

CLARK COUNTY COALITION SMP UPDATE

BATTLE GROUND | CAMAS | CLARK COUNTY | LA CENTER
RIDGEFIELD | VANCOUVER | WASHOUGAL | YACOLT



SHORELINE INVENTORY AND CHARACTERIZATION

Volume 2: Urban Areas
Chapter 2 City of Camas
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INTRODUCTION

The information in this Clark County Shoreline Inventory and Characterization report is divided into two volumes. This is **Chapter 2**, City of Camas, of Volume 2, of a two-volume set. Volume 1, Lewis and Salmon-Washougal Watersheds and Rural Areas, contains 11 chapters plus appendices. Volume 2, Urban Areas, contains seven chapters with information specific to each of the cities and their urban areas within Clark County. For more details, see “Report Organization” later in this Introduction.

Background

Clark County and its cities are updating their Shoreline Master Programs (SMPs). Cities and counties are required to amend their local SMPs consistent with the Shoreline Management Act (SMA), and its implementing guidelines (Revised Code of Washington [RCW] 90.58, Washington Administrative Code [WAC] 173-26). The SMP updates are required as part of a statewide program enacted by the 2003 Washington State Legislature (Substitute Senate Bill [SSB] 6012).

In order to obtain the best value for limited state grant funds, Clark County and its cities have formed a coalition to jointly update their SMPs. The Coalition consists of representatives from Clark County and the local jurisdictions within it (Cities of Vancouver, Camas, Washougal, Ridgefield, Battle Ground, and La Center and the Town of Yacolt). The County and its cities are conducting their comprehensive SMP updates in two phases over the next few years. The first phase is the development of the inventory and characterization of the shorelines within Clark County (see Volume 1, Map 1: Vicinity Map). This report provides the inventory and characterization study. In the second phase, the Coalition will update their shoreline management policies and regulations.

This inventory and characterization documents baseline shoreline conditions, evaluates existing functions and values of shoreline resources, and provides a basis for revising SMP goals, policies, and regulations. This characterization will help the Coalition make informed decisions about incorporating their communities’ visions for their shorelines, while accommodating growth and other SMA policy objectives, as well as exploring opportunities for conservation and restoration of ecological functions.

Using a landscape approach, this study examined how ecosystem processes relate to shoreline functions. Processes and functions are evaluated at two different scales: (1) a watershed scale, and (2) a shoreline reach scale. The purpose of the watershed characterization is to identify ecosystem processes that shape shoreline conditions and to determine which processes have been altered or impaired. The intent of the shoreline reach scale inventory and characterization is to: (1) identify how existing conditions in or near the shoreline have responded to process alterations; and (2) determine the effects of the alterations on shoreline ecological functions. The findings will help provide a framework for future updates of the shoreline management policies and regulations.

This study was prepared by ESA Adolfson in collaboration with the Clark County Coalition, and with technical assistance from BST Associates, Inc. (BST). BST inventoried and characterized current water-dependent shoreline uses, and conducted an analysis to estimate future demands and trends for such uses.

Funding for the SMP updates has been provided by the Washington State Department of Ecology (Ecology) through an SMA grant (Agreement No. G1000058). As part of the grant agreement, the Coalition is scheduled to complete their draft SMPs by January 20, 2011.

Report Organization

Volume 1, Lewis and Salmon-Washougal Watersheds and Rural Areas, contains 11 chapters plus 6 appendices. Review of Chapters 1 through 4 in Volume 1 will provide the reader a basic understanding of the context for the more detailed inventory and analysis of specific waterbodies within Clark County. The reader can then select subsequent chapters of interest for more in-depth review. Within Volume 1, the inventory and characterization is organized as follows:

- **Chapter 1** discusses the purpose of this report and describes the regulatory context for shoreline planning.
- **Chapter 2** describes the methods, approach, and primary data sources used for this inventory and characterization.
- **Chapter 3** provides a profile of the ecosystems within Clark County. This ecosystem profile provides a regional overview; describes process controls (e.g., climate, geology), fish and wildlife, and key ecosystem-wide processes; and provides a landscape-scale analysis.
- **Chapter 4** is an analysis of trends and future demand for use of the shoreline and potential land use conflicts, countywide.

The Clark County Coalition was purposeful in establishing a watershed approach to this inventory and characterization study. Chapters 5 through 9 are organized around the two main Water Resource Inventory Areas (WRIAs) identified within Clark County (see Volume 1, Map 2: WRIAs and Subbasins).

- **Chapters 5, 6, and 7** provide the shoreline inventory for the portions of Clark County within the Salmon-Washougal Watershed (WRIA 28). The inventory provides physical and biological characterizations of conditions in the vicinity of the shoreline. Water quality characteristics are also described. The chapters also provide assessments of shoreline use patterns, and identify potential opportunity areas for protection, enhancement, restoration, and public access. Waterbodies are described within three sub-watersheds: Lower Columbia River, Washougal River, and Salmon Creek. WRIA 28 includes the Cities of Battle Ground, Camas, Vancouver, and Washougal. Shoreline inventory information specific to these cities is provided in Volume 2.
- **Chapters 8 and 9** include the shoreline inventory and characterizations for waterbodies in the Lewis River Watershed, WRIA 27, including the lower Columbia River, Lewis River, and the East Fork Lewis River sub-watersheds. WRIA 27 includes the Cities of Ridgefield, La Center, and the Town of Yacolt. Shoreline inventory information specific to these jurisdictions is provided in Volume 2.
- **Chapter 10** summarizes the findings and recommendations of the shoreline inventory and characterization.

- **Chapter 11** is the reference list for this study. At the end of Volume 1 are the appendices.
- **Appendix A** is a county-scale map folio that illustrates the shoreline planning areas within Clark County and documents various biological, chemical, land use, and physical elements at the landscape analysis scale.
- **Appendix B** identifies the GIS data sources used in development of all map products in both Volumes 1 and 2.
- **Appendix C** is the *Watershed Characterization for Clark County* (Ecology, July 2009).
- **Appendix D** includes the *Assessment of Water-dependent Recreational, Commercial, and Industrial Uses* report prepared by BST.
- **Appendix E** includes the reach-scale analysis matrices.
- **Appendix F** is a glossary of terms used in this report.

Volume 2, Urban Areas, contains the shoreline inventory and characterization information, including map folios, specific to each of the seven cities. They are organized alphabetically as follows:

- **Chapter 1**, City of Battle Ground;
- **Chapter 2**, City of Camas;
- **Chapter 3**, City of La Center;
- **Chapter 4**, City of Ridgefield;
- **Chapter 5**, City of Vancouver;
- **Chapter 6**, City of Washougal; and
- **Chapter 7**, Town of Yacolt.

One of the goals of the Clark County Coalition is for each of the jurisdictions to have an updated SMP specific to their jurisdiction. Volume 1 provides the shoreline inventory and characterization foundation for unincorporated Clark County's SMP update. It also provides a foundation for each of the cities. Each city section in Volume 2 is designed as a pull-out to be accompanied with Volume 1, to provide a stand-alone document and foundation for development of each city's SMP update.

CHAPTER 2 CITY OF CAMAS

The city of Camas is located along the Columbia River 21 miles east of the city of Vancouver and 2.5 miles west of the city of Washougal. The City of Camas incorporated in 1906 and currently has a population of about 16,700. Six shorelines of the state are located within the city limits and urban growth area (UGA). These include the following:

1. Columbia River;
2. Washougal River;
3. Lacamas Creek;
4. Round Lake;
5. Fallen Leaf Lake; and
6. Lacamas Lake.

The Columbia and Washougal Rivers are both identified as shorelines of statewide significance. There are a total of 12 linear stream miles and nine linear lake miles (measured along the lake perimeter) in Camas and its UGA. Table 2-1 below shows the breakdown of linear miles by waterbody and acreage of shoreline planning area within the city and its UGA. Each of the 10 waterbodies is described separately in Section 2.1.

Table 2-1. Linear Stream Miles, Lake Miles and Shoreline Planning Areas by Waterbody in Camas

| Waterbody | Linear Miles (Shoreline Planning Area) | |
|------------------|--|-----------------|
| | City | UGA |
| Columbia River | 3.7 mi (1,638 ac) | 0.7 mi (300 ac) |
| Washougal River | 1.8 mi (260 ac) | 0 |
| Lacamas Creek | 1.3 mi (212 ac) | 1.4 mi (100 ac) |
| Lacamas Lake | 0.0 (106 ac) | 6.3 (370 ac) |
| Round Lake | 1.0 (28 ac) | 1.2 (44 ac) |
| Fallen Leaf Lake | 1.2 (52 ac) | 0 (0 ac) |

2.1 Physical and Biological Characterization

2.1.1 Columbia River

2.1.1.1 Drainage Basin, Tributary Streams and Associated Wetlands

The Columbia River is the fourth-largest river by volume in North America. It flows approximately 1,200 miles from its headwaters at Columbia Lake in British Columbia to its mouth on the Pacific Ocean near Astoria, Oregon. (USGS, 2009; NWPCC, undated). The river forms most of the boundary between Washington and Oregon. Camas is one of the larger cities

located along the Washington shorelines of the Columbia River along with Vancouver and Washougal. The Washougal River is one of several major tributaries to the Columbia River.

The size of the Columbia River shoreline planning area within Camas and its UGA is 1,938 acres (including the river itself). Three sub-reaches along the Columbia River are located within Camas and its UGA; these sub-reaches are shown on Map 2.

Wetland areas within the Camas sub-reaches that have been mapped by Clark County are shown in Table 2-2 below and on Map 4.

Table 2-2. Wetland Areas within Columbia River Sub-reaches

| Sub-reach | Wetland Area (ac) |
|------------|-------------------|
| COLU_RV_3c | 54 |
| COLU_RV_3d | 407 |
| COLU_RV_4a | 16 |

2.1.1.2 Process and Channel Modifications

The lower Columbia River has been extensively modified. Some of the process and channel modifications include:

- Installation of numerous dams along the Columbia River and its tributaries;
- Installation of levees that reduce historical floodplain width and channel migration;
- Construction of bridges and marinas;
- Fill and bank armoring;
- Installation of pilings, artificial jetties, and dikes;
- Conversion of forested land to impervious surfaces for urban development and agriculture; and
- Sediment removal to maintain deep channels.

Since the 1930s, the natural flow regime of the Columbia River has been modified by numerous hydroelectric dams on the mainstem of the river and its tributaries. River flows have been altered substantially because of the 21 dams built on the Columbia and Snake Rivers, as well as numerous dams built on tributaries to these rivers (Lower Columbia Fish Recovery Board, 2004).

2.1.1.3 Geologic and Flood Hazard Areas

Historically, extensive flooding and channel migration occurred on the lower Columbia River. The flooding in the lower Columbia River basin is now controlled partially by the Bonneville, The Dalles, and John Day dams, as well as levees along the Columbia River. The Federal Emergency Management Agency (FEMA) has prepared Flood Insurance Rate Maps (FIRMs)

that include the floodplain associated with the one percent chance flood event along the Columbia River (FEMA, 2007)..

The Columbia River flows over a wide range of terrain. Seismic and flood hazards (Map 4) exist for much of the length of the lower Columbia River. An earthquake hazard area and small areas with slopes exceeding 15 percent (Map 6a) are mapped for the Columbia River shoreline planning area. Erosion hazard areas are mapped near the confluence of the Washougal and Columbia Rivers and in limited portions of the remaining shoreline planning area (Map 6b).

2.1.1.4 Critical or Priority Habitat and Species Use

The lower Columbia River supports a number of anadromous salmonids as shown in Table 2-3.

Table 2-3. Listed Fish Species Documented for the Lower Columbia River

| Common Name | Scientific Name | Population * | Federal Status | Designated Critical Habitat in the Study Area? | Habitat Use |
|----------------|---------------------------------|--|----------------|--|---------------------|
| Bull trout | <i>Salvelinus confluentus</i> | Lower Columbia River | T | No | Migratory |
| Chinook salmon | <i>Oncorhynchus tshawytscha</i> | Lower Columbia River | T | Yes | Migratory / rearing |
| | | Upper Columbia River, spring-run | E | Yes | Migratory / rearing |
| | | Upper Willamette River | T | Yes | Migratory / rearing |
| | | Snake River, spring/summer and fall runs | T | Yes | Migratory / rearing |
| Chum salmon | <i>Oncorhynchus keta</i> | Columbia River | T | Yes | Migratory / rearing |
| Coho salmon | <i>Oncorhynchus kistutch</i> | Lower Columbia River | T | No | Migratory / rearing |
| Sockeye salmon | <i>Oncorhynchus nerka</i> | Snake River | E | Yes | Migratory / rearing |
| Steelhead | <i>Oncorhynchus mykiss</i> | Lower Columbia River | T | Yes | Migratory / rearing |
| | | Middle Columbia River | T | Yes | Migratory / rearing |
| | | Upper Columbia River | E | Yes | Migratory / rearing |
| | | Upper Willamette River | T | Yes | Migratory / rearing |
| | | Snake River Basin | T | Yes | Migratory / rearing |

* Evolutionarily Significant Unit (ESU) or Distinct Population Segment (DPS).

