APPENDIX A- Summary of Sockeye Weir Count Methods Used (1977-2003).

Appendix A- Summary of Sockeye Weir Count Methods Used (1977-2003)						
YEAR	**Method**	**Start Date**	**End Date**	**Potential errors**	**Dataset Available**	**Source**
1977	N = n + harvest. Weir was made of net weighted to bottom by lead line and chain. Counts from dusk to dawn with 24-hour counts only made bi-weekly from platform over illuminated counting board. Assumed there were no daytime migrants, weir presumably left open during day but unknown (Rob Snyder notes that it was mostly left open).	~5/14/1977	~8/10/1977	Missed early portion of the run, daytime migrants, weir not fish tight, potential no collected for multiple days within survey period	NO	Dlugokenski et al. (1981)
1978	N = n + harvest. Weir was made of net weighted to bottom by lead line and chain. Counts from dusk to dawn with no documented 24-hour counts. Assumed there were no daytime migrants, weir presumably left open during day but unknown (Rob Snyder notes that it was mostly left open).	~5/24/1978	~8/8/1978	Missed the majority of May counts, daytime migrants not monitored, weir may have not been fish tight, 60 fish were counted transiting the weir on May 16 and 17 prior to full scale monitoring	Partial dataset available	Dlugokenski et al. (1981)
1979	N = n + harvest. Weir was made of net weighted to bottom by lead line and chain. Counts from dusk to dawn with no documented 24-hour counts. Assumed there were no daytime migrants, weir presumably left open during day but unknown (Rob Snyder notes that it was mostly left open).	~5/20/1979	~8/8/1979	Missed a large portion of the May counts at least several fish per night were passing the weir prior to installation, daytime migrants not monitored, weir may have not been fish tight.	NO	Dlugokenski et al. (1981)

Appendix A- Summary of Sockeye Weir Count Methods Used (1977-2003)

YEAR	Method	Start Date	End Date	Potential errors	Dataset Available	Source
1980	Partial count N=n+havest, where n= n/p where p = proportion of fish transiting the weir between June 5 and June 24. Weir was made of net weighted to bottom by lead line and chain. Counts from dusk to dawn with no documented 24-hour counts. Assumed there were no daytime migrants, weir presumably left open during day but unknown (Rob Snyder notes that it was mostly left open).	?	?	Model is fairly inaccurate since it has the errors associated with the total counts described above. The potential errors in methods in 1977-1979 are also applicable to the daily counts in 1980	NO	Dlugokenski et al. (1981)
1981	Partial count N=n+havest, where n= n/p where p = proportion of fish transiting the weir between June 5 and June 24. Weir was made of net weighted to bottom by lead line and chain. Counts from dusk to dawn with no documented 24-hour counts. Assumed there were no daytime migrants, weir presumably left open during day but unknown (Rob Snyder notes that it was mostly left open). At least two days within the monitoring period were unmonitored.	6/8/1981	7/8/1981	Model is fairly inaccurate since it has the errors associated with the total counts described above. The potential errors in methods in 1977-1979 are also applicable to the daily counts in 1980	Yes- based upon plotted data taken off of graph	MFM 1981C
1982	Partial count N=n+havest. Weir was made of pickets with attached live trap. Counts are probably much better than in the years prior to 1982. Assumed that counts represent close to all fish transiting the weir (24 hour monitoring).	Deployed 5/21/1982; 24-hr counts 6/9/1982	8/17/1982	No expansion was done for missing data in April, May, or the first part of June- sporadic data for a few weeks prior to June 9.	Yes	MFM 1982B; Yellow Field Notebook Data
1983	No counts conducted due to lack of funding.	na	na	na	na	MFM 1983A
1984	Partial count N=n/p+havest. Where p was derived from the Dlugokenski model and dataset. Weir was made of pickets with attached live trap. Counts are probably much better than in the years prior to 1982. Assumed that counts represent close to all fish transiting the weir (24 hour monitoring).	6/19/1984	8/7/1984	Missed over half of June and all of May and April-	Yes	MFM 1984A
1985	No counts conducted.	na	na	na	na	LaRiviere 1991

Appendix A- Summary of Sockeye Weir Count Methods Used (1977-2003)

YEAR	Method	Start Date	End Date	Potential errors	Dataset Available	Source
1986	Counts conducted but no records could be found.	?	?	No records for RY 1986	NO	na
1987	No counts conducted.	na	na	na	na	LaRiviere 1991
1988	Partial count N=n/p. Where p was derived from the Dlugokenski model but data used for expansion were from the 1982 and 1984 weir datasets. The same full spanning picket weir was used in 1988 but no trap was attached. Fish were counted as the passed over an illuminated 3ft long, white, counting board by observers stationed on a small observation platform. The weir was installed just upstream of the ONP footbridge. Fish were counted from 2000 hr to 0600 hr. The weir was closed during non-observer time periods 0600 hr to 2000 hr. In conjunction with these observations a hydroaccoustic method was also employed but failed to yield adequate data.	6/27/1988	6/29/1988	Only three days of weir data collected, errors in expansion are likely huge	Yes	LaRiviere 1991
1989	Partial count N=n/p. Where p was derived from the Dlugokenski model but data used for expansion were from the 1982 and 1984 weir datasets. The same full spanning picket weir was used in 1989. A trap was attached for one night of monitoring. Fish were counted as the passed over an illuminated 3ft long, white, counting board by observers stationed on a small observation platform. The weir was installed just upstream of the ONP footbridge. Fish were counted from 2000 hr to 0600 hr. The weir was closed during non-observer time periods (0600 hr to 2000 hr).	6/19/1989	6/30/1989	Only 10-11 days worth of data were collected. Expansion relies on years with incomplete weir datasets.	Yes	LaRiviere 1991

Appendix A- Summary of Sockeye Weir Count Methods Used (1977-2003)

YEAR	Method	Start Date	End Date	Potential errors	Dataset Available	Source
1990	Partial count N=n/p. Where p was derived from the Dlugokenski model but data used for expansion were from the 1982 and 1984 weir datasets. The same full spanning picket weir was used in 1990. A trap was attached for trapping and approximately 17% of the sockeye counted past the weir were caught in the trap. In general, fish were counted as the passed over an illuminated 3ft long, white, counting board by observers stationed on a small observation platform. The weir was installed just upstream of the ONP footbridge. Fish were counted from 2000 hr to 0600 hr. The weir was closed during non-observer time periods (0600 hr to 2000 hr).	6/7/1990	8/11/1990	Weir fish 4-5 days per/week and left closed for up to 48 hrs at a time. This likely decreased the rate at which sockeye were detected. Expansion based upon partial dataset expansions.	Yes	LaRiviere 1991
1991	Partial count N=n/p. Where p was derived from the Dlugokenski model but data used for expansion were from the 1982 and 1984 weir datasets. The same full spanning picket weir was used in 1991. A trap was attached for trapping, but most fish were enumerated as they passed over an illuminated, white counting board. Observers were stationed on the ONP footbridge and were ably to open and close attached trap with ropes and pulleys. Fish tight by 5-23-1991 (although report mentions that smaller fish could squeeze through the pickets). On 5/23, 24, &27, fish were passed from 0430 to 0700 and from 2200 - 0000. From 5-29 - 6/17, 6/24 - 7/3, 7/10 - 7/12 fish were passed once daily from 0500-0700. From 5-29 - 6/17, 6/24 - 7/3, 7/10 - 7/12 fish were passed once daily from 0500-0700 every other day in early morning. Weir monitoring was de-emphasized from 7/3 - 7/12, fish were counted every other morning and the weir was left open.	5/23/1991	7/12/1991	Model only uses data from 6-19-1991 through the 30th. No data available to compare run-shape with other years. Several potential errors associated with the RY 1991 run-size estimate. Only 10 or 11 day's worth of data used in expansion.	No	Drange and LaRiviere 1991

Appendix A- Summary of Sockeye Weir Count Methods Used (1977-2003)

YEAR	Method	Start Date	End Date	Potential errors	Dataset Available	Source
1992	Partial count N=n/p. Where p was derived from the Dlugokenski model but data used for expansion were from the 1982 and 1984 weir datasets. The same full spanning picket weir was used in 1992. No trap was used to capture fish in 1992. Observers were presumably stationed on the ONP footbridge and able to count sockeye passing over a counting board (field report lacked sufficient method details). Fish were breeching weir between 5-29-1992 and 6-14-1992. Weir was left closed but sockeye were noted as burrowing under the weir pickets.	5/29/1992	7/9/1992	Closing weir at night likely decreased weir detection accuracy by fish by-passing the weir. Expansion uses less than half of the actual fish counted. The same issues of using partial datasets to expanded for partial datasets also applies to the original 1992 run-size estimate. 10-11 days of data used to generate total run-size.	Yes	MFM, 1992 Report of Activities
1993	Counts conducted but no records could be found.	?	?	No records for RY 1993	NO	na
1994	Counts conducted but no reports could be found	6/6/1994	7/15/1994	Same as 1989-1995	Yes	MFM Data Files
1995	Counts conducted but no records could be found.	?	?	No records for RY 1995	NO	na
1996	Partial count N=n/p. Where p was derived from the Dlugokenski model. The Ozette River counting weir was installed at the same location as used in RY 1989-1995. Weir setup and installation was similar to that used during RY 1989-1995. The weir was closed during the daytime (typically from 0500 to 23:00) and at other non-observer time periods. Data from the weir is available for 12 complete "days" between June 18th and June 29th. The data are currently only available in the form of daily counts. No daytime data are present within the dataset.	6/18/1996	6/29/1996	Fish were burrowing between pickets when weir was closed Dave Easton saw at least 10 sockeye bypass the weir during daylight hours.	Yes	MFM Data Files; Haggerty 2004F

