

2010 Stormwater Needs Assessment Program

Lawton Creek Subwatershed Needs Assessment Report

Clark County Department of Environmental Services

March 2011



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Acronyms and Abbreviations

B-IBI	Benthic Macroinvertebrate Index of Biological Integrity
BOCC	Board of County Commissioners
BMP	Best Management Practices
CCD	Clark Conservation District
CIP	Capital Improvement Program
CPU	Clark Public Utilities
CRFPO	Columbia River Fisheries Program Office
CWA	Clean Water Act
CWC	Clean Water Commission
CWP	Clean Water Program
DNR	Department of Natural Resources
EDT	Ecosystem Diagnostic and Treatment model
EIA	Effective Impervious Area
EIM	Environmental Information Management
EMAP	Environmental Mapping and Assessment
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FPIA	Focused Public Investment Area
FWS	Fall, Winter, Spring
GCEC	Gee Creek Watershed Enhancement Committee
GIS	Geographic Information System
GMA	Growth Management Act
GPS	Geographic Positioning System
HPA	Hydraulic Project Approval
IDDE	Illicit Discharge Detection and Elimination
LCFEG	Lower Columbia Fish Enhancement Group
LCFRB	Lower Columbia Fish Recovery Board
LID	Low-Impact Development
LiDAR	Light Detection and Ranging
LISP	Long-term Index Site Project
LWD	Large Woody Debris
MS4	Municipal Separate Storm Sewer System
MOP	Mitigation Opportunities Project
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollution Discharge Elimination System
NTU	Nephelometric Turbidity Unit
NWIFC	Northwest Indian Fisheries Commission
ODEQ	Oregon Department of Environmental Quality

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OWQI	Oregon Water Quality Index
PFC	Properly Functioning Condition
RM	River Mile
SCIP	Stormwater Capital Improvement Program
SCIPIT	Stormwater Capital Improvement Program Involvement Team
SCMP	Salmon Creek Monitoring Project
SCWC	Salmon Creek Watershed Council
SNAP	Stormwater Needs Assessment Program
SWMP	Stormwater Management Program
SWMMWW	Stormwater Management Manual for Western Washington
TIA	Total Impervious Area
TIP	Transportation Improvement Program
TIR	Technical Information Report
TMDL	Total Maximum Daily Load
TP	Total Phosphorus
UGA	Urban Growth Area
UIC	Underground Injection Control
USFS	U.S. Forest Service
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
VBLM	Vacant Buildable Lands Model
VLWP	Vancouver Lake Watershed Partnership
WAC	Washington Administrative Code
WCC	Washington Conservation Commission
WDFW	Washington Department of Fish and Wildlife
WRIA	Water Resource Inventory Area
WSDOT	Washington Department of Transportation
WSU	Washington State University

Executive Summary

Study Area

This Stormwater Needs Assessment report includes the Lawton Creek watershed in eastern Clark County.

Intent

Stormwater Needs Assessment reports compile and provide summary information relevant to stormwater management, propose stormwater-related projects and activities to improve stream health, and assist with adaptive management of the county's Stormwater Management Program. Assessments are conducted at a subwatershed scale, providing a greater level of detail related to stormwater management than regional Water Resource Inventory Area (WRIA) or Endangered Species Act (ESA) plans. Stormwater Needs Assessments are not comprehensive watershed plans or stormwater basin plans.

Findings

Watershed Conditions

The table on the following page summarizes conditions in the study area, including water quality, biological health, habitat, hydrology and the stormwater system.

Ongoing Projects and Involvement

There are no stormwater capital projects in this area under the 2010-2012 stormwater capital plan and no road projects in the 2008-2013 Transportation Improvement Program.

Lawton Creek does not have a watershed council or active grassroots organizations. However, the Lower Columbia Fish Recovery Board is active in salmon recovery planning and implementation in this area. Clark County implements its stormwater management program countywide, including the Lawton Creek watershed.

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Category	Status
Water Quality Overall	<ul style="list-style-type: none"> • Unknown • No 303(d) listed segments; data virtually non-existent
Biological Benthic macroinvertebrates Anadromous fish	<ul style="list-style-type: none"> • Moderate biological integrity • Known Coho and winter steelhead use; presumed Chum use. • Recovery priority not assigned
Habitat NOAA Fisheries criteria Riparian Wetland	<ul style="list-style-type: none"> • Forest cover and total impervious area fall midway between Functioning and Non-Functioning thresholds • Road crossing density falls into the Functioning category; overall road density is in the Non-Functioning category • Forest cover is about 54 percent and is found in stream valleys and some upland areas • Large woody debris recruitment potential is moderate to good in the upper basin and poor to moderate in the lower stream reaches • Limited wetlands associated with stream channels; 11 acres within the 1173 ac watershed • No large headwater or valley floor wetland complexes
Hydrology and Geomorphology Overall hydrology Future condition	<ul style="list-style-type: none"> • No hydrologic data is available but likely typical for a partly forested rural watershed • Projected impervious area suggests uncertain channel stability and somewhat altered hydrology in the future.
Stormwater (unincorporated areas) System description Inventory status System adequacy System condition	<ul style="list-style-type: none"> • Very limited stormwater infrastructure; primarily road-side ditches. There are five mapped stormwater outfalls. • No public or private stormwater facilities • Complete • Adequate treatment is probably provided by vegetation in ditches • No flow control other than infiltration in ditches • Largely unknown; outfall screening was not conducted and no off-site assessments were performed

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Opportunities

Opportunities for stormwater-related projects are limited in this assessment area. No specific project opportunities were discovered, and there are no specific recommendations to modify ongoing county stormwater management efforts in Lawton Creek.

General recommendations and observations include:

- Ecology recommends protection and restoration of hydrologic processes in the Lawton watershed
- Overall riparian management recommendations include preservation/acquisition of intact riparian forest, implementation of forestry best management practices, riparian forest restoration in areas degraded by agricultural and residential uses, and invasive species removal
- A lower than expected score for biological health (based on macroinvertebrate populations) suggests an opportunity to increase biological health through improved habitat. Limiting future degradation and promoting stream stewardship are important steps

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Introduction

This Stormwater Needs Assessment includes the Lawton Creek subwatershed in eastern Clark County. The Clean Water Program (CWP) is gathering and assembling information to support capital improvement project (CIP) planning and other management actions related to protecting water bodies from stormwater runoff.

Purpose

The Stormwater Needs Assessment Program (SNAP), initiated in 2007, creates a system for the CWP to focus activities, coordinate efforts, pool resources and ensure the use of consistent methodologies. SNAP activities assess watershed resources, identify problems and opportunities, and recommend specific actions to help meet the CWP mission of protecting water quality through stormwater management.

The overall goals of SNAP are to:

- Analyze and recommend the best, most cost effective mix of actions to protect, restore or improve beneficial uses consistent with NPDES permit objectives and the goals identified by the state Growth Management Act (GMA), ESA recovery plan implementation, Total Maximum Daily Load (TMDLs), WRIA planning, floodplain management, and other local or regional planning efforts
- Inform county efforts to address the following issues related to hydrology, hydraulics, habitat, and water quality:
 - Impacts from current or past development projects subject to lesser or non-existent stormwater treatment and flow control standards
 - Subwatershed-specific needs due to inherent sensitivities or the present condition of water quality or habitat
 - Potential impacts from future development

The CWP recognizes the need to translate assessment information into on-the-ground actions to improve water quality and habitat. Facilitating this process is a key requirement for the program's long-term success.

Results and products of needs assessments promote more effective implementation of various programs and mandates. These include identifying mitigation opportunities and providing a better understanding of stream and watershed conditions for use in planning county road projects. Similar information also is needed by county programs implementing critical areas protection and salmon recovery planning under the state GMA and federal ESA.

Scope

This report summarizes and incorporates new information collected for SNAP, as well as pre-existing information. In many cases, it includes basic summary information or incorporates by reference longer reports which may be consulted for more detailed information.

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SNAP reports produce information related to three general categories:

- Potential stormwater capital projects for county implementation or referral to other organizations
- Management and policy recommendations
- Natural resource information

Descriptions of potential projects and recommended program management actions are provided to county programs, including: Department of Environmental Services Clean Water, Stormwater Capital Planning, Legacy Lands, and ESA; Public Works Operations, Development Engineering, and CIP; Community Planning; Public Health. Potential project or leveraging opportunities also are referred to local agencies, groups and municipalities, as appropriate.

Assessment Approach

Priorities for Needs Assessment in Lawton Creek

Clark County subwatersheds were placed into a five-year schedule for assessment using the procedures described in *Prioritizing Areas for Stormwater Basin Planning* (Swanson, July 2006).

For SNAP purposes, Lawton Creek subwatershed is categorized as “Largely Forested Land.” Subwatersheds in this category contain significant amounts of private land zoned for industrial forestry and DNR forest lands. These areas have few county roads and stormwater management is limited to mapping and evaluating the area draining to county outfalls and possible habitat protection or restoration to mitigate for stormwater impacts to other parts of a watershed.

Assessment Tools Applied in Lawton Creek

SNAP uses a standardized set of tools for subwatershed assessment; including desktop mapping analyses, modeling, outreach activities and a variety of field data collection procedures. Tools follow standard protocols to provide a range of information for stormwater management. Though not every tool is applied in every subwatershed, the use of a standard toolbox ensures the consistent application of assessment activities county-wide.

Table 1 lists the set of tools available for use in the SNAP. Tools with an asterisk (*) are those for which new data was gathered or new analyses were conducted during this needs assessment. The remaining tools or chapters were completed based on pre-existing information.

