Clallam Bay River Mouth and Nearshore. 2003 Clallam Bay Technical Committee Findings.

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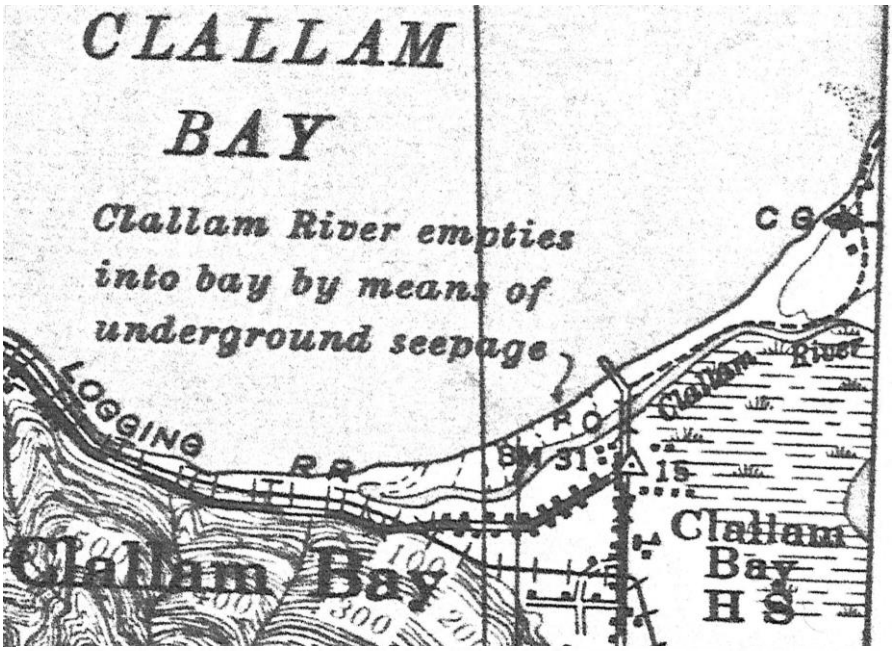
Technical Committee members: Anne Shaffer, WDFW, convener, Randy Johnson, Tim Rymer, Chris Byrnes, Randy Cooper, WDFW, Dave Parks, Martha Hurd, , DNR, Jeanne Wahler, State Parks, Jeffree Stewart, DoE, Pat Crain and Andy Brastad, Clallam County, Andy Ritchie, Makah Tribe, Mike McHenry, Elwha Tribe. Local citizens attending: Bob and June Bowlby, Don Baker, Patt Ness. Additional attending members: Brian Fairbanks, Sue Patnude, Steve Kawlinoski, WDFW, Craig Jacobs and Joel Winborn, Clallam County, Dave Roberts, DNR

Background

Physical processes. The Clallam River is a tributary to the western Strait of Juan de Fuca. The Clallam River mouth, located in the middle of Clallam Bay, is terminated by a well formed sand spit. The mouth closes off seasonally as a natural process.

While no pre-development characterizations of the mouth of the Clallam River have been located, the seasonal closure of the mouth has been documented on maps as early as 1934-35, in US Army maps. These maps show the Clallam River emptying into the bay by seepage through much of the area that currently makes up the state/county park lands on the spit (Andy Ritchie Makah Tribe, Figure 1).



Prepared under the direction of the Chief of Engineers, U. S. Army, 1934-35.
Horizontal control by U. S. Coast and Geodetic Survey, 1931, and 29th Engineers, U. S. Army, 1934-35.
Vertical control by U. S. Geological Survey, 1917, and 29th Engineers, U. S. Army, (1929 Gen. Adj.) 1934-35.
Topography by Corps of Engineers, U. S. Army, from five-lens aerial photographs, using elevation calculater and stereoscope, and Washington Paper and Pulp Co.
Polyconic Projection, North American Datum 1927.

Figure 1. Excerpt from US Army Corps of Engineers Tactical Map, 1934-1935.

Seasonal closure of spits such as this is common, and characteristic of the interplay between marine and riverine forces. Spit sediment is supplied by rivers and streams, bluff erosion and landsliding, and beach sediments. Sediments that make up such spits are transported by longshore current in drift cells, tidal currents, wave energy, and fluvial deposition from upland sources. Spits such as that at the mouth of the Clallam River typically form near the end of littoral drift cells, and form primarily from large amplitude/low frequency wave swash which transports sediment in the same direction as wave approach. Sediment is transported along the spit by wave refraction, resulting in deposition in lower energy environments.

