

Chapter 3



PACIFIC COAST DRAINAGES

WRIA 20

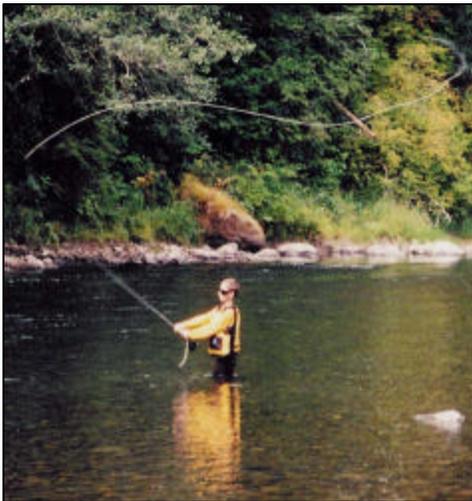
- ***Quillayute River***
 - ◊ ***Dickey River***
 - ◊ ***Sol Duc River & Tributaries***
 - North Fork, South Fork, Alcee, Bear, SF Bear,***
 - Beaver, Camp & Lake Creeks, Goodman & Tom Creeks***
 - ◊ ***Bogachiel River***
 - ◊ ***Calawah River***
 - South Fork, North Fork, Sitkum***
- ***Ozette River Watershed***
 - Ozette & Big Rivers, Coal, Crooked, Siwash, South & Umbrella Creeks & Ozette Lake***
- ***Sooes Basin***

**Streams & Rivers
by Watershed**

State of the Waters ~ Quillayute River Watershed:

Quillayute, Dickey, Sol Duc, Bogachiel & Calawah Rivers & Tributaries

General Description:



Fly fishing on the Sol Duc

The Quillayute River is a broad, low-gradient river, extending for 5.6 miles in the lowest reaches of the greater Quillayute watershed—the largest basin in Clallam County. Four large river basins feed into the Quillayute River and comprise the majority of the watershed; these are the Dickey, Sol Duc, Bogachiel and Calawah Rivers. The Dickey River sub-basin, containing Dickey Lake, is 108 square miles, entering the Quillayute River at RM 1.6. The Sol Duc River sub-basin (226 square miles) contains Lake Pleasant, developed with residential and recreation areas. Hwy. 101, the major transportation route for the Western Olympic Peninsula, follows this scenic river valley. The confluence of the Sol Duc River and the Bogachiel River (sub-basin area 162 square miles) is located at the upper extent of the Quillayute River at RM 5.6. The City of Forks sits on the Forks Prairie near the confluence (forks) of the Calawah River with the Bogachiel, around RM 10. Mill Creek is a small tributary to the Bogachiel that flows through the City. Groundwater from the Forks Prairie aquifer supports local development and the City. The Calawah River sub-basin has an area of 133 square miles. Land ownership in the Quillayute watershed includes Olympic National Forest, Olympic National Park, the Quileute Tribe (around the Quillayute River mouth), Washington Dept. of Natural Resources, Clallam County, City of Forks, and private landowners.

Primary human activities in all sub-basins of this watershed include: forestry, tourism, and residential and commercial development, the majority of which is in the City of Forks. Some of the known impacts of clear-cutting timber and road development (such as has been practiced in this watershed) include increased runoff (causing erosion and movement of dirt and soil into streams and estuaries), and increased streamflow (which scours out existing channels). Some roads in this watershed closely parallel the streams and act as dikes, disconnecting potential off-channel habitat and increasing sediment inputs into the stream.

Typical environmental impacts of tourism and development include nonpoint source pollution (see Chapter 1 for information), increased runoff due to increased impervious surfaces and vegetation removal, and alterations to the flora, fauna and natural habitat in general.

***Health ratings
for the
Quillayute
Watershed start
on page 22.***

What do the health ratings mean to people?

While it is hard to generalize across such a large watershed, certain similarities exist in these rivers: conditions on stream reaches in Olympic National Park are generally better than those outside the Park. Most development in this watershed draws groundwater as

a drinking water source; the safety of community supplies is tested according to state regulations. There are no known groundwater contamination problems, however, the only data that has been collected has been by water purveyors for the purpose of compliance with state regulations.

What do the health ratings mean to fish?

