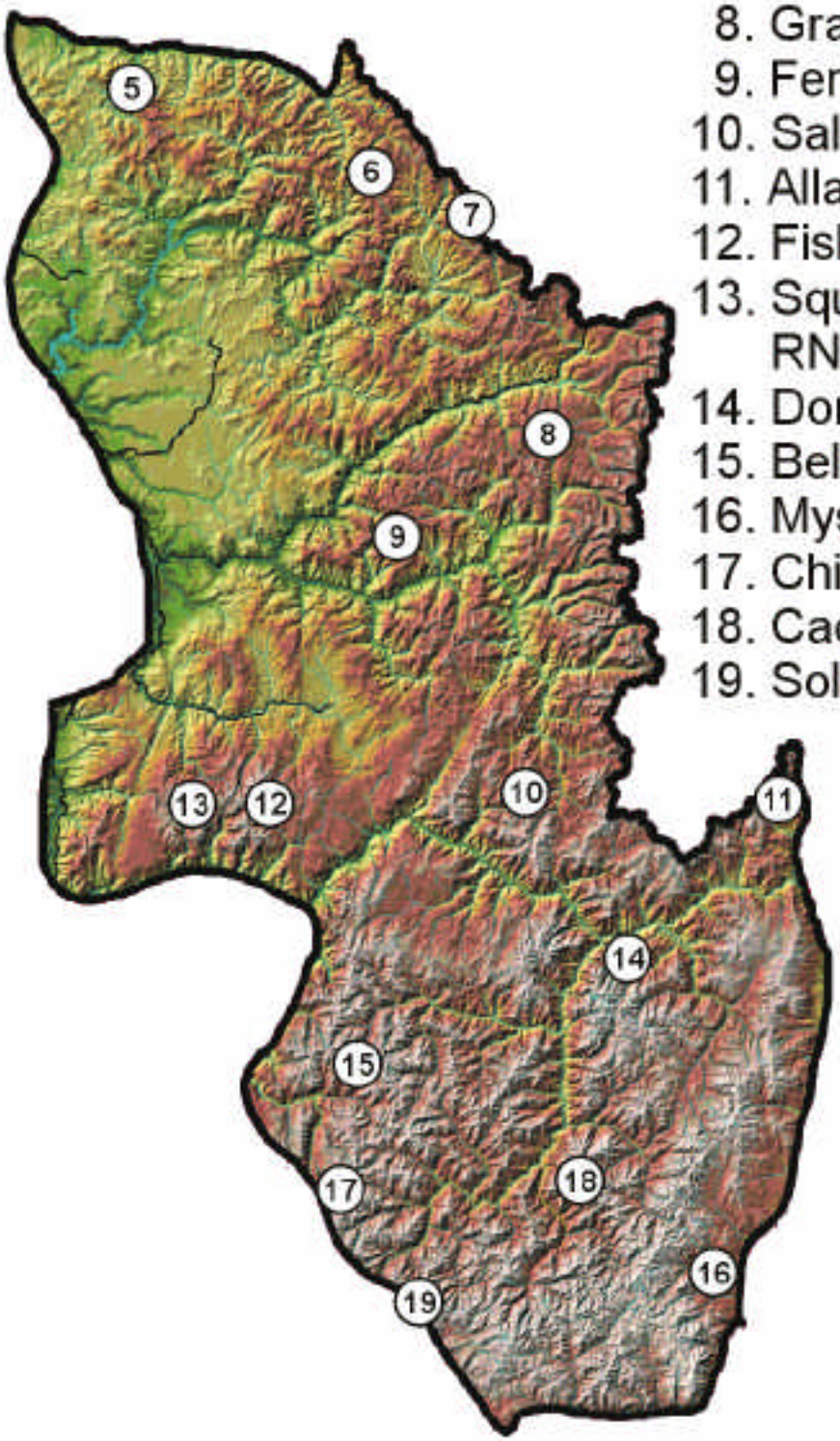
IDAHO BATHOLITH

5. Theriault Lake RNA
6. Five Lakes Butte RNA
7. Steep Lakes RNA
8. Grave Peak RNA
9. Fenn Mountain pRNA
10. Salmon Mountain RNA
11. Allan Mountain RNA
12. Fish Lake RNA
13. Square Mountain Creek RNA
14. Dome Lake RNA
15. Belvidere Creek RNA
16. Mystery Lake RNA
17. Chilcoot Peak RNA
18. Cache Creek Lakes RNA
19. Soldier Lakes RNA



Theriault Pond

Theriault Lake Research Natural Area
Idaho Panhandle National Forest

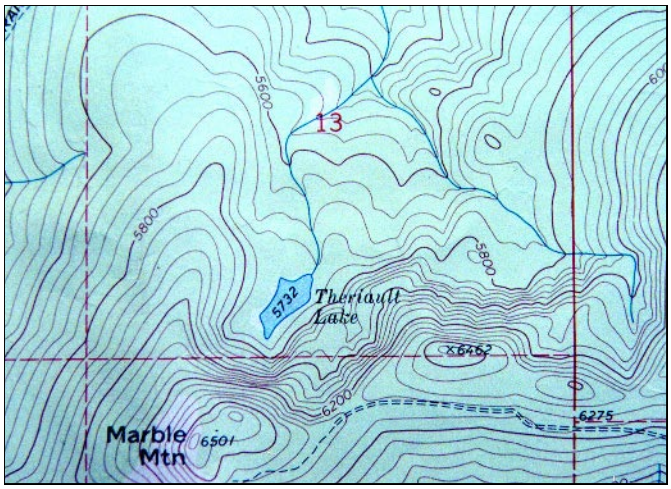
Fred Rabe and Bill Minnerly surveyed Theriault Pond on July 12,1998. According to Anderson (1971), the water body is a pond not a lake (see Classification section).

Location

Theriault Pond is a tributary to Marble Creek, a major tributary to the St. Joe River near Clarkia. The pond is located in a cirque basin on the north side of Marble Mountain.

Ecoregion section: BITTERROOT MOUNTAINS (M333D), Shoshone County; Quad: MARBLE MOUNTAIN.

From Clarkia take FS Road 301 east for one mile. Then travel FS Road 321 north over Hobo Pass down to Marble Creek. Continue on 321 until it joins with FS Road 216, 16 miles from Clarkia. Take FS Road 216 east for about 9 miles bearing left at junctions until reaching FS Road 1936. Proceed northwest on FS 1936 for 4.5 miles until road junctions with FS Road 1938. Continue on FS Road 1938 until you come to the end of the road. Hike up the trail several hundred yards to the top of Marble Mountain. Proceed down steep hillside to Theriault Pond.



USGS Quad: MARBLE MOUNTAIN.