Spit morphology is defined by the balance between sediment inputs, the volume of sediment stored in spit, and output or net erosion of spit. Seasonal variations in spit morphology are controlled by sediment transport and deposition from wind, waves, and floods. The morphology of the spit, including the location of the river mouth, is controlled by balance between "fluvial" and "coastal" processes. (reprinted with permission by Dave Parks, DNR; Figure 2.)

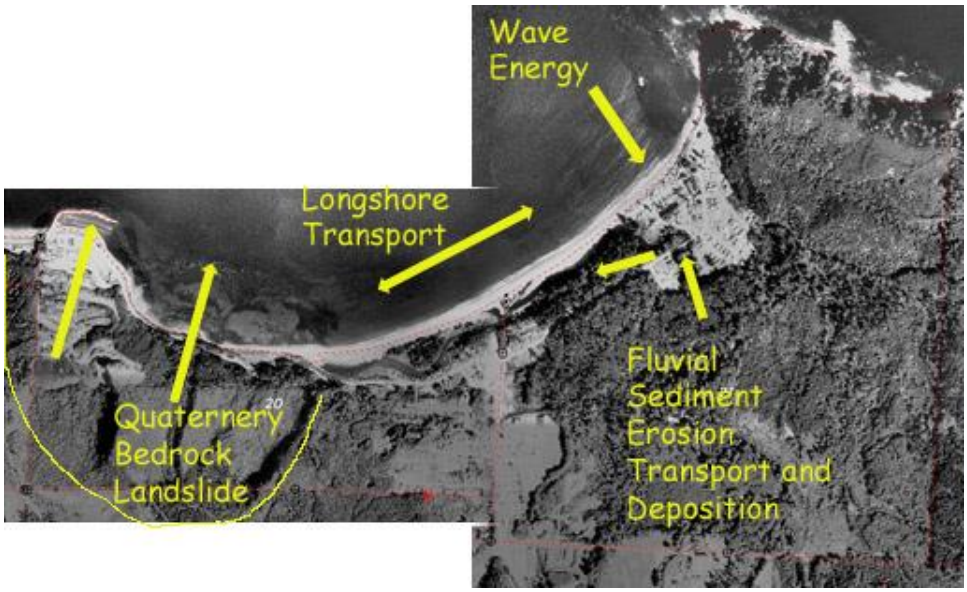


Figure 2. Clallam Bay with geologic and hydrologic processes (Reprinted with permission from Dave Parks, DNR)

The geology of the area is equally complex. (Figure 2). Historically the location of the river mouth has varied from the far western to far eastern ends of this portion of the bay. The western boundary of the river mouth location is defined by a large rotational deep seated land slide. The eastern boundary of the river mouth location is bordered by the town of Clallam Bay (Figure 2).

In summary, the Clallam Bay nearshore and spit are products of complex interactions between coastal and fluvial sediment transport, deposition, and erosion. Clallam Bay Spit experiences natural variability in sediment volume and/or morphology as the relative influence of various geomorphic processes changes seasonally, annually, and decadally. The river mouth responds to these spit changes via changes in both it's location and seasonal closure. The effect of human

activities on both the physical processes and river mouth responses (meandering and closing off) is unknown, but important to understand.

Significant anthropogenic changes have occurred in the Clallam River mouth and estuary since the late 19th century. Beginning in the late 1800's, modifications include wood clearing from the lower river, which was used as a staging area for log rafts and a sawmill, filling and diking significant portions of the estuary and lower river channel migration zone, and constructing roads and piers on and over the estuary and spit. An 1890 painting in the Bert Kellogg Collection (not shown) depicts the river mouth filled with bucked logs, and an industrial building (sawmill?) located the spit, with its dock overhanging the river. Gravel was mined from Clallam Bay beaches for road fill until the mid 1940's.

Biological resources The Clallam River supports a number of anadromous fish stocks including coho (*Oncorhynchus kisutch*), fall chum (*O. keta*), steelhead (*O. mykiss*), and sea-run cutthroat trout (*O. clarkii*) populations, numerous bird species, and complex nearshore habitats. Details of each follow.

Clallam River supports healthy stocks of spawning coho and steelhead. A total of 1,210 coho redds were counted in the river in 2001. River production for coho over the last 10 years has been steadily increasing (Figure 2. Randy Cooper WDFW, McHenry, Elwha S'Klallam Tribe unpublished data). Estimated coho escapement in 2001-2002 (Brood Year 2001) to the Clallam River was 7,896 fish, a short-term historical high number (McHenry, pers. comm.). Coho spawning occurs throughout the Clallam River watershed and generally begins in late October with 50% of the spawning occurring by early December (WDFW files). Spawning is usually complete by early January but may continue through the end of the month. Coho fry emerge from the gravel beginning around March each year, but emergence timing can vary year to year due to water temperatures. Most juvenile coho rear in freshwater for one year before migrating downstream the following spring to saltwater as smolts. After spending a period of 16 to 18 months at sea adult coho return to spawn during the late fall and early winter. Precocious males or "jacks" and females ("jills" or "jennies") return to the rivers after spending only one summer in saltwater.