Table 1: Stormwater Needs Assessment Tools

Outreach And Involvement *	Riparian Assessment *
Coordination with Other Programs *	Floodplain Assessment
Drainage System Inventory and Condition *	Wetland Assessment *
Review Of Existing Data	Macroinvertebrate Assessment *
Illicit Discharge Screening	Fish Use And Distribution *
Broad Scale GIS Characterization *	Water Quality Assessment *
Rapid Stream Reconnaissance	Hydrologic and Hydraulic Modeling
Physical Habitat Assessment	Source Control
Geomorphology Assessment	

Assessment Actions

Outreach Activities

Outreach activities were limited and focused primarily on raising awareness about the SNAP effort. The following activities were completed:

- Press release to local media
- April 2010 – article in Clean Water Program E-Newsletter
- August 2010 – information on SNAP distributed at 10-day Clark County Fair
- Clean Water Program web pages updated as needed; 135 visitors to the SNAP web page since June 2010. (Note: these figures are under-reported as tracking software only records top 20 pages and documents monthly)
- A description of SNAP is included in Clark County’s annual stormwater management program plan submitted to Ecology

Clark County Clean Water Commission members were updated periodically on SNAP progress.

Actions available to educate in response to identified problem areas include the following:

- Site visits by CWP technical assistance staff
- Letters detailing specific problems and solutions to individual landowners
- General educational mailings to selected groups of property owners
- Workshops on best management practices, including septic maintenance and mud, manure and streamside property management
- Referral to other agencies, such as Clark Conservation District or WSU Extension, for educational follow-up

Review of Existing Data

Data and information review is incorporated throughout this report in pertinent sections. A standardized list of typical data sources created for the overall SNAP effort is supplemented by subwatershed-specific sources as they are discovered. Data sources consulted for this report include, but are not limited to those listed below:

- LCFRB Habitat Characterization (2004)
- LCFRB 6-Year Habitat Workplan
- Ecology 303(d) list
- WRIA 27/28 Plan
- Ecology EIM data
- Clark County 2004 Subwatershed summary

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- Clark County 2010 Stream Health ReportS
- Clark County 6-Year TIP

Broad-Scale GIS Characterization and Metrics

The broad-scale characterization is a GIS-based exercise providing an overview of the biophysical setting for each subwatershed, background information for use in implementing other SNAP tools, and identification of potential acquisition or project sites. GIS data describe subwatershed characteristics such as topography, geology, soils, hydrology, land cover, land use and GMA critical areas. A standard GIS workspace, including shape files for more than 65 characteristics, forms the basis for the characterization.

GIS data are generally used as a tool to complete the report and not presented in the report itself. Summary metrics are taken from existing reports and data; for example, Wierenga (2005) summarized many GIS characteristics for Clark County subwatersheds. Some of these characteristics are described in greater detail in later sections.

The characterization includes three components:

- A set of four standard map products, as paper maps for SNAP use
- A summary table of selected subwatershed-scale metrics
- A brief narrative including comparison of metrics to literature values, and conclusions about general subwatershed condition and potential future changes

Map Products

The four standard SNAP map products are: 1) Stormwater Infrastructure and Hydrologic Soil Groups, 2) Critical Areas information, 3) Vacant Buildable Lands within UGAs, and 4) Orthophoto. These maps are printed out for tabletop evaluations.

General Conditions and Subwatershed Metrics

General Geography

The study area is a small watershed on the eastern border of Clark County in the Columbia River Gorge at the edge of the Cascade Mountain. The uppermost part of the basin is in Skamania County. The stream divides to form three main branches, including the only named tributary (Walton Creek). A few small tributaries enter from steep canyon walls (Figure 1). Land use is rural, with a mix of steep, forested riparian areas and upland prairie/pasture.

Topography

The study area headwaters are in rolling hills with relatively flat prairie plateaus between 600 and 800 feet elevation. Water moves down deep canyons to the Columbia River floodplain. Floodplains are lacking upstream of the Columbia River floodplain due to steep-walled canyons with slopes ranging from 30 to 100 percent.

Geology and Soils

Lawton Creek is in the hydrogeologic landform referred to as the Troutdale bench, which is an elevated surface underlain by sedimentary rocks deposited by the ancestral Columbia and local

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streams. Canyons cut into the gravelly geologic deposits produce stream channels carrying a gravel bedload. Deep soils formed on the sedimentary rocks are well-drained and fall in hydrologic soil group C, primarily Hesson clayey loams with lesser amounts of Lauren gravelly loam and Olympic stoney clay at the lower end of the watershed.

Hydrology

Geology and topography play the main roles in determining study area hydrologic framework. The relatively flat lying sedimentary deposits are capable of retaining relatively large amounts of rainfall as recharge. This groundwater recharge returns to the streams in summer months from seeps and springs.

Land cover is typical for rural areas, and all tributary streams in the study area drain forested canyons with prairie or pastured uplands. Generally, flatter hilltops are cleared for pastures while steeper valleys walls are forested. Overall, about 54 percent of Lawton Creek is forested, but cleared uplands and relatively steep gradient streams can lead to somewhat flashy streams. Level uplands were cleared in the first half of the 20th century, as 1955 and 1968 aerial photographs show extensive tilled fields. There are no stream gauges on Lawton Creek, although it is likely that stream hydrology is less altered than in many Clark County streams.

2008 Stormwater Needs Assessment Program

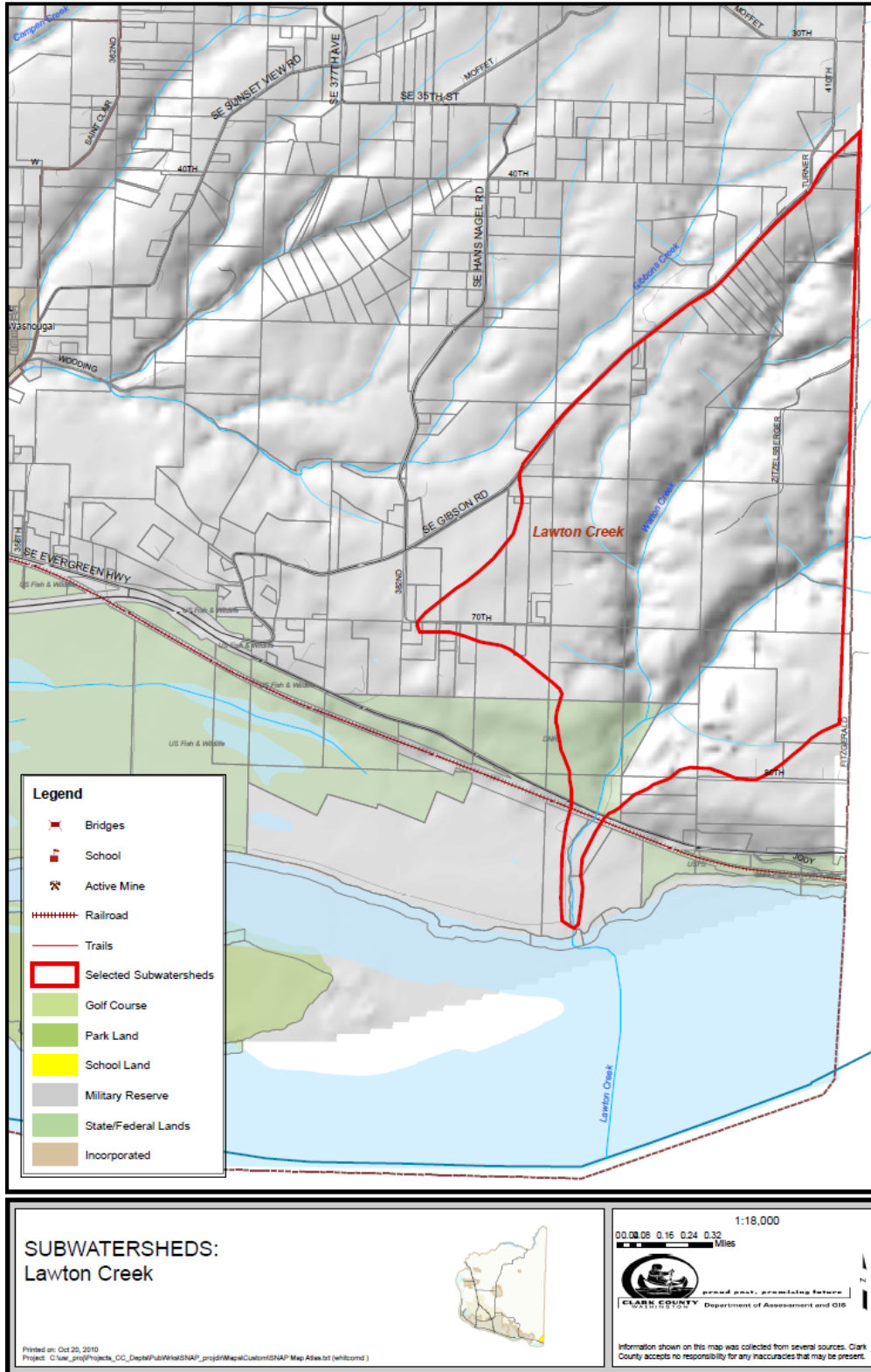


Figure 1: Subwatershed Map: Lawton Creek

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Subwatershed Metrics

Subwatershed scale metrics provide a simple way to summarize overall conditions. Metrics are calculated from Landsat land cover analysis and current GIS data. Benchmarks for properly functioning and not properly functioning are based on NOAA fisheries standards for salmon protection and restoration (1996 and 2003).

Overall, these metrics suggest that the study area has partially functioning stream habitat (Table 2).

Table 2: Watershed Scale Metrics

Metric	Lawton Creek	Functioning	Non-functioning
Percent Forested (2000 Landsat)	54	> 65 %	< 50 %
Percent TIA (2000 Landsat)	8	< 5 %	> 15 %
Road Density 2007 data (miles/mile ²)	5	< 2	> 3
Stream Crossing Density (crossings per stream mile)	0.5	< 3.2/mile	> 6.4/mile
Percent EIA estimated from the Comprehensive Plan	4	< 10 %	> 10 %

Forest Cover

The proportion of a watershed in forest cover is known to have a profound influence on watershed processes. Forest cover estimates are taken from a report summarizing land cover for Clark County (Hill and Bidwell, January 2003). Research in the Pacific Northwest has shown that when forest cover declines below approximately 65 percent, watershed forming processes become degraded (Booth and Jackson, 1997). These include reducing riparian shade, less wood debris delivery to streams, increased stormwater runoff, and increased fine sediment delivery due to mass wasting.