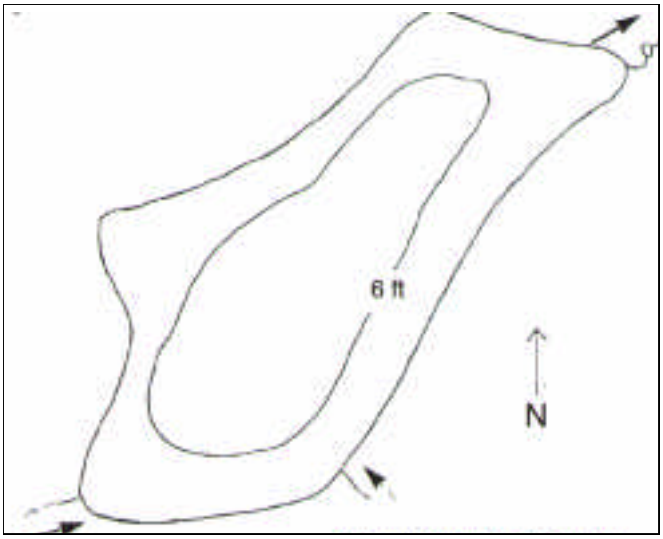
Geology

Precambrian Belt Series metasediments comprise the geologic formations of Theriault Lake RNA. Wellner and Moseley (1986) describe the geology as being metamorphosed rocks of white coarse-grained vitreous quartzite to micaceous quartzite and mica schist.

Precambrian Belt Series metasediments comprise geologic formation. Photo credit: Wellner and Moseley (1986).

Classification

- Subalpine, small, shallow cirque pond
- Medium-high production potential
- Circumneutral water in Precambrian Belt rock
- Inlet: stream; Outlet: Meandering glide stream



Bathymetric map of Theriault Pond (1 inch = 25 m).

Theriault Pond from slope of Marble Mountain with mountain hemlock (*Tsuga mertensiana*) in foreground.

Aquatic physical-chemical factors

Lake surface area (hectares): 1.7 (4.3 acres)
Length of shoreline (m): 231 (758 ft)
Maximum depth (m): 1.9 (6 ft)
Elevation (m): 1747 (5732 ft)
Aspect: NE
Percent shallow littoral zone: 100%
Dominant bottom substrate: soft sediments
Shoreline development: 1.29
Alkalinity (mg/l): 8
Conductivity (micromhos/cm): 20
pH: 7.2
Inlets: 2 seeps
Outlet: Meandering glide stream

A pool originating from an underground spring flowed into an inlet which emptied into the pond. The stream inlet averaged 0.3 m wide and 7 cm deep. Water temperature was 8.3 degrees C.

Ameandering glide outlet stream 25 cm deep and 0.3 m wide flows about 26 m into a large pool, 9 m wide, 25 m long and

View of pool about 26 m below outlet stream with Theriault Pond in the background.

35 cm deep. The stream is surrounded by sedges mostly *Carex utriculata.* Both pool and stream channels have a substrate of soft sediments. The outlet stream below the pool is 1 m wide and about 2 cm deep.

Bottom substrate was mainly composed of soft sediments and coarse particulate organic matter. An aquatic moss (*Fontinalis* sp.) is present in the water. The outlet stream temperature was 21 degrees C compared to 8 degrees for the inlets. Respiratory activities of the massive amount of plant material in the pond apparently contributed to the substantial rise in temperature of the pond.

Mountain hemlock (*Tsuga mertensiana*) with pond in background

Inlet stream flowing into Theriault Lake. The sedge, *Carex aquatilis* dominates the area.

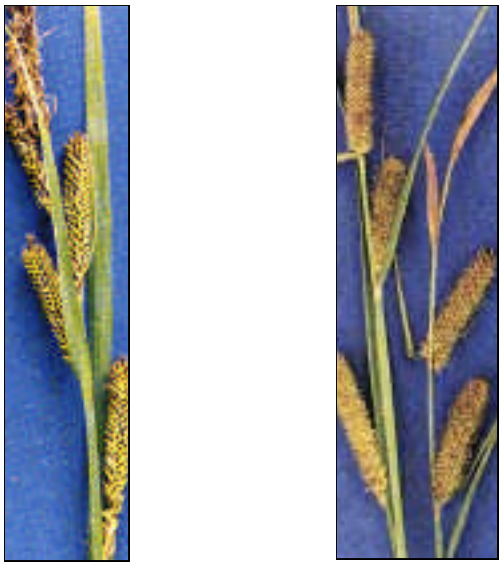
View southwest of outlet stream flowing from Theriault Pond. Here the sedge *Carex utriculata* was dominant. Marble Mountain is in background.

Fontinalis (an aquatic moss) found in the lower outlet stream is an indicator of soft water conditions in the drainage.

Vegetation

The habitat type of mountain hemlock-menziesia (*Tsuga mertensiana-Menziesia ferruginea*) is located in the RNA. The old growth mountain hemlock is associated with sub-alpine fir (*Abies lasiocarpa*) and Engelmann spruce (*Picea engelmannii*).

The wet meadow at the inlet end of the pond is dominated by the water sedge *Carex aquatilus* and the outlet meadow by the beaked sedge *Carex utriculata.* Other sedges and rushes listed by Wellner and Moseley (1986) are Merten's sedge (*C. mertensiana*), smallwing sedge (*C. microptera*), green sedge (*C. oderi*), and the rushes *Juncus drummondii* and *J. ensifolius.*



Carex aquatilus (left) and *Carex utriculata* (right) inflorescences. They are some of the most common sedges of the Intermountain area. *C. aquatilus* has a wide distribution from foothills to near timberline. From: Hurd et al. 1998.

Zooplankton

Polyphemus pediculus
Suborder Harpacticoida
Chydorus sp.

Both Harpactocoida and *Polyphemus* were dominant. The same zooplankton were found in Pond Peak Pond which was also shallow and partially surrounded by sedges.

Macroinvertebrates

	Pond edge	Outlet
Trichoptera		
Homophylax sp.		X
Protoptila sp.		X
Ephemeroptera		
Siphlonurus sp.	X	
Odonata		
Libelluidae	X	
Family Cordulegastridae	X	
Ischnura / *Enallagma*	X	
Coleoptera		
Ilybius / *Agabus*	X	X
Hemiptera		
Gerris sp.		X
Notonecta kirbiyi		X
Diptera		
Subfamily Tanypodinae	X	X
Family Psychodidae		X
Family Culicidae		X
Pelecypoda		
Pisidium sp.	X	X

Six macroinvertebrate species were collected from Theriault Pond and nine species from the outlet stream. *Pisidium*, a freshwater clam, was found by the hundreds in one square meter of sample from the pond's outlet stream. No clams were observed in the outlet below the pool, which was more shallow and had less sedge cover.

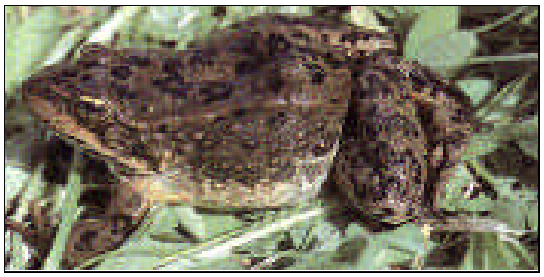
Pisidium sp., a freshwater clam.

Vertebrates

No fish were observed in the pond. However spotted frogs (*Rana pretiosa*) were extremely abundant along the edge of the pond and in the stream. This species is not as common in its western range because of development and the introduction of bass and bullfrogs (Corkran and Thoms 1996).

Spotted frogs breed in flooded meadows like those at Theriault Pond. Tadpoles live in the warmest parts however none were noted in July. The frogs are best identified by the huge black spots on the back and the belly. The underside of the thigh is opaque with a mottling of brick red to orange -red or yellow-orange (Corkran and Thoms 1996).

