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# TRIBUTARY BARRIERS PHOTOGRAPHS

2008 - 2018



May 2018



Public Utility District No. 1 of Chelan County  
Wenatchee, Washington

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## INTRODUCTION

This report is intended to document existing conditions occurring at the mouths of major tributaries to Lake Chelan, specifically First, Fish, Gold, Grade, Mitchell, Prince, Railroad, Safety Harbor, and Twenty-five Mile creeks. Monitoring to determine the presence of barriers to upstream fish passage in these tributaries is a requirement of the Lake Chelan Fishery Plan (LCFP), Article 404. The LCFP was approved by the Federal Energy Regulatory Commission (FERC) on December 4, 2007. Photographs of tributary barrier mouths are taken annually in late March during the time when Lake Chelan is usually at its lowest elevation in order to observe, thoroughly, any potential barriers to upstream fish passage.

Barriers to upstream fish passage were identified in seven of the nine study tributaries to Lake Chelan during relicensing baseline studies conducted in 1999. Of the nine tributaries identified in the previous paragraph, only First Creek and Twenty-five Mile Creek did not exhibit one or more of a water depth, water velocity, and gradient barrier to upstream fish passage. Barriers to upstream fish passage were not identified in previous licensing studies. The presence of barriers in 1999 was attributable to Lake Chelan lake level operation during the second license. Chelan PUD committed to the goal of ensuring channel integrity sufficient to maintain upstream and downstream fish passage between the lake and the tributaries through either mechanical treatment or lake level operation contained in the current license. Mechanical treatment of passage barriers was conducted in Gold and Mitchell creeks in 2011. Rock-weir structures were constructed to create step-pools in order to provide upstream fish passage between elevations 1086 feet and 1100 feet. Photographs documented that the other tributaries were able to “heal” themselves by barriers being removed during high stream flow events associated with current license lake level operations that occurred after 2008 surveys.

After Gold Creek and Mitchell Creek barriers were treated mechanically, the LCFP requires monitoring of all tributary mouths to evaluate whether they are accessible by spawning fish. Original monitoring efforts described in the LCFP involved surveying the tributary mouths on an as-needed basis to identify formation of new depth, velocity, or gradient barriers. The Lake Chelan Fishery Forum (LCFF) recommended annual monitoring consisting of photo-documentation of tributary mouth conditions. If photographs identified potential new barriers to upstream passage, then methods used to identify barriers initially during relicensing studies would be employed to determine, more rigorously, whether barriers exist, and assist with identifying treatment recommendations.

The photographs contained in this report document tributary mouth conditions in all nine tributaries beginning in 2008 running through the current year. Photographs of Grade Creek have only been taken intermittently since 2009 because the LCFF determined that Grade needed mechanical treatment, due to its short and very steep mouth entering the lake, but, the LCFF could not develop an acceptable mechanical treatment alternative similar to those performed at Gold and Mitchell creeks. The LCFF felt that just leaving Grade Creek to natural processes was the only alternative available to remove the barriers to upstream fish passage at low lake elevations identified in relicensing studies.

Tributary locations are shown in Figure 1.

