

Birch Bay Characterization & Watershed Planning Pilot – Taking Action

Cover Page

Puget Sound Watershed

This project will take place in the Birch Bay watershed of Whatcom County in WRIA 1. Birch Bay is part of a coastal watershed encompassing 31 square miles between Drayton Harbor and Lummi Bay (See attached Figure 1). Located approximately twenty miles north of Bellingham the Bay includes the marine shoreline from Birch Point south to Point Whitehorn.

Applicant Contact Information

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Abstract

Birch Bay was the subject of an innovative pilot study where local, state, and federal agencies collaborated to create a comprehensive set of watershed management recommendations using integrated watershed characterization tools and techniques. This project will implement recommendations (“outputs”) specific to select rural and urban subbasins to improve hydrological, denitrification and pathogen removal processes (“outcomes”) that will improve water quality for recreational swimming and shellfish harvest (“environmental benefits”).

Building upon the successful “Tenmile Creek Model”, work products of the Pilot Study will be shared with watershed residents to impart a greater appreciation for the potential impacts of their individual actions that either improve or degrade their marine and freshwater ecosystems. Residents will be inspired to adopt good stewardship practices, install LID and agricultural BMPs and participate in riparian, wetland and water quality restoration projects. A high resolution subwatershed plan will quantify the ability to mitigate development impacts out of subbasin.

Association Restriction: Whatcom Conservation District is **NOT** an affiliate, subsidiary or allied organization of the Association of Community Organizations for Reform Now (“ACORN”).

Whatcom Conservation District by

George J. Boggs, Executive Director January 25, 2010

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Watershed Description Birch Bay is designated as a “Shoreline of Statewide Significance”, the only marine shoreline in Whatcom County with that designation. It is a beachfront community situated around a shallow bay estuary with exposed tide flats stretching up to a mile under extreme low tides. Its associated salt marshes, beaches, and mud flats provide habitats that play a vital role in the health of the local environment. These habitats are spawning, rearing, and feeding grounds for a wide variety of marine and terrestrial life. Juvenile and adult fish, birds (including a Great Blue Heron colony, bald eagles, swans and loons), and shellfish inhabit the waters of Birch Bay. Of the approximately 12 lineal miles of marine shoreline within the Bay, roughly one and a half miles within the 194 acre Birch Bay State Park is publicly accessible for swimming. Of all the State’s Parks, it was the most visited for recreational shellfish harvesting in 2009. It is the proving ground of new watershed-based planning tools to streamline development review and improve resource management protocols in rapidly developing areas of the County and the Region. Known as the Birch Bay Watershed Characterization and Watershed Assessment Pilot Study (“BB Pilot Study”), it is currently the only Puget Sound watershed with specific management recommendations available for immediate implementation.

Threats And Emerging Problem Description Birch Bay is very susceptible to elevated pathogen and nutrient levels caused by polluted runoff from the adjacent lands due to areas of weak circulation in the Bay near the State Park at the mouth of Terrell Creek and past development patterns. This project will not only remediate existing problems (pathogens, excess nutrients, high temperatures, low dissolved oxygen) but initiate restoration of natural processes to protect against degradation by future growth and development.

Pathogens (fecal coliform). Waterborne diseases present a risk of illness either through direct contact or after consuming fish and shellfish harvested from polluted water. Residents and many visitors are attracted to Birch Bay. Birch Bay and Terrell Creek (which discharges into Birch Bay) are classified as Extraordinary Primary Contact Recreation areas for bacteria criteria by the Washington Department of Ecology because of their widespread use by the public.

In fresh water, the standards for fecal coliform for areas with this classification are 1) a geometric mean of less than 50cfu/100mL and 2) not more than 10% of the samples may exceed 100cfu/100mL. Of the twenty-eight samples from the mouth of Terrell Creek taken from 2004 to 2008, nearly a third exceeded the 100 cfu/100mL standard. Eighteen coastal drainage sites in Birch Bay were sampled from May 2006 through May 2009. Only five of the sites meet the geometric mean standard and all sites exceed the 90th percentile standard. In 2005 WDOH added Birch Bay to its list of shellfish areas threatened by fecal coliform contamination. In October of 2008 WDOH closed a 670-yard area radius around the mouth to Terrell Creek to commercial harvest. It also recommends against recreational harvest at the site.

Nutrients. There have been reports that algae growth has increased in the bay. This may indicate that nutrients have increased. *Birch Bay Comprehensive Stormwater Plan*, July 2006 pg 5-13 (“*BB Plan*”). Too many nutrients may be partially responsible for the low dissolved oxygen events in the Terrell Creek Estuary. *BB Pilot Study*, Oct 2007 pg 73).

High Temperature. The Terrell Creek drainage is the primary freshwater drainage within the Birch Bay watershed. The marsh at its mouth is one of the few remaining saltwater/freshwater estuaries in northern Puget Sound. Terrell Creek provides habitat for a variety of native fish species including: sea-run and resident Cutthroat Trout, Chum, Coho and Steelhead salmon. They have very specific requirements for dissolved oxygen and water temperature. Unfortunately, the numbers of these species have declined significantly in the past 50 years do to these factors. *BB Pilot Study* pg 21.

Urban Stormwater. Birch Bay is transforming from a resort community to a major residential community within Whatcom County (see Future Development Patterns below). Relatively dense urban development exists along most of the shoreline of Birch Bay. Internal drainage is poor in most areas. Localized flood-

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ing is a chronic problem along Birch Bay Drive and elsewhere throughout Birch Bay. To date, drainage system planning has been informal, uncoordinated and lacking any comprehensive planning. Most of the existing stormwater systems lack retention and only the most recently installed provide any water quality treatment. Drainage systems are currently evaluated on a project by project basis and typically utilize road drainage ditches as their primary conveyance to Birch Bay. As noted above, shoreline drainage outlets have not met water quality standards. Resizing drainage outlets to address existing flooding problems and expected future development could result in further degradation to water quality and the near shore environment if careful planning and stormwater treatments is not done.

Future Development Patterns. The Birch Bay Urban Growth Area (UGA) is one of the fastest growing communities within Whatcom County. Birch Bay's UGA is not associated with an incorporated city and therefore lacks many of the governance features of an incorporated city. Growth estimates included in the recently adopted Whatcom County Comprehensive Plan indicate that the Birch Bay UGA will exceed a total population of 8,500 people by 2029, an increase of over 3,200 residents from the current population of 5,290. With a population slightly larger than the adjoining city of Blaine, the Birch Bay UGA has twice in the past 20 years pursued incorporation. Both efforts failed to achieve incorporation, but are indicators of the perceived need for enhanced governmental services. A recent development proposal for a 1,200 unit Planned Unit Development was filed and accepted by the County within an area adjacent to the currently adopted UGA, resulting in a major addition of urban development within Birch Bay. Such rapid growth has the potential to adversely affect the ecological processes and natural resources that have historically attracted people to the watershed. *BB Pilot Study* pg 16.

Project Need This Project is significant not only for the recovery and sustained protection of the Birch Bay watershed but also to demonstrate efficacy of a methodology perceived as necessary and effective for the recovery of Puget Sound. For years, significant resources have been allocated around Puget Sound towards gathering information and creating plans to guide development in a manner that protects natural resource objectives. In spite of these efforts there has been continued, significant ecosystem degradation. If ecosystem health is to be maintained, salmonid populations recovered and nearshore habitat conditions improved, these previous efforts must be enhanced.

