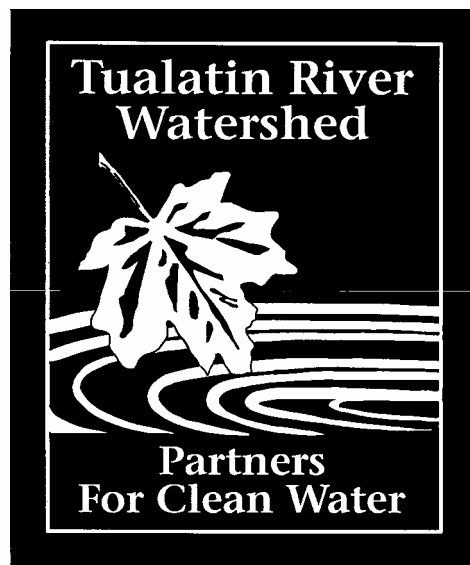


**TUALATIN RIVER WATERSHED
ACTION PLAN**



**Prepared by
The Tualatin River Watershed Council**

February 3, 1999

Abstract

The following document is the Tualatin River Watershed Action Plan. The Action Plan contains the Watershed Council's goals, objectives, and priority action items for the Tualatin River Watershed. The action items will be implemented as resources allow. Plan implementation will involve various Council partner organizations, public and private groups, and citizens. A separate Technical Supplement provides additional technical background to support the Action Plan.

Acknowledgement

The completion of the Tualatin River Watershed Action Plan and the companion Technical Supplement was accomplished through the combined efforts of citizens, students, private and non-profit organizations, and local and state agencies. Production of these documents was made possible with assistance from the Unified Sewerage Agency.

Technical advice for the Action Plan was provided by a Technical Assistance Committee, composed of local and regional experts, and members of the Council's Action Plan Subcommittee.

The Geographical Information System maps were compiled by Ecotrust (formerly Interrain Pacific).

For more information about the Action Plan and Technical Supplement or to obtain copies, please contact:

Tualatin River Watershed Council
PO Box 338
Hillsboro, OR 97123-0338
(503) 846-4810



This document was printed on recycled paper.

Tualatin River Watershed Action Plan

1.0 Introduction	7
1.1 Purpose	
1.2 Background	
1.3 Development of the Action Plan	
1.4 Public Input	
2.0 Role of the Watershed Council	17
3.0 Goals and Objectives for the Tualatin River Watershed	19
3.1 Water	
3.2 Soil	
3.3 Plants and Animals (Biota)	
3.4 Air Quality	
3.5 Human Component	
4.0 Priority Action Items to Meet Council Goals and Objectives	25
5.0 Monitoring and Evaluation	53
Appendix A: Tualatin River Watershed Council Charter and Vision Statement	
Appendix B: Action Items and Associated Tasks	
Appendix C: Prioritization of Action Item Tasks	
Appendix D: Technical Supplement Summary	
Appendix E: List of Contributors	

Abbreviations and Acronyms

BLM	Bureau of Land Management
BMP	Best Management Practice
BOR	Bureau of Reclamation
CRP	Conservation Reserve Program
cfs	cubic feet per second
DEQ	Department of Environmental Quality
EPA	Environmental Protection Agency
FTE	Full Time Employee
GIS	Geographic Information System
GPS	Geographic Positioning System
GWEB	Governor's Watershed Enhancement Board
IPM	Integrated Pest Management
IWRM	Integrated Water Resource Management
Metro	Metropolitan Service District
N	Nitrogen
NMFS	National Marine Fisheries Service
NRCS	Natural Resources Conservation Service
OAR	Oregon Administrative Rules
ODA	Oregon Department of Agriculture
ODF	Oregon Department of Forestry
ODFW	Oregon Department of Fish and Wildlife
ODSL	Oregon Division of State Lands
OGI	Oregon Graduate Institute
OSU	Oregon State University
ODOT	Oregon Department of Transportation
ORS	Oregon Statute
OWRD	Oregon Water Resources Department
P	Phosphorus
PSU	Portland State University
RARE	Resource Assistance for Rural Environments
SB1010	Senate Bill 1010 (Agricultural Water Quality Management Area Plan)
STEP	Salmon Trout Enhancement Program
SWCD	Soil and Water Conservation District
SWRP	Student Watershed Research Project
TAC	Technical Assistance Committee
TMDL	Total Maximum Daily Load
TVID	Tualatin Valley Irrigation District
UGB	Urban Growth Boundary
USA	Unified Sewerage Agency
USGS	United States Geological Survey
USFW	United States Fish and Wildlife Service
WRP	Wetland Reserve Program

1.0 Introduction

1.1 Purpose

This document is the Action Plan of the Tualatin River Watershed Council (Council). The Tualatin River Watershed Council is a voluntary, non-regulatory group that unites diverse interests to improve watershed health. The Action Plan is based on the Council's goals and vision (Appendix A) and the Action Plan takes a watershed-wide approach and strives to integrate existing plans and efforts. This Plan is a working document that will be updated and reevaluated, as information becomes available.

The Council works closely with many local, state, and federal agencies and organizations. Implementation of the Action Items described in this Action Plan would not be possible without the commitment, collaboration, and technical expertise of these groups. A separate technical report supplements the Action Plan, providing additional technical background information used in developing the Action Plan.

The Tualatin River Watershed Council depends entirely on voluntary efforts. The Council is not a regulatory or enforcement agency, nor does the Council adopt plans or rules in a legal sense. Instead, the Council makes recommendations to decision-makers, landowners, and managers on ways to protect and enhance Tualatin River watershed resources. Implementation of the recommendations in the Action Plan also will be a completely voluntary effort. The Council provides a framework for communication, collaboration, and cooperation among its member organizations and others.

Some of the Council's work will involve onsite assessments of stream or riparian conditions. These assessment visits will be done only after giving notification to and receiving consent from the landowner. The Watershed Council is developing a form and procedure for assuring that consent is obtained before entry.

The Tualatin River Watershed Action Plan is a resource guide to better understand the nature of the Tualatin River and its drainage basin. This Plan describes specific ways to participate in protecting significant habitats and restoring degraded areas through public, private, and volunteer efforts.

Document Organization

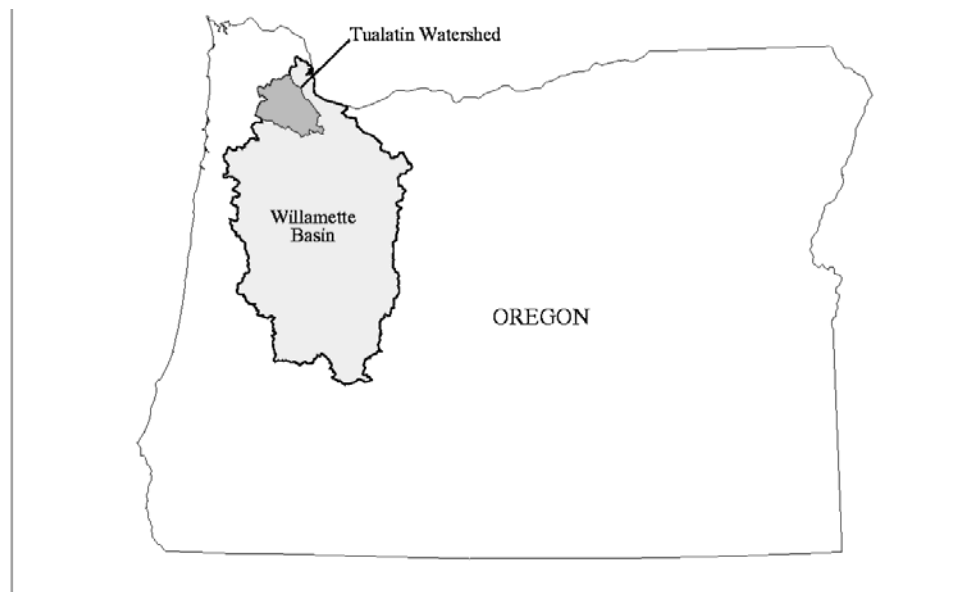
Section 1 describes the motivation and impetus for the Action Plan, gives background information about the Tualatin River Watershed, and describes the process for developing the Action Items. A description of the Watershed Council and its formation are found in Section 2. Section 3 discusses the Tualatin River Watershed goals, existing conditions, and trends. The priority Action Items are described in detail in Section 4. Monitoring of Action Items and evaluating success are discussed in Section 5. Appendix A contains the Tualatin River Watershed Council Charter and Vision Statement. Appendix B lists the priority Action Items with tasks necessary to accomplish each Item. Appendix C describes the Prioritization of Action

Item Tasks. Appendix D provides a brief summary of the Technical Supplement. A list of contributors is found in Appendix E.

1.2 Background

Set within a growing and thriving metropolitan area and a large temperate rain forest, the Tualatin River Watershed (**Figures 1-1 and 1-2**) is at the center of a dynamically changing region of the country. Its lowlands, historically and still prevalently agricultural, are giving way to increased residential and industrial development. As the population and economic base of the region has grown, stresses on the Tualatin River Watershed have increased. In order to foster a biologically healthy and functional resource, while still supporting the economy of the region, active stewardship of the watershed is essential.

Figure 1-1. The Tualatin River Watershed



Listed below are some basic characteristics of a healthy watershed ecosystem:

- Biologically diverse, providing abundant and sustainable beneficial plant and animal populations.
- Resilient enough to heal itself after catastrophic events, both natural and human-made, without large investment of outside resources.
- Minimizes input or output of undesirable products such as air pollutants, water pollutants, and solid waste.
- Maximizes the sustainable production of desirable commodities such as food, fiber, and manufactured goods.
- Efficiently uses scarce inputs, such as energy and water.
- Fulfills human values, including housing, economic, social, aesthetic, spiritual, recreational, health, and safety.

Watershed health is achieved through the active stewardship of the water, soil, plant, animal, air, and human resources in the watershed. The desired condition of these resources is described in Section 3 (Goals) of this document. Specific tasks to help achieve these goals are provided in Section 4 (Priority Action Items). Ignoring the health of the watershed will result in long-term degradation of the environment, local economy, public health and safety, and quality of life for which this region is known.