Appendix A- Summary of Sockeye Weir Count Methods Used (1977-2003)

YEAR	Method	Start Date	End Date	Potential errors	Dataset Available	Source
1997	Partial count N=n/p. Where p was derived from the Dlugokenski model. The Ozette River counting weir was installed at the same location as used in RY 1989-1996. Weir setup and installation was similar to that used during RY 1998. However, only visual observers monitored the weir during RY 1997. The weir was closed during the daytime (typically from 06:00 to 22:00) and at other non-observer time periods. Data from the weir is available for 18 complete "days" between June 10th and June 30th. The data are currently only available in the form of daily counts. No daytime data are present within the dataset.	6/9/1997	7/1/1997	Potential errors are outlined in Haggerty 2004F; main issues are related to the proportion of sockeye transiting the weir which are detected by the methods employed.	Yes	MFM Data Files; Haggerty 2004F
1998	N=(R*V) +C (as described in MFM 2000). Where R represented the ratio of sockeye transits observed by visual observers vs. the number detected by camera method, used to expand for observer detection rate. The Ozette River counting weir was installed on May 5, 1998, in the upper river at the Olympic National Park foot bridge (located near the lake outlet; this is same location as used in RY 1999-2004. Weir setup and installation was similar to that used in past years. Both visual observers and a time-lapse VCR system were used to enumerate sockeye transiting the weir. Makah Fisheries Management (2000) stated that the weir was monitored from May 5, 1998 through August 6, 1998. However, field notes and data files indicate that data were collected at the weir from May 7th through August 6, 1998. Visual observers were stationed at the weir starting May 7th and ending July 2, 1998. The video system was operated from June 16th through August 6, 1998.	5/7/1998	7/2/1998	Potential errors are outlined in Haggerty 2004F; main issues are related to the proportion of sockeye transiting the weir which are detected by the methods employed.	Yes	MFM Data Files; Haggerty 2004F

Appendix A- Summary of Sockeye Weir Count Methods Used (1977-2003)

YEAR	Method	Start Date	End Date	Potential errors	Dataset Available	Source
1999	N=(R*V) +C (as described in MFM 2000). Where R represented the ratio of sockeye transits observed by visual observers vs. the number detected by camera method, used to expand for observer detection rate. The Ozette River counting weir was installed on April 30, 1999 in the upper river at the Olympic National Park foot bridge. Weir setup and installation was similar to that used during RY 1998. Both visual observers and a time-lapse VCR system were used to enumerate sockeye transiting the weir. The video system operated for a total of 153 days from May 1, 1999 to September 30, 1999. In addition to the video system observers were stationed at the weir opening between 2200 and 0700 beginning April 30, 1999 and ending August 6, 1999.	5/1/1999	9/30/1999	Potential errors are outlined in Haggerty 2004F; main issues are related to the proportion of sockeye transiting the weir which are detected by the methods employed.	Yes	MFM Data Files; Haggerty 2004F
2000	See Haggerty 2005D for detailed methods used for calculating N. The Ozette River counting weir was installed on April 19, 200 in the upper river at the Olympic National Park foot bridge. Weir setup and installation was similar to that used during RY 1998 and 1999. Both a time-lapse VCR system and a trap were used to enumerate sockeye transiting the weir. The video system and trap were operated from April 19, 2000 through August 12, 2000.	4/19/2000	8/12/2000	Potential errors are outlined in Haggerty 2005D; main issues are related to the proportion of sockeye transiting the weir which were detected by the video system, some missing time expansion.	Yes	MFM Data Files; Haggerty 2005D

Appendix A- Summary of Sockeye Weir Count Methods Used (1977-2003)

YEAR	Method	Start Date	End Date	Potential errors	Dataset Available	Source
2001	See Haggerty 2005C for detailed methods used for calculating N. The Ozette River counting weir was installed on April 30, 2001 in the upper river at the Olympic National Park foot bridge. Weir setup and installation was similar to that used during 2000 but included an attached smolt screw trap and an adult trap located along the right bank. *Vexar* screen in trap limited viewing conditions for part of the return. Lighting issues also played a role in limiting image quality at times. Both a time-lapse VCR system and a trap were used to enumerate sockeye transiting the weir.	4/30/2001	8/18/2001	Potential errors are outlined in Haggerty 2005C; main issues are related to the proportion of sockeye transiting the weir which were detected by the video system, some missing time expansion.	Yes	MFM Data Files; Haggerty 2005C
2002	See Haggerty 2005A for detailed methods used for calculating N. The Ozette River counting weir was installed on April 11, 2002 in the upper river at the Olympic National Park foot bridge. Weir setup and installation was similar to that used during 2001 but didn't include an adult trap Both a time-lapse VCR system and a computer hard drive and software system were used to enumerate sockeye transiting the weir.	4/11/2002	8/14/2002	Potential errors are outlined in Haggerty 2005A; main issues are related to the proportion of sockeye transiting the weir which were detected by the video system vs. hard drive system, missing time expansion.	Yes	MFM Data Files; Haggerty 2005A
2003	See Haggerty 2005B for detailed methods used for calculating N. The Ozette River counting weir was installed on May 12, 2003 in the upper river at the Olympic National Park foot bridge. Weir setup and installation was similar to that used during 2002. Both a time-lapse VCR system and a computer hard drive and software system were used to enumerate sockeye transiting the weir.	5/12/2003	8/12/2003	Potential errors are outlined in Haggerty 2005C; main issues are related to the proportion of sockeye transiting the weir which were detected by the video system, some missing time expansion.	Yes	MFM Data Files; Haggerty 2005B

APPENDIX B-Summary of Sockeye Run-Size Estimates for RY (1977-1995)

	High Detection (90%)			Moderate Detection (70%)			Low Detection (50%)				
YEAR	Average DRP	1998 DRP LATE	2000 DRP EARLY	Average DRP	1998 DRP LATE	2000 DRP EARLY	Average DRP	1998 DRP LATE	2000 DRP EARLY	Median	n=
1977	2,141	1,517	3,730	2,752	1,950	4,795	3,853	2,730	6,713	2,752	666
1978	1,584	1,355	2,398	2,037	1,742	3,083	2,851	2,439	4,317	2,398	844
1979	1,038	736	1,809	1,335	946	2,326	1,869	1,324	3,256	1,335	323
1980	820	581	1,428	1,054	747	1,836	1,475	1,045	2,570	1,054	255
1981	668	468	1,554	858	602	1,998	1,202	843	2,797	858	239
1982	4,131	3,409	6,375	na	na	na	na	na	na	4,131	2122
1983	na	na	na	na	na	na	na	na	na	na	na
1984	2,474	2,325	5,639	na	na	na	na	na	na	2,474	518
1985	na	na	na	na	na	na	na	na	na	na	na
1986	na	na	na	na	na	na	na	na	na	na	na
1987	na	na	na	na	na	na	na	na	na	na	na
1988	7,599	4,661	25,554	9,770	5,992	32,855	13,678	8,389	45,997	9,770	218
1989	1,304	812	4,257	1,677	1,043	5,473	2,347	1,461	7,663	1,677	143
1990	560	407	1,141	719	523	1,467	1,007	732	2,053	732	174
1991	1,520	991	5,044	1,955	1,274	6,486	2,736	1,783	9,080	1,955	182
1992	2,870	2,315	4,222	3,690	2,976	5,429	5,166	4,167	7,600	4,167	1182
1993	na	na	na	na	na	na	na	na	na	na	na
1994	728	565	1,371	936	727	1,762	1,311	1,018	2,467	1,018	213
1995	na	na	na	na	na	na	na	na	na	na	na

DRP= Daily Run Proportion.

APPENDIX C- Summary Table of Annual Lake Ozette Sockeye Beach Spawning Ground Surveys.