The BB Pilot Study was initiated to “provide further direction to evaluate recommendations, identify cost-effective management strategies and sources of funding, and implement collaborative, solutions-oriented land use practices”. *BB Pilot Study* pg 1. While Phase 1 of the Pilot is complete and the work products tantalizing in their potential application, its premises are untested. This Project will provide proof of a concept essential to addressing the negative activities historically associated with population and development growth in Birch Bay and the Puget Sound. With the completion of Phase II of the BB Pilot Study it is anticipated that its final recommendations will be adopted as a local watershed-based management plan that will substitute for the requirements of the current ordinance to protect critical areas. These development regulations will impose a cohesive, coordinated framework for efforts to protect or improve water quality, hydrology and natural resources including terrestrial wildlife, fish, shellfish, wetlands and flood plains.

The nascent Birch Bay Watershed and Aquatics Resource Management District (“BBWARM”) needs assistance to develop an ecologically based approach to stormwater system management. Meeting the goal of protecting the water quality and reducing impacts to Birch Bay requires a stormwater management program that is informed by high quality, site specific information, competent hydrologic models and a carefully constructed and managed stormwater infrastructure.

Urban stormwater planning is not a typical service or function of county government. The primary urban services in Birch Bay UGA are provided by the Birch Bay Water and Sewer District. Until the establishment of the BBWARM in 2006 and the funding mechanism in 2008, there was no dedicated district to address stormwater within the UGA or the Birch Bay watershed. As a newly created entity, BBWARM faces

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many challenges and opportunities. While much planning work has been done in the Birch Bay community, detailed stormwater system inventory of existing conditions or future infrastructure upgrades has not been done. In addition, as the entity charged with stormwater management in Birch Bay, BBWARM seeks to evaluate and incorporate the recommendations as included in the Birch Bay Watershed Characterization Plan. Specifically those provisions that focus development into specified subwatersheds (we are proposing to focus on the Central North Subwatersheds), and involve mitigation transfers and LID components as these provisions could have significant long-term impacts on BBWARM's programs and services.

Relevance to the PS Action Agenda. Priority C of the Action Agenda is to reduce the sources of water pollution. The first of five primary objectives is:

C.1 Prevent pollutants from being introduced into the Puget Sound ecosystem to decrease the loadings from toxics, nutrients and pathogens. The most reliable and cost effective way to manage for water quality health is to decrease the loadings of pollutants before they enter Puget Sound's surface and groundwater. Source control tactics include education, pollution prevention ... protection of vegetated areas and wetlands ... natural infrastructure ... as well as incentives and technical assistance.

Project Plan Stages 1 and 2 of the “Framework for Planning at the Watershed Scale” are essentially completed for the Birch Bay Watershed. This project will take actions to implement specific recommendations for selected rural and urban subbasins (Stage 3). By focusing these actions on urban and rural subbasins respectively identified as suitable for Development/Restoration and Protection/Restoration and monitoring the actions taken we expect to see if our efforts are achieving desired results (Stage 4). This project builds on the ongoing Birch Bay Watershed Action Plan by helping to achieve the BB Pilot Study recommendations. It does so by reducing impacts of existing land use practices rather than protecting the watershed from future land development impacts as the Action Plan does. This work fits well with the Watershed Action Plan by increasing landowner stewardship programs of Task 1 and by providing specific stormwater flow volumes (Task 2) that can be achieved through development standards coming out of the Action Plan.

Rural Initiative: Combining a “Model that Works” with work products of the “Innovative BB Pilot Study”. “Tenmile Creek is a Model for What Works” so says EPA in its October 2009 issue of *Nonpoint Source News-Notes* (See www.epa.gov/newsnotes/pdf/88issue.pdf). This project will build upon our experiences there. We will embed a “trusted advisor” into the community who will instill sufficient motivation and make available the resources necessary to effect positive social and environmental change. Trust is the necessary first step to education. Education is necessary before problem recognition and resolution can proceed. This will facilitate educating the landowners about their watershed, the potential negative impacts of their current activities and the opportunities for improvement.

The trusted advisor will be mentored and guided by an advisory committee comprised of residents of the Terrell Creek subbasin BBWARM, Birch Bay Steering Committee, Nooksack Salmon Enhancement Association (NSEA) and Applicant. There is a strong expression of support from the community to improve the watershed through collective action. This project will establish a linkage between the BB Pilot Study findings, recommendations and strategies and landowners of the upper watershed of Terrell Creek. The trusted advisor and landowners will take responsibility for reversing the water quality problems. The agency representatives will not only have an opportunity to educate and inform them as to the problems and possible alternative solutions but also, receive valuable input from the community on the management options that are being developed to sustain the efforts over the long term.

The BB Pilot Study evaluated patterns of water, nitrogen and pathogen movement through the watershed using an approach developed by Ecology to determine the relative importance of each basin for these processes. These processes play a key role in structuring and maintaining aquatic ecosystems within the

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Puget Sound Region (Naiman et al., 1992; Beechie and Bolton, 1999 Beechie et al., 2003) One initiative of this project will focus its work with the landowners to who control the land where these critical processes occur to adopt best management practices and projects that will protect and restore these processes.

Hydrologic Process – The Birch Bay watershed has been altered from natural conditions by human activity within the basin. Changes in the hydrologic regime can cause erosion, increased rates and severity of flood events, loss of groundwater recharge, and decreased low flow regimes, which can adversely affect humans, fish and wildlife. The highest ranking (most important) areas for hydrologic processes included the upper subbasins of and estuarine reach of Terrell Creek. (See Figure 2.)

Pathogen (fecal coliform) Reduction Processes – Pathogens are removed from aquatic environments through sedimentation (includes adsorption), filtration by vegetation, movement through soils and loss through death of the organisms from environmental and biological factors (heat, UV radiation, predation). These processes work best in areas where surface waters are slowed (depressional wetlands and riparian areas) or infiltrated (permeable soils). The upper sub-basins of the Terrell Creek are ranked of high importance providing this process. (See Figure 3.)

Denitrification Process – Denitrification is the process of reducing highly oxidized forms of nitrogen available for consumption by many groups of organisms into gaseous nitrogen. This process takes place under special (low oxygen) conditions found in some wetlands, lakes, and lowland riparian environments. The denitrification process is important in areas of increasing land use intensity because these areas typically generate high nitrogen loads as a result of agricultural and urban land uses. It is also important that denitrification environments are located in lower areas of the watershed because denitrification efficiency increases in areas where there are higher levels of nitrogen inputs. The upper subwatersheds of the Terrell Creek are ranked of highest denitrification importance. (See Figure 4.)

Social Marketing – Removing barriers to communication. Compared to the Tenmile Creek Project, there is much more information of a more sophisticated nature that will be available to the Advisory Committee and landowners. Also avoiding a regulatory hammer is not the motivating force here. So, we will need to elevate the level of communication to foster understanding and engender action. This is why we have made social marketing is an essential element of our project.

The principles of social marketing will be used to deliver key messages to project stakeholders, focusing primarily on landowners. A basic tenet of social marketing is identifying the barriers to and benefits of desired behaviors. Understanding these barriers and benefits enables the development of messaging that resonates with target audiences, increasing the chances that desired behaviors will be adopted. Social marketing also examines micro and macro environment factors to assess how these will influence the decisions of landowners. An important aspect of this assessment will be determining the communications delivery mechanisms most likely to reach target audience members. Over the long term, characteristics of social marketing such as diffusion and establishing societal norms will build a groundswell of BMP adoption. Communications tools and delivery methods will be evaluated and revised as needed to reflect changes in the attitudes and opinions of target audiences. The refined work products will be of value not only for this project but others who are similarly situated.

