

# HOQUIAM-WISHKAH MANAGEMENT UNIT

## HOQUIAM RIVER

### Description:

The confluence of the West and Middle Forks of the Hoquiam River form the mainstem Hoquiam River. The mainstem is seven miles long and has 124 miles of tributaries. The watershed drains an area of 90 square miles.

The upper reaches lie in flat, brushy valleys surrounded by low hills. The entire mainstem watershed is of a relatively low gradient and is intertidally influenced up to its main tributaries, the West and Middle Forks. The substrate of the mainstem is predominately mud and silt. Tributaries lying beyond the intertidal zone have a gravel and rubble base except for the Little Hoquiam, which remains primarily sediment-based throughout its length.

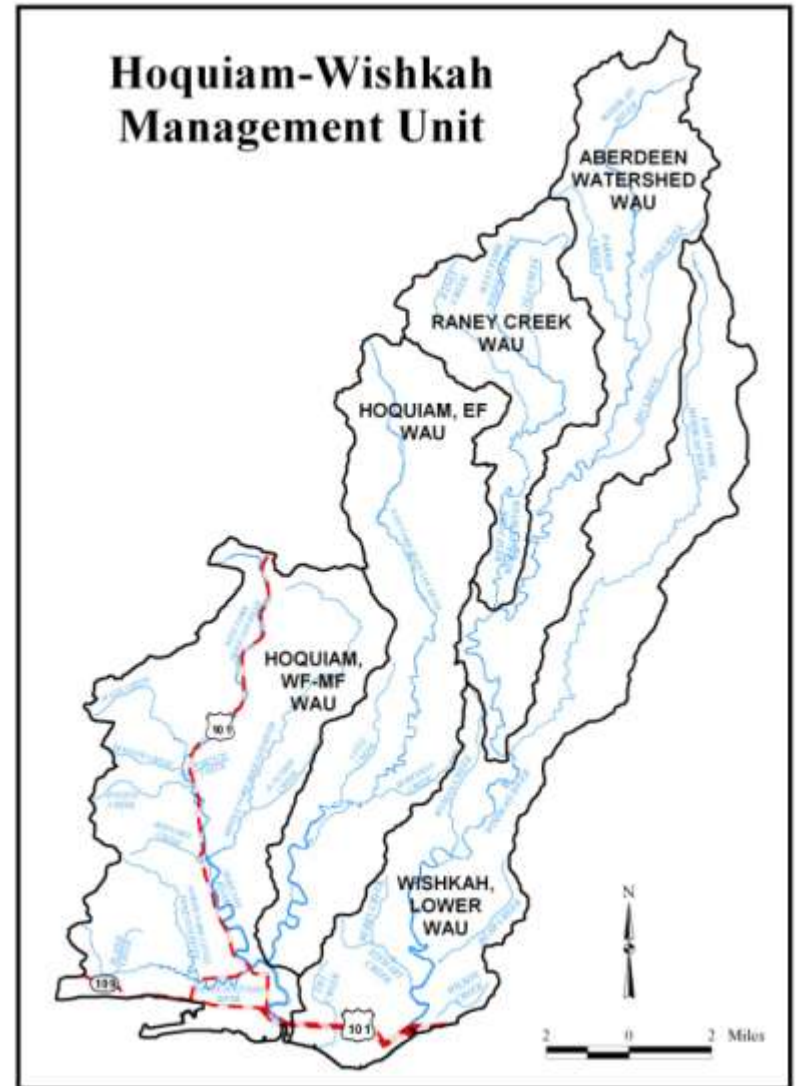
The City of Hoquiam straddles the lower mainstem while rural residences and some agricultural lands lie along the river and its major tributaries beyond the city limits. However, the Middle Fork and its subbasin are in second growth timber production. Davis Creek, Little North Fork Hoquiam, and West Fork Hoquiam have diversion dams. The East Fork has an industrial diversion.

The Mason Conservation District Barrier Assessment observed 298 culverts in the watershed. Of this number, 94 are not in fish-bearing streams, 20 are 100% passable, 45 were not assessed, and 139 had varying levels of passability (0%, 33%, and 67%).