Forest cover in the study area is primarily within steep, wooded riparian valleys. Steep slopes have spared the riparian area from clearing for agricultural uses and helped maintain a relatively large percentage of overall forest cover. The position of this watershed in the Columbia Gorge Scenic Area provides some protection against additional large-scale clearing.

TIA (Total Impervious Area)

Total impervious area is one of the most widely used indicators of urbanization and coincident watershed degradation (Center for Watershed Protection, March 2003). Total impervious areas are estimated from land cover data in Hill and Bidwell (January 2003). While various organizations and publications categorize stream condition based on TIA, the NOAA fisheries standard is less than five percent as fully

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functional and greater than 15 percent as non-functioning. Values for Lawton Creek fall between the Functioning and Non-Functioning habitat thresholds, indicating partial function.

Road Density

Road density, including all public and private roads, is an easily calculated development measure. Based on criteria set by NOAA Fisheries to protect salmon habitat, road densities are relatively low compared with most areas of Clark County, but still nearly twice as dense as the threshold for non-functioning habitat (>3 road miles/mi²).

Stream Crossing Density

Stream crossing densities are easily measured using available road and stream channel data. The salmon protection standard considers larger fills more than 60 feet wide, which would be approximately five- to 10-foot high road fill. The study area has stream crossing density well within the functioning category (<3.2 crossings/stream mile NOAA Fisheries criteria).

Future Effective Impervious Area

Effective impervious area is the amount of impervious area that actually drains to a water body. Depending on factors such as soil types and level of development, effective impervious area is about half (lower intensity development) to almost equal (high intensity development) the TIA value.

The Comprehensive Plan guides development for the next few years, and when used to estimate effective impervious area, it can provide a metric for potential hydrologic impacts due to expected development. Expected EIA places the study area in the functioning category.

Estimated Channel Stability Based on Forest and EIA

In a recent publication by Booth, Hartley, and Jackson (June 2002), a relationship between forest and percent EIA was presented as a graphic (**Error! Reference source not found.**). According to this figure, Lawton Creek has a typical level of EIA for rural areas and falls within the zone of uncertain channel stability.

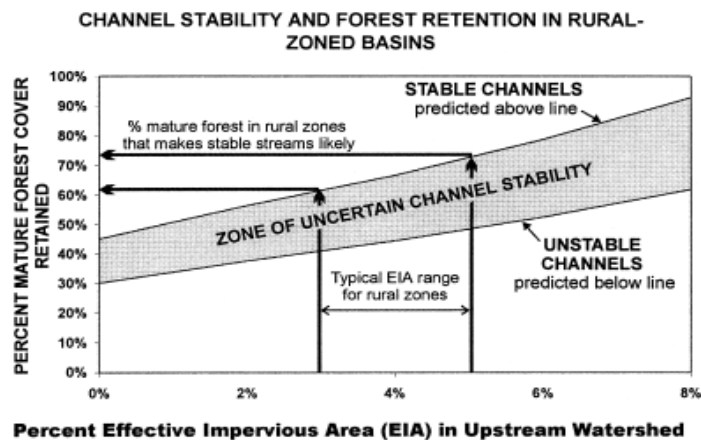


Figure 2: Channel stability in rural areas (Booth, Hartley, and Jackson, June 2002)

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Water Quality Assessment

This section briefly summarizes and references available water quality data from the Lawton Creek subwatershed. A description of applicable water quality criteria is included along with discussions of beneficial use impacts, likely pollution sources, and possible implications for stormwater management planning.

Water Quality Criteria

For a full explanation of current water quality standards see the Ecology website at:
<http://www.ecy.wa.gov/programs/wq/swqs/index.html>

Under Washington state water quality standards, Lawton Creek (and tributaries) above latitude 45.5708 and longitude -122.2576 is to be protected for the designated uses of: “Core Summer Salmonid Habitat; primary contact recreation; domestic, industrial, and agricultural water supply; stock watering; wildlife habitat; harvesting; commerce and navigation; boating; and aesthetic values” (WAC 173-201A-600, Table 602).

Table 3 summarizes currently applicable water quality criteria for the assessment area.

Table 3: Applicable Water Quality Criteria for Lawton Creek Subwatershed

Characteristic	Ecology criteria
Temperature	≤ 16° C (60.8° F)
Dissolved Oxygen	≥ 9.5 mg/L
Turbidity	shall not exceed 5 NTU over background when background is 50 NTU or less
pH	6.5 – 8.5 units
Fecal coliform bacteria	Geometric mean fecal coliform concentration not to exceed 100 colonies/100mL, and not more than 10% of samples exceeding 200 colonies/100mL.
Aesthetics	Aesthetic values must not be impaired by the presence of materials or their effects... which offend the senses of sight, smell, touch, or taste
Toxics	Toxic substances shall not be introduced... which have the potential...to adversely affect characteristic water uses, cause acute or chronic toxicity to the most sensitive biota dependent upon those waters, or adversely affect public health

Source: Washington Department of Ecology (<http://www.ecy.wa.gov/programs/wq/swqs/index.html>)

303(d) Listed Impairments

The 2008 303(d) list of impaired waters is on the Ecology website at:
<http://www.ecy.wa.gov/programs/wq/303d/index.html>

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There are no listings for Lawton Creek.

Clark County Stream Health Report

In 2010, the CWP compiled available data and produced a countywide assessment of general stream health.

Based on the available dataset, including water quality, biological health and stream flow patterns, overall stream health in the Lawton Creek subwatershed scored in the fair range. No water quality data was available for this analysis.

The 2010 Stream Health Report may be viewed on the county website at:
<http://www.clark.wa.gov/water-resources/stream.html>.

Available Data

Ecology and CWP databases contain no records for water quality samples in Lawton Creek.

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Drainage System Inventory and Condition

Inventory

Clark County's drainage system inventory resides in the StormwaterClk GIS database and is available to users through the county's GIS.

Drainage system inventory is an ongoing CWP work effort focused on updating the StormwaterClk database to include all existing stormwater drainage infrastructure. In 2008-2009, the inventory was a significant priority for the CWP, with a major work effort focused on identifying and mapping previously unmapped infrastructure and reviewing existing records for completeness and accuracy.

Table 4 indicates the number of features currently inventoried in StormwaterClk. There are no mapped stormwater facilities in the Lawton Creek subwatershed.

Table 4: Drainage System Inventory Results, Lawton Creek

Database Feature Category	Inventoried prior to 2007	Added during 2007-2009	Total Features
Inlet	0	0	0
Discharge Point (outfall)	0	25	25
Flow Control	0	0	0
Storage/Treatment	0	0	0
Manhole	0	0	0
Filter System	0	0	0
Channel	1	58	59
Gravity Main	3	17	20
Facilities	0	0	0

Condition

Stormwater system condition is assessed based on three components:

- An evaluation of retrofit opportunities at public stormwater facilities
- An inspection and maintenance evaluation at public stormwater facilities
- An off-site assessment to check for outfall-related problems in downstream receiving waters

Component 1: Retrofit Evaluation

Purpose

The purpose of this component is to identify existing public stormwater facilities that may be retrofitted to provide additional storage or treatment, beyond the level intended during original construction.

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Methods

The evaluation is conducted at all public stormwater facilities that contain detention ponds, treatment wetlands, wet ponds, pre-settling cells, open filters or bioswales and discharge to surface waters or stormwater drainage infrastructure that eventually discharges to surface waters.

The retrofit evaluation includes a review of the drainage area, stormwater infrastructure condition, facility lot size, ownership of adjacent parcels, and the functionality of the facility objects listed above. Facilities or parcels with the potential to provide additional storage and/or treatment of stormwater are referred as "potential retrofit" opportunities for further evaluation as Capital Improvement Projects.

Results

Based on the county's StormwaterClk database, as of August 2010, there were no mapped public stormwater facilities in the Lawton Creek subwatershed.

Component 2: Inspection and Maintenance Evaluation

Purpose

The inspection and maintenance evaluation verifies that maintenance activities are implemented and facilities are properly functioning.

Methods

The inspection and maintenance evaluation is conducted at public stormwater facilities in conjunction with retrofit evaluations. Public stormwater facilities are evaluated if they contain detention ponds, treatment wetlands, wet ponds, pre-settling cells, open filters or bioswales and discharge to surface waters or stormwater drainage infrastructure that eventually discharges to surface waters.

Public stormwater facilities that contain filter systems, buried detention or retention vaults, and facilities that infiltrate stormwater are typically not included in this evaluation. They may be inspected on a case-by-case basis as resources allow.

The evaluation is conducted using county and state standards equivalent to maintenance standards specified in Chapter 4, Volume V, of the 2005 Stormwater Management Manual for Western Washington. The standards list the part or component of the facility, condition when repair or maintenance is needed, and expected results. Individual components of a facility are referred to as "facility objects."

The inspection and maintenance evaluation process involves inspecting all facility objects to determine if maintenance complies with the standards. If any facility object fails to meet the maintenance standards, the entire facility is not in compliance. Noncompliant stormwater facilities are referred to the appropriate department for repairs or maintenance.

Results

Based on the county's StormwaterClk database, as of August 2010, there were no mapped public stormwater facilities in the Lawton Creek subwatershed.

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Component 3: Offsite Assessment

Purpose

Discharges from stormwater outfalls can cause moderate to severe erosion as stormwater moves through the riparian zone and to the receiving water. Erosion creates a source of sediment to the stream due to incision and slope failures. It also can increase slope instability problems.

