Whatcom County

Grant No. G1000002

GRANT TITLE: Northwest Straits Project: Marine Resources Committee Administration and Action Projects

TASK NO: Task 3.2 Chuckanut Village Marsh monitoring

(___) ANNUAL REPORT
(___) WORK PLAN
(___) PROGRESS REPORT No. 1 ☐ No. 2 ☐ No. 3 ☐
(___) FINAL PROGRESS REPORT
(___) PROJECT COMPLETION REPORT
(_X_) SUMMARY REPORT
(___) TECHNICAL REPORT
(___) PROTOCOL
(___) QUALITY ASSURANCE/QUALITY CONTROL

PERIOD COVERED: July 1, 2009-June 30, 2011

DATE SUBMITTED: June 16, 2011

This report was funded in part through a cooperative agreement with the National Oceanic and Atmospheric Administration.

Summary Report

Task 3.2
Chuckanut Village Marsh Monitoring

Whatcom County Public Works – Natural Resources

June 16, 2011

For
Whatcom County Marine Resources

This report was funded in part through a cooperative agreement with the National Oceanic and Atmospheric Administration.

Project Title: Chuckanut Village Marsh Monitoring

Project Lead: Chris Fairbanks, Whatcom MRC
Erika Stroebel, Whatcom County Staff

Introduction:

The Whatcom County Marine Resources Committee (MRC) performed biological monitoring in the Chuckanut Village marsh area to measure the effectiveness of replacing a partial fish passage barrier culvert with an appropriately-sized box culvert. The MRC monitored use of the marsh by juvenile salmonids before and after the City of Bellingham removed the culvert in March of 2011. This project effectively involved the local community in restoration and monitoring, with 27 different community members contributing a total of 200 cumulative hours to the project.

Project Background:

Removal of an undersized culvert between Chuckanut Village Marsh and Chuckanut Bay estuary was first recommended by the Bellingham Bay Habitat Action Team, a Pilot Project of Department of Ecology, Port of Bellingham, City of Bellingham, Lummi Tribe, ReSources and other stakeholders and NGOs. The project was again recommended in the Whatcom County's Nearshore Assessment and Nearshore Habitat Restoration Prioritization reports funded through the Whatcom MRC in 2007. Funding for design and permitting was secured through the Whatcom MRC in 2008 and funding for construction was secured by the City of Bellingham through a grant from Washington State Department of Ecology. In October of 2009 a final plan for construction was completed and in March of 2011 the undersized culvert was replaced with an appropriately sized box culvert.

(http://www.cob.org/services/environment/restoration/chuckanut-village-marsh.aspx)

Chuckanut Creek and the Chuckanut Village Marsh are connected when the tidal elevation is greater than 6.6 feet above mean lower low water (MLLW). This occurs approximately 40 percent of the time (Bates *et al*. 2003) and during this period, the wetland habitat could become available as rearing habitat for juvenile salmonids. Although fish had been observed in the wetland channel before this project, none had been positively identified as salmon. The pre-existing culvert was 27 feet long with a 1.1% slope which, in a freshwater system would be determined to be a fish passage barrier using the level-A SSHEAR protocol (WDFW 2000). (However, because of tidal influence the SSHEAR protocol is not applicable.) The water velocity and direction in the culvert is variable depending on tidal stage. At times, the flow direction would assist salmon passing through this culvert and at other times the flow would exceed fish swimming speed and fish would not be able to pass through the culvert swimming against the water flow. Replacement of this undersized culvert with an appropriately sized box culvert combined with enhancement of the channel was intended to increase access by juvenile salmonids to rearing habitat in the wetland channels.

The Whatcom MRC was instrumental in development of the culvert removal project, which was aligned with the Northwest Straits Commission benchmarks for Marine Habitat and Marine Life as a local project that restored natural habitat processes for the benefit of salmonids. This monitoring project is also aligned with the Northwest Straits Commission benchmarks for both Science and Education & Outreach as the MRC recognized and filled an important data gap by collecting high quality data to verify effectiveness of a nearshore restoration project, simultaneously engaging the public in an active stewardship opportunity.