Appendix C- Summary table of annual Lake Ozette sockeye beach spawning ground surveys.						
Return Year	**Lake Survey or Capture Site**	**Date**	**Observation or Capture Comments**	**Information Source**	**BROOD YEAR**	**Peak Count or No. of Collections**
1973	Ozette beaches	1/10/1974	The only area sockeye spawning was observed in was along Olsen's Beach. Five dead and one live sockeye observed	J. Meyer written communication in Bortleson and Dion 1979	A	6
1976	West Shore	11/9/1976	Spawning ground survey from Elk Creek north to Preachers Point- No sockeye observed.	Bortleson and Dion 1979	D	0
1976	Ericson's Bay	11/9/1976	Spawning ground survey of Ericson's Bay- No sockeye observed	Bortleson and Dion 1979	D	0
1976	Olsen's Beach	2/8/1977	Spawning ground survey of Olsen's Beach- 6-10 live and 1 dead sockeye observed along with 6 redds in 1-2ft of water.	Bortleson and Dion 1979	D	11
1976	Allen's Beach	2/8/1977	Allen's spawning ground survey- 1 live sockeye	Bortleson and Dion 1979	D	1
1978	Olsen's Beach	11/22/1978-1/22/1979	5 spawning ground surveys conducted; peak count (12/20/78) 60 live and 4 dead sockeye.	Dlugokenski et al. 1981	B	64
1978	Allen's Beach	12/6/1978-2/23/1979	5 spawning ground surveys conducted; peak count (1/14/79) 150 live.	Dlugokenski et al. 1981	B	150
1978	Umbrella Beach	1/20/1978-3/1/1979	3 spawning ground surveys conducted; peak count 30 live sockeye	Dlugokenski et al. 1981	B	30
1978	Near Quinn Creek	Jan. 1979	Several ripe sockeye captured in gill net near the mouth of Quinn Cr. (Boot Bay Area).	Dlugokenski et al. 1981	B	5
1983	Olsen's Beach	12/13/1983-12/14/1983	Broodstock capture, egg take totaled 27,000-15000 eggs. At 3,000 eggs/female and 1:1 sex ratio capture provides an estimate of 18-10 sockeye.	MFM 1984B	C	18

Appendix C- Summary table of annual Lake Ozette sockeye beach spawning ground surveys.						
Return Year	**Lake Survey or Capture Site**	**Date**	**Observation or Capture Comments**	**Information Source**	**BROOD YEAR**	**Peak Count or No. of Collections**
1985	Olsen's Beach	Dec. 1985	Broodstock capture of 40 adult sockeye.	MFM 1986	A	40
1986	Olsen's Beach	Dec. 1986	Broodstock capture of 43 adult sockeye.	MFM unpublished broodstock collection data	B	43
1987	Olsen's Beach	11/16/1987-2/26/1988	11 spawning ground surveys conducted, first sockeye observed on 11/27. Peak count was 50 sockeye on 1/21/1988. Lat sockeye observed 2/26/1988	MFM unpublished spawning ground survey data	C	50
1987	Allen's Beach	12/11/1987-2/26/1988	8 spawning ground surveys conducted, 50 sockeye observed 12/11/1987; peak count 57 sockeye on 1/21/1988. No sockeye observed on 2/26/1988.	MFM unpublished spawning ground survey data	C	57
1987	Umbrella Beach	11/16/1987-11/27/1987	2 spawning ground surveys conducted, no sockeye observed.	MFM unpublished spawning ground survey data	C	0
1987	Allen's and Olsen's beaches	12/8/1987-12/23/1987	Broodstock capture of 123 adult sockeye from both beaches.	MFM unpublished broodstock collection data	C	123
1988	Olsen's Beach	11/15/1988-3/23/1989	10 spawning ground surveys conducted, first and peak sockeye counts occurred on 12/2. 7 sockeye were observed on 2/23/1989.	MFM unpublished spawning ground survey data	D	80
1988	Allen's Beach	11/15/1988-3/23/1989	10 spawning ground surveys conducted, 31 sockeye were observed on 11/15, peak sockeye counts (100 fish) occurred on 12/9. 11 sockeye were observed on 1/27/1989.	MFM unpublished spawning ground survey data	D	100
1988	Umbrella Beach	12/2/1988-3/23/1989	5 spawning ground surveys conducted, no sockeye observed.	MFM unpublished spawning ground survey data	D	0

Appendix C- Summary table of annual Lake Ozette sockeye beach spawning ground surveys.						
Return Year	**Lake Survey or Capture Site**	**Date**	**Observation or Capture Comments**	**Information Source**	**BROOD YEAR**	**Peak Count or No. of Collections**
1988	Allen's and Olsen's beaches	12/2/1988-12-15/1988	Broodstock capture of 193 adult sockeye from both beaches.	MFM unpublished broodstock collection data	D	193
1989	Olsen's Beach	11/26/1989-2/23/1990	12 spawning ground surveys conducted, despite intense efforts sockeye were observed on only 2 occasions, peak count 2 sockeye.	MFM unpublished spawning ground survey data	A	2
1989	Allen's Beach	11/26/1989-2/23/1990	12 spawning ground surveys conducted, despite intense efforts very few sockeye were observed, first sockeye observed on 11/30 (n=3), 1-2 sockeye captured or observed on each survey through 1/30/1990.	MFM unpublished spawning ground survey data	A	3
1989	Allen's and Olsen's beaches	12/11/1989-12-21-1989	Catch was poor only at total of 6 sockeye and 1 kokanee captured in four days of fishing at both beaches.	MFM unpublished broodstock collection data	A	6
1990	Olsen's Beach	11/5/1990-12/12/1990	Fished and viewed sockeye for 8 days, one dead fish seen on 11/6, 20 sockeye captured on 11/8, last fish caught and released on 12/12.	MFM unpublished broodstock collection data	B	21
1990	Allen's Beach	11/8/1990-12/12/1990	One dead sockeye observed on 11/8, 11 fish caught on 12/6, none captured on 12/12.	MFM unpublished broodstock collection data	B	12
1991	Allen's and Olsen's beaches	?	No specific breakdown by beach, a total of 175 sockeye were collected for broodstock.	MFM unpublished broodstock collection data	C	175
1992	Allen's and Olsen's beaches	?	No specific breakdown by beach, a total of 109 sockeye were collected for broodstock.	MFM unpublished broodstock collection data	D	109
1993	Allen's and Olsen's beaches	?	No specific breakdown by beach, a total of 32 sockeye were collected for broodstock.	MFM unpublished broodstock collection data	A	32

Appendix C- Summary table of annual Lake Ozette sockeye beach spawning ground surveys.						
Return Year	**Lake Survey or Capture Site**	**Date**	**Observation or Capture Comments**	**Information Source**	**BROOD YEAR**	**Peak Count or No. of Collections**
1994	Baby Island, Allen's, and Olsen's beaches	12/16/1994	A total of seven sockeye redds were observed at Olsen's Beach, Baby Island, and Allen's Beach.	Meyer and Brenkman 2001	B	na
1994	Allen's and Olsen's beaches	?	No specific breakdown by beach, a total of 54 sockeye were collected for broodstock.	MFM unpublished broodstock collection data	B	54
1995	Allen's and Olsen's beaches	Nov. 1995	No specific breakdown by beach, a total of 94 sockeye were collected for broodstock. 33 genetic tissue samples were collected at Allen's.	MFM unpublished broodstock collection data	C	127
1996	Allen's and Olsen's beaches	11/24/1996-12/23/1996	No specific breakdown by beach, a total of 200 sockeye were collected for broodstock. 100 genetic tissue samples were collected at Olsen's Beach 11/24/96-12/23/96. 101 genetic samples collected at Allen's.	MFM unpublished broodstock collection data; Hawkins 2004	D	200
1997	Olsen's Beach	?	A total of 263 sockeye were collected for broodstock.	MFM unpublished broodstock collection data	A	263
1998	Olsen's Beach	?	A total of 88 sockeye were collected for broodstock. Additional fish were captured for genetic tissue sampling. A total of 136 sockeye were sampled.	MFM 2000	B	136
1998	Allen's Beach	?	27 sockeye were captured for tissue sampling.	Hawkins 2004	B	27
1999	Olsen's Beach	11/2/1999-3/1/2000	12 spawning ground surveys conducted, first sockeye observed 11/2/1999, peak dive counts were 12 sockeye, poor visibility after 12/13. A total of 10 redds were identified during the spawning season.	MFM unpublished spawning ground survey data	C	12

Appendix C- Summary table of annual Lake Ozette sockeye beach spawning ground surveys.						
Return Year	**Lake Survey or Capture Site**	**Date**	**Observation or Capture Comments**	**Information Source**	**BROOD YEAR**	**Peak Count or No. of Collections**
1999	Olsen's Beach	11/11/1999-12/23/1999	A total of 29 sockeye were collected for broodstock. An additional 76 sockeye were captured and tissues were sampled. A total of 105 fish were handled.	MFM 2000; Crewson et al. 2001	C	105
1999	Allen's Beach	11/2/1999-3/1/2000	12 spawning ground surveys conducted, first sockeye and redd observed 11/2/1999, peak dive counts were only 4 sockeye, survey conducted along lead line transect- not an entire overview of the beach as in other years.	MFM unpublished spawning ground survey data	C	4
1999	Miscellaneous Shoreline Surveys	11/10/1999-2/23/2000	Surveys of areas north and south of Allen's transect, Baby Island, Boot Bay, Cemetery Point, Umbrella Beach, and east Ericson's Bay. Sockeye activity only observed at South Allen's.	MFM unpublished spawning ground survey data	C	na
2000	Olsen's Beach	11/8/2000-1/4/2001	Genetic tissue sampling; 59 samples taken from carcasses, 41 samples from sockeye captured with gill net.	Crewson et al. 2001.	D	100
2000	Olsen's Beach	11/15/2000-2/13/2001	11 spawning ground surveys conducted, on 11-15 there were 20 or more sockeye spawning (8 redds) and a group of 60-80 fish holding offshore in 20-25ft of water, peak dive counts occurred on 11-15. 30-50 sockeye observed each week until 1/22, last fish observed 1/31	MFM unpublished spawning ground survey data	D	100

