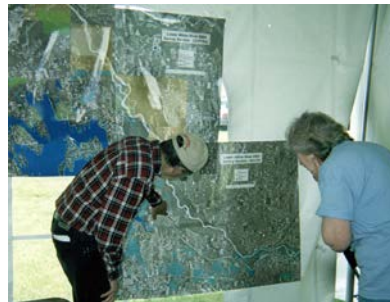


FINAL DRAFT

**Lower White River Biodiversity Management Area
(BMA) Stewardship Plan**



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Introduction

Biodiversity has been defined as the existence of a wide variety of plant and animal species in their natural environments. Maintaining biodiversity is economically valuable because it provides breathable air, drinkable water, food, pollution and pest control, and resilience after natural catastrophes, such as floods and drought.

Biodiversity planning is a method used to identify land areas that provide for a biologically diverse representation of species. This planning method considers long-term ecosystem health and establishes a goal of maintaining adequate habitat to ensure the continued viability of a diversity of species within an ecoregion. Forest, riparian, and wetland habitats provide a full suite of ecosystem services vital to human health and livelihood besides a diversity of species.

Currently fish and wildlife planning methods consist of migratory routes and point locations of species of concern. What is missing is connecting the routes and points together that provide the necessary habitat to sustain all species, not just the rare and endangered ones.

The benefits of biodiversity planning:

- Protects remaining high-quality land cover important for fish and wildlife
- Implements Growth Management Act requirements for Habitat Conservation Areas
- Provides regional connectivity network for fish and wildlife dispersal and migration
- Establishes proactive approach to help avoid future listings under ESA
- Includes all habitat types not just point specific habitats such as wetlands, streams, endangered species locations

Pierce County's biodiversity planning efforts resulted in a Biodiversity Network consisting of 16 Biodiversity Management Areas (BMA). The BMA's are the "best of the best" within Pierce County. The Network is included in Pierce County's Comprehensive Plan Open Space Maps for fish and wildlife. Residents in each BMA automatically qualify for tax incentives.

Maintaining biodiversity within the Network starts with a long-term stewardship plan developed with the citizens and local jurisdictions throughout the County. In 2005 the Crescent Valley BMA was selected by the Pierce County Biodiversity Alliance (PCBA) as the pilot to implement long-term stewardship within the Network. As a result of a year-long effort working with the citizens, the Crescent Valley Stewardship Plan was developed and a community group formed, Crescent Valley Alliance (CVA) to undertake the action items identified in their plan.

The Crescent Valley Stewardship Plan was used as a template for the Lower White River. However, the Crescent Valley BMA falls within unincorporated Pierce County, while the Lower White River BMA lies between unincorporated King and Pierce County, Muckleshoot Indian Tribe, and the cities of Auburn, Buckley, Pacific, and Sumner. Therefore this Plan, although designed as a non-regulatory document for local citizens, has been written to provide a thorough detailed report of what citizens and jurisdictions will need to do to protect, maintain and restore biodiversity over time.

Jurisdictions should be cognizant of the fact that much of the details and terminology may be familiar to them, but this Stewardship Plan is to be also used by the local citizens. Furthermore, if each of the Network's Stewardship Plans uses the same template, they can easily be merged to represent the overall stewardship goals for the entire Biodiversity Network.

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Frequently Used Acronyms

- APD – Agriculture Production District
- BMA – Biodiversity Management Area
- BWH – Backyard Wildlife Habitat
- CLC – Cascade Land Conservancy
- CVA – Crescent Valley Alliance
- COI – Community of Interest
- CWH – Community Wildlife Habitat
- FLWR – Friends of the Lower White River
- GIS – Geographic Information System
- KCCD – King County Conservation District
- NWF – National Wildlife Federation
- PCBA – Pierce County Biodiversity Alliance
- PCCD – Pierce County Conservation District
- PHS – Priority Habitats of Species
- PSAT – Puget Sound Action Team
- PWU – Pierce County Public Works and Utilities
- RM – River Mile
- SMA – Shoreline Master Act
- SMP – Pierce County Shoreline Master Program
- SMR – Pierce County Shoreline Management Regulations
- SYH – Schoolyard Habitats
- TNC – The Nature Conservancy
- TPCHD – Tacoma Pierce County Health Department
- URS – URS Consulting
- WDFW – Washington Department of Fish and Wildlife
- WSU – Washington State University – Pierce County Cooperative Extension Office

Chapter I - Background

Creation of a Biodiversity Plan for Pierce County

The Washington Growth Management Act requires each of the state's 39 counties and their cities to address open space and environmentally sensitive areas in their comprehensive plans. Pierce County's open space planning process includes land areas with the greatest fish and wildlife biological diversity or "biodiversity". The planning method used to identify these biodiversity areas is called "GAP analysis."

GAP analysis is a process of identifying core habitat areas that contain the highest level of species richness and representation remaining across the landscape. The GAP analysis methodology uses the mapping technologies of satellite imagery and the Geographical Information System (GIS) to create a current vegetation map. From that, distribution of wildlife species is derived and areas of high biodiversity are identified. The map is refined or "ground-truthed" with any and all known plant community and wildlife occurrences from WDFW's Priority Habitats and Species and Streamnet databases, the Department of Natural Resources' Heritage and Sensitive Plant Species databases, county natural resource inventories, and local expert biological opinion. This process identified core habitat areas that, along with a surrounding ¼ mile buffer area, provided the framework for the creation of biodiversity management areas (BMAs). BMAs were then connected, often along watercourses, and the resulting coverage became the Biodiversity Network. This information was subsequently incorporated into Pierce County's Comprehensive Plan Open Space Corridors Map.

In January 2000, the first Biodiversity Plan for Pierce County was published¹. The habitat types represented in the Pierce County Biodiversity Network include lowland riparian areas and wetlands, deciduous hardwoods, oak savannahs and prairies, deciduous old-growth forests, and alpine peaks and meadows. Many of these habitats contain imperiled species including Chinook Salmon, Western Gray Squirrel, Bald Eagle, Spotted Owl, Grizzly Bear, Gray Wolf, and Western Pond Turtle. In addition, the Pierce County GAP analysis was conducted using watershed boundaries, rather than jurisdictional boundaries; therefore the Pierce County Biodiversity Network extends into the adjacent counties of King, Kitsap, Thurston, Lewis and Yakima.

In 2003, Pierce County began a finer-level assessment of lands within the Biodiversity Network to provide a groundtruthing of the original network. This assessment included detailed review of each BMA and connecting corridors through the use of recent orthophotography and site visits conducted by a WDFW biologist. The predicted species lists were also updated to add all predicted species including butterflies, introduced species, and known salmonid presence. The result of this assessment was unilateral removal of the ¼ mile buffer placed around the core habitat polygons, re-alignment of all the connecting corridors along watercourses, and a decision to refine the boundaries of each of biologically rich areas to ensure property lines were not bisected and habitats necessary for the long-term survival of the species based on local watersheds were included. The final revised Biodiversity Network identifies 16 biologically rich areas and connecting corridors that cover 267,784 acres of land (Figure 1 – County's Revised BMA network) and 41 percent of the salmonid-bearing streams (Figure 2 – Salmonids). In 2004, the County Council adopted the Pierce County Biodiversity Network Assessment Report², and modified the County's Comprehensive Plan Open Space Corridors Map to reflect this revised data set.

¹ Pierce County GAP Application Pilot Project: A Biodiversity Plan for Pierce County, Washington, January 2000.

² Pierce County Biodiversity Network Assessment, August 2004.

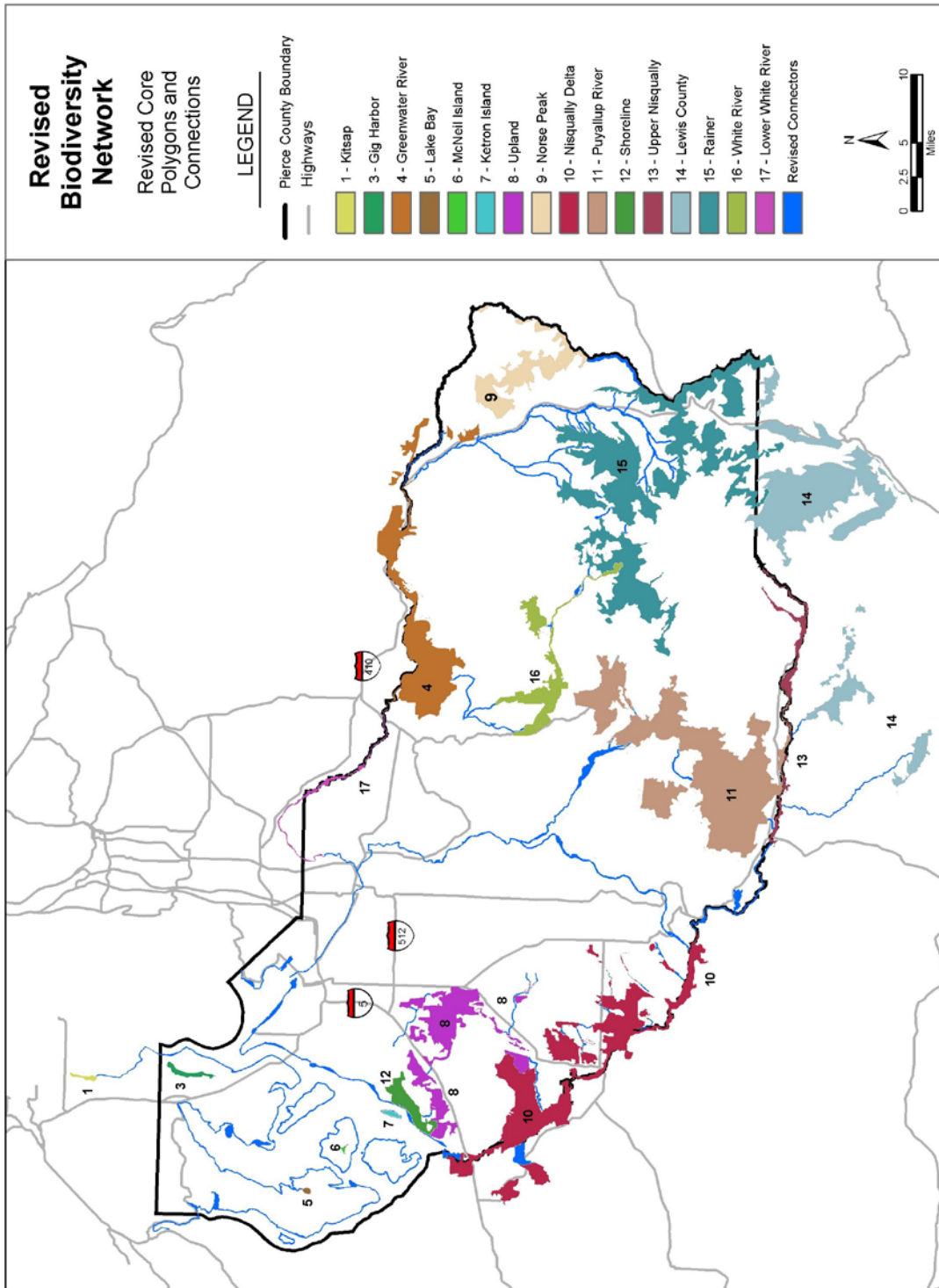


Figure 1. Revised BMA network

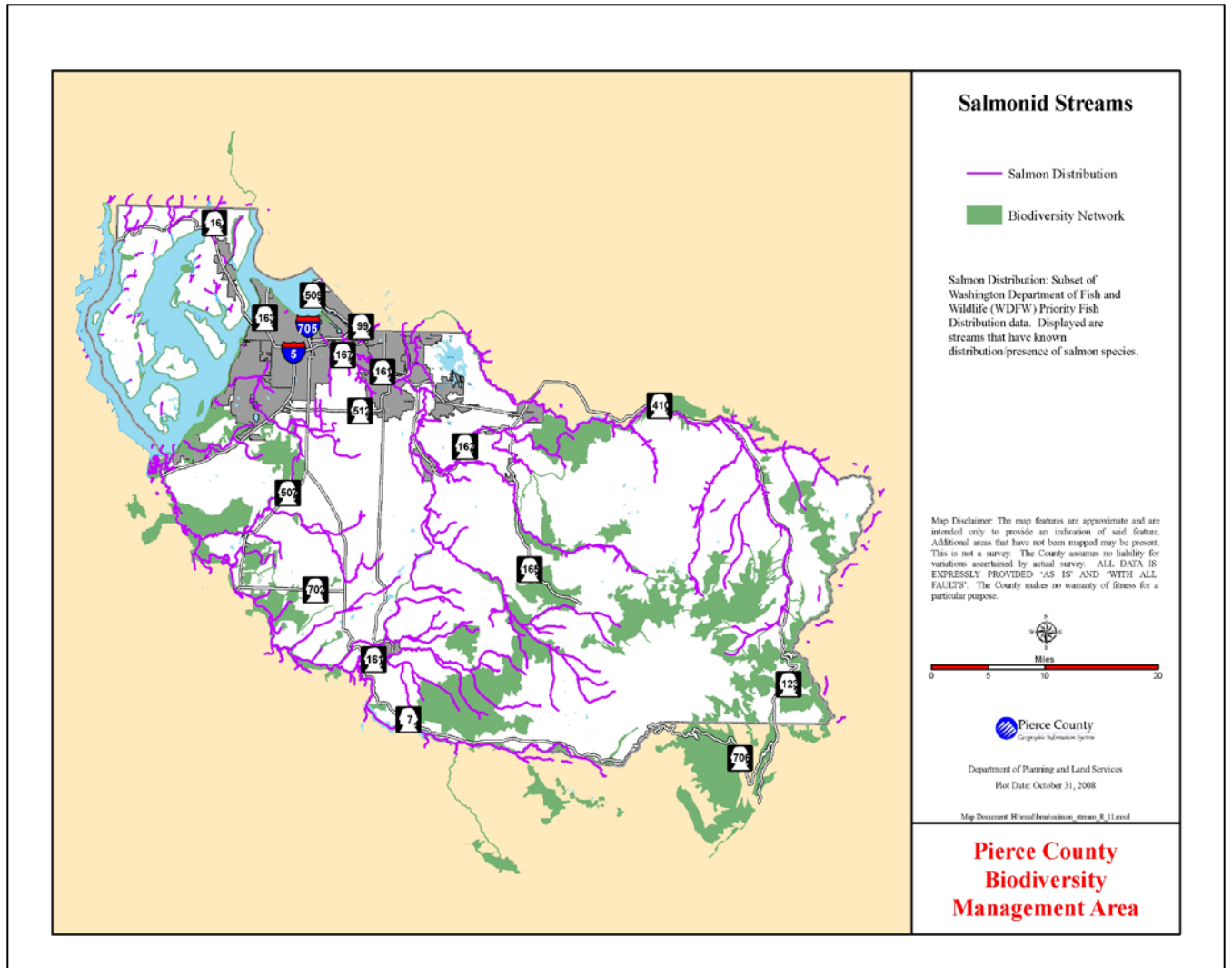


Figure 2. Salmonid presence

In June, 2015 another aerial comparison was made along the LWR BMA and compared with 2008 aeriels. The BMA riparian area showed little change, although the quality of the habitat was not addressed. Previous stream segment surveys along the Lower White River and Lake Tapps Sub-basins as part of Pierce County's White River Basin Plan outlining 100 and 500 year flood zones, ranked streams aquatic habitat and riparian corridor poor or fair along reaches below Auburn. Good/fair reaches were found in unincorporated areas between Auburn and Buckley.

Implementation Strategies for the Biodiversity Network at a County and City Level

Since adoption of the first Pierce County Biodiversity Plan, the County has been using this biodiversity information in relation to land use planning in a variety of ways. The Biodiversity Network coverage has been integrated into the County's Comprehensive Plan Open Space Corridors map. This map has been considered in many community planning processes and within those plans has served as the basis for the creation of lower density zones and the establishment of habitat conservation based design standards, such as **low impact development (LID)** techniques and minimum native vegetation retention. In addition, Pierce County regulations have been changed to recognize lands within the Biodiversity Network as a high priority for various incentive programs such as the Conservation Futures Program and Current Use Assessment Program.

Because the Biodiversity Network was created using watershed rather than political boundaries, King, King, Kitsap, Mason, Thurston, Lewis, and Yakima counties are being notified of the Network and of opportunities to work together for the protection of biodiversity. To date, King and Pierce County Executives have signed a declaration authorizing cooperation on significant, shared boundary natural resources, including the Lower White River. King County Water and Land Resources Division provided information inserted within this report and at the end as a separate chapter.

This multi-pronged implementation strategy is putting emphasis on proactive conservation of multiple species, rather than on reactive restoration of individual threatened or endangered species. This approach helps guide county and city planners in directing more intense development away from identified bio-rich lands and can also guide private and public land conservation purchases or easements and restoration actions.

However, while some progress has been made at a countywide planning level, landscape scale planning documents often fail to implement on-the-ground land use actions that serve to promote long-term conservation in "bio-rich" areas. Thus, the ultimate strategy for implementation is to work directly within each BMA to conduct detailed inventories of the predicted species and habitat; re-evaluate the BMA boundaries at a local watershed scale making sure not to bisect property lines or missing critical features not obvious at the countywide scale the BMA was created; meet with local jurisdictions and property owners to ascertain potential stresses to the system and sources of stress (collectively referred to as "threats") and identify a set of conservation strategies to abate these threats; and develop a set of prioritized actions to reduce or eliminate threats and restore habitat areas that will be implemented by a community group or individual landowners over time.

Pierce County Biodiversity Alliance (PCBA)

In order to accomplish the preservation of biodiversity within Pierce County's Biodiversity Network, a group of dedicated individuals formed an alliance (referred to as the Pierce County Biodiversity Alliance). The Pierce County Biodiversity Alliance (PCBA) is comprised of a unique set of stakeholders, representing governmental, academic and non-profit agencies, who are interested in preserving the long-term biodiversity of Pierce County. Alliance members include Pierce County government; University of Washington - Cooperative Fish and Wildlife Unit; *NatureMapping* Program; NatureMapping Foundation; Washington Department of Fish and Wildlife; Metro Parks Tacoma; Tahoma Audubon Society; Friends of Pierce County; Pierce County Conservation District; Point Defiance Zoological Society; U.S.G.S. - National GAP Program, University of Puget Sound, National Wildlife Federation, Puyallup River Watershed Council; and Forterra. In 2015, the PCBA received funding from the Russell Foundation's 10-year Puyallup River Watershed Initiative. The PCBA members were part of the Initiative's Biodiversity

Community of Interest (COI) for one year in order to complete this document and provide biodiversity educational materials to the other COI's. Other COI's include Forest Lands, Active Transportation, Environmental Education, Industrial Stormwater, Social and Environmental Justice, Just and Healthy Food System, and Economic Development. The COI's have multiple partners that cross into other COI's, thus taking advantage of opportunities that any single COI may not have access to.³

The main emphasis of the PCBA is non-regulatory in nature and instead focuses on public outreach to property owners within the Pierce County Biodiversity Network, providing education and incentive programs to maintain the habitats and biological diversity. The PCBA goal is to establish biological surveys and monitoring programs and facilitate the development of locally derived habitat conservation plans that will provide detailed information on habitat quality and species presence/viability, identification of threats, threat abatement strategies including restoration opportunities, and priorities for conservation and land acquisition for each BMA. And during this process, create a cohesive community group that can work together towards long-term implementation of conservation strategies.

This endeavor advocates responsible land use and success will be achieved when each BMA and connecting corridor retains ecological function given the community's land-use objectives as outlined in their adopted County or City Comprehensive Plan or in their community plan. Any Biodiversity Stewardship Plans adopted by Pierce County are considered a supporting plan to the Comprehensive Plan.

Project Description and Public Participation

The Lower White River BMA is a Puget Sound lowland environment that includes the local jurisdictions Buckley, Auburn, Pacific, and Sumner on the Pierce-King county border. The White River joins the Puyallup River in Sumner, and flows into Puget Sound at Commencement Bay in Tacoma. The BMA covers 1,593.27 acres/2.49 square miles of which 941.39 acres/1.47 square miles are within Pierce County. Ten miles of the Lower White River⁴ (River Miles [RM] 14 to 24) are within the BMA. The river supports several documented salmonid species including Chinook (Federally Threatened, State Candidate), Chum, Coho, Pink, and Steelhead. In particular, the White River Spring Chinook population is considered a priority population in Puget Sound.

On April 29th 2006 a public tour of three sites within the Lower White River (Figure 3) was hosted by the Puyallup River Watershed Council to begin publicizing the biological importance of the Lower White River. In June 2006, the PCBA conducted an intensive 24-hour species verification survey (referred to as a "bioblitz") and community outreach efforts on private lands within the Lower White River BMA. Three sets of teams covered three areas: Buckley, lands east of the Muckleshoot tribal lands, and Auburn/Pacific. The Washington Biodiversity Council⁵ selected the PCBA's work beginning in the Lower White River BMA as one of their two pilot projects and provided funding for the bioblitz. An EPA grant funded the April, 2007 12-hour bioblitz in 3 areas in Auburn and Pacific not adequately sampled in 2006: City of Pacific's Riverside Park, City of Auburn's Game Farm, and Pierce County Water Program's property. Many of the volunteers that were trained for the first bioblitz held in 2005 in the Crescent Valley BMA were the leaders for the 2006 Lower White River bioblitz. These volunteers were trained at a *NatureMapping* workshop on data collection protocols⁶. Additional *NatureMapping* workshops in 2007

³ The Puyallup Watershed Initiative website <http://www.pwi.org/>

⁴ The sections of the Lower White River that did not qualify as a BMA were designated as a connecting corridor.

⁵ The Washington Biodiversity Council's website http://www.landscape.org/washington/partners/biodiversity_council/

⁶ The *NatureMapping* Program trains teachers and citizens to conduct wildlife and habitat assessments, using standardized protocols and methodology, for integration into a statewide biological survey. Data were previously housed at the University

were conducted in preparation for the 2007 bioblitz. There were direct mailings to all property owners within the BMA for each of the three above mentioned events (Figures 3-5) and follow-up telephone contacts. The events also received media coverage through the Tacoma News Tribune, Auburn Reporter, Courier-Herald, and a Rainier Cable broadcast on the local government channel. Beginning in the afternoon of June 2, 2006 bioblitz participants, lead by a Department of Fish and Wildlife staff biologist, utilized the *NatureMapping* Program's NatureTracker data collection and global positioning software to precisely identify where birds, mammals, amphibians, reptiles, insects, aquatic insects, and plants were found and accurately document what species was identified. The Marion Grange on Old Buckley Hwy served as science central headquarters in 2006 and the Auburn Game Farm was science central in 2007. [Five private landowners allowed access to their private property in 2006.] A total of 80 volunteers including taxonomic experts, 5 high school students, and 10 landowners in 2006 and 39 volunteers in 2007 observed 84% of the predicted bird species, 88% of the predicted amphibians, 52% of the predicted mammals, 60% of the predicted reptiles, 5 fish species, 207 invertebrate samples, and 276 plant species.

The information gathered from the field surveys established a benchmark of current species located within the Lower White River BMA and will also contribute to long-term monitoring activity. Species observations recorded during this monitoring will be used to evaluate whether biodiversity conservation strategies are having positive and successful results. Landowners may also use this information when enrolling in Pierce County's Current Use Assessment tax incentive program or making application for a land acquisition using Conservation Futures funding.



The Puyallup River Watershed Council and Pierce County Biodiversity Alliance (PCBA) invite you to learn from the experts about the dynamics of the Lower White River Corridor watershed. Come view the White River as it meanders through hardwood forests home to eagle, osprey, and bear. View elk wintering grounds, amphibian breeding ponds, and more. Learn how responsible land use decisions can combat the threats to biodiversity and retain ecological function while achieving a community's land use objectives. Learn about opportunities for volunteer tax-reduction programs.

1. Site 1: Auburn Game Farm Park – Encompasses ~72 acres of park and open space along the White River, the park is a unique mix of untapped wildlands within an urbanized environment. After an introduction to biodiversity by Michelle Tirhi, state wildlife biologist and PCBA member, we'll search for many species of birds, fish and wildlife. Aaron Nix, Environmental Protection Mgr with the City of Auburn, will discuss Auburn's comprehensive environmental plan and explain his role in helping keep these types of places special in Auburn.

2. Site 2: River Trail Walks – Don Johnson, a private landowner in the Lower White River, will lead a wildlife walk down the river trail where we will seek out beaver, elk beds, and other elk sign. Michelle Tirhi will talk about the upcoming BioBlitz on June 2nd and 3rd where landowners can become biologists for the day participating in frog trapping to eagle nest counts.

Site 3: Wetlands Complex – This is an area where red-legged frogs and wetland dependent birds, especially several species of flycatchers nest. Tony Fuchs, staff biologist from Puget Sound Energy (PSE), will discuss the dynamics of the wetland complex, including the water regime, beaver modifications, and habitats. Chip Nevins, Conservation Director for Cascade Land Conservancy, will talk about plans to acquire a 10 mile stretch (~3,000 acres) of undeveloped PSE-owned land straddling both sides of the White River to preserve it for future generations.

Vans depart from Auburn Game Farm Wilderness Park
Saturday, April 29th 1-4 PM
RSVP required to reserve your seat on the van
Phone 253-863-1860 or ltburgess3@msn.com

Figure 3. Mailing Notice for April 29th Preview Tour in Lower White River BMA



Dear Lower White River Resident:

As a resident of the Lower White River, you know that it's a special place filled with natural beauty and wildlife. This area was recently recognized as a unique place that sustains healthy populations of fish, mammals, birds, reptiles, and amphibians. Pierce County Biodiversity Alliance (PCBA) needs **YOUR** help to better understand the wildlife that lives in the Lower White River watershed.

As a land owner in the Lower White River, you may qualify for a property-tax reduction while you help Washington wildlife. By granting access for a one-day wildlife inventory in the Lower White River watershed, you could become eligible for your county's open-space tax-reduction program. If wildlife were found on your property, a wildlife assessment would increase your tax break and add points to your application. Join Fish and Wildlife biologists and volunteers for a day of fun as they create wildlife assessments of the area.

Pierce County Biodiversity Alliance, in cooperation with the University of Washington, Washington Department of Fish and Wildlife, Metro Parks Tacoma, Puyallup River Watershed Council, Friends of Pierce County, Pierce County Conservation District, Point Defiance Zoological Society, U.S.G.S. National GAP Program, and National Wildlife Federation, will be conducting a wildlife inventory known as a "**Bioblitz**" **from 3:00 p.m. Friday, June 2nd through 3:00 p.m. Saturday, June 3rd**. We are asking you and other property owners for your participation to help make this event a success.