The Offsite Assessment looks for offsite or downstream problems associated with the county's storm sewer system, particularly from facility outfalls that discharge to critical areas.

Methods

County-owned and operated stormwater outfalls meeting one or more of the following criteria are included in the offsite assessment:

- Within 200 feet of a critical area (e.g. riparian, wellhead protection, landslide hazard)
- Within 300 feet of a headwater stream
- Located on public land
- Originates from a public-dedicated facility currently under the two-year maintenance warranty bond

Stormwater outfalls are prioritized into three categories:

- Priority 1 outfalls are stormwater outfalls that discharge to landslide hazard areas outside of county road rights-of-way
- Priority 2 outfalls are stormwater outfalls that discharge to all other critical areas outside of county road rights-of-way
- Priority 3 outfalls are stormwater outfalls that discharge to critical areas within county road rights-of-way

At a minimum, all Priority 1 outfalls are inspected. As resources allow, Priority 2 and Priority 3 outfalls may be inspected. If an outfall fails to meet the general outfall design criteria or is contributing to a downstream erosion problem, the outfall is not in compliance. Non-compliant outfalls are referred to the appropriate Public Works program for maintenance or repair or, in some cases, referred as potential Capital Projects.

Results

Based on the county's StormwaterClk database, as of August 2010, there were five mapped outfalls in the Lawton Creek subwatershed, all of which were Priority 3. No assessments were conducted.

Potential Projects

The offsite assessment project yielded no potential project opportunities.

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Management Recommendations

Drainage system inventory is an ongoing CWP work effort focused on updating the StormwaterClk database to include all existing stormwater drainage infrastructure. Prior to 2007, stormwater drainage infrastructure in the Lawton Creek subwatershed included four objects. In 2007-2009, an additional 100 previously unmapped objects were added to the StormwaterClk database.

Since there were no mapped public stormwater facilities found in the Lawton Creek subwatershed, retrofit evaluations and inspection and maintenance evaluations were not conducted.

Outfall assessments were not conducted in the Lawton Creek subwatershed. Future efforts should be made to assess Priority 3 outfalls, which make up all of the outfalls discharging to critical areas in these subwatersheds. Maintaining the frequency of offsite assessment activities may reduce downstream erosion problems by discovering potential issues before they become more serious erosion problems.

Illicit Discharge Detection and Elimination Screening

Illicit discharge screening was not conducted.

Source Control

Purpose

Source control visits to Clark County businesses provide both an educational and technical assistance purpose. An initial site visit allows staff to educate owners and employees by providing basic information about nearby water resources and Clark County's Water Quality Ordinance (13.26A). The initial site visit also provides information on how Clark County's storm sewer system works, how the site is connected to this storm system, and how the activities performed by the business may impact their subwatershed.

Most importantly, the source control visit can find, then eliminate or change, business activities that negatively impact stormwater runoff.

Methods

Under the County's 2007 NPDES municipal stormwater permit, each year staff is required to visit 20 percent of businesses that perform one of many potential pollution-generating activities listed in the permit. Additionally, the permit requires visits to any business with a paved parking area. To simplify project planning and tracking, the CWP plans to visit 20 percent of all county businesses each year.

To determine which specific businesses will be inspected each year, SNAP prioritizes a list of subwatersheds where source control visits will be performed. Once those subwatersheds are determined, GIS maps are developed to highlight all parcels paying the Type 4 (commercial and

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industrial property) and Type 3 (Multi-Family property) Clean Water Fee. Each highlighted parcel is labeled with the parcel number (Property Account Number).

At each site, staff asks the business manager or owner to lead a tour of the business, inside and out. By closely observing business activities and asking questions, staff gains information about site-specific conditions and current stormwater best management practices (BMPs).

If any business related activities allow contaminants to enter stormwater runoff, specific BMPs are suggested to the business manager or owner. Following the tour, BMP sheets explaining the issue and required fixes are left with the manager or owner. If the BMP will take some time to implement, a follow up visit date is agreed upon. Letters are sent to businesses when multiple activities require BMPs and/or when a specific BMP may take some time to implement. Letters usually give a deadline for completion of BMP implementation.

Following the deadline date, a follow up visit is made to the business to confirm BMP implementation. As long as some corrective effort has been made, source control staff will continue working with the business until it is in compliance. However, if the business fails to take any corrective action despite repeated visits, a referral to Clark County Code Enforcement and possibly the Washington Department of Ecology is made to assist with compliance through enforcement.

During or immediately after each site visit, a Business Site Visit Report Form is completed for entry into the Tidemark database.

Results

GIS analysis indicated there are no Type 4 parcels in the Lawton Creek subwatershed. This area is a low priority for future Type 4 (business) source control site visit planning.

Stream Reconnaissance and Feature Inventory

A stream reconnaissance and feature inventory was not conducted.

Physical Habitat Assessment

A physical habitat assessment was not conducted.

Geomorphology Assessment

A geomorphology assessment was not conducted.

Riparian Assessment

Purpose

The riparian assessment characterizes existing conditions, based on available data, to identify general riparian needs and potential areas for rehabilitation projects. Riparian enhancement

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projects, such as installation or protection of native plantings in riparian areas, can provide for increased future shading and woody debris recruitment, which can further provide an opportunity for stormwater-related watershed improvement.

The need for riparian rehabilitation tends to be widespread and exceeds the scope and resources of the CWP mission of stormwater management. Therefore, potential riparian projects are usually referred to agencies such as the LCFRB, Lower Columbia Fish Enhancement Group (LCFEG), Clark Public Utilities, Fish First, Washington State University (WSU) Watershed Stewards Program and Clark Conservation District for possible implementation.

This section focuses on opportunities located on public lands within high priority salmon-bearing stream reaches as defined by LCFRB salmon recovery priorities.

Method

Where possible, the assessment is based on GIS data from existing reports, primarily the Habitat Assessment reports prepared for the Lower Columbia Fish Recovery Board (R2 Resource Consultants, Inc., 2004). These reports apply primarily to salmon-bearing stream reaches and therefore do not provide information for many smaller streams. Results are based on aerial photo interpretation using Washington Forest Practices Board methods for LWD delivery and channel shade estimates.

In streams where no data exists from the LCFRB characterization, an examination of current orthophotographs is used to make a general assessment of riparian condition and identify areas where restoration or preservation projects may be appropriate.

Aerial photographs also were reviewed for specific project opportunities in each subwatershed. Potential project sites have been reviewed and verified through field reconnaissance and are detailed in the results.

Results

The 2004 LCFRB Habitat Assessment did not include the Lawton Creek subwatershed. Therefore, LWD recruitment potential and shade rating analyses were based on a qualitative review of 2010 aerial photographs available through Google Earth.

Riparian (Large Woody Debris (LWD) Delivery)

Approximately 0.5 mi north (upstream) of its confluence with the Columbia River, Lawton Creek crosses SR 14 (at appx (45.561424, -122.266610)). Downstream from SR 14, the forested riparian zone of Lawton Creek is relatively narrow (maximum ~200', minimum 0') where it passes between two fields. This section of Lawton Creek would be expected to have low LWD recruitment potential for most of the 0.5 mi, with possible areas of moderate LWD recruitment potential where the riparian zone is forested.

Upstream of SR 14, the forested riparian zones of Lawton Creek and its tributaries are significantly larger (generally 500' – 1000'). Furthermore, these reaches are located at the bottoms of deep ravines (300'+). These reaches of Lawton Creek and its tributaries (including Walton Creek) would be expected to have moderate to high LWD recruitment potential.

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Shade

Approximately 0.5 mi north (upstream) of its confluence with the Columbia River, Lawton Creek crosses SR 14 (at appx (45.561424, -122.266610)). Downstream from SR 14, the forested riparian zone of Lawton Creek is relatively narrow (maximum ~200', minimum 0') where it passes between two fields. This section of Lawton Creek would be expected to have low levels of shade for most of the 0.5 mi, with possible areas of moderate shade where the riparian zone is forested.

Upstream of SR 14, the forested riparian zones of Lawton Creek and its tributaries are significantly larger (generally 500' – 1000'). Furthermore, these reaches are located at the bottoms of deep ravines (300'+). These reaches of Lawton Creek and its tributaries (including Walton Creek) would be expected to have moderate to high levels of shade.

Management Recommendations

Overall recommended management activities for the Lawton Creek subwatershed include preservation/acquisition of existing intact riparian forest, implementation of forestry best management practices, riparian forest restoration in areas degraded by agricultural and residential uses, and invasive species removal.

Potential Projects

The reach of Lawton Creek with the greatest restoration potential is the reach located downstream (south) of SR 14. This section of the creek would benefit from riparian forest replanting and invasive species removal. However, the parcels bordering Lawton Creek in this reach are privately owned.

Three publicly owned parcels border Lawton Creek immediately upstream of the SR 14 crossing. These are owned by Washington State and managed for forestry operations. Therefore, the potential for county-driven restoration projects is likely to be limited. See description in Table 5.

Table 5: Tax Exempt Parcels Overlapping Potential Riparian Restoration Areas

ASSR_SN	ASSR_AC	OWNER	PT1DESC	Description
133695-000	40	Washington State	Forestry Operations	Implementation of forestry best management practices to ensure conservation of intact riparian forest.
135825-000	20.77			
133686-000	10			

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Floodplain Assessment

A floodplain assessment was not conducted.

Wetland Assessment

Purpose

Wetlands perform important hydrologic, water quality and habitat functions. The primary reasons for the wetlands assessments are to:

- Describe wetland conditions related to how they influence hydrology, water quality and habitat
- Identify priority potential wetland projects to mitigate for stormwater impacts
- Make management recommendations for wetlands related to stormwater management

A primary objective of the wetland assessment is to identify sites containing modestly sized, degraded or ditched wetlands where minor construction projects can be used to improve wetland hydrology. Improved wetland function can reduce peak storm discharges, increase groundwater recharge and improve habitat through increasing biodiversity, species population health and organic input.