Figure 1-2. Tualatin Watershed Base Map

1.3 Development of the Action Plan

Development of this Action Plan began in December 1996 following adoption of the Council's strategic plan. The Council's strategic plan is organized around four main functional areas:

- Enhance the watershed
- Provide a forum for watershed issues
- Provide education about watershed improvement
- Develop the Council organization

The Council identified the development of an Action Plan as a key objective under the Watershed Enhancement Goal.

Goal: Watershed Enhancement

To provide a foundation for implementing coordinated resource enhancement and restoration projects by integrating watershed information and plans.

Objective 1. Develop a Tualatin River Watershed Action Plan

Objective 2. Implement partnered watershed improvement projects

To aid in development of the Action Plan, the Council assembled a group of technical advisors and recruited graduate students from Oregon Graduate Institute and Portland State University to assist with data collection and analysis.

The Technical Assistance Committee (TAC) met monthly from the winter of 1996 through fall of 1997 to help define desired conditions, evaluate existing conditions, develop goals, identify problem areas, and recommend actions for Council consideration. The TAC consists of nineteen professionals with expertise in the following areas: water quality, hydrology, geology, ecology, biology, fisheries, soils, forestry, agriculture, wetlands, watershed planning, engineering, and restoration.

The Watershed Council identified the following five priority areas to be addressed in the Action Plan:

- Water Quality
- Water Quantity
- Fish and Wildlife Habitat
- Research and Monitoring
- Education and Stewardship

Based on the Council's vision statement and the above priority areas, the TAC recommended a number of broad action items and tasks for the Council's review in fall of 1997. The TAC deemed these tasks to be most important for achieving the Council's vision and goals. The Council appointed a subcommittee to review these action items and tasks and to develop a process for prioritization.

The subcommittee developed a procedure to prioritize the TAC recommended tasks. The procedure consisted of applying specific criteria developed from the Council's vision, goals and strategic plan. These criteria included:

- Alignment with the Council's strategic plan
- Mixture of both short-term and long-term action items
- Logical sequence and linkage between tasks and existing information
- Effect on natural resources
- Maximizing benefits
- Likelihood of funding
- Ability to implement

The subcommittee also reviewed and assessed linkages among the different action items and tasks. For example, it is important to understand how an action in the watershed's upland areas will affect the system lower in the watershed. Therefore, the number of linkages to other tasks is important and was used to help prioritize tasks.

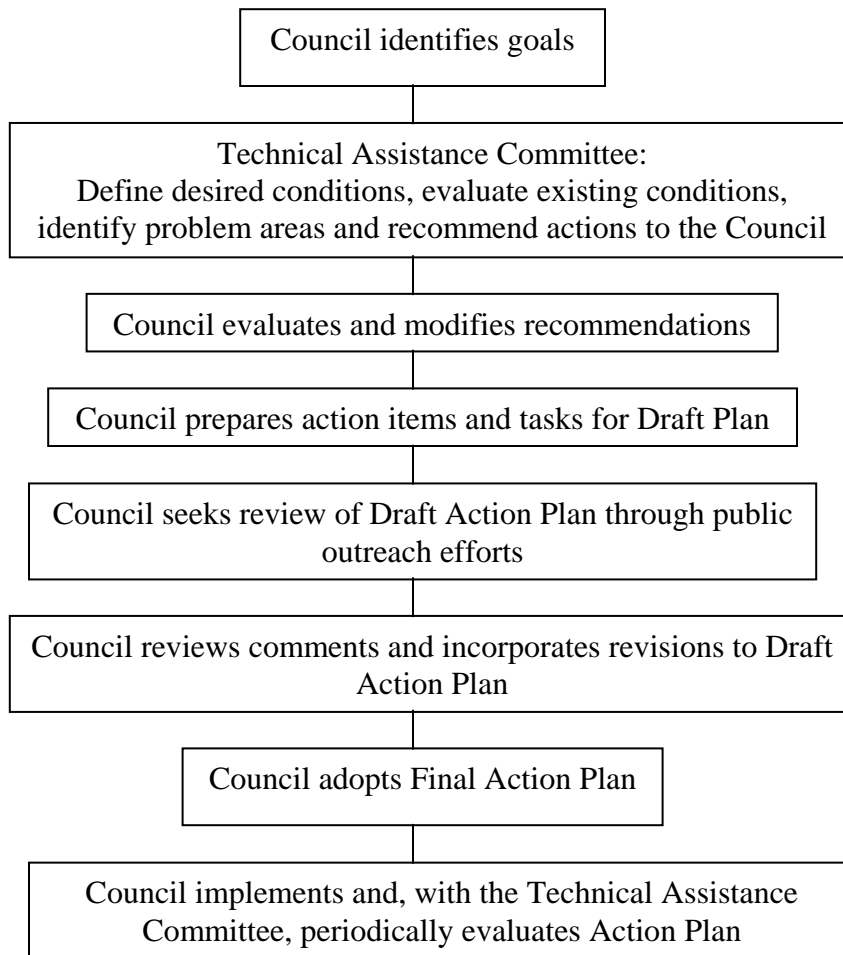
From the above criteria, the subcommittee developed a prioritization matrix using a weighted average ranking methodology. Tasks first were rated by the number of direct linkages to other tasks. Next, tasks were rated according to their likelihood of implementation and funding and the expected effect on a specific ecosystem component. A matrix was developed to show the relationship between the likelihood of implementation and/or funding, defined as low, moderate, or high, and the effect of the task on the ecosystem component (i.e. Water Quality, Water Quantity, Fish, etc.). This effect is defined as 1) no or negative effect; 2) low or minimal effect; 3) moderate effect; or 4) high or significant positive effect. Based on this prioritization process, an overall rating for each task was calculated and the subcommittee was able to make specific recommendations to the Council. See Appendix B for the ranked list of Action Items Tasks.

The Council reviewed the subcommittee's recommendations. Additions and revisions to recommendations were made by the Council and incorporated into the draft Action Plan.

1.4 Public Input

Development of this Action Plan involved a series of meetings and work sessions as shown in **Figure 1-3**. The flowchart also identifies future activities by the Council and others.

Figure 1-3. Action Plan Development Flowchart



2.0 Role of the Watershed Council

The Tualatin River Watershed Council, formed in 1996, is an advisory body to established, decision-making entities and communities of interest. The purpose of the Council is to bring residents, local governments, and organizations together to take a pro-active approach to addressing watershed management issues in the Tualatin Basin. The mission of the Council, as contained in its charter, is “to foster better stewardship of the Tualatin River Watershed resources, deal with issues in advance of resource degradation, and ensure sustainable watershed health, functions, and uses.” The Council’s charter can be found in Appendix A of this document. The Council provides a framework for coordination and cooperation and uses consensus as its decision-making process.

The Council has no regulatory authority. The 20-member council (**Figure 2-1**) represents key interests and stakeholders in the watershed, thereby attempting to ensure a comprehensive view of watershed issues. Council members also regularly communicate with other groups and individuals, forming an even broader network of watershed stakeholders.

Figure 2-1. Tualatin River Watershed Council Members

Agriculture Community

Washington County Soil and Water
Conservation District
Tualatin Valley Irrigation District
Farm Bureau
Nursery Industry

Business/Industry Community

Sunset Corridor Association
Home Builders/Development

Chambers of Commerce

Hillsboro Chamber of Commerce

Education Community

Pacific University

Environmental Community

Friends of Rock, Bronson, Willow Creeks

Forestry Community

Forestry Products
Small Woodlands Association

Citizens

Citizen and Neighborhood Participation
Organizations
Citizen-at-large (2)

Local Government

Cities (City of Hillsboro)
Counties (Washington County)

Urban Community

Water Districts (Tualatin Valley Water
District)
Sewer Districts (Unified Sewerage Agency)
Parks/Recreation (Tualatin Hills Park and
Recreation District)

Commercial/Recreational Fisheries

Trout Unlimited

3.0 Goals and Objectives for the Tualatin River Watershed

This section describes the Council's goals for the following watershed components: water, soil, plants and animals (biota), human, and air quality. These goals are broad statements describing how the Council would like conditions or activities to be in the future. The goals provide direction for the development of priority actions and tasks. The Council's proposed actions are contained in Section 4. A discussion of existing conditions and trends is included here to help clarify the intent of the goals as well as to provide an overview of existing conditions. The Technical Supplement provides further detailed technical information that was used to determine these goals.

3.1 Water

Goals for water are:

- WQ-1 Reducing contaminants in water to protect aquatic life and human health
- WQ-2 Meeting standards for designated beneficial uses for a given water body
- WQ-3 Quantifying and timing stream flows to support ecological and human uses
- WQ-4 Stabilizing channels (within natural range) with in-stream structure
- WQ-5 Maintaining high quality and stable groundwater levels

3.1.1 Summary of Existing Conditions and Trends (See Technical Supplement for complete analysis)

Existing conditions: Water quality and quantity in the Tualatin Watershed have been the subject of intense scrutiny for well over ten years since total maximum daily loads (TMDLs) were developed for the watershed's streams and other waterbodies.

Water quantity: Hagg Lake and Barney Reservoir were constructed to provide irrigation for cropland, supply municipal water, provide flood protection, and improve water quality. Significant quantities of drinking water also are imported from Bull Run Reservoir, which serves as Portland's water supply. Barney Reservoir is currently being expanded to augment drinking water supplies. The City of Tigard is considering the Willamette River as a potential drinking water source. The Tualatin Basin is far from self-sufficient, with respect to providing for all recognized uses of water.

Flooding has become a major concern, but only after two very intense rainy seasons following eight years of below normal rainfall. Lack of water was a major concern during those dry years, and may become an issue of concern again due to the Endangered Species Act.

Water quantity trends: The water supply in the Tualatin is currently the subject of an Integrated Water Resources Management (IWRM) study. Once the study results become available, recommendations for future actions should be forthcoming. Important issues include

flooding, long-term stability of sources, conservation, production practices in the high technology industry, and irrigation of urban systems.

Water quality: With the introduction of intensive phosphorus removal at Unified Sewerage Agency's wastewater treatment plants and summer dilution with low-phosphorus water from Hagg Lake and Barney Reservoirs, phosphorus concentrations in the mainstem of the river itself have dropped dramatically during summer months. However, concentrations regularly exceed Total Maximum Daily Loads (TMDLs) and are high enough to sustain significant algae growth through mid and late summer. In addition, with the exception of Scoggins Creek, the Upper Tualatin River, and Gales Creek, most tributaries are well above phosphorus concentrations that support significant algae growth in the lower river. Most of the phosphorus in streams during summer appears to be derived from groundwater due to natural weathering processes, rather than summer sediment delivery.

