STATE OF WASHINGTON
CONSERVATION COMMISSION
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September 18, 2018

Greta Holmstrom
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Cowlitz County Department of Building and Planning
207 Fourth Avenue North, Suite 119
Kelso, WA 98626

Re: Approval of Cowlitz County Voluntary Stewardship Program Work Plan

Dear Greta:

The Voluntary Stewardship Program (VSP) Technical Panel has reviewed the work plan submitted by the County and has approved the work plan at a formal review meeting on September 17, 2018.

As a result of the approval of the work plan by the Technical Panel, and in accordance with RCW 36.70A.725 (3) (a) (ii), the Director of the Conservation Commission must approve the work plan.

Therefore, by this letter, as Executive Director of the Washington State Conservation Commission, I formally approve the work plan for the County as of the date of this letter.

If any amendments have been made to the work plan during the Technical Panel review process, please provide the Conservation Commission an electronic link to the final version of the work plan. That link can be sent to Alicia McClendon at **amcclendon@scc.wa.gov**.

Thank you for your continued engagement in and support of VSP, and congratulations on the approval of the county's plan. If you have any questions, please feel free to contact me.

Sincerely,

Mark Clark
Executive Director

Work Plan

Cowlitz County

VSP Working Group

September 17, 2018

Voluntary Stewardship
Work Plan Outline

Section	Elements
1 - Introduction	1.1 - Purpose 1.2 - State VSP Summary 1.3 - VSP Definitions 1.4 - Overview of Local Process 1.5 - Local Work Group Vision Statement 1.6 - Document Organization
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6 - Monitoring, Reporting & Adaptive Management	6.1 - Performance Metrics 6.2 - Monitoring Methods 6.3 - Reporting 6.4 - Adaptive Management
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1 Introduction

1.1 Purpose

Enabled by the State Legislature through the Washington State Growth Management Act (RCW 36.70A), the Voluntary Stewardship Program (VSP) is an alternative to traditional top-down regulations for the protection of critical areas on agricultural lands. VSP uses a collaborative stake-holder driven process to identify, coordinate, and build on existing programs and practices that address agricultural effects on critical areas. These practices are then implemented by individual farmers through voluntary, site-specific stewardship plans.

The purpose of this Work Plan is to fulfill VSP legislative requirements to create an optional set of goals, benchmarks, and planned activities, in order to protect and enhance critical areas while maintaining and improving agricultural viability in Cowlitz County. So long as the county participates in the VSP, regulatory requirements under the County's critical areas ordinance will not apply to agricultural activities.

1.2 State VSP Summary

The intent of the VSP, defined in RCW 36.70A.700.2, are as follows:

a. Promote plans to protect and enhance critical areas within the area where agricultural activities are conducted, while maintaining and improving long-term viability of agriculture in the state of Washington and reducing the conversion of farmland to other uses;
b. Focus and maximize voluntary incentive programs to encourage good riparian and ecosystem stewardship as an alternative to historic approaches used to protect critical areas;
c. Rely upon critical areas development regulation for the protection of critical areas for those counties that do not choose to participate in this program;
d. Leverage existing resources by relying upon existing work and plans in counties and local watersheds, as well as existing state and federal programs to the maximum extent practicable to achieve program goals;
e. Encourage and foster a spirit of cooperation and partnership among county, tribal, environmental, and agricultural interests to better assure the program success;
f. Improve compliance with other laws designed to protect water quality and fish habitat;
g. Rely upon voluntary stewardship practices as the primary method of protecting critical areas and not require the cessation of agricultural activities.

1.3 VSP Definitions

Agricultural Activities. The definition of "Agricultural Activities" is found in the Shoreline Management Act – RCW 90.58.065(2)(a): Agricultural uses and practices including, but not limited to: Producing, breeding, or increasing agricultural products; rotating and changing agricultural crops; allowing land used for agricultural activities to lie fallow in which it is plowed and tilled but left unseeded; allowing land used for agricultural activities to lie dormant as a result of adverse agricultural market conditions; allowing land used for agricultural activities to lie dormant because the land is enrolled in a local, state, or federal conservation program or the land is subject to a conservation easement; conducting agricultural operations; maintaining, repairing, and replacing agricultural equipment; maintaining,

repairing, and replacing agricultural facilities, provided that the replacement facility is no closer to the shoreline than the original facility; and maintaining agricultural lands under production or cultivation.

Enhance. The definition of "enhance" is provided in the legislation for the Voluntary Stewardship Program (RCW 36.70A.703). "Enhance" means "to improve the processes, structure, and functions existing, as of July 22, 2011, of ecosystems and habitats associated with critical areas."

Functions and Values. The phrase is not defined specifically in the Voluntary Stewardship Program legislation. However, it is explained in WAC 365-196-830 "Functions and values must be evaluated at a scale appropriate to the function being evaluated. Functions are the conditions and processes that support the ecosystem. Conditions and processes operate on varying geographic scales ranging from site-specific to watershed and even regional scales. Some critical areas, such as wetlands and fish and wildlife habitat conservation areas, may constitute ecosystems or parts of ecosystems that transcend the boundaries of individual parcels and jurisdictions, so that protection of their function, and values should be considered on a larger scale."

Protect. The definition of "protect" is provided in the legislation for the Voluntary Stewardship Program (RCW 36.70A.703). "Protect" means "to prevent the degradation of functions and values existing as of July 22, 2011."

Viability of Agriculture. The Washington State Conservation Commission has provided the following definition: "Agricultural viability can be defined as the ability of a farmer or group of farmers to:

- Productively farm on a given piece of land or in a specific area,
- Maintain an economically viable farm business,
- Keep the land in agriculture long-term, and
- Steward the land so it will remain productive into the future.

Voluntary. Participation in VSP is voluntary – no landowner is required to participate. Agricultural producers who choose to participate may withdraw at any time. VSP does not exempt landowners from other applicable laws and regulations.

1.4 Overview of Local Process

The Watershed Work Group was established by the county. Representatives were specifically invited from the Cowlitz Tribe, Yakama Nation, agencies, environmental groups, agricultural groups, agricultural landowners, and interested citizens. In addition, press releases were published in The Daily News, the regional newspaper of record, and sent to news media lists maintained by the county seeking interested members. A radio ad was broadcasted on KLOG, a local radio station, announcing the first work group meeting and seeking work group members.

The Work Group began meeting on November 1, 2016 and has since held ten meetings. A staff member for the Cowlitz Tribe attended the initial meeting, but was not authorized to attend future meetings. The Work Group remains open to new members at any time. Work Group meetings were open to the public. Several members of the public with agricultural interests regularly attended meetings though not officially part of the Work Group. The following members represent a diverse cross-section of Cowlitz County's agriculture and environmental interests:

Member	Affiliation
Steve West	Lower Columbia Fish Recovery Board
Dixie Edwards	Watershed Garden Works (small farm)
Scott Edwards	Watershed Garden Works (small farm)
Alan Engstrom	Citizen
Gary Fredricks	Washington State University Extension
Margaret Lapic	Citizen
Even Sheffels	Washington Farm Bureau
Lynn Simpson	Cowlitz Conservation District
Steffanie Taylor	Ecological Land Services
Erin Thoeny	Thoeny Farms (large farm)
Val Tinney	Citizen
Chuck Stambaugh-Bowey	Washington Department of Fish and Wildlife
Jeff Wilson	Citizen
Jeanette Scibelli	Lower Columbia Contractors Association
Andrea Aberle	Ash Eco Solutions, LLC

The Work Group is responsible for developing the Work Plan. This responsibility includes setting goals and benchmarks, designating technical assistance providers, identifying outreach and implementation approaches, establishing a monitoring plan, and regular reporting and adaptive management. The Work Group has encouraged public participation and input during all meetings.

1.5 Local Work Group Vision Statement

Keep agricultural activities viable as the centerpiece of our communities while recognizing the need to conserve resources, habitats and healthy environments as we use and care for the land.

This plan aims for a straightforward approach to increase awareness, educate, and provide assistance in various forms (technical, monetary, best practices, etc.) to achieve our goals for resource stewardship and viable agriculture. Through these efforts, we hope to encourage a willing and creative “can do” attitude to guide our effort to solve problems and practice good stewardship in our communities.

When implementing the Voluntary Stewardship Program Work Plan, it is the expressed intent of this Work Group to work collaboratively with farmers, stakeholders, and landowners conducting agricultural activities. If progress towards the goals and benchmarks of this plan are not proceeding in a satisfactory manner, further outreach and education will be designed and implemented to address the shortcomings of this plan.

The Work Group will not coerce, intimidate, or use any other form of undue influence to convince any landowner to implement any of the practices described in this plan. The Work Group agrees that we will not utilize or rely upon mandatory enforcement as described in RCW 36.70A.720(3). Nor does this Work Group intend on developing a plan that any agency or the county could construe as requiring or encouraging focused enforcement.

1.6 Document Organization

Requirements of RCW 36.70A.720(1)	Cowlitz County VSP Work Plan Section(s)	PG #
a. Review and incorporate applicable water quality, watershed management, farmland protection, and species recovery data and plans.	Section 2 – Regulatory Context	20
b. Seek input from tribes, agencies and stakeholders.	Section 1 – Introduction	2
c. Develop goals for participation by agricultural operators conducting commercial and noncommercial agricultural activities in the watershed necessary to meet the protection and enhancement benchmarks of the work plan.	Section 4 – Goals, Benchmarks, Strategies and Indicators	54
d. Ensure outreach and technical assistance is provided to agricultural operators in the watershed.	Section 1 – Introduction Section 5 - Implementation	2 81
e. Create measureable benchmarks that, within ten years of receipt of funding, are designed to result in (i) the protection of critical area functions and values and (ii) the enhancement of critical area functions and values through voluntary, incentive-based measures.	Section 4 – Goals, Benchmarks, Strategies and Indicators	54
f. Designate entity or entities that will provide technical assistance	Section 5 - Implementation	81
g. Work with the entity providing technical assistance to ensure that individual stewardship plans contribute to the goals and benchmarks of the work plan.	Section 5 - Implementation	81
h. Incorporate into the work plan any existing development regulations relied upon to achieve the	Section 2 – Regulatory Context	12

goals and benchmarks for protection.		
i. Establish baseline monitoring for (i) Participation activities and implementation of the voluntary stewardship plans and projects; (ii) stewardship activities; and (iii) the effects on critical areas and agriculture relevant to the protection and enhancement benchmarks developed for the watershed	Section 6 – Monitoring, Reporting and Adaptive Management	91
j. Conduct periodic evaluations, institute adaptive management, and provide a written report of the status of plans and accomplishments to the county and to the commission within sixty days after the end of each biennium.	Section 6 – Monitoring, Reporting and Adaptive Management	91
k. Assist state agencies in monitoring their programs.	Section 6 – Monitoring, Reporting and Adaptive Management	91
l. Satisfy any other reporting requirements of the program.	Section 6 – Monitoring, Reporting and Adaptive Management	91

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2 Regulatory Context

2.1 Relationship to County Regulations

Critical Areas Ordinance

Washington State's Voluntary Stewardship Program (VSP) (RCW 36.70A.705) provides an alternative approach for counties in Washington to address the requirements for critical area protection under the Growth Management Act (GMA) (RCW 36.70A). The Voluntary Stewardship Program uses a voluntary approach to protect and enhance critical areas on lands used for agricultural activities, while maintaining the viability of agriculture in the watershed.

Critical Areas include wetlands, fish & wildlife habitat conservation areas, frequently flooded areas, geologically hazardous areas and critical aquifer recharge areas. The definitions from both state law and county code are provided below.

Table 2.1.1 Critical areas definitions per the Growth Management Act and Cowlitz County Critical Areas Ordinance

Critical Area	Growth Management Act	Cowlitz County Critical Areas Ordinance
Wetlands	**RCW 36.70A.030-** "Areas that are inundated or saturated by surface water or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas. Wetlands do not include those artificial wetlands intentionally created from nonwetland sites, including, but not limited to, irrigation and drainage ditches, grass-lined swales, canals, detention facilities, wastewater treatment facilities, farm ponds, and landscape amenities, or those wetlands created after July 1, 1990, that were unintentionally created as a result of the construction of a road, street, or highway. Wetlands shall include those artificial wetlands intentionally created from nonwetland areas to mitigate conversion of wetlands."	**CAO 19.15.050** – Substantively the same as RCW
Critical Aquifer Recharge Areas	**WAC 365-190-030(3) –** "Areas with a critical recharging effect on aquifers used for potable water, including areas where an aquifer that is a source of drinking water is vulnerable to contamination that would	**CAO 19.15.160(A)(1) –** Those areas with a critical recharging effect on aquifers used for potable water as defined by WAC 365-190-030(2). CARAs have prevailing geologic conditions that create

Critical Area	Growth Management Act	Cowlitz County Critical Areas Ordinance
Critical Aquifer Recharge Areas, continued	affect the potability of the water, or is susceptible to reduced recharge."	potential for contamination of ground water resources. Aquifer recharge areas are rated based on water-bearing formation type, soil infiltration, soil restrictive layer presence, soil permeability, annual precipitation, water supply well density, and presence of Group A or B Wellhead Protection Areas (WHPAs) are categorized according to the following standards: a. Severe Aquifer Susceptibility. Those areas within Group A 10-year Time of Travel Wellhead Protection Areas (WHPAs) or Group B WHPAs where geologic conditions allow for rapid recharge with little restrictive layer protection, high soil permeability, and other similar factors. b. Moderate Aquifer Susceptibility. Those areas within Group A 10-year Time of Travel WHPAs or Group B WHPAs where geologic conditions allow for moderate recharge with moderate restrictive layer protection, moderate soil permeability, and other similar factors. c. Slight Aquifer Susceptibility. Those areas within Group A 10-year Time of Travel WHPAs or Group B WHPAs where geologic conditions provide low permeability and infiltration, more restrictive geology, and/or lower levels of precipitation. d. If special ground water management areas or susceptible ground water management areas are established in Cowlitz County in accordance with WAC 173-200-090 or 173-100-010, respectively, these areas shall be considered areas of special protection and designated with severe susceptibility. e. In the event that new Group A or Group B wells are developed in Cowlitz County, the areas around those wells will be considered CARAs using the Cowlitz County CARAs Map in accordance with the Severe, Moderate,

Critical Area	Growth Management Act	Cowlitz County Critical Areas Ordinance
		and Slight aquifer susceptibility characteristics described above.
Fish and Wildlife Habitat Conservation Areas	**WAC 365-190-130(2) -** "Fish and wildlife habitat conservation areas that must be considered for classification and designation include: (a) Areas where endangered, threatened, and sensitive species have a primary association; (b) Habitats and species of local importance, as determined locally; (c) Commercial and recreational shellfish areas; (d) Kelp and eelgrass beds; herring, smelt, and other forage fish spawning areas; (e) Naturally occurring ponds under twenty acres and their submerged aquatic beds that provide fish or wildlife habitat; (f) Waters of the state; (g) Lakes, ponds, streams, and rivers planted with game fish by a governmental or tribal entity; and (h) State natural area preserves, natural resource conservation areas, and state wildlife areas." **WAC 365-190-130(3)(a) -** "Counties and cities should consider the following: (i) Creating a system of fish and wildlife habitat with connections between larger habitat blocks and open spaces, integrating with open space corridor planning where appropriate; (ii) Level of human activity in such areas including presence of roads and level of recreation type (passive or active recreation may be appropriate for certain areas and habitats); (iii) Protecting riparian ecosystems including salmonid habitat, which also includes marine nearshore areas; (iv) Evaluating land uses surrounding ponds and fish and wildlife habitat conservation	**CAO 19.15.130 -** Substantively the same as WAC, with differences noted below: (a) Same as WAC. (b) Includes state priority habitats and areas associated with state priority species as well. Habitats of local importance include caves, talus slopes, and snag-rich areas (outside forest practices). (c) Not included. (d) Not included. (e) Same as WAC. (f) Same as WAC. (g) Not included. (h) Same as WAC, with the exception that state wildlife areas are not included. Merrill Lake is the only natural resource conservation area in Cowlitz County. Natural area preserves and natural resource conservation areas are defined, established, and managed by WDNR. 19.15.130 also designates areas of rare plant species and high quality ecosystems, as identified by WDNR through the Natural Heritage Program. In addition, it includes unintentionally created ponds with a surface area between one and 20 acres.

Critical Area	Growth Management Act	Cowlitz County Critical Areas Ordinance
Fish and Wildlife Habitat Conservation Areas, continued	areas that may negatively impact these areas, or conversely, that may contribute positively to their function; (v) Establishing buffer zones around these areas to separate incompatible uses from habitat areas." **RCW 36.70A.030** - "Does not include artificial features such as irrigation delivery systems, irrigation infrastructure, irrigation canals, or drainage ditches that lie within the boundaries of and are maintained by a port district or an irrigation district or company."	
Frequently Flooded Areas	**WAC 365-190-110**(1) - "Classifications of frequently flooded areas should include, at a minimum, the 100-year flood plain designations of the Federal Emergency Management Agency (FEMA) and the National Flood Insurance Program (NFIP)."	**CAO 19.15.140 –** Includes all lands identified in the FEMA flood insurance rate maps, as amended, and approved by the county as within the 100-year floodplain.
Geologically Hazardous Areas	**RCW 36.70A.030 - "**Areas that because of their susceptibility to erosion, sliding, earthquake, or other geological events, are not suited to the siting of commercial, residential, or industrial development consistent with public health or safety concerns."	**CAO 19.15.150 –** 1. Seismic hazard areas include any area subject to: a. Underlying deposits indicative of a risk of liquefaction during a seismic event; b. Areas subject to slope failure, including lateral spreading, during a seismic event; c. Areas subject to surface faulting during a seismic event; d. Areas that are at risk of mass wasting due to seismic forces. Seismic hazard areas are indicated by 1) a Zone D1 or higher rating as defined by the Seismic Risk Map of the U.S. adopted by the Washington State Legislature and defined in the International Residential Code (IRC); and 2) areas with Site Class D, D to E, E, and E to F as defined by the Site Class Map of Cowlitz County (WDNR and International Building Code). 2. Mine hazard areas are those areas underlain by or affected by mine

Critical Area	Growth Management Act	Cowlitz County Critical Areas Ordinance
Geologically Hazardous Areas, continued		workings such as adits, gangways, tunnels, drifts, or airshafts, and those areas of probable sink holes, gas releases, or subsidence due to mine workings. 3. Volcanic hazard areas are those areas identified as being within the Volcanic Hazard Zone 1, demarcated by a five-mile radius based on the center of the cone of Mt. St. Helens and mapped extents of Zone 1, Zone 2, and Zone 3 shown on the Cowlitz County adapted map of the Mt. St. Helens Flowage-Hazard Zones Map, 1995, USGS. These areas can be subject to pyroclastic flows, lava flows, debris avalanche, and inundation by debris flows, lahars, mudflows, or related flooding resulting from volcanic activity. 4. Erosion hazard areas are those areas identified by the USDA's NRCS as having a "severe" or "very severe" erosion hazard. Erosion hazard areas are also those areas impacted by shore land and/or streambank erosion and those areas within a stream's channel migration zone. 5. Landslide hazard areas are areas potentially subject to landslides based on a combination of geologic, topographic, and hydrologic factors. They include areas susceptible because of any combination of bedrock, soil, slope (gradient), slope aspect, structure, hydrology, or other factors.

So long as the county participates in the VSP, regulatory requirements under the County's critical areas ordinance will not apply to agricultural activities. The VSP statutes encourage, but do not require improvements or enhancements to critical areas already in a degraded condition. The VSP must ensure no further degradation from the date that the VSP bill (ESHB 1886) was enacted, on July 22, 2011. Cowlitz County enrolled the entire county in the VSP in 2012, naming the Grays/Elochoman Watershed (Water Resource Inventory Area [WRIA] 25), the Upper Chehalis Watershed (WRIA 23), the Cowlitz Watershed (WRIA 26), and the Lewis Watershed (WRIA 27) as priority watersheds (Resolution 2012-

016). Participation in the VSP is defined as developing and implementing a work plan that protects critical areas and maintains agricultural viability under the timeline established by the state.

Table 2.1.2 Comparison of Characteristics of the Critical Areas Ordinance and Voluntary Stewardship Program

	CRITICAL AREAS ORDINANCE	VOLUNTARY STEWARDSHIP PROGRAM
Approach	Protective regulatory provisions, such as buffers, and enforcement	Voluntary participation in individual stewardship plans
Protection Standard	Preserve the functions and values of the natural environment, or safeguard the public from hazards to health and safety (WAC 365-196-830)	Prevent the degradation of functions and values existing as of July 22, 2011 (RCW 36.70A.703(8))
Scale	Site-by-site basis	Collective, watershed basis
Monitoring	Site-by-site basis	Monitoring required to demonstrate that objective benchmarks of critical area protection are met. Progress reports are submitted every five years to demonstrate progress.
Adaptive Management	Periodic updates to the critical area ordinance are required based on best available science	Adaptive management required if measureable benchmarks are not met
Responsible Party (Parties)	Cowlitz County	Cowlitz County
Other County, State, and Federal Regulations	Continue to apply	Continue to apply

Shoreline Master Program

Cowlitz County and the Washington State Department of Ecology have jointly adopted a Shoreline Master Program (SMP) addressing shorelines of the state. Shoreline jurisdiction extends 200 feet from the Ordinary High Water Mark (OHWM) of all rivers and streams with greater than 20 cubic feet per second mean annual flow, and lakes and reservoirs greater than 20 acres in area. Shoreline jurisdiction also encompasses wetlands associated with the above-listed waters, as well as floodways and contiguous floodplain areas landward two hundred feet from such floodways. The SMP promotes a balance of shoreline uses, public access, and ecological protection.

Provisions of the Cowlitz County SMP will continue to apply to areas under shoreline jurisdiction, *except that* the SMP references the CAO for the regulation of critical areas, critical areas buffers, and shoreline buffers. Therefore, the implementation of the VSP would mean that critical area standards, including shoreline buffers, would not apply to agricultural activities in shoreline jurisdiction. However, all other

provisions in the County's SMP, including provisions related to agricultural shoreline uses, would continue to apply.

Other Regulations

VSP provides an alternative to critical areas regulations for agricultural activities. VSP does not "limit the authority of a state agency, local government, or landowner to carry out its obligations under any other federal, state, or local law" (RCW 36.70A.702). However, one objective of the VSP is to promote enhancements to "improve compliance with other laws designed to protect water quality and fish habitat" (RCW 36.70A.700). All local, state and federal regulations still apply. Additionally, outside of the Critical Areas Ordinance, all applicable local development regulations (for example, Title 16 CCC, Buildings and Construction Code) still apply. Regulations that continue to apply are described below:

Table 2.1.3

REGULATION	DESCRIPTION	WATER QUANTITY	WATER QUALITY	HABITAT	SAFETY
COWLITZ COUNTY					
Title 6 Cowlitz County Code (CCC) – Animals and Agriculture	This section establishes rules and procedures for weed control, including establishment of the County's Noxious Weed Control Board; and designates the entire County as a stock restricted area pursuant to Chapter 16.24 RCW.		X	X	X
Title 16 CCC – Buildings and Construction	This section includes the County's building code (Chapter 16.05) as well as regulations for road and other public works construction, grading, floodplain management, and stormwater management. Commercial agriculture practices are generally exempt from stormwater management rules, but the construction of structures and storage areas are not exempt.	X	X		X
Floodplain Management (Chapter 16.25 CCC)	This section regulates building within the 100-year floodplain and floodway. Fill within the floodway that would increase the base flood elevation is prohibited. Normal farm agricultural practices and activities, other than structures and filling for structural support, are exempt from the requirement to obtain a County floodplain permit.	X			X
Title 18 CCC – Land Use Development	This title contains the County's Land Use Ordinance as well as rules on land subdivision. It also contains the County's Open Space Rating Ordinance (Chapter 18.52), which establishes the open space current use assessment and taxation program (see Voluntary Programs).			X	X

REGULATION	DESCRIPTION	WATER QUANTITY	WATER QUALITY	HABITAT	SAFETY
Land Use Ordinance (Chapter 18.10 CCC)	This chapter contains zoning standards that direct uses, building bulk, scale, and location, and other design considerations. The zones match the designations and implement the land use policies in the County's Comprehensive Plan.	X	X	X	X
Title 19 CCC – Environmental Protection	This title contains development regulations for protection of critical areas and shorelines, as well as the County's SEPA procedures.	X	X	X	X
Shoreline Management (Chapter 19.20 CCC)	Ongoing agricultural activities are not subject to the provisions of the SMP. SMP regulations apply to new or expanded agricultural activities on non-agricultural land; conversion of agricultural land to other uses; and non-agricultural activities on agricultural land. Agricultural structures are further exempt from the requirement to obtain a Shoreline Substantial Development Permit. Ongoing aquacultural activities are exempt from the requirements of a Shoreline Substantial Development Permit, but are still subject to compliance with the SMP. New culture techniques or species are not considered new aquaculture activities unless new to the State of Washington and potentially harmful to the environment. For those agricultural activities that are not exempt, the SMP includes provisions guiding the application of pesticides, herbicides, and fertilizers/ and use standards specific to the siting of new agricultural and aquacultural activities to achieve no net loss of ecological functions.	X	X	X	
Cowlitz County Comprehensive Plan	The Comprehensive Plan establishes land use policies for the unincorporated areas of the County.			X	X

2.2 Relationship to Federal and State Regulations

The VSP does not "limit the authority of a state agency, local government, or landowner to carry out its obligations under any other federal, state, or local law" (RCW 36.70A.702). However, one objective of the VSP is to promote enhancements to "improve compliance with other laws designed to protect water quality and fish habitat" (RCW 36.70A.700). All state and federal regulations still apply. These provisions provide a regulatory backstop, which can help provide assurances that the voluntary nature of the VSP can effectively conserve critical areas. A number of other regulations, such as labor and industries laws, may affect agricultural practices, but those regulations not germane to critical areas are not addressed

1 Table 2.2.1

REGULATION	DESCRIPTION	WATER QUANTITY	WATER QUALITY	HABITAT	SAFETY
FEDERAL REGULATIONS					
Clean Water Act (CWA)					
Section 303: Water Quality Standards and Implementation Plan	Section 303(d) of the Clean Water Act established a process to identify and clean up polluted waters. Under the authority of Section 303 of the Clean Water Act, states establish water quality standards, identify impaired waters, and develop total maximum daily loads (TMDLs). TMDLs can be used to address water quality impairments through regulatory (for point source) or non-regulatory (for non-point source) mechanisms. In Cowlitz County, TMDLs have been established for the upper Chehalis River Basin to address dissolved oxygen (including ammonia and biological oxygen demand), fecal coliform, and temperature. A TMDL has been established for the Columbia River, including that portion which passes through Cowlitz County, to address total dissolved gas.		X		
Section 402: National Pollutant Discharge Elimination System (NPDES)	NPDES Permits are required to authorize for point-source discharges of pollutants into a receiving body. Ecology is authorized by EPA to administer NPDES permits. NPDES permits are not required for most agricultural activities, as they are non-point sources of pollutants. Agricultural stormwater discharges and return flows from irrigated agriculture are specifically exempted from NPDES permit requirements. NPDES permits are required for finfish net pens, the use of aquatic pesticides, and discharge from concentrated animal feed operations (CAFOs). NPDES permits assure discharges comply with state water quality, sediment quality, and resource protection standards. A 2011 federal general NPDES permit restricts pesticide application near waterbodies; a draft 2016 general permit for pesticide applications is under review. A general NPDES permit for CAFOs was issued in 2006 and expired in 2011. A draft general NPDES permit for CAFOs is under development.		X		

REGULATION	DESCRIPTION	WATER QUANTITY	WATER QUALITY	HABITAT	SAFETY
Section 404: Discharge of Dredged and Fill Material	Normal farming, silviculture, and ranching practices such as plowing, cultivating, minor drainage, and harvesting for the production of food, fiber, and forest products, or upland soil and water conservation practices are generally exempt from Section 404. Activities that convert a wetland that has not been used for farming or forestry into such uses are not considered part of an established operation, and are not exempt. Additionally, activities that result in a "reduction in reach/impairment of flow or circulation" of waters of the United States are not exempt. Where direct impacts occur to wetlands from these non-exempt activities, compensatory mitigation is required. A Nationwide Permit (NWP 40) for agricultural activities allows for discharges of dredged or fill material for agricultural activities, including the construction of building pads for farm buildings. The discharge must not cause loss greater than one half acre of non-tidal waters of the U.S. or 300 linear feet of stream bed, unless for intermittent and ephemeral stream beds the district engineer waives the 300 linear foot limit. This NWP can be used for agricultural activities regardless of whether the applicant is a USDA participant. The NWP authorizes the construction of farm ponds in non-tidal waters, excluding perennial streams, but cannot be used to authorize aquaculture ponds.		X	X	
Section 401- Water Quality Certification	Where a federal permit is required, a Section 401 water quality certification from Washington Department of Ecology is also required. Issuance of a 401 Certification means that Ecology has reasonable assurance that the applicant's project will comply with state water quality standards and other aquatic resources protection requirements under Ecology's authority.	X	X	X	
Other provisions of the CWA	Other provisions of the Clean Water Act apply to the following, which may apply to some agricultural activities in Cowlitz County: Underground injection Small Drinking Water Systems Oil Pollution Prevention Spill Prevention Control and countermeasures Facility response plan		X		

REGULATION	DESCRIPTION	WATER QUANTITY	WATER QUALITY	HABITAT	SAFETY
Rivers and Harbors Act Section 10	Section 10 of the Rivers and Harbors Act requires that regulated activities conducted below the Ordinary High Water (OHW) elevation of navigable waters of the United States be permitted by the U.S. Army Corps of Engineers. Regulated activities include the placement/removal of structures, work involving dredging, disposal of dredged material, filling, excavation, or any other disturbance of soils/sediments or modification of a navigable waterway. All tidal waters are considered navigable waters.			X	X
Endangered Species Act (ESA) Section 9 and Section 7	ESA prohibits the "take" of species listed as threatened or endangered. For projects involving federal funding, action, or approval, consultation with the US Fish and Wildlife Service is required for projects with the potential to affect listed species.			X	
Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)	FIFRA regulates pesticide usage, storage, and disposal in accordance with label use restrictions and registration requirements to prevent unreasonable risks to human health and the environment. Under the authorization of this act, the EPA has banned the use of certain pesticides and limited the use of others. The EPA is currently studying the effects of the organophosphates chlorpyrifos, diazinon, and malathion on federally listed species. The EPA recently proposed a plan to prohibit the use of pesticides that are toxic to bees when crops are in bloom and bees are under contract for pollination services. In 2016, it released a preliminary assessment of the risks of the pesticide impadacloprid. Risk assessments of three other neonicotinoid pesticides were released in 2017. The plan also recommends that states and tribes develop pollinator protection plans and best management practices.		X		X
US Department of Agriculture (USDA) Farm Bill (Swampbuster)	Per the 2014 Farm Bill, in order to maintain eligibility for US Department of Agriculture funding programs, participants must certify that they have not produced crops on converted wetlands after December 23, 1985, and did not convert a wetland after November 28, 1990, to make agricultural production possible. Additionally, producers must certify that they will not plant or produce an agricultural commodity on		X	X	

REGULATION	DESCRIPTION	WATER QUANTITY	WATER QUALITY	HABITAT	SAFETY
	highly erodible land without following an NRCS approved conservation plan or system.				
Coastal Zone Management Act	An activity requiring a Federal permit must be determined by Ecology to be consistent with the policies and guidelines laid out in the state's Coastal Zone Management Program "to the maximum extent practicable."	X	X	X	
Migratory Bird Treaty Act	This act makes it illegal for anyone to "take" any migratory bird, or the parts, nests, or eggs of such a bird, except under the terms of a valid permit. The Columbia River Estuary has been proposed as a site of international significance relative to its importance on migratory birds, thus there is potential for incidental take of migratory birds through agricultural activities.			X	
STATE					
Agriculture and Marketing – RCW Title 15	Regulates agricultural practices generally, with specific reference to pest and disease control, fertilizers, and crop-specific commissions.		X	X	X
Horticultural Pests and Diseases (15.08 RCW)	Horticultural premises include orchards, vineyards, berry farms, vegetable farms, and others. This section outlines regulations for the disinfection of fruit trees, the disposal of cuttings, records of premises disinfected, and prohibits the dumping of any infected products.		X		X
Washington Pesticide Control Act (15.58 RCW)	Regulates the formulation, distribution, storage, transportation, and disposal of any pesticide and the dissemination of accurate scientific information as to the proper use, or nonuse, of any pesticide in the interest of maintaining a high level of public health and welfare both immediate and future.		X		X
Animals and Livestock – RCW Title 16	Regulates livestock practices generally, including stock on state or federal lands. Regulated practices include animal health, slaughtering, identification, fences, and disposal.		X		X
Weeds, Rodents, and Pests – RCW Title 17	Establishes and regulates pest control, agricultural pest districts, etc.		X	X	X
Noxious weeds - Control Boards (17.10 RCW)	Establishes state and regional noxious weed control board. Establishes owner's duty to eradicate all class A noxious weeds and to control and prevent the spread of all class B noxious weeds.			X	X

REGULATION	DESCRIPTION	WATER QUANTITY	WATER QUALITY	HABITAT	SAFETY
Washington Pesticide Application Act (17.21 RCW)	Regulates the use and application of pesticides for protection of public health and welfare.		X		X
Fish and Wildlife – RCW Title 77	Establishes Washington Department of Fish and Wildlife, including enforcement code, hydraulic project approval permits, salmon recovery, and invasive species regulations.	X	X	X	
Wildlife Damage (77.36 RCW)	Allows landowners and their representatives to trap or kill wildlife that is threatening human safety or causing property damage on that property subject to specific standards. This provision is implemented under 220-660 WAC.				X
Hydraulic Code (77.55 RCW)	The Hydraulic Code gives the Washington Department of Fish and Wildlife (WDFW) the authority to review, condition, and approve or deny "any construction activity that will use, divert, obstruct, or change the bed or flow of any of the salt or fresh waters of the State." These activities may include stream alteration, culvert installation or replacement, pier and bulkhead repair or construction, among others. In a permit called a Hydraulic Project Approval (HPA), WDFW can condition projects to avoid, minimize, restore, and compensate for adverse impacts. 77.55 RCW does not apply to wholly artificial waterways, so long as they were not historically constructed from natural wetlands or streams.	X		X	
Flood Control – RCW Title 86	Establishes flood control districts and regulatory framework for flood control by county, state, and federal agencies.	X	X	X	X
Floodplain Management (86.16 RCW)	Statewide floodplain management regulation shall be exercised through: (1) Local governments' administration of the national flood insurance program (NFIP), (2) the establishment of minimum state requirements for floodplain management that equal the minimum federal requirements for the NFIP, and (3) the issuance of regulatory orders.	X	X	X	X
Irrigation – RCW Title 87	Establishes and regulates irrigation and rehabilitation districts.	X	X		

REGULATION	DESCRIPTION	WATER QUANTITY	WATER QUALITY	HABITAT	SAFETY
Reclamation, Soil Conservation, and Land Settlement – RCW Title 89	Establishes conservation districts, farmland preservation, watershed restoration, and farm plans.	X	X	X	
Water Rights – Environment – RCW Title 90	Regulates water rights, water use and flow levels, water pollution, nutrient management, wetlands mitigation, shoreline management, aquatic rehabilitation, and Columbia River basin water supply.	X	X		
Water Code (90.03)	Establishes water rights appropriation standards and procedures. Water use is subject to the "first in time, first in right" clause.	X			
Regulation of Public Groundwaters (90.44 RCW)	The groundwater permit exemption allows the users of small quantities of groundwater to construct wells and develop their water supplies without first obtaining a water right permit from Ecology. Agricultural exceptions to the permit requirement for withdrawals of groundwater apply to: Providing water for livestock (no gallon per day limit). Providing water for industrial purposes, including irrigation (limited to 5,000 gallons per day but no acre limit).	X			
Water Pollution Control (90.48 RCW)	Establishes state water quality program, and water quality standards for groundwater (WAC 173-200A) and surface water (WAC 173-201A).		X	X	
Dairy Nutrient Management (90.64 RCW)	Requires all dairy producers, regardless of size to prepare and implement a dairy nutrient management plan, register with WSDA, and participate in a program of regular inspections and compliance. The Department of Ecology is responsible for developing and maintaining a standard protocol for water quality monitoring of the waters of the state within the vicinity of dairies and Confined Animal Feeding Operations (CAFOs).		X		
Family Farm Water Act (90.66 RCW)	This act gives priority water right status to irrigation of family farms.	X			
Shoreline Management Act (SMA) (RCW 90.58)	The SMA requires cities and counties to prepare Shoreline Master Programs (SMPs). See discussion of VSP and SMP, and description of County's Shoreline Management code, above.	X	X	X	X

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2.3 Related Plans

Existing water quality, watershed management, farmland protection, and species recovery plans are a source of potential objectives and strategies that can inform and/or be incorporated into the VSP and associated individual VSP stewardship plans. This document provides a high-level summary of issues and strategies from applicable plans within Cowlitz County, intending to focus on those issues and strategies relevant to critical areas and agriculture. Individual plans should be consulted for complete context and details on summary information provided in the tables below. This document is intended as a working document, which will benefit from review and contributions by the VSP Working Group.