Please note: This inventory is intended for scientific information gathering purposes only and landowners participating in the Bioblitz are under no further obligation or restriction to land-use on their property. The inventory will involve a visual tally of observed wildlife and every effort will be made to avoid impacting any natural or man-made features on the property. Everyone participating in this event is insured, so there is no liability to property owners. Landowners are encouraged but not required to accompany biologists during the inventory.

To participate in the **Bioblitz** of the Lower White River, or if you have questions, please complete the attached form or respond to Michelle Tirhi by email at tirhimjt@dfw.wa.gov or by telephone at 253-813-8906.

Michelle Tirhi
Pierce County Biodiversity Alliance
25644 44th Ave. S.
Kent, WA 98032

Figure 4. Mailing Notice for June 2006 Bioblitz Event in Lower White River BMA



Greetings:

Please join the Pierce County Biodiversity Alliance for BioBlitz 2007: Lower White River – Part 2. Many of you participated in last year's BioBlitz. It was a very fun event and quite successful in terms of wildlife and habitat inventory. An overview is provided at:

http://www.naturemappingfoundation.org/natmap/projects/bma/lower_white_river/.

Formally designated the Lower White River Biodiversity Management Area (BMA), this region is an incredible mix of habitat. Dominated by riparian hardwood, the habitat also includes abundant wetlands, flood channels, seeps, and grasslands. Because of the size of the survey area, there is a need for several BioBlitz events.

This year's BioBlitz will focus on filling in the gaps from last year's event. We will be surveying sites that are more urban, but still important to the wildlife that live there. Additionally, we will be targeting several species that we believe should be found in the BMA but were not recorded during last year's survey. The BioBlitz will occur on Saturday, April 21 from 6:00am to 6:00pm. Team leads will do some additional surveys before and after. Taxa that will be surveyed include: mammal, bird, amphibian, reptile, invertebrate, fish, and plant.

Also this year, in conjunction with the survey work, we will host a special event commemorating Earth Day which will highlight the biological diversity of the Lower White River area. We will be inviting the public and members of the media to Science Central for the latter part of the day to heighten their awareness of the natural world and offer ways to help support biodiversity in their own backyard.

So, the 2007 BioBlitz has three objectives. First, to continue to validate the species predicted to inhabit the area based on modeling conducted as part of our larger Pierce County Biodiversity Network Project. Second, to engage community members in discovering the biological richness of the region. Third, to have a great field day for all participants in one of Western Washington's most scenic areas.

This is an intensive event and our team participants work hard documenting as many species as possible against the clock. The members of the Pierce County Biodiversity Alliance and Puyallup River Watershed Council thank you in advance for your assistance. What a great way to do something meaningful for Earth Day! Please indicate your interest by filling out the attached Participation form and sending it to me as soon as possible. Please contact me if you need additional information. Thank you!

Michele Cardinaux
BioBlitz 2007 Coordinator
1919 S. Tyler Street
Tacoma, WA 98405
(253) 591-6439
michele@tacomaparks.com

Pierce County Biodiversity Alliance (PCBA)
Dedicated to conserving the biodiversity of Pierce County, Washington

Figure 5. Mailing Notice for April 2007 Bioblitz Event in Lower White River BMA

A community meeting was held in November 8, 2006 to present the results of the June bioblitz to the residents in the Lower White River BMA and solicit their help developing long-term biodiversity conservation strategies for this area. The PCBA led a total of four community meetings over four months using the same approach to develop community stewardship plans. However, bad weather and flooding reduced public attendance. Those that did attend were personnel representing multiple jurisdictions within the BMA and didn't need to be educated about conservation planning and terminology. It was decided that the meetings should be postponed until a draft plan was developed and presented to the jurisdictions. The meeting agendas and meeting summaries are attached as Appendix 1.

Implementation of the Lower White River BMA Stewardship Plan

The Lower White River BMA Stewardship planning process includes the development of implementation measures to conserve biodiversity within each jurisdiction included in the BMA. These measures include actions such as property owner enrollment in county tax reduction incentive programs (Current Use Assessment - Public Benefits Rating System) or permanent dedication or purchase of properties as open space (Conservation Futures Program); restoration of native vegetation in areas of degraded habitat (Landowner Incentive Programs, Washington Department of Fish and Wildlife's and National Wildlife Federation's Backyard Wildlife Sanctuary Programs, Pierce County Conservation District's Stream Team); and education on acceptable riparian/wetland land management. Because local jurisdictions may have additional implementation measures that can be applied to their local communities, Chapters VII – XII lists these measures. Chapters VII-XII also customizes proposed action steps for community review.

It should be noted that the Lower White River is not a separate “entity”, but part of the Biodiversity Network continuum between the White River BMA, and the Puget Sound via the Puyallup River. The cities of Sumner and Buckley fall within the Lower White River BMA and along the connectors. Therefore, their stewardship efforts extend into the Network.

As stated above, the PCBA's goal is to create a cohesive network of community groups that can work together towards long-term implementation of conservation strategies outlined in the Stewardship Plan. One group that has formed is the Friends of the Lower White River (FLWR) that will be pursuing funding opportunities to complete action items. To that end the FLWR adopted the following Mission Statement:

Our mission is to protect the biodiversity and health of the Lower White River Basin and its communities through education; supporting scientific research; fostering citizen participation in government; and by buying, and holding in trust for the public good, critical areas, aquatic and riparian wildlife habitats, and other lands of ecological significance.

One easy to implement action within the stewardship plan is the certification of individual backyard wildlife habitats individually through the Washington Department of Fish and Wildlife and/or the National Wildlife Federation, or as a community certification with the National Wildlife Federation. The Crescent Valley Alliance was formed by local citizens that helped create their Biodiversity Stewardship Plan as part of the PCBA's Gig Harbor/Crescent Valley BMA implementation pilot project. The Alliance listed the creation of 50 certified backyard habitats as one of their short-term stewardship action plans and as a community became registered for the National Wildlife Federation's Community Habitat Program in 2008.

National Wildlife Federation - Community Wildlife Habitat Program Certification

National Wildlife Federation's (NWF) community education programs empower homeowners, students, community leaders and businesses to preserve, restore and create sustainable landscapes that support a multitude of wildlife and native plants in their backyards, workplaces, places of learning and other community spaces. NWF supports these efforts through training, print and online resources and recognition through a formal certification process. To certify a habitat through NWF, individuals must provide local wildlife with four basic elements: food, water, cover and places for wildlife to raise their young. To date there are 2,325 certified Backyard Wildlife Habitat (BWH) sites, 50 Schoolyard Habitats (SYH). Homeowners can jointly certify their property with NWF, Washington Department of Fish and Wildlife and NW Zoo and Aquarium Alliance.

The Community Wildlife Habitat (CWH) program is critical to NWF's work in the Puget Sound as it takes the basic elements of the BWH program from the individual backyard to multiple locations throughout a community. Once a community is engaged and interested in taking action to promote healthy habitat, they form a habitat team and, with guidance from NWF staff, set achievable goals that reflect the size and needs of the community; at which point they become formally registered as a Community Wildlife Habitat site. The CWH certification system is points-based and each community earns a certain amount of points that fall within five categories (Registration, Habitat Certification, Education, Community Projects and Administrative Goals). Communities will become Registered as they work towards Certification. There are 11 registered CWH's that include Crescent Valley, Bonney Lake, Edgewood, Brier, Burien, Friday Creek, Mercer Island, Newcastle, Poulsbo, Queen Anne, and Redmond. Certified Community Wildlife Habitats in Washington State grew from 2 (Tukwila and Camano Island) in 2009 to 15 (Alki, Lake Forest Park, Bainbridge Island, Bellingham, Edmonds, Fidalgo Island/Anacortes, Kirkland, Mukilteo, Sammamish, Shoreline, Skagit Valley, Surrey Downs, and Whidbey Island) in 2015.

On average, communities spend three to five years completing their certification goals during which time a certain number of residences, schools and businesses become certified backyard, schoolyard and workplace habitats. Community groups also design and implement an array of locally relevant, habitat-related projects within their communities. Projects include (but are not limited to): stream cleanups, invasive plant removal and native habitat restoration, plant and wildlife rescue, after-school ecology programs, the creation of educational outreach materials and community-sponsored events such as the Tukwila Backyard Wildlife Fair and the Lake Forest Park Dig It! Green Fair.

The Crescent Valley Alliance founding members have certified backyard habitats. Their efforts to convince more residents within the BMA to certify their yards and join their efforts as a Certified Community Wildlife Habitat site have three key components. The first is on an emotional level:

"It causes us to hold ourselves accountable for what we do, and it's created a very emotional, meaningful connection to our land. There is a sense of accomplishment and a feeling that we have done something good for the world and for our kids." ...And that, Lucinda Wingard says, is worth the effort.

The second component is educational. Residents within the BMA signing up for backyard habitat certification through the Crescent Valley Alliance are learning the Biodiversity Stewardship Plan and how they can play a role as stewards. The third component is financial. BMA residents learn about the financial incentives available to them. Some residents have received up to 25% reduction on their property taxes.

Chapter II - Lower White River BMA Overview

General Description of Lower White River BMA

The Lower White River BMA is located along the White River west of the Greenwater River BMA and is approximately 1,593 acres in size. This BMA is located within the Puget Trough ecoregion⁷ (Region 7) and the Puget Sound Douglas-fir vegetation zone (Zone 31). The primary driver habitat for this BMA is riparian habitat (code 533) dominated by hardwood trees and small shrubs. The entire BMA is located within the Puyallup-White River Watershed WRIA 10 (Watershed Resource Inventory Area). Figure 6 depicts the BMA boundary overlaid on ortho-photography mapping of the surrounding area.

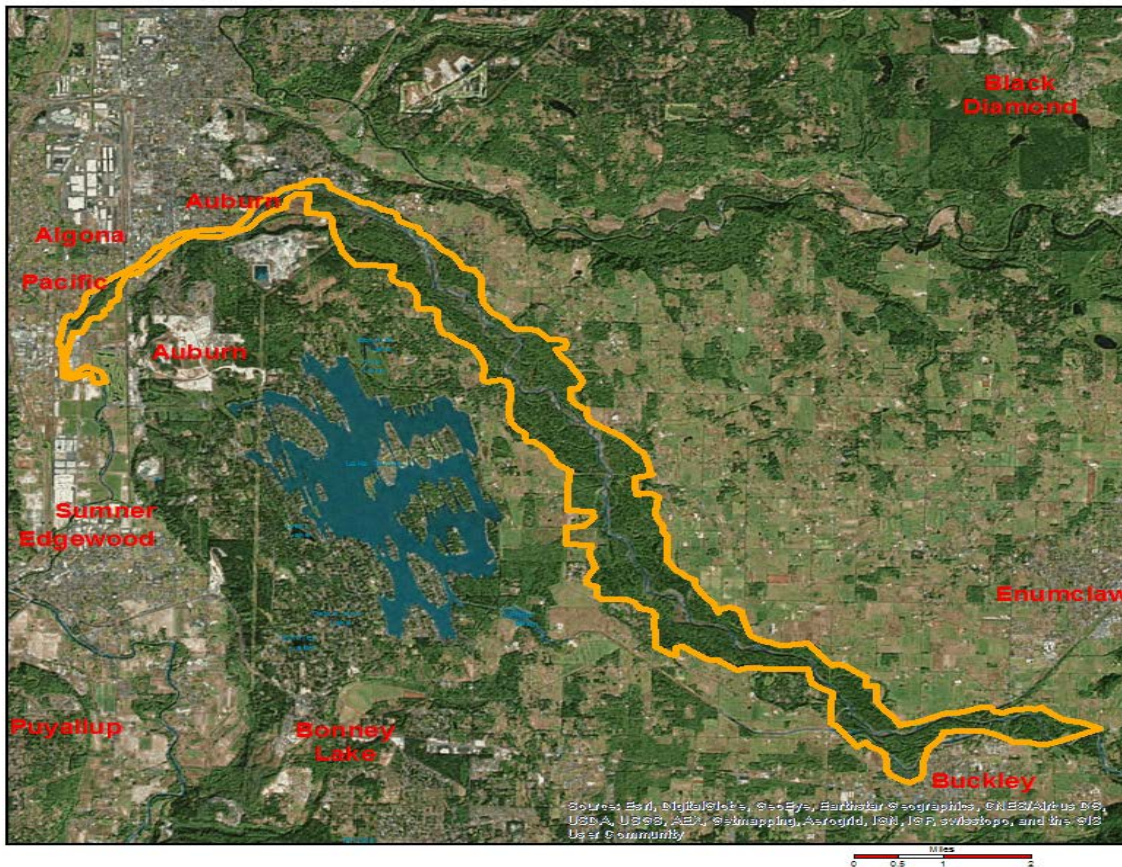


Figure 6. Lower White River BMA

The White River demarcates King County’s southern geo-political boundary. Multiple jurisdictions are present in the BMA in King County including the cities of Auburn, Pacific, and Enumclaw and the Muckleshoot Indian Tribe. King County owns some lands within those other jurisdictions. Additionally, the portion of the BMA that stretches from the Muckleshoot Reservation east to the terminus of the Lower White River BMA is all unincorporated King County. The actual area covered by the BMA that lies within the jurisdiction of unincorporated King County is very limited

⁷ Washington Gap Analysis Project Volume 1 – Landcover of Washington State defines ecoregions as contiguous geographic areas of similar climate and geologic history and vegetation zones as areas in which moisture, temperature, and other environmental parameters combine to create conditions that favor similar vegetation communities. 1997.

The White River Basin Plan Characterization Report⁸ contains the following general description of the physical and biological characteristics of the watershed basin, which also provides a good representation of the Lower White River, as follows:

The White River Basin is divided into 10 sub-basins. The Lower White Sub-basin was established based on the transition from the Cascade foothills to the Puget Sound Lowlands. This sub-basin drains 52 square miles of the plateau formed by the Osceola mudflow and landforms associated with the last glacial advance in the region. The White River flows for 22.5 miles in the sub-basin, dropping in altitude from 620 to 39 feet at the confluence with the Puyallup River. Flooding in the Lower White River Basin is a natural phenomenon that has been mitigated by means of engineered structures (dams and levees). The river flows unconstrained until it reaches Mud Mountain Dam at RM 29.6. The dam, which began operation in 1948, is operated by the U.S. Corps of Engineers to control flooding in the lower Puyallup floodplain. (The Corps of Engineers co-located the Mud Mountain Dam fish passage facility which is a trap and haul program at the Puget Sound Energy (PSE) Diversion Dam. This facility consists of a fish trap, fish ladder and truck transfer facility to load and haul upstream migrants. The transfer process involves trucking the fish to a release point 10 miles upstream and 4 miles above Mud Mountain dam. The Corps of Engineers re-initiated ESA consultation with the National Marine Fisheries Service because the continued maintenance of the existing barrier structure constitutes an impact on listed species that was not considered in the 2007 Biological Opinion)⁹

Pierce County maintains a system of flood control levees along the White River. According to the 2005 Capital Improvement Program (CIP), prepared by Surface Water Management, only 6 percent (1,840 of 29,209 linear feet of levee) on the White River levee system currently provides 100-year flood protection. There are 4,551 acres in 100-year flood zone and an additional 459 acres in the 500-year flood zone. Specific areas with flooding issues include the Red Creek area just downstream of the dam, Muckleshoot Tribe fish hatchery, Buckley Meadows subdivision, Sumner golf course, residences near the intersection of 8th Street and 138th Avenue East and the Sumner sewage treatment plant.

Before 1906, the White River flowed north from Auburn to join the Green River and ultimately discharged into Seattle's Elliott Bay. In 1906, a debris jam blocked the channel of the White River and diverted all the floodwaters away from King County down the Stuck River and south into the Puyallup River. The debris dam was replaced by a permanent diversion wall located at the game farm park in Auburn.

Stream flow in the White River is affected by the Lake Tapps diversion near Buckley. Diverted water is stored in Lake Tapps and eventually returned to the White River via the Deiringer Canal. Lake Tapps was built to create storage for the PSE White River hydroelectric project, which came on line in 1912 and suspended operations in January 2004. Approximately 2.5 miles of earthen dikes and embankments were built around four small natural lakes to create the current Lake Tapps. The dikes are maintained to control flooding. A diversion dam on the White River at RM 24.3 is used to fill the lake. Flooding in November 2006 damaged the structure and spawning salmon had difficulty using the adjacent fish ladder in the fall of 2007. Spawning salmon are trapped at the fish ladder and trucked approximately 5 miles upstream of Mud Mountain Dam.

7 "White River Basin Plan" Pierce County Public Works and Utilities Department – Surface Water Management Division, November, 2013.

⁹ US Army Corps of Engineers, Seattle District website

<http://www.nws.usace.army.mil/Missions/CivilWorks/ProgramsandProjects/Projects/MudMountainDamFishPassage.aspx>

Significant native riparian vegetation exists within the Lower White River riparian corridor despite continued development encroaching from western Pierce and King Counties. The river running through Sumner, Pacific, and Auburn has been channelized in many locations. The cities of Sumner, Auburn, and Buckley are partially located within the floodplain of the river. The floodplain width is variable, ranging from less than 100 to 1,000 feet. The bankfull width e.g. maximum width the stream attains and is typically marked by a change in vegetation or other geological features) ranges from 80 to 500 feet, but the bankfull depth is more consistent and averages 5.5 feet throughout the river. Flood control levees on the White River extend upstream to RM 11.5 but are maintained only to RM 9.4. Segments of the White River have been identified by the Puyallup Tribe as Critical Fishery Rivers and Streams (Pierce County Critical Areas- Type F1: Title 18E40.060B), mandating 150-foot buffers.

When the boundary lines were drawn around the Lower White River BMA, the current river channel was included, but much of the riparian area (including the floodplain) was not. However, that was an oversight due to scale of the original GAP polygons, and the BMA should be changed to include riparian areas, including at a minimum, the entire floodplain. With that said, the changes to the landscape and cities along the river limit the boundary lines extending very far from the river.

From an ecological standpoint, the river cannot be separated from its floodplain. These areas are tightly interconnected, and these connections contribute to biodiversity. The floodplain contains substantial physical diversity, including a mosaic of semi-aquatic habitats, complex micro-topography, and patchy concentrations of moisture and nutrients. The physical diversity of the floodplain is supported by riverine processes such as periodic flooding, channel migration, and sediment deposition. Similarly, the floodplain contributes to the diversity of the river by providing wood and sediment to the channel. These are the raw materials for building instream habitats, and for creating new floodplains. The physical diversity that results from these interactions supports high levels of species diversity in the river, as well as in the floodplain. For example, where the river is rich with wood from the floodplain, the channels are split into multiple threads with abundant cover, pools, edges, and gravels that support diverse communities of fish and insects. Where the floodplain is connected to the river, there is abundant habitat for raptors, songbirds, shorebirds, and waterfowl, as well as small and large mammals and reptiles and amphibians. Floodplains also support high levels of plant diversity, owing to the variable patterns of moisture and resources, and wide distribution of protected refuges. In addition, riparian areas contribute substantially to biodiversity by providing habitat for plants and animals that are not commonly found in uplands.

The Lower White River BMA is narrow and in fact does not fully occupy the extent of the historic floodplain in which it lies. That portion of the BMA in unincorporated King County is even smaller and more limited. All of that area is either active river channel or adjacent riparian forest. King County maintains levees and revetments along the lower White River within the cities of Pacific and Auburn. The river through these reaches is channelized and disconnected from its historic floodplain.

The Setback Levee Feasibility study for the Puyallup, Carbon and White Rivers by Pierce County in 2008 listed 22 sites. There were 6 sites on the White River. Pacific Park project on the west side of the river is underway with King County in the City of Pacific. King County and other partners will also improve the right bank of the river with construction set to begin in 2018. The other 5 sites in the study are north of the City of Sumner, which increases the importance of maintaining riparian habitat for flood control in Sumner.

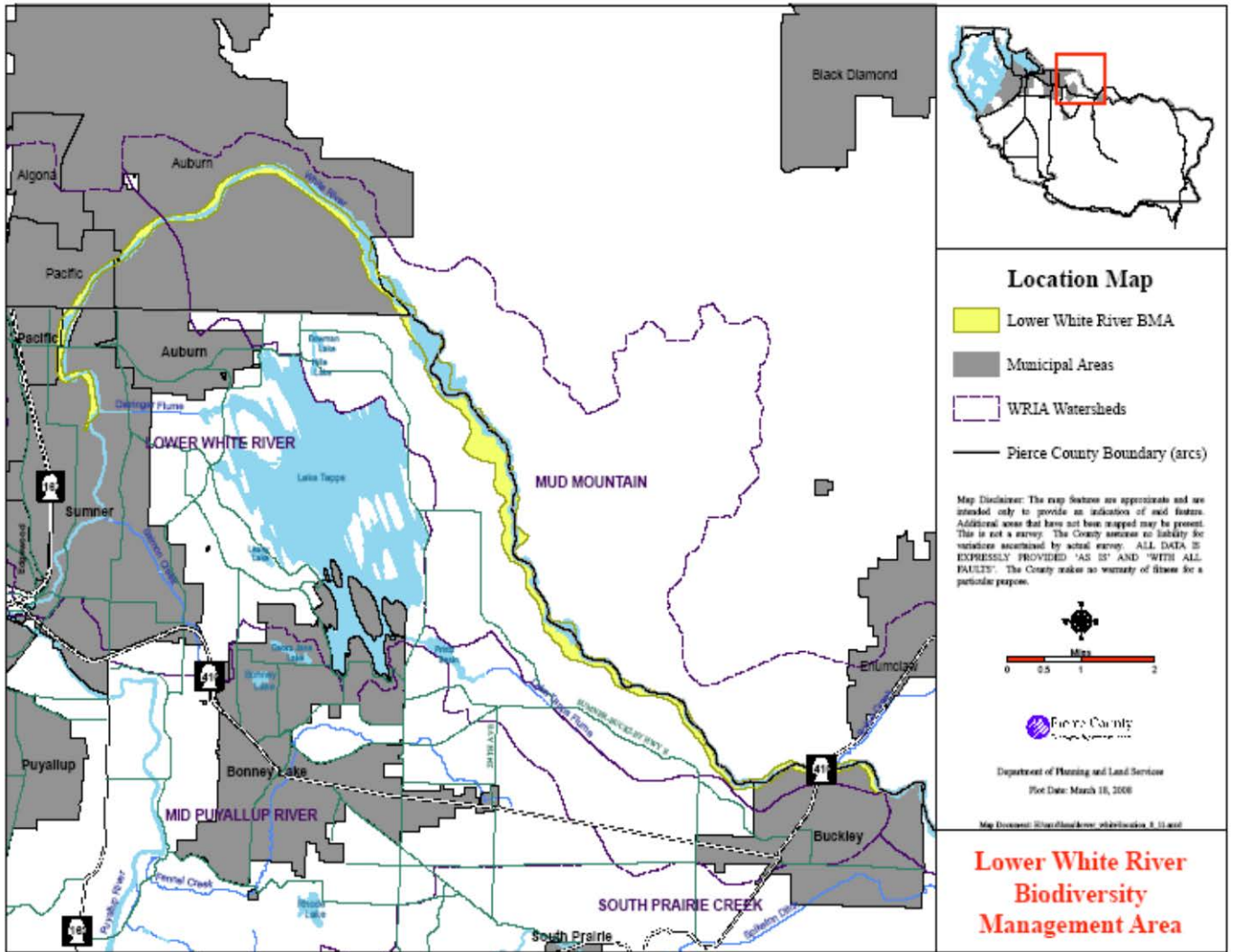


Figure 7. Lower White River BMA Location Map

Current land use is a combination of resource use, residential, civic, vacant, and limited industrial and commercial land use around Sumner, Pacific, and Buckley. In King County, land use is mostly agriculture, tribal lands, and residential around Pacific and Auburn.

Fish and Wildlife Resources

Predicted Wildlife Species (F = federal, S = state, T = threatened, M = monitor, C = candidate, Co = of concern)

The Pierce County Biodiversity Assessment provides a detailed list of predicted species for each of the 16 biodiversity management areas in the biodiversity network. The Painted Turtle is the only trigger species identified for this BMA. There are 6 predicted species listed as at-risk, 16 state or federal listed species and 18 PHS species. The predicted listed species include the Red-Legged Frog (FCo), Western Toad (FCo, SC), Bald Eagle (FT, ST), Great Blue Heron (SM), Green Heron (SM), Olive-sided Flycatcher (FCo), Osprey (SM), Turkey Vulture (SM), Vaux’s Swift (SC), Willow Flycatcher (FCo), Fisher (FCo,

SE), Long-eared Myotis (FCo, SM), Long-legged Myotis (FCo, SM), Pacific Water Shrew (SM), Townsend's Big-eared Bat (FCo, SC), and Yuma Myotis (FCo). A total of 6 amphibians, 85 birds, 46 mammals, and 5 reptiles were predicted (Table 1 – Predicted and Confirmed Wildlife and Fish Species).

The Lower White River supports three salmonid species that are listed as threatened under the Endangered Species Act: Puget Sound Chinook, Puget Sound steelhead, and Coastal-Puget Sound bull trout. The Lower White River is particularly important to Chinook recovery because it is the only population of spring Chinook in south Puget Sound. The Lower White River also supports Pink, Chum, Coho, and Sockeye¹⁰ salmon, as well as Cutthroat trout. The mouth of Boise Creek falls within the BMA on the King County side. Boise Creek supports Chinook, Coho, and Pink salmon, Steelhead, Bull trout, and Cutthroat trout.

8 Gustafson, R.G., T.C. Wainwright, G.A. Winans, F.W. Waknitz, L.T. Parker, and R.S. Waples. 1997. Status review of sockeye salmon from Washington and Oregon. U.S. Dept. Commer., NOAA Tech. Memo. NMFS-NWFSC-33, 282 pp.