**Major Tributaries:** West Fork Hoquiam, North Fork Hoquiam, East Fork Hoquiam, Middle Fork Hoquiam, Little Hoquiam River, Polson Creek, Hoover Creek, and Barnard Creek

**Land Uses:** Forestry, Industrial, Urban and Rural Residences

**Anadromous Fish Stocks:** Fall Chinook\*, coho, chum, cutthroat, winter steelhead (\* denotes priority stock)



## Hoquiam River Tier 1 Concerns

Hoquiam River Tier 1 WATER QUALITY		
Symptom	Cause	General Actions
<ul style="list-style-type: none"> <li>➔ The lower Hoquiam has Class B waters</li> <li>➔ Hoquiam River is recorded as a significant contributor to fecal coliform in Grays Harbor</li> </ul>	<ul style="list-style-type: none"> <li>➔ The periodic flushing of the dams most likely affects water quality during the flushing.</li> <li>➔ The Class B Ecology rating is due to industrial and residential development.</li> <li>➔ Sediment loading. Water quality diminishes during high flows due to sediment loading from extensive road systems, sediment trapped behind dams, and lower river sediment substrate.</li> <li>➔ The Class B Ecology rating is due to industrial and residential development.</li> <li>➔ The data regarding water quality is limited.</li> </ul>	<ul style="list-style-type: none"> <li>➔ Abandon roads on steep geologically sensitive areas; implement alternative methods of bank stabilization (bioengineering) in locations of excessive erosion/sediment input; reduce sediment loading by reducing road densities (abandon/decommission); upgrade logging roads to comply with Forest and Fish Agreement (1999)</li> <li>➔ Adjust sediment flushing through dams to occur only during high flow events; develop improved methods of flushing sediment from the municipal dams</li> <li>➔ Determine water quality conditions; implement TMDL recommendations</li> <li>➔ Identify specific degraded riparian areas for restoration; revegetate open riparian areas with native plants; revegetate riverbanks for added protection from the erosion</li> <li>➔ Protect, fee simple/easement key properties riparian habitat</li> </ul>
<ul style="list-style-type: none"> <li>➔ High summer water temperatures</li> </ul>	<ul style="list-style-type: none"> <li>➔ Lack of riparian vegetation, logging practices, and development</li> </ul>	<ul style="list-style-type: none"> <li>➔ Identify specific degraded riparian areas for restoration</li> <li>➔ Implement activities that lead to natural recharge of aquifers                             <ul style="list-style-type: none"> <li>• Reduce storm water discharge directly to streams</li> <li>• Restore wetlands for water storage</li> </ul> </li> <li>➔ Increase hydrologic continuity - reduce impervious surfaces</li> <li>➔ Interplant conifers in deciduous dominant areas; revegetate open riparian areas with native plants</li> </ul>

Hoquiam River Tier 1 FISH PASSAGE		
Symptom	Cause	General Actions
<ul style="list-style-type: none"> <li>➔ Fish access to spawning/rearing habitat is restricted</li> </ul>	<ul style="list-style-type: none"> <li>➔ High density of roads with barrier culverts. The EF Hoquiam has 114 miles of logging roads, Middle and W. Fork has 212 miles of roads.</li> <li>➔ Dams with inefficient laddering systems or no laddering. Municipal diversions exist on Davis Cr., and W. Fork Hoquiam. Fishways have been installed on Davis Cr. and the W. Fork while the N. Fork remains a total barrier.</li> </ul>	<ul style="list-style-type: none"> <li>➔ Consider providing access to past natural barriers on case-by-case basis</li> <li>➔ Correct barrier culverts. See Section 4 for guidelines.</li> <li>➔ Improve fish passage at the dam fishways and add fishways to those dams that do not have them</li> </ul>

Hoquiam River Tier 1			FISH PASSAGE		
Symptom		Cause		General Actions	
		<ul style="list-style-type: none"> <li>➔ Natural barriers on the EF, WF, upper Polson, Hoover, and Barnard Cr. Load in system</li> </ul>			