Cowlitz County includes portions of four Water Resource Inventory Areas (WRIAs): Grays Elochoman (WRIA 25), Cowlitz (WRIA 26), Lewis (WRIA 27), and a small portion of the Upper Chehalis (WRIA 23). In addition, WRIAs 25, 26, and 27 overlap with the Lower Columbia Watershed (defined by USGS cataloging unit 17080006). Agricultural uses are mapped by the Washington Department of Agriculture as occurring in three out of the four WRIAs (25, 26 and 27). Agricultural uses are not mapped in the portion of the Upper Chehalis watershed located within Cowlitz County, but a summary of the Upper Chehalis watershed is included for completeness.

The key functions associated with critical areas can be broken into four primary categories. These include: water quantity, including flow and storage; water quality, which is defined by factors including sediment, nutrients, temperature, bacteria, and other contaminants such as metals and chemicals; habitat; and physical safety.

Tables 2.3.1 through 2.3.4 summarize issues and strategies from applicable plans for each of the four WRIAs. Table 2.3.5 summarizes plans specific to the Lower Columbia Watershed. While the Lower Columbia Watershed overlaps geographically with WRIAs 25, 26, and 27, the plans summarized in this table address issues and strategies specific to the Columbia River. For all five watersheds, issues and strategies are summarized by key critical area function. Table 2.3.6 summarizes agricultural viability issues and strategies relevant to Cowlitz County.

WRIA 23 – Upper Chehalis Watershed

Watershed Plans and Associated Reports

See the references section at the end of this document for complete bibliographical information on the plans listed below.

A. The Chehalis Basin Salmon Habitat Restoration and Preservation Work Plan for WRIA 22 and 23 (2011)
B. The Chehalis Basin Salmon Habitat Restoration and Preservation Work Plan for WRIAs 22 and 23. Subbasin Action Steps: Boistfort Management Unit - South Fork Chehalis Summary (2011)
C. Chehalis River Basin Comprehensive Salmonid Enhancement Plan (2012) – Anchor QEA
D. The Chehalis/Grays Harbor Watershed Dissolved Oxygen, Temperature, and Fecal Coliform Bacteria TMDL, Detailed Implementation Plan (2004)
E. The Chehalis Basin Partnership Watershed Management Plan: Detailed Implementation Plan (2009)
F. ESA Recovery Plan for Lower Columbia River Coho Salmon, Lower Columbia River Chinook Salmon, Columbia River Chum Salmon, and Lower Columbia River Steelhead (2013)
G. Shoreline Restoration Plan for Shorelines in Cowlitz County (2016)
H. Management recommendations for Washington's priority species, Volume III: Amphibians and Reptiles (1997)

Table 2.3.1. Issues and Strategies Identified for the Upper Chehalis Watershed

Issue	Strategies	Implementation Status
WATER QUALITY		
Excess sediment inputs	• Abandon roads on steep geologically sensitive areas • Correct cross drains that may trigger mass wasting on geologically sensitive slopes • Identify roads that contribute to sediment loading • Implement bank stabilization in locations of excessive erosion • Revegetate streams and riverbanks for added protection from erosion • Manage pasture to provide forage production and soil cover/stabilization • Revegetate exposed soil surfaces • Protect heavy-use areas from livestock trampling	• WA Dept. of Ecology Centennial Clean Water Grants

Issue	Strategies	Implementation Status
High summer water temperatures	• Implement TMDL recommendations • Revegetate open riparian areas with native plants • Revegetate streams and riverbanks for added protection from erosion	Unknown at this time
High fecal coliform bacteria levels, low oxygen levels, excess nutrients	• Install riparian fencing to exclude or reduce livestock access • Collect runoff from animal confinement areas into waste storage facilities • Implement farm management plans that guide when manure is applied to land • Collect and properly store manure • Identify and repair or replace failing on-site septic systems	Unknown at this time
Limited nutrient availability in salmon-bearing watersheds	• Implement approved nutrient enhancement efforts	Unknown at this time
WATER QUANTITY		
Insufficient water supply	• Determine if water withdrawals are being followed in accordance with water rights • Improve enforcement of existing laws and regulations to support voluntary efforts • Reduce water withdrawals from surface sources • Create a partnership with the Department of Ecology and Conservancy Boards in issuing and transferring water rights • Develop and implement water conservation programs • Allow out-of-kind mitigation (watershed mitigation) for new or changed water rights • Develop a water bank or trust • Develop funding sources for water quantity issues • Clarify water rights and uses • Map water rights in the basin	Unknown at this time

Issue	Strategies	Implementation Status
	• Provide mitigation credit of water use by considering the return of reclaimed water to aquifer recharge, wetland, enhancement, and/or in-stream augmentation • Analyze and develop a means for capturing and storing surface water during the rainy season • Implement activities that lead to natural recharge of aquifers	
HABITAT		
Upland and Riparian		
Ecological degradation from invasive species	• Remove / control invasive species • Prevent the introduction of detrimental plant and animal species (aquatic and terrestrial)	• Cowlitz County Noxious Weed Board
Reduced and degraded riparian habitat	• Interplant conifers in deciduous dominant areas where appropriate • Protect key properties of riparian habitat by a fee simple or easement • Revegetate open riparian areas with native plans • Width of riparian ecosystem equivalent to the site potential of a 200 year old tree (https://wdfw.wa.gov/publications/01987/)	• Voluntary planting through NRCS incentive programs (CREP, EQIP)
Aquatic		
Loss or degradation of off-channel, floodplain, and wetland channel habitat to support spawning and rearing	• Reconnect, enhance, or restore off-channel, floodplain, and wetland habitat • Remove hard armoring (riprap) or implement bioengineering techniques in place of hard armoring	• SRFB funded fish habitat enhancement projects completed by tribes, nonprofits, conservation district, land trusts, government agencies, etc.

Issue	Strategies	Implementation Status
Loss of fish access to habitat	• Correct barrier culverts • Improve fish passage at fishways and add fishways to structures that do not have them	Unknown at this time
Loss of woody debris to support fish habitat	• Develop large woody debris supplementation plan that will install logjams and key pieces to improve in-stream channel structure and habitat diversity • Determine ways to keep large woody debris in system • Educate landowners about the importance of leaving large woody debris in the stream • Install large woody debris pieces in conjunction with other restoration projects • Plant riparian areas for future recruitment	• SRFB funded fish habitat enhancement projects completed by tribes, nonprofits, conservation district, land trusts, government agencies, etc.
Sensitive Species		
Loss of habitat for listed and priority species	• Identify and protect habitats (e.g. Pacific lamprey, Dunn's salamander, Roosevelt elk) • Retain shade over seeps, stream corridors and talus (for Dunn's salamander) • Retain woody debris of all size and decay classes	• 2015 State Wildlife Action Plan
PHYSICAL SAFETY		
Flooding risk	• Prevent development within the floodplain • Restore floodplains • Avoid floodplain filling	• County Floodplain Management Ordinance

WRIA 25 – Grays - Elochoman Watershed

Watershed Plans and Associated Reports

See the references section at the end of this document for complete bibliographical information on the plans listed below.

A. Washington Lower Columbia Salmon Recovery and Fish and Wildlife Subbasin Plan (2010)
    a. Elochoman Subbasin Plan
    b. Mill, Abernathy and Germany Subbasin Plan
B. Grays-Elochoman and Cowlitz Watershed Management Plan (2014)
C. ESA Recovery Plan for Lower Columbia River Coho Salmon, Lower Columbia River Chinook Salmon, Columbia River Chum Salmon, and Lower Columbia River Steelhead (2013)
D. Revised Recovery Plan for the Northern Spotted Owl (2011)
E. Shoreline Restoration Plan for Shorelines in Cowlitz County (2016)

Table 2.3.2 Issues and Strategies Identified for the Grays-Elochoman Watershed

Issue	Strategies	Implementation Status
WATER QUALITY		
Excess sediment inputs	• Manage agricultural practices to minimize impacts to sediment supply processes • Tax incentives to prevent agricultural and forest lands from becoming developed • Follow state and federal regulations with respect to contaminant use, erosion, and runoff • Provide technical and financial assistance to enable small owners to conduct necessary improvements • Identify and rectify problem legacy roads	Unknown at this time
High summer water temperatures	• Increase riparian shading • Decrease channel width-to-depth ratios • Expand monitoring • Develop waterbody cleanup plans	Unknown at this time

Issue	Strategies	Implementation Status
High fecal coliform bacteria levels	• Exclude livestock from riparian areas • Address leaking septic systems	Unknown at this time
Excess fertilizer and pesticides	• Reduce delivery of chemical contaminants to streams • Follow state and federal regulations with respect to fertilizer and pesticide use, erosion, and runoff	Unknown at this time
WATER QUANTITY		
Insufficient water supply	• Restore instream flows through acquisition of existing water rights • Restore instream flows through implementation of water conservation measures	Unknown at this time
Degraded flow regime to support fish habitat and channel processes	• Protect the natural stream flow regime	Unknown at this time
HABITAT		
Upland and Riparian		
Reduction/degradation of wildlife habitat	• Protect habitat conditions and watershed functions through land acquisition or easements where existing policy does not provide adequate protection • Designate set-asides where no use or limited uses are allowed • Plan future improvements and expansion to avoid critical areas • Encourage the use of low-impact development methods and materials • Apply mitigation measures to offset potential impacts	• 2015 State Wildlife Action Plan
Ecological degradation from invasive species	• Restore and protect native plant communities • Eradicate invasive plant species from riparian areas	• WSU Extension Integrated Weed Control Project

Issue	Strategies	Implementation Status
Reduction/degradation of riparian habitat	• Increase funding available to purchase easements or property in sensitive areas in order to protect watershed function. • Restore the natural riparian plan community • Exclude livestock from riparian areas • Eradicate invasive plant species from riparian areas. • Width of riparian ecosystem equivalent to the site potential of a 200 year old tree (https://wdfw.wa.gov/publications/01987/)	• Voluntary planting through NRCS incentive programs (CREP, EQIP)
Aquatic		
Loss/degradation off-channel and side channel habitat for spawning and rearing	• Create, protect and restore lost side-channel/off-channel habitat • Build chum salmon spawning channels • Construct coho overwintering habitat such as alcoves, side channels and log jams • Protect channel structure and stability	• SRFB funded fish habitat enhancement projects completed by tribes, nonprofits, conservation district, land trusts government agencies etc.
Loss of fish access to habitat	• Protect and restore fish access to isolated habitats blocked by culverts, dams, or other barriers • Conduct additional monitoring and assessment to identify and prioritize potential blockages. • Increase technical support and funding to landowners faced with impassable barriers.	• WDFW Fish Passage Program
Loss of adequate woody debris to support fish habitat	• Place stable woody debris in streams to enhance cover, pool formation, bank stability, and sediment sorting • Structurally modify stream channels to create suitable habitat types • Restore natural rates of erosion and mass wasting within river corridors • Increase implementation of voluntary habitat enhancement projects through building partnerships and providing incentives.	Unknown at this time

Issue	Strategies	Implementation Status
Floodplain and Wetland		
Enhance or restore floodplains impaired by development	• Conduct voluntary floodplain restoration on lands being phased out of agricultural production • Allow restoration projects to serve as mitigation for other activities • Set-back, breach, or remove artificial channel confinement structures	Unknown at this time
Protect existing floodplains	• Protect and restore floodplain function and channel migration processes • Increase funding available to purchase easements or property in sensitive areas in order to protect watershed function where existing programs are inadequate	Unknown at this time
Sensitive Species		
Loss of habitat for listed and priority species	• Increase habitat for listed and priority species (e.g. northern spotted owl, cavity nesting ducks, waterfowl concentrations, elk) • Plan to minimize fragmentation of habitat areas • Maintain connectivity between habitat patches • Control invasive species	Unknown at this time
PHYSICAL SAFETY		
Flooding risk	• Prevent development within the floodplain • Restore floodplains • Avoid floodplain filling	• County Floodplain Management Ordinance

WRIA 26 – Cowlitz Watershed

Watershed Plans and Associated Reports

See the references section at the end of this document for complete bibliographical information on the plans listed below.

A. Washington Lower Columbia Salmon Recovery and Fish and Wildlife Subbasin Plan (2010)
    a. Lower Cowlitz Subbasin Plan
    b. Toutle Subbasin Plan
    c. Coweeman Subbasin Plan
B. Grays-Elochoman and Cowlitz Watershed Management Plan (2014)
C. ESA Recovery Plan for Lower Columbia River Coho Salmon, Lower Columbia River Chinook Salmon, Columbia River Chum Salmon, and Lower Columbia River Steelhead (2013)
D. Lower Cowlitz River and Floodplain Habitat Restoration Project Siting and Design: Final Revised Report (2007)
E. Revised Recovery Plan for the Northern Spotted Owl (2011)
F. Shoreline Restoration Plan for Shorelines in Cowlitz County (2016)

Table 2.3.3. Issues and Strategies Identified for the Cowlitz Watershed

Issue	Strategies	Implementation Status
WATER QUALITY		
Excess sediment inputs	• Protect hillslope processes • Protect and restore stream bank stability • Manage agricultural practices to minimize impacts to sediment supply processes, runoff regime, and water quality • Manage expansion and improvements to minimize impacts to sediment supply processes, runoff regime and water quality • Provide Tax incentives to prevent agricultural lands from becoming developed • Upgrade or remove problem agricultural roads • Follow state and federal regulations with respect to contaminant use, erosion, and runoff • Reduce turbidity sources	Unknown at this time

Issue	Strategies	Implementation Status
High summer water temperatures	• Increase riparian shading in tributaries • Decrease channel width-to-depth ratios • Restore dissolved oxygen concentrations	Unknown at this time
High fecal coliform bacteria levels	• Exclude livestock from riparian areas • Assess, upgrade and replace onsite septic systems • Manage onsite manure	• Voluntary NRCS incentive programs (CREP, EQIP)
Excess fertilizer and pesticides	• Reduce delivery of chemical contaminants to streams • Protect and restore wetlands • Follow state and federal regulations regarding pesticide, herbicide and fertilizer • Provide technical assistance programs for implementing water quality measures	Unknown at this time
WATER QUANTITY		
Insufficient water supply	• Restore instream flows through acquisition of existing water rights • Restore instream flows through implementation of water conservation measures	• WA Dept. of Ecology – Water Resources Program
Degraded flow regime to support fish habitat and channel processes	• Protect the natural stream flow regime	Unknown at this time
HABITAT		
Upland and Riparian		
Reduced/degraded riparian habitat	• Restore the natural riparian plant community • Exclude livestock from riparian areas • Eradicate invasive plant species from riparian areas • Take aggressive measures to avoid inadvertent introductions of new species and to control or reduce potential effects of existing non-native species or their effects.	• WDNR Habitat Conservation Program • NGOs, tribes, agencies, landowners – habitat projects • Noxious Weed Control Board – Noxious weed

Issue	Strategies	Implementation Status
	• Increase technical assistance to landowners and increase landowner participation in conservation programs that protect and restore habitat and habitat-forming processes. • Increase the level of implementation of voluntary habitat enhancement projects in high-priority reaches and subwatersheds. • Width of riparian ecosystem equivalent to the site potential of a 200 year old tree (https://wdfw.wa.gov/publications/01987/)	education, control and enforcement • Voluntary planting through NRCS incentive programs (CREP, EQIP)
Ecological degradation from invasive species	• Protect and restore native plant communities from the effects of invasive species	• Cowlitz County Noxious Weed Control Board – Education, Control, Enforcement
Aquatic		
Loss of fish access to habitat	• Restore access to isolated habitats blocked by culverts, dams, or other barriers • Monitor and assess to ensure all potential blockages have been identified and prioritized	• WDFW Fish Passage Program • LCFEG Habitat Program
Loss/degradation of off-channel habitat for spawning and rearing	• Restore historical off-channel and side-channel habitats • Create new channel or off-channel habitats (i.e. spawning channels)	Unknown at this time
Modified channel structure and stability	• Place stable woody debris in streams to enhance cover, pool formation, bank stability, and sediment sorting • Structurally modify channel morphology to create suitable habitat • Restore natural rates of erosion and mass wasting within river corridors	Unknown at this time
Floodplain and Wetland		
Loss/degradation of floodplain and side channel habitat due to development	• Protect floodplain function and channel migration processes • Set-back, breach or remove artificial confinement structures.	• WDFW Habitat Program • USACE Water Resources Development Act

Issue	Strategies	Implementation Status
	• Conduct floodplain restoration where feasible along the mainstem and in major tributaries that have experienced channel confinement • Prevent floodplain impacts from new development through land use controls • Create and/or restore lost side-channel/off-channel habitat for chum spawning and coho overwintering • Increase funding available to purchase easements or property in sensitive areas where existing programs may not be able to adequately protect watershed function.	• Various groups – Habitat Projects • LCFEG – Habitat Program • WDNR – Aquatic Lands Authorization
Sensitive Species		
Loss of habitat for listed and priority species	• Identify and protect habitats (e.g. northern spotted owl , cavity nesting ducks, waterfowl concentrations, elk) • Plan to minimize fragmentation of habitat areas • Maintain connectivity between habitat patches • Control invasive species	Unknown at this time
PHYSICAL SAFETY		
Flooding risk	• Prevent development within the floodplain • Restore floodplains • Avoid floodplain filling	• County Floodplain Management Ordinance

WRIA 27 – Lewis Watershed

Watershed Plans and Associated Reports

See the references section at the end of this document for complete bibliographical information on the plans listed below.

A. Washington Lower Columbia Salmon Recovery and Fish and Wildlife Subbasin Plan (2010)

   a. North Fork Lewis Watershed Subbasin Plan
   b. Kalama Subbasin Plan

B. Kalama, Washougal, and Lewis River Habitat Assessments (2004)
C. Lower Kalama River Off-Channel Habitat Assessment (2009)
D. Salmon-Washougal and Lewis Watershed Management Plan (2006)
E. ESA Recovery Plan for Lower Columbia River Coho Salmon, Lower Columbia River Chinook Salmon, Columbia River Chum Salmon, and Lower Columbia River Steelhead (2013)
F. Revised Recovery Plan for the Northern Spotted Owl (2011)
G. Lewis River Wildlife Habitat Management Plan. Volume I (2008)
H. Lewis River Case Study Final Report: A decision-support tool for assessing watershed-scale habitat recovery strategies for ESA-listed salmonids. (2007)
I. Shoreline Restoration Plan for Shorelines in Cowlitz County (2016)

Table 2.3.4. Issues and Strategies Identified for the Lewis Watershed

Issue	Strategies	Implementation Status
WATER QUALITY		
Excess sediment inputs	• Protect hillslope processes • Protect and restore stream bank stability • Manage agricultural practices to minimize impacts to sediment supply processes, runoff regime, and water quality • Manage expansion and improvements to minimize impacts to sediment supply processes, runoff regime and water quality • Provide tax incentives to prevent agricultural lands from becoming developed • Upgrade or remove problem agricultural roads • Follow state and federal regulations with respect to contaminant use, erosion, and runoff • Reduce watershed imperviousness • Reduce turbidity sources	Unknown at this time
High summer water temperatures	• Increase riparian shading in tributaries • Decrease channel width to depth ratios • Restore dissolved oxygen concentrations	Unknown at this time

Issue	Strategies	Implementation Status
High fecal coliform bacteria levels	• Exclude livestock from riparian areas • Assess, upgrade and replace onsite septic systems • Manage onsite manure	Unknown at this time
Excess fertilizer and pesticides	• Reduce delivery of chemical contaminants to streams • Protect and restore wetlands • Follow state and federal regulations regarding pesticide, herbicide and fertilizer • Provide technical assistance programs for implementing water quality measures	Unknown at this time
WATER QUANTITY		
Insufficient water supply	• Employ water conservation measures for irrigated agriculture • Restore instream flows through acquisition of existing water rights • Restore instream flows through implementation of water conservation measures • Switch from surface water to groundwater; discourage new use of surface water • Support the transfer of ground water rights from one user to another to meet future water demand	• WA Ecology – Water Resources Program
Degraded flow regime to support fish habitat and channel processes	• Protect the natural stream flow regime	Unknown at this time
HABITAT		
Upland and Riparian		
Loss/degradation of riparian habitat	• Restore the natural riparian plant community • Exclude livestock from riparian areas • Eradicate invasive plant species from riparian areas	• WDNR Habitat Conservation Program • NGOs, tribes, agencies, landowners – habitat projects

Issue	Strategies	Implementation Status
	• Take aggressive measures to avoid inadvertent introductions of new species and to control or reduce potential effects of existing non-native species or their effects. • Increase technical assistance to landowners and increase landowner participation in conservation programs that protect and restore habitat and habitat-forming processes. • Increase the level of implementation of voluntary habitat enhancement projects in high-priority reaches and subwatersheds. • Width of riparian ecosystem equivalent to the site potential of a 200 year old tree (https://wdfw.wa.gov/publications/01987/)	• Noxious Weed Control Board – Noxious weed education, control and enforcement • Voluntary planting through NRCS incentive programs (CREP, EQIP)
Ecological degradation from invasive species	• Protect and restore native plant communities from the effects of invasive species	• WSU Extension Integrated Weed Control Project
Aquatic		
Loss of fish access to habitat	• Restore access to isolated habitats blocked by culverts, dams, or other barriers • Monitor and assess to ensure all potential blockages have been identified and prioritized	• WDFW Fish Passage Program • LCFEG Habitat Program
Reduced/degraded off-channel habitat	• Restore historical off-channel and side-channel habitats • Create new channel or off-channel habitats (i.e. spawning channels)	Unknown at this time
Modified channel structure and stability	• Place stable woody debris in streams to enhance cover, pool formation, bank stability, and sediment sorting • Structurally modify channel morphology to create suitable habitat • Restore natural rates of erosion and mass wasting within river corridors	Unknown at this time
Floodplain and Wetland		

Issue	Strategies	Implementation Status
Loss/degradation of floodplain and side channel habitat due to development	• Protect floodplain function and channel migration processes • Set back, breach or remove artificial confinement structures. • Conduct floodplain restoration where feasible along the mainstem and in major tributaries that have experienced channel confinement • Prevent floodplain impacts from new development through land use controls • Create and/or restore lost side-channel/off-channel habitat for chum spawning and coho overwintering • Increase funding available to purchase easements or property in sensitive areas where existing programs may not be able to adequately protect watershed function.	• WDFW Habitat Program • USACE Water Resources Development Act • Various groups – Habitat Projects • LCFEG – Habitat Program • WDNR – Aquatic Lands Authorization
Sensitive Species		
Loss of habitat for listed and priority species	• Identify and protect habitats (e.g. northern spotted owl, cavity nesting ducks, waterfowl concentrations, elk) • Plan to minimize fragmentation of habitat areas • Maintain connectivity between habitat patches • Control invasive species	Unknown at this time
PHYSICAL SAFETY		
Flooding risk	• Prevent development within the floodplain • Restore floodplains • Avoid floodplain filling	• County Floodplain Management Ordinance

Lower Columbia

Watershed Plans and Associated Reports

A. Washington Lower Columbia Salmon Recovery and Fish and Wildlife Subbasin Plan (2010)
B. Comprehensive Conservation and Management Plan Update (2011)
C. State of the Estuary Report (2015)
D. Columbia Estuary Ecosystem Restoration Program (2012)
E. Lower Columbia River and Columbia River Estuary Subbasin Summary (2002)
F. ESA Recovery Plan for Lower Columbia River Coho Salmon, Lower Columbia River Chinook Salmon, Columbia River Chum Salmon, and Lower Columbia River Steelhead (2013)
G. Columbian White-Tailed Deer Management Plan (2010)
H. Designation of Critical Habitat for the Southern Distinct Population Segment of Eulachon (2011)
I. Shoreline Restoration Plan for Shorelines in Cowlitz County (2016)

Table 2.3.5. Issues and Strategies Identified for the Lower Columbia River

Issue	Strategies	Implementation Status
WATER QUALITY		
Toxic contaminants and organic nutrients from upstream sources	• Follow state and federal regulations to limit contaminant impacts • Monitor the Columbia River for contaminants and restore or mitigate contaminated sites	• Columbia River Basin Restoration Act authorizes Congress to appropriate funds to create a voluntary grant program to reduce, clean up, or eliminate toxic contaminants in the Columbia River Basin • State of Oregon Pesticide Stewardship Partnerships – voluntary

Issue	Strategies	Implementation Status
		reductions in pesticide applications • Columbia River Toxics Reduction Working Group
High summer water temperatures	• Protect and restore riparian forests • Operate the hydro system to reduce the effects of reservoir surface heating, or conduct mitigation measures • Incorporate low-impact design elements and on-site stormwater management where applicable	Unknown at this time
Low dissolved oxygen levels	• Protect and restore riparian forests	Unknown at this time
Pollution from creosote piles	• Remove or replace creosote piles	Unknown at this time
WATER QUANTITY		
Reduced in-stream flow	• Relinquish existing unused water rights • Comply with water withdrawal regulations	Unknown at this time
HABITAT		
Invasive species	• Continue to research, control, and monitor invasive species, including both non-native, invasive fauna (listed as aquatic invasive species by WDFW) and noxious weeds (listed by the Washington State Noxious Weed Control Board) • Employ integrated pest management measures and follow state and federal regulations to control non-native, invasive species	Unknown at this time
Aquatic		
Decrease in suspended organic matter due to reduced sediment supply	• Protect and restore riparian forests	Unknown at this time
Reduction in productivity	• Protect and restore riparian forests	Unknown at this time

Issue	Strategies	Implementation Status
Alteration of currents and sedimentation processes from piles and pile dikes	• Consider removal or modification of pilings and pile dikes that have low economic value when removal or modification would benefit juvenile salmonids and improve ecosystem health	Unknown at this time
Reduced submerged aquatic vegetation and altered trophic relationships from overwater structures	• Consider removal or modification of overwater structures that have low economic value when removal or modification would benefit juvenile salmonids and improve ecosystem health	Unknown at this time
Increased predation of juvenile salmonids due to habitat changes that have increased predator populations	• Implement methods to reduce predation mortality on migrating salmonids	• U.S. Fish & Wildlife Service predator population control efforts (sea lion)
Reduced or degraded riparian habitat	• Plant disturbed riparian areas (e.g. grazed areas) • Install livestock exclusion fencing • Protect intact riparian areas on the Columbia River and its tributaries and restore riparian areas that are degraded • Retain large trees in riparian zones and landscape with native plants • Width of riparian ecosystem equivalent to the site potential of a 200 year old tree (https://wdfw.wa.gov/publications/01987/)	• Voluntary planting through NRCS incentive programs (CREP, EQIP)
Floodplain and Wetland		
Loss of historical floodplain and off-channel habitat due to diking and reduced overbank events	• Explore strategies to improve access to off-channel habitats • Reconnect flows between floodplain habitats and the mainstem	Unknown at this time
Loss of shallow water wetland habitat	• Restore shallow water wetland habitat	Unknown at this time
Sensitive Species		
Loss of habitat for listed and priority species	• Identify and protect known habitats for sensitive species in the tidal freshwater portion of the lower Columbia River (e.g. eulachon, green sturgeon, Pacific lamprey) • Plan to minimize fragmentation of habitat areas	Unknown at this time

Issue	Strategies	Implementation Status
	• Maintain connectivity between habitat patches • Control invasive species	
Threats to Columbian white-tailed deer habitat	• Protect Columbia River island habitat • Prevent barbed-wire fence entanglement • Use landowner incentives to secure habitat on the lower Columbia River	Unknown at this time
PHYSICAL SAFETY		
Flooding risk	• Avoid development within the floodway • Where possible, protect or restore natural floodplain areas • Maintain flood control structures such as levees, dams, and retention ponds in good condition	• County Floodplain Management Ordinance

Farmland Protection

Farmland Protection Plans

A. Cowlitz County Comprehensive Plan (2017)
B. Designation of Agricultural Lands in Chelan, King, Lewis, and Yakima Counties (Washington Department of Community Trade and Economic Development 2004)
C. Strategic Plan for Washington Agriculture: 2020 and Beyond (Washington Department of Agriculture 2009)

Table 2.3.6. Farmland Protection Issues and Strategies

Issue	Strategies	Implementation Status
AGRICULTURAL VIABILITY		
Land • Conversion of agriculture land to other uses • Speculative buying, taking land out of production • Fragmentation of agricultural land base	• Designate agricultural land of long-term commercial significance • Develop program for land banking, selling, and leasing farmland • Enact Purchase of Development Rights program on State basis • Downzone agricultural lands • Allow accessory or commercial uses on farms • Provide funding for agriculture infrastructure • Create fund endowment to support research grants • Create or support training programs for new farmers • Support NRCS, Conservation District, and WSU Extension service programs financially • Encourage innovative techniques to promote small farms, gardens, and agricultural activities within suburban areas. • Identify Agricultural Resource Land of long-term commercial significance for agricultural production • Create a Strategic Plan for Agriculture in Cowlitz County • Allow agricultural use in all land use classifications	• Land purchase assistance programs by land trusts, other farmland preservation organizations • County designation of Agricultural land of long-term commercial significance; Comprehensive Plan policies
Neighbors • Incompatible adjacent uses • Lawsuits	• Adopt and maintain right-to-farm laws (protection from nuisance lawsuits) • Require transitional space between development adjacent to agriculture	Unknown at this time

Issue	Strategies	Implementation Status
Regulations	• Employ alternatives to local regulations • Provide regulatory certainty	• VSP under development
Operation costs • Taxes • Financing • Seasonal worker housing • Wages • Transportation	• Address appraisal practices • Expand Open Space Tax Incentive programs to agriculture structures and improvements; provide other tax incentives • Fund farm ombudsman position • Address need for temporary housing for farm workers	• County's Agricultural Current Use Taxation • Federal loan program to assist in infrastructure • Conservation easement programs
Markets • Global economy • Changing international markets • Consolidation of buyers • Access to markets	• Develop coordinated statewide agriculture economic development policy • Encourage consumer support of local agriculture • Develop demonstration farms for testing new products	Unknown at this time

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Table 2.3.7 Translating the Existing Plans to VSP Goals.

COWLITZ COUNTY

VOLUNTARY STEWARDSHIP PROGRAM

PLAN OF WORK

GOALS	WRIA 23							WRIA 25					WRIA 26						WRIA 27								LOWER COLUMBIA								FARMLAND PROTECTION		
Goal 4.2.1 - Protect or enhance natural hydrologic storage capacity	A	B	C	D	E	F		A	B	C		E	A	B	C			F	A	B		D	E	F			I	A	B	C		E	F		H	I	A		C
Goal 4.2.2 - Maintain or increase groundwater recharge levels	A			D	E	F		A	B	C		E	A	B	C			F	A	B		D	E	F			I	A	B	C		E	F		H	I	A		C
Goal 4.3.1 - Protect or enhance soil quality for agriculture		B	C	D	E	F			B	C		E		B	C			F					E	F			I			C		E	F			I	A		C
Goal 4.3.2 - Maintain or improve surface water quality through implementation of key conservation practices that reduce impacts to waterbodies, including: sediment, nutrients, and other contaminants.	A	B	C	D	E	F	G	A	B	C		E	A	B	C			F	A			D	E	F			I	A	B	C		E	F		H	I	A		C
Goal 4.3.3 - Maintain or improve groundwater quality through implementation of key conservation practices that reduce negative impacts to groundwater, including: nutrients, pesticides, and other contaminants.	A	B	C	D	E	F	G	A	B	C		E	A	B	C			F	A			D	E	F			I	A	B	C		E	F		H	I	A		C
Goal 4.4.1 - Preserve and enhance existing terrestrial habitat areas	A	B	C	D	E	F	G	A	B	C	D	E	A	B	C		E	F	A	B		D	E	F	G		I	A	B	C	D	E	F	G	H	I	A		C
Goal 4.4.2 - Preserve and enhance riparian and aquatic habitat	A	B	C	D	E	F	G	A	B	C		E	A	B	C			F	A	B		D	E	F	G		I	A	B	C	D	E	F	G	H	I	A		C
Goal 4.6.1 - A stable and secure sustainable agricultural land base.		B	C	D	E	F	G	A	B	C		E	A	B	C			F	A				E	F	G		I	A		C	D	E	F	G		I	A		C

3 Baseline Conditions

Baseline conditions are defined as those conditions occurring on the effective date of the VSP legislation – July 22, 2011. These are the conditions against which future conditions will be measured to evaluate the progress of the Work Plan towards its stated goals and measurable benchmarks for critical areas protection and enhancement. This chapter describes the baseline conditions of critical areas, agricultural activities, and their intersection in Cowlitz County.

3.1 Methods

Data sources for Critical Areas are those identified in the Cowlitz County Critical Areas Ordinance CCC 19.15.110.

The following sources have been used to identify agricultural lands in Cowlitz County:

- 2010 Washington State Landuse (Statewide land use based on parcels)
- Current Cowlitz County parcel and assessment data
- Cowlitz County Zoning and Comprehensive Plan data
- WSDA 2015 Crop data (File Geodatabase Feature Class)
- USDA-NASS Cropland Data Layer for 2011 (raster data from satellite imagery, annual)
- 2011 National Land Cover Dataset (NLCD) (raster data)
- Aerial photos from NAIP: 2011, 2013, 2015
- Other sources as may be provided by the County

3.2 Agriculture in Cowlitz County

Agriculture in Cowlitz County is an important source of economic activity, with more than $37 million in cash receipts generated in 2015 (having increased almost five percent annually since 2011). In the past ten years, covered farm employment increased almost one percent per year, while overall covered employment in the county has grown at a rate of just 0.1 percent. In 2015, livestock and animal products in the county represented 41 percent of farm receipts while crop production represented 59 percent.