**TABLE 1 - PREDICTED AND CONFIRMED WILDLIFE AND FISH SPECIES
FOR THE LOWER WHITE RIVER BMA**

PREDICTED SPECIES Note:			PREDICTED SPECIES Note:		
Species observed but not predicted are italicized	Bioblitz 2006 Survey	Bioblitz 2007 Survey	Species observed but not predicted are italicized	Bioblitz 2006 Survey	Bioblitz 2007 Survey
AMPHIBIANS			BIRDS (Cont'd)		
Bullfrog ^(7,8)	X		Common merganser	X	X
Ensatina	X		Common nighthawk	X	
Long-toed salamander	X		Common raven	X	
Northwestern salamander	X		Common snipe		
Pacific treefrog (Chorus frog)	X		Common yellowthroat	X	
Red-legged frog ⁽³⁾	X		Cooper's hawk ⁽²⁾	X	
Roughskin newt	X		Dark-eyed junco ⁽⁸⁾	X	X
Western toad ^(3,6)	X		Downy woodpecker	X	X
			European starling ⁽⁷⁾	X	
			Evening grosbeak	X	
			Gadwall		
			Glaucous-winged gull ⁽⁸⁾		X
American bittern ⁽²⁾			Golden-crowned kinglet ⁽⁸⁾	X	
American coot		X	Great blue heron ^(3,4,6)	X	X
American crow	X	X	Great horned owl		
American dipper			Green heron (Green-backed) ⁽³⁾	X	X
American goldfinch	X		Green-winged teal		
<i>American kestrel</i>	X		Hairy woodpecker ⁽⁸⁾	X	
American robin	X	X	Hooded merganser ⁽⁴⁾		
Bald eagle ^(3,4,6)	X	X	House finch	X	
Band-tailed pigeon ⁽⁴⁾	X		House sparrow ⁽⁷⁾	X	
<i>Bank swallow</i>	X		House wren		
Barn swallow	X		Hutton's vireo	X	
Barred owl ⁽⁸⁾	X		Killdeer	X	
Belted kingfisher	X	X	Lazuli bunting	X	
Bewick's wren	X	X	Macgillivray's warbler	X	
Black-capped chickadee	X	X	Mallard	X	X
Black-headed grosbeak	X		Marsh wren	X	
Black-throated gray warbler	X		Mourning dove ⁽⁸⁾	X	
Blue-winged teal			Northern flicker	X	X
Brewer's blackbird	X		Northern harrier		
Brown creeper ⁽⁸⁾	X	X	Northern oriole		
Brown-headed cowbird	X		Northern rough-winged swallow	X	
Bushtit	X		Northern shoveler		
California quail			Olive-sided flycatcher ⁽³⁾	X	
Canada goose	X	X	Osprey ⁽³⁾		X
Cedar waxwing	X	X	Pacific slope flycatcher (Western)	X	
Chestnut-backed chickadee ⁽⁸⁾	X	X	Pied-billed grebe ⁽⁴⁾		
Cinnamon teal			Pileated woodpecker ^(6,8)	X	X
Cliff swallow	X				
Common barn-owl	X				

TABLE 1 - PREDICTED AND CONFIRMED WILDLIFE AND FISH SPECIES

PREDICTED SPECIES Note:			PREDICTED SPECIES Note:		
Species observed but not predicted are italicized	Bioblitz 2006 Survey	Bioblitz 2007 Survey	Species observed but not predicted are italicized	Bioblitz 2006 Survey	Bioblitz 2007 Survey
BIRDS (Cont'd)			MAMMALS		
Pine siskin ⁽⁸⁾	X		Beaver	X	X
Purple finch	X		Big brown bat ⁽⁴⁾	X	
Red-breasted nuthatch ⁽⁸⁾	X	X	Black bear		
Red-breasted sapsucker	X	X	Black rat ⁽⁷⁾		
Red-eyed vireo	X		Black-tailed deer ⁽⁴⁾	X	X
Red-tailed hawk	X	X	Bobcat	X	
Red-winged blackbird	X	X	California myotis ⁽⁴⁾	X	
Rock dove	X		Coast mole		X
Ruddy duck			Coyote	X	X
Ruffed grouse			Creeping vole		
Rufous hummingbird	X	X	Deer mouse	X	X
Savannah sparrow	X	X	Douglas squirrel	X	
Song sparrow	X	X	Dusky (Montane) shrew		
Sora			Eastern cottontail ⁽⁷⁾	X	X
Spotted sandpiper ⁽⁴⁾	X		Eastern gray squirrel ⁽⁷⁾	X	X
Spotted towhee (Rufous-sided)	X	X	Elk ⁽⁸⁾	X	
Steller's jay	X		Ermine		
Swainson's thrush	X		Fisher ^(2,3,4)		
Townsend's warbler ⁽⁸⁾		X	Hoary bat	X	
Tree swallow	X	X	Little brown myotis ⁽⁴⁾	X	
Turkey vulture ⁽³⁾	X	X	Long-eared myotis ^(3,4)		
Vaux's swift ^(3,4,6)	X		Long-legged myotis ^(3,4)		
Violet-green swallow	X	X	Long-tailed (Forest) deer mouse	X	
Warbling vireo	X		Long-tailed vole		
<i>Western meadowlark</i>	X		Long-tailed weasel	X	
Western screech-owl		X	Mink ⁽⁴⁾		X
Western tanager ⁽⁸⁾	X		Mole spp.	X	
Western wood-pewee	X		Mountain beaver	X	
White-crowned sparrow	X	X	Mountain lion ⁽⁷⁾	X	
Willow flycatcher ⁽³⁾	X	X	Muskrat	X	X
Wilson's warbler	X		Northern flying squirrel		
Winter wren ⁽⁸⁾	X	X	Norway rat ⁽⁷⁾	X	X
Wood duck ⁽⁴⁾	X		Nutria ⁽⁷⁾	X	
Yellow warbler ⁽²⁾	X	X	Pacific jumping mouse	X	
Yellow-rumped warbler ⁽⁸⁾	X	X	Pacific water shrew ⁽³⁾		
			Porcupine		

TABLE 1 - PREDICTED AND CONFIRMED WILDLIFE AND FISH SPECIES

PREDICTED SPECIES Note:

Species observed but not predicted are italicized

Bioblitz 2006 Survey

Bioblitz 2007 Survey

MAMMALS (Cont'd)

	Bioblitz 2006 Survey	Bioblitz 2007 Survey
Raccoon	X	X
Red fox		
River otter	X	X
Shrew-mole		
Shrew spp.	X	
Silver-haired bat ⁽²⁾		
Southern red-backed vole		
Spotted skunk		
Striped skunk		
Townsend's big-eared bat ^(2,3,4)		
Townsend's chipmunk ⁽⁸⁾	X	
Townsend's mole		X
Townsend's vole	X	
Vagrant shrew		
Virginia opossum ⁽⁷⁾	X	X
Vole spp.	X	
Yuma myotis ^(3,4)	X	

Footnote:

- (1) - Trigger Species - Species that needed additional mapped land cover units to ensure representation within the network
- (2) - At-Risk - Washington Gap Analysis Project (WAGAP) selected species considered to be most at risk of continued or future population declines due to human activities
- (3) - Listed (State or Federal) - Species listed as State endangered, threatened, sensitive, candidate or monitor, as well as species listed or proposed for listing by the U.S. Fish and Wildlife Service
- (4) - PHS - a species defined as priority under the WDFW Priority Habitats and Species (PHS) Program
- (5) - Included based on species significance under the WDFW PHS/Heritage database, although not predicted to occur
- (6) - Included in the Washington Comprehensive Wildlife Conservation Strategy list
- (7) - Current supporting location data
- (8) - Washington Comprehensive Wildlife Conservation Strategy (2005) species recommended for monitoring

REPTILES

Common garter snake ⁽¹⁾	X	X
<i>Northwestern garter snake</i>	X	
Northern alligator lizard	X	X
Painted turtle		
Rubber boa		
Western terrestrial garter snake	X	

FISH

<i>Prickly sculpin</i>	X
<i>Sculpin spp.</i>	X
<i>Speckled dace</i>	X
<i>Western brook lamprey</i>	X

Confirmed Fish and Wildlife Species and Habitats

The WDFW Heritage data indicates point locations within the BMA for the following species: Bald Eagle (FT, ST), Great Blue Heron (SM), Vaux’s Swift (SC), and Western Brook Lamprey (FCo). The WDFW PHS data designates this area as priority habitat for fish resources and small waterfowl. The Pierce County fish presence maps identify several anadromous fish species within the rivers and stream systems in this BMA including Chinook (FT, SC), Chum, Coho, Pink, and Steelhead.

The King County Wildlife Habitat Network, mapped in the County’s Comprehensive Plan, runs through the BMA. The Wildlife Habitat Network is protected in the King County Critical Areas Ordinance as a Wildlife Habitat Conservation Area (WHCA). Other WHCA’s include the nest and designated buffer areas around the nest of certain species, including Bald Eagle, Osprey, Red-tailed Hawk, and Great Blue Heron. Although the White River Hatchery nest has not been surveyed since 2002, there has been unconfirmed reports of a new nest location in that area. On the Pierce County side of the BMA, there are multiple locations of Osprey, Bald Eagle and Great Blue Herons nests near the river and use the river and Lake Tapps as forage habitat. (Figure 8).

During the bioblitz event of June 2006, a variety of species were identified and confirmed within the Lower White River BMA within Pierce County (Table 1 – Predicted and Confirmed Wildlife and Fish Species). Confirmed terrestrial vertebrate species in the Lower White River BMA include 8 amphibian species, 80 bird species, 30 mammal species, and 4 reptile species. Additional species from each group were confirmed during the follow-up bioblitz in June, 2007. A confirmed cougar sighting was reported by the Muckleshoot Tribal biologist within the BMA, although he was not involved in the bioblitz. (Figure 9 - Fish and Wildlife Resources Map.)

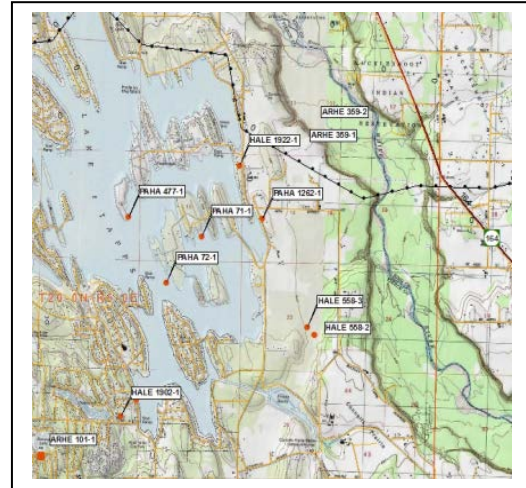


Figure 8 – Bald Eagle, Osprey, Great Blue Heron nest sites

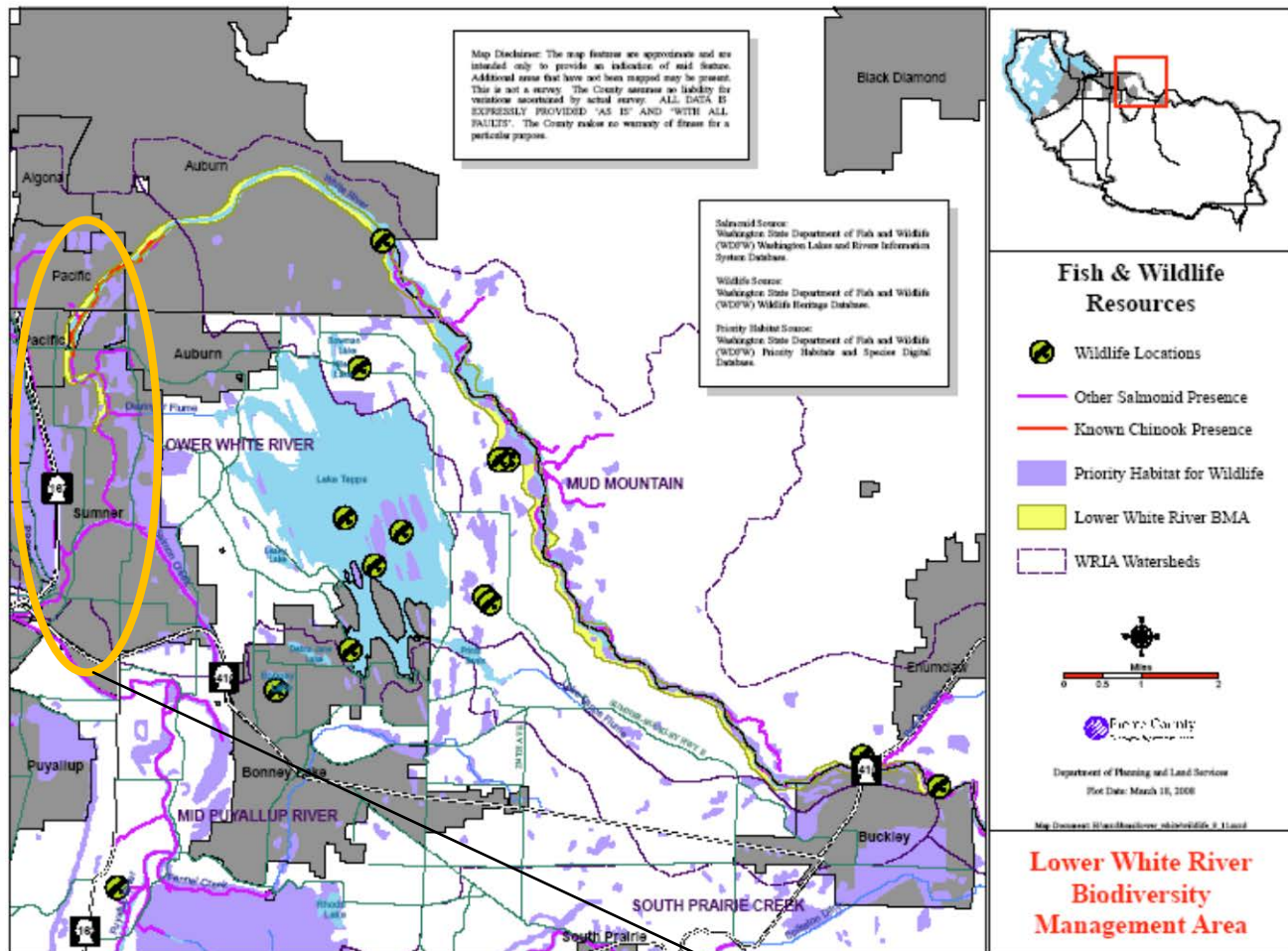
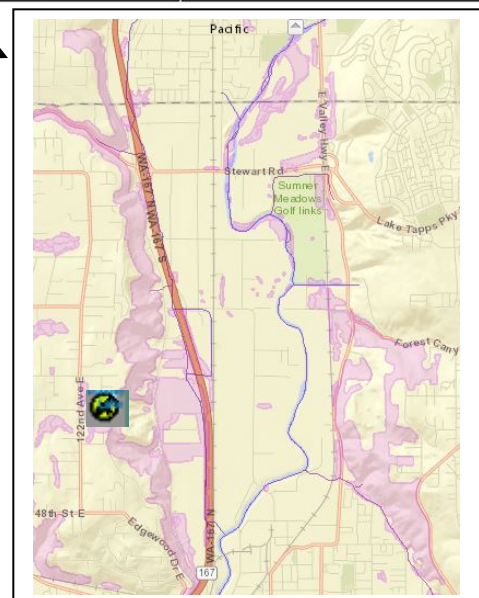


Figure 9. Fish and Wildlife Resources Map

The White River is identified as riparian habitat according to WDFW Priority Habitat and Species Program, and also medium quality riparian salmon habitat. Fall Chinook salmon (FT, SC), Spring Chinook salmon, Coho salmon, Fall Chum salmon, Pink salmon, Sockeye salmon, Bull trout (FT, SC), and Winter Steelhead (FT) fish species have been verified and/or known to occur in the stretch of the White River contained within the LWR BMA¹¹. In addition, the draft White River Basin Plan⁶ includes anadromous runs of Steelhead and coastal Cutthroat trout. Resident coastal Cutthroat trout and Bull trout also are present. Fall-run Chinook, Chum, and Pink salmon spawning occurs



¹¹ Salmon and Steelhead Habitat Inventory and Assessment Program, <http://nwifc.org/about-us/habitat/sshiap/>

primarily below the diversion dam; Steelhead trout and spring-run Chinook salmon primarily spawn above Mud Mountain Dam, outside of the BMA. Coho salmon and coastal Cutthroat trout spawn and rear primarily in tributary streams throughout the basin. Bull trout spawning occurs only in snowmelt-fed tributaries in the upper White River Basin above Mud Mountain Dam. The Muckleshoot Indian Tribe operates the White River Hatchery and the Puyallup Tribe operates 4 spring Chinook acclimation ponds located in the upper White River basin.

Confirmed Invertebrate Species

There are 27 confirmed butterfly species¹² within the Lower White River BMA. The following four butterflies are state-listed: Hydaspe Fritillary (SM), Juba Skipper (SM), Purplish Copper (SM), and Sonora Skipper (SM). The remaining butterfly species include: Anise Swallowtail, Cabbage White, Clodius Parnassian, Echo Blue, Large Wood Nymph, Lorquin's Admiral, Monarch, Mustard White, Mylitta Crescent, Orange Sulphur, Pale Tiger Swallowtail, Pine White, Red Admiral, Ringlet, Sara Orange Tip, Satyr Anglewing, Silvery Blue, Two Banded Checkered Skipper, Western Brown Elfin, Western Meadow Fritillary, Western Tailed Blue, Western Tiger Swallowtail, and Woodland Skipper.

The health of an aquatic ecosystem depends on the health of all its biological components, not just commercially or culturally important species such as salmon. Fish species are supported by the phytoplankton, zooplankton, insects, plants, bacteria, and fungi also inhabiting the waterway.

Benthic (bottom dwelling) invertebrates are effective indicators of the health of watercourses and watersheds. The term "benthic invertebrates" include animals such as aquatic insects (mayflies and stoneflies), snails, clams, crayfish, and aquatic worms. These species represent a diversity of morphological, ecological, and behavioral adaptations to surrounding natural environments (i.e. they have co-evolved with their surrounding ecosystems to preferred locations)¹³. Many factors can affect the types of benthic invertebrates in a system including riparian conditions, thermal regimes, discharge patterns, light penetration, channel gradients, sediment conditions, water, sediment chemistry, and channel stability which is linked to the quantity and size of large woody debris (LWD). Each location along the watercourse continuum will contain a variety of habitats, such as riffles, pools, sloughs, bars, and backwaters, which differ in respect to substrate type and stability, current velocity, and water depth. Each location in the watercourse has a range of natural conditions that, when coupled with environmental requirements of the invertebrate species, determine whether a given organism can live in a particular habitat at a particular point.

These patterns of species distribution are affected by actions that alter the landscape (e.g. wild fires, logging, earthquakes, agriculture, volcanic eruptions, and urbanization), modify hydrologic conditions (changes in evapotranspiration and runoff or construction of reservoirs and irrigation diversions), modify habitats (snagging operations, channel dredging, sedimentation, hurricanes), or add chemicals that are toxic or that elevate nutrient or organic loads. Organisms vary in their tolerance of degradation caused by human actions; some require clean, clear water while others occupy a wide range of conditions (i.e. generally tolerant of the effects caused by human alterations)¹⁴. As the natural environment is altered by human activities, changes start to occur in the type of benthic invertebrate species that inhabit a waterway

¹² Washington State Butterfly Atlas

¹³ Cuffney, T.F., Gurtz, M.E., and Meador, M.R., 1993, Methods for collecting benthic invertebrate samples as part of the National Water-Quality Assessment Program: U.S. Geological Survey Open-File Report 93-406, 66 p.

¹⁴ "Restoring Life in Running Waters," James R. Karr and Ellen W. Chu, 1998 and "Biological Assessment: Using Biology to Measure the Health of Watersheds," James R. Karr.

Those less tolerant to human alterations begin to disappear and others that are more tolerant appear more abundantly or replace other species altogether. In an effort to understand the health of a particular waterway (e.g. creek, stream, river) benthic invertebrate samples are collected at various intervals along the reach to assess the quality of the system. Species are typically categorized in groups including:

- Group 1 - those organisms which are generally pollution intolerant and signify excellent-good water quality including riffle beetle, stonefly, caddisfly, mayfly, and snail;
- Group 2 – those organisms that exist in a wide range of water quality conditions including crane fly, dragonfly, crayfish, sowbug, filtering caddisfly, blackfly, scud, and dobsonfly; and
- Group 3 – those organisms that are generally tolerant of pollution and whose presence generally indicates fair-poor water quality conditions including midge, pouch snail and aquatic worm.

During the bioblitz event of June 2006, 98 terrestrial and 16 benthic invertebrate species were recorded. Eleven of the terrestrial invertebrates were non-native. Ten more terrestrial species were identified in the April 2007 bioblitz (Table 2). The benthic sample size was too small to assess the overall water quality of the Lower White River. However, it was also found to support at least some taxa that are relatively intolerant to pollution. This indicates that general water quality in the river is relatively good.

**TABLE 2 - CONFIRMED TERRESTRIAL AND AQUATIC INVERTEBRATES
FOR THE LOWER WHITE RIVER BMA**

	Order	Family	Genus/Species	Common
Ants	Hymenoptera	Formicidae	<i>sp. 1</i>	Moss Ant
Bees	Hymenoptera	Apidae	<i>Bombus sp.</i>	
Beetles	Coleoptera	Carabidae	<i>Carabus nemoralis</i>	Carabid Beetle
Beetles	Coleoptera	Carabidae	<i>Cicindela oregano</i>	Tiger Beetle
Beetles	Coleoptera	Carabidae	<i>Harpalini sp.</i>	Black Ground Beetle
Beetles	Coleoptera	Carabidae	<i>Nubius sp.</i>	
Beetles	Coleoptera	Carabidae	<i>Scaphinopus sp.</i>	Small Slug Killer
Beetles	Coleoptera	Chrysomelidae	<i>Altica ambiens</i>	Alder Flea Beetle
Beetles	Coleoptera		<i>Cicindela depressula</i>	Ground Beetle
Beetles	Coleoptera		<i>Scaphinotus angusticollis</i>	Ground Beetle
Beetles	Coleoptera		<i>Cychrus tuberculatus</i>	Ground Beetle
Beetles	Coleoptera		<i>Nebria piperi</i>	Ground Beetle
Beetles	Coleoptera		<i>Nebria eschscholtzii</i>	Ground Beetle
Beetles	Coleoptera		<i>Nebria gyenhali</i>	Ground Beetle
Beetles	Coleoptera		<i>Nebria crassicornis</i>	Ground Beetle
Beetles	Coleoptera		<i>Diplous aterrimus</i>	Ground Beetle
Beetles	Coleoptera		<i>Loricara decimpucata</i>	Ground Beetle
Beetles	Coleoptera		<i>Harpalus carbonatus</i>	Ground Beetle
Beetles	Coleoptera		<i>Harpalus seclusus</i>	Ground Beetle
Beetles	Coleoptera		<i>Harpalus affinis</i>	Ground Beetle
Beetles	Coleoptera		<i>Pterostichis algidus</i>	Ground Beetle
Beetles	Coleoptera		<i>Pterostichus creniculus</i>	Ground Beetle
Beetles	Coleoptera		<i>Pterostichus herculeanus</i>	Ground Beetle
Beetles	Coleoptera		<i>Bembidion platinoides</i>	Ground Beetle
Beetles	Coleoptera		<i>Acupalpus</i>	Ground Beetle
Beetles	Coleoptera		<i>Trechus obtusus</i>	Ground Beetle
Beetles	Coleoptera		<i>Tachys</i>	Ground Beetle
Beetles	Staphylidae	Osoriinae		Rove Beetle
Butterflies/Moths	Lepidoptera	Arctiidae	<i>Tyria jacobaeae</i>	Cinnabar Moth
Caddisflies	Trichoptera	Brachycentrusidae	<i>Brachycentridae</i>	
Caddisflies	Trichoptera		<i>Rhyacophila</i>	Caddisfly
Caddisflies	Trichoptera		<i>Lepidostoma</i>	
Centipede	Myriopoda	Lithobiidae	<i>sp. 1</i>	Centipede
Crustacean	Crustacea	Ligiidae	<i>Ligidium gracile</i>	Isopod
Dragonflies	Odonata	Libellulidae	<i>Libellula forensis</i>	Eight Spotted Skimmer
Flies	Diptera	Chironomidae	<i>Chironomidae</i>	
Flies	Diptera	Simuliidae	<i>Simuliidae</i>	
Flies	Diptera	Tipulidae	<i>Tipula</i>	
Flies	Diptera		<i>Chelifera</i>	
Leafhoppers	Hemiptera			Tree Hopper
Mayflies	Ephemeroptera	Baetidae	<i>Baetis tricaudatus</i>	
Mayflies	Ephemeroptera	Heptageniidae	<i>Cinygmula</i>	
Mayflies	Ephemeroptera		<i>Ephemerellidae</i>	
Mayflies	Ephemeroptera		<i>Ameletus</i>	
Mayflies	Ephemeroptera		<i>Caudatella hystrix</i>	
Mayflies	Ephemeroptera		<i>Epeorus longimanus</i>	

**TABLE 2 - CONFIRMED TERRESTRIAL AND AQUATIC INVERTEBRATES
FOR THE LOWER WHITE RIVER BMA**

	Order	Family	Genus/Species	Common
Millipedes	Diplopoda	Parajulidae	<i>sp. 1</i>	Millipede
Millipedes	Diplopoda	Parajulidae	<i>sp. 2</i>	Millipede
Mollusks	Gastropoda	Arionidae	<i>Arion ater</i>	European Black Slug
Mollusks	Gastropoda	Pupillidae		Minute snail
Mollusks	Gastropoda	Sminthuridae	<i>sp. 1</i>	Snail
Sawflies	Hymenoptera			Wood Sawfly
Snails & Slugs	Gastropoda	Agriolimacidae	<i>Deroceras reticulatum</i>	Grey Field Slug
Snails & Slugs	Gastropoda	Arionidae	<i>Ariolimax columbianus</i>	Pacific Banana Slug
Snails & Slugs	Gastropoda	Arionidae	<i>Arion intermedius</i>	Hedgehog Arion
Snails & Slugs	Gastropoda	Arionidae	<i>Arion rufus</i>	Chocolate Arion
Snails & Slugs	Gastropoda	Arionidae	<i>Arion subfuscus</i>	
Snails & Slugs	Gastropoda	Arionidae	<i>Prophysaon vanattae</i>	Scarletback Tailcropper
Snails & Slugs	Gastropoda	Bradybaenidae	<i>Monadenia fidelis</i>	Pacific Sideband
Snails & Slugs	Gastropoda	Corychiidae	<i>Carychium occidentale</i>	Western Thorn
Snails & Slugs	Gastropoda	Daubebariidae	<i>Oxychilus alliarius</i>	Garlic Glass-snail
Snails & Slugs	Gastropoda	Euconulidae	<i>Euconulus fulvus</i>	Brown Hive
Snails & Slugs	Gastropoda	Gastrodontidae	<i>Striatura pugentensis</i>	Northwest Striate
Snails & Slugs	Gastropoda	Haplotrematidae	<i>Ancotrema sportella</i>	Beaded Lancetooth
Snails & Slugs	Gastropoda	Haplotrematidae	<i>Haplotrema vancouverense</i>	Robust Lancetooth
Snails & Slugs	Gastropoda	Helicidae	<i>Cepaea nemoralis</i>	Grow Snail
Snails & Slugs	Gastropoda	Helicidae	<i>Cornu aspersum</i>	Grown Garden Snail
Snails & Slugs	Gastropoda	Limacidae	<i>Limax maximus</i>	Giant Garden Slug
Snails & Slugs	Gastropoda	Polygyridae	<i>Allogona townsendiana</i>	Oregon Forest Snail
Snails & Slugs	Gastropoda	Polygyridae	<i>Cryptomastix devia</i>	Puget Oregonian
Snails & Slugs	Gastropoda	Polygyridae	<i>Cryptomastix germana</i>	Pygmy Oregonian
Snails & Slugs	Gastropoda	Polygyridae	<i>Vespericola columbianus</i>	Northwest Hesperian
Snails & Slugs	Gastropoda	Pristilomatidae	<i>Pristiloma stearnsii</i>	Striate Tightcoil
Snails & Slugs	Gastropoda	Vertiginidae	<i>Columella edentula</i>	Toothless Column
Snakeflies	Raphidioptera		<i>sp. 1</i>	Snakefly
Spiders	Araneae	Agelenidae	<i>Agelenopsis sp. 1</i>	Funnel web spiders
Spiders	Araneae	Agelenidae	<i>Calymmaria sp. 1</i>	Funnel web spiders
Spiders	Araneae	Agelenidae	<i>Cicurina pusilla</i>	Funnel web spiders
Spiders	Araneae	Agelenidae	<i>Cicurina sp. 1</i>	Funnel web spiders
Spiders	Araneae	Agelenidae	<i>Cryphoea exlineae</i>	Funnel web spiders
Spiders	Araneae	Agelenidae	<i>Cybaeus sp.</i>	Funnel web spiders
Spiders	Araneae	Amaurobiidae	<i>Callobius pictus</i>	Spider
Spiders	Araneae	Amaurobiidae	<i>Callobius sp. 1</i>	Spider
Spiders	Araneae	Araneidae	<i>Araneus sp. 1</i>	
Spiders	Araneae	Araneidae	<i>Cyclosa conica</i>	
Spiders	Araneae	Clubionidae	<i>Clubiona sp. 1</i>	
Spiders	Araneae	Clubionidae	<i>Phruotimpus borealis</i>	
Spiders	Araneae	Dictynidae	<i>Dictyna sp. 1</i>	Spider
Spiders	Araneae	Gnaphosidae	<i>Zelotes fratris</i>	Ground spiders
Spiders	Araneae	Hahniidae	<i>Hahnina cinerea</i>	Dwarf sheet spider
Spiders	Opiliones	Ischyropsalididae	<i>Hesperonemastoma modestum</i>	Harvestmen
Spiders	Opiliones	Ischyropsalididae	<i>Sabacon occidentalis</i>	Harvestmen

