



December 2014

PREPARED FOR: FRANKLIN COUNTY



Franklin County Shoreline Master Program Update Shoreline Inventory, Analysis, and Characterization Report

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This report was funded through a grant from the Washington State Department of Ecology

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LIST OF ACRONYMS AND ABBREVIATIONS

°C	degrees Celsius
BLM	U.S. Bureau of Land Management
CBP	Columbia Basin Project
cfs	cubic feet per second
CIA	Cumulative Impacts Analysis
CNWR	Columbia National Wildlife Refuge
County	Franklin County
CRB	Columbia River Basalt
DOE	U.S. Department of Energy
Ecology	Washington State Department of Ecology
ESA	Endangered Species Act
FCC	Franklin County Code
FEMA	Federal Emergency Management Agency
GIS	Geographic Information System
GMA	Growth Management Act
gpm	gallons per minute
GWMA	Ground Water Management Area
IAC	Shoreline Master Program Inventory, Analysis, and Characterization Report
NASS	National Agricultural Statistics Service
NOAA	National Oceanic and Atmospheric Administration
NRHP	National Register of Historic Places
OHWM	ordinary high water mark
PCB	Polychlorinated biphenyl
ppm	parts per million
RCW	Revised Code of Washington
Reclamation	U.S. Bureau of Reclamation
SCBID	South Columbia Basin Irrigation District
SMA	Shoreline Management Act
SMP	Shoreline Master Program

SR	subreach
UGA	Urban Growth Area
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WAC	Washington Administrative Code
WDFW	Washington State Department of Fish & Wildlife
WDNR	Washington State Department of Natural Resources
WRCC	Western Regional Climate Center
WRIA	Water Resource Inventory Area

1 INTRODUCTION

1.1 Background and Purpose

Franklin County (the County) is in the process of updating its Shoreline Master Program (SMP). The County received grant funding from the Washington State Department of Ecology (Ecology) to develop an updated SMP. A primary purpose of this effort is to update the SMP to comply with Chapter 90.58 of the Revised Code of Washington (RCW), the Shoreline Management Act (SMA), and Ecology's 2003 SMP Guidelines (Chapter 173-26 of the Washington Administrative Code [WAC]).

This SMP Inventory, Analysis, and Characterization Report (IAC) provides a technical foundation for the SMP update. This report includes a discussion of the setting and ecosystem-wide processes that influence ecological functions within the County's shorelines. The report also addresses shoreline alterations based on existing land use patterns and future potential development within the shoreline jurisdiction areas. IAC tables summarizing conditions by reach are provided in Appendix A; a map folio is provided in Appendix B.

The SMP guidelines require the County to demonstrate that the SMP will result in no net loss to shoreline ecological functions during implementation. This report will serve to describe the existing baseline conditions of County shoreline ecological function. An associated Cumulative Impacts Analysis (CIA) Report and Shoreline Restoration (Restoration) Plan will follow development of the draft SMP and code elements. The CIA Report will demonstrate how future development under the proposed SMP will result in no net loss of shoreline ecological function. The Restoration Plan describes restoration measures that could be implemented to improve shoreline ecological functions beyond existing conditions.

1.2 Report Organization

The report is organized in the following sections:

- **Regulatory Overview** – Describes the SMA; local, state, and federal regulations, and cultural resource considerations.

- **Shoreline Jurisdiction Analysis** – Reviews the data and analysis used to determine the shoreline jurisdiction waterbodies and extents of the SMA shoreline jurisdiction.
- **Franklin County Inventory** – Provides a description of the project area, including ownership and land cover characteristics, land use and SMP environment designations, geology, climate, surface water resources, water quality, floodplains and floodways, channel migration zones, groundwater resources, geologic hazards, and cultural resources characteristics.
- **Shoreline Analysis and Characterization** – Describes the ecosystem processes and the level to which they are currently impaired or altered. The processes most critical to ecological functions are described for the Columbia, Palouse, and Snake rivers, and also lakes in the County. Also included are a review of the reach characterization methods and an overview of the IAC tables included in Appendix A. This section also provides an overview of the future land use and development potential analysis, which identifies developable lands and associated residential unit and commercial areas available for specific geographic areas within the County.
- **Public Access** – Identifies existing public access goals and policies.
- **Information Sources and Limitations** – The information sources used to develop the IAC and the associated limitations of that information are also detailed.

2 REGULATORY OVERVIEW

Counties, cities, and towns develop or update local SMPs to comply with the requirements of Washington State's SMA (RCW 90.58) and be consistent with Ecology's SMP guidelines. Washington's SMA addresses concerns about the effects of unregulated development on shorelines. The SMP update process follows the joint state/local nature of the SMA program as local governments develop SMPs in close coordination with Ecology; informed by local opportunities and constraints, and consistent with state laws and guidelines.

2.1 Local, State, and Federal Plans and Regulations

SMPs provide provisions to protect archaeological resources, historic resources, and environmentally critical areas within the shoreline, as well as to maintain flood hazard protection (WAC 173-26-221). Environmentally sensitive areas (critical areas) within Franklin County include wetlands, critical aquifer recharge areas, frequently flooded areas, geologically hazardous areas, and fish and wildlife habitat conservation areas.

The County has an existing SMP, originally adopted in 1974, and critical areas regulations under Franklin County Code (FCC) Chapter 18.08 for wetlands, critical aquifer recharge areas, frequently flooded areas, geologically hazardous areas, and fish and wildlife habitat conservation areas. Table 1 includes a summary of critical area buffer and mitigation requirements identified in critical areas regulations for the County.

Critical areas for each shoreline jurisdiction reach are also described within the flooding and geological hazards and habitat characteristics sections of the County shoreline reach characterization tables provided in Appendix A. These areas are also identified, as applicable, in the map folio provided in Appendix B.

Table 1
Critical Areas Buffers and Mitigation Requirements Summary (as of 2014)

FCC CAO (2009)		Protection Standards				
Wetlands						
Chapter 18.08 Article II	Wetland Delineation and Rating System		<ul style="list-style-type: none">Washington State Wetlands Identification and Delineation Manual for Eastern WashingtonWashington State Wetlands Rating System for Eastern Washington			
	Buffers and Mitigation Ratios		Category			
			I	II	III	IV
	Buffer (feet)	High Intensity	250	200	150	50
		Moderate Intensity	190	150	110	40
		Low Intensity	125	100	75	25
	Mitigation Ratio	Re-establishment or Creation	6:1	3:1	2:1	1.5:1
Rehabilitation		12:1	6:1	4:1	3:1	
Fish and Wildlife Habitat Conservation Areas						
Chapter 18.08 Article VI	Water Type		Buffers (feet)			
	Type 1 or S, except lakes		150			
	Type 2 or F, except lakes		150 (100 if no anadromous fish)			
	Type 3 or lakes		100 (75 if no anadromous fish)			
	Type 4 or Np		50			
	Type 5 or Ns		50			

Notes:

CAO = Critical Areas Ordinance

F = fish

FCC = Franklin County Code

Np = non-fish perennial

Ns = non-fish seasonal

S = shoreline

In addition, federal, state, and local regulations also apply to these features. Some of these federal regulations include the Clean Water Act (Sections 404 and 401), Endangered Species Act (ESA), Federal Water Pollution Control Act, National Environmental Policy Act, and the National Floodplain Insurance Program.

State regulations are administered through the RCW and include the State Environmental Policy Act, the Hydraulic Code (RCW 77.55 Construction Projects in State Waters), the Bald Eagle Protection Rules, the Surface Mining Act, the State Water Code and Water Pollution Control Act, the Growth Management Act (GMA), and the SMA.

2.2 Cultural Resources and Shoreline Development

Federal, state, and local cultural resources laws apply to shoreline development. Section 106 of the National Historic Preservation Act requires a cultural resource review process for federally funded and/or permitted projects. State laws include RCW 27.53 (Archaeological Sites and Records), which prohibits the unpermitted removal of archaeological materials and establishes a cultural resource permitting process, and RCW 27.44 (Indian Graves and Records), which describes how human remains must be treated.

3 SHORELINE JURISDICTION ANALYSIS

3.1 SMA Shoreline Criteria

The shoreline jurisdiction is the geographic area where the SMA applies and includes all Shorelines of the State and Shorelands, as defined by the SMA (RCW 90.58.030). Table 2 summarizes the definitions for areas that are included within a shoreline jurisdiction.

Table 2
Shoreline Criteria Definitions per RCW 90.58.030 and WAC 173-26-020

Term	Definition
Shoreline Jurisdiction (WAC)	All Shorelines of the State and Shorelands as defined in RCW 90.58.030
Shorelands (RCW)	<ul style="list-style-type: none">• Those lands extending landward for 200 feet in all directions as measured on a horizontal plane from the ordinary high water mark (OHWM)• Floodways and contiguous floodplain areas landward 200 feet from such floodways• All wetlands and river deltas associated with the streams, and lakes, which are subject to the provisions of this chapter; the same to be designated as to location by Ecology
Shorelines of the State (RCW)	The total of all Shorelines and Shorelines of Statewide Significance within the state.
Shorelines (RCW)	All of the water areas of the state, including reservoirs, and their associated shorelands, together with the lands underlying them; except: <ul style="list-style-type: none">(i) shorelines of statewide significance(ii) shorelines on segments of streams upstream of a point where the mean annual flow is twenty cubic feet per second or less and the wetlands associated with such upstream segments(iii) shorelines on lakes less than 20 acres in size and wetlands associated with such small lakes
Shorelines of Statewide Significance ¹ (RCW)	<ul style="list-style-type: none">• Those lakes, whether natural, artificial, or a combination thereof, with a surface acreage of one thousand acres or more measured at the ordinary high water mark.• The natural rivers or segments thereof as follows:<ul style="list-style-type: none">(A) Downstream of a point where the annual flow is measured at two hundred cubic feet per second or more(B) Downstream from the first three hundred square miles of drainage area, whichever is longer

Notes:

1. The definition provided is for streams and rivers of statewide significance east of the crest of the Cascade Range. See RCW 90.58.030(2)(f) for full description of specific larger waterbodies under the classification of Shorelines of Statewide Significance.

3.2 Study Area

The study area includes all of Franklin County, with primary emphasis on describing the existing and proposed shoreline areas. Franklin County is located in the eastern portion of Washington State and encompasses a total area of 1265 square miles (3276 square kilometers), of which 1220 square miles (3161 square kilometers) are land and 44 square miles (115 square kilometers; 3.5%) are water. The County is bordered by Adams County to the north, Whitman County to the east, Walla Walla County to the southeast, Benton County to the west and southwest, and Grant County to the northwest.

3.3 Shorelines Currently Designated in Franklin County

The WAC, Title 173 – Chapter 18 – Section 150, and Chapter 20 – Sections 240 and 250, list Lakes and Streams of Statewide Significance, Shorelines of the State, and Shorelines of Statewide Significance designated by statutes in the County. Where there is a conflict with the criteria set forth in RCW 90.58.030(2) and WAC 173-18-040, the RCW criteria shall control. The designation of the stream or river shall be governed by the criteria, except that the local government must amend the local SMP to reflect the new designation (WAC 173-18-046).

3.3.1 Shorelines of Statewide Significance

Rivers and streams currently designated per WAC 173-18-150 as Shorelines of Statewide Significance in the County are summarized below in Table 3. There are no lakes currently listed in WAC 173-20-250 as meeting the criteria for Shorelines of Statewide Significance in the County.

Table 3
Franklin County Stream Shorelines of Statewide Significance per WAC 173-18-150

Stream Name	Legal Description	Estimated Length (miles)
Columbia River	From the Hanford Works boundary (Sec. 23, T12N, R28E) downstream left bank only to (Sec. 13, T9N, R28E) questionable. The flow exceeds 200 cfs MAF at Hanford Works boundary.	17.2
Esquatzel Coulee	From the mouth of Old Maid Coulee (Sec. 11, T12N, R30E) downstream to a sump (Sec. 12, T9N, R29E) (The Esquatzel River is gradually sinking into ground). This stream has more than 300 square miles of drainage area ending at mouth of Old Maid Coulee.	23.6

Table 3
Franklin County Stream Shorelines of Statewide Significance per WAC 173-18-150

Stream Name	Legal Description	Estimated Length (miles)
Palouse River	From the Adams County line (Sec. 5, T14N, R37E) downstream right bank only to its mouth on Snake River (Sec. 19, T13N, R37E). This stream has more than 300 square miles of drainage area and more than 200 cfs MAF at Adams County line.	13.8
Snake River	All of the Snake River within Franklin County is under federal jurisdiction. The flow exceeds 200 cfs MAF at Whitman County line.	58.5

Notes:

cfs = cubic feet per second

MAF = mean annual flow

Sec = section

3.3.2 Shorelines of the State

All streams in the County designated under shoreline jurisdiction per WAC 173-18-150 are classified as Shorelines of Statewide Significance (see Table 3). Twenty-four lakes in the County are currently designated as Shorelines of the State per WAC 173-20-240. Table 4 lists the lakes that fall under shoreline jurisdiction (and their acreage) according to WAC 173-20-240.

Table 4
Lakes under Shoreline Jurisdiction per WAC 173-20-240

Lake Name	Acreage in Franklin County	Lake Name	Acreage in Franklin County	Lake Name	Acreage in Franklin County
Bailie Pond	22.7	Unnamed Lake (T13N R29E S05)	29.7	Unnamed Lake (T14N R29E S23)	24.0
Clark Pond	49.3	Unnamed Lake (T13N R29E S15)	50.0	Unnamed Lake (T14N R29E S25)	49.6
Kahlotus Lake	321.0	Unnamed Lake (T13N R30E S05)	63.0	Unnamed Lake (T14N R29E S26)	130.0
Mesa Lake	50.0	Unnamed Lake (T14N R28E S24)	20.0	Unnamed Lake (T14N R29E S36)	20.0
Scooteney Lake	217.0	Unnamed Lake (T14N R28E S26)	25.0	Unnamed Lake (T14N R30E S14)	25.8
Scooteney Reservoir	685.0	Unnamed Lake (T14N R29E S11N)	71.9	Unnamed Lake (T14N R30E S27)	23.0
Sulphur Lake	22.0	Unnamed Lake (T14N R29E S11Q/R)	29.5	Unnamed Lake (T14N R30E S33)	30.0
Unnamed Lake (T12N R30E S20)	26.2	Unnamed Lake (T14N R29E S14)	50.0	Washtucna Lake	43.4

3.4 Preliminary Shoreline Jurisdiction Analysis and Findings for the Shoreline Master Program Update

3.4.1 Shoreline Jurisdiction Data Analysis

Anchor QEA reviewed the information in the WAC and compared it to a number of data sources to determine, as accurately as possible with the available data, which waterbodies in the County fit the definition of Shorelines of the State. Anchor QEA received and downloaded Geographic Information System (GIS)-format datasets from the Franklin County Planning, Franklin County GIS website, U.S. Geologic Survey (USGS), U.S. Department of Agriculture (USDA), U.S. Fish and Wildlife Service (USFWS), and Ecology containing information from a variety of sources about the waterbodies and potential shorelands within the County.