Habitat integrity for all Quillayute sub-basins was rated as impaired due to specific problems. On the other hand, most stocks of salmonids are surviving. Water quality and biological conditions were often rated as compromised. The 303(d) listings for increased water temperature and dissolved oxygen show that water quality degradation has occurred in these rivers. Salmon need cold temperatures and lots of dissolved oxygen to thrive, and these poor conditions will add to the stress caused by other environmental factors. Fine sediment in streams fills up the “interstitial” spaces between the gravel that fish need for spawning and feeding, and therefore negatively impacts the survival success of salmon.

Excessive sedimentation is a problem in the

No. Fork Calawah, the lower Bogachiel, the Dickey, as well as in numerous small tributaries, where fine sediments are generally high, with some stream banks collapsing, causing debris flows. Sedimentation and incision is worsened by high precipitation levels, lack of LWD, and road surfacing materials. Other sediment sources are logging, wildfires and subsequent salvages after the burns. In some of the rivers severe aggradation has occurred. Past alterations have impacted wetland habitat in some areas. Natural mass wasting occurs on several systems, including the Calawah and Sol Duc and contributes the greatest volume of sediment to the river.

PARTICULAR CONCERNS (generalized for entire region)

- Excessive sedimentation and/or aggradation in many stream reaches
- Warm stream temperatures; compromised water quality in tribs. and smaller rivers
- Lack of protection from erosion and degraded habitat from lack of large woody debris (LWD)
- Loss of wetlands functions
- Degraded riparian habitat, from road development
- Inaccessible off-channel habitat
- Lack of data on biological conditions

RECOMMENDATIONS (generalized for entire region)

- Address blockages for fish passage
- Leave large wood where it exists in the floodplain
- Maintain and conserve off-channel habitat
- Protect beaver population which provide important habitat and water quality functions
- Increase LWD to increase nutrient cycling & prevent erosion, provide habitat for fish, and to reduce stream velocity
- Reduce riparian roads and/or their impacts; improve roads and route sediment out of channels
- Revegetate open riparian areas/protect riparian zones
- Address sediment sources
- Reduce water velocity in Quillayute River
- Start monitoring biological conditions
- Report habitat integrity for areas not covered by Watershed Analyses

Current Overall Health Based on Information Below:

Quillayute River (mainstem)—IMPAIRED

1. Water quality conditions according to CCWQI = IMPAIRED

Site 7 = 2.5 (impaired)

OVER-ALL CCWQI CONFIDENCE RATING (FOR WATERSHED): MODERATE

Quillayute River is on the 303(d) list for dissolved oxygen and temperatures.

2. Biological conditions according to B-IBI = AMPLE DATA DO NOT EXIST. The LFA listed biological conditions as good.

3. Habitat integrity overall, according to the LFA WRIA 20 and CC Watershed Facts = IMPAIRED TO HIGHLY IMPAIRED

Habitat concerns include:

- a. Riparian roads forming dikes, disconnecting habitat, and sedimentation
- b. Lack of LWD in the mainstem
- c. Warm temperatures
- d. Estuarine habitat is altered, extremely limited and impacted by upstream problems

OVER-ALL HABITAT INTEGRITY CONFIDENCE RATING: MODERATE

Current Overall Health Based on Information Below:

Dickey River—IMPAIRED

1. Water quality conditions according to CCWQI = COMPROMISED

Dickey RM 0.15 = 4.0 (compromised)

(approx) 7.50 = 3.3 (impaired)

E. Fork RM 0.00 = 5.0 (healthy)

Coal Crk RM 0.00 = 5.0 (healthy)

(Dickey trib.)

OVER-ALL CCWQI CONFIDENCE RATING (FOR WATERSHED): MODERATE

E. Fork Dickey River & Coal Crk. are on the 303(d) list for temperature

2. Biological conditions according to B-IBI = AMPLE DATA DO NOT EXIST

3. Habitat integrity overall, according to the LFA WRIA 20 and CC Watershed Facts = IMPAIRED TO HIGHLY IMPAIRED

Habitat concerns include:

- a. Blockages for fish passage
- b. Riparian roads forming dikes, disconnecting habitat, and sedimentation
- c. Collapsing banks add sediment and degrade habitat
- d. Fine sediments are high, resulting in poor spawning habitat quality and quantity
- e. Lack of LWD in some reaches
- f. Warm temperatures
- g. Wind-thrown trees resulting in degraded riparian corridors, lack of buffers

OVER-ALL HABITAT INTEGRITY CONFIDENCE RATING: MODERATE

**Current Overall Health Based on Information Below:
Bogachiel River—IMPAIRED/COMPROMISED**

1. Water quality conditions according to CCWQI = HEALTHY

Bogachiel River RM 00.0 = 5 (healthy)
15.0 = 5 (healthy)