**TABLE 2 - CONFIRMED TERRESTRIAL AND AQUATIC INVERTEBRATES
FOR THE LOWER WHITE RIVER BMA**

	Order	Family	Genus/Species	Common
Spiders	Araneae	Linyphiidae	<i>Ceratinella sp. 1</i>	Sheeweb weavers
Spiders	Araneae	Linyphiidae	<i>Entelecara acuminata</i>	Sheeweb weavers
Spiders	Araneae	Linyphiidae	<i>Leptyphantes zibus</i>	Sheeweb weavers
Spiders	Araneae	Linyphiidae	<i>Neriere litigiosa</i>	Sheeweb weavers
Spiders	Araneae	Linyphiidae	<i>Wubana pacifica</i>	Sheeweb weavers
Spiders	Araneae	Lycosiadae	<i>Pardosa dosuncata</i>	Wolf spiders
Spiders	Araneae	Lycosiadae	<i>Pardosa vancouveri</i>	Wolf spiders
Spiders	Araneae	Lycosiadae	<i>Tarentula kochii</i>	Wolf spiders
Spiders	Opiliones	Phalangiidae	<i>Leptobunus sp. 1</i>	Harvestmen
Spiders	Opiliones	Phalangiidae	<i>Paraplatybunus triangularis</i>	Harvestmen
Spiders	Araneae	Salticidae	<i>Calticus scenicus</i>	
Spiders	Araneae	Salticidae	<i>Evarcha prozysniskii</i>	
Spiders	Araneae	Salticidae	<i>Neon reticulatus</i>	
Spiders	Araneae	Salticidae	<i>Phania albeolus</i>	Jumping spiders
Spiders	Araneae	Tetragnathidae	<i>Metellina curtisi</i>	
Spiders	Araneae	Tetragnathidae	<i>Tetragnatha laboriosa</i>	
Spiders	Araneae	Theridiidae	<i>Enoplognatha ovata</i>	
Spiders	Araneae	Theridiidae	<i>Theridion bimaculatum</i>	
Spiders	Araneae	Theridiidae	<i>Theridion sexpunctatum</i>	
Spiders	Araneae	Theridiidae	<i>Theridion simile</i>	
Spiders	Araneae	Theridiidae	<i>Theridion tinctum</i>	
Spiders	Araneae	Theridiidae	<i>Theridion varians</i>	
Spiders	Araneae	Thomisidae	<i>Misumena vatia</i>	Crab spiders
Spiders	Araneae	Thomisidae	<i>Ozyptila pacifica</i>	Crab spiders
Spiders	Araneae	Thomisidae	<i>Philodromus dispar</i>	Crab spiders
Spiders	Araneae	Thomisidae	<i>Philodromus josemitensis</i>	Crab spiders
Spiders	Araneae	Thomisidae	<i>Xysticus pretiosus</i>	Crab spiders
Stoneflies	Plecoptera	Chloroperlidae	<i>Sweltsa</i>	
True bugs	Hemiptera			True bug
True bugs	Heteroptera	Miridae		Plant bug
Worms	Oligochaeta		<i>sp. 1</i>	
Worms	Oligochaeta			Earth worms

Confirmed Plant Species

During the bioblitz event of June 2006 plant specialists collected a variety of native and introduced plant species within the Lower White River BMA. A complete listing of 184 native plants is detailed in Table 3. Table 4 provides a list of 98 non-native/introduced plant species.

TABLE 3 - 2006, 2007 LOWER WHITE RIVER BIOBLITZ PLANT INVENTORY

Common name	Scientific name	Plant family
Big-leaf maple	<i>Acer macrophyllum</i>	Aceraceae
Vine maple	<i>Acer circinatum</i>	Aceraceae
American waterplantain	<i>Alisma plantago-aquatica</i>	Alismataceae
Cow parsnip	<i>Heracleum lanatum</i>	Apiaceae
Sweet cicely	<i>Osmorhiza chilensis</i>	Apiaceae
Water parsley	<i>Oenanthe sarmentosa</i>	Apiaceae
Western sweet-cicely	<i>Osmorhiza occidentalis</i>	Apiaceae
Devil's club	<i>Oplopanax horridum</i>	Araliaceae
Wild ginger	<i>Asarum caudatum</i>	Aristolochiaceae
Coltsfoot	<i>Petasites frigidus</i>	Asteraceae
Composite sp.	<i>Composite sp.</i>	Asteraceae
Douglas' sagewort	<i>Artemesia douglasiana</i>	Asteraceae
Hawksbeard sp.	<i>Crepis sp.</i>	Asteraceae
Pearly everlasting	<i>Anaphalis margaritacea</i>	Asteraceae
Suksdorf's sagewort	<i>Artemesia suksdorfii</i>	Asteraceae
White-flowered hawkweed	<i>Hieracium albiflorum</i>	Asteraceae
Yarrow	<i>Achillea millifolium</i>	Asteraceae
Cascade Oregongrape	<i>Berberis nervosa</i>	Berberidaceae
Tall Oregongrape	<i>Berberis aquifolium</i>	Berberidaceae
Vanilla leaf	<i>Achlys triphylla</i>	Berberidaceae
Hazelnut	<i>Corylus cornuta</i>	Betulaceae
Red alder	<i>Alnus rubra</i>	Betulaceae
Forget-me-not	<i>Myosotis sylvatica</i>	Boraginaceae
Small-flowered forget-me-not	<i>Myosotis laxa</i>	Boraginaceae
American wintercress	<i>Barbarea orthoceras</i>	Brassicaceae
Bittercress	<i>Cardamine sp.</i>	Brassicaceae
Field pepperweed	<i>Lepidium campestre</i>	Brassicaceae
Little Western bittercress	<i>Cardamine hirsuta</i>	Brassicaceae
Spring beauty	<i>Cardamine pulcherrima</i>	Brassicaceae
Spring whitlow-grass	<i>Draba verna</i>	Brassicaceae
Butterflybush	<i>Buddleja davidsonii</i>	Buddlejaceae
Different-leaved water-starwort	<i>Callitriche heterophylla</i>	Callitrichaceae
Pond water-starwort	<i>Callitriche stagnalis</i>	Callitrichaceae
Common snowberry	<i>Symphoricarpos albus</i>	Caprifoliaceae
Creeping snowberry	<i>Symphoricarpos mollis</i>	Caprifoliaceae
Orange honeysuckle	<i>Lonicera ciliosa</i>	Caprifoliaceae
Red elderberry	<i>Sambucus racemosa</i>	Caprifoliaceae
Twinberry	<i>Lonicera involucrata</i>	Caprifoliaceae
Twinflower	<i>Linnaea borealis</i>	Caprifoliaceae
Crisped starwort	<i>Stellaria crispa</i>	Caryophyllaceae
Munchkin chickweed	<i>Moenchia erecta (Kozloff)</i>	Caryophyllaceae
Northern starwort	<i>Stellaria calycantha</i>	Caryophyllaceae
Pacific dogwood	<i>Cornus nuttallii</i>	Cornaceae
Red-osier dogwood	<i>Cornus stolonifera</i>	Cornaceae
Pacific stonecrop	<i>Sedum divergens</i>	Crassulaceae
Spearleaf stonecrop	<i>Sedum lanceolatum</i>	Crassulaceae
Western red cedar	<i>Thuja plicata</i>	Cupressaceae
Dewey's sedge	<i>Carex deweyana</i>	Cyperaceae
Henderson's sedge	<i>Carex hendersonii</i>	Cyperaceae

TABLE 3 - 2006, 2007 LOWER WHITE RIVER BIOBLITZ PLANT INVENTORY

Common name	Scientific name	Plant family
Sawbeak sedge	<i>Carex stipata</i>	Cyperaceae
Sedge	<i>Carex sp.</i>	Cyperaceae
Slough sedge	<i>Carex obnupta</i>	Cyperaceae
Small-flowered bulrush	<i>Scirpus microcarpus</i>	Cyperaceae
Woolgrass	<i>Scirpus cyperinus</i>	Cyperaceae
Common horsetail	<i>Equisetum arvense</i>	Equisetaceae
Giant horsetail	<i>Equisetum telmateia</i>	Equisetaceae
Scouring rush	<i>Equisetum hyemale</i>	Equisetaceae
Water horsetail	<i>Equisetum fluviatile</i>	Equisetaceae
Bearberry	<i>Arctostaphylos uva-ursi</i>	Ericaceae
Pacific madrone	<i>Arbutus menziesii</i>	Ericaceae
Pink wintergreen	<i>Pyrola asarifolia</i>	Ericaceae
Red huckleberry	<i>Vaccinium parvifolium</i>	Ericaceae
Salal	<i>Gaultheria shallon</i>	Ericaceae
Single-flowered indian pipe	<i>Monotropa uniflora</i>	Ericaceae
American vetch	<i>Vicia americana</i>	Fabaceae
Clover	<i>Trifolium sp.</i>	Fabaceae
Miniature lotus	<i>Lotus micranthus</i>	Fabaceae
Tiny vetch	<i>Vicia tetrasperma</i>	Fabaceae
Two-color lupine	<i>Lupinus bicolor</i>	Fabaceae
Vetch sp.	<i>Vicia sp.</i>	Fabaceae
Black oak	<i>Quercus sp.</i>	Fagaceae
Bleeding heart	<i>Dicentra formosa</i>	Fumariaceae
Western corydalis	<i>Corydalis scouleri</i>	Fumariaceae
Coast black gooseberry	<i>Ribes divaricatum</i>	Grossulariaceae
Gummy gooseberry	<i>Ribes lobbii</i>	Grossulariaceae
Prickly currant	<i>Ribes lacustre</i>	Grossulariaceae
Red-flowered currant	<i>Ribes sanguinum</i>	Grossulariaceae
Mock-orange	<i>Philadelphus lewisii</i>	Hydrangeaceae
Pacific waterleaf	<i>Hydrophyllum tenuipes</i>	Hydrophyllaceae
Small-flowered nemophila	<i>Nemophila parviflora</i>	Hydrophyllaceae
Daggerleaf rush	<i>Juncus ensifolius</i>	Juncaceae
Field woodrush	<i>Luzula campestris</i>	Juncaceae
Rush sp.	<i>Juncus sp.</i>	Juncaceae
Slender rush	<i>Juncus tenuis</i>	Juncaceae
Small-flowered woodrush	<i>Luzula parviflora</i>	Juncaceae
Soft rush	<i>Juncus effusus</i>	Juncaceae
Cooley's hedge-nettle	<i>Stachys cooleyae</i>	Lamiaceae
Hedge nettle	<i>Stachys sp.</i>	Lamiaceae
Self-heal	<i>Prunella vulgaris</i>	Lamiaceae
Great duckweed	<i>Spirodela polyrhiza</i>	Lemnaceae
Water lentil	<i>Lemna minor</i>	Lemnaceae
Clasping-leaved twisted-stalk	<i>Streptopus amplexifolius</i>	Liliaceae
False lily-of-the-valley	<i>Maianthemum dilatatum</i>	Liliaceae
False Solomon's seal	<i>Smilacina racemosa</i>	Liliaceae
Hooker fairy-bell	<i>Disporum hookeri</i>	Liliaceae
Star-flowered Solomon's seal	<i>Smilacina stellata</i>	Liliaceae

TABLE 3 - 2006, 2007 LOWER WHITE RIVER BIOBLITZ PLANT INVENTORY

Common name	Scientific name	Plant family
White trillium	<i>Trillium ovatum</i>	Liliaceae
Oregon ash	<i>Fraxinus latifolia</i>	Oleaceae
Privet sp.	<i>Liquistrium sp.</i>	Oleaceae
Enchanter's nightshade	<i>Circaea alpina</i>	Onagraceae
Evening primrose	<i>Oenothera biennis</i>	Onagraceae
Fireweed	<i>Epilobium angustifolium</i>	Onagraceae
Rattlesnake-plantain	<i>Goodyera oblongifolia</i>	Orchidaceae
Oregon oxalis	<i>Oxalis oregana</i>	Oxalidaceae
California poppy	<i>Eschscholzia californica</i>	Papaveraceae
2 needle pine	<i>Pinus sp.</i>	Pinaceae
Douglas fir	<i>Pseudotsuga menziesii</i>	Pinaceae
Grand fir	<i>Abies grandis</i>	Pinaceae
Lodgepole pine	<i>Pinus contorta</i>	Pinaceae
Sitka spruce	<i>Picea sitchensis</i>	Pinaceae
Western hemlock	<i>Tsuga heterophylla</i>	Pinaceae
Annual bluegrass	<i>Poa annua</i>	Poaceae
Blue wild rye	<i>Elymus glaucus</i>	Poaceae
Brome sp.	<i>Bromus sp.</i>	Poaceae
Common brome	<i>Bromus vulgaris</i>	Poaceae
Hairy brome	<i>Bromus commutatus</i>	Poaceae
Mannagrass	<i>Glyceria sp.</i>	Poaceae
Nodding trisetum	<i>Trisetum cernuum</i>	Poaceae
Northern mannagass	<i>Glyceria borealis</i>	Poaceae
Pacific brome	<i>Bromus pacificus</i>	Poaceae
Roughstalk bluegrass	<i>Poa trivialis</i>	Poaceae
Water foxtail	<i>Alopecurus geniculatus</i>	Poaceae
Western fescue	<i>Festuca occidentalis</i>	Poaceae
Bracken	<i>Pteridium aquilinum</i>	Polypodiaceae
Deer fern	<i>Blechnum spicant</i>	Polypodiaceae
Lady fern	<i>Athyrium filix-femina</i>	Polypodiaceae
Licorice fern	<i>Polypodium glycyrrhiza</i>	Polypodiaceae
Maidenhair fern	<i>Adiantum pedatum</i>	Polypodiaceae
Oak fern	<i>Gymnocarpium dryopteris</i>	Polypodiaceae
Spreading wood-fern	<i>Dryopteris austriaca</i>	Polypodiaceae
Sword fern	<i>Polystichum munitum</i>	Polypodiaceae
Candyflower	<i>Montia siberica</i>	Portulacaceae
Miner's lettuce	<i>Montia perfoliata</i>	Portulacaceae
Water chickweed	<i>Montia fontana</i>	Portulacaceae
	<i>Montia parvigez (Kozloff)</i>	Portulacaceae
Broadleaved starflower	<i>Trientalis latifolia</i>	Primulaceae
Baneberry	<i>Actaea rubra</i>	Ranunculaceae
Little buttercup	<i>Ranunculus uncinatus</i>	Ranunculaceae
Cascara	<i>Rhamnus purshiana</i>	Rhamnaceae
Baldhip rose	<i>Rosa gymnocarpa</i>	Rosaceae
Black hawthorn	<i>Crataegus douglasii</i>	Rosaceae

TABLE 3 - 2006, 2007 LOWER WHITE RIVER BIOBLITZ PLANT INVENTORY

Common name	Scientific name	Plant family
Blackcap	<i>Rubus leucodermis</i>	Rosaceae
Cherry	<i>Prunus sp.</i>	Rosaceae
Coastal strawberry	<i>Fragaria chiloensis</i>	Rosaceae
Field strawberry	<i>Fragaria virginiana</i>	Rosaceae
Goatsbeard	<i>Aruncus sylvester</i>	Rosaceae
Hardhack	<i>Spiraea douglasii</i>	Rosaceae
Indian plum	<i>Oemlaria cerasiformus</i>	Rosaceae
Large-leaved avens	<i>Geum macrophyllum</i>	Rosaceae
Nootka rose	<i>Rosa nutkana</i>	Rosaceae
Ocean spray	<i>Holodiscus discolor</i>	Rosaceae
Ornamental rose	<i>Rosa sp.</i>	Rosaceae
Pacific crabapple	<i>Malus fusca</i>	Rosaceae
Pacific ninebark	<i>Physocarpus capitatus</i>	Rosaceae
Pacific silverweed	<i>Potentilla pacifica</i>	Rosaceae
Pear	<i>Pyrus communis</i>	Rosaceae
Salmonberry	<i>Rubus spectabilis</i>	Rosaceae
Serviceberry	<i>Amelanchier alnifolia</i>	Rosaceae
Sour cherry	<i>Prunus cerasus</i>	Rosaceae
Thimbleberry	<i>Rubus parviflorus</i>	Rosaceae
Western lady's mantle	<i>Alchemilla occidentalis</i>	Rosaceae
Western lady's mantle	<i>Aphanes arvensis</i>	Rosaceae
Wild blackberry	<i>Rubus ursinus</i>	Rosaceae
Wild strawberry	<i>Fragaria vesca</i>	Rosaceae
Cleavers	<i>Galium aparine</i>	Rubiaceae
Fragrant bedstraw	<i>Galium triflorum</i>	Rubiaceae
Black cottonwood	<i>Populus trichocarpa</i>	Salicaceae
Hooker's willow	<i>Salix hookeriana</i>	Salicaceae
Pacific willow	<i>Salix lasiandra</i>	Salicaceae
Quaking aspen	<i>Populus tremuloides</i>	Salicaceae
Scouler willow	<i>Salix scouleriana</i>	Salicaceae
Sitka willow	<i>Salix sitchensis</i>	Salicaceae
Willow	<i>Salix sp.</i>	Salicaceae
Fringecup	<i>Tellima grandiflora</i>	Saxifragaceae
Leafy miterwort	<i>Mitella caulescens</i>	Saxifragaceae
Youth-on-age	<i>Tolmiea menziesii</i>	Saxifragaceae
American brooklime	<i>Veronica americana</i>	Scrophulariaceae
Purslane speedwell	<i>Veronica peregrina</i>	Scrophulariaceae
Thyme-leaf speedwell	<i>Veronica serpyllifolia</i>	Scrophulariaceae
Water speedwell	<i>Veronica anagallis-aquatica</i>	Scrophulariaceae
Black nightshade	<i>Solanum nigrum</i>	Solanaceae
Common cattail	<i>Typha latifolia</i>	Typhaceae
Stinging nettle	<i>Urtica dioica</i>	Urticaceae
Stream violet	<i>Viola glabella</i>	Violaceae

**TABLE 4 - 2006, 2007 LOWER WHITE RIVER BIOBLITZ PLANT INVENTORY
(* NON-NATIVE/INTRODUCED PLANTS)**

Common name	Scientific name	Plant family
Sugar maple	<i>Acer saccharum</i> *	Aceraceae
Daffodil	<i>Narcissus pseudonarcissus</i> *	Amaryllidaceae
Chervil	<i>Anthriscus scandicina</i> *	Apiaceae
Poison hemlock	<i>Conium maculatum</i> *	Apiaceae
English holly	<i>Ilex aquifolium</i> *	Aquifoliaceae
English ivy	<i>Hedera helix</i> *	Araliaceae
Bull thistle	<i>Cirsium vulgare</i> *	Asteraceae
Canada thistle	<i>Cirsium arvense</i> *	Asteraceae
Common burdock	<i>Arctium minus</i> *	Asteraceae
Common groundsel	<i>Senecio vulgaris</i> *	Asteraceae
Common tansy	<i>Tanacetum vulgare</i> *	Asteraceae
Dandelion	<i>Taraxacum officinale</i> *	Asteraceae
European daisy	<i>Bellis perennis</i> *	Asteraceae
Field sowthistle	<i>Sonchus arvensis</i> *	Asteraceae
Hairy cat's-ear	<i>Hypochaeris radicata</i> *	Asteraceae
Nipplewort	<i>Lapsana communis</i> *	Asteraceae
Ox-eye daisy	<i>Chrysanthemum leucanthemum</i> *	Asteraceae
Spotted knapweed	<i>Centaurea maculosa</i> *	Asteraceae
Tansy ragwort	<i>Senecio jacobaea</i> *	Asteraceae
Wall lettuce	<i>Lactuca muralis</i> *	Asteraceae
Common forget-me-not	<i>Myosotis scorpioides</i> *	Boraginaceae
Yellow & blue forget-me-not	<i>Myosotis discolor</i> *	Boraginaceae
Common mustard	<i>Brassica campestris</i> *	Brassicaceae
Hedge mustard	<i>Sisymbrium officinale</i> *	Brassicaceae
Pepper weed	<i>Lepidium campestre</i> *	Brassicaceae
Shepherd's purse	<i>Capsella bursa-pastoris</i> *	Brassicaceae
Teesdalia	<i>Teesdalia nudicaulis</i> *	Brassicaceae
Thale cress	<i>Arabidopsis thaliana</i> *	Brassicaceae
Common chickweed	<i>Stellaria media</i> *	Caryophyllaceae
Mouse-ear chickweed	<i>Cerastium vulgatum</i> *	Caryophyllaceae
Sticky chickweed	<i>Cerastium viscosum</i> *	Caryophyllaceae
Field morning-glory	<i>Convolvulus arvensis</i> *	Convolvulaceae
Teasel	<i>Dipsacus sylvestris</i> *	Dipsacaceae
Birdsfoot trefoil	<i>Lotus corniculatus</i> *	Fabaceae
Black medic	<i>Medicago lupulina</i> *	Fabaceae
Common vetch	<i>Vicia sativa</i> *	Fabaceae
Cow vetch	<i>Vicia cracca</i> *	Fabaceae
Everlasting peavine	<i>Lathyrus latifolius</i> *	Fabaceae
Least hop clover	<i>Trifolium dubium</i> *	Fabaceae
Red clover	<i>Trifolium pratense</i> *	Fabaceae
Scot's broom	<i>Cytisus scoparius</i> *	Fabaceae
Tiny vetch	<i>Vicia hirsuta</i> *	Fabaceae
White clover	<i>Trifolium repens</i> *	Fabaceae
White sweet-clover	<i>Mellilotus alba</i> *	Fabaceae
Cut-leaf geranium	<i>Geranium dissectum</i> *	Geraniaceae
Dovefoot geranium	<i>Geranium molle</i> *	Geraniaceae
Filaree	<i>Erodium cicutarium</i> *	Geraniaceae
Stinky Bob	<i>Geranium robertianum</i> *	Geraniaceae

**TABLE 4 - 2006, 2007 LOWER WHITE RIVER BIOBLITZ PLANT INVENTORY
(* NON-NATIVE/INTRODUCED PLANTS)**

Common name	Scientific name	Plant family
Horse chestnut	<i>Aesculus hippocastaneum</i> *	Hippocastanaceae
Klamath weed	<i>Hypericum perforatum</i> *	Hypericaceae
Toad rush	<i>Juncus bufonius</i> *	Juncaceae
Creeping Charlie	<i>Glechoma hederacea</i> *	Lamiaceae
Red dead-nettle	<i>Lamium purpureum</i> *	Lamiaceae
Grape hyacinth	<i>Muscari botryoides</i> *	Liliaceae
Spanish squill	<i>Hyacinthoides hispanica</i> *	Liliaceae
Hops	<i>Humulus lupulus</i> *	Moraceae
Watson's willow-herb	<i>Epilobium ciliatum</i> *	Onagraceae
Watson's willow-herb	<i>Epilobium ciliatum watsonii</i> *	Onagraceae
Common plantain	<i>Plantago major</i> *	Plantaginaceae
English plantain	<i>Plantago lanceolata</i> *	Plantaginaceae
Barren fescue	<i>Festuca bromoides</i> *	Poaceae
Bulbous bluegrass	<i>Poa bulbosa</i> *	Poaceae
Common velvet grass	<i>Holcus lanatus</i> *	Poaceae
Early hairgrass	<i>Aira praecox</i> *	Poaceae
English ryegrass	<i>Lolium perenne</i> *	Poaceae
Fowl bluegrass (meadow grass)	<i>Poa palustris</i> *	Poaceae
Italian ryegrass	<i>Lolium multiflorum</i> *	Poaceae
Kentucky bluegrass	<i>Poa pratensis</i> *	Poaceae
Orchard grass	<i>Dactylis glomerata</i> *	Poaceae
Quack grass	<i>Agropyron repens</i> *	Poaceae
Rat-tail fescue	<i>Festuca myuros</i> *	Poaceae
Reed canarygrass	<i>Phalaris arundinacea</i> *	Poaceae
Silver hairgrass	<i>Aira caryophyllea</i> *	Poaceae
Soft brome	<i>Bromus mollis</i> *	Poaceae
Sweet vernalgrass	<i>Anthoxanthum odoratum</i> *	Poaceae
Tall fescue	<i>Festuca arundinacea</i> *	Poaceae
Bohemian knotweed	<i>Polygonum 1. bohemicum</i> *	Polygonaceae
Broad-leaved dock	<i>Rumex obtusifolius</i> *	Polygonaceae
Japanese knotweed	<i>Polygonum cuspidatum</i> *	Polygonaceae
Sheep sorrel	<i>Rumex acetocella</i> *	Polygonaceae
Sour dock	<i>Rumex crispus</i> *	Polygonaceae
Creeping buttercup	<i>Ranunculus repens</i> *	Ranunculaceae
Meadow buttercup	<i>Ranunculus acris</i> *	Ranunculaceae
English hawthorn	<i>Crataegus monogyna</i> *	Rosaceae
European mountain-ash	<i>Sorbus aucuparia</i> *	Rosaceae
Evergreen blackberry	<i>Rubus laciniatus</i> *	Rosaceae
Himalayan blackberry	<i>Rubus discolor</i> *	Rosaceae
Japanese rambler rose	<i>Rosa multiflora</i> *	Rosaceae
Ornamental/cultivated Apple	<i>Pyrus malus</i> *	Rosaceae
Sweet cherry	<i>Prunus avium</i> *	Rosaceae
White poplar	<i>Populus alba</i> *	Salicaceae
Common mullein	<i>Verbascum thapsus</i> *	Scrophulariaceae
Common speedwell	<i>Veronica officinalis</i> *	Scrophulariaceae

**TABLE 4 - 2006, 2007 LOWER WHITE RIVER BIOBLITZ PLANT INVENTORY
(* NON-NATIVE/INTRODUCED PLANTS)**

Common name	Scientific name	Plant family
Field veronica	<i>Veronica arvensis</i> *	Scrophulariaceae
Foxglove	<i>Digitalis purpurea</i> *	Scrophulariaceae
Ivy-leaved speedwell	<i>Veronica hederifolia</i> *	Scrophulariaceae
Moth mullein	<i>Verbascum blattaria</i> *	Scrophulariaceae
Bittersweet nightshade	<i>Solanum dulcamara</i> *	Solanaceae

Demographics, Land Use (e.g. how the land is being utilized) and Growth Potential

It has been recognized that land use and human activities are the primary driver of habitat loss, introduction of exotic species, environmental degradation, and increased runoff and pollutants. These effects are exacerbated in urbanizing landscapes such as Pierce and King Counties where changes are both rapid and permanent. As such, a discussion of the current land use trends within the Lower White River BMA is essential to understanding impacts to the feasibility of retaining biodiversity within this area. The data and tables below reflected current conditions in 2009. After reviewing aerial photography in 2015, it was decided not to re-calculate exact acreage due to 1) the nominal changes within the Lower White River BMA, 2) future changes due to levee work around the City of Pacific through 2019, 3) changes in each of the jurisdictions updated Shoreline Management Plans (2014), and the White River Water Basin Plan (2013) for changes in current and future land use potential. The White River Basin Plan¹⁵ projects future land use to continue as resource use except in the Upper White River Subbasin, where vacant land is projected to develop as residential. Current residential development is limited to 29% of the Upper White River Subbasin. Current commercial land use in the Lower White River Subbasin is estimated to be 2.4% and industrial use 0.4%. Commercial and industrial land use at full build out is projected to increase to 4.1% and 2.2% respectively.