In the mainstem of the Tualatin River, dissolved oxygen, pH, temperature, and suspended sediments are not in compliance with state standards. Sediment, in particular, causes problems both while in the water column and after settling onto the stream bottom. In most tributaries, sediment, temperature, bacteria, and dissolved oxygen are significant problems. Low flows, lack of riparian vegetation, erosion, and surface water runoff are contributing factors. Many tributaries and segments of the Tualatin River have been designated as water quality limited by the Oregon Department of Environmental Quality for temperature, bacteria, dissolved oxygen, and sediment.

Water quality trends: Most, if not all, readily identifiable point sources of phosphorus have been eliminated or controlled in agricultural and urban areas (none of significance exist in forested areas). The remaining problems are related to non point sources, primarily in urban and agricultural areas.

Data collected by the Unified Sewerage Agency (USA) shows that water quality in the tributaries is slowly improving, but will require a greater investment due to the cumulative impacts of growth and development.

Urban: The Unified Sewerage Agency and cities are actively working to protect and improve water quality in the urban area. The first phosphorus detergent ban on the West Coast was initiated in the Tualatin Basin. Since 1990, new development has been required to construct onsite stormwater treatment facilities. Approximately 30 - 40 new stormwater management facilities are built each year. In 1997, approximately 1480 out of 1575 acres of new development were served by onsite facilities. USA has developed Design and Construction Standards that address erosion control in urban areas. This construction standard requires erosion control permits from USA or a city for most land development activities. However, more daily enforcement and education and is needed. Balanced cut and fill is required for all development in floodplains. USA also has invested \$350 million to upgrade wastewater treatment facilities. Finally, the Tualatin Basin Public Awareness Committee has undertaken extensive public outreach efforts to educate landowners about individual practices that can protect water quality.

Remaining challenges include reducing the use of fertilizers, herbicides, and other lawn chemicals, particularly along streams and storm drains. These chemicals harm fish and upset the ecological balance of streams and contribute to eutrophication problems in lakes and reservoirs.

Agriculture: More ground cover, especially winter cover crops, has improved soil stability and helped control erosion. In some cases this has led to more herbicide (glyphosate mainly) use. However, buffer and riparian zone management practices have not yet been applied widely. The USDA Natural Resources Conservation Services Conservation Reserve Program provides funding to encourage farmers to plant riparian areas into perennial vegetation. The Tualatin River Sub-basin Agricultural Water Quality Management Area Plan (1996), an outgrowth of Oregon Senate Bill 1010, requires farmers to protect the quality of water that leaves their fields. More education, incentives, and funding are needed for widespread successful implementation of this plan.

Channel habitat: Stream channels within the Tualatin Watershed have been severely altered to improve drainage and increase flows. The loss and alteration of side channels, oxbows, and wetlands suggest a need for channel restoration efforts throughout the basin. Restoring these systems might result in hydrological changes that could affect agriculture and urban systems.

Groundwater: Groundwater quality in the Tualatin Watershed is not changing very rapidly, except in shallow wells where there is a higher risk of contamination than in deeper wells. Importing more surface water has diminished reliance on wells by municipal users; however, agricultural demand from wells is increasing, especially for irrigation. Groundwater quantity is decreasing in a number of locations, and restrictions have been placed on groundwater use in some areas of the Basin. It is highly unlikely that future trends will result in greater groundwater use. In fact, groundwater aquifers may prove to be a useful storage system for excess flows, if recharge can be improved significantly.

3.2 Soil

Goals for soil are:

- S-1 Decreasing contaminants in soil to protect human health and the environment
- S-2 Optimizing water intake and storage
- S-3 Maintaining optimal plant productivity
- S-4 Supporting diverse biota
- S-5 Establishing stable soils that minimize erosion

3.2.1 Summary of Existing Conditions and Trends

Existing conditions: Tualatin Watershed soils are naturally fertile and productive, but cultivation over a hundred years or longer has lowered inherent productivity. Greater use of fertilizer and pesticides are now required to maintain productivity. Sometimes fertilizer and pesticide use exceed the amounts needed to optimize farm profit which is especially true of phosphorus. This situation results in increased soil phosphorus concentrations on livestock

farms and on fields used for the production of high value crops. Adoption, implementation, and follow-up of water quality management plans for individual farms will help promote proper application of fertilizers and optimize crop production.

In agricultural areas, increased use of cover crops to control erosion for improved water quality also keeps high-quality topsoil on the field. Use of cover crops is a Best Management Practice (BMP) involving non-harvested vegetation that also adds organic matter to the soil, recycles nutrients, and increases infiltration. However, ditch walls and streambanks are frequently unstable and erode because of poor vegetation cover.

In urban systems, the soil is frequently covered with impervious surfaces (e.g., roads or roofs) that greatly lower the soil's ability to capture and store water and reduce contaminants and to provide these resources to plants. Even in locations where people have planted vegetation, it is often ineffective compared with natural cover. As a result, runoff increases, stream channels downcut, and pollutants enter and accumulate in streams, wetlands, lakes, and other waterbodies.

Trends: Covercrop usage will likely continue to increase as more appropriate plant materials and management practices are developed and implemented. In addition, expansion of wood pulp crops, especially hybrid poplar, will greatly lower the frequency and types of soil disturbances in agriculture. Lower fertilizer use, especially phosphorus, may occur as better information becomes available to farmers. However, continued manure application to livestock farms and fields will cause soil phosphorus concentrations to increase unless managed properly.

3.3 Plants and Animals (Biota)

Goals for plants and animals are:

- B-1 Decreasing pollutants to levels protective of human health and the environment
- B-2 Maintaining habitat and biological diversity across the watershed
- B-3 Sustaining agriculture and forestry
- B-4 Protecting sensitive, threatened and endangered species
- B-5 Sustaining aquatic and terrestrial systems

3.3.1 Summary of Existing Conditions and Trends

Existing conditions: The status of Tualatin Watershed plants, animals, and general habitat is overall very poorly documented although some studies have documented small areas of the Basin. Initial studies at Pacific University have begun mapping the occurrence and distribution of biota, but more work is needed. Monocultures and low-diversity disturbed urban and rural environments have greatly diminished the habitat variability that characterized the area prior to human settlement. Natural riparian areas are narrow or lost entirely, large areas of wetlands have been drained or filled, and only scattered old growth trees remain.

Trends: The potential listing of steelhead and cutthroat as threatened species in the Tualatin Watershed will focus attention on fish habitat. A major opportunity exists to increase streamside

plantings that enhance fish habitat, stabilize stream channels, and benefit terrestrial organisms. The effects of shorter harvest intervals on fish and wildlife should be evaluated.

3.4 Air Quality

Goals for air quality are:

- AQ-1 Maintaining air quality in Tualatin Basin that meets or exceeds Federal Ambient Air Quality Standards
- AQ-2 Preventing adverse impacts on biological systems
- AQ-3 Maintaining high visibility
- AQ-4 Allowing no offensive odors
- AQ-5 Limiting emissions of toxins (e.g. Hg, As, PCBs, Dioxins, and Furans) to protect human and biota health

3.4.1 Summary of Existing Conditions and Trends

Existing conditions: Air quality has improved as compared with 20 to 30 years ago when slash was burned in clearcuts and many homes used inefficient wood-burning stoves. In addition, sawmills no longer use burners to get rid of wood waste. Slash fires still are used at times to burn timber harvest waste and prepare the seedbed for reforestation.

Trends: Although carbon dioxide control rules and strict emission controls on vehicles and industry are now in effect in Oregon, the projected increase in industry and vehicle use within the watershed will add to degradation of air quality. The Department of Environmental Quality (DEQ) recently expanded their vehicle emissions testing to include better technology and more test areas in the Tualatin Basin.

3.5 Human Component

Goals for the human component are:

- HC -1 Utilizing inputs efficiently (especially scarce and non-renewable ones)
- HC -2 Minimizing adverse inputs and outputs
- HC -3 Balancing economic and environmental impacts
- HC -4 Minimizing threats to plants and animals (including humans)
- HC -5 Providing an aesthetically pleasing environment
- HC -6 Providing diverse recreational opportunities
- HC -7 Providing adequate employment opportunities, economic base, and housing opportunities

3.5.1 Summary of Existing Conditions and Trends

Existing conditions: Air quality regulations have done a good job of managing point sources of pollution from human activities. More industries now find it beneficial to calculate the efficiency with which they manufacture products not only in terms of dollars but also in terms of resources. Impacts of land use changes (e.g. agriculture or forestry to urban, in particular) are significant and still poorly understood. The automobile is still the major mode of individual transportation, which results in more impervious surfaces (e.g. parking lots, roads, driveways) that increase the amount of contaminants in runoff.

Active outdoor recreation in the Tualatin Watershed has mainly focused on Hagg Lake and team sports. The Tillamook State Forest offers a broad range of seasonal recreation opportunities including hiking, camping, fishing, hunting, motorcycle riding, mountain biking, and nature watching. Bicycling is a growing activity, but narrow roads with no shoulders make it difficult. Jackson Bottom Wetlands, the Linear Park in Buxton, Tualatin Hills Nature Park, and Fernhill Wetlands provide passive recreational opportunities such as hiking and nature viewing. The Tualatin River itself can be canoed but access sites are limited. Continuous inputs of snags and live wood often lead to log jams in the middle sections of the river where steep mountain gradients meet more gentle meander sections. Although logjams may limit access to all but the most experienced canoers, they can provide significant habitat and refuge for fish and wildlife, insects, and others.

Trends: Better access to the Tualatin River in a few locations will increase usage. If year-round facilities at Hagg Lake are developed, use of that resource will increase. Development of Fernhill Wetlands and the Tualatin River National Wildlife Refuge should provide more hiking and viewing opportunities in the near future. The Jackson Bottom Interpretive Center will provide a first-class place for citizens to interact with their environment and learn from it. The acquisition of open spaces under Metro's Greenspaces program will have a positive effect in the midst of rapid growth in the Basin.