Appendix C- Summary table of annual Lake Ozette sockeye beach spawning ground surveys.						
Return Year	**Lake Survey or Capture Site**	**Date**	**Observation or Capture Comments**	**Information Source**	**BROOD YEAR**	**Peak Count or No. of Collections**
2000	Allen's Beach	11/15/2000-2/13/2001	11 spawning ground surveys conducted, along main transect on 11-15 there were12 or more sockeye spawning (3 redds), dozens holding offshore, more fish located south of lead line, 25 fish on one redd on 12/4, peak activity on 1/4/2001. No fish observed after 1/11/2001. Peak activity south of lead line was on 11/21/00 when approximately 30 redds and 100 sockeye were observed. In total on 11-21-00 approximately 48 redds and 150+ sockeye were present. Kokanee present at several locations.	MFM unpublished spawning ground survey data	D	150
2000	Miscellaneous Shoreline Surveys	11/15/2000-2/6/2000	Surveys of areas north and south of Allen's transect, Pt north of Olsen's, Boot Bay, Cemetery Point, Umbrella Beach, and east Ericson's Bay. Activity only reported at Cemetery Point and point north of Olsen's. Peak counts of 20 sockeye at Cemetery point on 11-21, last fish observed 1/4. Sockeye active north of Olsen's from 12/4 to 1/11/01- peak count of 8 live sockeye and 5 redds.	MFM unpublished spawning ground survey data	D	28
2001	Olsen's Beach	11-1/2001-unknown	11 redds and at least 23 sockeye observed on 11-1-01. 30 sockeye and several active redds observed on 11-14-01. A total of 107 carcasses were sampled plus 5 live fish on 1-4-02.	MFM unpublished spawning ground survey data	A	111
2001	Allen's Beach	11-1/2001-unknown	Only partial dataset was recovered for this year. 18 carcasses collected, half collected on 1/4/02 when at least 3 live fish were also seen. Peak count from the two existing surveys was 51 sockeye on 11/14/01.	MFM unpublished spawning ground survey data	A	51

Appendix C- Summary table of annual Lake Ozette sockeye beach spawning ground surveys.						
Return Year	**Lake Survey or Capture Site**	**Date**	**Observation or Capture Comments**	**Information Source**	**BROOD YEAR**	**Peak Count or No. of Collections**
2002	Olsen's Beach	10/22/02-12/5/02	Only 4 spawning ground surveys were made. Peak counts on last survey (12/5), 61 live fish at point north of Olsen's Beach and 97 live fish at Olsen's Beach.	MFM unpublished spawning ground survey data	B	158
2002	Allen's Beach	10/22/02-12/5/02	Only 4 spawning ground surveys were made. Peak counts on last survey (12/5), 190 live fish along Allen's Beach observed by visual survey. Highest visual counts ever made!!!	MFM unpublished spawning ground survey data	B	190
2003	Olsen's Beach	9/24/2003-2/4/2004	8 spawning ground surveys conducted, 153 sockeye observed 12/17/2003, no fish observed before peak survey, last fish observed on 1/15/04.	MFM unpublished spawning ground survey data	C	153
2003	Allen's beach	9/24/2003-2/4/2004	7 spawning ground surveys conducted, 170 (125L, 45D) sockeye observed 12/11/2003, 20 live sockeye observed on 11/5. Peak live count on 12/17/03 (134L), about 50 of these fish were on point to the north.	MFM unpublished spawning ground survey data	C	213
2003	Cemetery Point, Baby Island, and Umbrella Beach	11/5/2003	No activity observed.	MFM unpublished spawning ground survey data	C	0
2004	Olsen's Beach	10/20/2004-1/5/2005	6 spawning ground surveys were made. First fish observed on beach on 10/20 but no spawning until 11/17. Peak live count on 12/1 last fish observed on 1/5/05 but no surveys after this date. No dive surveys, 2 snorkel surveys after peak boat count.	MFM unpublished spawning ground survey data	D	73
2004	Allen's beach	10/20/2004-1/5/2005	6 spawning ground surveys were made. First fish observed on beach on 11/4 but no spawning until 12/23. Peak live count on 11/17, last fish observed on 1/5/05 but no surveys after this date. No dive surveys, 2 snorkel surveys after peak boat count.	MFM unpublished spawning ground survey data	D	44

Appendix C- Summary table of annual Lake Ozette sockeye beach spawning ground surveys.						
Return Year	**Lake Survey or Capture Site**	**Date**	**Observation or Capture Comments**	**Information Source**	**BROOD YEAR**	**Peak Count or No. of Collections**
2004	Cemetery Point, Baby Island, and Umbrella Beach	11/4/2004-1/5/2005	3 surveys at Umbrella Beach, no fish or redds observed. Cemetery Point surveys are included in the main Allen's Beach surveys.	MFM unpublished spawning ground survey data	D	0

APPENDIX D-Summary table of Lake Ozette tributary channel attributes.

Appendix D- Summary of Lake Ozette tributary channel attributes (by habitat segment)

Stream Name	Habitat Segment	Habitat Segment ID	Upstream End (Meter)	Segment Length	Gradient	Channel Confine-ment	BFW	Number of BFWs
Coal Creek	1a	PS-1	500	500	<1%	C-M	12	41.6
Coal Creek	1b	PS-2	1,000	500	<1%	M-C	10.3	48.5
Coal Creek	1c	PS-3	1,500	500	<1%	M-C	10.2	48.8
Coal Creek	1d	PS-4	2,042	542	<1%	M-C	11	49.3
Coal Creek	2a	PS-5	2,700	658	<1%	C-M	7.8	83.9
Coal Creek	2b	PS-6	3,200	500	<1%	M	8.5	58.5
Coal Creek	2c	PS-7	3,700	500	<1%	M	8.7	57.2
Coal Creek	3a	PS-8	4,200	500	<1%	U	8	62.4
Coal Creek	3b	PS-9	4,700	500	<1%	U	8.6	58
Coal Creek	3c	PS-10	5,500	800	<1%	U	8	99.8
Coal Creek	4a	PS-11	6,000	500	1-2%	U	7.2	69.7
Coal Creek	4b	PS-12	6,500	500	1-2%	U	8.2	61.2
Coal Creek	4c	PS-13	7,000	500	1-2%	U	6.9	72.5
Coal Creek	5	PS-14	7,803	804	2-4%	C	5.5	145.8
20.0050	1	PS-15	700	700	<1%	U	6.3	111.3
20.0050	2	PS-16	1,200	500	1-2%	U	6.3	78.9
20.0050	3	PS-17	2,134	934	2-4%	M	5.7	163.6
LBT 22,772	1	PS-18	305	305	2-4%	C-M	5.5	55.3
Palmquist Creek	1a	PS-19	500	500	<1%	U	4.6	108.5
Palmquist Creek	1b	PS-20	1,000	500	1-2%	U	4.8	103.2
Palmquist Creek	1c	PS-21	1,625	625	1-2%	U	6	104.3
Palmquist Creek	2	na	2,900	1,275	1-2%	M	5.8	221.4
Umbrella Creek	1a	PS-22	500	500	<1%	U	15.9	31.4
Umbrella Creek	1b	PS-23	1,300	800	<1%	U	18.4	43.4
Umbrella Creek	2a	PS-24	1,800	500	<1%	U	14.7	34.1
Umbrella Creek	2b	PS-25	2,300	500	<1%	U	18.6	26.9
Umbrella Creek	2c	PS-26	2,800	500	<1%	U	16.7	29.9
Umbrella Creek	2d	PS-27	3,300	500	<1%	U	15.8	31.7
Umbrella Creek	2e	PS-28	3,800	500	<1%	U	17.1	29.3
Umbrella Creek	2f	PS-29	4,300	500	<1%	U-M	16.4	30.4
Umbrella Creek	2g	PS-30	4,800	500	<1%	U	16.5	30.4
Umbrella Creek	2h	PS-31	5,300	500	<1%	U	17.1	29.3
Umbrella Creek	2i	PS-32	6,000	700	<1%	U-M	13.6	51.5
Umbrella Creek	3a	PS-33	6,500	500	1-2%	M	12.7	39.4
Umbrella Creek	3b	PS-34	7,000	500	1-2%	M-C	12.8	39.2
Umbrella Creek	3c	PS-35	7,500	500	1-2%	M-C	11.4	43.7
Umbrella Creek	4a	PS-36	8,000	500	1-2%	U-M	13.5	37.2
Umbrella Creek	4b	PS-37	8,500	500	1-2%	U-M	15.7	31.9
Umbrella Creek	5a	PS-38	9,000	500	1-2%	C	13	38.5

Appendix D- Summary of Lake Ozette tributary channel attributes (by habitat segment)