OVER-ALL CCWQI CONFIDENCE RATING: MODERATE CONFIDENCE

2. Biological conditions according to B-IBI = AMPLE DATA DO NOT EXIST

3. Habitat integrity overall, according to the LFA WRIA 20 and CC Watershed Facts = IMPAIRED TO HIGHLY

IMPAIRED (*lacking specific data regarding many habitat conditions*)

Habitat concerns include:

- a. Poor riparian conditions
- b. Excessive aggradation of sediment
- c. Collapsing banks add sediment and degrade habitat
- d. Lack of LWD
- e. Floodplain impacts; encroaching development, particularly SR 110
- f. Warm temperatures, 303(d) listing for temperature & dissolved oxygen.

OVER-ALL HABITAT INTEGRITY CONFIDENCE RATING: MODERATE CONFIDENCE

**Current Overall Health Based on Information Below:
Calawah River—IMPAIRED**

1. Water quality conditions according to CCWQI = COMPROMISED

Calawah RM 0.0 = 5.0 (healthy)
S. Fk. Calawah RM 5.0 = 5.0 (healthy)
6.0 = 2.0 (highly impaired)
N. Fk. Calawah RM 0.4 = 5.0 (healthy)
0.5 = 5.0 (healthy)
Sitkum River RM 0.0 = 5.0 (healthy)
0.1 = 2.5 (impaired)
2.8 = 4.0 (compromised)

OVER-ALL CCWQI CONFIDENCE RATING: HIGH CONFIDENCE

2. Biological conditions according to B-IBI = AMPLE DATA DO NOT EXIST.

3. Habitat integrity overall, according to the LFA WRIA 20 and CC Watershed Facts = IMPAIRED TO HIGHLY IMPAIRED

Habitat concerns include:

- a. Excessive sedimentation
- b. Channel instability
- c. Lack of LWD
- d. Floodplain impacts; retaining pool refuges in summer
- e. Warm temperatures, 303(d) listings for temperatures/dissolved oxygen

OVER-ALL HABITAT INTEGRITY CONFIDENCE RATING: MODERATE CONFIDENCE

Current Overall Health Based on Information Below:
Sol Duc River & Tributaries—COMPROMISED-HIGHLY IMPAIRED

1. Water quality conditions according to CCWQI = Sol Duc—COMPROMISED; TRIBS—COMPROMISED

Sol Duc	RM	00.0 = 4.5 (healthy)	53.4 = 5.0 (healthy)
		6.50 = 4.0 (compromised)	53.5 = 4.5 (healthy)
		13.0 = 4.0 (compromised)	55.0 = 5.0 (healthy)
		19.0 = 4.5 (healthy)	61.6 = 5.0 (healthy)
		36.0 = 5.0 (healthy)	63.0 = 2.5 (impaired)

OVER-ALL CCWQI CONFIDENCE RATING FOR SOL DUC: HIGH CONFIDENCE

Tribs:

N. Fork	RM	0.0 = 5.0 (healthy)	Lake Crk.	RM	0.0 = 4.0 (compromised)
S. Fork	RM	0.0 = 5.0 (healthy)			0.7 = 3.0 (impaired)
		1.0 = 4.0 (compromised)			1.6 = 2.0 (highly impaired)
Alckee Crk.	RM	0.0 = 5.0 (healthy)			2.0 = 2.5 (impaired)
		0.3 = 5.0 (healthy)			2.75 = 2.0 (highly impaired)
Bear Crk.	RM	0.0 = 4.0 (compromised)			4.5 = 4.0 (compromised)
		0.1 = 5.0 (healthy)			5.0 = 5.0 (healthy)
		2.5 = 4.0 (compromised)			7.0e = 4.5 (healthy)
		5.1 = 3.0 (impaired)			7.0w = 5.0 (healthy)
		5.8 = 4.5 (healthy)	Lake trib/LB RM		6.2 = 4.0 (compromised)
		8.9 = 5.0 (healthy)	Goodman	RM	0.0 = 5.0 (healthy)
S. Fork Bear	RM	0.2 = 5.0 (healthy)			0.1 = 4.5 (healthy)
		0.5 = 5.0 (healthy)	Tom Crk.	RM	0.0 = 5.0 (healthy)
Beaver Crk.	RM	0.0 = 4.0 (compromised)			
Camp Crk.	RM	0.0 = 3.0 (impaired)			
		0.4 = 5.0 (healthy)			