Anadromous salmonids that use the lower Columbia River include: summer and winter steelhead; summer, fall, and spring-runs of Chinook salmon, coho salmon, fall chum salmon, and sockeye salmon (Map 5). Columbia River populations of all of these species are federally listed as threatened or endangered under the Endangered Species Act (70 FR 52630; Table 1).

Anadromous salmonids use the lower Columbia River primarily for migration and rearing; however, chum salmon are known to spawn in the reach of the Columbia River near the I-205 bridge (WDFW, 2009a; WDFW, 2009b). The Columbia River within Clark County is designated as critical habitat for all of the listed anadromous salmonid populations identified above (70 FR 52630; Table 2-3). The Columbia River contains no designated critical habitat for bull trout, also a federally listed species (70 FR 56211). Critical habitat for the Lower Columbia River (LCR) coho salmon Evolutionarily Significant Unit (ESU) has not been designated at this time and is currently under review.

Other priority habitats associated with the Columbia River includes oak woodlands and urban natural open spaces (Map 5).

The Washington Department of Natural Resources (WDNR) Natural Heritage Program has not identified priority plant species or vegetation communities in the Columbia River shoreline planning area within the city of Camas or its UGA (WDNR, 2008).

2.1.1.5 Instream and Riparian Habitats

The construction of upstream hydropower dams has reduced the variability of flow and delivery of sediments, drastically changing the nature of the lower Columbia River and estuary (LCFRB, 2004). In addition, the channelization, dredging, jetties, removal of wetlands, and isolation of wetlands from the former floodplain have altered the character of the lower Columbia River and estuary, reducing the ability of the river to support biological systems (LCFRB, 2004). The introduction of non-native and invasive species as well as the continued degradation of water quality have also adversely impacted the aquatic ecosystem and biota of the lower Columbia River and estuary. The overall changes in flow and sediment delivery have reduced the availability of shallow, low velocity habitats with increasing flow. This combined with the decreased floodplain connectivity has reduced the availability of shallow water habitats that are important for juvenile salmonids, likely contributing to increased juvenile mortality during high flow events (NMFS, 2000).

2.1.1.6 Water Quality

The Washington State Department of Ecology (Ecology) lists the status of water quality for streams, rivers and lakes in one of five different categories recommended by the U.S. Environmental Protection Agency. The Water Quality Assessment represents the integrated report required for Sections 303(d) and 305(b) of the Clean Water Act. The 303(d) list reports on Category 5 waters, which are the “impaired” waters of the state. “Total Maximum Daily Loads” or TMDLs are a key tool in the work to clean up polluted or impaired waters once they are identified. The latest Water Quality Assessment conducted by Ecology was published in 2008.

According to the 2008 Washington State Water Quality Assessment, the lower Columbia River within the jurisdiction of Camas and its UGA has one 303(d) listing (Category 4A) for dioxin (in tissue), which requires the development of a TMDL (Ecology, 2008).

2.1.2 Washougal River

2.1.2.1 Drainage Basin, Tributary Streams and Associated Wetlands

The Washougal River headwaters are in Gifford Pinchot National Forest in Skamania County. It flows southwest through Clark County and Washougal, joining the Columbia River at Camas. The upper watershed is largely forested, and the middle reaches are rural residential and agricultural. The lower four miles of the river flows through Washougal and Camas. The lower part of the river experiences small daily tidal fluctuations from the Columbia River (Parametrix, 2008; Wade, 2001). Lacamas Creek joins the Washougal River about 0.5 miles upstream of the confluence with the Columbia River.

The size of the Washougal River shoreline planning area within Camas and its UGA is 260 acres (including the waterbody itself). Two sub-reaches along the Washougal River lie within Camas; these are identified on Map 2.

Clark County maps 205 acres of the entire Washougal River shoreline planning area as wetland. Most of this acreage is within a large wetland complex (palustrine emergent, scrub-shrub, and forested) located in Camas in the floodplain area at the river mouth and at the Lacamas Creek confluence. Upstream of NE 3rd Avenue (Evergreen Highway) which is east of Camas, the Washougal River floodplain is generally narrow with scattered wetlands. Wetland areas within the Camas sub-reaches that have been mapped by Clark County are shown in Table 2-4 below and on Map 4.

Table 2-4. Wetland Areas within Washougal River Sub-reaches

| Sub-reach | Wetland Area (ac) |
|------------|-------------------|
| WASH_RV_01 | 49 |
| WASH_RV_2a | 37 |

2.1.2.2 Process and Channel Modifications

The Washougal River basin has been extensively modified. Some of the modifications include:

- Urban and suburban development;
- Gravel mining and levees;
- Installation of dikes and rip-rap;
- Splash damming and logging which have left some portions of the river scoured to bedrock;
- Streamside development and channelization associated with agriculture, residential/urban development, and roadways; and
- Disconnected floodplains.

Left undisturbed, Washougal River sediment would have formed an alluvial fan and delta that reached into the floodplain of the Columbia River (R2 Resource Consultants, 2004a). As sediment would build up in the Washougal River, the river would probably have migrated across the delta. The west-trending channel path observed over the past 150 years suggests that the Columbia River has kept the Washougal River channel confined to the sideslope (R2 Resource Consultants, 2004a).

Along the lower 5.5 miles of the river, the area of currently unconstrained floodplain is 27 percent smaller than the historical floodplain (Camas city limits start at river mile [RM] 2) (R2 Resource Consultants, 2004). The reduction may be due to sediment deposition, channel migration, off-channel habitat development, and bank erosion. In the last 150 years, most floodplain surfaces adjacent to the lower 4.2 miles of the Washougal River have been cleared and used for residential development, industrial development, or parks (R2 Resource Consultants, 2004). The loss of 31 acres of historic floodplain has occurred near RM 2 (which is located at the border between Washougal and Camas city limits). This loss of floodplain is caused by a levee which separates the Washougal River from 13 acres of ponds associated with gravel mining.

2.1.2.3 Geologic and Flood Hazard Areas

Flooding along the lower Washougal River is partially confined due to levees. The FEMA FIRMs show some streamflow flooding adjacent to the lower reach of the Washougal River. The existing floodplain in the lower reach of the river ranges from 0.1 to 0.5 miles wide.

The surface geology in the Washougal River sub-basin downstream of the confluence with the Little Washougal River is composed primarily of unconsolidated sedimentary material (LCFRB, 2004; Map 6c). Within the city of Camas, the Washougal River is classified as having a moderate-high potential for channel migration (Olson, 2010; Map 4). Earthquake hazard and flood hazard areas are mapped on the Washougal River in Camas (Map 4). An erosion hazard area is mapped near the confluence of the Washougal and Columbia Rivers (Map 6b).

2.1.2.4 Critical or Priority Habitat and Species Use

The Washougal River supports federally listed Chinook salmon, chum salmon, coho salmon, and steelhead (Table 2-5) (Map 5). The river is known to provide rearing habitat for juvenile Chinook salmon and to serve as a migration corridor in the fall for adult Chinook (WDFW, 2009). Fall chum salmon are documented as using the Washougal River for migration (WDFW, 2009), but spawning habitat has not been documented. The Washougal River is also a documented migration corridor for coho salmon. Summer and winter steelhead spawn in portions of the river, and rearing habitat is known for summer steelhead.

The Washougal River, including the portion within the city of Camas, is designated as critical habitat for LCR Chinook salmon and LCR steelhead (70 FR 52630). The Washougal River is also designated as critical habitat for Columbia River chum salmon (70 FR 52630). Critical habitat for coho salmon has not been proposed.

Table 2-5. Listed Fish Species in the Washougal River

| Common Name and Population * | Scientific Name | Federal Status | Designated Critical Habitat in the Study Area? | Habitat Use |
|--------------------------------------|---------------------------------|-----------------------|---|--------------------------------|
| Chinook salmon, Lower Columbia River | <i>Oncorhynchus tshawytscha</i> | T | Yes | Migratory / rearing |
| Chum salmon, Columbia River | <i>Oncorhynchus keta</i> | T | Yes | Migratory |
| Coho salmon, Lower Columbia River | <i>Oncorhynchus kistutch</i> | T | No | Migratory |
| Steelhead, Lower Columbia River | <i>Oncorhynchus mykiss</i> | T | Yes | Migratory / rearing / spawning |

* Evolutionarily Significant Unit (ESU) or Distinct Population Segment (DPS).

Priority habitats associated with the Washougal River include oak woodlands which are mapped within Camas city limits (Map 5) (WDFW, 2009).

The WDNR Natural Heritage Program has identified small-flowered trillium (State Sensitive) in the Washougal River shoreline planning area within the city of Camas. There are no priority plant species or vegetation communities identified within the city of Camas UGA (WDNR, 2008).

2.1.2.5 Instream and Riparian Habitats

Instream habitat in the lower Washougal River consists primarily of small cobble riffles and glides with approximately two pools every kilometer (R2 Resource Consultants, 2004). Pool depth ranges from 10 to 15 feet (R2 Resource Consultants, 2004). Cascades and large cobble riffles are absent from the lower reaches (RM 0.7 to 4.4). Substrate is primarily gravel and cobbles with some boulders. Fines are largely absent from the Washougal River basin (R2 Resource Consultants, 2004). Large wood is limited in the lower reaches, with approximately 3.5 pieces per kilometer. Active channel width in the mainstem ranges from 100 to 150 feet (R2 Resource Consultants, 2004).

Side channels and off-channel habitat are lacking in the Washougal River; however, several secondary flow channels are present in the lower river. These channels are created in the mainstem by islands or bars (R2 Resource Consultants, 2004). The lower reach of Lacamas Creek serves as backwater habitat for the Washougal River.

2.1.2.6 Water Quality

The Washougal River within Clark County is not listed as exceeding state water quality standards (Ecology, 2008). Clark County has rated the overall health of the Washougal River as good to excellent based on water chemistry and bacteria (Clark County, 2004). This high rating is likely due to the fact that 63 percent of the Washougal River watershed is forested (Clark County, 2004a). High bacteria levels were observed in the mainstem during one summer and continue to be monitored through the Clark County Public Works volunteer program (Clark County, 2004a).

2.1.3 Lacamas Creek

2.1.3.1 Drainage Basin, Tributary Streams and Associated Wetlands

Lacamas Creek has its headwaters in forested areas and wetlands northeast of Vancouver. It joins with Fifth Plain Creek at the Vancouver city limits and then flows southeast through the city of Camas. In Camas, Lacamas Creek flows into Lacamas and Round Lakes. Below the lakes, Lacamas Creek flows for just under one mile through a series of waterfalls before entering the Washougal River, just upstream from the Columbia River (Clark County, 2004).

The upper part of the Lacamas Creek watershed is forested and agricultural, while the lower portion within Camas is more urbanized. Within Camas, most of Lacamas Creek is impounded within two lakes, Lacamas Lake and Round Lake. The two lakes are connected by a short segment of stream channel that crosses under SR 500 (SE Everett Road).

The size of the Lacamas Creek shoreline planning area within Camas and its UGA is 312 acres (including the waterbody itself). Four sub-reaches along Lacamas Creek lie within Camas and its UGA; these are identified on Map 2.

There are significant areas of associated wetlands along Lacamas Creek. An estimated 1,050 acres of the entire Lacamas Creek shoreline planning area is mapped as wetland. In reaches LACA_CR_01 and 02, wetlands in the planning area include palustrine forested and palustrine emergent wetlands.

Wetland areas within the Camas sub-reaches that have been mapped by Clark County are shown in Table 2-6 and on Map 4.

Table 2-6. Wetland Areas within Lacamas Creek Sub-reaches

| Sub-reach | Wetland Area (ac) |
|-------------|-------------------|
| LACA_CR_01a | 11 |
| LACA_CR_01b | 4 |
| LACA_CR_02a | 59 |
| LACA_CR_02b | 44 |

2.1.3.2 Process and Channel Modifications

Primary process and channel modifications in the Lacamas Creek sub-basin include:

- Diversions from Lacamas Lake contributing to low flows in the lower reaches of Lacamas Creek (HDR and EES, 2006);
- Dam around Round Lake;
- Land conversion from pervious to impervious surfaces; and
- Replacement of forests with agricultural and residential use.