Stream Name	Habitat Segment	Habitat Segment ID	Upstream End (Meter)	Segment Length	Gradient	Channel Confine-ment	BFW	Number of BFWs
Umbrella Creek	5b	PS-39	9,500	500	1-2%	C	10.1	49.5
Umbrella Creek	5c	PS-40	10,200	700	1-2%	C	9.5	73.4
Umbrella Creek	6	PS-41	10,972	772	1-2%	M-C	6.7	116
W.B. Umb. Creek	1a	PS-42	500	500	1-2%	C	9.8	51.2
W.B. Umb. Creek	1b	PS-43	1,000	500	1-2%	C-M	8.4	59.5
W.B. Umb. Creek	1c	PS-44	1,800	800	1-2%	C-M	8.5	93.6
W.B. Umb. Creek	2a	PS-45	2,300	500	2-4%	C	7.8	64.3
W.B. Umb. Creek	2b	PS-46	2,800	500	2-4%	C	6.8	73.1
W.B. Umb. Creek	2c	PS-47	3,400	600	2-4%	C-M	6.8	88.3
W.B. Umb. Creek	3	PS-48	4,054	654	2-4%	C	4	165.4
E.B. Umb. Creek	1a	PS-49	500	500	0-2%	M-C	7.8	64.4
E.B. Umb. Creek	1b	PS-50	1,000	500	0-2%	M-C	7.3	68.9
E.B. Umb. Creek	1c	PS-51	1,600	600	0-2%	M	8.2	73.4
E.B. Umb. Creek	2	PS-52	2,469	869	1-2%	U-M	5.8	150
LBT 5,210	1	PS-53	396	396	1-2%	M	5.1	76.9
LBT 8,100	1	PS-54	213	213	1-2%	M	5.8	36.4
RBT 9,400	na	na	366	366	1-2%	M	3.7	98.3
RBT 15,663	1	PS-55	409	409	2-4%	C	4.3	101.4
Hatchery Creek	na	na	457	457	1-3%	M-C	5.5	83.5
Elk Creek	1	na	400	400	<1%	U	4.6	86.4
Elk Creek	2	na	1200	800	1-2%	M	5.7	139.2
Elk Creek	3	na	1818	618	1-3%	C	4.9	101.7
Big River	1	PS-56	671	671	<1%	U	16.3	41.1
Big River	2a	PS-57	1,200	529	<1%	U	17	31.1
Big River	2b	PS-58	1,700	500	<1%	U	17.3	28.8
Big River	2c	PS-59	2,200	500	<1%	U	16.5	30.3
Big River	2d	PS-60	2,700	500	<1%	U	15.8	31.7
Big River	2e	PS-61	3,200	500	<1%	U	17.8	28.1
Big River	2f	PS-62	3,700	500	<1%	U	20.8	24
Big River	2g	PS-63	4,200	500	<1%	U	18.1	27.6
Big River	2h	PS-64	4,700	500	<1%	U	19.2	26
Big River	2i	PS-65	5,200	500	<1%	U	20.6	24.3
Big River	2j	PS-66	5,700	500	<1%	U	22.1	22.7
Big River	2k	PS-67	6,444	744	<1%	U	20.9	35.5
Big River	3a	PS-68	7,000	556	0.1-2%	U	20.7	26.9
Big River	3b	PS-69	7,500	500	0.1-2%	U	20.6	24.3
Big River	3c	PS-70	8,000	500	0.1-2%	U	20	24.9
Big River	3d	PS-71	8,500	500	0.1-2%	U	25	20
Big River	3e	PS-72	9,000	500	0.1-2%	U	20	25
Big River	3f	PS-73	9,500	500	0.1-2%	U	18.5	27
Big River	3g	PS-74	10,000	500	0.1-2%	U	23.7	21.1
Big River	3h	PS-75	10,500	500	0.1-2%	U	32.4	15.4
Big River	3i	PS-76	11,000	500	0.1-2%	U	23	21.7
Big River	3j	PS-77	11,500	500	0.1-2%	U	20.5	24.4

Appendix D- Summary of Lake Ozette tributary channel attributes (by habitat segment)

Stream Name	Habitat Segment	Habitat Segment ID	Upstream End (Meter)	Segment Length	Gradient	Channel Confine-ment	BFW	Number of BFWs
Big River	3k	PS-78	12,000	500	0.1-2%	U	27.4	18.3
Big River	3l	PS-79	12,680	680	0.1-2%	U	25.4	26.7
Big River	4a	PS-80	13,200	520	0.1-2%	U	19.5	26.6
Big River	4b	PS-81	13,700	500	0.1-2%	U	26.2	19.1
Big River	4c	PS-82	14,200	500	0.1-2%	U	26.1	19.2
Big River	4d	PS-83	14,700	500	0.1-2%	M	23.8	21
Big River	5a	PS-84	15,200	500	1-3%	C	18.8	26.5
Big River	5b	PS-85	15,700	500	1-3%	C	17.9	28
Big River	5c	PS-86	16,200	500	1-3%	C	16.8	29.8
Big River	5d	PS-87	16,700	500	1-3%	C	13.3	37.5
Big River	5e	PS-88	17,221	521	1-3%	C	20.4	25.5
Dunham Creek	1	na	700	700	0-1%	U	10.1	69.2
Dunham Creek	2	na	2,600	1,900	0.1-2%	U	12.1	157
Dunham Creek	3	na	3,300	700	2-3%	M	11.5	61.1
Dunham Creek	4	na	5,061	1,760	2-4%	C	7.7	228.6
Trout Creek	1a	na	500	500	1-2%	U	7.9	63.2
Trout Creek	1b	na	1,000	500	1-2%	U	9	55.3
Trout Creek	2a	na	1,500	500	1-3%	M-C	8.9	56.4
Trout Creek	2b	na	2,000	500	1-3%	M-C	7.9	63.1
Trout Creek	2c	na	2,500	500	1-3%	C	7.5	66.7
Trout Creek	2d	na	3,000	500	1-3%	C-M	8.4	59.2
Trout Creek	2e	na	3,500	500	1-3%	M	8	62.8
Trout Creek	2f	na	4,000	500	1-3%	C-M	6.2	81.1
Trout Creek	2g	na	4,695	695	1-3%	C-M	5.7	121
Solberg Creek	1	PS 89	462	462	1.20%	U	9	51.5
Solberg Creek	2	na	701	239	1-3%	M	9.1	26.2
Stony Creek	1	PS-90	600	600	1-3%	C	5.1	118.2
Stony Creek	2	PS-91	1000	400	3-5%	C	5.9	68.2
Stony Creek	3	PS-92	1323	323	2-4%	C	6.3	51.2
Boe Creek	1	PS-93	945	945	1-3%	U	6.1	155.9
Boe Creek	2a	PS-94	1,500	555	1-3%	M	5.3	104.7
Boe Creek	2b	PS-95	2,056	556	1-3%	M	4.6	120.7
Boe Creek	3	na	2,400	344	2-3%	U	3.7	92.3
Boe Creek	4	na	2,896	496	3-6%	C	2.8	176.1
Crooked Creek	1	na	na	~1,200	<1%	U	na	na
Crooked Creek	2	na	3993	3993	<1%	U	15.2	263
Crooked Creek	3a	PS-97	4,500	507	<1%	U	15.2	33.4
Crooked Creek	3b	PS-98	5,309	809	<1%	U	14.7	55
Crooked Creek	4	PS-99	5,642	333	<1%	U	10.1	33
Crooked Creek	5	PS-100	6,400	758	1-2%	U-M	5.4	141.5
Crooked Creek	6	PS-101	6,940	540	1-3%	C	5.5	98.7
SF Crooked Creek	1	PS-102	600	600	1-2%	U	16.4	36.5
SF Crooked Creek	2	PS-103	765	165	1-2%	C	14.5	11.4
N.F. Crooked	1a	PS-104	500	500	<1%	U	10.1	49.3

Appendix D- Summary of Lake Ozette tributary channel attributes (by habitat segment)								
Stream Name	**Habitat Segment**	**Habitat Segment ID**	**Upstream End (Meter)**	**Segment Length**	**Gradient**	**Channel Confine-ment**	**BFW**	**Number of BFWs**
N.F. Crooked	1b	PS-105	1,100	600	<1%	U	9.1	66.3
N.F. Crooked	2	PS-106	1,500	400	1-2%	M	9.4	42.5
N.F. Crooked	3	PS-107	2,300	800	1-2%	C	8	100
N.F. Crooked	4	PS-108	2,900	600	2-3%	M	6.3	95.2
N.F. Crooked	5	PS-109	3,206	306	2-4%	C	6.2	49.2
Siwash Creek	2a	PS-110	500	500	<1%	U	7.3	68.6
Siwash Creek	2b	PS-111	1,000	500	<1%	U	7.2	69.1
Siwash Creek	3a	PS-112	1,500	500	1-2%	U	8	62.7
Siwash Creek	3b	PS-113	2,400	900	1-2%	U	8.5	106.1
Siwash Creek	4	PS-114	3,071	671	1-3%	M	8.5	78.5
Siwash Creek	5	na	4,595	1,524	2-4%	C	7.4	205.9

APPENDIX E-Summary of Lake Ozette tributary LWD and habitat ratings.