OVER-ALL CCWQI CONFIDENCE RATING FOR TRIBS: HIGH CONFIDENCE

Sol Duc River & Tributaries continued:

2. Biological conditions according to B-IBI = Sol Duc: AMPLE DATA DO NOT EXIST; Bear Creek: HEALTHY

Bear RM 0.1 = 47.3 (healthy)
 2.5 = 42.0 (compromised)
 5.1 = 45.3 (healthy)
 Bear SF RM 0.2 = 47.3 (healthy)

OVER-ALL B-IBI CONFIDENCE RATING (FOR WATERSHED): HIGH CONFIDENCE

3. Habitat integrity overall for Sol Duc and its creeks, according to the LFA WRIA 20 and CC Watershed Facts = IMPAIRED TO HIGHLY IMPAIRED

Habitat concerns include:

- a. Loss of off-channel habitat
- b. Excessive sedimentation
- c. Poor riparian conditions and loss of wetlands
- d. Lack of LWD
- e. Warm temperatures and low dissolved oxygen; 303(d) listing for temperature & dissolved oxygen

OVER-ALL HABITAT INTEGRITY CONFIDENCE RATING: MODERATE CONFIDENCE



*Streamkeeper volunteer measuring stream cross-section
at Bear River RM 5.1*

State of the Waters ~ Ozette River Watershed

General Description:

Ozette Lake is the third largest natural lake in Washington State and a popular tourist destination within Olympic National Park. The Lake is drained to the Pacific Ocean by the Ozette River; Coal Creek is a major tributary to the Ozette River. The larger tributaries that drain into Ozette Lake are Big River, Umbrella Creek, Crooked Creek, Siwash Creek, South Creek and Quinn Creek. These are low gradient, low elevation streams which provide spawning and rearing habitat for salmon and steelhead, as do Ozette River and Lake. While the Olympic National Park surrounds Ozette Lake, most of the tributary sub-basins that drain into the Lake are private timber lands. It has been estimated that over 90% of this basin has been clearcut sometime in the past, and many riparian corridors have transitioned from conifer to alder stands.

What do the health ratings mean to people?

Lake water was not tested, and streams don't have ample biological data to be rated. However, Ozette Lake is used as a water source by local residents and the Olympic National Park and compromised water quality conditions could impact those uses and potentially require costly treatment. High flows result in turbid conditions within the tributaries

that feed Ozette Lake, especially in Big River and Umbrella Creek. If the Lake is turbid, it impacts the condition of drinking water. A transition from coniferous to deciduous forest affects timber resources as well as habitat. An accumulation of tannic acids within the estuary could also be a concern.

What do the health ratings mean to fish?

According to the LFA, both water temperature and dissolved oxygen levels in Ozette Lake are adequate for salmon use, but the Lake is rated as poor for biological processes and sediment quality. Conditions along the edge of Ozette Lake have changed as water levels have fluctuated, and vegetation has invaded what was once good spawning habitat for sockeye salmon and other species. The LFA rates Ozette streams poor to fair for

the percent of fine sediments, and excessive sediment causes problems with spawning, rearing and feeding, as well as viewing predators for salmon. In this watershed, summer temperatures are warmer than State water quality standards in Ozette River, Umbrella Creek, Crooked and No. Fork Crooked Creeks, and Big River, according to the LFA.

Current Overall Health Based on Information Below:

Ozette River Watershed—IMPAIRED

1. Water quality conditions according to CCWQI = COMPROMISED

Ozette River RM 0.0 = 4.5 (healthy)

Siwash Crk. RM 0.0 = 4.5 (healthy)

Big River RM 0.0 = 4.5 (healthy)

Coal Crk. RM 0.0 = 4.0 (compromised)

South Crk. RM 0.0 = 4.5 (healthy)

Umbrella Crk. RM 0.0 = 4.5 (healthy)

OVER-ALL CCWQI CONFIDENCE RATING (FOR WATERSHED): MODERATE CONFIDENCE

North Fork Crooked Creek is on the 303(d) list for elevated temperatures.

2. Biological conditions according to B-IBI = AMPLE DATA DO NOT EXIST

LFA gave a poor rating for biological process in the Ozette River.