Technical & Financial Assistance -- Because not all of this is intuitive, affordable and easy. Terrell Creek is a high priority restoration area for water processes. Mainstem 2 segment of Terrell Creek is additionally a key area for discharge, pathogen removal and denitrification. Specific recommended actions of the BB Pilot Study for these areas include:

- Creating additional woody cover through planting to improve infiltrative capacity;
- Re-vegetating riparian corridors;
- Plugging ditches to increase residence time and/or route water to depressional wetlands before discharging to creeks are specific recommended actions;
- Restoring floodplain by improving in-stream structure.

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- Reducing nutrient and pathogen loading into surface waters.

To be successful, the correct native plants must be selected for site conditions. Work cannot occur within the high water mark of stream without hydraulic project approval. These call for designs and surveys prepared by engineers. Acquisition, mobilization and placement of large woody debris are a specialty. Even if motivated to do so, the typical landowner does not possess the knowledge, expertise, resources and time to implement most of these actions on their own. The experienced project team of professionals has extensive experience successfully and efficiently restoring riparian zones on thousands of acres, installing dozens of instream projects and developing farm plans and implementing agricultural BMPs on hundreds of farms. Wherever possible, the USDA programs (Environmental Quality Incentive Program, Conservation Reserve Enhancement Program, Wildlife Habitat Incentive and Wetlands Restoration Program) will be tapped to bring additional funds for restoration, reforestation and Ag BMP projects.

Whatcom County has a unique way of protecting critical areas from the impacts of agriculture. It is called the Conservation Program on Ag Lands or CPAL. To deal with the numerous small or hobby farms in the County, a streamlined method for rapidly assessing them for potential negative impacts and effectively prescribing BMPs was created by Applicant. This model is being considered in the SSB5248 Ruckelshaus Center process for state-wide application. It is comprised of a checklist, action plan and supporting guidance materials for utilizing such that small farmers could complete and implement themselves. It will serve as the performance measure for eliminating discharges from livestock operations in the project area. It can be found at: <http://www.whatcomcd.org/FarmAssist/SmallFarm/WORKBOOK2009.pdf>

Urban Initiative: Drilling Down Into the Details of Taking Action. Phase I of the BB Pilot Study, has identified several subwatersheds as desirable for further development – with the purpose of redirecting growth from other areas more suitable for preservation/restoration. (See Figure 5). Recommendations also infer that mitigation for development impacts could be provided as “in lieu” payments for restoration efforts in more “suitable” areas within the watershed. At the same time, LID stormwater practices are encouraged. Recent urban comprehensive plan and zoning designations also re-affirm that these areas identified as more desirable for development should be developed. The BBWARM District, the entity charged with stormwater planning for this area, is interested in proofing the concepts included in the BB Pilot Study as included in the North Central subwatersheds designation to ensure that the planning proposals can be accommodated while limiting stormwater impacts and expenditures to the existing and future residents.

BBWARM seeks to establish a method for systematic analysis of current infrastructure and future infrastructure needs required to accommodate stormwater volumes while not degrading water quality. To accomplish this, the BBWARM District proposes to develop a subwatershed stormwater master plan which will serve as a prototype for analysis and planning of the remaining subwatersheds within Birch Bay’s UGA. The initial stormwater master plan seeks to establish a level of regulatory influence by utilizing an approach recommended by the Birch Bay Characterization Plan and incorporated into the Critical Area Ordinance (WCC 16.16.260.E “Watershed based Management Plan”). The current Critical Area Ordinance allows for deviation from the standard requirements if in compliance with the approved plan. Future regulations being developed through the “Birch Bay Action Plan” process could also incorporate “Subwatershed Master Plans” as a development alternative, which could assist in streamlining permitting as well as incorporating subwatershed specific stormwater standards.

This proposal will include a review of the current storm water district authorities and if required the development of a proposed code provision to require compliance with special system design standards as identified in the subwatershed stormwater master plan. Without a clear requirement to comply with basin specific stormwater plans, BBWARM’s ability to protect water quality and reduce stormwater related flooding could be severely limited. And worse, the level of effort and expense invested in developing site specific, “subwatershed master plans” would be of little value. In addition, the initial stormwater sub-

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watershed master plan will offer a proof of concept exercise to evaluate the BB Pilot Study recommendations on a sub basin level. The subwatershed master plan would be proposed for adoption as amendments to the Birch Bay Comprehensive Stormwater Plan and subwatershed specific flow volumes would also be proposed for adoption in stormwater regulations.

Project Components This project is divided into two initiatives to implement rural and urban recommendations. This will afford insights as to how the premises for the pilot study work in a real world application. Each initiative has its distinct phases and timing for implementation as shown in the following table.

Project Phase and Time Frame	Activities
Task 1. Rural Initiative (Terrell Creek Subbasin)	
<p><u>Phase R-1</u> <i>Develop an Effective Landowner Education and Outreach Program</i></p> <p><i>Jul – Oct 2010</i></p>	<ol style="list-style-type: none"> 1. Recruit a qualified Landowner Resource Advisor (“Advisor”). 2. School the Advisor as necessary to ensure she is conversant with this project, the Birch Bay Watershed Action Plan, LID, OSS and Ag BMPs, and establish working relationships with key project stakeholders. 3. Form an Advisory Committee of watershed residents, agency and NGO representatives and conduct regular meetings to select and guide the Advisor. 4. Engage a social marketing consultant to review/modify communication materials, develop tools to generate feedback and obtain focus group recommendations to ensure messaging and Advisor outreach effectiveness. 5. Create, revise, compile and print written materials; 6. Create website describing project goals, activities timelines, relevant info & links to technical and financial assistance. <p>Outputs: An Advisor who is fully prepared and equipped to effect positive change. A management structure to ensure attainment of project goals. A public outreach plan for how to successfully engage the community.</p>
<p><u>Phase R-2</u> <i>Implement Program of Education, Outreach & Project Development</i></p>	<ol style="list-style-type: none"> 1. The Advisor will meet with landowners to encourage adoption of LID, OSS and Ag BMPs, cooperate in riparian/wetland restoration projects and assess need for technical and financial assistance. 2. The Advisor will work with Applicant and NSEA to identify, design, permit and implement “in-stream” and “riparian” restoration projects. 3. The Advisor will refer landowners with livestock to applicant for development of farm plans. 4. The Advisor will attend meetings of the BB Steering Committee, BBWARM Board, and BB Shellfish Protection District and convene meetings of his Advisory Committee to review activities and receive input. 5. Applicant will provide professional support to the Advisor in public education and outreach efforts. This will include but not be limited to developing watershed newsletter and other printed materials, creating and maintaining a project web page, coordinating workshops for landowners, and facilitating coordination with stakeholders and participation on the advisory committee. 6. Applicant’s cartographer will work with the Advisor to produce maps and databases to support education efforts. 7. Outputs: List of landowners willing and desiring assistance to engage in water quality protection and riparian restoration activities. The Advisor will provide in-