Methods

The assessment includes review of existing GIS data for wetlands. Primary information sources are the county wetlands atlas, Draft Watershed Characterization of Clark County Version 3 (Ecology, 2007), and personal communication with other county programs.

Potential project sites have been reviewed and verified through field reconnaissance and are detailed in the results section below.

Tax-exempt parcels often indicate the presence of publicly owned land, schools or churches where large parcel sizes and opportunities for leveraging may exist. Potential wetlands were overlaid with tax-exempt parcels and with county vacant buildable lands model (VBLM) information to identify possible wetland enhancement opportunities.

Results

Figure 3 shows potential wetland areas in the Lawton Creek subwatershed based on data from the county wetlands atlas, including the Clark County wetland model and National Wetlands Inventory.

The Lawton Creek subwatershed has wetlands associated with the main channel of Lawton Creek and its tributaries, including flood influenced riverine wetlands and sloped seep wetlands dominated by groundwater discharge. There are no large complexes of wetlands in headwater areas or on the valley floors.

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Table 6: Distribution of Wetlands by Hydrogeomorphic Class

HGM Class	Area (ac.)	% of Sub-basin*	% of total wetland
Slope Wetlands	7.1	0.6	64.5
Riverine Wetlands	3.9	0.3	35.5
All Wetlands	11	0.9	

*Subwatershed area 1,173 ac.

The majority of wetlands is located in landscape positions (along stream channels) where there are limited opportunities to improve water quality or hydrologic functions in this subwatershed. Review of the wetland inventories and studies identified a large portion of the total wetland area in the subwatershed is on state-owned land (DNR). However, the wetland and riparian areas are fully vegetated with willow and red alder, and there is no further restoration potential.

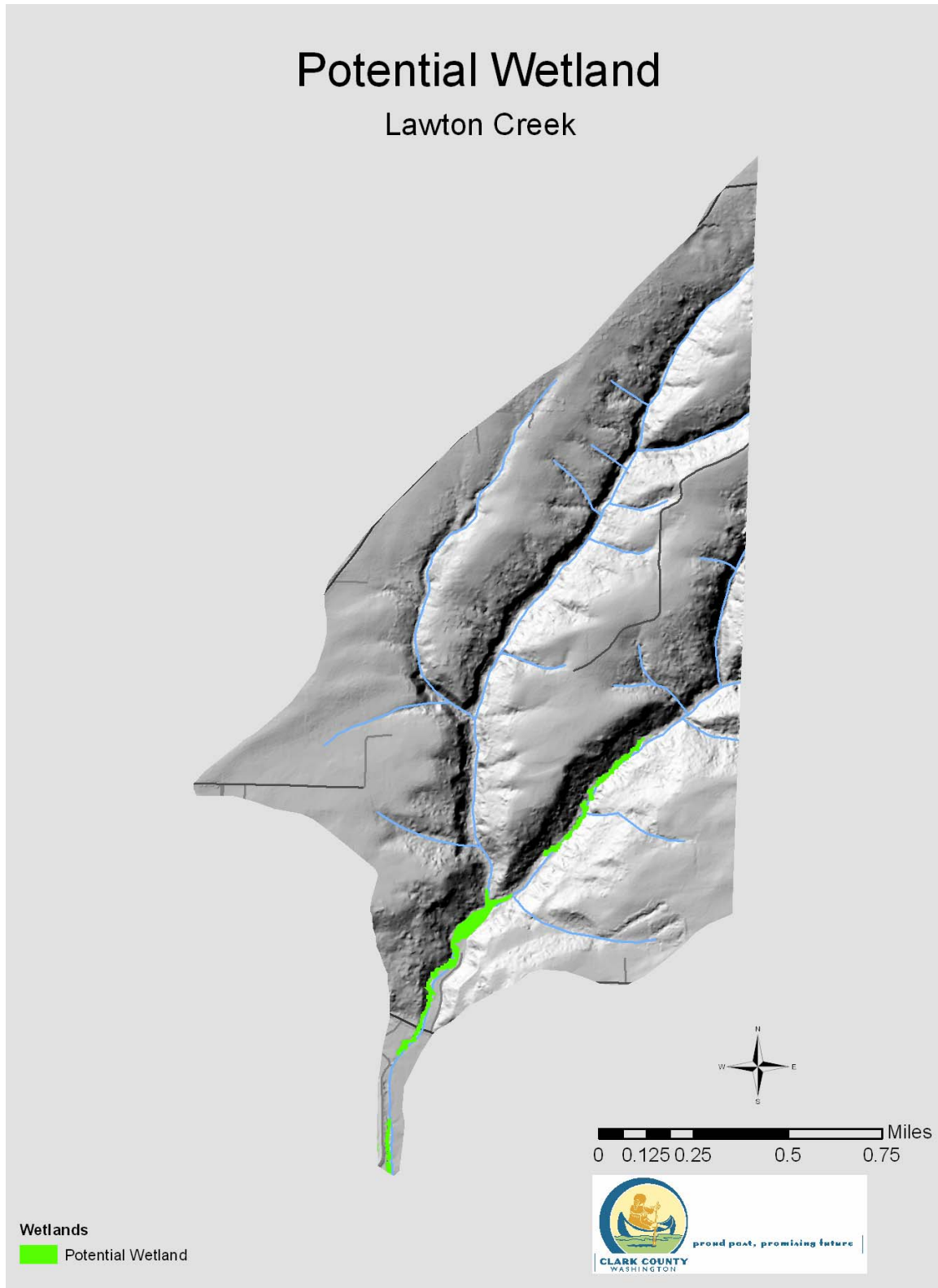


Figure 3: Lawton Creek Potential Wetlands

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Watershed Characterization

The Washington Department of Ecology completed the Watershed Characterization and Analysis of Clark County (2009) to assist in planning wetland and riparian habitat restoration and preservation projects.

Results pertaining to the Lawton Creek subwatershed are summarized below.

The Lawton Creek subwatershed is part of the Columbia River hydrogeologic unit. It is located in a rain zone and has sub-surface water flow patterns (influenced by groundwater discharge from the adjacent upland units) and recharge from the river surface waters. Geologic deposits consist primarily of relatively recent river alluvium (sand and silt). The floodplain is riverine with valley walls formed by fluvial action of the river (Ecology, 2009).

Figure 4 depicts priority areas for protection and restoration of hydrologic and denitrification processes county-wide based on an analysis of the relative importance and level of alteration in each subwatershed.

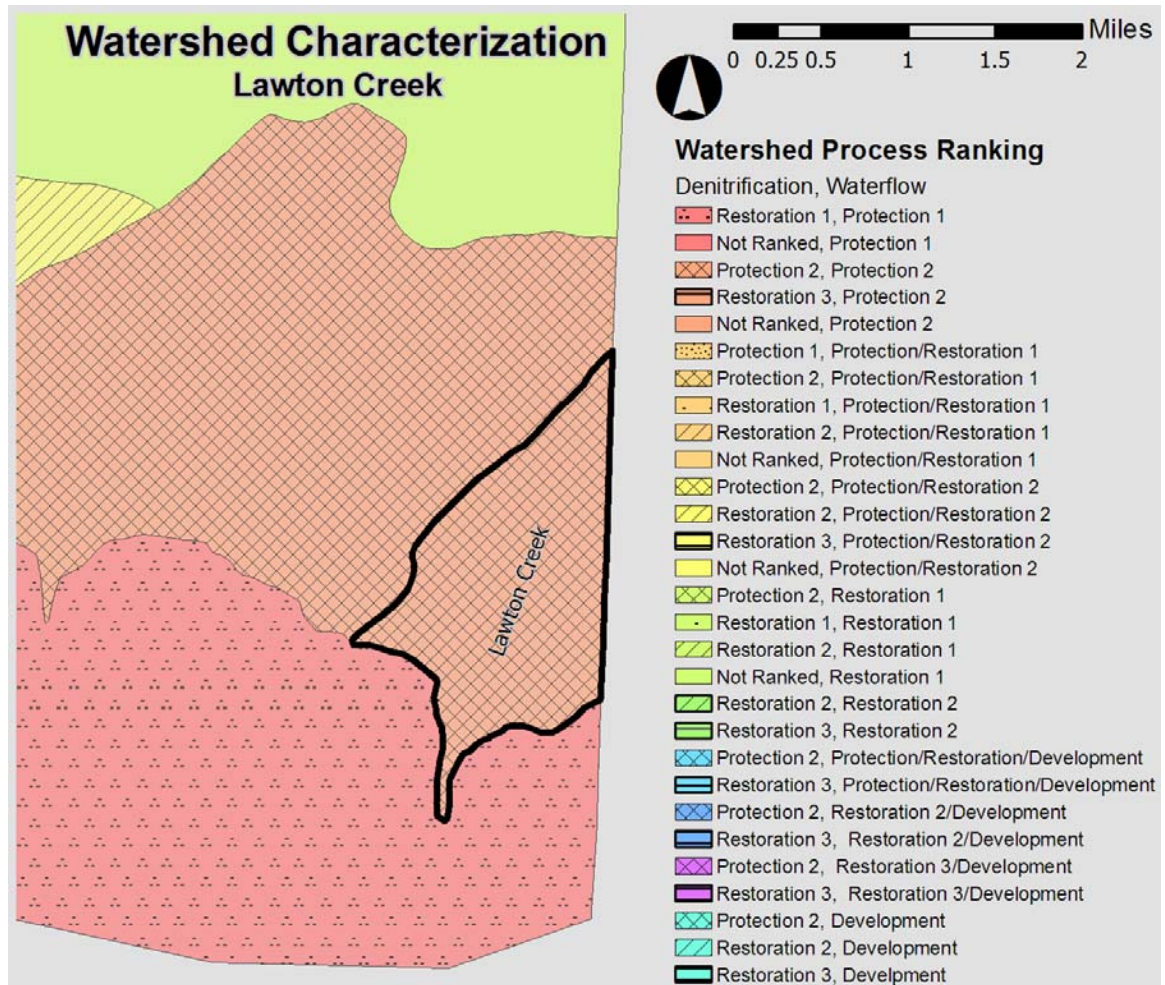


Figure 4: Priorities for suitability of areas for protection and restoration for the hydrogeologic process (from Watershed Characterization and Analysis of Clark County (Ecology, 2009))

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In general, red areas have higher levels of importance for watershed hydrologic processes and limited alteration, and should be considered for protection. Yellow areas have a higher level of importance for watershed processes and a higher level of alteration, and should be considered for restoration unless watershed processes are permanently altered by urban development. Green to blue areas have lower levels of importance for watershed processes and higher levels of alteration, and should be considered as more suitable for development. Because green, purple and blue areas represent a transition from restoration areas, planning measures employing both restoration and appropriately sited development should be considered (Ecology, 2009). Hatch patterns represent the importance of denitrification processes.