Lacamas Creek has been extensively modified by human activities. The Georgia-Pacific Camas Mill has a large water right for Lacamas Lake, Camas Slough Columbia River, and nearby groundwater (HDR and EES, 2006). The diversions from the lake have significantly reduced flows in the lower reach of Lacamas Creek throughout the year. The combination of low summer flows and diversions negatively impacts the adult population of summer steelhead and significantly reduces flows (Wade, 2001). Additionally, the dam around Round Lake has altered the natural hydrology of Lacamas Creek and limited fish passage (Wade, 2001). There are no flow limitations on the operation of the dam.

2.1.3.3 Geologic and Flood Hazard Areas

The underlying geology for much of Lacamas Creek is alluvial fan deposits and alluvium (Map 8). Geologists suspect that Lacamas Creek used to flow into Burnt Bridge Creek prior to the Missoula Floods, which deposited alluvial materials and diverted this stream into Lacamas Lake and the Washougal River. Peat deposits are also noted to the west in what could have been the original stream channel. The Lacamas Lake fault line runs in line with Lacamas Creek and Lacamas Lake (USGS, 2006). Within the city of Camas, Lacamas Creek is classified as having a moderate to moderate-high potential for channel migration (Olson, 2010; Map 4). Landslide hazard areas (Map 6a), earthquake hazard areas, and flood hazard areas (Map 4) are mapped in the Lacamas Creek shoreline planning area in Camas. An erosion hazard area (Map 6b) is mapped in the Lacamas Creek shoreline planning area downstream of Round Lake in Camas.

2.1.3.4 Critical or Priority Habitat and Species Use

Lacamas Creek provides habitat for federally listed Chinook salmon, coho salmon, chum salmon, and steelhead from the confluence with the Washougal River up to the dam at Lacamas Lake (RM 0.9) (Map 5) (WDFW, 2009). This lowest reach of the stream is designated as critical habitat for Chinook salmon, chum salmon, and steelhead (70 FR 52630). Priority oak woodlands are mapped along Lacamas Creek (WDFW, 2009) in sub-reach LACA_CR_01b. Priority wood duck habitat is mapped in sub-reach LACA_CR_02a (WDFW, 2009).

WDNR has recently designated the Lacamas Prairie Natural Area Preserve/Natural Resource Conservation Area. It includes the single largest remaining wet prairie remnant in the states of Oregon and Washington and harbors endangered plants and rare plant associations.

The WDNR Natural Heritage Program has identified a number of priority plant species and vegetation communities within the city of Camas and its UGA shoreline planning areas (Table 2-7) (WDNR, 2008).

Table 2-7. Priority Plant Species and Communities Identified in the Lacamas Creek Shoreline Planning Area in the City of Camas and its UGA

| Priority Plant Species or Community | Federal Status | State Status | City of Camas | City of Camas UGA |
|--|-----------------------|---------------------|----------------------|--------------------------|
| Bradshaw's lomatium | Endangered | Endangered | X | X |
| Nuttall's Quillwort | None | Sensitive | X | X |
| Dense sedge | None | Threatened | X | X |
| Oregon coyote-thistle | None | Threatened | X | |
| Small-flowered trillium | None | Sensitive | X | |
| Hall's aster | None | Threatened | X | |
| Oregon white oak – (Oregon ash) / common snowberry | None | Sensitive | X | X |

2.1.3.5 Instream and Riparian Habitats

The lower reach of Lacamas Creek (RM 0 to 0.9 – the dam on Lacamas Lake) is rated high for large wood recruitment potential based on the presence of dense, mature riparian forest (R2 Resource Consultants, 2004). This lowest reach is also rated “off-target” for state stream-shading standards (R2 Resource Consultants, 2004). Lower Lacamas Creek functions as off-channel habitat for the Washougal River mainstem, providing refugia for salmon and steelhead (R2 Resource Consultants, 2004). Riparian habitat in the upper Lacamas Creek basin is considered impaired (R2 Resource Consultants, 2004).

2.1.3.6 Water Quality

Lacamas Creek is on Ecology's 303(d) impaired list for dissolved oxygen, fecal coliform, pH, and temperature (Ecology, 2008).

2.1.4 Round Lake

2.1.4.1 Drainage Basin, Tributary Streams and Associated Wetlands

Round Lake is located southeast of Lacamas Lake within the 67-square-mile Lacamas Creek drainage basin. Round Lake is hydrologically connected to Lacamas Lake by a narrow channel that flows under SE Everett Road. This lake is 0.4 miles long and 0.2 miles wide at its maximum

width (USGS, 1993a). Water is diverted through a spillway and a dam into Mill Ditch for operations at the Georgia-Pacific Camas Mill.

Round Lake is located entirely within Camas city limits and UGA boundaries. The size of the Round Lake shoreline planning area is 72 acres (including the lake itself). Three sub-reaches along Round Lake lie within Camas and its UGA; these are identified on Map 2.

Four acres of the Round Lake shoreline planning area are mapped as wetland. Specifically, wetland areas within the Round Lake sub-reaches that have been mapped by Clark County are shown in Table 2-8 below and on Map 4.

Table 2-8. Wetland Areas within Round Lake Sub-reaches

| Sub-reach | Wetland Area (ac) |
|-------------|-------------------|
| ROUN_LK_01a | 1 |
| ROUN_LK_01b | 1 |
| ROUN_LK_01c | 2 |

Most of the shoreline surrounding the lake is forested, although development is present west and north of the lake.

2.1.4.2 Process and Channel Modifications

Round Lake has been extensively modified by humans. Some of the process modifications include:

- Dams that have artificially raised water levels;
- Land conversion from pervious to impervious surfaces; and
- Dams connected to Lacamas Lake and Round Lake have altered the natural hydrology and limit fish passage (Wade, 2001).

2.1.4.3 Geologic and Flood Hazard Areas

Flood hazards around Round Lake extend into residential areas to the northeast and southwest. Areas of flooding associated with streamflow in Lacamas Lake and with rainfall extend from Lacamas Lake to Round Lake. The flood zones are identified in FEMA FIRMs and shown in Map 4 (FEMA, 2007). Severe erosion hazards exist to the east of Round Lake (Map 6b). The area within and to the west of the lake include semi-consolidated sediment. Unconsolidated sediment exists to the north of the lake, so this area has seismic hazards (Map 6c). Landslide hazards are located along the entire eastern bank of the lake and are characterized by areas of potential instability and slopes greater than 15 percent (Map 6a). Additional landslide hazards are located along the southwest bank of the lake.

2.1.4.4 Critical or Priority Habitat and Species Use

Round Lake is inaccessible to anadromous fish due to the dam constructed at the southern end of Lacamas Lake (WDFW, 2009). No critical habitat for federally listed fish is designated along Round Lake (70 FR 52630). Priority urban natural open space is mapped for a majority of Round Lake (Map 5) (WDFW, 2009). Bald eagles are known to use habitats in and around Round Lake.

2.1.4.5 Instream and Riparian Habitats

The riparian habitat along Round Lake consists of relatively dense forest wider than 200 feet in several locations (Clark County, 2007b). Only a minimal amount of intrusion into the riparian zone has occurred due to residential or road development.

The WDNR Natural Heritage Program has identified the State Sensitive Oregon white oak / Pacific poison-oak / blue wildrye vegetation community within the city of Camas UGA Round Lake shoreline planning area (WDNR, 2008).

2.1.4.6 Water Quality

Round Lake is on Ecology's 303(d) list of impaired waters due to dissolved oxygen, temperature and pH (Ecology, 2008). Similar to Lacamas Lake, Round Lake is classified as "eutrophic" because of high nutrient levels and biological productivity (Clark County, 2007a).

2.1.5 Fallen Leaf Lake

2.1.5.1 Drainage Basin, Tributary Streams and Associated Wetlands

Fallen Leaf Lake (formerly called Dead Lake) is located south of Lacamas Lake and west of Round Lake entirely within the Camas city limits. The lake is bordered by steep forested slopes to the west and south, wetlands to the east, and Lacamas Lake Road to the north. This lake is 0.35 miles long and 0.1 miles wide at its maximum width (USGS, 1993a). In 1918, water from Fallen Leaf Lake was piped into the city of Camas for use in fighting fires (City of Camas, 2010). A more sophisticated system was adopted after fire destroyed part of downtown in 1923 (City of Camas, 2010). No water withdrawals are currently known for the lake.

The size of the Fallen Leaf Lake shoreline planning area is 52 acres (including the waterbody itself). Fallen Leaf Lake has one reach which is illustrated on Map 2.

An estimated 17 acres of the Fallen Leaf Lake shoreline planning area is mapped as wetland by Clark County (Map 4). The National Wetland Inventory (NWI) maps palustrine emergent and palustrine scrub-shrub wetlands along the lakeshore.

2.1.5.2 Process and Channel Modifications

Fallen Leaf Lake is surrounded by a wooded area on the west, south, and east that extends 0.1 mile from the edge of the lake. The north shore of the lake is adjacent to residential development and roads. The primary modification around Fallen Leaf Lake is the conversion of forests to residential structures and roads.

2.1.5.3 Geologic and Flood Hazard Areas

The 100-year flood zone around Fallen Leaf Lake is connected to the southeast section of the floodplain around Lacamas Lake. Flooding in the lake is associated with water levels in Lacamas Lake. The floodplain is identified on the FEMA FIRMs (Map 4; FEMA, 2007). Severe erosion hazards exist to the west of Fallen Leaf Lake (Map 6b). The areas within and to the north, south, and west of the lake include semi-consolidated sediment (Map 6c). Unconsolidated sediment exists to the east of the lake, between Lacamas Lake, and is associated with seismic hazards. Landslide hazards are located along the entire western bank of the lake and are characterized by areas of potential instability and slopes greater than 15 percent (Map 6a).

2.1.5.4 Critical or Priority Habitat and Species Use

Fallen Leaf Lake is inaccessible to anadromous fish (WDFW, 2009) and no critical habitat for federally-listed fish is designated for this lake (70 FR 52630). Priority urban natural open space is mapped for Fallen Leaf Lake (Map 5) (WDFW, 2009). Similar to Round Lake, bald eagle territories are documented in and around this area.

The WDNR Natural Heritage Program has identified the State Sensitive Douglas fir / beaked hazel / swordfern vegetation community within the city of Camas Fallen Leaf Lake shoreline planning area (WDNR, 2008).

2.1.5.5 Instream and Riparian Habitats

The riparian habitat along Fallen Leaf Lake consists of wetlands and relatively dense forest. Only a minimal amount of intrusion into the riparian zone has occurred at the north end, predominantly from road development (Clark County, 2007b).

2.1.5.6 Water Quality

Fallen Leaf Lake is not recorded on Ecology's 303(d) list of impaired waterbodies (Ecology, 2008). However, this does not necessarily mean that there are no water quality problems. The fact that there are no listings may only indicate that the lake has not been assessed for water quality concerns.

2.1.6 Lacamas Lake

2.1.6.1 Drainage Basin, Tributary Streams and Associated Wetlands

Lacamas Lake is part of the 67-square-mile Lacamas Creek watershed and is situated in the northern part of the city of Camas between SR 500 and NE Goodwin Road (Clark County, 2004d). The lake is 2.4 miles long, less than a quarter of a mile wide at its widest point, and approximately 60 feet deep at its deepest point (Clark County, 2004d). Lacamas Lake is a natural lake but water levels were raised by approximately 12 feet after the construction of a dam at the southern end of the lake in 1883 (Clark County, 2004d). The dam was constructed for industrial water supply and to float logs down the lake during the timber boom of the late 19th and early 20th centuries.

Lacamas Lake and its neighboring water body, Round Lake, are impoundments of Lacamas Creek. The two lakes are connected by a channel crossing under SR 500 (SE Everett Road). Water levels in the lakes are controlled by dams at the southern end of the lakes. The Georgia-Pacific Mill in Camas draws water from Lacamas Lake for its operations (Clark County Public Works Clean Water Program, undated).

The eastern shoreline of Lacamas Lake is rural, forested and agricultural, while the western shoreline is more urbanized with a golf course and residential development.

Lacamas Lake is located entirely within Camas and its UGA. The size of the Lacamas Lake shoreline planning area is 476 acres (including the waterbody itself). Three sub-reaches along Lacamas Lake lie within Camas and its UGA; these are identified on Map 2.

Clark County has identified 148 acres of the Lacamas Lake shoreline planning area as wetland. Specifically, wetland areas within the Lacamas Lake sub-reaches that have been mapped by Clark County are shown in Table 2-9 below and on Map 4.