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Project Phase and Time Frame	Activities
<i>Nov 2010 – May 2014</i>	<p>formation to land owners on site design standards, watershed-specific stream and wetlands protections, and wildlife habitat enhancements that are part of the BB Watershed Action Plan.</p> <p>8. Prioritize outreach to landowners that are in “protection and restoration” sub-watersheds as identified in the BB Pilot Study.</p> <p>Outputs Completion of an inventory and characterization of all livestock operations in the Terrell Creek. Completing at least 300 farm and home visits. Convincing 30 landowners to take actions to eliminate discharges of pathogens and nutrients from their property through the adoption of agricultural, stormwater or On-site Septic System BMPs.</p>
<p><u>Phase R-3</u> <i>Implement Riparian, BMP projects and WQ monitoring</i></p> <p><i>Sep 2010 – Oct 2013</i></p>	<ol style="list-style-type: none"> 1. NSEA and Applicant will cooperate to plant trees and shrubs along watercourses, re-slope, re-meander and install large woody debris to improve natural processes and fish habitat. 2. Applicant will work with at least half the landowners with livestock to provide farm plans and install Ag BMPs to reduce discharges of sediments, nutrients and pathogens. 3. NSEA will develop a QAPP and collect water samples bi-monthly at four sites that bracket the rural initiative project area. <p>Outputs: Plant & maintain at least 6 riparian restoration projects, re-slope 1,500’ of stream bank, place 10 large woody debris arrays of 5 root-wads, re-meander 1,000’ of stream and provide \$100,000 in cost share assistance for the installation of needed BMPs. All monitoring data will be entered into EIM. Farm Plans cost share will result in: Completion of 20 standard farm checklists to identify potential impacts to water quality; Development of 10 standard farm plans to protect water from pathogens and nutrients; Installation of 5,000 feet of fencing to exclude livestock from watercourses.</p>
<p><u>Phase R-4</u> <i>Post-project Evaluation</i></p> <p><i>Oct 2013 – Jun 2014</i></p>	<ol style="list-style-type: none"> 1. Obtain Focus Group Recommendations to gain valuable insights about messages, materials and activities so that they can be adapted to be most effective in the future. 2. Compile/analyze data regarding # of landowner contacts; types and #s of BMPs installed; acres/feet of in-channel and riparian projects; dollars spent or required for additional projects. <p>Outputs: Survey and analysis of data.</p>
<p><u>Phase R-5</u> <i>Presentations of Results & Final Report</i></p> <p><i>Dec 2013 – Jun 2014</i></p>	<ol style="list-style-type: none"> 1. Update the project website to show post-project evaluation and conclusions. 2. Present to conservation district employees and board members at state-wide and National meetings; Whatcom County Council and the WRIA 1 Watershed Management Team and EPA. 3. Final report describing results of project, associated water quality monitoring and discussion of limitations or appropriateness for application to other watershed. <p>Outputs: Final report, website and presentation materials.</p>
Task 2. Urban Stormwater Subwatershed Masterplan	
<p><u>Phase U-1</u> <i>Public involve-</i></p>	<ol style="list-style-type: none"> 1. Convene working stakeholder group, establish a meeting schedule based on the project tasks to encourage timely review and comment from group.

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<p><i>ment/outreach</i></p> <p>Jul 2010 – Jun 2014</p>	<p>2. Conduct public outreach - community meeting at the beginning, mid point and at the conclusion of the process - include additional outreach efforts for the development community.</p> <p>Outputs: Three public meetings/presentation, public education materials regarding purpose of BBWARM and value of subwatershed stormwater master planning.</p>
<p><u>Phase U-2</u> <u>Subwatershed Inventory & Hydraulic Analysis</u></p> <p>Mar 2011 – Dec 2011</p>	<ol style="list-style-type: none"> 1. Field verify public and private stormwater systems during wet season, modify maps as needed. 2. Conduct initial hydrologic and hydraulic modeling including up to 3 possible land use scenarios (this will allow consideration of selected BB Characterization Pilot Study recommendations) and establish recommended design standards and outlet sizing. 3. In conjunction with the process of #2 above, and in consultation with Birch Bay Action Plan Team, select the most likely proposed development recommendations as included in the BB Characterization Pilot Study and analyze the feasibility of implementing that proposal on the Central North Subwatersheds. 4. Produce 1st draft subwatershed stormwater Masterplan with recommended system standards, subwatershed specific flow volumes for new development, and a stormwater system problems list. <p>Outputs: Subwatershed hydrologic Analysis including custom stormwater flow volumes standards, Stormwater System Inventory, Site Specific Analysis of BB Characterization, Draft Subwatershed Masterplan.</p>
<p><u>Phase U-3</u></p> <p><i>Policy Analysis, development and adoption of Final Subwatershed Plan</i></p> <p>Jan 2012 – Aug 2012</p>	<ol style="list-style-type: none"> 1. Research legal options and survey other stormwater programs as background for developing a recommendation for inclusion in local plans and development regulations. 2. Methods will be evaluated to further integrate LID solutions into BBWARM stormwater capital improvement list as preferred stormwater retrofits. 3. Research legal options and survey other stormwater programs as background for developing proposed fiscal and funding policies in conjunction with BBWARM Advisory Committee and the stakeholder group. 4. As part of the inventory process, capital project needs be will identified. Cost estimates will be developed and provided in the form of a capital improvement project list for inclusion in the final subwatershed master plan. 5. Development of a phasing plan, to be based on logical infrastructure development which will include extension of new stormwater facilities and retrofits of existing drainage systems where needed. <p>Outputs: LID incentives through reduced BBWARM fees for development within the subwatershed area, fiscal and funding policies for incorporation into the BBWARM program and Comprehensive Stormwater Plan for Birch Bay, Subwatershed capital improvement program project list that includes considerations of BB Pilot Study recommendations for stormwater management through green infrastructure, and subwatershed phasing plan for system upgrades and new connections.</p>
<p><u>Phase U-4</u></p>	<ol style="list-style-type: none"> 1. Engineering design and construction of a selected capital improvement project(s)

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<i>Capital project(s) engineering and construction Apr 2012 – Oct 2013</i>	within the subwatershed. Output: major stormwater system element designed and constructed within the sub-watershed.
<u>Phase U-5</u> <i>Final Report Dec 2013 – Jun 2014</i>	1. Participate in final report preparation and presentations as needed. Output: Final report summarizing program accomplishments and findings.

Partners Key partnerships have been established to ensure success. These include:

- Birch Bay Watershed and Aquatics Resource Management District (“BBWARM”) – the jurisdiction responsible for implementing the Birch Bay Comprehensive Stormwater Plan;
- Whatcom County –
 - Planning & Development, Planning Services Division -- The BB Pilot Study lead
 - Public Works, Natural Resources Division – Responsible for Protecting and Recovering Marine Resources Public Works, Stormwater Division – Responsible for stormwater planning and project management and providing staff and administrative support to BBWARM.
- Nooksack Salmon Enhancement Association (“NSEA”) – the NGO who has a long history of implementing salmonid habitat restoration projects in and water quality monitoring in the Birch Bay watershed.

Anticipated Outputs And Outcomes:

Project Outputs Include:

Project Administration

- Submittal of all required performances
- Maintenance of all records
- Prompt & complete reporting of project activities.

Education & Outreach

- Development of effective education and outreach program for the landowners and residents of upper Terrell Creek subbasin.
- Completion of an inventory and characterization of all livestock operations in the Terrell Creek subbasin.
- Completing at least 300 farm and home visits.
- Convincing 30 landowners to take actions to eliminate discharges of pathogens and nutrients from their property through the adoption of agricultural, stormwater or on-site septic (OSS) BMPs.

Farm Plan Development & Implementation

- Completion of 40 standard farm checklists to identify potential impacts to water quality.
- Development of 20 standard farm plans to protect water from pathogens and nutrients.
- Installation of 10,000 feet of fencing to exclude livestock from watercourses.

Riparian & Instream Restoration

- Restoration of 10 acres of riparian buffer through USDA/State CREP program.

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- Re-meander of 1,000 feet of stream
- Re-sloping of 1,500 feet of stream bank
- Installation of 10 large woody debris arrays

Water Quality Monitoring

- Develop a QAPP for conducting water quality monitoring in the Terrell Creek watersheds.
- Collecting bi-weekly water samples and in-stream flow data at four sites on Terrell Creek.
- Compiling, analyzing, and summarizing water quality monitoring results.