Existing Land Use and Population - Pierce - 2013

There were 94 individual properties (tax parcels) located within the Lower White River BMA and according to year 2000 census data approximately 302 people lived within the BMA. Land use on the Pierce County side of this BMA is predominately for utilities (Puget Sound Energy - 12%). The rest of the breakdown is parks/open space (5%), industrial (3%), low density single-family residential (2%), natural resources (2%) and commercial (.2%). Approximately 16% of the BMA is vacant land (i.e., no building on the parcel), 10% water bodies, and 11% classified as unknown. The remaining 41% are lands within King County. (Figure 10 for Existing Land Use Pierce and King County - 2013)

Existing Land Use and Population - King - 2013

The properties along the White River in unincorporated King County in and adjacent to the BMA are nearly all owned by Puget Sound Energy and all in riparian/floodplain forest (Table 5). Land use on the King County side of this BMA is predominately low density single-family residential (47%) with a few family farms (7%). Approximately ¼ of the BMA (24%) is vacant land. (Figure 10 for Existing Land Use Pierce and King County – 2013)

¹⁵ White River Basin Plan, Pierce County Public Works and Utilities Department – Surface Water Management Division, November, 2013.

Table 5. Land Ownership in the Lower White River BMA within King County (2009)

Land Owner	Acres within BMA
King County	5.4
State of Washington-DNR	2.1
Puget Sound Energy	60.1
Other Private Ownership	15.3
Total	82.9

Table 6 provides a breakdown of existing land use on these parcels by categories such as residential, commercial, industrial, civic, and vacant lands. Note that the figures for King County are for geographic King County, meaning that they are not all in King County government’s jurisdiction.

TABLE 6 – EXISTING LAND USES IN THE LOWER WHITE RIVER BMA					
Land Use	Acreeage (Pierce/King)		Total Parcels		% of the BMA
Single-Family	19.76	387.99	10	103	1.24%
Mobile Homes	6.70	92.92	6	23	0.42%
Total Residential	26.46	480.91	16	126	1.66%
Commercial	3.20	-	5	-	0.20%
Industrial	41.05	26.03	14	1	2.58%
Transportation/Communication/Utility	194.40	1.75	15	2	12.20%
Education (includes schools)	-	7.91	-	1	-
Public & Quasi-Public Facility (churches)	-	7.73	-	1	-
Parks, Open Space, Recreation	74.26	34.43	9	3	4.66%
Natural Resource					
Mining/Quarry/Ore	-	2.84	-	3	
Forestry	24.91	-	5	-	1.56%
Agriculture	-	0.05	-	1	
Total Natural Resource	24.91	2.89	5	4	1.56%

TABLE 6 – EXISTING LAND USES IN THE LOWER WHITE RIVER BMA					
Land Use	Acreage (Pierce/King)		Total Parcels		% of the BMA
Vacant	252.22		30		15.83%
Vacant Single Family		328.75		68	
Vacant Multi-Family		3.92		4	
Vacant Commercial		69.10		4	
Vacant Industrial		0.01		1	
Water Body River/Creek/Stream*	155.07	.97	12	1	9.73%
Unknown	169.82	-	n/a	-	10.67%
TOTAL LOWER WHITE RIVER AREA	1,593.27				100%

* Rivers are considered waters of the state and are not put into parcels. The acreage of Water is higher, but these numbers represent the amount of area in the BMA based within legal parcels.

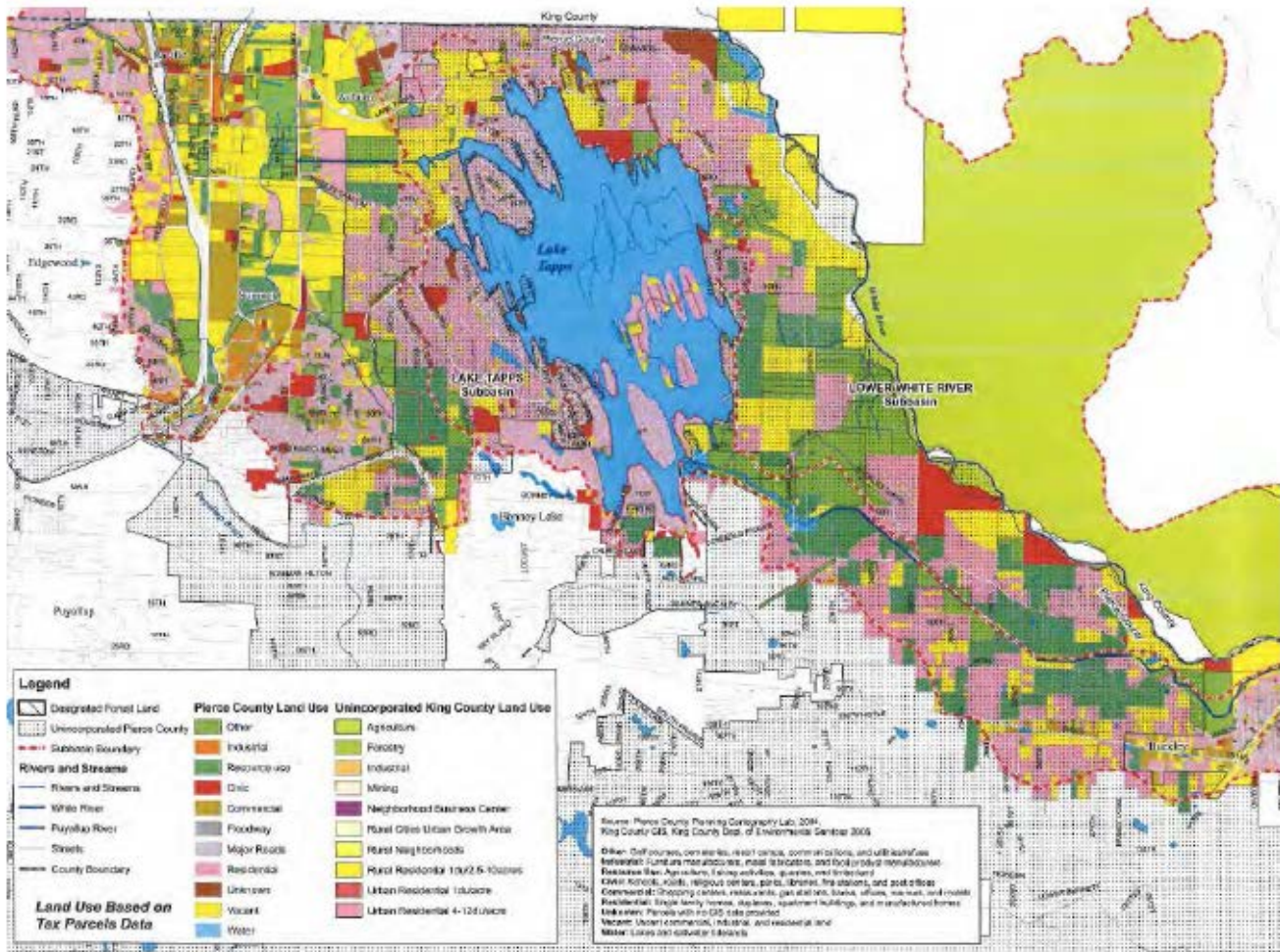


Figure 10 – Existing Land Use Pierce and King County (2013)

There are eighteen properties located within or partially within the BMA that are publicly owned by local, state, and tribal governments. A comparison of 2009 and 2015 showed 3 changes in ownership listed below. The Muckleshoot Tribe owns five properties containing 66 acres. Pierce County owns approximately 40 acres of land on five parcels of land. The City of Pacific owns 26 acres within their City Park. The City of Buckley owns one property, 0.83 acres in size. Segregation and/or merging of 10 “parent” properties including this one took place in 2010. Cascade Water Alliance now owns 2 of the “children” properties after the merge. The City of Sumner owns six parcels for a total of 9 acres. Sumner also went through segregation and/or merging with 4 of the 6 parcels in 2009 and again in 2013. Cascade Water Alliance now owns 1 of the “children” properties after the 2009 segregation and the City of Sumner continues to own the rest of the parcels for the 2009 and all of the 2013 segregation and merging. Table 7 provides a breakdown of publicly owned lands within the Lower White River BMA in Pierce County.

There are twenty-three properties located within or partially within the BMA within geographic King County that are publicly owned (Table 8). Of these, only 3 properties are owned by King County totaling approximately 16 acres are within King County’s jurisdiction.

Current Zoning and Shoreline Environments

Zoning

On the Pierce County side, very small portions of the Lower White River BMA are located within Pacific (14 acres), Sumner (78 acres), and Buckley (69 acres) and the remaining area is located in unincorporated Pierce County. Within unincorporated Pierce County, the BMA is predominately zoned Rural 10 (R10) and Employment Centers (EC). A small portion of a parcel is zoned Agricultural Resource Land (ARL). One change being considered in the 2015 Pierce County Comprehensive Plan Update would add over 53,000 acres of property to Agricultural Resource Lands, by changing the criteria for that designation. The additional acreage would happen via a change in zoning from R-10 to ARL. It is currently unknown how the zoning will shift along the BMA. (Figure 11 – Pierce County Zoning Map)

The Rural 10 zone allows for densities of 1 dwelling unit (du) per 10 acres with a bonus density of 2 du/10 acres when 50% of the property is set aside as permanent open space. Lot sizes within the R10 zone must be a minimum of 1 acre in size. Employment Centers allow a wide variety of industrial uses with some limited commercial uses. The ARL is a resource lands zone that allows densities of 1 du/10 acres with minimum lot sizes of 10 acres. Table 9 provides a breakdown of the zones that apply within the BMA.

Lands in the BMA, as it is currently drawn, in *unincorporated* King County (and outside the Muckleshoot Indian Reservation) are within either the Agriculture Production District (APD) or are in RA-10 zoning (Table 10). The zoning in the APD is A-35: Agricultural, one dwelling unit per 35 acres. The zoning in RA-10 has a 10-acre minimum parcel size, except for smaller parcels that were already established when zoning was established. (Figure 12 – King County Zoning Map).

Figure 13 is an aerial photograph with parcels overlaid in the same area outlined in Figure 12, showing that the landscape still matches the zoning regulations.

TABLE 7 – LOWER WHITE RIVER BMA PUBLIC LANDS (PIERCE & KING COUNTY)				
Parcel Number	Total Area		Area Within BMA Only	
	# Parcels	Acres	# Parcels	Acres
<i>Pierce County</i>				
0520022011	1	12.40	1	12.29
0520123001	1	9.70	1	0.11
0420012003	1	25.98	1	25.29
0420013047	1	8.16	1	2.37
4495400422	1	2.52	1	0.42
Total Pierce County	5	58.76	5	40.48
<i>City of Buckley</i>				
0620344004 *	1	0.83	1	0.17
Total City of Buckley	1	0.83	1	0.17
<i>City of Sumner</i>				
0420121012	1	1.01	1	0.61
0420014059	1	10.89	1	7.24
0420014058 *	1	104.86	1	0.05
0420121003 *	1	5.25	1	0.29
0420121011 *	1	4.74	1	0.96
0420121010 *	1	9.84	1	0.06
Total City of Sumner	6	136.59	6	9.21
<i>Muckleshoot Tribe</i>				
0520023008	1	39.32	1	36.94
0520023012	1	3.20	1	0.13
0520023010	1	10.37	1	10.01
0520023002	1	16.16	1	6.80
0520024000	1	19.17	1	12.41
Total Muckleshoot Tribe	5	88.22	5	66.29
<i>City of Pacific (King)</i>				
3621049077	1	26.40	1	26.40
Total City of Pacific	1	26.40	1	26.40
TOTAL	18	310.80	18	142.55

* - Parcels were segregated/merged

Table 8. Lower White River BMA Public Lands within Geographic King County.

Public Agency	Acres within BMA
King County	251.3
City of Auburn	210.1
City of Pacific	2.2
United States-BIA	36.9
Grand Total	500.6

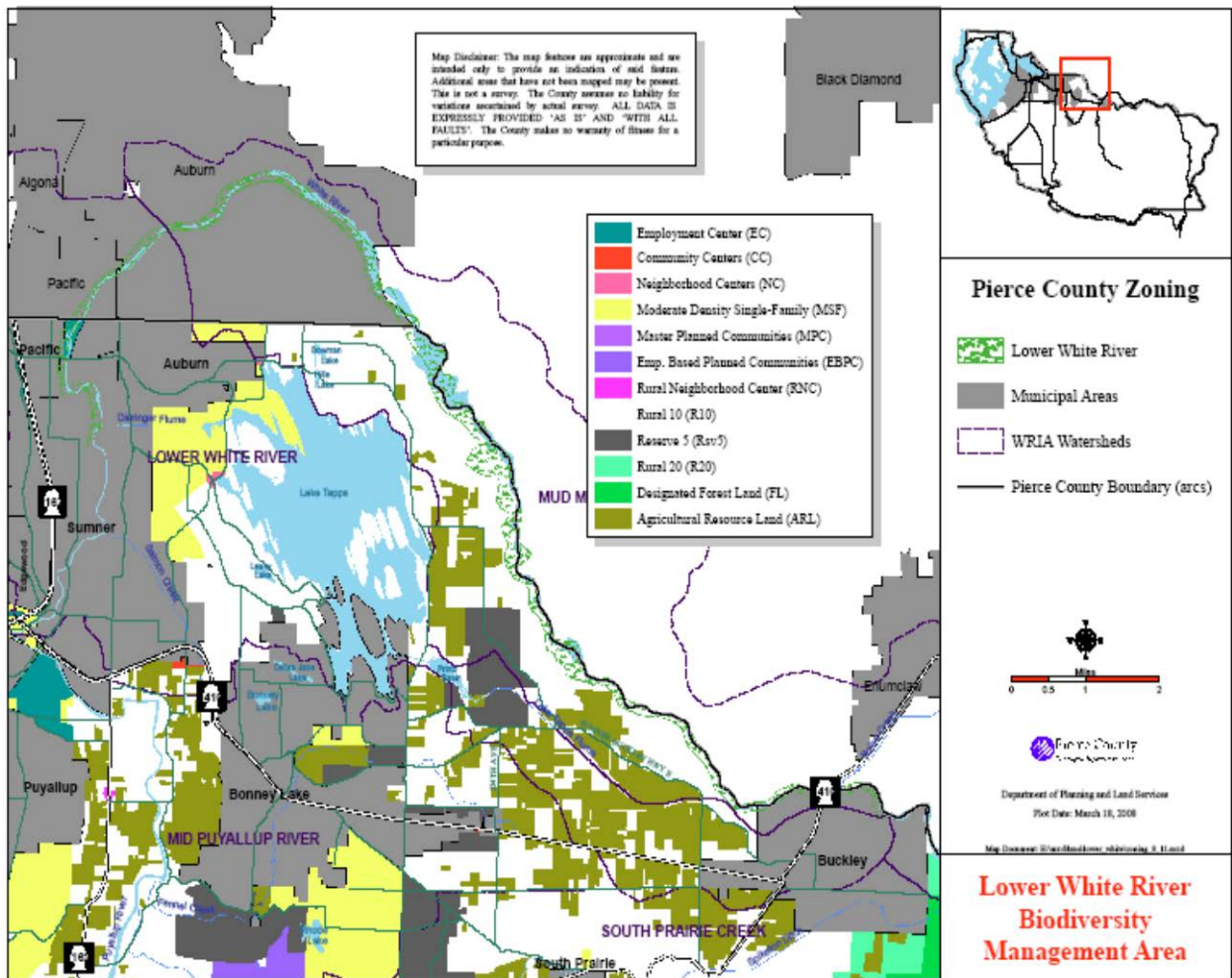


Figure 11. Pierce County Zoning Map (2009)

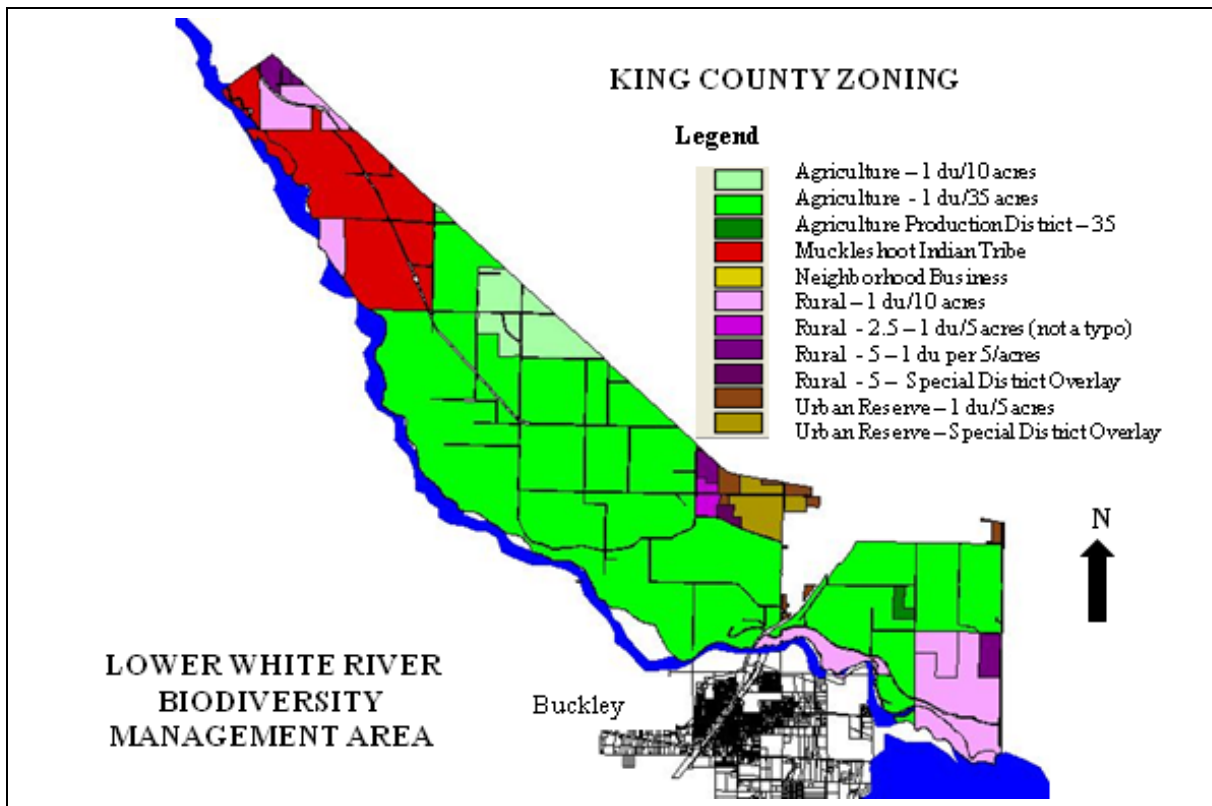


Figure 12. King County Zoning Map (2009)



Figure 13. King County Parcel Map near Buckley (2015)

TABLE 9 - PIERCE COUNTY ZONING CLASSIFICATIONS WITHIN THE LOWER WHITE RIVER BMA (2009)		
Zones	Acreage	Percent of BMA
<i>Urban Zones (unincorporated Pierce County)</i>		
EC	33.00	3.51%
Total Urban	33.00	3.51%
<i>Rural Zones</i>		
R10	747.14	79.37%
Total Rural	747.14	79.37%
<i>Natural Resource Zones</i>		
ARL	0.04	0.00%
Total Natural Resource	0.04	0.00%
Total Pierce County Unincorporated	780.18	82.88%
<i>Pierce County Incorporated</i>		
City of Buckley	69.46	7.38%
City of Pacific	13.80	1.46%
City of Sumner	77.95	8.28%
Total Pierce County Incorporated	161.21	17.12%
TOTAL PIERCE COUNTY	941.39	100%

Table 10. Zoning Classifications within the Lower White River BMA in Geographic King County.

Zoning Classification	Acres in BMA
A-35 (Agricultural Production District)	109.57
RA-10 (Rural, 10-acre minimum parcel size)	83.17
MIT (Muckleshoot Reservation; their zoning applies)	175.02
Grand Total	367.76

Shoreline Environments

The Washington State Shoreline Management Act (SMA) provides for the management of water bodies or watercourses identified as “Shorelines of the State.” Areas under jurisdiction of the SMA include water courses with a mean annual flow of 20 cubic feet per second (cfs), lakes greater than 20 acres in size and the shorelines of Puget Sound. All lands within 200 feet of the ordinary high water mark, and associated wetlands and floodplains, fall within the jurisdiction of Shorelines of the State. The Pierce County Shoreline Management Program (SMP) and companion Shoreline Management Regulations (SMRs) designate Shorelines of the State into five types of environments including Urban, Residential Rural, Rural, Conservancy, and Natural. These environments are similar to zoning designations allowing different land uses, densities and activities ranging from the most intensive uses (Urban) to very limited uses (Natural).

The Puyallup River, White (Stuck) River and Lake Tapps are considered shorelines of statewide significance per Revised Code of Washington (RCW) 90.58.030(2)(e). The majority of the shorelines within the BMA are classified as Rural, Urban, and Conservancy. The classification of Rural shoreline in Pacific and Buckley, allows for areas which are presently used for intensive agricultural and recreation purposes or for those areas having the potential of supporting intensive agricultural and recreational development. This classification is intended to protect agricultural land from urban expansion, restrict intensive development along undeveloped shorelines, and encourage preservation of open spaces. A small section at the west tip of the BMA in Sumner is classified as Urban. Urban shorelines are areas of high intensity land use including residential, commercial and industrial development. These areas are presently subjected to intensive use pressure as well as those areas planned to accommodate urban expansion. However, Sumner must determine an appropriate designation to replace the Urban environment since it is not an established designation per Ecology Guidelines. Most of the river from the Muckleshoot tribe south towards Buckley is classified as Conservancy Environment, which allows for low density residential, outdoor recreation and low intensity agricultural and forestry uses. (Figure 14 -Shorelines Environment Map).

The shoreline in this area within King County is designated as either Natural or Rural shoreline in the 2004 Shoreline Management Master Program. Shorelines were re-designated during an update of the program during 2007-2008, and the new Shoreline Master Program designations include High Intensity, Residential, Rural, Conservancy, Resource, Forestry, Natural, and Aquatic. King County shorelines along the White River in this area are designated Resource Shoreline because they are within the Agricultural Production District (APD). A small area outside the APD near Buckley is designated Conservancy Shoreline. According to the code, the Resource shoreline designation is applied to allow for mining and agricultural uses on lands that have been designated under the Growth Management Act as agricultural land of long-term commercial significance or mineral resource lands. The Conservancy designation is applied to protect and conserve the shoreline for ecological, public safety, and recreation, purposes. It includes areas with important ecological processes and functions, valuable historic and cultural features, flood and geological hazards, agricultural and mineral resource lands, and recreational opportunities. Residential areas can be designated as conservancy shorelines. (Figure 15 – Shoreline Designations Map).

Open Space Corridors

Pierce County identifies land areas most desirable for open space purposes (Figure 16 - Open Space Corridors Map). These areas represent the highest priority for lands for conservation including creeks, wetlands, and fish and wildlife habitat areas. The Lower White River BMA is included within the County’s Open Space Corridor map because of its status as a biodiversity management area and because of the White River. Identified open space corridor areas may be used as the basis for application of special zoning that provides for greater environmental protection and less density. For example, Pierce

County has applied a Rural Sensitive Resource (RSR) in rural areas (i.e. at least 50% of a parcel must fall within the open space corridor) and a Residential Resource (RR) in urban areas. In addition, extra points under Pierce County's Current Use Assessment and Conservation Futures Programs are awarded to properties located within the open space corridor. All of these new environmentally sensitive zones were created as a result of the BMA work.

Future Growth Potential

Figure 17 – Potential Development Map indicates the parcels of land in 2009 located within the Lower White River BMA that have a potential to subdivide and create additional lots. Each of these parcels is represented with an ID number. Table 8 provides a list of these parcels and indicates the parcel acreage, the potential total lots and the potential additional number of lots that may be possible given the Rural 10 zones provision for a maximum of two dwelling units per 10 acres if 50% of the property is set aside as open space. Given the County's provision for rounding up to the next whole number for anything greater than .5 any parcel of land greater than 7.5 acres would be able to subdivide. Of the 37 parcels of land within the Lower White River BMA, there are currently 33 parcels that could be subdivided with no bonus density for a potential total of 275 additional new lots. If landowners used the bonus density, those parcels could be subdivided for a potential total of 308 additional new lots. A review of the parcels in 2015 show 4 parcels marked with an * were segregated/merged into new lot sizes. Puget Sound Energy sold 3 parcels to the City of Buckley and 2 to Cascade Water Alliance. No other changes took place.

