Colville Reservation Lakes Compendium, Limiting Factors, and Management Plan

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Colville Confederated Tribes Fish and wildlife Department

Colville Reservation Lakes Compendium, Limiting Factors, and Management Plan

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Executive Summary

The Colville Tribal Hatchery produced 56,934 pounds of trout, 6,934 pounds more than the minimum production goal of 50,000 pounds. To accomplish this and to apply adaptive management based on the best available knowledge, CTH increased the size of fish planted into Colville Reservation Lakes. Considerable progress was made in 2002 to develop a captive redband trout brood stock at CTH by expanding raceway rearing space and acquiring seed fish. These efforts should start to produce eggs that can partially replace the current costal rainbow trout stocks currently being raised and stocked in 2004. Creel Data indicated that the average production of all lakes sampled was 3 pounds per pound of fish stocked. Creel data provided strong support for continued adaptive management and trout stocking into Colville Reservation waters. Creel data collection should be expanded where possible to provide a more complete picture of hatchery production benefits that occur post-stocking. Lake survey work should continue to focus on filling data gaps for reservation waters. A multitude of lakes smaller than 50 acres exist on the Colville Reservation however these waters represent mostly marginal fisheries at best and have limited production potential. The main factors limiting trout production in these waters includes, insufficient depth, warm summer temperatures, low dissolved oxygen in summer and winter, competition from non-salmonid fishes, and high alkalinity. Some smaller waters could be managed or rehabilitated to improve production but most have little productivity potentiality for trout and others could produce sustainable warm-water fisheries. Restoration or rehabilitation work for these small lakes should be prioritized with consideration for economic benefit, production capacity, long-term sustainability, risks to the ecosystem, and the desires of the Tribes membership.

History

The Colville Reservation was established by President Grant under an Executive Order, Dated July 2, 1872. The name derives from Fort Colville, a trading post established by the Hudson Bay Company in 1826, and named after a governor of the company, Andrew Colvil. The Reservation consolidated approximately 4,200 native people from the Methow, Okanogan, San Poil, Lake, Colville, Kallispel, Spokane, Couer d'Alene and scattered bands not party to any treaty. In 1895, Chief Moses, with four bands from the Columbia and Methow Rivers areas and Chief Joseph and his band of Nez Perce moved to the Reservation. The North Half of the Reservation (1.5 million acres) was relinquished to public domain by the Act of July 1, 1892 and this reduced configuration (1.4 million acres) remains today (Figure 1) however, fishing and hunting rights to the North Half were retained by the Tribes and reaffirmed in the Antoine Decision of 1975.

The topography of the Colville Reservation consists of rolling hills and mature rounded mountains. Approximately two-thirds of the Reservation is coniferous forest and one-third is arid shrub-step habitat with bunch grass and sage. Elevations range from 760 feet

at the mouth of the Okanogan River to 6,774 feet at the summit of Moses Mountain. Soils are mainly glacial-till overlaying bedrock of metamorphic rocks, such as marble, slate, gneiss, and in the southern half of the reservation basaltic lava flows exist (USGS 1974). Thirty-five lakes dot the landscape of the Colville Reservation that have a history of fisheries management along with approximately 306 miles of streams.

The original inhabitants, not unlike other Columbia River Basin Tribes had a strong reliance on the fishes of the Columbia River and tributaries. Chinook salmon (Oncorhynchus tshawytscha), sockeye salmon (Oncorhynchus nerka), rainbow trout or steelhead (Oncorhynchus mykiss), and both green (Acipenser medirostris) and white sturgeon (Acipenser transmontanus) were the main species harvested at fisheries located along the Columbia, Methow, Okanogan, San Poil, and Kettle Rivers. The completion of Grand Coulee (1942) and later Chief Joseph (1951) Dams eliminated approximately 200 miles of the Columbia, San Poil, and Kettle Rivers and extirpated many of the native fish especially those that provided subsistence to native people. The Wells pool inundated many miles of the Okanogan and Methow Rivers severely impacting anadromous fisheries along those rivers.

The Tribes original dependence upon salmon and the subsequent loss of this resource required a cultural shift to reliance and exploitation of the Reservations natural resources namely timber (over 100 million board feet per year), mining (gold, cooper, and molybdenum), extensive grazing, and irrigated agriculture (uses 74% of the 25,300 acre-foot water budget). Because of anadromous fish losses created by the federal hydropower projects located at Grand Coulee and Chief Joseph Dams resident fish have played an important role in supplementing tribal subsistence needs. The Colville Tribes in conjunction with the Washington Department of Game provided fish and wildlife management for resident fish from the 1930's to 1965. This management mainly involved stocking rainbow and eastern brook trout (Salvelinus fontinalis) into Twin, Buffalo, McGinnis, and Crawfish Lakes in exchange for 7 to 10 million, green brook trout eggs from Owhi Lake that was originally planted in the 1930's. Differences in management philosophy and fishing permit issues, provided the impetus for a change to a cooperative agreement with the USFWS in 1965. The USFWS mainly provided management assistance and fish for stocking lakes and streams form 1965 to 1976 when the Colville Tribes began actively managing the fisheries of the Reservation with the hiring of Gerald Marco. The stocking of resident fish continued with trout raised at Winthrop National Fish Hatchery. In 1975, the U.S. District Court of Spokane restrained the state game agency from enforcing state fishing regulations on the Reservation.

During the period from 1976 to 1989 the Tribes managed the fisheries resources of the Colville Reservation by stocking most of the waters eastern brook trout, both eggs and fish, from Owhi Lake and rainbow trout supplied from the Fish and Wildlife Service and in conjunction with the Regional Fishery Office. Chinook and coho salmon were experimentally stocked in select waters with marginal results. The Colville Tribes Fish and Wildlife Department began successfully applying for funding from Bonneville Power Administration and the program began to build expertise and infrastructure. Considerable information about the lakes and streams was collected during this period

and much for this baseline data is still in use today. Planning and construction began on the Colville Tribal Trout Hatchery with construction and funding starting in 1985. Legal cases were won by the Colville Tribes that upheld Tribal Sovereignty over the hunting and fishing rights on the reservation without interference from the State of Washington and in usual and accustomed areas off the reservation.

Upon completion of the Colville Tribal Hatchery in 1989, all cooperative agreement between the USFWS and Colville Tribes had ended. Although today the USFWS has jurisdiction over endangered species and provides funding for various projects. A good working relationship currently exists between the Colville Tribes, USFWS, and the Washington Department of Fish and Game. The Colville Tribes fish and Wildlife Department has approximately 63 employees. They have successfully competed with other agencies and tribes for many grants from a variety of funding sources. The Colville Tribes Fish and Wildlife Department spends over 6 million dollars annually to support hatchery production, enforcement, monitoring, evaluation, restoration, acquisitions, operations, maintainace, administration, research, and planning for the fish and wildlife resources on the Colville Reservation and surrounding usual and accustomed areas.

Economics and Angler Opionions

Cost benefit analysis

Records from 1965 indicate that annual angling effort was approximately 16,000 angler-days but by 1977 angler effort was approximately 85,000 angler-days. In 2002 it was estimated that anglers expended 77,484 angler-days of effort fishing waters wholly contained within the boundaries of the Colville Reservation . In 1977, for every dollar spent by the Tribes to raise fish non-member anglers spent 24-dollars and tribal members spent 47-dollars (Halfmoon 1977). However, this analysis only identified the cost of raising fish at an existing facility and assume that one-third of all Tribal members fish only on member only waters when in reality tribal members are not limited to season, catch limit, or location. In 2003, we conducted a cost benefit analysis that included all hatchery and management cost and we combined all anglers in estimating the number of angler-days for all actively managed lakes and streams contain completely on the Colville Reservation. The annual expenditures by the anglers that fished the Colville Reservation in 2002 were estimated to be $2,089,900 based on the 2001 National Fishing, Hunting and Wildlife Associated Recreation Survey that estimates that anglers fishing in Washington State spend on average $27 dollars per angler day. The costs of operating the Colville Tribal Hatchery were $827,000 in 2002 less capitol expenses. The cost benefit ratio for angling on Colville Reservation waters is estimated at 2.53 meaning operations are economically viable and $2.53 in revenue is generated form every dollar spent on fisheries within the boundaries of the Colville Reservation.

Angler opinion survey

In 2002, an angler survey of member and non-member anglers was conducted to assess angler preferences and opinions. The small sample size made it difficult to make strong

statements about angler preferences but some general conclusions were obvious. Most of the anglers that utilized the fisheries resources of the Colville Reservation were not tribal members (Table 1). Most anglers harvested the majority of fish they caught. Most anglers identified fish size as important and preference toward catching a few large fish rather than catching several small fish. The majority of anglers preferred trout but species was not a major concern. Anglers did identify cutthroat trout as least desirable trout species. Lake anglers were satisfied with the way the Colville Tribes manage reservation fisheries. Most anglers were not supportive of additional or more stringent regulations.

Table 1: The number and percentage for responses from 17 anglers surveyed at Colville Reservation lakes during the 2002 fishing season.

Question and responses	**Number**	**Percent**
Are you a tribal member?		
Yes	1	6%
No	16	94%
HOW MANY YEARS HAVE YOU BEEN FISHING ON THE COLVILLE RESERVATION?		
0 to 9	9	53%
10 to 19	7	41%
20 to 29	1	6%
30 or more	0	0%
How would you classify your reason for fishing?		
Subsistence/Harvest	5	29%
Recreation/Sport	12	71%
REGARDLESS OF YOUR REASON FOR FISHING, WOULD YOU RATHER CATCH?		
Several small fish (10 to 12 < 12 inches)	4	24%
A few large fish (2 to 3 fish > 16 inches)	9	52%
Makes no difference to me	4	24%
What type of fish do you prefer to catch?		
Salmon	1	6%
Trout	10	60%
Warm-water fishes	3	17%
It does not matter	3	17%
What species do you prefer to catch?		
Rainbow Trout	6	35%
Brook Trout	4	24%
Cutthroat Trout	1	6%
Largemouth Bass	1	6%
It does not matter to me	5	29%
Which type of water do you fish most often?		
Lakes or Ponds	17	100%
Rivers or Streams	0	0%
Reservoirs	0	0%
DO YOU FEEL THAT THE COLVILLE TRIBES ARE MANAGING RESERVATION FISHERIES		

SATISFACTORILY?		
Yes	17	100%
No	0	0%
WOULD YOU BE IN FAVOR OF INCREASED OR MORE STRINGENT REGULATIONS, IF THEY INCREASED YOUR CHANCES OF HARVESTING LARGER FISH?		
Yes	5	31%
No	11	69%

Specific Lake Information and Management Plans

Allen Lake **(No Map Available)**

No Picture Available

Description

Allen is a small cool water lake located in Oakanogan County at T30N, R27E, section 2 in the Rice canyon portion of the Tumwater creek drainage within the Lake Rufus Woods Sub-basin. The drainage of the lake is southwest through Rice Canyon and Tumwater Creek. Sagebrush and grasslands are the dominant landscape cover. Little information is currently available for this lake but it appears to be a shallow pothole wetland. Grazing pressures has largely eliminated riparian vegetation that once surrounded this lake.

Specifications

Little data has been collected about Allen Lake because it has been dry several times in recent history due to shallow water depth (Table 1). Allen Lake should be classified as an intermittent wetland that provides little fishery potential; therefore, additional data collection is unwarranted.

Table 1: The average point measurements (unless otherwise labeled) for several important lake habitat variables.

Attribute	Measure	Attribute	Measure
Elevation	2,120 feet	Surface Area	6.6 Acres
Watershed Area	0.20 Miles^2	Volume	71.5 Acre-feet
Summer Max Temp	Unknown	Summer Max Temp @ 15ft	Unknown
Winter D.O. @ 15ft	Unknown	Summer D.O. @ 15ft	Unknown
Maximum Depth	Unknown	Average Depth	<10 feet
Conductivity or TDS	Unknown	Trophic State	Unknown
Natural Reproduction	Unknown	PH (1 year average)	Unknown
Dominant Substrate	Unknown	Aquatic Vegetation	Abundant
Shoreline Development	None	Dominant Forage	Unknown
Seechi Disk	Unknown	Land Use Issues	Grazing

Annual Historic Stocking Averages

Historical stocking were likely conducted by people unfamiliar with the intermittent nature of this lake. It was common for agencies during the 1930's to 1970's to stock trout into water to determine if the habitat was suitable (Table 2). Today we know what habitats will support fish of many different species so habitat suitability can be determined before fish are planted to avoid unintended consequences.

Table 2: The species, quantity, and size of fish stocked by agency and years.

Agency (Dates)	Species	Pounds	# of Fish	Size (Fish/Pound)
WDFW (1964)	EBT	10	1,120	112

Fishing History

No creel data are available for this lake.

Fish Life and Management Data

No fish surveys have been conducted

Limiting Factors

- No data has been collected for this lake but this lake appears better suited to ducks than fish.

Recommendations

1) Complete a lake specification survey of this lake.

Apex Lake **(Map, Figure 2)**

No Picture Available

Description

Apex is a small cool water lake located in Ferry County at T32N, R36E, section 35L in the Stray Dog Canyon drainage within the Upper Columbia Sub-basin. The intermittent drainage of the lake is southwest through Bourgeau Lake. Conifers, mostly Western Larch, Douglas Fir, and Yellow Pine are the dominant trees in this drainage. The lake bottom is mostly peat and decomposing vegetation. The small surface area to volume ratio makes this lake susceptible to winter kills. Brown bullheads are the main fish species in this lake.

Specifications

Apex Lake has poor habitat for salmonid species and marginal habitat for warm water species due to the high depth to surface ratio that makes surface to bottom water exchange minimal (Table 3). Lakes with poor circulation often exhibit high stratification in summer months and low dissolved oxygen levels (Figure 1). Habitat at this lake is limiting for fish survival.

Table 3: The average point measurements (unless otherwise labeled) for several important lake habitat variables.

Attribute	Measure	Attribute	Measure
Elevation	2,020 feet	Surface Area	3.1 Acres
Watershed Area	0.20 Miles^2	Volume	71.5 Acre-feet
Summer Max Temp	72°F	Summer Max Temp @ 15ft	56°F
Winter D.O. @ 15ft	2.0ppm	Summer D.O. @ 15ft	1.3ppm
Maximum Depth	29 Feet	Average Depth	5 Feet
Conductivity or TDS	Unknown	Trophic State	Eutrophic
Natural Reproduction	None	PH (1 year average)	6.2
Dominant Substrate	Peat	Aquatic Vegetation	90%
Shoreline Development	Minimal	Dominant Forage	Invertebrates
Seechi Disk (2-yr avg.)	2.0 Meters	Land Use Issues	Logging/road
Depth^2 to Surface Area	271:1		

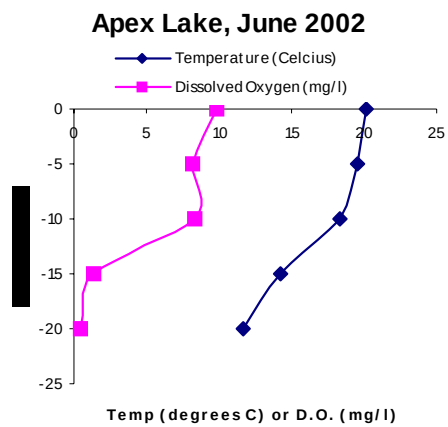
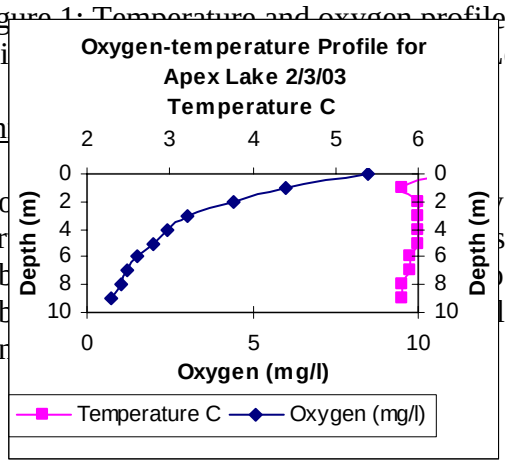


Figure 1: Temperature and oxygen profile for warmest summer water temperatures (Ri eft) on record.



An

Tro lakes on the Colville Reservation to determine sur suitability (Table 4). Today we can identify hab determine the fish species best suited to a lakes hab ling the fish stocked and help avoid unforeseen con

Table 4: The species, quantity, and size of fish stocked by agency and years.

Agency (Dates)	Species	Pounds	# of Fish	Size (Fish/Pound)
USFWS (1965-76)	RBT	14	1,229	87
USFWS (1966)	EBT	17	1,500	88

Fishing History

No creel data are available for this lake. According to local anglers, this lake receives very light use, if any.

Fish Life and Management Data

Fish population data has been collected at Apex Lake several times and the most abundant fish species has always been Black Bullheads (Table 5). Black bullheads are small but abundant and few anglers utilize this fish for food or sport. Black bullhead thrive in lakes with harsh habitat conditions such as exist at Apex Lake. Harsh environmental conditions exclude native predatory species or other fish that might otherwise compete with black bullheads and control population abundance.

Table 5: the year, gear, effort, and catch information from fish population surveys conducted to date at Apex Lake.

Fish Survey Results					
Year	Equipment Used	Effort	# Caught	Size Range	Species
1975	Gill Net	21 Hours	85	1-5”	BBH
1979	Gill Net	18 Hours	10	6”	BBH
			1	8”	LMB
2002	Gill Net	34 Hours	30	4-9”	BBH
2002	Trap Net	34 Hours	136	4-6”	BBH

Limiting Factors

- This lake lacks any suitable spawning habitat for salmonids so any cold-water management will require annual hatchery stocking.
- The lack of flushing flows, a high Depth^2 to Surface Area ratio, and high biological oxygen demand result in dissolved oxygen being a limiting factor in both summer and winter for salmonids.
- Temperature issues reduce the available habitat in this lake during summer periods.
- Competitive pressures from a high-density population of brown bullhead make this lake inhospitable to all fish expect predators like flathead catfish.
- This lake has poor access and no history of fishing

Recommendations

1) Rehabilitation will be required at this lake but unless considerable effort and resources are committed then the best management is to do nothing.
2) Install a passage barrier to block up stream and down stream migration of bullheads to/from Bourgeau Lake.
3) If resources are committed toward lake rehabilitation then rotentone over winter at 2 ppm to eliminate brown Bullhead population that has plagued this lake for almost 30 years.
4) Install an aeration system to improve dissolved oxygen levels in both the summer and winter.
5) Improve access points by installing a boat ramp and /or fishing pier.
6) Restock, monitor, and evaluate the habitat and success of the fishery

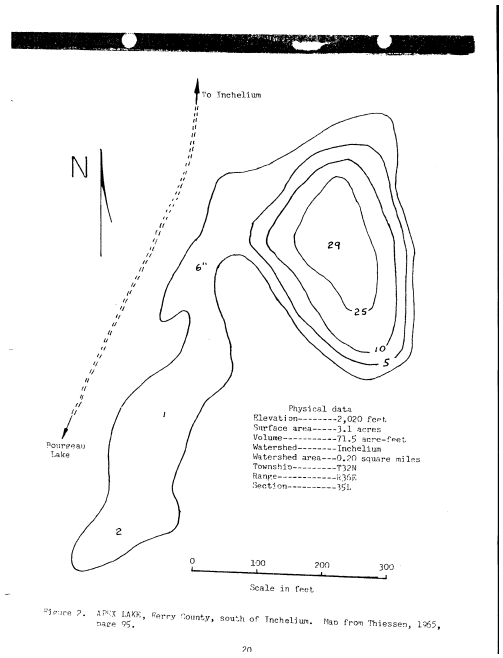


Figure 2: Most recent bathometry map on record for Apex Lake.

Big Goose Lake**(Map, Figure 5)**

Figure 3: Goose Lake at mid-summer 1989. The Picture on the left, taken in the summer of 1989 shows dense stands of rushes (Typha, Scirpus) along the shore. The aquatic plant in the foreground is Rupia maritina a salt tolerant aquatic plant dominant in this lake. The

photo on the right, taken in the summer of 1997 shows the enormous change to this prolific wildlife wetland resulting from cattle grazing on shoreline vegetation.

Description

Big Goose Lake, also known as Goose Lake is a shallow warm-water lake located in Oakanogan County at T31N, R28E, section 29F in the Omak Lake drainage within the Oakanogan Sub-basin. This lake is spring feed from the north but has no outlets and is surrounded by rolling hills in a semi-arid region of sage and bunch grasses (Figure 3). Soils are alkaline and the bedrock is basaltic. The lake is surrounded by American bulrushes (*Scirpus annericanus)* with the lake bottom made up of muck and marl this rich lake can summer or winter kill during periods of drought. The extensive stands of bulrushes were severely denuded by overgrazing and trampling by cattle from 1993 on. Aquatic vegetation consists of *Rupia maritina*, sago pondweed (*Potomogeton pecttinatus*), milfoil (*Myriophyllum sp.*), calcium encrusted stonewart (*Chara sp.)*, smart weed (*Polygonium sp.*), bladderwart (*Utricularia vulgaris*), filamentous green algae, and filamentous blue-green algae.

Specifications

Goose Lake has marginal habitat specification for a warm water lake (Table 6). The main habitat constraint is dissolved oxygen and recently installed windmill pumps should provide the slight increase in dissolved oxygen needed to prevent most fish kills (Figure 4). The lake is extremely shallow so water is critical to the success of any fishery at this lake. No water withdrawals should occur from this lake as ample water is available from other sources in this area.

Table 6: The average point measurements (unless otherwise labeled) for several important lake habitat variables.

Attribute	Measure	Attribute	Measure
Elevation	1,225 feet	Surface Area	248 Acres
Watershed Area	23.5 Miles^2	Volume	726 Acre-feet
Summer Max Temp	79°F	Summer Max Temp @ 9ft	72°F
Winter D.O. @ 15ft	Unknown	Summer D.O. @ 9ft	4.0ppm
Maximum Depth (varies)	10 Feet	Average Depth	2.6 Feet
Conductivity	1,301μmhos/cm	Trophic State	Eutrophic
Natural Reproduction	Yes	PH (10 year avg.)	9.0
Dominant Substrate	Muck/marl	Aquatic Vegetation	Very Abundant
Shoreline Development	Low	Dominant Forage	Invertebrates
Secchi-disks	1.9 Meters	Land Use Issues	Roads and Heavy Grazing
Chlorophyll a	4.0 μg/l		
Depth^2 to Surface Area	0.4:1		

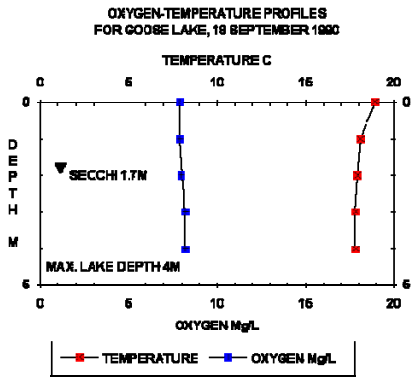


Figure 4: Temperature and oxygen profile for warmest summer water temperatures on record.

Stocking History

Fish stocked in 1949 and 1950 came from Pearrygin Lake located near the town of Winthrop. The 1974 stocking was from fish collected at Fish Lake in Pine Creek, 1981 stockings were from Bourgeau Lake on the Colville Reservation. In 2002, this lake was stocked with fish salvaged from Rebecca Lake when the lake level was lowered.

Table 7: The species, quantity, and size of fish stocked by agency and years.

Agency (Dates)	Species	# of Fish	Size (Fish/Pound)
WDFW (1949, 50, & 74)	LMB	76	4-0.5
Tribe (1981)	LMB	213	Varying
Tribe (2002)*	LMB	3,000	Varying
Tribe (2002)*	PSS	1,000	Varying
Tribe (2002)	RBT	4	2 lbs

* numbers are approximate.

Fishing History

After bass were stocked in 1974, game wardens reported that anglers were fishing and catching bass later that same year. However, a complete winter kill occurred in 1979 and the lake was restocked in 1981 and plans to install an aeration system began. A partical winter kill in 1984 prompted the Colville Business Council to close Big Goose Lake in 1985 so that the population could be restocked and have time to be re-established. No records of stocking during this time are available. This lake supported medium-to-heavy fishing effort after an aerator system was installed in 1987. Many large fish were taken and fish appeared to be naturally reproducing however, the aeration system was not maintained and during low water-years the lake died out. A new aeration system is planned for installation in 2002, with hopes of recreating a quality largemouth bass fishery. No anglers were observed by creel personnel however, one employee of the Fish and Wildlife Department did observe one boat of anglers on one day but no creel data was recorded.

Table 8: Creel data from Goose Lake for largemouth bass including year data was collected, catch, effort, size, and catch rate.

Year	# Caught	Hours Fished	# Anglers	Size Range	Fish/hour
1977	99	36	14	8-14”	2.75
1978	175	209	71	10”-14”	0.84
1984	59	45	N/D	N/D	1.31
2002	0	0	0	0	0

Fish Life and Management Data

Goose Lake has always been managed as a largemouth bass fishery and is one of only three lakes actively managed for largemouth bass on the entire reservation. Winter kills has been a problem at is lake and several attempts have been made to improve this problem. The lake is very shallow and in low water years it is prone to winter kills and any water withdrawals from this lake would only exacerbate this problem. Fish surveys show clearly that complete fish kills have occurred at this lake (Table 9). Windmills were installed at this lake in 2002 and fish were restocked. Pumpkinseed sunfish were also stocked in 2002 to enhance the prey base.

Table 9: the year, gear, effort, and catch information from fish population surveys conducted to date at Goose Lake.

Fish Survey Results					
Year	Equipment Used	Effort	# Caught	Size Range	Species
1976	Gillnet	24 Hours	16	7-15”	LMB
1979	Winter kill report	N/A	817	20-405 mm	LMB
1979	Gillnet	32 Hours	No Fish		
1980	Gillnet	34 Hours	No Fish		
1982	Electrofishing	Unknown	50	2-12”	LMB

Limiting Factors

- The lack of flushing flows, and high biological oxygen demand make dissolved oxygen in winter limiting.
- This lakes thermal regime limits it to a warm-water fishery.
- Some facilities at this lake were built at one time but not maintained.

Recommendations

1) Complete fish salvage at Rebecca Lake and stock between 3 and 5 thousand largemouth bass and 1,000 pumpkinseed sunfish into this lake.
2) Install a wind powered aeration system to improve thermal and dissolved oxygen issues.
3) Monitor and evaluate the success of this lake as a warm water fishery including both population and creel surveys.
4) Install signs to lake on lower river road.
5) Install pit toilets and a boat ramp.

6) If successful in reducing summer/winter die-offs provide regulations that maintain large bass to keep this population in balance.

Figure 5: Most recent bathometry map on record for Big Goose Lake.

B. J. Lake **(No Map)**

Figure 6:Veiw of lake access and saline parameter in the summer of 2002

Description

B. J. Lake is a small alkaline pothole located in Oakanogan County at T32N, R25E, section 26 N/P at an elevation of 1390 feet. This lake is high in alkalinity from sodium sulfate and dries up completely during extended dry periods (Figure 6). The surrounding landscape is mostly rolling sagebrush covered hills and rangeland. **This lake has no fishery potential** and limited wildlife potential due to its shallow depth and high alkalinity.

Bourgeau Lake **(Map, Figure 10)**

Figure 7: Bourgeau Lake at high water in the spring (Left) and at late summer low water (Right) exposing the shallow Chara bench.

Description

Bourgeau is a small cold water lake located in Ferry County at T32N, R36E, section 36E,M in the Stray Dog Canyon drainage that travels 1.9 miles before entering the Columbia River at Lake Roosevelt within the Upper Columbia Sub-basin (Figure 7). The intermittent inlet is to the Northeast from Apex Lake. Ponderosa pine and mixed fir forest, mostly Western Larch, Douglas Fir, are the dominant trees in this drainage on broadleaf shrubs at the northern end of the lake. Marsh vegetation surrounds about half of this lake but is much reduced due to cattle grazing pressures. The lake bottom is mostly peat and decomposing vegetation making this lake susceptible to occasional winter-kills. The lakeshore is marl consisting mostly of calcium carbonate deposited by the macroalga Chara sp. The deposition of marl along the shoreline forms a shallow bench. Such lakes are referred to as Chara bench lakes and are characteristic of the region. Access can be difficult during wet periods because of slick, steep dirt road.

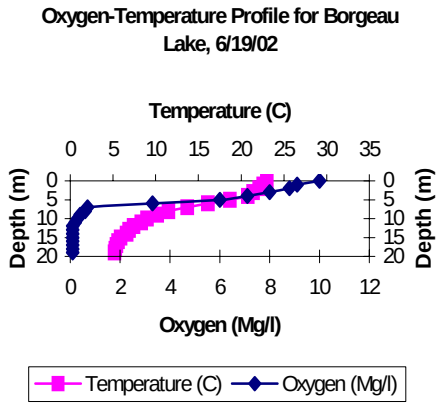
Specifications

Bourgeau Lake provides marginal coldwater fish habitat but issues related to dissolved oxygen and high summer water temperatures minimize available habitat (Table 10). Stratification in the summer is most limiting for salmonid fishes and can result in partial fish kills if abundance is to high (Figure 8).

Table 10: The average point measurements (unless otherwise labeled) for several important lake habitat variables.

Attribute	Measure	Attribute	Measure
Elevation	1,900 feet	Surface Area	21.9 Acres
Watershed Area	1.26 Miles^2	Volume	574 Acre-feet
Summer Max Temp	73°F	Summer Max Temp @ 15ft	69°F
Winter D.O. @ 15ft	7.4 mg/l	Summer D.O. @ 15ft	6.0 mg/l

Maximum Depth	54 Feet	Average Depth	20 Feet
Conductivity	326 µmhos/cm	Trophic State	Eutrophic
Natural Reproduction	Warm water SPP.	PH (3 year avg.)	7.2
Dominant Substrate	Peat	Aquatic Vegetation	Abundant
Shoreline Development	Minimal	Dominant Forage	Invertebrates
Secchi-disks	3.2 Meters	Land Use Issues	Heavy Grazing
Chlorophyll a	0.003 µg/l?	Depth^2 to Surface Area	133:1



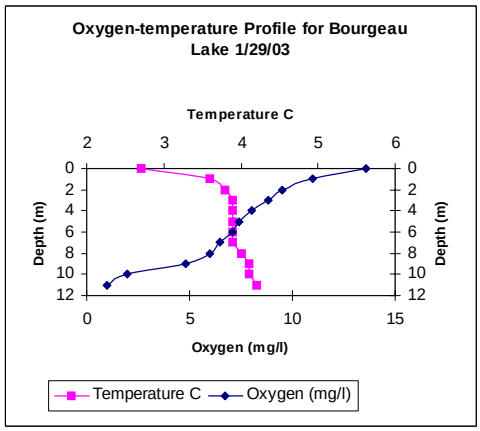


Figure 8: Temperature and oxygen profile for warmest summer water temperatures (Left) and Coldest water temperatures (Right) on record.

Stocking History

Bourgaeu Lake has been a trout fishery for the Colville Tribes for many years but has never produced impressive catches or large fish. Although managed as a put-grow-and-take water and fish are capable of surviving from one year to the next this lake is stressful to salmonid fishes and likely reduces growth and longevity of the fish stocked. Stocking fish in the fall provides the best habitat for fish but the abundance of fish that are carried into the summer period should be low to reduce the impact of stressful conditions. The timing of fish stocked into this lake has largely been ignored but could result in higher returns to creel (Table 11).

Table 11: The species, quantity, and size of fish stocked by agency and years.

Agency (Dates)	Species	Pounds	# of Fish	Size (Fish/Pound)
WDFW (1950)	RBT	3	4,500	1,500
USFWS (1966-1976)	RBT	52	3,374	65
USFWS (1967-1976)	EBT	18	2,315	126
Tribe (Winthrop 1977,79,87-89)	RBT	84	3,029	36
Tribe (Winthrop 1977)	EBT	7	1,000	143
Tribal Hatchery (1990-91, 93-2001)	RBT	209	2,792	13
Tribal Hatchery (1994)	EBT	71	20,000	283

Tribal Hatchery (2002)	RBT	689	3,445	5

Fishing History

In 1974 this lake was creeled for 1-day and 2-anglers caught 12-fish between 10 and 13 inches long in 8-hours. According to local anglers, this lake receives moderate use but largemouth bass, introduced in the late 1970's has increased fishing for bass at this lake. In 2002 a 1-day creel identified 2 anglers that caught 1-rainbow trout and 1-largemouth bass which were 12 and 14 inches respectively.

Fish Life and Management Data

Many small bullheads were observed in the shallow water areas of this lake during the 1950 and 1964 WDFG surveys and this species was the only fish known to inhabit this lake at that time. After the 1950 stocking, anglers reported catching rainbow trout for several years. Black bullhead, largemouth bass, and pumkinseed sunfish all naturally reproduce in this lake. The abundance of each species has changed over the years with black bullheads being more abundant historically and pumpkinseed sunfish being most abundant in recent years (Table 12). Largemouth bass has always maintained a presence and rainbow trout have been maintained through stocking. Predation and competition need to be considered in managing this water as a cold-water fishery (Figure 9). Larger trout stocked into waters with abundant warm water fish populations return more fish to the creel but stressful summer habitats limit the number of these fish that should be stocked in the spring.

Table 12: the year, gear, effort, and catch information from fish population surveys conducted to date at Bourgaeu Lake.