Fall chum have been observed spawning in the lower Clallam River drainage at the same time as coho. Briefly, fall chum emerge from the gravel and migrate promptly downstream to estuarine waters from February to June. The entry timing of chum into saltwater is related to the warming of nearshore waters and plankton blooms. Chum feed in nearshore marine habitats until the prey resources have declined. When they have attained sufficient size, chum move offshore to feed on larger organisms. Chum will spend 3 to 5 years in the ocean before returning to their natal stream to spawn.

Wild adult steelhead entry timing in the Clallam River is in late November or early December with their numbers increasing in February and continuing into May. Steelhead spawning occurs throughout the Clallam River watershed and generally begins in late February and is done by late May to early June. Steelhead may return to spawn more than once with female steelhead surviving as repeat spawners more often than males. Adults returning to saltwater after spawning are known as "kelts". Wild steelhead juveniles spend 1 to 4 years in freshwater before

migrating to sea as smolts but the majority of steelhead smolts are 2 year olds. When steelhead smolts enter saltwater they will move offshore quickly and will spend 1 to 4 years in the ocean before returning to their natal streams to complete the cycle.

Sea-run cutthroat will enter freshwater from July through August but fish returning to small rivers and streams draining directly to saltwater begin entering in November and peak in January-February. They try to avoid competition with other species such as steelhead and coho by spawning in headwater streams and in small tributaries of large and small streams. Cutthroat are capable of being repeat spawners. Spawn timing occurs from late winter and spring and can vary by geographic location. Cutthroat juveniles will rear in freshwater usually one to four years before migrating downstream as smolts. In saltwater, cutthroat will feed and migrate along the shoreline. Their run timing may coincide with the availability of salmon eggs in the stream.

Smolt migration timing in the Clallam River is assumed to be similar to that of similar-sized rainfall-dominated streams along the Western Strait of Juan de Fuca. Coho, steelhead, and cutthroat smolts have been monitored by WDFW at Snow Creek in Discovery Bay since 1977. Tribal and state fisheries staff have also documented smolt migration in other streams such as McDonald Creek, Siebert Creek, Ennis Creek, Valley Creek, Tumwater Creek, Little Hoko River, Deep Creek, and JimmyComeLately Creek. Smolt migration can begin as early as late March and typically peaks in May. Migration is completed by mid-to-late June.

The nearshore of Clallam Bay, including the estuary and spit, supports a number of diverse assemblages. All are defined by their high seasonal variability (Shaffer 2000). Nearshore habitats include mixed *Nereocystis*/ *Macrocystis/Egregia* spp. kelp beds, eelgrass (*Zostera marina*) beds, and mixed sand/gravel beds that are documented spawning areas for surf smelt, which spawn during spring and summer months, and sand lance, which spawn in winter and early spring months. Collectively known as forage fish, these are considered critical species for a number of salmonid and bird assemblages. The WDFW therefore manages for no net loss of spawning habitats of these species (WAC 220.110). The nearshore of Clallam Bay is also critical habitat important for migrating juvenile and adult salmonids and forage fish (Shaffer 2002, Moriarty et al 2002). A diverse array of bird species depend heavily on the lower Clallam River. Eagles use the area regularly. Numerous diving and dabbling marine and freshwater ducks and shorebirds depend on the lower river, side channel, and nearshore areas for foraging and refuge. More information on the biological function of this area would be very useful in understanding the biological linkages between the river, the nearshore, human activities along the lower river, and how they interact.

Management issues

The lower river and mouth have been repeatedly altered over time. Beach gravel was mined for road fill primarily from the eastern portion of the bay by private timber companies and Clallam County from the 1800's to as recently as the 1940's (Don Nordstrom, WADOT, and Bob Bowlby, pers comm.). The river mouth was also proposed for gravel mining in the early 1950's but the proposal was shelved due to local concerns that the mining, which would result in a dedicated river mouth to the east of the historic pier, would impede the river's ability to flush sewage and garbage dumped into the river by local citizens (Kramer 1952). The lower river area

was heavily used for logging support operations, including rail and pier structures during the early 1900's. The lower river alterations still in place include fill material, channelizing, diking, and undersized culverts and diversions.