Anchor QEA has reviewed and appended a Shoreline Management Plan, Lakes, and Rivers dataset developed by the County to identify those waterbodies that meet the definition(s) of Shoreline of the State or Shoreline of Statewide Significance in RCW 90.58.030.

Anchor QEA used several data sources in determining whether a waterbody met this definition. Those most used include the following:

- Designated streams named in WAC 173-18-150
- Designated lakes named in WAC 173-20-240 and WAC 173-20-250
- Ecology-suggested shoreline arcs (stream) and points (at which streams reach the threshold of significance)
- Ecology-suggested shoreline polygons (for lakes)
- USGS National Hydrography Dataset
- USDA National Agriculture Imagery Program 2013 imagery (USDA 2013)
- Google Earth historical aerial imagery
- USFWS National Wetland Inventory
- Federal Emergency Management Agency (FEMA) flood insurance rate maps

3.4.2 Identification of Shorelines for the Shoreline Master Program Update

3.4.2.1 Rivers and Streams

Anchor QEA used Ecology's suggested locations, at which streams reach a mean annual flow of 20 cubic feet per second (cfs) or upstream drainage of 300 square miles, to determine an initial upstream extent of the shoreline jurisdiction for the rivers.

In the Draft IAC Report (Anchor QEA 2014a), Esquatzel Coulee was preliminarily excluded from shoreline jurisdiction. Esquatzel Coulee is operated by the South Columbia Basin Irrigation District (SCBID) and serves as a drainage, wasteway, and water conveyance route for the Columbia Basin Project (CBP) irrigation water supply, which serves the irrigation needs of the County. Portions of the drainage follow natural topographic lows, with constructed channels in several locations to improve conveyance. The drainage in the natural topographic low areas has stream-like features, and some wetlands have also formed from current and historical operations. About 35% of the length of Esquatzel Coulee is a constructed channel (similar to an irrigation canal maintained by SCBID and the U.S. Bureau of Reclamation [Reclamation]), which improves conveyance capacity and connects drainage and diversion points.

Additionally, the majority of Esquatzel Coulee shoreline jurisdiction lands (61%) are located in a federal right-of-way dedicated to facilitate maintenance to meet irrigation supply and operational needs; SCBID and Reclamation continue to have authority to maintain the area to meet its operational needs. The Washington State Department of Transportation and Burlington Northern Santa Fe Railroad also have right-of-way within the Esquatzel Coulee (27% of the area). The remaining portions of land not within these right-of-ways are mostly privately owned, irrigated cropland (Anchor QEA 2014b).

Although natural drainage is minimal and significant portions of the waterbody are in a constructed channel, Esquatzel Coulee still follows the historical natural stream channel in certain locations and currently exceeds the 20 cfs mean annual flow criteria, which is significantly enhanced by the CBP. It also has a contributing drainage area of more than 300 square miles, which is located downstream of its confluence with Old Maid Coulee. Based on these criteria, Anchor QEA concludes that Esquatzel Coulee should remain a shoreline

waterbody and a Shoreline of Statewide Significance at the point where the channel becomes a topographic low (approximately 1 mile downstream of its confluence with Old Maid Coulee). Shoreline jurisdiction for Esquatzel Coulee should terminate at the Esquatzel Diversion Channel headworks, where flow is completely diverted away from Esquatzel Coulee.

With the addition of Esquatzel Coulee, the Franklin County SMP includes four Shorelines of Statewide Significance. Anchor QEA's analysis results in four rivers being categorized as Shorelines of Statewide Significance, with the revisions to shoreline lengths as summarized in Table 5 and shown in Appendix A. Anchor QEA's analysis has increased the length of the Columbia River shoreline jurisdiction to include the Hanford Nuclear Reservation area within the County in the proposed shoreline jurisdiction area.

Table 5
Streams of Statewide Significance to be included in the SMP Update

Stream Name	Included in current Franklin County SMP	Total Length Proposed Shoreline
Columbia River	Yes	32.97 miles ¹
Palouse River	Yes	14.54 miles ²
Snake River	Yes	58.53 miles
Esquatzel Coulee	Yes	14.73 miles

Notes:

1. The SMP Update has included the Hanford Nuclear Reservation area along the Columbia River within Franklin County.
2. The measurement is based on the Ecology arc data.

3.4.2.2 Lakes

The Franklin County datasets identified all lakes that originated from the waterbody polygon in USGS National Hydrography Dataset. In order to determine which of these features are likely to be, "lakes whose area is greater than 20 acres," all contiguous polygons with a total area of 15 acres or more were compared with the Google Earth aerial imagery between 2005 and 2013 (Google Earth 2013). The aerial imagery analysis verified the continued existence of lakes represented in the data as being greater than 20 acres and also identified lakes that decreased in size to less than 20 acres.

The analysis recommended 9 of the 24 identified lakes in the current WAC 173-20-240 list be removed (see Table 6) and 3 lakes be added: Camp Lake; T-Lake; and Unnamed Lake (T13N R31E S18). See Table 7 for a summary of the resulting 18 shoreline jurisdiction lakes to be included in the SMP update. There are no lakes in the County that meet the definition of Lakes of Statewide Significance (WAC 173-020-250).

Table 6
Lakes Currently under Shoreline Jurisdiction Proposed for Removal

Lake Name	Historical Acreage in Franklin County (Total Acreage)	Current Acreage ¹ in Franklin County (Total Acreage)
Unnamed Lake (T12N 30E S20)	26.2	4.94
Bailie Pond	22.7	10.08
Sulphur Lake	22.0	0
Kahlotus Lake	321.0	0
Unnamed Lake (T13N R29E S05)	29.7	12.85
Unnamed Lake (T14N R29E S23)	24.0	Merged with Eagle Lake (T14 R29E S26) ²
Unnamed Lake (T14N R29E S25)	49.6	Merged with Eagle Lake (T14 R29E S26) ²
Unnamed Lake (T14N R29E S36)	20.0	10.06
Washtucna Lake	43.4	0

Notes:

1. Current acreage was determined by comparing Google Earth aerial imagery between 2005 and 2013 with the USGS National Hydrography dataset.
2. Ecology-suggested shoreline polygons indicate that this waterbody is merged Eagle Lake (T14 R29E S26). See Table 7.

Table 7
Shoreline Jurisdiction Lakes to be Included in the SMP Update

Lake Name	Included in current Franklin County SMP	Total Area Proposed Shoreline (acres)	Lake Name	Included in current Franklin County SMP	Total Area Proposed Shoreline (acres)
Bailie Lake ^[1]	Yes	56	Scootene Lake (Eagle Lakes) ^[8]	Yes	213
Camp Lake	No	37	Scootene Reservoir (East) ^[9,10]	Yes	47
Chance Lake ^[2,3]	Yes	18 ³	Scootene Reservoir (West) ^[9]	Yes	711
Clark Pond	Yes	38	T Lake	No	125
Eagle Lakes T14N R29E S11N ^[4]	Yes	73	Unnamed T13N R30E S5	Yes	27
Eagle Lakes T14N R29E S14 ^[5]	Yes	70	Unnamed T13N R31E S18	No	71
Eagle Lakes T14N R29E S11QR ^[6]	Yes	33	Unnamed T14N R30E S33	Yes	49
Eagle Lakes T14N R29E S26 ^[7]	Yes	147	Wahlake Slope HMA N ^[11]	Yes	37
Mesa Lake	Yes	48	Wahlake Slope HMA W ^[12]	Yes	49

Notes:

1. Currently listed as Unnamed Lake (T13N R29E S15) in WAC 173-20-240
2. Currently listed as Unnamed Lake (T14N R30E S27) in WAC 173-20-240
3. Chance Lake is only 18 acres, but it is hydrologically connected to Scootene Reservoir (711 acres)
4. Currently listed as Unnamed Lake (T14N R29E S11N) in WAC 173-20-240
5. Currently listed as Unnamed Lake (T14N R29E S14) in WAC 173-20-240
6. Currently listed as Unnamed Lake (T14N R29E S11Q/R) in WAC 173-20-240
7. Currently listed as Unnamed Lake (T14N R29E S26) in WAC 173-20-240
8. Currently listed as Unnamed Lake (T14N R29E S12) in WAC 173-20-240
9. Scootene Reservoir East and West are hydrologically connected but are listed as two separate waterbodies in WAC 173-20-240
10. Currently listed as Unnamed Lake (T14N R30E S14) in the WAC 173-20-240
11. Currently listed as Unnamed Lake (T14N R28E S24) in WAC 173-20-240
12. Currently listed as Unnamed Lake (T14N R28E S26) in WAC 173-20-240

3.4.3 Preliminary Shoreline Jurisdiction Areas

As discussed in Section 3.1, the shoreline jurisdiction is the geographic area where the SMA applies and includes all Shorelines of the State and Shorelands as defined by the SMA (RCW 90.58.030). Shorelines of the State to be included in the SMP update are summarized in Section 3.4.2. This section describes how the extent of the shoreline jurisdiction, including the shorelands, was determined.

The extent of the preliminary shoreline jurisdiction was determined (mapped) using the following steps:

- All shorelines meeting the definitions provided in Table 2 and identified above were buffered by 200 feet.
- All wetlands from the USFWS National Wetland Inventory dataset that intersected any part of the 200-foot buffer were provisionally included.
- Those wetlands identified were reviewed for spatial accuracy to determine if any part of them intersected the 200-foot buffer. If so, they were included.
- Any additional wetlands in the floodway of streams, meeting the shoreline definition above, were provisionally included.
- Those wetlands identified were reviewed for spatial accuracy to determine if any part of them intersected with the 200-foot buffer. If so, they were included.

The preliminary shoreline jurisdictions are shown in the map folio included as Appendix B.

3.5 Reach Breaks

Reaches are specific segments of the shoreline that are typically distinguished by the relative intensity of land use development patterns, the physical landscape, or critical biological processes. Reaches are numbered numerically (i.e., 1, 2, 3, etc.) with subreaches listed alphanumerically (i.e., a, b, c, etc.). Reaches and subreaches provide the basis for the in-depth analysis and characterization information in this report. Physical changes often translate into differences in the function of the shoreline with regards to ecological and physical processes, which in turn may influence the shoreline designation.

The reach delineation was performed by evaluating aerial photography, topographic data, geologic maps, and land cover data, which were compiled in a GIS database. Specific factors that influenced the delineation of stream reaches include channel and floodplain geomorphology, geologic controls, channel confinement and modification, hydrology, and irrigation practices. Subreaches were identified primarily to distinguish different patterns in land use, ownership, zoning, and level of development. Subreaches were delineated primarily where changes in land use, parcel density, or zoning affected the current or potential future ecosystem function.

A list of the reaches and subreaches for the shoreline jurisdiction areas within the County are provided in Table 8.

Table 8
Reach and Subreaches

Shoreline	Reach (Subreaches) or Lake Groups
Columbia River	1 (a-e), 2 (a-d), 3 (a-d), 4 (a-e)
Palouse River	1 (a-d)
Snake River	1 (a-h), 2 (a-g), 3 (a-i), 4 (a-b)
Esquatzel Coulee	1 (a-d)
Mesa Area Lakes Group	Mesa Lake Clark Pond T-Lake Unnamed Lake (T13N R31E S18)
Scooteney Reservoir Lakes Group	Scooteney Reservoir (East and West) Chance Lake Camp Lake Unnamed Lake 1 (T14N R30E S33) Unnamed Lake 2 (T13N R30E S5)
Eagle Lakes Groups	Eagle Lake 1 (T14N R29E S11N) Eagle Lake 2 (T14N R29E S11QR) Scooteney Lake Eagle Lake 3 (T14N R29E S14) Eagle Lake 4 (T14N R29E S26) Bailie Lake
Wahluke Lakes Group	Wahluke Slope Habitat Management Area (HMA) W Wahluke Slope HMA N

Characterization tables and reach maps are provided in Appendix A, and figures depicting these reaches and subreaches, where applicable, are provided in the map folio in Appendix B.

4 FRANKLIN COUNTY INVENTORY

4.1 Ownership and Land Cover

Table 9 shows land ownership coverage for the County. Private holdings make up the majority of the County, approximately 84% (680,420 acres). Reclamation owns about 5.34% (43,256 acres) of the County, which represents the largest share of the public land held by a single agency. The USFWS owns 2.69% (21,739 acres) within the Hanford Reach National Monument area. The U.S. Bureau of Land Management (BLM) owns approximately 2.91% (23,587 acres), most of which surrounds Juniper Dunes Wilderness Area. The Washington State Department of Natural Resources (WDNR) owns approximately 3.63% (29,376 acres). U.S. Indian tribal lands represent less than 0.02% (139 acres).

Table 9
Ownership Types within Franklin County

Ownership Type		Owner	Acreage	Percentages
Public	Federal	U.S. Bureau of Reclamation	43,256	5.34%
		U.S. Bureau of Land Management	23,587	2.91%
		U.S. Fish and Wildlife Service	21,739	2.69%
		U.S. Army Corps of Engineers	2,745	0.34%
		U.S. Department of Defense	740	0.09%
		Other	1,505	0.19%
	State	Washington State Department of Natural Resources	29,376	3.63%
		Washington Department of Park and Recreation	3,436	0.42%
		Washington Department of Fish & Wildlife	2,303	0.28%
		Washington Department of Transportation	223	0.03%
		Other	7	0%
U.S. Indian Tribal Land			139	0.02%
Private			680,420	84.06%
TOTAL			809,476	100%

Land ownership within shoreline jurisdiction includes upland lands (above the ordinary high water mark [OHWM]) and aquatic lands (below the OHWM). Upland shoreline jurisdiction

lands are roughly divided between 73% publically owned and 27% privately owned, with less than 1% tribally owned. Federal agencies, including Reclamation, USFWS, U.S. Army Corps of Engineers (USACE), and U.S. Department of Defense, own more than 60%. Among state agencies, Washington State Parks and Recreation Commission is the largest owner of shoreline lands with about 10.36% of upland ownership in recreation areas along the Snake and Palouse rivers. Aquatic shoreline jurisdiction lands are almost entirely publically owned by various federal and state agencies. See Table 10 for additional detail.

Table 10
Ownership Types within Franklin County Shoreline Jurisdiction

Ownership Type		Owner	Acreage (above OHWM)	Percentages
Public	Federal	U.S. Bureau of Reclamation	1,955	32.46%
		U.S. Fish and Wildlife Service	602	10.00%
		U.S. Army Corps of Engineers	516	8.56%
		U.S. Department of Defense	263	4.36%
		Others	286	4.75%
	State	Washington State Parks and Recreation	624	10.36
		Washington Department of Fish & Wildlife	74	1.24%
		Washington State Department of Natural Resources	62	1.03%
		Washington Department of Transportation	2	0.03%
U.S. Indian Tribal Land		15	0.26%	
Private		1,624	26.95%	
TOTAL		6,023	100%	

Notes:

Calculations do not include area below OHWM.