The installation of light rail connecting the Tualatin Watershed to Portland will provide alternatives to automobile usage. Probable future increases in gasoline, water, and electricity costs will encourage conservation of these resources. The trend toward smaller lot sizes will reduce residential water use and modern building codes require better insulation that should decrease electricity or natural gas use per capita. All of these positive effects, however, may be overshadowed by the predicted rapid growth of the watershed population for the next 20 to 40 years.

4.0 Priority Action Items to Meet Council Goals and Objectives

This chapter contains the Tualatin River Watershed Council's priority action items for **Water Quality, Water Quantity, Fish and Wildlife Habitat, Education and Stewardship, and Research and Monitoring**. These actions were developed through a review of existing conditions in light of the Council's goals and long-term vision. The Technical Assistance Committee, with review and refinement by the Council, recommended these action items. Several action items address multiple goals that were identified in Section 3.

The ten priority action item areas identified by the Council are:

- Action # 1:** Assess watershed conditions to help prioritize restoration activities.
- Action #2:** Conserve and improve fish and wildlife habitat (focusing on anadromous fish).
- Action #3:** Develop, support, and implement a broad-based education/outreach program focusing on reducing non-point source pollution and improving protection and management of riparian areas.
- Action #4:** Develop demonstration projects in priority areas to encourage restoration on private lands in cooperation with willing landowners.
- Action #5:** Establish a Tualatin Watershed Resource Collection and web site.
- Action #6:** Promote management practices that improve watershed functions and protect values.
- Action #7:** Work with Tualatin Basin water managers to implement Integrated Water Resource Management strategy (IWRM).
- Action #8:** Assist Designated Management Agencies with implementation of all non-point source water quality management plans.
- Action #9:** Expand existing watershed monitoring programs to broaden citizen involvement and to create greater awareness.
- Action #10:** Promote recreational experiences that foster watershed stewardship.

Each action item includes a background section describing the purpose of the action and a list of tasks to accomplish the action item (Appendix B). The actions also include a discussion of possible lead sponsors, necessary resources, and potential funding options. The Council will work further to identify resources to accomplish each task as the Plan is implemented.

Action # 1: Assess watershed conditions to help prioritize restoration activities.

The following action items address these goals (as outlined in Section 3): WQ1-5; S1-5; B1-5; HC2,3

Action Item 1A: Assess key watersheds to determine the best areas to manage, protect, and restore.

Description

The Governor’s Watershed Enhancement Board (GWEB) is developing an assessment manual for use by watershed councils to determine watershed conditions. This manual will be used to describe present conditions, identify problems, and help councils develop restoration plans to address these problems.

The Unified Sewerage Agency (USA) has already conducted several urban stream assessments within its jurisdiction. Assessments, however, also are needed in the rural and upland areas of the Tualatin Basin. Ultimately, these assessments should be incorporated into a coherent basin-wide assessment. Additional management and restoration efforts can be developed to further existing efforts in the Basin. The Bureau of Land Management (BLM) also will conduct watershed assessments in the Dairy, McKay, and Scoggins sub-basins in 1998 and 1999. The Oregon Department of Forestry (ODF) plans to conduct assessments on their managed lands in the watershed. The Washington County Soil and Water Conservation District (SWCD) has received funding from the Oregon Department of Agriculture (ODA) to conduct watershed assessments in other rural areas of the Basin.

Tasks

- Conduct Gales Creek sub-basin assessment pilot project using draft GWEB manual
- Coordinate with BLM to conduct assessments in Dairy, McKay, and Scoggins sub-basins
- Develop framework for coordination with other assessments such as USA’s urban stream assessments
- Develop comprehensive watershed-wide assessment

Lead/Sponsor

Tualatin River Watershed Council, Washington County SWCD, BLM, ODF, USA, U.S. Environmental Protection Agency

Resources/Implementation

Personnel to conduct assessments and compile data:

- Students (Oregon Graduate Institute (OGI), Pacific University, Portland State University (PSU), Portland Community College-Rock Creek) to help with data gathering
- Volunteers and Council staff

Equipment needs: Aerial photographs, topographic maps, land use data, historical data, and a Geographic Information System (GIS) database to track and assist in linking sub-basin assessments.

Potential Funding

GWEB, Washington Co. SWCD, Tualatin Valley Irrigation District (TVID), Washington County Land Use and Transportation Department

(Note: See Section 1.1, page 4, regarding voluntary involvement and implementation.)

Action Item 1B: Conduct stream habitat surveys and mapping.

Description

For areas outside the Urban Growth Boundary (UGB), a general lack of information about instream habitat including riparian areas exists. The riparian corridor is defined as the corridor within which vegetation adapted to streamside conditions grow. In order to have a technical basis for a restoration program, an inventory of existing riparian and stream conditions must initially be conducted. Initial efforts would focus on surveying streams with potential anadromous fish habitat such as Gales Creek, Dairy Creek, and McKay Creek. Stream habitat surveys and mapping would provide information regarding:

- Habitat quality and quantity
- Riparian characteristics and quality
- Potential priority enhancement areas
- Artificial obstructions to fish passage

Information gathered under this action item will link to Action Item 1A.

Tasks

- Choose one high priority sub-watershed for an initial assessment
- Obtain existing data from Oregon Department of Fish and Wildlife (ODFW), ODF, Oregon Department of Environmental Quality (DEQ), USA, United States Geological Survey (USGS), Student Watershed Research Project (SWRP) at Saturday Academy, and private landowners
- Compile and evaluate existing data to determine priority survey areas in cooperation with the TAC
- Prioritize data gathering, surveys, and mapping
- Use state developed survey protocols consistent with existing data
- Conduct stream habitat surveys in locations lacking data
- Update surveys in areas with outdated data
- Compile data into Tualatin Watershed GIS
- Obtain access via landowner permission to evaluate sites in the chosen watershed

Lead/Sponsor

The Watershed Council will work in cooperation with ODFW, ODF, Washington County SWCD and volunteer groups to conduct the above tasks.

Resources/Implementation

1.0 Full time employee (FTE) to 1.5 FTE for two years, depending on survey protocol

Personnel needed to:

- Conduct surveys (1 to 2 persons needed depending on survey protocol)
- Input survey data into GIS and database
- Compile, evaluate, and analyze survey data for identify priority areas
- Coordinate volunteers

Specific equipment dependent upon survey protocol. General equipment includes USGS quad maps, Global Positioning System (GPS), aerial photographs, data sheets, and vehicle

Potential Funding

GWEB, ODFW, U.S. EPA, SWRP, OGI, Pacific University

(Note: See Section 1.1, page 4, regarding voluntary involvement and implementation.)

Action Item 1C: Inventory habitat for fish species and other significant fauna and flora.

Description

Obtain information regarding habitat for fish species, reptiles, amphibians, benthic macroinvertebrates (aquatic insects that live on the bottom of streams), and significant aquatic and terrestrial plant communities in second order and higher streams. This survey also will include determining presence of fish species. Data from this action item will provide information regarding:

- Anadromous fish usage
- Resident cutthroat trout usage
- Invasion of non-indigenous fauna and flora
- Ecosystem diversity
- Biological integrity
- Potential degradation areas and sources
- Potential enhancement sites

Priority areas include sub-basins outside the UGB on East Fork Dairy, West Fork Dairy, Gales and McKay Creeks. Information gathered under this action item will link to Action Item 1A.

Tasks

- Develop or adopt inventory protocols
- Obtain access to inventory areas via landowner permission
- Choose one high priority sub-basin for assessment (probably the same one as 1B)
- Determine fish species presence and absence in second order and higher streams
- Conduct habitat mapping
- Identify presence of other significant fauna and flora
- Identify priority inventory areas based on existing data (e.g. Dairy, Gales, and McKay Creeks)
- Compile data into GIS system

Lead/Sponsor

The Watershed Council will work with ODFW, ODF, SWRP (Saturday Academy) OGI, Pacific University, Trout Unlimited, and Northwest Steelheaders to conduct the above tasks.

Resources/Implementation

0.5 to 1.0 FTE for two years

Personnel to:

- Compile and evaluate existing data and prioritize inventory areas
- Conduct inventory
- Input data into GIS

Specific equipment dependent upon protocol (snorkel, seine, trap, and electroshock). General equipment includes USGS topographic maps, aerial photographs, data sheets, and vehicle.

Potential Funding

GWEB, BLM

(Note: See Section 1.1, page 4, regarding voluntary involvement and implementation.)

Action Item 1D: Determine functions and values of wetlands and uplands contained within the floodplain in terms of the effect on water quality, flood reduction, and wildlife usage and habitat.

Description

Land drained for urban and agricultural purposes has reduced the acreage of wetlands in the Tualatin River Watershed significantly. Preservation and restoration of wetlands and upland areas help restore watershed functions. As part of the watershed assessment process, inventories of wetland and upland areas will be conducted. These inventories will serve as a basis to identify wetlands and floodplain areas appropriate for enhanced protection and restoration.

Tasks

- Determine acres of emergent, shrub, and forested wetland and upland in the Tualatin River floodplain and tributary floodplains
- Study what species of wildlife will benefit if additional riparian shrub and tree acreage is added along mainstem and tributaries
- Locate existing wetlands and critical habitat areas to serve as reference sites

Lead/Sponsor

Watershed Council, USA, USGS, United States Fish and Wildlife Service (USFWS), ODFW, Oregon Division of State Lands (ODSL), OGI, cities and counties

Resources/Implementation

Infrared aerial photos, photos

Volunteer technical experts to develop estimation protocols

Potential Funding

(Note: See Section 1.1, page 4, regarding voluntary involvement and implementation.)

Action # 2: Conserve and improve fish and wildlife habitat (focusing on anadromous fish).

The following action items address these goals (as outlined in Section 3): WQ3,4; S2,5; B1-5; HC4,5

Action Item 2A: Promote and implement streambank and riparian restoration.

