_____ Planned Start Date: _____

School: _____ Planned End Date: _____

Course Area/Title: _____

This worksheet is designed to help you develop a project for your class that links community service to the course curriculum, fulfilling the Extended Student Learning Through Service-Learning component of the graduation requirements. Please review the Developing Ideas for Service-Learning and Post-Project Report sheets for additional ideas and guidelines.

Community Benefit/Benefactors (What will the service be? Who will be served?):

Curriculum Connection (How will the project be linked to in-class curriculum?):

*The process of Service-Learning includes four essential stages. Please check the **PARC/D** elements that will be included in your project:*

Preparation

- ☐ Student-generated project ideas
- ☐ Student planning (time schedules, budgeting, materials, tools, etc)
- ☐ Research
- ☐ Brainstorming possible partners/resources

Action

- ☐ Contacting partners
- ☐ Surveys
- ☐ Interviews
- ☐ Off-campus service
- ☐ Conducting experiments
- ☐ Collecting data

Reflection

- ☐ Journaling/Reflection
- ☐ Assessing outcome of project

Celebration/Demonstration

- ☐ Presenting the project (oral report, visual display, etc.)
- ☐ Final class discussion or wrap-up session

Your Service-Learning project can and should qualify as meeting the Career-Related Learning Standards (CRLS) and Civic Standards. Reviewing these requirements can also help with brainstorming ideas. Please mark the components that you plan to incorporate into your project.

CRLS

- ☐ *Personal Management (PM)*
  - ☐ CS.PM.01: Identified tasks to be completed and initiated necessary action
  - ☐ CS.PM.02: Planned, organized and completed projects on time and met quality standards
  - ☐ CS.PM.03: Took responsibility for decisions and actions and anticipated the consequences
  - ☐ CS.PM.04: Maintained regular and punctual attendance
  - ☐ CS.PM.05: Maintained appropriate interactions with colleagues

- ☐ *Problem Solving (PS)*
  - ☐ CS.PS.01: Identified problems and located information that would lead to solutions
  - ☐ CS.PS.02: Identified alternatives to assist in problem solving
  - ☐ CS.PS.03: Assessed the consequences of the alternatives
  - ☐ CS.PS.04: Selected and explained a proposed solution and course of action
  - ☐ CS.PS.05: Developed a plan to implement the selected course of action
  - ☐ CS.PS.06: Assessed results and took corrective action

- ☐ *Communication (CM)*
  - ☐ CS.CM.01: Located, processed and conveyed information using traditional and technological tools
  - ☐ CS.CM.02: Listened to and summarized key elements of verbal and non-verbal communication
  - ☐ CS.CM.03: Gave and received feedback in a positive manner
  - ☐ CS.CM.04: Read technical/instructional materials for information and applied to tasks
  - ☐ CS.CM.05: Wrote instructions, technical reports, and business communications clearly and accurately
  - ☐ CS.CM.06: Spoke clearly, accurately, and appropriately when giving oral instructions, technical reports and business communications

- ☐ *Teamwork (TW)*
  - ☐ CS.TW.01: Identified teams and roles within teams; described importance of roles
  - ☐ CS.TW.02: Demonstrated skills that improve team effectiveness (e.g., negotiation, compromise, conflict management, shared decision-making)

- ☐ *Employment Foundations (EF)*
  - ☐ CS.EF.01: Applied academic knowledge and technical skills in a career context
  - ☐ CS.EF.02: Selected, applied and maintained tools and technologies appropriate for the workplace
  - ☐ CS.EF.03: Identified parts of organizations and systems and how they fit together
  - ☐ CS.EF.04: Described how work moves through a system
  - ☐ CS.EF.05: Described the changing nature of work, workplaces and work processes on individuals, organizations and systems
  - ☐ CS.EF.06: Demonstrated appropriate dress, appearance and personal hygiene
  - ☐ CS.EF.07: Explained and followed health and safety practices
  - ☐ CS.EF. 08: Explained and followed regulatory requirements, security procedures and ethical practices

☐ *Career Development (CD)*

- ☐ CS.CD.01: Assessed personal characteristics related to educational and career goals
- ☐ CS.CD.02: Researched and analyzed career and educational information related to project
- ☐ CS.CD.03: Developed and discussed a plan designed to achieve personal, educational and career goals
- ☐ CS.CD.04: Monitored and evaluated educational and career goals
- ☐ CS.CD.05: Demonstrated job-seeking skills (e.g., writing resumes, completing applications and participating in interviews)