OHWM = ordinary high water mark

Table 11 describes the land cover types within the study area derived from USDA, National Agricultural Statistics Service (NASS) cropland data layer. Land cover describes the surficial composition analyzed from satellite and aerial imagery. Land cover type analysis indicates that approximately 44.18% (357,627) acres of the County can be visually identified as agricultural lands. About 50% (390,572) acres of the County has been identified as a mix of

shrub-scrub and grass lands. The rest of the County comprises a variety of other land covers. See Table 11 for a summary of land cover types in the County.

Table 11
Land Cover Types within Franklin County

Land Cover Type	Acreage	Percentages
Agriculture	357,627	44.18%
Shrub/Scrubland	229,810	28.39%
Forest	40,231	4.97%
Grassland	160,762	19.86%
Open Water	15,866	1.96%
Wetlands	5,181	0.64%
TOTAL	809,476	100%

Source: U.S. Department of Agriculture, National Agricultural Statistics Service Cropland Data 2012

Land cover types in the County's shoreline lands are provided in Table 12.

Table 12
Land Cover Types within Franklin County Shoreline Jurisdiction

Land Cover Type	Acreage	Percentages
Agriculture	306	1.62%
Shrub/Scrubland	4,275	22.70%
Forest	656	3.48%
Grassland	281	1.49%
Open Water	12,599	66.90%
Wetlands	718	3.81%
TOTAL	18,335	100%

Notes:

Calculations include area below OHWM.

Source: U.S. Department of Agriculture, National Agricultural Statistics Service Cropland Data 2012

4.2 Land Use

4.2.1 County Existing Land Use

The County is located at the eastern part of Washington State and is bounded by rivers on the west, south, and east sides. The Columbia River forms the western boundary of the County. It is bounded by Snake River to the south and Palouse River to the east. It abuts Grant County and Adams County to the north. The County shoreline also includes several lakes and reservoirs as indicated in the previous sections. A major portion of the Columbia River shoreline on the north side of the County is under the federal ownership as part of the Hanford Reach National Monument's Wahluke unit. The County shoreline contains a mix of agricultural and residential uses on private lands, and open space, parks, and recreational opportunities on publicly owned lands.

The County's land use categories are identified in the 2008 Franklin County Comprehensive Plan. The County's existing land uses are generally consistent with the Comprehensive Plan land uses. Agriculture is a predominant land use in the County, containing more than 88% of the County's land use and includes both Croplands (56%) and Rangelands (32%). The west side of the County is within the Columbia Basin Project boundary and has irrigated cropping. Non-irrigated cropping also exists in the County's agriculture land. Other uses include Federal Reserve land and Rural Lands serving residential, industrial, and other activities. Most of the developed lands lie within the County's Urban Growth Areas (UGAs) in Connell, Kahlotus, Mesa, and Pasco. Table 13 summarizes the land uses within the County, according to the County's Comprehensive Plan land use categories.

Table 13
Existing Comprehensive Plan Land Use of Franklin County

Land Use Category	Acres	% of Land Use
Federal Lands/Lakes and Rivers	45,683	5.6%
Hanford Reach National Monument	23,195	
Juniper Dunes Wilderness Area	7,393	
Lakes and Rivers	15,095	
UGAs	35,508	4.4%
Rural Lands	13,243	1.6%
Rural Residential	506	
Rural Shoreline	1,548	
Rural Settlement	2,773	
Rural Remote	4,772	
Rural Industrial	3,052	
Rural Activity Center	95	
Ag Service Center	4,956	
Croplands	455,276	56.2%
Irrigated Cropland	232,283	
Dryland Cropland	222,992	
Rangeland	259,776	32.1%
Total	809,486	100%

Source: Franklin County Comprehensive Plan 2008

The County has approximately 6,023 acres within its shoreline jurisdiction for lands above the OWHM. Similar to the entire County's land use pattern, Agricultural use dominates the County's shoreline land use consisting of more than 75% of the overall shoreline land use. Federal Reserve to the northwest corner of the County contains about 21% of the shoreline area. The remaining shoreline area is comprised of Rural Remote, Rural Settlement, and Rural Shoreline Development land uses. Public lands within shoreline areas are owned by multiple state and federal agencies such as the Washington Department of Natural Resources (WDNR), Department of Energy, Washington State Department of Parks and Recreation, Washington State Department of Transportation, and Washington State Department of Fish & Wildlife (WDFW). USACE also manages portions of shoreline along the Columbia and

Snake rivers. See Table 14 for a summary of existing land use within the County's shoreline jurisdiction.

Table 14
Existing Land Use within Franklin County Shoreline Jurisdiction

Land Use	Acres within Shoreline	% of Land Use
Agricultural	6,449.57	75.62%
Federal Reserve	1,818.42	21.32%
Rural Remote	4.85	0.06%
Rural Settlement	137.51	1.61%
Rural Shoreline Development	118.24	1.39%
Total	8,528.59	100%

Source: Franklin County

The Comprehensive Plan land use categories and their purposes are discussed below.

- **Agricultural** – Agricultural land use assures the conservation of, "agricultural lands of long term commercial significance." The diversity of this agricultural base provides a relatively stable economic base and contributes to the areas' cultural heritage and quality of life. Residential densities on irrigated and non-irrigated agricultural lands are to accommodate minimum parcel sizes of 20 and 40 acres, respectively.
- **Federal Reserve** – Federal Reserve land includes land along the Columbia River on the north side of the County as part of the Hanford Reach National Monument.
- **Rural Remote** – Rural Remote areas were established for residential development size through an exemption to the State Platting law prior to the growth management legislation. Most lots are 5 acres in area, have private wells, on-site sewage disposal, and private gravel roads, and the perimeter of each designated area is established around existing parcel boundaries. No expansion of the boundaries is envisioned in the County's Comprehensive Plan. Infill developments may occur at a minimum lot of 5 acres only.
- **Rural Settlement** – Rural Settlement is generally a designated rural area that functions as a small cross roads business center and provides housing, convenience goods, and services to residents in and around the area. This designation provides for the infill,

development, and redevelopment of lands. This area is intended to be a mixture of residential, commercial, and industrial areas. New residential development will be allowed at a minimum density of one dwelling unit per acre provided the land can physically support such development without requiring public sewer or water services, if not currently available.

- **Rural Shoreline Development** – This designation provides for the infill, development, and redevelopment of lands. It is intended this area be exclusively residential in nature. The maximum residential density for this area ranges from one dwelling unit per acre to one dwelling unit per 5 acres.

Land uses are implemented through zoning that regulates different uses and developments within the County. Agricultural Production 20 is the predominant zoning category within the shoreline. This zoning district is primarily designated to areas that have access to irrigation water. In contrast, Agricultural Production 40 is designated primarily to the areas that lack irrigation water and are used for rangeland and dryland farming. See Table 15 for a summary of existing zoning within the County's shoreline jurisdiction.

Table 15
Existing Zoning of Franklin County Shoreline

Zoning	Acres within Shoreline	% of Total	Allowed Residential Density
Agricultural Production 20	5927.70	76.15%	1 du/20 acres
Agricultural Production 40	1605.05	20.62%	1 du/40 acres
General Industrial District	24.48	0.31%	N/A
Residential Suburban District 40	5.55	0.07%	1 du/40,000 sf
Residential Transition	9.58	0.12%	1 du/5 acres
Rural Community 1	138.86	1.78%	1 du/acre
Rural Community 5	46.95	0.60%	1 du/5 acres
Rural Service District	25.99	0.33%	N/A
Total	7784.16	100%	

Notes:

Source: Franklin County Assessor's Office, Kathleen Martello and Jason Guthrie, 9/30/2013, Franklin County Municipal Code

du = dwelling unit

N/A = not applicable

4.2.2 *Water-dependent Uses*

Water-dependent use means a use or portion of a use that cannot exist in a location that is not adjacent to the water and is dependent on the water by reason of the intrinsic nature of its operations (WAC 173-26-020(36)). The County's water-dependent uses are mostly located along the Columbia and Snake rivers. They include boat launches, boat moorages, grain and bulk fuel terminals, and docks.

Boat launches on Snake River are located on Levey Landing Park, Windust Park, and Ice Harbor Dam. The Columbia River includes boat launches that are located in the Hanford Reach National Monument. Private docks are also located adjoining residential properties on Columbia River. Scooteney Park on Scooteney Reservoir has boat launches and boat docks for public use. Grain elevators with water-dependent docks and fuel terminals with barge facilities for commercial purposes are located on the Snake River.

4.2.3 *Water-related and Water-enjoyment Uses*

Water-related use means a use or portion of a use, which is not intrinsically dependent on a waterfront location, but whose economic viability is dependent upon a waterfront location because: a) the use has a functional requirement for a waterfront location such as the arrival or shipment of materials by water or the need for large quantities of water; or b) The use provides a necessary service supportive of the water-dependent uses and the proximity of the use to its customers makes its services less expensive and/or more convenient (WAC 173-26-020 (40)).

Water-enjoyment use means a recreational use or other use that facilitates public access to the shoreline as a primary characteristic of the use or a use that provides for recreational use or aesthetic enjoyment of the shoreline for a substantial number of people as a general characteristic of the use, and which through location, design, and operation, ensures the public's ability to enjoy the physical and aesthetic qualities of the shoreline. In order to qualify as a water-enjoyment use, the use must be open to the general public and the shoreline-oriented space within the project must be devoted to the specific aspects of the use that fosters shoreline enjoyment (WAC 173-26-020 (37)).

The County consists of water-related uses such as industrial and barge facilities along the Snake River. It consists of water-enjoyment uses such as parks, open spaces, and trails along the shoreline in general. The County also contains fishing and hunting opportunities on multiple shoreline locations.

4.2.4 *Non-water-related Uses*

Non-water-related uses include uses not intrinsically dependent on a waterfront location and not economically dependent upon a waterfront location. These uses in the County include agricultural land, rangeland, and other rural uses.

4.3 Current SMP Environment Designation

The County applies shoreline environment designations within its shoreline jurisdiction under its current SMP. The 1974 SMP indicates four environment designations: natural; conservancy; rural; and urban, as described below. These have remained in place through the present. The last amendment to the SMP occurred in 1983.

4.3.1 *Natural*

The purpose of assigning an area to the Natural environment is to preserve and restore those natural resource systems existing relatively free of human influence. Local policies to achieve this objective should aim to regulate all potential developments degrading or changing the natural characteristics, which make these areas unique and valuable.

The primary determination for designating an area as a Natural environment is the actual presence of some unique natural or cultural features considered valuable in their natural and original condition, which are relatively intolerant of intensive human use.

4.3.2 *Conservancy*

The purpose of assigning an area to the Conservancy is to protect, conserve, and manage existing natural resources and valuable historic and cultural areas to ensure a continuous flow of recreational benefits to the public and to achieve sustained resource utilization.

The Conservancy environment is for those areas meeting these criteria and is intended to maintain their existing character. The preferred uses are those which are non-consumptive of the physical and biological resources of the area. Non-consumptive uses are those uses that utilize resources on a sustained basis while minimally reducing opportunities for other future uses of the resources in the area. Activities and uses of a non-permanent nature that do not substantially degrade the existing character of an area are appropriate uses for a Conservancy environment. Examples of predominant uses include diffuse outdoor recreation activities and passive agricultural uses such as pasture and range lands.

4.3.3 *Rural*

The purpose of Rural environment is to protect agricultural land from urban expansion, restrict intensive development along undeveloped shorelines, function as a buffer between urban areas, and maintain open spaces and opportunities for recreational uses compatible with agricultural activities.

The Rural environment is intended for those areas characterized by intensive agricultural and recreational uses and those areas having a high compatibility to support active agricultural practices and intensive recreational development.

4.3.4 *Urban*

The purpose of assigning an area to Urban environment is to ensure optimum utilization of shorelines occurring within urbanized areas by providing for intensive public use and managing development, so that it enhances and maintains shorelines for a multiplicity of urban uses.

The Urban environment is an area of high intensity land use including residential, commercial, and industrial development. It is particularly suitable to those areas presently subject to extremely intensive use pressure, as well as areas planned to accommodate urban expansion.

4.4 Geology

The surficial geology, soils, and topography of the County are primarily dictated by glacial outburst flooding that occurred near the end of the last major glacial period, approximately 18,000 to 20,000 years ago. This event is referred to as the Missoula Floods. The geologic makeup of the County is the result of erosion of pre-floods geologic units, deposition of sediments carried by the floodwaters, and the formation of the unique topographic features that influence present-day hydrology. Prior to the floods, the geology of the County consisted primarily of Miocene-aged Columbia River Basalt (CRB) flows that were in some places (e.g., plateaus) capped with varying thicknesses of wind-blown fine sands and silt known as loess. The CRB bedrock units were formed by numerous separate flows of molten volcanic rock, resulting in stratified layers of rock with distinct contacts that are visible between each volcanic event. The cooling process of each these types of lava flows results in a relatively dense but highly jointed rock that is subject to fracturing and erosion.

Metamorphism of the CRB also contributed to its weakness and the development of fold axis that later became preferential pathways for floodwaters. Miocene/Pliocene-aged fluvial and lacustrine sedimentary rock, known as the Ringold Formation, also formed pre-floods, and earlier Eocene-aged intrusive crystalline rocks were present locally in the northern portion of the County (Grolier and Bingham 1978). The Ringold Formation is exposed on the white bluffs near the Columbia River and in the northern part of the County.

During the Missoula Floods, the rapid drainage of glacial Lake Missoula sent floodwaters through northern Idaho and eastern Washington, where the extremely high-erosive energy flows were primarily focused on folds and joints in the bedrock. Today these areas are characterized by steep-walled canyons and coulees; Smith Canyon and Ryegrass Coulee are examples. The flooding deposited thick layers of sands and gravels in wide, flat, areas including the Pasco Basin, which is currently heavily developed for agriculture on the west side of the County (Lyerla 1991). Wind-driven fine material from these outburst flood deposits has more recently formed active sand dunes that are used for off-road vehicle recreation in some locations, but are not well suited to agriculture or other uses. Additional prominent geologic features present in the County include loess (wind-blown silt) deposits within the western half of the County. The sediment rests atop high-relief areas that were not eroded in the floods. Recent fluvial deposits (alluvium) deposited by post-glacial and

modern-day streams are present in most of the major stream valleys; these deposits are typically comprised of sands and gravels.

4.5 Climate

The County falls within the Central Basin region of Washington (NOAA 2013a and 2013b). This region is the driest region in eastern Washington. The annual precipitation ranges from 7 inches in the drier southern slopes of the Saddle Mountain to 15 inches in the vicinity of the Blue Mountains. Snowfall varies from 10 to 35 inches and occurs after the first of December through the last of February. The Central Basin is subject to “Chinook” winds, which produce a rapid rise in temperature. A few damaging hailstorms are reported in the agricultural areas each summer. Monthly average high temperature in January is near 40 degrees in the lower Yakima valley, and low temperatures between 15 to 25 degrees. In the summer, monthly average high temperatures are in the low 90s with low temperatures occurring in the upper 50s (WRCC 2013).