Seasonal closures of the river mouth have been documented repeatedly over the last 100 years. It is not known if human activities have altered the frequency, timing, or duration of these closures. While a natural process, seasonal closure of the river mouth has been an ongoing concern for fish passage. To address fish passage concerns, permits for digging a river mouth were requested seven times between 1977 and 2002. All of these proposals received hydraulics permits, and all but one (a mitigation action performed by Crown Zellerbach) were funded with state or county public moneys. During this time all river mouth excavations were done in response to fish passage being completely blocked during the period of springtime out migration of smolts and kelts or in anticipation of the fall adult salmon returns. (Randy Johnson WDFW, pers comm.). In most instances the river mouth re-closed within days of being opened. The last man made breach closed back off within 24 hours (Rymer, pers comm.).

In addition to seasonally closing off, the river mouth meanders. It is the perception of local citizens that the river appears to have lost it's zeal for remaining at the western end of this portion of the bay and has migrated back and forth across the bay at an accelerated rate since the mid 1990's.

If they are occurring, reasons for change in river meander as well as change in frequency and duration of the river closing off may include: 1)Increase in sediment loads from forest practice activities; 2) Change in river hydrodyamics, including decreased dry-season river discharge due to changes in watershed hydrologic maturity and surface water withdrawals in the basin; 3) Alteration in the lower river course, including wood removal, culverts and dikes along the lower river, and associated decrease in floodplain connectivity and tidal prism and; 4) Change in elevation of the western portion of the bay due to rotation of a deep seated landslide.

Implications of seasonal closure and meandering of the river mouth to biological, and recreational resources

Biological. Salmonid spawning survey data over the last decade indicate that fish passage does not appear to be a compelling fish management issue for coho or steelhead stocks in the Clallam River during the low flow months when the river is bar bound. Coho spawning has been documented in a section of Charley Creek, a Clallam River tributary, since 1987 and Figure 3 shows the trend in the coho redd counts.

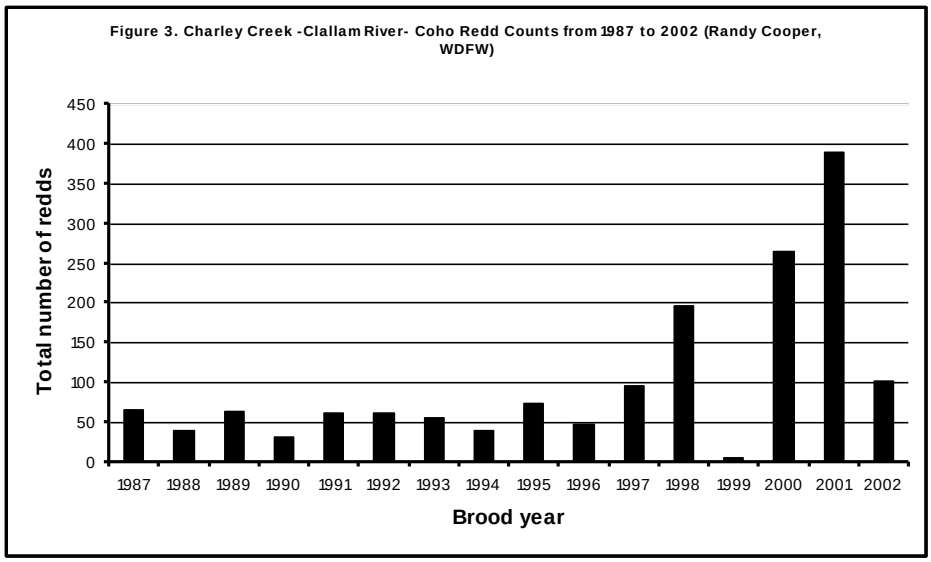


Figure 3 shows the distribution and coho redd densities (redds per mile) in Clallam river during the 2001-02 season. A total of 1,210 coho redds were counted in index sections surveyed by the Elwha S'Klallam Tribe and WDFW fisheries staff.

