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MEMORANDUM

To:	Irene Whipple, Ferry County Planning Director, Chris Meng, City of Republic Public Works Supervisor, Ferry County and Jeremy Sikes, Washington State Department of Ecology	**Date:**	June 5, 2014
From:	Ben Floyd, Anchor QEA, LLC	**Project:**	141067-01.01
Re:	Ferry County Preliminary Draft Shoreline Determination		

INTRODUCTION

The purpose of this memorandum is to document the efforts taken to preliminarily identify shoreline jurisdiction waterbodies in Ferry County and the City of Republic (Coalition). An additional purpose is to develop a GIS-based dataset that spatially approximates the location of the ordinary high water mark (OHWM), as defined in the Washington Administrative Code (WAC) (Section 172-22-030) for those shorelines in the County and City meeting the definition of Shorelines of the State in the Revised Code of Washington (RCW) Section 90.58.030. The shoreline jurisdiction waterbodies and the associated dataset will be used for planning-level analysis during the development of the Coalition Shoreline Master Program (SMP) Update. This dataset will also serve as a reference for site-specific implementation of the SMP going forward; however, for individual decisions, site-specific surveys of the OHWM may be required.

STUDY AREA

Ferry County is located in the northeastern portion of Washington and encompasses a total area of 2,257 square miles (5,846 square kilometers). The Colville Indian Reservation encompasses 1,079 square miles (2,794 square kilometers; 47.8 percent) of the southern portion of Ferry County. Private lands held in fee ownership on the Reservation that are along shoreline jurisdiction waterbodies potentially fall under County jurisdiction, as such entire waterbodies (streams and lakes) were included in shoreline jurisdiction, as applicable, even where they are on the Reservation. Of the 1,178 square miles (3,051 square kilometers) in the study area, 1,124 square miles (2,912 square kilometers) are land and 54 square miles (139 square kilometers; 4.6 percent) are water. Ferry County is bordered by the Canadian

Province of British Columbia to the north, Stevens County to the east, Lincoln County to the south and southeast, and Okanogan County to the west.

DEFINITION OF SHORELINE JURISDICTION

The Washington State Shoreline Management Act (SMA; RCW 90.58) defines the criteria for waterbodies under shoreline jurisdiction. The shoreline jurisdiction is the geographic area where the SMA applies and includes all Shorelines of the State and Shorelands, as defined by RCW 90.58.030. See Table 1 for a summary of definitions for areas included within a shoreline jurisdiction.

Table 1
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)	• Those lands extending landward for two hundred feet in all directions as measured on a horizontal plane from the ordinary high water mark (OHWM) • Floodways and contiguous floodplain areas landward two hundred feet from such floodways • All wetlands and river deltas associated with the streams, lakes, and tidal waters which are subject to the provisions of this chapter; the same to be designated as to location by the Department of 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: (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 twenty acres in size and wetlands associated with such small lakes
Shorelines of Statewide Significance[1] (RCW)	The natural rivers or segments thereof as follows: • Downstream of a point where the annual flow is measured at two hundred cubic feet per second or more • 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.
RCW = Revised Code of Washington
WAC = Washington Administrative Code

SHORELINES CURRENTLY DESIGNATED IN FERRY COUNTY

The WAC 173-18-140, 173- 20-220, and 173-20-230 list Lakes and Streams of Statewide Significance, Shorelines of the State, and Shorelines of Statewide Significance designated by statute in Ferry 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). The streams designated in Ferry County as Streams of Statewide Significance are summarized in Table 2.

Table 2
Streams of Statewide Significance per WAC 173-18-140

Stream Name	Legal Description	Estimated Length (miles)
Columbia River	All of Columbia River (Franklin D. Roosevelt Lake) within Ferry County is under federal jurisdiction	98.8
Kettle River	From the United States-Canada border (Sec. 3, T40N, R32E) downstream to said border (Sec. 3, T40N, R34E) returning to the United States (Sec. 2, T40N, R36E) right bank only downstream to (Sec. 20, T38N, R37E), excluding all Colville National Forest lands. The flow exceeds 200 cfs MAF at United States-Canada boundary	62.9

Notes:
cfs = cubic feet per second
MAF = mean annual flow
WAC = Washington Administrative Code

Five streams are listed in WAC 173-18-140 as Shorelines of the State but not Streams of Statewide Significance. These streams are listed in Table 3.