Table 2-9. Wetland Areas within Lacamas Lake Sub-reaches

| Sub-reach | Wetland Area (ac) |
|-------------|-------------------|
| LACK_LK_01a | 28 |
| LACK_LK_01b | 104 |
| LACK_LK_01c | 16 |

A large wetland complex consisting of palustrine aquatic bed, emergent, and forested habitats is located on the southeastern side of the lake. A few other smaller wetlands are present at the north end of the lake.

2.1.6.2 Process and Channel Modifications

Lacamas Lake has been extensively modified by humans. Some of the process modifications include:

- Dams that have artificially raised water levels;
- Land conversion from pervious to impervious surfaces; and
- Diversions from Lacamas Lake contributing to low flows in the lower reaches of Lacamas Creek (HDR and EES, 2006).

Water levels in Lacamas Lake have been artificially raised by the installation of dams. The first dam was built in 1883 at the southern end of the lake and raised water levels in the lake by 12 feet (Clark County, 2010). The deeper water facilitated floating of logs to a lumber mill on Lacamas Creek. An additional dam and aqueduct were built to convey water from Round Lake to the Georgia-Pacific Camas Mill.

The Georgia-Pacific Camas Mill has a large water right for Lacamas Lake, Columbia River, and groundwater (HDR and EES, 2006). The diversions from the lake have significantly reduced flows in the lower reach of Lacamas Creek. Additionally, the dam around Round/Lacamas Lake

has altered the natural hydrology of the stream. There are no flow limitations on the operation of the dam.

2.1.6.3 Geologic and Flood Hazard Areas

The underlying geology for much of Lacamas Lake is alluvial fan and lake deposits (Map 8). Lake deposits are unconsolidated black mud, silt and organics that have formed in the Lacamas Lake valley (USGS, 2006). The Lacamas Lake fault line runs toward the southeast in line with Lacamas Lake (USGS, 2006).

Flood hazards in Lacamas Lake and upstream areas are associated with streamflow, precipitation, and operation of the dams (Map 4). Flooding is identified in FEMA FIRMs and shown in Map 6 (FEMA, 2007). The floodplain upstream of Lacamas Lake and downstream of Fifth Plain Creek varies from approximately 0.2 mile to 1 mile wide. Severe erosion hazards are located along the western edge of the lake (Map 6b). Lacamas Lake consists of and is primarily surrounded by semi-consolidated sediment (Map 6c). The wetland areas north of Lacamas Lake and to the southeast are made up of unconsolidated sediment and associated with seismic hazards. Landslide hazards are present adjacent to the western and northeast banks of Lacamas Lake, where slopes are greater than 15 percent (Map 6a).

2.1.6.4 Critical or Priority Habitat and Species Use

The dam at the southern end of the lake is a barrier to anadromous fish. Lacamas Lake historically supported cutthroat trout, but this species is considered eradicated from the lake due to changes in water quality over the years (Clark County, 2004d). No priority fish or habitat are now documented. Urban natural open space is mapped along the southwestern portion of the lake (Map 5) (WDFW, 2009). The lake also provides habitat for state-listed threatened bald eagles (WDFW, 2009).

The WDNR Natural Heritage Program has identified tall bugbane (Federal Candidate and State Sensitive) in the Lacamas Lake shoreline planning area, both within the city of Camas and its UGA (WDNR, 2008).

2.1.6.5 Instream and Riparian Habitats

Lacamas Lake experiences aquatic plant growth due to relatively high nutrient levels (Clark County, 2007). Water clarity is low in the summer because of algal growth and an aquatic weed, Brazilian elodea, which forms dense mats in shallow water. Suitable water temperatures for fish in the lake during the summer are found at depths greater than four to six feet, but a depletion of dissolved oxygen reduces the suitability of these cold-water areas. Suitable fish habitat is consequently restricted to a narrow stratum, if present at all (Clark County, 2007a). Because of these water quality limitations, the lake is no longer able to sustain native cutthroat trout populations. Non-native bass, perch, and bluegill appear to be self-sustaining, but these populations were found to be in poor condition due to slow growth and low recruitment in a 1997 study (Clark County, 2007a). Dissolved oxygen depletion is indicated as the main stressor that inhibits normal fish population growth (Clark County, 2007a).

Riparian habitat varies around the lake. On the west side of the lake, the riparian zone ranges from 50 to 200 feet wide with some intrusion from residential development at the northwest end

of the lake (Clark County, 2007b). Road development on the east side of the lake limits riparian vegetation to a band less than 20 feet wide that lacks tree cover, while a large patch of forest is located along the southern end of the lake.

2.1.6.6 Water Quality

Lacamas Lake is on Ecology's 303(d) list of impaired waters due to exceedances for total phosphorous, PCBs, dissolved oxygen, fecal coliform, pH, and temperature (Ecology, 2008). Tissue from brown trout and largemouth bass sampled in 2003 did not exceed National Toxic Rule criteria for several toxic chemicals including mercury and toxaphene (Ecology, 2008). Lacamas Lake is also listed for an invasive aquatic species, Brazilian elodea (*Egeria densa*) (Ecology, 2008).

The water quality problems persist in Lacamas Lake, despite government-funded efforts between 1987 and 2001 to address high nutrient levels and raise public concern about the lake's water quality (Clark County, 2007a). Persistent water quality issues include the following: severe dissolved oxygen depletion, poor water clarity, high levels of algae growth, nuisance blue-green algae blooms, and dense beds of Brazilian elodea (Clark County, 2007a).

Eutrophication was first observed in the lake in 1970, which led to the development of a Phase I Diagnostic and Restoration Study (Giglio and Erickson, 1996). Eutrophication is a natural process but can be accelerated by land use activities that result in large amounts of nutrients entering aquatic systems. The goal of this basin-wide plan was to reduce phosphorous loading in the water by implementing best management agricultural practices at the surrounding dairy farms (Giglio and Erickson, 1996). While phosphorous levels in the lake have decreased, nutrient levels remain a water quality concern (Clark County, 2004d). Clark County continues to monitor water quality in the lake to inform management decisions (Clark County, 2007a).

2.2 Existing Plans, Programs and Policies

2.2.1 Existing Shoreline Master Program

The City adopted the *Shoreline Master Program for City of Camas* on December 14, 1998 (see Map 1 for current shoreline jurisdiction) (City of Camas, 1998). A limited amendment pursuant to Ordinances 2544 and 2551 was made on October 1, 2009. The program applies the following shoreline environment designations to the portions of the Columbia River, Washougal River, Lacamas Creek, Fallen Leaf Lake and Lacamas Lake that are located within the city limits and, in some cases, UGA:

- Aquatic Environment
- Conservancy Environment
- Urban High Environment
- Urban Medium/Low Environment
- Natural Environment

The Shoreline Master Program (SMP) established goal statements for circulation, conservation, design, economic development, flood hazard, historical/cultural, long-range planning, public

access, recreational, redevelopment, and shoreline use elements. The SMP also has policy statements and regulations for shoreline use activities (e.g., clearing and grading, parking).

Administrative provisions for implementing the Shoreline Management Act are included in Chapter 18.88 of the Camas Municipal Code (City of Camas, 2010a). Chapter 18.88 created a shoreline review committee which is composed of an ex-officio member, the chairman of the planning commission, the chairman of the parks and recreation commission, and a councilperson to be appointed by the mayor and confirmed by the council. The committee is charged with determining whether a shoreline permit application is significant or non-significant. Significant applications must be reviewed by the City planning commission and approved or denied by the city council. Chapter 18.88 also establishes code enforcement standards, and criteria for approving conditional use permits and variances.

2.2.2 Comprehensive Plan

The City of Camas *Comprehensive Plan* (City of Camas, 2004) outlines general growth management goals over the next 20 years. Chapter VI Environmental Element of the Comprehensive Plan contains goals and policies for management of the City's shoreline areas, including the goals and policies contained in the *Camas Shoreline Master Program*. Fifteen "land use categories" are described in the plan. These categories serve as the basis for more detailed zoning code designations. Land use categories include:

- Single-family Residential Designations: Low density, medium density, and high density
- Multi-family Residential Designations: Low density and high density
- Commercial Designation
- Industrial Designations: Light industrial and heavy industrial
- Light Industrial/Business Park Designation
- Park Designation
- Green Space Designation
- Public Facility Designation

Land use designations are relevant to this shoreline characterization report as they establish the general land use patterns and vision of growth the City has adopted for areas both inside and outside the shoreline planning area.

2.2.3 Municipal Code

Title 18 of the Camas Municipal Code (CMC) establishes zoning districts in the city (City of Camas, 2010a). These districts, which follow land use designations established in the Comprehensive Plan, include 10 residential zones, three commercial zones, one mixed residential/commercial zone, one mixed residential/commercial/light industrial zone, one heavy industrial zone and one light industrial/business park zone.

2.2.4 Critical Areas Regulations

The City of Camas regulates activities in or adjacent to environmentally sensitive areas under Title 16 CMC, adopted in 2008. Critical areas protected by this code include wetlands, fish and wildlife habitat conservation areas, critical aquifer recharge areas, geologically hazardous areas, and frequently flooded areas. Critical area reports and decisions to alter critical areas rely on the best available science consistent with WAC 365-195-900 through 365-195-925.

Wetlands are classified using the *Washington State Department of Ecology Wetland Rating System for Western Washington* (Hruby, 2004). This system rates wetlands into four categories, with Category 1 being the highest and Category 4 the lowest. Buffers are based upon wetland category and the intensity of land use, and range from 25 to 300 feet in width (CMC 16.53.040). Standard mitigation ratios are provided in CMC 16.53.050. Wetlands have been mapped in the shoreline planning area of the Columbia River, Washougal River, Lacamas Creek, Lacamas Lake, and Round Lake.

Critical Aquifer Recharge Areas (CARA) include wellhead protection areas, sole-source aquifers, susceptible groundwater management areas, special protection areas, and moderately or highly vulnerable aquifer recharge areas (CMC 16.55.010.) Category 1 CARAs are mapped within portions of the shoreline planning areas of the Columbia River and Washougal River, and two small areas within the shoreline planning area of Lacamas Creek and Round Lake (Map 4). Category 2 CARAs are mapped throughout most of the shoreline planning areas of the Columbia and Washougal Rivers, Lacamas Creek and Round Lake, and Fallen Leaf Lake.

Frequently Flooded Areas are designated based upon *The Flood Insurance Study for the City of Camas, Washington* (FEMA, 1982). The CMC provides general standards for activities within the flood hazard zone, including: grading and fill, construction materials and methods, utilities, anchoring, floodproofing, and sanitary sewage systems. The code regulates alteration of watercourses. The code specifies maintenance of flood conveyance at no more than one inch above base flood elevation (CMC 16.57.040). The flood hazard zone of the Columbia River extends into the city of Camas as well as the UGA (Map 4). The flood hazard zones associated with the Washougal River, Lacamas Creek, Lacamas Lake, and Round Lake also lie within the city and its UGA.

Geologically Hazardous Areas include erosion hazard, landslide hazard, seismic hazard, or geologic hazards including areas with potential for mass wasting, debris flows, rock falls, and differential settlement. Erosion and landslide hazard areas are protected by management zones of 50 feet or the height of the slope, whichever is greater (CMC 16.59.090). Activities in seismic hazard areas must meet general standards in CMC 16.59.080, where the hazard can be eliminated or mitigated to pre-development conditions. Most of the shoreline planning area associated with the Columbia River, the Washougal River, and with Lacamas Creek, Lacamas Lake, and Round Lake is mapped as an earthquake hazard zone. Landslide hazard zones are mapped within the shoreline planning areas of Lacamas Lake and Round Lake, Lacamas Creek downstream of Round Lake, and the Washougal River (Map 6a). The Columbia River shoreline planning area has small areas with slopes exceeding 15 percent. An erosion hazard area is mapped near the confluence of the Washougal and Columbia Rivers, in limited portions of the Columbia River

shoreline planning area, and the Lacamas Creek shoreline planning area downstream of Round Lake (Map 6b).

Fish and Wildlife Habitat Conservation Areas include areas with which federal or state designated endangered, threatened, or sensitive species have a primary association; state priority habitats and areas associated with priority species; habitats of local importance including natural open space, Oregon white oaks (over 20 inches diameter at breast height [dbh]) and stands of white oak greater than one acre, and Oregon white oak snags; camas lily stands of one-quarter acre; naturally occurring ponds under 20 acres; waters of the state; bodies of water planted with game fish by governmental or Tribal entities; and State Natural Area Preserves and Natural Resource Conservation areas (CMC 16.61.010). Mitigation for a net loss of function is required on-site if possible, then off-site with coordination with the city and the WDFW. Mitigation prioritizes the preservation and restoration of the lower Washougal River instream and riparian habitat, and is guided by the Washougal River Subbasin Chapter of the Lower Columbia Salmon Recovery Plan (CMC 16.61.030).