Figure 18 – Potential Property Acquisition in the White River Floodplain Map is part of the White River Basin Plan, Vol. 1 adopted November 26, 2013. With the issues of flooding along the White River, this potential property acquisition map is part of Pierce County's 2020 Sustainability Goals¹⁶ - Climate Change Resilience to

1. Continue to partner with cities, local Tribes, the agricultural community and recreation community to compete for Floodplains by Design dollars at the State level.
2. Reduce flood risk to buildings by elevating 20 low and at risk buildings to freeboard standards or by removing them from the floodplain.

There could be additional development potential within the incorporated cities given what their zoning is and what the development provisions are for those zones. The segregation and merging of parcels in the cities of Buckley and Sumner in 2009 and again in 2013 may either increase additional development potential or provide more protection to the shoreline of the Lower White River. If developed each of these lots could support a new residential home, associated driveways, and accessory structures along the river on the Pierce County side. Of the White River Basin, the Lower White River sub-basin has the highest percentage (14%) of impervious surface with a projected increase to 20% future land use converting open space to residential and commercial uses. This projected increase would be with the potential new lots within the Lower White River BMA. Therefore, any property acquisition along the river by Pierce County would minimize the conversion of open space.

¹⁶ Pierce County Sustainability 2020 Plan website <http://www.co.pierce.wa.us/index.aspx?NID=2058>

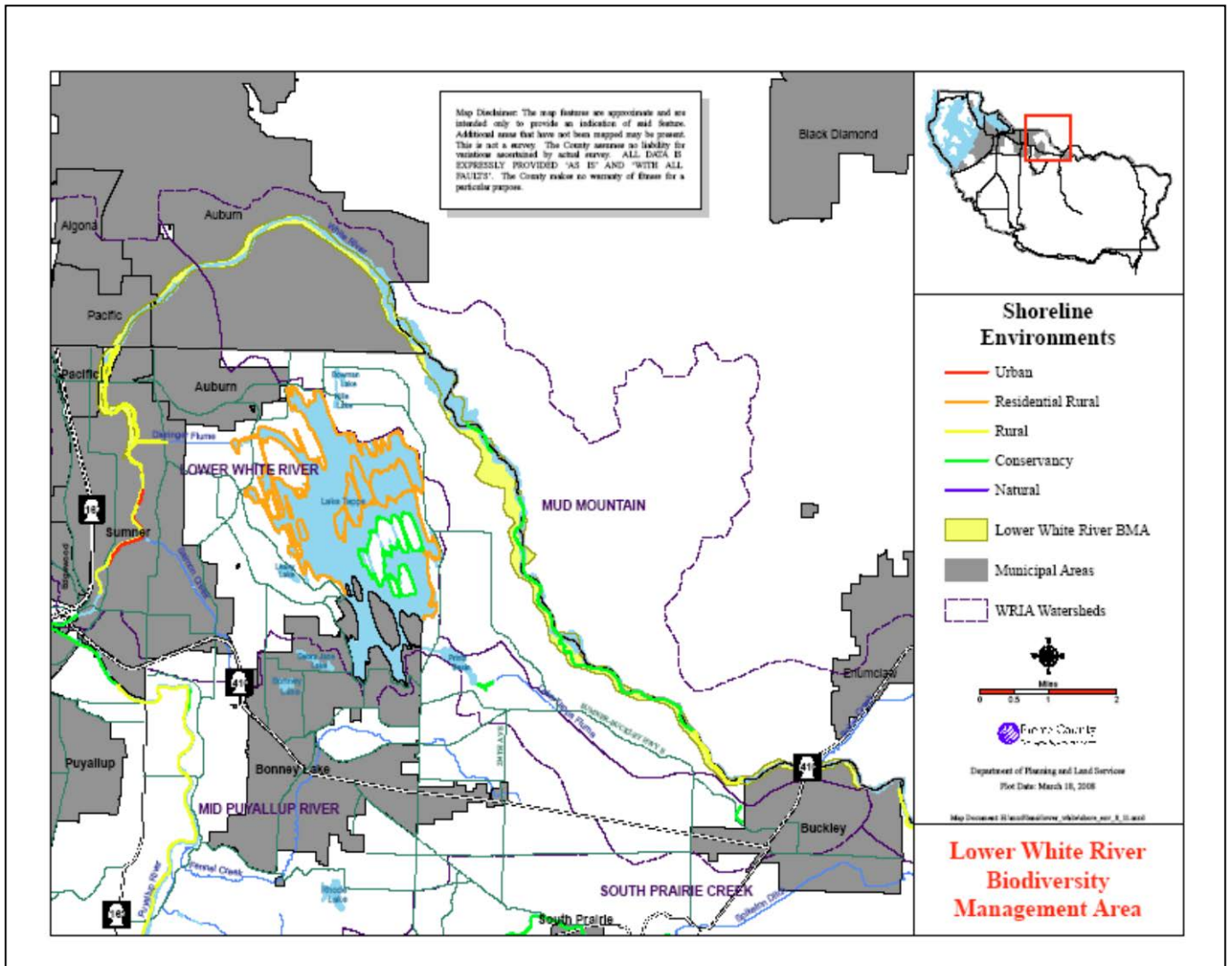


Figure 14. Shoreline Environments Map – Pierce County

Over 260 towns, cities and counties are required to comprehensively update their Shoreline Master Programs. Most local programs have not been fully updated in over 30 years. Pierce County’s Plan is still being updated. King County’s Plan was completed in January, 2013.

The cities located within the Lower White River have completed their plans:

- Auburn - May, 2009
- Pacific - March, 2013
- Buckley - June, 2013
- Sumner - December, 2014

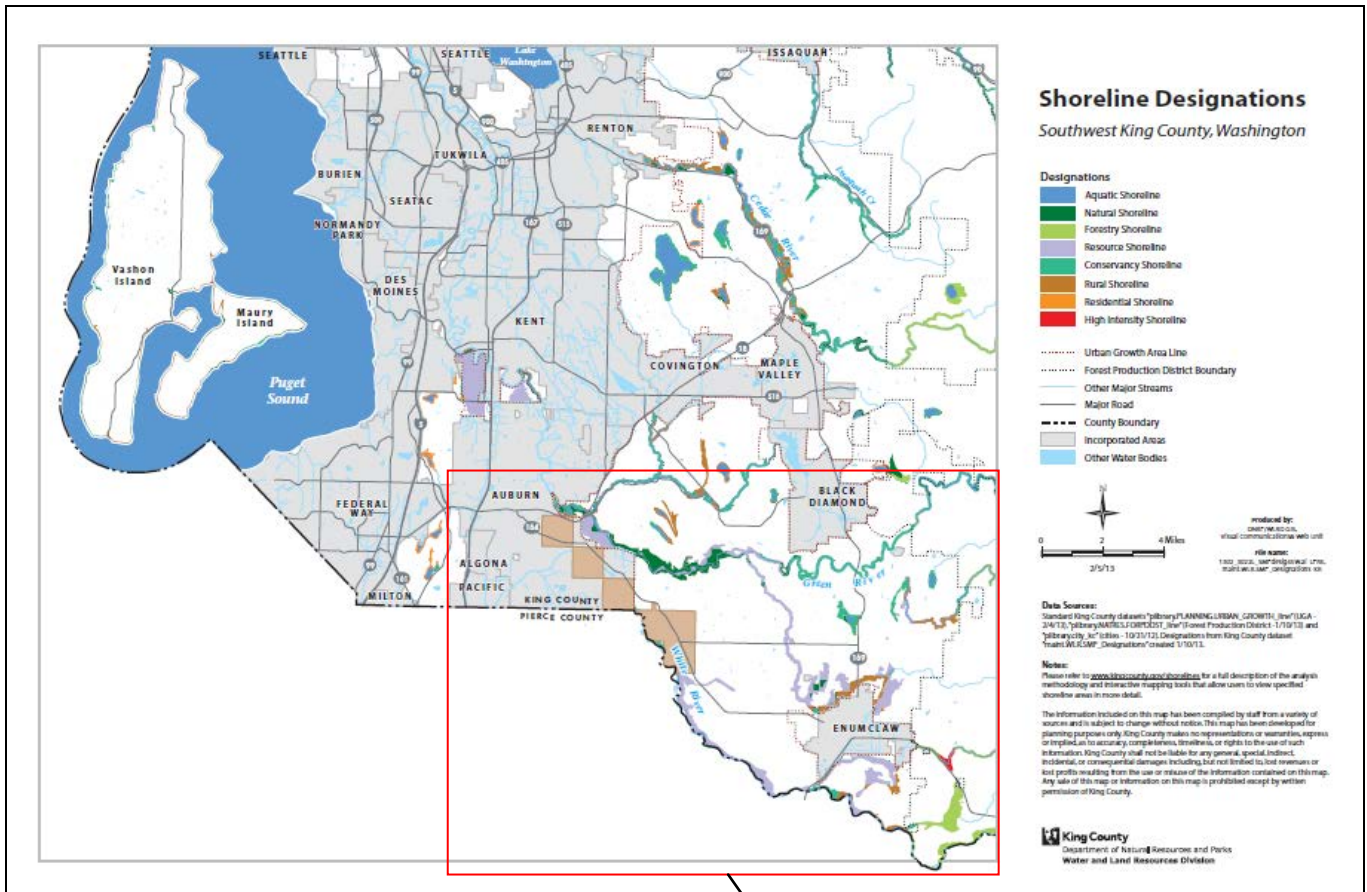
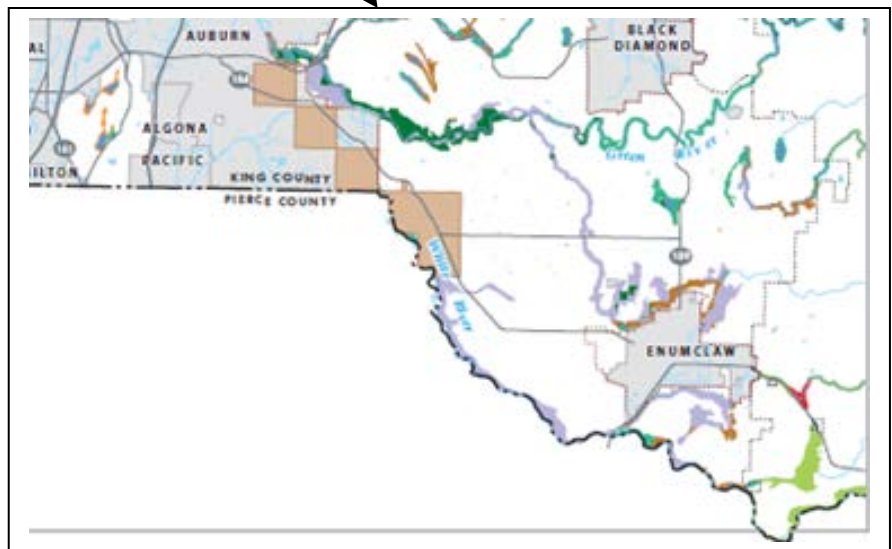


Figure 15. Shoreline Designations Map – King County



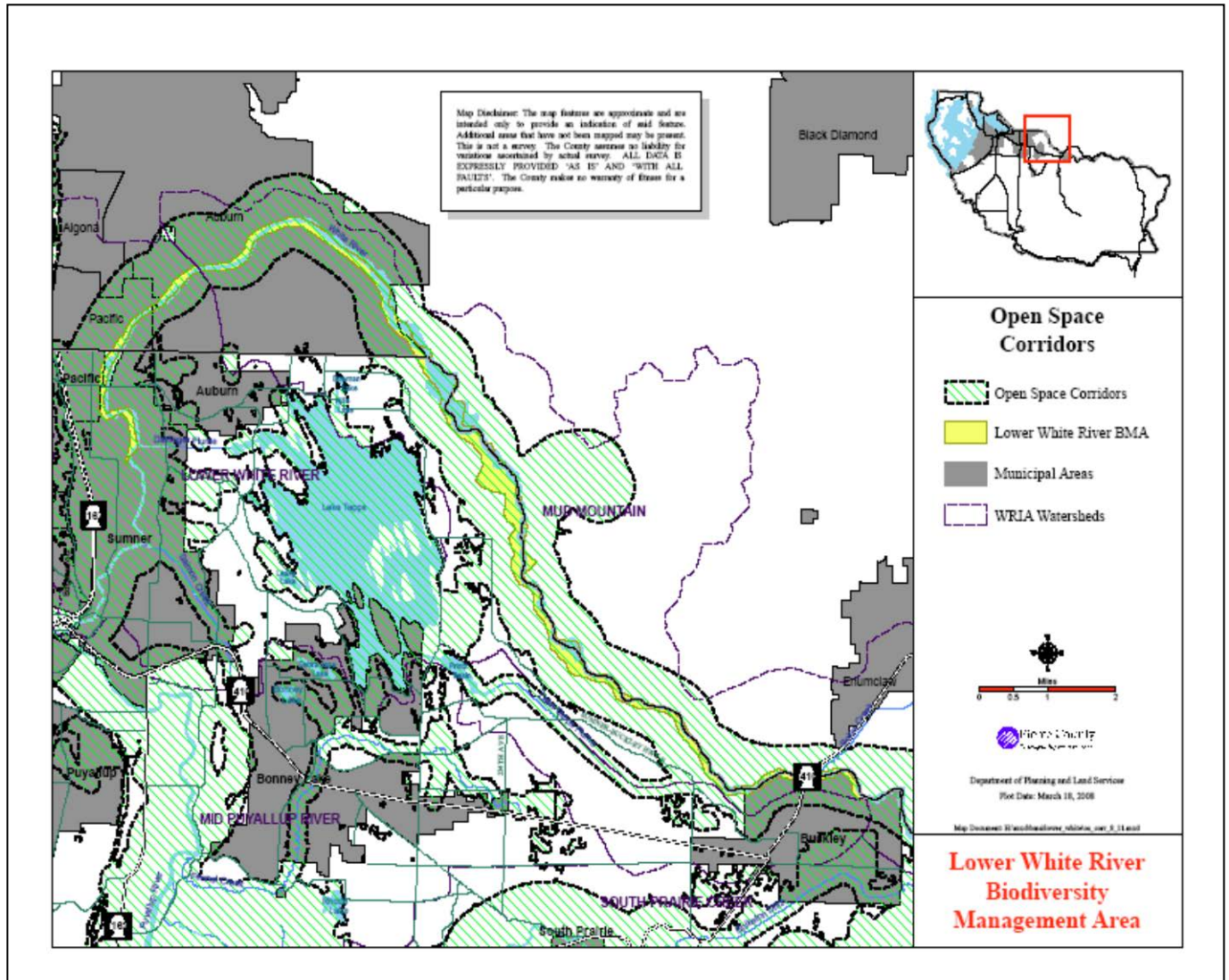


Figure 16. Open Space Corridor Map

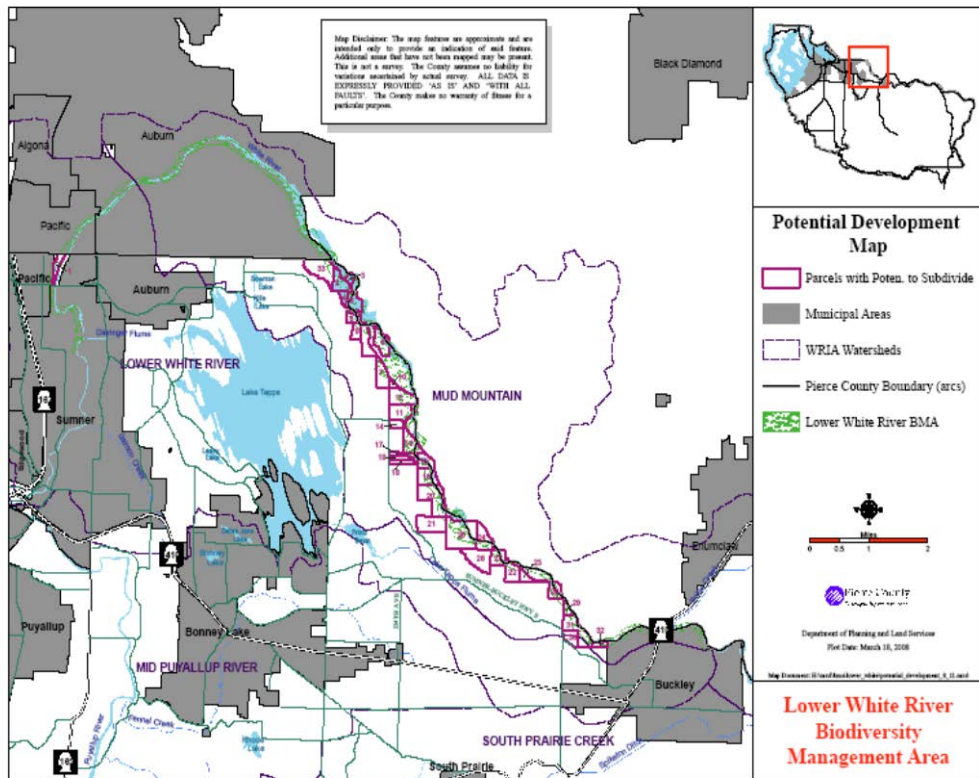


Figure 17. Potential Development Map – Pierce County

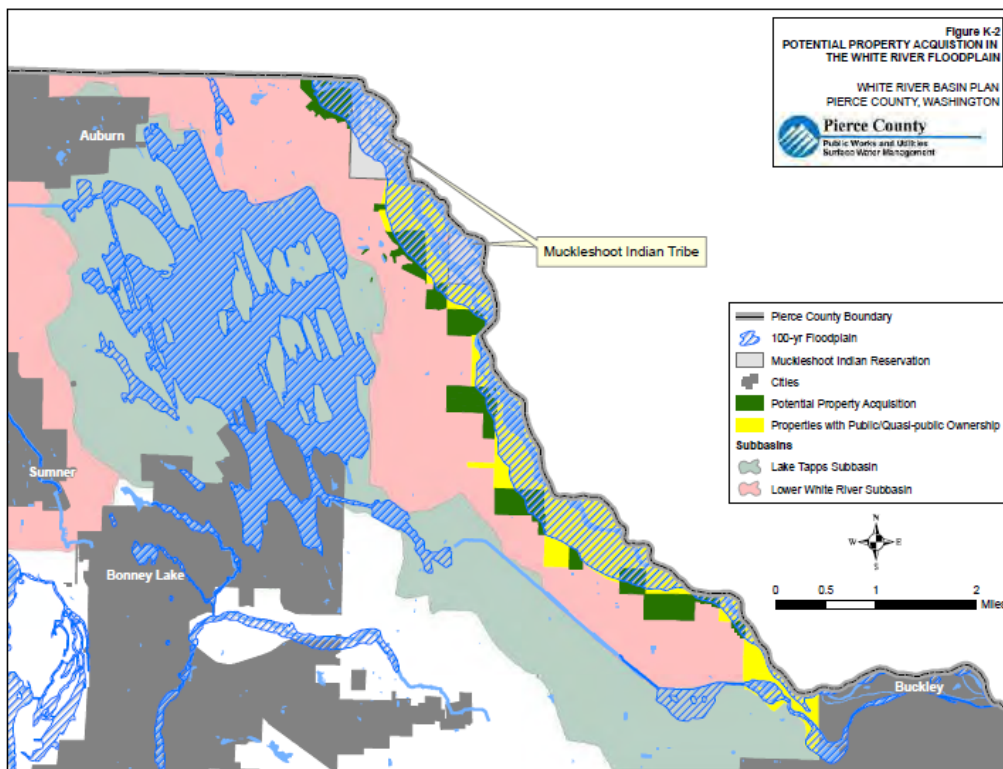


Figure 18. Potential Property Acquisition in the White River Floodplain

TABLE 11 – DEVELOPMENT POTENTIAL WITHIN LOWER WHITE RIVER BMA (PIERCE COUNTY UNINCORPORATED)

Map ID #	Parcel #	Acreage	Potential # of Total Lots¹	Potential # of Additional Lots
1	0420012003	25.20	5	4
2	0520022001	38.00	7	7
3	0520022011	10.78	2	1
4	0520023002	14.00	2	1
5	0520023007	17.50	3	2
6	0520023008	23.95	4	3
7	0520111000	115.85	23	22
8	0520111001	34.75	6	5
9	0520112012	25.75	5	4
10	0520123001	10.00	2	1
11	0520132000	58.90	11	10
12	0520132002	61.70	12	11
13	0520133000	51.30	10	9
14	0520133004	20.00	4	3
15	0520241000	32.90	6	5
16	0520241001	54.00	10	9
17	0520242021	20.00	4	3
18	0520242022	20.00	4	3
19	0520242023	20.00	4	3
20	0520244000	108.95	21	20
21	0520251001	80.20	16	15
22	0620293000	57.92	11	10
23	0620293001	20.00	4	3
24	0620301000	35.00	7	6
25	0620302000	127.80	25	24
26	0620303001	85.25	17	16
27	0620304000	40.00	8	7
28	0620321001	25.00	5	4
29	0620332000 *	45.00	9	8
30	0620333001 *	30.00	6	5
31	0620333002 *	120.00	24	23
32	0620334000 *	65.00	13	12
33	7001480280	90.32	18	17
TOTALS		1,585.02	308	275
1 – The number of total lots is based on maximum development potential in cases where the property owner utilizes the bonus density of 2 dwelling units per 10 acres with 50% of the parcel set aside as open space.				

Because of the zoning in this area, only five parcels that intersect the BMA in unincorporated King County (and outside the MIT Reservation) would potentially be able to be subdivided (Table 12).

Table 12. Development Potential within Lower White River BMA (King County Unincorporated).

PIN	Zoning	Present Use	Acres	No. possible lots
1120059001	RA10	Vacant(Single-family)	41.75	4
2420059001	A35	Vacant(Single-family)	71.54	2
1120059002	RA10	Vacant(Single-family)	34.75	3
3520069024	RA10	Farm	35.26	3
2420059002	A35	Vacant(Single-family)	71.64	2

Impacts of Growth and Development on Habitat and Species Presence

Future growth potential on the lands in unincorporated King County is somewhat limited by regulatory protections offered to critical areas present within the BMA. The entire BMA in King County is within a Critical Aquifer Recharge Area (CARA) and a seismic hazard area, and much of it is within an erosion hazard area. Portions of the BMA that are along the valley wall are within the slide hazard area. The BMA is also located within the 100-year floodplain of the White River.

The Lower White River BMA will only remain rich in species diversity if care is given to maintaining large enough habitat areas for species viability and good quality habitat conditions, including corridors for safe movement between primary and seasonal habitats. Stressors to habitat include a variety of factors such as:

- Fragmentation in habitat below the threshold for species viability due to land development, removal of vegetation, and roads
- Actions that change the hydrology within the watershed and specifically within the floodplain which especially affects amphibians, fish species, and wetland plant species
- Species mortality caused by vehicular traffic on roads and predation by non-native animals (cats, dogs, bullfrogs, non-native fish, etc.)
- Conversion of native vegetation to non-native and invasive plant species
- And other human actions that cause species mortality or negatively impact habitat, such as water or air quality changes.

Stressors to the Lower White River BMA are discussed in greater detail in Chapter III. In addition, the fate of the Puget Sound Energy (PSE) properties along the White River (totaling 2,500 acres) will play a critical role for the long-term protection of biodiversity within the Lower White River BMA. Negotiations between PSE and Forterra and other parties were initiated in 2006 to preserve this land. Most of the PSE properties were inventoried in the 2006 LWR Bioblitz. A report was prepared for the Forterra identifying which parcels had the greatest potential for long-term conservation. A 2015 review of the parcel ownership, however, shows that PSE is still the landowner.

Pierce County Regional Trails Maps and Plans¹⁷

In the summer of 2008, Pierce County began a planning process to improve its existing trail system and prepare for future population growth, implementing a key recommendation and project identified in the Park and Recreation Open Space (PROS) Plan. The intent of the regional trail system is to provide recreational opportunities, promote healthier lifestyles, create connections to major developed areas and destinations, and enhance non-motorized transportation options throughout the County.

The Regional Trails Plan is a continuation of the PROS Plan process. Through the PROS planning effort, the public indicated a need for trail facilities for both recreation and transportation purposes. Key findings from the recreation questionnaire indicate that trails are popular among Pierce County residents.

Since then, much progress has been made to develop a regional trail system (Figure 19– Pierce County Regional Trails Map) and identify opportunities to continue the regional trail expansion (Figure 20 – Pierce County Trail Connection Opportunities).