Table 3
Streams as Shorelines of the State per WAC 173-18-140

Stream Name	Legal Description	Estimated Length (miles)
Boulder Creek	From the Colville National Forest boundary (Sec. 36, T39N, R36E) downstream to mouth at Kettle River and Stevens County line (same section)	1.0
Curlew Creek	From the confluence of Curlew Creek and St. Peter Creek (Sec. 11, T38N, R33E) downstream to Kettle River (Sec. 14, T39N, R33E)	6.3
Sanpoil River	From the confluence of Sanpoil River and O'Brien Creek (Sec. 5, T36N, R33E) downstream to federal boundary (Sec. 12, T35N, R32E)	10.4
Toroda Creek	From the Intersection of Nickolson Creek and Toroda Creek (Sec. 30, T40N, R32E) downstream to mouth at Kettle River near Toroda (Sec. 27, same township)	3.7
Sherman Creek	From the Colville National Forest boundary (Sec. 30, T36N, R37E) downstream to mouth at Columbia River (Sec. 27, T36N, R37E)	5.0

Note:
WAC = Washington Administrative Code

There are no lakes specifically listed in WAC 173-20-230 as meeting the criteria for Lakes of Statewide Significance in Ferry County.

WAC 173-20-220 identifies three lakes that are Shorelines of the State. Table 4 lists the lakes that fall under shoreline jurisdiction (and their acreage) according to WAC 173-20-220.

Table 4
Lakes under Shoreline Jurisdiction per WAC 173-20-220

Lake Name	Acreage in Ferry County
Mud Lake	23.0
Sanpoil Lake	27.7
Curlew Lake	869.6

AVAILABLE DATA

Anchor QEA received and downloaded GIS-format datasets from Ferry County, the U.S. Geologic Survey (USGS), the U.S. Department of Agriculture (USDA), the U.S. Fish and Wildlife Service (USFWS), and the Washington State Department of Ecology (Ecology) containing information from a variety of sources about the waterbodies and potential

shorelands within Ferry County. Anchor QEA has reviewed and appended the existing datasets to identify those waterbodies that meet the definition 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 sources primarily relied on the following data:

- Designated streams named in WAC 173-18-140
- Designated lakes named in WAC 173-20-220 and WAC 173-20-230
- 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 (NHD)
- USDA National Agriculture Imagery Program 2013 imagery (USDA 2013)
- Google Earth historical aerial imagery
- USFWS National Wetland Inventory
- Federal Emergency Management Agency flood insurance rate maps

IDENTIFICATION OF SHORELAND JURISDICTION

Anchor QEA reviewed and classified the accuracy of the OHWM represented in the USGS's NHD area, flowline, and waterbody datasets, as well as the Ecology-suggested shoreline polygon. There were significant variations in the accuracy related to differences in the sources of data. In many cases, recent and historical aerial imageries were used to determine which of the available datasets provided the most accurate representation of the actual shoreline locations.

Identification of Stream Ordinary High Water Mark

Anchor QEA used Ecology's suggested locations to determine an initial upstream extent of the shoreline jurisdiction of several streams. The suggested locations are based on WAC 173-18-140. Because the statute excludes Colville National Forest land, data were reviewed to determine if extents should be adjusted. Limited gage data are available, so information from the USGS report developed for determining upstream boundary points in Ferry County (Kresch 1998) was utilized.

The Kresch report developed a regression equation that estimates mean annual flow based on drainage area and mean annual precipitation. The regression equation is as follows:

$$Q = 0.00103(P)1.81(A)1.04 \quad (1\text{-}1)$$

where:

Q = Mean annual flow (in cubic feet per second [cfs]),
P = Mean annual precipitation (in inches), and
A = Basin drainage area (in square miles).