According to the 2012 Agriculture Census, 492 farms in the county utilized more than 39,000 acres in the county. Leading crops grown by acreage planted in Cowlitz include hay, grasses, sweet corn and peas, each with more than 2,800 acres harvested in 2012. Overall, cropland represents more than 47 percent of the farm acres in the county, with woodland and pastureland making up the remainder. Small beef cattle herds are common in many agricultural areas. Two dairies are in operation.

Prime farmland conditions with both fertile soil and supplemental irrigation are found in the lands along the Columbia River. In particular, the Woodland Bottoms, and to a lesser extent, Willow Grove are where the highest value agricultural output occurs in the County. Other pockets of well-suited farmland are also important. Livestock production and associated crop activity, especially hay production, is found in many lower elevation areas.

Further downstream, food processing plays an important role in the food system; in 2012, Cowlitz County was among the top ten counties in the state in terms of food processing jobs. In total with all

direct, indirect and induced impacts, agriculture accounts for over 700 jobs, $20.6 million in income and $99.0 million in value of output in the county.

Cowlitz County faces the same plight as neighboring counties in Western Washington: deep level soils are also the preferred location for development of housing and other urban uses including industrial site expansion. The county is distinguished by having no impact fees, lower permit costs and less regulation that most other western Washington counties. This makes it attractive for non-agricultural development.

Major population centers are located to the north and south. Commercial and industrial users enjoy immediate access for cargo to the interstate highway and rail, as well as the Columbia River gateway to regional and international markets.

Small farms, those between one and nine acres, have rapidly increased from 1997 to 2012. Larger farms, those between 50 and 999 acres have shown a decline. Very large farms, those greater than 1,000 acres, have increased.

3.3 Critical Areas and their Intersection with Agriculture

Critical Areas in Cowlitz County include Wetlands, Fish and Wildlife Habitat Conservation Areas, Frequently Flooded Areas, Geologically Hazardous Areas, and Critical Aquifer Recharge Areas.

The key functions associated with critical areas can be broken into four primary categories. These include: water quantity, including flow and storage; water quality, which is defined by factors including sediment, nutrients, temperature, bacteria, and other contaminants; habitat; and physical safety. Table 1 identifies which functions relate to each type of critical area.

Table 3.3.1. Relationship between critical areas and key functions. Shaded areas represent functions associated with each critical area.

	Water Quantity		Water Quality					Habitat	Physical Safety
	Flow	Storage	Sediment	Nutrients	Temperature	Bacteria	Contaminants		
Wetlands	■	■	■	■	■	■	■	■	
Fish and Wildlife Habitat Conservation Areas	■	■	■	■	■	■	■	■	
Frequently Flooded Areas	■	■						■	■
Geologically Hazardous Areas			■						■
Critical Aquifer Recharge Areas		■		■		■	■		■

Critical areas and their functions in Cowlitz County are characterized in a number of documents. The *Shoreline Analysis Report for Shorelines in Cowlitz County and the Cities of Castle Rock, Kalama, Kelso, and Woodland* (May 2014) summarizes available literature to describe watershed conditions, as well as historical and current ecological functions and processes in Cowlitz County. The C*owlitz County Critical Areas Review of Existing Conditions and Best Available Science* (March 2016) further describes critical area functions and references summaries of best available science. Other references include the *Chehalis Basin Salmon Habitat Restoration and Preservation Strategy for WRIA 22 and 23* (Grays Harbor County Lead Entity Habitat Work Group 2011) and the *Washington Lower Columbia Salmon Recovery and Fish and Wildlife Subbasin Plan* (Lower Columbia Fish Recovery Board 2015). Together, these reports and analyses characterize the baseline conditions of critical area functions in the county.

In addition, the following section briefly describes the major geographical areas of overlap between mapped agricultural activities and the five types of critical areas, then provides a discussion of the relationships between agricultural activities and the four major critical area functions in areas of intersection. Non-agricultural activities such as industrial development, residential development, forest practices, natural disasters, and climate change also affect critical area functions; however, these activities are outside of the scope of the VSP and are not addressed in this Work Plan.

A summary of the amount of intersection between agriculture and critical areas in Cowlitz County is presented in *Profile and Analysis of Cowlitz County Agricultural Conditions* (Globalwise Inc. and CORE GIS 2017). In addition to a quantitative analysis of agricultural parcels within critical areas, the report presents a series of maps showing the areas of intersection between agriculture and critical areas in the county. The analysis shows that the vast majority (90 percent) of agricultural parcels intersect with at

least one critical area. Areas of intersection are concentrated in the Woodland Bottoms and Willow Grove areas of the county.

The following sections describe the key functions associated with each type of critical area and briefly summarize where each type of critical area may be found in the county, as well as how they intersect with agriculture.

Wetlands

Wetland functions can be separated into water quantity (recharge and discharge), water quality (filtration and assimilation of nutrients and contaminants), and habitat (Sheldon et al. 2005). Each of these functions is summarized in Table 2.

Table 3.3.2. Summary of wetland functions

Water Quantity	Wetlands store water, recharge groundwater, and discharge groundwater into streams.
Water Quality	Periodic inundation allows for effective biofiltration of nutrients, bacteria, and other chemicals; moderation of temperature; and reduced siltation and erosion.
Habitat	Wetlands support a range of birds, mammals, and amphibians. Upland areas surrounding wetlands often support a portion of the lifecycle of wetland dependent species.

Mapped wetlands in Cowlitz County are concentrated near large waterbodies, especially along the Columbia River, in the vicinity of Silver Lake, and within the channel migration zone of the Toutle River System. The concentration of wetlands tends to be higher along the Lower Cowlitz River compared to the Coweeman River and Lewis River watersheds. The Toutle watershed features the highest concentration of mapped wetlands in the county, while the fringe of the Columbia River features the largest wetland complexes in the county, particularly surrounding tributary mouths. Tidally-influenced fringe wetlands along the Columbia River provide young salmonids with protection from large piscivorous predators (Gregory and Levings 1998), as well as improved foraging capacity (Levings et al. 1991). In the Lower Columbia, salmonids are primarily impacted by disconnected or lost habitats.

In the Mill, Abernathy, and Germany Creek subbasin, the Coal Creek delta supports a large emergent and scrub-shrub wetland complex with first- and second-order tidal channels that are particularly significant habitats for small fish throughout the year. This wetland complex also provides significant flood storage capacity for the Columbia River and Coal Creek.

Intersection between Wetlands and Agriculture

Approximately 50 percent of agricultural parcels intersect with mapped wetlands. These areas are distributed primarily along the Columbia and Cowlitz River shorelines, as well as fringing Silver Lake. The National Wetlands Inventory indicates that the majority of these are likely to be freshwater emergent (47 percent) and riverine (33 percent) wetlands. The remainder are likely categorized as freshwater forested/shrub wetlands and ponds (USFWS 2017).

Fish and Wildlife Habitat Conservation Areas

Fish and wildlife habitat conservation areas support a variety of functions, including dynamic instream habitats, water quality, streambank stability, organic inputs, and habitat connections across the landscape. Fish and wildlife habitat conservation areas in Cowlitz County encompass both upland and aquatic areas that provide habitat for species of local, state, and federal importance. The functions of these different habitats can be summarized by functions related to water quantity, water quality, and habitat, as shown in Table 3.

Table 3.3.3. Summary of fish and wildlife habitat conservation area functions

	Aquatic	Upland
Water Quantity	Adequate flows are needed throughout the year to allow salmonid access to spawning grounds and maintain water temperatures that support salmonids and other fish species.	Not Applicable
Water Quality	Temperature, nutrient load, bacterial load, and chemicals all influence water quality conditions that affect sensitive fish species. A balance of sediment load and transport helps to maintain complex channel form and viable salmon redds.	Riparian areas reduce erosion by stabilizing stream banks, provide water filtration, and moderate water temperature by providing shade.
Habitat	Instream habitat functions are characterized by a diversity of pools and riffles, and this diversity is often	Habitat functions are associated with specific structural and biological elements, at various

	improved by the presence of woody debris. Riparian areas help improve instream habitat. Free access to spawning and rearing areas is critical to provide habitat opportunity.	spatial scales, depended upon by regionally significant and/or vulnerable wildlife species. For example, Larch Mountain salamander (sensitive) require talus slopes with specific rock sizes. Marbled murrelet (threatened) and spotted owl (endangered/threatened) rely on mature forests. Columbian White-Tailed Deer (endangered) populations are threatened by habitat fragmentation resulting from development.

Several major rivers and many of their tributaries provide habitat for salmonids, including state- and federally-listed species. Other state- and federally-listed sensitive, threatened, or endangered species, including bald eagle, peregrine falcon, northern spotted owl, Columbian white-tailed deer, marbled murrelet, larch mountain salamander, and eulachon are documented within the county. Merrill Lake, a 114-acre Natural Resource Conservation Area managed by DNR, features old-growth forest and habitat for Cascade torrent salamander, birds of prey, and waterfowl around a mid-elevation lake. The Mount Saint Helens Wildlife Area managed by WDFW contains several management units within the county, including Abernathy Creek, Fisher Island, Nelson, Hall Road, Canal Road, Gardner, and Mount Saint Helens.

Intersection between Fish and Wildlife Habitat Conservation Areas and Agriculture

Fish and wildlife habitat conservation areas include all streams and rivers and associated riparian areas. Approximately 30 percent of agricultural parcels in the county intersect with fish-bearing streams. In the Woodland Bottoms area, agricultural activities are separated by a dike from the shorelines of the Columbia and Lewis Rivers, but intersect with Wallace Slough, Burris Creek, and small tributaries throughout the area. In the Willow Grove area, agricultural activities are mapped along the Columbia River shoreline between Fall Creek and the City of Longview. West of Castle Rock, a cluster of primarily livestock-based agricultural activity intersects with fish-bearing Arkansas, Baxter, Whittle, and Delameter creeks. On the northern county border, a small cluster of agricultural activity intersects with the Cowlitz River and Olequa Creek. Agricultural lands provide murrelet habitat in this area; additional waterfowl habitat intersects with agriculture along the Columbia River shoreline.

Elk habitat is mapped throughout the majority of the county, intersecting with agricultural lands on either bank of the Cowlitz River as well as in the Longview Heights area.

Frequently Flooded Areas

Frequently flooded areas are important for the temporary storage of floodwaters. Deep and high velocity floodwaters pose safety concerns when they overlap with certain land uses. Floodplains also play a role in moderating flows, providing a source of organic material, and providing off-channel habitat for fish during high flows. The key functions of frequently flooded areas are summarized in Table 4.

Table 3.3.4. Summary of frequently flooded area functions

Water Quantity	Floodplains provide overbank storage; this helps reduce peak flows and contributes to groundwater recharge.
Habitat	Many aquatic species, including salmon species, rely on off–channel areas of floodplains for rearing. Floodplains provide pulses of organic detritus and insect prey following flood events.
Physical Safety	Fast moving or rapidly rising floodwaters present risks to structures and people. Where floodwaters spread across floodplains, velocities decrease and peak flows are reduced downstream.

FEMA-mapped 100-year floodplains exist throughout Cowlitz County. The majority of the floodplains in the county lie adjacent to the Columbia River. Major floodway areas are concentrated along the Columbia River, the North Fork Toutle River, and Silver Lake. Most of the large rivers in Cowlitz County have some limited floodplains directly adjacent to their banks, including the Coweeman River, the South Fork Toutle, the Green River, the Kalama River, and others.

Intersection between Frequently Flooded Areas and Agriculture

Approximately 16 percent of agricultural parcels intersect with mapped floodplain. These areas of intersection are located along all major rivers and tributaries in the county, with concentrations along the Cowlitz River to the west and south of Castle Rock, and along lower reaches of tributaries of the Columbia River in the western part of the county (Abernathy Creek, Germany Creek, and Coal Creek). Additional small concentrations are located along the Cowlitz River south of Vader, and at the confluence of the North and South Fork Toutle Rivers.

Geologically Hazardous Areas

As described in WAC 365-190-120, geologically hazardous areas pose a threat to the health and safety of citizens when incompatible uses are sited in areas of significant hazard. As such, the primary function associated with protection of geologically hazardous areas is related to ensuring physical safety. Protection of landslide hazard areas and erosion hazard areas also serves an important water quality function, as activities in these areas may be more prone to significant erosion.

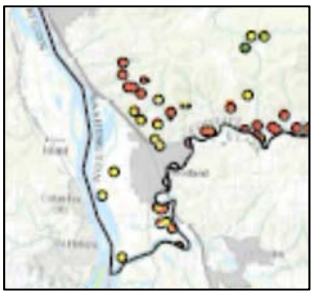
Table 3.3.5. Summary of geologically hazardous area functions

Water Quality	Landslide hazard areas and erosion hazard areas serve as potentially significant sources of sediment to surface waters. Avoiding development in these areas may protect against adverse impacts to water quality.
Physical Safety	Geologically hazardous areas pose a threat to the health and safety of citizens when incompatible uses are sited in areas of significant hazard.

Geologically hazardous areas in Cowlitz County include erosion hazard areas, landslide hazard areas, seismic hazard areas, volcanic hazard areas, and mine hazard areas. The county has a history of large landslides (Burns, et al. 2002, Fiksdal 1973, Beckstrand et al. 2000), active erosion, and volcanic activity with the eruption of Mount St. Helen's in 1980. Landslide hazard areas are clustered along the lower reaches of most of the major rivers in the county. In addition, the county is within the Cascadia Subduction Zone fault that stretches from Northern Vancouver Island to Cape Mendocino in California, and that is expected to produce a magnitude 9.0 or greater earthquake in the future (PNSN 2016). The county is also susceptible to relatively frequent surface earthquakes (Barnett et al. 2009).

Intersection between Geologically Hazardous Areas and Agriculture

Liquefaction zones are mapped on approximately 90 percent of all agricultural parcels, located primarily in the Woodland Bottoms and Willow Grove areas along the Columbia River. An additional concentration located west of Castle Rock also features mapped volcanic hazards. Approximately 33 percent of agricultural parcels intersect with mapped steep slopes. Approximately 10 percent of agricultural parcels intersect with soils designated as erosion hazards under the county's critical areas regulations; these are clustered west of Castle Rock or distributed along the Lewis River shoreline (NRCS 2016).



Critical Aquifer Recharge Areas

Critical aquifer recharge areas (CARAs) are designated to protect areas that have a critical recharging effect on the county's potable water and that may be susceptible to contamination from surrounding land uses. Critical area functions of CARAs are summarized in Table 6. As population grows and land use activities change, aquifers are affected in several ways: increased impervious surfaces reduce recharge surface area and can send precipitation directly into surface water systems; increased numbers of wells or usage of wells draws down aquifer levels; and increased use of hazardous materials increases risk of ground water contamination. To maintain potable water uses, both water quality and quantity must be managed.

Table 3.3.6. Summary of critical aquifer recharge area functions

Water Quantity	Rapid infiltration of rainwater recharges the aquifer.
Water Quality and Physical Safety	CARAs are designated and protected because of their vulnerability to contamination. Clean water supplies are critical for drinking water sources. Nutrient contamination is a particular concern because of serious health implications.

Cowlitz County is an area of major use of groundwater in Washington. Areas of aquifer susceptibility are designated within Group A 10-year time of travel wellhead protection areas, or Group B wellhead protection areas where geologic conditions allow for rapid recharge with little restrictive layer protection, high soil permeability, and other similar factors. Areas of moderate and severe aquifer susceptibility are mapped around wells along the Cowlitz, Columbia, and Lewis Rivers, with larger areas mapped between the cities of Kalama and Longview.

Intersection Between Agriculture and Critical Aquifer Recharge Areas

A large cluster of agricultural parcels intersects with aquifer recharge areas between Kelso and Kalama, south of the Coweeman River and on either side of the Kalama River. More disperse areas of intersection are located along the Columbia, Cowlitz, and Lewis Rivers.

4 Goals, Benchmarks, Strategies and Indicators

4.1 Approach

Goals and Benchmarks

Baseline conditions (2011 and present), including the number of acres and landowners associated with each goal and benchmark, will be established during the first year of implementation. This data will be established by looking at average annual historic enrollment and use of conservation activities. Average annual acreage discontinuing practices will also be evaluated in setting realistic benchmarks. Maintaining and increasing participation will be the protection and enhancement benchmark for each goal.

Critical Areas Functions

Table 4.1.1 Critical areas and key functions. Shaded areas represent functions associated with each critical area.

	Water Quantity		Water Quality					Habitat	Physical Safety
	Flow	Storage	Sediment	Nutrients	Temperature	Bacteria	Contaminants		
Wetlands	■	■	■	■	■	■	■	■	
Fish and Wildlife Habitat Conservation Areas	■	■	■	■	■	■	■	■	
Frequently Flooded Areas	■	■						■	■
Geologically Hazardous Areas			■						■
Critical Aquifer Recharge Areas		■		■		■	■		■

4.2 Water Quantity

Relationship to Agricultural Activities

Most agricultural activities rely on water sources for irrigation or watering of livestock. Intensive crop production often requires supplemental irrigation during dry summer months to maximize production levels and profits. Water sources may come from surface waters, such as streams or ditches, or from groundwater wells. Low in-stream flow in surface waters can lead to stagnant water and toxic algae blooms that may be harmful to humans, pets, and livestock, if consumed, and that can facilitate propagation of harmful insects, which can ultimately damage crops, and serve as host vectors of serious disease pathogens, and lead to outbreaks such as West Nile and Zika Virus(es).

Given the climate of Cowlitz County, many agricultural activities rely on surface water drainages (either streams or ditches) to maintain farmable dry lands and pasture. Where ditches are wholly artificial, they are not considered critical areas; however, even ditches that have been heavily altered are considered critical areas if they historically carried flow. Ditched systems are typically maintained to quickly and efficiently convey water away from farmed lands. Quick conveyance can reduce groundwater recharge and increase peak flows in receiving waters. Excess water volume and velocity from production agriculture and/or stormwater events via drainage ditches or run-off along steep roads can be slowed down and diverted using rolling dips, water bars, and water spreaders, improving surface water distribution across farm/pasture land, allowing for increased natural absorption into shallow groundwater aquafers, allowing extended slow-water release from streambanks longer into the dry, summer months.

While insufficient water quantity can threaten crop production, excessive water can lead to significant production loss through flooding. Seasonal or episodic high water events can delay spring field work and damage crops. At the same time, many of the most fertile soils in the county are found within active or historic floodplains. Agricultural dikes, levees, and tide gates are common in Cowlitz County to protect farms from flood waters. These features compromise natural floodplain function by restricting flooding and, in some areas tidal hydrology, from historic floodplain areas.

Goals, Benchmarks and Strategies

Goal 4.2.1 – Protect or enhance natural hydrologic storage capacity.				
Benchmark ID	Protection Benchmark	Enhancement	Priority Strategies / BMPs	Contributes to Associated Existing Plans
4.2.1.1	*Protect and maintain current number of active agricultural acres managed through Best Management Practices (BMPs) that limit soil compaction and degradation.	*Increase active agricultural acres managed using BMPS that limit soil compaction.	*No till/direct seed *Weed management *Cover crop *Access control *Conservation crop rotation *Public Outreach and Education regarding Holistic Watershed Management	WRIA 23 – A, B, C, D, E, F, G, H WRIA 25— A, B, C, D, E WRIA 26 – A, B, C, D, E, F WRIA 27 – A, Aa, Ab, B, C, D, E, F, G, H, I

				LOWER COLUMBIA – A, B, ,C, D, E, F, G, H, I FARMLAND PROTECTION – A, B, C
4.2.1.2	* Protect and maintain current number of historical wetland, riparian and floodplain acres on active agricultural land.	*Enhance or restore natural wetland, riparian and floodplain functions to improve water quality and decrease of hydraulic volume and velocity across floodplains during floodwater events, reducing risk of detrimental impact to streambanks, farmland and real properties downstream.	*Access control of livestock and equipment *Prescribed grazing *Restore riparian forest buffers *Wetland enhancement * Consideration of Engineered Wetland design and construction * Construction of set-back dikes * Re-connection of historical side-channels and oxbows for refugia habitat for anadromous fish and off-channel water storage during high water events	WRIA 23 – A, B, C, D, E, F, G, H WRIA 25— A, B, C, D, E WRIA 26 – A, B, C, D, E, F WRIA 27 – A, Aa, Ab, B, C, D, E, F, G, H, I LOWER COLUMBIA – A, B, ,C, D, E, F, G, H, I FARMLAND PROTECTION – A, B, C

1

Goal 4.2.2– Maintain or increase groundwater recharge levels.				
Benchmark ID	Protection Benchmark	Enhancement	Priority Strategies / BMPs	Contributes to Associated Existing Plans
4.2.2.1	*Maintain current number of active agricultural acres managed using techniques for water conservation.	*Evaluate and/or develop farm plans, to include stormwater planning using effective BMPs to slow down and/or capture excess waters to allow for a gradual recharge of ground water aquafers and slow release from streambanks into waterways. *Increase active agricultural acres managed using techniques for water conservation	*No till/direct seed *Cover crop *Access control *Conservation crop rotation * Alternating planting/fallow crop cycles *Installation of rolling dips and water bars to divert excess run-off along steep roads into water spreaders for increased hydraulic distribution across pasture land,	WRIA 23 – A, B, C, D, E, F, G, H WRIA 25— A, B, C, D, E WRIA 26 – A, B, C, D, E, F WRIA 27 – A, Aa, Ab, B, C, D, E, F, G, H, I LOWER COLUMBIA – A, B, ,C, D, E, F, G, H, I

			allowing for gradual absorption, recharge, and release of surface waters into/from aquafers * Replace hard-surface roads, parking lots with semi-permeable materials to allow recharge of aquifers	FARMLAND PROTECTION – A, B, C

Associated Agricultural Viability Gains

- Maximize availability of ground water withdrawals for irrigation.
- Soil preservation.
- Financial incentives to offset start-up costs for new practices and infrastructure.
- Weed management.
- Advantage to pollinators and other beneficial organisms.
- Reduced cost associated with flood management and flood cleanup.
- Reduced cost of irrigation and livestock watering.

Indicators

- Summer low flows
- Lack of riparian forest/woody canopy cover
- Flood damage

4.3 Water Quality

Relationship to Agricultural Activities

Nearly all agricultural activities in Cowlitz County rely on clean water sources. Agricultural practices such as spreading manure and fertilizer on fields during rainy periods and allowing unrestricted livestock access to streams can contribute to fecal coliform contamination of surface waters. At the same time, non-agricultural sources of fecal coliform from pets, wildlife, and failing septic systems can compromise clean water sources needed for agricultural use.

Livestock waste also provides a source of nutrients, which is managed through manure lagoons, rotational grazing, and stocking rates, among other practices. Excess nutrient loads contribute to eutrophication in surface waters, which can result in excess algae growth and low dissolved oxygen levels. These often toxic algae conditions can lead to sickness in humans and pets, fish and invertebrate mortality and/or avoidance of the low oxygenated areas by native fish and wildlife species.

Soil quality is critical for productive crops and livestock. Tilled or otherwise disturbed soils often have increases in moisture loss, higher rates of seed germination of invasive weed species, and are more likely to erode, particularly in areas of steep slopes or erodible soils, and in wet weather conditions.

Eroding sediment can enter streams and adversely affect salmonid habitat by filling pools necessary for migrating and rearing, embedding spawning gravels, reducing gravel permeability, increasing turbidity, often smothering and killing eggs/alevin, effectively wiping out future runs of salmon three to five years down the road (depending on the species) . In the county, the Cowlitz watershed includes a significant area of highly erodible soils that are affected by ground disturbance, including use of heavy equipment for vegetation clearing or construction. Fortunately, the majority of these erodible soils are not prime agricultural soils and do not overlap with the most intensive agricultural activities in the county.

Agricultural activities are often closely tied to water sources and drainage pathways. Where agriculture extends to the edge of these drainage areas, it may be associated with removal or degradation of riparian vegetation. Intact riparian vegetation provides a number of water quality functions, including shading and moderation of water temperatures, filtration of sediment, nutrients, and bacteria, and anchorage of soil particles using the natural root systems of native vegetation to lock soil particles in place, stabilizing the stream bank, and preventing fine sediments from entering the waterway. Livestock access to streams can further degrade riparian vegetation while directly causing stream bank instability and erosion, and putting livestock at risk for injury as they traverse up and down steep slopes to access potable water. Agricultural activities also impede upland wildlife species.

Agricultural activities can also contribute to chemical pollution of surface waters and groundwater. Pesticides can reach surface water through runoff from treated plants and soil. Pesticides can enter water-bearing aquifers below ground from aerial and mechanical applications to crop fields, seepage of contaminated surface water, accidental spills and leaks, or improper disposal. Additionally, operation of machinery near or in water has the potential to result in oil spills or leaks of toxic contaminants.

Goals, Benchmarks and Strategies

Goal 4.3.1 – Protect or enhance soil quality for agriculture				
Benchmark ID	Protection Benchmark	Enhancement	Priority Strategies/ BMPs	Contributes to Associated Existing Plans
4.3.1.1	*Maintain current number of active agricultural acres managed using techniques that limit water or wind erosion of soil.	*Increase of active agricultural acres managed using techniques that limit water or wind erosion.	*No till/direct seed *Mulch till/reduced till *cover crop to protect from erosion and/or for use as green manure and/or with legumes for nitrogen fixation the following season *Seasonal livestock exclusion * Planting wind breaks if needed	WRIA 23 – A, B, C, D, E, F, G, H WRIA 25— A, B, C, D, E WRIA 26 – A, B, C, D, E, F WRIA 27 – A, Aa, Ab, B, C, D, E, F, G, H, I LOWER COLUMBIA – A, B, ,C, D, E, F, G, H, I FARMLAND PROTECTION – A, B, C

Goal 4.3.2– Maintain or improve surface water quality through implementation of key conservation practices that reduce impacts to waterbodies, including sediment, nutrients and other contaminants.				
Benchmark ID	Protection Benchmark	Enhancement	Priority Strategies / BMPs	Contributes to Associated Existing Plans
4.3.2.1	Protect and maintain current number of active agricultural acres managed under water, nutrient and pesticide management systems	*Increase active agricultural acres managed under water, nutrient and pesticide management systems	*Irrigation water management *Integrated pest management *Nutrient management *Stormwater Management Plans *Rotational Grazing of livestock with Riparian Grazing Monitoring *Limited access for livestock to fenced riparian corridors to help control invasive weeds *Use of upland grassed waterways and filter strips to prevent sediment transport before reaching riparian zones. *Wildlife-friendly fencing within movement corridors	WRIA 23 – A, B, C, D, E, F, G, H WRIA 25— A, B, C, D, E WRIA 26 – A, B, C, D, E, F WRIA 27 – A, Aa, Ab, B, C, D, E, F, G, H, I LOWER COLUMBIA – A, B, ,C, D, E, F, G, H, I FARMLAND PROTECTION – A, B, C
4.3.2.2	*Maintain current lineal feet of active agricultural land alongside streams protected by riparian management	*Increase lineal feet of active agricultural land alongside streams protected by riparian management	*Limited access for livestock and equipment *Prescribed grazing with limited fenced riparian corridor access to control spread of invasive weeds. *Wildlife-friendly riparian Fencing *Filter strips as riparian buffer zones * Integrated Pest Management, i.e. invasive weeds, insects, wildlife *Digital mapping by watershed for use of	WRIA 23 – A, B, C, D, E, F, G, H WRIA 25— A, B, C, D, E WRIA 26 – A, B, C, D, E, F WRIA 27 – A, Aa, Ab, B, C, D, E, F, G, H, I LOWER COLUMBIA – A, B, ,C, D, E, F, G, H, I FARMLAND PROTECTION – A, B, C

			eradication of invasive weeds. *Public Outreach and Education regarding Holistic Watershed Management *Tree canopy cover within site potential tree height of 200 year old tree	

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Goal 4.3.3– Maintain or improve groundwater quality through implementation of key conservation practices that reduce negative impacts to groundwater including, nutrients, pesticides, and other contaminants.				
Benchmark ID	Protection Benchmark	Enhancement	Priority Strategies / BMPs	Contributes to Associated Existing Plans
4.3.3.1	*Protect and maintain the current number of active agricultural acres managed under water, nutrient and pesticide management systems	*Increase of active agricultural acres managed under water, nutrient and pesticide management systems	*Irrigation water management *Integrated pest management *Nutrient management *Limited livestock access * Stormwater Management *Public Outreach and Education regarding Holistic Watershed Management	WRIA 23 – A, B, C, D, E, F, G, H WRIA 25— A, B, C, D, E WRIA 26 – A, B, C, D, E, F WRIA 27 – A, Aa, Ab, B, C, D, E, F, G, H, I LOWER COLUMBIA – A, B, ,C, D, E, F, G, H, I FARMLAND PROTECTION – A, B, C
4.3.3.2	*Protect and maintain current number of active agricultural acres managed under natural filtration practices	*Increase number of active agricultural acres managed under natural filtration practices	*Conservation crop rotation *Cover crop *Public Outreach and Education regarding Holistic Watershed Management	WRIA 23 – A, B, C, D, E, F, G, H WRIA 25— A, B, C, D, E WRIA 26 – A, B, C, D, E, F WRIA 27 – A, Aa, Ab, B, C, D, E, F, G, H, I LOWER COLUMBIA – A,

				B, ,C, D, E, F, G, H, I FARMLAND PROTECTION – A, B, C

Associated Agricultural Viability Gains

- Protecting land available for agriculture
- Reducing costs associated with soil erosion
- Weed management
- Increased fertility
- Advantage to pollinators and beneficial organisms
- Financial incentives to offset start-up costs for new practices and infrastructure

Indicators

Surface Water

- Acres of tree canopy within site potential tree height of 200 year old tree
- Turbidity
- Agriculture-related toxins or nutrients
- Dissolved oxygen/temperature

Groundwater

- Agriculture-related contaminants in public drinking water systems (Group A)

4.4 Habitat

Relationship to Agricultural Activities

Clearing of vegetated open space corridors and habitat features associated with sensitive species can eliminate or degrade habitat functions, including foraging, nesting, or migration.

As described above, agricultural activities often rely on maintenance of drainage ditches to manage drainage and maintain farmable uplands. Where drainage ditches are modified from natural stream channels, drainage ditch maintenance can also result in the simplification of in-stream habitat. In-stream habitat can also be affected by fish barriers created by culverts, bridges, or dams, and clearing of large woody debris for agriculture can limit channel complexity. Many tributaries in the Cowlitz River watershed have experienced losses in key in-stream habitat areas and habitat diversity due to channel simplification. Grazing and other agricultural activities have also contributed to a reduction in riparian function, reduced bank stability, and increased fine sediment loading. Fencing can also impede movement of upland species.

As mentioned above, dikes and levees installed to protect farms from flooding isolate floodplain areas from natural riverine flooding regimes. In Cowlitz County, extensive diking to protect agricultural fields

along the Columbia River has isolated large areas of floodplain from the river. It is estimated that greater than 50 percent of historic floodplain has been disconnected from the Lewis River, especially in the lower river where extensive diking has almost entirely disconnected floodplains. Despite significant degradation of natural functions of the lower river, the agricultural fields in the area do likely provide winter foraging habitat for migratory birds. Elsewhere in the county, wetlands and shallow water areas associated with agricultural lands provide habitat for waterfowl.

Many crop production operations rely on pollinators, which in turn are dependent upon suitable habitat on the farm and in the surrounding landscape. Careful timing of pesticide application and consideration of drift to surrounding areas may mitigate negative effects. Agricultural operators can enhance pollinator habitat through planting of fallow fields, road edges, and cover crops with flowering plants to provide forage.

In addition to agricultural effects on habitat, producers face losses from wildlife species. Deer and elk damage can have significant economic impact on commercial cropland and pastures, as can migratory waterfowl such as the protected Dusky Canada Goose and the state-listed Sandhill Crane. Controlling invasive vegetation requires significant resources and can be compromised by spread from adjacent lands.

Goals, Benchmarks and Strategies

Goal 4.4.1– Preserve and enhance existing terrestrial habitat areas.				
Benchmark ID	Protection Benchmark	Enhancement	Priority Strategies / BMPs	Contributes to Associated Existing Plans
4.4.1.1	*Preserve and maintain the current number of active agricultural acres managed using techniques that limit negative disturbance of habitat	*Increase active agricultural acres managed using techniques that limit negative disturbance of habitat	*Prescribed grazing *Limited access by livestock, equipment, off-road vehicles *Wildlife-friendly fencing	WRIA 23 – A, B, C, D, E, F, G, H WRIA 25— A, B, C, D, E WRIA 26 – A, B, C, D, E, F WRIA 27 – A, Aa, Ab, B, C, D, E, F, G, H, I LOWER COLUMBIA – A, B, ,C, D, E, F, G, H, I FARMLAND PROTECTION – A, B, C
4.4.1.2	*Maintain current number of active agricultural acres that promote agricultural practices that prevent conversion of priority habitat to other uses	*Increase active agricultural acres that promote agricultural practices that prevent conversion of priority habitat to other uses	*Conservation cover, such as, hedge row plantings, wildlife food plots, brush piles, preserving dead trees/snags for raptor perches and	WRIA 23 – A, B, C, D, E, F, G, H WRIA 25— A, B, C, D, E WRIA 26 – A, B, C, D, E, F

			cavity nest builders, i.e. owls, woodpeckers, raccoons, etc. *CRP/CREP land taken out of production *Purchase Conservation Easement *Instill Community Farmland Trust model to ensure that farmland remains farmland and is affordable to the next generation to acquire and farm *Promote and recruit Legacy Endowments, i.e. land left in wills, donating it to remain farm/conservation land in perpetuity	WRIA 27 – A, Aa, Ab, B, C, D, E, F, G, H, I LOWER COLUMBIA – A, B, ,C, D, E, F, G, H, I FARMLAND PROTECTION – A, B, C
4.4.1.3	*Maintain current numbers of acres of on-farm habitat areas associated with active agricultural land	*Increase on-farm habitat areas on active agricultural land	*Prescribed grazing *Integrated pest management *Access control *Conservation cover *Forest buffer *Restoration and management of habitat *Restore and enhance dense, healthy riparian canopies and ground cover *Cover crop when production ag. land is sitting fallow for the season following harvest *Wildlife conservation cover, such as: hedge row plantings, wildlife food plots, brush piles, preserving dead trees/snags for raptor perches and	WRIA 23 – A, B, C, D, E, F, G, H WRIA 25— A, B, C, D, E WRIA 26 – A, B, C, D, E, F WRIA 27 – A, Aa, Ab, B, C, D, E, F, G, H, I LOWER COLUMBIA – A, B, ,C, D, E, F, G, H, I FARMLAND PROTECTION – A, B, C

			cavity nest builders, i.e. owls, woodpeckers, raccoons, etc.	