Base stream buffer widths are based upon the stream rating (DNR Water Typing System) modified by fish presence for Type F streams. Type S streams (shorelines of the state) have 150-foot buffers, and buffers for other streams range from 25 to 100 feet in width. Stream buffers can be averaged or reduced up to 50 percent of their width, but to not less than 15 feet in width, on a case-by-case basis (CMC 16.61.040). Specific activities may be allowed within stream buffer areas, ponds, lakes, and waters of the state or associated buffer, when the activity complies with the provisions of the City of Camas SMP. These activities include clearing and grading, streambank stabilization, construction of launching ramps, docks, roads, trails, bridges, and rights-of-way, utility facilities, public flood protection measures, instream structures (as part of an approved watershed basin restoration project), stormwater conveyance facilities, on-site sewage systems and wells (CMC 16.61.040[E]). Priority habitats including white oak woodland, urban natural open space, and wood duck habitat are mapped within the shoreline planning area of Lacamas Creek, Lacamas Lake, Round Lake, and the Washougal River.

2.2.5 Parks, Open Space Plan

The *City of Camas Park, Recreation and Open Space Comprehensive Plan* (City of Camas, 2007) establishes a vision for Camas' park system. The plan inventories existing park, open space, and trail areas in the city; recommends a six-year Capital Improvement Plan to implement park improvements; identifies potential funding sources; and provides park development guidelines.

2.3 Shoreline Use Patterns

2.3.1 Existing Land and Shoreline Uses

Existing uses along the Columbia River in Camas are mainly industrial (81 percent of total shoreline planning area) with some vacant lands (11 percent of total shoreline planning area) (Map 9). Industrial uses are concentrated in sub-reach COLU_RV_03d with vacant lands located in all three sub-reaches. Impervious surfaces are highest in sub-reach COLU_RV_04a (23 percent), which means the reach is the most intensely developed. Impervious area is based on

land cover data from the National Oceanic and Atmospheric Administration (C-CAP/NLCD, 2006). The data differentiate between developed open space (0-20 percent impervious), low intensity developed (21-49 percent impervious), medium intensity developed (50-79 percent impervious) and high intensity developed (80-100 percent impervious).

There are 11 over-water structures (mainly docks) on the Columbia River in Camas. Based on review of aerial photos, armoring along the Columbia River is focused in developed areas (Map 8). Washington SR 14, the Lewis and Clark Highway, crosses the Camas Slough to Lady Island and crosses back to the east across the mouth of the Washougal River. The Burlington Northern-Santa Fe (BNSF) railroad tracks parallel the Columbia River shoreline west of the mouth of the Washougal River (Map 3).

Lady Island is located near the northern shore of the Columbia River. This island is separated from the Camas mainland by the Camas Slough. The Washougal River enters the Columbia at the upper end of the island (Columbia River Images, 2010). Part of the Georgia-Pacific Mill in Camas resides on Lady Island, which is wholly owned by the mill. A wastewater treatment system and solid waste landfill for the mill are also located on the island. The mill is a pulp and paper manufacturing complex that produces bleached kraft paper, tissue and toweling products (see Photo 2-1 for a picture of the mill from 1920).

Photo 2-1. Crown-Willamette Paper Mill, Camas, ca. 1920



Courtesy Clark County Historical Museum (Image No. P10.53.2)

The final effluent discharge outfall from the mill extends into the Columbia River (Ecology, 2010b). SR 14 crosses the island and is slated for widening in 2010 (Washington State Department of Transportation, 2010). Archaeological investigations on Lady Island have unearthed prehistoric ceramic artifacts that indicate human presence as long ago as 2,000 to 2,500 years (HistoryLink.org, 2010). No public access is currently provided on Lady Island. Existing uses along the Washougal River, as outlined in Table 2-9, are mainly vacant lands (44 percent of entire shoreline planning area) and industrial (42 percent of entire shoreline planning area). Downstream of the eastern city limits, the Washougal River shoreline planning area is

characterized by the Washougal River Greenway, owned and maintained as open space by the City of Camas (Map 9). Commercial and industrial uses continue to exist farther downstream, although there is a significant amount of undeveloped land including Beach Island. At the confluence of the Washougal and Columbia Rivers, there are several shoreline industrial uses including the Georgia-Pacific Camas Mill. (See Photo 2-2 for a picture from 1908 of the Washougal River being used for log storage and transportation.) This mill encompasses 660 acres (including Lady Island in the Columbia River channel) on the shorelines of both the Columbia and Washougal Rivers. The Camas wastewater treatment facility is also located within the shoreline planning area on the east side of the river.

Photo 2-2. Logjam on Washougal River, Camas, ca. 1908



Courtesy The Coast

In Camas, the Washougal River is crossed by NE 3rd Avenue, SE 6th Avenue, the BNSF railroad and a utility bridge (see Photo 2-3). SE 6th Avenue and the BNSF crossings are parallel to each other immediately upstream of Beach Island (Map 3). The City of Camas also has a pedestrian trail and waterline bridge constructed in 2008 that cross the Washougal River. There are no other shoreline modifications mapped along the river. Impervious surfaces are highest in reach WASH_RV_01 which means the reach is the most intensely developed (C-CAP / NLCD, 2006).

**Photo 2-3. Utility Bridge over the Washougal River in Camas, Washington.
Placed in August 2008.**



Courtesy of the Camas Public Works Department.

The Lacamas Creek shoreline planning area is a mix of vacant land (28 percent of total shoreline planning area), and recreation and open space areas (33 percent of total shoreline planning area) (Map 9). Other existing uses include institution (16 percent of total shoreline planning area) and residential (11 percent of total shoreline planning area). Vacant lands are located in all sub-reaches except for LACA_CR_01b, which is composed entirely of Lacamas Lake Regional Park, identified in Table 2-9 as open space. Recreation land use is composed entirely of the Camas Meadows Golf Course, located in sub-reach LACA_CR_02a. Impervious surfaces are highest in sub-reach LACA_CR_01a, indicating more intense development (C-CAP / NLCD, 2006). Lacamas Creek is crossed by NE Goodwin Rd and NE 3rd Avenue (Map 3). There are no data on shoreline modifications.

Existing uses in the Round Lake shoreline planning area are predominantly mobile home park (68 percent of total shoreline planning area) and undeveloped parkland (19 percent of total shoreline planning area) (Map 9). The Lake Lacamas County Park surrounds nearly the entire lake. The mobile home park is located near the southwest corner of the lake, and single-family residential development is located at the north end of the lake. Impervious surfaces are highest in sub-reach ROUN_LK_01c, indicating more intense development (C-CAP / NLCD, 2006). Two roads, NE Everett Street and NE 35th Street, are located within the shoreline planning area (Map 3). The lake's shoreline appears to be relatively unmodified. There are no piers or docks on the lake.

Fallen Leaf Lake and its shoreline planning area include developed trails, a privately owned park with developed picnic shelter, restrooms, volleyball court, lake access, forested areas as well as a caretaker mobile home (Map 9). This lake is held in private ownership by the Georgia-Pacific Camas Mill, which is responsible for environmental stewardship. A 43-acre forested parcel to the west of the lake was purchased by the Columbia Land Trust and held for the benefit of the City of Camas. Once, a cemetery was located near this lake called Dead Lake Cemetery, but the cemetery has since been moved. Existing uses are mainly vacant lands (58 percent) and a large mobile home site (37 percent). Impervious surfaces are limited.

The west shore of the Lacamas Lake is single-family residential with some open/recreational space (Map 9). Homes are generally separated from the lake by a vegetated hillside, resulting in a relatively unmodified shoreline. The Heritage Trail also travels the length of the west shoreline between the homes and the lake. The east shore of the lake is characterized primarily by undeveloped lands with a few existing residences including the historic Leadbetter House. There are also some residential and commercial developments at the southern end of the lake including a restaurant. Overall, existing uses are mainly vacant lands (42 percent of entire shoreline planning area) with some single-family residential (18 percent of entire shoreline planning area) and mobile homes (11 percent of entire shoreline planning area). Impervious surfaces are highest in sub-reach LACA_LK_01c, indicating more intense development (C-CAP / NLCD, 2006). SE Leadbetter Road runs most of the length of the east side of the lake (Map 3). The lake shore is riprap supporting the roadway along much of the eastern shore.

There are several docks on Lacamas Lake, most of which are located on the western shore. Two of the docks on the west shore are associated with a boat launch owned by the Lacamas Shores Homeowners Association and a set of community docks located within Heritage Park, along with an associated boat launch, which are owned and maintained by the City of Camas. The existing Moose Lodge building and dock are also owned by the City of Camas within this area. A privately owned dock is located within the Lacamas Shores development. A third boat launch is

located on the east side of the lake and appears to be accessible to the public from Leadbetter Road.

Existing uses and impervious surfaces are shown in Table 2-10 by reach.

Table 2-10. Existing Uses and Impervious Surfaces in Camas

| Reach | Existing Uses | | | Impervious Surface (0-100%) |
|-------------------|---------------------------|---------|------------|-----------------------------|
| | Use Type | Acreage | Percentage | |
| COLU_RV_03c (UGA) | Single-family residential | 20 | 49% | 4% |
| | Vacant | 21 | 51% | |
| COLU_RV_03d | Industrial | 518 | 92% | 8% |
| | Single-family residential | 6 | 1% | |
| | Vacant | 37 | 7% | |
| COLU_RV_04a | Multi-family residential | 4 | 9% | 23% |
| | Public Facility | 8 | 18% | |
| | Single-family residential | 11 | 26% | |
| | Undetermined | 4 | 10% | |
| | Vacant | 16 | 37% | |
| WASH_RV_01 | Industrial | 55 | 57% | 43% |
| | Multi-family residential | 1 | 1% | |
| | Open Space | 1 | 1% | |
| | Public Facility | 4 | 5% | |
| | Single-family residential | 3 | 3% | |
| | Vacant | 32 | 33% | |
| WASH_RV_02a | Commercial | 2 | 2% | 22% |
| | Forestry | 1 | 1% | |
| | Industrial | 29 | 29% | |
| | Public Facility | 6 | 6% | |
| | Single-family residential | 8 | 8% | |
| | Vacant | 55 | 54% | |

| Reach | Existing Uses | | | Impervious Surface (0-100%) |
|-------------------|---------------------------|---------|------------|-----------------------------|
| | Use Type | Acreage | Percentage | |
| LACA_CR_01a | Industrial | 9 | 22% | 24% |
| | Institution | 3 | 7% | |
| | Multi-family residential | 1 | 2% | |
| | Open Space | 7 | 18% | |
| | Single-family residential | 2 | 5% | |
| | Vacant | 18 | 45% | |
| LACA_CR_01b (UGA) | Open Space | 29 | 100% | 1% |
| LACA_CR_02a | Forestry | 10 | 6% | 10% |
| | Institution | 18 | 11% | |
| | Open Space | 5 | 3% | |
| | Recreation | 65 | 41% | |
| | Undetermined | 20 | 13% | |
| | Vacant | 42 | 26% | |
| LACA_CR_02b (UGA) | Institution | 30 | 32% | 0% |
| | Single-family residential | 31 | 34% | |
| | Vacant | 31 | 34% | |
| ROUN_LK_01a | Commercial | 1 | 1% | 14% |
| | Forestry | 5 | 6% | |
| | Mobile Home | 70 | 83% | |
| | Open Space | 5 | 6% | |
| | Single-family residential | 1 | 1% | |
| | Vacant | 3 | 4% | |
| ROUN_LK_01b (UGA) | Open Space | 13 | 100% | 1% |
| ROUN_LK_01c | Commercial | 0.05 | 1% | 56% |
| | Forestry | 1 | 12% | |
| | Open Space | 1 | 21% | |
| | Public Facility | 1 | 14% | |
| | Single-family residential | 1 | 17% | |
| | Undetermined | 0.16 | 3% | |
| | Vacant | 2 | 32% | |

| Reach | Existing Uses | | | Impervious Surface (0-100%) |
|-------------------|---------------------------|---------|------------|-----------------------------|
| | Use Type | Acreage | Percentage | |
| FALL_LF_LK_01 | Institution | 1 | 2% | 4% |
| | Mobile Home | 18 | 37% | |
| | Single-family residential | 2 | 3% | |
| | Vacant | 28 | 58% | |
| LACK_LK_01a | Institution | 2 | 2% | 20% |
| | Mobile Home | 16 | 23% | |
| | Open Space | 7 | 9% | |
| | Recreation | 1 | 1% | |
| | Single-family residential | 12 | 17% | |
| | Undetermined | 10 | 14% | |
| | Vacant | 23 | 33% | |
| LACK_LK_01b (UGA) | Forestry | 9 | 14% | 2% |
| | Institution | 9 | 14% | |
| | Single-family residential | 9 | 14% | |
| | Vacant | 38 | 59% | |
| LACK_LK_01c | Agriculture | 5 | 13% | 31% |
| | Commercial | 0.28 | 1% | |
| | Forestry | 3 | 8% | |
| | Institution | 4 | 8% | |
| | Mobile Home | 3 | 8% | |
| | Open Space | 2 | 4% | |
| | Public Facility | 0.36 | 1% | |
| | Single-family Residential | 11 | 25% | |
| | Vacant | 14 | 33% | |

2.3.2 Shoreline Environment Designations and Zoning

The existing shoreline environment designations along the Columbia River are Urban Medium / Low and Urban High. All of Washougal River in Camas is designated a mix of Urban Medium / Low, Urban High, Natural and Conservancy. Lacamas Creek is mainly designated Conservancy with one area identified as Urban Medium / Low. Round Lake and Lacamas Lake are designated as Conservancy. Fallen Leaf Lake is designated Natural and Conservancy.