CIVIC STANDARDS

- ☐ Understand rights and responsibilities of citizens
- ☐ Understand that limited resources make economic choices necessary
- ☐ Design and implement strategies to analyze issues, explain perspectives and resolve issues
- ☐ Other, please explain _____

There are four methods of conducting Service-Learning. Once your project design is decided, you should be able to categorize it as one or more of the following:

1. **Direct:** Students' service directly affects and involves the recipients (e.g., tutoring, animal care, working w/ elderly).
2. **Indirect:** Activities do not directly impact individuals, but benefit the community as a whole (e.g., restoring wetlands, painting park benches, stocking food pantries, collecting books for kids).
3. **Advocacy:** The intent is to create awareness of or promote action on an issue of public interest (e.g., writing to government leaders, holding a town meeting, performing a play).
4. **Research:** Students find, gather and report information in the public interest (e.g., developing surveys, conduct formal studies, evaluations, experiments or interviews)

Please describe your project and action plan:

POST-PROJECT TEACHER REPORT: SERVICE-LEARNING

Project Title: _____

Teacher: _____ Ph. #_____ Start Date: _____

School: _____ End Date: _____

Course Area/Title: _____

Service Site: ☐ School Site ☐ Other _____

Please provide a brief description of your project:

A) # of students participating _____ students

B) # of student classroom hours per student _____ avg. hrs/student
(Include project selection, planning, reflection and celebration time)

C) # of student non-classroom hours _____ avg. hrs/student
(Include only hours spent as a class)

D) Total # of Project Hours **_____ total hours**
(Line A) x (Line B + Line C) = Line D

E) # of Adult Volunteers _____ adults
(Include Partners, Parents, AmeriCorps Members, etc)

F) # of Adult Volunteer hours _____ avg. hours/adult

COMMUNITY PROJECT PARTNER(S) **PHONE #**

_____ _____

_____ _____

PLEASE LIST COMMUNITY RESOURCES (ESTIMATED $)

Materials _____

Grants _____ Total $_____

Donors _____

Please mark the Career-Related Learning Standards and Civic Standards met by your project.

CRLS

- ☐ *Personal Management (PM)*
  - ☐ CS.PM.01: Identified tasks to be completed and initiated necessary action
  - ☐ CS.PM.02: Planned, organized and completed projects on time and met quality standards
  - ☐ CS.PM.03: Took responsibility for decisions and actions and anticipated the consequences
  - ☐ CS.PM.04: Maintained regular and punctual attendance
  - ☐ CS.PM.05: Maintained appropriate interactions with colleagues
- ☐ *Problem Solving (PS)*
  - ☐ CS.PS.01: Identified problems and located information that would lead to solutions
  - ☐ CS.PS.02: Identified alternatives to assist in problem solving
  - ☐ CS.PS.03: Assessed the consequences of the alternatives
  - ☐ CS.PS.04: Selected and explained a proposed solution and course of action
  - ☐ CS.PS.05: Developed a plan to implement the selected course of action
  - ☐ CS.PS.06: Assessed results and took corrective action
- ☐ *Communication (CM)*
  - ☐ CS.CM.01: Located, processed and conveyed information using traditional and technological tools
  - ☐ CS.CM.02: Listened to and summarized key elements of verbal and non-verbal communication
  - ☐ CS.CM.03: Gave and received feedback in a positive manner
  - ☐ CS.CM.04: Read technical/instructional materials for information and applied to tasks
  - ☐ CS.CM.05: Wrote instructions, technical reports, and business communications clearly and accurately
  - ☐ CS.CM.06: Spoke clearly, accurately, and appropriately when giving oral instructions, technical reports and business communications
- ☐ *Teamwork (TW)*
  - ☐ CS.TW.01: Identified teams and roles within teams; described importance of roles
  - ☐ CS.TW.02: Demonstrated skills that improve team effectiveness (e.g., negotiation, compromise, conflict management, shared decision-making)
- ☐ *Employment Foundations (EF)*
  - ☐ CS.EF.01: Applied academic knowledge and technical skills in a career context
  - ☐ CS.EF.02: Selected, applied and maintained tools and technologies appropriate for the workplace
  - ☐ CS.EF.03: Identified parts of organizations and systems and how they fit together
  - ☐ CS.EF.04: Described how work moves through a system
  - ☐ CS.EF.05: Described the changing nature of work, workplaces and work processes on individuals, organizations and systems
  - ☐ CS.EF.06: Demonstrated appropriate dress, appearance and personal hygiene
  - ☐ CS.EF.07: Explained and followed health and safety practices
  - ☐ CS.EF. 08: Explained and followed regulatory requirements, security procedures and ethical practices