Description

Many stream channels and riparian areas within the watershed have been degraded due to past management practices. Creating more stable channels in those reaches with severe impacts will enhance fishery and aquatic resources and improve water quality in the Tualatin River system. Some restoration efforts have already been completed or underway, however, additional work is needed. Priority restoration areas will be determined from information gathered in Action Items 1B and 1C. However, the Technical Assistance Committee has already suggested some stream segments for potential restoration. These may include:

- Mainstem Tualatin (between Cherry Grove and Gaston)
- Dairy Creek (Council Creek to East Fork Dairy Creek), East Fork Dairy Creek (mouth to Murtaugh Creek)
- West Fork Dairy Creek (mouth to Lousignont Creek), Gales Creek (mouth to Roderick Creek)
- McKay Creek (East Fork to Jackson Creek), Fanno Creek (mid reaches), Chicken Creek (mid reaches)
- Cedar Creek (upper reaches), Dawson Creek (lower reaches), Beaverton Creek (lower reaches)
- Bronson Creek (lower reaches)

Tasks

- Identify restoration efforts conducted to date and projects currently underway
- Compile existing habitat and riparian data and prioritize streams and stream reaches
- Identify those stream reaches where stream bank and stream bed restoration will be most effective
- Identify potential properties along this reach where restoration projects would be beneficial
- Identify potential funding sources and/or incentives for landowners
- Complete stream restoration projects

Lead/Sponsor

The Watershed Council is in a position to provide coordination among many of these efforts. Some of the groups that may be involved in this action include the Washington County SWCD,

Natural Resource Conservation Service (NRCS), ODFW, Northwest Steelheaders, Tualatin Riverkeepers, Trout Unlimited, local stream groups, and schools.

Resources/Implementation

Priority areas could be identified during stream surveys and inventories under other action items and during compilation of existing data for watershed assessments.

Potential Funding

GWEB, Tualatin River Water Quality Endowment Fund, NRCS, USA, U.S. Army Corps of Engineers, U.S. EPA

(Note: See Section 1.1, page 4, regarding voluntary involvement and implementation.)

Action Item 2B: Improve fish passage at identified priority artificial obstructions.

Description

The purpose of this action item is to facilitate anadromous fish passage to historic spawning habitat areas in the watershed to the maximum extent possible. This action item will become a high priority with a listing of steelhead or cutthroat under the Endangered Species Act. Action items 1B and 1C will provide information on quantity of lost anadromous fish habitat, quality of habitat, and anadromous fish use of the watershed. During the assessment process, artificial obstructions to fish passage can be identified and prioritized. Priority areas identified to date include:

- Forest Grove (Clear Creek Dam and Balm Grove)
- McFee Creek Dam
- Hagg Lake (Scoggins Creek)

Tasks

- Identify obstructions in priority and non-priority anadromous fish-bearing sub-watersheds
- Develop a plan with landowner assistance to deal with obstructions
- Identify feasibility (engineering/economics) of increasing fish passage at priority obstructions
- Communicate with owners regarding potential fish passage options, including potential funding
- Assess spawning potential upstream of blocked-off stream sections
- Pursue funding for one project to improve anadromous fish passage (at one of the priority areas listed above, according to feasibility and owner interest)

Lead/Sponsor

The successful completion of this action will require cooperation and coordination among many different organizations and agencies. The Council will strive to assist in coordinating these activities and identify leads for each of the above tasks.

Resources/Implementation

0.5 FTE for one year

Personnel to coordinate with ODFW, ODF, and Oregon Department of Transportation (ODOT) regarding current fish passage efforts and work with Oregon Water Resources Department (OWRD) to maintain reservoir (dam) records
Equipment is dependent upon type of survey.

Potential Funding

GWEB, ODFW, Bureau of Reclamation (BOR), NRCS, USFWS

(Note: See Section 1.1, page 4, regarding voluntary involvement and implementation.)

Action Item 2C: Encourage placement of fish screens on water diversions in areas where fish may be present.

Description

There are many areas within in the watershed where water is diverted from rivers and streams. These diversions are designed to draw water out of streams and onto pastures and fields to irrigate crops and water livestock. Without fish screens, fish may stray into pump intakes. Juvenile fish are especially vulnerable during spring migration periods or en route to summer rearing areas. As a result, fish are destroyed. Many of these fish are salmonid species classified as “sensitive” by the state or proposed for federal listing under the Endangered Species Act.

Oregon law requires fish screens on the intakes for diversions of 30 cubic feet per second (cfs) or more (ORS 498.311), but enforcement of this requirement is limited. State incentive programs exist for screening water diversions of less than 30 cfs. ODFW offers economic incentives in the form of the Fish Screening Cost Share Program. Eligible irrigators are reimbursed for 60 percent of the total cost of installing a self-cleaning or manually cleaning screen on their irrigation diversions. Tax credits also are available.

When a list of diversions is compiled, water rights holders should be notified of the need to install fish screens, if required, and advised of the state’s incentive program for smaller diversions. Washington County SWCD should incorporate intake screening into the development of voluntary farm plans.

Primary emphasis areas include Gales Creek, McKay Creek, Scoggins Creek, East and West Forks of Dairy Creek, and the mainstem Tualatin River. Major diversions, such as dams, also can block fish passage to important spawning and rearing habitat. Dams will be assessed based on their value and/or detrimental effects to the watershed.

Tasks

- Identify and catalog all unscreened intakes in fish bearing streams from water rights on the six streams listed above
- Survey intakes and record locations into the Tualatin Watershed GIS database
- Prioritize screening locations
- Communicate with owners of all unscreened diversions and intakes identified above
- Work with highest priority diversion owners to identify funding options and technical assistance

Lead/Sponsor

The Watershed Council will work in partnership with OWRD, ODFW, SWCD, and fishery groups such as Trout Unlimited and Northwest Steelheaders

Resources/Implementation

Equipment: Fish screens, materials to replace and install screens, education materials for landowners, GPS to identify location coordinates

Potential Funding

ODFW, Oregon Plan for Salmon and Watersheds, GWEB, ODFW Research & Education grants

(Note: See Section 1.1, page 4, regarding voluntary involvement and implementation.)

Action Item 2D: Assess instream water rights for fish needs.

Description

Under Oregon law (ORS 537.110), “all water within the state from all sources of water supply belongs to the public.” Like most western states, Oregon water law is based upon the “prior appropriation” doctrine. Under this doctrine, rights for withdrawal of water are given priority based on the date of acquisition, otherwise known as “first in time, first in right.” During shortages, earlier permittees receive water while more recent permittees may not. Quite commonly streams become over appropriated; that is, permits are issued for water diversions that exceed the flow available at certain times. This is the case for many streams within the Tualatin River Watershed. During the summer, considerable amounts of water are diverted from the Tualatin River and its tributaries for municipal, industrial, irrigation, and agricultural use. Lack of accurate measurement and reporting, however, make it difficult to determine the current levels of water diversion and use.

The first step in a program to increase summertime flow in the Tualatin Watershed is to develop a complete and accurate picture of current water rights and actual diversion rates. The second step is to establish instream flow for fish needs. Instream water rights on the Tualatin River and its major tributaries currently exist. However, a review of these rights should be conducted to assess if they are adequate in quantity and coverage. OWRD compiles an annual instream water right report that identifies all instream water rights locations where regulation provides protection. Acquiring water rights by donation, lease, or purchase may be needed to enhance these flows.

Priority stream systems include: Dairy Creek mainstem, East Fork Dairy Creek, West Fork Dairy Creek above Lousignont Creek, Gales Creek above Little Beaver Creek, and McKay Creek up to Brunswick Canyon.

Tasks

- Compile existing flow data (data sources – OWRD, USGS, DEQ) and identify data gaps

- Screen and prioritize instream water right needs based on existing fisheries resources and existing instream water rights
- Calculate minimum instream flows where flow data exists and on priority streams without flow data
- Encourage ODFW or DEQ to develop strategies to provide adequate instream water
- Promote cooperation with Oregon Trust or others to provide water for instream use

Lead/Sponsor

The Watershed Council will work in cooperation with OWRD and ODFW. The Council may also contact cities that currently hold water rights, the Tualatin Valley Irrigation District, and private landowners to explore options for lease or purchase. Oregon Water Trust will be contacted for sample lease contracts.

Resources/Implementation

0.5 FTE for one year

Personnel to:

- Compile existing flow data and identify data gaps
- Calculate minimum instream flow requirements

Potential Funding

GWEB, USA, OWRD, USGS, Oregon Water Trust

(Note: See Section 1.1, page 4, regarding voluntary involvement and implementation.)

Action Item 2E: Promote development of management plans for non-indigenous terrestrial and aquatic species.

Description

A number of invasive, nuisance plant and animal species are known to occur in the Tualatin Watershed, and others are likely to invade. Preventing the establishment of invasive species is the most cost-effective management option. Control of established populations is often expensive and may have unintended adverse impacts.

Development of a management plan for non-indigenous species is needed for sound control of introduced species. A management plan for terrestrial and aquatic non-indigenous species should address prevention by focusing on known vectors of dispersal, education, and management methods necessary to control existing and potential invasive species in the watershed.

Tasks

- Identify invasive, nuisance, and ecologically damaging populations of aquatic and terrestrial species currently in selected sub-watersheds, as part of the assessments in Action Items 1A-1C

- Develop an integrated management plan that addresses prevention and control of aquatic and terrestrial non-indigenous species. Education of watershed residents will be a part of this plan.
- Work with residents and students to control existing populations of invasive, non-indigenous species (e.g. distribute biocontrol agents for purple loosestrife; physical removal of scotch broom)
- Work with TVID and Washington County Parks and Recreation Department to develop an educational program to discourage introducing non-native fish species and aquatic plant species into Hagg Lake

Lead/Sponsor

Oregon State University Cooperative Extension with cooperation from NRCS, ODFW Salmon Trout Enhancement Program (STEP) program, and ODA

Resources/Implementation

Personnel to:

- Develop management plans
- Provide technical assistance and coordinate management activities

Equipment to conduct surveys and map populations (GPS, boat, etc.) is included in Items 1A-1C.

Potential Funding

GWEB, ODA, ODFW

(Note: See Section 1.1, page 4, regarding voluntary involvement and implementation.)

Action Item 2F: Identify priority habitat areas and suggest strategies for protection and management of wildlife purposes.

Description

Certain lands within the Tualatin Watershed are particularly important as fish and wildlife habitat. Examples include lands adjacent to spawning and rearing habitat for native fish; habitat types underrepresented in the watershed such as forested and emergent wetlands, seeps, and springs; and the habitats of special status plants and animals. The protection of these lands may best be accomplished by acquiring them, obtaining conservation easements, or developing land management agreements with landowners. It is important that sufficient funds are available to manage and maintain any lands acquired.