Fish Survey Results					
Year	Equipment Used	Effort	# Caught	Size Range	Species
1964	Gillnet	62 Hours	1	Small	BBH
1975	Gillnet	21 Hours	14	3-7"	BBH
			5	10-13"	RBT
1977	Gillnet	23 Hours	8	10-13"	RBT
			2	4-6"	BBH
			1	11"	LMB
1979	Gillnet	17 Hours	8	260-305mm	RBT
			1	290 mm	LMB
1980	Gillnet	32 Hours	16	280-340mm	RBT
			256	Avg.155 mm	BBH
1981	Gillnet	73 Hours	5	332-360 mm	RBT
			2	220-319 mm	EBT
			4	190-203 mm	LMB
			86	128-186 mm	BBH
1989	Gillnet	30 Hours	4	N/D	PSS
2002	Gillnet	9 Hours	23	220-360mm	RBT
			3	190-210mm	LMB

			1	258mm	BBH
2002	Trapnet	9 Hours	49	70-160mm	PSS
2002	Electrofishing	1 Hour	28	12-440mm	LMB
			128	40-160	PSS
			16	220-250	BBH

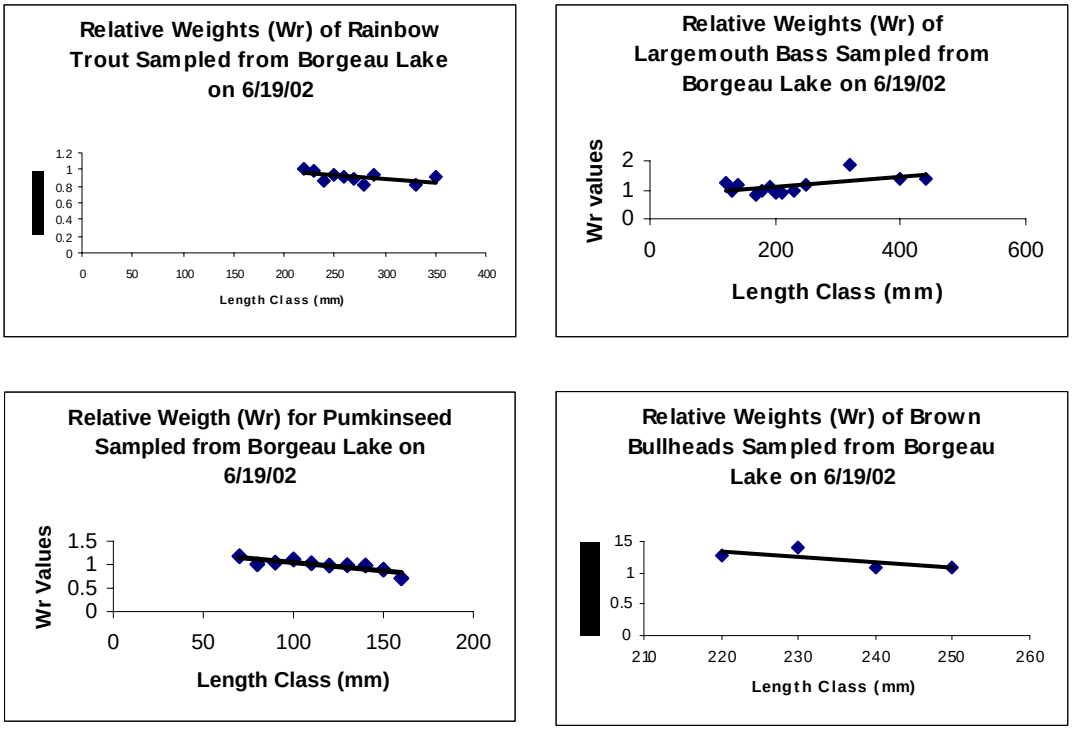


Figure 9: Relative weight indices for game species present in Bourgeau Lake.

Limiting Factors

- This lake lacks suitable spawning habitat for salmonids so any coldwater fisheries will require annual hatchery stocking.
- Temperature issues reduce salmonid habitat in this lake during summer periods.
- Competitive pressures from introduced species (LMB, PSS) and brown bullhead limit salmonid survival and growth.
- This lake has poor access and no facilities.

Recommendations

1) Stop stocking brook trout into this lake because few have been creeled or collected during fish surveys yet they have been stock since 1966.
2) Install voluntary creel box to better determine usage and angler preferences.
3) Determine the population of largemouth bass and only stock catchable rainbow trout in the spring.
4) Exclude cattle from lake shoreline to reduce nutrient inputs and plant trees to lower summer temperatures.

5) If bass numbers decline and brown bullhead become dominant use rotenone over winter at 2 ppm to eliminate brown bullhead and largemouth bass populations in conjunction with work at Apex Lake.
6) If rotenone option is used, restock lake with 4,000 fingerling red-band rainbow trout the following spring or fall.
7) Monitor and evaluate the success of this lake as a cold water fishery once every five years.

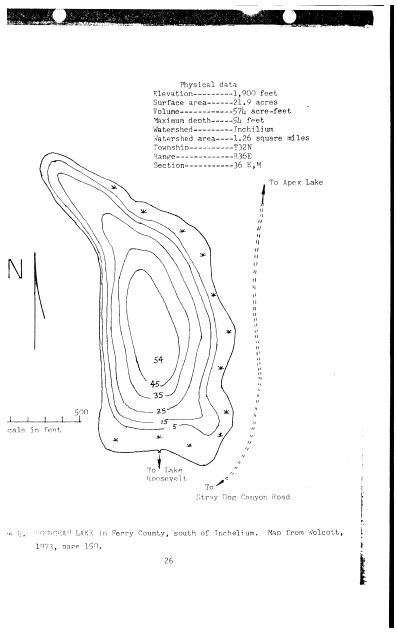


Figure 10: Most recent bathometry map on record for Bourgeau Lake.

Buffalo Lake **(Map, Figure 14)**

Figure 11: Buffalo Lake looking southeast.

Description

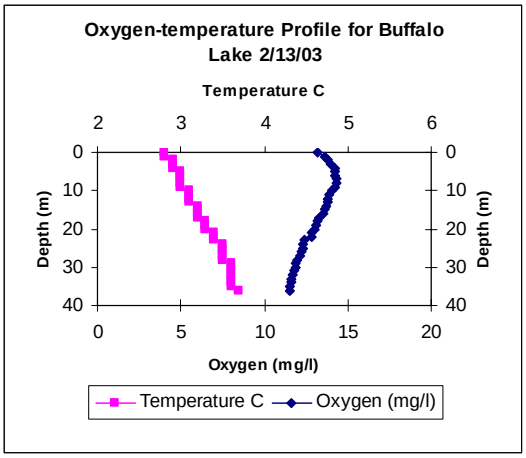
Buffalo is a large coldwater lake located in Okanogan County at T30N, R31E, sections 26, 27, 34, and 35 in the Nespelem River drainage within the Upper Columbia Sub-basin. Several intermittent and one unnamed inlets are located along this lakes northern and eastern shorelines along with several submerged springs. Elders in the area have mentioned that rainbow trout historically spawned in the no name perennial creek at the lakes eastern end however, heavy grazing and upland timber harvest has devasted this drainage that has down-cut over 30 feet in some places. Due to the major damage in the no-name creek drainage, adfluvial rainbow trout spawning is not possible and creek rehabilitation would be cost-prohibitive. Because no inlets provide a potential spawning sight for kokanee spawning, biologist think this occurs near sub-surface springs or along the shoreline. The lake sits in an area of ancient basaltic lava flows with rolling hills covered by mostly sage and bunch grasses (Figure 11). Extensive weed beds exist in the back bays and in the shallow eastern end. This lake provides good year round salmonid habitat regardless of precipitation. Access is good by dirt roads, amenities include a resort, public boat launch, pit toilets, and a campground and several summer cabins sit along the southern and western shoreline.

Specifications

Buffalo Lake has excellent water quality parameters for salmonid survival. However, habitat conditions in the surrounding watershed are poor and contribute to lower productivity than would normally be expected. Summer water temperatures are high reaching 73°F but good dissolved oxygen and depth refugia provide excellent habitat even in the warmest part of the summer (Table 13). Winter habitat conditions are equally impressive (Figure 12). However, it is unclear what is constraining the primary productivity at this lake.

Table 13: The average point measurements (unless otherwise labeled) for several important lake habitat variables.

Attribute	Measure	Attribute	Measure
Elevation	2,402 Feet	Surface Area	539 Acres
Watershed Area	13.7 Miles^2	Average Depth	63 Feet
Maximum Depth	121 Feet	Summer Max Temp@15ft	71°F
Summer Max Temp	73°F	Summer D.O. @ 15ft	7.7 mg/l
Winter D.O. @ 15ft	14.2 mg/l	Trophic State	Oligatrophic
Conductivity	121 μmhos/cm	PH (10 year avg.)	7.6
Natural Reproduction	Yes	Aquatic Vegetation	Some
Dominant Substrate	Sand/Gravel	Dominant Forage	Unknown
Shoreline Development	Moderate	Secchi-disc	6.2 Meters
Shoreline Length	7.41 Miles	Chlorophyll a	1.9 μg/l
Land Use Issues	Grazing and Development	Volume	33,700 Acre-feet
		Depth^2 to Surface Area	27:1



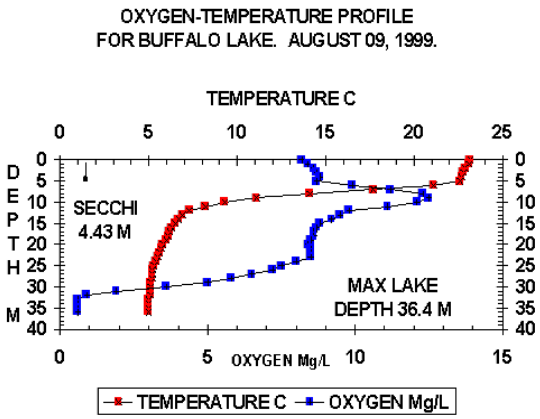


Figure 12: Temperature and oxygen profile for warmest summer water temperatures (Right) and coldest water temperatures (left) on record.

Stocking History

The Washington Department of Game (WDG) began stocking Lake Whatcom stock kokanee salmon in 1946 and today this population is naturally reproducing (Table 14). Most of the historic stocking utilized rainbow trout and eastern brook trout. Lahontan cutthroat trout were stocked in 1968 by the USFWS and coho salmon were stocked by the tribe in 1985 neither of these species is currently a part of the lakes fish population. The large increase in size and pounds stocked in 2002 were the result of stocking 1,124 rainbow trout that weighted between 8 and 10 pounds each.

Table 14: The species, quantity, and size of fish stocked by agency and years.

Agency (Dates)	Species	Pounds	# of Fish	Size (Fish/Pound)
WDFW (1947-48,53-64)	RBT	1,332	129,855	98
WDFW (1964)	EBT	365	40,880	112
WDFW (1946-49,58)	KOK	118	486,800	4,123
USFWS (1966-1976)	RBT	3,245	46,756	14
USFWS (1967-1976)	EBT	1,450	88,066	61
USFWS (1968)	LCT	325	325	1
Tribe (Winthrop 1977-89)	RBT	791	38,225	48
Tribe (Winthrop 1977-89)	EBT	246	31,047	126
Tribe (Winthrop 1985)	Coho	397	150,000	378
Tribal Hatchery (1990-2001)	RBT	375	36,668	38
Tribal Hatchery (1990-95,97-98,2001)	EBT	455	29,583	65
Tribal Hatchery (2002)	RBT	13,792	18,420	1.3

Fishing History

Buffalo is the only lake on the Colville Reservation that contains kokanee salmon while providing fishing opportunities for rainbow trout, brook trout, largemouth bass, and pumpkinseed sunfish. This lake was treated unsuccessfully using rotenone in 1953 to

eliminate pumpkinseed sunfish. Springs in the lake worked to make rehabilitation difficult and an alternate control measure (using rotenone to kill fish in shallow areas) was proposed but it is unknown if it was tried or successful in reducing competition between pumpkinseed sunfish and salmonids. Buffalo Lake is one of the more popular fisheries on the Colville Reservation and angler usage in the 1970's was around 8,000 angler-days per year and average catch rate estimates were 2.5 fish per hour for an annual harvest of 20,000 trout between 7 and 13 inches in length however the creel data discovered during research for this manuscript was unable to confirm these values (Table 15). Anglers introduced largemouth bass in the 1970's, from nearby Rebecca Lake and this population is naturally reproducing in Buffalo Lake. A marking program was initiated in 1978 to determine fish survival, clipping fins on a subset of fish produced at the Winthrop hatchery this continued through 1983, however inconsistencies on the program and a poor experimental design failed to produce usable results. Bluegills were recorded for the first time in the 2002 creel. Buffalo Lake usage has reduced to 5,261 angler days and so has the harvest to 10,360 fish in 2002.

Table 15: Creel data from Buffalo Lake for all fish species including; year data was collected, catch, effort, size, and catch rate.

Year	Days of Creel	# Harvested	Hours Fished	# Anglers	Size Range	Fish/hour
1964	N/D	399	861	123	4-22"	0.46
1977	14	228	249	93	9"	0.92
1978	4	93	48	12	10"	1.96
1979	10	416	591	122	11"	0.70
1980	2	69	69	20	10"	1.00
1982	2	63	102	31	12"	0.62
1985	4	27	53	19	10"	0.51
1988	2	20	34	21	10'	0.60
2002	28	56	153	56	177-533mm	1.04

Fish Life and Management Data

Bridgelip suckers, kokanne salmon, pumkinseed sunfish, largemouth bass, rainbow trout, and eastern brook trout have been present in Buffalo Lake (Table 16). Historically eastern brook trout and rainbow trout populations had similar population size structures however, eastern brook trout have not been collected in recent years (Figure 13). All species are naturally reproducing in Buffalo Lake with the exception of rainbow trout that are stocked annually. All game fish species are in good condition, have stable abundance and growth characteristics except for eastern brook trout that have declined precipitously in recent years (Table 17). The data suggest that the decline of eastern brook trout has also resulted in an increase in largemouth bass abundance in recent years (Table 18). Rainbow trout and kokanne salmon have and continue to make up the majority of the game fish catch at Buffalo Lake.

Table 16: the year, gear, effort, and catch information from fish population surveys conducted to date at Buffalo Lake.

Fish Survey Results					
Year	Equipment Used	Effort	# Caught	Size Range	Species
1975	Gillnet	15 Hours	15	3-7”	BLS
			8	8-14”	RBT
			4	8-12”	KOK
			4	2-5”	PSS
			2	9-10”	EBT
1979	Gillnet	95 Hours	18	Unknown	RBT
			61	100-400 mm	EBT
			10	Unknown	KOK
			156	Unknown	LMB
			556	Unknown	PSS
1981	Gillnet	Unknown	70	150-490mm	RBT
			64	110-410mm	EBT
			N/D	N/D	KOK
			N/D	N/D	LMB
			N/D	N/D	PSS
1990	Gillnet	38 Hours	6	138-410mm	RBT
			3	345-350mm	EBT
			7	355-430mm	KOK
			20	N/D	BLS
			8	N/D	PSS

Table 17: Gillnet survey information by species showing the year, abundance, effort, average length and weight, plus relative weight by population and size class.

Rainbow Trout

						Relative Weight by size		
Year	# Fish	# Nets	CPUE Fish/Net	Avg. Length (mm)	Avg. Weight (g)	Population all fish	S to P (30 to 50cm)	P to M (50 to 65cm)
1994*	15	9	1.67	329	597	159	N/D	N/D
1995*	7	9	0.78	338	642	157	N/D	N/D
1996	15	9	1.67	275	294	135	N/D	N/D
1997	6	9	0.67	339	631	135	130	93
1998	15	5	3.00	304	533	123	128	157
1999	8	5	1.60	311	453	108	104	105
2000	8	5	1.60	374	753	126	126	N/D
AVG.	**10.57**	**7**	**1.57**	**324**	**558**	**135**	**122**	**118**

Eastern Brook Trout

						Relative Weight by size		
Year	# Fish	# Nets	CPUE Fish/Net	Avg. Length (mm)	Avg. Weight (g)	Population all fish	S to P (26 to 33cm)	P to T (>33 cm)
1994*	15	9	1.67	329	597	142	N/D	N/D
1995*	7	9	0.78	338	642	140	N/D	N/D
1996	15	9	1.67	275	294	122	N/D	N/D
1997	9	9	1	296	376	119	111	110
1998	3	5	0.60	260	420	117	N/D	125

1999	0	5	0.00	N/D	N/D	N/D	N/D	N/D
2000	0	5	0.00	N/D	N/D	N/D	N/D	N/D
AVG.	**7**	**7**	**0.82**	**300**	**466**	**128**	**111**	**118**

Largemouth Bass

Year	# Fish	# Nets	CPUE Fish/Net	Avg. Length (mm)	Avg. Weight (g)	Relative Weight by size Population all fish	S to P (20 to 30cm)	P to M (30 to 38cm)	M to Q (38 to 51cm)
1997	1	9	0.11	114	30	170	N/D	N/D	N/D
1998	7	5	1.40	273	593	128	N/D	145	120
1999	7	5	1.40	273	593	148	N/D	135	142
2000	4	5	0.80	336	1003	132	131	115	150
AVG.	**5**	**6**	**0.93**	**249**	**555**	**144**	**131**	**132**	**137**

Kokanne Salmon

Year	# Fish	# Nets	CPUE Fish/Net	Avg. Length (mm)	Avg. Weight (g)	Relative Weight Population all fish**
1997	8	9	0.89	179	79	83
1998	12	5	2.40	219	146	93
1999	14	5	2.80	214	123	95
2000	48	5	9.60	227	181	100
AVG.	**21**	**6**	**3.92**	**210**	**132**	**93**

***** 1994 and 1995 data taken from 1999 annual production report but could not be verified.
** Standard weight equation determined from 2000 data regression analysis.

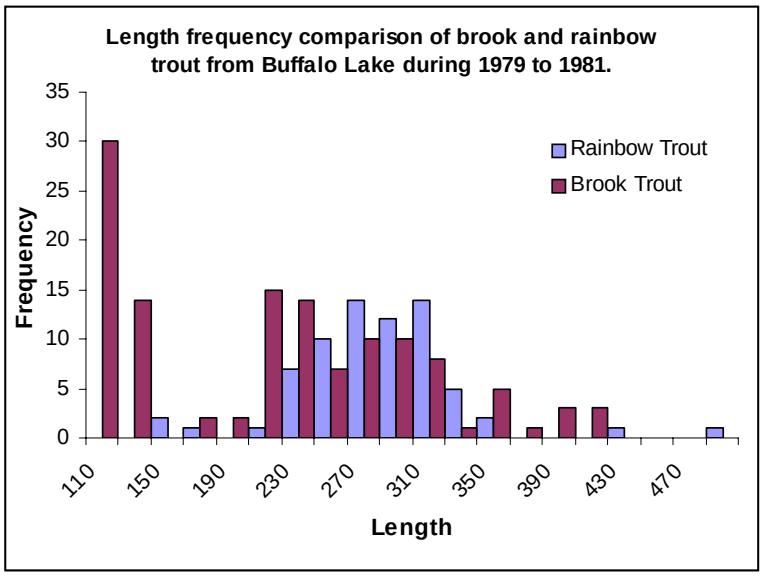


Figure 13: Length frequency histograms for Buffalo Lake.

Table 18: Species composition of the game fish present in Bufffalo Lake showing year, catch, and percentage of the total.

Brook Trout	Rainbow Trout	Kokanee Salmon	Largemouth Bass	Punkinseed

Date	# Caught	Realitive Abundance	Percent of Catch	# Caught	Percent of Catch	# Caught	Percent of Catch	# Caught	Percent of Catch	# Caught	Percent of Catch	Total Caught
Jun-94	6	18%	17%	15	43%	13	37%			1		35
Jun-95	1	5%	5%	7	35%	11	55%			1		20
Jun-96	2	7%	6%	15	47%	14	44%			1		32
Jul-97	9		36%	6	24%	8	32%	1	4%	1	4%	25
Jul-98	3		8%	15	41%	9	24%	7	19%	3	8%	37
Jul-99	0		0%	7	27%	14	54%	4	15%	1	4%	26
Jul-00	0		0%	8	13%	48	80%	4	7%	0	0%	60
AVG.	**4**	**11%**	**12%**	**11**	**36%**	**12**	**41%**	**4**	**13%**	**1**	**5%**	**29**

Limiting Factors

- Although some limited natural recruitment of kokanne salmon occurs and the stream that enters this lakes southeast bay has sufficient flow to provide natural recruitment. No spawning activity takes place at this location because suitable substrate and depth are lacking due to poor upland land-use practices. This stream could be used to collect fish for spawning then eggs taken to the Colville Tribal Hatchery for incubation and rearing. However, this lake lacks suitable spawning habitat for trout to be self-sustaining without annual supplemental hatchery stocking.
- Shoreline vegetation loss from cattle grazing has reduced cover and shade for fish.
- Algal abundance has increased and this is suspected as causing reduced macrophyte production but this lake remains low in primary productivity.
- Competitive pressures from introduced species (LMB, PSS, and BLG?) may limit salmonid survival and growth.
- Zooplankton populations appear constrained in this lake and could limit recruitment of naturally reproducing fish however this limitation could be part of a natural cyclic event.

Recommendations

1) Reduce to biannual or eliminate brook trout plants into this lake because few have been creeled or collected during fish surveys yet they have been stock since 1947.
2) Stock primarily trout at no less than 5/lb to reduce competition with kokanee salmon for limited zooplankton resources. Determine the population of largemouth bass and adjust stocking sizes of redband/rainbow trout accordingly. Stock only triploid rainbow trout until redband trout are available. Remove all largemouth bass and pumpkinseed sunfish collected during lake surveys and release into Big Goose Lake.
3) Build a permanent spawning facility on no-name creek to collect redband trout once a population has been established use these fish to supplement the Colville Tribal Hatchery's redband trout captive brood stock program.

4) Work with range and local cattlemen and develop an interdisciplinary team of natural resource experts to create a long-term watershed management plan for Buffalo Lakw and the surrounding area.
5) Reduce cattle grazing along the shoreline and plant willows to improve shoreline cover and shading once cattle have been excluded.
6) Consider nutrient enrichment to increase primary productivity and zooplankton abundance.
7) Monitor and evaluate the success of this lake as a coldwater fishery.

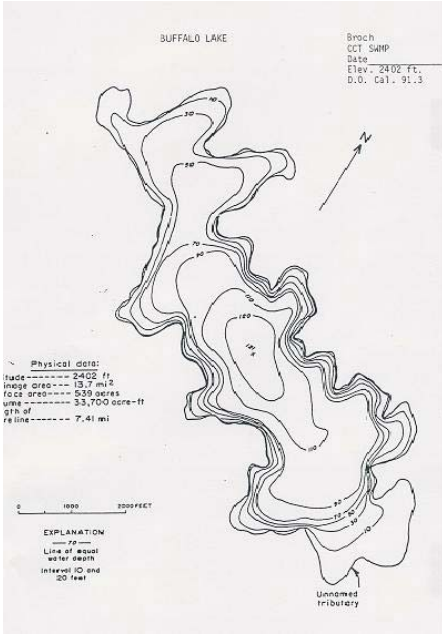


Figure 14: Most recent bathometry map on record for Buffalo Lake.

Camille Lake **(Map, Figure 16)**

Insert picture here

Description

Camile Lake is a warm water lake located in Ferry County at T32N, R36E, section 3G/H in the Stranger Creek drainage within the Upper-Columbia Sub-basin. The landscape is open rangeland with scattered conifer trees and a mixed conifer forest on the northwest slope above the lake. Little is known about this lake but it does have a history of salmonid stocking in the 1960's and 1970's however an overnight gillnet set in 1975 indicated no fish had survived so salmonid stockings were discontinued even though an aeration system was in place when fish were stocked. The main use of this lake at this time is for livestock watering. A lake survey in 2002 indicated an intense green algal bloom and the lake smelled of sulfur indicating that hydrogen sulfide gas is limiting fish survival. Access is poor by an overgrown two-track road to the northeast corner of the lake. The lake is entirely on private lands and the landowner to the west does not want trespassers.

Specifications

Table 19: The average point measurements (unless otherwise labeled) for several important lake habitat variables.

Attribute	Measure	Attribute	Measure
Elevation	1,958	Surface Area	26.8 Acres
Watershed Area	Unknown	Volume	348 Acre-feet
Summer Max Temp	81°F	Summer Max Temp @ 15ft	73°F
Winter D.O. @ 15ft	Unknown	Summer D.O. @ 15ft	1.0 mg/l
Maximum Depth	32 Feet	Average Depth	13 Feet
Conductivity	1,000µmhos/cm	Trophic State	Eutrophic
Natural Reproduction	None	PH (1 year avg.)	7.8
Dominant Substrate	Peat	Aquatic Vegetation	Abundant
Shoreline Development	None	Dominant Forage	Unknown
Seechi disk	7 Feet	Land Use Issues	Some Grazing
Depth^2 to Surface Area	Unknown		

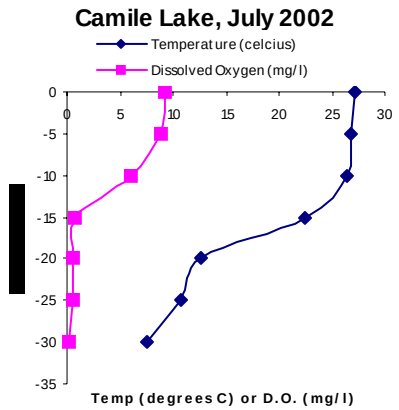


Figure 15: Temperature and oxygen profile for warmest summer water temperatures on record.

Stocking History

Biologists speculate that after 1971 salmonid stockings stopped due to poor returns.

Date	Season	Species	# of Fish	Size (Fish/Pound)
1966	Spring	WCT	6,000	500
1967	Spring	WCT	6,000	462
1970	Spring	RBT	1,000	59
1971	Spring	RBT	3,009	91

Fishing History

No creel data exists for this lake.

Fish Life and Management Data

A survey in 2002 of this lake resulted in collecting only 2 brown bullheads however nets collected 87 salamanders and 14 turtles but these were not identified to species.

Fish Survey Results

Year	Equipment Used	Effort	# Caught	Size Range	Species
2002	Gillnet	31 Hours	2	118-155mm	BBH
2002	Trapnet	14 Hours	0	N/A	N/A

Limiting Factors

- This lake lacks any suitable spawning habitat and temperatures in the upper 5 meters exceed the tolerance for salmonids.
- The lack of flushing flows, the presence of hydrogen sulfide gas, and high biological oxygen demand make dissolved oxygen in both summer and winter limiting for salmonids and other fish species.
- Considerable information gaps exist for this lake including temperature and dissolved oxygen profiles for winter and water chemistry.
- This lake is on private land, has poor access, and no history of fishing

Recommendations

1) **This lake has no potential as a cold-water fishery**
2) Do winter DO profile, and water chemistry survey.
3) Do an inventory of turtles and other amphibians to identify species present.
4) Determine the potential to be an Inchelium area warm-water fishery as this might help reduce non-discriminate bass introductions into salmonid fisheries by local anglers.
5) Determine access options and if a fishery is to be developed, an arrangement with landowners will need to be investigated.
6) Creating a fishery at this lake is a long term project, perhaps the better option is to do nothing for fish but manage this lake for waterfowl, turtles, and amphibians

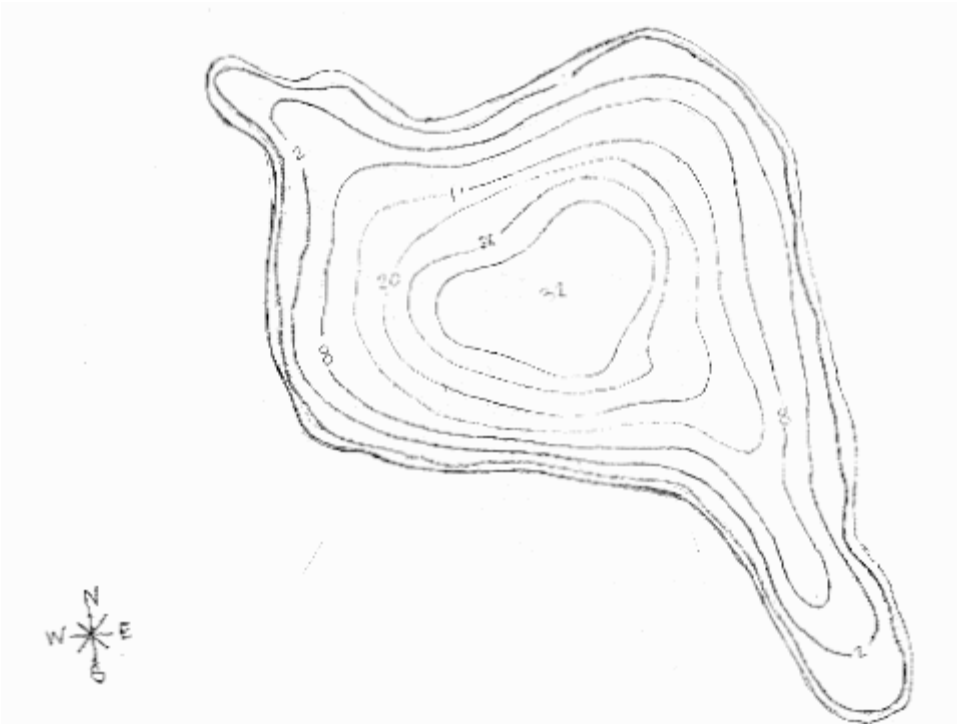


Figure 16: Most recent bathometry map on record for Camile Lake.

Cody Lake**(Map, Figure 19)**

Figure 17: Inundated timer that surrounds Cody Lake.

Description

Cody Lake is a small coldwater lake located in Ferry County at T33N, R33E, section 23-Q/R in the Twentythree Mile Creek drainage within the San Poil Sub-basin. This lake is spring fed from the north and has one small pocket of deep water. A beaver dam has raised the lake level about 2 feet inundating many of the trees that historically surrounded

this lake. The lake has adequate depth to provide a summer thermal refuge for salmonids but dissolved oxygen is limited to less than 2 feet of water making the deep water anoxic. A lack of mixing in this lake has created a lethal oxygen situation for fish due to the small size of the lake and the small basin that is surrounded by a dense stand of Douglas fir except were logging has removed this timber near the western shoreline and the landscape is mostly grasses and shrubs. Access is good and a potential parking area or boat launch already exists.

Specifications

Attribute	Measure	Attribute	Measure
Elevation	3,500 Feet	Surface Area	6.8 Acres
Watershed Area	Unknown	Volume	95 Acre-feet
Summer Max Temp	70 ^{o} F	Summer Max Temp @ 15ft	53 ^{o} F
Winter D.O. @ 15ft	O mg/l	Summer D.O. @ 15ft	2.1 mg/l
Maximum Depth	36 feet	Average Depth	14 Feet
Conductivity or TDS	Unknown	Trophic State	Oligotrophic
Natural Reproduction	None	PH or Alkalinity	Unknown
Dominant Substrate	Silt	Aquatic Vegetation	Nominal
Shoreline Development	None	Dominant Forage	Invertebrates
Depth^2 to Surface Area	153:1	Land Use Issues	Logging/Road

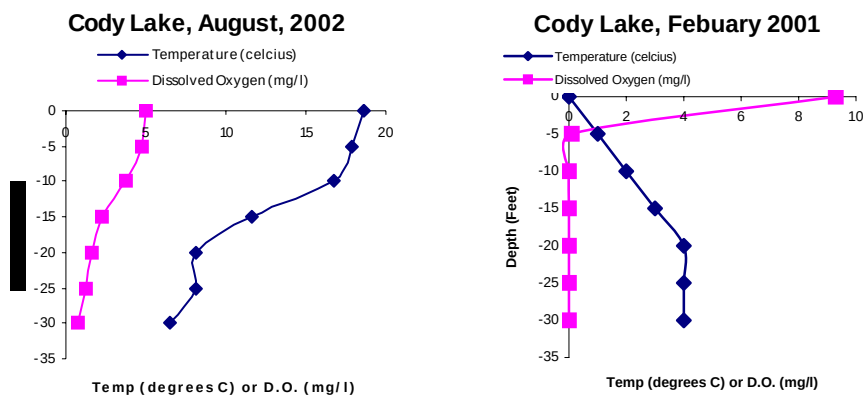


Figure 18: Temperature and oxygen profile for warmest summer water temperatures (Left) and coldest winter water temperature (Right) on record.

Stocking History

Date	Season	Species	# of Fish	Size (Fish/Pound)
1951	N/D	RBT	N/D	N/D
1957	N/D	EBT	N/D	N/D
1958	N/D	EBT	N/D	N/D
1984	Spring	RBT	750	3
1985	Spring	RBT	500	4
1986	Spring	RBT	500	5
1987	Spring	RBT	500	5

1988	Spring	RBT	500	5
1989	Spring	RBT	500	5
2002	Summer	WCT	493	22

Fishing History

No creel data exists for this lake.

Fish Life and Management Data

No fish can survive dissolved oxygen levels of zero therefore it is a safe assumption to say that no fish were present until this lake was stocked in 2002 and these fish all died although no sampling occurred to verify this.

Fish Survey Results					
Year	Equipment Used	Effort	# Caught	Size Range	Species
N/A	N/A	N/A	N/A	N/A	N/A

Limiting Factors

- This lake lacks any suitable spawning habitat for salmonids so any coldwater management will require annual hatchery stocking.
- The lack of flushing flows, a high Depth^2 to Surface Area ratio, and high biological oxygen demand make dissolved oxygen levels in winter toxic and in summer dissolved oxygen is stressful to salmonids.
- Temperature limits the amount of preferred habitat available to salmonids during summer.
- This lake has no facilities nor history of fishing

Recommendations

1) Finish lake specification survey in 2003.
2) Install aeration system to test if extreme anoxic conditions can be improved in a small lake.
3) Monitor and evaluate temperature and dissolved oxygen and when these reach safe levels > 6 mg/l oxygen and <70 degrees Fahrenheit, stock lake with 500 rainbow trout.
4) Monitor and evaluate this lake as a coldwater fishery after fish are stocked.
5) If dissolved oxygen do not meet above standards after 3-years place lake on non-fish lakes list and move aeration system to a less anoxic lake (i.e. Sugar Lake).
6) Improve lake facilities and include a picnic area, toilet, and parking area.

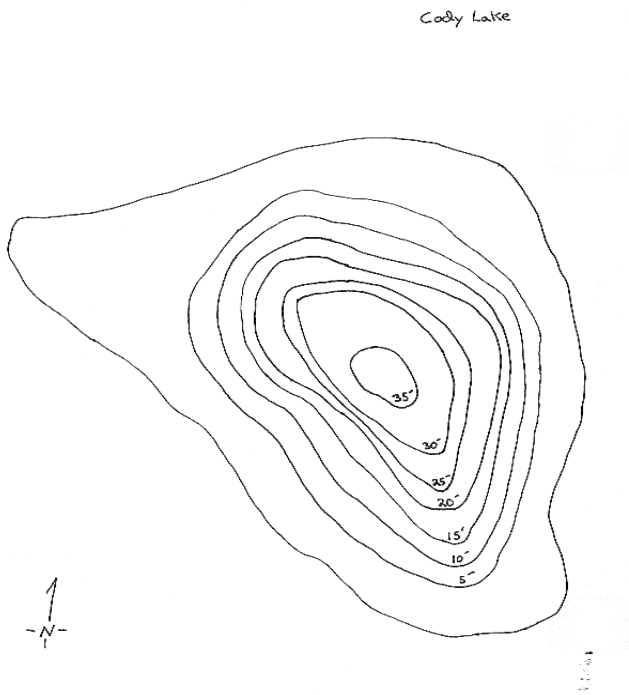


Figure 19: Most recent bathometry map on record for Cody Lake.