Hoquiam River Tier 1			RIPARIAN		
Symptom		Cause		General Actions	
<ul style="list-style-type: none"> <li>➔ In the lower 5.2 miles of the mainstem Hoquiam and the last mile of the E. Fork, the riparian area has been developed and is rated as poor riparian conditions.</li> <li>➔ Riparian conditions in the E. Fork Hoquiam are poor with 70% of the riparian area consisting of deciduous or non-forested use</li> <li>➔ The middle and W. Fork Hoquiam has poor conditions with 62% classified as non-forested, open or deciduous and 36% classified as conifer or mixed conifer in mid to late seral stages.</li> </ul>		<ul style="list-style-type: none"> <li>➔ Commercial and residential development in the lower reaches.</li> </ul>		<ul style="list-style-type: none"> <li>➔ Identify specific degraded riparian areas for restoration</li> <li>➔ Install riparian fencing to exclude or reduce livestock access</li> <li>➔ Interplant conifers in deciduous dominant areas</li> <li>➔ Protect by fee simple or easement key properties of riparian habitat</li> <li>➔ Remove invasive species. See Section 5.</li> <li>➔ Revegetate open riparian areas with native plants</li> </ul>	
<ul style="list-style-type: none"> <li>➔ In the upper reaches above the dense residential area, the drainage has fair and poor riparian conditions consisting of mixed conifer and deciduous with areas lacking any vegetation.</li> <li>➔ The Little Hoquiam, and N. Fork Hoquiam are undeveloped, but the riparian is rated as fair as it recovers from past logging practices.</li> </ul>		<ul style="list-style-type: none"> <li>➔ Timber harvest. Past logging practices of not leaving riparian buffers.</li> </ul>		<ul style="list-style-type: none"> <li>➔ Identify specific degraded riparian areas for restoration</li> <li>➔ Install riparian fencing to exclude or reduce livestock access</li> <li>➔ Interplant conifers in deciduous dominant areas</li> <li>➔ Protect, fee simple/easement key properties riparian habitat</li> <li>➔ Remove invasive species. See Section 5.</li> <li>➔ Revegetate open riparian areas with native plants</li> </ul>	

## Hoquiam River Tier 2 Concerns

Hoquiam River Tier 2		
FLOODPLAIN		
Symptom	Cause	General Actions
<ul style="list-style-type: none"> <li>➔ Severely degraded fish habitat with channel incision, low levels of LWD, scoured streambed gravels, and blocked access to off-channel habitat.</li> <li>➔ Restricted floodplain connectivity</li> </ul>	<ul style="list-style-type: none"> <li>➔ Splash dams. The historic logging practices utilized 21 splash dams to transport timber upstream to mills.</li> <li>➔ High density of roads. Highway 101 borders the mainstem Hoquiam and W. Fork Hoquiam periodically for 16 miles with localized areas confining the river migration.</li> <li>➔ Commercial and residential development in the lower reaches restricts floodplain function</li> </ul>	<ul style="list-style-type: none"> <li>➔ Assess floodplain conditions and identify impacts</li> <li>➔ Protect, fee simple or easement, key properties to facilitate natural channel migration and reconnection to the floodplain</li> <li>➔ Reconnect, enhance, and/or restore potential off-channel, floodplain, and wetland habitat</li> <li>➔ Remove hard armoring / implement bioengineering</li> </ul>

Hoquiam River Tier 2		
SEDIMENT		
Symptom	Cause	General Actions
<ul style="list-style-type: none"> <li>➔ Complete evaluation cannot be done at this time.</li> <li>➔ There are no sedimentation studies on the Hoquiam.</li> </ul>	<ul style="list-style-type: none"> <li>➔ Soil types in the lower EF and extreme upper EF Hoquiam have high surface erosion potential. The remainder of the drainage has medium erosion potential. Low gradient and tidal influences are natural contributors.</li> <li>➔ Logging and unpaved roads constructed in areas geologically sensitive and prone to sediment transport.               <ul style="list-style-type: none"> <li>• Fine sediment can originate from the erosion of roads.</li> <li>• Road ditches can serve as pathways for sediment coming from exposed cut slopes adjacent to roads.</li> </ul> </li> <li>➔ Landslides. Sidecast roads in combination with soil types conducive to erosion can trigger mass wasting/landslides contributing sediment to streams in the basin. Sediment loading, primarily attributed to logging road densities, is poor in the MF and WF, (&lt; 3mi/sq. mi); fair in the EF Hoquiam.</li> <li>➔ Roads not constructed or maintained to current standards</li> <li>➔ Periodic releases of sediment that degrades spawning and rearing habitat downstream.</li> <li>➔ Dam operations. Municipality reservoirs (dams) trapping and flushing sediment downstream is a maintenance practice detrimental to fish and habitat conditions.</li> </ul>	<ul style="list-style-type: none"> <li>➔ Conduct studies similar to that done on Upper Wishkah River to determine sediment loading and reduction</li> <li>➔ Correct cross drains that may trigger mass wasting on geologically sensitive slopes</li> <li>➔ Develop improved methods of flushing sediment from municipal dams</li> <li>➔ Interplant conifers in deciduous dominant areas where appropriate</li> <li>➔ Reduce road densities by abandoning and/or decommissioning roads to reduce sediment loading</li> <li>➔ Reduce sediment loading by reducing road densities (abandon/decommission)</li> <li>➔ Remove dams where feasible</li> <li>➔ Revegetate open riparian areas with native plants</li> <li>➔ Upgrade to logging roads to comply with Forest and Fish Agreement (1999)</li> </ul>