Protection and restoration of hydrologic (waterflow) processes is recommended for the Lawton subwatershed (orange). The subwatershed also is ranked for restoration of denitrification processes (cross-hatched).

Macroinvertebrate Assessment

Purpose

The Benthic Macroinvertebrate Index of Biological Integrity or B-IBI (Karr, 1998) is a widely used measurement of stream biological integrity or health based on macroinvertebrate populations. Macroinvertebrates spend most of their lives in the stream substrate before emerging as adults. While in the stream, they are subject to impacts from continuous and intermittent pollutant sources, hydrology and habitat changes, and high summer water temperatures.

The B-IBI score is an index of 10 metrics describing characteristics of stream biology, including tolerance and intolerance to pollution, taxonomic richness, feeding ecology, reproductive strategy and population structure. Each metric was selected because it has a predictable response to stream degradation. For example, stonefly species often are the most sensitive and first to disappear as human-caused disturbances increase, resulting in lower values for the metric “Number of Stonefly taxa.”

In addition to the overall B-IBI scores, examining individual metric scores gives insight into stream conditions and better explains differences in the overall score.

Methods

All field and laboratory work followed CWP protocols for macroinvertebrate sampling and analyses (June 2003). Samples are collected during late summer, preserved and delivered to a contracted lab for organism identification, enumeration and calculation of B-IBI metrics.

Raw data values for each metric are converted to a score of one, three or five, and the 10 individual metrics are added to produce an overall B-IBI score ranging from 10 to 50. Scores 10 to 24 indicate low biological integrity, 25 to 39 indicate moderate integrity, and greater than 39 indicate high biological integrity.

Results are influenced by both cumulative impacts of upstream land use and reach-specific conditions at or upstream of sampling sites. Thus, samples from a reach integrate local and

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upstream influences. Many of the B-IBI metrics also are influenced by naturally occurring factors in a watershed. For example, the absence of gravel substrate can lower scores.

Data are available for only one location in this study area:

- LAW030 (Lawton Creek upstream of SR 14)

Station LAW030 was sampled in 2009 by CWP staff.

Results

A B-IBI score of 36 at Station LAW030 places it in the category of moderate biological integrity.

Table 7 indicates five high, three moderate and two low scores among the results for individual metrics at Station LAW030. The low scores for Number of Intolerant taxa and Percent Predator taxa metrics suggest human disturbance. Intolerant taxa typically are the first to disappear as human disturbance increases, while predator taxa are a measure of food web complexity which decreases as human disturbance increases (Fore, 1999).

Table 7: Station LAW030 Average Annual Macroinvertebrate Community Metrics and Total Score from 2009

B-IBI Metrics	LAW030 2009		
	Value	Score	Category
Total number of taxa	41	5	high
Number of Mayfly taxa	9	5	high
Number of Stonefly taxa	8	5	high
Number of Caddisfly taxa	6	3	moderate
Number of long-lived taxa	5	5	high
Number of intolerant taxa	1	1	low
Percent tolerant taxa	24.2	3	moderate
Percent predator taxa	3.4	1	low
Number of clinger taxa	32	5	high
Percent dominance (3 taxa)	58.0	3	moderate
Total B-IBI Score		36	moderate

Booth et al. (2004) found a wide but well defined range of B-IBI scores for most levels of development, but observed overall that B-IBI scores decline consistently with increasing watershed total impervious area (TIA).

By comparing B-IBI scores in the study area with the likely range of conditions for watersheds with similar amounts of development, measured as total impervious area, it is possible to make some general statements about the potential benefits from improving stream habitat.

Figure 5 indicates that the score for station LAW030 is near the middle of the range of expected scores for subwatersheds, with around 8 percent impervious area (estimated 2000 Total

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Impervious Area from Wierenga, 2005). This score suggests that factors other than impervious area are contributing to less than optimal biological integrity. There should be an opportunity to increase the level of biological health by improving habitat and stream conditions. Management strategies that limit further degradation and promote stewardship are important to realizing this opportunity.

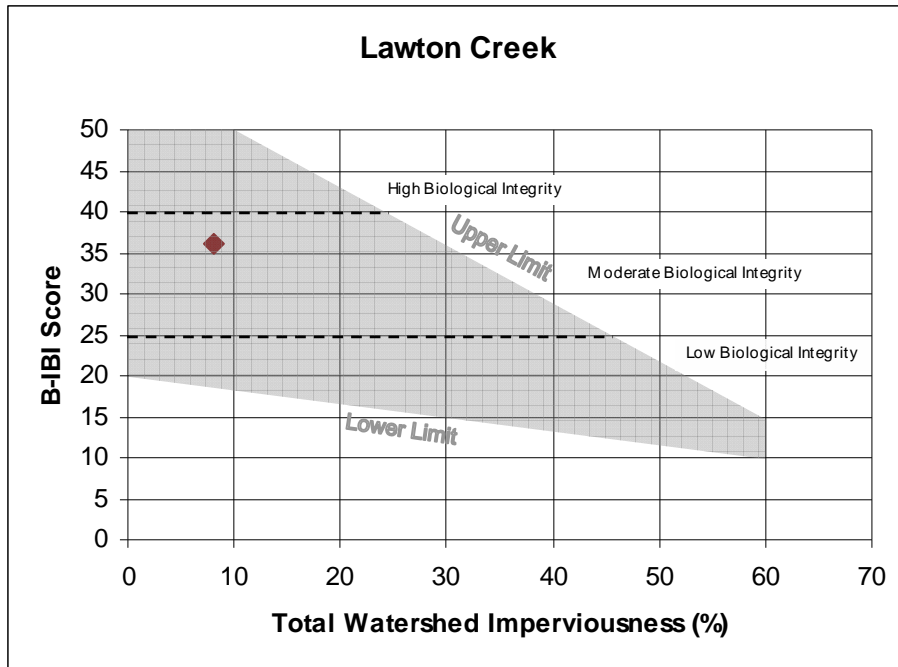


Figure 5: Approximate range of B-IBI in Puget Lowland watersheds, showing progressive decline with increasing imperviousness in the upstream watershed. Adapted from Booth et. al, 2004. Markers indicate B-IBI scores at Station LAW030 for particular years, versus estimated 2000 subwatersheds TIA.

Fish Use and Distribution

Purpose

Fish distribution refers to salmon and steelhead use. This information helps identify stream segments where land-use changes may impact fish populations, inform management decisions, and aid in identifying and prioritizing potential habitat improvement and protection projects.

Methods

Fish distribution for the Lawton Creek subwatershed is mapped from existing Clark County GIS information, which reflects data collected and analyzed by the Northwest Indian Fisheries Commission (NWIFC). Fish distribution data for Clark County is available on the County's website.

Several sources of barrier assessment data are available and briefly summarized here:

- WDFW passage barrier database

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- SalmonScape (<http://wdfw.wa.gov/mapping/salmonscape/>)
- Clark County 1997 passage barrier data
- Clark Conservation District/LCFRB passage barrier dataset

Many stream crossings have not been assessed for passage barrier potential, and the extent of public and private road crossings is a good indicator of the potential for additional barriers. Road crossings were mapped by overlaying the county road layer with LiDAR-derived stream data.

The barrier assessment data also was reviewed for specific project opportunities in each subwatershed. Potential project sites have been reviewed and verified through field reconnaissance and are detailed in the results section below.

Results/Summary

Distribution

The available evidence documents known use of the Lawton Creek subwatershed by coho in Lawton Creek and Walton Creek (Figure 7) and by winter steelhead in Lawton Creek (Figure 8). Lawton Creek is shown as having “Presumed” and “potential” use by chum (Figure 6). Upstream reaches above the known distribution of coho and winter steelhead in Lawton Creek are shown as having “Presumed” and “Potential” habitat for both (Figure 7 and Figure 8).

In addition, Walton Creek is shown as having “Presumed” and “Potential” use by winter steelhead (Figure 8) and chum (Figure 6). In upstream reaches above the known distribution of coho, Walton Creek is listed as having “Potential” coho habitat (Figure 7).