Cook Lake**(Map, Figure 22)**

Figure 20:Cook Lake in late summer of 2002 showing annual evaporative loss.

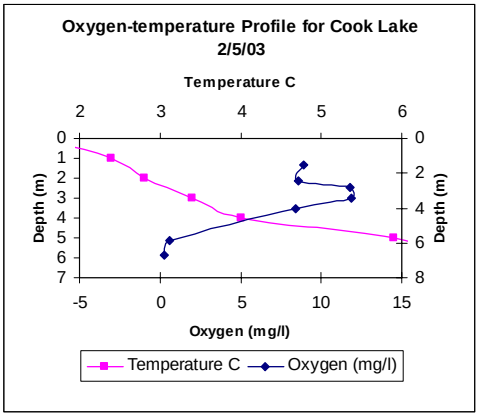
Description

Cook Lake, is a shallow cool water lake located in Oakanogan County at T32N, R26E, section 11 in the Omak Lake drainage within the Oakanogan Sub-basin. Cook Lake is spring feed from the west but has no outlets and is surrounded by rolling hills in a semi-arid region of sage and bunch grasses with intermixed conifers. Soils are alkaline and the bedrock is basaltic. Cook Lake is bordered by Cameron Lakes Road to the southeast and

is mostly on private property if a successful fishery is developed at this lake improved access must follow. The lake bottom is mostly sand and rock. Aquatic vegetation has not been identified, but is abundant.

Specifications

Attribute	Measure	Attribute	Measure
Elevation	2,450 feet	Surface Area	26.4 Acres
Watershed Area	Xxx Miles^2	Volume	290Acre-feet
Summer Max Temp	70 ^{o} F	Summer Max Temp @ 15ft	68 ^{o} F
Winter D.O. @ 15ft	8.4 mg/l	Summer D.O. @ 15ft	6.5 mg/l
Maximum Depth	17 Feet	Average Depth	11 Feet
Conductivity or TDS	Unknown	Trophic State	Unknown
Natural Reproduction	Unknown	PH or Alkalinity	Unknown
Dominant Substrate	Sand/Rock	Aquatic Vegetation	Abundant
Shoreline Development	Moderate	Dominant Forage	Amphipods
Depth^2 to Surface Area	11:1	Land Use Issues	Roads/Access/ Grazing



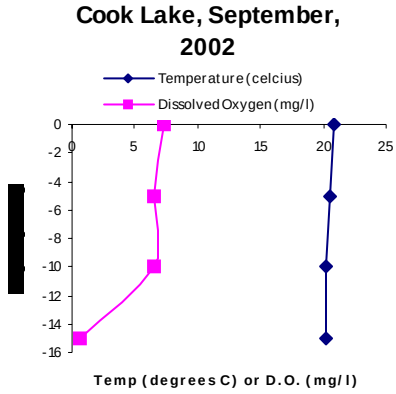


Figure 21: Temperature and oxygen profile for warmest summer water temperatures (Right) and coldest water temperatures (Left) on record.

Stocking History

Angler accounts of crappie at this lake have persisted for many years but these accounts have not been verified. In 2002, this lake was stocked with rainbow trout and Lahontan cutthroat trout to determine if this lake has any potential to be a salmonid fishery. No other stocking records could be found for this lake.

Date	Season	Species	# of Fish	Size (Fish/Pound)
5/23/2002		RBT	26	0.13
6/11/2002		RBT	500	3.7
6/11/2002		LCT	962	12

Fishing History

Cook Lake has not been actively managed prior to 2002 therefore no creel data exists for this lake. In 2003, a lake and creel survey will be conducted.

Fish Life and Management Data

In 2002, a survey of the lake was conducted in September to establish if fish stocked in June had survived the warmest part of the summer. Although no fish were collected in the trap net trout most like (based on size of fish seen) Lahontan cutthroat trout were seen swimming around the net and jumping.

Fish Survey Results

Year	Equipment Used	Effort	# Caught	Size Range	Species
2002	Trap net	3 Hours	20	75-115mm	PSS

Limiting Factors

- This lake lacks any suitable spawning habitat for salmonids so any coldwater management will require annual hatchery stocking.
- The lack of flushing flows, and high biological oxygen demand make dissolved oxygen in winter potentially limiting for salmonids but empirical data to support this is lacking.
- Temperature issues reduce the available habitat in this lake during summer periods and a lack of stratification may make temperature limiting to salmonids in some summer periods.
- This lake has access only off a paved road, is located on mostly private land, a limited fishing history, and no facilities.

Recommendations

1) Determine salmonid survival in 2002 and 2003 to determine if this lake will support a coldwater fishery.
2) Collect lake specification data and fish survey data.
3) Talk to land owners and parks department about improving access for both shore and boat anglers.
4) Monitor and evaluate the success of this lake as a coldwater fishery including both fishery and creel surveys.
5) Install sign at lake.

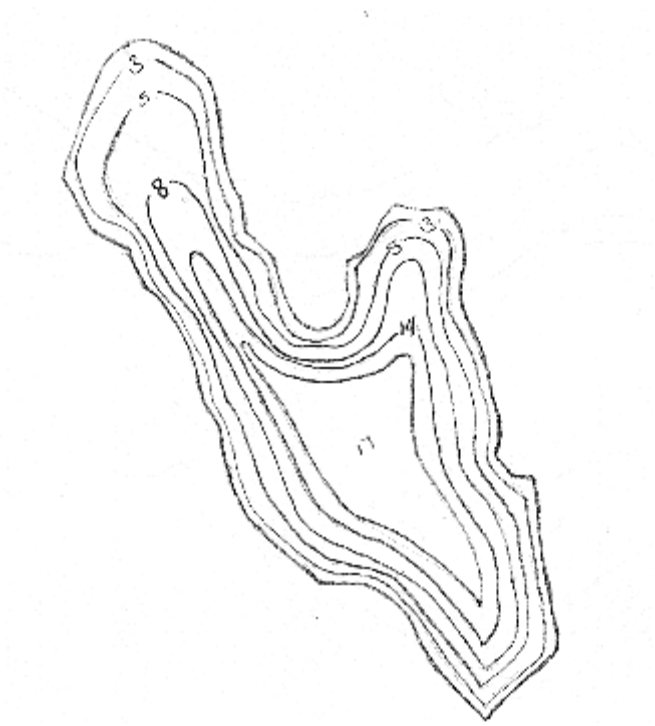


Figure 22: Most recent bathometry map on record for Cook Lake.

Duley Lake **(Map, Figure 24)**

No Picture currently available

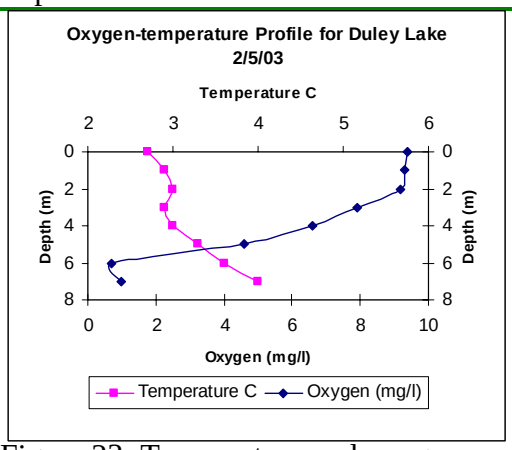
Description

Duley Lake is a shallow, spring fed, cool-water lake located in Oakanogan County at T31N, R26E, section 24R in the Omak Lake drainage within the Oakanogan Sub-basin. This lake is spring feed from the west but has no outlet and is surrounded by rolling hills in a semi-arid region of sage and bunch grasses. Soils are alkaline and the bedrock is basaltic. This lake has limited salmonid potential due to high summer water temperatures, shallow depth, and the presence of toxic blue-green algae (*Microcystis)* discovered in 1989. Aquatic vegetation is nominal and no facilities are available at this lake although access potential is excellent as an old road is located along the eastern shore of the lake. The lake is mainly used for livestock watering at present.

Specifications

Attribute	Measure	Attribute	Measure
Elevation	2,430 feet	Surface Area	109.1 Acres
Watershed Area	0.35 Miles^2	Volume	982 Acre-feet
Summer Max Temp	72°F	Summer Max Temp @ 15ft	66°F
Winter D.O. @ 15ft	4.6 ppm	Summer D.O. @ 15ft	9.6 ppm

Maximum Depth	18 Feet	Average Depth	9 Feet
Conductivity or TDS	Unknown	Trophic State	Eutrophic
Natural Reproduction	Unknown	PH (1 year avg.)	8.5
Dominant Substrate	Silt	Aquatic Vegetation	Nominal
Shoreline Development	Minimal	Dominant Forage	Unknown
Seechi Disk	0.5 Meters	Land Use Issues	Roads and Grazing
Depth^2 to Surface Area	1.1:1		



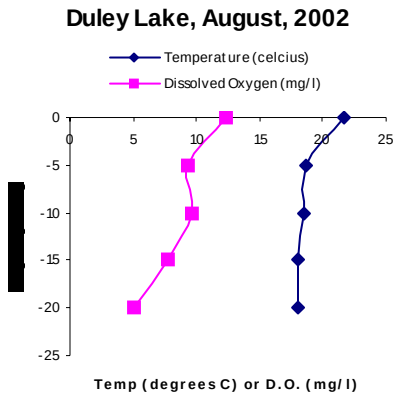


Figure 23: Temperature and oxygen profile for warmest summer water temperatures (Right) and coldest water temperatures (left) on record.

Stocking History

Wolcott (1973) reported that brook trout were present in 1920 and Thiessen (1965) reported carp feeding caused turbidity and later reported carp caught in 1974.

Date	Season	Species	# of Fish	Size (Fish/Pound)
5/26/1950		RBT	6,600	370
1974	Summer	LMB	97	N/A

Fishing History

Little to no fishing currently occurs at Duley Lake. Anglers still fish at this lake even though it has not been actively managed as a fishery showing support for developing a fishery at this sight.

Year	# Caught	Annual Hours	Annual Anglers	Avg. Size	Fish/hour
1978	0	79	105	N/D	0.00
1979	0	315	709	N/D	0

Fish Life and Management Data

Many large carp were observed in 1964 when surveyed by Theisen (1965). A survey of this lake in 2002 resulted in no fish being collected however, two waterdogs were found tangled in the net.

Fish Survey Results					
Year	Equipment Used	Effort	# Caught	Size Range	Species
1964	Gillnet	38 Hours	2	14”	CCP
2002	Gillnet	4 Hours	0	N/A	N/A

Limiting Factors

- This lake lacks any suitable spawning habitat for salmonids so any coldwater management will require annual hatchery stocking.
- Temperature issues reduce the available habitat and could be lethal to salmonids during summer periods.
- Dissolved oxygen levels during winter could produce occasional winter-kills.
- This lake has excellent access potential but permits need to be obtained and improvements made.
- The main water in-flow is in jeopardy due to cattle grazing in the area around the spring.

Recommendations

1) Stock this lake with 500 rainbow trout in the early spring at 5/lb for the next 3-years to test salmonid survival and produce a put and take fishery.
2) Survey lake specification and fish populations.
3) Because this lake is spring-fed water quality is likely good therefore the lake would likely support a self sustaining warm or cool water fishery.
4) Test the survival of possible cool and warm water species by stocking 200 adult yellow perch, 50 adult smallmouth bass, 50 adult walleye from Lake Roosevelt, 1,000 peamouth shiners from Omak Lake, 1,000 redside shiners from Lake Rufus Woods.
5) The rocky substrate should be conducive for developing a fishable crawfish population and starter stocks can be obtained from Buffalo Lake.
6) Monitor the success of species stocked and evaluate future management direction as a warm, cool, or cold water fishery and as a put and take trout fishery using fish population surveys.
7) Conduct a creel survey after lake has been established for 3-years.

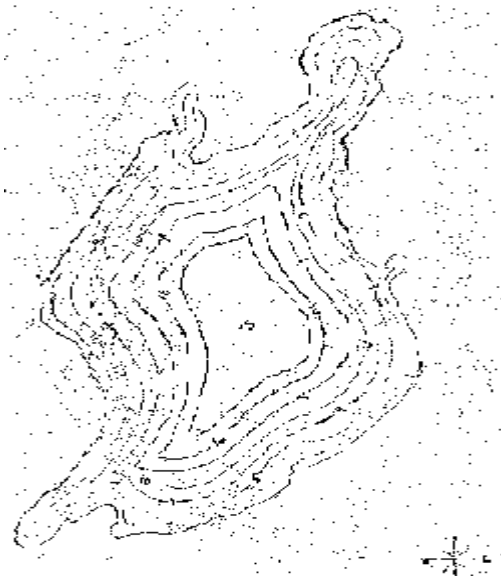


Figure 24: Most recent bathometry map on record for Duley Lake.

Elbow Lake (Map, Figure 26)

Figure 25: Picture of elbow Lake during a drying phase in October of 1987.

Description

Elbow Lake is a medium sized coldwater lake located in Ferry County at T34N, R35E, sections 1R, 6N, 12A, and 12B 35L in the Onion Creek drainage within the Upper Columbia Sub-basin. The western inlet to this lake is Onion Creek which is perennial and the outlet is a is a fracture in the bedrock with an unknown terminus that occasionally drains the water from this lake until above average snow fall provides water to refill the lake. The intermittent nature of this lake provides its local name of Ghost Lake and is both a blessing and a curse. The lake is unpredictable but with two years of above average snowfall the lake will fill completely but two years of below average snowfall will also allow the lake to dry up by fall. Dry periods provide a renewal of the nutrients and when the lake refills it is highly productive as a result. Several attempts to plug the

drain including explosives, bentonite, and tracing the outflow all have failed. The latest attempt to solve this mystery took place in 2002 when a series of test wells indicated that the fracture went deep into the bedrock and determined the drainage rates but the outflow was never detected as it likely is connected to an underground aquifer. The terrain is mostly rock outcroppings with tamarak, lodgepole pine, and douglas fir the dominant vegetation. The aquatic macrophytes consisted of *Myriophyllum exalbescens*, the dominant species, *Ranunculus aquatilus* var. *capillaceus*, and *Eleocharis acicularis*. *Potamogeton* sp. and *Chara* sp. were scattered. *Eleocharis acicularis* occured along the shoreline and extends into shallow water. Access is fair by dirt road, once the snow has melted but no facilities are available at this lake.

Specifications

Attribute	Measure	Attribute	Measure
Elevation	2,125 feet	Surface Area	51.2 Acres
Watershed Area	6.00 Miles^2	Volume	Variable
Summer Max Temp	75°F	Summer Max Temp @ 10ft	67°F
Winter D.O. @ 10ft	Unknown	Summer D.O. @ 10ft	6.8ppm
Maximum Depth (Feet)	Variable (9.8)	Average Depth	Variable
Conductivity	111 μmhos/cm	Trophic State	Mesotrophic
Natural Reproduction	Limited	PH (1 year avg.)	8.5
Dominant Substrate	Rock/Gravel	Aquatic Vegetation	Minimal
Shoreline Development	None	Dominant Forage	Zooplankton
Secchi-disk	Unknown	Land Use Issues	Grazing
Chloraphyll a	2.3 μg/l	Depth^2 to Surface Area	1.9:1

Stocking History

In addition to the stockings below, the Tribes stocked an unknown quantity of adult brook trout from Owhi Lake sporadically between 1965 and 1975 until 30 dead adult spawning brook trout appeared with severely eroded caudal fins. The fin erosion and death of the fish was believed to be the result of fish attempting to spawn near the Onion Creek inlet were sharp edge gravels are common (Halfmoon 1977). Years when the lake was not stocked were due to low lake levels. The increase in pounds stocked in 2002 was the result of planting 30 rainbow trout that averaged 8lbs.

Agency (Dates)	Species	Pounds	# of Fish	Size (Fish/Pound)
USFWS (1969, 75)	RBT	443	8,856	20
USFWS (1971-73)	EBT	44	4,525	102
Tribe (Winthrop 1981-82, 84, 86-87,89)	RBT	427	2,012	5
Tribe (Winthrop 1985-86)	EBT	128	3,000	24
Tribal Hatchery (1991-2000)	RBT	160	2,178	14
Tribal Hatchery (2002)	RBT	1,111	3,800	3.4

Fishing History

Fishing pressure is heaviest on years when catchable rainbow trout were stocked and Halfmoon (1977) estimated effort at between 500 and 1000 annual angler days. However, no empirical creel data are available for this lake.

Fish Life and Management Data

In the summer of 2001, the lake was dry or almost dry for much of the summer and fall and no fish life was present. Rainbow trout were stocked in 2002, but by late-summer large numbers of fish had died because the lake again dried up due to a lack of rainfall.

Fish Survey Results					
Year	Equipment Used	Effort	# Caught	Size Range	Species
None	conducted or	planned	due to	lake level	variability

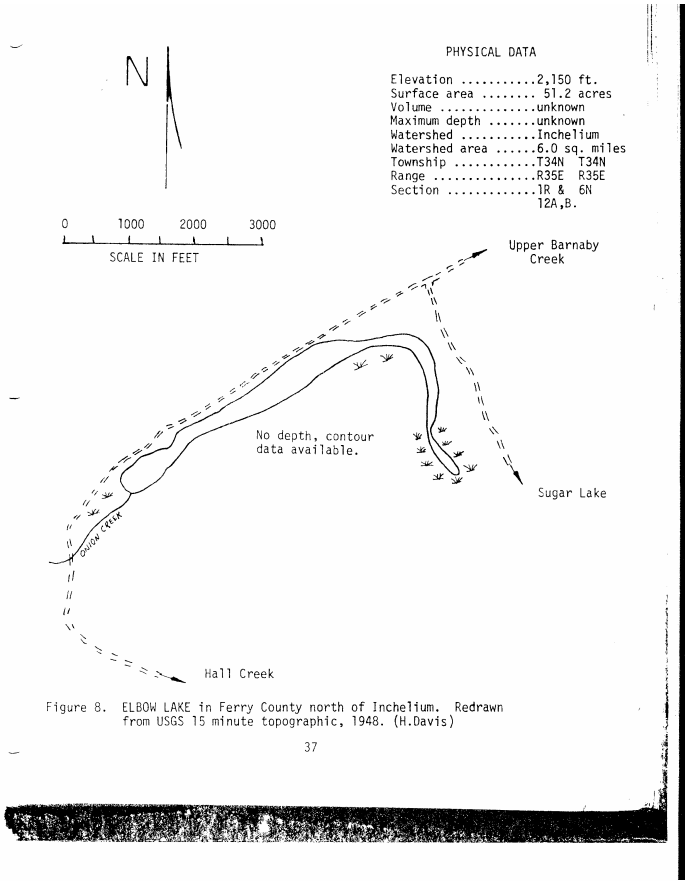
Limiting Factors

- This lake lacks stable water source so water availability is limiting.
- Suitable spawning habitat limited by lake level so any coldwater management will require annual hatchery stocking.
- Temperature issues reduce the available habitat in this lake during summer periods.
- This lake has no facilities and a sporadic fishing history.

Recommendations

1) Determine 1-year snow-pack needed to refill lake or the necessary lake elevation sufficient for salmonid survival. Monitor this level and do not stock fish unless this level is achieved.
2) If 2-years above average snow-packs occur in back-to-back years stock 1,000 rainbow trout @ 5/lb and 1,000 brook trout @ 25/lb to take advantage of lake productivity and possible reproductive potential.
3) Determine spawning sites near Onion Creek inlet and deposit conducive spawning gravels up-stream and down-stream of these areas so that spawning can occur at various lake elevations.
4) Exclude cattle from the lake and Onion Creek inlet area.
5) Survey lake to update lake specification once lake has reached full pool.
6) Conduct a creel survey of lake after stocking occurs.

Figure 26 Most recent bathometry map on record for Elbow Lake.



Fish Lake **(Map, Figure 28)**

No Picture Currently Available

Description

Fish Lake is a shallow cool-water lake located in Ferry County at T31N, R36E, section 5P in the Nez Perce Creek drainage within the Upper-Columbia Sub-basin. This lake is in the final stages of succession and currently surrounded by a deep, thick cattail mats that are achored around the edge of the lake and floating in the center. Some open water exists within the center of this cattail forest but the foot trail has become overgrown and stocking the lake has become almost impossible. Gravel roads provide good access to this marsh but access to the open water of the lake is extremely difficult. The surrounding lands are mainly pine and fir forest.

Specifications

Attribute	Measure	Attribute	Measure
Elevation	1,940 feet	Surface Area	2 Acres

Watershed Area	2.91 Miles^2	Volume	Unknown
Summer Max Temp	67°F	Summer Max Temp @ 10ft	63°F
Winter D.O. @ 15ft	Unknown	Summer D.O. @ 10ft	10.4 mg/l
Maximum Depth	16 Feet	Average Depth	Unknown
Conductivity or TDS	Unknown	Trophic State	Unknown
Natural Reproduction	Unknown	PH or Alkalinity	Unknown
Dominant Substrate	Unknown	Aquatic Vegetation	Abundant
Shoreline Development	None	Dominant Forage	Unknown
Depth^2 to Surface Area	85:1	Land Use Issues	None

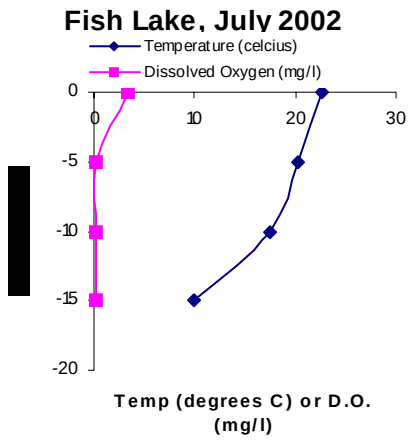


Figure 27: Temperature and oxygen profile for warmest summer water temperatures on record.

Stocking History

Fish stocked was discontinued in 1996 due to poor access to this lake.

Agency (Dates)	Species	Pounds	# of Fish	Size (Fish/Pound)
USFWS (1972-76)	EBT	16	1,800	114
Tribe (Winthrop 1980-89)	EBT	17	1,692	100
Tribal Hatchery (1990-1996)	EBT	23	2,788	123

Fishing History

Historic reports of good fishing years ago are all that remain of this fishery. Today, stocking no longer occurs and few anglers fish this lake.

Fish Life and Management Data

A 1962 report described this lake noted it was “full of shiners” but no detailed information to support this could be found. No stocking records of Chinook salmon into this lake were found but the identification of this species found in 1979 was done by Jerry

Marco so it is believed to be correct. A fish survey was conducted in 2002, and only collected largemouth bass but no stocking records were found so it is believed that local anglers stocked these fish.

Fish Survey Results					
Year	Equipment Used	Effort	# Caught	Size Range	Species
1979	Gillnet	16 Hours	5	295-370mm	EBT
			25	119-220mm	Chinook
2002	Gillnet	31 Hours	6	150-260mm	LMB

Limiting Factors

- This lake lacks any suitable spawning habitat for salmonids so any coldwater management will require annual hatchery stocking.
- At only 16-feet deep, depth is likely a limiting factor for salmonids because temperature issues reduce the available habitat in this lake.
- Dissolved oxygen is poor at all depths during summer periods and unknown during winter months.
- Poor access and lack of angling effort limit the usefulness of this fishery.

Recommendations

1) Do winter survey of lake specifications.
2) Access to the lake could be improved by: dredging the lake, filling in a portion of the lake to allow access to the deeper water, or by experimenting with chemical herbicides that could reduce the cattail mats.
3) If lake access is improved, develop a plan to manage this lake as a warm water fishery because temperature issues will likely constrain salmonid survival.
4) Monitor and evaluate the success of this lake as a warm-water fishery including both fish surveys and creel surveys.
5) If no action is taken, consider managing this lake for waterfowl, amphibians, and turtles rather than fish.

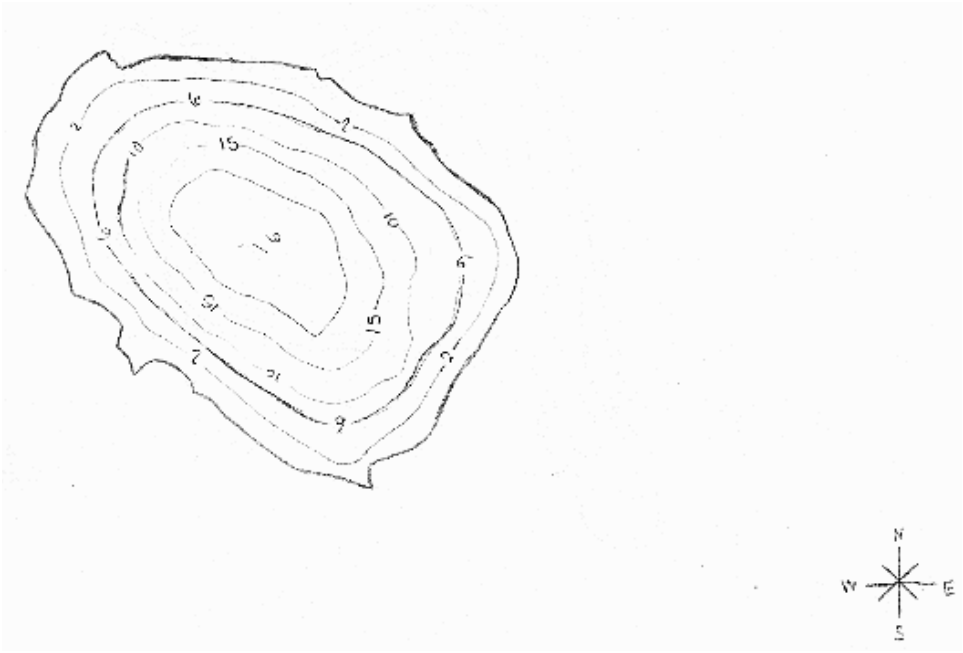


Figure 28: Most recent bathometry map on record for Fish Lake.

Freidlander Lake (No Map)

Figure 29: Freiedlander Lake is surrounded by extensive row crop agriculture and minimal access.

Description

Freidlander Lake is a large warm water lake located in Oakanogan County at T31N, R27E, section 4-A/B in the Oakanogan River drainage within the Oakanogan Sub-basin. Little is known about this lake because it is located on private land and surrounded by wheat fields. This lake is productive for waterfowl but its fisheries potential is unknown at this time. There is no direct access to this lake.

Specifications

Attribute	Measure	Attribute	Measure
Elevation	2,660 Feet	Surface Area	22 Acres
Watershed Area	Unknown	Volume	Unknown
Summer Max Temp	Unknown	Summer Max Temp @ 10ft	Unknown
Winter D.O. @ 15ft	Unknown	Summer D.O. @ 10ft	Unknown
Maximum Depth	Shallow	Average Depth	Unknown
Conductivity or TDS	Unknown	Trophic State	Unknown
Natural Reproduction	Unknown	PH or Alkalinity	Unknown
Dominant Substrate	Unknown	Aquatic Vegetation	Unknown
Shoreline Development	None	Dominant Forage	Unknown
Depth^2 to Surface Area	Unknown	Land Use Issues	Agriculture

Stocking History

No known stocking history.

Agency (Dates)	Species	Pounds	# of Fish	Size (Fish/Pound)

Fishing History

No creel data exists for this lake.

Fish Life and Management Data

Unknown at this time.

Fish Survey Results					
Year	Equipment Used	Effort	# Caught	Size Range	Species
N/A	N/A	N/A	N/A	N/A	N/A

Limiting Factors

- A complete lack of data on these lakes makes limiting factor impossible to establish.

Recommendations

1) Do lake specification surveys.
2) Determine from lake specifications if these lakes have any fisheries potential for a put-and-take coldwater or a year-round warm water fishery.

Five Lakes**(Map, Figure 30)**

No picture currently available

Description

Five Lakes are shallow warm water ponds located in Oakanogan County at T30N, R31E, section 20, and 21 west lake is section 20-R in the Nespelem River drainage within the Upper-Columbia Sub-basin. Little is known about these lakes but they do have a history of salmonid stocking in the 1960's. The primary use of these lakes is for livestock watering however the western most lake may have some fisheries potential.

Specifications

Attribute	Measure	Attribute	Measure
Elevation	1,900 Feet	Surface Area (west lakes)	(est.) 1.5 Acres
Watershed Area	Unknown	Volume	18 acre-feet
Summer Max Temp	Unknown	Summer Max Temp @ 10ft	Unknown
Winter D.O. @ 15ft	Unknown	Summer D.O. @ 10ft	Unknown

Max. Depth (west lake)	18 Feet	Average Depth (west lake)	12 feet
Conductivity or TDS	Unknown	Trophic State	Unknown
Natural Reproduction	Unknown	PH or Alkalinity	Unknown
Dominant Substrate	Unknown	Aquatic Vegetation	Unknown
Shoreline Development	None	Dominant Forage	Unknown
Depth^2 to Surface Area	Unknown	Land Use Issues	Heavy Grazing

Stocking History

Biologists speculate that after 1967 salmonid stockings stopped due to poor survival. However which lake received fish is unknown.

Agency (Dates)	Species	Pounds	# of Fish	Size (Fish/Pound)
USFWS (1966)	RBT	3	1,500	500
USFWS (1967)	EBT	4	1,500	375

Fishing History

No creel data exists for these lakes.

Fish Life and Management Data

Unknown at this time.

Fish Survey Results					
Year	Equipment Used	Effort	# Caught	Size Range	Species
N/A	N/A	N/A	N/A	N/A	N/A

Limiting Factors

- A complete lack of data on these lakes makes limiting factor impossible to establish but the depth of the western most lake makes collecting more data useful.
- The one lake with the most fisheries potential has no direct access.

Recommendations

1) Do lake specification surveys.
2) Determine from lake specifications if these lakes have any fisheries potential for a put-and-take coldwater or a year-round warm water fishery.
3) Collect future data on western most lake only because all the other lakes have no fishery potential.
4) These lakes may have potential to be a Nespelem area warm water fishery and serve as kids fishing pond.

Figure 30: Most recent bathometry map on record for Five Lakes.

Furman Lake (South) (No Map)

No Picture Available

Description

Furman Lake is a warm water lake located in Oakanogan County at T31N, R27E, section 7 in the Oakanogan River drainage within the Oakanogan Sub-basin. Little is known about this lake because it is located on private land and surrounded by wheat fields. This lake is productive for waterfowl but its fisheries potential is unknown at this time. There is no direct access to this lake.

Specifications

Attribute	Measure	Attribute	Measure
Elevation	2,660 Feet	Surface Area	9.4 Acres
Watershed Area	Unknown	Volume	Unknown
Summer Max Temp	Unknown	Summer Max Temp @ 10ft	Unknown
Winter D.O. @ 15ft	Unknown	Summer D.O. @ 10ft	Unknown
Maximum Depth	Shallow	Average Depth	Unknown
Conductivity or TDS	Unknown	Trophic State	Unknown
Natural Reproduction	Unknown	PH or Alkalinity	Unknown
Dominant Substrate	Unknown	Aquatic Vegetation	Unknown
Shoreline Development	None	Dominant Forage	Unknown
Depth^2 to Surface Area	Unknown	Land Use Issues	Agriculture

Stocking History

No known stocking history.

Agency (Dates)	Species	Pounds	# of Fish	Size (Fish/Pound)

Fishing History

No creel data exists for this lake.

Fish Life and Management Data

Unknown at this time.

Fish Survey Results					
Year	Equipment Used	Effort	# Caught	Size Range	Species
N/A	N/A	N/A	N/A	N/A	N/A

Limiting Factors

- A complete lack of data on these lakes makes limiting factor impossible to establish.

Recommendations

1) Do lake specification surveys.
2) Determine from lake specifications if these lakes have any fisheries potential for a put-and-take coldwater or a year-round warm water fishery.

Gold Lake **(Map, Figure 33)**

No picture available

Description

Gold Lake is a small coldwater fishery located in Oakanogan County at T33N, R31E, section 9N and 9P in the Gold Creek drainage within the San Poil Sub-basin. The perennial inlet is unnamed and flows into the west lake basin the outlet drains the eastern lake basin and is the origination point for Gold Creek, which flows to the San Poil River. The dominant substrate is sand and gravels. Zooplankton communities are dominated by rotifers with only a few large cladocerans (*Daphnia spp.*) present. *Chara globularis*, *Nuphar polysepalum* and *Potamogeton gramineus* were the conspicuous macrophytes. Some *Typha* sp. was present at the marshy west end of the lake. This lake was one of the original three lakes set aside strictly for tribal member use. The Colville Tribes maintains

a picnic area, campground, toilets, boat launch, and dock at this lake. The surrounding terrain is comprised of steep canyons and most of the vegetation is western larch and Douglas fir.

Specifications

Attribute	Measure	Attribute	Measure
Elevation	2,950 feet	Surface Area	27 Acres
Watershed Area	1.26 Miles^2	Volume	478 Acre-feet
Summer Max Temp	77°F	Summer Max Temp @ 15ft	55°F
Winter D.O. @ 15ft	Unknown	Summer D.O. @ 15ft	9.5 mg/l
Maximum Depth	45 Feet	Average Depth	18 Feet
Conductivity	60 µmhos/cm	Trophic State	Oligotrophic
Natural Reproduction	Yes	PH (4 year avg.)	6.9
Dominant Substrate	Silt/Sand	Aquatic Vegetation	Abundant
Land Use Issues	Garbage	Dominant Forage	Invertebrates
Shoreline Development	Minimal	Chlorophyll a	1.5 µg/l
Secchi-disk	6.3 Meters	Depth^2 to Surface Area	75:1

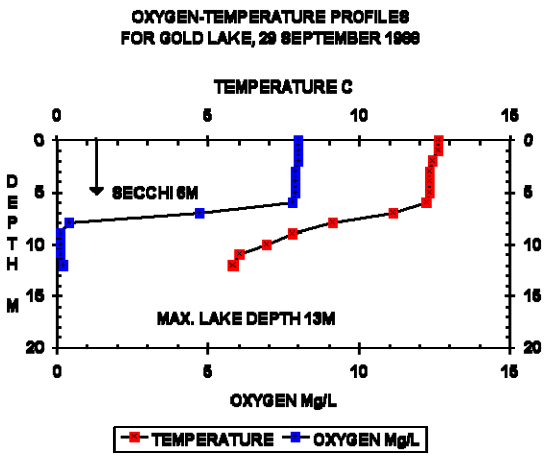


Figure 31: Temperature and Oxygen profile from the warmest water temperatures currently on record.