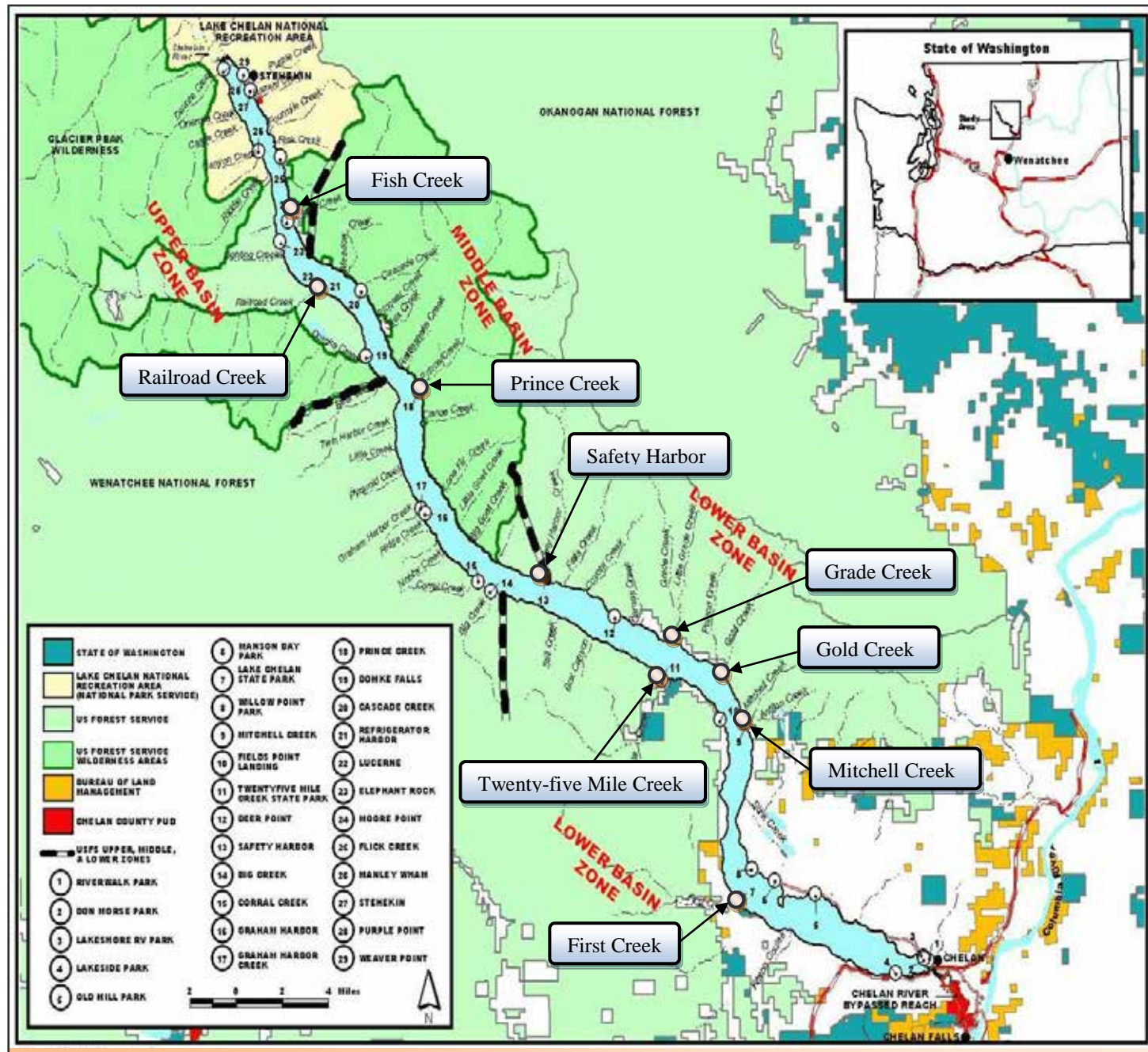


Figure 1: Tributary locations

## **FIRST CREEK**





2008 First Creek: Elevation 1082.9



2013 First Creek: Elevation 1086.85



2014 First Creek: Elevation 1086.16



2015 First Creek: Elevation 1092.06





2016 First Creek: Elevation 1087.8



2017 First Creek: Elevation 1086.0



2018 First Creek: Elevation 1085.84

## **FISH CREEK**





2008 Fish Creek: Elevation 1082.9



2009 Fish Creek: Elevation 1087.6



2011 Fish Creek: Elevation 1087.48



2013 Fish Creek: Elevation 1086.85





2014 Fish Creek: Elevation 1086.16



2015 Fish Creek: Elevation 1092.06



2016 Fish Creek: Elevation 1087.8



2017 Fish Creek: Elevation 1086.0

## **GOLD CREEK**





2008 Gold Creek: Elevation 1082.9



2009 Gold Creek: Elevation 1087.6



2011 Gold Creek: Elevation 1087.48



2013 Gold Creek: Elevation 1086.85





2014 Gold Creek: Elevation 1086.16



2015 Gold Creek: Elevation 1092.06



2016 Gold Creek: Elevation 1087.8



2017 Gold Creek: Elevation 1086.0



2018 Gold Creek: Elevation 1085.84

## **GRADE CREEK**





2008 Grade Creek: Elevation 1082.9



2009 Grade Creek: Elevation 1087.6



2017 Grade Creek: Elevation 1087.8



2018 Grade Creek: Elevation 1085.84



## **MITCHELL CREEK**



2008 Mitchell Creek: Elevation 1082.9



2009 Mitchell Creek: Elevation 1087.6



2011 Mitchell Creek: Elevation 1087.48



2013 Mitchell Creek: Elevation 1086.85





2014 Mitchell Creek: Elevation 1086.16



2015 Mitchell Creek: Elevation 1092.06



2017 Mitchell Creek: Elevation 1086.0



2018 Mitchell Creek: Elevation 1085.84

## **PRINCE CREEK**





2008 Prince Creek: Elevation 1082.9



2009 Prince Creek: Elevation 1087.6



2011 Prince Creek: Elevation 1087.48



2013 Prince Creek: Elevation 1086.85





2014 Prince Creek: Elevation 1086.16



2015 Prince Creek: Elevation 1092.06



2016 Prince Creek: Elevation 1087.8



2017 Prince Creek: Elevation 1086.0

## **RAILROAD CREEK**





2008 Railroad Creek: Elevation 1082.9



2014 Railroad Creek: Elevation 1086.16



2015 Railroad Creek: Elevation 1092.06



2016 Railroad Creek: Elevation 1087.8





2017 Railroad Creek: Elevation 1086.0

## **SAFETY HARBOR**



2008 Safety Harbor: Elevation 1082.9



2009 Safety Harbor: Elevation 1087.6



2011 Safety Harbor: Elevation 1087.48



2013 Safety Harbor: Elevation 1086.85





2015 Safety Harbor: Elevation 1092.06



2016 Safety Harbor: Elevation 1087.8



2017 Safety Harbor: Elevation 1086.0



2018 Safety Harbor: Elevation 1085.84

## **TWENTY-FIVE MILE CREEK**





2008 Twenty-five Mile Creek: Elevation 1082.9



2013 Twenty-five Mile Creek: Elevation 1086.85



2014 Twenty-five Mile Creek: Elevation 1086.16



2015 Twenty-five Mile Creek: Elevation: 1092.06





2016 Twenty-five Mile Creek: Elevation 1087.8



2017 Twenty-five Mile Creek: Elevation 1086.0



2018 Twenty-five Mile Creek: Elevation 1085.84