The regression equation was used to estimate mean annual flow for streams that do not have gage data available (all streams except the Columbia River, West Fork Sanpoil River, and Kettle River). Mean annual precipitation and basin drainage area were developed using USGS StreamStats for Washington (USGS 2014a). Table 5 lists the data source used for mean annual flow threshold analysis for the streams listed in WAC 173-18-140.

Table 5
Data Source for Mean Annual Flow -
Streams Under Shoreline Jurisdiction per WAC 173-18-140

Stream Name	Source
Columbia River	USGS 2014b
Kettle River	USGS 2014c
West Fork Sanpoil River	USGS 2013
Boulder Creek	USGS 2014a
Curlew Creek	USGS 2014a
Sanpoil River	USGS 2014a
Toroda Creek	USGS 2014a
Sherman Creek	USGS 2014a

In addition to the streams listed in WAC 173-18-140, the Kresch report listed seven additional water bodies in Ferry County that meet the 20 cfs mean annual flow minimum threshold. All seven of these were included in the analysis. One of these water bodies, West Fork Sanpoil River, was listed in the Kresch report as meeting the requirements to be considered a Shoreline of Statewide Significance. Upon review, West Fork Sanpoil River has

a drainage area above 300 square miles from its confluence of Gold Creek to the mouth and should be included in the Shorelines of Statewide Significance.

Table 6 lists the mean annual precipitation, drainage area, and location for each of the 12 streams analyzed using StreamStats and the Kresch regression equation (five from WAC 173-18-140 and seven from the Kresch report). Locations were iteratively analyzed to determine the estimated locations where the mean annual flow thresholds of 20 cfs are reached. Table 6 also lists stream points immediately upstream of the proposed location (where appropriate) to show that upstream areas are below the 20 cfs threshold. These streams proposed not to be included are italicized in Table 6.

Table 6
Streams Analyzed Using StreamStats and Kresch Regression Equation

Stream Name	Location	Mean Annual Precipitation (in)[1]	Drainage Area (sq mi)[1]	Mean Annual Flow (cfs)[2]
Boulder Creek	At North Fork and South Fork confluence	26.0	99.4	44.8
North Fork Boulder Creek[3]	*Above North Fork and South Fork confluence*	*25.2*	*30.5*	*12.4*
South Fork Boulder Creek	Downstream of U S Creek confluence	28.5	38.5	19.7
South Fork Boulder Creek[3]	*Upstream of U S Creek confluence*	*29.2*	*24.0*	*12.6*
Curlew Creek	North end of lake	20.9	103.7	31.5
Curlew Creek[3]	*South end of lake*	*22.9*	*41.5*	*14.4*
Sanpoil River	Below Granite Creek	21.3	129.5	41.1
Sanpoil River[3]	*Above Granite Creek*	*21.3*	*57.9*	*17.8*
West Fork Sanpoil River	At county line	21.6	234.3	78.1
Toroda Creek	At county line	19.8	135.9	37.9
Sherman Creek	Below South Fork confluence	26.1	75.7	34.0

Sherman Creek[3]	*Above South Fork confluence*	*26.2*	*41.2*	*18.2*
South Fork Sherman Creek[3]	*Above confluence*	*26.0*	*34.4*	*14.9*
Deadman Creek	Below unnamed creek (SW ¼, NW ¼, Sec. 23, T37N, R36E)	24.6	52.0	20.7
Deadman Creek[3]	*Above unnamed creek (SW ¼, NW ¼, Sec. 23, T37N, R36E)*	*24.8*	*49.4*	*19.9*
Granite Creek	Below North Fork confluence	21.6	63.2	20.0
Hall Creek	Below Grizzly Creek	25.3	49.4	20.6
Hall Creek[3]	*Above Grizzly Creek*	*25.4*	*46.0*	*19.3*
Ninemile Creek (within Colville Indian Reservation)	Below South Fork confluence	20.1	91.6	25.8
Ninemile Creek (within Colville Indian Reservation)[3]	*Above South Fork confluence*	*20.3*	*62.6*	*17.7*
Stranger Creek	Below Cornstalk Creek	22.8	65.1	22.7
Stranger Creek[3]	*Above Cornstalk Creek*	*23.1*	*51.9*	*18.4*