## Hoquiam River Tier 3 Concerns

Hoquiam River Tier 3		
LARGE WOODY DEBRIS		
Symptom	Cause	General Actions
<ul style="list-style-type: none"> <li>➔ LWD is generally lacking.</li> </ul>	<ul style="list-style-type: none"> <li>➔ Splash dams and timber harvest. Most of the LWD in the lower reaches was eliminated during the early logging periods when 21 splash dams were used to transport timber to the mills.</li> <li>➔ Timber harvest, land use and dam operations. Recruitment is reduced by past logging practices, commercial and residential use, agricultural development, and the presence of dams in three of the main branches of the river hindering LWD transport.</li> <li>➔ Riparian degradation and loss. With the riparian areas rated from fair to poor through-out most of the watershed the near term potential is fair to poor for LWD recruitment.</li> <li>➔ Lack of late seral canopy within the riparian areas for LWD recruitment throughout the watershed.</li> </ul>	<ul style="list-style-type: none"> <li>➔ Determine LWD quantities</li> <li>➔ Develop LWD supplementation plan that will install logjams in key places to improve instream channel structure and habitat diversity</li> <li>➔ Install LWD pieces in conjunction with other restoration projects</li> <li>➔ Install riparian fencing to exclude or reduce livestock access</li> <li>➔ Interplant conifers in deciduous dominant areas where appropriate</li> <li>➔ Protect by fee simple or easement key properties of riparian habitat</li> <li>➔ Revegetate open riparian areas with native plants</li> </ul>

Hoquiam River Tier 3		
WATER QUANTITY		
Symptom	Cause	General Actions
<ul style="list-style-type: none"> <li>➔ The land cover conditions for the E. Fork, W. &amp; Middle Forks of the Hoquiam WAUs have 21% to 37% land cover in mid-to-late seral. This equates to a poor rating for water quantity.</li> </ul>	<ul style="list-style-type: none"> <li>➔ The lack of vegetation cover is due to logging and development.</li> </ul>	<ul style="list-style-type: none"> <li>➔ Identify specific degraded riparian areas for restoration</li> <li>➔ Install riparian fencing to exclude or reduce livestock access</li> <li>➔ Interplant conifers in deciduous dominant areas</li> <li>➔ Protect (fee simple or easement) key properties of riparian</li> <li>➔ Revegetate open riparian areas with native plants</li> </ul>
<ul style="list-style-type: none"> <li>➔ The quantity of water for fish is generally low during low flow summer months.</li> </ul>	<ul style="list-style-type: none"> <li>➔ The City of Hoquiam owns water rights within 7500 acres of the Davis Cr. and W. Fork Hoquiam watersheds, but would not make information available on flows and withdrawals.</li> </ul>	<ul style="list-style-type: none"> <li>➔ Adjust dam flows to better accommodate fish</li> <li>➔ Determine if water withdrawals are being followed in accordance with current water rights</li> <li>➔ Implement activities that lead to natural recharge of aquifers</li> <li>➔ Increase hydrologic continuity - reduce impervious surfaces</li> </ul>

# WISHKAH RIVER

## Description:

The Wishkah River originates in the foothills of the southern Olympic Mountains and drains a 102 square mile area. The mainstem, East, and West Forks comprise the Wishkah River system. The river flows directly into the north side of Grays Harbor near the mouth of the Chehalis River. The Wishkah River is tidally influence for eight miles upstream.

The lower 3 miles of the river are in intensive urban development. The remaining 5 miles of tidily influenced River are undeveloped, characterized by a mature alder and conifer. From RM 8 to RM 23, agriculture dominates the floodplain with the mix of rural residences. Upstream from RM 23, the watershed is intensively managed for timberlands at various stages of growth.

Most spawning occurs above RM 14. Long live the king's operates a hatchery at RM 25.75. A high Falls at RM 29.4 blocks upstream fish passage. Malinowski Dam at RM 32.2 forms a 15-acre reservoir that provides domestic water supply for the City of Aberdeen.