APPENDIX E- LWD and Pool Habitat Ratings											
Stream	**Habitat Segment**	**Pool Segment ID**	**LWD Pieces per 100 M**	**LWD Pieces per BFW**	**Key Pieces per BFW**	**Large Pieces per BFW**	**Percent of Pieces Large (>50cm)**	**Pool Frequency**	**Percent Pool**	**Percent woody cover**	**Holding Pools**
Coal Creek	1a	PS-1	Good	Good	Poor	Good	Poor	Fair	Good	Fair	Good
Coal Creek	1b	PS-2	Good	Good	Poor	Fair	Poor	Fair	Good	Fair	Good
Coal Creek	1c	PS-3	Good	Good	Poor	Poor	Poor	Fair	Good	Poor	Good
Coal Creek	1d	PS-4	Good	Good	Fair	Fair	Poor	Good	Good	Fair	Good
Coal Creek	2a	PS-5	Good	Good	Poor	Fair	Poor	Fair	Good	Fair	Good
Coal Creek	2b	PS-6	Fair	Good	Poor	Fair	Poor	Fair	Good	Poor	Good
Coal Creek	2c	PS-7	Good	Good	Poor	Fair	Poor	Fair	Good	Poor	Good
Coal Creek	3a	PS-8	Good	Good	Poor	Poor	Poor	Fair	Good	Poor	Good
Coal Creek	3b	PS-9	Fair	Good	Poor	Poor	Poor	Fair	Good	Poor	Good
Coal Creek	3c	PS-10	Good	Good	Poor	Poor	Poor	Fair	Good	Poor	Fair
Coal Creek	4a	PS-11	Good	Good	Poor	Fair	Poor	Fair	Good	Poor	Fair
Coal Creek	4b	PS-12	Good	Good	Poor	Fair	Poor	Fair	Good	Poor	Fair
Coal Creek	4c	PS-13	Poor	Fair	Poor	Poor	Poor	Fair	Fair	Poor	Poor
Coal Creek	5	PS-14	Fair	Fair	Poor	Poor	Poor	Poor	Fair	Fair	Poor
20.0050 Trib	1	PS-15	Good	Fair	Poor	Poor	Poor	Fair	Good	Poor	Poor
20.0050 Trib	2	PS-16	Good	Good	Poor	Poor	Poor	Fair	Good	Fair	Poor
20.0050 Trib	3	PS-17	Good	Fair	Poor	Poor	Poor	Poor	Poor	Poor	Poor
LBT22772coal	1	PS-18	Fair	Fair	Poor	Poor	Poor	Fair	Poor	Poor	Poor
Palmquist Creek	1a	PS-19	Fair	Fair	Poor	Fair	Poor	Poor	Fair	Poor	Poor
Palmquist Creek	1b	PS-20	Fair	Fair	Poor	Fair	Poor	Poor	Good	Fair	Poor
Palmquist Creek	1c	PS-21	Fair	Fair	Poor	Fair	Poor	Poor	Good	Poor	Poor
Umbrella Creek	1a	PS-22	Good	Good	Poor	Good	Poor	Fair	Good	Good	Good
Umbrella Creek	1b	PS-23	Good	Good	Poor	Good	Poor	Fair	Good	Good	Good

APPENDIX E- LWD and Pool Habitat Ratings

Stream	Habitat Segment	Pool Segment ID	LWD Pieces per 100 M	LWD Pieces per BFW	Key Pieces per BFW	Large Pieces per BFW	Percent of Pieces Large (>50cm)	Pool Frequency	Percent Pool	Percent woody cover	Holding Pools
Umbrella Creek	2a	PS-24	Fair	Good	Poor	Good	Fair	Fair	Good	Fair	Good
Umbrella Creek	2b	PS-25	Fair	Good	Fair	Good	Fair	Good	Good	Fair	Good
Umbrella Creek	2c	PS-26	Fair	Good	Fair	Good	Fair	Good	Good	Fair	Good
Umbrella Creek	2d	PS-27	Fair	Good	Poor	Fair	Poor	Fair	Good	Fair	Good
Umbrella Creek	2e	PS-28	Good	Good	Fair	Good	Poor	Fair	Good	Poor	Good
Umbrella Creek	2f	PS-29	Poor	Good	Poor	Fair	Poor	Fair	Good	Poor	Good
Umbrella Creek	2g	PS-30	Fair	Good	Poor	Fair	Poor	Fair	Good	Poor	Good
Umbrella Creek	2h	PS-31	Fair	Good	Poor	Fair	Poor	Fair	Good	Poor	Good
Umbrella Creek	2i	PS-32	Poor	Good	Poor	Poor	Poor	Poor	Fair	Poor	Poor
Umbrella Creek	3a	PS-33	Poor	Fair	Poor	Poor	Poor	Poor	Fair	Poor	Good
Umbrella Creek	3b	PS-34	Fair	Good	Poor	Poor	Poor	Fair	Good	Fair	Poor
Umbrella Creek	3c	PS-35	Poor	Good	Poor	Poor	Poor	Poor	Poor	Fair	Poor
Umbrella Creek	4a	PS-36	Poor	Good	Poor	Poor	Poor	Fair	Poor	Poor	Fair
Umbrella Creek	4b	PS-37	Fair	Good	Poor	Poor	Poor	Fair	Fair	Fair	Good
Umbrella Creek	5a	PS-38	Poor	Fair	Poor	Poor	Poor	Fair	Poor	Fair	Fair
Umbrella Creek	5b	PS-39	Poor	Fair	Poor	Poor	Poor	Poor	Poor	Poor	Fair
Umbrella Creek	5c	PS-40	Poor	Fair	Poor	Poor	Poor	Poor	Poor	Poor	Poor
Umbrella Creek	6	PS-41	Poor	Poor	Poor	Poor	Poor	Fair	Poor	Poor	Poor
W.B. Umbrella Creek	1a	PS-42	Poor	Fair	Poor	Fair	Poor	Poor	Poor	Poor	Poor
W.B. Umbrella Creek	1b	PS-43	Fair	Good	Poor	Fair	Poor	Poor	Poor	Poor	Poor
W.B. Umbrella Creek	1c	PS-44	Good	Good	Poor	Fair	Poor	Fair	Fair	Poor	Poor
W.B. Umbrella Creek	2a	PS-45	Fair	Fair	Poor	Poor	Poor	Poor	Poor	Poor	Poor
W.B. Umbrella Creek	2b	PS-46	Good	Good	Poor	Fair	Poor	Poor	Poor	Poor	Poor
W.B. Umbrella Creek	2c	PS-47	Fair	Good	Fair	Fair	Poor	Fair	Good	Poor	Poor
W.B. Umbrella Creek	3	PS-48	Fair	Fair	Fair	Fair	Poor	Poor	Poor	Fair	Poor
E.B. Umbrella Creek	1a	PS-49	Poor	Poor	Poor	Poor	Poor	Fair	Poor	Poor	Poor

APPENDIX E- LWD and Pool Habitat Ratings

Stream	Habitat Segment	Pool Segment ID	LWD Pieces per 100 M	LWD Pieces per BFW	Key Pieces per BFW	Large Pieces per BFW	Percent of Pieces Large (>50cm)	Pool Frequency	Percent Pool	Percent woody cover	Holding Pools
E.B. Umbrella Creek	1b	PS-50	Poor	Fair	Poor	Poor	Poor	Poor	Fair	Fair	Poor
E.B. Umbrella Creek	1c	PS-51	Poor	Poor	Poor	Poor	Poor	Fair	Fair	Poor	Poor
E.B. Umbrella Creek	2	PS-52	Poor	Poor	Poor	Poor	Poor	Poor	Poor	Poor	Poor
LBT5210_EB Umbr	1	PS-53	Fair	Fair	Poor	Poor	Poor	Poor	Poor	Poor	Poor
LBT8100_EB Umbr	1	PS-54	Poor	Fair	Poor	Poor	Poor	Good	Fair	Poor	Poor
RBT15663_Umbr Creek	1	PS-55	Good	Fair	Poor	Fair	Poor	Poor	Poor	Poor	Poor
Big River	1	PS-56	Fair	Good	Fair	Fair	Poor	Fair	Good	Poor	Good
Big River	2a	PS-57	Fair	Good	Fair	Fair	Poor	Good	Good	Fair	Good
Big River	2b	PS-58	Fair	Good	Poor	Poor	Poor	Fair	Good	Fair	Good
Big River	2c	PS-59	Poor	Good	Poor	Poor	Poor	Fair	Good	Poor	Good
Big River	2d	PS-60	Fair	Good	Poor	Poor	Poor	Fair	Good	Poor	Good
Big River	2e	PS-61	Fair	Good	Poor	Poor	Poor	Good	Good	Fair	Good
Big River	2f	PS-62	Poor	Good	Fair	Fair	Poor	Good	Good	Fair	Good
Big River	2g	PS-63	Poor	Good	Poor	Poor	Poor	Fair	Good	Poor	Good
Big River	2h	PS-64	Fair	Good	Poor	Fair	Poor	Good	Good	Poor	Good
Big River	2i	PS-65	Fair	Good	Poor	Fair	Poor	Good	Good	Poor	Good
Big River	2j	PS-66	Fair	Good	Poor	Poor	Poor	Good	Good	Poor	Good
Big River	2k	PS-67	Poor	Good	Poor	Fair	Poor	Fair	Good	Poor	Fair
Big River	3a	PS-68	Fair	Good	Poor	Good	Fair	Fair	Good	Poor	Fair
Big River	3b	PS-69	Fair	Good	Fair	Good	Fair	Good	Good	Poor	Fair
Big River	3c	PS-70	Fair	Good	Fair	Good	Fair	Poor	Fair	Fair	Fair
Big River	3d	PS-71	Fair	Good	Fair	Good	Fair	Good	Good	Poor	Good
Big River	3e	PS-72	Poor	Good	Poor	Good	Fair	Fair	Good	Poor	Good
Big River	3f	PS-73	Poor	Fair	Poor	Fair	Good	Fair	Good	Poor	Good
Big River	3g	PS-74	Poor	Good	Poor	Good	Fair	Good	Good	Fair	Good