Notes:
1. From StreamStats (USGS 2014a)
2. Calculated from Kresch regression equation (Kresch 1998)
3. The stream at this point and upstream is assumed to not be included in shoreline jurisdiction because it is below the 20 cfs threshold (italicized)
in = inches
sq mi = square miles
cfs = cubic feet per second

In addition to the streams listed in Table 6, 20 other streams (Catherine Creek, La Fleur Creek, Little Boulder Creek, East Deer Creek, Tonata Creek, Emanuel Creek, Long Alec Creek, West Deer Creek, Trout Creek, Lambert Creek, Saint Peter Creek, Barnaby Creek, O'Brien Creek, Scatter Creek, Thirteenmile Creek, Ninemile Creek (outside of Colville Indian Reservation), Twentyone Mile Creek, Twentythree Mile Creek,

Wilmont Creek, and Lynx Creek) were analyzed based on a visual review that the drainage area may be large enough to approach the mean annual flow threshold. Through a StreamStats analysis, it was calculated that none of the 20 additional streams analyzed had a mean annual flow that exceeded the shoreline jurisdiction threshold.

Identification of Lake Ordinary High Water Mark

The USGS NHD Waterbody and Ecology-suggested polygon datasets were primarily evaluated to identify the shoreline jurisdiction. 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, from 2005 to 2013 (Google Earth 2014). The aerial imagery analysis verified the continued existence of lakes represented in the data as being greater than 20 acres and lakes that decreased in size to less than 20 acres. The analysis recommended all three lakes identified in the current WAC 173-20-240 list be maintained (Mud Lake, Sanpoil Lake, and Curley Lake) and nine lakes be added (Twin Lakes, Ferry Lake, Lake Ellen, Swan Lake, Elbow Lake, Camille Lake, Bourgeau Lake, Round Lake, and La Fleur Lake).

DETERMINATION OF THE PRELIMINARY SHORELINE JURISDICTION

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-feet buffer; if so, they were included.

RESULTS

The current Ferry County SMP includes two Shorelines of Statewide Significance and five additional streams that are Shorelines of the State. Anchor QEA's analysis appends two Shorelines of Statewide Significance and seven other streams to this list, resulting in four rivers categorized as Shorelines of Statewide Significance and 12 streams that are Shorelines of the State. Two Shorelines of Statewide Significance became Shorelines of the State at upstream locations where their drainage areas are no longer greater than the 300-square-mile threshold. Revisions to shoreline lengths are summarized in Tables 7 and 8.

Table 7
Shorelines of Statewide Significance to be Included in the SMP Update

Stream Name	Included in Current Ferry County SMP	Total Length Proposed Shoreline
Columbia River	Yes	98.8 miles
Kettle River	Yes	62.9 miles
West Fork Sanpoil River	No	3.1 miles
Sanpoil River	No	47.2 miles

Notes:
Entire length of Columbia River along Colville Indian Reservation included
SMP = Shoreline Master Program

Table 8
Additional Shorelines of the State to be Included in the SMP Update

Stream Name	Included in Current Ferry County SMP	Total Length Proposed Shoreline
Boulder Creek	Yes	2.6 miles
South Fork Boulder Creek	No	10.3 miles
Curlew Creek	Yes	10.7 miles
Sanpoil River	Yes	16.7 miles
West Fork Sanpoil River	No	5.6 miles
Toroda Creek	Yes	4.6 miles
Sherman Creek	Yes	9.3 miles
Deadman Creek	No	5.0 miles
Granite Creek	No	4.0 miles
Hall Creek	No	37.0 miles
Ninemile Creek	No	13.1 miles
Stranger Creek	No	10.2 miles

Note:
SMP = Shoreline Master Program

The additional Shorelines of Statewide Significance in Table 7 were not included in Table 2 because the additional streams (Sanpoil and West Fork Sanpoil rivers) are located on Colville Indian Reservation land that was not included in WAC 173-18-140. Additional Shorelines of the State listed in Table 8 were not included in Table 3 because the additional streams are located either on Colville Indian Reservation or Colville National Forest land that was not included in WAC 173-18-140.