**Major Tributaries:** East and West Forks Wishkah River

**Land Uses:** Forestry, rural residences, and urban development

**Anadromous Fish Stocks:** Fall Chinook, coho\*, chum, cutthroat, winter steelhead, and bull trout\* (\* denotes priority stock)

## Wishkah River Tier 1 Concerns

Wishkah River Tier 1		SEDIMENT
Symptom	Cause	General Actions
<ul style="list-style-type: none"> <li>➔ The lower Wishkah has high quantities of fine sediments.</li> </ul>	<ul style="list-style-type: none"> <li>➔ Early logging used splash dams degrading stream complexity and substrate</li> <li>➔ Poorly constructed roads, lack of cross drains, road ditches directed to cross streams, and poor road surface quality.</li> <li>➔ Two main haul roads contribute the majority of the sediment loading; A-line Mayr Bros. Rd, and the Weyco G-line</li> <li>➔ Road densities are rated fair in upper basin and poor in the lower basin due to increased recent logging in the upper basin.</li> <li>➔ High landslide potential in upper basin due to geologically sensitive areas.</li> <li>➔ Mass wasting, road building, logging geologically sensitive areas, agriculture, and development in the lower reaches.</li> <li>➔ Older abandoned logging roads not in use and not maintained, failing culverts on unmaintained or abandoned</li> </ul>	<ul style="list-style-type: none"> <li>➔ Correct cross drains that may trigger mass wasting on geologically sensitive slopes</li> <li>➔ Develop improved methods of flushing sediment from municipal dams</li> <li>➔ Gravel enhancement downstream of dams and weirs to decrease scouring an incision</li> <li>➔ Identify sources that are contributing to loading</li> <li>➔ Identify specific degraded riparian areas for restoration</li> <li>➔ Install riparian fencing to exclude or reduce livestock access</li> <li>➔ Interplant conifers in deciduous dominant areas</li> <li>➔ Revegetate streams and riverbanks for erosion protection</li> <li>➔ Upgrade logging roads to comply with Forest and Fish Agreement (1999)</li> <li>➔ Upper watershed above RM 28.5 included in a sediment</li> </ul>

Wishkah River Tier 1			SEDIMENT		
Symptom		Cause		General Actions	
		roads. ➔ Dam operations may affect sediment transport.		model analysis completed by Rayonier NW Timber Resources. Reduce sediment loading by reducing road densities (abandoned/decommissioning)	

Wishkah River Tier 1			RIPARIAN		
Symptom		Cause		General Actions	
➔ The riparian corridor condition is poor in the lower Wishkah, W. Fork, and half of the upper Wishkah.		➔ The riparian corridor is considered to have a low LWD recruitment potential because it is dominated by hardwoods. ➔ Substantial industrial-residential development in the first three river miles with poor riparian habitat. ➔ The lower reach to RM 3 contains little riparian vegetation due to land conversions, from RM 3-7.5 the riparian corridor is dominated by red alder. ➔ From RM 7.5- 20 the riparian corridor is dominated by hardwoods or is lacking vegetation due to harvesting or agricultural practices. Agriculture and residential development in the 3 to 7.5 mile reach has eliminated much of the riparian corridor. ➔ Above RM 20, the land use is primarily forestry and conditions vary depending on the harvesting practices. ➔ Agricultural, residential activities in the 7.5 -20 RM that had mixed conifer and hardwood and is now mostly hardwood.		➔ Control invasive species. See Section 5. ➔ Identify specific degraded riparian areas for restoration needs ➔ Install riparian fencing to exclude or reduce livestock access ➔ Interplant conifers in deciduous dominant areas where appropriate ➔ Protect by fee simple or easement key properties of habitat ➔ Revegetate open riparian areas with native plants	

Wishkah River Tier 1			FISH PASSAGE		
Symptom		Cause		General Actions	
➔ Fish access to spawning/rearing habitat is restricted		➔ Barrier culverts under the main county roads and forestland roads. ➔ The east side of Middle and Upper Wishkah has limited access to tributaries because of high rocky banks and waterfalls impassible to fish. ➔ High road densities 3.36 mi./sq. mi., some with fish barrier culverts		➔ Consider providing access over natural barriers on a case-by-case basis ➔ Correct barrier culverts. See Section 4 for guidelines.	