A Coeur d'Alene salamander (*Plethodon idahoensis*) was observed about 25 m from the lake shore in a wet area. The range of this vertebrate is somewhat restricted; it is one of the less well known amphibians in our region (Corkran and Thoms 1996).



Spotted frog *(Rana pretiosa*) was extremely common in both pond and streams. From Corkran and Thoms (1996)

Coeur d'Alene Salamander (*Plethodon idahoensis*) observed in a wet area 25 m from the pond shore. This specimen coiled up when discovered.

Literature Cited

Anderson, R. S. 1971. Crustacean plankton of 146 alpine and subalpine lakes and ponds in western Canada. Journal Fisheries Research Board Canada 28: 311-321.

Corkran, C. C.; Thoms, C. 1996. Amphibians of Oregon, Washington and British Columbia. Redmond, WA: Lone Pine Press. 175 p.

Hurd, E. G.; Shaw, N. L.; Mastrogiuseppe, J. (and others) 1998. Field guide to Intermountain sedges. GTR-10. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 282 p.

Wellner, C. A.; Moseley, R. K. 1986. Establishment Record for Theriault Lake Research Natural Area. Moscow, ID: U.S. Department of Agriculture, Forest Service. Unpublished report on file at Northern Region, Missoula, MT. 19 p.

Bacon Lakes

Five Lakes Butte Research Natural Area
Idaho Panhandle National Forest

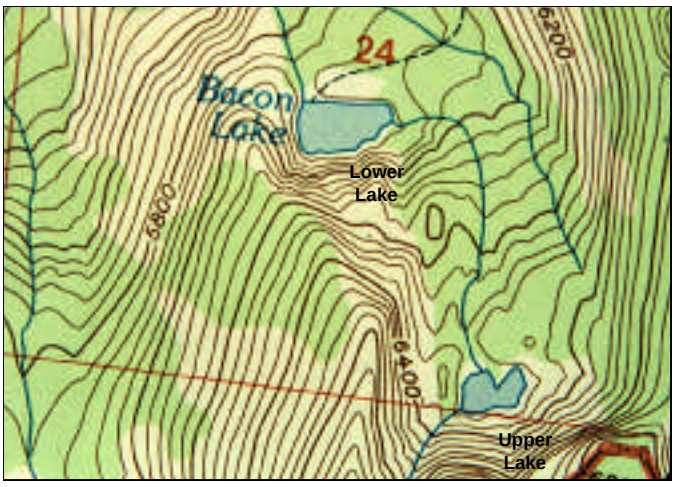
Fred Rabe, Bob Wissmar and Bill Parr studied ten lakes including Lower Bacon Lake in the Five Lakes Butte area in 1968. Upper Bacon Lake was not sampled. Upper and Lower Bacon Lakes were established within Five Lakes Butte RNA in 1986 after a visit to the site by Charles Wellner and Bob Moseley. The following report deals with research on Lower Bacon Lake and several other lakes in the Five Lakes Butte area.

Location

Upper Bacon Lake occupies a cirque and drains south into a basin entering Lower Bacon Lake about one-half mile downstream. The outlet from the lower lake flows about one-quarter mile south before converging with an unnamed creek that empties into the St. Joe River.

Ecoregion Section: BITTERROOT MOUNTAIN (M333D), Idaho County; USGS Quad: BACON PEAK.

From Superior, Montana on Interstate 90 travel Forest Road 250 south over Hoodoo Pass. Take Forest Road 720 west to Fly Hill. At Fly Hill take Forest Road 715 north to the trail going west to Five Lakes Butte. Park and follow trail approximately two miles between Tin and Gold Lakes. Leave the trail and proceed north across basin to a ridge following it to the head of Bacon Creek. The lakes are within the basin. The trailhead can also be reached from Orofino, Idaho on U.S. Highway 12. From Orofino take State Highway 11 to Pierce, Idaho and then Forest Road 250 to the Cedars (Moseley and Wellner 1988).



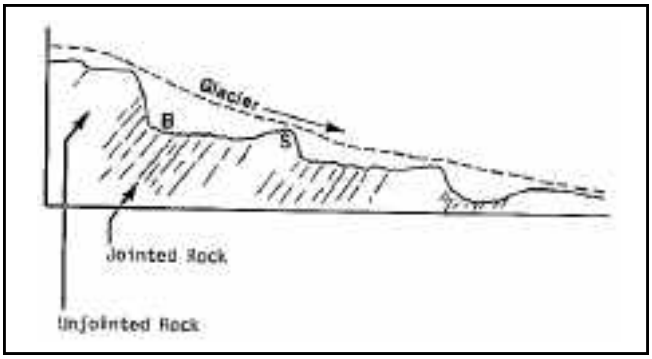
USGS Quad: BACON LAKE.

Bacon Lake basin - Lower Bacon Lake to left (see arrow).
Photo credit: Charles Wellner.

Geology

The area is underlain by Precambrian Belt Supergroup metasediments which are folded and intensely faulted (Moseley and Wellner 1988). According to Parr et al. (1968), the Wallace Formation is the only carbonate-bearing siltite and quartzite formation of the Belt Supergroup. The glaciated landscape of the area is believed to be less than 40,000 years old (Savage 1967).

Four lakes south of Bacon Lake are described by Parr et al. 1968 as being formed by glacial “quarrying” which occurred in well-jointed bedrock adjacent to the more consolidated resistant rock comprised of black and gray argillites and greenish to gray carbonates.



The dashed line is the original valley floor. The solid line is the valley floor after glaciation. B = basin; S = step. Parr et al. (1968).

Classification

Lower Bacon Lake

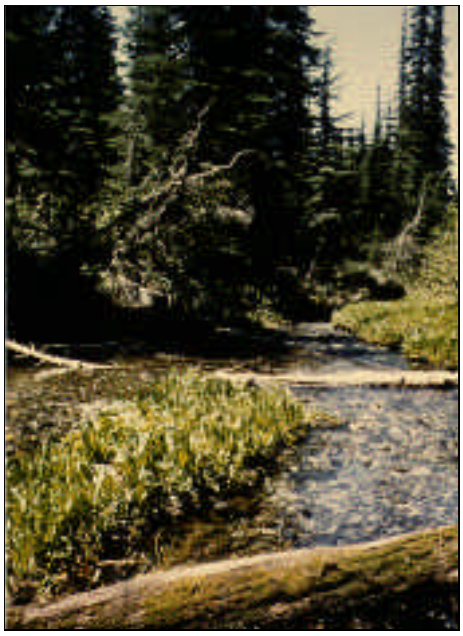
- Subalpine, small, deep cirque lake
- Low production potential
- Circumneutral water in Precambrian Belt basin
- Inlet: 1 stream; Outlet: 1 stream

Aquatic physical-chemical factors

Lower Bacon Lake
Area (hectares): 2.1 (5.1 acres)
Length of shoreline (m): 597 (1959 ft)
Maximum depth (m): estimate10 m (32 ft)
Elevation (m): 1793 (5880 ft)
Aspect: NNW
Dominant bottom substrate: bedrock, boulders
Shoreline development: 1.181
Alkalinity (mg/l): 4
pH: 6.8
Inlet: 1 stream
Outlet: 1 stream

Lower Bacon Lake. Photo credit: Charles Wellner.