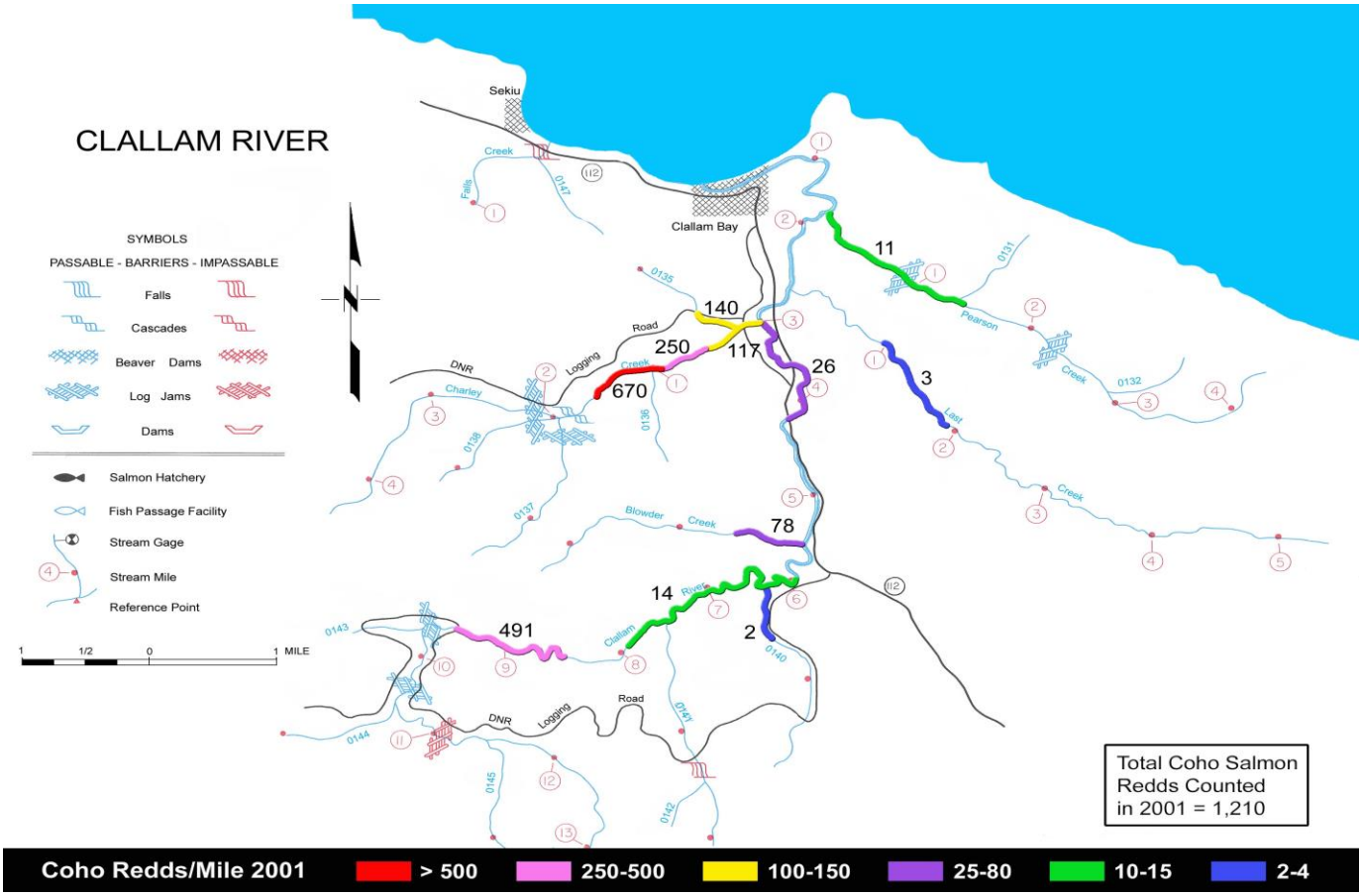


Figure 4. Clallam River 2001 coho spawner survey map, Mike McHenry, Elwha S'Klallam Tribe Randy Cooper, WDFW.

The Clallam River continues to support healthy coho stocks, and in fact, Charlie Creek, a tributary of the Clallam River, has among the highest coho spawner densities of any stream on the Olympic Peninsula. (Table 1. Randy Cooper, WDFW).

Table 1. Cumulative coho redd counts in index sections of Charley Creek (Clallam River tributary), Hoko River, Sekiu River tributaries, Pysht River tributaries, and Sadie Creek (East Twin River tributary) from 1987 to 2002.