Some water bodies had upstream extents that are different in this shoreline jurisdiction update compared to what was previously delineated. Upstream extents are based on the results in Table 6 and analyses described previously and may differ from previous analyses.

The current Ferry County SMP also includes three lakes; Anchor QEA's analysis has appended additional nine lakes, resulting in the 12 lakes as shown in Table 9.

Table 9
Shoreline Jurisdiction Lakes to be Included in the SMP Update

Lake Name	Included in Current Ferry County SMP	Total Area Proposed Shoreline (acres)
Mud Lake	Yes	24
Sanpoil Lake	Yes	24
Curlew Lake	Yes	860
Ferry Lake	No	20
Lake Ellen	No	75
Swan Lake	No	54
Twin Lakes	No	1,661
Elbow Lake	No	56
Camille Lake	No	26
Bourgeau Lake	No	37
Round Lake	No	83
La Fleur Lake	No	46

Note:
SMP = Shoreline Master Program

REFERENCES

Google Earth, 2014. Cited: April 15, 2014. Available from: http://www.google.com/earth/.

Kresch, David L., 1998. *Determination of Upstream Boundary Points on Northeastern Washington Streams and Rivers Under the Requirements of the Shoreline Management Act of 1971.* U.S. Geological Survey Water-Resources Investigation Report 98-4160. Tacoma, Washington. 1998.

USDA (U.S. Department of Agriculture), Farm Service Agency, 2013. National Agriculture Imagery Program (NAIP): 2013 data [Ferry County, WA dataset]. Cited: April 15, 2014. Available from: http://datagateway.nrcs.usda.gov/GDGOrder.aspx.