Stocking History

Agency (Dates)	Species	Pounds	# of Fish	Size (Fish/Pound)
WDFW (1947, 53-54, 56)	RBT	53	10,995	206
WDFW (1951-55, 60-64)	EBT	44	9,956	226
USFWS (1965)	RBT	77	7,000	91
USFWS (1966-67, 69-76)	EBT	59	7,572	128
USFWS (1970, 73, 75, 77)	WCT	84	8,666	103
Tribe (Winthrop 1977-89)	EBT	149	5,170	35
Tribal Hatchery (1990-2001)	EBT	211	4,685	22
Tribal Hatchery (2002)	WCT	487	10,909	22

Fishing History

Halfmoon (1977) estimated angler use to be around 1,200 angler days annually and reported that most tribal members caught brook trout. A one day random creel was conducted at gold lake in 2002 but no anglers were observed.

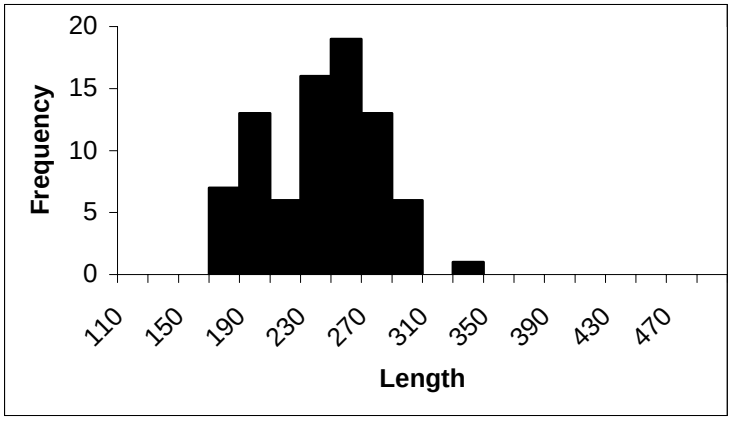
Year	# Caught	Angler Hours	# Anglers	Avg. Size	Days of Creel	Angler CPUE
1977	5	2	2	8”	1	2.5
1982	8	2	3	10”	1	4
2002	0	0	0	N/A	1	N/A

Fish Life and Management Data

Bridgelip suckers, brook trout, and westslope cutthroat trout are known to exist at Gold Lake and black spot disease is know to be present. However, recent tribal member accounts of fishing at Gold Lake indicate that westslope cutthroat appear to be in better condition than brook trout. For the last several years, only brook trout were stocked indicating that some natural reproduction of westslope cutthroat is occurring in this system. The cutthroats are likely leaving the lake to spawn in either Gold Creek or the lakes unnamed inlet. Eastern brook trout were observed spawning in the lakes outlet in the fall of 1981. A population survey of this lake is scheduled for 2004 or 2005.

Fish Survey Results

Year	Equipment Used	Effort	# Caught	Size Range	Species
1980	Gillnet	70 Hours	334	13-300mm	BLS
			81	150-290mm	EBT
			1	290mm	WCT
1982	Gillnet	37 Hours	67	120-335mm	BLS
			23	153-289mm	EBT



1987	Gillnet	38 Hours	13	180-235mm	EBT

Figure32: Length frequency histogram for Gold Lake from 1980 gillnet sampling.

Limiting Factors

- Gold Lake has some suitable spawning habitat for salmonids but the contribution to the population is unknown.
- Temperature issues reduce salmonid habitat in this lake during summer periods.
- Density dependence and both inter and intra specific competitive pressures may be limiting growth of fish at Gold Lake.

Recommendations

1) Reduce number of brook trout stocked in this lake to 3,000 at 90/lb.or 1,000 at 25/lb., making sure all fish stocked into this lake have elastomer marks.
2) Stock 8,000 westslope cutthroat trout fingerlings every five years to supplement natural population. Make sure all fish stocked into this lake have elastomer marks.
3) Monitor and evaluate fishery using creel survey and hook-and-line sampling to determine actual catch and fish condition to see if brook trout condition improves.
4) Monitor growth, relative condition, and %marked to estimate the portion of the population that is contributed by natural reproduction annually and protect or enhance spawning areas.
5) Adjust stocking rates to minimum level needed to supplement natural reproduction annually.

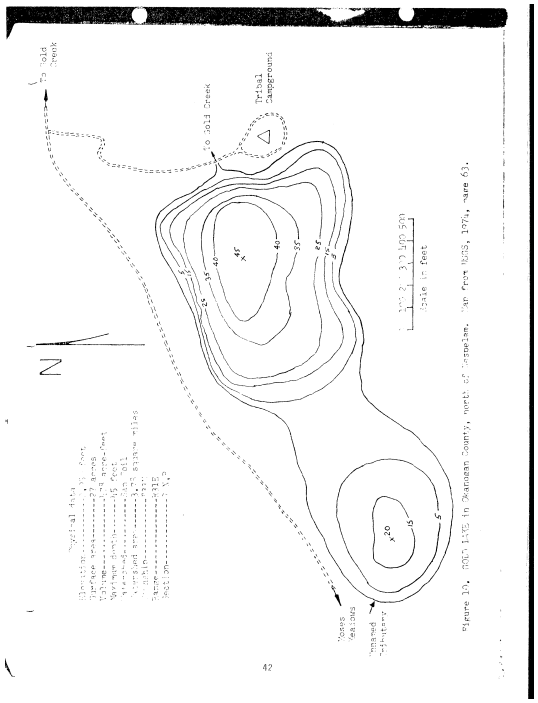


Figure 33: Most recent bathometry map on record for Gold Lake

Grant Lake **(Map, Figure 34)**

Insert picture here

Description

Grant Lake is a shallow warm water lake located in Oakanogan County at T31,32N, R30E, section 31, and 6-C in the Coyote Creek drainage within the Upper-Columbia Sub-basin. This lake has extensive lillypad beds and has no history as a fishery. Unless the lake level is raised or the bottom is dredged to increase depth, it has little future fisheries potential. The location is good and has fair access by dirt road and an ideal boat launch site presently exists.

Specifications

Attribute	Measure	Attribute	Measure
Elevation	2598 Feet	Surface Area	21.6 Acres
Watershed Area	Unknown	Volume	86 acre-feet
Summer Max Temp	Unknown	Summer Max Temp @ 10ft	Unknown
Winter D.O. @ 15ft	Unknown	Summer D.O. @ 7ft	0.7 ppm
Maximum Depth	10 Feet	Average Depth	4 Feet
Conductivity or TDS	Unknown	Trophic State	Unknown
Natural Reproduction	Unknown	PH or Alkalinity	Unknown
Dominant Substrate	Silt	Aquatic Vegetation	Abundant

Shoreline Development	Minimal	Dominant Forage	Amphipods
Depth^2 to Surface Area	6.5:1	Land Use Issues	Grazing

Stocking History

Fish stocked in 1962 were known to have survived until fall but these fish were not present the following year likely due to a complete or nearly complete winter-kill.

Agency	Species	Pound	# of Fish	Size (Fish/Pound)
WDFW (1956, 1962)	EBT	21	4,500	218

Fishing History

No creel data exists for this lake.

Fish Life and Management Data

Unknown at this time but it is unlikely fish exist in this waterbody.

Fish Survey Results

Year	Equipment Used	Effort	# Caught	Size Range	Species
N/A	N/A	N/A	N/A	N/A	N/A

Limiting Factors

- A complete lack of data on this lake makes limiting factor impossible to establish.
- A lack of sufficient depth likely results in poor dissolved oxygen levels in winter and high summer temperatures that limit fish populations.

Recommendations

1) This Lake has little fisheries potential due to its shallow depth.
2) Complete a lake survey to determine specifications.
3) A put-and-take fishery could exist at this lake by stocking 1,000 rainbows at 5/lb in early spring.
4) This lake may have limited potential as a warm water fishery.

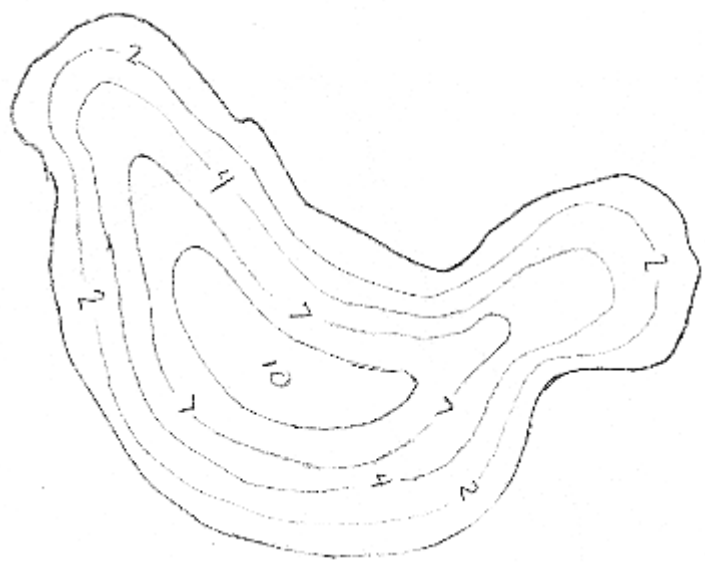


Figure 33: Most recent bathometry map on record for Gold Lake

Johnson Lake **(Map, Figure 35)**

No picture available

Description

Johnson Lake is a shallow warm water lake located in Oakanogan County at T32N, R31E, section 32 in the Nespelem River drainage within the Upper-Columbia Sub-basin. The surrounding landscape is mostly grasslands with pine, cottonwood, and aspen forest above. Access to the lake is mostly through private property. Heavy grazing occurs around this lake making it a somewhat undesirable location. The size of the lake however makes it a possible candidate for development into a warm water fishery provided the access issues could be resolved. The lake stagnates badly with heavy blooms of green and blue-green algae likely a result of external nutrient inputs.

Specifications

Attribute	Measure	Attribute	Measure
Elevation	2,180 Feet	Surface Area	57.6 Acres
Watershed Area	Unknown	Volume	580 Acre-feet
Summer Max Temp	74°F	Summer Max Temp @ 5ft	70°F
Winter D.O. @ 5ft	Unknown	Summer D.O. @ 5ft	5.9 ppm
Maximum Depth	12 Feet	Average Depth	10 feet
Conductivity	220 μmhos/cm	Trophic State	Hypereutrophic
Natural Reproduction	Unknown	PH (2 year avg.)	7.2
Dominant Substrate	Silt	Aquatic Vegetation	Abundant
Shoreline Development	Minimal	Dominant Forage	Unknown

Secchi disk	0.33 Meters	Land Use Issues	Heavy Grazing
Depth^2 to Surface Area	2.5:1		

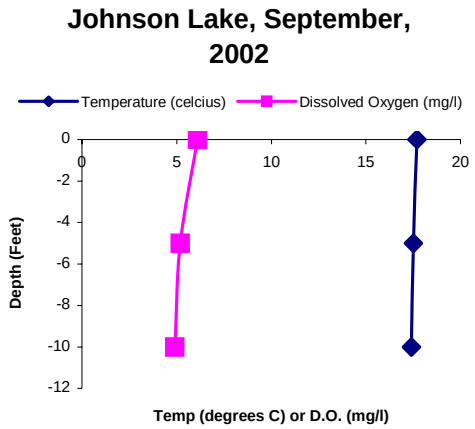


Figure 34: Temperature and Oxygen profile from the warmest water temperatures currently on record.

Stocking History

None of the brook trout stocked in the 1950's was ever reported caught.

Agency (Dates)	Species	Pounds	# of Fish	Size (Fish/Pound)
WDFW (1951-52, 54)	EBT	28	9,040	323

Fishing History

No creel data exists for this lake.

Fish Life and Management Data

Unknown at this time but it is unlikely fish exist in this water body unless warm-water species were introduced illegally.

Fish Survey Results					
Year	Equipment Used	Effort	# Caught	Size Range	Species
N/A	N/A	N/A	N/A	N/A	N/A

Limiting Factors

- Lake depth, dissolved oxygen, and temperature are all believed to be limiting.
- Toxic algal blooms could present a challenge to fishery development.
- Access difficulties and extensive livestock use limit the viability of this lake as a fishery and contribute to excessive nutrient enrichment.

- No natural reproduction of salmonids would be possible but warm water species may be able to reproduce successfully.

Recommendations

1) Contact landowners for permission to investigate lake specifications and determine if they would cooperate on the development of a fishery or commit to an access agreement.
2) This lake may be too shallow to over winter fish so dredging may be needed to develop a year-round fishery.
3) Yellow perch, channel catfish, white bass, wipers, northern pike, or tiger muskies are tolerant of hypereutrophic aquatic systems. These fish species would provide a unique opportunity for reservation anglers. This lake is best suited to development as a warm-water fishery
4) It's possible a put-and-take trout fishery could exist at this lake by stocking 2,000 rainbows at 5/lb in early spring.

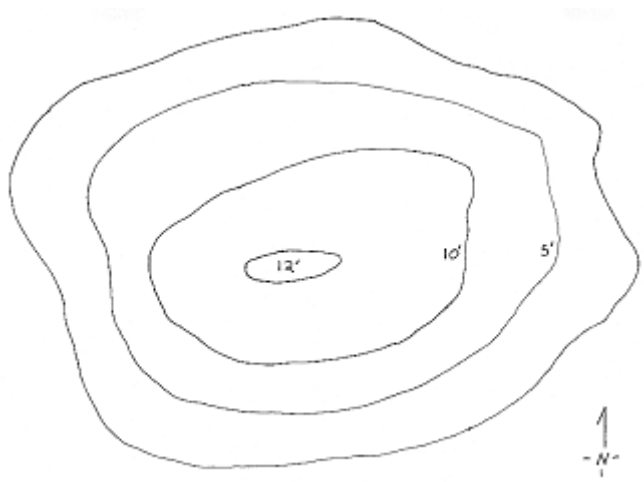


Figure 35: Most recent bathometry map on record for Johnson Lake

La Fleur Lakes

The La Fleur Lakes are comprised of a north and southern basin. These two basins are divided by a narrow forested spit of land, a thin meadow interspersed with cattails and a very small, poorly defined, intermittent channel. The section connecting the two lakes is approximately 150m long. When sufficient snowmelt occurs to raise the level in the southern basin above the elevation of the spit, water flows from the southern basin into the northern basin. The northern basin is regulated by the outlet that drains into Cedar Creek. The northern basin has been commonly referred to Beaverhouse Lake in Theissen (1965), and Halfmoon (1976). Water flowing into the southern end of the northern basin must flow through a large shallow cattail forest before it encounters the main lake. Each lake is discussed individually below.

Northern Basin of La Fleur Lake
(commonly referred to as Beaverhouse Lake)

No picture available

Description

Beaverhouse Lake's actual location is unknown but it was believed to be located near Inchelium in the Barnaby Creek drainage. References to this lake exist in the literature although specific coordinates for this lake are unknown careful examination of maps of the small section of the Barnaby Creek watershed lead us to believe it to be the northern basin of La Fleur Lake. Cattail beds rim the entire lake and are especially extensive at the northern and southern ends of the lake. Aquatic plants in the northern basin are mainly milfoil (*Myriophyllum sp.*), and common cattails but filamentous green algae and sago pondweed are common. Land surrounding the meadow were the lake is located are mostly ponderosa pine, with some fir and deciduous trees. Access to the western shore is good by fair dirt road but parking space is very limited.

Specifications

Attribute	Measure	Attribute	Measure
Elevation	2,298 Feet	Surface Area	Unknown
Watershed Area	Unknown	Volume	Unknown
Summer Max Temp	75 ^{o}F	Summer Max Temp @ 15ft	64 ^{o}F
Winter D.O. @ 15ft	Unknown	Summer D.O. @ 15 ft	1.1 mg/l
Maximum Depth	26 Feet	Average Depth	8 Feet
Conductivity(µmhos/cm)	Unknown	Trophic State	Eutrophic
Natural Reproduction	None	Alkalinity	137 mg/l
Dominant Substrate	Silt	Aquatic Vegetation	Abundant
Shoreline Development	None	Dominant Forage	Invertebrates
Chlorophyll a	Unknown	Seechi Disk	3.1 m
Shoreline Length	Unknown	Land Use Issues	Logging

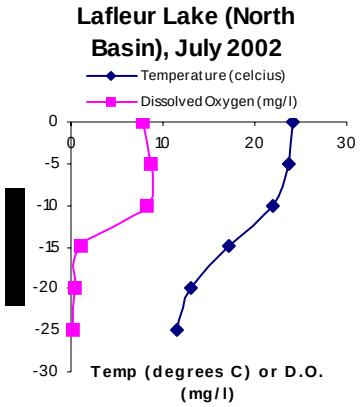


Figure 36: Temperature and Oxygen profile from the warmest water temperatures currently on record.

Annual Historic Stocking Averages

Stocking ended in 1972 but no data or rational for this is available.

Agency (Dates)	Species	Pounds	# of Fish	Size (Fish/Pound)
USFWS (1966-1972)	EBT	23	4,693	204

Fishing History

This lake has no fishing history.

Fish Life and Management Data

This lake has no fish data.

Fish Survey Results					
Year	Equipment Used	Effort	# Caught	Size Range	Species
2002	Gillnet	33 hours	70	160-190mm	BBH
			4	215-240mm	LMB
2002	Trapnet	24 Hours	100	155-200mm	BBH

Limiting Factors

- This lake has temperature and oxygen parameters that are lethal to salmonids during the summer.
- Winter dissolve oxygen information is lacking.
- Access and parking are very limited.

Recommendations

1) Data collected in 2002 indicates this lake has some warm water fishery potential however the proximity to La Fleur Lake makes developing this type of fishery problematic.
2) A rock or sand filter to minimize movement of fish between the northern and southern basins could reduce emigration or immigration risks.
3) A rock or sand filter would need to be erected at the outlet to reduce warm water fish species from exiting the lake and entering Barnaby Creek.
4) Largemouth Bass and yellow perch could be potential species for introduction in this lake if it were made secured and isolated from other waters.
5) The present population of largemouth bass and brown bullheads complicates management of the southern basin for salmonids unless a project to isolate these lakes is undertaken.

See Northern Basin on Lafleur Lake

Lafleur Lake (**Southern Basin**) **(Map, Figure 39)**

No Picture Available

Description

Lafleur Lake is a medium sized cool water lake located in Ferry County at T33N, R34D, section 34D and E in the Barnaby Creek drainage within the Upper Columbia Sub-basin. The inflow is mostly from snowmelt within the lake basin the lake is split into a southern basin that is mostly open water and the northern basin that is surrounded by cattails. These two basins occasionally connect in spring and water drains out of the northern basin and into Cedar Creek. The southern basin has a plant community dominated by common cattail, American bulrush, stonewort, pondweed, spatterdock, and milfoil. Maps often call this lake "Simpson Lake", which lays a short distance to the east. Lafleur Lake is located in a marshy meadow and upland cover is mostly Western Larch, Douglas Fir, and Yellow Pine. Facilities at the lake include a campground, pit toilet, and boat launch.

Specifications

Attribute	Measure	Attribute	Measure
Elevation	2,300 feet	Surface Area	25 Acres
Watershed Area	Unknown	Volume	776 Acre-feet
Summer Max Temp	75°F	Summer Max Temp @ 15ft	64°F
Winter D.O. @ 15ft	Unknown	Summer D.O. @ 15ft	9.3 mg/l
Maximum Depth	34 Feet	Average Depth	15 feet
Conductivity	269 µmhos/cm	Trophic State	Mesotrophic
Natural Reproduction	None	PH (5 year avg.)	7.3
Dominant Substrate	Silt/Peat	Aquatic Vegetation	Abundant
Shoreline Development	None	Dominant Forage	Invertebrates
Secchi-disks	4.0 Meters	Land Use Issues	Logging
Chlorophyll a	Unknown	Depth^2 to Surface Area	46:1

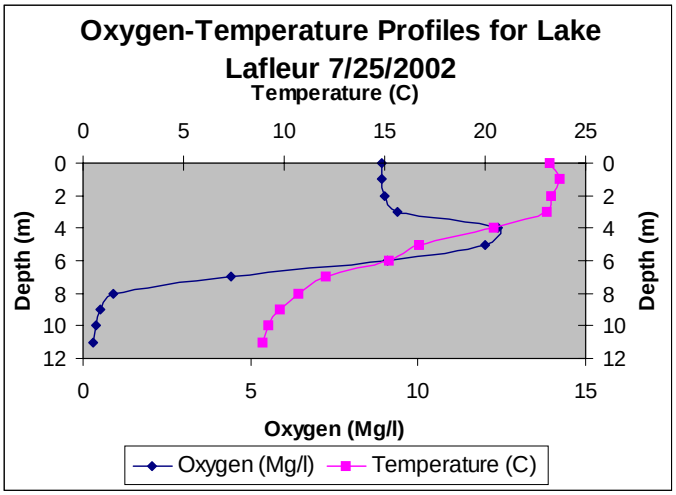


Figure 37: Temperature and Oxygen profile from the warmest water temperatures currently on record.

Stocking History

Poundage in 2002 was much higher than historic due to the stocking of one hundred 8-10 lb rainbow trout.

Agency (Dates)	Species	Pounds	# of Fish	Size (Fish/Pound)
WDFW (1952, 65)	RBT	17	9,192	556
WDFW (1954)	EBT	No	Data	
USFWS (1966-76)	RBT	77	3,683	8
USFWS (1967, 72-76)	EBT	54	5,500	101
Tribe (Winthrop 1977, 81-83, 88-89)	RBT	258	2,490	10
Tribe (Winthrop 1977, 80, 82-86)	EBT	56	3,301	59
Tribal Hatchery (1990-2001)	RBT	198	2,128	14
Tribal Hatchery (2002)	RBT	1,897	4,631	2

Fishing History

According to local anglers, this lake receives moderate use. Creel data for this lake was from a 1-day creel each year.

Year	# Caught	Day of Creel	Angler Hours	Number of Anglers	Avg. Size	Angler CPUE
1974	3	1	2	2	13”	1.5
1977	4	1	N/D	1	10”	N/D
1978	22	1	12	3	11”	1.83
1979	2	1	1.5	1	9”	1.33
2002	2	1	2.5	1	330mm	0.8

Fish Life and Management Data

Abundant bullheads were observed in shallow water around this lake and in the northern basin during the 1964 WDFG and 1976 YCC survey (Yuska 1976) other sightings have occurred since. Thiesen (1965) reported that this lake had a history of winter kills and suggested that this may have occurred in the winters of 1952 and 1954 however the small size of fish planted could have also disappeared due to predation from bullheads. In an attempt to eliminate brown bullheads from this lake, the Colville Confederated Tribes Fish and Wildlife Department treated the lake with 1ppm of 5% liquid rotenone (Noxfiish) in the fall of 1982. The extensive wetlands around this lake were inaccessible and gillnetting surveys indicate that only a slight reduction in bullhead numbers was achieved. In 2002, a survey indicated a few large bullheads still remain but a large number of small largemouth bass were now present while the trout population stayed relatively constant.

Fish Survey Results

Year	Equipment Used	Effort	# Caught	Size Range	Species
1964	Gillnet	48 hours	6	6”	BBH
1975	Gillnet	16 Hours	2	9-10”	RBT
1976	Gillnet	24 Hours	6	9-12”	RBT
1980	Gillnet	75 Hours	5	210-324mm	EBT
			53	195-300mm	RBT
			130	98-167mm	BBH
1982	Gillnet	32 Hours	2	260-350mm	RBT
			35	130-180mm	BBH
1983	Gillnet	27 Hours	12	250-295mm	RBT
			53	125-175mm	BBH
1986	Gillnet	47 Hours	34	164-279mm	EBT
			19	92-205mm	BBH
			1	236	LMB
1987	Gillnet	35 Hours	4	180-200mm	EBT
			47	70-180	BBH
2002	Gillnet	21 Hours	92	135-580mm	RBT
			17	95-250mm	LMB
2002	Trapnet	21 Hours	1	80mm	LMB
2002	Electrofishing	5 Hours	1	245mm	RBT
			215	55-340mm	LMB
			80	90-350mm	BBH

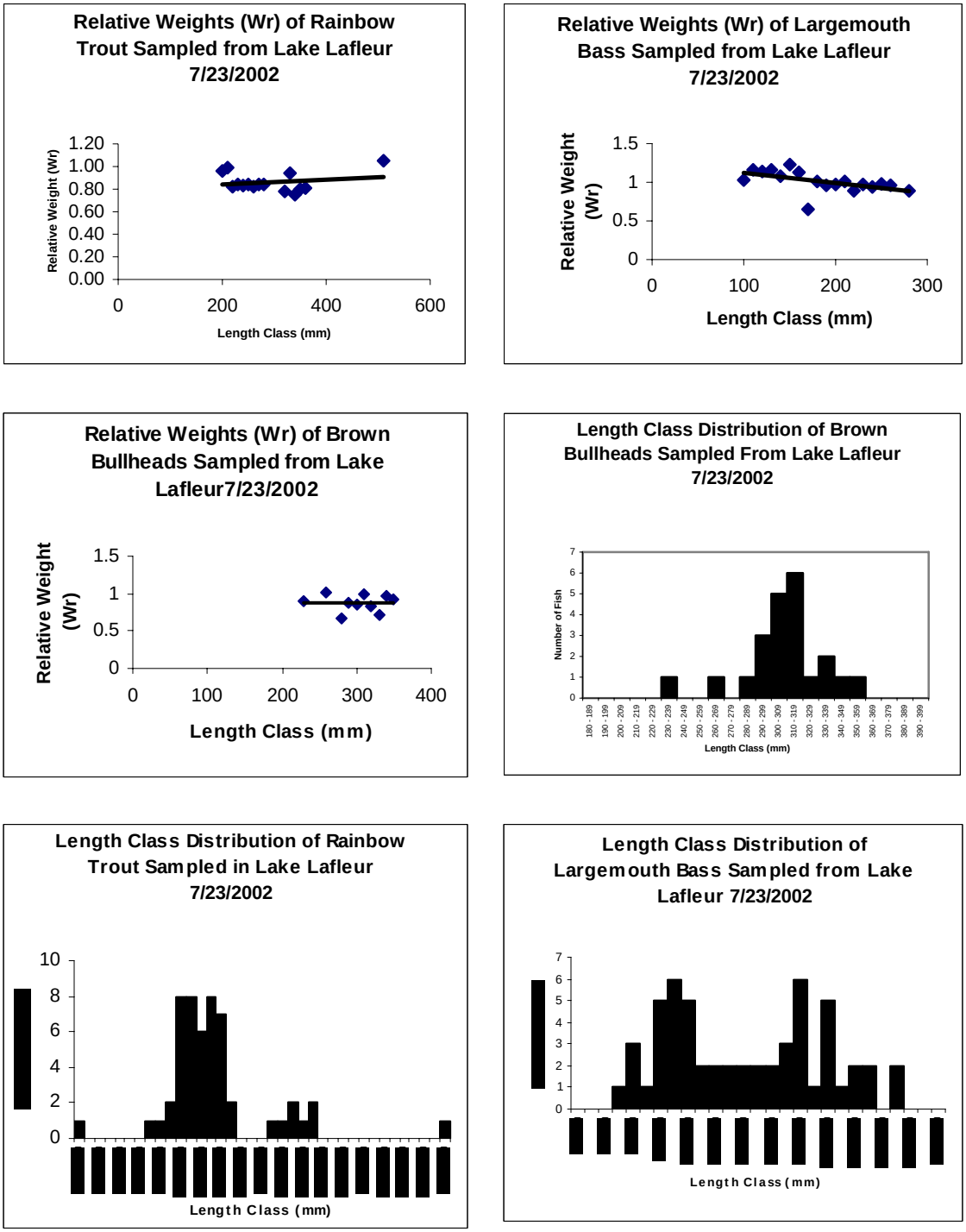


Figure 38: Relative weights and length frequency histograms for the primary game fish found in Lafleur Lake.

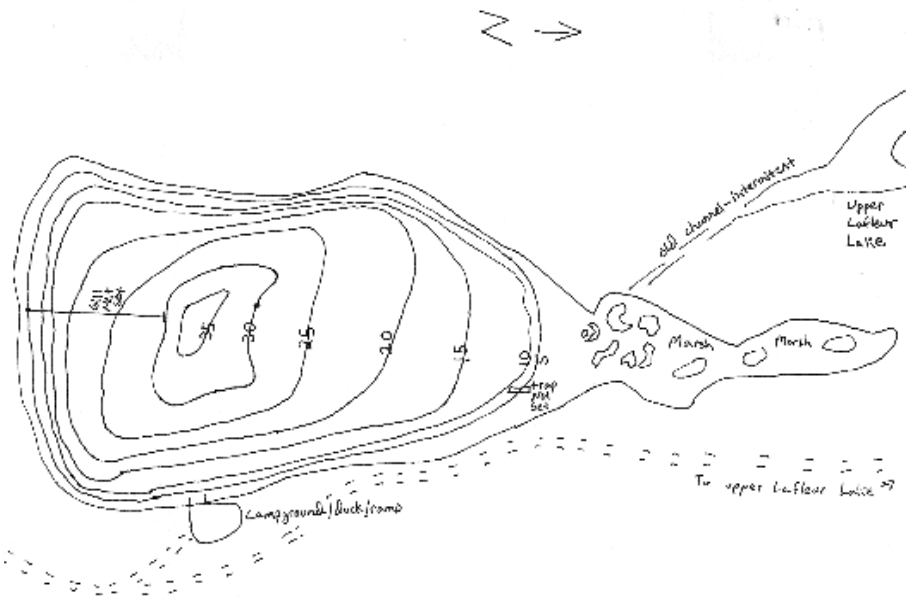
Limiting Factors

- This lake lacks suitable spawning habitat for salmonids so any coldwater fisheries will require annual hatchery stocking.

- Temperature issues reduce salmonid habitat in this lake during summer periods.
- Competitive pressures from introduced species (LMB) and brown bullhead limit salmonid survival and growth.
- Information about this lakes dissolved oxygen profile in winter is lacking.
- Considerable water in this basin is inaccessible due to shallow depth and abundant aquatic vegetative limiting the productivity of this lake.
- Depressed invertebrate abundance and a lack of large invertebrates or prey fish limits growth for all fish species.

<u>Recommendations</u>

1) Stop stocking brook trout into this lake because few have been creeled or collected during fish surveys yet they have been stock since 1967.
2) Stock fewer fish of larger size change stocking schedule to no more than 1,000 rainbow trout at 5/lb.
3) Introduce large invertebrate prey such as crawfish and amphipods.
4) Introduce prey fish such as peamouth, or redside shiners.
5) Monitor fish population for improvement in relative weight.
6) Install a rock or sand filter between north and south basins to isolate lakes.
7) Use electrofishing to remove largemouth bass and bullheads and restock these fish into the northern basin.
8) If non-native species abundance increases or forage base cannot be established use rotenone over winter at 2 ppm to eliminate fish population and reestablish the forage and fish population.
9) If rotenone option is used, restock lake with 4,000 fingerling red-band rainbow trout in the fall after establishing the forage community in the spring.
10) Continue to monitor and evaluate the success of Lafleur Lake as a coldwater



fishery once every 3 to 5 years.

Figure 39: Most recent bathometry map on record for South Lafluer Lake.
:

Little Goose Lake (Map, Figure 42)

Figure 40: Little Goose Lake in mid-summer.

Description

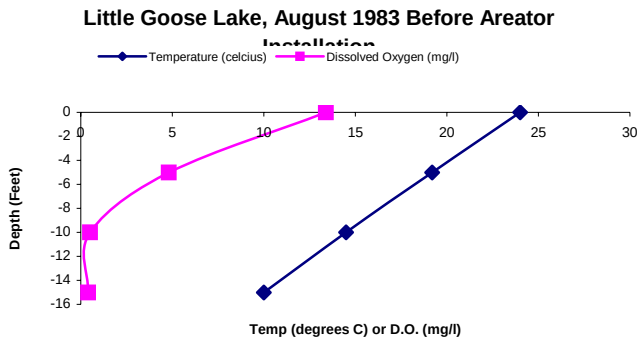
Little Goose Lake is a small coldwater lake located in Oakanogan County at T32N, R26E, section 14H in the Omak Lake watershed within the Oakanogan Sub-basin. What this lake lacks in size it more than makes up in productivity. The inflow is mostly from snowmelt and there is no outlet. Terrain surrounding the lake is rolling hills covered in sage and bunch grasses. Little Goose Lake has a history of winter-kills with a particle kill in 1953 and a complete kill in 1962 and other unverified reports. Aquatic macrophytes are found from the lake margin to just below 2.5 m. *Myriophyllum exalbescens* dominates deeper areas whereas *Potamogeton pusillus* L. seems restricted to a shallower zone of less than 1.25 m depth. *Polygonum coccineum* Muhl. can be found in scattered pockets around the lake. This lake also can summer kill if a heavy algae bloom occurs such as happened the summer of 1957. A fence was recently built to excluded cattle however the lake is in open range and cows are often found inside the fence making it difficult to rehabilitate shoreline vegetation that could reduce high summer water temperatures. Area land use is mostly cattle grazing and some limited agriculture. Access is good by gravel road. Facilities at this lake include a picnic area and pit toilet.

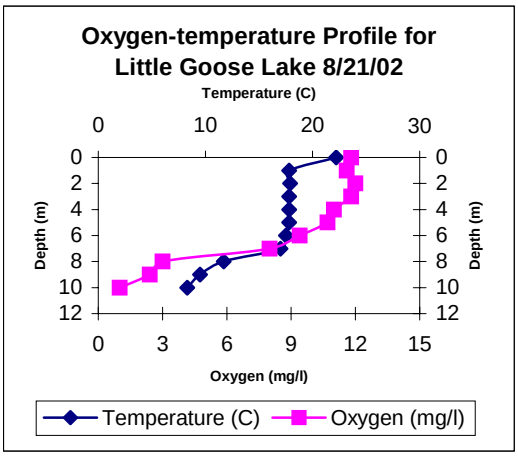
Specifications

In 2002, a wind powered aeration system was installed at this lake improving the temperature oxygen profile dramatically specification are presented with the first number before installation then the after installation number after.