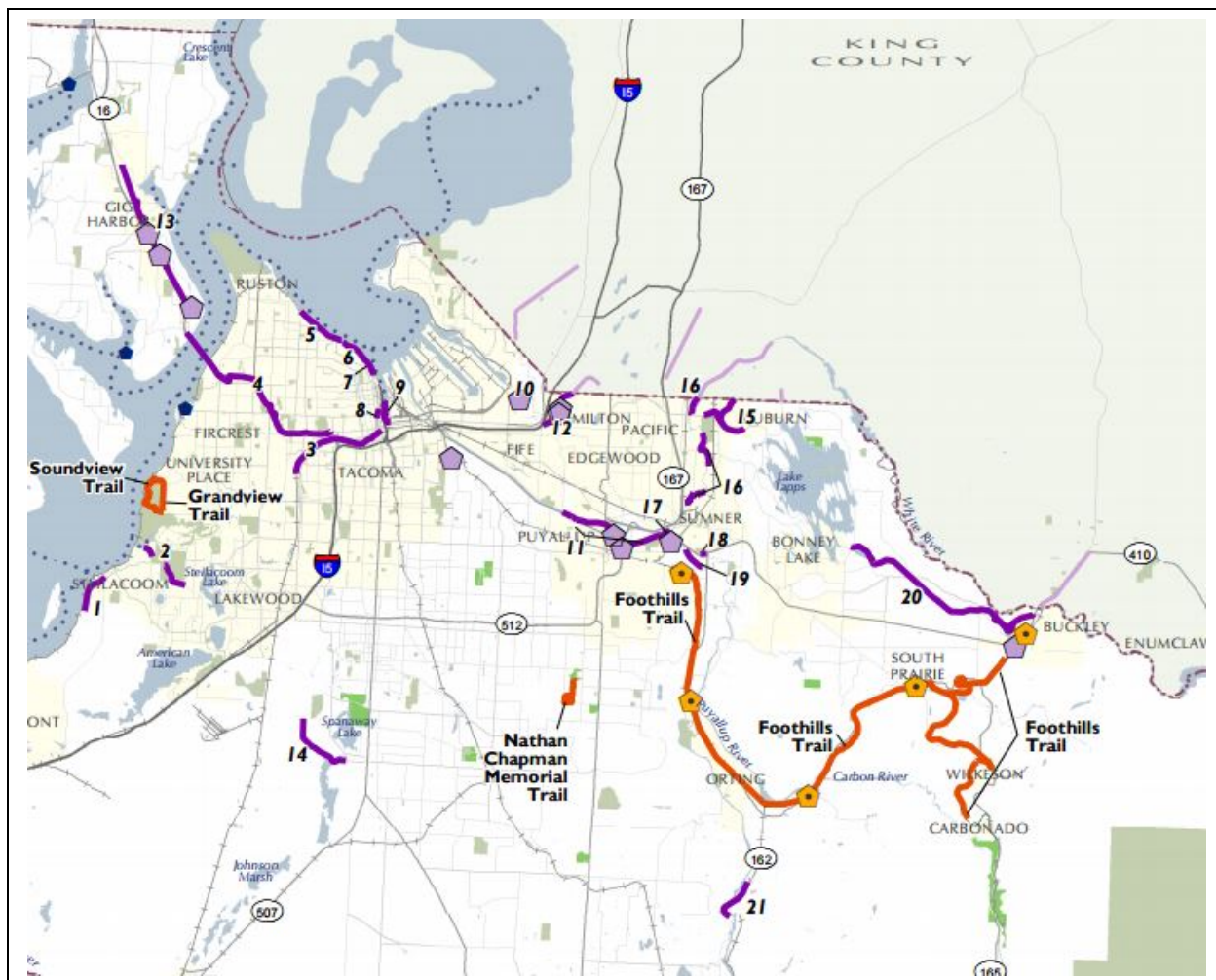


Figure 19. Pierce County Regional Trails Map

¹⁷ Pierce County Park and Recreation Open Space Plan. Chapter 7.1 <http://www.co.pierce.wa.us/DocumentCenter/View/2895>

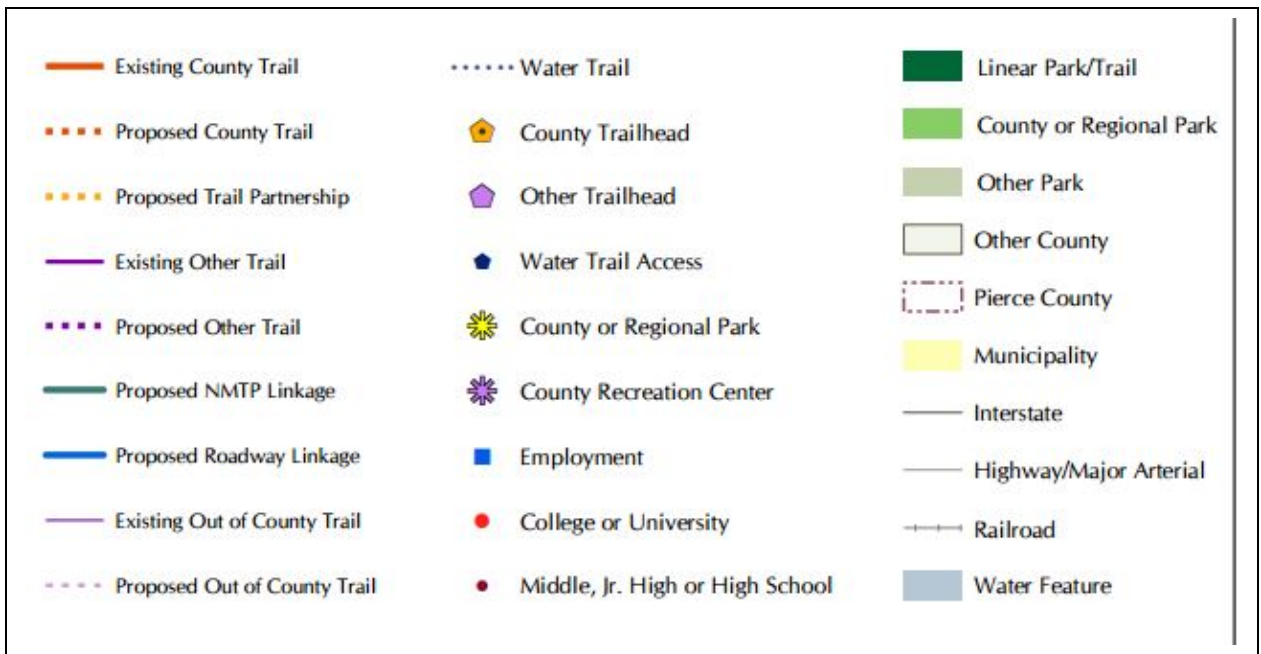
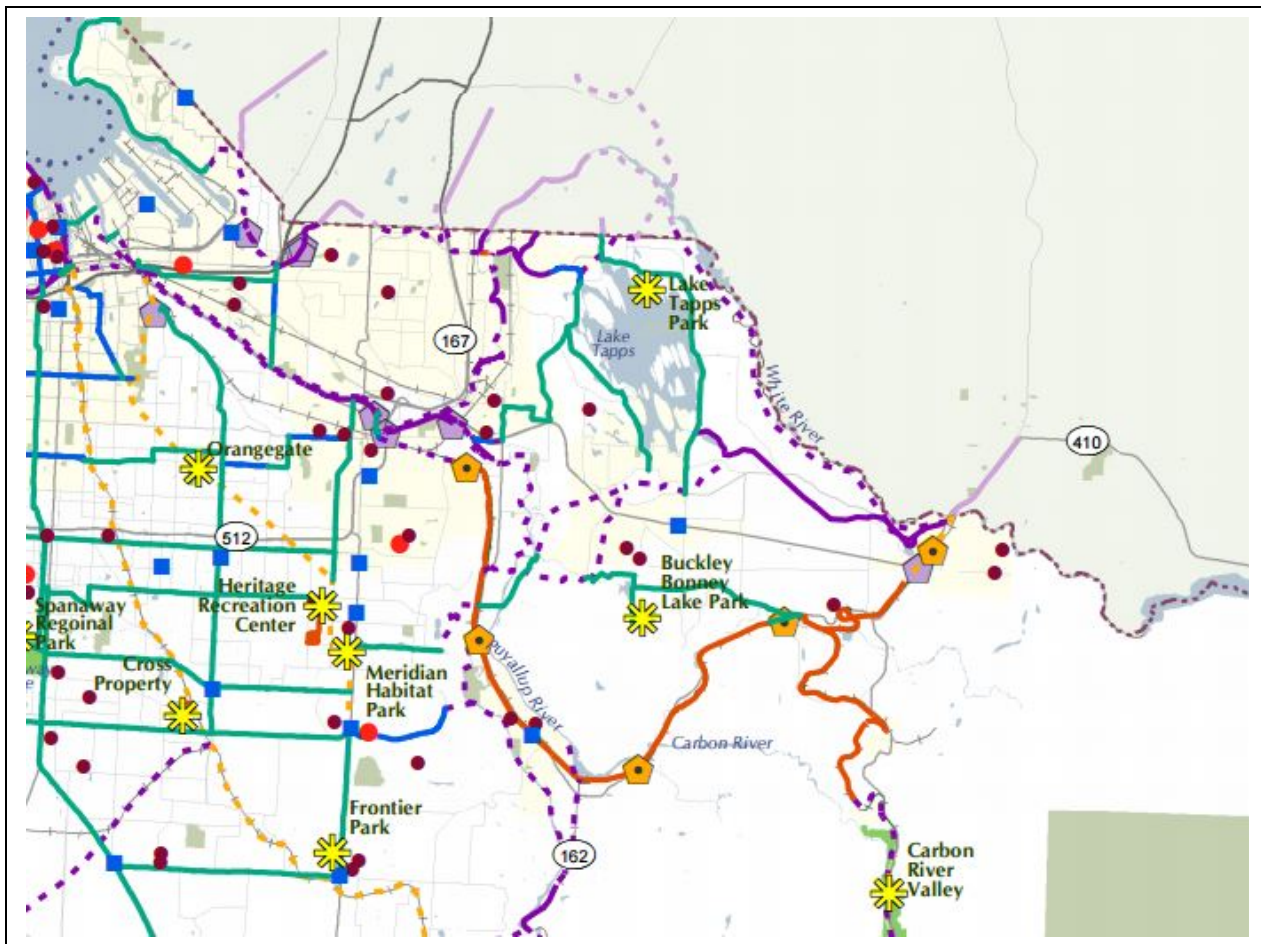


Figure 20. Pierce County Trail Connections Opportunities

Chapter III - Conservation Targets and Threats

Overview of Conservation Targets and Threats

At a landscape level, conservation targets (systems) may include ecological systems, ecological communities, species, and other important natural resources. Ecological systems share common ecological processes (e.g. hydrology), environmental features (e.g. soil types), or environmental conditions (e.g. precipitation). Ecological communities have common or co-occurring features such as species or natural vegetation types. Other important factors in determining conservation targets include groundwater recharge, forest reserves, etc.¹⁸

Each conservation target has key ecological attributes that ensure the proper functioning of that system's occurrence in a landscape over the long-term. Key ecological attributes consist of size, condition (i.e. measure of the composition, structure and biotic interactions that characterize the occurrence), ecological processes (e.g. hydrologic regimes, fire regimes and other natural disturbances) and connectivity of target species to habitats and resources including dispersal or migration routes.

In an ideal situation, intact and properly functioning conservation targets are not significantly stressed. Stresses to a conservation target result in degradation and impairment of key ecological attributes and occur in a variety of ways from human impacts and other natural factors. The source(s) of the problem is what causes the stress to occur. Collectively, stresses and sources of stress are referred to as threats to the system.

In the Lower White River BMA several conservation targets were selected to represent the key ecological functions occurring throughout the area. These conservation targets include

- Lower White River
- Tributaries, wetlands, and oxbows
- Conifer/deciduous mixed forest areas.

Each of these conservation targets provides the systems that collectively create the rich variety of habitats necessary to foster a high level of biodiversity in that BMA. A detailed description of each conservation target and the threats to these systems follows. Conservation strategies to abate these threats are discussed in Chapter IV.

Lower White River

General Description of the Lower White River

The Lower White River riparian corridor is dominated by riparian habitat, with an over-story of hardwood and hardwood/conifer trees. The BMA begins in the north-end of Sumner, passes through an area recently restored by Pierce County, and continues northwards through the cities of Pacific and Auburn. Riverfront property just north of Pacific City Park in Auburn (east end of 3rd Ave SE) has resulted in some removal

¹⁸ The concept of identification of conservation targets and key ecological attributes, threats (stresses and sources of stress), and threat abatement strategies (referred to here as "conservation strategies" to abate threats) is derived from The Nature Conservancy (TNC) 5-S conservation action planning methodology. However, this method has been adapted to acknowledge the fact that the BMA was already identified utilizing the GAP methodology and as such the conservation targets were selected based on review of the key ecological attributes within the BMA.

of native riparian vegetation. The dominant hardwood forest along this stretch of the river consists of willows, red alder, black cottonwood, black hawthorn, bigleaf maple, and Pacific dogwood. The BMA then continues through Auburn Game Farm Wilderness Park; an area dominated by native vegetation with a mix of hardwood and conifer trees with western hemlock, western redcedar, and Douglas fir the dominant conifers. Hazelnut, salmonberry, red elderberry, red osier dogwood, and invasive Himalayan and evergreen blackberries are the dominant shrubs. One small section of the White River Trail System, near the riverfront has also had native vegetation removed. Stuck River Drive may also impede movement of some species; however, this is a minor road with little traffic. As the BMA continues eastward through Muckleshoot Indian Reservation and into eastern Pierce County, it continues to be dominated by riparian, deciduous/conifer vegetation in a non-fragmented arrangement (e.g. mostly undeveloped).

Water Quality of White River

Pierce County does not monitor water quality along the Lower White River. The White River Basin Plan's efforts to analyze water quality selected 5 sites in 2005-2006. Two gaging stations, one at Salmon Springs in Sumner and Stream 51 near Bonney Lake collected flow data over the same time frame. Neither the water quality sampling sites or gaging stations were within the LWR BMA. The White River mainstem was surveyed by URS Consultants in the fall of 2004. Reach observations were summarized by reach lengths, physical features and overall aquatic and riparian conditions. Reach observations that fell within or near the LWR BMA are included with the individual jurisdictional breakout in this plan. In 2008 the water quality was assessed for the White River Basin Waterbodies. All the waterbodies were considered polluted requiring TMDL (Total Maximum Daily Load) plan. The Lower White River TMDL requirement was for fecal coliform, pH, and temperature primarily along the incorporated portions of the river.

The Basin Plan ranked and prioritized stream reaches and selected 73 sites. Riparian integrity is considered high if >70% of the corridor has an intact riparian zone wider than 100 ft., and <10% of the corridor is <35 ft., and there are <3 breaks (road crossings) in the corridor per stream mile. Streams meeting these conditions have greater potential for maintaining natural ecological functions. The Plan indicates that as of 2006:

- 4% of the White River riparian corridor was in good condition,
- 59% was in fair condition, and
- 37% was in poor condition.

Of the 21 sites sampled within the LWR BMA,

- 5% were in good condition,
- 86% in fair condition, and
- 10% were in poor condition.

The Ecosystems Diagnosis and Treatment (EDT) model rates the quality, quantity, and diversity of habitat along a stream relative to the needs of fish such as Coho or Chinook salmon. The method describes how the fish would rate conditions in a stream based on current scientific understanding of their needs.

Aquatic habitat EDT rankings indicated 16% is in good condition, 37% in fair condition, and 47% in poor condition. Within the BMA, 33% of aquatic habitat is in good condition, 43% aquatic habitat is in fair condition, and 24% aquatic habitat is in poor condition.

As part of Pierce County's Sustainability 2020 Plan, the water quality goal is to increase stream quality to a reported grade of B in at least one watershed by 2020, with all others reaching a minimum of C+. ¹⁹ A

¹⁹ Pierce County Sustainability 2020 Plan website <http://www.co.pierce.wa.us/index.aspx?NID=3389#water>

number of streams are selected each year as part of Pierce County's "Raise the Grade"²⁰ program to improve water quality. To date, none of the streams flow into the Lower White River.

Development Along the River

Puget Sound Energy and Mud Dam have restricted or prohibited development along the White River, which has contributed to the continued biodiversity of this important riparian corridor and its designation as ecoregionally significant²¹.

Tributaries, Wetlands and Oxbows

The Lower White River watershed is a complex hydrologic system with wetlands and multiple tributaries feeding into this wetland/riparian system from the Upper White River. The wetland and riparian systems provide a rich habitat for a variety of fish, reptiles, amphibians, mammals and bird species. Certain wildlife species, such as pond breeding amphibians, are very dependent on the hydrology of an area such as this or their life cycle needs.

Private homes, farms, and light industry are located near the tributaries and the condition of the streams depends to a large extent on how individual developers and owners have treated the riparian corridor, which in most cases has resulted in poor to fair condition.

Wetlands filter excess nutrients, chemicals and sediments from excess runoff. They help keep groundwater clean, store flood waters and provide habitat for aquatic species and wildlife that use the water. Wetlands may dry up in the summer or they may be saturated year round. Wetlands generally support plants adapted to wet areas but are able to tolerate dry spells.

Oxbows, plus buffer zones can be useful and environmentally sound measures of flood control. Other flood control measures may have a detrimental effect on salmon habitat, specifically dikes that impair connections between rivers and their flood plains, which would normally supply large woody debris, fine organic matter and dissolved nutrients to the drainage network. Oxbows retain those characteristics that are important habitat elements, providing refuge and food sources for the riverine community. Re-channeling or braiding of the streams may be necessary to restore oxbows.

King County has allocated Capital Improvement funds for the White River flood damage repair at Stuck River Drive. Both King Floodplain management and Pierce County Surface Water Management have purchased land along the BMA between Pacific and Auburn for the purpose of flood control. Pierce County has analyzed the feasibility of levee setbacks and the White River at 6 locations between RM 2.6 and 5.1.

Riparian habitat or buffer zones along the river can contribute many attributes to the river it abuts. Shade to cool the water, organic and woody debris provides nutrients to river inhabitants. Vegetation roots protect and stabilize the banks, providing shelter and habitat. The riparian zone contributes to a high water table, increased storage capacity and higher late summer stream flows. Lawns, agricultural areas

²⁰ Pierce County's "Raise The Grade" program <http://www.piercecountywa.org/raisethegrade>

²¹ Flobert, J., M. Goering, G. Wilhere, C. MacDonald, C. Chappell, C. Rumsey, Z. Ferdana, A. Holt, P. Skidmore, T. Horsman, E. Alverson, C. Tanner, M. Bryer, P. Iachetti, A. Harcombe, B. McDonald, T. Cook, M. Summers, D. Rolph. 2004. Willamette Valley-Puget Trough-Georgia Basin Ecoregional Assessment, Volume One: Report. Prepared by The Nature Conservancy with support from The Nature Conservancy of Canada, Washington Department of Fish and Wildlife, Washington Department of Natural Resources (Natural Heritage and Nearshore Habitat programs), Oregon State Natural Heritage Information Center and the British Columbia Conservation Data Centre.

adjacent to the river, non-native vegetation and impervious surfaces contribute none of these things and indeed degrade the quality and quantity of the river itself.

Forest – Conifer/Deciduous Mixed Forest

The Lower White River BMA contains a patchwork of mixed lowland conifer/deciduous forest, punctuated with wetlands, riparian areas, pastures, areas developed for single family residential and commercial uses. Along the adjacent lands the forest cover transitions to a conifer/deciduous forest habitat. The Muckleshoot Tribe and Puget Sound Energy have left much of the forest surrounding the river intact. Forested areas provide connectivity between the different habitat patches and also serve to maintain hydrologic cycles within a watershed. Best available science indicates that 65% forest cover within an urban watershed provides high quality hydrological function for wetland water level fluctuation and stream hydrology²². The Lower White River BMA currently has at least 65% forest cover and more if the riparian areas along the floodplain are included. These forest areas are a necessary component in many terrestrial species lifecycles. Each species has their own unique needs for habitat patch size, which increases for mammals and birds with a sensitivity to patch size. This is very important for pond-breeding amphibians, and native fish species that utilize the stream, wetland, and lake systems in the watershed and BMA. It will be crucial to work with each jurisdiction to maintain or increase forest cover.

Threats to Conservation Targets

The main threats that are or may potentially be occurring to conservation targets include:

- Habitat conversion and fragmentation due to development, removal of native vegetation and roads, specifically potential development of the Puget Sound Energy properties.
- Poor water quality caused by residential use of fertilizers, domestic animal waste, septic tank leakage, spraying of herbicides along public roads, and road runoff
- Loss of pools, large woody debris (LWD), and riparian vegetation due to development and channelization of the river.
- Introduction of invasive, exotic, non-native species including plant species, wildlife species (e.g. bullfrogs, Japanese knotweed, Himalayan blackberry)
- Fish passage blockage from culverts
- Wildlife movement blockages from roads, driveways and fencing
- Erosion and damage of riparian habitat from dikes/levees along cities of Buckley, Pacific, and Sumner
- Predation of native species by domestic cats and dogs
- Water fluctuations due to storm drains redirecting water flow into the river and not into wetlands, dikes, and stormwater from development
- Pollution caused by dumping of trash and debris into or near the river, warehouse parking lot runoff
- Non-permitted illegal discharge dumped directly into the river

²² Booth, D.B., 2000. Forest Cover, Impervious-Surface Area, and the Mitigation of Urbanization Impacts in King County, Washington, Prepared for King County Water and Land Resources Division.

Chapter IV - Conservation Strategies

Overview of Conservation Strategies

To achieve long-term health of a conservation target, threats must be abated to ensure viable, functioning systems. There are two approaches to lessen the stress and enhance or maintain the viability of the conservation target. The first is to abate the sources that are causing the stresses, under the assumption that the stress will subside if the source is removed. The second is to directly abate the stresses that may persist once the source is removed.

Conservation strategies are developed and implemented to (1) abate the critical sources of stress (i.e., threat abatement); and (2) directly restore altered key attributes of the systems (i.e., restoration). Threat abatement may involve a number of approaches including direct actions (e.g. removal of a culvert blocking a creek) or public education and outreach (e.g. educating property owners on the negative impacts of removing native vegetation that provides habitat). Restoration actions may include replanting native vegetation that is appropriate to the underlying soils and indigenous plant communities that historically thrived in a given location.²³

In the Lower White River BMA planning process each of the conservation targets described in the previous chapter were reviewed in detail and potential threats identified. During this process Lower White River jurisdictions also identified conservation strategies to ascertain the level or severity of a potential threat, to directly abate known threats, or to identify restoration opportunities where degradation has occurred. Some threats applied to multiple conservation targets and as such the conservation strategies have been grouped under the following categories, which have been stated as a positive outcome:

- Reduce Habitat Conversion and Fragmentation (due to development and human activity)
- Enhance Water Quality and Quantity
- Eliminate Invasive and Introduced Species
- Remove Fish and Wildlife Movement Blockages
- Manage Flooding
- Control Erosion and Siltation
- Reduce Predation by Domestic Animals
- Reduce or Eliminate Pollution Within the LWR BMA

The discussion below provides recommended conservation strategies for each stress and source of stress to the conservation targets.

²³ TNC 5-S conservation action planning methodology.

Reduce Habitat Conversion and Fragmentation

Source of Stress: Development, Vegetation Removal and Deforestation

Conservation Strategies

1. Adjust the Lower White BMA boundary as evidence presents itself and after review by all jurisdictions, to better represent lands necessary for the long-term persistence of aquatic species, as well as other birds, mammals, amphibians, and reptiles.
 - a. Work with all appropriate jurisdictions to adopt the Lower White River BMA Stewardship Plan and companion amendments to the Lower White River BMA boundary.
 - b. Integrate the revised Lower White River BMA boundary into the Pierce County Comprehensive Plan Open Space Corridors Map
 - c. Foster natural floodplain processes by preserving and creating conveyance areas (levee removal and/or setback) to accommodate flood waters
 - d. Integrate the revised Lower White River BMA boundary into the King County Levee Projects along the river
 - e. Continue to acquire lands to reduce fragmentation along the river.
 - f. Apply the Rural Sensitive Resource zoning to the tax parcels located within the revised Open Space Corridors Map at the county level.
2. Utilize Low Impact Development (LID) techniques within the BMA.
 - g. Work with the Counties, Pierce and King Conservation Districts and other interested agencies to educate property owners on LID techniques.
 - h. Work with the Counties, Cities of Buckley, Auburn, Pacific, and Sumner, and State Agencies to promote the use of LID on public properties.
3. Continue to apply native vegetation retention practices to environmentally sensitive areas within BMA.
 - a. During the review of development proposals work with the County and local jurisdictions in the design of projects that maintain native vegetation, wetlands, and shorelines and ensure mitigation efforts are appropriate and relevant to the development impacts.
 - b. Enforcement of potential violations to existing regulations should receive a higher priority. Work with the County and City Councils to provide adequate staffing resources for this purpose.
4. Provide increased education and outreach to property owners, developers and real estate agents regarding impacts of vegetation removal and fish and wildlife habitat stewardship actions through organized community groups working with the cities and counties.
 - a. Provide landscape consultation and on-going workshops (with guest speakers) to homeowners.
 - b. Provide homeowners with literature on how to be a shoreline steward
 - c. Create realtor packets with materials on shoreline stewardship to be given to new residents of shoreline properties.
 - d. Present community projects at realty offices to get them to pass out realtor packets and educate on unique ecological characteristics of the communities.
 - e. Contact developers and alert them about community projects and their role in transforming ideology around selective cutting vs. clear cutting a property
 - f. Create homeowner information packets that describe the location and importance of corridors. Include all certified backyard habitats/sanctuaries to help inspire people to get involved.
 - g. Use social media to inform and educate property owners.

5. Participate in local land use advisory meetings regarding proposed developments that affect the BMA
 - a. Landowners who live within or are interested in a development that is located within jurisdictional boundaries of a city should attend City Planning Commission meetings to provide input into development proposals. Those who live within the jurisdictional boundaries of unincorporated Pierce or King County should go to the County Planning Commission meetings.
 - b. Create a phone tree (provide agency numbers of enforcement for community) to contact community members when a proposed development is being reviewed by the City or County.
 - c. Have groups placed on interested parties list for notification by the City or County of any development proposals within or adjacent to the BMA.
 - d. Advocate for conditions that eliminate or minimize threats to the conservation targets.
 - e. Work with developers to achieve a “win-win” solution (i.e. utilizing density bonus for open space and where best to locate open space areas in relation to the BMA and adjacent wildlife habitat areas).

6. Consider application of special zoning that provides for greater environmental protection and less density (i.e. the RSR zoning either through a Comprehensive Plan amendment process or adoption of a new Community Plan or the city equivalent -downzoning) to LWR BMA areas that are located in unincorporated rural portions of Pierce and King Counties. Also, consider requiring LID and other environmentally sensitive design techniques within the LWR BMA areas.
 - a. Any future updates to the White River Basin Plan should include a review of additional habitat areas for inclusion within the BMA.

7. Work with the counties, cities and developers to locate open space set aside areas in contiguous tracts or within contiguous conservation easements located in such a manner as to promote connectivity and proximity to the conservation targets including:
 - a. Identify the best locations for designated open space areas during the development proposal review process.
 - b. High priority open space set aside areas are along tributaries and the White River.
 - c. New development in forested areas should provide their open space dedications adjacent to the BMA as first priority.
 - d. Establish connectivity and habitat zones around wetlands and White River and adjacent forest areas which provide habitat.
 - e. Refer to the Washington Department of Fish and Wildlife (WDFW) landscape planning document²⁴ for guidance to help maintain fish and wildlife habitat including:
 - i. Maintain habitat connectivity within the BMA and adjacent habitat areas through corridors and permeable landscape mosaics.
 - ii. Proactively address wildlife and road issues by routing traffic through less sensitive wildlife areas, locate development with road placement and traffic intensity issues for wildlife in mind, and provide connectivity linkages across roads that intersect habitat patches or corridors.
 - iii. Rectify existing road conditions that cause wildlife mortality at important crossing areas such as in connective corridors, or amphibian crossing locations, through road and wildlife planning approaches.
 - iv. Maintain larger habitat areas to support development sensitive species.