Year	Charley Creek Coho redd count	Hoko River Coho redd count	Sekiu River tribs Coho redd count	Pysht R. tribs Coho redd count	Sadie Creek Coho redd count
1987	**66**	**76**	**19**	**94**	**11**
1988	**41**	**69**	**8**	**67**	**6**
1989	**65**	**55**	**17**	**107**	**34**
1990	**32**	**23**	**11**	**110**	**26**
1991	**62**	**29**	**9**	**77**	**11**
1992	**62**	**115**	**26**	**132**	**7**
1993	**56**	**35**	**24**	**137**	**10**
1994	**41**	**42**	**13**	**112**	**3**
1995	**74**	**108**	**37**	**221**	**20**
1996	**48**	**70**	**41**	**127**	**3**
1997	**96**	**54**	**14**	**125**	**8**
1998	**196**	**227**	**68**	**219**	**3**
1999	**7**	**103**	**53**	**220**	**12**
2000	**266**	**257**	**47**	**177**	**30**
2001	**389**	**375**	**94**	**440**	**44**
2002	**102**	**234**	**73**	**250**	**38**
Average	**100.2**	**117.0**	**34.6**	**163.4**	**16.6**
Average/ mile	**167/mile**	**55.7/mile**	**66.36/mile**	**108.9/mile**	**27.6/mile**

(WDFW Coho Redd Count Index Sections; Charley Creek Index (Clallam River) = River mile 0.9 to 1.5; Hoko River main stem Index = River mile 20.4 to 22.5; Sekiu River tribs Index = East Fork Carpenter Creek River mile 0 to 0.5 plus Carpenter CreekRiver mile 0 to 0.6; Pysht River tribs Index = South Fork Pysht River from River mile 5.7 to 7.2 plus Green Creek from River mile 1.0 to 2.2; Sadie Creek (East Twin River) =from Rivermile 1.6 to 2.2)

Autumn freshets are very important for upstream migrating adults. Sandercock (1991) reported that adult coho gather at the mouths of small coastal streams that have insufficient flows during the late summer and early autumn. Under these conditions, there is not enough energy from river flows to breach the sand bars that have accumulated across the mouths of the streams by wave action. Adult coho began moving upstream after the first high water event. A similar situation occurred in many streams in western Washington during 2002. Coho were observed congregating near the mouths and bays of smaller streams and in the lower reaches of larger river systems. At Snow Creek in Discovery Bay, adult coho showed a similar behavior. Although the mouth of Snow Creek was open during the low flow period, coho did not move upstream into the WDFW Snow Creek fish trap located at river mile 0.8 until the first autumn freshet on November 7. Due to the dry conditions of the surrounding watershed, Snow Creek flows quickly

dropped and returned to low levels within a couple of days. New adult coho did not move upstream into the trap until a month later when the next major freshet occurred. In a larger river system, coho and fall chinook (*O. tshawytscha*) were observed staging in large numbers in the lower Sol Duc and Quillayute rivers because of the extremely low river flows. After the November 7 rainfall, coho and chinook moved quickly upstream. Similarly, low water flows in Clallam River will also prevent fish from accessing spawning areas even if the mouth is open (Randy Cooper, WDFW, pers.comm.). This is a yearly event on several other streams here on the North Olympic Peninsula such as Siebert and McDonald Creeks.

Smolt outmigration and upstream and downstream migrating adult steelhead and cutthroat occur during March, April, May, and June. Spawned out steelhead and cutthroat (kelts) return in small numbers to saltwater, important because of their potential to return as repeat spawners. The river mouth does not completely close off during this critical time period very often but it should be monitored (Randy Cooper, WDFW, pers. comm.).

Local biologists have identified a number of limiting factors within the freshwater habitats that could be addressed to further increase productivity of Clallam River salmon populations. These include riparian restoration, in-channel large woody debris restoration projects, improving access though culvert removal/replacement, development of off-channel areas, removal of floodplain constrictions, and floodplain acquisition.

Sand lance spawning was documented in February 2003. Surf smelt spawning was documented on this beach summer in 2002, and juvenile smelt and salmon migration occurred along the kelp beds of this area of Clallam bay in 2002 (Moriary et al 2002, Shaffer 2002). These beaches are therefore critical habitat and must be managed according to state hydraulics guidelines.

Local citizen/recreational management concerns.

Recreational issues: In the course of the last year the river mouth has migrated west down the beach to just in front of the Clallam Bay state park foot bridge. This bridge is the pedestrian access to the beach from the park bathrooms and parking lot. At the request of Clallam County, WDFW issued a permit to Clallam County in September of 2002 to place large wood strategically to reduce river and marine energy on the bridge and path. DNR agreed the work should occur. The work was not conducted, and the landing and a portion of the foot path were lost. While the bridge is still sound, the path along the spit at the end and to the west of the bridge was temporarily eroded (portions subsequently began filling back in naturally), which affected pedestrian access. This led some local citizens to insist that the river mouth be reconstructed and maintained at the western border of the bay (Figure 5). These citizens feel this action will relieve riverine pressure at the foot of the bridge, reduce flooding in the side channel areas, and alleviate the perceived water quality problem in the lower river. It is important to note that some residents of the lower river take the opposite position, and are concerned about erosion of their shorelines if the western mouth is re-opened (Arstad et al. 2003, Appendix A).