Upper Bacon Lake. Photo credit: Charles Wellner.



Bacon Creek. Photo credit: Charles Wellner.

Vegetation

Terrestrial vegetation of the RNA is comprised of successional stages of forests in the mountain hemlock series that burned in 1910 (Moseley and Wellner 1988). Relatively dense stands of subalpine fir (*Abies lasiocarpa*) and mountain hemlock (*Tsuga mertensiana*) occurred on north and east facing slopes whereas west facing slopes had little tree cover. These species also occurred in the valley bottom.

Mountain hemlock-menziesia habitat type. Photo credit: Charles Wellner.

Beargrass (*Xerophyllum tenax*) and mountain heather (*Phyllodoce glanduliflora*) are the dominant understory vegetation and avalanche chute and snowbank communities exist on the cirque headwall.

Carex sp., *Sparganium* sp., *Isoetes* sp., *Fontinalis* sp. and *Drepanocladus* sp. occurr in and around the lower lake. *Isoetes* (quillwort), a rooted submergent, is present in the shallows where the bottom is soft enough for rooting. *Fontinalis,* an aquatic moss, and algae grow profusely around springs in Copper and Tin Ponds a few miles south of Bacon Lake (Parr et al. 1968). A high concentration of carbon dioxide in the vicinity of the spring may account for this growth. *Sparganium* (bur-reed) is an emergent confined to the littoral zone where depth is less than one meter.

Sparganium sp. (Bur-reed) growing in the littoral zone of Lower Bacon Lake.

Zooplankton

Lakes in Five Lakes Butte area

Diaptomus sp.
Daphnia sp.
Holopedium gibberum
Conochilus sp.

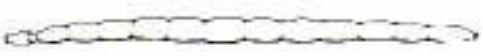
The cladoceran, *Holopedium gibberum*, is considered an indicator of ultra-soft water lake environments (Pennak 1991).

Holopedium gibberum
From: Brooks (1959).

Macroinvertebrates

Ten lakes in the Five Lakes Butte area

Family Ceratopogonidae
Family Limnephlidae
Family Dytiscidae
Family Sialidae
Family Libelluidae
Family Sphaeriidae
Class Oligochaeta



Immature Ceratopogonidae (biting midges). The adults are known as “punkies” or “no-see-ums.” Their mouthparts are modified for piercing. Sketch credit: Melanie Abel.

Research

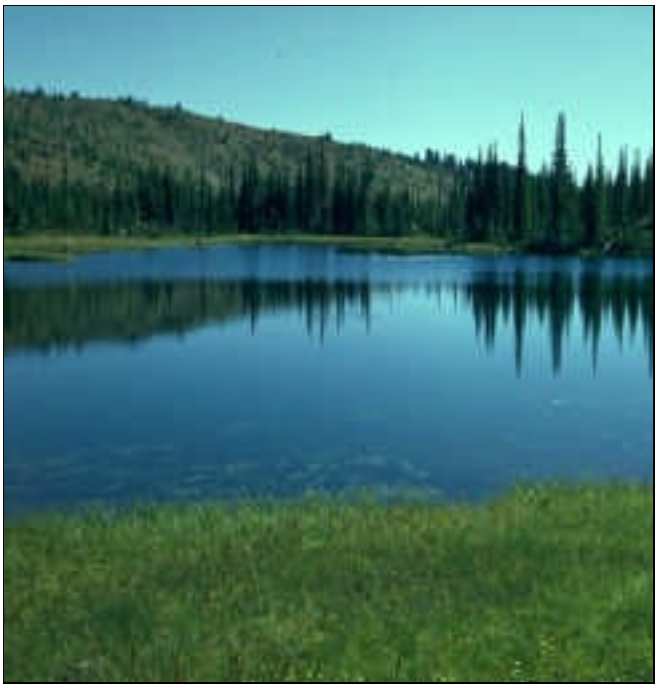
Before Bacon Lake was established as an RNA, research occurred on four lakes adjacent to Bacon Lake. These studies resulted in four publications in refereed journals.

Wissmar and Rabe (1970) studied zooplankton populations and sampling techniques in four mountain lakes in the Five Lakes Butte area. Samples were based on vertical plankton

View of two high lakes in the Five Lake Butte area. Gold Lake is in foreground and Silver Lake in the background. Methods of zooplankton collection in these lakes were studied by Wissmar and Rabe (1970).

hauls using four different field methods of collection together with various sample sizes. It was concluded that both rocky and semidrainage type lakes had similar species composition and low density of crustaceans.

Sampling zooplankton from Gold Lake.



Copper Pond is in the Five Lakes Butte area. It is a semi-drainge pond lower in elevation than Gold and Silver Lakes pictured in the opposite column. Instead of a rocky basin it is located in a meadow.

Literature Cited

Brooks, J. L. 1963. Cladocera. In: Freshwater biology. New York: Wiley Publishers: 599 p.

Moseley, R. K.; Wellner, C. A. 1988. Research Natural Area establishment record Five Lakes Butte RNA, Shoshone County, Idaho. U.S. Department of Agriculture, Forest Service, Unpublished report on file at Northern Region, Missoula, MT. 22 p.

Parr, W. H.; Rabe, F. W.; Wissmar, R. C.1968. Investigations of subalpine lakes, Five-Lakes Butte, Idaho. Journal Idaho Academy of Science 8: 1-5.

Pennak, R. W. 1991. Freshwater invertebrates of the U.S. Third edition. New York: Wiley Publishers. 628 p.

Savage, C. N. 1967. Geology and mineral resources of Clearwater County. County Report No. 6. Moscow, ID: University of Idaho, Bureau of Mines and Geology. 131 p.

Wissmar, R. C.; Rabe, F. W. 1970. Crustacean populations and sampling techniques in four mountain lakes of Idaho. Transactions American Microscopic Society 89(2): 205-215.

Steep Lakes

Steep Lakes Research Natural Area
Clearwater National Forest

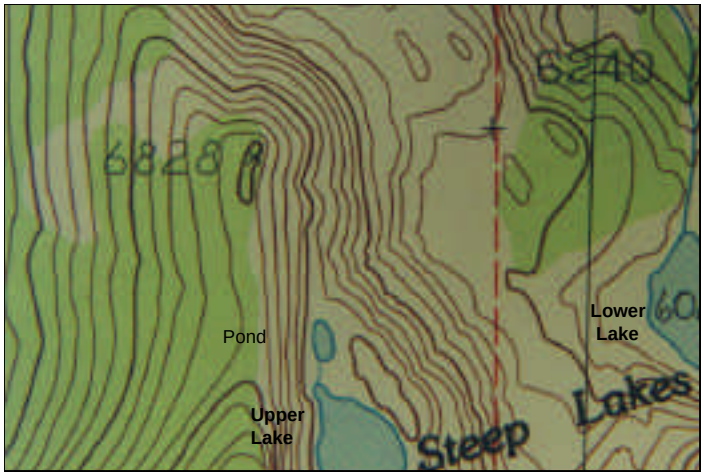
During the summer of 1997, Fred Rabe and Steve Crumb conducted research at the two Steep Lakes and pond.

Location

Steep Lakes are located northeast of Lewiston at the head of the Clearwater River drainage straddling the Idaho/ Montana border.