Project Objectives:

Objectives of this monitoring project:

- Monitor fish use of the marsh before and after removal of the fish passage barrier
- Engage the public in an active stewardship opportunity

Objectives of the culvert removal project:

- Build partnerships between local government, tribes, and citizen science organizations
- Remove vehicle access to a natural marine shoreline
- Restore marine riparian habitat
- Restore passage for juvenile salmon into a tidal saltmarsh

Project Implementation:

Who did the work?

MRC member Chris Fairbanks was the lead on this monitoring project with support from the Nearshore Subcommittee. Lummi Nation partnered in this monitoring by including the project under the Lummi Nation Dept of Natural Resources' ESA permit and providing support in the field.
The monitoring was made possible by the involvement of 27 different community members contributing a total of 200 cumulative hours to the project (Attachment A).

Figure 1. Volunteers at a Chuckanut Marsh monitoring event, spring 2010.

When?

Pre-project monitoring began in February of 2010 and ran through late June (Table 1). The project was constructed in March 2011 and post-project monitoring occurred late March through June 2011 (Table 2). Sampling dates were scheduled during the high tide events once during each spring-tide cycle at approximately two-week intervals.

As of this writing, one final monitoring date still remains to be completed on June 21, 2011. Data analysis will be completed after this last monitoring event.

Table 1. Chuckanut Village Marsh Monitoring Dates, 2010

DATE	TIDE (MLLW)	SET TRAP[1]	BEACH SEINE	CHECK TRAP[2]	REMOVE TRAP[2]
February 9	+ 7.8	11:30	12:00 noon	2:00 pm	3:30 pm
February 24	+ 8.4	11:00	12:00 noon	2:00 pm	2:30 pm
March 6	+ 8.5	8:00	9:00	11:00	11:30
March 24	+ 7.6	10:00	11:00	12:30 pm	1:00 pm
April 5	+ 6.9	9:00	10:00	11:00	11:30
April 21	+ 6.9	9:00	10:00	11:00	11:30
May 4	+ 6.2	8:00	9:00	10:30	11:00
May 18	+ 6.2	7:00	8:00	9:30	10:00
June 1	+ 7.3	6:15	8:00	8:30	9:00
June 16	+ 7.0	7:00	8:00	9:30	10:30
June 29	+ 6.6	6:00	7:00	8:00	8:30

Table 2. Chuckanut Village Marsh Monitoring Dates, 2011

DATE	**TIDE (MLLW)**	**SET TRAP[1]**	**BEACH SEINE**	**CHECK TRAP[2]**	**REMOVE TRAP[2]**
March 25	+8.0	8:00	9:00	11:00	11:30
April 11	+6.7	8:30	9:00	10:00	10:30
April 22	+7.7	7:00	8:30	10:00	10:30
May 6	+7.3	6:00	7:30	9:00	9:30
May 20	+7.7	6:00	7:30	9:00	9:30
June 7	+8.8 / +5.9	7:30	8:00	10:00	10:30
June 21	+8.6 / 5.3	8:00	8:30	10:00	10:30

Notes:

1. All times are **AM** unless otherwise noted
2. Estimated time for checking and removal
3. 2011 schedule revised March 25, 2011

Where?

Chuckanut Bay is one of seven pocket estuaries found within Bellingham Bay. Pocket estuaries are shallow, low energy shoreline areas that range from the mouths of small streams and creeks (such as Chuckanut Creek) to nearly enclosed bays and lagoons (such as Padden lagoon).

They can be composed of habitats such as unvegetated mud flats, salt marsh, tidal channels and estuarine wetlands. Cumulatively, pocket estuaries are very important to several life history stages of juvenile chum salmon and federally listed juvenile Chinook and steelhead salmon. Chuckanut Bay and adjacent lands also provide habitat for many species of wildlife, including Great Blue Heron.

Restoration at Chuckanut Village Marsh (Figure 2) was proposed based on an understanding of the ecological importance of this type of habitat and its scarcity locally. Numerous technical assessments attest to the importance of this type of marine habitat.