APPENDIX E- LWD and Pool Habitat Ratings

Stream	Habitat Segment	Pool Segment ID	LWD Pieces per 100 M	LWD Pieces per BFW	Key Pieces per BFW	Large Pieces per BFW	Percent of Pieces Large (>50cm)	Pool Frequency	Percent Pool	Percent woody cover	Holding Pools
Big River	3h	PS-75	Poor	Good	Poor	Good	Fair	Fair	Good	Fair	Fair
Big River	3i	PS-76	Poor	Fair	Poor	Fair	Fair	Fair	Good	Fair	Fair
Big River	3j	PS-77	Poor	Fair	Poor	Fair	Fair	Fair	Good	Poor	Poor
Big River	3k	PS-78	Fair	Good	Poor	Good	Fair	Good	Good	Fair	Fair
Big River	3l	PS-79	Fair	Good	Poor	Good	Fair	Good	Good	Fair	Good
Big River	4a	PS-80	Poor	Fair	Poor	Poor	Poor	Fair	Fair	Poor	Good
Big River	4b	PS-81	Fair	Good	Poor	Fair	Poor	Good	Fair	Poor	Good
Big River	4c	PS-82	Poor	Good	Poor	Fair	Poor	Good	Fair	Poor	Good
Big River	4d	PS-83	Poor	Good	Poor	Fair	Poor	Fair	Fair	Poor	Fair
Big River	5a	PS-84	Poor	Fair	Poor	Poor	Fair	Fair	Fair	Poor	Poor
Big River	5b	PS-85	Poor	Fair	Poor	Poor	Fair	Fair	Fair	Poor	Poor
Big River	5c	PS-86	Fair	Good	Poor	Good	Fair	Fair	Good	Poor	Fair
Big River	5d	PS-87	Fair	Good	Poor	Good	Fair	Poor	Good	Poor	Fair
Big River	5e	PS-88	Good	Good	Good	Good	Fair	Fair	Good	Fair	Fair
Solberg Creek	1	PS-89	Poor	Fair	Poor	Poor	Poor	Fair	Fair	Poor	Poor
Stony Creek	1	PS-90	Poor	Poor	Poor	Poor	Poor	Poor	Poor	Fair	Poor
Stony Creek	2	PS-91	Good	Good	Poor	Good	Fair	Fair	Poor	Fair	Poor
Stony Creek	3	PS-92	Good	Good	Poor	Poor	Poor	Poor	Poor	Poor	Poor
Boe Creek	1	PS-93	Poor	Poor	Poor	Poor	Poor	Poor	Good	Poor	Poor
Boe Creek	2a	PS-94	Fair	Fair	Poor	Poor	Poor	Fair	Good	Fair	Poor
Boe Creek	2b	PS-95	Poor	Poor	Poor	Poor	Poor	Poor	Good	Poor	Poor
Unnamed Trib 20.0065	1	PS-96	Poor	Fair	Poor	Fair	Poor	Poor	Poor	Poor	Poor
Crooked Creek	3a	PS-97	Fair	Good	Poor	Fair	Poor	Poor	Good	Fair	Fair
Crooked Creek	3b	PS-98	Fair	Good	Poor	Fair	Fair	Poor	Good	Fair	Fair
Crooked Creek	4	PS-99	Fair	Good	Poor	Poor	Poor	Fair	Good	Fair	Good
Crooked Creek	5	PS-100	Fair	Fair	Fair	Fair	Poor	Fair	Good	Poor	Poor

APPENDIX E- LWD and Pool Habitat Ratings

Stream	Habitat Segment	Pool Segment ID	LWD Pieces per 100 M	LWD Pieces per BFW	Key Pieces per BFW	Large Pieces per BFW	Percent of Pieces Large (>50cm)	Pool Frequency	Percent Pool	Percent woody cover	Holding Pools
Crooked Creek	6	PS-101	Fair	Fair	Fair	Fair	Fair	Fair	Good	Fair	Poor
SF Crooked Creek	1	PS-102	Good	Good	Fair	Good	Poor	Good	Good	Fair	Good
SF Crooked Creek	2	PS-103	Fair	Good	Poor	Fair	Poor	Fair	Good	Fair	Fair
NF Crooked Creek	1a	PS-104	Fair	Good	Poor	Fair	Poor	Poor	Good	Poor	Fair
NF Crooked Creek	1b	PS-105	Fair	Fair	Poor	Fair	Poor	Poor	Good	Poor	Poor
NF Crooked Creek	2	PS-106	Good	Good	Fair	Good	Poor	Fair	Good	Fair	Fair
NF Crooked Creek	3	PS-107	Fair	Good	Fair	Fair	Poor	Fair	Good	Poor	Fair
NF Crooked Creek	4	PS-108	Good	Fair	Poor	Poor	Poor	Fair	Good	Fair	Poor
NF Crooked Creek	5	PS-109	Good	Good	Fair	Fair	Poor	Fair	Good	Fair	Poor
Siwash Creek	2a	PS-110	Good	Good	Fair	Good	Poor	Poor	Good	Fair	Good
Siwash Creek	2b	PS-111	Good	Good	Fair	Fair	Poor	Poor	Good	Poor	Good
Siwash Creek	3a	PS-112	Fair	Good	Poor	Good	Fair	Poor	Good	Poor	Good
Siwash Creek	3b	PS-113	Fair	Good	Fair	Good	Fair	Poor	Good	Fair	Good
Siwash Creek	4	PS-114	Fair	Fair	Fair	Good	Fair	Fair	Good	Fair	Fair

APPENDIX F-List of Ranked Research and Monitoring Priorities (by Life Stage).

Edit from the Lake Ozette Sockeye Habitat Technical Work Group 2001 Draft LFA

A-ADULT SOCKEYE ENTERING SYSTEM

Adult Sockeye Entering the Ozette River

Ranked Priority	Life Stage Factor	Planned or/ Conducted
1	Population size, run-timing	Ongoing
2	Streamflow	
3	Predation	1998-2000+
4	Water quality	Ongoing
5	In-river habitat conditions	
6	Estuary alterations	

PRIORITY JUSTIFICATION

1. Run Size: Determining the current run-size and abundance trend of the sockeye population is critical to attaining recovery of Lake Ozette sockeye. Tracking population fluctuations over time will be a gauge to determine the success of restoration activities, as well as the success of the overall Lake Ozette Sockeye Recovery Plan . Also, has run timing in Ozette changed? How much inter-annual run-timing variation occurs?
2. Streamflow: Streamflows during that adult migration have been reduced. Detailed modeling is required to determine the exact magnitude that flows have been altered. What effect changes to streamflow have on migrating sockeye remains unknown (see Hypothesis 4 in Section 6.2.1.4).
3. Predation: Continued monitoring of in-river predation is an important component to understanding the degree that predation affects the sockeye population at different abundance levels.
4. Water quality: Have stream temperatures increased during the last 50 years, how much? How do high stream temperatures limit Ozette sockeye? Variations in timing of spawning migrations may be in response to river flow and water temperature (flow and temperature as intensity factors of migration). Water temperature during mid-summer is generally greater than the preferred range for sockeye. Turbidity has also been shown to affect Lake Ozette sockeye during the adult migration. Continue to monitor water temperature and turbidity.
5. Habitat conditions: Due large logjams which form deep pools in the Ozette river provide important refugee habitat for sockeye salmon? Do deep pools provide thermal refugee habitat. How does habitat affect predation?
6. Estuary Alterations: Are there unique tidal prism influences that enhance or are detrimental to the sockeye life cycle (analyze sequential historical photos).

B-ADULT SOCKEYE HOLDING IN LAKE

Adult Sockeye in Lake Ozette

Ranked Priority	Life Stage Factor	Planned or/ Conducted
1	Population, distribution, holding, habitat characteristics	Ongoing
2	Predation and disease	Ongoing

PRIORITY JUSTIFICATION

1. Population: Determining the current sockeye population abundance, distribution, and where they hold within the lake will be important to understand behavior, habitat use, survival, and achieve recovery. Tracking the population movement and habitat use over time will be a gauge to design restoration activities (Makah and NPS research).
2. Predation and disease: What impacts do these factors have on adult sockeye in the lake environment? Examine scat collected during the 2002 and 2003 summers.

C-ADULT SOCKEYE SPAWNING ON BEACHES

1. Number and distribution
2. Predation (NOAA and MFM research)
3. Suitable substrate quantity and quality (location of spawning beaches, potential spawning beaches)
4. Water quality
5. Habitat (suitability of vegetation and sediment)
6. Sex ratio; fecundity, age
7. Morphology
8. Possible interactions between sockeye and kokanee (stray rates, genetic analyses)
9. Natural sub-populations (stray rates, genetic analyses)

Adult Sockeye Spawning in Lake Ozette

Ranked Priority	Life Stage Factor	Planned or/ Conducted
1	Number, distribution, sex ratio of total population and sub-populations	Ongoing
2	Suitable substrate, habitat characterization	Ongoing
3	Predation	Ongoing
4	Water quality	1997

PRIORITY JUSTIFICATION:

1. Abundance and distribution: There is a lack of information on the abundance and distribution of spawners along the Lake Ozette shoreline (Makah and NPS research).
2. Suitable substrate: An analysis of the substrate will aid in determining areas of suitable spawning habitat (Makah and NPS research).

3. Predation: Little is known about predation of adult sockeye in Lake Ozette. Adults spend a 5+ month period in lake during spawning season. This is a substantial amount of time when little is known about mortality. Heavy seal activity was observed on both spawning beaches in 1999 and seal predation of spawners has been observed in the past.
3. Water quality: Is there evidence of anthropogenic impacts to water quality in the lake? If so, to what extent have any changes influenced adult holding? Is water quality changing over time (NPS data)?
   -Data are not available for shoreline habitats (water temperature and intra-gravel dissolved oxygen.
   -There are elevated turbidity levels during storm events.