The zoning for properties along the Columbia and Washougal Rivers is mainly industrial. Commercial is the predominant zoning designation for Lacamas Creek. Round Lake is mainly

zoned for residential – single family and parks and open space. Fallen Leaf Lake is mainly zoned for residential – single family. See Map 10 for zoning designations.

Most of the western shore of Lacamas Lake is zoned as single-family residential, with the northern end and parts of the eastern shore zoned for parks and open space. The remainder of the eastern shore reflects zoning designated as “moratorium” in the data set used for this report (see Section 2.3.1); however, the City of Camas has since lifted those restrictions upon completion of its capital facilities planning efforts. This area now reflects zoning intended for industrial and small amounts of commercial and residential uses.

A summary of the zoning and shoreline environment designations along the sub-reaches in Camas is shown in Table 2-11.

Table 2-11. Zoning and Shoreline Environment Designations in Camas

| Reach | Zoning Designation | Acreage | Percentage | Shoreline Environment Designation |
|-------------------|-----------------------------|---------|------------|--|
| COLU_RV_03c (UGA) | Parks/Open Space | 19 | 47% | Urban Medium / Low |
| | Residential – Single Family | 22 | 53% | |
| COLU_RV_03d | Commercial | 1 | 0.2% | Urban Medium / Low, Urban High |
| | Industrial | 571 | 97% | |
| | Residential – Single Family | 17 | 3% | |
| COLU_RV_04a | Commercial | 16 | 37% | Urban Medium / Low |
| | Residential – Multi-Family | 11 | 25% | |
| | Residential – Single Family | 17 | 38% | |
| WASH_RV_01 | Commercial | 4 | 3% | Urban Medium / Low, Urban High, Natural, Conservancy |
| | Industrial | 116 | 93% | |
| | Residential – Multi-Family | 7 | 4% | |
| WASH_RV_02a | Commercial | 10 | 7% | Conservancy, Natural, Urban Medium / Low |
| | Industrial | 39 | 29% | |
| | Residential – Multi-Family | 74 | 55% | |
| | Residential – Single Family | 12 | 9% | |
| LACA_CR_01a | Residential – Multi-Family | 17 | 36% | Conservancy and Urban Medium / Low |
| | Residential – Single Family | 30 | 63% | |
| LACA_CR_01b (UGA) | Parks/Open Space | 30 | 100% | Conservancy |

| Reach | Zoning Designation | Acreage | Percentage | Shoreline Environment Designation |
|-------------------|-----------------------------|---------|------------|--|
| LACA_CR_02a | Commercial | 139 | 84% | Conservancy (County) |
| | Moratorium | 16 | 10% | Conservancy (City) |
| | Residential – Single Family | 9 | 6% | |
| LACA_CR_02b (UGA) | Parks/Open Space | 63 | 98% | Conservancy (County) |
| | Residential – Multi-Family | 1 | 2% | |
| ROUN_LK_01a | Commercial | 2 | 9% | Conservancy (County) |
| | Residential – Multi-Family | 0.1 | 1% | Conservancy (City) |
| | Residential – Single-Family | 19 | 90% | |
| ROUN_LK_01b (UGA) | Parks/Open Space | 13 | 100% | Conservancy (County) |
| ROUN_LK_01c | Commercial | 0.3 | 4% | Conservancy (County) |
| | Residential – Single-Family | 7 | 96% | |
| FALL_LF_LK_01 | Residential – Multi-Family | 2 | 3% | Conservancy and Natural and Conservancy (County) |
| | Residential – Single-Family | 51 | 97% | |
| LACK_LK_01a | Residential – Multi-Family | 7 | 12% | Conservancy (County) |
| | Residential – Single-Family | 52 | 88% | Conservancy (City) |
| LACK_LK_01b (UGA) | Parks/Open Space | 55 | 100% | Conservancy (County) |
| LACK_LK_01c | Commercial | 1 | 2% | Conservancy (County) |
| | Moratorium | 28 | 61% | |
| | Parks/Open Space | 3 | 6% | |
| | Residential – Single-Family | 15 | 31% | |

2.3.3 Existing Public Access

No public access facilities are currently identified within the Columbia River and Fallen Leaf Lake shoreline planning areas in Camas. The Washougal River shoreline planning area in Camas contains the Washougal River Greenway, with a pedestrian trail running through it and a waterline bridge constructed in 2008 that crosses the river. Public access facilities along Lacamas Creek and Lacamas Lake are numerous and include Camp Currie, Camas Meadows Golf Course

(privately-owned), Lacamas Heritage Trail, Heritage Park, and Lacamas Lake Regional Park. The Lacamas Heritage Trail and Lacamas Park trail networks include over three miles of fully developed mixed-use trails. Round Lake is also adjacent to Lacamas Lake Regional Park. See Map 7 for public access facilities.

A summary of the public access facilities in Camas is found in Table 2-12. Following the table, major park facilities are described based on the *Camas Parks, Recreation and Open Space Comprehensive Plan* (City of Camas, 2007).

Table 2-12. Public Access Facilities in Camas

| Reach | Facility Name | Facility Type | Area or Length within Shoreline | Status |
|-------------|--------------------------|-----------------------|---------------------------------|-----------------------|
| WASH_RV_01 | Oak Park | Neighborhood Park | 2.5 acres | Developed |
| | Washougal River Greenway | Greenway | 2.0 acres | Developed |
| | Heritage Park – Camas | Undefined Park | 1.2 acres | Undeveloped |
| WASH_RV_02a | Washougal River Greenway | Undefined Park | 80.9 acres | Developed |
| | Washougal River Trail | Trails | 2,368 feet | Developed |
| LACA_CR_01a | Lacamas Lake | Undefined Park | 23.2 acres | Improved / Greenspace |
| | Un-named Trail | Trails | 1,343 feet | Developed |
| LACA_CR_01b | Lacamas Lake | Regional Park | 29.4 acres | Developed |
| | Un-named Trail | Trails | 3,131 feet | Developed |
| LACA_CR_02a | Camas Meadows Golf Club | Golf Course | 85.4 acres | Developed |
| | Camp Currie | Special Facility | 0.4 acres | Developed |
| | Heritage Trail | Trails | 15.6 acres | Improved / Greenspace |
| | Lacamas Heritage Trail | Trails | 1.2 miles | Developed |
| LACA_CR_02b | Camp Currie | Special Facility | 63.6 acres | Developed |
| | Heritage Trail | Improved / Greenspace | 0.1 acres | Improved / Greenspace |
| ROUN_LK_01a | Lacamas Lake | Regional Park | 5.7 acres | Developed |
| | Un-named Trail | Trails | 1,591 feet | Developed |

| Reach | Facility Name | Facility Type | Area or Length within Shoreline | Status |
|-------------|-------------------------|-----------------------|---------------------------------|-----------------------|
| ROUN_LK_01b | Lacamas Park | Regional Park | 15.1 acres | Developed |
| | Un-named Trail | Trails | 3,594 feet | Developed |
| ROUN_LK_01c | Lacamas Lake | Regional Park | 2.0 acres | Developed |
| | Un-named Trail | Trails | 1,195 feet | Developed |
| LACK_LK_01a | Camas Meadows Golf Club | Golf Course | 0.7 acres | Developed |
| | Heritage Trail | Improved / Greenspace | 18.4 acres | Improved / Greenspace |
| | Heritage Park – Camas | Undefined Park | 9.5 acres | Undeveloped |
| | Lacamas Heritage Trail | Trails | 2.2 miles | Developed |
| | Un-named Trail | Trails | 170 feet | Developed |
| LACK_LK_01b | Camp Currie | Special Facility | 15.2 acres | Developed |
| | Heritage Park – Camas | Undefined Park | 7.5 acres | Developed |
| | Lacamas Heritage Trail | Trails | 27 feet | Developed |
| | Un-named Trail | Trails | 136 feet | Developed |
| LACK_LK_01c | Un-named Trail | Trails | 92.5 feet | Developed |

2.3.3.1 Oak Park

The City of Camas owns a small (1.8-acre) park on the Washougal River located at the end of 8th Avenue. This park provides public access to the river, a basketball court, play structure, picnic areas, and paved walkways (City of Camas, 2010a).

2.3.3.2 Washougal River Greenway

This park includes various parcels on the lower Washougal River between the Sandy Swimming Hole and Lacamas Creek. The trailhead is located in Camas, at 3010 NE 3rd Avenue. The park provides extensive shoreline access with one-half mile of walking trail and a boat launch. There are additional sites located on the river upstream of Vernon Road Bridge which provide opportunities for picnicking and fishing.

2.3.3.3 Lacamas Lake Regional Park

Lacamas Lake Regional Park is a 312-acre park located east of and including Round Lake. This park contains a six-mile-long hiking trail system, accessing several local falls and picnicking areas. One feature of the park is access to camas lilies and prairie habitat. Public access to the east side of Lacamas Lake and Round Lake shorelines is provided. Amenities include non-motorized boating, fishing, bird watching, picnic shelters, restrooms and parking (City of Vancouver, 2010). Trails in this regional park connect to Lacamas Heritage Trail.

2.3.3.4 Heritage Park

Heritage Park is located on the west side of Lacamas Lake just north of Fallen Leaf Lake. The park is a popular trailhead for Heritage Trail and has a boat launch and dock, restroom facilities, boat rentals and a parking lot.

2.3.3.5 Lacamas Heritage Trail

This gravel trail is 3.5 miles long and located on the west side of Lacamas Creek and Lacamas Lake. The trailhead is located on Goodwin Road near Lacamas Creek. It offers views, waterfront access and picnicking. The trail is part of a trail system between the city of Camas and the county, some of which is developed and other sections which are primitive.

2.3.3.6 Lacamas Lake Boat Ramp

Boat access to Lacamas Lake (Photo 2-4) is provided by a WDFW-owned boat ramp located on the east side of the lake. Facilities include a boat launch and off-street parking. The boat ramp is located at 800 Leadbetter Road in Camas.

Photo 2-4. Lacamas Lake



Photo courtesy of WDFW

2.3.3.7 Camp Currie

Camp Currie is a 249-acre youth camp located at the north end of Lacamas Lake, three miles from downtown Camas. This camp was founded in 1943 and includes tent facilities, cabins, outdoor amphitheatres and other rustic facilities (J.D. Currie Youth Camp, 2010). The camp was purchased through the Conservation Futures Open Space Program (City of Vancouver, 2010).

2.3.3.8 Camas Meadows Golf Course

Camas Meadows Golf Course is located on the north end of Lacamas Lake, on the west side of Lacamas Creek across the creek from Camp Currie. The 18-hole golf course is a privately-owned facility (Camas Meadows Golf Course, 2010).

2.3.3.9 Mill Ditch Trail

This trail is 2.6 miles from NW Drake to Round Lake. The trail is unpaved but accessible from many of the main streets such as NE Dallas and NE Garfield. The trail travels alongside the Georgia-Pacific Camas Mill's ditch which supplies water for paper production. According to the City's web page, the ditch was hand dug in 1884 by Chinese laborers in about five months (City of Camas, 2010a).

2.3.3.10 Recreational Fishing

White sturgeon, green sturgeon, largemouth bass, smallmouth bass, American shad, mountain whitefish, coastal cutthroat trout, and walleye occur in the Columbia River. Game fish such as largemouth bass, mountain whitefish, and resident cutthroat occur in the Washougal River. Important game fish that occur in Lacamas Creek include resident cutthroat, rainbow trout, largemouth bass, and mountain whitefish (WDFW, 2009a; WDFW, 2009b). Warmwater fishes documented in Round Lake include: brown bullhead, black crappie, bluegill, largemouth bass, pumpkinseed sunfish and yellow perch (WDFW, 2005). Lacamas Lake is annually stocked with brown and rainbow trout and also supports non-native warm water fishes such as brown bullhead, black crappie, bluegill, largemouth bass, pumpkinseed sunfish, and yellow perch (WDFW, 2005; Clark County, 2004d).