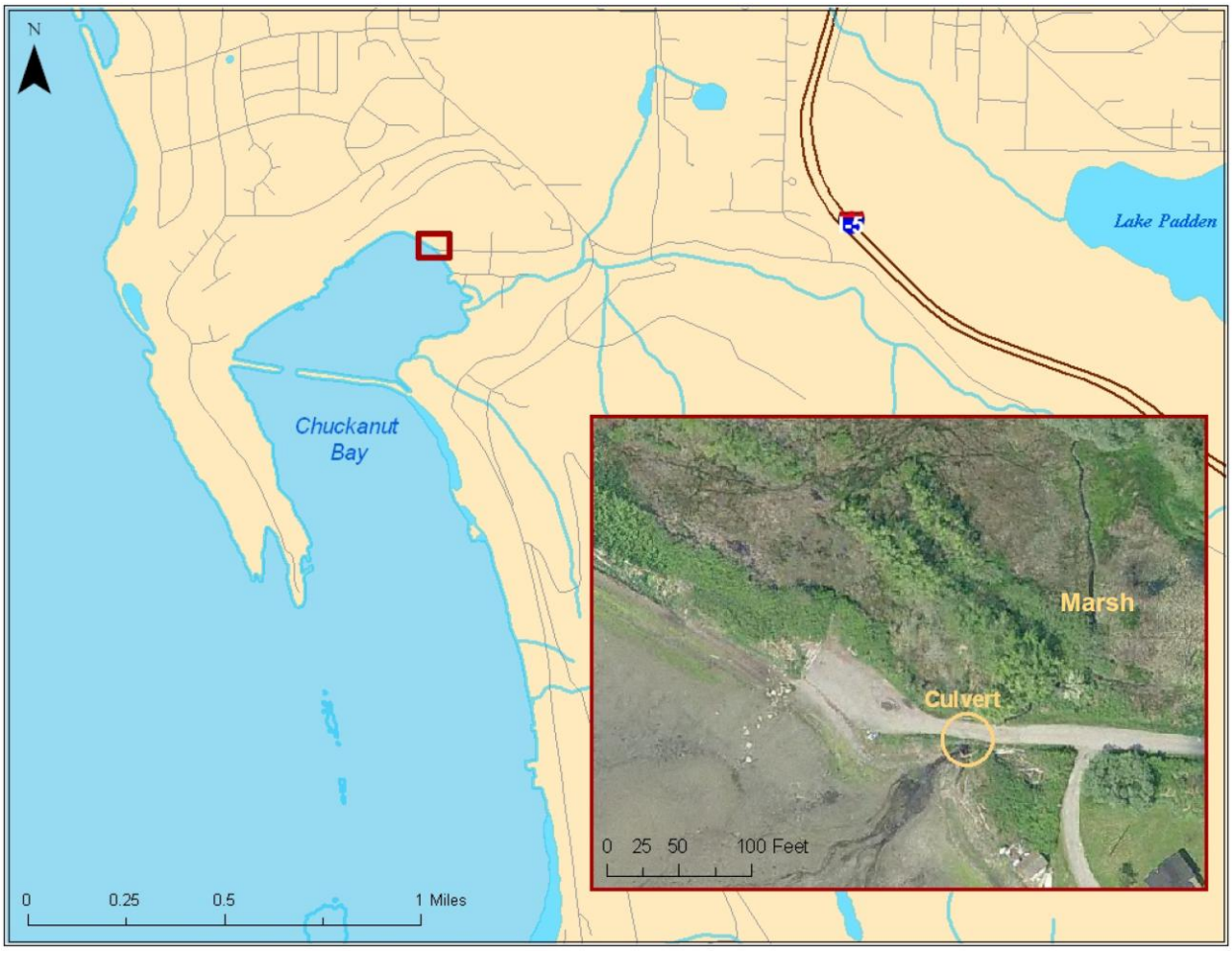

Figure 2. Chuckanut Village Marsh is located at the northern end of Chuckanut Bay. Photo inset shows the pre-restoration culvert, beach parking area and marsh.

Discussion:

An undersized culvert was a barrier to fish passage between the estuary at the mouth of Chuckanut Creek and a functioning salt marsh wetland that is valuable rearing habitat for juvenile salmon (Figure 3). The undersized culvert was replaced with a concrete box culvert that allowed for a natural stream bed to form at the base of the culver (Figure 4). Fish passage has been restored and the marine riparian zone has been replanted with native shrubs and grasses.