Urban Stormwater – Subwatershed Masterplans.

- Subwatershed master plan
- Hydraulic modeling that results in specific flow volume capacities for each subwatershed.
- Model approach to apply to other urbanizing subwatershed in Birch Bay and throughout Puget Sound
- Construction of a capital project – designed as an integrated component into a stormwater system which emphasizes the ecological planning practices and recommendations contained in the BB Pilot Study and ground tested within the subwatershed.
- Reduced flooding and improved water quality of surface waters conveyed to Birch Bay
- Improved water quality sampling results at discharge points to Birch Bay
- Enhanced stormwater management services from BBWARM to public through adoption of fiscal policies that identify measures to manage and fund construction of system infrastructure

Specific Water Quality Outcomes include:

- Measured reductions in pathogens at monitoring stations bracketing the project area.
- Estimated reductions of nutrients after BMPs installation.
- Contribution to long term goals of reducing water temperature and increasing dissolved oxygen by re-establishing riparian cover.

Qualitative Improvements include:

- Increased awareness of landowners and residents in the project area of the state of the watershed and potential beneficial or detrimental impacts of their activities to the water quality of their watershed.
- Improved hydrologic, denitrification and pathogen reduction processes in the project area.
- Continued support for BBWARM special district to assess residents to improve water quality in the watershed.
- Improved stormwater system design standards for new construction
- Retro-fits of existing systems to provide improved water quality for discharges to the by through enhanced treatment and detention utilizing LID techniques and natural features where possible

Monitoring And Measuring Project monitoring will be appropriate to identify results that can reasonably be attributed to the specific project activity. Water quality sampling for pathogens will bracket the areas where landowners will receive information, technical and financial support to address pollution from failing onsite septic systems, pets and livestock. Baseline conditions will be captured for riparian projects prior to site preparation for planting. Post-planting, the sites will be monitored for maintenance needed to ensure that the projects are established and free to grow without additional maintenance. This could facilitate possible inclusion as sites for future acquisition with in-lieu mitigation fees.

A landowner focus group will provide feedback on the messages, materials, technical assistance provided and overall experiences from participating in the program. This will inform decision makers about the efficacy of the approach and including the incentives to spur voluntary action.

Birch Bay Characterization & Watershed Planning Pilot – Taking Action Project Narrative

Outreach And Information Transfer For the project area, a “trusted advisor” will act as an intermediary between the advisory committee and watershed residents. This will provide for the timely exchange of information, ideas and feedback as BB Pilot Study Phase II work products are being developed. Utilizing social marketing steps will aid in communication and refinement of a methodology that can be used in other watersheds engaging in similar efforts.

The applicant is held in high regard by its peers as an effective, innovative conservation leader. To transfer the information beyond the project area, experiences and lessons learned will be shared by project staff at an annual training offered to the State’s 47 conservation districts, annual meeting of the Washington Association of Conservation Districts and annual meeting of the National Association of Conservation Districts. Presentations will also be made to local and regional watershed groups such as the Puget Sound Partnership. Conservation districts are recognized for their high degree of success in engaging with private landowners in terms of developing practical solutions cooperatively with landowners on a range of land, water, and natural resource stewardship concerns. In learning how to integrate the Characterization and Assessment process into their district’s long range and annual plans of work they can most effectively utilize limited resources to achieve positive environmental outcomes. The project’s final report will include project data, mapping and an analysis of results for the focus subbasins. Materials will be made available on the applicant’s website (www.whatcomcd.org).

Communication with the development community through the development of the subwatershed stormwater master plan will provide many opportunities to provide information sharing, particularly as the master plan can become a method to streamline the permitting process due to the high level of area specific hydrologic and site information collected and incorporated into the stormwater system design.

Programmatic Capability And Past Performance Since 1998, the applicant has successfully administered eight Centennial Clean Water and 319 Water Quality projects five examples are: Whatcom Water Quality Improvement Project (G9800201), Whatcom County Shellfish Protection Plan (G9900096), Tenmile Creek Riparian Restoration Pilot (G0200268), Tenmile Watershed Rehabilitation Phase III (G0500076) and Drainage Improvement District (DID) Education and Reform Initiative (G0700135) Most recently, applicant was selected as NW District of 2009 by the Washington State Conservation Commission and Conservation District of the year by the Washington Association of Conservation Districts. The District plays significant roles in local, state and international efforts to restore and protect surface water and ground water resources from nutrients and pathogens and to protect air quality. See http://www.epa.gov/owow/nps/Success319/state/wa_nook.htm where our watershed, Nooksack River, is listed as an EPA Section 319 Nonpoint Source Success Story

The applicant attracts and retains technically proficient and productive staff that has been recognized by peers and partner organizations for their contributions and accomplishments. The project team includes experienced professionals with training in forestry, botany, horticulture, animal science, agronomy and law. The project principal investigator is George Boggs who has managed the District since 1997. He holds a B.S. in Agronomy and a J.D. in Law. George will provide direct oversight to the trusted advisor, district staff and direct communication with county departments and regulatory agencies to ensure timely completion of the project tasks within budget.

Kraig Olason the “Major Co-Investigator” is a Senior Stormwater Planner with Whatcom County Public Works, Stormwater Division has worked with resource planning issues in the public sector for over 25 years. He currently manages the BBWARM program and provides planning assistance and project management for other stormwater activities in Whatcom County. Kraig has successfully managed and completed many water quality related grant funded projects for both Conservation Districts and local county governments.