D-SOCKEYE ENTERING TRIBUTARIES

1. Predation
2. Population and distribution within and among streams
3. Water quality
4. Competition and interaction with kokanee
5. Flow rates
6. Habitat Characteristics

Sockeye Entering Tributaries

Ranked Priority	Life Stage Factor	Planned or/ Conducted
1	Population and distribution	On going
2	Water quality	On going
3	Habitat characteristics	On going

PRIORITY JUSTIFICATION

1. Population and distribution: Distribution and relative abundance of tributary spawners (NOR's and hatchery returns) continues to be monitored (MFM).
2. Water quality: Are there water quality issues unique to the spawning tributaries that would make them ultimately more or less viable to survival of the fry (variety of thermograph sites; turbidity)?
3. Habitat characteristics: Are there unique tributary features of the areas being utilized. Could land-use over time have altered this habitat in a manner that would have impacted sockeye use?

E-SOCKEYE SPAWNING IN TRIBUTARIES

1. Redd count
2. Population
3. Distribution (both redds and fish)
4. Predation
5. Quality, quantity, and suitability of spawning substrate (scouring, fine sediment levels)

6. Water quality
7. Flow
8. Chemical influence
9. Habitat quality and quantity
10. Morphology (sex ratio, size, truss measurements, genetic variation)
11. Interaction between sockeye and kokanee

Sockeye Spawning in Tributaries

Ranked Priority	Life Stage Factor	Planned or/ Conducted
1	Redd count, population, distribution, morphology, interrelationship with sockeye and kokanee	Ongoing
2	Substrate suitability quality and quantity, habitat quality and quantity	On going
3	Water quality, flow, chemical influence	Ongoing
4	Predation	?

PRIORITY JUSTIFICATION

1. Redd count, etc.: Distribution and relative abundance of tributary spawners (NOR's and hatchery returns) continues to be monitored (MFM). Continue to measure spawner replacement rates of NOR and hatchery returns. Are tributary spawners uniquely different from beach spawners? Continue to enumerate sympatric spawning among kokanee and sockeye, if observed.
2. Substrate suitability, etc.: What type and how much spawning substrate is available to the sockeye in the tributaries. Continue to characterize tributary habitat (MFM).
3. Water quality, etc.: Are there unique water chemistry profiles that encourage/discourage tributary use? What type of hydrology suits spawning sockeye? (various thermograph sites). Predation: Determine impact of predation on sockeye tributary spawners. What are the circumstances and the overall impacts to the population?

F-SOCKEYE EGG INCUBATION IN LAKE

1. Egg predation (during and after spawning)
2. Gravel quality and quantity (suitable substrate)
3. Habitat suitability (upwelling/springs)
4. Fertilization mortality rates
5. Change in lake water levels (8 feet per year)
6. Water quality (temperature, dissolved oxygen)
7. Changes in sedimentation, turbidity
8. Incubation duration
9. Outside chemical influence

Sockeye Egg Incubation on Beaches

Ranked Priority	Life Stage Factor	Planned or/ Conducted
1	Suitable substrate, habitat, changes in sedimentation, turbidity	ongoing
2	Egg to hatching survival	2000+
3	Egg predation	2000+
4	Lake levels	1997

PRIORITY JUSTIFICATION

1. Suitable substrate, etc: (What spawning beaches are utilized, what type of habitat is utilized, what is substrate composition? Determine habitat characteristics, substrate used during the incubation period. All viewed as critical for reproductive success.
2. Egg to hatching survival: Critical data gaps exist on early life history survival. What is egg to hatching survival? Are there fertility issues?
3. Egg predation: To what extent is predation impacting early life history (i.e. natural predation such as sculpin, peamouth, cutthroat trout, coho, or introduced predators such as perch and largemouth bass, mergansers and other piscivorous birds?
4. Lake levels: Influence of fluctuating lake levels or evidence of anthropogenic impact related to lake level. -The lake level may vary as much as 8 feet annually. This may impact the beach spawning areas.

G-SOCKEYE EGG INCUBATION IN TRIBUTARIES

1. Egg predation (during and after spawning)
2. Gravel quality and quantity
3. Habitat suitability (upwelling/springs)
4. Fertilization mortality rates
5. Change in lake water levels (8 feet per year)
6. Water quality (temperature, dissolved oxygen)
7. Changes in sedimentation, turbidity
8. Incubation duration
9. Outside chemical influence
10. Tributary scour, fine sedimentation

Tributary Egg Incubation in Tributaries

Ranked Priority	Life Stage Factor	Planned or/ Conducted
1	Egg to emergent survival, predation, sedimentation, scour, fertilization mortality	Ongoing
2	Gravel quality and quantity, habitat suitability	Ongoing
3	Water quality, incubation duration	Ongoing

PRIORITY JUSTIFICATION

1. Egg to emergence survival: What percent of the eggs survive to the emigrant fry stage? What types of habitat issues impact this survival?
2. Gravel quality, etc.: What is the preferred spawning substrate for optimal egg survival. Are these incubation areas also utilized by other species that would result in a detrimental effect to sockeye? How much and where is this habitat available? Is it being utilized?
3. Water quality, etc: Are there water chemistry and hydrology factors occurring in the tributaries that could impact hatching success? Are there variables that impact egg incubation?

H-SOCKEYE FRY EMERGENCE AND MIGRATION IN LAKE

1. Predator biomass and predation rate estimates
2. Mortality
3. Food Availability
4. Migration

Sockeye Fry Emergence and Migration in Lake

Ranked Priority	Life Stage Factor	Planned or/ Conducted
1	Predation	2000+
2	Food availability	2000+
3	Migration	2000+

PRIORITY JUSTIFICATION

1. Predation: Cursory evidence suggests that sockeye fry are preyed upon by coho and sculpin. To what extent is unknown (biomass studies required). Other possible predators of sockeye fry include yellow perch and cutthroat trout.
2. Food availability: Is proper size and type of zooplankton available for swim up sockeye fry in Lake Ozette during their emergence period?
3. Temporal and spatial distribution of fry remains unknown.

I-SOCKEYE FRY EMERGENCE AND OUT-MIGRATION IN TRIBUTARIES

1. Predation
2. Mortality
3. Food Availability
4. Migration

Tributary Fry Emergence and Emigration

Ranked Priority	Life Stage Factor	Planned or/ Conducted
1	Migration	Ongoing
2	Predation	Ongoing
3	Food availability	2000+
4	Mortality	Ongoing

PRIORITY JUSTIFICATION

1. Migration: Where are fry migrating to and how long and under what circumstances are they migrating?
2. Predation: What unique circumstances are the fry encountering on their travels to the lake? What percentage of this population is successful on this migration?
3. Food availability: What are sockeye fry consuming and where? What is the preferred diet and to what extent is it available in the system? What other fish, etc., are also seeking out this food source?
4. Mortality: How successful is sockeye productivity through emergence? What percentage of the eggs hatch? Is this comparable with same species in other stream environments or different species in the same environment?

J-SOCKEYE PELAGIC REARING

1. Predation
2. Food availability

Pelagic Rearing

Ranked Priority	Life Stage Factor	Planned or/ Conducted
1	Predation	
2	Food availability	

PRIORITY JUSTIFICATION

1. Predation: What predators impact the juvenile sockeye population in Lake Ozette? What percentage of the juvenile population survives this predation? Are the predators introduced or naturally occurring in this system?
2. Food availability: What are the juveniles consuming in the lake environment? How available is this food? What is the competition for this food? Does it vary with seasonal changes?

K-JUVENILE SOCKEYE EMIGRATION

1. Population
2. Predation
3. Water quality

Juvenile Emigration

Ranked Priority	Life Stage Factor	Planned or/ Conducted
1	Population	2000+
2	Predation	2000+
3	Water quality	Ongoing

PRIORITY JUSTIFICATION

1. Population: What proportion of NOR and hatchery lake- and tributary-origin smolts survive to emigration?
2. Predation: What predator circumstances do the juveniles encounter during emigration? What type of impact does this have on the population?
3. Water quality: Are there unique water chemistry and hydrologic circumstances that impact emigration? Water quantity in the river also needs to be measured during emigration.

L-MARINE ENVIRONMENT

1. Population trends (regional and large scale). What is the ocean survival rate of smolt emigrants?
2. Productivity of marine environment
3. Harvest

Marine Environment

Ranked Priority	Life Stage Factor	Planned or/ Conducted
1	Population trends	2000+
2	Productivity of marine environment	2000+
3	Harvest	2000+

PRIORITY JUSTIFICATION

1. Population trends: What is the smolt to adult survival rate? How has marine survival varied over time? Can environmental- or human- induced changes over time be correlated with population abundance variations?
2. Productivity of marine environment: How successful are the sockeye in the marine phase of their life cycle? What are they eating and how available is it? Do they share this food source with other species?
3. Harvest: Historically, what volume of sockeye was harvested? What percentage of these fish were Lake Ozette sockeye? How many sockeye have been caught as a non-target species? What influence did this have on the population? -Marine interception of Lake Ozette sockeye appears to be low based on their early run timing in relation to the opening of fisheries off of Vancouver Island.