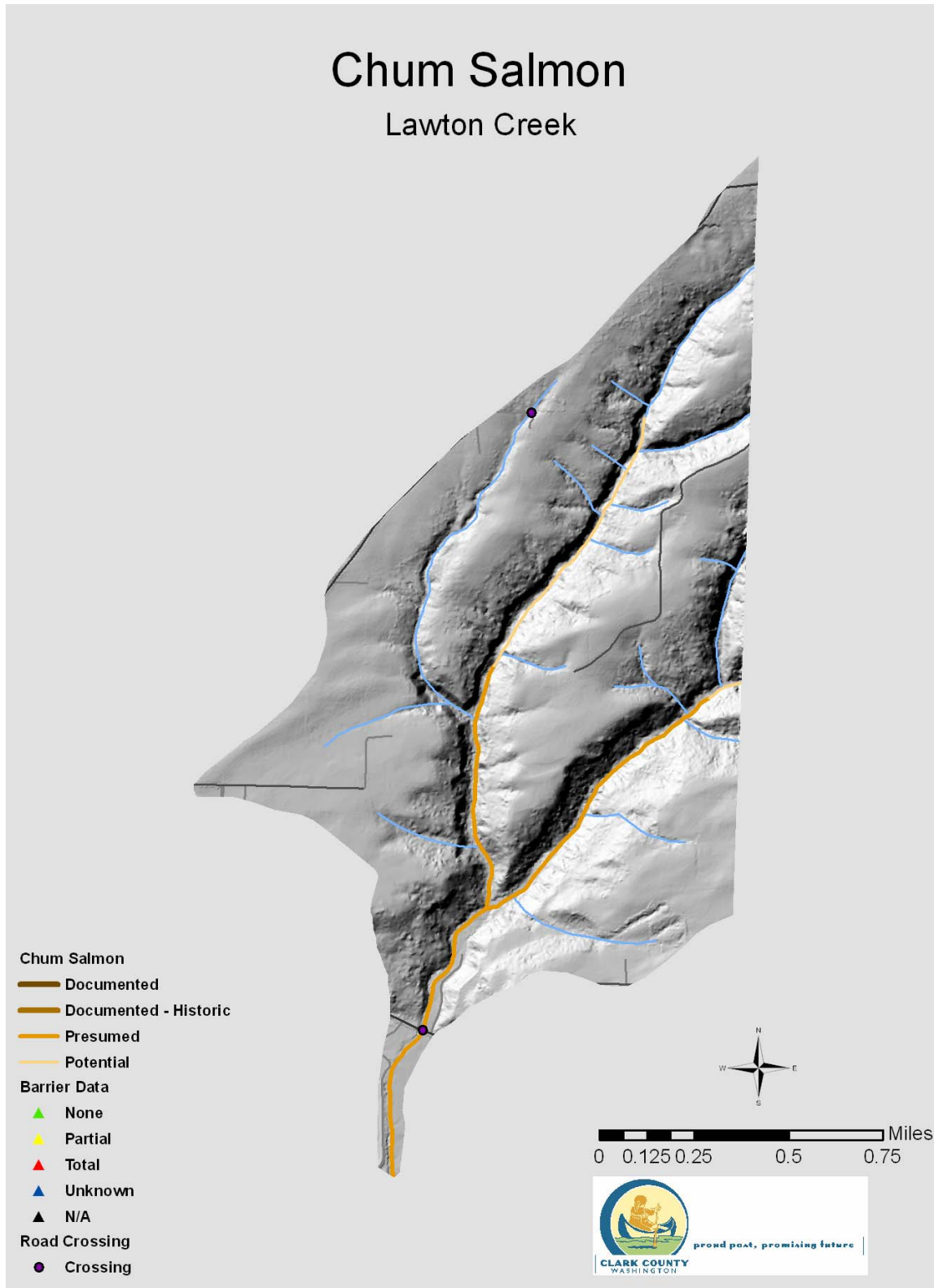


Figure 6: Lawton Creek Chum Salmon Distribution and Barriers

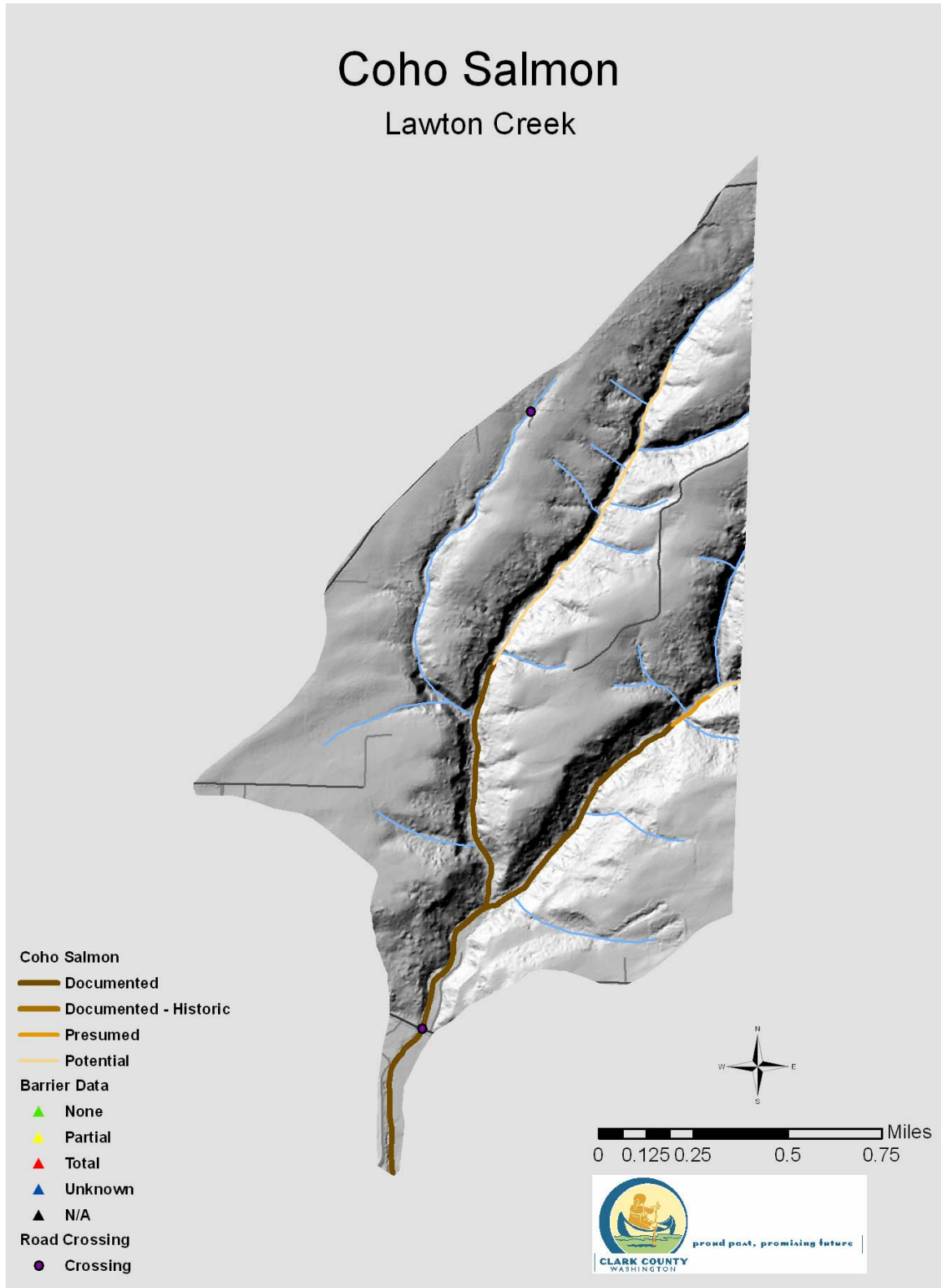


Figure 7: Lawton Creek Coho Salmon Distribution and Barriers

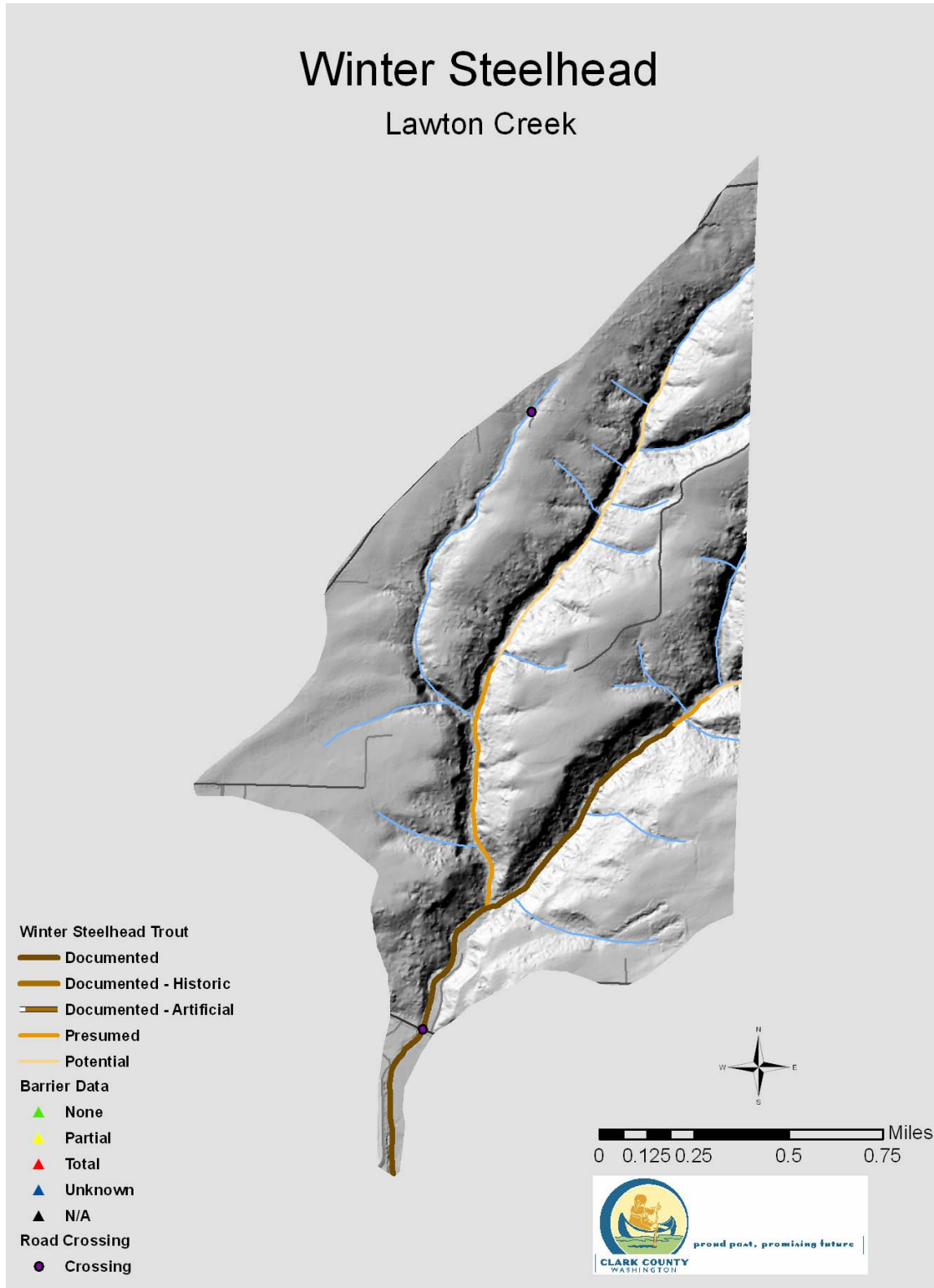


Figure 8: Lawton Creek Winter Steelhead Distribution and Barriers

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Barriers

The WDFW barrier database provides the most complete assessment of barriers in the Lawton Creek subwatershed (Figure 6, Figure 7 and Figure 8). There are no mapped fish barriers in the Lawton Creek subwatershed.