Attribute	Measure	Attribute	Measure
Elevation	2,740 feet	Surface Area	8.6 Acres
Watershed Area	0.48 Miles^2	Volume	202 acre-feet
Summer Max Temp	75°F	Summer Max Temp @ 15ft	58-64°F
Winter D.O. @ 15ft	N/D-7.7 mg/l	Summer D.O. @ 15ft	0.4-10.7 mg/l
Maximum Depth	38 Feet	Average Depth	22 Feet
Conductivity	560 μmhos/cm	Trophic State	Eutrophic

Natural Reproduction	None	PH (10 year avg.)	8.2
Dominant Substrate	Silt/Cobble	Aquatic Vegetation	Nominal
Shoreline Development	None	Dominant Forage	Invertebrates
Secchi-disks	2.4 Meters	Land Use Issues	Heavy
Chlorophyll a	10.07 µg/l	Depth^2 to Surface Area	Grazing 168:1





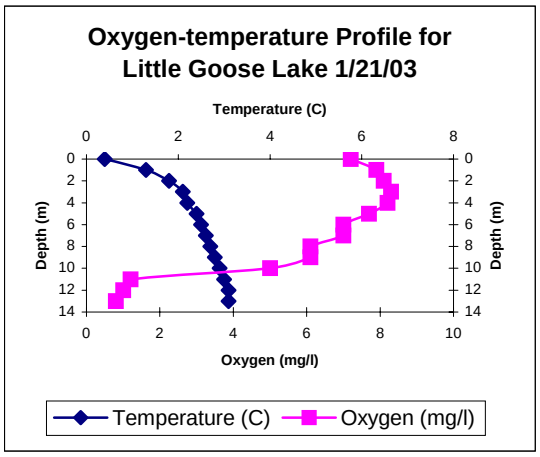


Figure 41: Temperature and Oxygen profile from the warmest water temperatures before an aeration system was installed (Above) and after aeration system installation (Below Left) and coldest water temperatures after installation (Below right) currently on record.

Stocking History

In 2002, rainbow trout pounds stocked was inflated due to stocking 26 fish at an average of 8 pounds each.

Agency (Dates)	Species	Pounds	# of Fish	Size (Fish/Pound)
WDFW (1945, 47-48, 50-52, 65)	RBT	15	9,588	652
WDFW (1954-1964)	EBT	29	5,934	204
USFWS (1969-76)	RBT	39	3,422	88
USFWS (1966-67, 70-76)	EBT	17	2,823	165
Tribe (Winthrop 1977-89)	RBT	94	2,076	22

Tribe (Winthrop 1977, 80-89)	EBT	57	1,351	24
Tribal Hatchery (1990-2001)	RBT	240	3,209	13
Tribal Hatchery (1990-95, 97-2001)	EBT	76	1,847	24
Tribal Hatchery (2002)	RBT	650	6,038	9.3
Tribal Hatchery (2002)	EBT	207	5,000	24.2

Fishing History

Halfmoon (1977) determined that this lake received about 300 man-days of effort per year. However, since the 1970's, this lake has been a popular destination for local anglers from Okanogan and Omak. We estimated that about 722 angler days of pressure occurred in 2002 although little creel data has been recorded. Angling pressure is very heavy at this lake in the spring but tapers off by summer.

Year	# Harvested	Angler Hours	# of Anglers	Avg. Size	Days of Creel	Angler CPUE
1977	122	121	49	11"	10	1.01
1978	17	42	20	11"	6	0.40
1979	66	228	82	11"	13	0.29
1980	23	72	24	10"	6	0.32
1981	100	124	27	12"	2	0.81
1982	16	56	16	14"	1	0.29
1983	11	23	6	10"	1	0.48
1985	18	66	31	8"	3	0.27
2002	9	16	4	334mm	4	0.63

Fish Life and Management Data

Adverse conditions for salmonids are often present at Little Goose Lake such as thermal stress, dissolved oxygen deprivation, and a lack of hiding cover. These adverse conditions result in reports of both summer and winter-kills. Summer kills were reported and verified in 1979 and 1983. Little Goose Lake is one of the most productive lakes on the Colville Reservation and in 2002, produced an estimated return to creel of 4.5 pounds of fish harvested for every pound of fish stocked.

Fish Survey Results

Year	Equipment Used	Effort	# Caught	Size Range	Species
1964	Gillnet	62 Hours	51	6"	EBT
1979	Gillnet	45 Hours	151	130-378mm	RBT
			33	125-428mm	EBT

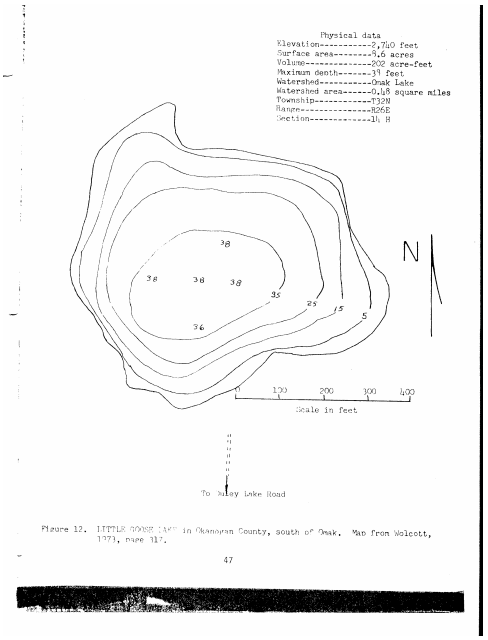
Limiting Factors

- This lake lacks suitable spawning habitat for salmonids so any coldwater fisheries will require annual hatchery stocking.

- The lack of flushing flows, a high Depth^2 to Surface Area ratio, and high biological oxygen demand make dissolved oxygen in both summer and winter limiting for salmonids.
- Temperature issues reduce salmonid habitat in this lake during summer periods.
- Information about this lakes dissolved oxygen profile in winter is lacking.
- Shoreline vegetation has been reduced or eliminated by cattle around most of this lake and cattle contribute considerable nutrient loads to this lake.

<u>Recommendations</u>

1) Collect creel data and fish population data for this lake in 2002.
2) Monitor this lake closely to determine if winter or summer fish kills occur, document the extent of the kill and restock the following spring or fall with catchable rainbow trout if they do occur.
3) If the small aeration windmill installed at this lake to improve water circulation and dissolved oxygen issues is effective at eliminating summer and winter kills begin stocking only fingerling fish at a rate of 2,000 brook trout and 5,000 rainbow trout annually.
4) Plant willows and trees along the bank within cages if necessary to keep cows away. Shoreline vegetation would improve fish cover and reduce summer water temperatures.
5) Work with local anglers, angling groups, the range department, and enforcement to try to reduce incidences of cattle inside the exclosure fence.
6) Determine if support exists for managing this lake for artificial flies and lures only as fish are very susceptible angler harvest.



7) Monitor and evaluate the success of Little Goose Lake as a coldwater fishery.

Figure 42: Most recent bathometry map on record for Little Goose Lake.

Little Owhi Lake (Map, Figure 45)

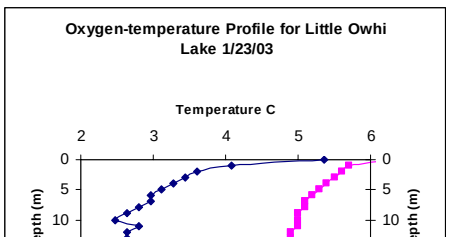
Figure 43: Mapping and sampling activities at Little Owhi Lake in the Fall of 2002.

Description

Little Owhi Lake was considered a shallow warm turtle pond until it was mapped in 2002 when it was discovered to be over 35 feet deep. Although little historical data was ever collected the winter dissolved oxygen levels in this lake would preclude fish survival probably accounting for why a lake located just north of Owhi Lake and managed since the 1930's was never developed into a fishery. Little Owhi Lake is located in Oakanogan County at T32N, R31E, section 22-N and is the origination point of the Little Nespelem River in the Nespelem River drainage within the Upper-Columbia Sub-basin. The outlet drains intermittently to Owhi Lake. Access to this lake is good by dirt road and facilities for tribal members are near by at Owhi Lake. The lakes inlet is mostly by snowmelt so logging activity in this area is of major concern. The surrounding terrain is hilly and covered by mostly conifer forest dominated by Douglas fir.

Specifications

Attribute	Measure	Attribute	Measure
Elevation	2,600 Feet	Surface Area	39.3 Acres
Watershed Area	Unknown	Volume	786 Acre-feet
Summer Max Temp	67 ^{o}F	Summer Max Temp @ 15ft	66 ^{o}F
Winter D.O. @ 15ft	0.7 mg/l	Summer D.O. @ 15ft	8.5 mg/l
Maximum Depth	56 Feet	Average Depth	20 Feet
Conductivity or TDS	Unknown	Trophic State	Mesotrophic
Natural Reproduction	Unknown	PH or Alkalinity	Unknown
Dominant Substrate	Silt	Aquatic Vegetation	Abundant
Shoreline Development	None	Dominant Forage	Amphipods
Secchi-disks	3.5 Meters	Land Use Issues	Heavy Logging
Chlorophyll a	10.07 µg/l	Depth^2 to Surface Area	83:1



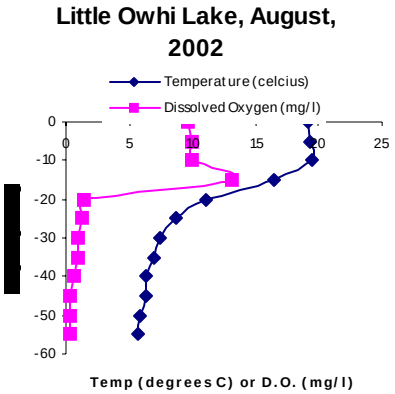


Figure 44: Temperature and Oxygen profile from the warmest water temperatures (Left) and coldest water temperatures (Right) currently on record.

Stocking History

None until 2002, although in the book Lakes of Eastern Washington the author states that at sometime both eastern brook trout and brown trout were stocked but this could not be verified (Wolcott 1973). It is unlikely that and fish survived the winter of 2002/2003 due to extremely poor dissolved oxygen levels at this lake.

Date	Species	Pounds	Species	# of Fish	Size (Fish/Pound)
10/10/2002	EBT	605	EBT	14,641	24.2

Fishing History

No creel data exists for this lake.

Fish Life and Management Data

None until stocked in 2002.

Fish Survey Results					
Year	Equipment Used	Effort	# Caught	Size Range	Species
2002	Gillnet	39 Hours	0	N/A	N/A
2002	Trapnet	39 Hours	0	N/A	N/A

Limiting Factors

- This lake lacks suitable spawning habitat for salmonids so any coldwater fisheries will require annual hatchery stocking.
- Temperature issues reduce salmonid habitat in this lake during summer periods.
- This lakes dissolved oxygen profile in winter indicates no salmonid survival is possible.

Recommendations

1) Do nothing, as Little Owhi Lake has little fisheries potential.
2) Manage this lake for amphibian, turtles and waterfowl.
3) If a fishery is desired, use only brook trout to develop a put-and-take fishery due to its proximity to Owhi Lake. A put-and-take fish could be created by stocking small numbers of catchable sized fish in the spring but winter oxygen level would preclude any over-winter survival.

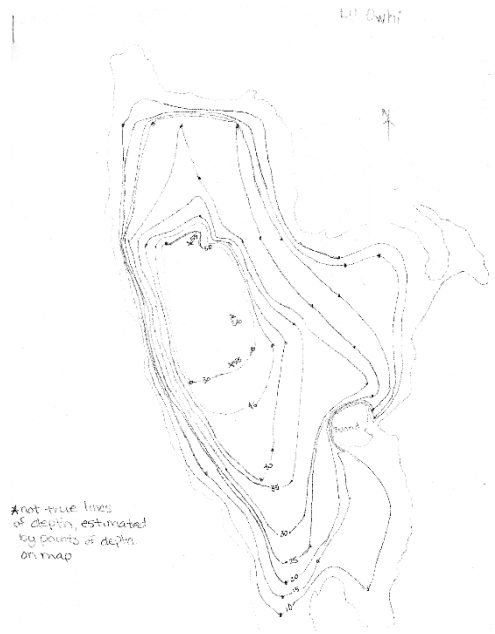


Figure 45: Most recent bathometry map on record for Little Owhi Lake.

McGinnis Lake **(Map, Figure 48)**

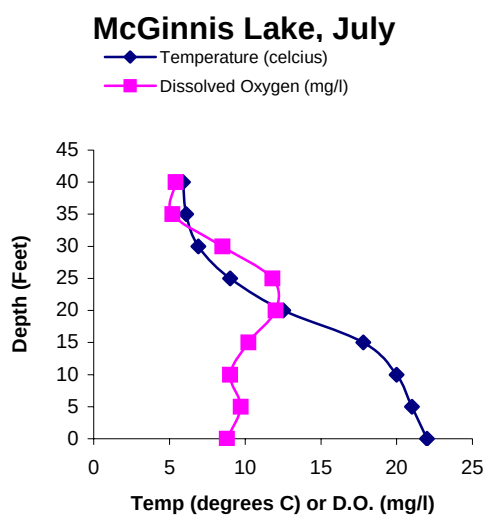
No Picture Available

Description

McGinnis Lake is a medium sized coldwater lake located in Oakanogan County at T29N, R31E, section 2,3,10A, 10B within the Upper-Columbia Sub-basin. The inflow along the north- eastern corner of the lake via an intermittent unnamed tributary, there is no outlet. Terrain surrounding the lake is rolling hills covered in sage and bunch grasses with a few stands of aspen, yellow pine and basalt outcroppings. Macrophytes found include *Chara* sp., *Potamogeton zosteriformis*, *Potamogeton amplifolius*, *Potamogeton praelongus*, *Potamogeton richardsonii*, *Elodea canadensis*, *Ceratophyllum demersum*, and *Eleocharis acicularis*. A turf of the tiny spikerush *Eleocharis acicularis* extended from the water level up to about 0.5 m above the water level in many places along the shoreline. Access is good by paved road and a boat launch is available. Several homes are located on the western shore of this lake receives moderate cattle grazing pressure.

Specifications

Attribute	Measure	Attribute	Measure
Elevation	2,375 feet	Surface Area	118 Acres
Watershed Area	4.03 Miles^2	Volume	3,505acre-feet
Summer Max Temp	72°F	Summer Max Temp @ 15ft	65°F
Winter D.O. @ 15ft	Unknown	Summer D.O. @ 15ft	9.4 mg/l
Maximum Depth	46 Feet	Average Depth	30 Feet
Conductivity	129 µmhos/cm	Trophic State	Mesotrophic
Natural Reproduction	Minimal	PH (5 year avg.)	7.6
Dominant Substrate	Sand/Rock	Aquatic Vegetation	Nominal
Shoreline Development	Moderate	Dominant Forage	Invertebrates
Secchi-disks	4.8 Meters	Land Use Issues	Grazing and development
Chlorophyll a	5.2 µg/l		
Depth^2 to Surface Area	18:1		



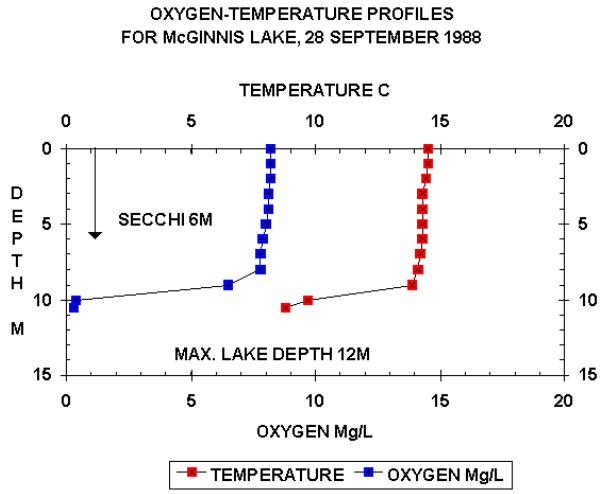


Figure 46: Temperature and Oxygen profile from the warmest water temperatures (Left) and coldest water temperatures (Right) currently on record.

Stocking History

This lake was rehabilitated by chemical treatment with toxaphene in 1965 by the Colville Confederated Tribes and stocking was curtailed by the Washington Department of Game until the rehabilitation work had been completed and the lake had time to detoxify.

Agency (Dates)	Species	Pounds	# of Fish	Size (Fish/Pound)
WDFW (1947-62)	EBT	94	71,521	762
USFWS (1968, 71-76)	EBT	645	102,893	160
Tribe (Winthrop 1977-89)	EBT	212	17,906	84

Tribal Hatchery (1990-2001)	EBT	392	26,012	66
Tribal Hatchery (2002)	EBT	1,526	34,989	23

Fishing History

Halfmoon (1977) determined that this lake received about 2,000 man-days of effort per year. This lake is the only place that non-members can fish for exclusively brook trout hence it is often a destination for local anglers targeting this species. A voluntary creel program was initiated late in 2002 and information will be available starting in 2003. A creel survey for 1-day in August of 1977 recorded 1 angler who caught no fish in 3 hours of effort. This fishery is most productive in the winter and spring, summer water temperatures force fish to suspend off-shore and many anglers are not equipped for this type of fishing so the 1977 creel results are not surprising.

Year	Creel days	# Harvested	Hours Fished	# Anglers	Size Range	Fish/hour
1964		44	140	20	7-15”	0.31
1977	3	777	354	161	Avg. 9”	2.20
1978	3	34	80	35	Avg. 11”	0.43
1979	4	268	99	48	7-21”	2.70
1980	1	165	96	40	Avg. 11”	1.72
1981	3	117	99	30	Avg. 14”	1.18
1982	2	75	74	24	Avg. 14”	1.01
1983	2	84	95	25	Avg. 11”	0.88
1988	1	20	22	7	6-17”	0.91

Fish Life and Management Data

Prior to 1953, the trout fishing at this lake was good but by the mid 1950’s fish production had been reduced and the Washington Department of Game determined the lake was in need of rehabilitation. The rehabilitation efforts started in 1953 and were repeated in 1958 using 5% rotenone applied at 1-ppm by weight but these efforts were ineffective for reducing the population of pumpkinseed sunfish. The Colville Tribes used toxaphene in 1965 and no pumpkinseed sunfish have been observed since.

Fish Survey Results					
Year	Equipment Used	Effort	# Caught	Size Range	Species
1964	Gillnet	38 Hours	572	4-8”	PSS
1977	Gillnet	23 Hours	14	10-12”	EBT
1980	Gillnet	118 Hours	102	104-390mm	EBT
1981	Gillnet	76 Hours	187	116-390mm	EBT
1987	Gillnet	38 Hours	48	100-395mm	EBT
1989	Gillnet	30 Hours	46	280-450mm	EBT

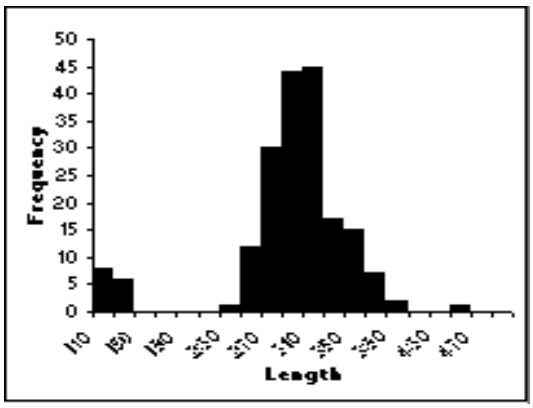


Figure 47: Length Frequency histograms for eastern brook trout collected from McGinnis Lake, showing excellent growth and survival to longer lengths from fingerling stocking.

Limiting Factors

- This lake lacks suitable spawning habitat for salmonids so any coldwater fisheries will require annual hatchery stocking.
- Temperature issues reduce salmonid habitat in this lake during summer periods.
- Information about this lakes dissolved oxygen profile in winter is lacking.

Recommendations

1) Do nothing except continue to stock viable brook trout at 40,000 fish at 90 fish/lb in size.
2) Conduct creel survey to determine usage.
3) Monitor and evaluate this fishery as a coldwater fishery but maintain current management unless population changes require change.

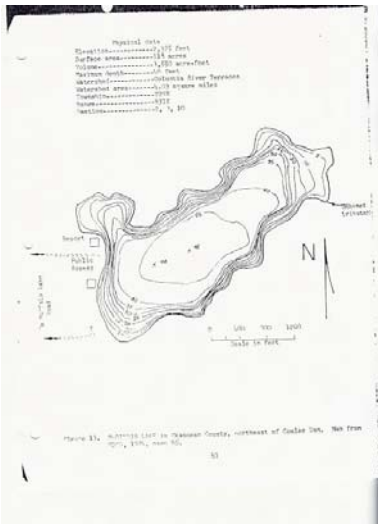


Figure 48: Most recent bathometry map on record for McGinnis Lake.

Mirror Lake **(No Map Available)**

No picture available

Description

Mirror Lake has had little historical data collected but is located in Oakanogan County at T33N, R28E, section 17 and is in the Omak Lake drainage within the Oakanogan River Sub-basin. Access to this lake is fair by dirt road but the many roads in the area and lack of signage make it difficult to find. This lake is mostly located on private property. Mirror Lake receives water mostly by snowmelt so cattle grazing in the area is of major concern. Mirror Lake has a rocky shoreline and drops off steeply. Algae blooms have been observed during the summer months attesting to this lakes high productivity. The surrounding terrain is mostly sage and bunch grasses.

Specifications

Attribute	Measure	Attribute	Measure
Elevation	Unknown	Surface Area	(est.) 27 Acres
Watershed Area	Unknown	Volume	Unknown
Summer Max Temp	60+^{o}F	Summer Max Temp @ 10ft	Unknown
Winter D.O. @ 15ft	Unknown	Summer D.O. @ 10ft	Unknown
Maximum Depth	23+ Feet	Average Depth	Unknown
Conductivity or TDS	Unknown	Trophic State	Eutrophic
Natural Reproduction	Unknown	PH or Alkalinity	Unknown
Dominant Substrate	Silt	Aquatic Vegetation	Nominal
Shoreline Development	None	Dominant Forage	Amphipods
Secchi-disks	<1 Meter	Land Use Issues	Cattle Grazing
Chlorophyll a		Depth^2 to Surface Area	20:1

Stocking History

None.

Date	Season	Species	# of Fish	Size (Fish/Pound)
N/A	N/A	N/A	N/A	N/A

Fishing History

No creel data exists for this lake.

Fish Life and Management Data

No fish are know to inhabit this lake.

Fish Survey Results					
Year	Equipment Used	Effort	# Caught	Size Range	Species
1981	Gillnet	19 Hours	0	N/A	N/A

Limiting Factors

- A complete lack of data on this lake makes limiting factor impossible to establish.

Recommendations

3) Map and survey lake specifications and water quality.
4) Establish an easement with landowner or acquire property for access to this lake through North American Wetland Conservation Fund grant.
5) Once access is established stock 1,000 triploid rainbow trout at 5/lb and monitor survival.

No Map Available

Nicolas Lake **(Map, Figure 51)**

Figure 49: Picture taken in the fall of 1987 clearly shows the Chara bench on this lake.

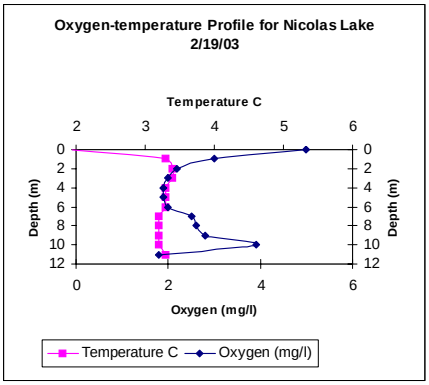
Description

Nicolas Lake is a small coldwater lake located in Ferry County at T34N, R36E, section 10G on the west slope of Staehley Mountain within the Barnaby Creek drainage in the Upper-Columbia Sub-basin. The inflow is mostly from snowmelt. The outlet is through an intermittent stream that drains the lake to the southwest toward Barnaby Creek. The basin is surrounded by hills covered with a mixed forest of *Pinus ponderosa*, *Larix occidentalis*, *Amelanchier alnifolia*, *Holodiscus discolor*, *Acer glabrum*, *Pseudotsuga menziesii*, *Abies grandis*, *Populus tremuloides*, *Alnus* sp., *Salix* sp., *Lonicera* sp., *Rosa* sp., and *Symphoricarpus albus*. Nicholas Lake is elongate with extensive shallow areas occupied by light green marly *Chara* and old drowned trees, with patches of

Potamogeton berchtoldii, *Ceratophyllumdemersum*, and *Myriophyllum exalbescens* interspersed. Calcium carbonate precipitation by Chara forms an extensive shallow bench around the lake. Surrounding the deep (10.4 m) portion at the northeast end of the lake is a broken ring of floating islands of *Scirpus* sp., and *Typha* sp. Access is difficult by a steep dirt road from Barnaby Creek road and no signs indicate the location or direction of the lake. No facilities are available at this lake.

Specifications

Attribute	Measure	Attribute	Measure
Elevation	2660 Feet	Surface Area	2 acres
Watershed Area	Unknown	Volume	Unknown
Summer Max Temp	67°F	Summer Max Temp @ 15ft	55°F
Winter D.O. @ 15ft	Unknown	Summer D.O. @ 15ft	6.0 mg/l
Maximum Depth	34 Feet	Average Depth	Unknown
Conductivity	245 µmhos/cm	Trophic State	Mesotrophic
Natural Reproduction	Unknown	PH (2 year avg.)	7.4
Dominant Substrate	Unknown	Aquatic Vegetation	Abundant
Shoreline Development	None	Dominant Forage	Unknown
Secchi-disks	6.7 Meters	Land Use Issues	Logging and Roads
Chlorophyll a	Unknown		
$Depth^2$ to Surface Area	578:1		



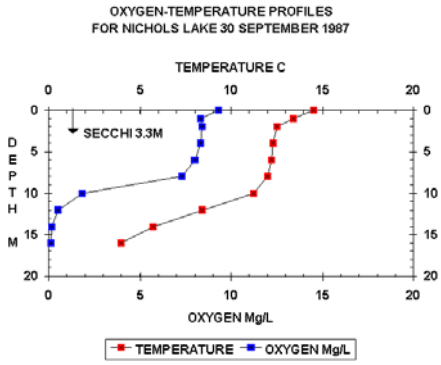


Figure 50: Temperature and Oxygen profile from the warmest water temperatures (Right) and coldest water temperatures (Left) currently on record.

Stocking History

Agency (Dates)	Species	Pounds	# of Fish	Size (Fish/Pound)
USFWS (1969-76)	EBT	43	3,028	71
Tribe (Winthrop 1983-89)	RBT	220	1,934	9
Tribal Hatchery (1990-2001)	RBT	393	1,859	5

Fishing History

Federal stocking was curtailed in 1977 due to lack of angler use and in the fall of 1977 tribal biologist observed adult trout in good condition at this lake. No other data is available for this lake.

Fish Life and Management Data

No fish have been colleted for this lake but a survey is schedules for 2002.

Fish Survey Results					
Year	Equipment Used	Effort	# Caught	Size Range	Species
1981	Gillnet	15 Hours	0	N/A	N/A
1982	Gillnet	17 Hours	0	N/A	N/A

Limiting Factors

- This lake lacks any suitable spawning habitat for salmonids so any cold-water management will require annual hatchery stocking.
- The lack of flushing flows, a high Depth^2 to Surface Area ratio, and high biological oxygen demand make dissolved oxygen in both summer limiting and makes winter survival highly unlikely in most years for salmonids.
- Temperature issues reduce the available habitat in this lake during summer periods.
- Poor access, signage, and a lack of facilities limit angler use.

Recommendations

1) This small alpine lake has winter oxygen level below those needed for salmonid survival, summer conditions are marginal, and few anglers use this lake therefore continued stocking of this lake would largely result in wasted resources.
2) An aeration system might minimize winterkills and allow trout to survive year round however temperature would continue to limit salmonid production. Limited use and minimal benefits may make an aeration system economically difficult to justified.
3) If an aeration system was installed and habitat conditions improved, resume stocking with 1,000 rainbow trout at 25/lb and improve access to promote angler use.

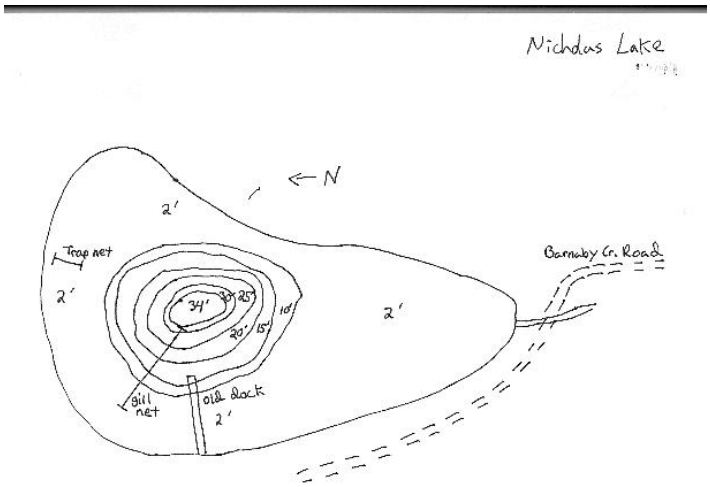


Figure 51: Most recent bathometry map on record for Nicolas Lake.

<u>North Twin Lake</u> (Map, Figure 54)

Figure 52: An overlook of North Twin Lake.

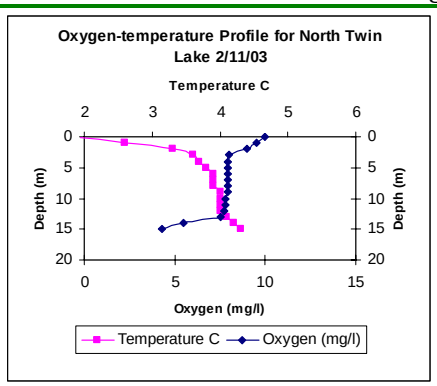
<u>Description</u>

North Twin Lake is the third largest coldwater lake on the Colville Reservation and is located in Ferry County at T32N, R35E, sections 9,10,11,15 and 16 in the Stranger Creek drainage within the Upper Columbia Sub-basin. Several intermittent (Carson Creek and other unnamed creeks) creeks enter from the north and one perennial creek (Beaver Dam Creek) enters the eastern end of the lake two outlets exist at Cornstalk Creek and Stranger Creek both outlets are screened to reduce fish losses. North Twin Lake is connected to South Twin Lake by a 300-foot long navigable channel that was inundated in 1932 when a stop board dam was placed on the Stranger Creek outlet this raised the lake level about 8-feet. The dam was originally installed to provide irrigation waters to the lands below. Locals commonly refer to both lakes as “twin lakes”. The surrounding terrain is mountainous, covered by western larch, Douglas fir, and ponderosa pine. Uplands support timber harvest and lowland use is agriculture. Lake bottom is made up of mostly soft sediments (silt and detritus) however gravels and boulders are common along the

shoreline. Dominant vegetation includes: water milfoil, coontail, waterweed, and pondweed. Access is excellent by paved highway, resorts and many summer cabins are located around North Twin Lake along with supplies, boat rental, restrooms, lodging, gas, boat ramps, docks, picnic areas, swimming beach, and campsites mostly along the north and west shoreline.

Specifications

Attribute	Measure	Attribute	Measure
Elevation	2,572 Feet	Surface Area	917 Acres
Watershed Area?	13.7 Miles^2	Average Depth	32 Feet
Maximum Depth	51 Feet	Summer Max Temp@15ft	65°F
Summer Max Temp	75°F	Summer D.O. @ 15ft	9.5mg/l
Winter D.O. @ 15ft	Unknown	Trophic State	Mesotrophic
Conductivity	59 µmhos/cm	PH (9 year avg.)	7.3
Natural Reproduction	Moderate	Aquatic Vegetation	Nominal
Dominant Substrate	Silt/Gravel	Dominant Forage	Unknown
Shoreline Development	Moderate	Secchi-disc	6.0 Meters
Shoreline Length	7.41 Miles	Chlorophyll a	4.1 µg/l
Land Use Issues	Development and Irrigation	Volume	29,600 Acre-feet
		Depth^2 to Surface Area	2.8:1



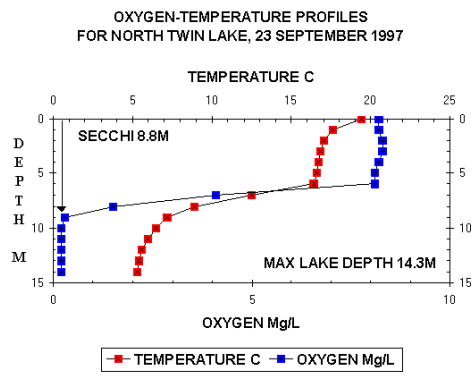


Figure 53: Temperature and Oxygen profile from the warmest water temperatures (Right) and coldest water temperatures (Left) currently on record.

Stocking History

Since 1946, North Twin Lake has been extensively managed using hatchery trout. Several non-native fish species have been stocked illegally by anglers including; largemouth bass, pumpkinseed sunfish, golden shiners, and fathead minnows.

Agency (Dates)	Species	Pounds	# of Fish	Size (Fish/Pound)
WDFW (1946-48, 50-65)	RBT	808	437,014	541
WDFW (1949, 51-54, 62)	EBT	72	95,183	1,313
WDFW (1959)	WCT	267	85,300	320

USFWS (1966-76)	RBT	2,392	95,594	40
USFWS (1966-67, 70-76)	EBT	1,001	110,903	111
Tribe (Winthrop 1977, 79-89)	RBT	1,258	56,473	45
Tribe (Winthrop 1977, 79-89)	EBT	654	68,102	104
Tribe (Winthrop 1984)	Coho	470	188,000	400
Tribal Hatchery (1990-2001)	RBT	1,619	85,086	53
Tribal Hatchery (1990-2000)	EBT	1,222	89,877	74

Fishing History

North Twin Lake is the second most popular fishery on the Colville Reservation and angler usage in the 1970's was around 12,000 angler-days per year and average catch rate estimates were around 1.5 trout per hour with the majority of these trout between 10 and 16 inches in length. By 1985, angler effort was estimated at only 7,354 angler days per year with a mean catch rate of 0.69 trout per hour. In 1987, the annual angler effort was estimated at 9,576 angler days for fish that averaged 10 inches long and were caught at a rate of 1.17 trout per hour. Annual harvest was estimated to be 15,505 rainbow trout, 2,626 largemouth bass, and 314 eastern brook trout. North Twin Lake provides fishing opportunities for rainbow trout, brook trout, largemouth bass, and pumpkinseed sunfish, however only salmonids have been included in creel data to date. Anglers illegally introduced pumpkinseed sunfish and largemouth bass from nearby lakes in 1982 and both populations are naturally reproducing in North Twin Lake. Some anglers do target largemouth bass at this lake but harvest has had little impact on this population. From 1978 to 2000, creel data was compiled for both North and South Twin Lakes and treated as one lake. Creel data were then divided between rainbow trout and brook trout. For this report brook trout data is provided under North Twin Lake and rainbow trout data will be displayed under South Twin Lake even though both lakes contain populations of both species.