2.3.4 Historical and Cultural Resources

2.3.4.1 Prehistoric and Archeological Resources

The Columbia River shoreline planning area within Clark County is in the Columbia Valley lowlands, which extend east into the Vancouver Lake lowlands. Ethnographically, Chinookan-speaking peoples lived in the area, focused along the Columbia River. Cowlitz Tribes lived nearby to the north. Cultural resources have been discovered within the Camas sub-reaches along the Columbia River shoreline planning areas (DAHP, 2010). Archaeological investigations on Lady Island have unearthed prehistoric ceramic artifacts that indicate human presence as long ago as 2,000 to 2,500 years (HistoryLink.org, 2010).

Table 2-13 documents the number of recorded archaeological sites in each Columbia River sub-reach.

Table 2-13. Archaeological Reach Summary for the Columbia River

| Sub-reach Number | Jurisdiction | Summary of Identified Archaeological Resources |
|------------------------------|--|--|
| COL_RV_03b through COL_RV_3d | Vancouver and Camas UGA, and City of Camas | 6 Sites with historic and pre contact components |
| COL_RV_04a | City of Camas | None identified |

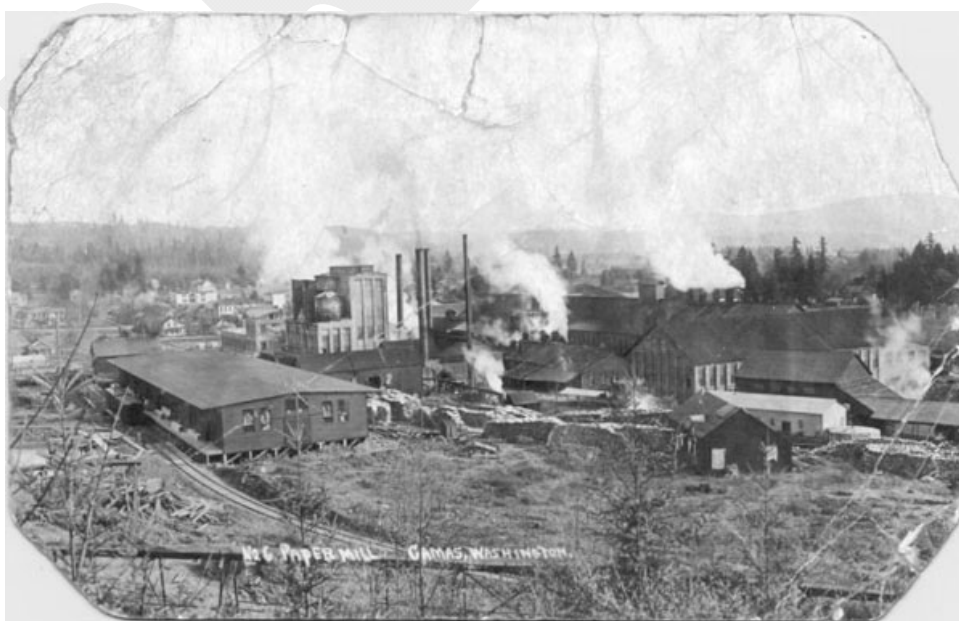
Cultural resources within the entire Washougal River, Lacamas Creek, and Lacamas Lake shoreline planning areas include several recorded pre-contact materials and campsites. The majority of recorded sites are within the cities of Camas and Washougal. There are currently no recorded archeological sites (DAHP 2010) in the Fallen Leaf Lake and Round Lake shoreline planning areas.

Clark County archaeological resource probability mapping suggests there is a significant chance of finding unknown artifacts within almost all of the County's shoreline planning areas, including those located within Camas and its UGA (Clark County, 2003).

2.3.4.2 Historic Uses and National and State Registered Sites

In Camas, the Columbia River Paper Company was established in 1883 to supply newsprint for a Portland newspaper, *The Oregonian* (see Photo 2-5). The mill has been operating continuously since it opened (<http://www.ccrh.org/comm/camas/millhist.php>).

Photo 2-5. Early photograph of the Columbia River Paper Company Mill in Camas, Washington.



Undated. Center for Columbia River History.

Historic resources are documented through a variety of sources. Official registers include the National Register of Historic Places, the Washington State Heritage Register, and the Clark County Heritage Register. The Washington Information System for Architectural and Archaeological Records Data and the Clark County Historic Preservation Website were used to identify County, state, and federal historic resources within the City of Camas' shoreline planning areas (DAHP, 2010; Clark County, 2010d).

Registered resources include the following:

- Camas Main Post Office (Washougal River shoreline planning area) – National and State Registers. Built in 1939. From the nomination form: “The Camas Main Post Office is significant on the local level for its art and its legacy of the Federal public works programs of the Depression era. The Camas MPO is an unaltered example of a small town single-purpose post office. The building and mural within symbolize the assistance to small communities by the Federal government, through its public buildings and arts programs, during a period of national economic emergency. It also represents the efforts of local citizens in obtaining their first and only Federal building. The mural, through its visual presentation, relates the history of the locality and represents a significant period and type of American artistic expression.” (National Register of Historic Places Registration Form – Camas Main Post Office)
- Farrell Building (Washougal River shoreline planning area) – National and State Registers. Built in 1924 and listed in 2006. From the nomination form: “The Farrell Building is historically significant at the local level under Criterion "A" for its direct association to development and growth of downtown Camas, Washington. The building is also significant under Criterion "C" as a representative example of the work of local builder John Roffler. The building retains a high level of architectural integrity, both inside and out, demonstrating the principles of 20th Century building traditions.” (National Register of Historic Places Registration Form – Farrell Building 2006)
- Pittock-Leadbetter House (Lacamas Lake shoreline planning area) - Listed on both the state and federal registers in 1978, the house was built in 1902 (Photo 2-6). From the nomination form: “The Pittock-Leadbetter House, a particularly fine example of the Queen Anne style in a rural setting, is associated with two interrelated families prominent in regional Oregon-Washington history. They were part of the development of commerce and industry in the Columbia and Willamette River valleys and some of the important local businesses of today -- The Oregonian, Crown-Zellerbach, the Oregon Bank – are an outgrowth of these early endeavors.” (National Register of Historic Places Registration Form – Pittock-Leadbetter House 1978)

Photo 2-6. Pittock-Leadbetter House (undated).



Accessed Jan 2010 from DAHP.

In addition to these registered historic properties, there are two unregistered historic structures inventoried by the Washington State Department of Archaeology and Historic Preservation (DAHP) along the Columbia River, including a homestead within the reach COLU_RV_03 area and an historic hydroelectric structure within the sub-reach COLU_RV_04a area. Fallen Leaf Lake was formerly the home of Dead Lake Cemetery, a Catholic cemetery; this cemetery is noted by the state archeological database but is not registered (DAHP, 2010). There are no county-, state-, or federally-listed historic properties within the Round Lake, Lacamas Creek, and Fallen Leaf Lake shoreline planning areas (DAHP, 2010; Clark County, 2010d).

2.3.5 Areas of Special Interest

There are a significant number of industrial facilities and contaminated sites listed in Ecology's facilities/sites database throughout the Columbia River shoreline planning area. In the city of Camas, however, the only listed facility is the Camas wastewater treatment plant which is required to submit a Tier 2 Emergency Hazards Chemical Report (EHCR) (required for businesses that store 10,000 pounds or more of a hazardous chemical or 500 pounds or less, depending on the chemical, of an extremely hazardous chemical on site at any one time) (Ecology, 2010).

Ecology has previously monitored one site within the Washougal River shoreline planning area: a Hazardous Waste Generator facility within the city limits (sub-reach WASH_RV_02a). Activity related to this site occurred in the first half of the 1990s.

There are no Ecology-listed facilities or contaminated sites within the Lacamas Creek, Round Lake, and Fallen Leaf Lake shoreline planning areas.

The Lacamas Lake shoreline planning area includes eight Ecology-listed sites, which are located within the city of Camas (reach LACK_LK_01). Seven of the eight sites are Tier 2 EHCR reports, submitted for City of Camas facilities. In addition, a Leaking Underground Storage Tank facility cleanup occurred in 1996 within the reach.

The presence of Ecology-listed facilities indicates the increased potential for contamination of soil, groundwater, and surface water.

2.4 Opportunity Areas

2.4.1 Restoration

2.4.1.1 Columbia River

General restoration measures include:

- Restoration of swamp and marsh habitat within the freshwater portion of the lower Columbia River;
- Dike removal;
- Enhancement of connections between side-channels, sloughs, lakes, and the mainstem;
- Property acquisition of diked lands; and
- Riparian vegetation enhancement.

2.4.1.2 Washougal River

The Washougal River basin is an important system for fisheries. Several opportunities exist for protecting existing resources (e.g., headwater forests) while restoring instream habitat elements. A majority of the Washougal River in the study area is identified as high priority for fish habitat restoration (LCFRB, 2004).

The *Washougal River Greenway Shoreline Inventory and Characterization* (Parametrix, 2008) identified numerous restoration opportunities on the river and its tributaries, such as development of off-channel rearing habitat, restoration of riparian forest, placement of large wood, breaching of levees, and enhancement of spawning gravel. Restoration projects along the lower Washougal River are underway.

The Lower Columbia Fish Recovery Board has identified key restoration priorities for salmon recovery in the Washougal River. The Board's Six-Year Habitat Work Schedule (LCFRB, 2009b) groups these priorities into categories, such as protecting stream corridor structure and function; protecting and restoring hill slope processes; providing for adequate instream flows; restoring riparian conditions; restoring floodplains and channel migration processes; restoring water quality; and restoring access to habitats blocked by artificial barriers. For each of these categories, the report makes specific recommendations for types and in some cases locations of restoration projects.

Other restoration measures and management recommendations include:

- Restore floodplain connectivity where feasible along the lower mainstem and in major tributaries where bank armoring has occurred. Related restoration includes creating off-channel habitat in the lower mainstem for salmon rearing and/or spawning habitat;
- Prevent floodplain impacts from new development through land use controls and best management practices;
- Install large wood in the mainstem to enhance channel conditions;
- Protect and restore native plant communities from the adverse effects of invasive species (HDR-EES, 2006); and
- Continue to control and remove knotweed, an invasive weed that spreads by rhizomes. One and a half miles of the Washougal River were treated in 2007 (Clark County, 2007c).

2.4.1.3 Lacamas Creek

Restoration opportunities identified in the WRIA 28 Salmon and Steelhead Limiting Factors Report (Wade, 2001) include protecting and enhancing wetland habitat in the Lacamas Creek watershed. There is an opportunity to enhance floodplain and side-channel habitat within public parks along lower Lacamas Creek.

The WRIA 28 report also identifies low flows in Lacamas Creek as an impact to salmonid habitat. The report recommends addressing water withdrawals and the operation of the Round Lake dam.

Restoration opportunities for the Lacamas Creek basin include the following:

- Maintain adequate summer flows to control high temperature;
- Educate landowners regarding best management practices for various land uses;
- Develop and enhance thermal refugia for rearing salmon; and
- Protect and enhance wetlands throughout the watershed.

2.4.1.4 Round Lake

Similar to Lacamas Lake, restoration opportunities for Round Lake include educating property owners to reduce their impacts on lake water quality.

Water withdrawals and the existing operational plan for the dam on Round Lake significantly reduce flows into Lacamas Creek during the summer months (Wade, 2001). A major restoration opportunity lies in water withdrawal management.

2.4.1.5 Fallen Leaf Lake

Restoration opportunities in the Fallen Leaf Lake shoreline planning area include removing invasive vegetation and reestablishing native riparian plantings, particularly in areas impacted by informal recreational access on the eastern side of the lake. The City of Camas Parks and Open

Space Plan identifies a desire to acquire property along the eastern side of the lake to create a public park around the existing privately owned picnic and recreation area, and to formalize or develop trails that connect to other City trails as well as the regional trail system. The Columbia Land Trust owns forested property along the western side of Fallen Leaf Lake.

2.4.1.6 Lacamas Lake

Lacamas Lake is nutrient-rich and experiences algal blooms and low dissolved oxygen levels. Between 1987 and 2001, the Lacamas Lake Restoration Program undertook major efforts to improve water quality in the lake by reducing nutrient inputs from agricultural areas (Clark County Public Works Clean Water Program, undated). While these efforts have significantly reduced lake nutrient levels, development activities in the watershed continue to impact water quality (Clark County Water Resources, 2007). Opportunities remain to work with landowners to reduce their water quality impacts on the lake.