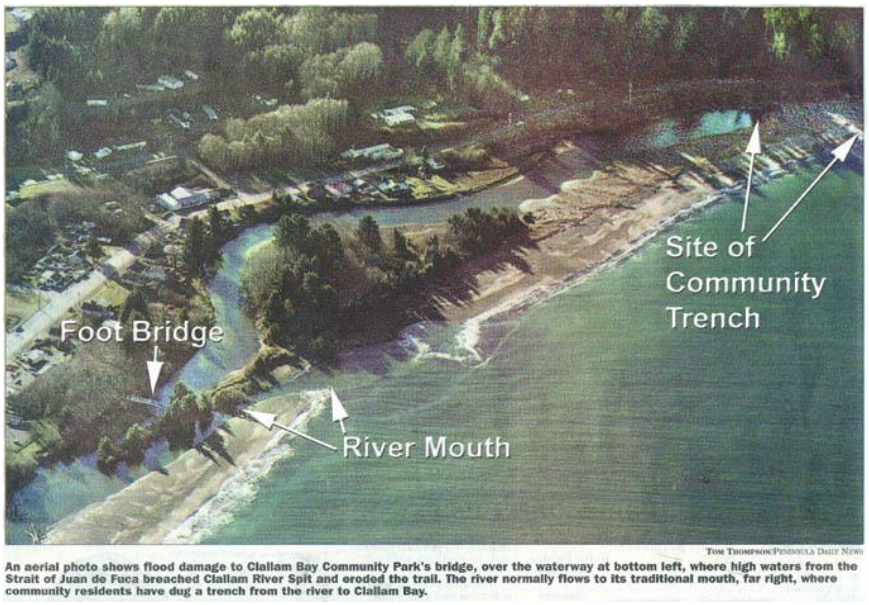


Figure 5. (Clallam River mouth, 9 January 2003; reprinted with permission from the Peninsula Daily News)

WDFW convened a technical committee with members of local, tribal, and state management agencies and interested local citizens (attendance list attached) to go over the technical and recreational issues of the river. The group met twice in January and February. Concerns with the citizen proposal to move the river mouth identified by the technical committee include:

1) The minor and temporary nature of erosion on the spit, which is a natural process;
2) Increased erosion to landowners along the lower river just upstream of the proposed river mouth location that would occur if the river mouth was moved to the identified location (Arstad et al. 2003, Appendix A). This is supported by WDFW permitting records, which reflect numerous bulkheading activities along these properties when the river mouth was in the proposed location (Johnson, pers comm.);
3) Disruptions to physical processes due to altering the river mouth, which may disrupt transport of riverine sediments and thereby result in the river closing off earlier in the year. This could disrupt biological functions that are currently intact as well as exacerbate both erosion and flooding of the lower river areas.
4) Environmental consequences of moving the river mouth, including impacts to smolt outmigration and steelhead migration, and surf smelt and sandlance habitat from trenching activities, as well as long term maintenance activities including armoring of lower river, dredging and armoring of lower river, and river mouth;
5) Economical economic consequences of long term maintenance, including channelizing, armoring, and dredging, all of which would likely be required to dedicate the river mouth to the western end as some citizens would prefer.

State and local officials agreed that moving the location of a river mouth for access was not an emergency, everyone agreed that maintaining access for recreation in a manner that does not impact the high quality functioning nearshore habitat is a top priority. The following short-term action was taken with this aim. On the group's recommendation, Clallam County revised its proposed project to rebuild access, and WDFW permitted the revised work. Work occurred

within the last three weeks, and included reconstructing the path and landing using native fill. Wood was anchored along the reconstructed area in an attempt to deflect future wave and riverine energy.

The local citizens have also submitted a JARPA to dig a 100' wide by 10' deep channel connecting the estuary with the western portion of the bay. Clallam County is the SEPA lead on this application. The WDFW has sent a SEPA hold letter to the citizens, as the project is incomplete until a SEPA determination has been made by the County. Long term work associated with breaching the bar would require a Shoreline Conditional Use Permit from Clallam County. An Emergency declaration could be declared by the County; however, after the emergency (high water season) passed, the work would have to be undone and the area restored, or the required shoreline permit applied for. Work in waters of the State also requires 401 Certification and breach proposals would need to be reviewed by the Corps of Engineers (Stewart, DoE, ,pers comm..).