- [ ] *Career Development (CD)*
  - [ ] CS.CD.01: Assessed personal characteristics related to educational and career goals
  - [ ] CS.CD.02: Researched and analyzed career and educational information related to project
  - [ ] CS.CD.03: Developed and discussed a plan designed to achieve personal, educational and career goals
  - [ ] CS.CD.04: Monitored and evaluated educational and career goals
  - [ ] CS.CD.05: Demonstrated job-seeking skills (e.g., writing resumes, completing applications and participating in interviews)

CIVIC STANDARDS

- [ ] Understand rights and responsibilities of citizens
- [ ] Understand that limited resources make economic choices necessary
- [ ] Design and implement strategies to analyze issues, explain perspectives and resolve issues
- [ ] Other, please explain _____

PRE-PROJECT STUDENT WORKSHEET: SERVICE-LEARNING

Name: _____

Project Title: _____

Teacher: _____ Ph. #_____ Planned Start Date: _____

School: _____ Planned End Date: _____

Course Area/Title: _____

This worksheet is designed to help you develop a project with your classmates and instructor that links community service to the course curriculum, fulfilling the Extended Student Learning Through Service-Learning component of the graduation requirements. Please review the Post-Project Report for additional ideas and guidelines.

Community Benefit/Benefactors (What will the service be? Who will be served?):

Curriculum Connection (How will the project be linked to in-class curriculum?):

*The process of Service-Learning includes four essential stages. Please check the **PARC/D** elements that will be included in your project:*

Preparation

- ☐ Student-generated project ideas
- ☐ Student planning (time schedules, budgeting, materials, tools, etc)
- ☐ Research
- ☐ Brainstorming possible partners/resources

Action

- ☐ Contacting partners
- ☐ Surveys
- ☐ Interviews
- ☐ Off-campus service
- ☐ Conducting experiments
- ☐ Collecting data

Reflection

- ☐ Journaling/Reflection
- ☐ Assessing outcome of project

Celebration/Demonstration

- ☐ Presenting the project (oral report, visual display, etc.)
- ☐ Final class discussion or wrap-up session

Your Service-Learning project can and should qualify as meeting the Career-Related Learning Standards (CRLS) and Civic Standards. Reviewing these requirements can also help with brainstorming ideas. Please mark the components that you plan to incorporate into your project.

CRLS

- ☐ *Personal Management (PM)*
  - ☐ CS.PM.01: Identified tasks to be completed and initiated necessary action
  - ☐ CS.PM.02: Planned, organized and completed projects on time and met quality standards
  - ☐ CS.PM.03: Took responsibility for decisions and actions and anticipated the consequences
  - ☐ CS.PM.04: Maintained regular and punctual attendance
  - ☐ CS.PM.05: Maintained appropriate interactions with colleagues

- ☐ *Problem Solving (PS)*
  - ☐ CS.PS.01: Identified problems and located information that would lead to solutions
  - ☐ CS.PS.02: Identified alternatives to assist in problem solving
  - ☐ CS.PS.03: Assessed the consequences of the alternatives
  - ☐ CS.PS.04: Selected and explained a proposed solution and course of action
  - ☐ CS.PS.05: Developed a plan to implement the selected course of action
  - ☐ CS.PS.06: Assessed results and took corrective action

- ☐ *Communication (CM)*
  - ☐ CS.CM.01: Located, processed and conveyed information using traditional and technological tools
  - ☐ CS.CM.02: Listened to and summarized key elements of verbal and non-verbal communication
  - ☐ CS.CM.03: Gave and received feedback in a positive manner
  - ☐ CS.CM.04: Read technical/instructional materials for information and applied to tasks
  - ☐ CS.CM.05: Wrote instructions, technical reports, and business communications clearly and accurately
  - ☐ CS.CM.06: Spoke clearly, accurately, and appropriately when giving oral instructions, technical reports and business communications