4.6 Water Resources

This section includes an inventory of water resources within the County, including resources that do not fall under the shoreline jurisdiction. Water resources discussed in this section include surface water resources and quality, floodplains and floodways, channel migration zones, and groundwater.

4.6.1 Surface Water Resources

Approximately 3.5% (44 square miles) of the County surface area is water. Three Water Resource Inventory Areas (WRIAs) are within the County. The most significant WRIA by area is WRIA 36 (Esquatzel Coulee). WRIAs 33 (Lower Snake) and 34 (Palouse) are also located in the County.

Water resources in the County are significantly affected by the CBP. The CBP is a large, multi-purpose development that utilizes Columbia River water for irrigation, power, recreation, and flood control. Grand Coulee Dam is the key structure that provides water and energy for the CBP. Water is pumped from Grand Coulee Dam to Banks Lake, an equalizing reservoir that allows irrigation requirements to be met without extensive

scheduling of pumping from Lake Roosevelt. Water can be pumped into Banks Lake when power and water are available at Grand Coulee Dam and stored until needed for irrigation (Anchor Environmental 2007).

Water from Banks Lake travels to Billy Clapp Lake through the Main Canal before being distributed to the irrigation districts. Much of the irrigation water delivered is recycled and reused before returning to the Columbia River. It is initially used for irrigation and then recaptured in drains, wasteways, and natural channels before being used again to irrigate additional farmland. Potholes Reservoir and O'Sullivan Dam are the key structures that facilitate water conservation for the CBP (Anchor Environmental 2007).

Development of the CBP has caused an increase of water available for recreation. Before the CBP was developed, there were 35 lakes in the project area, including portions of Grant, Lincoln, Adams, and Franklin counties. There are now more than 140 lakes, ponds, and reservoirs (USBR 2011).

The Columbia River within the County receives water from the operation of multiple hydroelectric dams upstream of the County. Columbia River flows are dependent on the coordination of dam operations of all seven dams in the mid-Columbia River, which range from Grand Coulee Dam to Priest Rapids Dam. The Columbia River within the County includes a portion of the Hanford Reach, the only free-flowing section of the Columbia River in the United States.

The Snake River within the County consists of a series of lakes formed by the construction of run-of-the-river dams, specifically McNary Dam on the Columbia River downstream of its confluence with the Snake River (Lake Wallula), Ice Harbor Dam (Lake Sacajawea), and Lower Monumental Dam (Lake West).

4.6.2 *Surface Water Quality*

Surface water quality in the County is generally affected by climate, dam, and hydropower operations, past industrial use and agricultural runoff. These impacts have caused certain

waterbodies to be impaired by temperature, dissolved oxygen, total dissolved gas, polychlorinated biphenyls (PCBs), pH, and/or other pollutants.

Within the Columbia River and the Esquatzel Coulee watersheds, increased temperatures and pH levels within waterbodies are common. Elevated temperatures in the streams are attributed to low stream flows, lack of shade from non-existent riparian vegetation, and groundwater contributions. Elevated pH values are related to excessive aquatic vegetation growth. These two parameters are indirectly related to elevated nutrient levels, because aquatic vegetation growth is supported by the presence of nitrogen and phosphorous in stream water.

The presence of nutrients in the streams and lakes appears to be associated with non-point sources such as historical agricultural activities. This conclusion was based on a lack of significant non-agricultural-related industry and commercial activities in the watershed over time. Due to significant improvements in agricultural practices, fewer nutrients should be contributed to the surface waterbodies in the future than have been in the past.

Monitoring data from the County has also exhibited exceedances of several other water quality parameters, including PCBs, Dioxins, 4,4'-DDE, total dissolved gas, and dissolved oxygen at various locations.

It should be noted that in many areas of Snake River, invasive exotic species (zebra mussels [*Dreissena polymorpha*] and quagga mussels [*Dreissena rostriformis*]) rank among the most common water quality concerns. Specifically, these species are known to remove beneficial algae and release nutrients into the water, which may fuel a growth of harmful aquatic vegetation (Aquatic Nuisance Species Center 2013).

4.6.3 Floodplain and Floodway

FEMA has established 100-year floodplains for most waterways in the County. Esquatzel Coulee has floodways established near populated communities, including near Connell, Mesa, Eltopia, and Pasco.

4.6.4 Groundwater Resources

Groundwater in the County is part of the Columbia Plateau regional aquifer system. This system occupies about 50,600 square miles and extends across northern Idaho, northeastern Oregon, and a large part of southeastern Washington. Miocene basaltic rocks are the major aquifers in the Columbia Plateau regional aquifer system. Unconsolidated deposits are also a major source of groundwater, and some unconsolidated-deposit aquifers in the County are up to 1,000 feet thick and can yield as much as 3,200 gallons per minute (gpm). Miocene basaltic rocks that underlie the unconsolidated deposits yield as much as 4,800 gpm (Whitehead 1994).

The Columbia Plateau aquifer system is subdivided into four aquifers: the suprabasalt sediment (overburden) aquifer; Saddle Mountains aquifer; Wanapum aquifer; and Grande Ronde aquifer. The overburden aquifers are found within the main structural basins and are the main recipients of surface recharge water, primarily from the Columbia Basin Project (GWMA 2001).

The Columbia Basin Project has impacted the County groundwater levels within the project area. The extensive canal system of the Columbia Basin Project, combined with non-uniformity in sediment characteristics, largely influences groundwater movement (GWMA 2001).

Groundwater typically originates as precipitation that infiltrates through soil and underlying unsaturated geologic materials until reaching the water table. In the case of the Columbia Basin Project, groundwater mainly originates as irrigation supply (USBR 2007).

A northern portion of the County is within the Odessa Groundwater Management Subarea (Odessa Subarea), an area designated by Washington State Legislature in 1967 due to groundwater declines. Since the 1980s, groundwater levels in the Odessa Subarea have declined as much as 200 feet (USBR and Ecology 2012).

The County is one of four counties that make up the Columbia Basin Ground Water Management Area (GWMA). The GWMA was designated by Ecology in 1998 due to concerns over high nitrate concentrations in groundwater.

Several federal, state, and local regulations are in place to help minimize negative impacts to groundwater quality. These include regulations on drinking water wells, septic tanks, and runoff from landscaping practices.

In general, groundwater is the major source of drinking water in Washington State, including Franklin County. To protect groundwater used for drinking water supplies as required by the Federal Safe Drinking Water Act, the Washington State Department of Health requires all Group A public water systems (those that serve 25 or more people or 15 or more connections) that use groundwater as their supply source to implement a wellhead protection program. The wellhead protection program has several requirements that are designed to prevent contamination of groundwater used for drinking water (DOH 2010).

Septic (on-site sewage) systems that are improperly sited, operated, or maintained can affect groundwater quality by discharging contaminants to groundwater. WAC Chapter 246-272A regulates on-site sewage system location, design, installation, operation, maintenance, and monitoring to limit the discharge of contaminants and to minimize public health impacts from septic systems.

Runoff from landscaping practices can contain herbicides and pesticides, which could impact groundwater quality. Title 16 of the WAC contains regulations on pesticide and herbicide use.

4.7 Geologic Hazards

Geologic hazards, as defined in the County Comprehensive Plan, include “areas that, because of their susceptibility to erosion, sliding, earthquake, or other geologic events, are not suited to the siting of commercial, residential, or industrial development consistent with public health or safety concerns.” The primary geologic hazards in the County are “Erosion and/or Landslide Hazard Areas” where soils are susceptible to erosion and landslides or rock fall. Seismic hazards and mine sites are secondary geologic hazards that generally present less of a

concern in most areas. Table 16 summarizes each of the hazards that may be associated with County shorelines, as well as the sources of information that were evaluated.

Table 16
Geologic Hazards of Franklin County

Hazard	Description	Summary	Source
Erosion and/or Landslide Hazards	Soil units susceptible to erosion by wind, water, and unstable slopes.	About 4.3% (821 acres) of shoreline jurisdiction areas has a 40% slope or greater. About 0.03% (63.18 acres) is identified with all three of the following characteristics: 1) slopes that are 15% or greater; 2) the sediment group known as Ringgold Fines; and 3) soils known as being severe water erosion hazards.	Generalized Slope GIS Data (Franklin County), Soils – Water Erosion Hazards GIS Data (Franklin County) Surface Geology Polygon, 100,000 Scale (WDNR)
Landslides	Areas that historically have been prone to landslides	About 2% (350 acres) of shoreline jurisdiction is mapped as active landslide areas.	Active Landslide Area GIS Data (Franklin County),
Seismic Hazards	Active faults	Faults exist to the west of Eagle Lakes Group and two locations along Snake River.	Active fold and fault GIS data layers (WDNR)
Mine Sites	Active (permitted) mine sites	10 mine sites were identified; 3 were for rock or stone and 7 were for sand or gravel. Underground mining practices are currently not taking place in the County. There are no known inactive mines sites; however, if they exist, these areas may present slope hazards.	Mining and Energy Resources GIS data (WDNR) 2004, 2010, 2011, 2012

Notes:

GIS = Geographic Information Systems

WDNR = Washington State Department of Natural Resources

4.8 Cultural Resources

4.8.1 Historical Background

The County is in the Southern Plateau culture area, which is bounded by the Okanogan Highlands to the north, the Bitterroot Mountains to the east, the Cascade

Mountains to the west, and the Deschutes and John Day River drainages to the south (Ames et al. 1998). It forms part of the larger Columbia Plateau culture area.

The oldest archaeological sites in the Southern Plateau date to the end of the Pleistocene, when hunters of large mammals fanned out across North America. The earliest Paleoindian sites in the area are attributed to the Clovis culture, including the Ritchey-Roberts Clovis cache in East Wenatchee, which dates to 12,250 years ago (Mehring and Foit 1990). Clovis sites are rare across the region.

After the brief but widespread Clovis occupation, a broad-spectrum hunter-gatherer culture developed in the region and persisted until the middle Holocene, around 5,300 years ago. Sites dating to this time period are generally limited to lithic assemblages (basalt projectile points and flake tools) and lack evidence of long-term habitation (Ames et al. 1998).

A shift toward more permanent settlement began around 6,000 years ago and initiated a period that lasted until the beginning of the early Holocene, around 3,000 years ago (Chatters and Pokotylo 1998; Ames et al. 1998). In general, tool assemblages are characterized by the addition of groundstone and bone/antler tools to the existing flaked stone technology. The appearance of woodworking tools correlates with the first semi-subterranean structures.

Late Holocene cultures in the Plateau region exhibit a, “shift in adaptations...to storage-dependent collector strategies” (Chatters and Pokotylo 1998:76), which are characterized by intensive salmon fishing and associated storage features, social inequality, large permanent winter villages, and diverse tool assemblages. This shift began around 4,000 years ago and persisted until historic contact (Chatters and Pokotylo 1998). In the southern Plateau, this period also included evidence of intensive camas processing and fiber and wood artifacts preserved in the relatively dry climate (Ames et al. 1998). The late Holocene archaeological cultures correlate with historic ethnographic descriptions.

The County is in the traditional territory of Native American tribes who are now members of the Confederated Bands and Tribes of the Yakama Nation. The tribes, called Yakima, Klikitat, Kittitas, Taitnapam, Wanapum, and Palouse by twentieth century ethnographers,

speak dialects of the Sahaptin language (Schuster 1998; Ruby and Brown 1986). Sahaptin peoples practiced an annual subsistence round, traveling from large winter villages to fish camps in the spring, uplands for hunting and plant-gathering in the summer and early fall, and fish camps again in the fall for late runs (Schuster 1998). Winter village structures included pit houses and mat lodges, some housing multiple families (Sprague 1998). There are many Sahaptin place names along the shorelines of the County, including *k^wsís* (“two rivers meet”) for the confluence of the Snake and Columbia rivers and *tanáxalu*, a, “large village and noted fishing site...located east of the Columbia opposite the mouth of the Yakima River” (Schuster 1998:329).

The communities of the southern Columbia Plateau began to see the effects of Euro-American contact decades before the first explorers and traders arrived in the area. These effects, beginning around A.D. 1600, included introduced diseases, trade goods, and the introduction of the horse (Walker and Sprague 1998). The Yakima Treaty of 1855 established the Yakima Reservation, where many descendants of the original inhabitants live.

The first documented Euro-American explorers, Lewis and Clark, passed through the area in 1805 and David Thompson passed through 6 years later (Hayes 2011), but the first non-Native settlement did not occur until for almost another 50 years. In the 1860s, cattle ranchers and farmers began to settle the north part of the County (USDA 2006, Gibson 2005). The North Pacific Railroad through the area was built in the 1880s (partially by Chinese laborers), and the County was created from Whitman County in 1883. A rail bridge over the Columbia River from Pasco to Kennewick was built in 1887, Pasco was incorporated in 1891, and a roadway bridge was constructed in 1922 (Gibson 2005). The economy was primarily agricultural until the 1940s, when the Pasco airfield became a Naval air station and plutonium production was established across the river at Hanford (Sanger 1995; Gibson 2005). Agriculture remained an important component of the economy, especially with the completion of the Columbia Basin Irrigation Project in the late 1940s (Tate 2005). Though agriculture is still of primary importance, the County is hardly a farming backwater; the fastest-growing county in the Pacific Northwest in 2000, the County today has a diverse population and economy (Gibson 2005).

The Department of Archaeology and Historic Preservation lists 324 archaeological sites and districts in the County, the majority of which are within a half-mile of the banks of the Columbia, Snake, and Palouse rivers. Other sites, especially cairns and lithic sites, are located near upland lake shorelines. Four archaeological sites and five archaeological districts in the County are listed in the National Register of Historic Places (NRHP). All nine NRHP-listed properties are located within 100 feet of the shoreline (some are completely or partially submerged). The properties include the exceptionally significant Marmes Rockshelter site, Windust Caves Archaeological District, and Tri-Cities Archaeological district (the nationally known Kennewick Man remains were found within the latter). The Ainsworth town site archaeological site in Sacajawea State Park is listed on the Washington Heritage Register. Any location within shoreline jurisdiction in the County should be considered to have high potential for archaeological materials, and finds can be expected to be significant.

In addition to archaeological materials, a many historic structures are recorded in the County and many more are likely unrecorded. Three bridges over the Columbia River (State Route 397 Pasco-Kennewick Bridge, Pasco-Kennewick Columbia River Rail Bridge, and State Route 395 Pioneer Memorial Bridge [the “Blue Bridge”]) are NRHP-listed, as is the James H. Moore House, located on the shoreline of the Columbia River near Pioneer Memorial Bridge. The Box Canyon Viaduct near the Snake River is also NRHP-listed. Another 422 structures have been inventoried but not evaluated for NRHP-eligibility, many of which are near shorelines.