BIRCH BAY CHARACTERIZATION AND WATERSHED PLANNING PILOT – TAKING ACTION MAPS



Figure 1. Birch Bay Area Map

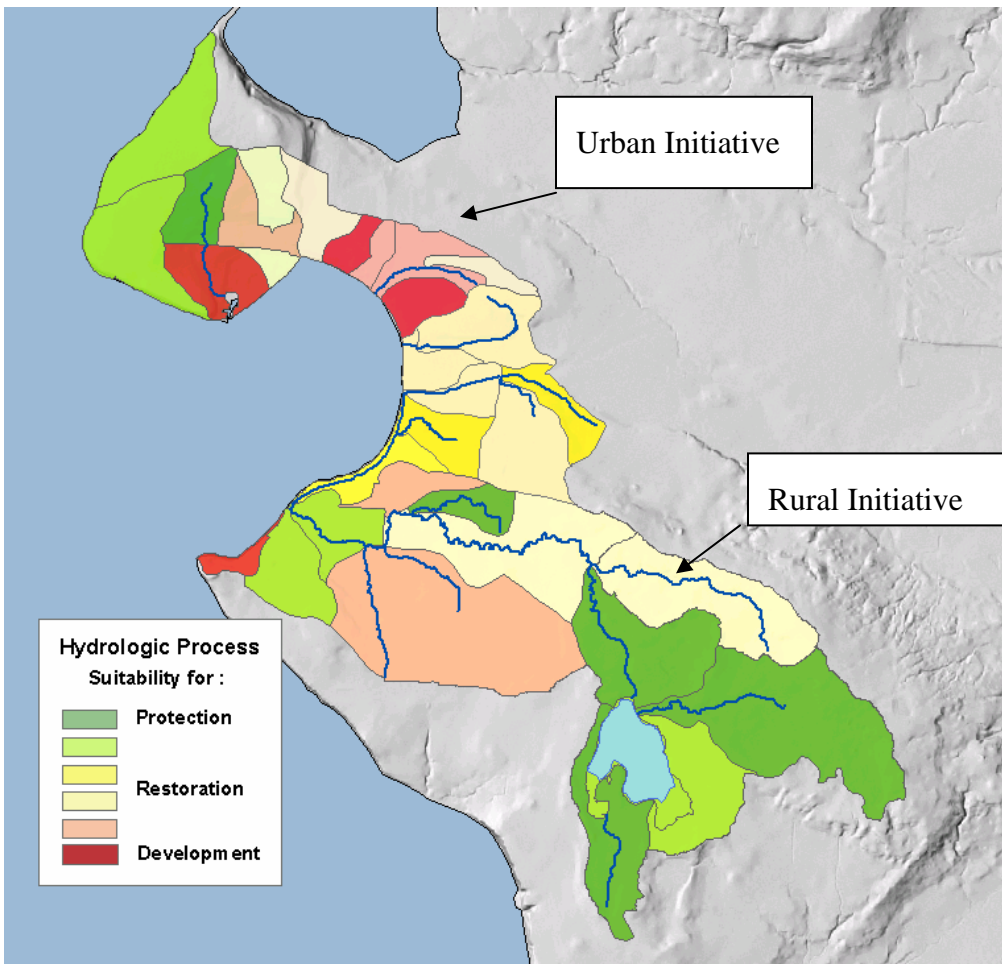


Figure 2. Management Recommendations for Hydrologic Processes

BIRCH BAY CHARACTERIZATION AND WATERSHED PLANNING PILOT – TAKING ACTION
MAPS

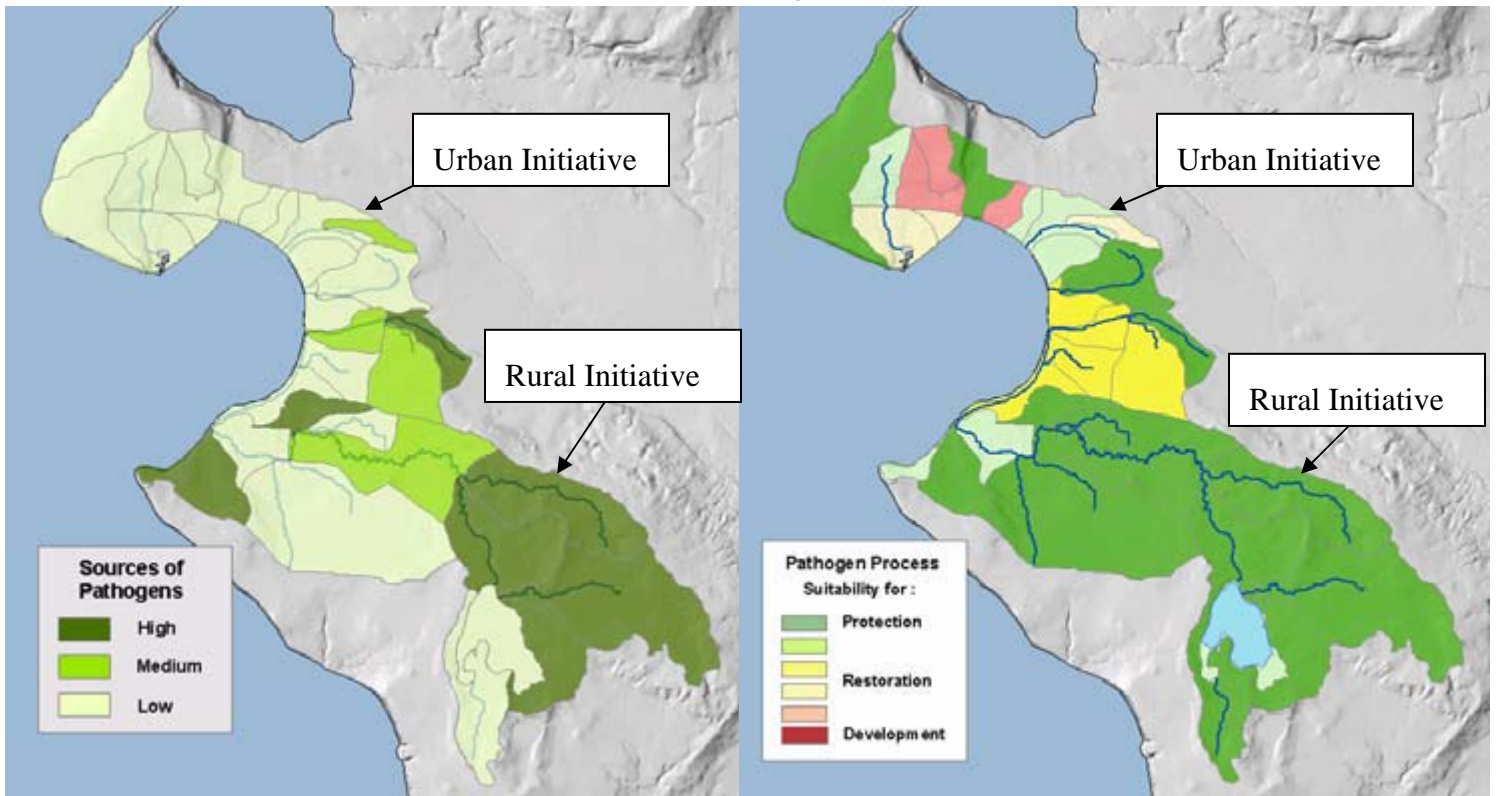


Figure 3. Management Recommendations for Pathogen Process

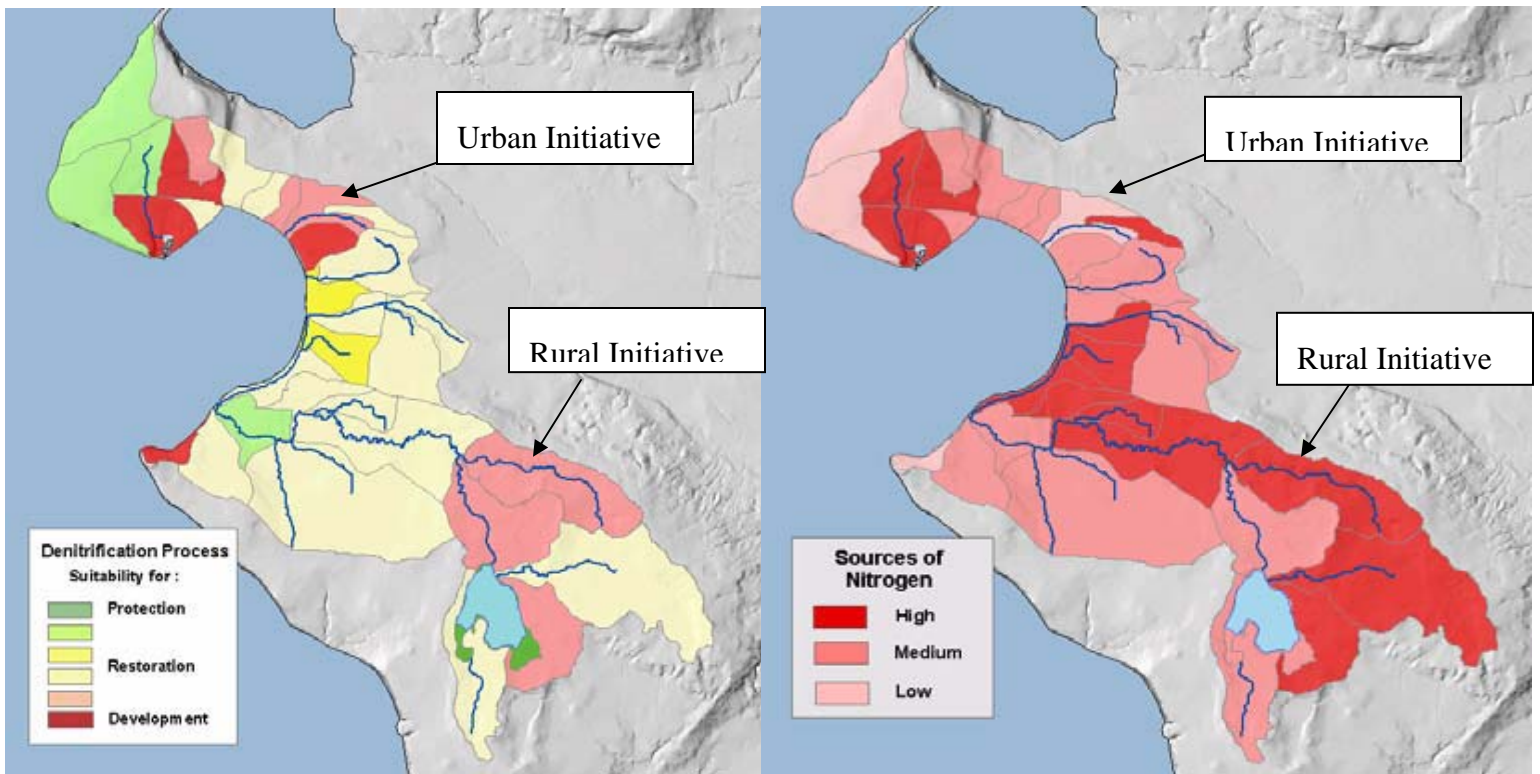
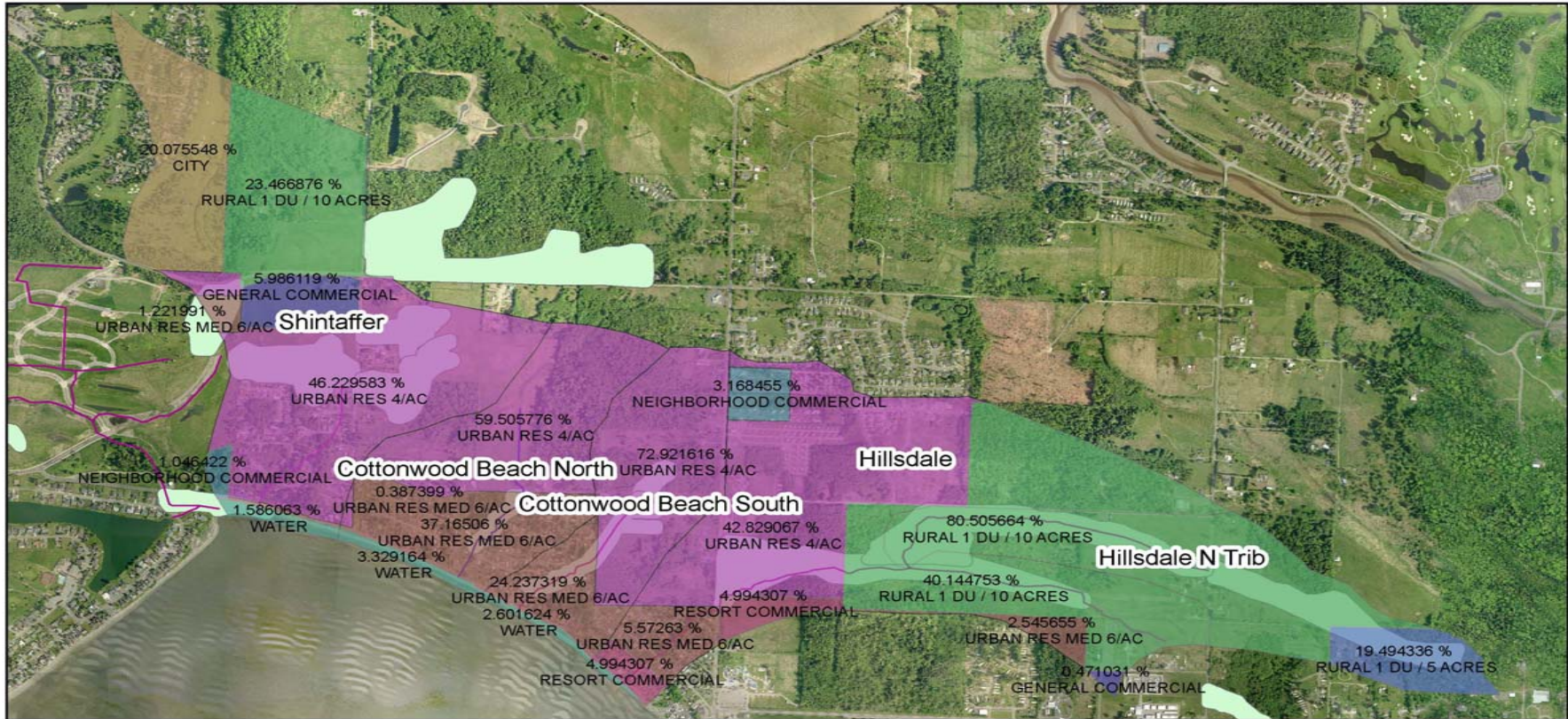


Figure 4. Management Recommendations for Denitrification Process

BIRCH BAY CHARACTERIZATION AND WATERSHED PLANNING PILOT – TAKING ACTION MAPS



Legend

wszone selection

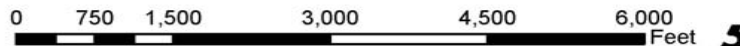
<all other values>

WCZONE_DES

- CITY
- GENERAL COMMERCIAL
- NEIGHBORHOOD COMMERCIAL
- RESORT COMMERCIAL
- RURAL 1 DU / 10 ACRES
- RURAL 1 DU / 5 ACRES
- URBAN RES 4/AC
- URBAN RES MED 6/AC
- WATER

Central North Sub-basins

1 inch = 1,606 feet



Total Acres	991.42
City of Blaine	62.23
Commercial	49.36
UR4	439.12
URM6	107.83
Rural 5	25.96
Rural 10	306.93
Total County Acres	929.20
Total Acres zoned for urban use	596.31
Percent County area urban	64%
Percent Total Area Urban designation	66%