Tasks

- Identify list of candidate sites as part of the habitat inventory under the watershed assessment action items 1A-1C
- Work with land trusts to educate landowners about conservation alternatives
- Work with Metro to identify potential lands for future acquisition

Lead/Sponsor

Public agencies and land trusts take the lead on this action item.

Resources/Implementation

Personnel to conduct inventory and interact with interested landowners.

Potential Funding

Partial funding through watershed assessment process. Work with land trust and public agencies to identify funds for conservation easements or land acquisition. United States Department of Agriculture programs (Conservation Reserve Program and Wetland Reserve Program)

(Note: See Section 1.1, page 4, regarding voluntary involvement and implementation.)

Action # 3: Develop, support, and implement a broad-based education/outreach program focusing on reducing non-point source pollution and improving protection and management of riparian areas.

The following action items address these goals (as outlined in Section 3): WQ1,2; S1-5

Action Item 3A: Work with local schools to enhance stewardship and science education by incorporating study of the Tualatin River and its watershed into science curricula.

Description

An understanding of the basic science and critical thinking skills that good stewardship and management efforts are based on must be encouraged within the Tualatin Watershed at all ages. Adoption of an integrated K-12 curriculum for schools in the watershed will help facilitate this understanding. Several curricula already have been developed and should be made available to schools and teachers within the watershed.

Tasks

- Promote adoption and incorporation of existing water curricula into schools (i.e. Streamscene, Project Wet, Adopt-a-Stream, Aquatic Wild, Watershed Uplands, Comprehensive Water Education Grades K-6)
- Promote use of Tualatin River Rangers Program
- Develop a Tualatin Watershed web page for use by schools
- Hold a “Tualatin Science Fair” to facilitate learning and educate parents

Lead/Sponsor

Jackson Bottom Wetlands Preserve, Student Watershed Research Project, Washington County Educational Services District, Stafford/Athey Creek Tualatin Science Education Committee

Resources/Implementation

Personnel to:

- Develop/adapt curricula
- Implement curricula
- Organize science fair

Equipment needed to implement curricula and travel

Potential Funding

GWEB, Oregon Community Foundation, U.S. EPA

Action Item 3B: Conduct workshops for streamside residents focusing on environmentally-friendly riparian management practices (i.e. Naturescaping).

Action Item 3C: Help develop, customize, and distribute education brochures, videos and newsletters to provide information about proper riparian management and water quality improvement.

Description

Much of the Tualatin River and its tributaries flow through privately owned lands. Consequently, improvement of stream corridors will depend on active participation of private landowners. The education program will provide a mechanism for dissemination of technical information and guidance to landowners wishing to enhance natural vegetation on their property or implement alternative land management practices.

NRCS and Washington County SWCD already provide technical assistance to agricultural landowners. USA provides assistance to urban landowners, and ODF provides assistance to forest landowners. The Watershed Council will work with these agencies and other groups to coordinate and expand outreach to landowners.

Tasks

- Determine what education materials are now available and customize brochures for the Tualatin River Watershed
- Develop articles about friendly riparian management practices for local newspapers
- Prepare and distribute a Stream Care guide for urban Tualatin Watershed residents to encourage stream stewardship
- Sponsor and promote Naturescaping workshops targeting streamside property owners
- Present an annual award to residents, schools, and businesses to highlight practices that best work to improve riparian areas
- Work with USA to make available a catalog of local suppliers of native plant materials
- Assist local jurisdictions with implementation of Metro's Title 3 (establishes riparian buffers or "water quality management areas") of the Regional Framework Plan
- Encourage development, implementation, and follow-up of Voluntary Water Quality Management Plans for rural landowners (see Action Item 8A)

Lead/Sponsor

The Council will work in partnership with the Tualatin Basin Public Awareness Committee to conduct several of these tasks.

Resources/Implementation

Personnel to:

- Develop program materials
- Coordinate with other groups
- Organize and conduct workshops

Funds for printing, production, and mailing

Potential Funding

Tualatin River Water Quality Endowment Fund, Portland General Electric, USA, GWEB

Action Item 3D: Expand the Tualatin River Watershed Council speakers bureau.

Description

The Tualatin River Watershed Council initiated a speakers bureau in the fall of 1997 to inform citizens about watershed issues and Watershed Council activities. Since that time, the Council Coordinator and members of the speakers bureau have made over 25 presentations to a variety of organizations such as citizen and civic groups, trade associations, chambers of commerce, city councils, and agricultural groups. Although the speakers bureau has been successful, a need to reach out to a broader audience and to train additional members exists.

Tasks

- Prepare a list of organizations and individuals to contact for potential speaking engagements
- Advertise availability of the speakers bureau through local newspapers and newsletters
- Recruit new members

Lead/Sponsor

Tualatin River Watershed Council

Resources/Implementation

These tasks can be accomplished with existing personnel

Potential Funding

None required

Action #4: Develop demonstration projects in priority areas to encourage restoration on private lands in cooperation with willing landowners.

The following action items address these goals (as outlined in Section 3): WQ1-5; S1-5; B1-5; HC1-4,7

Description

The Council’s mission advocates “deal[ing] with issues in advance of resource degradation” and “foster[ing] better stewardship of the Tualatin River Watershed resources.” Initiating demonstration projects on private lands is a means of promoting and highlighting good stewardship among private landowners. Since the vast majority of lands in the Tualatin Basin are privately owned (approximately 93%), working with private landowners is a high priority. Demonstration projects provide opportunities to build strong cooperative relationships between the Council and private landowners. Engaging private landowners in these projects allows these stakeholders to develop a greater awareness of the role they play in maintaining watershed health.

NRCS, in partnership with Washington County SWCD and the Council, is working with private landowners to implement demonstration projects in the Tualatin Watershed. NRCS will continue to take the lead in working with private agricultural landowners to implement restoration, enhancement, and conservation projects on private lands. ODF will continue to work with small woodland and industrial forest landowners on restoration and enhancement projects.

Tasks

- Assist NRCS/SWCD/ODF in identifying and recruiting private landowners in the Tualatin Watershed to participate in demonstration projects for priority sites
- Recruit citizens, school groups, organizations, private industries, and public agencies to provide resources and volunteers for demonstration projects
- Assist landowners with project implementation and maintenance
- Monitor effectiveness of demonstration projects, involving citizens where appropriate
- Make use of existing incentive programs that encourage private landowner participation in demonstration projects

Lead/Sponsor

NRCS, Washington County SWCD, ODF, Tualatin River Watershed Council

Resources/Implementation

Personnel now exist who can:

- Identify interested landowners
- Assist in project implementation
- Provide ongoing technical support
- Develop incentive programs

Personnel are needed, however, for project monitoring

Potential Funding

GWEB, Tualatin River Water Quality Endowment Fund, and existing federal programs which can be used to help fund demonstration projects.

(Note: See Section 1.1, page 4, regarding voluntary involvement and implementation.)

Action #5: Establish a Tualatin Watershed Resource Collection and web site.

The following action items address these goals (as outlined in Section 3): HC1-7

Description

Although considerable information is available on the Tualatin River Watershed, information is located in many different locations throughout the region. Water quality and flow information is compiled by several agencies and organizations: USA, USGS, DEQ, OWRD, Oregon Graduate Institute, and the Student Watershed Research Project. Fish and wildlife habitat information is maintained by ODFW, ODF, and Pacific University.

This information could be managed more effectively if a single repository for data on the river and its watershed existed. Also, the information would be more accessible to citizens interested in managing watershed resources wisely. The Council will establish a Tualatin River Watershed information clearinghouse. The starting point will be the library of documents assembled during preparation of this Action Plan and documents available from state and local agencies.

Government agencies and others gathering natural resource information will be encouraged to file copies with the resource center as it becomes available. Development of a Tualatin River Watershed Geographic Information System (GIS) is underway. This information also will be available to the public through a web site.

Tasks

- Establish location for Tualatin Watershed Resource Collection
- Compile and catalog existing Tualatin Watershed information
- Maintain Tualatin Watershed GIS with development of a Tualatin Watershed GIS atlas if funds are available
- Develop a Tualatin Watershed web page with links to GIS and other watershed-related web sites
- Advertise availability of web page

Lead/Sponsor

Watershed Council with assistance from Resource Assistance for Rural Environments (RARE), Pacific University, OGI, and government agencies.

Resources/Implementation

0.5 FTE ongoing, to establish and maintain Tualatin Watershed Resource Collection and web page. Need long term stable funding for monitoring and research to continue and need to continue collection of baseline data in key areas.

Potential Funding

Tualatin Valley Water Quality Endowment Fund, GWEB

Action #6: Promote management practices that improve watershed functions and protect values.

The following action items address these goals (as outlined in Section 3): WQ1-5; S1-5; B1, 3-5; AQ1-5; HC1-4,7

Action Item 6A: Evaluate management practices.

Description

A great deal of time and money are spent on management practices, but not enough is done to evaluate which practices (or combinations of practices) are most effective in achieving watershed goals. The Technical Assistance Committee has developed a model to assess management practice performance. The Watershed Council will use this model to develop specific criteria to measure management practice effectiveness.

Tasks

- Ask agencies to make presentations to the Watershed Council regarding management practices used in the Tualatin Watershed
- Use the criteria for a properly functioning watershed presented in Section 1.2 to monitor and evaluate management practice effectiveness
- Coordinate with agencies implementing management practices (NRCS, ODF, ODA, SWCD, USA)

Lead/Sponsor

Watershed Council and TAC, OGI

Resources/Implementation

0.5 FTE to conduct monitoring and coordinate with agencies

Potential Funding

Agencies implementing management practices, USA, Oregon DEQ, U.S. EPA

Action Item 6B: Develop strategies to reduce soil erosion.

Description

Accelerated soil erosion is a major problem on urban, forestry, and agricultural lands throughout the watershed. Excessive soil erosion lowers soil productivity and degrades water quality. In urban areas undergoing development, runoff from construction is noted as the largest source of sediment discharge. Cities and the USA are implementing USA's Construction Management Practices, but staffing for daily enforcement and ongoing education of these practices is limited.