4.8.2 *Potential for Archaeological and Historic Resources*

Given the history of the County from the late Pleistocene to the present, a number of archaeological and historical site types could be expected, including:

- Lithic scatters, quarries, and caches
- Pre-contact habitation sites (e.g., camps, villages, and cave sites)
- Resource procurement sites (e.g., fish traps and camas ovens)
- Pictographs and petroglyphs
- Historic habitation sites (e.g., homesteads, farms, cabins, and railroad laborer camps)
- Historic agricultural infrastructure

- Historic and pre-contact transportation corridors (e.g., trails , routes, railroad grades, and road grades)
- Historical public works infrastructure (e.g., dams and transmission corridors)

Some sites may be on or near the surface, and others may be deeply buried, depending on the localized geomorphology. The proximity of such sites as the Marmes Rockshelter and the Kennewick Man find underscore that County shorelines may contain highly sensitive and nationally significant archaeological and cultural resources. Human remains are also found in archaeological sites in the County. The long human history and strong tribal ties to the land also indicate that the potential for Traditional Cultural Properties and Native American ethnographic landscapes should be considered.

4.8.3 Cultural Resources and Shoreline Development

State and local cultural resources laws apply to shoreline development. State laws include RCW 27.53 (Archaeological Sites and Records), which prohibits the unpermitted removal of archaeological materials and establishes a permitting process, and RCW 27.44 (Indian Graves and Records) which describes how human remains must be treated.

Given the importance of shoreline locations throughout the human history of the County, the potential for cultural resources should be considered high for any shoreline development permit unless demonstrated otherwise. Because the probability of unrecorded resources is high, applicants should be prepared to follow the provisions of RCW 27.53 and 27.44 if cultural resources are identified or encountered during planning or construction processes.

5 SHORELINE ANALYSIS AND CHARACTERIZATION

5.1 Ecosystem-wide Processes and Conditions

An ecosystem is a natural system consisting of biological, physical, and chemical factors that together make up the environment. Ecosystem-wide processes are defined by statute as, “the suite of naturally occurring physical and geologic processes of erosion, transport, and deposition; and specific chemical processes that shape landforms within a specific shoreline ecosystem and determine both the types of habitat and the associated ecological functions” (WAC 173-26-020 (14)). Processes occur at multiple scales and are influenced by hydrology, geology, topography, soils, land cover, and land use characteristics. These processes determine the types and quality of shoreline functions or services that contribute to the maintenance of aquatic and terrestrial environments that make up an ecosystem (WAC 173-26-020 (13)).

The following sections discuss ecosystem processes and habitat structures that these processes form and maintain. This section also describes current conditions, including alterations to the ecosystem processes in the County. Alterations to ecosystem processes can affect habitat structure and the availability of habitat services, especially over long periods of time. Ecosystem processes and conditions in the County are presented through the categories of hydrology, sediment, water quality, and habitat.

5.1.1 *Hydrology*

5.1.1.1 *Ecosystem Process*

The process of water delivery, movement, and storage within an ecosystem is largely affected by landform, geology, soil characteristics, and climate, including precipitation. Rain and snowmelt provide the hydrologic inputs into a watershed. This cycle affects other physical, chemical, and biological functions of the river system. The speed with which water flows through the watershed also affects whether nutrients, sediments, or other materials are deposited or retained in the water and transported through the watershed.

Water is delivered to streams primarily from surface water runoff from above and, in some cases, from groundwater. The horizontal structure of river and stream channels includes the

wetted channel zone where water is present during low-flow events, an active channel that is seasonally inundated, and the riparian zone located above seasonal high water elevations. The vertical structure of these systems includes a benthic zone along the surface of the bottom substrate and the hyporheic zone, which provides a transition between the surface and the groundwater, or phreatic zone. Hyporheic and benthic zones cycle out excessive nutrients and contaminants, store and transport water and sediment, maintain base flows, and can support vegetation and microorganism communities. The interaction of hydrologic and geomorphic processes contributes to habitat structures useful to aquatic species, including shallow water and off-channel refugia, gravel bars, pools, riffles, and the transport of organic material, including large woody debris.

5.1.1.2 Conditions in Franklin County

The County has little precipitation, less than 12 inches annually on average. County hydrology is generally dependent on snowmelt from upper basins, groundwater/surface water interaction, and runoff from irrigation and agricultural use.

Columbia River

Columbia River hydrology in the County is generally described by USGS gage #12472800 (Columbia River below Priest Rapids Dam, Washington), the nearest upstream gage with consistent flow records. Flows are regulated from 10 major reservoirs and numerous smaller reservoirs and powerplants upstream. The average discharge for the regulated period of record (1960 to 2012) is 118,500 cfs, with average monthly flows ranging from 78,500 cfs (in September) to 203,600 cfs (in June). The Columbia River is free-flowing in the County until the downstream end, where the Lake Wallula reservoir pool begins.

Palouse River

Palouse River hydrology in the County is generally described by USGS gage #13351000 (Palouse River at Hooper, Washington), the nearest upstream gage with consistent flow records. The average discharge for the period of record (1898 to 1899, 1901 to 1906, 1909 to 1911, 1914 to 1915, and 1952 to 2012) is 601 cfs, with average monthly flows ranging from 34 cfs (in August) to 1,810 cfs (in March).

Snake River

Snake River hydrology in the County is generally described by USGS gage #13334300 (Snake River near Anatone, Washington), the nearest upstream gage with consistent flow records. Flows are regulated from multiple reservoirs. The average discharge for the regulated period of record (1958 to 2012) is 34,700 cfs, with average monthly flows ranging from 17,900 cfs (in August) to 70,800 cfs (in June).

Esquatzel Coulee

Esquatzel Coulee hydrology in the County is dependent on irrigation water returns. Natural flow is generally described by USGS gage #12513000 (Esquatzel Coulee at Connell, Washington). Mean monthly flow peaks in February at 15 cfs and is less than 0.5 cfs March through December (1953 through 1985). Total flow is generally described by inactive USGS gage #12513500 (Esquatzel Coulee at Eltopia, Washington) from August 1971 through September 1979. Mean monthly flow peaks in September and October at above 30 cfs and is lowest in the winter (December through March). Reclamation also maintains flow records at the Esquatzel Diversion Channel headworks where all flow from Esquatzel Coulee is diverted; from 1991-2001 the mean monthly flow peaks in October (113 cfs) and is less than 60 cfs during the winter.

Mesa, Eagle, and Wahluke Lakes Groups

The County lakes are seepage lakes and dependent on irrigation water beyond their natural drainage area.

Scooteney Reservoir Lakes Group

The Scooteney Reservoir lakes are developed from impoundment of irrigation canal water and dependent on irrigation runoff and canal operations.

5.1.2 Sediment Delivery

5.1.2.1 Ecosystem Process

Sediment delivery through a watershed is based on interactions among, gravity, wind, and water across the various geologic features, soils, and land covers. Landslides and mass

wasting are a function of slope, soil, and water interacting to create instability. Soil erosion is a function of slope, soil cohesiveness, and ground cover interacting with water or wind forces. Sediments transported by water or wind are deposited wherever and whenever the water or wind transporting them slows. As the size of sediment increases, the water or wind force required to transport the sediment increases, so smaller sediment particles are able to travel farther than larger sediment particles when the transporting forces decrease. Deposition often occurs within topographic depressions where sediment is deposited into lakes and stream pools, wetlands, and floodplains. The sediment erosion, transport, and deposition cycle is a major aspect of river and stream channel formation and channel migration.

5.1.2.2 *Conditions in Franklin County*

On the major waterbodies, upstream dams and regulated dam operations restrict the movement of sediment and cause buildup of sediment at dam bases. Landslide potential in some areas along these rivers may contribute to increased sediment input during storm events.

Most lakes in the County are dependent on irrigation runoff and/or operations, so sediment may enter into lakes but will not likely exit due to slower velocities, causing silt buildup in lake bottoms.

Streams generally can transport sediment along reaches, and sediment input would likely occur during storm events. Some streams have lakes within a stream reach; sediment may not be mobile in these reaches due to lower velocities occurring in the lake portions of the stream reach.

Columbia River

Sediment in the Columbia River in the County is restricted by regulated operations upstream. Landslide potential in some areas could contribute to increased sediment input during storm events. Sediment can generally move freely within the County until the downstream end where the pool of Lake Wallula begins and water velocities tend to slow.

Palouse River

The Palouse River is not regulated. Some fine sediment may be input into the river during high-precipitation events; sediments can generally move freely throughout this system.

Snake River

Sediment in the Snake River in the County is restricted due to its series of dams and reservoirs controlling river flow and capturing sediment. Sediment may build at the base of the dams.

Esquatzel Coulee

Throughout the County, sediment in Esquatzel Coulee is impacted by irrigation and wasteway runoff and channelized features. Sediment accumulates in topographic low sections in which coulee velocities are relatively slower than in channelized sections.

Mesa Area Lakes Group

Sediment in the Mesa Area Lakes Group is impacted from irrigation runoff. The lakes are a point of sediment accumulation due to decreased velocities compared to the runoff draining to the lakes.

Scooteney Reservoir Lakes Group

Sediment in the Scooteney Reservoir is generally dependent on input from irrigation runoff. The reservoir is a point of sediment accumulation due to decreased velocities in the reservoir when compared to the runoff rates of the waterbodies draining to the lakes.

Eagle Lakes Group

Sediment in the Eagle Lakes Group is generally impacted from irrigation runoff. The lakes are a point of sediment accumulation due to decreased velocities in the lakes when compared to the runoff rates of the waterbodies draining to the lakes.

Wahluke Lakes Group

Sediment in the Wahluke Lakes Group is impacted from irrigation runoff. The lakes are a point of sediment accumulation due to decreased velocities in the lakes when compared to the runoff rates of the waterbodies draining to the lakes.

5.1.3 Water Quality

5.1.3.1 Ecosystem Process

Water quality is based upon the chemical, physical, and biological characteristics of water, and associated human and aquatic species requirements and needs for water quality conditions. The combined processes that deliver, transport, and store water and sediment in the ecosystem have a substantial impact on surface water quality. Impacts to surface water quality occur through land cover changes and development; chemical use in manufacturing, agriculture, and recreation; pathogens from waste; temperature; and natural processes such as plant respiration.

Human-induced changes to water quality (e.g., industrial effluents, sewer overflows, and runoff from upland areas) can alter river and lake water temperatures, turbidity, and oxygen content, as well as nutrient, toxin, and pathogen concentrations (Karr 1995; Welch and Lindell 2000). In general, these changes can affect the presence, abundance, and vitality of all aquatic organisms. Water delivery and water quality is affected by soil loss, soil compaction, and road and building construction typically associated with development and urbanization. These activities increase the amount of impervious surface (e.g., parking lots and roads), reduce the percolation of precipitation into the ground, and concentrate pollutants into stormwater discharge areas. Reduced water infiltration increases the amount and rate of surface water runoff, causing high stream discharge or high direct delivery of water to the stream and lake shorelines (Dunne and Leopold 1978; Arnold and Gibbons 1996; Poff et al. 1997).

Fertilizers, pesticides, and automobile- and boat-generated pollutants are linked to runoff-borne pollution that enters streams and lakes. Toxins from these and other previously described human-induced changes can settle in river pools, contaminating the sediments of the benthic zone. This leads to toxins, either directly affecting benthic species through

illness and mortality, or indirectly affecting aquatic and terrestrial species through bioaccumulation from animals lower on the food chain.

Many pathogenic protozoa, bacteria, and viruses can be found naturally in the environment, some of which occur as a result of fecal wastes deposited by animals. These come from fecal material of wildlife and domesticated animals deposited within upland areas that drain into aquatic ecosystems or deposited directly into them (Sherer et al. 1992; Stanley et al. 2005). A higher concentration of domesticated livestock (such as in livestock farms or concentrated animal feeding operations) can increase the potential of fecal material draining to shoreline areas.

Solar energy input can be another important factor that impacts water quality, especially in the summer when high temperatures coincide with high nutrient loads from agricultural runoff and lower river flows. This can result in high water temperatures and very low levels of dissolved oxygen, both of which can alter the ecology of rivers and streams. Water temperature, a physical characteristic, affects the chemical process of breaking down organic material into nutrients, as well as the biological processes of phytoplankton and zooplankton reproduction and the metabolism of fish species.

Water temperatures, plant respiration, and biological decomposition are also inversely related to dissolved oxygen levels, which play a critical role in supporting aquatic organisms such as salmonids. Similarly, alkalinity/pH and nutrient concentrations influence biological processes, particularly phytoplankton production.

5.1.3.2 Conditions in Franklin County

Columbia River

The Columbia River in the County is generally impacted by agricultural runoff from irrigation drainage canals and dam operations. Other potential impacts, such as industrial runoff and runoff from impervious material in roads and buildings can be greater in downstream reaches. Several reaches in Columbia River are on the 303(d) list for a various issues, including PCB, Dioxin, 4,4'-DDE, temperature, pH, dissolved oxygen, and total dissolved gas.

Palouse River

Potential impacts to water quality of Palouse River include upstream agricultural runoff, recreational uses, and runoff from impervious material in roads and buildings. A section of SR 1c of the Palouse River is on 303(d) list for pH and temperature.

Snake River

Snake River is impacted by agricultural runoffs, industrial runoff, and confined pool environments created by Ice Harbor Dam and Lower Monumental Dam, and hydropower operations. Invasive exotic species are one of the most common quality concerns across reaches. Other issues on the 303(d) list include temperature, dissolved oxygen, pH, total dissolved gas, total chlordane, PCB, 4,4'-DDE, 2,3,7,8-TCDD, and total phosphorus.

Esquatzel Coulee

Esquatzel Coulee is impacted by agricultural runoff and flows controlled by irrigation operations. Esquatzel Coulee is on the 303(d) list for pH and temperature at the downstream end of shoreline jurisdiction (near the Esquatzel Diversion Channel headworks).

Mesa Area Lakes Group

The Mesa Area Lakes Group is impacted by agricultural runoff and flows controlled by irrigation operation.

Scooteney Reservoir Lakes Group

Scooteney Reservoir is severely impacted by agricultural and industrial runoff that it receives from Potholes Canal. The entire body of Scooteney Reservoir is on the 303(d) list (Category 5) for PCBs and Dieldrin; is impaired (Category 4C) by invasive exotic species; and is a water of concern (Category 2) for 4,4'-DDE.

Eagle Lakes Group

Lakes in the Eagle Lakes Group are impacted by agricultural runoff and flows controlled by irrigation operation.

Wahluke Lakes Group

The Wahluke Lakes are impacted by agricultural runoff and flows controlled by irrigation operation.

5.1.4 Habitat

Habitat is the natural environment in which particular species or populations have adapted to live. This section describes aquatic and terrestrial habitat conditions and the stressors that may affect the functions provided by these habitats in the County, focusing on habitat types such as aquatic, riparian, and shrub-steppe habitats and functions such as foraging, breeding/nesting, and migration for terrestrial species and spawning, rearing, and migration for aquatic species.