Figure 5. Urban Initiative Area

BIRCH BAY CHARACTERIZATION AND WATERSHED PLANNING PILOT – TAKING ACTION

LOGIC MODEL

INPUTS	OUTPUTS		OUTCOMES		
	ACTIVITIES	PARTICIPANTS	SHORT TERM	MEDIUM TERM	LONG TERM
<p>EPA funds \$ 772,570</p> <p>Whatcom CD Staff time in project. \$7,461</p> <ul style="list-style-type: none"> ○ Project Management ○ Rural Subbasin Leadership ○ Technical assistance: ○ BMP, Riparian, Wetland, Forest Restoration Technical Assistance <p>Whatcom County \$236,000</p> <ul style="list-style-type: none"> ○ Urban Subbasin Leadership ○ OSS Objective ○ Monitoring ○ Engineering <p>BBWARM</p> <ul style="list-style-type: none"> ○ Board member time in project <p>NSEA</p> <ul style="list-style-type: none"> ○ Volunteers <p>Landowner labor/money contributions. \$16,666</p> <p>CREP State portion of Riparian Restoration in-kind contribution.</p>	<ol style="list-style-type: none"> 1. Recruit the Advisor. 2. School the Advisor 3. Form an Advisory Committee 4. Engage a social marketing consultant to review/modify communication materials, develop tools to generate feedback and obtain focus group 5. Create, revise, compile and print written materials; 6. Create website describing project goals, activities timelines, relevant info & links to technical and financial assistance. 7. Meet with landowners to gain cooperation, provide or refer for technical/financial assistance. 	<ol style="list-style-type: none"> 1. Applicant, Whatcom Co, BBWARM 2. Applicant, Whatcom County. 3. Applicant, Whatcom Co, BBWARM 4. Applicant, Advisory Committee, Advisor 5. Applicant, Advisory Committee, Advisor 6. Applicant 7. Advisor 	<p>Create Effective Landowner Outreach & Education Program.</p> <p>Implement Riparian Restoration, Ag BMP Installation and Stormwater Projects</p> <p>Develop information helpful for use by community and others interested in recovering and protecting watersheds.</p> <p>Develop and Adopt sub-watershed Master Plan</p> <p>Design and Construction of a capital project within sub-watershed</p>	<p>Create effective landowner led watershed restoration process.</p> <p>Increased awareness of landowners & residents of the condition of their watershed and potential beneficial/detrimental impacts of their activities.</p> <p>Inform policy makers as to effective means of effecting adoption of BMPs by landowners.</p> <p>Streamlined permitting</p> <p>Enhance water quality</p>	<p>Continued support of landowners for self assessment to improve/protect water quality.</p> <p>Restoration of naturally functioning ecosystem/watershed process.</p> <p>Improved systems to protect and restore watersheds.</p> <p>Flooding events associated with storm water run-off significantly reduced.</p> <p>Protect watershed and aquatic habitat to and in critical receiving waters.</p>

BIRCH BAY CHARACTERIZATION AND WATERSHED PLANNING PILOT – TAKING ACTION

LOGIC MODEL

<p>8. Design, permit and implement “in-stream” and “riparian” restoration projects.</p> <p>9. Attend meetings of the BB Pilot Study Steering Com., BBWARM Board, BB Shellfish Protection & Advisory Com</p> <p>10. Develop QAPP& Collect water samples.</p>	<p>8. NSEA & Applicant</p> <p>9. Advisor, & Applicant</p> <p>10. NSEA</p>	<p>Amended Comprehensive Stormwater Plan for Birch Bay to include fiscal and phasing policies</p> <p>Sub-WS Analysis of BB Characterization recommendations</p>	<p>Predictable stormwater requirements – phased system implementation</p> <p>Retrofit existing stormwater systems</p>	<p>Improve stormwater retention time and capacity in the Birch Bay Watershed.</p> <p>Protect watershed and aquatic habitat to and in critical receiving waters.</p>
<p>OUTCOME MEASURES</p>				
<p>11. Restore Channel and Riparian Areas</p> <p>12. Provide farm planning and cost share assistance to landowners.</p> <p>13. Obtain Focus Group Recommendations</p> <p>14. Compile/analyze data.</p> <p>15. Convene working stakeholder group, establish a meeting schedule based on the project tasks to en-</p>	<p>11. NSEA & Applicant</p> <p>12. Applicant</p> <p>13. Applicant, Advisor & Advisory Com.</p> <p>14. Applicant, Advisor & Advisory Com.</p> <p>15. Whatcom Co & Stakeholders</p>	<p>Final Report</p> <p>Acres of wetlands created.</p> <p>Acres of riparian buffers planted.</p> <p>Feet of stream rehabilitated.</p> <p># of Fences or other Ag BMPs installed.</p> <p># Landowners adopting BMPs</p> <p># Acres protected through farm plans.</p> <p>Reduced levels of Pathogens.</p> <p>Estimated reductions in nutrients from BMPS</p>	<p>Validation of Characterization & Assessment usefulness to guide protection and restoration activities.</p> <p>Developers designing projects to sub-basin design standards</p> <p>Cost effective stormwater system implementation</p> <p>Reduced flooding in near-shore areas of UGA</p>	<p>Watershed hydrology maintained.</p> <p>Shellfish beds reopened for harvest.</p>

BIRCH BAY CHARACTERIZATION AND WATERSHED PLANNING PILOT – TAKING ACTION

LOGIC MODEL

<p>courage timely review and comment from group.</p> <p>16. Conduct public outreach - community meeting at the beginning, mid point and at the conclusion of the process - include additional outreach efforts for the development community.</p> <p>17. Develop & publicize RFP for stormwater sub-watershed master plan development/select and establish contract with selected candidate.</p> <p>18. Inventory and map all existing stormwater systems, evaluate sub-watershed site conditions, field verify during wet season, modify maps as needed.</p> <p>19. Conduct initial hydrologic and hydraulic modeling including up to 3 possible land use scenarios</p>	<p>16. Consultant/Whatcom County and BBWARM AC</p> <p>17. Whatcom County</p> <p>18. Consultant & Whatcom Co</p> <p>19. Consultant & Whatcom County Public Works</p>	<p>adopted.</p> <p>Reduced overall stormwater system costs and greater predictability for new development</p>	<p>Improved water quality at marine discharge points</p>	
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BIRCH BAY CHARACTERIZATION AND WATERSHED PLANNING PILOT – TAKING ACTION

LOGIC MODEL

<p>(this will allow consideration of selected BB Characterization Pilot Study recommendations) and establish recommended design standards and outlet sizing.</p> <p>20. In conjunction with the process of #19 above, and in consultation with Birch Bay Action Plan Team, select the most likely proposed development recommendations as included in the BB Characterization Plan and analyze the feasibility of those proposal on the Central North Sub-watershed</p> <p>21. Produce 1st draft sub-watershed storm-water Masterplan with recommended system standards, identified LID types and preferred sites and include system problems list.</p> <p>22. Research legal options and survey</p>	<p>20. Consultant & Whatcom County Public Works, Planning</p> <p>21. Consultant & Whatcom County Public Works, BBWARM AC</p> <p>22. Consultant & Whatcom County</p>		
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BIRCH BAY CHARACTERIZATION AND WATERSHED PLANNING PILOT – TAKING ACTION

LOGIC MODEL

<p>other stormwater programs as background for developing a recommendation for inclusion in local plans and development regulations.</p> <p>23. Methods will be evaluated to further integrate LID solutions into BBWARM stormwater capital improvement list as preferred stormwater retrofits.</p> <p>24. Research legal options and survey other stormwater programs as background for developing proposed fiscal and funding policies in conjunction with BBWARM Advisory Committee and the stakeholder group.</p> <p>25. As part of the inventory process, capital project needs will be identified. Cost estimates will be developed and provided in the form of a capital</p>	<p>Public Works, BBWARM AC</p> <p>23. Consultant & Whatcom County Public Works, BBWARM AC</p> <p>24. Consultant & Whatcom County Public Works, BBWARM AC</p> <p>25. Consultant & Whatcom County Public Works, BBWARM AC</p>		
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BIRCH BAY CHARACTERIZATION AND WATERSHED PLANNING PILOT – TAKING ACTION

LOGIC MODEL

<p>improvement project list for inclusion in the final sub-basin master plan.</p> <p>26. Development of a phasing plan, to be based on logical infrastructure development, which will include extension of new stormwater facilities and retrofits of existing drainage systems where needed.</p> <p>27. Development of the final sub-basin stormwater master plan and submittal of plan for adoption as a chapter of the Birch Bay Comprehensive Stormwater Plan. Engineering design and construction of a selected capital improvement project(s) within the sub-basin.</p> <p>28. Final report</p>	<p>26. Applicant, Advisor & Whatcom Co.</p> <p>27. Consultant & Whatcom County Public Works, BBWARM AC</p> <p>28. Applicant, Advisor & Whatcom Co.</p>		
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