Rural stormwater runoff is associated with open spaces, agricultural and forest lands, and undeveloped lands outside the urban growth boundary. Overland flow of stormwater can be a problem where soil is compacted, such as roads. Logging roads are of special concern as they have the greatest potential for causing sedimentation in forest areas. Agricultural activities, and

to a lesser extent, forestry, involve the periodic disruption of vegetation and the land surface. This disruption may result in increased rates of soil erosion, which can impair fish habitat as sediment is washed into stream channels. Additionally, phosphorus attaches to sediment particles and is transported downstream via storm runoff events. The runoff then is discharged into receiving water bodies resulting in eutrophication problems.

Tasks

- Promote the implementation of the Agricultural Water Quality Management Area Plan (SB 1010) targeting the most highly erosion-prone areas for erosion predictions rather than average field slopes
- Conduct workshops for developers and builders to promote use and maintenance of proper erosion prevention and sediment control techniques during construction
- Promote improved forest road construction and maintenance techniques to reduce impacts on streams, lakes, wetlands, and other waterbodies
- Explore incentives program for minimizing runoff

Lead/Sponsor

The Watershed Council will work cooperatively with government agencies and other organizations to conduct erosion control workshops. Washington County SWCD is the lead agency for implementation of SB1010 while ODF enforces erosion control under the Forest Practices Act. USA and its member cities are the lead in the urban area of the watershed.

Resources/Implementation

No additional personnel are needed to accomplish the above tasks.

Potential Funding

USA, ODA, ODF, DEQ 319 funds

Action Item 6C: Promote the improvement of soil quality in the Tualatin Watershed.

Description

High soil quality ('tilth') can:

- Increase water infiltration and thus improve hydrology
- Reduce erosion and thus decrease sediment load to streams
- Decrease the need for fertilizer application
- Grow high quality produce with increased profitability for the farmer

Tasks

- Increase organic matter levels of soils with use of cover crops, manure, and compost
- Promote the use of no-till farming where feasible

Lead/Sponsor

NRCS, Washington County SWCD, Oregon State University (OSU) Cooperative Extension

Resources/Implementation

The Council will coordinate with existing USA, NRCS, and SWCD staff to implement these tasks.

Potential Funding

GWEB, Tualatin River Water Quality Endowment Fund

Action Item 6D: Educate urban and rural landowners about agronomic levels of nitrogen (N) and phosphorus (P) applications to crops and landscaping.

Description

Many Tualatin Watershed farmers (e.g. most wheat growers) apply N and P according to soil test results and OSU recommendations. Some (including growers of higher value crops and livestock farmers) apply more N and P than OSU recommends for maximum profit. These growers are reluctant to reduce applications for fear of decreased yields or because of limited acreage on which to spread manure. Lawns and gardens in urban areas also are a source of N and P and users need to be informed about the impacts of fertilizer over-application on water quality.

Tasks

- Request that OSU, SWCD, NRCS, and local agribusiness dealers meet to develop a list of the five main crops which show the greatest discrepancy between OSU recommendations and actual applications. The ranking in this list should be based on acreage of the crop in the Tualatin Watershed multiplied by the over-application of N plus P.
- Provide a minimum of 3 years of on-farm demonstration/research plots for these high priority crops to demonstrate optimal fertilizer levels
- Provide urban gardeners with fertilizer and pesticide application information through Master Gardener Programs and other sources

Lead/Sponsor

OSU Cooperative Extension

Resources/Implementation

Estimated 0.25 FTE plus \$5,000 for 3 - 5 years

Potential Funding

Tualatin River Water Quality Endowment Fund, GWEB

(Note: See Section 1.1, page 4, regarding voluntary involvement and implementation.)

Action Item 6E: Promote projects and developments that minimize effective impervious surfaces.

Description

Development in urban areas leads to more impervious surfaces such as roads, parking lots, roofs, and piped drainage. This increase in impervious area disrupts the hydrologic cycle by not allowing precipitation to infiltrate into the ground. Groundwater recharge is lessened during the

rainy season due to impervious cover. Surface water flows become more intense and concentrated and thus flow faster causing stream channel erosion which gradually detaches the stream from its floodplain. Stream base flow during the summer months is reduced in part by lack of groundwater recharge during the rainy season. Lack of sufficient water in riparian zones during the summer and intense high flows in the winter reduce vegetation growth along the riparian corridor.

The Watershed Council will work with agencies, developers, and landowners to promote projects that minimize impervious surfaces.

Tasks

- Work with jurisdictions to review building and development codes to encourage increased use of pervious landscaping (less pavement)
- Explore alternatives to pavement (ie. grasscrete) that increase infiltration
- Develop demonstration projects for impervious surface alternatives
- Promote use of Naturescaping and roof gardens
- Coordinate with Home Builders Association to include Naturescaping at their annual Street of Dreams Event
- Work with nursery owners to reduce winter runoff from greenhouses
- Promote roof drain disconnect programs (may require review of existing building and plumbing codes)

Lead/Sponsor

USA is the lead agency for this action item with responsibility for urban stormwater management. The Council will coordinate with USA to develop demonstration projects. In regards to reviewing building codes, the Council will work with city and county planning agencies. The Council will sponsor Naturescaping workshops and encourage private developers and landowners to promote use of roof gardens and other practices that minimize effects of impervious surfaces.

Resources/Implementation

Personnel to coordinate with local jurisdictions and other organizations
Equipment and materials to carry out demonstration projects

Potential Funding

Tualatin River Water Quality Endowment Fund, Metro Greenspaces Grants, GWEB

(Note: See Section 1.1, page 4, regarding voluntary involvement and implementation.)

Action Item 6F: Conduct road/ditch/culvert assessment, inventory, and maintenance training to reduce erosion and flooding.

Description

Private, city, county, and state road maintenance personnel should be aware of sediment problems associated with roads, culverts, and ditches. It is common practice to scour ditches or use a herbicide to completely remove vegetation. This exacerbates erosion by removing soil-

retaining vegetation, increasing water velocity during flood events, and de-stabilizing banks during litter removal. Plugged culverts can lead to erosion, flood, and road damage. Culverts also can block upstream fish migration. The Watershed Council will work with County road departments, landowners adjacent to ditches, city, and state road maintenance personnel to assist with culvert surveys and promote more environmentally friendly ditch maintenance practices.

Tasks

- Coordinate workshop to promote alternative maintenance practices of ditches, roads, and culverts
- Provide panel of technical experts at workshops
- Present slide show of best maintenance practices
- Develop demonstration site with Washington County SWCD, landowners, and Washington County Department of Land Use and Transportation and cities
- Complete road inventory and risk assessment project on forest lands, per the Oregon Plan for Salmon and Watersheds

Lead/Sponsor

Washington, Multnomah, and Clackamas Counties road departments, city road departments, Washington County SWCD, ODF, assistance from Watershed Council

Resources/Implementation

Personnel to:

- Set up and conduct workshops
- Coordinate demonstration project

Potential Funding

Tualatin River Water Quality Endowment Fund, Washington County Department of Land Use and Transportation, GWEB salmon license plate funds

(Note: See Section 1.1, page 4, regarding voluntary involvement and implementation.)

Action Item 6G: Support and enhance Integrated Pest Management (IPM).

Description

Integrated Pest Management (IPM) refers to the use of a wide variety of techniques – biological, cultural, mechanical, and chemical – to approach pest problems. IPM uses scientific methods to determine pest populations in specific fields. Pest control measures are used only when populations approach economic thresholds (the point at which pest damage exceeds control costs). Currently very few IPM consultants are present within the Tualatin Watershed.

Tasks

- Sponsor workshops for landowners
- Train personnel to work with landowners
- Enroll farmers in the Environmental Quality Incentive Program to provide an incentive for IPM use

Lead/Sponsor

OSU Cooperative Extension
Natural Resources Conservation Service

Resources/Implementation

OSU personnel to set up and conduct workshops and work with landowners

Potential Funding

USDA's Environmental Quality Incentive Program, Sustainable Agriculture Grants

(Note: See Section 1.1, page 4, regarding voluntary involvement and implementation.)

Action #7: Work with Tualatin Basin water managers to implement Integrated Water Resource Management (IWRM) Strategy.

The following action items address these goals (as outlined in Section 3): WQ1-5; S2; B2-5; HC1-7

Action Item 7A: Promote urban water conservation and re-use measures.

Description

The Watershed Council recommends that measures such as water conservation and re-use be increased to promote efficient use of water resources throughout the watershed. The Tualatin Basin water managers group is evaluating several alternatives as part of the Integrated Water Resource Management Strategy currently under development. The Council is working with this group to provide input and will assist with implementation of the adopted strategy.

Examples of urban conservation measures that could be implemented in the Tualatin Basin include:

Water pricing. When water is priced by the unit, the pricing structure often provides a discount to large users. Rate structures of this kind may encourage inefficient use. Water use can be reduced by adoption of structures that penalize high users that inefficiently use water.

Leak detection and repair. Water systems can lose 20% to 30% of their water between the source and the consumer as a result of leaks. Programs for leak detection and repair and for regular replacement of distribution lines can reduce losses to 5% to 10%.

Water conservation devices. Considerable amounts of water can be saved by retrofitting existing homes with water saving devices, such as low-flow shower heads and low-flush volume toilets.

Reduce Lawn Areas. Reduce lawns and other landscaping that require intensive watering. Use native ground cover vegetation in areas where grass is not necessary or difficult to maintain.

Consider using other ground covers to save water such as mulch, gravel, or porous paving blocks in high traffic areas.

Tasks

- Assess existing water rate system
- Promote water rate system that discourages waste (i.e. incentive based rates)
- Work with water utilities to promote water conservation for industrial and municipal sectors
- Promote use of cisterns and disconnecting downspout drains (may require review of existing building and plumbing codes)
- Develop Naturescaping projects and use of native plants
- Develop recognition program of low water users
- Promote use of efficient landscape irrigation systems
- Work with large water users to promote re-use

Lead/Sponsor

Watershed Council, all water purveyors, Columbia Conservation Coalition

Resources/Implementation

Recognition and conservation tasks may involve additional personnel

Potential Funding

Major purveyors such as Tualatin Valley Water District and the Joint Water Commission

(Note: See Section 1.1, page 4, regarding voluntary involvement and implementation.)