Ecoregion Section: BITTERROOT MOUNTAIN (M333D), Clearwater County; USGS Quad: STRAIGHT PEAK.

From Superior, Montana on I-90, follow FR 250 over Hoodoo Pass and FR 5450 up Goose Creek to its end. Hike Trail 414 which parallels Goose Creek for 1.5 miles to the mouth of Steep Creek. Access to the lower lake is by a steep one mile unimproved trail. An undeveloped campsite is located above the lower lake on the northwest side in the timber. The upper lake and pond are reached by hiking over 500 feet up a steep incline .



USGS Quad: STRAIGHT PEAK.

Upper and Lower Steep Lakes.

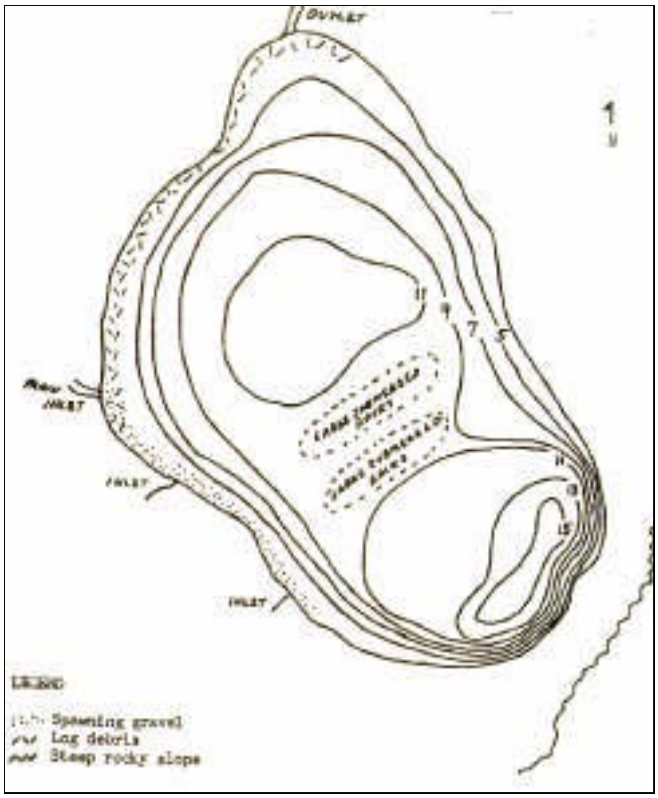
Geology

Upper and Lower Steep Lakes are subalpine cirque lakes si ated on the west side of the Bitterroot Range in the headwate of the North Fork of the Clearwater River. The site is Precambrian Belt quartzites and argillites that have been su jected to alpine glaciation. Carbonaceous argillites are present the basins accounting for the relatively high calcium carbona content of the water (Crumb 1977).

Classification

Upper Steep Lake
- Subalpine, small, deep cirque lake
- Low production potential
- Alkaline water in Precambrian Belt basin
- Inlet: 1 stream, 1 seep; Outlet: 1 stream

Lower Steep Lake
- Subalpine, small, shallow cirque lake
- Low-medium production potential
- Alkaline water in Precambrian Belt basin
- Inlet: 1 stream, 2 seeps; Outlet: 1 stream



Bathymetric map of Lower Steep Lake. Contour levels in feet, Crumb (1977).

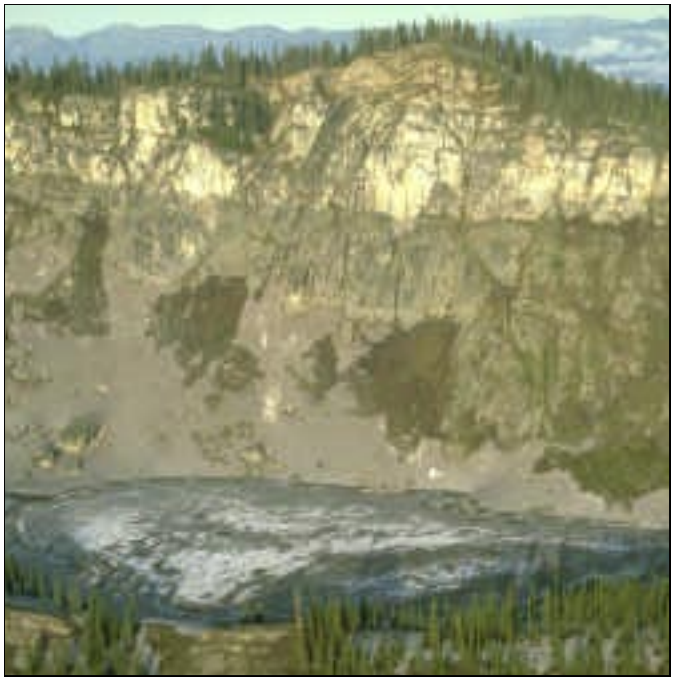
Aquatic physical-chemical factors

Lower Steep Lake

Area (hectares): 2.3 (5.8 acres)
Length of shoreline (m): 610 (2001 ft)
Aspect: NW
Maximum depth (m): 4.7 (15 ft)
Elevation (m): 1800 (5904 ft)
Percent shallow littoral zone: 20
Dominant substrate: primarily silt and large boulders
Shoreline development: 1.142
Alkalinity (mg/l): 50
Inlets: 1 stream, 2 seeps
Outlet: 1 stream

Lower Steep Lake is in a steep-walled cirque basin with a "V" shaped draw at the outlet. The outlet stream from the lake flows for about 150 feet at a low gradient before it cascades into a steep canyon. The upper portion of the outlet stream is partly blocked by log debris forming a barrier preventing loss of fish from the lake. The main inlet stream is on the west side of the lake and provides about 150 feet of 1/4 inch to 1 inch spawning gravel. Two other small seeps enter from the southwest side.