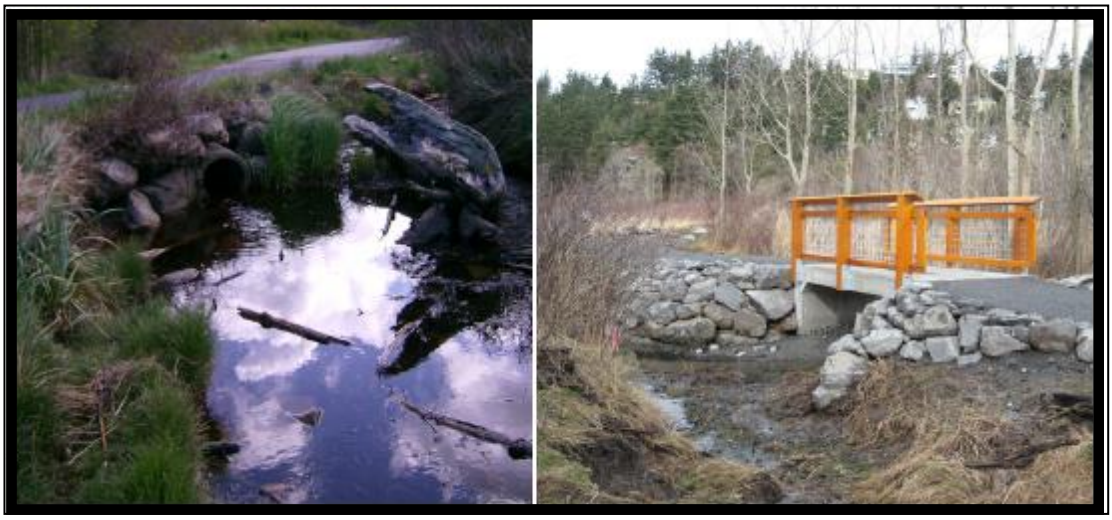

Figure 3. Undersized culvert, pre-restoration.

Figure 4. New box culvert, post-restoration.

Table 3 (below) lists the number of species of fish caught in the beach seine in the Chuckanut Bay estuary and with dip nets in the salt marsh during the 2010 monitoring events (before the culvert was replaced) and during the 2011 monitoring events (conducted after the culvert was replaced). Only one juvenile coho was caught in the marsh in 2010 compared with the 150 juvenile coho caught in the marsh in 2011. Additionally, four juvenile Chinook were also caught in the marsh in 2011. It is clear that juvenile salmon, particularly coho salmon, are using the salt marsh for rearing now that the fish passage barrier has been removed.

Table 3. Numbers of fish caught in the beach seine in the Chuckanut Bay estuary and with dip nets in the salt marsh during the 2010 and 2011 monitoring events.

Chuckanut Marsh Beach Seine Results 2010

	Total # by species							
	Chinook	**Chum**	**Coho**	**Staghorn sculpin**	**Sculpin unid.**	**3-spine Stickleback**	**Shiner perch**	**Starry flounder**
Beach seine	4	210	0	422	363	20	31	4
Marsh	0	0	1	2	1	111	0	

Chuckanut Marsh Beach Seine Results 2011

	Total # by species							
	Chinook	**Chum**	**Coho**	**Staghorn sculpin**	**Sculpin unid.**	**3-spine Stickleback**	**Shiner perch**	**Starry flounder**
Beach seine	11	488	0	25	459	11	1	2
Marsh	4	0	150	0	0	269	0	0

As of this writing, the monitoring dataset for 2011 is not yet complete. One final monitoring date remains on June 21, 2011. Following completion of this last monitoring event, a one-tailed t-test will be used to compare the average number of juvenile salmon captured between year-one, prior to culvert replacement and year-two post culvert replacement. The null hypothesis is that the average value will not be significantly different.

Although one monitoring event still remains, this monitoring project has already met both primary objectives:

- Fish use of the marsh before and after removal of the fish passage barrier was successfully monitored (Table 3).