Goal 4.4.2– Preserve and enhance riparian and aquatic habitat.				
Benchmark ID	Protection Benchmark	Enhancement	Priority Strategies / BMPs	Contributes to Associated Existing Plans
4.4.2.1	*Preserve and protect the current number of acres associated with active agricultural land managed using techniques that limit shoreline and watercourse degradation * Protect reaches of land with healthy-functioning riparian corridors, and diverse in-stream habitat complexity for native anadromous fish populations associated with active agricultural land * Protect critical area function for wetlands associated with active agricultural land	*Increase acres managed using techniques that limit shoreline and watercourse degradation associated with active agricultural land *Increase cooperative partnerships between the County and local, regional, state, federal, and tribal entities, as well as non-profit groups, private individuals, and any stakeholder in Cowlitz County dedicated to the protection, acquisition, restoration and enhancement and conservation of natural habitat/farmland activities to help native fish recovery to return fish to sustainable populations	*Prescribed grazing *Access control *Fencing *Watering facility *Integrated pest management *Restoration and management of habitat *Channel bed stabilization *Fish and wildlife structures on terrestrial uplands, along riparian corridors and in-stream to protect water quantity/ quality, and increase in-stream habitat complexity for native fish.	WRIA 23 – A, B, C, D, E, F, G, H WRIA 25— A, B, C, D, E WRIA 26 – A, B, C, D, E, F WRIA 27 – A, Aa, Ab, B, C, D, E, F, G, H, I LOWER COLUMBIA – A, B, ,C, D, E, F, G, H, I FARMLAND PROTECTION – A, B, C

Associated Agricultural Viability Gains

- Advantage to pollinators and beneficial organisms
- Financial incentives to offset start-up costs for new practices and infrastructure

Indicators

- Change in vegetation cover

4.5 Physical Safety

Relationship to Agricultural Activities

In Cowlitz County, agricultural activities are concentrated in floodplain valleys. Development in the floodplain is prone to risks associated with flooding. Where new flood protection facilities, including dikes or levees, reduce floodplain storage, flood risks may be transferred to downstream areas.

Where agricultural activities do intersect with steep or unstable slopes, activities that result in significant clearing on or near the slope may contribute to soil destabilization.

Goals, Benchmarks and Strategies

Goal 4.5.1– Maintain or reduce hazards to physical safety associated with critical areas.				
Benchmark ID	Protection Benchmark	Enhancement	Priority Strategies / BMPs	Contributes to Associated Existing Plans
4.5.1.1	*Maintain current level of flood and erosion protection measures associated with active agricultural land.	*Increased flood and erosion protection measures associated with active agricultural land.	*Ensure no increase in number of agricultural structures in floodway *Maintain and upgrade flood control structures to ensure structural integrity/function to keep them in good working condition *Implement best management practices in geologically hazardous areas	WRIA 23 – A, B, C, D, E, F, G, H WRIA 25— A, B, C, D, E WRIA 26 – A, B, C, D, E, F WRIA 27 – A, Aa, Ab, B, C, D, E, F, G, H, I LOWER COLUMBIA – A, B, ,C, D, E, F, G, H, I FARMLAND PROTECTION – A, B, C

Associated Agricultural Viability Gains

Indicators

- flood and erosion damage to existing infrastructure

4.6 Agricultural Viability

The definition of agricultural viability is not provided in the VSP legislation. However, the Farming in the Floodplain Project Existing Conditions Report prepared for PCC Farmland Trust in 2016 provides a definition. In this report, agricultural viability is the ability of a farmer or group of farmers to:

- Productively farm on a given piece of land or in a specific area,
- Maintain an economically viable farm business,
- Keep the land in agriculture long-term, and
- Steward the land so it will remain productive in the future.

Goals, Benchmarks and Strategies

Goal 4.6.1 – A stable and secure agricultural land base

Benchmark ID	Maintain Benchmark	Enhancement	Priority Strategies / BMPs	Contributes to Associated Existing Plans
4.6.1.1	*Maintain land available for agricultural production outside critical areas	*Increase land available for agricultural production outside critical areas	*Promote agricultural conservation easements *Support new and innovative farming opportunities *Improve awareness of agricultural activities *Adopt local right-to-farm ordinance *Protect farmland through agricultural zoning *Reduce barriers to entry for open space ag and open space open space current use assessment program	WRIA 23 – A, B, C, D, E, F, G, H WRIA 25— A, B, C, D, E WRIA 26 – A, B, C, D, E, F WRIA 27 – A, Aa, Ab, B, C, D, E, F, G, H, I LOWER COLUMBIA – A, B, ,C, D, E, F, G, H, I FARMLAND PROTECTION – A, B, C
4.6.1.2	*Maintain water available for agricultural use	*Maximize water available for agricultural use	*Advocate for water allocation for agriculture through WRIA process *Advocate for a stable water right legal system	WRIA 23 – A, B, C, D, E, F, G, H WRIA 25— A, B, C, D, E WRIA 26 – A, B, C, D, E, F WRIA 27 – A, Aa, Ab, B, C, D, E, F, G, H, I LOWER COLUMBIA – A, B, ,C, D, E, F, G, H, I FARMLAND PROTECTION – A, B, C

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Goal 4.6.2 – Agriculture supported by needed infrastructure and services				
Benchmark ID	Maintain Benchmark	Enhancement	Priority Strategies / BMPs	Contributes to Associated Existing Plans
4.6.2.1	*Maintain agricultural support infrastructure and services	*Increase agricultural support infrastructure and services	*Support ag services *Ease permitting process for ag support infrastructure and services *Improve commercial connections and transport	WRIA 23 – A, B, C, D, E, F, G, H WRIA 25— A, B, C, D, E WRIA 26 – A, B, C, D, E, F

			*Ensure comprehensive plan and land use regulations encourage ag support infrastructure and services	WRIA 27 – A, Aa, Ab, B, C, D, E, F, G, H, I LOWER COLUMBIA – A, B, ,C, D, E, F, G, H, I FARMLAND PROTECTION – A, B, C
4.6.2.2	*Maintain existing education, training programs and succession planning services	*Increase education, training and succession planning programs	*Highlight existing programs Provide new programs for young farmers	WRIA 23 – A, B, C, D, E, F, G, H WRIA 25— A, B, C, D, E WRIA 26 – A, B, C, D, E, F WRIA 27 – A, Aa, Ab, B, C, D, E, F, G, H, I LOWER COLUMBIA – A, B, ,C, D, E, F, G, H, I FARMLAND PROTECTION – A, B, C

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Goal 4.6.3 – Provide a welcoming business environment				
Benchmark ID	Maintain Benchmark	Enhancement	Priority Strategies / BMPs	Contributes to Associated Existing Plans
4.6.3.1	*Maintain income potential for agricultural activities	*Maximize income potential for agricultural activities	*Promote options for agri-tourism where appropriate to the agricultural context *Ensure regulations create opportunities for retention of agricultural lands through compatible uses *Ensure flexibility and speed in permitting process *Support RCW 36.71.090 providing exemption from business license	WRIA 23 – A, B, C, D, E, F, G, H WRIA 25— A, B, C, D, E WRIA 26 – A, B, C, D, E, F WRIA 27 – A, Aa, Ab, B, C, D, E, F, G, H, I LOWER COLUMBIA – A,

			requirements for produce sales *Ensure carbon taxes and cap and trade systems for greenhouse gas emissions do not apply to agricultural activities.	B, ,C, D, E, F, G, H, I FARMLAND PROTECTION – A, B, C
4.6.3.2	*Maintain economic value for Cowlitz County agricultural products	*Maximize economic value for Cowlitz County agricultural products	*Create marketing incentives/programs for Cowlitz County products *Develop "buy local" initiatives *Encourage development of new added-value products or varieties of existing products *Encourage development of existing and new Farmers Markets, and Farm-related Events, i.e. Blueberry Festival, Harvest Festival, etc. * Research development of a Farm-related special events unique to Cowlitz County that promote tourism from nearby communities or throughout the western Washington region, such as Cowlitz County Historical Farm Days *Encourage revitalization of Grange Clubs, Ag-Boosters clubs, and related community activities *Encourage development of Farm to Plate educational program for public schools *Encourage development of local agricultural niche markets, promoting "locally grown food" to public schools and local restaurants.	WRIA 23 – A, B, C, D, E, F, G, H WRIA 25— A, B, C, D, E WRIA 26 – A, B, C, D, E, F WRIA 27 – A, Aa, Ab, B, C, D, E, F, G, H, I LOWER COLUMBIA – A, B, ,C, D, E, F, G, H, I FARMLAND PROTECTION – A, B, C

Indicators

- Acreage of agricultural production land outside agricultural land

- Participation and acreage in open space ag and open space open space current use assessment programs
- Water resource education and outreach
- Irrigation efficiencies implemented and structural improvements to water infrastructure
- Water rights data
- Advocacy for water use for agriculture
- Education and training opportunities and participation
- Events and outreach opportunities and participation
- Economic activity related to agriculture and food processing
- Number of farmers markets / direct sale availability
- Participation in branding efforts
- Policy outreach efforts
- New or amended regulations related to improving agricultural viability

5 Implementation

Existing programs and organizations will frame implementation. Many agricultural-based programs, activities and efforts are already in place to protect and enhance critical areas and maintain agricultural viability. The Work Plan has been designed to fit within this existing framework. Supplemental efforts will meet the requirements of VSP. These requirements include documenting 2011 critical areas baseline conditions, establishing goals and measurable benchmarks, identifying conservation activities, and establishing monitoring and adaptive management measures to track Work Plan performance in protecting critical areas and maintaining agricultural viability.

RCW 36.70A.705 identifies the Work Group as being responsible for developing the Work Plan and overseeing implementation. Implementation responsibilities include agricultural producer participation and outreach; technical assistance; program performance tracking and reporting; and adaptive management.

Agricultural producers are critical to the implementation of VSP. Success of the program relies on producers to voluntarily implement conservation actions that contribute to goals and benchmarks established in the Work Plan for protection of critical areas and agricultural viability.

5.1 Existing Voluntary Programs

Voluntary programs provide agricultural producers a mechanism to combine conservation and enhancement of critical areas with maintenance and enhancement of agricultural operations. These programs may target agricultural producers and operations specifically, or may be broadly available to private and public landowners or organizations.

Voluntary programs foster conservation and enhancement of critical areas through the use of incentives. Different programs offer different types of incentives to participants, including:

- **Financial assistance for implementation of conservation practices.** Participants receive financial assistance in the form of direct payments, cost-sharing, lower taxes, or grant funds to implement conservation or restoration practices on their land.
- **Financial assistance for land conservation.** Participants receive funds in return for full or partial sale of their land and/or its associated development rights, including sale of conservation easements. The land is then conserved in support of one or more natural resource objectives. In some cases, conservation requires modification or cessation of agricultural operations on the enrolled land.
- **Regulatory.** In exchange for actions that conserve or enhance a particular natural resource, participants receive relief from certain regulatory requirements associated with that natural resource.
- **Marketing.** Participants enjoy enhanced marketability of their agricultural products, either through changes made to their processes or products (e.g. through a certification program), or through direct outreach to potential customers.

Many agencies and organizations also provide technical assistance to agricultural producers to implement sustainable farming practices and other conservation measures. This kind of assistance may be offered on its own or in conjunction with one of the incentives described above.

The following table summarizes existing voluntary, incentive-based programs available to agricultural producers in Cowlitz County. Programs are included below whether or not they are currently used by agricultural producers in the County. It is important to note that the following table does not present a comprehensive list of all voluntary incentive programs in the County. It is also important to note that many of the programs included are dynamic and influenced by changing federal regulations and budgets, industry norms, and market conditions.

NAME	DESCRIPTION	TYPE OF INCENTIVE	CRITICAL AREA FUNCTION TARGETED			
			WATER QUANTITY	WATER QUALITY	HABITAT	SAFETY
FEDERAL GOVERNMENT						
USDA Natural Resources Conservation Service (NRCS): Financial Assistance and Easement Programs						
Environmental Quality Incentives Program (EQIP)	Under EQIP, NRCS helps agricultural producers address natural resource concerns such as water and air quality, ground and surface water availability, soil erosion and sedimentation, and wildlife habitat. Program participants receive financial and technical assistance to implement conservation practices and/or conservation planning activities to address natural resource concerns on their land. Eligible land includes cropland, rangeland, pastureland, non-industrial forestland, and other farm or ranch lands.	Financial assistance to implement conservation practices	X	X	X	X
Conservation Stewardship Program (CSP)	Under CSP, NRCS helps agricultural producers maintain and improve their existing conservation systems and adopt additional conservation activities to address priority resource concerns. CSP provides annual payments for installing new conservation activities and maintaining existing practices, and supplemental payments for adopting a resource-conserving crop rotation. Payment amounts are based on conservation performance.	Financial assistance to implement conservation practices	X	X	X	X

	CSP is available to all agricultural producers, regardless of operation size or crop type.					
Conservation Innovation Grants (CIG)	NRCS uses EQIP funds to award competitive grants for the development and adoption of innovative approaches and technologies for conservation on agricultural lands. CIG benefits agricultural producers by providing more options for environmental enhancement and compliance with environmental regulations. Eligible grant awardees include non-federal governmental or nongovernmental organizations, Tribes, and individuals.	Financial assistance to implement conservation practices	X	X	X	X
Emergency Watershed Protection Program – Floodplain Easement (EWP -FPE)	Under this program, NRCS may purchase permanent easements on eligible floodplain lands, including lands that would contribute to the restoration of flood storage and flow or provide for control of erosion. Easement lands are restored to the maximum extent practicable to maintain and enhance floodplain functions while conserving natural values such as fish and wildlife habitat, water quality, flood water retention, and ground water recharge.	Financial assistance for land conservation (lands that were or could be used for production)	X	X	X	X
National Water Quality Initiative (NWQI)	NRCS works with conservation partners to help agricultural producers and landowners implement conservation practices to improve water quality in high-priority watersheds. The goal of NWQI is to implement conservation practices in sufficient quantity in a concentrated area so that agriculture no longer contributes to	Financial assistance to implement conservation practices		X		

	the impairment of water bodies within those priority watersheds. NWQI uses EQIP funds to provide cost-sharing for implementation of conservation practices. In Washington, NRCS is using the NWQI to pilot its Water Quality Index for Agricultural Runoff, a web-based tool to help producers understand the relationships between conservation systems and water quality on their lands.					
Voluntary Public Access and Habitat Incentive Program (VPA-HIP)	NRCS awards grants to state and tribal governments, which then provide funds to participating private landowners for new or expanded public access to private lands for wildlife-dependent recreation. Lands eligible for assistance under state VPA-HIP grants include private forest, farm, or ranch lands.	Financial assistance for land conservation (lands that were or could be used for production)			X	
Agricultural Conservation Easement Program (ACEP)	Under the Agricultural Land Easements component of this program, NRCS helps organizations with farmland, rangeland, or grassland protection programs protect working agricultural lands and limit non-agricultural uses of the land. NRCS provides financial assistance to eligible partners, including Tribes, state and local governments, and non-governmental organizations to purchase easements that protect the agricultural use and conservation values of eligible land.	Financial assistance for land conservation (lands that were or could be used for production)			X	
USDA Farm Service Agency: Conservation Programs						

Conservation Reserve Program (CRP)	The CRP is a land conservation program that aims to reestablish valuable land cover to help improve water quality, prevent soil erosion, and reduce loss of wildlife habitat. In return for a yearly rental payment, enrolled farmers agree to remove environmentally sensitive land from agricultural production and plant species that will improve environmental health and quality.	Financial assistance for land conservation (lands not in production)		X	X	
Conservation Reserve Enhancement Program (CREP)	CREP is an offshoot of CRP, targeting high-priority conservation issues identified by local, state, or tribal governments or non-governmental organization.	Financial assistance for land conservation (lands not in production)		X	X	
Farmable Wetlands Program (FWP)	FWP is a component of CRP, targeting previously farmed wetlands and wetland buffer to improve vegetation and water flow. Participants agree to restore the wetlands, establish plant cover, and remove the enrolled land from production.	Financial assistance for land conservation (lands not in production)	X	X	X	
Conservation Loan Program	Under this program, the Farm Service Agency provides direct or guaranteed conservation loans to agricultural producers to cover the costs of qualified conservation projects. A conservation project is "qualified" for a loan if it is included in a conservation plan that is approved by NRCS.	Financial assistance to implement conservation practices	X	X	X	
Emergency Conservation Program (ECP)	The Farm Service Agency (FSA) provides technical and financial assistance to implement water conservation practices during severe drought.	Financial assistance to implement conservation practices	X			

USDA Agricultural Marketing Service						
National Organic Certification Cost Share Program	Funded through the USDA farm bill, this program helps farmers, handlers, and processors afford the expense of organic certification, with reimbursements of up to 75 percent of certification costs.	Financial assistance to implement conservation measures	X	X		
U.S. Fish and Wildlife Service						
Safe Harbor Agreements	Safe Harbor Agreements (SHAs) are voluntary agreements between private or other non-federal landowners and the U.S. Fish and Wildlife Service (USFWS) or National Oceanic and Atmospheric Administration (NOAA). In exchange for actions that contribute to the recovery of species listed as threatened or endangered under the Endangered Species Act (ESA), participating landowners receive formal assurances from the federal service agency (USFWS or NOAA) that the agency will not require any additional or different management activities by the participants without their consent. In addition, at the end of the agreement period, participants may return the enrolled property to the baseline conditions that existed at the beginning of the SHA. Similar regulatory incentive mechanisms available under the ESA include development of Habitat Conservation Plans and 4(d) rule exemption.	Regulatory			X	
Candidate Conservation Agreements/Candidate Conservation	Candidate Conservation Agreements (CCAs) are voluntary agreements between the USFWS	Regulatory			X	

agreements with Assurances	and one or more public or private entities. These agreements address the conservation needs of one or more species that are candidates for listing under the Endangered Species Act. Participants commit to implement specific actions designed to remove or reduce threats to the covered species, so that listing may not be necessary. On non-federal lands, CCAs with Assurances provide participating property owners with a permit containing assurances that if they engage in certain conservation actions for the covered species, no additional conservation measures will be required, nor will land, water, or resource use limitations be imposed on them without their consent should the species become listed in the future.					
Partners for Fish and Wildlife Program	This program provides technical and financial assistance to private landowners and Tribes for habitat restoration and conservation projects that benefit Federal Trust Species. Field staff help landowners find other sources of funding and help them navigate any necessary environmental permitting. Participants agree to retain restoration projects for at least 10 years, but otherwise retain full control of their land.	Financial assistance to implement conservation practices.			X	
Conservation Banking	Conservation banks are permanently protected lands that are conserved and permanently managed for species that are endangered, threatened, candidates for listing, or are otherwise at risk. In exchange for	Financial assistance for land conservation			X	

	permanently protecting the land and managing it for these species, the USFWS approves a specified number of habitat or species credits that bank owners may sell to developers or other project proponents.					
STATE GOVERNMENT						
Washington Wildlife Recreation Program (WWRP)	The Washington State's Recreation and Conservation Office's WWRP provides funding for a broad range of land protection and outdoor recreation projects, including habitat conservation, farmland preservation, park acquisition and development, and outdoor recreation facilities. Example projects relevant to agriculture include land acquisition; enhancement, restoration, or conservation activities such as riparian planting, irrigation improvements, or livestock fencing; and development of farm stewardship plans. Local and state agencies, special purpose districts, Tribes, and nonprofits are eligible to receive WWRP funds.	Financial assistance for land conservation for lands that are or were in production and/or to implement conservation practices	X	X	X	
Water Quality Grant Program	The Washington State Conservation Commission awards grants to fund projects that improve water quality.	Financial assistance for implementation of conservation practices.		X		
LOCAL GOVERNMENT						
Cowlitz County Open Space Taxation Program	The County's Open Space Taxation Program enables owners of open	Financial assistance for			X	

(Chapters 3.27 and 18.52 Cowlitz County Code)	space, agricultural, and timber lands to have those lands valued at their current use rather than at their highest and best use. Landowners with enrolled lands enjoy reduced property tax burdens. The goal of the program is to maintain and conserve adequate open space lands for the production of food, fiber, and forest crops, and to assure the use and enjoyment of natural resources for the future. This program differs from others in this table in that it does not offer incentives to participants to protect or enhance critical areas. However, it is included for its potential to be used by the County to offer these types of incentives in the future.	land conservation for lands that are or were in production				
Noxious Weed Program	Programs available to owners for eradication of Noxious Weeds	Financial and technical assistance available		X	X	
NON-GOVERNMENTAL ORGANIZATIONS AND PROGRAMS						
Land Trusts	Land trusts use land acquisition, conservation easements, and long-term stewardship to conserve lands in perpetuity. Lands may be conserved for their ecological value (e.g. as habitat for an imperiled species), or to preserve farmland for sustainable farming practices. Depending on the conservation goals of the project, lands may be returned to and/or preserved in their natural state, or may continue to be used for agricultural production.	Financial assistance for land conservation	X	X	X	X

	Land Trusts that work with agricultural producers in Cowlitz County include Columbia Land Trust, and the American Farmland Trust.					
Western Sustainable Agriculture Research & Education (SARE)	Western SARE provides grants for activities related to sustainable agricultural practices, including research and education, professional development, and implementation of sustainable agricultural practices.	Financial assistance for implementation of conservation practices	X	X	X	X
MARKETING PROGRAMS						
Certification programs	Certification programs define standards and best practices for agricultural operations that are intended to achieve one or more natural resource objectives. Agricultural operations meeting those standards receive certification that can enhance the marketability of their agricultural products. •	Marketing	X	X	X	X
Agritourism	Agritourism supports agricultural producers through direct outreach to consumers, by bringing those consumers to farms. Programs can be designed to focus on farms that employ sustainable practices or other conservation measures, and can be used to challenge negative public perceptions of agriculture. The WSDA Savor Washington program is an example of an agritourism program that offers tours in Cowlitz County.	Marketing	X	X	X	X

1

5.2 Technical Assistance and Outreach

The Work Plan is intended to increase the number of conservation practices implemented by agricultural producers. This will help meet protection, and where possible, enhancement, goals outlined in the Plan. Technical assistance will be offered to producers with development of individual farm stewardship plans. These plans will identify technical assistance and financial incentive programs that further the goals of the Work Plan. Technical assistance will also identify benefits that can be expected at the farm level.

Cowlitz County will reach out to each source of technical assistance to make them aware of VSP, and determine an appropriate plan for connecting them with producers. Memorandums of Understanding will be developed as necessary to describe how the County and the various Technical Assistance Providers will cooperate to engage producers.

Table 5.2.1

Agency	**Role**
Cowlitz County Department of Building and Planning	Administration of Work Plan Monitoring and Implementation Lead Outreach Coordinator and Provider
Cowlitz County Conservation District	Primary Technical Assistance Provider
United States Department of Agriculture Farm Service Agency (USDA- FSA) USDA Natural Resources Conservation Service (NRCS) Washington State University Extension (WSU) Washington State Department of Fish and Wildlife Cowlitz County Noxious Weeds Cowlitz County Assessor's Office	Supporting Technical Assistance Providers
Washington Association of Conservation Districts Washington Cattleman's Association Washington Conservation Commission Washington Dairy Federation	Possible Additional Sources of Technical Assistance

Washington Farm Bureau Washington State Tree Fruit Association Washington Tree Fruit Research Commission Cowlitz Farm Forestry Association Washington Farm Forestry Association Northwest Food Processors Association Washington Sustainable Food & Farming Network Tilth Alliance American Farmland Trust	

Outreach will be critical to the success of the work plan, and will focus on goals and benchmarks outlined in this plan. The Work Group will act as ambassadors into the community. Outreach will be prioritized to producers with critical areas on their land most likely to benefit from participation. Table 5.2.2 summarizes the type and anticipated number of outreach opportunities per year. Following the table is a detailed description of the outreach plan.

Table 5.2.2 Outreach Plan

Outlet	**Opportunities**	**Number per Year**
Tours	Field Tours	2
	VSP Project Tours	2
Meetings	Conservation District Board	10
	Agricultural Associations / Producer Groups	4
	Grange Meetings	6
	Farm Bureau	2
	Diking Districts	3
	Environmental and Special Interest Group Monthly Meetings	6
	Nonprofits	3
	Local Government	7

		2
Media	Newspapers – The Daily News, Columbia River Reader, etc. Email distribution lists – County, Conservation District, WSU, Fish Recovery Board, Chamber, etc. Social media	12 articles 12 mailings Establish social media presence
Other	Press Releases Informational booth at County Fair, and other local events Advertising displays at local events	12 4 4

The Outreach Plan will include the following:

IDENTIFY TARGET AUDIENCE(S)

The intent of the VSP, defined in RCW 36.70A.700.2 includes the promotion of plans to protect and enhance critical areas within the area where agricultural activities are conducted, while maintaining and improving long-term viability of agriculture in the state of Washington— including locally in Cowlitz County.

Primary Target**—** As such, the primary target identified for success of the VSP are the agricultural operators who produce fresh, quality agricultural commodities within the geographic borders of Cowlitz County.

The VSP Work Group will continue to research and update a list of agricultural groups/associations that have members in Cowlitz County in efforts to ensure that all producer groups can have representation on the VSP Work Group, or have the opportunity to become involved in the Cowlitz County VSP as a participant or supporting volunteer.

Types of agricultural production within the boundaries of Cowlitz County include: grains and legumes; vegetables, melons, potatoes and sweet potatoes; fruits, tree nuts & berries; nursery, greenhouse, floriculture, & sod; cut Christmas trees & short-rotation woody crops; other crops & hay; poultry and eggs; cattle & calves; milk & other dairy products from cows; hogs & pigs; sheep, goats & their products; horses, ponies, mules, burros & donkeys; and aquaculture.

As agricultural production throughout Cowlitz County encompasses such a broad spectrum of commodities, development of an *all-inclusive* education and outreach strategy to reach all producers equitably may take time to reach full fruition during the early stages of VSP implementation.

Secondary Targets**—** Farm operators depend on consumers and the purchase of agricultural commodities and value-added products by local consumers. Marketing and Agricultural Branding of the

VSP will also contain a component focused on encouraging private citizens and their families to support local farmers dedicating to maintaining healthy watershed functions by participating in the VSP.

***Auxiliary Targets*—** Development of additional marketing strategies may include promoting VSP participating farm activities and special events designed to entice *eco-friendly, nutritionally- conscious* visitors into escaping their inner-city life-styles on weekends in order to trek to Cowlitz County as a weekend get-away where they can relax and *eat-local* while supporting local agriculture at the regional level.

***Additional Targets*—** Restaurants and stores throughout the county will be encouraged to sponsor VSP special events, and to carry, and promote fresh fruits, produce, meat(s), and dairy products produced by the local farmers who have chosen to participate in the VSP.

CLARIFY THE PURPOSE OF THE VSP TO TARGET AUDIENCES

Enabled by the State Legislature through the Washington State Growth Management Act (RCW 36. 70A), the Voluntary Stewardship Program (VSP) is an alternative to traditional top-down regulations for the protection of critical areas on agricultural lands.

Local farmers, agri-businesses, and other interested stakeholders in Cowlitz County will be invited to participate as active members of the VSP Work Group in order to insure equitable representation of the diverse spectrum of agricultural, environmental, or special interest throughout the county, and to encourage and foster a spirit of cooperation and partnership among county, tribal, environmental, and agricultural interests. Other interested stakeholders include, but are not limited to: the Cowlitz Tribe, environmental and/or sportsman groups, educational groups, and local, regional, and federal governmental entities.

A strong, active VSP Work Group comprised of a balanced representation of the diverse groups of agricultural producers and stakeholders throughout the County will best reach out and educate the multitude of people that the VSP can assist.

OUTREACH OPPORTUNITIES

FIELD TOURS The Cowlitz Conservation District and USDA-NRCS work cooperatively with local farmers to provide technical assistance, project planning and design, guidance when seeking and applying for state and federal funding for agricultural producers, and project implementation and monitoring in the field.

The NRCS and local Conservation Districts often schedule annual Field/Farm tours to showcase new Best Management Practices (BMPs), offer farm equipment demonstrations, and also discuss current agricultural issues and trends in the U.S.

It may be beneficial to “tag-a-long” onto tours and field demonstrations already planned by the Cowlitz Conservation District and USDA-NRCS. Cooperating agencies can work together to inform local farmers that participation in the new VSP will provide valuable landowner incentives, and strengthen the vitality

of local agricultural production while protecting, restoring, and enhancing water quality & quantity, and habitat utilized during the life cycles of native fish and wildlife species.

VSP PROJECT TOURS

Cowlitz County VSP will organize and conduct annual outreach tours to showcase VSP activities and to educate local stakeholders that VSP enhancement efforts help restore functions and values that protect critical areas while maintaining the viability of agriculture in local watersheds.

MEETINGS AND PUBLIC PRESENTATIONS

Conservation District Board (CD) – conservation districts throughout Washington State hold monthly board meetings, and an Annual Meeting with training for agricultural producers. These meetings will be an opportunity to advocate the Cowlitz County VSP.

Agricultural Associations/Groups— The VSP Work Group will reach out to the various agricultural commodity groups represented within county boundaries, utilizing a wide variety of methods designed to maximize exposure to the new VSP. Continued efforts to recruit additional members of the VSP Work Group will be encouraged in order to tap into the diverse brain-trust of various farm operations identified, and ensure the best approach for reaching all local agricultural groups to increase and retain VSP participation.

VSP staff are continuously collecting information for the various agricultural associations around Cowlitz County, Washington State, and the Pacific Northwest and will use the information to contact those groups, recruit new VSP Work Group members and participants.

Grange Meetings— one approach to reaching the primary target audience includes visiting local farmers by the geographic community in which they reside. Development of partnerships with the six active local Granges in Cowlitz County may be beneficial for dissemination of educational VSP material. Local county Granges include: *Pleasant Hill #101*, *Catlin #199* and *Rose Valley #953* which meet in Kelso, Washington; *Silver Lake #105* (Spirit Lake Hwy); *Sunnyside #129* in Castle Rock, Washington; and *Woodland #178* in Woodland, Washington.

Farm Bureau— VSP staff and the Work Group will partner with the Clark Cowlitz Farm Bureau, to pursue the opportunity of setting up an educational booth and giving an educational presentations at monthly and annual bureau events in SW Washington.

Diking/Flood Control Districts— VSP staff will collaborate with the diverse Diking/Flood Control Districts throughout Cowlitz County, to include:

- *Consolidated diking and improvement district #1 (CDID)* – Longview
- *CDID #2* – Woodland Bottoms (Public Works)
- *Lexington Flood Control District* (Board and Public Works)
- *City of Castle Rock*
- *City Councils*
- *Willow Grove Diking District*

Environmental & Special Interest Group Monthly Meetings—various special interest nonprofit group monthly meetings will also be utilized as platforms for presenting the VSP information to farmers and other local citizens who are enjoy fishing, hunting, or other outdoor activities in the Pacific Northwest.

Ducks Unlimited, an environmental sportsman group with a strong history of working with local landowners to protect, restore, and enhance natural eco-systems in the Pacific Northwest, has recently shown great interest in the VSP working collaboratively as the VSP objectives align strongly with their program and practices.

Other local special interest groups include: *Friends of the East Fork* (Lewis River), *Lower Columbia Flyfishers*, *Friends of the Cowlitz*, and the *Rocky Mountain Elk Foundation*.

Nonprofits—various nonprofit groups, such as the *Lower Columbia Fish Enhancement Group (LCFEG)*, among others, will be contacted and educated about Cowlitz County's new VSP, and the opportunities for nonprofits to partner with the county and local participating farmer, thus improving and strengthening the grant funding process.

Nonprofit groups whose mission statement and goals strongly align with the VSP, and who share a common dedication to clean, plentiful water, and the protection, enhancement, and restoration of critical areas, will only help to strengthen and promote the county's VSP.

Local Government—VSP staff will contact elected officials and peer staff from local, county, and tribal entities. Fact sheets, brochures, and educational information & Power Point presentations will be developed and shared with these groups.

Municipal groups identified to date include:

- *Cowlitz County Commissioners*
- *City Councils for: Castle Rock, Longview, Kalama, Kelso, and Woodland*
- *Cowlitz Tribe*

PRINT AND BROADCAST MEDIA EVENTS

Media Press Releases— VSP staff and Work Group will identify all news media outlets that provide local news to potential VSP participants and other interested stakeholders throughout the County, and will prepare press releases to local media outlets, including television and radio stations, local newspapers, and regional/national magazines.

Press releases will be provided to the various media outlets with an introduction to the VSP mission and goals, membership & contact information, and the special incentives and benefits offered exclusively to VSP participants.

Press releases will be designed to educate local farmers and the general public, providing information on how the protection of critical areas strengthens natural watershed functions, boosts local agriculturally-based economies by protecting the viability of local farmlands, and restores thriving, natural ecosystems which provide clean, abundant water for farming, native fish and wildlife, and for household, municipal and recreational use by humankind.

Press releases will also inform the general public as to VSP special events, newly formed cooperative partnerships, grant awards, highlights of local farm families who become VSP participants, and VSP success stories. Guest spots on local media outlets (i.e. television talk shows, radio broadcasts, newspapers, etc.) will be pursued.

PRINTED MEDIA

Newsletters— VSP staff will utilize professional networking and the development of cooperative partnerships with nonprofit groups, such as the local conservation district, NRCS, Clark Cowlitz Farm Bureau, Tilth Alliance, etc., and share newsletter articles symbiotically to broaden VSP's education and outreach base, in efforts to recruit new participants from the local farming community.

Advertisements— newspaper inserts, and advertisement in agricultural publications, will be pursued.

Printed Advertisements— VSP information will be distributed to local communities via purchasing or negotiating gratuitous ads in local newspapers and regional & national ag-related magazines. Mass-quantity mailings will also be sent to targeted producer groups.

Agricultural News Outlets—Seeking exposure in newspapers, magazines and e-zines, i.e. *Capital Press*, *Successful Farming*, and *Farm* and *Ranch Living*, can all further VSP efforts to recruit participants from agricultural producers and gain support from the general public.

Email distribution lists—A large group of organizations dedicated to a balance between sustainable farming for a strong local economy and environmental integrity, exist throughout Cowlitz County, SW Washington and the Pacific Northwest.

VSP staff will develop fact sheets, brochures, newsletter articles, and/or brief educational video clips that other organizations can include as attachments, articles, and/or video blogs in their own member newsletters/website.

VSP will continue development of our own Email distribution lists, newsletter, and webpage for current and future VSP participants.

BROADCASTING—paid or gratuitous spots on local television stations, such as KLTV, KRQT, and KBAM, or on local radio shows, can reach everyday citizens while driving in the car, or simply relaxing at home in the evening.

Developing cooperative partnerships with the broadcasting community can cut advertising costs, and allows those participating stations to show their audience that their station are dedicated to supporting local farms and local fish.

SOCIAL MEDIA— In this modern day of information, with more computer and cell phone applications (commonly referred to as apps) being developed each year, people can instantly access their favorite websites in order to shop, look up information, support for their regional sports club, search upcoming events for an environmental organization they have joined, or simply to watch video clips on leisure activities like fishing, camping, or urban gardening.

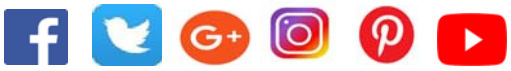
VSP staff will look into various social media outlets, such as Facebook, Twitter, Pinterest, Instagram, Google +, and LinkedIn to determine the best course of action, if any, for reaching agricultural

producers, educational and environmental groups, governmental/tribal entities, and other stakeholders throughout the four subbasins in Cowlitz County regarding VSP membership, training opportunities, and potential grant-funded programs to assist landowners.

Cowlitz County currently has a web page with a link to the Voluntary Stewardship Program. Eventually the VSP web page will include digital photos of projects with pictures documenting conditions prior to, during, and post construction, and an explanation of why the project was funded, and how it is beneficial to critical areas functions and values.

The VSP web page will become interactive and promote upcoming VSP events, future volunteer work party opportunities, links for educators and youth, and video clips explaining the VSP, our mission, and importance of Voluntary Stewardship of the land used for farming, fish, forests and future generations.