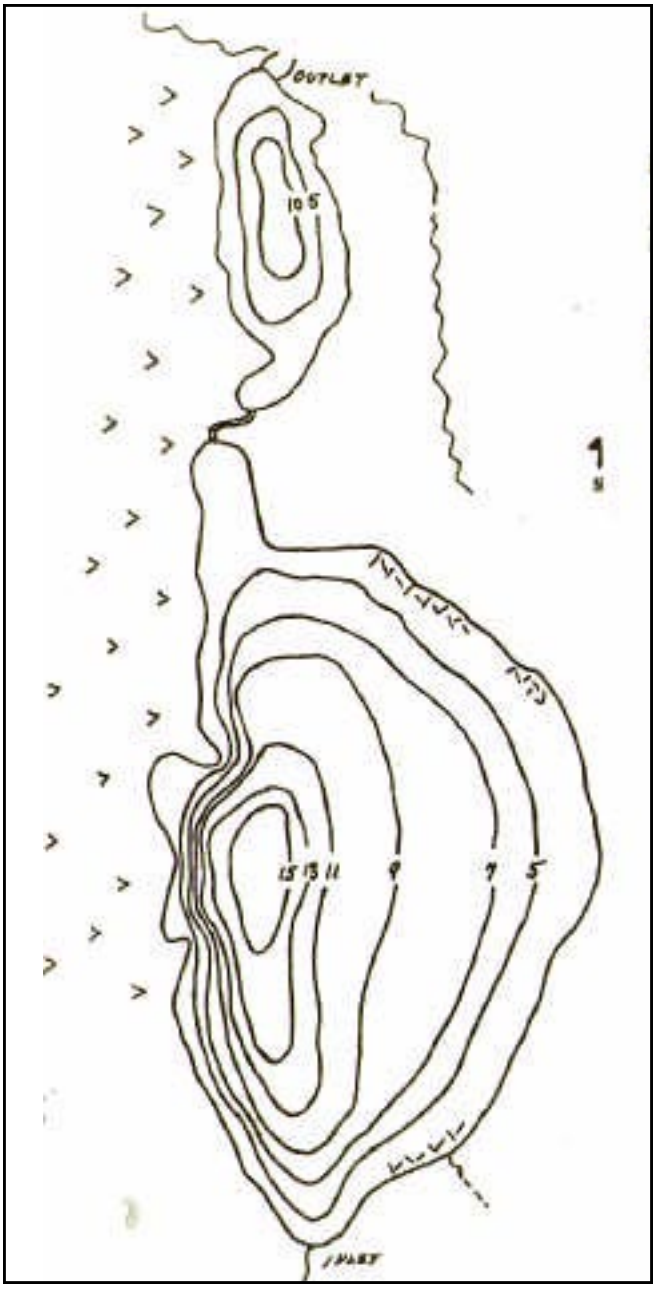
The lake substrate consists of fine silt and large angular boulders. Considerable log debris extends along the northwest side and provides good cover for trout. Underwater springs provide oxygenated water that help the trout survive in the lake during the winter months when oxygen might be limited.



Lower Steep Lake.

Upper Steep Lake

Area (hectares): 2.3 (5.7 acres)
Length of shoreline (m): 625 (2051 ft)
Maximum depth (m): 4.6 (15.1 ft)
Elevation (m): 2012 (6600 ft)
Aspect: N
Percent shallow littoral zone: 20
Dominant substrate: silt and angular boulders
Shoreline development: 1.172
Alkalinity (mg/l): 50

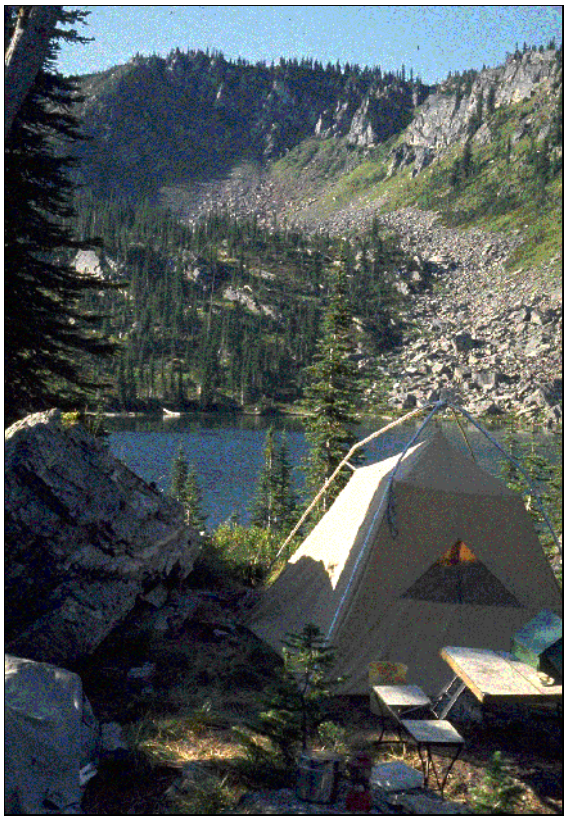


Bathymetric map of Upper Steep Lake and pond. Contour levels are in feet. Crumb (1977).

Upper Steep Lake is southwest of the lower lake and about 213 m (700 ft) higher in elevation. Bottom substrate consists of silt and large boulders. Numerous springs are present. No macrophytes and only scattered log debris occur there. The inlet stream is approximately 3 m (10 ft) wide and lacks the spawning gravel present in the lower lake basin. The outlet, about 3.7m (12 ft) wide, flows into a pond that drains down the mountainside over a steep cascade going underground before reaching the lower lake.

Upper Steep Lake outlet flows into a pond. The outlet of the pond then cascades down the mountain and goes underground until entering the lower lake.

A helicopter transported us and our supplies back and forth to the study lakes.



Camp and study site on Upper Steep Lake.

Pond draining Upper Steep Lake. Experiments were conducted here on *Diaptomus shoshone,* a zooplankton present in the upper lake and pond. Pond is also visible in upper left photograph.

Vegetation

The surrounding forests are dominated by mountain hemlock (*Tsuga mertensiana*) and subalpine fir (*Abies lasiocarpa*). Whitebark pine (*Pinus albicaulis*) and Sitka alder (*Alnus sinuata*) communities are also present (Habeck 1988).

Steep Lakes Basin was burned in 1910 and therefore has sparse tree cover. The South Basin with older stands did not burn in 1910 (Habeck 1988). Little or no macrophytic vegetation was noted in the lakes.

Zooplankton

Diaptomus shoshone, a zooplankton, was present only in the upper lake which lacked fish (Crumb 1977). *Diaptomus arapahoensis* was more abundant in the lower lake stocked with fish. *Daphnia schodleri* was more abundant in the stocked lake except in late summer and fall when fish apparently switched to feeding on it. *Bosmina longirostris* and *Macrocyclops albidus* were zooplankton collected in both lakes.

Diaptomus shoshone was present only in the upper lake. Females like this will attain sizes up to 4 mm in length.

Macroinvertebrates

Upper and Lower Steep Lakes

Amphipoda
- *Gammarus lacustris*

Rhynchobdellida
- *Glossiphonia complanata*

Haplotaxida
- *Ilyodrilus templetoni*

Heterodonta
- *Pisidium subtruncatum*

Upper and Lower Steep Lakes continued

Plecoptera
- *Acroneuria* sp. - stream
- *Alloperla* sp. - stream

Ephemeroptera
- *Ameletus* sp.
- *Siphlonurus* sp. - stream
- *Cinygmula* sp.

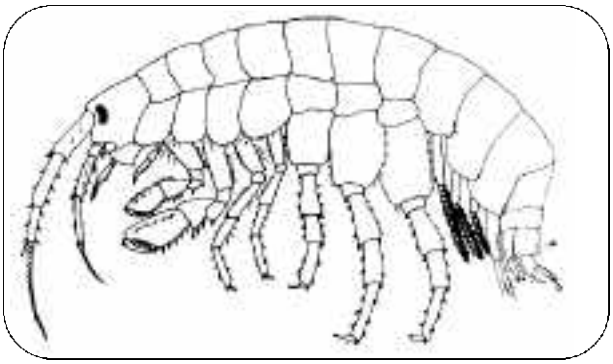
Trichoptera
- *Rhyacophila* sp.
- *Hesperophylax* sp.
- *Onocosmoecus* sp. - stream
- *Psychoglypha* sp.

Megaloptera
- *Sialis* sp.

Coleoptera
- *Gyrinus* sp.
- *Hydrovatus* sp.