## Wishkah River Tier 2 Concerns

Wishkah River Tier 2		
FLOODPLAIN		
Symptom	Cause	General Actions
<p>➔ The floodplain rating for the Wishkah is poor for the lower watershed and fair-to-good for the upper watershed.</p>	<p>➔ The floodplain is disconnected in the lower basin due to channel incision and bordering road restrictions.</p> <p>➔ The Wishkah had 34 splash dams for timber harvest. Splash dam use and historic logging practices straightened that channel and incised lower river.</p> <p>➔ Much of the floodplain in the middle and upper east side of the basin is cut off by high, steep rocky banks.</p> <p>➔ Portions of the upper Wishkah have incised and disconnected from the floodplain due to frequent high peak flows caused from extensive harvesting of watershed and early seral canopy cover.</p>	<p>➔ Assess floodplain conditions and identify impacts</p> <p>➔ Protect, fee simple / easement, key properties to facilitate natural channel migration and reconnection to the floodplain</p> <p>➔ Reconnect, enhance, and/or restore potential off-channel, floodplain, and wetland habitat</p> <p>➔ Remove hard armoring (riprap) or implement bioengineering techniques in place of hard armoring</p>

Wishkah River Tier 2		
LARGE WOODY DEBRIS (LWD)		
Symptom	Cause	General Actions
<p>➔ The Wishkah Basin has low levels of LWD. Areas surveyed show low levels LWD and the near-term recruitment potential is low due the hardwood dominated riparian corridor.</p>	<p>➔ In the lower three-mile reach, riparian buffer and LWD recruitment are non-existent due to heavily industrially developed areas.</p> <p>➔ In the middle to upper Wishkah River, agricultural and rural residential development has removed much of the conifer riparian cover allowing hardwoods to dominate the stream edges thus decreasing recruitment potential of large long term LWD.</p>	<p>➔ Develop LWD supplementation plan that will install log jams to improve instream channel structure and habitat diversity</p> <p>➔ Identify specific degraded riparian areas for restoration</p> <p>➔ Install LWD pieces in conjunction with restoration projects</p> <p>➔ Interplant conifers in deciduous dominant areas</p> <p>➔ Revegetate open riparian areas with native plants</p>
<p>➔ The instream LWD rating in some of the tributaries in the Upper Wishkah were rated as good, but the LWD was in an advanced stage of decay. The good rating may therefore decline.</p>	<p>➔ Logging practices until recent times allowed riparian corridors to be logged, thus removing long-term conifer recruitment potential of LWD.</p>	<p>➔ Develop LWD supplementation plan that will install logjams in key places to improve instream channel structure and habitat diversity</p> <p>➔ Install LWD pieces in conjunction with restoration projects</p> <p>➔ Interplant conifers in deciduous dominant areas</p>



## Wishkah River Tier 3 Concerns

Wishkah River Tier 3			WATER QUALITY		
Symptom		Cause		General Actions	
<ul style="list-style-type: none"> <li>➔ Increased temperatures continue to be a problem in portions of the mid to lower basin during the summer months.</li> </ul>		<ul style="list-style-type: none"> <li>➔ Long Live the Kings / Mayr Bros. hatchery in the upper basin is in the process of collecting temperature data, but no information has been documented as yet.</li> <li>➔ Due to industrial, residential and agricultural development there is poor land cover vegetation in the Lower and West Fork Wishkah causing poor water quality</li> </ul>		<ul style="list-style-type: none"> <li>➔ Adjust dam flows to better accommodate fish</li> <li>➔ Determine if water withdrawals are being followed in accordance with current water rights</li> <li>➔ Reduce water withdrawals from surface sources</li> </ul>	

Wishkah River Tier 3			WATER QUANTITY		
Symptom		Cause		General Actions	
<ul style="list-style-type: none"> <li>➔ In the Lower Mainstem and West Fork Wishkah, the water quantity is poor. The upper Wishkah has good vegetative land cover and the water quantity is good.</li> </ul>		<ul style="list-style-type: none"> <li>➔ Riparian degradation in land use limits water table recharge, lowering summer flows</li> <li>➔ Recent logging and clear-cut operations the upper basin have reduced water retention, lowering summer flows.</li> <li>➔ Development-related water withdrawals</li> <li>➔ Dam operations</li> </ul>		<ul style="list-style-type: none"> <li>➔ Adjust dam flows to better accommodate fish</li> <li>➔ Determine if water withdrawals are being followed in accordance with current water rights</li> <li>➔ Implement activities that lead to natural recharge of aquifers (reduce storm water discharge directly to streams, restore wetlands water storage, increase hydrologic continuity)</li> <li>➔ Interplant conifers in deciduous dominant areas where appropriate</li> <li>➔ Protect, fee simple/easement, key riparian habitat properties</li> <li>➔ Reduce water withdrawals from surface sources</li> <li>➔ Revegetate open riparian areas with native plants</li> </ul>	