Year	# Harvested	Hours Fished	# Anglers	Size Range	Fish/hour
1964	3,036	3,170	453	7-22"	0.96
1974	323	328	179	7-21"	0.98
1977	15	26	12	7-13"	0.58

Eastern brook trout creel data from both North and South Twin Lakes.

Year	Hrs. Fished	EBT Catch	AVG. Fl (mm)	AVG. Wt (gr)	ACR Fish/hr	Relative Weight
1978	55,653	2,414	295	342	0.04	114
1979	81,124	2,677	302	360	0.03	111
1980	64,323	8,453	268	304	0.13	136
1981	55,528	9,361	303	379	0.17	116
1982	57,659	5,681	314	415	0.20	114
1983	45,173	4,321	303	389	0.10	119
1984	51,614	7,020	310	419	0.14	120
1985	44,760	6,793	311	434	0.15	123
1986	42,893	2,646	340	593	0.06	127

1987	47,676	600	336	531	0.01	118
1988	52,571	966	309	421	0.02	121
1989	39,019	1,167	302	396	0.03	123
1990	47,929	794	358	656	0.02	120
AVG.	**52,763**	**4,069**	**312**	**434**	**0.08**	**122**
1991*	40,411	1,045	336	536	0.03	119
1992*	40,452	2,681	330	457	0.07	107
1993*	60,110	2,709	337	468	0.05	103
1994*	91,928	5,670	307	403	0.06	118
1995*	74,411	13,141	321	410	0.18	105
1996*	29,611	5,215	329	454	0.18	108
1997*	20,930	3,842	346	500	0.18	101
1998*	29,252	2,766	351	557	0.09	108
1999*	34,825	2,528	344	508	0.07	105
2000*	32,470	2,907	339	455	0.09	98
AVG.	**51,122**	**4,900**	**329**	**461**	**0.11**	**109**

North and South Twin Lakes eastern brook trout return to creel data.

Year	Species	Acres	lbs stocked	lbs/ac.	Harvest	Avg. Size	lbs.Harvested/ac.	% return
1991	EBT	1937	17517	9.0	1045	1.18	0.6	7
1992	EBT	1937	8053	4.2	2681	1.01	1.4	34
1993	EBT	1937	8548	4.4	2709	1.03	1.4	33
1994	EBT	1937	9826	5.1	5670	0.89	2.6	51
1995	EBT	1937	6405	3.3	13141	0.90	6.1	185
1996	EBT	1937	7639	3.9	5215	1.00	2.7	68
1997	EBT	1937	9270	4.8	3842	1.10	2.2	46
1998	EBT	1937	13818	7.1	2766	1.23	1.8	25
1999	EBT	1937	10589	5.5	2528	1.12	1.5	27
2000	EBT	1937	10589	5.5	2907	1.00	1.5	28
Annual return to creel averages			**10185**	**5.3**	**4400**	**1.05**	**2.3**	**53**

Fish Life and Management Data

North Twin Lake contained bridgelip suckers, rainbow trout, and brook trout in the 1940's then redside shiners were introduced around 1946 and their population expanded rapidly. The brook trout catch reduced considerably from 80 percent of trout caught to 3.5 percent in 1964 as a result of the redside shiner population (Larkin and Smith 1954), In the 1980's, anglers introduced both pumpkinseed sunfish and largemouth bass and both populations have since been reproducing naturally but the redside shiner population has crashed with none reported during gillnet surveys conducted by Halfmoon (1977). In 1984, redside shiners had become abundant again and coho salmon were introduced to determine if they could be used as a biologic control. Recently reports of golden shiners or gold fish were received by the Colville Tribes Fish and Wildlife Department but these fish have yet to be verified in North Twin Lake but goldfish have been verified to exist in mallard bay a shallow area on South Twin Lake. The current fish community at this lake is believed to be rainbow trout, brook trout, largemouth bass, pumpkinseed sunfish,

redside shiners, and bridgelip suckers. Lake surveys during 2003 or 2004 will attempt to verify the presence or absence of golden shiners in North and/or South Twin Lakes.

Fish Survey Results

Year	Equipment Used	Effort	# Caught	Size Range	Species
1975	Gillnet	15 Hours	4	9-15”	BLS
			18	8-14”	RBT
			2	8-15”	EBT
1979	Gillnet (5)	90	254	108-376mm	BLS
			23	120-415mm	RBT
			49	100-455mm	EBT
			55	78-102mm	RSS
			29	118-200mm	PYW
1980	Gillnet (6)	110	97	160-360mm	BLS
			55	150-410mm	RBT
			192	130-440mm	EBT
			58	80-130mm	RSS
			97	108-182mm	PYW
1981	Gillnet (8)	137	105	165-368mm	BLS
			90	236-397mm	RBT
			167	118-327mm	EBT
			12	90-102mm	RSS
			104	117-173mm	PYW
1985	Gillnet	23 net-nights	534	110-420mm	BLS
			178	115-410mm	RBT
			264	155-440mm	EBT
			541	90-125mm	RSS
			254	65-185mm	PYW
			57	92-315mm	LMB
			107	160-362mm	COS
			1	210mm	Goldfish
1986	Gillnet (4)	72	8	100-345mm	LMB
			34	265-420mm	RBT
			26	140-400mm	EBT
			29	260-370mm	BLS
			2	110-180mm	PYW
			4	340-375mm	COS
1987	Gillnet (2)	34	20	242-370mm	BLS
			43	230-450mm	RBT
			27	238-450mm	EBT
			2	148-173mm	LMB
			3	155-180mm	COS
1989	Gillnet (3)	57	38	242-370mm	BLS
			51	200-396mm	RBT
			4	240-335mm	EBT

			7	200-465mm	LMB
1998	Gillnet	114 Hours	95	8-12”	RBT
			122	7”-18”	EBT
			4	6-10”	LMB
1999	Gillnet	114 Hours	33	9-17”	RBT
			43	7-17”	EBT
			1	12”	LMB
			3	13-14”	BLS
2000	Gillnet	114 Hours	101	8-18”	RBT
			50	7-18”	EBT
			12	6-19”	LMB
			3	14-15”	BLS

Percentage of fish collected by species from gillnet surveys on North and South Twin Lakes.

Date	Total fish Caught	# BKT	Percent of Catch	# RBT	Percent of Catch	# LMB	Percent of Catch
Jun-94	150	141	94%	9	6%	ND	ND
Jun-95	363	187	52%	176	48%	ND	ND
Jun-96	114	79	69%	35	31%	ND	ND
Jun-97	0	0	ND	0	ND	ND	ND
Jun-98	373	179	48%	166	45%	28	8%
Jun-99	179	73	41%	90	50%	16	9%
Jun-00	195	63	32%	115	59%	17	9%
Avg.	**196**	**103**	**56%**	**84**	**40%**	**20**	**8%**

Limiting Factors

- Although some limited natural recruitment may occur in streams feeding this lake the extent of suitable spawning habitat for salmonids and the contribution to the population is unknown. Beaver Dam Creek could potentially be used to collect fish for spawning and eggs taken to the Colville Tribal Hatchery for incubation and rearing. However, this lake lacks suitable spawning habitat to sustain this fishery without annual supplemental hatchery stocking.
- Competitive pressures from introduced species (LMB, PSS) may limit salmonid survival and growth.
- Temperature issues reduce salmonid habitat in this lake during summer periods.

Recommendations

1) Reduce to biannual or eliminate brook trout plants into this lake because few have been creeled or collected during fish surveys yet they have been stock since 1947.
2) Determine the population of largemouth bass and adjust stocking sizes of redband/rainbow trout and triploid rainbow trout accordingly. Stock only triploid rainbow trout until redband trout are available from a hatchery source.

Remove all largemouth bass and pumpkinseed sunfish collected during lake surveys and release into Fish Lake or other established warm-water fishery.

3) Determine if natural reproduction is occurring by differentially marking all fish planted into this lake and survey all inlet streams for suitable spawning habitat noting where reclamation work is needed to restore natural production.
4) Monitor and evaluate the success of this lake as a coldwater fishery every 3 to 5 years since good baseline data already exists for this lake.
5) Establish a multidisciplinary working group to coordinate and prioritize natural resource activities and leverage funding to maintain and improve the habitat in and surrounding this important resource.

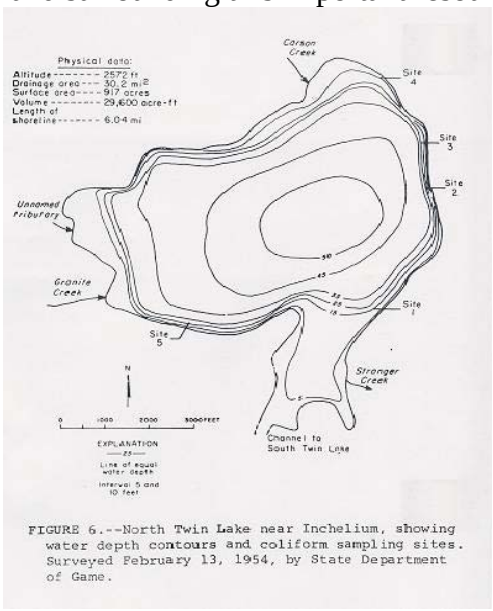


Figure 54: Most recent bathometry map on record for North Twin lake.

Omak Lake **(Map, Figure 59)**

Figure 55: Overlook of Omak Lake taken in the spring of 1978 looking southeast.

Description

Omak Lake is the largest alkaline lake in the state of Washington and this coldwater lake is located in Oakanogan County at T33, 32N, R27,28E, section 33, 34, 3, 4, 10, 11, 14, 15, 23, 24, 25, 19, 29, and 30 in the Omak Lake drainage of the Oakanogan River Sub-basin. This lake represents the historic brood source for all Lahanton cutthroat trout eggs used by the Colville Tribal Hatchery. The Lahanton stock at Omak Lake is a cross between the rainbow hybrid Heenan Lake stock from California and pure Pyramid Lake stock from Nevada, originally stocked in 1968. A successful fishery at this lake has been in existence since 1975 and fish from this lake have set the last two state records for cutthroat trout. Eleven intermittent streams flow into Omak Lake along the western shore with another 7 streams that flow into the eastern side the 2 largest being Beaver House Creek and Poison Oak Creek. Two perennial streams flow into Omak Lake. No Name Creek flows into the northern most end and some minimal natural reproduction has been observed in this stream. On the extreme southern end of the lake Kartar Creek intermittently connects to the lake during the spring but flows go sub-surface by mid-summer due to infiltration to the Kartar valley aquifer. Connections between the lake and the Kartar valley aquifer are unknown at this time. A steep-walled canyon surrounds the lake and is covered with mostly sage, greasewood, conifers, and bunch grasses. Access is good by dirt road and paved roads. Facilities include a rough boat launch, campsite, and pit toilets. Some cattle grazing takes place around this lake but the eastern shore is part of the Omak Lake Wildlife Preserve. High alkalinity at Omak Lake precludes other salmonid species from surviving in the lake and is a function of the closed basin, soils, and evaporation.

Specifications

Attribute	Measure	Attribute	Measure
Elevation	950 Feet	Surface Area	3,244 Acres
Watershed Area?	104 Miles^2	Volume	705,000 Acre-feet
Summer Max Temp	70°F	Summer Max Temp @ 15ft	70°F
Winter D.O. @ 15ft	Unknown	Summer D.O. @ 15ft	9.1 ppm
Maximum Depth	325 Feet	Average Depth	210 Feet
Conductivity	5,449µmhos/cm	Trophic State	Mesotrophic
Natural Reproduction	Minimal	PH (13 year avg.)	9.5
Dominant Substrate	Gravel/rock	Aquatic Vegetation	Minimal
Shoreline Development	Minimal	Dominant Forage	Midges/fish(PMS)
Secchi-disks	4.4 Meters	Land Use Issues	Some grazing
Chlorophyll a	Unknown	Depth^2 to Surface Area	36:1

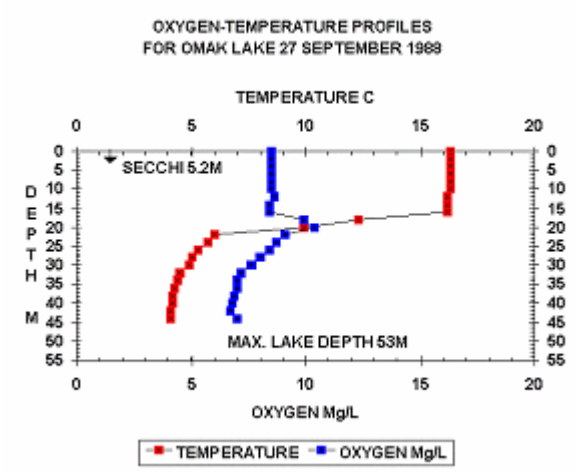


Figure 56: Temperature and oxygen profile from the warmest water temperatures currently on record.

Stocking History

This lake serves as the Lahontan cutthroat trout brood stock for the Colville Tribal Hatchery. Supplemental stocking has occurred since the 1970's with only a minimal number of fish produced through natural reproduction due to poor stream habitat conditions. Fish were stocked from Winthrop National fish hatchery from 1968 to 1990 with the exception of 59,360 fish of various sizes stocked in 1983 from the State of Washington Hatchery located in Omak. From 1990 to 2002 all fish were stocked from the Colville Tribal Hatchery located at Bridgeport, WA. The amount of reproduction will be verified over the next several years, starting in 2002 all fish stocked will be differentially marked. Rainbow trout were stocked by the State Game Department from 1950 to 1960 with fish from 1954-1960 being placed into Kartar Creek after gill net surveys in 1953 yielded no trout only suckers, chubs, and shiners. Eastern Brook Trout (266,000) were stocked in 1956 but no size information could be found. No fish were ever found that survived being stocked into either the lake or tributary streams prior to 1968, due to high alkalinity levels at Omak Lake.

Agency (Dates)	Species	Pounds	# of Fish	Size (Fish/Pound)
WDFW (1950-52, 54-57, 60)	RBT	74	33,301	451
WDFW (1956)	EBT	ND	266,000	ND
USFWS (1968-76)	LCT	491	37,768	77
Tribe (Winthrop 1977-89)	LCT	541	51,283	95
Tribal Hatchery (1991-96, 98-2001)	LCT	2,837	93,347	33

Fishing History

Omak Lake is restricted to fly and lure fishing only and although it has received much notoriety among high-profile anglers who have written several articles and even made

some fishing videos about the fabulous fishing, angling pressure remain light for a lake of this size. Halfmoon (1977) determined this lake received about 400 man-days of effort per year from voluntary creel returns that commonly underestimate angler effort. In an effort to determine actual angler use, surveillance of creel boxes proved that the probability of an angler reporting their catch was only 39.3%. The 2002 estimate was similar to Halfmoons at 466 angler-days prior to factoring in the non-reporting multiplier. Actual use was calculated as 1,184 angler-days with a much higher degree of certainty. This fishery is most productive and popular in the spring when shore anglers can most effectively target large fish as they cruise the shore looking for a place to spawn. Creel data is has been collected since 1975 using voluntary creel reporting boxes located at three sites around Omak Lake.

Omak Lake return to catch and creel from voluntary creel data collected from 1975-2000.

Omak Lake lahontan cutthroat trout return to creel

Year	Species	Acres	Pounds stocked	Pounds per Acre	Caught (#)	Harvest (#)	Average Size (lbs)	Pounds caught/ac.	Pounds harvested/ac.	% Return to Catch	% Return to Harvest
1975	LCT	3340	519	0.2	213	213	4.26	0.27	0.27	175	175
1976	LCT	3340	1943	0.6	314	314	2.72	0.26	0.26	44	44
1977	LCT	3340	1823	0.5	526	526	3.68	0.58	0.58	106	106
1978	LCT	3340	2820	0.8	540	540	1.59	0.26	0.26	30	30
1979	LCT	3340	2003	0.6	911	911	3.17	0.87	0.87	144	144
1980	LCT	3340	1826	0.5	1248	1248	1.93	0.72	0.72	132	132
1981	LCT	3340	702	0.2	1004	1004	2.72	0.82	0.82	388	388
1982	LCT	3340	1069	0.3	790	790	1.93	0.46	0.46	142	142
1983	LCT	3340	1426	0.4	230	230	3.68	0.25	0.25	59	59
1984	LCT	3340	1190	0.4	841	841	1.59	0.40	0.40	112	112
1985	LCT	3340	540	0.2	644	644	1.93	0.37	0.37	230	230
1986	LCT	3340	540	0.2	796	796	2.29	0.55	0.55	338	338
1987	LCT	3340	355	0.1	937	937	3.17	0.89	0.89	838	838
1988	LCT	3340	690	0.2	297	297	3.17	0.28	0.28	137	137
1989	LCT	3340	890	0.3	366	184	1.59	0.17	0.09	66	33
1990	LCT	3340	1500	0.4	N/D	N/D	N/D	N/D	N/D	N/D	N/D
1991*	LCT	3340	5812	1.7	N/D	N/D	N/D	N/D	N/D	N/D	N/D
1992	LCT	3340	4554	1.4	559	210	2.29	0.38	0.14	28	11
1993	LCT	3340	1305	0.4	288	107	1.80	0.16	0.06	40	15
1994	LCT	3340	5065	1.5	308	157	2.09	0.19	0.10	13	6
1995	LCT	3340	4747	1.4	323	226	2.53	0.24	0.17	17	12
1996	LCT	3340	5668	1.7	275	88	2.60	0.21	0.07	13	4
1997	LCT	3340	0	0.0	398	114	2.04	0.24	0.07	N/D	N/D
1998	LCT	3340	2886	0.9	99	31	2.40	0.07	0.02	8	3
1999	LCT	3340	1144	0.3	587	200	1.82	0.32	0.11	93	32
2000	LCT	3340	2779	0.8	818	396	2.14	0.52	0.25	63	30
2001	LCT	3340	3000	0.9	1094	254	1.36	0.45	0.10	50	12
2002*	LCT	3340	8,090	2.4	16,870	656	1.43	7.22	0.28	616	12
Average return to creel			**2104**	**0.6**	**576**	**450**	**2.42**	**0.40**	**0.33**	**136**	**126**

***2002 values were annualized and are considered closer to the true vakue, but were not included in the averages.**

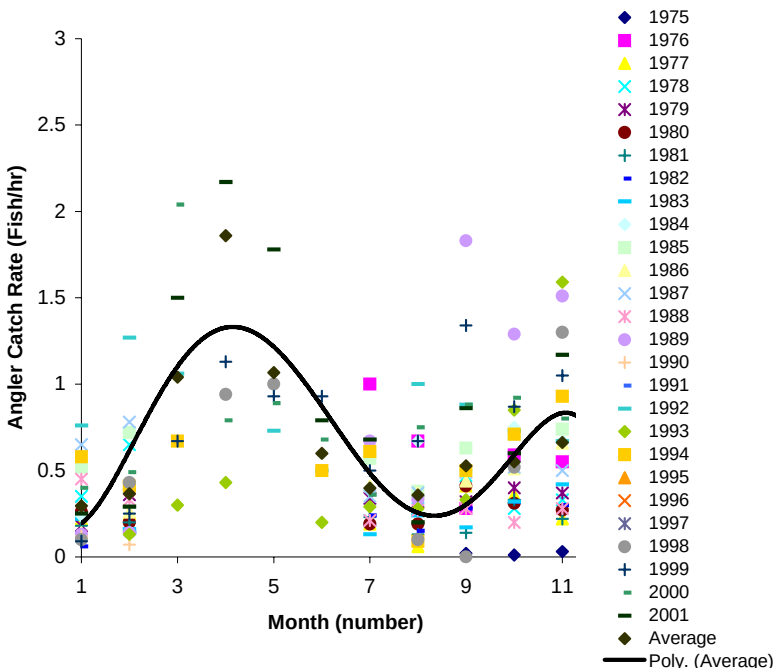
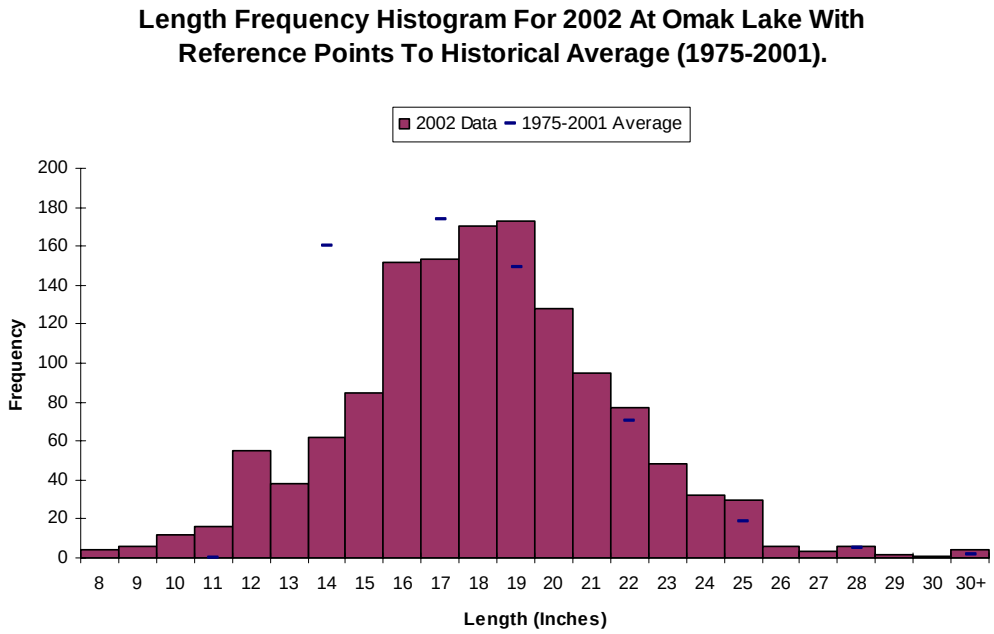


Figure 57: Catch rates by month for Omak Lake based on voluntary creel data collected from 1975-2001.

Fish Life and Management Data

Fish Survey Results					
Year	Equipment Used	Effort	# Caught	Size Range	Species
1953	Several Gillnets	Unknown	0-trout	Suckers, Chubs,	Shiners
1975	Gillnet (6)	333 Hours	140	17-31”	LCT
1978	Gillnet (18)	308 Hours	99	133-635mm	LCT
			431	148-262mm	PMS
			33	155-230mm	BLS
1979	Gillnet (15)	292 Hours	133	221-697mm	LCT
			198	125-250mm	PMS
			74	156-325mm	BLS
1980	Gillnet (15)	322 Hours	123	248-650mm	LCT
			442	106-248mm	PMS
			96	145-298mm	BLS
1981	Gillnet (15)	307 Hours	193	200-708mm	LCT
			218	100-253mm	PMS
			62	167-310mm	BLS
1982	Gillnet (12)	258 Hours	100	305-720mm	LCT
			144	105-270mm	PMS
			42	140-310mm	BLS
1983	Gillnet (12)	307 Hours	96	325-670mm	LCT
			287	100-295mm	PMS

	65	110-325mm	BLS



F ary creel from 2002 catch with references to historic categorized length frequency data collected from1975 to 2001.

Limiting Factors

- Although some limited natural recruitment may occur in streams feeding this lake the extent of suitable spawning habitat for salmonids and the contribution to the population is unknown. No Name Creek and Kartar Creek could potentially be used to enhance natural reproduction or for collecting spawning fish and eggs taken to the Colville Tribal Hatchery for incubation and rearing. However, this lake lacks suitable spawning habitat to sustain this fishery without some annual supplemental stocking.
- Information about this lakes dissolved oxygen profile in winter is lacking.
- Information about this lakes macrophyte, phytoplankton, and zooplankton communities is lacking.
- Understanding the food-web dynamics of this lake could help determine carrying capacity and identify if a growth bottle-neck is limiting the production of larger fish.

Recommendations

1) Omak Lake has been a productive fishery for several years but the trout in this lake appear to be getting more dense and smaller in size. Therefore reduce numbers stocked from 100,000 @ 25/lb to 60,000 annually or 100,000 @ 90/lb.

2) Study the feasibility of creating spawning habitat in Kartar Creek and No Name Creek sufficient to replace current stocking program.
3) Continue to collect brood stock from Omak Lake annually and determine the feasibility of building a brood-stock collection facility on No-name or Kartar Creek.
4) Differentially mark all fish stocked to determine the current amount of natural reproduction that is occurring.
5) Improve signage for regulations and voluntary creel to improve compliance and consider increasing creel limit while protecting fish over 20-inches long.
6) Research zooplankton production and food-web dynamics through a cooperative agreement with Dr. Laurel Saito at the University of Nevada Reno.
7) Monitor and evaluate this fishery as a coldwater fishery.

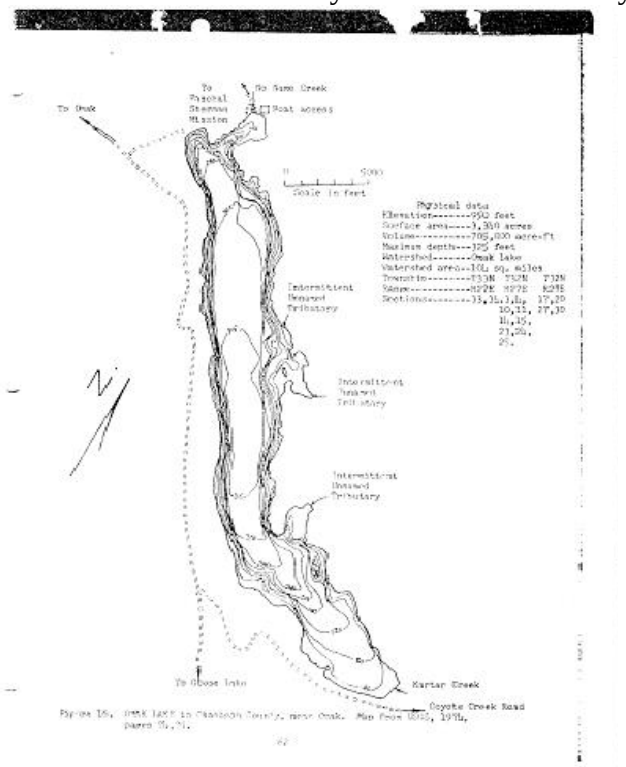


Figure 59: Most recent bathometry map on record for Omak lake.

Owhi Lake **(Map, Figure 63)**

Figure 60: Owhi Lake looking to the north in the summer.

Description

Owhi Lake is a medium sized coldwater lake located in Oakanogan County at T32, 31N, R31E, section 27,34,3 in the Nespelem River drainage of the Upper-Columbia Sub-basin. This lake was originally developed as an irrigation reservoir but today is managed as a recreational and substance fishery for Colville Tribal members. Owhi Lake is the brood source for all brook trout eggs used by the Colville Tribal Hatchery and historically produced up to 10 million eggs commercially sold by the Tribes before the 1947 cooperative agreement with the Washington Department of Game was signed. The intermittent inflow along the northeastern portion is through Owhi Creek. Several springs and a perennial unnamed tributary that flows from Little Owhi Lake enter the north end of Owhi Lake and provide excellent shoreline spawning habitat for brook trout. The outlet is through the Little Nespelem River. Heavy phytoplankton blooms occasionally occur at this lake in July, comprised mainly of *Gloeotrichia echinulata* and in Spetember, composed mainly of *Anabaena flos-aquae*. Zooplankton communities are dominated by cladocerans (*Daphia spp.*) and food habit studies indicate that freshwaters scuds (amphipods) dominated brook trout diets making up 66% of the stomach contents. Crayfish, annelids, and, choronimids were commonly found in trout stomachs. The lake bottom is gravel, clay, and muck. Ceratophyllum demersum L. and Myriophyllum exalbescens are the most common macrophytes in the lake. A great portion of the littoral zone of the lake is not colonized by macrophytes. This is probably due to the frequent algal blooms that tend to shade out the macrophytes. The terrain surrounding the lake is rolling hills covered with mostly conifer forest but on the southern end of the lake sage and bunch grasses dominate the landscape. Access is good by paved road and a boat launch, campsite, and pit toilets are available for Tribal members only. Cattle grazing and timber harvest are the main land uses in this area. This lake is naturally eutrophic so, small increases in nutrient loading tend to produce large algae-blooms that have caused particle summer kills such as occurred in 1967.

Specifications

Attribute	Measure	Attribute	Measure
Elevation	2,566 Feet	Surface Area	500 Acres
Watershed Area	13.2 Miles^2	Volume	21,500acre-feet
Summer Max Temp	74°F	Summer Max Temp @ 15ft	70°F
Winter D.O. @ 15ft	Unknown	Summer D.O. @ 15ft	9.1 ppm
Maximum Depth	77 Feet	Average Depth	44 Feet
Conductivity	170 µmhos/cm	Trophic State	Eutrophic
Natural Reproduction	Nominal	PH (13 year avg.)	7.9
Dominant Substrate	Gravel/clay	Aquatic Vegetation	Nominal
Shoreline Development	Minimal	Dominant Forage	Amphipods
Secchi-disks	4.3 Meters	Land Use Issues	Grazing and timber harvest
Chlorophyll a	8.3 µg/l		
Depth^2 to Surface Area	12:1		

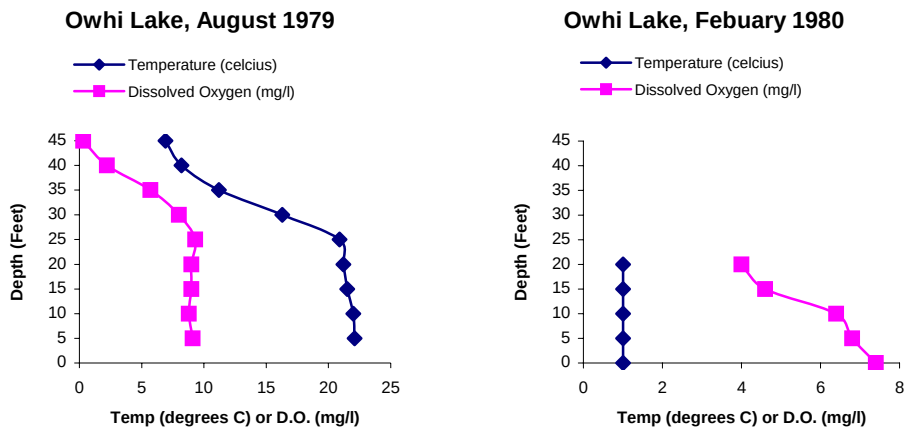


Figure 61: Temperature and oxygen profile from the warmest water temperatures (Left) and coldest water temperatures (right) currently on record.

Stocking History

This lake serves as the brook trout brood-stock for the Colville Tribal Hatchery. Supplemental stocking has occurred since the 1930's but most of the fish are thought to be produced through natural reproduction but this will be verified over the next several years, starting in 2002 all fish stocked will be differentially marked. Stocking records are unknown until 1951 but Washington Department of Game did stock Owhi Lake prior to this date.

Agency (Dates)	Species	Pounds	# of Fish	Size (Fish/Pound)
WDFW (1951-64)	EBT	363	103,251	285
USFWS (1966, 68-76)	EBT	528	84,889	161
Tribe (Winthrop 1977-78, 80-81, 83-89)	EBT	162	29,062	180
Tribal Hatchery (1990-2001)	EBT	889	36,769	41

Fishing History

Owhi Lake is only open to Tribal Members and they mainly fish this lake in the winter. Halfmoon (1977) determined that this lake received about 6,240 man-days of effort per year but he based his estimate on a flat percentage of Tribal Members that fished and not on actual creel data from this lake. Owhi Lake is the most popular Tribal Member only lake on the reservation and has a reputation for producing large brook trout. This fishery is most productive in the winter, early spring and late fall because summer water temperatures force fish to suspend off-shore and many anglers are not equipped for this type of fishing. However, most angling effort is expended during the winter months once ice becomes stable. In 2002, a year-round roving creel is planned to estimate actual angler use.

Year	Hrs. Fished	Total Catch	Avg Fl (mm)	Avg Wt (gr)	ACR (Fish/Hr)	Relative Weight
1977	132	269	12”	N/D	2.04	N/D
1978	120	205	13”	N/D	1.71	N/D
1979	226	99	12”	N/D	0.44	N/D
1980	48	58	14”	N/D	1.32	N/D
1982	39	44	12”	N/D	1.13	N/D
1983	538	730	12”	N/D	1.36	N/D
1984	3542	4994	298	312	1.41	101
1985	2214	2845	285	284	1.29	105
1986	ND	ND	ND	ND	ND	ND
1987	ND	ND	ND	ND	ND	ND
1988	ND	ND	ND	ND	ND	ND
1989	2832	2556	316	416	0.90	112
1990	3046	3561	329	426	1.17	101
AVG.	**2909**	**3489**	**307**	**356**	**1.17**	**105**
1991 *	1086	932	319	433	0.86	113
1992 *	ND	ND	ND	ND	ND	ND
1993 *	4248	2974	365	612	0.70	105
1994 *	5335	4728	361	575	0.89	102
1995 *	1539	1321	383	718	0.86	106
1996 *	1978	2261	379	653	1.14	100
1997 *	4388	3351	370	628	0.76	103
1998*	1067	1197	359	573	1.12	104
1999*	2310	2133	356	533	0.92	99
2000*	2844	6739	334	427	2.37	97
2001*	2275	2099	353	513	0.92	98
AVG.	**3096**	**2595**	**363**	**603**	**1.05**	**106**

ND - No Data Available
* - Hatchery Operation Years

Fish Life and Management Data

Although it is unknown when brook trout were originally introduced into Owhi Lake, it is known that brook trout eggs were being collected by the late 1920's (Marco and Kucera 1981). In 1977, amphipods were introduced from the southwest in the late 1950's and subsequently introduced into North Twin, South Twin, Round, Buffalo, Mcginnis, and Summit Lakes from Owhi Lake. Crayfish were introduced from Arizona in the late 1960's. Average length at age was determined to be 123mm for age-1 fish, 221mm at age-2, 319mm at age-3, and 366mm at age-4 this indicates fast growth for brook trout at Owhi Lake when compared to other lakes (Carlander 1969). No adjustment for length at focus formation (estimated at between 25 and 50mm) was made in the length at age calculations. The length to weight relationship in 1979 for this lake was determined to be:

$$\text{Weight}=7.833^{-6}\text{xLenght}^{3.1023}$$

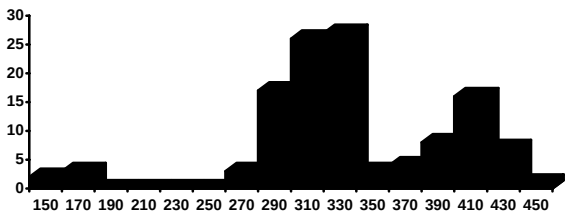


Figure 62: Length frequency histogram from data collected in the summer of 1979.