3. Habitat integrity overall for the Ozette Watershed, include Lake Ozette, according to the LFA WRIA 20, CC Watershed Facts, Status = IMPAIRED TO HIGHLY IMPAIRED

Habitat concerns include:

- a. Impacts resulting from past watershed alterations
- b. Loss of off-channel habitat
- c. Excessive sedimentation
- d. Poor riparian conditions; non-coniferous trees dominate, which will be unable to supply future LWD
- e. Warm temperatures and low dissolved oxygen

OVER-ALL HABITAT INTEGRITY CONFIDENCE RATING: HIGH CONFIDENCE

PARTICULAR CONCERNS

- High flows resulting in excessive sedimentation
- Warm stream temperatures in summer in some streams
- Lack of protection from erosion and degraded habitat from lack of LWD
- Loss of wetlands functions
- Degraded riparian habitat and transition from coniferous to deciduous forests
- Lack of data on biological conditions
- Impaired to highly impaired habitat

RECOMMENDATIONS

- Address blockages for fish passage
- Address habitat concerns in box on left
- Reduce riparian roads and/or their impacts
- Revegetate open riparian areas with conifers/protect riparian corridors
- Address other sediment sources
- Continue water quality monitoring
- Start monitoring biological conditions

State of the Waters ~ Sooes Basin

General Description:

The Sooes River is 16.2 miles long and begins in low foothills, draining to the Pacific Ocean at Mukkaw Bay near the Makah Indian Reservation. Tidewater extends to Sooes RM 6, and a falls blocks salmon access at RM 13.8. Streams on the Olympic Peninsula have naturally high rates of erosion, and this erosion has been accelerated by deforestation and road building. The most common floodplain impacts in the Sooes basin are riparian roads, some of which closely parallel the streams, acting as dikes, disconnecting potential off-channel habitat and increasing sediment input into the stream. Channel incision is another floodplain problem here. Historically the streams in these lowlands were unconfined, meandering across their floodplains with extensive logjams in place. As large wood has washed out without being replenished, stream energy has increased and scoured and incised the channel. In some cases the increased bank disturbance has resulted in the invasion of reed canarygrass on the banks, further hardening the incised channels.

What do the health ratings mean to people?

The impacts caused by the riparian roads on the Peninsula and in these watersheds result in excessive sediment entering the channels. This causes turbid conditions which can be harmful if the water is used

for human consumption. Otherwise, there is a lack of data about these watersheds, and further analysis is not valid.

What do the health ratings mean to fish?

The Sooes River provides habitat for winter steelhead, fall chinook, chum and coho salmon. Important salmon and steelhead producing tributaries are: Snag Creek, Pilchuck Creek, Shaffer Creek, Thirty Cent Creek, Miller Creek and Grimes Creek. High water

temperatures, low dissolved oxygen, and excessive sedimentation have been recorded in the Sooes River, all of which negatively impact the success of salmon in the stream. The LFA's habitat rating for floodplain impacts is fair, and the rating for biological processes is poor.

Small streams along the Pacific Coast have little available data with which to determine their current condition, or possible impacts on humans in the watersheds.

Current Overall Health Based on Information Below:

Sooes Basin—IMPAIRED*

(*low confidence in this rating)

1. Water quality conditions according to CCWQI = AMPLE DATA DO NOT EXIST

LFA gave a poor rating for water quality for the Sooes River.

2. Biological conditions according to B-IBI = AMPLE DATA DO NOT EXIST

LFA gave a poor rating for biological process for the Sooes River.

3. Habitat integrity overall for the Sooes basin, according to the LFA WRIA 20 and CC Watershed Facts = IMPAIRED

Habitat concerns include:

- a. Loss of access for anadromous salmon due to culverts, pipes, small dams and a hatchery weir
- b. Loss of off-channel habitat
- c. Excessive sedimentation
- d. Poor riparian conditions; non-coniferous trees dominate, which will be unable to supply future large woody debris (LWD)
- e. Warm temperatures and low dissolved oxygen

OVER-ALL HABITAT INTEGRITY CONFIDENCE RATING : MODERATE CONFIDENCE

PARTICULAR CONCERNS

- Excessive sedimentation
- Warm stream temperatures
- Lack of protection from erosion and degraded habitat from lack of LWD
- Degraded riparian habitat
- Habitat is impaired
- Lack of data on water quality and biological conditions

RECOMMENDATIONS

- Address blockages for fish passage
- Leave large wood in the floodplain
- Maintain and conserve off-channel habitat
- Increase LWD to increase nutrient cycling & prevent erosion
- Reduce riparian roads and/or their impacts
- Revegetate open riparian areas with conifers/protect riparian corridors
- Address sediment sources
- Start monitoring water quality & biological conditions