Below are easily recognizable social media icons that will link our County web page to various VSP web sites. As shown from left to right, they represent: Facebook, Twitter, Google Plus, Instagram, Pinterest, and YouTube.



PUBLIC EVENTS

Educational Booths— VSP staff and the Work Group will recruit and train a volunteer force to design, construct, and operate educational booths at local Farmers Markets and the Cowlitz County Fair. VSP staff/volunteers could also operate vendor booths at the Washington State Association of Agriculture Educator's annual conference when it's on the west side of the state, and also at WDFW's Outdoor Youth Expo when it's held in Kelso, Washington.

At other local events, Cowlitz County VSP informational booths will be designed to recruit new participants, via educating the public regarding VSP mission, goals, producer incentives, and overall benefits to farm, fish, and local stakeholders. Informational booths with signage and volunteer presenters can be made available for education and outreach of a wide diversity of groups, such as agricultural associations, i.e. the Cowlitz Conservation District Annual Meeting, Washington Cereal Growers, local Farmers' Markets, and state and/or regional Production Agriculture Conferences, such as the Cattleman's Association Conferences, Tilth Alliance Conference, and/or the Washington Fruit Growers Association.

Community Events— VSP staff will develop cooperative partnerships with various local ag-related groups, such as Farmer's Market, Clark Cowlitz Farm Bureau, and WSU County Extension Office, and local ag-associations, and discuss the "gratuitous" displaying of banners and/or flags, and/or vendor space for educational booth at events with color signage, handouts, brochures, etc.

In person inquiries— finally, good old face-to-face cold-calling techniques can be utilized to get the word out about the new VSP in Cowlitz County. The "Let your feet hit the pavement…" approach, allows VSP

staff, Work Group members and volunteers to get out and spread the word. Word-of-mouth advertising helps build trust, and is one of the greatest tools for recruiting new VSP participants and volunteers.

5.3 Participation

According to the USDA Census of Agriculture, there are approximately 500 agricultural producers in Cowlitz County. Participation goals will be established in the first year of implementation upon quantifying the baseline conditions of participation in existing programs.

The success of VSP relies on participation by agricultural producers. In order for producers to participate, they must be ensured that confidentiality of their business information will be maintained. The Washington State Conservation Commission has provided guidance indicating that statutory provisions ensuring confidentiality and nondisclosure of farm plans found in RCW 89.08.560 also apply to individual stewardship plans that may be developed with assistance from conservation districts. It is the intent of the Working Group to maintain confidentiality.

Farmers can participate in VSP by implementing conservation projects on their property. Often this is in collaboration with a technical service provider. Conservation projects may include development of a farm plan, an individual stewardship plan, and/or implementation of conservation practices such as habitat creation, pest management, and water conservation, etc. Technical assistance providers working with VSP will provide specific confidentiality and disclosure details for particular types of agricultural operations and conservation programs.

Individuals wishing to document their voluntary participation in VSP, or wishing to take advantage of incentives offered through the program, can complete an anonymous Stewardship Checklist with a technical assistance provider. The Stewardship Checklist is an information sharing tool. It places no obligation on the individual. The Stewardship Checklist will not be tracked on an individual basis, only looking at a watershed-basis. The County will be the lead entity for this effort with assistance from individual technical assistance providers.

5.4 Incentives

Per RCW 36.70A.700(2)(b), one purpose of the VSP is to focus and maximize voluntary incentive programs to encourage good riparian and ecosystem stewardship as an alternative and historic approaches used to protect critical areas. Potential participation incentives identified by the Work Group include:

Incentive 1 - Priority funding identified and available from federal, state, and/or local sources to support VSP Program participation.

Incentive 2 – Department of Building and Planning to provide permit cost waiver or reduction for participating producers.

Incentive 3 – Department of Building and Planning to provide additional permit process assistance for participating producers.

Incentive 4 - Promote VSP participating through Local Cowlitz County Ag branding

Incentive 5 - VSP recognition signs will be made available to all participants for voluntary posting on their property. The work group will establish tiered program of recognition based on participation level.

Incentive 6 - Agricultural Tourism and Heritage Map highlighting all Cowlitz County agriculture, with special focus on VSP participants.

Incentive 7 - Regular media promotion for VSP participants who have accomplished conservation efforts.

Incentive 8 - Promote policies and regulations that support agricultural operators.

6 Monitoring, Reporting and Adaptive Management

This chapter presents a plan for monitoring the progress of the VSP against its stated goals and benchmarks; reporting the results of that monitoring and, in the event that monitoring results indicate failure of the VSP to meet its stated goals and benchmarks, instituting adaptive management.

6.1 Performance Metrics

The Work Group must "establish baseline monitoring for: (i) participation activities and implementation of the voluntary stewardship plans and projects; (ii) stewardship activities; and (iii) the effects on critical areas and agriculture relevant to the protection and enhancement benchmarks developed for the watershed. To meet this requirement, one or more performance metrics have been defined for each of the benchmarks in Section 4, Goals, Benchmarks and Priority Strategies.

6.2 Monitoring Methods

In order to evaluate the success of the VSP over time, the Work Plan must establish an approach to monitoring the progress of the VSP against its defined benchmarks. Specifically, the Work Plan must establish "baseline monitoring for: (i) participation activities and implementation of the voluntary stewardship plans and projects; (ii) stewardship activities; and (iii) the effects on critical areas and agriculture relevant to the projection and enhancement benchmarks developed for the watershed" (RCW 36.70A.720(1)(i)).

Participation Monitoring

Participation Monitoring will be ongoing, and will involve tracking the following:

- Implementation of voluntary stewardship practices relevant to goals and benchmarks established in Chapter 4.
- Occurrence of relevant education events, workshops, forums, farm tours and any other events to assist, encourage or improve voluntary stewardship efforts in the county.
- Participation in VSP Individual Stewardship Checklists.
- Participation in farm planning or conservation planning reported by technical assistance providers.
- Incentives issued as outlined in Section 5.4.

Effectiveness Monitoring

Effectiveness monitoring will be used to determine the need for adaptive management. Monitoring data sources may be added, adjusted or removed based on their usefulness over time. New data sources and monitoring techniques will be approved by the Work Group before being incorporated into the monitoring process. Monitoring data will be supplemented by ground-truthing to verify causes of change to critical area functions and values.

Effectiveness monitoring will detect watershed-scale landscape changes to critical areas on agricultural lands since 2011 using benchmarks established during the first year of implementation. This will involve superimposing 2011 aerial imagery over imagery from future reference points to detect and analyze where landscape changes have occurred. Additional indicators will be used to validate results and detect impacts to critical areas functions and values beyond that established through aerial imagery.

The County will contract with the Washington Department of Fish and Wildlife (WDFW) to engage in it's High-Resolution Change Detection (HRCD) Project. HRCD provides high accuracy land use analysis at a fine scale. It can quantify canopy loss and new impervious and semi-pervious surfaces.

Though HRCD is highly accurate, the potential error rate can be up to 15% due to imagery detection errors. Therefore, benchmarks that are validated solely using HRCD should stay at least 115% above the 2011 baseline to ensure critical areas functions and values are protected. Ground truthing the accuracy of HRCD, as well as imagery detection improvements may reduce the error rate over time.

Additional suggested data sources for analyzing landscape changes are included below. Over time, additional data sources may be identified and used by the Work Group and staff.

Table 6.2.1 – Suggested Data Sources

Information	Source	Time Period	Notes
County Boundary	Cowlitz County	N/A	GIS Department
Agricultural Activities	WSDA Assessor's Parcel Data USDA/NASS	2011, most recent 2011, most recent 2011, most recent	 Parcels in agricultural exemption program Cropland Data Layer
Mapped Streams	Washington DNR	Most recent	
WRIA Boundaries	Ecology	Most recent	
Critical Areas Mapping	Cowlitz County	2011, most recent	Collected from other agencies or generated in-house and adopted with Critical Areas Ordinance in 2009 and 2016.
100-year floodplain	FEMA	2011, most recent	
303(d) List	Ecology	2011, most recent	
Groundwater Quality Monitoring	Cowlitz County	2011, most recent	Health Department
Streamflow Data	USGS	2011, most recent	WaterWatch

Baseline Monitoring

At this time, the Work Group has established the connection between agriculture and critical areas. However, data is not available on how agriculture is affecting the functions and values of those critical areas over time. Upon entering the implementation phase, the Work Group will compare the 2011 baseline using more recent data. This will include working with WDFW's HRCD data as well as the other suggested data sources outlined above. This process will occur within the fall and winter of 2018/2019.

Based on results of this initial monitoring, the Work Group will prioritize adaptive management to ensure protection of critical area functions and values. This will include establishing the level of participation needed to reach targets necessary for protection.

Formal periodic evaluations will be conducted every two years, with focus on the measurable protection benchmarks found in Section 4. Cowlitz County will conduct evaluation, with support from technical assistance providers. Cowlitz County will assemble all data, draft reports and submit them to the Work Group.

6.3 Reporting

Reporting will include the following tasks:

- Prepare a written report on the status of the Work Plan, including accomplishments, to the Washington State Conservation Commission within 60 days after the end of each biennium. The first report will be finalized and submitted on August 30, 2019.
- Develop and provide 5-year progress reports on Work Plan performance in meeting goals and benchmarks. During implementation, reporting of progress under the plan will occur every five years from the date of receipt of funding. County VSP staff and the Work Group will prepare and submit a written report to the Washington State Conservation Commission summarizing the evaluation and any adjustments necessary. The first report will be finalized and submitted December 20, 2020, and every five years thereafter.

Reporting will be completed by the Work Group as managed by the County, with assistance from the technical assistance providers. Comments will be addressed and edits made to the reports, which will then be approved by the Work Group and distributed on behalf of the Work Group. Other reporting requirements of the program will be completed as necessary. The Work Group and VSP staff will provide available information and assistance to help state agencies align their monitoring efforts with VSP monitoring and the goals and benchmarks of the VSP Work Plan. Watershed-scale monitoring reports will be made available to agencies.

6.4 Adaptive Management

Monitoring will identify changes in the environment coupled with a response system to adjust activities based on results and review of indicators. Adaptive management will be used on a continuous basis to ensure protection of critical area functions as they existed in 2011. Adaptive management will be triggered at minimum if protection benchmark is within 15% of quantity measured not being met. During adaptive management, the following will occur:

Implement: Work Plan put into action.

Monitor: Data will be collected regarding critical area function and value, as well as agricultural viability.

Evaluate: Differences between goals and results are identified. Causes are investigated.

Adjustment: Goals, benchmarks, metrics and incentives may be adjusted.

COWLITZ COUNTY VOLUNTARY STEWARDSHIP CHECKLIST
FOR INTERNAL USE ONLY

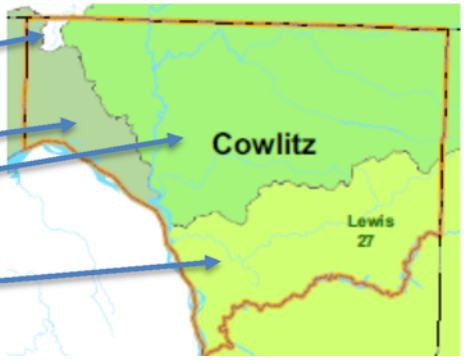
What watershed(s) is your farm located in?

__ Upper Chehalis

__ Grays-Elochoman

__ Cowlitz

__ Lewis



What Critical Areas potentially intersect with agricultural activities on your property?

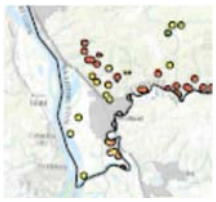
Note: Checking one or more critical areas does not indicate an official determination of critical area presence. It is only for the benefit of completing this checklist. Critical areas will be verified during plan development.

___ Wetland

___ Fish & Wildlife Habitat Conservation Area

___ Frequently Flooded Areas

___ Geologically Hazardous Areas



___ Critical Aquifer Recharge Areas

Agricultural Viability

What types of land management or agricultural viability concerns do you have on your property?

__ Availability of water	__ Pollinators/beneficial organisms	__ Availability of land
__ Cost of water	__ Flood management/cleanup	__ Soil preservation
__ Financing of new practices	__ Weed management	__ Land fertility
__ Other_____	__ Other_____	__ Other_____

Ideas for Agricultural Viability Incentives and Outcomes - What incentives could help you achieve your goals for your farm? (i.e. permit assistance, tax reduction, marketing programs, special recognition, etc.)

_____

_____

_____

What service provider(s) are you working with?

__ Cowlitz Co. Building and Planning	__ Cowlitz Conservation District	__ USDA / Farm Service Agency
__ USDA / Natural Resource Conservation Service	__ Washington State University Extension	__ Washington Department of Fish and Wildlife
__Cowlitz County Noxious Weeds	__ Cowlitz County Assessor	__ Other_____

Name of Service Provider Contact:_____

Signature of Service Provider:_____ Date:_____

COWLITZ COUNTY VOLUNTARY STEWARDSHIP CHECKLIST
FOR INTERNAL USE ONLY

What conservation practices are being implemented on your farm?

Example Conservation Practices	Wetlands	Fish & Wildlife Habitat Areas	Frequently Flooded Areas	Geologically Hazardous Areas	Critical Aquifer Recharge Areas	Agricultural Viability	**I do this**	**I'm interested in this**	**Does not apply**	**Average units/year (acres / feet / other)**
No till/direct seed	X	X								
Weed management	X	X								
Conservation crop rotation	X	X								
Cover crop	X	X								
Residue / tillage management	X	X								
Mulching	X	X								
Access control	X	X			X					
Prescribed grazing	X	X								
Seasonal livestock exclusion	X	X								
Fencing	X	X	X	X	X					
Livestock watering facility	X	X								
Riparian forest buffer		X								
Wetland enhancement	X	X								
Irrigation water management	X	X			X					
Integrated pest management	X	X								
Nutrient management	X	X			X					
Filter strips	X	X			X					
Restoration and management of habitat	X	X								
Channel bed stabilization		X	X							
Fish and wildlife structure	X	X								
Agricultural structures not located in floodway			X							
Maintain and upgrade flood control structures			X							
Avoid geologically hazardous areas				X						
Other_____										
_____										
_____										
_____										
_____										
_____										

Cowlitz County Building and Planning Department

360-577-3052

Cowlitz County Agriculture

August 9, 2017

Profile and Analysis of Cowlitz County Agricultural Conditions

By Globalwise Inc., Vancouver, WA
In Association with CORE GIS, LLC, Seattle, WA

This report addresses agricultural conditions in Cowlitz County, starting with acreage and type of agricultural land activity and the economic contributions of this industry. Agricultural economic data shows the county suffered a significant decline during and after the Great Recession of 2007 to 2009 with lingering effects until about 2015. The Woodland Bottoms is the major high-value agricultural production area with other agricultural land found in many of the lower elevation valleys. Nearly all the identified agricultural land is in critical areas of environmental concern. This follows from location factors: most crop and grazing land is found on lower elevation sites that are near rivers and other water sources. Metrics to monitor future conditions are discussed and recommendations are included for supporting the viability of agriculture.

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Tables and Figures

APPENDICES

Executive Summary

Cowlitz County crop production mainly includes berries, grass seed, vegetable seed, flowers, nursery crops, hay, grain, and pasture. Small beef cattle herds are common in many agricultural areas. Dairies are in decline with two still in operation.

Several different data sources were reviewed to estimate the acreage and location of agricultural land. The data source primarily relied on in this study is ground-truth survey analysis conducted by the Washington State Department of Agriculture. This survey is recent and estimates actual land use for agriculture.

Lower elevation soil resources are often suited for farming and ranching, especially the rich alluvial deposits found in "bottom" land. The Woodland Bottoms have about 5,100 acres in agricultural production and account for about two-thirds of the county's total cropland. Most of the highest value crops are produced there. Clusters of agriculture are found in lower elevation valleys and lowland terraces. Much of the agricultural land is near rivers and streams which strengthens the need for the Voluntary Stewardship Program (VSP).

Cowlitz County agriculture comprises less than two percent of total county employment but economic data do not reveal all factors. Agricultural activity is important in rural parts of the county because crop and livestock production is wide spread and agriculture is central to the lifestyle and activities of many rural residents. Farm income is usually supplemental and not the main income source for rural residents. Wages earned by hired workers further supports the rural economy.

Bureau of Economic Analysis data shows net farm income in the county's agricultural sector has been low and erratic since 2000. The Great Recession of 2007-2009 and the sluggish economic recovery thereafter has contributed to losses in farm income. However, in 2015, the final year of available data, net farm income rose significantly. Larger farms depend on conventional market channels for their sales. Yet for many small farms in Cowlitz County, local markets are vital for sales and profits. Therefore, economic conditions in Southwest Washington play a key role in the prosperity for many Cowlitz County farmers.

Economic analysis shows that the county employment related to local farm production directly contributes close to 500 jobs and generated about $10.3 million in income. When the county's farm production that goes to local food processing is added, the direct contribution adds another 36 jobs and $1.7 million in income. In total with all direct, indirect and induced impacts, local agriculture accounts for over 700 jobs, $20.6 million in income and $99.0 million in value of output in the county.

Industrial and residential expansion threatens to reduce the available land for agriculture in the Woodland Bottoms. Some Woodland area farmers report they are no longer operating at a profitable level. A few others are expanding. One farm operates a large frozen fruit processing plant. The trend is toward specialized production with fewer crops. The smaller size of many farms is a disadvantage in relation to much larger farm competitors who are outside Cowlitz County. The Woodland dike system is well managed for flood protection but seasonal high water can delay spring field work and damage crops.

This analysis finds that most of the agricultural land in Cowlitz County is in critical areas. Aquifer recharge areas are the most frequently found category of critical areas, followed closely by geologic hazards (liquefaction). Wetland critical areas were found on about also prevalent on about 45

percent of agricultural parcels. About 16 percent of the agricultural parcels are in floodplains. The greatest amount of agricultural land along salmon bearing rivers and streams are at the Ostrander Creek – Cowlitz River and at the Kalama River and Frontal Columbia River.

This analysis shows that Cowlitz County has significant land resources to produce farm products. Many of the small farms have markets other than the local food processors. The county's food processors are few but are important employers in the local economy. Processors purchase and use local farm products but they also purchase raw products from outside the county. In most cases, local products are important to the processing sector even if they are a small share of the total raw inputs products required.

Cowlitz County agriculture's viability is challenging. Demographics and economics play a large role. Agricultural land use and its income potential could drop in the next decade in large part because the average age of farmers is nearly 60, and many will be selling or seeking other transitions. Some older farmers report that they are not sure if they can transfer ownership to a new generation of farmers. High land prices are a barrier to entry by new farmers, an issue that threatens long term viability. This transition is a large factor in the future of farming.

Farmers disagree on their future in the industry. Some believe they can meet future challenges and are expanding their businesses. Others look to exit. Many smaller scale, part-time farmers appear to accept that their business provides only supplemental income below the net return if they desire. It is hard to forecast if a significant number of farmers might exit over the next decade.

VSP can pay a role in supporting agriculture in the years ahead. This analysis shows that many farm properties have environmental issues to consider and address. Since farm income is relatively low, cost-effective, voluntary solutions are needed.

Introduction

This report and analysis is commissioned by Cowlitz County with funding from the Washington Voluntary Stewardship Program (VSP). The county has elected to participate in the VSP to support non-regulatory management of agricultural activities in critical environmental areas. Cowlitz County is addressing the viability of agriculture as the first step in this process is to consider current agricultural conditions.

This report is a baseline profile of agriculture and current conditions. It is the first in a series of several to follow. The author of this report is Globalwise Inc., an economic consulting company in Vancouver, Washington that specializes in analysis of Northwest agriculture.

The project was conducted in May and June of 2017. In-person and telephone interviews were conducted with a cross section of the local agricultural and food processing industries and knowledgeable observers of these sectors. See Appendix C for the list of interviewees.

Published economic data for several sources was incorporated in the analysis. An impact model for Cowlitz County was constructed to estimate the contributions and Cowlitz agriculture and the food processing industry. The data for this model was slightly modified with information and insights drawn from the interviews and observations of local conditions. A set of metrics are proposed to track changes in the agricultural sector over time. The report includes a set of recommendations that the county may consider as the VSP program is further developed.

Purpose and Scope of Study

This report provides information to Cowlitz County and the agricultural community as they determine how VSP can best serve the needs of local farmers and support related businesses such as food processors. This report is an initial characterization of Cowlitz County agriculture in both descriptive and quantitative terms.

The universe of activities that define agriculture for the needs of the county in this project are guided by RCW 90.58.065(2) (a). This citation is from the Washington Shoreline Management Act and is utilized because VSP is authorized with this definition of agriculture. RCW 90.58.065(2) (b) states:

> "Agricultural products" includes but is not limited to horticultural, viticultural, floricultural, vegetable, fruit, berry, grain, hops, hay, straw, turf, sod, seed, and apiary products; feed or forage for livestock; Christmas trees; hybrid cottonwood and similar hardwood trees grown as crops and harvested within twenty years of planting; and livestock including both the animals themselves and animal products including but not limited to meat, upland finfish, poultry and poultry products, and dairy products."

This report is a baseline assessment prepared to establish current conditions for policy planning and for future reference to determine progress and changes in the agricultural industry. A Cowlitz County VSP workgroup is developing a Cowlitz County stewardship workplan to support agriculture with voluntary environmental safeguards in lieu of environmental regulations. The workgroup is evaluating

benchmarks that measure progress in agriculture over time. This report reviews data to support the workgroup and presents data when available to help quantify the benchmarks.

Historical Conditions

Cowlitz County was established along with six other Washington counties when the Washington Territory was formed in 1853. Its border along the Columbia River boosted early white settlement. The area's deeply gorged rivers and streams and semi-rugged, timber-covered hills and mountains are other defining characteristics. River access spurred timber production and harvesting as a mainstay industry. The readily available fertile, level bottom land soil next to settlements and towns along rivers helped establish farming even though early farmers faced crop loss from frequent flooding. The necessity of local food supply was a driving force while affording an important livelihood for residents. Later an extensive system of dikes and levees was added to protect residents and valuable properties including farmland from flooding.

Seven major rivers transect the county: Columbia, Coweeman, Cowlitz, Green, Kalama, Lewis, and Toutle. Varied agricultural activities are found in the lower valleys of these rivers. The most intensive crop production is in the Woodland Bottoms, the diked lowlands at the confluence of the Columbia and the Lewis Rivers. In other lowlands and valleys agricultural activity is more scattered. These same areas are also favored for home sites, industry, and other urban uses and agriculture has diminished steadily over time.

The climate is temperate. Summers are generally dry and warm to hot, with wet, mild conditions in the fall and winter months. Annual rainfall ranges from 50 to 60 inches in the lower elevations with significantly higher rainfall in the higher elevations. Little agricultural production is found above 1,800 feet.

Much of the county's land that is classified as agricultural land is devoted to non-irrigated pasture and grass for livestock feed. High value annual vegetable and specialty crops need supplemental irrigation and are most often grown at the lowest elevations in floodplains or on terraces and benches below 400 feet in elevation. High value perennial crops such as raspberries, blueberries, flower bulbs, seed crops and nursery plants also need irrigation and are grown at the lowest elevations on level ground.

In the mid-21st Century, farming and agriculture played a large role in the county's local economy. The 1940 Washington Census of Agriculture reported that there was steady growth in the number of farms. The 1930 farm count was 1,147 and it rose to 1,925 in 1940.[1] The land area in farms was estimated at 112,474 acres in 1939, a 15.3 percent share of the county's total land area. However, 47,800 acres of this total were classified as woodland.[2] The amount of land used for crops in 1939 was tabulated at 19,312 acres.

[1] Source is 1940 Census of Agriculture Volume II, Third Series State Reports Part 3, Statistics for Counties, County Table I, page 549.

[2] Woodland is defined in the 1940 Census as farms with wood lots, or natural or planted timber tracts, and cut-over land with young growth. Today much of this land would probably be considered forested land.

The 1950 Census of Agriculture reported that Cowlitz County had 1,487 farms and harvested cropland totaling 16,348 acres.[3] This was a declining trend compared to 1940, with a loss of 22 percent of farms and a 15 percent decline in the cropland harvested.

Unfortunately, census reports do not include maps to show where farming activity was found historically relative to present times. The technology of evaluate aerial photography and interpret satellite imagery greatly aids analysis of agricultural land use. These advances are incorporated later in the analysis of this report.

Although private property owners built small levees and dikes for flood protection on their own land, it was not until the early 1920's that taxes were collected for construction of the larger scale diking system in Woodland.[4] Consolidated Diking Improvement District No. 2 was formed at that time and taxes were collected from all property owners who benefitted – mostly farmers since in that period this was primarily a farming community. Federal funding was authorized in 1937 and 1938 to enhance the local funding and obtain land needed for dike construction. Diking District No. 2 remains fully operational for the protection of all property owners in the City of Woodland and the Woodland Bottoms. Farmers are well represented on the diking district board and the district is considered well-run and a large benefit to all property owners and residents.

Diking Improvement District No. 15 operates at Willow Grove with much less land area than Diking District No.2 at Woodland. The smaller property tax base at Willow Grove limits funding for dike system improvements, especially pump capacity and related infrastructure to address major rainfall events. This has limited residential expansion within the diked area. The smaller farmland base at Willow Grove and lower value crop alternatives restrain agriculture in this area. One small diversified crop farm is operating, but currently hay is the principal crop produced. Under these conditions the future of farming in Willow Grove is threatened.

Current Agriculture Conditions

Location

A general rule in agriculture is that fertile soil at lower elevations which is flat can support more intensive crop production. Intensive crop production also usually has another important requirement: supplemental irrigation is often needed during the dry summer months to ensure plants receive adequate moisture to achieve the quality and total production level for farmer profit.

The prime farmland conditions described above are found in the "bottom land" along the Columbia River. Other pockets of well suited farmland are also important and should not be overlooked but the bottoms at Woodland and to a lesser extent at Willow Grove are where the highest value of agricultural output occurs in the county. Livestock production and associated crop activity, especially hay production, is found in many lower elevation areas.

[3] Source is 1950 U.S. Census of Agriculture, Counties and State Economic Areas, Washington and Oregon, Volume I, Part 32, Chapter B - Statistics for Counties, County Table 1, page 43.

[4] See Fields of Flowers and Forest of Firs: A History of the Woodland Community 1850 – 1958, Eleanor Olson, editor, revised edition, Judy Card, ed. Self-published, 2000. Assessed at Cowlitz County Historical Museum library.

Cowlitz County faces the same plight as neighboring counties in Western Washington: deep, level soils are also the preferred location for development of housing and other urban uses including industrial site expansion. The county is distinguished by having no impact fees, lower permit costs and less regulation than most other western Washington counties. This is attractive for non-agricultural development.

The county also attracts commercial and industrial development with its strategic location. Major regional population centers to the north and south have excellent highway and rail access from the county. Favorable river access to both regional and to international markets is a further advantage.

Soils

A wide range of soils are farmed in Cowlitz County. This section references a smaller number of the principal soils utilized for more intensive agricultural production. With proper management, other soils than those highlighted here can be successfully utilized by farmers.

Caples soils are found on floodplains and low terraces in Cowlitz County.[5] These are the principal soils series in the floodplains of the Woodland Bottoms and Willow Grove, as well as other areas along the Columbia River. This series is predominantly confined to Cowlitz County. A soil mapping unit is comprised of Caples, Clato and Newberg series. Taken together, these soils comprise about six percent of the county's soils and this mapping unit encompasses much of the main agricultural production areas found at the lowest elevations.

The Caples loam soils are deep and either artificially drained or naturally well drained. Generally, these soils are suitable for crop production. When cultivated a diverse mix of crops are produced and include row crops, small grains, cane fruits (primarily raspberries and blackberries), bulbs, hay and pasture. A seasonal high-water table of 18 to 30 inches below the surface in the winter months can limit suitable crops. These soils are in flat areas which also leads to competing land uses that include home sites, and related urban uses including industrial development.

Table 1 lists the soils in Cowlitz County that are indicated as suitable for cropland production.

[5] Source for the soils information reported here are Washington Soil Atlas, by Karl W. Hipple, U.S. Department of Agriculture, Natural Resource Conservation Service, (undated) and Soil Survey of Cowlitz County, Washington, U.S. Department of Agriculture, NRCS, printed in electronic form in 2006.

Table 1. Soils in Cowlitz County Indicated as Suitable for Crop Production

Soil Series	Slopes	Comments
Caples silty clay loam	0 - 3%	Floodplain soils at 15 - 40 feet elevation; needs artificial drainage
Centralia silt loam	0 - 8% & 8 - 20%	Hillslopes, ridgetops & plateaus; 200 - 1,600 ft. elevation
Cinebar loamy sand	5 - 30%	Terraces, benches & hillslopes; 1,200 - 1,800 ft. elevation
Cinebar silt loam	5 - 20%	Terraces, benches & hillslopes; 300 - 1,800 ft. elevation
Clato silt loam	0 - 3%	Floodplain soils formed in mixed alluvium; 30 - 300 ft. elevation
Germany silt loam	0 - 3% & 8 - 20%	Plateaus & hillslopes; 200 - 1,400 ft. elevation
Hazeldell gravelly silt loam	8 - 20%	Hillslopes; 200 - 1,800 ft. elevation
Kalama gravelly loam	8 - 15%	High terraces; 100 - 500 ft. elevation
Kelso silt loam	0 - 8% & 8 - 15%	Terraces; 50 - 200 ft. elevation
Mart silt loam	0 - 8% & 8 - 20%	Hillslopes & ridgetops; 500 – 1,800 ft. elevation
Maytown silt loam	0 - 3%	Floodplains, 10 – 25 ft. elevation
Melbourne loam	8 - 20%	Hillslopes and ridgetops; 200 - 800 ft. elevation
Newberg fine sandy loam	0 - 3%	Floodplains; 10 - 50 ft. elevation
Olequa silt loam	0 - 8% & 8 - 20%	Terraces & Plains; 40 to 300 ft. elevation
Olympic silt loam	2 - 8% & 8 - 20%	Hillslopes and mountain slopes; 200 -1,400 ft. elevation
Olympic silt loam/tuff substratum	5 - 30%	Benches, terraces & hillslopes; 300 -1,800 ft. elevation; steep slopes are main limitation
Pilchuck loamy fine sand	0 - 8%	Floodplains; 10 - 50 ft., elevation
Prather silty clay loam	0 - 5% & 5 - 15%	Terraces & till plains; 200 - 600 ft. elevation
Salkum silt loam	2 - 8% & 8 - 20%	Terraces & hills; 200 - 600 ft. elevation
Sara silt loam	0 - 8% & 8 - 15%	Terraces; 250 - 450 ft. elevation
Sara silty clay loam	0 - 8%	Terraces; 250 - 450 ft. elevation
Sauvola loam	0 - 8% & 8 - 15%	Upland terraces & hillslopes; 150 -900 ft. elevation
Seaquest silt loam	0 - 8% & 8 - 20%	Terraces & hills; 400 - 700 ft. elevation
Snohomish silty clay loam	0 - 1%	Floodplains; 10 - 550 ft. elevation
Stella silt loam	3 - 8% & 8 - 15%	Ridgetops & hillslopes; 300 - 700 ft. elevation

Source: Soil Survey of Cowlitz County, Washington, U.S. Department of Agriculture, NRCS, printed in electronic form 2006.

Table 1 displays the diversity of land resource conditions for crop and livestock production in the county. The cropland base Land includes ground where only grass is harvested for forage and these soils are sometimes marginal for more intensive crop production. Therefore, not all cropland soils can be considered well suited for growing vegetables and other food crops for direct human consumption.

Hay production also has much lower economic value than most food crops. Availability for irrigation water is also a major factor for determining if crop production occurs at any given site. Without supplemental irrigation, many soils will not support crop production in summer months, especially during years of limited precipitation.

Soils suited only for to pasture to graze livestock are not included in Table 1. Many soils that that cannot support crop production can be used for pasture, at least for part of the year. This includes sites with partial tree cover. The potential to use land for pasture greatly complicates the analysis of what constitutes the economically viable agricultural land base in Cowlitz County.

Identification of prime farmland soils and soils of statewide significance are a further way to evaluate the potential for farming. The U.S. Department of Agriculture (USDA) Natural Resource Conservations Service (NRCS) maintains a database of these soils.[6].

Prime farmland is defined as follows:

> Prime farmland is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops, and is also available for these uses (the land could be cropland, pastureland, rangeland, forest land, or other land, but not urban built-up land or water). It has the soil quality, growing season, and moisture supply needed to economically produce sustained high yields of crops when treated and managed, including water management, according to acceptable farming methods. In general, prime farmlands have an adequate and dependable water supply from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, acceptable salt and sodium content, and few or no rocks. They are permeable to water and air. Prime farmlands are not excessively erodible or saturated with water for a long period of time, and they either do not flood frequently or are protected from flooding.[7]

Farmland of statewide importance is defined as:

> This is land, in addition to prime and unique farmlands, that is of statewide importance for the production of food, feed, fiber, forage, and oil seed crops. Criteria for defining and delineating this land are to be determined by the appropriate State agency or agencies. Generally, additional farmlands of statewide importance include those that are nearly prime farmland and that economically produce high yields of crops when treated and managed according to acceptable farming methods. Some may produce as high a yield as prime farmlands if conditions are favorable. In some

[6] NRCS geodatabase is referenced as Soil Survey Geographic (SSURGO) database. This is the source to map soils classified as prime farmland and soils of statewide significance in Figure 1.
[7] This definition is from the National Soil Survey Handbook (NSSH) Part 622, Section 657.5a at http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/ref/?cid=nrcs142p2_054242 (accessed June 29, 2017).

States, additional farmlands of statewide importance may include tracts of land that have been designated for agriculture by State law.[8]

Table 2 shows the acreage of prime farm soils plus other farmland characteristics for Cowlitz County. There is an estimated 21,142 acres that meet the prime farmland definition and are identified as agricultural and in the WSDA agricultural land survey. Figure 1 displays the NRCS soils data identified a prime or farmland of statewide significance.