Fish Survey Results					
Year	Equipment Used	Effort	# Caught	Size Range	Species
1975	Gillnet	30 Hours	17	8-17"	EBT
1976	Gillnet	13 Hours	44	8-14"	EBT
1978	Beach Seine	N/D	106	309-405mm	EBT
1979	Gillnet (6)	109 Hours	110	118-432mm	EBT
1979	Beach Seine	N/D	161	181-450mm	EBT
1980	Gillnet (6)	108 Hours	118	100-441mm	EBT
1980	Beach Seine	N/D	229	277-418mm	EBT
1981	Gillnet (6)	100 Hours	149	6-18"	EBT
1983	Gillnet (3)	64 Hours	127	140-415mm	EBT
1986	Gillnet (3)	55 Hours	53	268-410mm	EBT
1987	Gillnet (2)	39 Hours	15	115-455mm	EBT

Limiting Factors

- This lake has some suitable spawning habitat for salmonids but the contribution to the population is unknown.
- Temperature issues reduce salmonid habitat in this lake during summer periods.

- Heavy algal blooms in the summer due to high phosphate levels have produced particle summer-kills.

Recommendations

1) Nutrient issues in the past have produced large algal blooms. To reduce the soluble phosphate available, iron can be added to Owhi Lake to bind large amounts of naturally occurring phosphate making summer kills less likely to occur. However, algal blooms have not occurred in several years.
2) Continue to stock 30,000 to 50,000 reproductively viable brook trout at between 90 and 25 fish/lb in size. Use differential marks (elastomer tags) to identify fish stocked verses wild fish.
3) Conduct creel survey to determine usage.
4) Monitor and evaluate this fishery as a coldwater fishery.

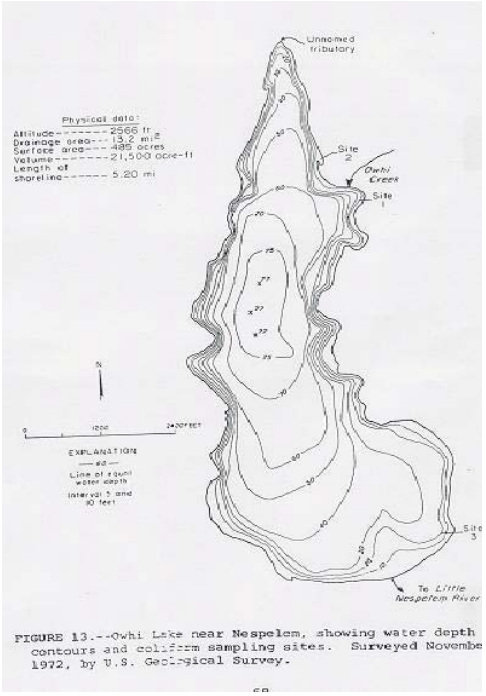


Figure 63: Most recent bathometry map on record for Owhi Lake.

Rebecca Lake **(Map, Figure 64)**

No Picture Available

Description

Rebecca Lake is a small cool-water lake located in Oakanogan County at T30N, R31E, section 32 within the Upper Columbia Sub-basin. This lake was created when a small board dam was placed at the outlet of a permanent wetland raising the water level 4 feet. Prior to the dam installation, this lake was better suited to waterfowl habitat. The

surrounding area is covered by mostly alder, aspen, water birch, sage, and bunch grasses that grow in sandy soils that overlay a boulder substrate. The lake bottom is several feet of silt and detritus and is surrounded by large beds of bulrush and cattails. Several large mats of bulrushes serve as floating islands that move around the lake propelled by the prevailing winds. Rebecca Lake water mostly comes from a perennial spring near the northeast corner. The intermittent outlet flows into Lake Rufus Woods and screened irrigation withdraws for local tribal members divert a small amount of water. Access is good by dirt road and facilities include pit toilets and a boat launch on the west shore. Land use in the area is mostly cattle grazing but the lake has been established as a waterfowl refuge by a Colville Confederated Tribes Business Council resolution.

Specifications

Attribute	Measure	Attribute	Measure
Elevation	1,900 Feet	Surface Area	57 Acres
Watershed Area	131 Miles^2	Volume	192 Acre-feet
Summer Max Temp	70°F	Summer Max Temp @ 5ft	68°F
Winter D.O. @ 15ft	Unknown	Summer D.O. @ 5ft	8.0 ppm
Maximum Depth	7 Feet	Average Depth	Unknown
Conductivity or TDS	Unknown	Trophic State	Eutrophic
Natural Reproduction	Yes	PH (1 year avg.)	6.2
Dominant Substrate	Silt/peat	Aquatic Vegetation	Abundant
Shoreline Development	None	Dominant Forage	PSS
Seechi disk	1.3 Meters	Land Use Issues	Dam
Depth^2 to Surface Area	0.86:1		Permitting

Stocking History

Rebecca Lake was stocked with largemouth bass by the Washington Department of Game, game wardens once in 1957 and again in 1974 but specific information is not available.

Agency (Dates)	Species	Pounds	# of Fish	Size (Fish/Pound)
WDFW (1957, 74)	LMB	N/D	30+	Adult
Tribal Hatchery (1999)	RBT	238	500	2

Fishing History

No creel data is available but local residents support this fishery.

Fish Life and Management Data

Punkinseed sunfish were collected using gillnets in Thiessen (1965). Rebecca lake has been a successful warm-water fishery for several years displaying a population structure of a traditional panfish option fishery. Small largemouth bass at high densities produce

moderate numbers of large pumpkinseed sunfish. No population data has been collected but angler comments support this conclusion. In 2002, fish from this lake were electroshocked and transported to Big Goose Lake to start a new warm-water fishery Legal issues may require the removal of the dam at Rebecca Lake and it is unclear if this lake will ever be refilled.

Fish Survey Results					
Year	Equipment Used	Effort	# Caught	Size Range	Species
1964	Gillnet	38 Hours	4	4”	PSS

Limiting Factors

- Removal of the dam at Rebecca Lake will reduce the lake to less than 4 feet deep and will likely result in no fish surviving the first winter except perhaps brown bullheads.

Recommendations

1) Determine the specifications for the lake after dam removal and look into the possibility of replacing the dam at this lake with the BIA superintendent.
2) Consider dredging the lake to provide added depth improving this lakes temperature and oxygen profile that could possibly allow for a year-round fishery.
3) If the lake retains sufficient depth refugia to support a fishery, conduct lake specification survey and fish survey after the dam is removed.
4) If depths greater than 8 feet exist stock 500 rainbow trout @ 5/lb annually to provide a put-and-take fishery.
5) Monitor and evaluate this fishery for angler use once depth issues are resolved.

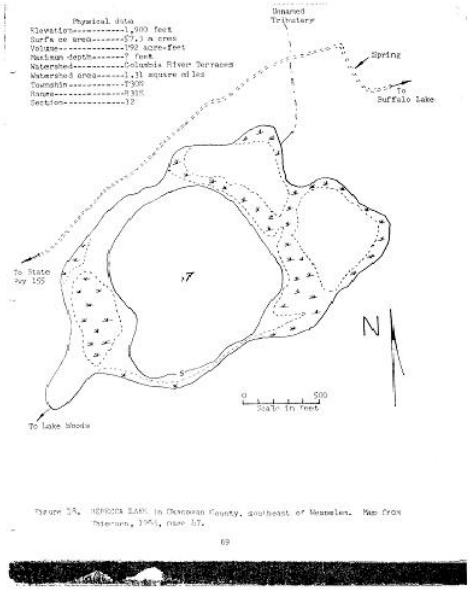


Figure 64: Most recent bathometry map on record for Rebecca Lake.

Round Lake **(Map, Figure 67)**

Figure 65: The Round Lake basin is circular and steep-sided with a flat bottom, typical of a Chara bench lake. The shores of the lake consist of marl precipitated by the abundant growth of Chara. Masses of Chara (a large algal plant) can be seen under water in the photo above.

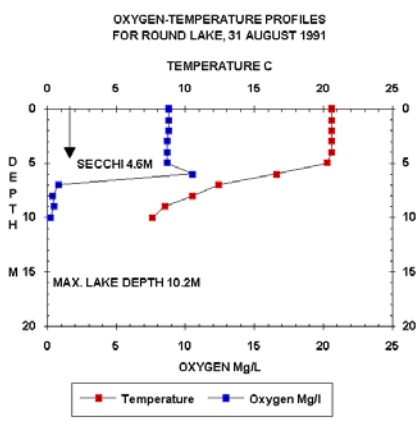
Description

Round is a medium sized coldwater lake located on the north side of moon mountain in Ferry County at T32N, R36E, sections 7 C,D,E in the Cornstalk Creek drainage within the Upper Columbia Sub-basin. The lake is fed by Cornstalk Creek that enters from North Twin Lake through an extensive marsh system on the west side of the lake. The lake is drained from the east by Cornstalk Creek, which then flows to Stranger Creek and ultimately to the Columbia River (Franklin D. Roosevelt Lake). The unscreened inlet and outlet allows for fish migration to and from this lake. Uplands are mostly western larch and Douglas fir and the low shores of Round Lake are predominantly covered with grasses, *Typha* sp., *Scirpus* sp., *Salix* sp., and *Alnus incana*. The emergent vegetation observed at the launch on the north shore included *Sparganium emersum* var. *multipedunculatum* , *Eleocharis palustris*, *megalodonta beckii* (*Bidens cernua*), an unidentified mint, *Equisetum* sp., and *Veronica* sp. The lake is surrounded by a *Typha-Scirpus* band of varying widths parallel to the shore. The band appears to be contiguous with the shoreline vegetation. Some *Potentilla palustris* was present along the south shore in the *Typha-Scirpus* band. Submergent vegetation consists of mostly calcium-encrusted stonewort, Elodea sp., coontail, and bulrushes. Access is good by paved road and pit toilets, boat launch, dock, and campsite are available. Round Lake was closed to non-tribal anglers in 1990 by Colville Business Council Resolution number 1989-439. The Colville Tribes Fish and Wildlife Department attempted to establish a rainbow trout brood stock at this lake for several years but trapping attempts were unsuccessful due to a lack of attracting flows in the spring from Cornstalk Creek and a lack of good gravel.

Specifications

Attribute	Measure	Attribute	Measure

Elevation	2,260 Feet	Surface Area	51 Acres
Watershed Area	5.02 Miles^2	Average Depth	28 Feet?
Maximum Depth	35 Feet	Volume	1,440 Acre-feet
Summer Max Temp	73°F	Summer Max Temp @ 15ft	68°F
Winter D.O. @ 15ft	Unknown	Summer D.O. @ 15ft	7.0 mg/l
Conductivity	270µmhos/cm	Trophic State	Mesotrophic
Natural Reproduction	No	PH (11 year avg.)	7.6
Dominant Substrate	Silt/Sand	Aquatic Vegetation	Some
Shoreline Development	Minimal	Dominant Forage	Invertebrates/BLS
Shoreline Length	7.41 Miles	Secchi-disc	5.6 Meters
Land Use Issues	Water Withdrawls	Chlorophyll a	3.2 µg/l
		Depth^2 to Surface Area	24:1



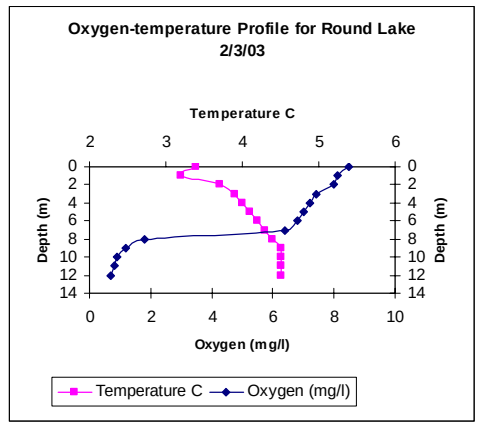


Figure 66: Temperature and oxygen profile from the warmest water temperatures (Left) and coldest water temperatures (Right) currently on record.

Stocking History

Agency (Dates)	Species	Pounds	# of Fish	Size (Fish/Pound)
WDFW (1951-54, 65)	RBT	30	25,290	846
WDFW (1955-64)	EBT	66	20,055	304
USFWS (1967-68, 70-74)	RBT	214	9,555	45
USFWS (1966-67,69-76)	EBT	71	10,641	151
USFWS (1973, 75)	WCT	100	11,992	119
Tribe (Winthrop 1977-78, 80-81, 83-89)	RBT	360	4,998	14
Tribe (Winthrop 1977-89)	EBT	87	10,192	117
Tribe (Winthrop 1977)	WCT	115	7,500	65
Tribal Hatchery (1990-2001)	RBT	363	4,677	13
Tribal Hatchery (1990-2001)	EBT	186	6,498	35

Fishing History

Halfmoon (1977) report 2,000 angler-days of effort occur on this lake annually but this was before Round Lake became open to Tribal Members only. Tribal Member only waters typically receive less fishing pressure compared to those open to the public so this usage is likely less today. Voluntary creel survey data will be collected to determine current angler use starting in spring of 2003.

Year	# Harvested	Hours Fished	# Anglers	Size Range	Fish/hour
1950	121	112	14	N/D	1.08
1951	380	256	32	N/D	1.48
1953	484	280	35	N/D	1.73
1954	698	528	66	N/D	1.32
1955	27	48	6	N/D	0.56
1957	99	480	60	N/D	0.21
1958	240	256	32	N/D	0.94
1959	189	208	26	N/D	0.91
1960	61	40	5	N/D	1.53
1962	173	216	27	N/D	0.80
1963	573	480	60	N/D	1.19
1964	78	128	15	7-18”	0.61
1977	28	8	2	Avg. 12”	3.50
1978	13	4	2	Avg. 12”	3.25

Fish Life and Management Data

Bridgelip suckers and brook trout were known to exist in this lake until 1964 when redside shiners were discovered but they have not been encountered on subsequent surveys. It is believed that redside shiners were introduced by anglers, who used them as bait, but the lack of shoal areas in this lake may have resulted in their extripation.

Fish Survey Results

Year	Equipment Used	Effort	# Caught	Size Range	Species
1964	Gillnet	38 Hours	15	N/D	RSS
1975	Gillnet	21 Hours	37	9-13”	BLS
			2	12-13”	RBT
			3	8-9”	EBT
1977	Gillnet	21 Hours	2	9-11”	EBT
1979	Gillnet	17 Hours	35	150-235mm	BLS
			49	Avg. 100mm	RSS
			8	285-335mm	WCT
			3	253-277mm	Chinook
			1	255mm	EBT
1980	Gillnet	31 Hours	290	Avg. 90mm	RSS
	(June survey)		41	180-225mm	EBT
			1	385mm	WCT
			2	Avg. 220mm	BLS
1980	Gillnet	107 Hours	184	Avg. 95mm	RSS

	(July survey)		54	150-330mm	EBT
			45	150-290mm	BLS
			3	235-270mm	RBT
1996	Merwin Trap	10 nights	202	N/D	RBT

Limiting Factors

- This lake lacks suitable spawning habitat for salmonids so any coldwater fisheries will require annual hatchery stocking. Enhancement options for improving natural reproduction would have a good chance of success at this lake.
- Temperature issues reduce salmonid habitat and access to productive littoral habitats during summer periods.
- Information about this lakes dissolved oxygen profile in winter is lacking.
- Shoreline vegetation has been reduced or eliminated by past land-use practices around most of this lake.

Recommendations

1) Reduce stocking of reproductively viable fish to begin transition to redband trout. Redband trout that are native this area. Their piscivorus nature will allow them to take advantage of the abundant sucker population. Stocking rates should be 20,000 @ 25/lb annually.
2) Planting trees and shrubs along the bank would aid summer water temperature cooling, provide cover for fish, and enhance the esthetics of the lake.
3) Dredging the inlet of Round Lake and confining the cornstalk creek channel allow better attracting flows in the spring for brood stock collection.
4) If this lake is dredged, place pea sized to 2-inch gravels along the banks of the inlet creek.
5) Continue voluntary creel and monitor compliance to expand results to total angler use.
6) Monitor and evaluate this lake as a coldwater fishery every three years.

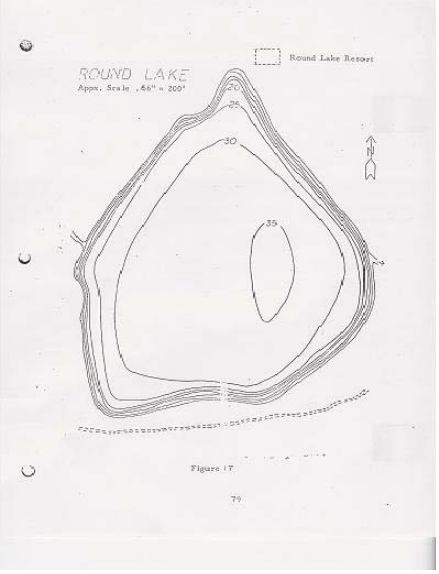


Figure 67: Most recent bathometry map on record for Round Lake.

Simpson Lakes

Simpson lakes are a series of wetlands to the east of Lafluer Lakes however these lakes are smaller and represent a group of waters with little fisheries value. Carry-over fisheries in these lakes are unlikely to be successful due to; shallow depths, small size, a lack of flushing flows, and the presence of cyanobacteria that produce hydrogen sulfide gas. The presence of these bacteria indicates that anoxic conditions are chronic. Persistent low dissolved oxygen levels are common in lakes that are in the latter successional stages, like the Simpson Lakes. **These wetlands are better suited to supporting waterfowl, amphibians, and turtle than fish.**

Little Simpson Lake

No Picture available

Description

Little Simpson Lake is a shallow marsh located in Ferry County at T34N, R36E, section 27 in the Little Jim Creek drainage within the Upper-Columbia Sub-basin. This is the Northernmost lake in the Simpson Lakes group. Cliffs, rock outcroppings, and several dead trees make this an attractive little lake, uplands are covered by western larch, Douglas fir and yellow pine. Stonewort (*Chara sp.*) and sago pondweed (*potamogeton pectinatus*) dominate the aquatic plant community but common cattail (*Typha latifolia*), american bulrush (*Scirpus americanus*) are also common. Unimproved dirt roads provide limited access to this lake but access to the open water of the lake is extremely difficult. The shallowness of the lake and warm summer temperatures make this lake better waterfowl habitat than fish habitat. Little Simpson Lake has little fisheries potential.

Specifications

Attribute	Measure	Attribute	Measure
Elevation	2,250? feet	Surface Area	2 ± Acres
Watershed Area	Unknown	Volume	Unknown
Summer Max Temp	74°F	Summer Max Temp @ 3ft	72°F
Winter D.O. @ 15ft	Unknown	Summer D.O. @ Surface	11 ppm
Maximum Depth	4 Feet	Average Depth	Unknown
Conductivity or TDS	Unknown	Trophic State	Eutrophic
Natural Reproduction	Unknown	PH or Alkalinity	9.2
Dominant Substrate	Unknown	Aquatic Vegetation	Abundant
Shoreline Development	None	Dominant Forage	Vegetation
		Land Use Issues	None

Stocking History
This Lake has no stocking record.

Fishing History
This lake has no fishing history.

Fish Life and Management Data

Fish Survey Results					
Year	Equipment Used	Effort	# Caught	Size Range	Species
1976	Gillnet	24 Hours	0	N/A	N/A

Limiting Factors

- A complete lack of data on this lake makes limiting factor impossible to establish.

Recommendations

1) Do nothing, this lake is not well suited to fisheries development.

Lower Simpson Lake

No Picture available

Description

Lower Simpson Lake is a shallow marsh located in Ferry County at T34N, R36E, section 35 in the Little Jim Creek drainage within the Upper-Columbia Sub-basin. This lake located just downstream of Upper Simpson Lake and is connected in the spring by the upper lakes outlet. Lower Simpson Lake becomes choked with weed growth and develops large mats of green and blue-green algae in the summer months. Stonewort

(*Chara sp.*) and sago pondweed (*potamogeton pectinatus*) dominate the aquatic plant community but common cattail (*Typha latifolia*), and duckweed (*Spirodela sp.*) are also common, uplands are covered by western larch, Douglas fir and yellow pine. A fair dirt road around Upper Simpson Lake provides access to this lakes outlet but a short hike is required to reach Lower Simpson Lake. The shallowness of the lake and warm summer temperatures make this lake better waterfowl habitat than fish habitat. Lower Simpson Lake has no fisheries potential.

Specifications

Attribute	Measure	Attribute	Measure
Elevation	2,250? feet	Surface Area	1 ± Acres
Watershed Area	Unknown	Volume	Unknown
Summer Max Temp	74°F	Summer Max Temp @ 3ft	72°F
Winter D.O. @ 15ft	Unknown	Summer D.O. @ Surface	10 ppm
Maximum Depth	4 Feet	Average Depth	3 Feet
Conductivity or TDS	Unknown	Trophic State	Eutrophic
Natural Reproduction	Unknown	PH or Alkalinity	9.2
Dominant Substrate	Unknown	Aquatic Vegetation	Abundant
Shoreline Development	None	Dominant Forage	Vegetation
		Land Use Issues	None

Stocking History
This Lake has no stocking record.

Fishing History
This lake has no fishing history.

Fish Life and Management Data

Bullheads were observed by a YCC crew working on the lake in 1976 (Yuska 1976).

Fish Survey Results

Year	Equipment Used	Effort	# Caught	Size Range	Species
1976	Gillnet	24 Hours	0	N/A	N/A

Limiting Factors

- A complete lack of data on this lake makes limiting factor impossible to establish.

Recommendations

1) Do nothing, this lake is not well suited to fisheries development.

Upper Simpson Lake or Simpson Lake (Map, Figure 69)

No Picture Available

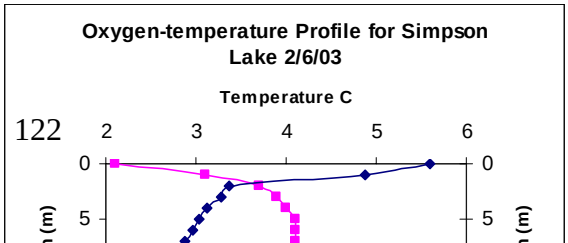
Description

The largest of a series of three lakes collectively called the Simpson Lakes this lake has been referred to as Upper Simpson Lake but is most commonly called Simpson Lake because it is the only lake has historically provided a fishery and most maps only indicate this one lake. Simpson Lake has been managed as a tribal member only fishery located in Ferry County at T34N, R36E, section 34, and 35 in the Little Jim Creek drainage within the Upper-Columbia Sub-basin. The main source of water is snowmelt that slowly filters through the Simpson Lake Basin before entering the intermittent Little Jim Creek. Stonewort (*Chara sp.*) is dominant but pondweeds (*potamogeton spp.*), smartweed (*Polygonium sp.*), cattail (*Typha latifolia*), and duckweed (*Spirodela sp.*) are common among the aquatic plant community, uplands are covered by western larch, Douglas fir and yellow pine. Access to the lake is fair by dirt road and the Tribes maintain a picnic area, boat launch, dock, pit toilets, and campground for tribal members use only. The access road provides access to over half of the lake. A culvert and road crossing at the outlet has increased the surface area of the lake from 16-22 acres and increased the lakes depth by 2 feet. Simpson Lake has been managed as the Inchelium area brook trout only fishery for several years. A history of winterkills such as occurred in 1963 required that the Colville Tribes Fish and Wildlife Department staff monitor this lake each spring to determine severity and extent of winterkills. The last several years stockings have not produced a fishery due to complete winter and partial summer kills of trout stocked in this lake.

Specifications

Hydrogen sulfide gas is present at a depth of 35 feet to the bottom of this lake. The presence of this gas and extremely low winter dissolved oxygen levels make this lake unsuitable habitat for trout survival. A put-and-take fishery could be supported but at present only catchable sized rainbow trout are available from the Colville Tribal Trout Hatchery.

Attribute	Measure	Attribute	Measure
Elevation	2,250 Feet	Surface Area (all lakes)	22 Acres
Watershed Area	0.81 Miles^2	Volume	213 Acre-feet
Summer Max Temp	73°F	Summer Max Temp @ 15ft	67°F
Winter D.O. @ 15ft	Low	Summer D.O. @ 15ft	5.5 ppm
Maximum Depth	40 Feet	Average Depth	Unknown
Conductivity	188µmhos/cm	Trophic State	Mesotrophic
Natural Reproduction	No	PH (3 year avg.)	7.8
Dominant Substrate	Unknown	Aquatic Vegetation	Abundant
Shoreline Development	None	Dominant Forage	Inverebrates/RSS?
Secchi-disc	5.0 Meters	Land Use Issues	Roads
Chlorophyll a	Unknown	Depth^2 to Surface Area	73:1



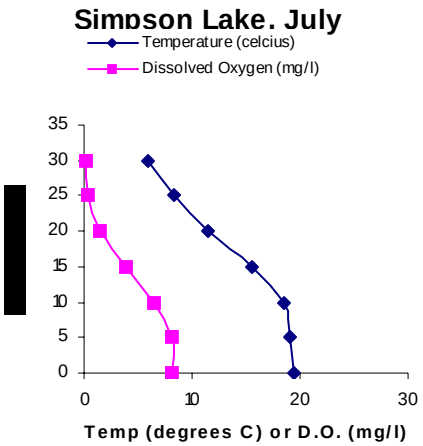


Figure 68: The temperature and dissolved oxygen profile from the warmest summer water temperature (Left) and the coldest water temperature on record.

Stocking History

Agency (Dates)	Species	Pounds	# of Fish	Size (Fish/Pound)
WDFW (1950, 52-55, 65)	RBT	16	10,783	654
WDFW (1959-63)	EBT	22	5,556	253
USFWS (1969-75)	RBT	37	3,457	93
USFWS (1966-67,69-76)	EBT	52	8,204	157
Tribe (Winthrop 1977, 79-89)	EBT	66	5,266	80
Tribal Hatchery (1990-98, 2000-01)	EBT	242	6,001	25

Fishing History

Halfmoon (1974) estimated that Tribal member use of this fishery was approximately 600 angler days per year but this estimate was based on a 1-day creel in August 1974. Anglers caught 2-rainbow trout, and 5-brook trout. One-day creel data was also collected in 1953, 1977, and 1978. No other creel data exists. A voluntary creel maybe started in 2003-2004. Local anglers started reporting poor catch rates in the late 1990's and current usage of this fishery is reported to be very low.

Year	# Harvested	Hours Fished	# Anglers	Size Range	Fish/hour
1953	18	N/D	5	N/D	N/D
1974	7	10	3	13-16"	0.70
1977	2	2	2	12-19"	1.0
1978	7	4	2	Avg. 18"	1.75

Fish Life and Management Data

In 1956, Simpson Lake had a catfish population so dense that competition between them and rainbow trout was high and Simpson Lake was slated for rehabilitation however, no records on treatment could be found. Population surveys since 1964 indicate that Simpson Lake was successfully rehabilitated for bullhead infestation probably using rotenone in the late 1950's. The dip-netting conducted in 1979 were fish collected when the Fish and Wildlife Department responded to a possible winter kill. Several fish examined for stomach contents in 1981 had white cysts on their kidneys which indicates that these fish were infected with BKD. The 1987 sampling indicated that a complete fish kill had occurred in 1986 or 1987. Length frequency data indicates that little or no natural reproduction is occurring at this lake. No redside shinners (RSS) have been collected since 1988 but crawfish started to appear at the same time. A survey of this lake is scheduled for 2002.

Fish Survey Results

Year	Equipment Used	Effort	# Caught	Size Range	Species
1964	Gillnet	86 Hours	1	6"	EBT
1975	Gillnet	14 Hours	7	8-16"	RBT
1976	Gillnet	24 Hours	6	14-19"	RBT
			1	10"	EBT
1977	Gillnet	21 Hours	7	10-13"	EBT
1979	Dip-net	N/D	4	250-350mm	EBT
1979	Gillnet	15 Hours	4	300-335mm	EBT
1981	Gillnet	76 hours	54	222-325mm	EBT
			19	Avg. 110mm	RSS
1983	Gillnet	25 Hours	27	210-362mm	EBT
			129	Avg. 102mm	RSS
1987	Gillnet	34 Hours	2	N/D	RSS
1988	Gillnet	26 Hours	15	175-430mm	EBT
1989	Gillnet	18 Hours	2	280-300mm	EBT

Limiting Factors

- This lake lacks suitable spawning habitat for salmonids so any coldwater fisheries will require annual hatchery stocking.
- The lack of flushing flows, a high Depth^2 to Surface Area ratio, high biological oxygen demand, and presence of hydrogen sulfide gas make dissolved oxygen during winter months limiting for salmonids.
- Temperature issues reduce salmonid habitat in this lake during summer periods.
- Possible disease issues at this lake need to be investigated.
- The abundance and growth of fish has been declining for the last 20 years and habitat conditions have deteriorated to the point that sustaining a fishery at this lake is biological no longer viable. However, if a fishery is desired in the future then a put-and-take fishery can continue to exist by stocking catchable rainbow trout at a rate of 1,100 fish at 5/lb.

Recommendations

1) This important fishery has deteriorated in recent years and habitat improvements are unlikely to succeed therefore, stock 1,100 rainbow trout @ 5/lb in the spring to provide a put-and-take fishery.
2) Do nothing and manage this lake for waterfowl, amphibian, and turles.

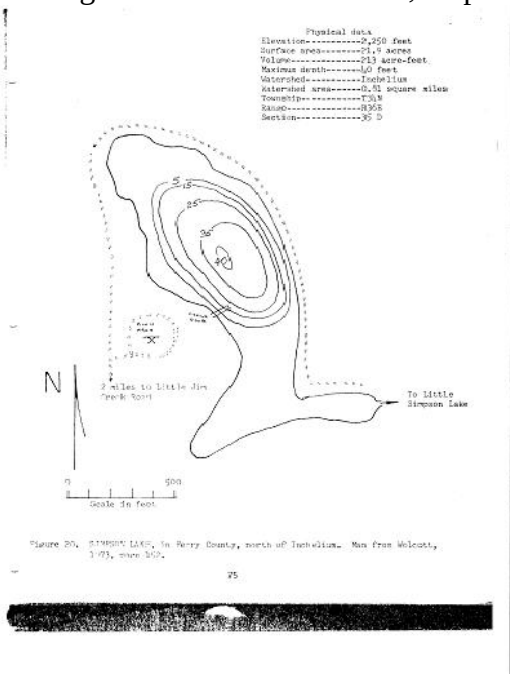


Figure 69: Most recent bathometry map on record for Simpson Lake.

Soap Lake **(Map, Figure 71)**

Figure 70: The highly alkaline waters of Soap Water are toxic to most biological life.

Description

Soap Lake is a medium sized, highly alkaline lake that supports little or no life and is located in Oakanogan County at T32N, R25E, section 35 in the Omak Lake drainage

within the Oakanogan River Sub-basin. Three intermittent unnamed tributaries serve as inlets to this closed-basin lake most water exits this lake as evaporation, concentrating the salts and minerals. Ditch grass (*Ruppia sp.*) and some other salt tolerant species of plant are all that grow sparsely around this lake. The terrain is rolling hills covered in bunch grasses and sage with basalt rock outcroppings scattered about the landscape. Soils are alkaline and clay providing ideal conditions for highly alkaline potholes of varying sizes and depths that are common in this semi-arid area. Access to the lake is fair by dirt road and no facilities are available. Soap Lake is extremely clear and light penetrates to the bottom producing a considerable solar energy sink that makes the lake very warm in the summer. No native freshwater fish or game fish species could survive the environment present at this lake.

Specifications

Hydrogen Sulfide gas (4,000 mg/l) is present below 40 feet.

Attribute	Measure	Attribute	Measure
Elevation	1,169 feet	Surface Area	154 Acres
Watershed Area	16.1 Miles^2	Volume	5,240 Acre-feet
Summer Max Temp	68°F	Summer Max Temp @ 15ft	72°F
Winter D.O. @ 15ft	Unknown	Summer D.O. @ 15 ft	8 mg/l
Maximum Depth	57 Feet	Average Depth	34 Feet
Conductivity(μmhos/cm)	55k-28,500	Trophic State	Highly Oligotrophic
Natural Reproduction	Unknown	PH or Alkalinity	Unknown
Dominant Substrate	Unknown	Aquatic Vegetation	Minimal
Shoreline Development	None	Dominant Forage	None
Chlorophyll a	1.4 μg/l	Seechi Disk	10.2 Meters
Shoreline Length	2.55 miles	Land Use Issues	None

Stocking History

This Lake has only one recorded stocking. In May of 1956, the Washington Department of Game planted 10,500-rainbow trout at 175-fish per pound from the Omak Hatchery. No fish were ever reported caught from this stocking.

Fishing History

This lake has no fishing history.

Fish Life and Management Data

Soap Lake has no fish life and is not managed as a fishery.

Limiting Factors

- This lake is limited by high alkalinity and this situation is not likely to change.
- This lake is limited by the presence of hydrogen sulfide gas.

Recommendations

1) Do nothing, this lake has no fisheries potential.

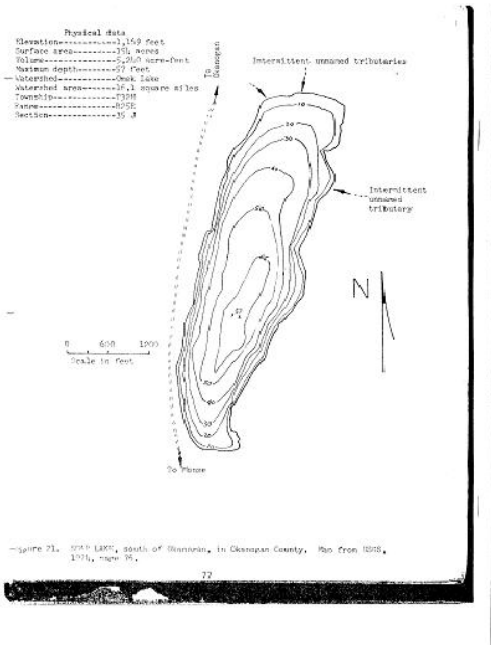


Figure 71: Most recent bathometry map on record for Soap Lake.

South Twin Lake (Map, Figure 74)

Figure 72: View of channel connecting North Twin and South Twin Lakes taken in the fall of 1995.