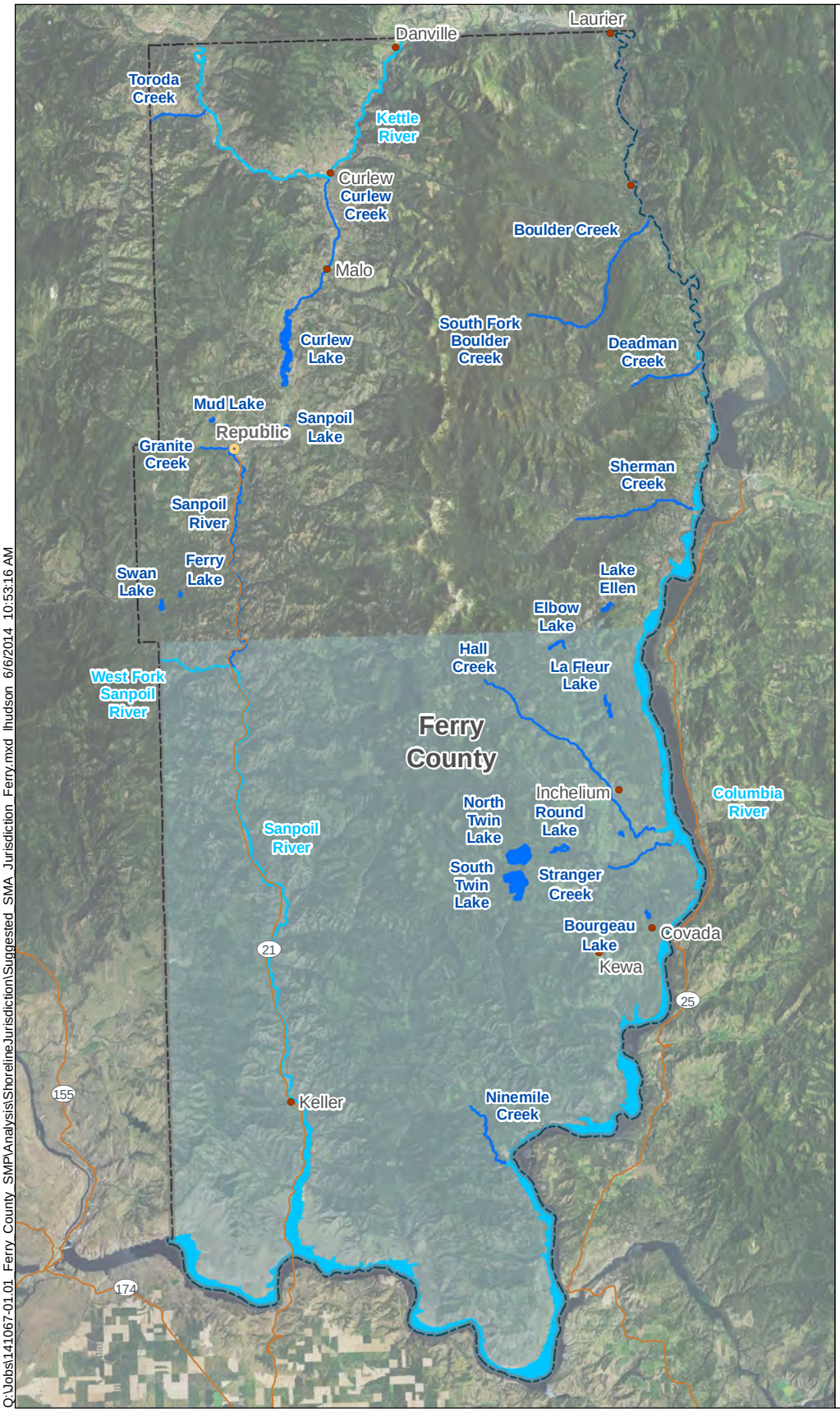
USGS (U.S. Geological Survey), 2014a. StreamStats for Washington. Cited: April 2014. Available from: http://water.usgs.gov/osw/streamstats/Washington.html.

USGS, 2014b. Water-resources data for the United States, Water Year 2013: U.S. Geological Survey Water-Data Report WDR-US-2013, site 12399500. Available from: http://wdr.water.usgs.gov/wy2013/pdfs/12399500.2013.pdf.

USGS, 2014c. Water-resources data for the United States, Water Year 2013: U.S. Geological Survey Water-Data Report WDR-US-2013, site 12401500. Available from: http://wdr.water.usgs.gov/wy2013/pdfs/12401500.2013.pdf.

USGS, 2013. Water-resources data for the United States, Water Year 2013: U.S. Geological Survey Water-Data Report WDR-US-2012, site 12434110. Available from: http://wdr.water.usgs.gov/wy2012/pdfs/12434110.2012.pdf.

ATTACHMENT A
PRELIMINARY SHORELINE JURISDICTION FIGURE



LEGEND

- Populated Place
- County Seat
- Highways
- Ferry County Boundary
- Shorelines of Statewide Significance
- Suggested Extents for Shoreline Waterbodies
- Colville Indian Reservation

NOTES:
1. This information is to be used for planning purposes only. Data are displayed as is and without any guarantee of accuracy or completeness.
2. Aerial image courtesy of USDA NAIP (2013).

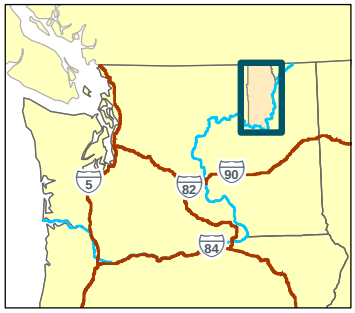


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Figure 1
Preliminary Shoreline Jurisdiction Extents
Ferry County Shoreline Master Program
Ferry County, Washington