- ☐ *Teamwork (TW)*
  - ☐ CS.TW.01: Identified teams and roles within teams; described importance of roles
  - ☐ CS.TW.02: Demonstrated skills that improve team effectiveness (e.g., negotiation, compromise, conflict management, shared decision-making)

- ☐ *Employment Foundations (EF)*
  - ☐ CS.EF.01: Applied academic knowledge and technical skills in a career context
  - ☐ CS.EF.02: Selected, applied and maintained tools and technologies appropriate for the workplace
  - ☐ CS.EF.03: Identified parts of organizations and systems and how they fit together
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  - ☐ CS.EF.07: Explained and followed health and safety practices
  - ☐ CS.EF. 08: Explained and followed regulatory requirements, security procedures and ethical practices

☐ *Career Development (CD)*

- ☐ CS.CD.01: Assessed personal characteristics related to educational and career goals
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- ☐ CS.CD.03: Developed and discussed a plan designed to achieve personal, educational and career goals
- ☐ CS.CD.04: Monitored and evaluated educational and career goals
- ☐ CS.CD.05: Demonstrated job-seeking skills (e.g., writing resumes, completing applications and participating in interviews)

CIVIC STANDARDS

- ☐ Understand rights and responsibilities of citizens
- ☐ Understand that limited resources make economic choices necessary
- ☐ Design and implement strategies to analyze issues, explain perspectives and resolve issues
- ☐ Other, please explain _____

There are four methods of conducting Service-Learning. Once your project design is decided, you should be able to categorize it as one or more of the following:

1. **Direct:** Students' service directly affects and involves the recipients (e.g., tutoring, animal care, working w/ elderly).
2. **Indirect:** Activities do not directly impact individuals, but benefit the community as a whole (e.g., restoring wetlands, painting park benches, stocking food pantries, collecting books for kids).
3. **Advocacy:** The intent is to create awareness of or promote action on an issue of public interest (e.g., writing to government leaders, holding a town meeting, performing a play).
4. **Research:** Students find, gather and report information in the public interest (e.g., developing surveys, conduct formal studies, evaluations, experiments or interviews)

Please describe your project and action plan:

POST-PROJECT STUDENT REPORT: SERVICE-LEARNING

Name: _____

Project Title: _____

Teacher: _____ Ph. #_____ Start Date: _____

School: _____ End Date: _____

Course Area/Title: _____

Service Site: ☐ School Site ☐ Other _____

Please provide a brief description of your project:

A) # of students participating _____ students

B) # of student classroom hours per student _____ avg. hrs/student
(Include project selection, planning, reflection and celebration time)

C) # of student non-classroom hours _____ avg. hrs/student
(Include only hours spent as a class)

D) My Total Project Hours **_____ total hours**
(Line B + Line C) = Line D

E) # of Adult Volunteers _____ adults
(Include Partners, Parents, AmeriCorps Members, etc)

F) # of Adult Volunteer hours _____ avg. hours/adult

Community Project Partner(s)	**Phone #**
_____	_____
_____	_____

Please list community resources (estimated $)

Materials _____

Grants _____ Total $_____

Donors _____

Please mark the Career-Related Learning Standards and Civic Standards met by your project.

CRLS

- [ ] *Personal Management (PM)*
  - [ ] CS.PM.01: Identified tasks to be completed and initiated necessary action
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CIVIC STANDARDS

- [ ] Understand rights and responsibilities of citizens
- [ ] Understand that limited resources make economic choices necessary
- [ ] Design and implement strategies to analyze issues, explain perspectives and resolve issues
- [ ] Other, please explain _____

CAREER-RELATED LEARNING EXPERIENCE
STUDENT REFLECTION

Name: _____

Project Title: _____

Class: _____ Grade: _____

☐ SERVICE-LEARNING Teacher: _____

☐ OTHER_____

RELEVANCE: How did this experience relate to your personal interests?

RIGOR: What skills and knowledge have you acquired from this experience that will help you achieve your post-high school goals?

REFLECTION: What is something new or surprising that you learned or experienced while participating in this project?