- Twenty-seven members of the public were engaged in active stewardship opportunities contributing 200 volunteer hours (Attachment A).

Recommendations:

Salt marshes are valuable rearing habitat for juvenile salmon and fish passage into these habitats has been blocked by land-use practices. Removing fish passage barriers between salt marshes and marine habitat is often inexpensive and success can be easily documented. We recommend that future projects should identify barriers between historic salt marshes and then restore and enhance the passage for juvenile salmon between these habitats.

Attachments:

A. Chuckanut Monitoring Volunteer Hours
B. Chuckanut Village Marsh Photos by CD (Task 3.2)

References:

Bates, K., B. Barnard, B. Heiner, J.P. Klavas, and P.D. Powers. 2003. Design of road culverts for fish passage. Washington State Dept of Fish and Wildlife. Olympia WA.

Beamer, E., A. McBride, R. Henderson, and K. Wolf. 2003. The importance of non-natal pocket estuaries in Skagit Bay to wild Chinook salmon: An emerging priority for restoration. Skagit System Cooperative Reasearch Department. La Conner, WA. http://www.skagitcoop.org/documents/EB1579_Beamer_et_al_2003.pdf

Beamer, E., A. McBride, R. Henderson, J. Griffith, K. Fresh, T. Zackey, R. Barsh, T. Wyllie-Echeverria, and K. Wolf. 2006. Habitat and fish use of pocket estuaries in the Whidbey Basin and north Skagit County Bays, 2004 and 2005. Skagit System

Cooperative Reasearch Department. La Conner, WA..
http://www.skagitcoop.org/documents/EB2207_Beamer_et_al_2006.pdf

M. MacKay, Lummi Nation Department of Natural Resources, Fisheries Biologist. Telephone conversation, April 15, 2008.

Shreffler, D.K., C.A. Simenstad, and R.M. Thom. 1992. Forging by juvenile salmon in a restored estuarine wetland. Estuaries; 15:2.

Washington State Depart of Fish and Wildlife (WDFW) 2000. Fish passage barrier and surface water diversion screening assessment and prioritization manual. WDFW Habitat Program. Olympia, WA.

StreamNet. 2008. Data query accessed February 6, 2008. http://www.streamnet.org

Attachment A
Whatcom County Marine Resources Committee
Task 3.2

Chuckanut Village March Monitoring - Volunteer Hours
February through June 2010 and 2011