²⁴ Schuett-Hames, J.P., J.M. Azerrad, M.J. Tirhi, B. Vadas Jr., C.L. Sato, C.W. May, J.L. Hayes, J.E. Jacobson, J.P. Carleton, and G.F. Wilhere. 2009. Landscape Planning for Washington’s Fish and Wildlife: Managing for Biodiversity in Developing Areas. Washington Department of Fish and Wildlife. Olympia, WA, pp. 163.
<http://wdfw.wa.gov/publications/00023/wdfw00023.pdf>

- v. Preserve rare landscape elements and associated species and connected areas with critical habitats.
 - vi. Retain large contiguous or connected areas that contain priority habitats and species.
 - vii. Preserve large habitat areas and sensitive locations through land use planning mechanisms like outright purchase, purchase of development rights, conservation easements, and transfer of development rights.
 - viii. Maintain natural hydrologic conditions and minimize surface runoff using low-impact site design principles and the retention of natural forest and wetland cover throughout the watershed.
 - ix. Protect water quality using a combination of innovative treatment BMPs and aggressive, comprehensive source controls.
 - x. Maintain watershed processes (e.g., delivery and routing of water, sediment, nutrients/toxicants/bacteria, large wood, heat, forest succession, and upland disturbance regimes).
 - xi. Protect in-stream habitat and natural channel morphological conditions through the control of storm-water inputs and bank-full flows.
 - xii. Protect the stream-riparian ecosystem corridor, channel migration zone (CMZ), and floodplain.
- f. Develop and implement community/school education programs (1) to prevent the introduction of nonnative species such as bullfrogs and fish, and (2) to encourage wildlife friendly, responsible pet ownership.
 - g. Place open space areas in such a manner as to create a transition area of native plants/vegetation between developed and non-developed areas thus reducing the edge effect.
8. Align the Pierce County Regional Trails Plan²⁵ goals with the growing network of trails plans from other jurisdictions to identify areas where communities can “adopt” a section to plant native species, assist with restoration, and set up designated photo monitoring sites to record changes over time.
- a. Goal 2D.1. Create connections between key community destinations such as regional and county park sites and schools
 - b. Goal 2D.2. Connect to neighboring counties and nearby jurisdictions throughout Pierce County.
 - c. Goal 2D.3. Provide linkages to the water trails and network where possible
 - d. Goal 2D.4. Acquire trail segments that complete the regional trails system through a variety of methods
 - e. Goal 2D.5. Work with other federal, state and local agencies to identify public property that could be used to further the regional trail system.
9. Maintain or restore at least 65% native vegetation throughout the LWR BMA and White River Sub-basin to maintain normal hydrological functions, as well as connectivity for wildlife. This can be done per residence, and can be boosted by keeping some large habitats in natural condition.
- a. Provide educational materials to homeowners in the Puyallup River Watershed, and especially to property owners within the BMA and along the shorelines of the White River, on the importance of retaining native vegetation and forest cover.
 - Use White River and Lake Tapps Basin Plan Questionnaire to homeowners as a reference to target specific points about the use of private property to protect stream corridors, fish and other wildlife, or the water quality. For example, out of 347 responses, 167 homeowners would not be willing to accept some limitations on the use of their property while 180 would. Of those 180, the following limits were acceptable

²⁵ Pierce County Park and Recreation Open Space Plan, Chapter 7.1 <http://www.co.pierce.wa.us/DocumentCenter/View/2895>

(more than one could apply):

- i. Maintenance of vegetated buffer zones along streams or Lake Tapps (105)
 - ii. Limits on extent of paved or other impermeable surfaces (118)
 - iii. Limits on fertilizer or pesticide use (160)
 - iv. Retention of a proportion of the tree canopy (88)
 - b. Work with developers to identify best locations for native vegetation retention and open space set asides.
 - c. Work with property owners to plant, retain, and restore buffers around the White River, tributaries and wetlands.
 - i. Organize work parties as an annual or biannual native vegetation planting event. Consider partnering with local Boy Scout or Girl Scout troops, schools, or other environmental or civic organizations for volunteers.
 - ii. Target identified restoration areas for native vegetation planting events.
 - iii. Pursue grant programs to help fund the purchase of native plant materials or work with local plant nurseries, Pierce and King Conservation Districts, developers or other potential sources to obtain native plant supplies.
 - d. Conduct monthly seminars on various components of creating wildlife habitats.
10. Encourage targeting the purchase of land within the Lower White River for wildlife habitat.
- a. Work with property owners located within the BMA to identify parties who are interested in selling their property or a portion of their property for permanent open space, passive recreation, or conservation easement.
 - b. Compile a list of willing sellers, property owners or other properties within the BMA that are a high priority for acquisition as permanent open space.
 - c. Reduce the threat of habitat conversion and fragmentation (resulting from development and human activity) by purchasing PSE lands or other undeveloped open space areas along the river corridor (King County).
 - d. Work with the cities of Buckley, Auburn, Pacific, Sumner and Forterra to promote purchase or transfer of development rights for high priority open space properties within the BMA.
 - e. Submit applications to the Pierce County Conservation Futures Program for acquisition of high priority open space properties.
11. Apply for National Wildlife Federation – Community Habitat Program certification and conduct public education and outreach efforts to property owners to participate in this program and certify their property as backyard wildlife sanctuaries.

Source of Stress: Roads and Driveways

12. Avoid new public and private roads that bisect and fragment the BMA considering the following criteria:
- a. Consider first the expansion of existing roads located outside or on the fringe of the BMA and install wildlife mitigation measures with the road expansion project.
 - b. If a new road is the only feasible option, construct the roadway with wildlife mitigation measures.²⁶
 - c. Avoid new roads that bisect open space set aside areas if at all possible.

²⁶ Schuett-Hames, JP. J.M. Azerrad, M.J. Tirhi, B. Vadas Jr., C.L. Sato, C.W. May, J.L.Hayes, J.E. Jacobson, J.P. Carleton, and G.F. Wilhere. Draft 2008. Landscape Planning for Washington's Fish and Wildlife: Managing for Biodiversity in Develop Areas. Washington Department of Fish and Wildlife, Olympia, WA.

- d. Utilize WDFW’s landscape planning document to help plan where roads should go based on fish and wildlife information.
13. Work with the counties and cities to install signage along Lower White River BMA that indicates the motorist is traveling through a “sensitive wildlife area” and that this road is a “wildlife crossing area”. Signage should include a caution statement to watch out for and avoid wildlife that may be crossing the road.
 14. Seek to identify alternative driveway access points rather than introduce new stream crossings.

Enhance Water Quality and Quantity

Source of Stress: Application of Fertilizers, Pesticides and Herbicides

Conservation Strategies

1. Evaluate the impacts to White River and its tributaries, and groundwater supplies resulting from the use of fertilizers, pesticides and herbicides on properties within the BMA.
 - a. Collect water quality data over a five year time period.
 - b. Work with the Tacoma Pierce County Health Department (TPCHD), Pierce County Public Works and Utilities (PWU), Pierce Conservation District (PCCD), King County Natural Resources Department, King Conservation District (KCCD) or a local water steward group to identify testing sites, gain access to monitoring equipment, etc.
 - c. Develop a list of streams to apply for Pierce County’s “Raise the Grade” program.
 - d. Acquire commitment from the TPCHD, PWU or PCCD for sampling kits and lab costs to establish water quality information at different reaches along the White River.
 - e. Educate property owners within the BMA on the importance of having their well water tested on a regular basis. Utilize this information to determine if any of the well water supplies are contaminated from the use of fertilizers, pesticides or herbicides or other toxins.
 - f. Partner with local Boy Scout or Girl Scout troops, schools, or other environmental or civic organizations to conduct monitoring and sampling of local streams and the White River. Consider creation of a booklet produced by students about the water quality monitoring in Lower White River and how the testing results impact the biodiversity in the BMA. Teachers and biologists could work with students to create booklet.
2. Replace the use of chemical fertilizers, pesticides and herbicides with natural, organic and permaculture methods.
 - a. Provide increased education and outreach to property owners regarding negative impacts of using non-organic pesticides and fertilizers and demonstrate natural alternatives (such as the use of biological pest control).
 - b. Provide this information as one of the community workshop topics or hold a Community Education Day to walk the neighborhood to distribute literature.
 - c. Work with PCCD, WSU – Pierce County Cooperative Extension Office (WSU), KCCD or other sources to identify natural methods now available.
3. Eliminate/discontinue the spraying of herbicides within the public right-of-ways and public owned land within the BMA by working with the County Public Work Utilities Departments to assess spraying regimes.
 - a. Property owners can install “no-spray” signs on their properties along public right-of-ways.
 - b. Park and road maintenance crews can alter spraying practices within BMA area and should

- consider utilizing Integrated Pest Management systems as an alternative to the use of chemicals.
 - c. Property owners can provide education and outreach to public agencies on why pesticide-free parks are beneficial.
4. Plant, retain, and restore buffers to prevent runoff from reaching the streams and river.
 - a. Work with jurisdictions including Washington Department of Natural Resources (DNR) to strengthen reforestation requirements through tighter timelines. Currently DNR applicants have two years to replant after logging.

Source of Stress: Domestic Animal Waste

Conservation Strategies

5. Acquire commitment with county/TPCHD for fecal coliform sampling kits and lab costs.
 - a. Collect fecal coliform water quality data for five years through local monitoring group.
6. Implement Pierce County pet waste education program.
7. Clean up after pets and livestock through community composting.
 - a. Provide property owners with educational information/materials on why this is so important (i.e. impacts associated with waste)
 - b. Work with local nurseries to institute a community compost program.
8. Use fencing to create a buffer between riparian (i.e. the lake, creek and estuary) and wetland areas and livestock pasture areas.
 - a. Encourage property owners with livestock to develop farm management plans.
 - b. Provide property owners with livestock educational materials on cost-share programs to install fencing between pasture areas and riparian and wetland areas.

Source of Stress: Septic Tanks

Conservation Strategies

10. Work with property owners to test all the septic tanks for possible contamination into the system.
 - a. Explore available King and Pierce County or Tacoma-Pierce County Health Department programs to check septic tanks.
 - b. Explore any available incentive programs to help homeowners pay for this.
11. Collect fecal coliform water quality data within water bodies and watercourse for five years.
12. Develop and/or distribute informational packets about septic tanks that go out to all residents.

Source of Stress: Runoff from Roads and Fields

Conservation Strategies

13. Review all local jurisdictions' planning documents to determine if any storm water drains in the BMA area discharge directly into a water body, watercourse or wetland. If this information is not available then work with the Counties or PCCD/KCCD to conduct an inventory to determine if any such stormwater drains exist. If there are any stormwater drains that discharge directly into a water body, watercourse or wetland then develop a community drain stenciling event to mark these drains to prohibit discharge into them.

14. Plant native vegetation along roads, driveways, roadside ditches, and channels of the tributaries to filter road runoff pollutants.
15. Work with local jurisdictions to apply new road maintenance standards to public right-of-way areas to reduce harmful impact from runoff from roads.
16. Identify culverts and ditches that deposit road runoff directly into a waterbody, watercourse or wetland. If this information is not available then work with the county or PCCD/KCCD to conduct an inventory to determine if any such culverts or ditches exist. If there are any culverts or ditches that discharge directly into a waterbody, watercourse or wetland than work with the local jurisdiction to apply mitigation measures for pre-treatment prior to discharge. Consider applying low impact development techniques for mitigation measures.
17. Remove or move pipes in fields and industrial parks to channel untreated stormwater runoff into detention areas.

Source of Stress: Trash/Garbage

Conservation Strategies

18. Develop a trash pickup campaign along roadways.
 - a. Work with local schools, neighborhood associations and local property owners to participate in an Adopt-a-road program to pick up trash and garbage.
19. Organize garbage cleanup days and/or educate property owners on need to keep garbage and pollutants out of habitat areas.
20. Create a watchdog team for development to report garbage dumping. When appropriate utilize the Pierce County Responds Program to report garbage dumping in the area.

Eliminate Invasive and Introduced Species

Source of Stress: Introduced Plant Species and Weeds

Conservation Strategies

1. Conduct a detailed inventory of the plants within the BMA to identify the density of invasive species and determine target areas for non-native/invasive plant removal and replanting of native vegetation.
2. Provide educational information to property owners and plant nurseries regarding the impact of local non-native and invasive plant species.
 - a. Develop or obtain a booklet of invasive local weeds and mail to local property homeowners. Booklet should include the following information: list of undesirable non-native and/or invasive plant species; methods of removal; native plants that can be used to revegetate; wildlife benefits of native plants; etc.
 - b. Contact local nurseries to discuss the impacts of non-native/invasive plant species on habitat areas and the potential to limit or eliminate the sales of non-native or invasive plant species and increase the sales of native plant species.
 - i. Explore the possibility for local nurseries to host monthly education community meetings

- ii. Request local nurseries to distribute brochures on the benefits of utilizing native plant species
 - iii. Work with local nurseries to host native plant sales in conjunction with BMA events
 - iv. Request local nurseries to label invasive plant species
3. Work with local property owners and municipal jurisdictions to remove non-native and invasive plant species within the BMA.
 - a. Organize a “Weed Walkabout” workshop for the community.
 - b. Organize weed cleanup activities utilizing PCCD, KCCD, schools, Boy Scout troops, or other local volunteers.
 - c. Contact Pierce County and the cities’ Public Works and Parks Departments about removal of invasive species within the road right-of-way and public properties.

Source of Stress: Introduced Non-Native Wildlife Species

Conservation Strategies

5. Educate the homeowners and pet stores on the damage that is done when they turn loose non-native fish and wildlife species into wetlands, tributaries, and other habitat areas within the BMA.
 - a. Include this information as part of lake information packet or fact sheet that should be developed for distribution to area property owners.
 - b. Species that should be listed in the information packet include but are not limited to turtles, frogs, and aquarium fish.
 - c. Contact local pet stores to discuss the impacts of non-native/invasive fish and wildlife species on habitat areas and the potential to limit or eliminate the sales of non-native fish and wildlife species.
 - d. Contact WDFW enforcement if non-native species are being sold.
6. Collect and destroy bullfrog egg masses.
 - a. Establish a bullfrog eradication program that lasts a minimum of 3 years, which could be part of a whole wildlife monitoring plan and/or water monitoring program.
7. Fence livestock out of creeks and wetland and their associated buffer areas.
 - a. Partner with PCCD and KCCD staff to educate and work with property owners to help develop farm management plans and with funding for fencing to keep livestock out of stream.
 - b. Provide educational materials to property owners with livestock on negative impacts associated with unrestricted access to creeks and wetland areas and incentive/grant programs to help defray the cost of fencing.

Remove Fish and Wildlife Movement Blockages

Source of Stress: Culverts

Conservation Strategies

1. Work with King and Pierce County, Cities of Buckley, Auburn, Pacific, and Sumner, PCCD and homeowners to replace existing culverts that are causing fish blockages.

Source of Stress: Roads and Driveways

Conservation Strategies

2. Monitor road kills and develop strategy for better wildlife crossings where most of the kills take place. Employ different strategies for the various species based upon their needs such as:
 - a. Amphibians may need crossings under roads.
 - b. Mammals need speed limit reduction, better signage, and connective corridors linking areas throughout the watershed with the large forest patch to the east.
3. Work with the County to establish signage along Lower White River roads that indicates this is a “sensitive wildlife area” and to drive with caution.
4. Encourage the development of a booklet for county, developers, park districts to explain the history and conservation efforts of Friends of the Lower White River and other community groups. Put on multiple websites to keep everyone aware of progress.
5. Provide education to landowners regarding the importance of maintaining vegetation corridors along roadways and driveways so that wildlife can have alternative movement corridors.
6. Work with the County, cities and developers to design new roadways within BMA to be wildlife friendly. Roads should not create barriers and should utilize new technologies in ecological road design that incorporates the needs for stormwater treatment, safety and ecology functions (e.g. bioswells).

Source of Stress: Fencing

Conservation Strategies

7. Utilize fencing that does not block wildlife movement from occurring.
 - a. Avoid solid board on board fencing in wildlife movement corridors.
 - b. Utilize smooth (as opposed to barbed) wire fencing for livestock that minimizes potential for injuring wildlife. An example is New Zealand smooth wire fencing.

Control Erosion and Siltation

Source of Stress: Channelization/Levees

Conservation Strategies

1. Riparian buffers along the King County-maintained levees and revetments are limited in quality, width, and connectivity along the river corridor.
 - a. Recommendations to remove and set back levees, restore riparian buffer, and connect the river to its historical floodplain habitat are part of King County’s adopted 2006 Flood Hazard Management Plan.

Source of Stress: Development

Conservation Strategies

1. Monitor new construction activities to ensure that erosion control measures are properly installed and functioning from preventing erosion into ditch systems, watercourse, wetland, and estuary areas.

- a. Local residents should call Pierce County Planning and Land Services Department with any potential violations of erosion control measures.

Reduce Predation by Domestic Animals

Source of Stress: Cats and Dogs Allowed Unconstrained Access to Outdoors

Conservation Strategies

1. Provide educational materials to property owners and residents on keeping domestic pets away from nesting areas and habitat areas during breeding season.
 - a. Distribute handouts on keeping cats and dogs indoors (Seattle Audubon has good handouts on this).
 - b. Address this issue as part of backyard habitat seminars.

Manage Flooding

Source of Stress: Water Fluctuation

Conservation Strategies

1. Work with the counties and cities to maintain buffers around wetlands to reduce major water fluctuation in the seeps, springs, wetlands and creeks feeding into the Lower White River.
2. Work with the counties, cities, DNR, and property owners to maintain or restore $\geq 65\%$ natural vegetation throughout the Lower White River BMA to maintain normal hydrological functions (including water level fluctuation in wetlands), as well as connectivity for wildlife. This can be done per residence, and can be boosted by keeping some large patches in natural vegetation.
 - a. Work with property owners within BMA to leave portions of the property in native vegetated condition. This can be done in conjunction with backyard wildlife sanctuary program.
 - b. Organize native planting work parties with local property owners and interested non-profit agencies, schools, Boy Scout troops, Stream Team, etc.
 - c. Work with property owners that have Forest Practices permits issued by DNR to not allow applicants to log in wetland buffers and increase their less restrictive buffers, restoration and reforestation requirements.

Source of Stress: Low Water Flow

Conservation Strategies

3. Maintaining the water level is a high priority in order for the Lower White River to function as a true river. Work with the Muckleshoot Tribe and other jurisdictions to maintain enough water in the river.
4. Conduct a review of adopted stormwater and watershed plans, or if necessary work with the County and cities to conduct a new analysis, to determine if any storm drains are directing water flow into the White River, tributaries and streams, or wetlands.
5. Work with the counties and cities to redirect any public storm water drains that discharge directly into a water body or water course into a pre-treatment facility that is designed to slowly infiltrate the water back into the aquifer (e.g. Low Impact Development facility).

6. Encourage property owners to leave properties in an open space condition and, as an incentive, enroll their properties in the County's Current Use Assessment Program (Public Benefit Rating System) to reduce taxes.
7. Encourage property owners to conserve water and when possible, reuse water.
 - a. Provide educational materials to property owners regarding reuse of grey water and rainwater for watering plants; use of native plant species that require less water; best times for watering vegetation (i.e. not in the heat of the day when large amount of water is lost to evaporation); etc.
8. Work with the Pierce and King County Health Departments, the counties' and cities' water departments and compare with planned development to identify where all of the current water sources are and future planned water sources.

Chapter V - Prioritization of Conservation Strategies

Short-Term Actions (1 year)

1. Work with Pierce County Planning and Land Services Department and all other applicable jurisdictions during the next Comprehensive Plan amendment cycle to:
 - a. Adopt the Lower White River BMA Stewardship Plan as a Title 19D document
 - b. Amend the Pierce County Comprehensive Plan Open Space Corridors Map and Biodiversity GIS layer to incorporate the revised Lower White BMA boundary as evidence presents itself.
 - c. Revise the zoning within all applicable jurisdictions to apply the RSR zoning to tax parcels located within the expanded BMA boundary.
2. Apply for National Wildlife Federation – Community Habitat Program. (*Registered*)
 - a. Identify and set participation goals for either individual cities, a joint LWR BMA Community, or a Puyallup Watershed Community Habitat.
 - b. Conduct public education and outreach efforts to property owners to participate in this program and certify their property as backyard wildlife sanctuaries using the joint certification with Washington Department of Fish and Wildlife and the NW Zoo and Aquarium Alliance.
 - c. Establish a 65% native vegetation and forest cover goal for each jurisdiction within the BMA.
3. Conduct surveys and collect ‘best science’ information about the Lower White River riparian system.
 - a. Organize a bioblitz in the same areas “blitzed” in 2006.
 - b. Work with school-related and other citizen projects in surveying the area.
 - c. Collect latest information on how to keep private property and the riparian system healthy.
 - d. Coordinate efforts with other groups, Community of Interest (COI’s) throughout the Puyallup River Watershed.
4. Provide increased education and outreach to property owners, developers and real estate agents regarding impacts of vegetation removal and earth moving. Create and dispense educational materials concerning fish and wildlife habitat stewardship actions.
 - a. Maintain signage along Lower White River roads that indicates the motorist is traveling through a “sensitive wildlife area” and that this road is a “wildlife crossing area”. Signage should include a caution statement to watch out for and avoid wildlife that may be crossing the road.
 - b. Create homeowner information packets that describe the location and importance of corridors. Include all certified backyard habitats/sanctuaries to help inspire people to get involved. Provide homeowners and developers with literature on how to be a shoreline steward.
 - c. Create realtor packets with materials on shoreline stewardship and on unique ecological characteristics of community to be given to new residents of shoreline properties.
 - d. Provide landscape consultation and on-going workshops (with guest speakers) to homeowners and others.
5. Participate in local land use decisions regarding proposed developments that affect the BMA. Advocate for conditions that eliminate or minimize threats to habitat fragmentation.
 - a. Work with Pierce County to include the BMA’s that are Habitats of Local Importance in Title

- 18E and develop/provide guidelines as how to regulate relative to proposed/possible development.
- b. Create a phone tree (provide agency numbers of enforcement for community) to contact community members when a proposed development is being reviewed by the County.
 - c. Have group placed on interested parties list for notification by the County of any development proposals within or adjacent to the BMA.
 - d. Work with the cities of Buckley, Auburn, Pacific, and Sumner, and developers to help identify the best locations for designated open space areas during the development proposal review process. Try and come up with a “win-win” solution (i.e. utilizing density bonus for open space and where best to locate open space areas in relation to the BMA).
 - e. Work with the cities of Buckley, Auburn, Pacific, and Sumner restoration and photo monitoring on existing and proposed network of trails.
6. Work with King County as they apply for Salmon Recovery Funding Board and other grant(s) to facilitate implementation of high priority restoration actions within the BMA.
 - a. Identify properties along the Lower White River to facilitate levee setback and floodplain reconnection projects for King County.

Mid-Term Actions (2-3 years)

1. Organize volunteer work parties. Partner with local Boy or Girl Scout troops, schools, or other environmental or civic organizations for volunteers.
 - a. Sponsor annual or biannual native vegetation planting event.
 - b. Sponsor invasive species eradication events.
 - c. Sponsor volunteer “bioblitz” activities led by professional experts.
 - d. Consider a project with the cities’ Parks Departments to create a demonstration project, cooperating with Pierce County Conservation District, Master Gardeners, schools, Boy Scout troops, or other local volunteers.

Long-Term Actions (3-5 years)

1. Conduct surveys and collect ‘best science’ information about the Lower White River riparian system.
 - a. Coordinate with the Watershed Planning groups for current data.
 - b. Arrange for Stream Team assistance in collection information on water quality and flow for the next five years.
2. Inventory biodiversity around schools and within sections of the White River and monitor changes.
 - a. Arrange for *NatureMapping* training through the Tacoma Nature Center, NW Trek, and Pt. Defiance Zoo and Aquarium for local residents and students for five years.
3. Involve commercial business parks, warehouses along the river to enhance riparian vegetation and “sponsor” sections of the trails that are maintained by their employees.

Chapter VI - Conclusions

General Overview

The availability of lowland deciduous, riparian, estuarine and upland coniferous habitats along the Lower White River contributes to this BMA's ecological richness. Most of the at-risk, listed, and/or priority species predicted or confirmed within this BMA have a primary association with water for either all or part of their life cycle. Water quality within the White River, its tributaries, streams, and wetlands should not be compromised as it contributes foremost to the presence of the species predicted within.

Farmlands and pasturelands along Lower White River continue to collect water and could be targeted for wetland restoration sites by willing sellers. In their present state, they may provide breeding locations for amphibians and reptiles, such as the Painted turtle. Sections of Lower White River located on private property, where native vegetation has been removed to the river's edge, should be targeted for habitat restoration. Future land development should not allow removal of native vegetation along the creek within a defined buffer. The updated Shoreline Management Plans for each jurisdiction addresses the need for the maintenance or restoration of native vegetation. Culverts along the creeks should be assessed for blockage to fish movement and the community should work with the local jurisdictions and Pierce County to correct these blockages and identify other target areas for restoration and protection. Landowners along these creeks, and within defined buffers of the Lower White River, should be educated on maintaining the integrity of the riparian corridors. Education should focus on vegetation retention and restoration, retaining in-stream flows to White River, and the biological importance of the Lower White River corridor. The Lower White River BMA would benefit by the application of WDFW PHS Riparian Habitat Guidelines on privately owned riparian lands and by enforcing county regulations for development along riparian corridors. WDFW PHS recommendations for salmonids and county critical area ordinance standards should also be applied in consideration of salmonid presence.

The community should coordinate with the Forest Stewardship Council for working forestland owners (minimum of 20 acres) and continue to monitor wildlife species within and adjacent to the BMA. This can be accomplished through participation in the Tahoma Audubon birding events, and WDFW's amphibian monitoring.

Certification for Wildlife Habitat Programs (CWH)

Puyallup Watershed Initiative (PWI) COI's, neighborhoods, and the Puyallup River Watershed Council should pursue certification in the NWF-CWH program. Puyallup River Watershed Council and city Parks Departments from Buckley, Auburn, Pacific, and Sumner should also continue to promote property owner participation in the WDFW-BWH program.

Pursuing Conservation Strategies

The conservation strategies outlined in Chapter IV provide a framework for abating threats to the Conservation Targets and conducting restoration of degraded habitat areas. Puyallup Watershed Initiative COI's should identify how these strategies fit within their own strategies and with other community groups work towards accomplishing the conservation strategies outlined in this plan.

Funding Options

The National Wildlife Federation Community Habitat Program has grant monies available for schools to assist in native vegetation planting and monitoring for Lower White River. Partnerships within the Puyallup River Watershed Initiative will provide some funding opportunities along with state and local

agencies, the Pierce and King Conservation Districts, and environmental foundations.

Stewardship Plans by Jurisdictions

The Lower White River BMA runs through six jurisdictions; the cities of Buckley, Pacific, Auburn, Sumner, King County, Pierce County, and the Muckleshoot Indian Tribe.

Although the Lower White River BMA has the same conservation targets, the stressors and subsequent conservation strategies, recommendations, and stewardship plans were tailored to individual jurisdictions. The following chapters were developed with input from each jurisdiction, except the Muckleshoot Indian Tribe, who currently has chosen not to participate with the stewardship planning process.