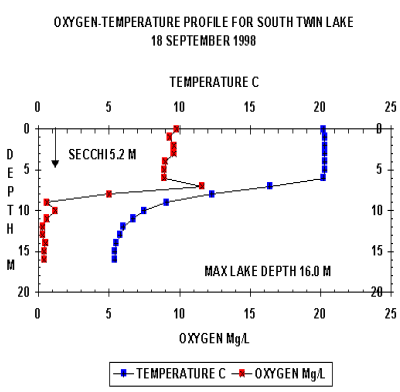
Description

South Twin Lake is the Second largest coldwater lake on the Colville Reservation and is located in Ferry County at T32N, R35E, sections 15,16,21,22, and 23 in the Stranger Creek drainage within the Upper Columbia Sub-basin. Several intermittent unnamed tributaries enter from the south and a channel between North Twin Lake enters from the north and serves as the outlet to Stranger Creek. This channel, inundated in 1932 when a

stop board dam was built on the Stranger Creek outlet that raise the lake level 8 feet, a rotating drum screened overflow spillway is present along the eastern bank that also flows to Stranger Creek. Locals commonly refer to both lakes as "twin lakes". The surrounding terrain is rolling mountains, covered by western larch, Douglas fir, and ponderosa pine. Uplands support timber harvest and low-land use is agriculture. Lake bottom is mostly silt and detritus however gravels and boulders are common along the shoreline and around the influent area at the southern end of the lake but this area is becoming overgrown with submergent vegetation. Dominate vegetation includes: water milfoil, coontail, waterweed, and pondweed. Access is excellent by paved highway, resorts and many summer cabins are located around South Twin Lake along with supplies, boat rental, restrooms, lodging, gas, boat ramps, docks, picnic areas, swimming beach, and campsites mostly along the eastern shoreline.

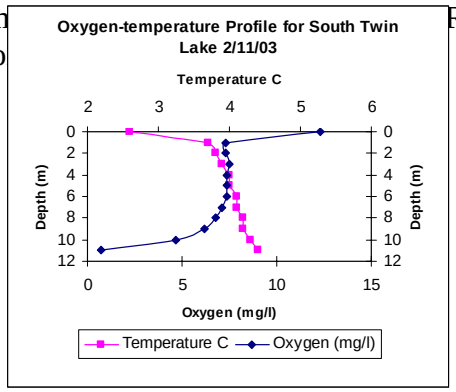
Specifications

Attribute	Measure	Attribute	Measure
Elevation	2,572 Feet	Surface Area	1,020 Acres
Watershed Area?	3.69 Miles^2	Average Depth	32 Feet
Maximum Depth	57 Feet	Summer Max Temp @ 20ft	62°F
Summer Max Temp	75°F	Summer D.O. @ 20ft	10.0 mg/l
Winter D.O. @ 20ft	Unknown	Trophic State	Mesotrophic
Conductivity	87 µmhos/cm	PH (9 year avg.)	7.6
Natural Reproduction	Moderate	Aquatic Vegetation	Nominal
Dominant Substrate	Silt/Gravel	Dominant Forage	Unknown
Shoreline Development	Moderate	Secchi-disc	5.5 Meters
Shoreline Length	6.41 Miles	Chlorophyll a	5.6 µg/l
Land Use Issues	Development	Volume	34,200 Acre-feet



Depth^2 to Surface area	3.2:1	

Figure 73: Temperature and Oxygen profile from [illegible] Right) and coldest water temperatures (Left) currently o[illegible]



Stocking History

South Twin Lake has been extensively managed using hatchery trout. Several non-native fish species have been stocked illegally by anglers including; largemouth bass, pumpkinseed sunfish, goldfish, and fathead minnows.

Agency (Dates)	Species	Pounds	# of Fish	Size (Fish/Pound)
WDFW (1946-65)	RBT	658	412,813	627
WDFW (1948, 51-54, 62)	EBT	72	95,183	1,313
WDFW (1959)	WCT	267	85,300	320
USFWS (1966-76)	RBT	2,217	103,548	47
USFWS (1966-67,69-76)	EBT	1,234	93,956	76
Tribe (Winthrop 1977, 79-89)	RBT	1,368	60,766	60
Tribe (Winthrop 1977, 79-89)	EBT	669	68,516	102
Tribal Hatchery (1990-2001)	RBT	965	71,299	74
Tribal Hatchery (1990-2000)	EBT	1,278	91,083	71

Fishing History

South Twin Lake is the most popular fishery on the Colville Reservation and angler usage in the 1970's was around 25,000 angler-days per year and average catch rate estimates were around 0.75 trout per hour with the majority of these trout between 10 and 16 inches in length. The annual yield of 55,600 trout as estimated by Halfmoon (1977). By 1985, these estimates had been lowered to 16,368 angler-days with anglers experiencing a catch rate of 0.54 fish per hour for trout that averaged 12.4 inches in length. In 1987 angler effort was reported as 18,588 angler days for trout that averaged 11 inches long at a catch rate of 0.85 fish per hour. Annual harvest was estimated at 23,307 rainbow trout, 2,645 largemouth bass, and 256 eastern brook trout. South Twin Lake provides fishing opportunities for rainbow trout, brook trout, largemouth bass, and pumpkinseed sunfish, however only salmonids have been included in creel data to date. Anglers illegally introduced pumpkinseed sunfish and largemouth bass from nearby lakes in the 1980's and both populations are naturally reproducing in South Twin Lake. Some anglers do target largemouth bass at this lake but there harvest has little impact on this population. From 1978 to 2000, creel data was compiled for both North and South Twin Lakes and treated as one lake. Creel data were then divided between rainbow trout and brook trout. For the purposes of this report brook trout data is provided under North Twin Lake and rainbow trout data will be displayed under South Twin Lake even though both lakes contain populations of both species.

Year	# Harvested	Hours Fished	# Anglers	Size Range	Fish/hour
1964	909	2,912	364	7"-22"	0.31
1974	318	351	129	10-19"	0.90
1977	7	15	5	10-16"	0.47

Rainbow trout creel data from both North and South Twin Lakes.

Year	Hrs. Fished	RBT Catch	AVG. Fl (mm)	AVG. Wt (gr)	ACR Fish/Hr.	Relative Weight

1978	55,653	26,526	274	278	0.48	129
1979	81,124	24,094	279	277	0.30	122
1980	64,323	48,158	269	297	0.75	146
1981	55,528	35,617	296	384	0.64	141
1982	57,659	28,338	303	388	0.49	133
1983	45,173	28,655	287	343	0.63	138
1984	51,614	22,916	305	415	0.44	139
1985	44,760	14,766	308	427	0.33	139
1986	42,893	11,873	304	479	0.28	162
1987	47,676	38,812	274	297	0.81	138
1988	52,571	39,072	293	369	0.74	140
1989	39,019	25,520	299	387	0.65	138
1990	47,929	19,316	320	444	0.40	129
AVG.	**52,763**	**27,974**	**293**	**368**	**0.533**	**139**
1991*	40,411	18,967	300	374	0.47	132
1992*	40,452	29,896	286	319	0.66	130
1993*	60,110	26,077	300	352	0.43	124
1994*	91,928	32,912	304	391	0.36	132
1995*	74,411	28,996	283	295	0.39	124
1996*	29,611	10,940	317	412	0.37	123
1997 *	20,930	9,094	308	358	0.44	116
1998*	13,187	29,252	310	381	0.45	122
1999*	34,825	17,411	325	436	0.50	121
2000*	32,470	18,442	310	390	0.57	124
AVG.	**43,834**	**22,199**	**304**	**371**	**0.452**	**125**

North and South Twin Lakes rainbow trout return to creel data.

Year	Species	Acres	lbs stocked	lbs/ac.	Harvest	Avg. Size	lbs.Harvested/ac.	% return
1991	RBT	1937	23871	12.3	18967	0.82	8.1	66
1992	RBT	1937	31857	16.4	29896	0.70	10.9	66
1993	RBT	1937	15606	8.1	26077	0.78	10.4	130
1994	RBT	1937	17516	9.0	32912	0.86	14.6	162
1995	RBT	1937	18590	9.6	28996	0.65	9.7	101
1996	RBT	1937	22527	11.6	10940	0.91	5.1	44
1997	RBT	1937	16431	8.5	9094	0.79	3.7	44
1998	RBT	1937	25703	13.3	29252	0.84	12.7	96
1999	RBT	1937	30029	15.5	17411	0.96	8.6	56
2000	RBT	1937	30029	15.5	18442	0.86	8.2	53
Annual return to creel averages			**22459**	**11.6**	**22616**	**0.81**	**9.3**	**85**

Fish Life and Management Data

The initial survey of this lake was conducted before 1940 and rainbow trout, brook trout, and bridgelip suckers were collected (Theisen 1965). Around 1940 redside shiners (*Richardsonius balteatus*) were introduced by anglers and the expansion of these shiners

caused a decline in the numbers of brook trout caught by anglers to around 5% (Theisen 1965). However, gillnet surveys conducted by Halfmoon in the mid 1970's failed to document a single redside shiner. Anglers illegally introduced pumpkinseed sunfish and largemouth bass from nearby lakes in the 1980's and both populations are naturally reproducing in South Twin Lake. In the 1980's fathead minnows were introduced by bass anglers that used them for bait and their numbers began to increase, Recently reports of goldfish were verified in Mallard Bay a very shallow backwater area adjacent to South Twin Lake it is believed these fish were also introduced by bass anglers.

Fish Survey Results

Year	Equipment Used	Effort	# Caught	Size Range	Species
1975	Gillnet	15 Hours	4	12-16"	RBT
			8	9-15"	EBT
			5	9-14"	BLS
1979	Gillnet (6)	90 Hours	21	150-420mm	RBT
			7	97-464mm	EBT
			86	155-365mm	BLS
			178	80-132mm	RSS
1980	Gillnet (6)	116 Hours	26	136-358mm	RBT
			50	100-395mm	EBT
			122	104-355mm	BLS
			309	90-114mm	RSS
1981	Gillnet (8)	137 Hours	41	145-500mm	RBT
			69	105-365mm	EBT
			212	180-372mm	BLS
			138	90-120mm	RSS
			1	100mm	GF
1981	Backpack EF	N/D	9	165-230mm	GF
1985	Gillnet	22 net-nights	91	115-405mm	RBT
			461	140-430mm	EBT
			103	125-355mm	LMB
			211	170-400mm	BLS
			19	170-360mm	COS
			1,223	80-150mm	RSS
1986	Night EF	2 Hours	156	47-256mm	LMB
1987	Gillnet (2)	34 Hours	19	260-470mm	RBT
			4	260-420mm	EBT
			25	110-250mm	LMB
			15	300-390mm	BLS
1998	Gillnet	95 Hours	71	9-16"	RBT
			57	5-17"	EBT
			24	4-9"	LMB
			2	13-16"	BLS
1999	Gillnet	38 Hours	57	4-16"	RBT
			30	8-17"	EBT

			15	6-13”	LMB
			8	5-8”	Gold fish
			3	15”	BLS
2000	Gillnet	57 Hours	14	7-12”	RBT
			13	9-15”	EBT
			5	8-11”	LMB
			17	4-8”	No ID

Percentage of fish collected by species from gillnet surveys on North and South Twin Lakes.

Date	Total fish Caught	# BKT	Percent of Catch	# RBT	Percent of Catch	# LMB	Percent of Catch
Jun-94	150	141	94%	9	6%	ND	ND
Jun-95	363	187	52%	176	48%	ND	ND
Jun-96	114	79	69%	35	31%	ND	ND
Jun-97	0	0	ND	0	ND	ND	ND
Jun-98	373	179	48%	166	45%	28	8%
Jun-99	179	73	41%	90	50%	16	9%
Jun-00	195	63	32%	115	59%	17	9%
Avg.	**196**	**103**	**56%**	**84**	**40%**	**20**	**8%**

Limiting Factors

- Although some limited natural recruitment may occur in streams feeding this lake the extent of suitable spawning habitat for salmonids and the contribution to the population is unknown. However, this lake lacks suitable spawning habitat to sustain this fishery without annual supplemental hatchery stocking.
- Competitive pressures from introduced species (LMB, PSS) may limit salmonid survival and growth.
- Temperature issues reduce salmonid habitat in this lake during summer periods.

Recommendations

1) Reduce or eliminate stocking fish smaller than 25/lb into this lake because of poor survival and abundant predators and competitors.
2) Determine the population of largemouth bass, redside shinners, pumpkinseeds, and golden shiners(?) then adjust stocking sizes of redband/rainbow trout and triploid rainbow trout accordingly. Stock only triploid rainbow trout until redband trout are available from a hatchery source. Remove all largemouth bass and pumpkinseed sunfish collected during lake surveys and release into Fish Lake or other local warm water fishery.
3) Develop a multidisciplinary team of natural resource departments to develop a cooperative management plan for monitoring, conservation, and development of this important resource.

4) Determine if natural reproduction is occurring by differentially marking all fish planted into this lake and survey all inlets for suitable spawning habitat consider mechanical treatment of aquatic plants near the south-end tributaries.
5) Monitor and evaluate the success of this lake as a coldwater fishery every three to five years since good baseline data already exists for this lake.

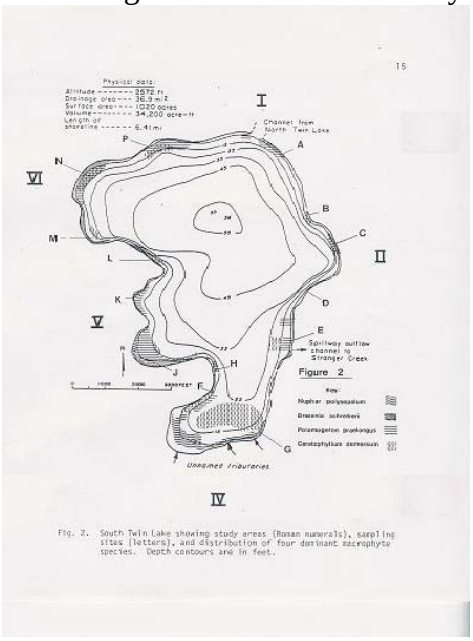


Figure 74: Most recent bathometry map on record for South Twin Lake.

Sugar Lake **(Map, Figure 77)**

Figure 75: Sugar lake at mid-summer showing shallow chara bench that restricts salmonid habitat during summer and winter to only the deep center portion of this lake.

Description

Sugar Lake is a small marginal coldwater lake located in Ferry County at T34N, R36E, section 15 on Brush Mountain at the northern-end of Rainy Ridge within the Barnaby Creek drainage that is in the Upper-Columbia Sub-basin. The inflow is mostly from snowmelt outlet information is believed to be intermittently through Barnaby Creek. The

lake has a history of winterkills. Sugar Lake is surrounded by forest that includes *Alnus* sp., *Betula papyrifera*, *Larix occidentalis*, *Pinus ponderosa*, *Pseudotsuga menziesii*, *Acer glabrum*, *Cornus stolonifera*, *Philadelphus lewisii*, *Symphoricarpus albus*, and *Rosa* sp. Along the shore *Eleocharis palustris*, *Sagittariacuneata*, and *Mentha arvensis* were found in addition to various grasses. Macrophytes observed include *Chara*, *Potamogeton* sp., *Ceratophyllum demersum*, and *Eleocharis* sp. *Scirpus* sp. and *Typha* sp. The lake basin contains many old drowned trees that appear to have been flooded as the result of the construction of a beaver dam quite some time ago. The old fence line on the northern side of the lake corresponds to the northern and eastern portion of the Chara bench encircling the deep part of the lake basin. Access is difficult by a steep unmarked dirt road from Barnaby Creek road and is problematic when it rains. Land use is mainly for livestock grazing but the bog-like area surrounding the lake keeps cow from damaging the shoreline. No facilities are available at this lake.

Specifications

Attribute	Measure	Attribute	Measure
Elevation	2,504 Feet	Surface Area	4 acres
Watershed Area	Unknown	Volume	28 Acre-Feet
Summer Max Temp	73°F	Summer Max Temp @ 15ft	65°F
Winter D.O. @ 15ft	2.7 mg/l	Summer D.O. @ 15ft	1.9 mg/l
Maximum Depth	31 Feet	Average Depth	7 Feet
Conductivity	501 µmhos/cm	Trophic State	Mesotrophic
Natural Reproduction	None	PH (3 year avg.)	7.8
Dominant Substrate	Silt	Aquatic Vegetation	Abundant
Shoreline Development	None	Dominant Forage	Zooplankton
Secchi-disks	3.9 Meters	Land Use Issues	Grazing and Roads
Chlorophyll a	Unknown		
Depth^2 to Surface Area	240:1		

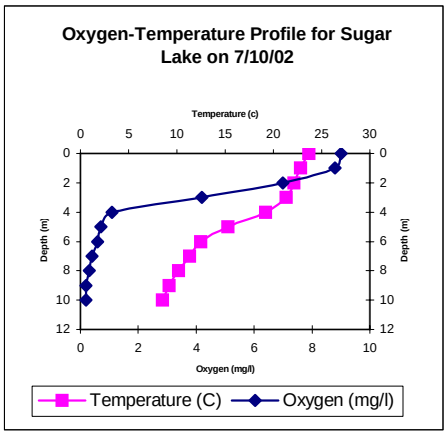
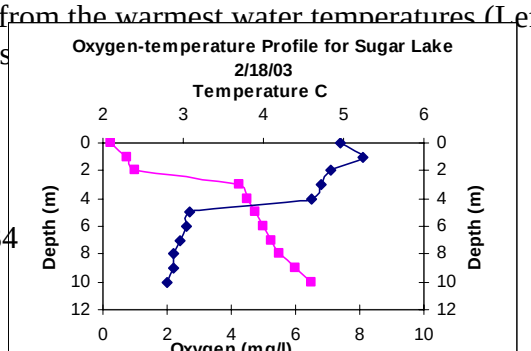


Figure 76: Temperature and Oxygen profile from the warmest water temperatures (Left) and coldest water temperatures



Stocking History

Agency (Dates)	Species	Pounds	# of Fish	Size (Fish/Pound)
USFWS (1971-76)	EBT	30	2,622	88
USFWS (1970, 73)	WCT	26	3,844	146
Tribe (Winthrop 1983-89)	RBT	232	1,059	5
Tribal Hatchery (1991-95, 97-2001)	RBT	212	954	5

Fishing History

Federal stocking was curtailed in 1971 and 1972 due to lack of eggs at the hatchery for westslope cutthroat trout then again in 1975 because fall water temperatures were considered to high for survival but this value was not quantified. In 1975, the USFWs curtailed stocking until angler use and limnological data were collected so that this fishery could be properly assessed. With the Completion of the Colville Tribal Hatchery, in 1991, and annually since 1993 Sugar Lake has been stocked as a put-and-take fishery however, occasionally fish do carrier over from one year to the next although most years the lake does winterkill. A lack of data does make management of this fishery difficult. No creel data is available for this lake.

Fish Life and Management Data

No data has been colleted for this lake.

Fish Survey Results					
Year	Equipment Used	Effort	# Caught	Size Range	Species
N/A	N/A	N/A	N/A	N/A	N/A

Limiting Factors

- This lake lacks any suitable spawning habitat for salmonids so any cold-water management will require annual hatchery stocking.
- The lack of flushing flows, a high Depth^2 to Surface Area ratio, and high biological oxygen demand restricts habitat due to dissolved oxygen and temperature in both summer and winter severely limiting fish production.
- Poor access, signage, and a lack of facilities limits angler use

Recommendations

1) This marginal fishery has a history of winter kill due to poor dissolved oxygen levels during winter months so stocking should be no higher than 500 rainbow trout @ 5/lb annually and managed as a put-and-take fishery.
2) Continue to collect lake specification and fish population information to assist in decision making on best management practices.

3) An aeration system, dredging, and/or installation of dam boards might minimize winterkills and allow trout to survive year round. If the lake rehabilitation is successful, restock with redband rainbow trout at 25/lb.
4) Access needs improvement, by posting a sign at the turn-off from Barnaby Creek Road. Once at the lake improve access by building a boardwalk to open water and/or bulrush removal and creation of rocked access points.
5) Monitor and evaluate this lake as a coldwater fishery.

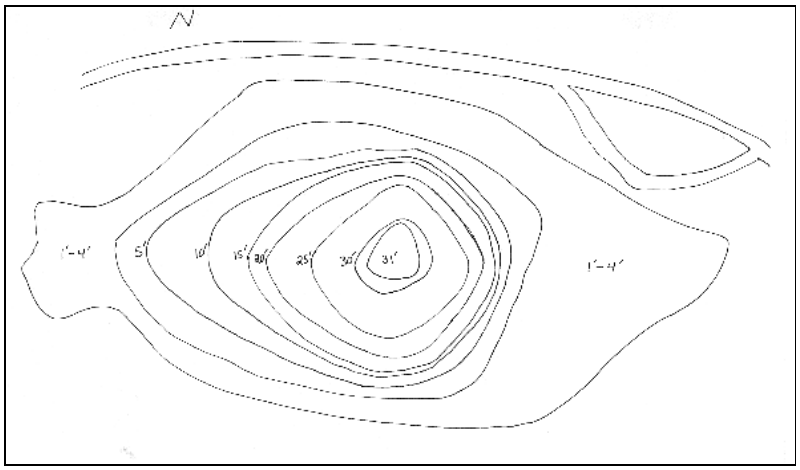


Figure 77: Most recent bathometry map on record for Sugar Lake.

Summit Lake **(Map, Figure 79)**

No Picture Available

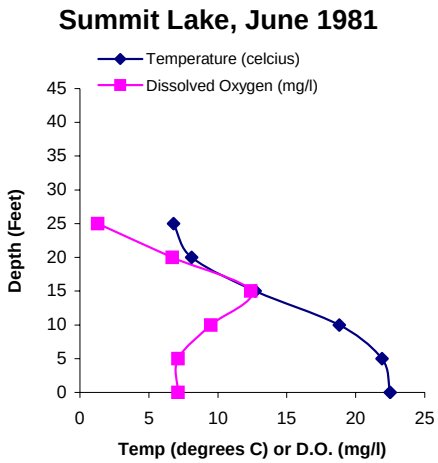
Description

Summit Lake is a small coldwater fishery near the summit of Disautel Pass located in Oakanogan County at T32N, R29E, section 10J, R in the Omak Creek drainage within the Oakanogan River Sub-basin. The main source of water is snowmelt and the outlet is undefined, and a good 8 feet higher than current lake level but believed to flow into the Omak Creek watershed or possibly subsurface. Zooplankton communities are dominated by rotifers with large caldocerans (*Daphnia spp.*) in good numbers. Stonewort (*Chara spp.*) and pondweeds (*potamogeton spp.*) are dominant, but Spatterdock (*Nuphar sp.)* and common cattail are present among the aquatic plant community, uplands are covered by ponderosa pine and Douglas fir. Access to the lake is good by dirt road and the Tribes maintain a very steep boat launch, picnic facilities, a foot trail surrounds this lake. Boyscouts of America have a camp located on the western shoreline.

Specifications

Attribute	Measure	Attribute	Measure
Elevation	3,270 Feet	Surface Area	12 Acres
Watershed Area	0.49 Miles^2	Volume	176 Acre-feet

Summer Max Temp	73°F	Max Temp @ 15ft	56°F
Winter D.O. @ 15ft	5.0 ppm	Summer D.O. @ 15ft	10.1 ppm
Maximum Depth	30 Feet	Average Depth	12 Feet
Conductivity	57µmhos/cm	Trophic State	Mesotrophic
Natural Reproduction	Minimal	PH (4 year avg.)	7.1
Dominant Substrate	Unknown	Aquatic Vegetation	Abundant
Shoreline Development	Minimal	Dominant Forage	Choronomid/Odonata
Secchi-disc	5.8 Meters	Land Use Issues	Roads
Chlorophyll a	1.9	Shoreline Length	0.6 Miles
$Depth^2$ to Surface Area	75:1		



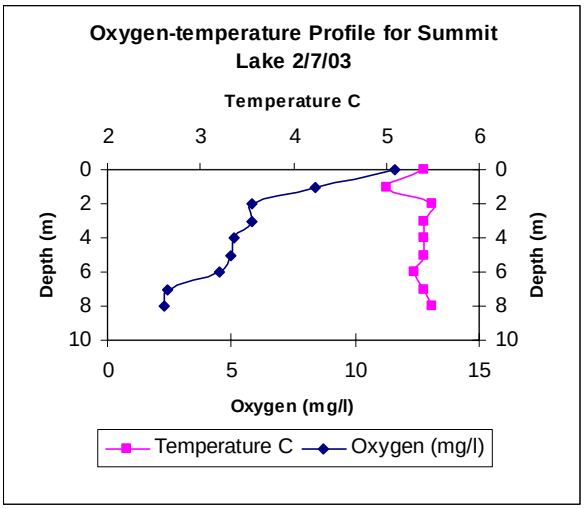


Figure 78: Temperature and Oxygen profile from the warmest water temperatures (Left) and coldest water temperatures (Right) currently on record.

Stocking History

Agency (Dates)	Species	Pounds	# of Fish	Size (Fish/Pound)
WDFW (1954, 56, 65)	RBT	20	5,138	258
WDFW (1951-53, 55-58, 60-64)	EBT	24	6,741	282
WDFW (1944)	WCT	200	50,000	250
USFWS (1970-72, 74-75)	RBT	57	4,624	81
USFWS (1966-67, 70-76)	EBT	51	9,683	190
USFWS (1970)	WCT	27	5,188	192
Tribe (Winthrop 1977, 79-89)	EBT	22	2,500	114
Tribal Hatchery (1990-2001)	EBT	45	3,084	69

Fishing History

Halfmoon (1974) estimated that Tribal member use of this fishery was approximately 900 angler days per year but this estimate was based on a 1-day creel in August 1977. Anglers caught 0-trout in 7 hours of effort. One-day creel data was also recorded in 1978

and 1980. A voluntary creel maybe started in 2003-2004 current usage of this fishery is reported to be low.

Year	# Harvested	Hours Fished	# Anglers	Size Range	Fish/hour
1977	0	7	4	N/D	0.00
1978	7	2.5	3	6-9.5”	2.8
1980	14	4.5	3	Avg. 10”	3.1

Fish Life and Management Data

A survey of this lake is scheduled for 2003-2004.

Fish Survey Results					
Year	Equipment Used	Effort	# Caught	Size Range	Species
1975	Gillnet	19 Hours	22	5”-12”	EBT
1976	Gillnet	19 Hours	14	7-13”	EBT
1980	Gillnet	63 Hours	86	111-370mm	EBT
1982	Gillnet	38 Hours	48	97-336mm	EBT

Limiting Factors

- This lake lacks suitable spawning habitat for salmonids so any coldwater fisheries will require annual hatchery stocking.
- The lack of flushing flows, a high Depth^2 to Surface Area ratio, and high biological oxygen demand make dissolved oxygen marginal in winter for trout survival.
- Temperature issues slightly reduce salmonid habitat in this lake during summer periods.

Recommendations

1) Determine the suitability of using this marginal carry-over fishery as a location for establishing a redband trout broodstock and annually stock with 2,000 redband trout @ 25/lb.
2) Determine the most productive trout species for this lake by stocking over the next 5 years with 2,000 redband trout @ 90/lb, 2,000 westslope cutthroats @ 90/lb, and 1,400 brook trout at 90/lb annually.
3) Do lake specification and fish population survey in 2003, 2005, and 2007 and determine the species that has the highest abundance of adult fish that are in the best condition to determine the single species stocked after this 5-year test.
4) Place voluntary creel box at access sites and ask scout camp to monitor compliance.
5) Monitor and evaluate this fishery as a carry-over coldwater fishery.

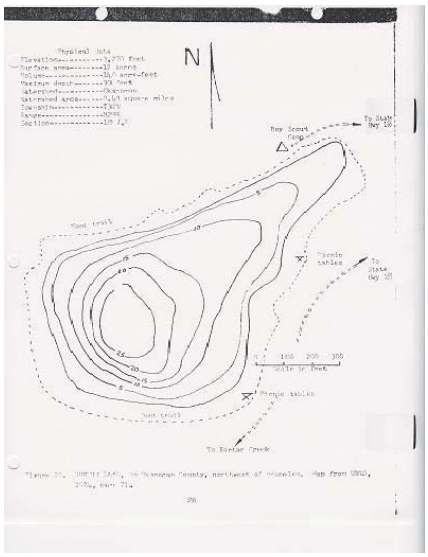


Figure 79: Most recent bathometry map on record for Summit Lake.

Unnamed Lake **(Map, Figure 82)**

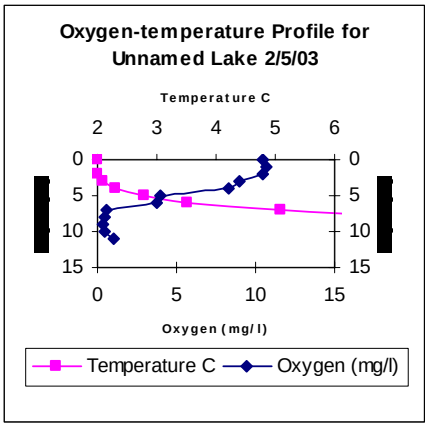
Figure 80: Private unnamed lake located 1-mile north of Cameron Lake with good fisheries potential.

Description

Unnamed Lake is one of many on the large plateau located west of Omak Lake. Two names have been proposed for this lake “Marvin Bob Lake” and “Broch’s Pond”. This cold water lake is located approximately 1 mile north of Cameron Lake in Okanogan County at T32N, R26E, and straddles sections 2 and 3 in the 24R in the Omak Lake drainage within the Oakanogan Sub-basin. The lake sits in a depression and is surrounded by steep embankments on each side. The northern end of the lake can be accessed by road. A mixture of Ponderosa pine, aspen, and sage surrounds the lake. Beyond the slope that surrounds this lake the countryside is open and dominated by grasses and sage. **The entire lake is on private land but can be accessed by a well-maintained road whose ownership has not yet been determined.**

Specifications

Attribute	Measure	Attribute	Measure
Elevation	2,800? feet	Surface Area	18-25? Acres
Watershed Area	Unknown	Volume	Unknown
Summer Max Temp	Unknown	Max Temp @ 15ft	68°F
Winter D.O. @ 15ft	4.0 ppm	Summer D.O. @ 15ft	8.0 ppm
Maximum Depth	30 Feet	Average Depth	17 Feet
Conductivity or TDS	Unknown	Trophic State	Unknown
Natural Reproduction	Unknown	PH	Unknown
Dominant Substrate	Unknown	Aquatic Vegetation	Unknown
Shoreline Development	Minimal	Dominant Forage	Unknown
Seechi Disk	Unknown	Land Use Issues	Access and Ownership
Depth[2] to Surface Area	Unknown		



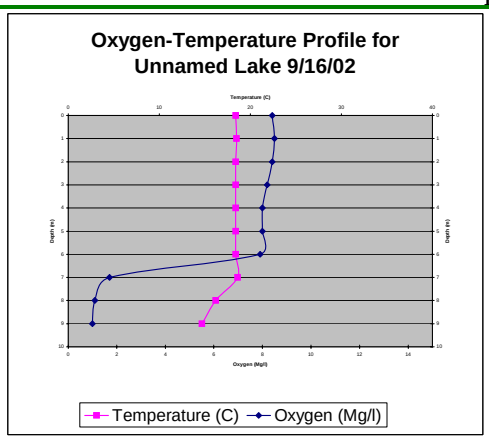


Figure 81: Temperature and oxygen profile for warmest summer water temperatures (Right) and coldest water temperatures (left) on record.

Stocking History

No historical data exists prior to 2002 when 2,500 surplus rainbow trout at 25/lb where stocked from the Colville Tribal Hatchery to monitor survival.

Fishing History

No fishing has ever been documented at this lake.

Fish Life and Management Data

No data currently exists however a fish population survey is scheduled for 2003.

Limiting Factors

- Private ownership precluded fishery development until an agreement with the landowner can be signed or the property purchased by the Tribes.
- Temperature issues reduce the available habitat and could be lethal to salmonids during summer periods.
- Dissolved oxygen levels during winter could produce occasional winter-kills.
- This lake has excellent access potential but permits need to be obtained and improvements made for parking.
- Determining fish survival will largely determine the amount of effort put toward developing this lake into a fishery.

Recommendations

1) Pursue contact with the landower/s to determine possible agreements for access.
2) Monitor temperature and dissolved oxygen in summer and winter.
3) Contact range and parks department about possible conflict with developing parking and access.
4) Contract roads department about road ownership.
5) Continue to collect information about lake specifications.
6) Monitor fish survival to determine potential for developing a future fishery or possible redband brood stock lake if ownership issues can be resolved.

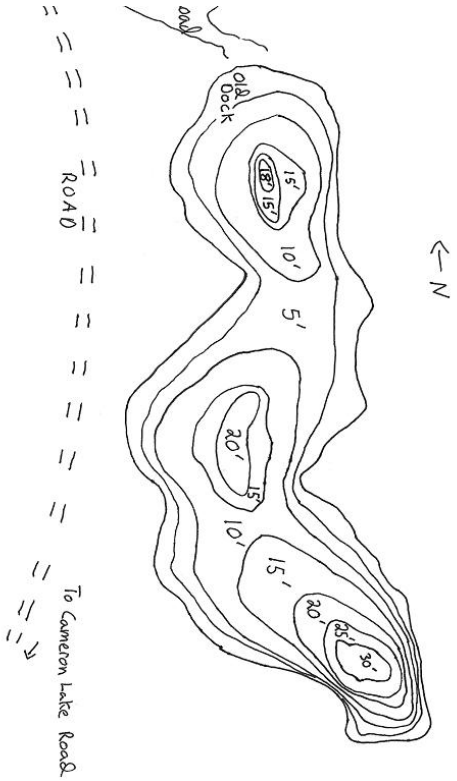


Figure 82: Most recent bathometry map on record for No Name Lake.

Non-fish lakes

The lakes on this list have been surveyed by the Colville tribes Fish and Wildlife department and classified as lakes with no fisheries potential so no additional or historic information has been or will be collected. Lakes identified that have no fisheries potential are included in the table below:

Lake Name	Location	Reason
B. J. Lake	T32N, R25E, 26-N/P	Shallow and salinity
L Lake	T32N, R27E, 5-M/N	Lake dries up completely
Long Lake	T31N, R27E, 8-L/P	Only 2-feet deep
Snyder Lake	T31N, R27E, 7-C	Only 4-feet deep
Rimrock Lake	T32N, R26E, 14-NW-1/4	Only 3-feet deep
White Lakes	T31N, R24E, 12-L	Shallow and salinity

Boundary Waters

Several boundary waters exist along the border of the Colville Reservation. Boundary waters are very important to the Colville Confederated Tribes but mainly managed by WDFW with consultation. Lake Roosevelt is cooperatively managed and has extensive information available from a variety of sources but is beyond the scope of this document. The other boundary waters have little information and WDFW has most of this so it was decided not to include information on Crawfish Lake, Washburn Pond, and Lake Rufus Woods in this document.