STUDENT SERVICE HOURS LOG

Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total
Jun																																
July																																
Aug																																
Sept																																
Oct																																
Nov																																
Dec																																
Jan																																
Feb																																
Mar																																
Apr																																
May																																

http://www.csd509j.net/district_information/departments_and_services/extended_learning/service_learning_resources.html

Community Sharing

When a student shares a project, they convey their inspiration of the natural world and hearten others to seek similar ventures. Opportunities for sharing student projects should be identified from the onset of participation in HW. By recognizing and rewarding youth engaged in civic activities that benefit their home waters, we seek to encourage their continued involvement and spark the interest of new audiences by showcasing student work.

Suggested products of student work include:

- Photos, drawings, wildlife art
- Maps, charts, graphs
- Power Point Presentations
- Essays, poetry, journal entries
- Oral histories
- WQ data, riparian assessments, bird counts
- Public art, murals
- Ephemeral art, music, skits, plays
- Anything a creative group can imagine!

Created products can be shared through:

1. *healthy waters* Journal, *healthy waters kids* and *HWI* website
2. Local newspaper
3. Watershed council events
4. Watershed symposiums or celebrations
5. Public libraries or other public buildings

Projects can also be shared through student summits or symposiums. These events provide opportunities for students to see what other students have created in their community.

Summits can tie into existing events and take place in an auditorium, theatre, or environmental center. Members from the general public including watershed council boards, community members and parents can be invited to attend and share in the work of their students.

Student summits provide opportunities for students to:

1. Interpret their watershed
2. Celebrate their watershed
3. Present projects to the public and their peers
4. Learn from other students
5. Teach the greater community
6. Develop public speaking skills
7. Integrate their learning into the larger community.

We encourage the sharing of student work through *HWI*! Please submit the Service Learning/ Independent Project Tracking Sheet to *HWI* for publication in our journal or through our website.

Appendix

List of Local Partners and Project Opportunities

The following service-learning project resource lists were compiled to assist teachers and students in designing projects. Schools are encouraged to partner with one or more of these organizations for projects in the local watershed to help with technical and material support. A partner may also be able to enhance the learning component of their projects to meet your needs. It's a good idea to alert your local watershed council coordinator of the project you and your students are planning. To find out which watershed your school belongs or if you have any questions, please contact the *Healthy Waters Insititute* and assistance will be provided.

CORVALLIS AREA

Local Watershed Councils

Calapooia WC
Contact: Denise Hoffert-Hey
541-367-6735
calapooia@centurytel.net
Restoration and monitoring projects. Call Denise for information.

Jackson Frasier Watershed Council
Contact: Jerry Davis
541-757-6871; FAX 541-757-6891
jerry.davis@co.benton.or.us
360 SW Avery, Corvallis, OR 97333
Project opportunities at Jackson Frasier Wetlands and other sites possibly further up stream. Monitoring and data collecting projects are available through the council.

Luckiamute WC
Contact: Erin McCabe
503-838-2794
mccabe.e@worldnet.att.net
Newly formed watershed council, but might have restoration and monitoring projects soon. Contact Erin for more information.

Marys River Watershed Council
Contact: Sandra Coveny
541-929-5768
sandrac@peak.org
www.scgis.org
330 N 13th St., Philomath, OR 97370
Many projects such as water quality monitoring and working on fish traps are possible in the Philomath area. Technical support and equipment is available for projects.

North Santiam Watershed Forum
Contact: Craig Luedeman
503-588-5333
3150 Lancaster Drive NE, Suite B, Salem, OR 97305

South Santiam Watershed Council
Contact: Greg Pendle (Council Coordinator, SWCD)
541-367-5564
sswc@centurytel.net
3225 Hwy 20, Sweet Home, OR 97386
Both middle and high schools can participate in water quality monitoring projects. Call for information on monitoring projects and other volunteer opportunities.

Area-Wide Resources

Benton County Soil and Water Conservation District
Contact: Teresa Matteson (Education and Outreach Director)
Heath Keirstead (Education Coordinator)
541-753-7208
office@benton-swcd.org
305 SW C Avenue, Suite 2, Corvallis, OR 97333
Educational support including a Stream stimulation table and curriculum notebook, Making Ripples: Community Building for Water Quality; and Conservation Poster Contest. Other opportunities include annual native tree and shrub sale and conservation mini-grants.