Table 2. Land Use Characteristics by Watershed in Cowlitz County (Acres)

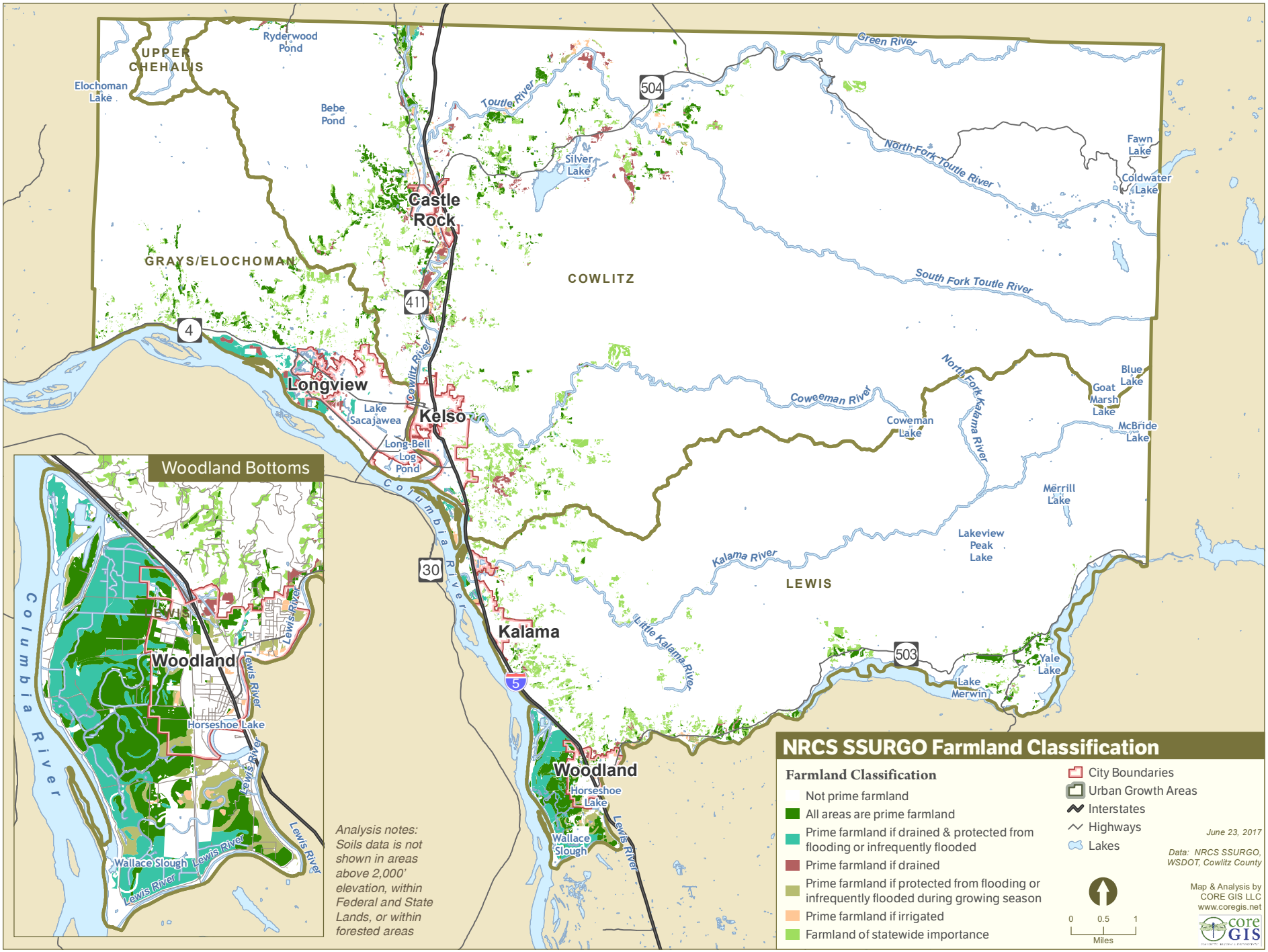
Characteristic	Lower Cowlitz Watershed	Grays – Elochoman Watershed	Lewis Watershed	County Total
Prime Farm Soils	8,792	3,619	8,731	21,142
Irrigated Land	133	135	3,441	3,709
Cropland	1,137	1,107	5,635	7,879
Pasture or Forage	105	109	350	564
Fallow	-	32.3	390.7	423.0

Note: Some prime farm soils are prime only if drained, protected from flooding, etc.

Source: Natural Resources Conservation Service, USDA, Soil Survey Geographic (SSURGO) digital soil survey for Cowlitz County with GIS analysis by CORE GIS

[8] This definition is from the National Soil Survey Handbook (NSSH) Part 622, Section 657.5c at http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/ref/?cid=nrcs142p2_054242 (accessed June 29, 2017).

Figure 1. USDA Farmland Classifications for Cowlitz County



Recent Farm Activity in Cowlitz County Based on Agricultural Census Data

The U.S. Census of Agriculture (referred to in this report as the "ag census") is the most frequent, consistent and detailed data collected to describe and analyze agricultural activity at the county level. This data is collected by survey every five years by the U.S. Department of Agriculture. The data is most useful for indicating general trends, especially in counties with a smaller number of farms such as Cowlitz where five-year data comparisons can show unexplainable changes in farm activity. This erratic pattern is seen in some data in recent ag censuses in Cowlitz County. Therefore, conclusions from these data are tempered with interviews in the farming community. With this limitation in mind, data for the last four ag censuses are displayed here.

Land in farms reported in the 2012 ag census is 39,009 acres (492 farms). In 2007 ag census data tracked 30,702 acres in 481 farms. (source is Table 8 Farms, Land in Farms, Value of Land and Building, and Land Use: 2012 and 2007.) USDA reports the ag census data without further interpretation.

The reason for total acreage increasing is likely at least partially explained by the increasing number of small and medium size farms by sales, as shown in Table 3. The smallest farms (those with sales of less than $2,500) increased dramatically from 1997 to 2002 but showed a declining trend from 2002 to 2007 and again from 2007 to 2012. In the latest five-year period farms with sales of $2,500 to $9,999 and $25,000 to $49,999 are also reported in higher numbers.

The ag census reports show that the number of farms with sales of over $250,000 have a trend of increasing. This is at odds with the views of interviewed farmers. Particularly in the Woodland Bottoms, the number of farmers is down over time, and this is where the largest farms are located. The broiler chicken farms have also been declining in the years from 1997 to 2012. Nurseries and Christmas tree farms may account for some expansion and perhaps some farms have woodland with timber sales as well as farm crop sales which are reported in the ag census.

Table 3. Number of Farms in Cowlitz County 1997, 2002, 2007 & 2012

Farms by Product Sales	1997	2002	2007	2012	Percent Change 1997 - 2012	Percent Change 2007 - 2012
Less than $2,500	192	335	293	286	+49%	-2%
$2,500 - $9,999	98	106	100	110	+12%	+10%
$10,000 - $24,999	27	26	36	36	+33%	+0%
$25,000 - $49,999	8	19	17	19	+138%	+12%
$50,000 - $99,999	3	5	8	7	+133%	-13%
$100,000 - $249,000	4	16	7	6	+50%	-14%
$250,000 plus	17	25	20	28	+53%	+40%
Grand Total	349	532	481	492	+41%	+2%
Total with Sales Over $25,000	32	65	52	60	+88%	+15%

Source: 1997, 2002, 2007 and 2012 U.S. Census of Agriculture for Cowlitz County, Washington by National Agricultural Statistics Service, U.S. Department of Agriculture.

Data in Table 4 shows that the trend is for smaller acreage in farms. The smallest farms, noted as one to 9 acres, have rapidly increased from 1997 to 2012 and increased at a slower pace in the 10-49 acre category in that same period. Meanwhile, all the larger size farm acreage categories have shown a declining trend.

This data trend concurs with the findings from our interviews in the agricultural community. As the population increases in the suburban and rural parts of Cowlitz County, farm properties are subdivided and parcel sizes decrease. The farmed land area is reduced as home sites and roads are constructed and in some cases as new owners choose not to grow crops or livestock on their land. Loss of farmable land area occurs even with the increase in the number of smaller farms.

Table 4. Farms by Size for All Farms in Cowlitz County 1997, 2002, 2007 & 2012

Size of Farms (Acres)	1997	2002	2007	2012
Acres	No. of Farms	No. of Farms	No. of Farms	No. of Farms
1 - 9	53	109	134	166
10 - 49	154	242	192	190
50 to 179	88	132	120	81
180 - 499	45	40	26	41
500 to 999	7	6	7	3
1,000 or more	2	3	2	11
Not Reported	--	--	--	6
Ave. Size	89	74	64	79

Note: "Farms" are those reporting sales of $1,000 or more or that normally have sales of $1,000 or higher.
Source: Table, 1 in 1997, 2002, 2007 and 2012 U.S. Census of Agriculture for Cowlitz County, Washington by National Agricultural Statistics Service, U.S. Department of Agriculture.

Crop and Livestock data show major trends but the detailed review of the crop and livestock production trends cannot be analyzed due to data being suppressed to avoid identifying sales of large operations. Table 5 provides a summary of available data.

Among food crop farms the greatest sales are reported for nursery and greenhouse operations and "other crops" which is dominated by hay. In 2012 each of these categories reported total annual sales of over $4.0 million. Fruit production category is led by berries and was reported at sales of $2.7 million in 2012, and down from $3.1 million in 2007.

Table 5. Type of Agricultural Products Grown on All Farms in Cowlitz County 2007 & 2012

Commodity/Group	2007		2012	
	Farms	$1,000	Farms	$1,000
Grains. Dry Beans, & Dry Peas	2	D	18	$1,511
Vegetables, Melons, Potatoes, Sweet Potatoes	23	1,202	42	D
Fruits, Tree Nuts & Berries	33	$3,153	41	$2,720
Nursery, Greenhouse, Floriculture, & Sod	33	$3,971	29	$4,124
Cut Christmas Trees & Short-Rotation Woody Crops	6	D	10	$122
Other Crops & Hay	61	$2,074	84	$4,571
Poultry & Eggs	62	$9,381	53	D
Cattle & Calves	167	$883	134	$1,204
Milk & Other Dairy Products from Cows	NA	NA	2	D
Hogs & Pigs	25	$23	14	$19
Sheep, Goats & their Products	NA	NA	30	$64
Horses, Ponies, Mules, Burros, & Donkeys	36	$508	28	$79
Aquaculture	9	$2,592	11	$2,205
Value of Ag Products Sold Directly to Individuals for Human Consumption	111	$358	124	$824

Notes: NA = Not Available; D = Not Disclosed
Source: Table 2, 2012 U.S. Census of Agriculture for Cowlitz County, Washington by National Agricultural Statistics Service, U.S. Department of Agriculture.

In the livestock category, Table 5 shows that cattle and calves are the most prevalent production activity, with an estimated 134 farms reporting. As measure by value of production, poultry and egg production dominates, with sales in 2007 of nearly $9.4 million. Note however that because of domination by just a few large broiler producers, no sales for poultry and egg production was estimated in 2012. 2012 estimated at their sales were estimated at $1.2 million. More about this important sector of agriculture is described later in this report.

Aquaculture was reported by the ag census as generating sales of over $2.0 million from 11 operations in 2012. However, no commercial aquaculture businesses are reported in the IMPLAN economic data.[9] The ag census counts fish hatchery facilities as aquaculture, which are operated by state and federal agencies. The Washington Department of Fish and Wildlife reports six state hatcheries in Cowlitz County.[10]

Economic Trends in Cowlitz County Agriculture

Agriculture is often considered a relatively stable industry sector because food and related agricultural production is such an essential component of everyday life. While true, smaller study areas like a single county can experience large changes over time. This section reviews the key farm business indicators for Cowlitz County. Below is a summary review of farm income and farm employment from 2000 to 2015.

Total Net Farm Income

Net farm income is the difference between all farm related earnings and all farm related expenses. Farm related earnings include cash receipts from the sale of livestock and crops, government farm payments, home consumption of farm products, and rental income from farm machinery. The cash receipts from livestock and crop sales are largely determined by prices set in national and world commodity markets, and therefore largely uncontrolled unless the farmers convince buyers that their products are unique or the farmers capture added margin by selling directly and avoiding "middleman markups." However, for most farmers, their prices follow prices set in markets that fluctuate with changes in supply and demand. Consequently, farm income changes significantly from year to year.

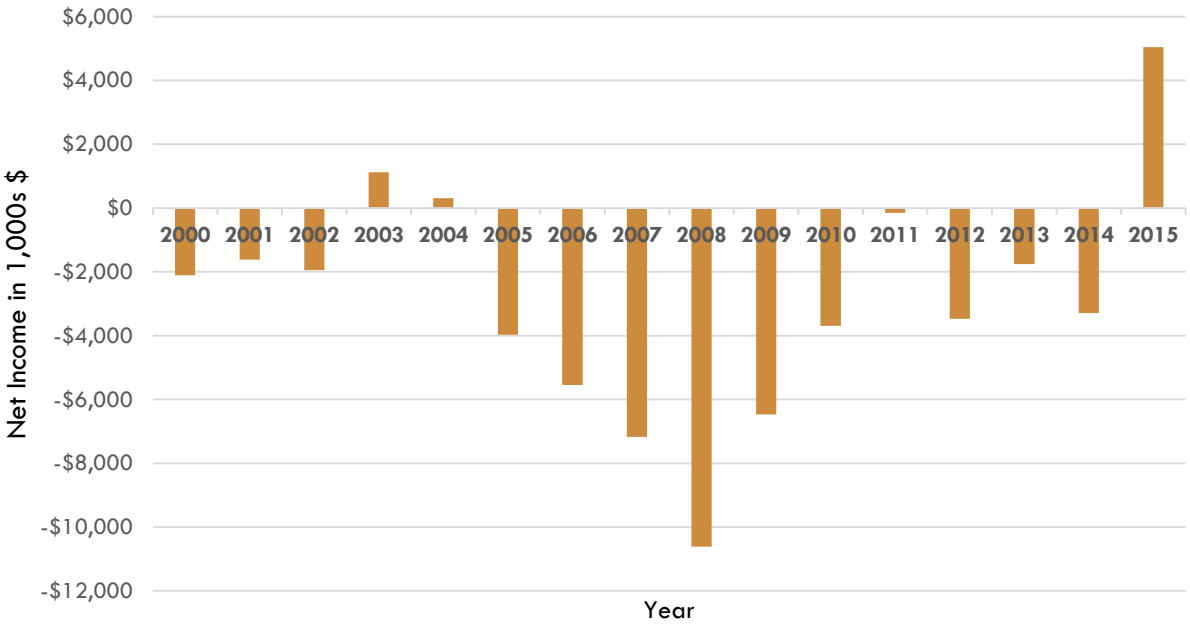
Farm related expenses include purchases of livestock, feed and seed, chemical products such as fertilizer, fuel and farm labor expenses. Farm input prices, like income, are also largely out of the farmer's control. Fuel prices are determined on the world market and can change significantly from year-to-year or during a growing season. Labor costs are usually less volatile than some other inputs, but farmers face a steady increase in the cost of hired workers. With uncertain immigration policies, farmers are worried that their labor costs are likely to raise faster in the future than historically.

Net farm income in Cowlitz County over the past 15 years is shown in Figure 2. The negative return reflects the highly competitive conditions in U.S. agriculture coupled with the economic downturn of the great recession in 2007 to 2009 with the sluggish aftermath. The Bureau of Economic Analysis does not show positive net farm income until 2015. The economic low in the 15-year period was in 2008 and the farm economy slowly recovered until net income rose from negative levels to plus $5.0 million in 2015.

Of note is that net income is not equally distributed among all agricultural subsectors. Wholesale broiler prices peaked in mid- 2013 with a decrease and then a return to historically high levels in mid-2014. Broiler prices have declined thereafter. Beef cattle prices peaked at an all-time high in 2015 but by 2017 prices have fallen by about 25 percent from those highs.

[9] IMPLAN refers to economic data collected for economic impact analysis. A later section of this report uses that data.
[10] See www.wdfw.wa.gov/hatcheries/facilities.php.

Figure 2. Net Farm Income for Cowlitz County, 2000 to 2015 (2009 Dollars)



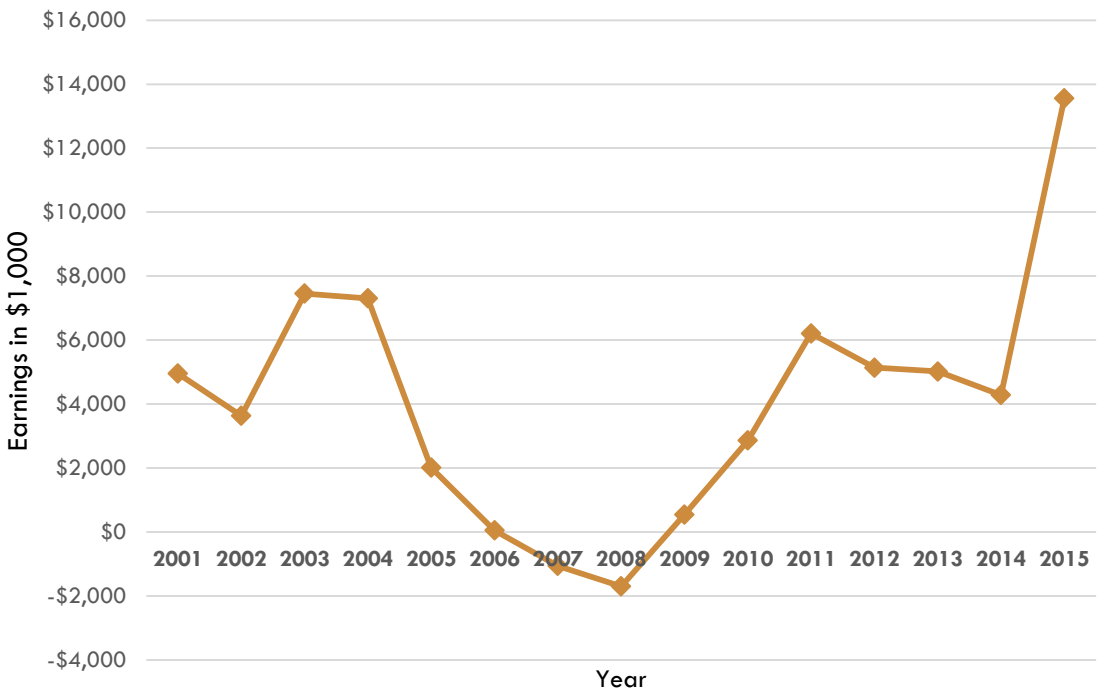
Source: Bureau of Economic Analysis, Regional Economic Information System, Table CA45, and U.S. Bureau of Economic Analysis, Farm output: Cash receipts from farm marketing: Crops (chain-type price index) [B1005G3A086NBEA], retrieved from Regional Data Tables, Bureau of Economic Analysis, www.bea.gov, accessed June 6, 2017

Farm Earnings

Farm earnings are comprised of the earnings by farm workers and proprietors' income that arises directly from the current production of agricultural commodities, either livestock or crops. It includes all compensation to hired farm laborers such as wages and salaries, pay-in-kind, and other labor income. Proprietors' income is the net income of sole proprietors and partners that operate farms but specifically excludes the income of farm corporations.

Figure 3 shows that in the period 2001 to 2015 farm earnings in the county were highly erratic, and dipped into negative territory at minus $1.7 million in 2008, the lowest level in the 14-year period. The high was $7.5 million in 2003. Farm earnings in 2015 were pegged at $6.2 million, close to the 2008 high. The deep recession of 2007 - 2009 and the stagnant recovery appears closely correlated with this data series.

Figure 3. Farm Earnings Cowlitz County, 2001 to 2015



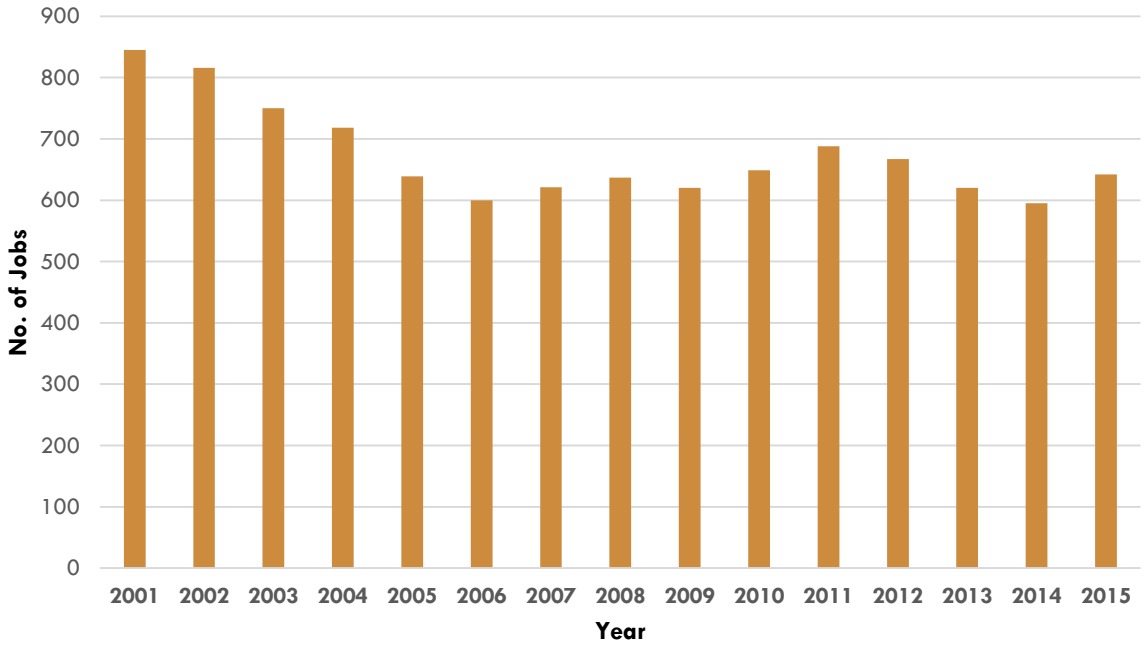
Source: Bureau of Economic Analysis, Regional Economic Information System, Table CA5N Personal Income by Major Component and Earnings by NAICS Industry retrieved from BEA; www.bea.gov, accessed June 7, 2017

Employment

Farm employment is the number of workers engaged in the direct production of agricultural commodities, either livestock or crops; whether as a sole proprietor, partner, or hired laborer.

Farm employment in Cowlitz County does not vary as drastically as farm earnings and net farm income. Figure 4 shows the total farm employment for all farms in the county. Farm employment was at its peak in 2001when there were 845 agricultural workers. The lowest level of total net farm income occurred in 2014 when there were 595 agricultural employees. With improved conditions in 2015, farm employment rose to 642 workers. However, the overall trend is downward, and can be attributed to the greater use of farm equipment such as mechanical harvesters and large hay balers.

Figure 4. Farm Employment Cowlitz County, 2001 to 2015



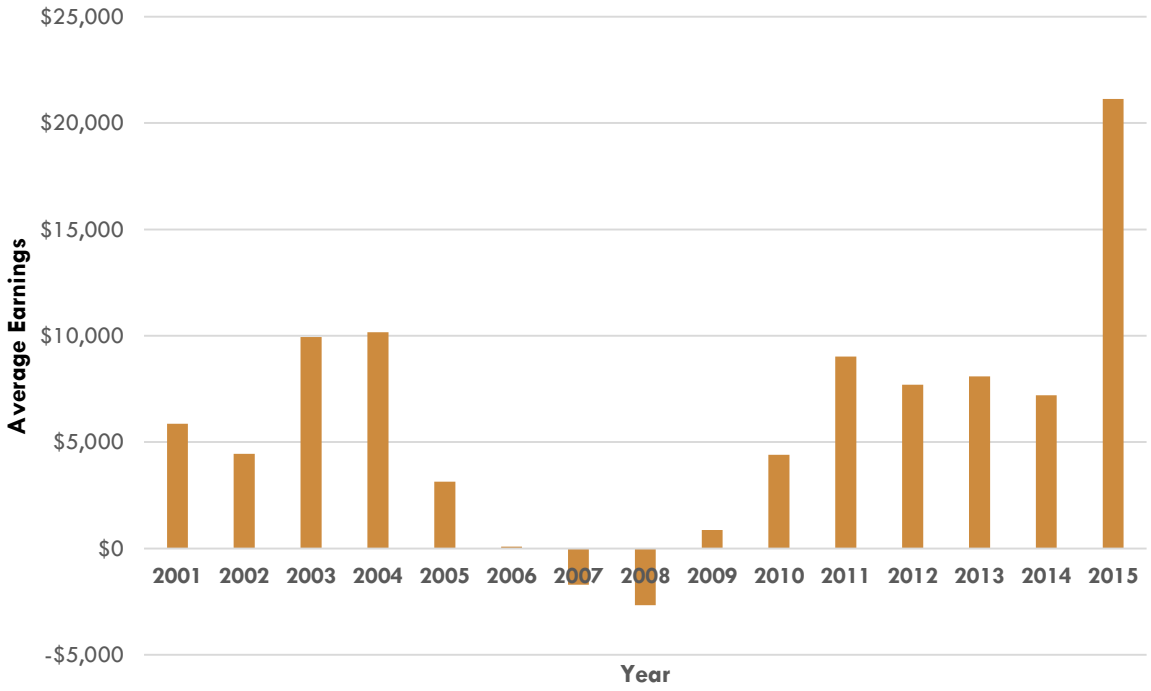
Source: Bureau of Economic Analysis, Regional Economic Information System, Table CA5N Total Full-Time and Part-Time Employment by NAICS Industry retrieved from BEA; www.bea.gov, accessed June 7, 2017

Farm employment as a percentage of nonfarm employment in the period 2001 to 2015 has ranged between 1.5 and 1.8 percent of nonfarm employment. In 2015 the percentage was 1.5 percent.

Average Earnings per Farm Job

Agricultural jobs for both proprietors and hired worked are often part-time/seasonal and many of these jobs pay less per hour than non-agricultural jobs. Proprietors' earnings are included which have been shown to be negative in many years during 2001 to 2015. Consequently, the average earnings for farm jobs are quite low in comparison to many other county jobs. Figure 5 displays the average wage for farm and non-farm jobs in Cowlitz County from 2001 to 2015. Farm wages were at their low in 2008 at minus $2,666, which reflects the negative income for proprietors that year. In 2007 the average earnings per job was also negative. And it was only slightly positive in 2006. Since 2009 average wages have been on an upward track and jumped up significantly in 2015 to over $21,000 per job.

Figure 5. Average Farm Earnings Per Job Cowlitz County, 2001 to 2015



Source: Bureau of Economic Analysis, Regional Economic Information System, Table CA5N Personal Income by Major Component and Earnings by NAICS Industry and Table CA5N Total Full-Time and Part-Time Employment by NAICS Industry retrieved from BEA; www.bea.gov, accessed June 7, 2017

Farm earning per job for all years 2001 to 2015 were significantly below average earnings for nonfarm jobs. For example, in 2008 nonfarm earnings averaged $45,378. In 2015 they averaged $55,300, or 2.6 times greater than the average farm job. It is important to note that most farm jobs in Cowlitz County are seasonal while many nonfarm jobs are full-time, so this is a key factor.

Analysis of Land Resource Use

Several recent studies have measured land resource use and capability and they report wide differences in the estimates of agricultural land use. Actual land use is much different than "potential or possible use." Furthermore, it is difficult to determine if grass covered land is used for hay, pasture or is merely idle for any agricultural use. Other uncropped land may also be difficult to categorize. A significant amount of grass land is harvested for hay or haylage[11] or it is grazed by livestock. Grass land can go "in or out" of agricultural production for many reasons, such as: 1) property ownership

[11] Haylage is increasingly popular for grass harvesting. Grass is cut and often chopped and baled in stretch wrapped with plastic at a high moisture content. The hay ferments without spoilage. It has high feed quality with much less risk of rain damage at harvest compared to dry hay baling. The plastic bags can also be stored outdoors which is big advantage over the covered storage requirements for dry hay.

and lease changes affect how fields are managed or used 2) changes in the prices of hay and cattle from year to year 3) the availability of custom hay cutting and baling since many farmers do not have the equipment to cut and bale 4) availability of seasonal hired workers 5) seasonal weather conditions that affect haymaking and or grazing and 6) land owner desire to participate in the agricultural current property tax program.

These factors also affect the utilization of agricultural land for other crops. For example, if farmers consider their property is likely to have development value, they may decrease their farm-related investment in anticipation of future development use. This is particularly true for farmers approaching retirement age who do not have younger family members to take over the farm. Rural property transfers also have a bearing on how acreage is used. More about trends in land use for agriculture is discussed later in this report.

Four sources of data are given in Table 6 to show the wide-ranging estimates of agricultural land resources in Cowlitz County. The first source, WSDA, uses several methods to determine agricultural acreage. WSDA conducts field reconnaissance to verify actual agricultural land use with windshield surveys. This is supplemented with National Agricultural Statistics Service Cropland data and Landsat imagery. The second source is 2017 Cowlitz County land use code data from assessor's records of land in agriculture – current use tax designation. The third source is Washington State Ecology survey data collected in 2010. The final source is aerial photo interpretation of 2011 data by Alsea Geospatial Inc. and is a measure of *potential* land available for agricultural use. This final method shows much more land area because of the emphasis is not on how the land is used. Different years for the data collection is also a factor.

A comparison of agricultural land emphasizes the WSDA and Cowlitz County Assessor's land use code sources can be found in Tables 7 and 8. These tables and accompanying narrative provide more details about the estimates of agricultural land by watersheds.

Table 6. Indicators of Land in Agricultural Use by Watershed in Cowlitz County (Acres)

Source	Lower Cowlitz Watershed	Grays – Elochoman Watershed	Lewis Watershed	County Total
WSDA 2016 Agriculture Land Use	1,106	1,069	6,066	8,241
Cowlitz County Agriculture Land Use Code	2,969	700	4,423	8,091
Washington State Dept. of Ecology - 2010	18,099	5,889	13,461	37,449
Interpretation from 2011 Aerial Photos	46,889	14,149	29,989	91,027

Sources: Washington State Department of Agriculture Crop Location data (https://agr.wa.gov/pestfert/natresources/aglanduse.aspx); Land coded as agriculture by Cowlitz County Assessor's Office; Washington State Department of Ecology Land Use Survey (ftp://www.ecy.wa.gov/gis_a/planningCadastre/wa_landuse.zip); and 2011 orthophotography from the National Agriculture Imagery Program, Farm Service Agency, USDA as interpreted by Alsea Geospatial Inc.

The WSDA analysis is the most current and uses extensive ground-truthing backed by aerial imagery evaluation. The Cowlitz County agriculture land use code data is valuable because property owners choose to place their property in agricultural use and must provide documentation that they meet edibility requirements. It is notable that while there are important variances in the total acres of agriculture land in the three watersheds, these two methods are quite close in the total county agriculture acreage, ranging from about 8,150 to 8,400 acres. Additional land can certainly be used for agricultural purposes, as indicated in other studies, but it is not clear through on-the-ground assessment that owners of these other properties have made investments or intend to achieve commercial agricultural production.

Much of the county's high-value agricultural production is found in the Woodland Bottoms. A comparison was made of the acreage in specific crop production in this area relative to total agricultural production (Table 7). The source of this data is the 2015 WSDA agricultural land use data.

Table 6 shows the Woodland Bottoms have over 75 percent of the county's total production in these crops: berries, flower bulbs, nursery plants, orchards, seed crops and vegetables. In total, about two-thirds of the county's agricultural cropland is in the Woodland Bottoms.

Table 7. Agricultural Land Use in the Woodland Bottoms as a Share of Cowlitz County Total

Crop	Wood-land Bottoms	Cowlitz County	Woodland Bottoms Share of County Total		Crop	Wood-land Bottoms	Cowlitz County	Woodland Bottoms Share of County Total
	Acres	Acres	Percent			Acres	Acres	Percent
Fescue Seed	1,853.5	1,944.0	95.3		Clover Hay	14.2	14.2	100.0
Grass Hay	842.7	1,459.8	57.7		Nursery, Ornamental	13.4	13.4	100.0
Pea, Green	553.4	646.2	85.6		Pumpkin	12.9	12.9	100.0
Caneberry	426.6	426.6	100.0		Nursery, Lilac	9.9	9.9	100.0
Pasture	379.0	1,480.9	25.6		Rhubarb	4.0	4.0	100.0
Wheat	292.8	431.0	67.9		Peony	3.3	3.3	100.0
Blueberry	131.4	131.4	100.0		Walnut	3.2	3.2	100.0
Fallow	123.7	245.7	50.3		Apple	0.7	0.7	100.0
Corn, Field	100.4	100.4	100.0		Christmas Tree	-	115.6	0.0
Developed	94.7	97.5	97.2		Golf Course	-	353.1	0.0
Poplar	61.3	105.0	58.3		Grape, Wine	-	0.5	0.0
Cabbage Seed	50.4	50.4	100.0		Market Crops	-	36.1	0.0
Tulip	44.6	44.6	100.0		Nursery, Holly	-	4.7	0.0
Corn, Sweet	42.1	58.4	72.1		Oat	-	1.3	0.0
Spinach Seed	25.1	25.1	100.0		Silvaculture	-	17.5	0.0
Strawberry	22.9	22.9	100.0		Total	5,106.4	7,860.6	65.0

Note: This data includes some land that in the city limits of Woodland and other incorporated areas of Cowlitz County.
Source: WSDA Agricultural Land Use, 2015 with GIS analysis by CORE GIS.

Agricultural Land Parcels by Watershed

This section reviews the agricultural acreage and number of parcels in the three watersheds. The WSDA and Cowlitz County Land Use Code datasets are used to identify the agricultural land.

Table 8. Agricultural Parcels and Parcel Sizes by Watershed in Cowlitz County Using WSDA Data

Size Category	Lower Cowlitz Watershed	Grays – Elochoman Watershed	Lewis Watershed	County Total
	No. of Parcels			
1 acre or less	3	1	5	9
1.1 - 5.0 acres	25	21	43	89
5.1 – 10.0 acres	12	32	60	104
10.1 – 20.0 acres	13	23	30	66
20.1 – 40.0 acres	8	11	42	61
40.1 or more acres	11	4	53	68
Total Parcels	72	92	233	397
	Acres			
1 acre or less	1.9	1.3	2.5	5.7
1.1 - 5.0 acres	61.0	72.4	1150.0	283.4
5.1 – 10.0 acres	106.5	193.3	367.0	666.8
10.1 – 20.0 acres	165.3	328.3	448.0	941.6
20.1 – 40.0 acres	221.0	273.2	1,222.8	1,717.0
40.1 or more acres	550.6	200.2	3,875.6	4,626.4
Total Acres	1,106.2	1,068.7	6,065.9	8,240.9
Ave Parcel Size	15.4	11.6	26.0	20.8

Note: This data includes 71 agricultural parcels that are within city limits of incorporated areas.
Source: WSDA 2015 with GIS analysis by CORE GIS

Table 9. Agricultural Parcels and Parcel Sizes by Watershed in Cowlitz County Using Cowlitz County Code Data

Size Category	Lower Cowlitz Watershed	Grays – Elochoman Watershed	Lewis Watershed	County Total
	No. of Parcels			
1 acre or less	13	9	6	28
1.1 - 5.0 acres	26	23	25	74
5.1 – 10.0 acres	23	12	48	83
10.1 – 20.0 acres	29	11	28	68
20.1 – 40.0 acres	28	10	37	75
40.1 or more acres	22	2	34	58
Total Parcels	141	67	178	386
	Acres			
1 acre or less	7.4	6.9	3.2	17.6
1.1 - 5.0 acres	81.6	67.0	82.7	231.2
5.1 – 10.0 acres	163.5	76.6	322.5	562.7
10.1 – 20.0 acres	421.9	175.5	403.7	1,001.1
20.1 – 40.0 acres	843.8	278.6	1,052.2	2,174.5
40.1 or more acres	1,450.5	95.1	2,558.7	4,104.3
Total Acres	2,968.7	699.7	4,423.0	8,091.4
Ave Parcel Size	21.1	10.4	24.8	21.0

Note: This data includes agricultural parcels that are within city limits of incorporated areas.
Source: Cowlitz County Land Use Code data from Assessors Records, with GIS analysis by CORE GIS.

The data in Tables 8 and 9 shows differences for each watershed in the number of estimated agricultural parcels and their size, but the totals are remarkable similar. For example, for the three watersheds combined, the WSDA data shows a total of 397 parcels adding to 8,241 acres with an average parcel size of 20.8 acres. The Cowlitz Land Use code data for parcels in agricultural current use taxation shows 386 parcels totaling 8,091 acres with an average parcel size of 21.0 acres.