Diptera
- *Chironomus* sp.
- *Microspectra* sp.
- *Procladius* sp

The freshwater shrimp (*Gammarus lacustris*) is present in both upper and lower lakes and is represented by unusually large specimens. It is abundant in Upper Steep Lake but limited in number in Lower Steep Lake apparently, due to selective predation by the trout population. The presence and size of these invertebrates may relate to the relatively high alkalinity in the waters compared to other northern Idaho lakes where this species has not been reported.



Freshwater shrimp (*Gammarus lacustris*). From Huggens et al. (1985).

Research

The invertebrate communities of the two sub-alpine lakes were compared to ascertain the effect of stocking golden trout (*Salmo aquabonito*) in 1962 in the lower lake by the Idaho Fish & Game Department (Crumb 1977). Attempts to stock the upper lake have failed. Both bodies of water were somewhat similar in size, morphometry and physical-chemical characteristics.

Both lakes had similar invertebrates except *Diaptomus shoshone*, a large zooplankton that was absent in the lower lake. This was apparently due to selective fish predation. *Diaptomus arapahoensis,* another zooplankton, was less abundant and of smaller size in the lake containing trout. *Gammarus lacustris*, a freshwater shrimp, was also found in both lakes but nearly absent in the lower lake probably due to selective predation by fish.

Since 1962, growth and reproduction of golden trout have been successful with trout reaching record weights for the state up to four pounds. Since 1977 no stocking has occurred since the original plantings. Lower Steep Lake was the only lake north of the Salmon River that contained a consistently good breeding population of golden trout.

Collecting water and plankton samples from Upper Steep Lake following eruption of Mt. St. Helens in 1978. Ash had settled on the surface of the ice which was beginning to melt.

California Golden Trout (*Salmo aquabonito*).

Mt. St. Helens erupted soon after Steve Crumb completed his study of the Steep Lakes. Since chemical and biological data on the lakes existed before the eruption, the Forest Service was interested in determining what effect if any the ash fall might have on the water chemistry and biota in the upper lake. A slight increase in nitrates and decrease in zooplankton was noted, but these effects were only temporary. Baseline data from the lake provided the opportunity to compare the undisturbed site with the disturbed site one year later (Rabe 1982).

Upper and Lower Steep Lakes provide an excellent opportunity for aquatic research.

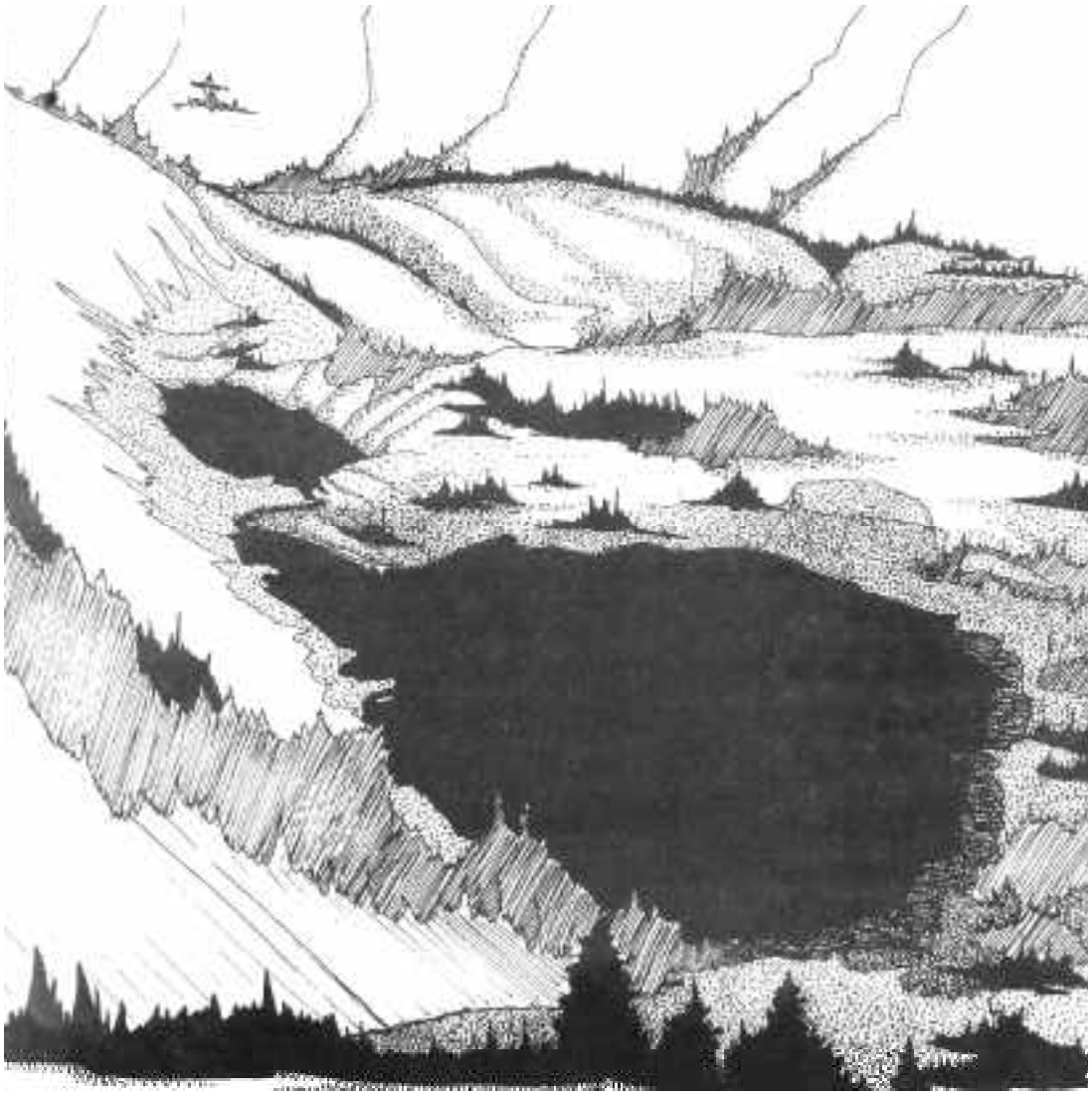
Literature Cited

Crumb, S. 1977. Long term effects of fish stocking on the invertebrate communities of Steep Lake, Idaho. Moscow, ID: University of Idaho. 27 p. Thesis.

Habeck, J. R. 1988. Research Natural Areas in the Northern Region. Review Draft. U.S. Department of Agriculture, Forest Service. Northern Rocky Mountain Research Station, Ogden, UT. Unpaginated.

Huggins, D. G.; Liechti, P. M.; Ferrington, L. C. 1985. Guide to the freshwater invertebrates of the midwest. Technical Publication No.11. Lawrence, KS: Kansas Biological Survey. 221 p.

Rabe, F. W. 1982. Effects of volcanic ash on plankton and benthos in subalpine lakes. Unpublished paper on file at: U.S. Department of Agriculture, Forest Service. Northern Rocky Mountain Research Station, Ogden, UT. Unpaginated.