Restoration opportunities for Lacamas Lake include the following (Clark County, 2007a; Wade, 2001):

- Maintain public interest in improving water quality conditions in the lake;
- Address water withdrawal policies;
- Address summer time depleted oxygen issues, possibly by mechanically introducing oxygen to the lake; and
- Control Brazilian elodea growth.

2.4.2 Public Access

The City of Camas is planning for new parks through its *Camas Parks, Recreation and Open Space Comprehensive Plan* (City of Camas, 2007). The plan proposes new special use areas and neighborhood parks, some of which would provide public access to shorelines in the city. New parks proposed include:

- Proposed Fallen Leaf Lake Picnic Area (SU-3) – recommends developing a new large group picnic area at Fallen Leaf Lake. This could be pursued as part of a master plan for the Fallen Leaf Lake complex;
- Washougal Greenway Boat Launch (SU-7) – this would include improvements to the existing informal boat launch to better serve fishing and small boat uses;
- Community Recreation Center Site (SU-8) – Proposed coordination between Cities of Camas and Washougal to partner on building a community recreation center located on the Washougal River and next to Goot Park; and
- Columbia Viewpoint (SU-11) – Camas has limited opportunities to engage with the Columbia River because SR 14 serves as a barrier. This policy encourages exploration and development of a viewpoint to the Columbia with access to trails.

The plan also includes a general recommendation to provide water access to shorelines in Camas:

Water access to the Washougal River, Lacamas Lake, Fallen Leaf Lake, and Columbia River is a high priority for residents. Camas should maximize water access opportunities at all waterfront parks and should target acquisition of additional waterfront park sites. Water access means trails, viewpoints, overlooks, and non-motorized boat access, and does not necessarily mean boat ramps and similar high intensity facilities. The Shoreline Master Plan for the Washougal River should be revisited and revisions considered allowing appropriate public access to the river in the Washougal River Greenway (Section 3.5).

In addition to recommending new parks, the *Parks, Recreation and Open Space Comprehensive Plan* (City of Camas, 2007) establishes a network of proposed trails. New trail networks include:

- **Trail T-2.** This regional trail is an extension of the Vancouver-Clark County trail system that parallels the Columbia River. It connects to neighboring Washougal's trail system. This trail provides visual access to the Columbia River, and makes an important regional connection.
- **Trail T-3.** This is a regional trail located along the north shore of Lacamas Lake and connecting Lacamas Park, Camp Currie and the County's Green Mountain Trail heading north. This trail segment will include bridges or boardwalks across wetlands and water features in some locations. T-3 continues just north of Lacamas Park and then south, crossing T-4 at the Washougal River and continuing on to the Columbia River and Trail T-2.
- **Trail T-4.** This is the Heritage Trail, a regional trail running along the south side of Lacamas Lake and connecting Lacamas Park and Camp Currie. It passes through Heritage Park and will link to planned segment T-3, creating a loop around Lacamas Lake. T-4 links through Lacamas Park, continues into the Washougal River Greenway, and includes a bridge across the Washougal River to connect with T-17.
- **Trail T-13.** This is the trail network around Fallen Leaf Lake. This trail connects to Fallen Leaf Park as well as T-4.
- **Trail T-17.** This is the Washougal River Greenway trail system on the south river bank. This trail segment passes through the Washougal River Greenway, providing access to the river corridor for Camas, Washougal, and regional residents. This trail segment is joined to T-4 by a proposed bridge across the Washougal River to link the Greenway corridor and increase access. T-17 links to Oak Park, Goot Park, and T-2. In addition, T-17 passes near a proposed community center site, and will be a major gateway to the Camas trail system for center users.
- **Trail T-31.** This trail is located in the UGA along Lacamas Creek in Camp Currie and provides a connection between T-3 and T-27 (a major trail route that connects all UGA neighborhoods).

The plan also recommends a water trail on the Washougal River with a list of facilities adjacent to the river.

Table 2-14 shows proposed trails by sub-reach for Washougal River and Lacamas Creek based on County GIS data.

Table 2-14. Proposed Trails in Camas

| Reach | Facility Name | Facility Type | Area or Length within Shoreline | Status |
|-------------|-----------------------|---------------|---------------------------------|----------|
| WASH_RV_01 | Un-named Trail | Trails | 855 feet | Proposed |
| LACA_CR_01a | Un-named Trail | Trails | 421 feet | Proposed |
| LACA_CR_02a | Camp Bonneville Trail | Trails | 387 feet | Proposed |
| | Un-named Trail | Trails | 3,072 feet | Proposed |
| LACA_CR_02b | Un-named Trail | Trails | 2,070 feet | Proposed |

2.5 Reach Scale Assessment

Table 2-15. Reach Assessment for Lower Columbia River

| Reach Number | Reach Location | Reach Length (miles) | Use Descriptions | Modifications | Unique Features | Riparian Zones | Restoration Opportunities | Existing Shoreline Environment Designation (SED) |
|-------------------|---|----------------------|--|--|--|---|--|--|
| COLU_RV_03c (UGA) | Western UGA boundary to western city limits | 0.9 | Single-family residential – 49% Vacant -51% | 4 mapped docks/piers Conversion to residential development | Georgia Pacific-owned island | Poor quality. Sparsely vegetated. Trees lacking | Riparian buffer restoration needed. | Conservancy |
| COLU_RV_03d | Western city limits to Washougal River | 3.1 | Industrial – 91% | SR-14 crosses the river in two locations 9 mapped docks/piers | 407 acres of wetland Confluence with Washougal River Georgia-Pacific Paper Mill development on Lady Island and north bank of river | Poor to moderate quality. Forested vegetation on portions of Lady Island. Narrow buffer zones with little vegetation along river bank. Trees lacking. | Riparian buffer restoration needed. | Conservancy and Urban |
| COLU_RV_04a | Washougal River to eastern city limits | 0.6 | Vacant – 37% Single-family residential – 26% Public Facility – 18% Undetermined – 10% | 4 mapped docks/piers Conversion to residential | Camas wastewater treatment facility | Poor quality. Limited vegetation along shore, mostly grasses and shrubs. | Restoration of riparian buffer needed. | Urban |

Table 2-16. Reach Assessment for Washougal River

| Reach Number | Reach Location | Reach Length (miles) | Use Descriptions | Modifications | Unique Features | Riparian Zones | Restoration Opportunities | Existing Shoreline Environment Designation (SED) |
|--------------|---|----------------------|----------------------------------|---|---|--|---|--|
| WASH_RV_01 | Mouth of Washougal River, from Lacamas confluence to Columbia River | 0.7 | Industrial – 57% Vacant – 33% | One road crossing and one railroad crossing 43% impervious Levees on 50% or more of shoreline | Oak Park Georgia-Pacific Paper Mill. | Moderate to high quality. Mostly vegetated with shrubs and some trees. | Install LWD to enhance fish habitat. Restore floodplain connectivity. Restore off-channel habitats for salmonids. | Urban |
| WASH_RV_02a | Lacamas Creek to eastern city limits | 1.1 | Industrial – 29% Vacant – 54% | 1 bridge crosses the river 1 mapped dock/pier Conversion to residential development Levees | Washougal River Greenway Rock quarry | Varies. Some areas well vegetated, other areas residential. | Install LWD to enhance fish habitat. Restore floodplain connectivity. Protect water quality. | Urban |

Table 2-17. Reach Assessment for Lacamas Creek

| Reach Number | Reach Location | Reach Length (miles) | Use Descriptions | Modifications | Unique Features | Riparian Zones | Restoration Opportunities | Existing Shoreline Environment Designation (SED) |
|-------------------|---|----------------------|--|----------------------------------|--|--|---|--|
| LACA_CR_01a | West bank of Lacamas Creek between Washougal River and Round Lake | 0.8 | Industrial – 22% Open space – 18% Vacant – 45% | Dam on Lacamas Lake. | Lacamas Lake Park | High quality within the park with dense vegetation. Moderate quality outside of park. Banks vegetated with shrubs but floodplain partly developed. | Enhance floodplain and side channel habitat. Protect floodplain areas. | Conservancy and Urban |
| LACA_CR_01b (UGA) | East bank of Lacamas Creek between Washougal River and Round Lake | 0.7 | Open Space – 100% | Dam on Lacamas Lake. | Lacamas Lake Regional Park | High quality with dense vegetation. | Native planting enhancements | Conservancy |
| LACA_CR_02a | West bank of Lacamas Creek between Lacamas Lake and western city limits | 0.5 | Recreation – 41% Undetermined – 13% Vacant – 26% | Conversion to recreational lands | 59 acres of wetland Heritage Trail Camas Meadows Golf Course | Moderate to poor quality. Large areas of vegetation outside of golf course which is more sparsely vegetated. | Native vegetation plantings. Wetland enhancement. | Conservancy |
| LACA_CR_02b (UGA) | East bank of Lacamas Creek between Lacamas Lake and western city limits | 0.7 | Institution – 32% Single-family residential – 34% Vacant – 34% | None apparent | 44 acres of wetland Camp Currie | Moderate quality. Forested area associated with Camp Currie | Native vegetation plantings. Wetland enhancement. | Conservancy |

Table 2-18. Reach Assessment for Round Lake

| Reach Number | Reach Location | Reach Length (miles) | Use Descriptions | Modifications | Unique Features | Riparian Zones | Restoration Opportunities | Existing Shoreline Environment Designation (SED) |
|-------------------|---|----------------------|---|--|---|---|---------------------------|--|
| ROUN_LK_01a | Eastern and smaller half of the lake | 0.9 | Mobile home – 83% | Conversion to residential development | Lacamas Lake Regional Park Mobile home park | Moderate quality. Shoreline is mostly vegetated | Riparian plantings | Conservancy |
| ROUN_LK_01b (UGA) | Western and larger half of the lake | 1.1 | Open Space – 100% | Presence of dam structure. | Lacamas Lake Regional Park Lacamas Creek flows in and out of lake. | High quality. Shoreline is fully vegetated with shrubs and trees. | Public education. | Conservancy |
| ROUN_LK_01c | Upland portion of the lake in Camas UGA | 0.1 | Open Space -21% Public Facility – 14% Single-family residential – 17% Vacant – 32% | 56% impervious surface Roadway parallels lake | Lacamas Lake Regional Park | Moderate quality. Shoreline is mostly vegetated | Riparian plantings | Conservancy |

Table 2-19. Reach Assessment for Fallen Leaf Lake

| Reach Number | Reach Location | Reach Length (miles) | Use Descriptions | Modifications | Unique Features | Riparian Zones | Restoration Opportunities | Existing Shoreline Environment Designation (SED) |
|---------------|--|----------------------|-----------------------------------|---|--------------------------------------|----------------------|---|--|
| FALL_LF_LK_01 | West of Lacamas Creek and west of Round Lake | 1.2 | Mobile home – 37% Vacant – 58% | Natural area, owned by Georgia-Pacific Mill and Land Trust Sediment transport from urban runoff. | Uphill development, former cemetery. | 17 acres of wetland. | High quality. Shoreline is fully vegetated with shrubs and trees. | None |

Table 2-20. Reach Assessment for Lacamas Lake

| Reach Number | Reach Location | Reach Length (miles) | Use Descriptions | Modifications | Unique Features | Riparian Zones | Restoration Opportunities | Existing Shoreline Environment Designation (SED) |
|-------------------|--|----------------------|--|---|---|---|--|--|
| LACK_LK_01a | South, upland portion of the lake within city limits | 0.1 | Mobile home – 23% Single-family residential – 17% Undetermined – 14% Vacant – 33% | Conversion to residential development | Heritage Trail Heritage Park | Moderate quality vegetation with shrubs and trees along bank and residential development within floodplain. | Reduce nutrient input. Enhance associated wetlands. Protect floodplain wetlands. | Conservancy |
| LACK_LK_01b (UGA) | Portion of the lake within UGA boundary | 6.3 | Forestry – 14% Institution – 14% Single-family residential – 14% Vacant – 59% | Dam structure present. Flow diversions. Water quality impairments due to runoff. | 104 acres of wetland Camp Currie Heritage Park Lacamas Creek flows through lake. | Open water and wetland area | Reduce nutrient input. Enhance associated wetlands. | Conservancy |
| LACK_LK_01c | North upland portion of the lake within city limits | 0.5 | Agriculture – 13% Single-family residential – 25% Vacant – 33% | Roadway parallels the lake | Large lots | Moderate quality vegetation with shrubs and trees along bank and little development within floodplain. | Enhance associated wetlands. Reduce nutrient input. Protect floodplain wetlands. | Conservancy |