The differences are much more pronounced when comparing the results for each watershed. This is a summary of the differences in the calculations for the two datasets at the watershed level:

- The Lewis Watershed has the most agricultural land in both data sets, but the WSDA data estimates that there is 6,066 acres of agricultural land, 1,643 acres more than the Cowlitz Code Data shows (4,423 acres). One possible explanation is that with Woodland's urban and industrial growth pressure some agricultural land owners prefer to keep their land out of the agriculture current use program if they plan to sell soon or convert their land to non-agricultural use.
- The Lower Cowlitz Watershed has 141 parcels enrolled in the ag current use program which is 69 more (about double) the 72 parcels that are reported in the WSDA data. This adds up to

1,863 more acres in ag current use in the Lower Cowlitz Watershed than are identified as agricultural land in the WSDA data. Due to the large number of small parcels in the Lower Cowlitz – which are hard to identify for agricultural use – this may be expected. None-the-less it might be useful for the county to take a closer look at a sample of these very small parcels to verify accuracy of program eligibility.

- Data from the two sources comes closest to agreement for the Grays Elochoman Watershed. The WSDA agricultural land totals 1,069 acres (in 92 parcels) and the Cowlitz County Code data totals 700 acres (in 67 parcels).
- Nineteen more parcels of one acre or less are enrolled in the ag current use program than WSDA indicates are used for agriculture. The acreage difference is negligible at 12 acres. Due to the difficulty of determining agricultural use on very small parcels there may be no issue with determination of agricultural-related use in the agriculture current use program.
- Estimates in the two data sets are reasonably close in the size category of 1.1 to 5 acres. The WSDA reports 52 more acres in agriculture use than the county code data.
- At the very largest size category of 40 acres or larger, the two data sets are not far apart. The WSDA data shows 68 total parcels with 4,626 acres in the three watersheds and the county code data shows 58 parcels with 4,104 acres. The key point is that in both data sets about half of the total agricultural land is in parcels of 40 acres or more. leading

Crop Sector Review

Berries

For many years berry crops have been a leading high-value crop category produced in the Woodland Bottoms. Berries, especially raspberries for processing, remain especially important. One large grower has a long-term commitment to grow and process raspberries along with other fruits in their modern freezing plant in the Bottoms. Blackberries and blueberries are also grown in the Bottoms and are processed there. Historically strawberries were the fourth berry crop, but they are nearly gone.

Growers of raspberries and blackberries with larger acreages who process their crop have the advantage of using mechanical harvesters. This reduces the risk that a shortage of harvest workers could prevent timely harvest of this highly perishable crop. No mechanical harvest method exists for strawberries, and blueberry mechanical harvesting is in its infancy.

The number of berry growers in the Bottoms has diminished significantly over time, but those who remain plan to remain in business, so long as they can complete with other countries. Sufficient labor supply that allows growers to remain competitive and profitable is a challenge that could change the outlook for the remaining farmers.

Vegetables

The WSDA data is the most reliable way to estimate the acreage growing vegetables in the county. Most farms that raise vegetables have a diversified crop portfolio and the mix of crops change yearly with market demand and grower prices. There is also the need to rotate crops for soil health and disease suppression. Carrots, peas, sweet corn, and beans are some of the main vegetable crops that larger farms have produced in the Bottoms for processing and in a few cases, fresh markets. These crops are slowly giving way to other crops such as grass seed and vegetable seed. A major reason for this shift is that large-scale, highly specialized vegetable producers outside of Cowlitz

County have a low-cost structure that medium to smaller size growers like those in the county cannot easily compete against. These large-scale growers are in California, Eastern Washington, Eastern Oregon and elsewhere and are favored with better growing conditions and nearby processors, giving them significant economic advantage.

In other areas of the county, smaller diversified farms grow vegetables for fresh market sales. These growers usually have five acres or less in production and they emphasize direct customer sales. These growers typically cannot specialize, and tend to grow tomatoes, lettuces, cucumbers, carrots, beans, carrots, and other vegetables based on buyer interest. Some small growers also have tree fruits or berries, and/or sell nursery plants or flowers. In a few cases they also have commercial kitchens and sell specialty jams or other preserved foods. Outlets include local farmer markets, on-farm sales via Community Supported Agriculture (CSA) customers and other buyers and perhaps direct delivery to retail or food service outlets.

Vegetable producers need irrigation, and deep, fertile soil, and may use greenhouses to extend their markets with early spring planting through to late fall sales. These growers are reported to be on the rise, but only a small number were identified during this study.

Some small-scale growers specialize in growing pumpkins, sweet corn squash and fall root crops, especially if they want to attract tours with school children and visitors in the fall for "agri-tainment or agri-tourism." One of the largest of these growers has had over 20 acres in this specialty and they are phasing out of this business due to age. Smaller farms will likely replace some of this market loss but it is not possible to determine if this is a growing segment of agriculture in Cowlitz County now.

Ornament and Native Plant Nurseries

Ornamental plant nurseries cover many types of growing operations, from greenhouses to open field container nurseries and on-site retail garden centers. This has been a stable and slightly expanding sector that relies on local sales to a large extent. Sales go to home owners for residential landscapes as well as government and related parties for restoration of public and private commercial sites. Nurseries sell a wide range of annual and perennial plants such as annual flowering plants, native plants, herbs, produce (food plant starts), berry plants, ground covers, and many types of trees. To compete in an environment of "big box" home improvement stores, small nurseries have tended to either offer a very large range of plant materials and services to appeal to a larger group of customers or getting very specialized to carve a niche.

The 2012 ag census shows 29 businesses in the county with nursery and related plants totaling sales of over $4 million.

Christmas Trees

Christmas trees are grown in many locations and on a variety of different sized parcels in the county. Well drained soils are considered best but site selection is highly dependent on the tree species. Some species grow optimally on higher elevation sites. However Noble firs are one such high elevation species that was observed on a tree farm near the lower reaches of the Cowlitz River. With the right management, the geographic range for production is wide.

The WSDA data shows about 235 acres in commercial tree production. Most of this is likely in Christmas trees. The 2012 ag census indicated the Christmas tree value of just $122,000. Annual sales can vary widely depending on the age of the trees and their readiness for sale. U-cut Christmas trees

are often an important outlet for smaller growers. Cowlitz County is somewhat disadvantaged for direct customer sales due to its smaller urban population in comparison to nearby Clark County.

Beef Cattle

The latest ag census reports that Cowlitz County had cattle and calves' sales of $1.2 million (2012). Discussions with some livestock operators indicate that there are five or fewer operations with more than 50 head of cattle. It is typical to have less than 10 cattle on small acreages. There are several reasons for this: 1) Cattle can be raised on grass but the cost of grain and higher energy feedstuffs such as alfalfa used to finish beef cattle have be trucked in at high cost 2) Larger herds need more acreage and land costs are driven up by rural population pressure, while central and eastern Washington have far less costly land for grazing. Large pastures are not common so trucking cattle between fields is a management constraint. 3) A few head of cattle are quite easily managed as an evening or weekend sideline with minimal specialized equipment but larger herds need more labor and greater management expertise 4) Forage management is a key to success in raising cattle and many newer rural land owners do not have this expertise 5) Butchering and cut and wrapping is a challenge with only two small mobile butchers operating in the county and 6) Beef cattle are typically kept for personal consumption, sold to neighbors or sold at the Chehalis livestock auction market. These are "thin" markets that often lead to lower sale prices.

Cowlitz County has one livestock slaughter facility, and some cattle are sold there. Most local cattle producer do not deliver to this facility because it specializes in buying truckloads of cattle from large livestock operations from outside the county. The mobile butchers are not USDA inspected and they can only kill, cut and process beef or other livestock for the owner of the animals. This means the buyer must have ownership of an animal before processing, which limits the sales.

Cow Dairies

Historically cow dairies were a much larger part of Cowlitz County agriculture. The dairy industry has steadily declined with just two remaining dairy farms in the county, both in the Woodland Bottoms. Both dairies sell their milk to processors outside the county since there is no local milk processing. One raw milk dairy farm recently produced and bottled milk but they are out of business.

Dairy farmers point to several reasons for the decline: 1) Milk prices are set by a complex formula weighted by supply and demand. Farm prices for milk have been trending lower for three years. 2) Large dairies are re-locating to lowest-cost areas for feed and labor (such as Southern Idaho and parts of Eastern Washington and Eastern Oregon) 3) New large dairies are using economies of scale to take ever-larger share of milk supply from small dairies and 4) Dairies have fewer environmental challenges in drier climate regions where manure management is less costly.

The advantage for western Washington dairies is their proximity to markets. However, this advantage has not offset the negative factors mentioned above.

Poultry & Eggs

Table 4 ag census data indicates that over 50 farms reported that they have poultry meat or egg production in 2012. However, the nondisclosure of sales in 2012 illustrates that few, large broiler operations remain. Interviews with farmers point out that only three large broiler production farms remain and one of these is owned by the broiler processor in Longview. Large volume broiler chicken growers raise birds under contract for large companies known as integrators. The growers receive chicks, feed, transportation, veterinary service and technical guidance from integrators. The growers

receive a contract fee to raise the chicks to market weight. One of the main long-term investments by growers is broiler housing. Outdated or otherwise substandard housing is one reason for some Cowlitz growers going out of business. USDA reports that there is also substantial risk on the part of growers because of the highly competitive contracts that integrators offer growers. Because of the presence of the large broiler processors in Cowlitz County, it is possible that new growers would be attracted to the area. The issue would be if they have the capital to purchase land and construct housing for such a competitive business.

The remaining growers are small scale and emphasize egg and poultry meat production from chickens, ducks and other fowl. Some are also raising other livestock such as cattle. These small-scale producers tend to have direct market outlets, selling to neighbors, at the local farmers markets, or on-line.

Horses, Ponies and Other Equine Animals

The 2012 Census of Agriculture estimates that there were 28 farms with just $79,000 in sales for the equine category in the county. Sales were reported to be down from $508,000 in 2007 on 36 farms. The reason for the large variance in sales value over the five-year period is not known. The number of properties with horses is probably much larger that the number of farms because the ag census is sent to persons who are identified as "agricultural producers", not every horse owner. However, the relevant question is not the total number of horses in the county but how many properties with horses can be considered part of commercial agriculture? Owning or renting enough acreage to pasture a few horses is outside the definition of commercial agriculture.

The equine sector is an important source of demand for agricultural crops such as grass hay and grain. The sector contributes to agriculture and rural agricultural land use. Demand for feed also adds pasture land for commercial horse operations such as commercial horse breeding operations and for grass hay production.

Aquaculture/Fish Farms

The ag census in both 2007 and 2012 shows there are between 9 and 11 aquaculture farms with sales ranging from 2.2 to $2.5 million.[12] However, no privately-operated Cowlitz County fish farms were identified during this study and IMPLAN economic data, which draws from a variety of sources including the ag census, does not show commercial aquaculture production.

Food Processing

A small number of firms comprise Cowlitz County's primary food processing industry. These firms include a frozen berry packing plant, a large broiler chicken processor, a large beef processing plant, four small custom slaughter and/or meat cut and wrap businesses. There is also a pet food producer in Woodland Washington. These businesses constitute what are referred to in this report as primary food processing companies. They are distinguished from secondary processors because they procure relatively large volumes of food ingredients for further processing. Secondary food processing would include small manufacturers of bakery products, ice cream, pizza dough, jam or other specialty foods that typically purchase ingredients from food wholesalers.

[12] Aquaculture is defined in the Agriculture Census as the farming of aquatic organisms, including baitfish, crustaceans, food fish, mollusks, ornamental fish, sport or game fish and other aquaculture products. Farming involves some form of intervention in the rearing process and farming implies individual or corporate ownership of the stock being cultivated in a controlled environment at least part of the time. Fish, shellfish, and other aquatic products which are caught or harvested by the public from non-controlled waters or beds are not included as aquaculture farms.

Two food processors are unique in that they are vertically integrated. This means they are in-county growers as well as processors. However, each firm also purchase a significant amount of food inputs from other sources that are grown outside the county. The custom meat slaughter and cut and wrap operations process mainly beef from local farms but some of their business also includes processing deer and other game animals from hunters.

Agricultural Support Activities and Food Distribution

Food processing utilizes services from other businesses. Most technical services required by the primary food processors discussed above are procured from specialized firms that do not have operations in Cowlitz County. Examples are firms that sell specialized equipment or offer repair services, plant sanitation services, solid waste management, water and product quality laboratory testing, legal services and many types of human resources support. Food processors use local services such as motor and pump repair, electrical repair, local trucking, vehicle purchases and maintenance, temporary labor services and general supply purchases. Most packaging supplies are procured from firms outside of Cowlitz County.

The larger food processors sell most of their finished products to customers outside of Cowlitz County. The large processors have some trucking capability but also contract with third party trucking companies for scheduled transit of their products to distribution centers and major buyers located outside Cowlitz County. These transportation services are provided by both local and non-local firms.

The small custom meat slaughter and cut/wrap businesses use a high percentage of local services. However, they also have specialized product and services needs that are not sourced from within the county.

Secondary food processing in Cowlitz County includes local bakeries; jam, condiment, pickled products processors; as well as craft breweries, distilleries and at least one winery. These firms utilize both local and non-local services. Demand is increasing for quality, local food and beverages. This segment of the food system is expected to grow and part of this growth is dependent on having local supplies. In this case local supply includes all Southwest Washington.

Agricultural Land in Critical Areas

Analysis shows that much of the agricultural land in Cowlitz County is within critical areas. VSP considers five general types of critical areas: wetlands, frequently flooded areas, geologically hazardous areas, fish and wildlife habitat conservation areas and critical aquifer recharge areas. There are many sub-categories to further define crucial areas.

Cowlitz County does not have a critical area ordinance (CAO) as part of its development regulations. In Washington counties with a CAO, exemptions are usually available for certain agricultural activities.[13]

[13] See Critical Areas and Agriculture: Regulations and Development, by Washington State Department of Commerce, December 2016.

The greatest concentration of agricultural land in critical areas is in the Woodland Bottoms and Willow Grove. Of these two areas, the Woodland Bottoms are much larger and have more critical areas.

An interesting third area is the pocket of agricultural land to the west of Castle Rock along Arkansas, Baxter, and Whittle Creeks, and to a lesser extent, Delameter Creek. There are prime soils, significant areas with wildlife habitat, floodplain, liquefaction, mine hazards, and other critical areas. This smaller agricultural area is predominantly livestock based. A fourth area that might bear potential further consideration is the pocket of agriculture south of Vader between Olequa Creek and the Cowlitz River. It has a mix of crop and livestock-based agriculture with some of the same characteristics as the area west of Castle Rock.

Measured by agricultural parcels using WSDA data, the most commonly found critical areas in Cowlitz County are: critical aquifer recharge areas, geologically hazardous areas (liquefaction), wetlands, geologically hazardous areas (steep slopes), and fish and wildlife habitat conservation areas (fish bearing streams). Table 10 identifies the full distribution of the parcels by watershed.

In this section of the report, agricultural properties that are within incorporated areas are excluded from consideration. This was done because VSP is only available in unincorporated parts of the county.

Table 10. Agricultural Parcels Within Critical Areas by Type and Watershed

Critical Area	Lower Cowlitz Watershed	Grays – Elochoman Watershed	Lewis Watershed	County Total
	No. Parcels			
Geologically Hazardous Areas				
Liquefaction	42	89	159	290
Steep Slope	5	16	86	107
Volcanic	31	0	0	31
Unstable Slope	4	0	1	5
Landslide	3	0	1	4
Scarps	3	0	1	4
Earthquake	0	1	2	3
Wetlands				
Wetlands	27	66	71	164
Fish & Wildlife Habitat Conservation Areas				
Fish Bearing Stream	15	4	81	100
Fish Distribution	16	0	48	64
Shoreline	23	42	16	81

Critical Area	Lower Cowlitz Watershed	Grays – Elochoman Watershed	Lewis Watershed	County Total
Murrelet Buffer	16	0	0	16
Spotted Owl	0	0	10	10
Plants	4	0	0	4
PHS Occurrence	0	2	0	2
Frequently Flooded Areas				
Floodplains	35	6	8	49
Critical Aquifer Recharge Areas				
Critical Aquifer Recharge Areas	0	0	44	44

Sources: See Appendix A

Measured by the WSDA identified agricultural parcels, about 90 percent of all agricultural land (290 parcels) in unincorporated areas have liquefaction hazard, the most common critical area factor in the county. About 50 percent of all ag parcels (164 parcels) have wetlands, the second most common critical area designation. The third highest ranking critical area category is proximity to fish bearing streams, which includes 100 parcels or about 30 percent of all ag parcels identified.

A series of maps follow to show the general location of critical areas in the county. Figure 6 displays wetlands, floodplains and aquifer recharge areas. Figure 7 displays fish and wildlife habitat conservation areas. Figure 8 shows the geologic hazards. Figure 9, displays the number of critical areas categories on each agricultural parcel. Note that the Woodland Bottoms have a high incidence of multiple categories on the agricultural land

Table 11 shows the linear feet of salmon bearing rivers and streams that are near agricultural parcels.

Figure 6. Critical Areas: Wetlands, Floodplains and Aquifer Recharge

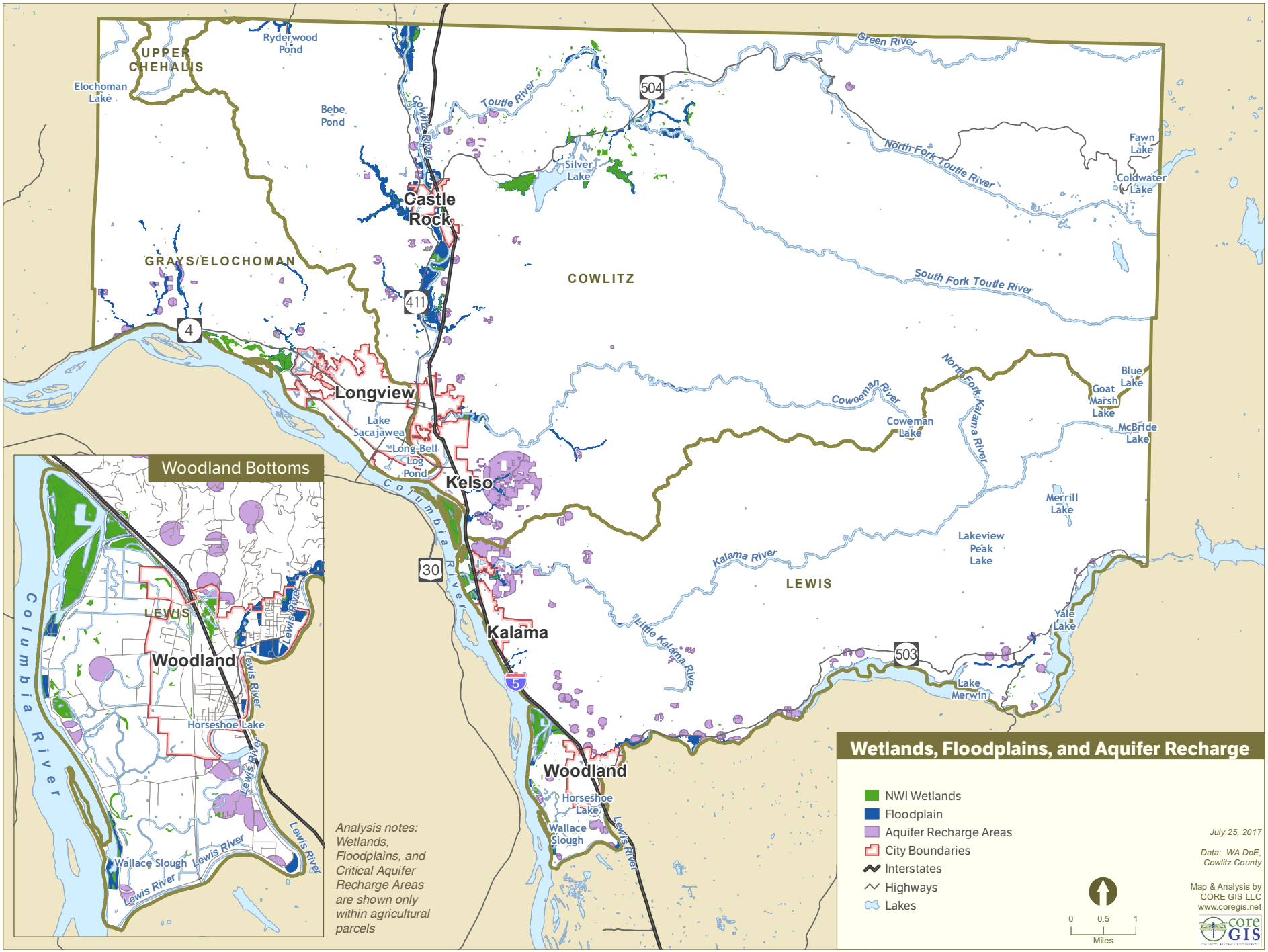


Figure 7. Critical Areas: Fish & Wildlife Habitat

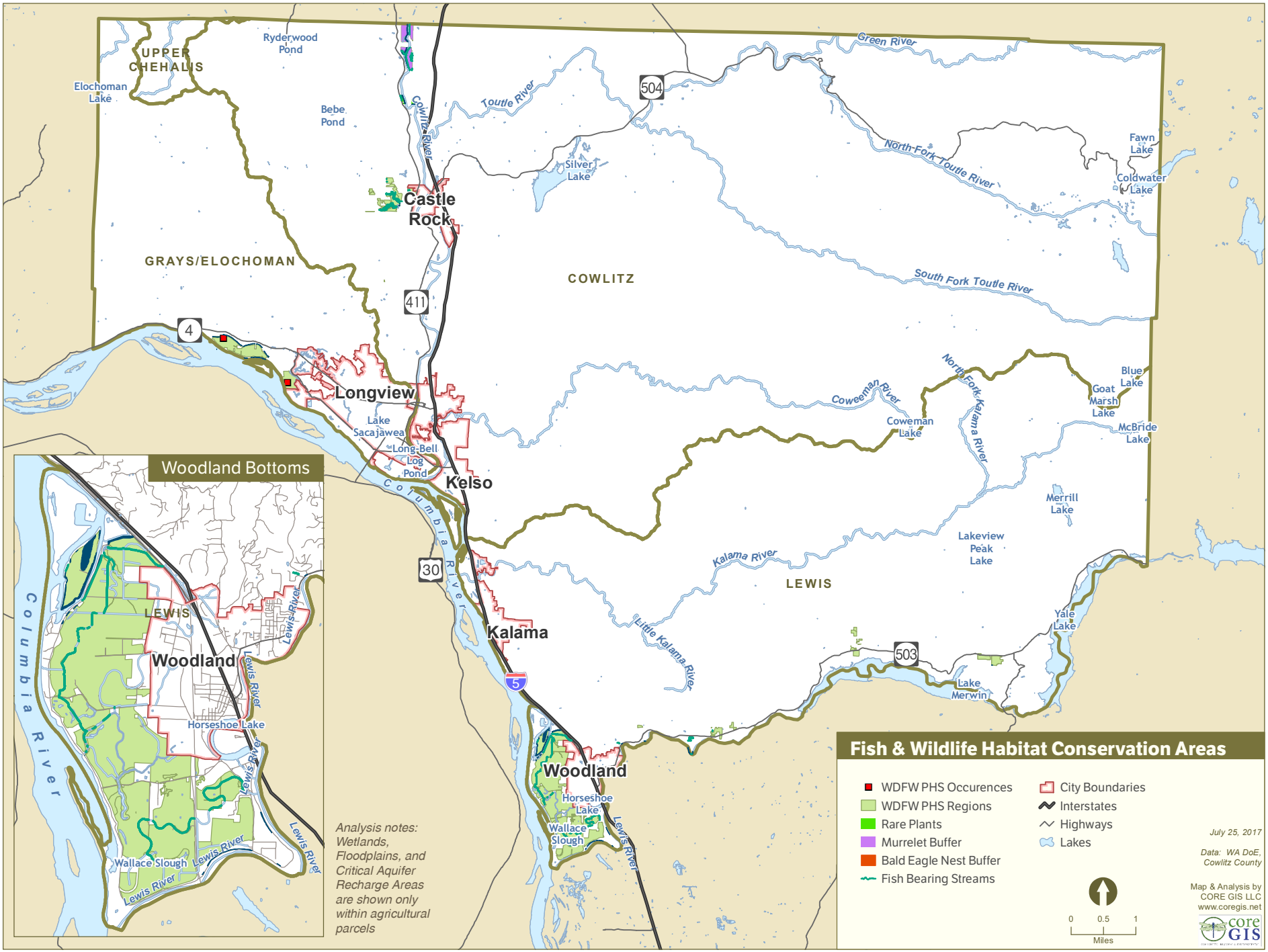


Figure 8. Critical Areas: Geologic Hazards

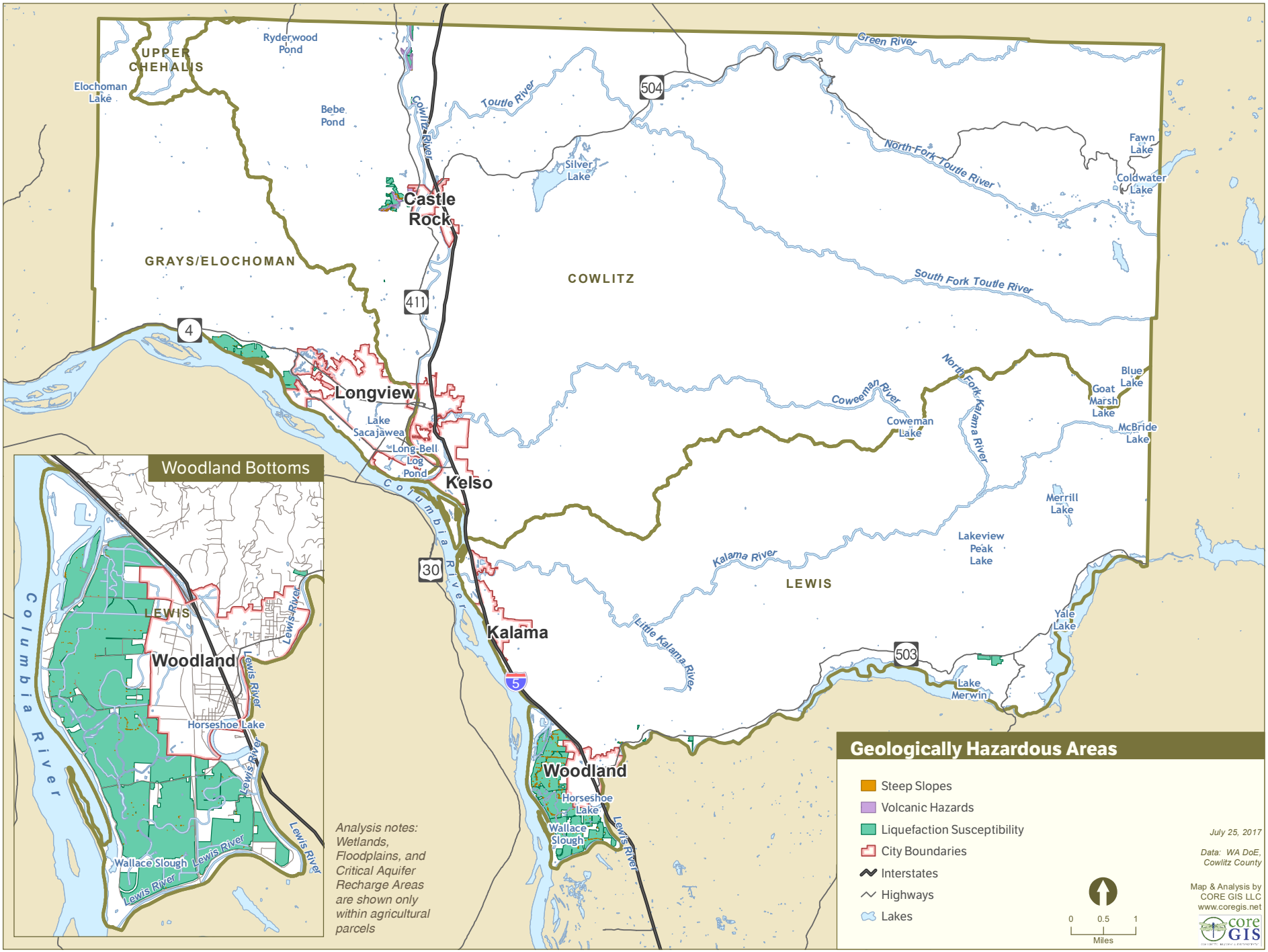


Figure 9. Count of Critical Area Categories Per Agricultural Parcel

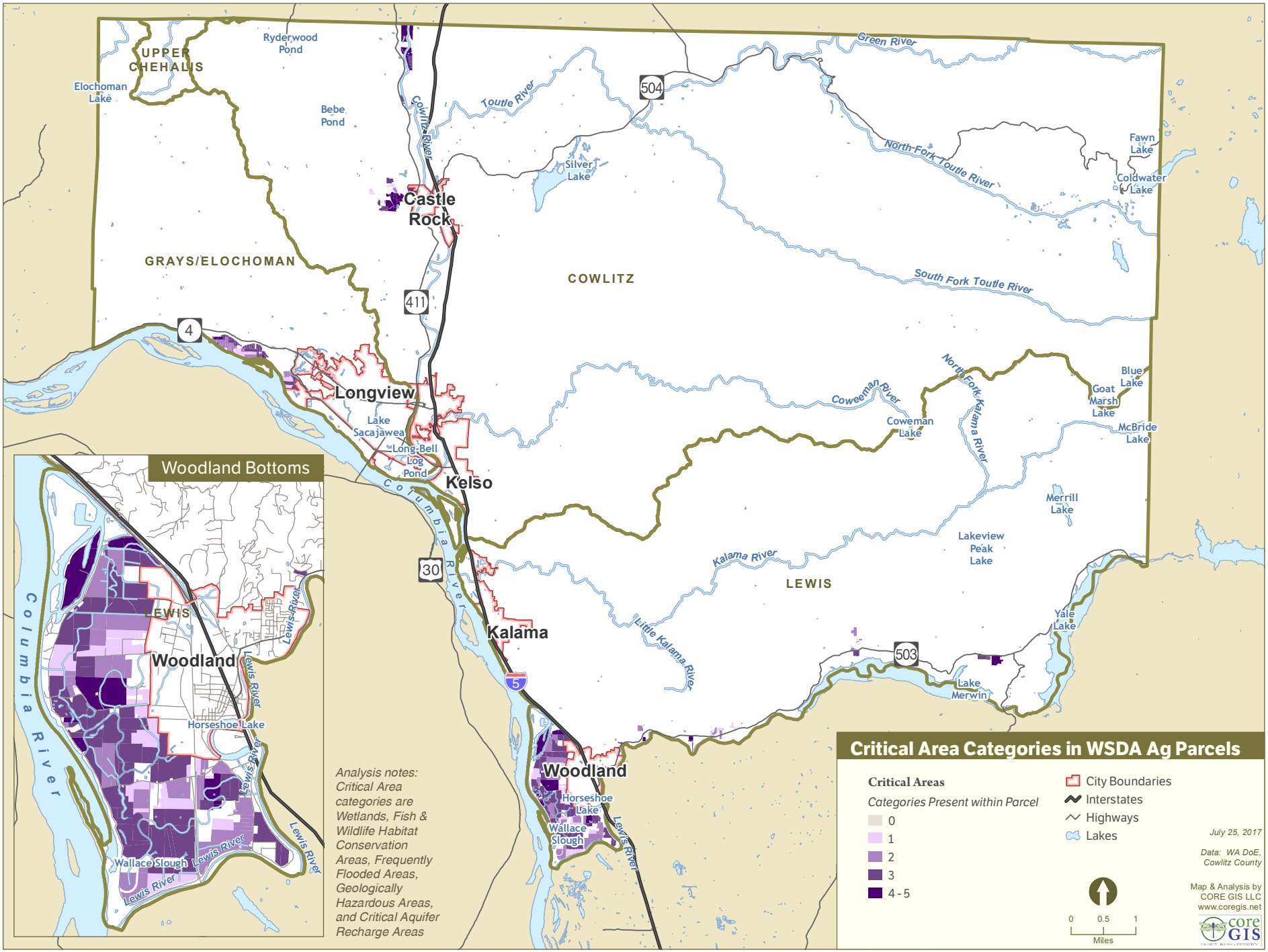


Table 11. Lineal Feet of Salmon Bearing River Stream Banks Near Agricultural Land by Watershed and Sub-Watershed

Watershed	Sub-Watershed	Linear Feet
Cowlitz	Coweeman River	-
Cowlitz	Green River	-
Cowlitz	Jackson Prairie-Cowlitz River	16,268
Cowlitz	North Fork Toutle River	-
Cowlitz	Ostrander Creek-Cowlitz River	72,384
Cowlitz	Outlet Creek-Toutle River	
Cowlitz	South Fork Toutle River	
Grays-Elochoman	Cathlamet Channel-Columbia River	999
Grays-Elochoman	Germany Creek-Frontal Columbia River	341
Lewis	Kalama River-Frontal Columbia River	69,275
Lewis	Lower Lewis River	51,472
Lewis	Middle Lewis River	-
	Total	210,739

Note: This data excludes agricultural parcels that are within city limits of incorporated areas. Agricultural parcels are from the WSDA agricultural land dataset. Salmon bearing rivers and streams were buffered by 50 feet and measured as lineal feet of both banks within intersecting parcels.
Source: Washington State Department of Agriculture – Agricultural Land Use Survey, and Washington Department of Fish & Wildlife Priority Habitats and Species (see http://wdfw.wa.gov/mapping/phs/)

Economic Impact Analysis

An "IMpact Analysis for PLANing" (IMPLAN) economic impact model of Cowlitz County was utilized to determine the economic contributions of Cowlitz County agriculture to the local economy. The total impact was determined by measuring agriculture's direct, indirect and induced impacts. In this analysis, direct economic contributions originate at the farm level: i.e. this is measured by the number of jobs at the farm level. Another direct impact from the sales of local farm products going to food processors. Indirect effects are the local purchases by farmers for their production. These purchases set off successive rounds of further interindustry purchases in the county economy. Finally, the induced effects measure the spending of households due to the added labor income. The IMPLAN model excludes all non-local purchases (i.e. purchases made outside the county) by farm and food processing businesses. The model also excludes household spending that takes place beyond the county. See Appendix B for a brief discussion of the impact analysis methodology.

A relatively small amount of local farm production goes to food processors in the county. If that production was not available, there would be a decline in processing output. This analysis determined that the principal loss would be for fruit and chicken processing. This local supply loss would have at least a short-term impact on output and income of food processors. This may be short-term because processors could adjust by sourcing more raw product from farmers in other areas.

One local fruit processor packs their own berry fruit crops that are grown in the Woodland Bottoms with additional fruit purchases from outside the county. If they did cease producing their own fruit, they would either decrease total output or pay to transport "replacement" fruit to their Cowlitz County processing facility. In another case, the large chicken processor mainly processes broiler chickens grown outside of the county, but they do have their own local growing houses and they currently purchase from one local broiler producer. A small decline in broiler output is assumed for this analysis based on these conditions.

The latest data available for the Cowlitz County IMPLAN model is 2015. The results are presented in 2015 dollars. Inflation has been negligible since that time so the results fairly represent current conditions.

Some modifications have been made to the IMPLAN data set to more accurately represent agriculture in the local economy. Based on discussions with local farmers and livestock producers, adjusted estimates for employment, compensation and/or economic estimates in the following farm-level sectors were made: grain farming, vegetable farming, fruit farming, greenhouse/nursery/floriculture production, all other crop farming, beef cattle ranching and farming and animal production other than cattle, poultry and eggs.