City of Corvallis, Public Works Department
Contact: 541-766-6916; FAX 541-766-6920
P.O. Box 1083, Corvallis, OR 97339
Mark Taratoot (Water Resources Specialist)
mark.taratoot@ci.corvallis.or.us
Diana Sharps (Water Resources Specialist)
diana.sharps@ci.corvallis.or.us
The Storm Drain Marking Program can be done by any age student and by any number of students. All of the needed materials are provided including the paint, stencils, safety vests and cones. The Public Works Department has just begun its outreach program and is in the process of developing other projects. Please call Sue to find out about these opportunities.

Corvallis Environmental Center
Contact: Connie Wiegers
541-753-9211
ecenter@peak.org
www.peak.org/~ecenter
254 SW Madison, P.O. Box 2189, Corvallis, OR 97339
Project opportunities include removing non-native plants, working on the Avery House (new nature center), working in collaboration with the Parks Department, and helping in the office. Call Connie to discuss other opportunities through the Environmental Center.

Corvallis Parks and Recreation
Contact: 541-766-6918
1310 SW Avery Park Drive, Corvallis, OR 97333
Becky Merja (City Forester)
541-754-1723
Steve DeGhetto (Parks Operations Specialist)
541-754-1738
The Corvallis Parks and Recreation Department offers a number of sites to the community as outdoor classrooms and laboratories. Some are urban parks and within walking distance of many schools. Others are open space areas that require transportation, but are within five miles of the city center.

Greenbelt Land Trust
Contact: Karlene McCabe
541-752-9609
P.O. Box 1721, Corvallis, OR 97339
Currently the Greenbelt Land Trust does not have projects underway. However, Karlene is a great resource regarding other possible projects in the area.

Oregon Department of Fish & Wildlife
Contact: Karen Hans
541-757-4186 x 251
Karen is very knowledgeable about the different projects and opportunities in this area. Potential projects include constructing and monitoring fish traps, streamside plantings and clean up projects. Projects are suitable for middle and high school students. The Salmon and Trout Enhancement

Program provides opportunities for youth including hatching and rearing salmon and trout eggs, stream habitat restoration work, surveys, and other educational projects. The Stream Scene: Watersheds, Wildlife and People is a comprehensive watershed-based education curriculum package designed to bring schools and communities to the resource. Fish Eggs to Fry is a classroom guide for teachers to teach students how to raise fish eggs in their classroom.

US Fish and Wildlife Service-Finley Refuge, William L. Finley National Wildlife Refuge
Contact: 26208 Finley Refuge Road, Corvallis, OR 97333
541-757-7236
The refuge consists of oak and maple woodlands, Oregon ash thickets, second growth Douglas-fir, hedgerows, marshes, meandering creeks, open meadows, and cultivated fields. The refuge offers wildlife observation, including migratory birds, and self-guided interpretive trails. Information kiosks and comfort station are available.

Other Resources

Audubon Society
Contact: Kate Matthews
541-754-7364
mathewsk@ava.bcc.orst.edu
P.O. Box 148, Corvallis, OR 97339-0148
They could possibly use some help on a wetland project at Jackson Frasier Wetland. Individuals might also be able to help with office tasks as well. Please call and talk to Kate for more information.

Avery House Nature Center
Contact: Keri Pilgrim
541-758-6198
ahnc@peak.org
1200 SW Avery Park Road, Corvallis, OR 97333
Avery House a part of the Corvallis Environmental Center, provides nature education programs for youths and adults, which fosters knowledge and stewardship for our local ecosystems.

Benton County-OSU Extension-4H Program
Contact: Maggie Livesay (4-H Faculty)
541-766-3550
maggie.livesay@oregonstate.edu
Tammy Skubinna (4-H Youth Development Faculty)
541-766-3555
tammy.skubinna@oregonstate.edu
1849 NW 9th Street, Corvallis, OR 97330
Extension provides research-based information to the general public. Subject areas include Community Horticulture, Small Farms, Forestry, Family and Community and Development and 4-H Youth Development.

Chintimini Wildlife Rehabilitation Center
Contact: Jeffrey S. Picton (Executive Director)
541-745-5324
cwrc@peak.com
P.O. Box 1433, Corvallis, OR 97339
The mission of the Chintimini Wildlife Rehabilitation Center is to provide care for injured and orphaned wildlife, and to foster a connection between people and wildlife through education. Presentations including Birds of Prey, Wildlife Rehabilitation and Owls can be tailored to any kind of group. The length of the presentation depends on the group age.