5.1.4.1 Habitat Structures

Habitat provides the physical conditions and biological functions needed to support the species as part of a larger ecosystem. The lifecycles of aquatic, avian, and terrestrial species are often interdependent, meaning the habitat requirements of a single species include other species on which they depend. The habitat requirements vary for different species and can vary for different life stages of a species.

Habitat is often described in terms of the functions of reproduction, forage, and shelter (Morrison et al. 1992):

- **Reproduction** - The reproduction needs of species vary greatly. All species have specific needs for areas to find a mate, reproduce, and successfully rear offspring (often referred to as breeding sites, birthing areas, and nest sites). Some species have very specific needs; for example, amphibians (frogs, toads, and salamanders) require water or moist areas for laying eggs and for larval development.
- **Forage** - Forage includes water and food sources. Water is a universal need of all species, while forage needs vary greatly by species. An important consideration is whether a species is prey or a predator. Predators obviously require that the habitat needs for prey species are met.

- **Shelter**– Shelter includes areas for safe resting, refuge, or cover from predators, and shelter from environmental hazards (e.g., daytime or nighttime temperatures, extreme weather events, seasonal climate fluctuations, and unpredictable disturbances such as drought, fire, or flooding).

The shoreline zone within the County provides aquatic and terrestrial habitats, which are characterized by a wide variety of features and functions provided within those types.

5.1.4.1.1 Aquatic Habitat

The aquatic habitat within the County consists of rivers, coulees, small creeks and streams, and lakes of various sizes. The quality of the aquatic habitat within these systems is controlled by a number of key ecosystem features that combine to provide important ecological functions (or ecosystem services). Aquatic habitat within the County supports an interconnected array of species, including numerous salmonids species listed as threatened under the ESA. Aquatic habitat features that support healthy salmonids stocks are likely to also support other aquatic-dependent and aquatic-associated species and, additionally, terrestrial species. Some ecosystem features applicable to aquatic habitat within the shoreline management jurisdiction of the County include water quality (including presence of contaminants as well as water temperature); water depth; instream cover, such as presence of large rocks and woody debris; substrate size; aquatic and riparian vegetation; floodplain extent and health; and channel migration access.

Water quality is a primary ecosystem feature that affects presence and health of aquatic life. Within aquatic habitats, water quality can affect survival of fish through low dissolved oxygen conditions (less than 3 parts per million [ppm] in warm-water streams, or less than 5 ppm in cold-water streams), very low alkalinity, high turbidity conditions, presence of contaminants, and high temperatures. Freshwater fish in the County include cold-water fish (including ESA-listed salmon and bull trout) that have an upper lethal limit of approximately 25 degrees Celsius (°C), warm-water fish (largemouth bass [*Micropterus salmoides*]) that can tolerate temperatures as high as 36°C, and cool-water fish (non-native smallmouth bass [*Micropterus dolomieu*]) that have similar tolerances to warm-water fish but require cooler average temperatures during the growing season.

Water depth and water quantity requirements vary by species and life stage. For example, areas near channel margins with shallow water depths are needed for migration of salmonids juveniles, while migrating adults may utilize deeper waters. Substrate requirements can vary by species, but many salmon cannot spawn in substrate smaller than gravel.

Instream cover increases the structural complexity of a system through presence of large wood and larger rocks or boulders that improve the habitat quality for most fish. Instream vegetation, similar to instream cover, can improve habitat as long as the amount of aquatic vegetation does not create a low dissolved oxygen issue. In general, native aquatic vegetation provides important habitat conditions, while introduced species such as Eurasian watermilfoil (*Myriophyllum spicatum*) does not. As a result of habitat simplification arising from the development of hydroelectric dams, these features of instream cover are largely absent from within the Columbia and Snake River systems within the County.

Riparian vegetation stabilizes banks, reduces summer temperatures, and provides nutrients through leaf debris and insect fall, and provides instream cover through tree-fall. Floodplain habitat is required for many fish species during multiple life stages. Extensive and unaltered floodplains that are accessible to fish species are ideal. However, the aforementioned development of hydroelectric dams have inundated original floodplain habitat in the County, and water levels are tightly managed, and therefore access to floodplain habitat by aquatic species is generally rare.

Instream cover, presence of riparian vegetation, and alteration of shorelines also affect the quality and intensity of available light energy in freshwater systems. Light energy affects water temperature, animal behavior (such as the relationship between predators and prey), and plant photosynthesis and growth (Tilzer et al. 1975). Natural light is altered when riparian vegetation is removed or when structures, such as docks, are built that create shade and prevent natural light from reaching the water. Reductions in this natural light preclude plant colonization, and growth beneath these structures and can cause changes in animal behavior. Natural light can also be reduced by the presence of algal blooms caused by excess nutrient additions that can collect in slack-water areas.

5.1.4.1.2 Terrestrial Habitat

Terrestrial habitat consists of many interconnected habitat types. Within the County, the terrestrial habitat within and adjacent to the shoreline zone primarily includes riparian, dryland and irrigated agricultural lands, and shrub-steppe habitat.

Irrigated agricultural lands may provide greater productivity of certain types of biomass compared to habitat with native shrub-steppe vegetation. Irrigated pasture, for example, produces much higher biomass than native shrub-steppe in arid areas and, therefore, may provide greater potential forage for certain species. Such agricultural areas may also displace native species, because their specific lifecycle needs are not met. Agriculture also may change the predator and prey community that affects native species. Agricultural landscapes typically support much higher rodent populations than non-agricultural landscapes. This larger population in turn supports higher populations of predators, such as raptors. This artificially higher population of predators may substantially change the balance between native species and introduced species more adapted to human alteration (Dunn 1978; Moulton et al. 2006). Dryland agriculture and cattle ranching also result in transformation of shrub-steppe habitats and displacement of native species.

Intact shrub-steppe habitat exists primarily on the eastern half of the County, although large areas of this habitat have also been transformed through agricultural use. The Columbia River, along the western end of the County, and the Snake and Palouse rivers, along the eastern County boundary are at many locations adjacent to shrub-steppe habitat, and many of the lakes within the County are adjacent as well. Large tracts of shrub steppe habitat are diminishing in Washington State due to ongoing habitat fragmentation and conversion, and have been identified by WDFW as priority habitats (WDFW 2013). Some estimates show available shrub-steppe habitat in the Columbia Basin has reduced by as much as 50% from historical conditions. Several species of birds and mammals found in eastern Washington are known to only use large, undisturbed tracts of shrub-steppe habitat, including the sage sparrow (*Amphispiza belli*), Brewer's sparrow (*Spizella breweri*), sage thrasher (*Oreoscoptes mantanus*), sage grouse (*Centrocercus urophasianus*), black-tailed jackrabbit (*Lepus californicus*) and other species.

The riparian habitat zone along a river, stream, or lake shore is an essential movement corridor for terrestrial species, and a healthy riparian zone can also support the health of the adjacent aquatic habitat. Habitat characteristics of healthy riparian areas include a connected corridor for wildlife travel, vegetation types adapted to wetter soils, occasional flooding, and natural disturbance regimes. Vegetation in the riparian zone within arid and semi-arid regions tends to be unique in comparison to riparian zones other regions of the United States, and these areas have stronger changes in character between riparian and upland zones (Malanson 1993 as cited in Buffler et al. 2005). Riparian areas offer important functions for species that inhabit the shrub-steppe, species more limited in range to the riparian zone, and that inhabit the adjacent aquatic habitat. For shrub-steppe species, riparian habitat provides access to a critical water source and often provides a more productive environment for forage, escape, thermal cover, nesting sites, and critical winter habitat. Riparian areas typically support larger flocks and a greater density of upland birds than shrub-steppe habitat because of the greater production of biomass and the more complex mosaic of vegetation (Stinson and Schroeder 2012).

Finally, riparian habitat supports a healthy freshwater ecosystem through the presence of complex vegetation communities that overhang the shoreline from the uplands. This overhanging vegetation provides cover and refugia to fish and other aquatic species from extreme conditions (high flows, high temperatures); supports insects that serve as prey for freshwater species; and provides leaf litter and large woody debris, which are integral components to freshwater ecosystems in terms of nutrient cycling and habitat complexity. Management of stream and river hydrology for irrigation and other activities can significantly influence riparian habitats and the terrestrial plant and wildlife species that occupy them. Overall, the availability of water in the semi-arid ecosystem is typically a major limiting factor for the diversity and abundance of terrestrial plant and wildlife species within riparian habitats.

Terrestrial wildlife uses the variety of habitats within the shoreline management zone primarily as movement corridors. Terrestrial movement corridors are crucial to wildlife and may be seasonal, depending on the species. The primary function of a corridor is to connect different habitat areas to facilitate migration and dispersal between the areas. Movement corridors provide the following functions essential to healthy wildlife populations:

- Connectivity and, thereby, genetic variation and biodiversity between differing populations and habitats, connects isolated habitats, and may allow recolonization of extirpated species
- Varying habitats for migration patterns (e.g., foraging, mating and nesting, rearing, shelter, and wintering) that allows populations to move in response to habitat changes such as fires
- Habitat for corridor dwellers, which are species that live within corridors for extended periods (Beier and Loe 1992)

Land use changes and land use activities can have a wide-spread impact on the functions provided by terrestrial habitat. Plants and animals are adapted to the light intensities and timing of natural lighted periods. Artificial light refers to the light that humans create at night, such as lights used for roads, parking lots, industrial complexes (including dams), houses, docks, piers, and sports fields. This light can interfere with aquatic and terrestrial animals' routines, change predator-prey relationships, and interfere with plant production and aquatic animal behavior.

The removal of native riparian vegetation, the introduction and proliferation of invasive plant species, and the filling or degradation of wetlands along shorelines impact the organic inputs that fuel production of the lower levels of the food chain and, therefore, can have impacts throughout the entire food web. Organic matter produced by these habitats supports terrestrial and aquatic insects and other organisms that are then eaten by birds, juvenile salmonids, and other fish species. An example of invasive plants is the aquatic plant Eurasian water milfoil (*Myriophyllum spicatum*), which can cover lake bottoms and out-compete the native aquatic species (altering the plant community), deplete dissolved oxygen, and lead to fish mortality (Frodge et al. 1995).

5.1.4.2 Conditions in Franklin County

5.1.4.2.1 Important Wildlife and Priority Habitat and Species in Franklin County

Table 17 summarizes the ESA-listed fish species, and Washington State Priority Habitat Species identified in the County.

Table 17
ESA-listed Fish Species, and Washington State Priority Habitat Species in Franklin County

Species Category	Common Name	Scientific Name
ESA-listed Fish Species	Bull Trout	<i>Salvelinus confluentus</i>
	Chinook	<i>Oncorhynchus tshawytscha</i>
	Steelhead	<i>Oncorhynchus mykiss</i>
	Sockeye	<i>Oncorhynchus nerka</i>
Washington Priority Species – Fish	Coho	<i>Oncorhynchus kisutch</i>
	Giant Columbia River Limpet	<i>Fisherola nuttalli</i>
	Leopard Dace	<i>Rhinichthys falcatus</i>
	Mountain Sucker	<i>Catostomus platyrhynchus</i>
	Pacific and River Lamprey	<i>Lampetra tridentate;</i> <i>Petromyzontiformes</i>
	Rainbow Trout/Inland Redband Trout	<i>Oncorhynchus mykiss</i>
	Westslope Cutthroat	<i>Oncorhynchus clarki lewisi</i>
	White Sturgeon	<i>Acipenser transmontanus</i>
Washington Priority Species – Rare Plants ¹	Canadian St. John's-wort	<i>Hypericum majus</i>
	Common northern sweet grass	<i>Anthoxanthum hirtum</i>
	Coyote tobacco	<i>Nicotiana attenuata</i>
	Desert dodder	<i>Cuscuta denticulata</i>
	Dwarf evening primrose	<i>Camissonia pygmaea</i>
	Grand redstem	<i>Ammannia robusta</i>
	Gray cryptantha	<i>Cryptantha leucophaea</i>
	Great Basin Gilia	<i>Aliciella leptomeria</i>
	Halfchaff awned sedge	<i>Lipocarpha aristulata</i>
	Lowland toothcup	<i>Rotala ramosior</i>
	Mat buckwheat	<i>Eriogonum caespitosum</i>
	One-cone ground-pine	<i>Lycopodium lagopus</i>
	Pauper milk-vetch	<i>Astragalus misellus</i> var. <i>pauper</i>
	Persistentsepal yellowcress ²	<i>Rorippa columbiae</i>
	Prairie cordgrass	<i>Spartina pectinata</i>
	Piper's daisy	<i>Erigeron piperianus</i>
	Red poverty-weed	<i>Micromonolepis pusilla</i>
	Shy gilly-flower	<i>Gilia inconspicua</i>
	Smooth willowherb	<i>Epilobium pygmaeum</i>
	Snake River cryptantha ²	<i>Ryptantha spiculifera</i>
	Twincrest onion	<i>Allium bisceptrum</i>
	Whited's penstemon	<i>Penstemon eriantherus</i> var. <i>whitedii</i>
	White Bluffs Bladderpod ²	<i>Physaria douglasii</i> ssp. <i>tuplashensis</i>

Table 17
ESA-listed Fish Species, and Washington State Priority Habitat Species in Franklin County

Species Category	Common Name	Scientific Name
Washington Priority Species – Other	American White Pelican	<i>Pelecanus erythrorhynchos</i>
	Bald Eagle	<i>Haliaeetus leucocephalus</i>
	Black-crowned Night-heron	<i>Nycticorax</i>
	Black-tailed Jackrabbit	<i>Lepus californicus</i>
	Burrowing Owl	<i>Athene cunicularia</i>
	Chukar	<i>Alectoris chukar</i>
	Columbia Pebble snail	<i>Fluminicola columbiana</i>
	Columbia River Tiger Beetle	<i>Cicindela columbica</i>
	Ferruginous Hawk	<i>Buteo regalis</i>
	Golden Eagle	<i>Aquila chrysaetos</i>
	Great Blue Heron	<i>Ardea herodias</i>
	Juniper Hairstreak	<i>Callophrys gryneus</i>
	Loggerhead Shrike	<i>Lanius ludovicianus</i>
	Merriam's Shrew	<i>Sorex merriami</i>
	Mule Deer	<i>Odocoileus hemionus</i>
	Peregrine Falcon	<i>Falco peregrinus</i>
	Prairie Falcon	<i>Falco mexicanus</i>
	Preble's Shrew	<i>Sorex preblei</i>
	Ring-necked Pheasant	<i>Phasianus colchicus</i>
	Sage Sparrow	<i>Amphispiza belli</i>
	Sage Thrasher	<i>Oreoscoptes montanus</i>
	Sagebrush Lizard	<i>Sceloporus graciosus</i>
	Striped Whipsnake	<i>Masticophis taeniatus</i>
	Townsend's Big-eared Bat	<i>Corynorhinus townsendii</i>
	Washington Ground Squirrel	<i>Urocitellus washingtoni</i>
	Western grebe	<i>Aechmophorus occidentalis</i>
	White-tailed Jackrabbit	<i>Lepus townsendii</i>
	Yellow-billed Cuckoo	<i>Coccyzus americanus</i>

Notes:

1. U.S. National Resource Conservation Service website, accessed February 12, 2014
2. Species are also under federal listing

5.1.4.2.2 Aquatic Habitat

Conditions of healthy aquatic habitat vary based on waterbody type (e.g., ocean, lake, or stream), channel type, stream size, water source, local geological conditions, and other factors that vary based on location and surrounding land uses.