Action Item 7B: Promote use of efficient irrigation systems

Description

Great strides have been made toward increasing the efficiency of irrigation methods throughout the Tualatin Basin. For example, drip or trickle irrigation is more efficient than sprinkler irrigation. However, these irrigation systems are not widespread, especially with small-scale farming operations. Irrigation efficiencies could be improved if more operators used state-of-the-art technology to schedule irrigation based on soil moisture measurements. The Watershed Council will work in partnership with NRCS, Washington County SWCD, OSU Cooperative Extension, and TVID to promote increased irrigation efficiency. OWRD also could support or help sponsor conservation efforts. Water quality concerns also have to be taken into consideration in determining efficiency of current water use.

Tasks

- Sponsor a demonstration project promoting water-conserving irrigation systems
- Analyze existing pricing structures and consider incentives to encourage water conservation
- Develop a fund which will help to cost-share water conservation investments by farmers

Lead/Sponsor

Washington County SWCD, NRCS, TVID, BOR, Watershed Council through the TAC

Resources/Implementation

Existing staff as written above could implement tasks.

Potential Funding

BOR, TVID

(Note: See Section 1.1, page 4, regarding voluntary involvement and implementation.)

Action #8: Assist Designated Management Agencies with implementation of non-point source water quality management plans.

The following action items address these goals (as outlined in Section 3): WQ1-5; S1-5; B1-5; HC1-4, 7

Action Item 8A: Promote Senate Bill 1010 (Tualatin River Sub-basin Agricultural Water Quality Management Area Plan) process.

Description

The Oregon administrative rules (OAR-603-95-000 through 6-3-95-100) adopted under this law prohibit excessive erosion, seasonal irrigation water runoff, agricultural waste runoff, and failure to maintain appropriate conditions in the near-stream area. Compliance with SB1010 is technically and economically feasible for all rural Tualatin Watershed residents and agricultural land managers. ODA can fine land managers who are found to be out of compliance with these rules. To guide, assist, and protect farmers and rural residents, Voluntary Water Quality Farm Plans are offered through Washington County SWCD. Farmers who participate receive a written management plan that includes site specific procedures to prevent violation of rules and to protect water quality. Adoption and implementation of an approved farm plan provides tools to increase farm profitability, to protect water and land resources, and to protect the manager from enforcement action if a complaint is filed.

Tasks

- Promote adoption of Voluntary Water Quality Farm Plans by rural residents
- Encourage ODA to ensure compliance by those who violate prohibited conditions. This may include penalties or additional restrictions.
- Promote consistency between state, county, and local building and health codes and the Tualatin River Sub-basin Agricultural Water Quality Management Area Plan Administrative Rules

Lead/Sponsor

Washington County SWCD will take the lead on this task with assistance from NRCS, ODA, Yamhill SWCD, Clackamas County SWCD, and West Multnomah SWCD.

Funding

ODA

(Note: See Section 1.1, page 4, regarding voluntary involvement and implementation.)

Action Item 8B: Assist USA, cities, and counties with implementation of urban stream watershed plans.

Description

Watershed Management Plans have been and are being developed by USA for each of the major Tualatin River tributaries within USA’s jurisdiction. These plans couple detailed technical analysis with extensive public involvement in order to identify solutions to water quality and flood management issues facing each sub-basin. A project committee consisting of staff from the cities, county, state, USA, and citizens representing businesses, homeowners, and environmental interests guides the planning process. Watershed plans are complete for Hedges Creek, Butternut Creek, Upper Rock Creek, Bronson Creek, Willow Creek, and Fanno Creek. Plans are currently being developed for Beaverton Creek and Dawson Creek (corridor management plan). The Watershed Council will coordinate with USA to facilitate plan implementation.

Tasks

- Implement structural BMPs including stream enhancement projects, wetland creation, culvert/bridge replacement, and stormwater pretreatment facilities
- Implement nonstructural BMPs such as code changes to reduce impacts of urban hydrology, increase enforcement of stream buffers, increase education of homeowners regarding riparian management, fertilizer, pest, and pet animal waste management
- Identify funding sources to install projects
- Review and update sub-basin plans on a regular basis

Lead/Sponsor

USA is the lead on projects within unincorporated Washington County within the Urban Growth Boundary. The cities are responsible for projects within their jurisdiction. The Council will work with USA and the cities to implement enhancement projects that involve citizens. The Council will recruit project partners and seek supplemental funding sources for the projects.

Resources / Implementation

Personnel to coordinate with citizens and local jurisdictions

Potential Funding

Tualatin River Water Quality Endowment Fund, GWEB, USA small grant program, state and federal grants

(Note: See Section 1.1, page 4, regarding voluntary involvement and implementation.)

Action Item #9: Expand existing watershed monitoring programs to broaden citizen involvement and to create greater awareness.

The following action items address these goals (as outlined in Section 3): WQ1-5; S4; B1-5; AQ1-5; HC2, 3,4

Description

Local and state agencies, as part of their water quality management plans, currently conduct watershed monitoring within the Tualatin Basin. However, the Council would like to involve more citizens in local monitoring efforts to promote greater watershed stewardship. Citizen monitoring will expand information gathering and augment agency monitoring efforts primarily in under-monitored rural tributaries of the watershed. Monitoring also is an excellent tool for educating citizens about stream health. Adequate training of the volunteers is critical to assure the credibility of the data that is gathered and to assure that monitoring is done with the consent and cooperation of landowners.

Examples of existing citizen-based monitoring efforts are the Student Watershed Research Project (SWRP) and Tualatin Riverkeepers Watershed Watch program. SWRP, a program of Saturday Academy at OGI, trains and equips local school groups to collect, compile, and report accurate biological and water quality data. The program combines education for 8-12th grade students with high quality watershed monitoring. Data is gathered biannually using consistent field and lab protocols and procedures and undergoes rigorous quality control and quality assurance. This information is currently provided to resource management professionals to augment existing agency monitoring and management efforts. The Tualatin Riverkeepers Watershed Watch program is an informal, quarterly monitoring program focusing on streamside observations of erosion, wildlife, and pollution. This program is less intensive but combines educational and recreational opportunities for watershed residents.

Expanding involvement with SWRP may include focusing student-monitoring efforts to assess restoration project effectiveness, as well as on-going monitoring of BMP effectiveness. The Council recommends that all restoration and enhancement projects, as well as land use activities adjacent to streams, include a schedule for monitoring that provides pre and post project information. This process will help determine both project and BMP effectiveness.

The Council will keep and update a database of monitoring activities as well as the level (as defined by DEQ monitoring protocols) of data collection being used. This process will diminish potential duplications in monitoring while facilitating collaboration among watershed groups.

If funds are available, the Watershed Council will prepare a “State of the Watershed” report. This report will include complete results of environmental monitoring programs. The report would include all government agency and volunteer activities.

Tasks

- Determine monitoring needs (e.g., water quality for pollutants, water flow, adequacy of erosion controls, etc.)
- Support expansion of existing monitoring efforts by the Student Watershed Research Project, Tualatin Riverkeepers Watershed Watch program, and other citizen groups

- Track and coordinate monitoring activities throughout the watershed
- Encourage Best Management Practice and rehabilitation effectiveness monitoring
- Determine data needs and gaps, especially in priority areas, as identified in the Action Plan
- Develop “State of the Watershed” report, if funds are available

Lead/Sponsor

Watershed Council, SWRP, Tualatin Riverkeepers, Stream groups, DEQ

Resources/Implementation

1.0 FTE to coordinate and expand monitoring programs

DEQ personnel to help develop monitoring programs and Quality Assurance/Quality Control plans

Potential Funding

GWEB, Tualatin River Water Quality Endowment Fund, DEQ

(Note: See Section 1.1, page 4, regarding voluntary involvement and implementation.)

Action # 10: Promote recreational experiences that foster watershed stewardship.

The following action items address these goals (as outlined in Section 3): WQ1-4; B1,4,5; HC2-7

Description

Providing a variety of recreational opportunities for citizens and visitors can help foster appreciation of the Tualatin River and its tributaries. The Council will work with other groups to promote activities such as fishing, canoeing, birding, and hiking. These types of activities suit a broad range of participants, can be educational, and will have a low impact on the watershed.

Tasks

- Improve access along the Tualatin River and its tributaries, where appropriate
- Educate users and recreation providers about how to protect riparian areas along stream and river corridors
- Promote partnerships and citizen involvement efforts to address maintenance, funding, safety and river ethics
- Promote restoration, enhancement and monitoring efforts as educational opportunities
- Improve recreational fishing of non-sensitive species

Lead/Sponsor

Audubon Society, Tualatin Riverkeepers, Tualatin Hills and Parks Recreation District, City of Tualatin Parks and Recreation Department, Trout Unlimited, NW Steelheaders, Jackson Bottom Wetland Reserve, Fernhill Wetlands

Resources/Implementation

Existing staff would be used to implement the above tasks

Potential Funding

Tualatin Valley Water Quality Endowment Fund, Metro Greenspaces Program

5.0 Monitoring and Evaluation

The Watershed Council and other partner groups are committed to successful restoration activities and promoting use of best management practices in the Tualatin River Watershed. Monitoring is a crucial component in determining the success of a restoration project or best management practice and in deciding whether a site is returning to a desired, properly functioning natural system. Monitoring project effectiveness also provides a means by which individual land owners and organizations can prove to themselves and others that they have indeed made a difference in the watershed.

Unfortunately, monitoring is often neglected because it requires a long-term commitment of time and resources. Personnel must continuously revisit sites for maintenance and data collection. Periodic evaluation also is necessary to determine whether the restoration project or best management practice is achieving the intended results. The Council will work with project sponsors to develop a monitoring plan for each action item, where appropriate. U.S. EPA's *Monitoring Guidance for Determining the Effectiveness of Nonpoint Source Controls* and protocols from Oregon Department of Environmental Quality will be used to develop monitoring plans. Other agencies, such as the Oregon Department of Fish and Wildlife, will be consulted in developing monitoring plans for fish and wildlife habitat enhancement projects. The Student Watershed Research Project staff also will be recruited to assist with monitoring protocols.

A geographic information system (GIS) database for the Tualatin Watershed was developed. The Tualatin Watershed GIS will be updated on a regular basis to reflect ongoing monitoring information. Adding monitoring data to this GIS database will facilitate analysis and provide a tool for tracking the gap between existing and desired conditions throughout the watershed. This information will be provided on the Tualatin Watershed web site and clearinghouse so that others may learn from activities in the watershed.