Hydrologic and Hydraulic Models

Modeling was not conducted in this study area.

Analysis of Potential Projects

The analysis of potential projects:

- Briefly summarizes stormwater conditions, problems and opportunities
- Notes recently completed or current projects within the study area that may be relevant to SNAP project selection
- Describes the analytical approach
- Lists recommended projects and activities for further evaluation

Projects or activities are placed in one of several categories.

Project descriptions summarize more detailed descriptions found in report sections. Project planners are encouraged to reference the longer descriptions and use the information found for each potential project in the SNAP GIS database available from the Clean Water Program. Reference IDs for the database are included in the tables for each project.

Summary of Conditions

Conditions and Problems

This section briefly summarizes important results from the assessment chapters.

Coordination with Other Programs

The assessment area lies within a lightly populated rural area where ongoing stormwater and water quality programs are quite limited. There are no active watershed groups or agency-sponsored implementation activities in this area beyond routine public road maintenance. There are no road improvement projects planned in the 2008-2013 Clark County Transportation Improvement Program. DES communicates on a regular basis with the Lower Columbia Fish Recovery Board, and Lawton Creek is included in the LCFRB fish recovery planning and implementation area.

Broad-Scale Characterization

The study area is a small watershed on the eastern border of Clark County within the Columbia River Gorge at the edge of the Cascade Mountains. Land use is rural, with a mix of steep, forested riparian areas and upland prairie/pasture. The study area headwaters are in rolling hills with relatively flat prairie plateaus between 600 and 800 feet in elevation. Water moves down deep canyons to the Columbia River floodplain

Lawton Creek is in the hydrogeologic landform referred to as the Troutdale bench, which is an elevated surface underlain by sedimentary rocks deposited by the ancestral Columbia and local streams. Canyons cut into the gravely geologic deposits produce stream channels carrying a gravel bedload. Deep soils formed on the sedimentary rocks are well-drained and fall in hydrologic soil group C, primarily Hesson clayey loams with lesser amounts of Lauren gravelly loam and Olympic stoney clay at the lower end of the watershed.

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The relatively flat lying sedimentary deposits are capable of retaining relatively large amounts of rainfall as recharge. This groundwater recharge returns to the streams in summer months from seeps and springs. There are no stream gauges on Lawton Creek, though it is likely that stream hydrology is less altered than in many Clark County streams.

Standard subwatershed scale metrics, such as percent forest, percent total impervious area, road density and effective impervious area, when compared with NOAA fisheries standards, suggest stream habitat is functioning at a somewhat degraded level. Several metrics fall somewhere between the thresholds for fully functioning and non-functioning habitat.

Water Quality Assessment

There are no Lawton Creek segments on the 2008 303(d) Ecology list of impaired water bodies. Water quality data is virtually non-existent for this watershed. The 2010 Clark County Stream Health Report lists Lawton Creek as being in fair health based on benthic macroinvertebrate scores.

Drainage System Inventory and Condition

Stormwater infrastructure is extremely limited in this area, consisting primarily of a few roadside ditches and associated outfalls. Overall drainage mapping is complete.

As of October 2010, there were no mapped public stormwater facilities in Lawton Creek.

There are five mapped stormwater outfalls in the watershed. All five are Priority 3 outfalls discharging within county road rights-of-way. No assessments were conducted for these outfalls.

Illicit Discharge Screening

Illicit discharge screening was not conducted in this study area.

Source Control

Source control project scoping determined there are no qualifying businesses in need of source control inspection in the Lawton Creek watershed.

Stream Reconnaissance Feature Inventory

Stream reconnaissance was not conducted in this study area.

Physical Habitat

A physical habitat assessment was not conducted in this study area.

Geomorphology

A geomorphology assessment was not conducted in this study area.

Riparian Assessment

Large woody debris recruitment potential and shade rating analyses were based on a qualitative review of 2010 aerial photographs. Downstream of SR14, recruitment potential and shade are low to moderate as the stream flows through a narrow forested riparian between agricultural fields.

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Upstream of SR14, forested riparian corridors are much wider and intact due to steep canyon walls. LWD recruitment and shade are expected to be moderate to high in these areas.

Wetland Assessment

Wetlands are limited, covering only 11 acres in the 1,173-acre watershed. Wetlands are associated with the main channels of Lawton Creek and its tributaries, including flood influenced riverine wetlands and sloped seep wetlands dominated by groundwater discharge. There are no large wetland complexes in headwater areas or on the valley floors. The majority of wetlands is located in landscape positions (along stream channels) where there are limited opportunities to improve water quality or hydrologic functions.

Ecology's watershed characterization of Clark County recommends protection and restoration of hydrologic (waterflow) processes (orange). The subwatershed also is ranked for restoration of denitrification processes.

Macroinvertebrate Assessment

A 2009 B-IBI score of 36 at Station LAW030 places Lawton Creek in the category of moderate biological integrity. This score is near the middle of the range of expected scores for subwatersheds with similar amounts of impervious area, suggesting that factors other than impervious area are contributing to less than optimal biological integrity. There should be an opportunity to increase the level of biological health by improving habitat and stream conditions.

Fish Use and Distribution

The available information suggests that anadromous fish use in the Lawton Creek watershed includes Coho salmon, Chum salmon and winter steelhead.

There are no identified fish passage barriers in the watershed.

Recently Completed or Current Projects

There are no recent or planned projects in this area on the 2010-2012 stormwater capital plan or the 2008-2013 Transportation Improvement Program.

Analysis Approach

Purpose

The Analysis of Potential Projects narrows the initial list of possible opportunities to a subset of higher priority items. Listed opportunities in sections of the SNAP report include sites requiring immediate follow-up, possible stormwater capital improvement projects, internal followup by DES staff, and in some cases, information to be forwarded to other county departments or outside agencies.

Stormwater capital improvement project opportunities are recommended for further evaluation by engineering staff and potential development into projects for consideration through the capital planning process. Sites flagged for internal action by ongoing programs, such as illicit discharge screening, operations and maintenance, and source control outreach, receive follow-up within the

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context and schedules of the individual programs. Information forwarded to other county departments, such as Public Health, or to outside agencies, such as Clark Conservation District and Clark Public Utilities, may lead to additional activities outside the scope of DES work.

Methods

An initial review is conducted for all potential projects identified during the stormwater needs assessment. Field notes, descriptions, field photos and other associated information are reviewed. In some cases, additional field reconnaissance is performed.

In general, capital project opportunities are initially evaluated by considering problem severity, land availability, access, proximity and potential for grouping with other projects, and potential for leveraging resources. Staff considers supporting data and information from throughout the SNAP report to assist in the initial project review.

Based on this review, lower priority opportunities are removed and higher priority opportunities are recommended below for further consideration.

Emergency/Immediate Actions

Emergency/Immediate actions may be pursued by Clark County staff or referred to other appropriate agencies. These cases represent a potential or immediate threat to public health, safety or the environment, and require timely follow-up.

No projects of this type were identified.

Potential Stormwater Capital Projects

Stormwater Capital Improvement Projects include projects that create new or retrofit existing stormwater flow control or treatment facilities, substantial infrastructure maintenance projects, habitat enhancement projects, or property acquisition to mitigate for stormwater impacts. Facility retrofits refer to projects that will increase an existing facility's ability to control or treat stormwater in excess of the original facility's design goals.

No projects of this type were identified.

Follow-up Activities for Referral within DES

This category includes opportunities other than capital projects that are dependent on DES programs or oversight. Examples include referrals to: Public Works Operations for public stormwater infrastructure maintenance or private facility inspection; DES Sustainability and Outreach for landowner letters regarding trash pickup or agricultural BMPS; the Illicit Discharge screening project; general reach information forwarded to DES engineers for capital planning purposes. Other opportunities such as possible fish barriers or culvert maintenance issues also may be included.

No projects of this type were identified.

Non-Project Management Recommendations

Non-project stormwater management recommendations address areas where county programs or activities could be modified to better address NPDES permit components or promote more effective mitigation of stormwater problems. Information of this type contributes to adaptive management strategies and more effective stormwater management during the permit term.

Stormwater impacts and management activities are limited in the Lawton Creek watershed. There are no specific recommendations to modify ongoing county stormwater management efforts.

General recommendations and observations include:

- Ecology recommends protection and restoration of hydrologic processes in the Lawton watershed
- Overall riparian management recommendations include preservation/acquisition of intact riparian forest, implementation of forestry best management practices, riparian forest restoration in areas degraded by agricultural and residential uses, and invasive species removal
- A lower than expected score for biological health (based on macroinvertebrate populations) suggests an opportunity to increase biological health through improved habitat. Limiting future degradation and promoting stream stewardship are important steps

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