Oregon Forestry Education Program, College of Forestry
Contact: 541-737-2128 or 800-554-6987
51 Peavy Hall, Oregon State University, Corvallis, OR 97331
The mission of Oregon Forestry Education Program (OFEP) is to provide resources to help teachers increase students' understanding of our environment; stimulate students' critical and creative thinking; develop students' ability to make informed decisions on environmental issues; and instill in students the commitment to take responsible action on behalf of the environment. Multi-day

workshops and summer institutes offer educators an opportunity for in-depth explorations of natural resource topics through experiential field trips, discussions with forest landowners, interaction with researchers and classroom activities.

Rocky Mountain Elk Foundation
Contact: Bill Richardson
541-917-7636
wildlife@peak.org
24550 Ervin Road, Philomath, OR 97370
The local chapter of the Rocky Mountain Elk Foundation serves the greater Benton and Linn County area and offers tours, kits, presentations and hands-on learning about elk, other wildlife and their habitats.

Science Education Partnerships—SEPS
Contact: Kathy Blaustein (Outreach Coordinator)
541-754-7574
blaustek@science.oregonstate.edu
SEPS is a partnership between Oregon State University, Hewlett-Parckard and the Corvallis School District that is committed to using community scientists to help teachers provide a quality science education for all students in classroom settings. SEPS maintains a database of scientists who are eager to give presentations, arrange field trips, mentor individual students, and help teachers with classroom science activities.

Suislaw National Forest
Contact: Kathy Fletcher
4077 SW Research Way
P.O. Box 1148, Corvallis, OR 97339
Materials for grades K-12 and college available for check out include puppets, videos and books on forests, wildlife, insects, mammals and curriculum boxes.

Starker Forests
Contact: Dick Powell (Forester)
541-929-2477
dick@starkerforests.com
P.O. Box 809, Corvallis, OR 97339
Dick provides forestry education upon request. The Starker Forestry Trail near Blodgett can be tailored to teacher/class needs, and is a day-long field trip.

EUGENE AREA

Local Watershed Councils

McKenzie Watershed Council
Contact: Kate Ferschweiler
541-988-9904
kfersch@callatg.com
341 S. E Street, Springfield, OR 97477
The McKenzie Watershed Council can use students to help them with water monitoring along the McKenzie River. Since much of Eugene's drinking water comes from this watershed, Eugene students are encouraged to explore their problems with the council.

Middle Fork Willamette WC
Contact: Juan Welsh
541-937-9800
mfwwc@efn.org
P.O. Box 27, Lowell, OR 97452
Contact Juan for more information on possible restoration or monitoring projects.

Area-Wide Resources

Cascade Family Flyfishers

Contact: Jane Sageser
541-687-5957
msageser@earthlink.net
84499 Boods Road, Eugene, OR 97405
The Cascade Family Flyfishers are involved with the Adopt-A-River program each year. They do clean-ups twice a year and could use volunteers to help them. The flyfishers meetings are open to the public and students are welcome to attend.

East Lane Soil & Water Conservation District
Contact: 541-465-6648
55 D Oakway Center, Eugene, OR 97401
Depending on the time of year, projects such as tree planting and clean-ups may be done.

Eugene Stream Team
Contact: Lorna Baldwin
541-682-4850
1820 Roosevelt Blvd., Eugene, OR 97402
The Eugene Stream Team is the volunteer component of the City of Eugene's Water Management Plan. Students can help with storm drain stenciling and clean-ups. Call for information on these volunteer opportunities and others. Lorna can help classrooms set up individual projects as well.

Eugene Water & Electric Board
Contact: John Femal
541-484-2411
500 East 4th Avenue, P.O. Box 10148, Eugene, OR 97440-2148
Currently Eugene Water & Electric Board (EWEB) does not have projects available for students, but later this year and beginning in the fall there will be project opportunities, such as trail maintenance. Contact John to discuss these opportunities.

Oregon Department of Fish & Wildlife
Contact: STEP Biologist
541-726-3515
odfwspfd@efn.org
3150 East Main Street, Springfield, OR 97478
ODFW needs seasonal help with various projects such as clean-ups and restoration projects. These projects are best suited for high school students. The biologist can help design projects to fit location and resource limitations.