Whatcom MRC Chuckanut Volunteers				
Name	**Date**	**Event**	**Hours**	**Task**
Alan Chapman	4/22/2011	Chuckanut Village Marsh Monitoring	1.5	3.2
Alan Chapman	5/5/2011	Chuckanut Village Marsh Monitoring	2.5	3.2
Atina Casas	6/2/2011	Chuckanut Village Marsh Monitoring	3	3.2
Bert Rubash	4/21/2010	Chuckanut Village Marsh Monitoring	2	3.2
Bert Rubash	3/25/2011	Chuckanut Village Marsh Monitoring	2.5	3.2
Bert Rubash	4/22/2011	Chuckanut Village Marsh Monitoring	1.5	3.2
Bert Rubash	5/5/2011	Chuckanut Village Marsh Monitoring	2.5	3.2
Bert Rubash	6/7/2011	Chuckanut Village Marsh Monitoring	1.5	3.2
Bob Cecile	4/22/2011	Chuckanut Village Marsh Monitoring	1.5	3.2
Bob Cecile	5/5/2011	Chuckanut Village Marsh Monitoring	2.5	3.2
Cheryl Lovato Niles	3/25/2011	Chuckanut Village Marsh Monitoring	2.5	3.2
Cheryl Lovato Niles	5/20/2011	Chuckanut Village Marsh Monitoring	1.5	3.2
Cheryl Lovato-Niles	3/23/10	Chuckanut Village Marsh Monitoring	1	3.2
Cheryl Lovato-Niles	5/4/2010	Chuckanut Village Marsh Monitoring	2	3.2
Chris Brown	4/5/2010	Chuckanut Village Marsh Monitoring	2	3.2
Chris Brown	4/21/2010	Chuckanut Village Marsh Monitoring	2	3.2
Chris Brown	5/4/2010	Chuckanut Village Marsh Monitoring	2	3.2
Chris Brown	6/1/2010	Chuckanut Village Marsh Monitoring	2	3.2
Chris Brown	3/25/2011	Chuckanut Village Marsh Monitoring	2.5	3.2
Chris Brown	4/22/2011	Chuckanut Village Marsh Monitoring	1.5	3.2
Chris Brown	5/5/2011	Chuckanut Village Marsh Monitoring	2.5	3.2
Chris Brown	5/20/2011	Chuckanut Village Marsh Monitoring	1.5	3.2
Chris Brown	6/7/2011	Chuckanut Village Marsh Monitoring	1.5	3.2
Chris Fairbanks	2/4/10	Chuckanut Village Marsh Monitoring	4	3.2
Chris Fairbanks	4/5/2010	Chuckanut Village Marsh Monitoring	2	3.2
Chris Fairbanks	3/25/2011	Chuckanut Village Marsh Monitoring	2.5	3.2
Chris Fairbanks	4/11/2011	Chuckanut Village Marsh Monitoring	2.5	3.2
Chris Fairbanks	3/3/2011	Prep for Chuckanut Monitoring	6	3.2
Chris Fairbanks	4/11/2011	Chuckanut Village Marsh Monitoring	2.5	3.2
Chris Fairbanks	4/22/2011	Chuckanut Village Marsh Monitoring	1.5	3.2
Chris Fairbanks	5/5/2011	Chuckanut Village Marsh Monitoring	2.5	3.2
Chris Fairbanks	5/20/2011	Chuckanut Village Marsh Monitoring	1.5	3.2
Chris Fairbanks	6/7/2011	Chuckanut Village Marsh Monitoring	1.5	3.2
Chris Fairbanks	4/14/2011	Prep for Chuckanut Monitoring	6	3.2
Chris Fairbanks	5/5/2011	Chuckanut events + data analysis	8	3.2
Dakota Stroebel	5/20/2011	Chuckanut Village Marsh Monitoring	1.5	3.2
Don Kruse	5/20/2011	Chuckanut Village Marsh Monitoring	1.5	3.2
Don Kruse	6/7/2011	Chuckanut Village Marsh Monitoring	1.5	3.2
Doug Stark	4/11/2011	Chuckanut Village Marsh Monitoring	1	3.2
Doug Stark	4/11/2011	Chuckanut Village Marsh Monitoring	1	3.2
Doug Stark	5/20/2011	Chuckanut Village Marsh Monitoring	1.5	3.2