In food processing sectors, adjustments were made for these sectors: frozen fruits, juices and vegetables manufacturing and animal slaughter except poultry and meat processing from carcasses. Impacts at the processing level were limited since relatively little local production goes to the local processors, except for frozen fruit. The resulting direct economic impact at the processing is quite minimal. Furthermore, in the absence of local supply, food processors could replace this decline with production from other areas beyond the county boundary. In that case, the decline in output might not be a factor in a relatively short time after new suppliers are found. Such possibilities also depend on the strength of final demand for the products manufactured by Cowlitz County food processors.

Table 12 shows the employment and income related impacts associated with agricultural production. The analysis indicates that agriculture supports about 522 jobs directly in the county. It also supports about another 119 jobs from indirect activity and finally about 63 more jobs in induced (household spending) activity. This adds up to just over 700 total jobs.

Labor income is also shown in Table 12. Farm jobs, which are largely seasonal, add about $10.27 million to the local economy according to the analysis. Average earnings including benefits per job are slightly more than $21,100. At the food processing level, the jobs that are dependent on local farm production generate pay and benefits of about $47,500 on average, or more than double the farm level compensation because a much higher proportion of food processing jobs are full time and many also have a higher average hourly wage. Indirect and induced jobs also pay much more than farm level jobs. In total with all impacts combined, agriculture contributed about $20.57 million to Cowlitz County's economy.

Table 12. Estimated Employment and income Impacts of Agriculture on the Cowlitz County Economy

Source of Impact	Jobs	Labor Income	Average Income per Job
Direct – farm level	486	$10,272,000	$21,135
Direct – food processing level	36	$1,712,000	$47,560
Direct - total	522	$11,984,000	$22,960
Indirect impact	119	$6,066,300	$50,980
Induced impact	63	$2,523,900	$40,060
Total Impact	704	$20,574,200	$29,225

Source: 2015 Cowlitz County IMPLAN data as modified by Globalwise.

Output generated by agriculture in Cowlitz County is given in Table 13. The table shows that the adjusted IMPLAN model estimates the total value of farm level output was approximately $63.7 million in 2015. If Cowlitz County food processors lost their local supply of farm production, the IMPLAN model estimate is that processing output would decline by $13.5 million, causing the total direct output loss of $77.2 million. This direct loss of output would then ripple through the county economy and cause further losses of $13.5 million in output from other business and a decline of $8.3 million in output associated with the reduced household spending.

Note that the decline in food processing output is only a fraction of total food processing output. This is because most of the raw farm products used by the food processors comes from outside the county. Consequently, the food processing industry is much larger than what is reported here.

The levels of employment, compensation, and output for specific food processing sectors are not reported here to avoid disclosure of proprietary business information.

Table 13. Estimated Output Impacts of Agriculture on the Cowlitz County Economy

Source of Impact	Value of Output
Direct – farm level	$63,704,000
Direct – food processing level	$13,539,000
Direct – total	$77,243,000
Indirect impact	$13,474,000
Induced impact	$8,258,000
Total Impact	$98,975,000

Source: 2015 Cowlitz County IMPLAN data as modified by Globalwise.

IMPLAN results include estimates of tax payments for all sectors of the economy. However, the data in the original IMPLAN model for the county appeared to underestimate the tax payments at the farm level and may have overestimated tax payments at the food processing level. There is insufficient data to provide more accurate levels of tax payments in this study. It is notable that the number of parcels receiving reduced property taxes in the agricultural current use program exceeded parcels determined to in agricultural use by the WSDA data set. This may mean that some properties are receiving reduced taxes which do not meet income guidelines. This is further discussed in the recommendations section.

Recommended Metrics

Benchmarks to measure the performance of agriculture are a valuable management tool for VSP programs. Cowlitz County is considering many appropriate metrics for this assessment. Criteria to evaluate the metrics are suggested here, followed by the final recommendations.

It is recommended that for usefulness, the selected metrics should meet two primary criteria. First, they should be well-defined and qualifiable with a reasonable degree of effort. Second, they should be crucial to the long-term vitality of agriculture in the county.

Using these guiding principles, the initial set of metrics considered by the VSP workgroup were reviewed. Other metrics were also considered. The final set of recommended metrics are given below.

1. *Number of farmers*. The most apparent signal of vitality is if new farmers enter agriculture or take over for those who are leaving the industry. This can be measured from the agricultural census every five years. It is desirable to collect this data more frequently by adding demographic questions to the agricultural current use tax program application, unless this is prohibited by the state. Other demographic questions related to metrics could also be added the agricultural current use tax program application.
2. *Farming as the primary occupation*. This is a good demographic measure of farming trends. This can also be measured from data collected in the ag census. The 2012 ag census reported that 47 percent of those reporting said farming was their principal occupation (230 out of 492). In 2007 44 percent reported farming as their primary occupation (213 out of 481). Primary occupation is likely to be more accurately reported than full time versus part time work status.
3. *Age of farmers*. Another demographic element that is crucial for agriculture to succeed is to have younger farmers stepping in to the industry. The average age is valuable the numbers by different age ranges has great value. Cowlitz County could request member data from the local Farm Bureau or seek data from the ag current use program. In 2007 the average age of farmers was 58.6 and rose to 59.5 in the 2012 ag census. It is recommended that farmers be categorized by those under age 40, those between age 40 to 60 and those over 60. Farmer age should also be cross tabulated with farming as the primary occupation. The ag census is currently the source for this metric.
4. *Number of farmers and number of new applicants to participate in Cowlitz County Conservation District Programs*. Cowlitz County has a strong conservation district program. Participating farms are an indicator of good farm management and awareness of environmental impacts. This data can be provided from records kept by Cowlitz County Conservation District. This

data can also show the extend that farms are participating in USDA farm conservation programs.

5. *Total farm acreage as measured by the Washington State Department of Agriculture*. On a frequent basis (approximately every three years) WSDA does a comprehensive survey of agricultural land use in Cowlitz County. Changes in acreage in each measurement period is a primary indicator of the change in the productive farmland base of the county.
6. *Total acreage and acreage withdrawals from enrollment in the Cowlitz County agriculture open space tax program*. Property owners can voluntarily enroll in the county's agricultural current use program with proof of the minimum required farm earnings for eligibility. Together with the WSDA acreage data this is a measure of land use intended for long-term agricultural use because land withdrawn is subject to back taxes when removed. Property withdrawals from agriculture current use is likely to be permanently removed from agricultural production and are a key metric to evaluate viability of agriculture.
7. *Net farm income*. Net income is the strongest single economic indicator of business vitality. The Bureau of Economic Analysis collects this annually at the county level. During this study, we determined that some subsectors of agriculture in Cowlitz County appear to not be accurately reported. However, this is the only annual published source and it should capture the trend, if not the absolute level of net income. To account for annual changes in commodity prices, it is recommended that this metric be calculated as a 3-year moving average to smooth out highs and lows from any individual year of price or volume variation.
8. *Total farm employment and percentage of total county jobs*. The jobs data reported by the Bureau of Economic Analysis is an indicator of economic strength and should be tracked. However, current trends indicate that farms will continue to substitute machines for human labor as the supply of farm labor shrinks, labor costs rise and technology innovation continues. It is recommended that employment be tracked for community support of agriculture but not as a necessary component to measure vitality.
9. *Number of farms engaged in direct marketing*. Direct marketing is a good indicator of strong marketing and higher gross returns compared to commodity and wholesale sales. This can be calculated from contact with farmers markets within the county, and checking with specific, known outlets such as direct retail placement, and checking for website sales. Currently the best estimate is that 7 to 12 Cowlitz County farms are selling their own products in farmers markets or other public venues. The number that sell products, especially eggs, live animals, directly to customers or to retailers is much larger but not known. In this metric farmers who sell in direct markets outside Cowlitz County should also be counted.
10. *Number of food and beverage retailers and restaurants participating in "buy local*." Currently the number of stores and restaurants that buy locally is very low (probably less than 5). Monitoring any change in this sales channel is a useful metric. Perhaps the expansion of local craft breweries and distilleries that increase their sales and add food to their offerings can lead to the change in this sales channel.
11. *Expansion of "buy local food" campaigns*. Cowlitz County has a strong school gardens program and on-going effort to promote local farmers markets. Very few restaurants feature locally grown foods. As a narrative (non-quantified) metric, any changes in "buy local" should be monitored to check on the shift in consumer attitudes which will result in greater demand for local food products.
12. *Programs to assist agricultural and food entrepreneurs*. Interviews indicate that the smaller size farm operators tend to have little awareness of how their operations impact environmental

outcomes. Outreach programs are therefore important. Cowlitz County has a strong conservation district and it works closely with NRCS. A recommendation is offered below to expand planning and outreach by these agencies. Tapping more program resources would help expand farmer knowledge and awareness so monitoring the availability and use of these programs is a useful metric. In part, this metric is covered in item 4 above.

13. *Number of manufacturers and food processors in the county and number of jobs*. Although currently most primary food processors do not reply mainly on local farms for their food input needs, processors remain a key part of the food industry and they strengthen local agriculture by their presence. A period count of primary food processors who include local farm product purchases is a useful metric. This could be conducted by contact with the known processors and in cooperation with the Cowlitz Economic Development Council.

Other Conditions Affecting Long-Term Viability

The global food system is large, complex and changing rapidly. Cowlitz County agriculture is part of this system and is directly impacted by actions of producers both within the county and elsewhere. Consumer purchase choices and government regulations and policies are other factors.

Specialized Technology and Large-Scale Production

Large agri-businesses are playing an ever-greater role in food production and markets. They adopt the latest technologies and often enjoy economies of scale. An example is precision farming, where fields are digitally-mapped so that inputs such as seed, fertilizer and water are delivered to achieve optimal yields. Labor can be minimized to further achieve maximum economic returns. Most small farmers cannot afford such technologies. As an example, large vegetable farms outside of Cowlitz County have specialized in carrot and other vegetable production to the detriment of local vegetable growers.

In certain cases, access to custom farm services or smaller scale technology can "level the playing field." A prime example is farmer-hired services of specialized firms. In Cowlitz County, the use of large, round hay bale machinery is one example of how technology has kept local hay production to support livestock producers. However, in most cases new technology boosts efficiency for larger farms rather than small farms. Smaller field size can be a serious limiting factor for of the new, efficient tractors and implements and harvesters.

In irrigation, water and energy saving "smart technology" is part of larger efficiency gains. For example, center-pivot irrigation uses almost no labor except periodic human monitoring – and even that is highly mechanized. Full size center pivot irrigation systems are used on fields of 160 acres of very level ground. This size field is quite uncommon in Cowlitz County.

Farms are adopting the use of Unmanned Aerial Vehicles (UAVs, also called drones), UAVs collect crop data digital imagery in low-level flight and real time for nearly continuous field monitoring throughout the growing season. Data is used for evaluation plant growth, plant diseases or stress, and intrusion by birds, deer, other animals and unauthorized human activity. There is great potential to achieve optimal yields and meet other data needs such as reporting for food safety/security. This technology is proving to be well suited for all types of field grown crops and probably favors larger

farms but also has applicability for medium and small farms as well. UAV uses for livestock producers also exist but are less common.

Consumer Views on Health, Safety and Cost of Food

Historically the U.S. food system has focused on reducing the cost of food and producing in large volumes. Public opinion and discourse is challenging this conventional view of agriculture and the food system priorities, arguing that health and environmental factors need greater attention. Reliance on large-scale agriculture remains the dominant source of food for most consumers. If consumers in Cowlitz and other nearby counties maintain this attitude for the next decade or more, local agriculture is likely to trend downward. Yet if the local choices shift, to purchasing food from what is often described as the new, sustainable food supply system the county's agriculture has a brighter future.

Organic and non-genetically modified agriculture is gaining consumer attention and is often a factor in the local sustainable food systems. However, no Cowlitz County farms were identified with certification for organic production. The amount of genetically modified production is not known. If consumers continue to increase the demand organic and non-genetically modified food, local agriculture might be further disadvantaged for supplying local food.

New Food Safety Modernization Act (FSMA) regulations and rules by the federal government are also a barrier to small and medium scale farmers. Retailers for example, require that farmers document their food safety practices and have traceability procedures in place. This compliance is harder for smaller farmers than large operations.

Farmer and Rancher Demographics

One of the most alarming statistics about farmers and ranchers is their advancing age. The 2012 ag census reports that Cowlitz County principal farm operators have an average age of 59.5 years. By 2017 it likely could exceed 60 years of age. In 10 to 15 years much of the current agricultural land will be sold, leased or inherited by someone other than whose who currently manage the land. This has significant implications for changes in farming and livestock activity, including exiting this occupation.

Partnerships in the county between government entities, the business community and other organizations to prepare for the turnover of landowners is a key to long-term viability. Historically the Extension Service has been the source for county-level technical support to farmers, but funding is very limited and program priorities have changed. The Farm Bureau, Washington State University, and other western Washington organizations can help "reach and teach" interested land owners. A much greater effort is needed to address this looming issue.

Irrigation Water for Farming

Water was once considered an abundant resource in much of western Washington. Rapid population growth, industrial water needs, and reserved water rights for in-stream flows for fish are some of the reasons why water rights have garnered increased attention. Agricultural water use needs qualification and concerted effort to assure farming and livestock production are not restricted. This is further discussed in the recommendations section.

Recommendations

Challenging conditions exist for agriculture in Cowlitz County. The following recommendations are made to support the long-term viability of agriculture and support resource conservation by agricultural producers.

Greater Local Level Conservation Planning and Outreach

The Cowlitz County Conservation District is working diligently to assist farmers with improved conservation practices. However, awareness of many farmers, especially the smaller, part-time operators, give little attention to how their farm practices may negatively impact the environment. The conservation district's outreach effort is limited by staff size. If more dedicated staff were added, greater farmer contact and higher VSP participation would be achieved.

Host Education Programs and Support Organizations that Assist New Farmers

County/VSP-related initiatives are needed to bring technical support to the county that address the transition of property ownership and support new farmer business success. This would include inviting organizations that lead seminars and workshops for beginning farmer programs.

One model to consider is the type of programming available in Thurston and nearby South Puget Sound counties by Enterprise for Equity, a non-profit entity based in Olympia Washington. They help budding entrepreneurs establish businesses with technical support and micro-loans. Farming and value-added food processing is a focus if this and other locally-based organization. Cowlitz County could help such a similar grassroots organization become established, perhaps in partnership with surrounding counties.

Reserve Adequate Water for Agriculture

Production of food and livestock is constrained by a lack of available water for more intensive crop and livestock production. It is recommended that Cowlitz County set a goal of increasing instream flow reservations for commercial agriculture. This entails: 1) evaluate and inform the Washington Department of Ecology of the adequacy of potable water needs for all uses in the rural areas and sub-basins of Cowlitz County as a precondition to reserve water for agriculture 2) implement water conservation standards and incentives for rural water users and 3) work with the Washington Department of Ecology to amend its water reserve policies to support increased water supply to farmers. Cowlitz County could add an agricultural water resource coordinator staff position to work with farmers and manage future county level water planning and policies.

Engage the Farm Community Regarding Reduced Permit Fees and Plan Reviews for Agricultural Buildings

Agricultural production offers many benefits to the citizens of the county and it is a primary way to preserve and protect natural resources used for agriculture. The county has already implemented a new fee structure that reduces fees but the farm community is likely not fully aware of this change. To more directly support agriculture, it is recommended that Cowlitz County reduce or possibly eliminate

its permit and building fees charged for building permits to construct or modify agricultural structures.[14]

The county should also work to reduce the time needed to review and approve building plans for agricultural structures. One way to accomplish this is to offer pre-approved plans to residents for the most common types of buildings. Another initiative to consider is exempting fire flow requirements in low hazard conditions. The county should also check with other counties to ensure it is using best practices for reviewing plans.

Declare and Clarify the Right to Farm

Washington has a "Right to Farm Act", (RCW 7.48.300 - 320) that protects reasonable and accepted farm and forest practices from nuisance lawsuits. It is recommended that Cowlitz County enact a local right to farm ordinance to strengthen and clarify the application of the state law. First, this ordinance would affirm the intent and purpose of the Washington Right to Farm Act. Second, the local ordinance could also provide specific guidance for the disclosure of the right to farm at the time of property transfers, options or leases. Third, the ordinance can further define acceptable farm and forestry practices in Cowlitz County for farmer protection from nuisance lawsuits.

It would be helpful for the county to periodically hold public meetings to inform and remind residents of protections to farms granted in this legislation. It is advisable to post signs for right-to-farm along roads in parts of Cowlitz County where potential conflicts are most common between rural residents and farmers.

Encourage Clustering of Housing in Rural Areas

Large-lot subdivisions accelerate the loss of agricultural land. To preserve larger tracts of agricultural land it is recommended that developers of rural residential subdivisions be given incentives to cluster residential subdivision lots so that larger contiguous areas remain for agricultural production. It is also recommended that new housing be sited close to existing road frontage to further support retention of larger remainder property for agriculture.

Allow Land Managed for Forestry to be Transferred to Agriculture Use with Minimal Permits, Fees, and Regulation

Both Cowlitz County and the Washington Department of Natural Resources Property regulate and require permits for forest practices on private timber land. If merchantable timber is harvested to convert the land to agriculture, lengthy and costly permitting is required through the county and the state. The county has the right to assume jurisdiction of the process of conversion of timber land to any use from the state. As part of this process, the permitting, fees and regulation could be minimized for conversions specifically to agricultural use.

Invite Land Trusts to Evaluate Critical Land for Purchase of Conservation Easements

Some land trusts specialize in protecting high priority farm land by purchasing conservation easements that remove the development rights with deed restrictions on the property. This gives the property

[14] Agricultural structures are defined in RCW 19.27.015(1) as "a structure designed and constructed to house farm implements, hay, grain, poultry, livestock, or other horticultural products. This structure may not be a place of human habitation or a place of employment where agricultural products are processed, treated, or packaged, nor may it be a place used by the public.

owner compensation for value beyond what is farmers can pay for land and it adds stability to continued farming operations. This also shows community support for agriculture without forcing farmers to bear the full cost of protecting agriculture. County governments often work with and trusts, sometimes contribution part of the cost to purchase the development rights. Conservation easements can also be a tool to keep land in arming to meet environmental goals such as maintain aquifer water quality. The Trust for Public Land and the Columbia Land Trust are two examples of land trusts that could be invited to Cowlitz County to review conditions.

Remove Barriers to Maintenance of Agricultural Drainage Ditches

Land owners are unclear of rules related to creating and maintaining ditches for proper drainage. It is recommended that the county declare by ordinance that land owners can construct and maintain drainage ditches on their own property if these drainage ways meet reasonable requirements. The requirements could be: 1) new or well managed drainage ways do not discharge directly to fish bearing streams and 2) the ditches do not add water such that there is harm to the use or enjoyment of property by downstream property owners.

Support Farms in Aquifer Recharge Areas

Cowlitz County has intensive crop farming and some livestock production in critical areas for aquifer recharge. The county can work cooperatively with the Washington Department of Ecology to monitor and protect wellheads and encourage lower-input farming when practical. The county can also offer grant assistance to obtain funding to cost-share if costly water quality protection measures are considered necessary. To keep agriculture viable, governmental action should be reviewed to ensure proposed plans are beneficial for water quality and do not unreasonably impede normal and accepted practices.

Create Dialogue Between Farmers and Local Food Buyers

Local food service sales have not been a significant market outlet for local farmers. Conditions may be changing as local brew pubs, distilleries, specialty restauranteurs, and perhaps others can expand their local farm product purchases. Dialogue can be encouraged between farmers and current and prospective local food buyers. One way to boost consumer interest in products of Cowlitz farmers is to point to the link between on-increased farm sales and on-farm conservation efforts, a broadly shared goal throughout the community. School gardening advocates are a logical place to further this dialogue. A showcase menu created with a forward-thinking food service business is another approach to consider.

Recruit a Mid-Size Food Processing Firm

A small number of large food processors dominate the primary food processing sector. It would be very positive if the Cowlitz Economic Development Council led an effort to prepare and execute a business recruiting plan to attract at least one new food processor in the next two years, with more to follow thereafter. An ideal candidate firm would have current or future potential to purchase local farm products. The plan should be flexible in defining the type of business. For example, it could include a firm that operates a commercial kitchen, a specialty cheese producer, or a more traditional primary food processing facility.

Conclusions

Agriculture holds an important position in Cowlitz County even though it not a major driver of the local economy. This is true because agriculture is a key part of much of rural Cowlitz County, where few other economic activities are available to residents.

The Woodland Bottoms comprise by far the most intensive, high value agricultural production. However, the farms in this area also facing a major threat of conversion to non-agricultural uses for industrial and urban growth. Decisions over future land use, some which are imminent, will have a major impact on the size and character of agriculture in the coming years.

Most of the identified agricultural land in this study is also in an area of critical environmental concern. In fact, most property in agricultural land use are in two or more categories of critical areas. This is due to the preferred location of agricultural land: lower elevation ground that is often near water sources.

With the overlap of agricultural land and critical areas, the VSP can support future viability of agriculture. Many actions are recommended in this report to assist Cowlitz County agriculture in the future.

Appendix A – Data Sources for Critical Areas Analysis

Appendix Table A-1. Critical Area Data Sources

Parameter	Source Feature Class	Attribute Name	Data Source
Critical Area Recharge Area	Susceptibility_Score_w_WHPA	CARA	Cowlitz County
Critical habitat polygon	(from analysis by Parametrix)"		
Critical habitat line	CRITHAB_POLY.shp	habitat1	USFW, from website
Fish Stream RHA	CRITHAB_LINE.shp	habitat2	USFW, from website
Non-Fish Stream RHA	Fish_Stream_RHA.shp	fish_str	Cowlitz County
Shoreline Stream RHA	Non_Fish_Stream_RHA.shp	non_fish	Cowlitz County
Streams	Shoreline_Stream_RHA.shp	shoreline	Cowlitz County
Impaired and threatened water bodies	streams.shp	all_stream	DNR, provided by Cowlitz County
NWI Wetlands	WQA_305b_current	imparedwat	Ecology
Active faults	NWI_Wetlands.shp	wetland	USFW, provided by Cowlitz County
Active folds	active_faults	Not in attribute table. No intersection with Ag Land parcels	DGER, from website
Earthquake locations	active_folds	Not in attribute table. No intersection with Ag Land parcels	DGER, from website
Floodplain	earthquakes_pnsn	earthquake	DGER, from website
Spring Locations	DNR_Spring_Locationst.shp	spring	DGER, provided by Cowlitz County
DNR Deep Seated Landslides	DNR_Deep_Seated_Landslides.shp	landslide	DNR, provided by Cowlitz County
DNR Deep Seated Landslides Scarps	DNR_Deep_Seated_Landslide_Scarps.shp	scarps	DNR, provided by Cowlitz County
DNR Shallow landslides	DNR_Shallow_Landslides.shp	shallow_landslide	DNR, provided by Cowlitz County
DNR Potentially Unstable Slopes	DNR_Potentially_Unstable_Slopes.shp	unstable_s	DNR, provided by Cowlitz County
DNR Sag Ponds	DNR_Sag_Ponds.shp	sag_pond	DNR, provided by Cowlitz County
Liquefaction susceptibility	liquefaction_susceptibility	liquefact	DGER, from website
Volcanic Hazards	Volcanic_Hazards.shp	volcanic	DGER, provided by Cowlitz County
Rare Plants	wnhp_curr.shp	plants	Washington Natural Heritage Program

Parameter	Source Feature Class	Attribute Name	Data Source
Water Bodies	WBHYDRO	water_body	Washington State Department of Natural Resources (DNR)
Mine Hazards	Mine_Hazard.shp	mine	DNR, provided by Cowlitz County
Steep Slopes	Slopes_45__to_60_.shp Slopes_60__to_80_.shp Slopes_80__and_Above.shp	Steep_s	Cowlitz County
Bald Eagle Nests	Cowlitz_BaldEagleNest_Buffer	bald_eagle	2010 PHS data from WDFW, provided for Cowlitz County by The Watershed Company
Egret Colony			2010 PHS data from WDFW, as above
Murrelet buffer	Cowlitz_Murrelet_Buffer	murrelet_buffer	2010 PHS data from WDFW, as above
Murrelets	Cowlitz_Murrelet_Presence	murrelet_presence	2010 PHS data from WDFW, as above
Priority Habitats and Species occurrences	Cowlitz_PHS_Occurences	PHS_occurence	2010 PHS data from WDFW, as above
Fish distribution	Cowlitz_Priority_Fish_Distribution	fish_distribution	2010 PHS data from WDFW, as above
PHS regions	Cowlitz_PHS_Regions	PHS_region	2010 PHS data from WDFW, as above
Seals and Sea Lions			2010 PHS data from WDFW, as above
Spotted owls	Cowlitz_SpottedOwl_Presence	spotted_owl	2010 PHS data from WDFW, as above
Talas slope			2010 PHS data from WDFW, as above

Terms:
USFW - United States Fish and Wildlife Service
RHA - Riparian Habitat Area
DNR - Washington State Department of Natural Resources
WDFW - Washington State Department of Fish and Wildlife
Ecology - Washington State Department of Ecology
EPA - United States Environmental Protection Agency
NWI - National Wetland Inventory
DGER - Division of Geology and Earth Resources, Washington State Department of Natural Resources
FEMA - Federal Emergency Management Agency
PHS - Priority Habitat & Species Area

Source: Prepared by CORE GIS

Appendix Table A-2. Critical Area Data Sources with Comments

Parameter	Description and Comments
Critical Area Recharge Area	The Critical Aquifer Recharge Area (CARA) is from a polygon dataset provided by Cowlitz County (via consultant Parametrix). We used the feature class named "Susceptibility_Score_w_WHPA" and we selected for areas within the Wellhead Protection Area (WHPA) buffers and that have Susceptibility_Score values from 5 to 34 (severe and moderate susceptibility classes).
Critical habitat polygon	This is the polygon dataset for the habitat locations of species listed as either endangered or threatened under the Endangered Species Act (ESA).
Critical habitat line	This is the line dataset for the habitat locations of species listed as either endangered or threatened under the ESA. This line shapefile represents aquatic (stream/river dwelling) species.
Fish Stream RHA	This is a polygon dataset developed by buffering selected segments of the DNR stream data based on WDFW recommended RHA widths for fish bearing or other specified streams types.
Non-Fish Stream RHA	This is a polygon dataset developed by buffering non-fish stream segments of the DNR stream data by 50 feet.
Shoreline Stream RHA	This is a polygon dataset developed by buffering selected segments of the DNR stream data based on WDFW recommended RHA widths for specified shorelines.
Streams	This is the DNR stream data for Cowlitz County, a line dataset of all water courses used to develop the RHA buffer polygon data. This dataset was included in the critical area assessment because according to WAC 365-190-130 Fish and Wildlife conservation areas include Waters of the State. Waters of the state are defined in RCW 90.48.020 and include lakes, rivers, ponds, streams, inland waters, underground waters, salt waters, and all other surface waters and water courses in Washington.
Impaired and threatened water bodies	This dataset was created to satisfy the State of Washington's requirement under the Clean Water Act to report impaired waters to the EPA. The 305(b) dataset includes all 5 categories of sampled waters. Published July 2016.
NWI Wetlands	The National Wetlands Inventory (NWI) dataset provides the location and classification of wetlands as defined by the U.S. Fish and Wildlife Service
Active faults	This line dataset was compiled as part of the Data Preservation Program of the Washington Division of Geology and Earth Resources. The shapefile contains arcs representing the location of faults with known or suspected quaternary age. This dataset was used in the selection model but did not intersect any ag land parcels so is not included in the final dataset attribute table.
Active folds	This dataset was compiled as part of the Data Preservation Program of the Washington Division of Geology and Earth Resources. The shapefile contains arcs representing the location of folds with known or suspected quaternary age. This dataset was used in the selection model but did not intersect any ag land parcels so is not included in the final dataset attribute table.
Earthquake locations	The data used to create this dataset was obtained from the Pacific Northwest Seismic Network (PNSN). This point shapefile displays earthquake hypocenter locations for the State of Washington.

Parameter	Description and Comments
Floodplain	The Digital Flood Insurance Rate Map (DFIRM) database depicts flood risk information and supporting data used to develop the risk data. Only 'at risk' areas were used for selection, with the definition query: "FLD_ZONE" = '0.2 PCT ANNUAL CHANCE FLOOD HAZARD' OR "FLD_ZONE" = 'A' OR "FLD_ZONE" = 'AE'.
Spring Locations	Shapefile point theme showing location of identified hydrologic springs in relation to landslides
DNR Deep Seated Landslides	This polygon shapefile shows the geographic distribution of identified deep-seated landslides within the Cowlitz County Urban Corridor Landslide Hazard project area.
DNR Deep Seated Landslides Scarps	Line shapefile containing the geographic distribution of identified landslide scarps associated with individual deep-seated landslides within the Cowlitz County Urban Growth Corridor
DNR Shallow landslides	Shapefile that contains data points for individual shallow landslide locations. Each point has been placed approximately at the centroid of each landslide polygon.
DNR Potentially Unstable Slopes	Polygon shapefile delineating of areas identified in the field, based on geologic characteristics, that appear to be potentially unstable.
DNR Sag Ponds	This polygon shapefile shows the geographic distribution of sag ponds identified within deep-seated landslides. The act of down-slope movement of geologic materials sometimes results in the formation of closed depressions (sag ponds), which in unglaciated terrain, such as western Cowlitz County, may serve as indicators of the presence of a landslide.
Liquefaction susceptibility	This dataset contains polygons that provide information regarding the relative liquefaction potential for Washington State. Only areas of moderate and above liquefaction susceptibility ratings were used. (Cowlitz County has no areas classified as peat which requires site-specific analysis in the International Building Code). The definition query used: LIQUEFACTION_SUSCEPT = 'high' OR LIQUEFACTION_SUSCEPT = 'moderate' OR LIQUEFACTION_SUSCEPT = 'moderate to high' OR LIQUEFACTION_SUSCEPT = 'low to moderate'
Volcanic Hazards	This shapefile shows the location of volcanic hazards from Mount St. Helens.
Rare Plants	The Washington Natural Heritage Program maintains a database of rare and imperiled species and plant communities for the state. An Element Occurrence (EO) is an area of land and/or water in which a species or natural community is, or was, present. For community Elements, the EO may represent a stand or patch of a natural community, or a cluster of stands or patches of a natural community. EOs are typically represented by bounded, mapped areas of land and/or water or, at small scales, the centroid point of this area. EO records are most commonly created for current or historically known occurrences of natural communities or native species of conservation interest.
Water Bodies	WCHYDRO and WBHYDRO together make up the most complete and up to date hydrography layer for the State of Washington. WCHYDRO contains watercourses represented as arcs or lines. The Watercourse (WC, WCHYDRO) and Water Body/Water Shoreline (WBWS, WBHYDRO) Hydrography layers support the implementation of the new Forest Practices Fish Habitat Water Type Map. The WBHYDRO (water body) data was used to include lakes and ponds in the critical areas.

Parameter	Description and Comments
Mine Hazards	Polygon shapefile of coal mine hazard areas identified by the Lynn Miller study for Cowlitz Co. Geologic Hazard Mapping, dated 1993. Comprised of known/identified abandoned mine lands problem areas (First Priority) and abandoned mines that haven't been identified (Second Priority).
Steep Slopes	Three polygon shapefiles provided by Cowlitz County GIS that indicate areas with slopes of three gradient classes: 45-60%; 60-80%; and >80%. However, metadata indicates the 60-80 dataset is actually 60-90%. And the >80% dataset overlaps with the others. These three datasets were merged together to act as a single dataset in the model, "steep slopes."
Bald Eagle Nests	This polygon Feature class shows the buffered location of bald eagle nests and communal roosts.
Egret Colony	Did not include. Not identified as a 'PHS listed species'
Murrelet buffer	This polygon feature class shows surrounding PLSS polygons based on the murrelet presence feature class.
Murrelets	This polygon feature class shows PLSS polygons that contain murrelets.
Priority Habitat & Species occurrences	We used a definition query on this point feature class to only display "PHS LISTED SPECIES OR HABITAT"
Fish distribution	This line feature class shows the location of streams that have fish documented, presumed, or potential for.
Priority Habitat Species regions	We used a definition query on this polygon feature class to only display "PHS LISTED SPECIES OR HABITAT"
Seals and Sea Lions	Did not include. Did not intersect the "Ag" parcel dataset
Spotted owls	This polygon feature class shows PLSS polygons that contain Spotted owls.
Talas slope	Did not include. Did not intersect the "Ag" parcel dataset

Source: Prepared by CORE GIS

Appendix B – Description of IMPLAN Economic Model

The impact model used in this study is Impact Analysis for PLANing (IMPLAN). It was first developed by the U.S. Forest Service for land and resource management planning. The University of Minnesota then offered IMPLAN software to non-Forest Service users.in the late 1980's. Its further development has been privatized at the Minnesota IMPLAN Group (now MIG, Inc.). The Cowlitz County model was specified with IMPLAN Pro and uses 2015 county IMPLAN data.

The descriptive model uses a social accounting system that describes transactions between producers, and intermediate and final consumers. is based upon regional economic accounts. The accounts are tables of interactions that describe an economy by the flow of dollars from purchasers to producers within the defined region, in this case Cowlitz County. The model is predictive in that multipliers define the response of the economy to a change in demand or production. Purchasers for final use (final demand) drive the input-output model. In this case, agriculture sectors are producing goods for final demand, either by local consumers, food manufacturers or export from the county. The agricultural sectors also purchase goods and services from other producers, which also sets off further purchases of goods and services. These indirect purchases (known as indirect effects) continue until leakages from the region—such as imports, profits, or wages—stop the economic transactions within the region. Added to the impact of direct and indirect effects are induced effects. These are the effects of household spending in the regional economy.

In this model of Cowlitz County modifications were made to the IMPLAN data provided by MIG. First, the total number of jobs and sales were adjusted when better estimates could be made through interviews conducted by Globalwise. In many cases however, the data from the IMPLAN data set for Cowlitz County was relied on. The number of jobs was distributed to each agricultural sector according to IMPLAN proportions. This adjustment was necessary because IMPLAN uses regional job per output ratios to estimate agricultural employments. The regional job-output ratios sometimes reflect commercial agricultural that is not fully representative of smaller farm operations that are typical in Cowlitz County. The second modification was to modify total sales in a few agricultural production sectors where better data was available through the insight and knowledge of local producers. No other modifications were made to key relationships such as trade flows, absorption coefficients, production functions or byproduct coefficients in the county data.

The model uses Social Accounting Matrices (SAM) based local relationships. Social accounting allows for consideration of non-industrial transactions such as household spending. The impact model is specified with 2015 data, which is the latest available.

For further information about IMPLAN, see www.implan.com.

Appendix C – Study Contacts

Jim Donald, Donald Dairy Farm

Scott & Dixie Edwards, Watershed Garden Works

Susan Eugenis, Cowlitz County Public Works

Jim Fager, Cowlitz Community Farmers Market

Gary Fredricks, WSU Cowlitz County Extension

Joe Godino, 4 Corners Farm & Garden

Jay Houser, Walt's Wholesale Meats

John Keatley, Keatley Ranch

Alex Murray, Cascade Farm

Marty Peterson, Peterson Farms & Columbia Fruit, LLC

Lisa Schuchman, NRCS, USDA

Joe Shulke, Shulke Farms

Ted Sprague, Cowlitz County Economic Development Council

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