Other Resources

Nearby Nature
Contact: 541-687-9699
P.O. Box 3678, Eugene, OR 97403
Nearby Nature is an environmental education non-profit organization that teaches children the ecological importance of being environmentally conscientious. They use Alton Baker Park as their classroom and always welcome students to help with restoration efforts within the park. It's best to leave an evening phone number where you can be reached because they are out in the field during the work day.

Old McKenzie Fish Hatchery
Contact: Ken Engelman
541-822-3358
RivRef@aol.com
P.O. Box 1117, Leaburg, OR 97489
The Old McKenzie Fish Hatchery was closed in the 1950s and is now being restored. The Hatchery is on 46 acres of privately and publicly owned land. Stream enhancement projects, watershed analysis, and brochures for a self-guided tour of the Hatchery could be developed and produced by students. There are also monthly Hatchery meetings in which students could participate. Project partners include Mckenzie River Watershed Council.

List of Grants

The grant opportunities listed below typically have 2-4 page applications and are not especially competitive. Please use this preliminary list as a reference for future planning if deadlines have passed for this year. All of these opportunities should be renewed for another cycle.

NATIONAL

NEA Foundation for the Improvement of Education Award
Contact: 203-822-7840
Goal: Grants seek to fund participation in high-quality professional development such as summer institutes or action research. Grants also fund lesson study or mentoring experiences to improve teaching, curriculum, or student achievement.
Award: $2000-$5000

National Science Teachers Association NSTA Sylvia Shugrue for Elementary School Teachers
Contact: awards@nsta.org
www.nsta.org/dcat
Goal: For an elementary school teacher who implements an interdisciplinary, inquiry-based lesson plan.
Award: $1000

Office of Education (OED) NOAA Environmental Literacy Grants for Free-Choice Learning
Contact: Sarah Schoedinger
704-370-3528
Sarah.Schoedinger@noaa.gov
www.oesd.noaa.gov/funding_opps.html
Goal: The priority is to create a more environmentally literate citizenry.
Deadline: see website for current deadline

Ecology and Environmental Science Teaching Award NABT and Vernier Software and Technology Foundation Award
Contact: www.nabt.org/sup/education/awards.asp
Goal: Award will be given to a teacher who has demonstrated an innovative approach in the teaching of ecology and environmental science.
Award: $1500

STATEWIDE

Diack Family Oregon Ecology Education Fund
Contact: 503-287-7974
www.diack-ecology.org
Goal: Assists in funding activities in Oregon which take children K-12 into the study of ecology in their fields, forests and waters to see personally what lives there and how it thrives. Funding primarily for long term field ecology studies program development, rather than one-day events. Does not cover substitute teachers or transportation.
Award: up to $1500

Learn & Serve America Youth In Action, Oregon Department of Education
Contact: 503-378-3584 x 369
Goal: This grant is designed specifically to remove barriers for service learning projects directly connected to the school curriculum. Barriers include transportation and plant materials. Projects must be student initiated, planned, and implemented and must provide opportunities to develop leadership and citizenship skills. Grants must be written by students and are reviewed by students. All applications that meet the grant criteria will be funded.
Award: up to $500
Deadline: usually mid-February and mid-March

Meyer Memorial Trust Teacher Initiatives Program
Contact: 503-228-5512
www.mmt.org/~mmt
Goal: Stimulating or facilitating more effective learning.
Award: up to $1500 for individual teachers, $5000 for teams
Deadline: February 1 each year

National Wildlife Federation Wild Seed Fund for Schoolyard Wildlife Habitats
Contact: Beth Stout
503-230-0421
stout@nwf.org
Goal: Creating or enhancing an existing schoolyard habitat
Award: one-time $150 plus $25 Fred Meyer gift certificate

The Oregon Parks Foundation
Contact: 503-297-6043
Goal: Land protection, community outdoor recreation and education programs, administrative expenses, publications, conferences and seminars, emergency funding, recognition and student internship in the context of providing for natural park settings and outdoor recreation and educational opportunities.
Award: $1500–5000

SOLV (Stop Oregon Litter & Vandalism) SOLV CUP projects
Contact: 1-800-322-3326
503-844-9571
Goal: Cleanups, prevention (recycling, signage), restoration (for those in need of social services), plantings, development (trail repair, brush removal)
Award: up to $250 plus free SOLV materials, does not cover transportation