The western portion of the County is crossed by various canals and wasteways, which convey water used for irrigation of the predominant agricultural lands throughout this part of the County. Wasteways, drains and water conveyance channels through topographically low areas, while not natural aquatic habitat systems, may provide some level of aquatic habitat and may be managed for recreational use, including stocking with warm-water trout and bass. In smaller stream systems on the western side of the Cascades, healthy aquatic habitat may be characterized by presence of larger rocky substrates on the channel bed and minimal amounts of aquatic vegetation due to the high water velocity. On the eastern side, smaller stream systems are primarily seasonal or ephemeral waterways that convey precipitation from the higher elevation bluffs to the Columbia, Snake, or Palouse rivers or may be entirely diverted for agricultural use.

Aquatic habitat conditions and functions of waterways under shoreline jurisdiction in the County are affected by a variety of stressors (as discussed in previous sections of this document) that affect water quality, water quantity, sedimentation, hydrology, and other physical processes that combine to create and support aquatic habitat. Stressors affecting the Columbia and Snake rivers may be similar, but these may differ from the stressors identified for the Palouse River or inland lakes.

Columbia River

Much of the aquatic habitat of the Columbia River within the County is adjacent to agricultural and rural residential developments, and major roads run parallel to and within 200 to 600 feet of the river shoreline along many subreaches. At the northwestern corner of the County, the Columbia River shoreline is adjacent to the Hanford unit managed by USFWS. The portion of the Columbia River within the County, but bordering the City of Pasco, will be addressed through the City's own SMP process and is not described here.

The full suite of ecological functions provided by aquatic habitat is primarily affected by Columbia River water management regimes. The hydropower management of upstream dams (nearest being the upstream Priest Rapids Dam), as well as the nearest downstream dam (McNary Dam), results in significant fluctuations in water levels that are likely inconsistent

with historical water level timing. These changes may alter the ability of Lake Wallula (also known as McNary Pool) to provide aquatic species rearing, migration, and spawning habitat and also impact these functions through disturbance of sediment and large wood transport, and reduced quality and quantity of riparian vegetation along the shoreline, which in turn affect nutrient cycling and localized water quality, among other ecological attributes.

As a result of development, water management regimes, and geologic features, riparian vegetation along the shoreline of the Columbia River in the County is generally confined to narrow strips adjacent to the river pool. Shoreline banks are predominantly moderately sloped, with some reaches having significantly steeper slopes as the river passes along bluff lands. In some subreaches, the riparian vegetation zone may consist of approximately 20 feet of water-dependent vegetation, and other reaches may be around 200 feet in width, primarily along reaches adjacent to in-pool islands or around natural or manmade discharge points. The function of the riparian vegetation and its ability to support terrestrial migratory corridors and in-water rearing and migratory habitat is constrained due to the management of water levels and upland land use, as well as natural steepness of the shoreline slope.

Recreational use along the river is common, with most access points and official recreational facilities concentrated in the more densely populated regions of the County. Recreational use may affect the amount of quality aquatic habitat through hardened banks and overwater structures and other access areas developed along the shoreline that remove native vegetation and create artificially shaded areas. Future recreational development along the shoreline of the Columbia River within the County is likely to be limited to areas within the City of Pasco based on the USACE's McNary Shoreline Management Plan (USACE 2012).

Palouse River

The Palouse River forms the far northeastern border of the County, running through a steeply sloped canyon comprised of Columbia Basalts. The river channel is confined by the canyon slopes into a narrow valley, which limits the width of the riparian vegetation zone.

This river is also impacted by agricultural use as a result of draws from the system to support irrigated crops and from runoff from agricultural fields which may convey nutrients or

pesticides into the river. In the upstream portion of the river within the County, shoreline conditions may be impacted by cattle that graze on nearby irrigated pasturelands, resulting in vegetation disturbance and decreased water quality through erosion and waste inputs, which may negatively impact the rearing and migratory functions provided by aquatic habitat.

There is a significant amount of shoreline beginning at the confluence with the Snake River, under federal ownership and management, where most recreational activity is concentrated. This reach of the Palouse is free from moderation by dams, and therefore water quantity and hydrology are occurring in a more natural manner, which has a positive effect on many aquatic habitat functions.

Snake River

The USACE manages the first 12 miles of the Snake River between the confluence with the Columbia River, as part of the McNary Shoreline Management Plan. The aquatic habitat at the Snake River confluence with the Columbia River is addressed as part of the City of Pasco's SMP process.

The reach of the Snake River within the County is subject to the constraints of hydroelectric dams, and therefore many of the same stressors regarding water management regimes identified for the Columbia River also impact the condition of the aquatic habitat and functions provided by the Snake River system within the County.

The Snake River runs through a canyon comprised of dunes and Columbia Basalts with a steeply sloped shoreline along most of the County's eastern border. The shoreline slope and sandy/rocky, erosive soils prevent growth of significant vegetation, and the riparian vegetation zone is constrained to either a very narrow (10 to 20 foot) strip adjacent to the water or small patches formed around the bays and inlets created by discharge points of the seasonal streams that convey precipitation from the higher elevations of the cliffs and bluffs.

The riparian vegetation adjacent to the waterway is occasionally bordered within the shoreline management jurisdiction by shrub-steppe habitat, with some adjacent uplands used for dryland farming. The combination of flow-management regimes and lack of riparian

vegetation cover and nutrient input into the system may result in water quality impacts, most significantly elevated water temperature. Elevated water temperatures may affect the ability of the aquatic habitat to support certain species or life stages, and therefore, affect the rearing and migratory functions provided by aquatic habitat within this reach of the river.

Esquatzel Coulee

Esquatzel Coulee drainage is mostly a single-thread channel with a varied geomorphic character, the channel includes artificially hardened banks and minor segments with wider floodplain areas. The riparian zone is predominately narrow, on average between 5 and 15 feet wide. A few segments of Esquatzel Coulee have wider bands of vegetation, though these areas appear to be dominated by the non-native Russian olive (*Elaeagnus angustifolia*). Farther upland from the channel, shrub-steppe habitat is found, with only a few segments of the channel adjacent to irrigated agriculture fields.

Lake Groups

Lakes included in the County SMP are addressed as groups, and this section will consider the general condition of all lake groups. Additional detail concerning conditions of aquatic habitat in specific lake groups and lakes are described in the IAC tables in Appendix A.

The aquatic habitat of the lakes within the County may be more susceptible to impaired water quality as a result of runoff containing pollutants as identified in previous sections on water quality and land use. Recreational use may be more disruptive to the riparian community, which in turn has an impact on water quality. Further, lakes in the County may vary in water depths throughout the year, based on Columbia Basin Project operations. The water quality in these lakes may fluctuate seasonally as water levels fluctuate.

5.1.4.2.3 Terrestrial Habitat

The County's urban populations are generally concentrated around and near the confluence of the Columbia and Snake rivers, and the terrestrial habitat within the shoreline jurisdictional zone throughout much of the County is rural and undeveloped or in agricultural use. Irrigated agricultural lands are prevalent throughout the western half of the County, with additional dryland agricultural use prevalent in the middle and northern area

of the County. The irrigated lands rely upon water from the Columbia Basin Project and, to a lesser extent, the Snake and Palouse rivers. On the eastern side of the County, agricultural development does not rely on water from the Columbia Basin Project, and consists mostly of dryland wheat cropping and hay for cattle. In most locations, these agricultural lands have replaced native shrub-steppe habitat. Agricultural lands provide increased biomass and primary productivity compared to the shrub-steppe community, but do not support native plants and wildlife communities, and are less effective at providing soil-stabilization services and wildfire control.

Undisturbed shrub-steppe habitat is dominated by native grasses and sagebrush, with an intact cryptogam crust (a thin layer of algae, moss, and lichen that indicates an undisturbed community), and contains mostly native shrubs (e.g., big sagebrush and bitterbrush) with a predominantly native grass understory. This habitat type, while negatively impacted by grazing, off-road vehicle use, and other disturbances, still provides significant function in terms of cover, food, and nesting habitat for many species of wildlife. Agricultural development, and to a lesser extent the development of urban areas, has resulted in loss of shrub-steppe habitat, habitat degradation, and fragmentation. Habitat fragmentation, through the building of roads, utility corridors, agricultural and urban development, and irrigation channels can affect terrestrial habitat. The remaining shrub-steppe habitat within the County provides many ecosystem services, including soil stabilization, wildfire moderation, overall biodiversity, and overall social or cultural functions for numerous people in terms of religious, spiritual, social, cultural, and recreational uses of these ecosystems.

Recommendations for preserving shrub-steppe habitat within the County include: limiting development footprints including agricultural land cover changes, particularly along the Snake and Palouse rivers; siting additional residential development to minimize the construction of road and utility corridors that may fragment shrub-steppe habitat; restricting vegetation clearing; keeping domestic animals out of sensitive species habitat; and limiting fencing to avoid barriers to native wildlife.

Riparian habitats are found in relatively narrow bands along the waterways in the County. Tree and shrub vegetation adjacent to the shoreline and overhanging streambanks is necessary for optimally functioning aquatic habitat, and the functions provided by

herbaceous riparian habitat with no tree or shrub canopy or overhanging vegetation are generally reduced in terms of food web support, thermal regulation, and soil stabilization. Riparian habitat adjacent to aquatic systems within the County can have limited or no tree or shrub vegetation due to hydrologic management regimes on the Columbia and Snake rivers, land use activities, natural geologic/environmental conditions, or a combination of these factors. Livestock grazing in certain locations, particularly on the Snake or Palouse River, has the potential to disturb riparian vegetation through long-term consistent use, which results in shoreline erosion and water quality impairment, and may create conditions suitable for colonization by invasive species.

Recreational use along the waterways of the County is generally well-managed, with several dedicated recreational access areas established along the primary waterways of the County that are managed by WDFW. In general, there are few overwater structures associated with recreational use on the waterways or lakes of the County.

Dam development along the Columbia and Snake rivers has altered the riparian areas associated with these waterbodies through water regime management and inundation of historical floodplains; resulting in disrupted sediment and wood recruitment and transport within the Columbia River basin. This is particularly evident in certain reaches of the Snake River where the floodplain is inundated and existing environmental conditions and geology of the canyon and bluffs now form shorelines that are unsuitable to support persistent riparian vegetation communities.

5.1.4.2.4 Condition Summary

Table 18 summarizes the key stressors affecting ecological functions provided by the specific aquatic and terrestrial systems within the County.

Table 18
Key Stressors Affecting Ecological Functions

Key Stressors	Columbia River		Palouse River		Snake River		Esquatzel Coulee		Lakes of Franklin County	
	Aquatic	Terrestrial	Aquatic	Terrestrial	Aquatic	Terrestrial	Aquatic	Terrestrial	Aquatic	Terrestrial
Recreational access – existing	X		X	X						
Recreational area – potential development			X	X	X	X			X	X
Agricultural use – irrigation	X		X	X	X	X	X	X	X	X
Agricultural use – livestock			X	X	X	X	X	X	X	X
Residential Development – existing shoreline development	X									
Residential development – land use change (e.g., development of new roads and utilities)		X	X	X		X	X	X	X	X
Residential Development – Future	X									
Hydrologic Management Regimes	X	X			X	X	X	X	X	

5.2 Reach Characterizations

Characterization of shoreline reaches and subreaches are provided in Appendix A. These reach and subreach characterization tables summarize the following items: existing physical conditions; characterizations and analyses for water quantity and sediment, water quality, and habitat and species; ecological functions analysis, including identifying functional conditions, stressors, and restoration and protection opportunities; preliminary shoreline environment designation considerations; existing public access and potential additional public access opportunities; and cumulative impact considerations.

Each reach was categorized overall in terms of ecosystem function. The categories include functioning, partially functioning, or impaired. The framework, definitions, and categories for this analysis were adapted from a system originally developed for Riparian Area Management guidelines proposed by BLM (Prichard 1998). This assessment is a relative assessment with some degree of calibration to reflect the overall conditions found in the County and cities.

The potential ecological function is defined as the highest ecological status a shoreline reach can attain given no development or management constraints, but does take into account the extent to which management (particularly water management) supports ecological function.

Ecological function is defined here as the degree of similarity between existing physical and biological conditions, and the potential ecological function of a site; the higher the ecological function, the closer the site is to potential. Potential, for this assessment, encompasses all the resources defined by the interaction of hydrology, vegetation, water quality, and erosion/deposition (soils), and aquatic and riparian habitat. For example, the potential of the hydrologic component includes the concept of a stream channel's physical characteristics (dimension, pattern, and profile) being within a "normal or usual" range (e.g., entrenchment, sinuosity, width, depth, and slope of the bankfull channel) as defined by landform and geomorphic stream type given current flows.

- **Functioning** – A state of resiliency that will allow a shoreline to hold together during high-flow events with a high degree of reliability. Over time, this resiliency allows an area to produce desired values, such as fish habitat, bird habitat, or forage.

Riparian-wetland areas that are not functioning properly cannot sustain these values over time and are susceptible to stochastic disturbances such as fire.

- **Partially functioning** – A state in which the ecological function of the shoreline is somewhat compromised by development or management trends, or is particularly susceptible to future degradation due to development, management, or ecological conditions. A partially functioning shoreline has some ability to recover through changes in management or the removal of identified stressors on ecological function.
- **Impaired** – A state in which the ecological functions of the shoreline are heavily compromised by development or management of the reach. An impaired reach has a low probability of recovery, through restoration, due to the degree of structural change to the shoreline, waterbody, and surrounding shorelands. Impaired shorelines can be functionally improved, but are unlikely to be self-sustainable.

5.3 Future Land Use and Development Potential

The County has limited development potential on the northeast side of the County along the Columbia River shoreline reaches 1 through 3. The Palouse and Snake River shorelines, Mesa Area Lakes Group, and northwest lake group shoreline are also expected to experience less future development pressure. Much of the shoreline in these areas is either owned by public agencies for parks or other public purposes, or they contain high banks unsuitable for development.

The most intense residential development within the County's shoreline is anticipated on the Columbia River Reach 4 within the Rural Shoreline Development land use designated area. The Eagle Lakes Group shoreline is mostly under private ownership and have the capacity to be developed in future based on the currently allowed zoning densities.

However, the future development can be impacted by the existence of steep slopes, as well as physical access to the site, or the site's access to utilities. This analysis has not taken into account the steep slope limitations for development potential, therefore, the future development potential could be less than what is being analyzed in this study.