Elizabeth Kilanowski	4/21/2010	Chuckanut Village Marsh Monitoring	2	3.2
Elizabeth Kilanowski	3/25/2011	Chuckanut Village Marsh Monitoring	2.5	3.2
Elizabeth Kilanowski	4/22/2011	Chuckanut Village Marsh Monitoring	1.5	3.2
Elizabeth Kilanowski	6/7/2011	Chuckanut Village Marsh Monitoring	1.5	3.2
Erika Stroebel	5/20/2011	Chuckanut Village Marsh Monitoring	1.5	3.2
Gene Hoerauf	3/23/10	Chuckanut Village Marsh Monitoring	1.5	3.2
Gene Hoerauf	4/21/2010	Chuckanut Village Marsh Monitoring	2	3.2
Gene Hoerauf	5/4/2010	Chuckanut Village Marsh Monitoring	2	3.2
Gene Hoerauf	5/18/2010	Chuckanut Village Marsh Monitoring	2	3.2
Gene Hoerauf	6/1/2010	Chuckanut Village Marsh Monitoring	2	3.2
Gene Hoerauf	3/25/2011	Chuckanut Village Marsh Monitoring	2.5	3.2
Gene Hoerauf	4/11/2011	Chuckanut Village Marsh Monitoring	2.5	3.2
Gene Hoerauf	4/22/2011	Chuckanut Village Marsh Monitoring	1.5	3.2
Gene Hoerauf	5/5/2011	Chuckanut Village Marsh Monitoring	2.5	3.2
Gene Hoerauf	5/20/2011	Chuckanut Village Marsh Monitoring	1.5	3.2
Gene Hoerauf	6/7/2011	Chuckanut Village Marsh Monitoring	1.5	3.2
Ginny Broadhurst	5/5/2011	Chuckanut Village Marsh Monitoring	2.5	3.2
Henry Niles	5/20/2011	Chuckanut Village Marsh Monitoring	1.5	3.2
Jamie Michel	3/23/10	Chuckanut Village Marsh Monitoring	1.5	3.2
Jamie Michel	5/18/2010	Chuckanut Village Marsh Monitoring	2	3.2
Jamie Michel	4/11/2011	Chuckanut Village Marsh Monitoring	2.5	3.2
Jamie Michel	4/11/2011	Chuckanut Village Marsh Monitoring	2.5	3.2
Jamie Michel	4/22/2011	Chuckanut Village Marsh Monitoring	1.5	3.2
Jane Lewinski	3/23/10	Chuckanut Village Marsh Monitoring	1.5	3.2
Jane Lewinski	4/5/2010	Chuckanut Village Marsh Monitoring	2	3.2
Jane Lewinski	4/21/2010	Chuckanut Village Marsh Monitoring	2	3.2
Jane Lewinski	5/4/2010	Chuckanut Village Marsh Monitoring	2	3.2
Jane Lewinski	5/18/2010	Chuckanut Village Marsh Monitoring	2	3.2
Jane Lewinski	6/1/2010	Chuckanut Village Marsh Monitoring	2	3.2
Jeanne Bogert	3/23/10	Chuckanut Village Marsh Monitoring	1.5	3.2
Jeanne Bogert	4/21/2010	Chuckanut Village Marsh Monitoring	2	3.2
Jeanne Bogert	5/4/2010	Chuckanut Village Marsh Monitoring	2	3.2
Jeanne Bogert	5/18/2010	Chuckanut Village Marsh Monitoring	2	3.2
Jeanne Bogert	6/1/2010	Chuckanut Village Marsh Monitoring	2	3.2
Keith Doran	5/20/2011	Chuckanut Village Marsh Monitoring	1.5	3.2
Kim Checkerstrom	5/5/2011	Chuckanut Village Marsh Monitoring	2.5	3.2
Kristine Penrod	3/23/10	Chuckanut Village Marsh Monitoring	1.5	3.2
Kristine Penrod	4/21/2010	Chuckanut Village Marsh Monitoring	2	3.2
Kristine Penrod	6/1/2010	Chuckanut Village Marsh Monitoring	2	3.2
Kristine Penrod	3/25/2011	Chuckanut Village Marsh Monitoring	2.5	3.2
Lisa Balton	3/23/10	Chuckanut Village Marsh Monitoring	1	3.2
Lisa Balton	4/21/2010	Chuckanut Village Marsh Monitoring	2	3.2
Lisa Balton	6/1/2010	Chuckanut Village Marsh Monitoring	2	3.2
Lisa Balton	4/11/2011	Chuckanut Village Marsh Monitoring	2.5	3.2
Lisa Balton	4/11/2011	Chuckanut Village Marsh Monitoring	2.5	3.2
Lisa Balton	5/5/2011	Chuckanut Village Marsh Monitoring	2.5	3.2
Maria Niles	3/25/2011	Chuckanut Village Marsh Monitoring	2.5	3.2

Attachment A
Whatcom County Marine Resources Committee
Task 3.2

Marie Hitchman	4/5/2010	Chuckanut Village Marsh Monitoring	2	3.2
Marie Hitchman	6/1/2010	Chuckanut Village Marsh Monitoring	2	3.2
Renee LaCroix	5/5/2011	Chuckanut Village Marsh Monitoring	2.5	3.2
Ron Roberts	5/18/2010	Chuckanut Village Marsh Monitoring	2	3.2
Shelley Halle	4/21/2010	Chuckanut Village Marsh Monitoring	2	3.2
Shelley Halle	5/4/2010	Chuckanut Village Marsh Monitoring	2	3.2
Sue Roberts	5/18/2010	Chuckanut Village Marsh Monitoring	2	3.2
		TOTAL Vounteer Hours 2010 & 2011	**201**	