Recommendations for long-term management of Clallam River and nearshore.

The group recommends the following priorities:

1) Diversify access so the beach can still be used if the bridge is closed. Access sites that are top priority include the Spring Tavern and private parcels between the lagoon and the highway. Pat, Bob, and June have had informal discussions with these land owners who are amenable to discussing selling;
2) Secure funding for acquisition of key properties that will allow restoration of lower river hydrologic processes;
3) Secure funding for monitoring of physical and biological processes in the estuary, including water quality and fish use;
4) Secure funding for monitoring of the deep-seated landslide on the western edge of the river mouth to determine its role in the relocation of the river mouth.

In summary, the Clallam River and nearshore is a highly functioning, highly-valued system. Meandering and seasonal closing of the river mouth are natural processes that are likely influenced by human alteration in many areas of the river. Historically, public agencies have permitted, and largely funded, activities to open the seasonally closed river mouth to alleviate fish passage concerns. Modification of the river mouth in attempt to alleviate public concerns over public access, however, is not recommended due to the minor and temporary impact to public access structures, and the significant environmental, liability, and economic concerns associated with the proposed modifying of the river mouth. The group as a whole will work to diversify access, restore lower river function, and further understand how the lower Clallam River ecosystem and humans interact for long term successful management of this highly functional and locally prized area.

References

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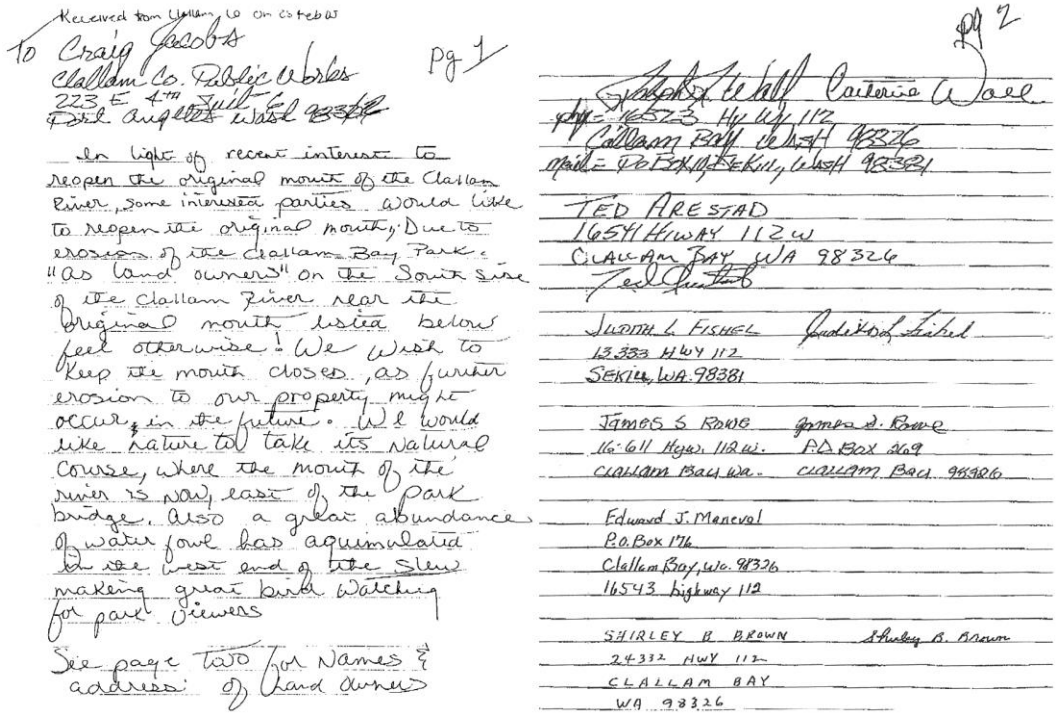
Appendix A. Arestad et al. February 2003 Land owner letter to Clallam County.



Received from Clallam Co on 03 Feb 03

To Craig Jacobs
Clallam Co. Public Works
223 E 4th St Ste 6
Port Angeles Wash 98362

Pg 1

In light of recent interest to reopen the original mouth of the Clallam River, some interested parties would like to reopen the original mouth. Due to erosion of the Clallam Bay Park, "as land owners" on the South side of the Clallam River near the original mouth listed below feel otherwise! We wish to keep the mouth closed, as further erosion to our property might occur, in the future. We would like nature to take its natural course, where the mouth of the river is now, east of the park bridge. Also a great abundance of water fowl has aquimulated in the west end of the Slew making great bird watching for park viewers

See page two for Names & address of land owners

Pg 2

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