5.3.1 Methodology

The future development potential was analyzed using existing County GIS data. GIS data used includes parcel, land ownership, existing land use, and zoning datasets. These datasets were overlaid on the reach map with the shoreline jurisdiction boundary. The overlaid map indicates parcels within the shoreline jurisdiction. Among these parcels, privately owned parcels were reviewed and analyzed for future development potential. In most cases, portions of the parcels fell within the shoreline. Such areas within shoreline were then measured using the County's online GIS mapping system (mapsifter). In some other instances, already subdivided and vacant lots were identified as developable land within the shoreline.

The undivided land within the shoreline was then calculated in order to get the number of developable lots. Allowed densities in the zoning districts were also taken into account to establish number of developable units.

5.3.2 Data Gaps

The analysis did not include an assessment of existing critical areas that would remove certain shoreline lands from being included in developable areas, such as areas with wetlands or steep slopes. Setbacks and other buffers were also not factored in the calculation, as these are applied at the time when development occurs. The analysis also did not address recreational improvements on public land.

5.3.3 Land Development Potential Summary

Table 19 indicates the future land development potential within the County's shoreline area. The purpose of the analysis is to estimate the level of potential development that may take place along shorelines within the planning timeframe, according to the existing land use and zoning designations. The analysis uses the existing GIS datasets provided by the County and existing development trends to provide a general overview of the future development potential, but not to dictate how the development should occur. Future development potential may vary from this analysis based on overall market conditions, property owner intentions, or other local or regional factors.

Table 19
Future Development Potential by Shoreline Reach

Reach	Area (acres)	Zoning	Development Constraints	Future Development Potential (No. of dwelling units)
Columbia River - Reach 1	627.15	Agricultural Production 20	Hanford Reach National Monument	0
Columbia River - Reach 2	167.47	Agricultural Production 20	Federal ownership of land, high bank, parallel road along the shoreline	3
Columbia River - Reach 3	124.08	Agricultural Production 20, Rural Residential 5, Rural Community	High bank, parallel road along the shoreline, agricultural use	4
Columbia River - Reach 4	133.17	Rural Community 1, Rural Community 5, Residential Suburban District 40, Residential Transition	Parallel road and easements along the shoreline, developed areas	70
Palouse River	373.87	Agricultural Production 40	Park and publicly owned lands that are less likely to be developed	4
Snake River - Reach 1	699.29	Agricultural Production 40	Mostly publicly owned lands that are less likely to be developed	0
Snake River - Reach 2	474.19	Agricultural Production 40	Mostly park and publicly owned lands that are less likely to be developed	0

Table 19
Future Development Potential by Shoreline Reach

Reach	Area (acres)	Zoning	Development Constraints	Future Development Potential (No. of dwelling units)
Snake River - Reach 3	602.76	Agricultural Production 40, Agricultural Production 20, Rural Residential 5	Some park and publicly owned land	18
Snake River - Reach 4	184.91	Agricultural Production 40, General Industrial District	Park easement and already developed areas	2
Esquatzel Coulee	847	Agricultural Production 20, Rural Community 1, Rural Community 5, and Rural Service District	Some public land, built-out areas	24
Mesa Area Lakes Group	646.26	Agricultural Production 20	Public ownership of land in part of the shoreline	19
Scootenev Reservoir Lake Group	1526.32	Agricultural Production 20	Public ownership of land in part of the shoreline	13
Eagle Lakes Group	988.30	Agricultural Production 20	Portion of shoreline under federal ownership	48
Wahluke Lakes Group	389.58	Agricultural Production 20	Public ownership of land in part of the shoreline	7

5.3.4 Preliminary Shoreline Environment Designation Considerations

The information in this report provides the foundation for developing the County's SMP. Information is organized by waterbodies and reaches to allow for SMP provisions tailored to local conditions found along shorelands. Goals, policies, and regulations will be established based on these conditions. Information on environment designations is discussed in this

section, as well as a preliminary discussion on how elements of the state classification system may apply to conditions in the County.

Environment designations are applied based on specific criteria, and include a purpose statement, a description of the classification criteria, management policies, and environment-specific regulations.

5.3.4.1 *State Recommended Classification System*

The state has identified a recommended classification system that can be used as a starting point in considering environment designations most applicable to the County and towns. The recommended classification system includes the following environment designations: high-intensity; shoreline residential; urban conservancy; rural conservancy; natural; and aquatic as described in WAC 173-26-211.

The purpose for each of these environment designations is described in WAC 173-26-211:

- **High-intensity** – "Provide for high-intensity water-oriented commercial, transportation, and industrial uses while protecting existing ecological functions and restoring ecological functions in areas that have been previously degraded."
- **Shoreline residential** – "Accommodate residential development and appurtenant structures that are consistent with this chapter. An additional purpose is to provide appropriate public access and recreational uses."
- **Urban conservancy** – "Protect and restore ecological functions of open space, floodplain and other sensitive lands where they exist in urban and developed settings, while allowing a variety of compatible uses."
- **Rural conservancy** – "Protect ecological functions, conserve existing natural resources and valuable historic and cultural areas in order to provide for sustained resource use, achieve natural floodplain processes, and provide recreational opportunities. Examples of uses include low-impact outdoor recreation uses, agricultural uses, aquaculture, low-intensity residential development, and other natural resource-based low-intensity uses."
- **Natural** – "Protect those shoreline areas that are relatively free of human influence or that include intact or minimally degraded shoreline functions intolerant of human

use. These systems require that only very low intensity uses be allowed in order to maintain the ecological functions and ecosystem-wide processes. Consistent with the policies of the designation, local government should include planning for restoration of degraded shorelines within this environment.”

- **Aquatic** – “Protect, restore, and manage the unique characteristics and resources of the areas waterward of the ordinary high-water mark.”

Local governments may also establish a different designation system or retain their current environment designations, provided these are consistent with the purposes and policies of WAC 173-26-211. Parallel environments can also be used where appropriate, with shorelands divided into different sections generally running parallel to the shoreline or along a physical feature such as a bluff. In applying environment designations, the state reminds local governments that they should ensure that existing shoreline ecological functions are protected with the proposed pattern and intensity of development and restoration potential for an area is considered (WAC 173-26-211).

5.3.4.2 Preliminary Considerations

Developing and applying environment designations in the County will come later in the SMP update process. In preparation for developing and applying environment designations, an initial description of shoreland areas with high-intensity, residential, conservancy and natural characteristics is described in Table 20. This initial description will provide a starting point for drafting environment designations, which will be applied at the reach level in the future. The listing of these areas under the high-intensity and other categories should not imply that this is what these areas will be designated in the SMP update process. Developing and applying environment designations in the County will occur with more detailed analysis of the information in this report, and input from the County Planning Commission, Ecology, and the public during the shoreline visioning process and other public forums.

Table 20
Preliminary Environment Designation Consideration

Shoreland Characteristics	Applicable Geographic Areas
High-intensity	<ul style="list-style-type: none"> • Industrial area in Pasco UGA (Snake River SR 4b) • Federal dams along the Snake River (Snake River SRs 1h and 3i) • Lyons Ferry Hatchery and State Park areas (Snake River SR 1a and Palouse River SR 1d) • Area around Windust Park (Snake River SR 2c) • State Park at Scooteney Reservoir
Residential	<ul style="list-style-type: none"> • Areas along Columbia River northwest of Pasco (Columbia River SRs 3c, 4c, and 4e)
Conservancy	<ul style="list-style-type: none"> • All other Columbia and Snake River reaches, and reaches around lakes/lake groups and Esquatzel Coulee¹
Natural	<ul style="list-style-type: none"> • Hanford Reach National Monument area (Columbia River Reach 1) • All islands (multiple reaches on Columbia and Snake rivers) • See also Conservancy

Note:

1. Some of these areas could also be candidates for Natural.

UGA= Urban Growth Area

6 PUBLIC ACCESS

A characterization of each shoreline's public access characteristics is provided in the related reach tables. Each table discusses existing public access features, identified public access improvements, and potential public access opportunities.

Public access within the County's shoreline includes boat launches, trails, parks, and similar water-oriented recreational facilities. The County contains shoreline public access opportunities in multiple parks along the Snake and Palouse rivers. Columbia Plateau Trail runs along the entire Snake River shoreline. It is located on the abandoned Burlington Northern Railroad right-of-way between East Pasco (Ice Harbor Dam) and Fish Lake through the counties of Franklin, Adams, Whitman, Lincoln, and Spokane ending near South Cheney (Washington State Parks Commission et al. 2006). Parks along Snake and Palouse rivers include Levey Landing Park, Big Flat Habitat Management Unit, Windust Park, and Palouse Falls State Park. Sacajawea State Park is located within the City of Pasco at the confluence of the Columbia and Snake rivers. Among other parks and open spaces, Scootene Park is located on the northern end, and Wahluke Slope Habitat Management Area is located on the northwest corner of the County. Most of these areas have boat launches, trails, or some passive recreation and public access opportunities.

6.1 Public Access Goals

The Franklin County Comprehensive Plan (Franklin County 2008) includes goals and policies for shoreline public access. The County Wide Planning Policy's Open Space and Recreation policy intends to, "increase public access to natural resource lands and water, and develop parks."

The Rural Shoreline Development Goal 1 ensures that "access to the shoreline is available in accordance with the provision of the Shoreline Management Act." Related policy and strategy state as follows:

- **Policy 1** – An adopted pedestrian walkway or trail plan should identify public access points to the shoreline.
- **Strategy 1** – Public access corridors should be established at the time of subdivision

Other agencies' public access goals related to shoreline are described below.

6.1.1 U.S. Army Corps of Engineers

USACE's environmental operating principles were developed to ensure USACE missions include totally integrated sustainable environmental practices. The Walla Walla district of USACE operates and manages dams on Snake River. It provides a variety of recreational opportunities within its management areas. Currently, no public lands are licensed to state or local park agencies.

6.1.2 U.S. Fish and Wildlife Service

USFWS prioritizes protection of biological and cultural resources. Goal 5 of the Columbia National Wildlife Refuge (CNWR) Comprehensive Conservation Plan (CNWR and USFWS 2011) is to, "provide access and opportunities for high-quality recreation compatible with resource protection." The objective of providing general public access would be implemented through the following strategies:

- Monitor visitor use patterns and identify unused parking lots for closure.
- Maintain horseback riding on the refuge on roads open to vehicular traffic.
- Maintain bicycle riding on the refuge on roads open to vehicular traffic.
- Implement and evaluate seasonal openings of Marsh Units I and IV for public access to protect migrating sandhill cranes (*Grus canadensis*) and waterfowl.
- Provide general public access for activities like hiking, wildlife observation, and fishing, exclusive of hunting.
- Provide access for hunting in some form (different areas will have different seasons and species hunted).

According to the plan, wildlife refuges would be open and available to the public for its use and enjoyment whenever possible and when compatible with resource protection. The USFWS, "makes a special effort to provide wildlife-dependent public use opportunities across the NWRs." The selected alternative of the CNWR intends to keep some of the USFWS land in this management area open to public year-round. The CNWR area is intended to stay open to public from March 1 to September 30 each year (CNWR 2011).

6.1.3 *Hanford Reach National Monument*

The Hanford Reach National Monument was protected by a Presidential proclamation in 2000. The key purpose of the monument is to protect the area's special landscape and resources. The monument's goals relating to public access include that public access:

- Be compatible with resource protection, provide a rich variety of educational and interpretive opportunities for visitors to gain an appreciation, knowledge, and understanding of the monument
- Be compatible with resource protection, provide access and opportunities for high quality recreation
- Protect the natural visual character and promote the opportunity to experience solitude in the monument.

The proclamation also identified multiple resource protection mechanisms that prohibit off-road vehicle use and grazing (USFWS 2008).

6.1.4 *Washington State Department of Fish & Wildlife*

WDFW's vision for Lands 20/20 (WDFW 2005) intends to offer all Washington citizens, "an opportunity to access and appreciate this state's fish and wildlife." Recreational uses of land are consistent with WDFW's land policy for providing outdoor recreation opportunities when they, "don't threaten fish and wildlife or degrade the habitats that support them." WDFW intends to continue providing wildlife viewing opportunities.

6.1.5 *Washington State Parks and Recreation*

The Washington State Parks and Recreation applies the following land classification systems to its parks and recreation areas:

- Recreational areas for high-intensity outdoor recreational use
- Resource recreation for high-intensity outdoor recreational use
- Natural areas for preservation, restoration, and interpretation of natural processes
- Heritage areas for preservation, restoration, and interpretation of unique or unusual archaeological, historic, scientific, and/or cultural features

- Natural forest areas for preservation, restoration, and interpretation of natural forest processes
- Natural area preserves designated for preservation of rare or vanishing flora, fauna, geological, natural historic, or similar features of scientific or educational value

Columbia Plateau Trail recreational resource management approach includes the following objectives related to public access:

- Provide for and encourage opportunities for education, interpretation, and understanding of natural, cultural, and historic resources related to the trail and past uses of the trail corridor by providing interpretive signage and viewpoints at appropriate locations to identify and explain resources in the trail corridor
- New trailheads to be established in specific locations
- Improve campsite facilities
- Minimize trail use conflict and improve safety
- Protect private properties from public access
- Encourage non-motorized trail connections to other trails such as Sacajawea State Park

6.1.6 Washington State Department of Natural Resources

WDNR allows public access on WDNR-owned land. The management of WDNR land's recreation and public use is guided as follows:

- (a) The department may limit any recreation activity or public use on department-managed lands to:
 - (i) Protect public safety, natural resources, or other property.
 - (ii) Execute its management and administrative obligations if any recreation activities or public use unreasonably interferes with the department's ability to carry out those obligations.
- (b) All persons shall comply with any department-posted restrictions that limit recreational activities (WAC 332-52-100)

7 INFORMATION SOURCES, ASSUMPTIONS, AND LIMITATIONS

This document is based on the best information available to the County at the time this document was produced. This information was obtained from a variety of sources and was collected and prepared for a variety of different purposes. The information was collected over a long time period; however, a substantial effort was made to use the most accurate and current information available.

Existing data, reports, and information used for the shoreline inventory are shown in the reference section. Generally, the documents used include: the County's comprehensive plan and municipal code; USFWS, and WDFW subbasin and habitat conservation plans; historical references; and scientific literature on ecological functions. GIS data illustrated in the map folio includes information on hydrology, soils, topography, vegetation, land cover, priority habitat, species concentrations, and other features.

This report relied largely on GIS data and remotely sensed imagery. Integrating various GIS layers together into map folio projects often resulted in polygon boundary discrepancies. Rectification of these discrepancies was only conducted for layers and geographic locations most relevant to the SMP update. For example, boundaries for zoning or land use designations do not always match an identified OHWM. The identified shoreline jurisdiction areas are only an approximation for purposes of updating the SMP for the County. Precise OHWM delineation and associated shoreline jurisdiction boundaries will be determined on a project-by-project basis and based on site-specific analysis during the proposal development application and review process.

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