Grave Peak Lake and Ponds

Grave Peak Research Natural Area
Clearwater National Forest

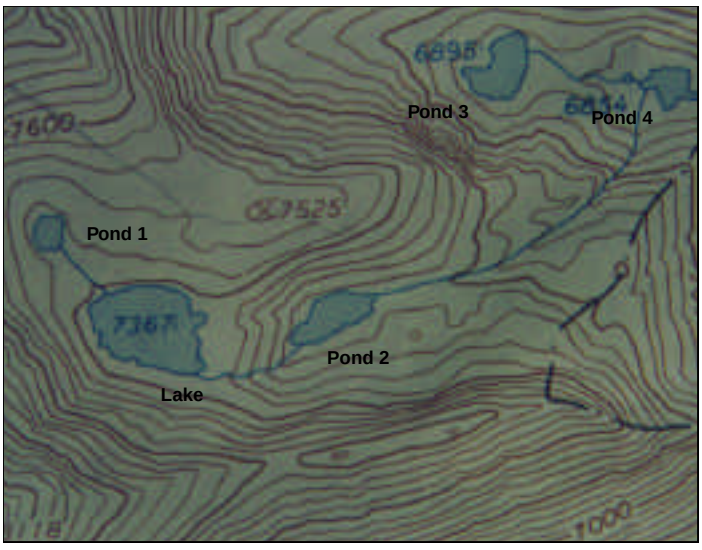
Fred Rabe, Andrea Brooks and Erin Brooks studied a lake, Pond 1, Pond 2 and associated inlet and outlet streams in the RNA on July 31-August 1, 1998. Ponds 3 and 4 in the RNA were not sampled.

Location

The RNA is situated on the northern boundary of the Selway-Bitterroot Wilderness in the Clearwater Mountains. It is about 8.5 air miles south of Powell Ranger Station (Wellner and Bernatas 1991).

Ecoregion Section: IDAHO BATHOLITH (M332A), Idaho County; Quad: GRAVE PEAK

Turn south onto the Elk Summit Road (FS road 360) from about two miles east of Route 12 near the Powell Ranger Station. Follow FS road 360 about 17 miles to the junction with FS road 358. Turn right on FS 358 and continue for two miles to where the road has been blocked. The road becomes FS trail 45 to Kooskooskia Meadows (Wellner and Bernatas (1991). Continue on the trail past Swamp Lake to Friday Pass about 3.5 miles from the trailhead. About 100 meters before reaching the top of Friday Pass, take a faint trail which branches to the right. It eventually takes you along a ridgeline separating Windy Lakes on one side and Grave Peak Lakes on the other. Two of the Grave Peak water bodies can be viewed off to the right. Use extreme caution working your way down the slope to Pond 1.



USGS Quad: GRAVE PEAK.

Grave Peak Pond 1 and lake viewed from the ridgeline.

Geology

Grave Peak RNA is located within the Idaho batholith of granitic and related rocks which were uplifted and exposed in the late Tertiary. The area experienced multiple glacial events during the Quaternary, described in more detail in the RNA Establishment Report (Wellner and Bernatas 1991).

Classification

Grave Peak Pond 1
- Subalpine, small, shallow, cirque pond
- Medium-high production potential
- Circumneutral water in granitic basin
- Inlet: stream; Outlet: riffle-pool stream

Grave Peak Lake
- Subalpine, small, deep, cirque lake
- Medium-low production potential
- Circumneutral water in granitic basin
- Inlet: stream; Outlet: riffle-pool stream

Grave Peak Pond 2
- Subalpine, small, shallow, cirque pond
- Medium-low production potential
- Circumneutral water in granitic basin
- Inlet: cascade; Outlet: stream

Aquatic physical - chemical factors

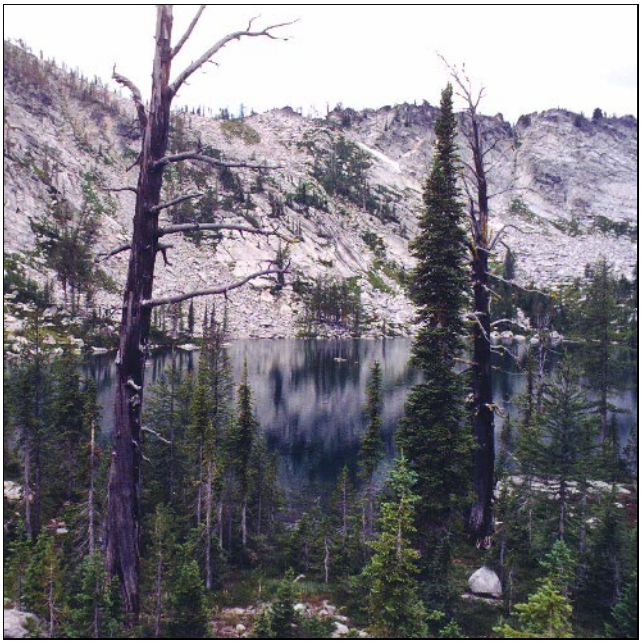
Grave Peak Pond 1
Area (hectares): 0.3 (0.8 acres)
Length of shoreline (m): 210 (689 ft)
Maximum depth (m): 1 (3.2 ft)
Aspect: SE
Elevation (m): 2268 (7440 ft)
Percent shallow littoral zone: 100
Dominant substrate: silt
Shoreline development: 1.089
Lake edge %: herbaceous-90, shrubs-10
Inlet: 1 stream
Outlet: 1 stream

The inlet to Pond 1 flows from the talus rock for about 30 meters and then takes on a meandering glide pattern for about the same distance to the pond. Sedges provide riparian cover. The lower section of the inlet substrate was organic sediment. The temperature of the inlet stream is 7 degrees C.

Meandering glide inlet stream flowed from talus rock to Pond 1. Riparian vegetation along the stream is mostly sedges.

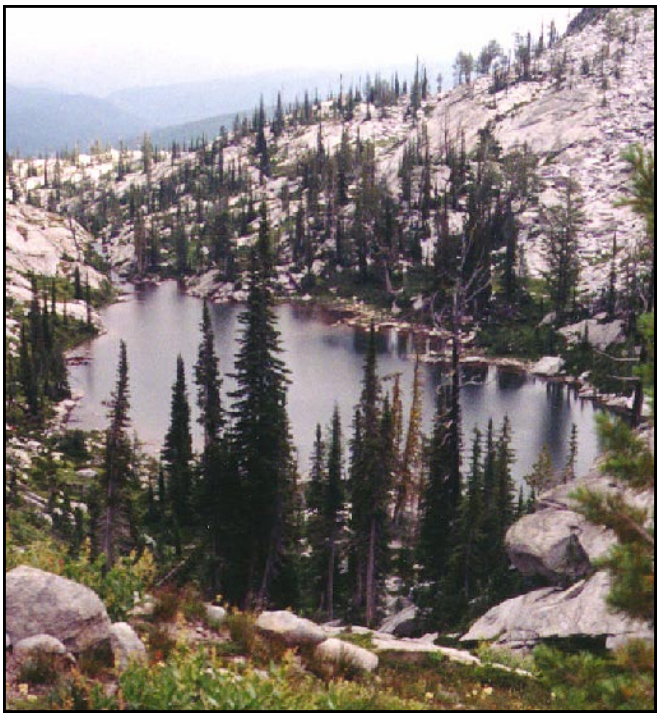
Riffle-pool type stream connecting Pond 1 and lake.

Grave Peak Lake
Area (hectares): 2.6 (6.5 acres)
Length of shoreline: 677 (2221 ft)
Maximum depth (m): estimate >5 m (> 16 ft)
Elevation (m): 2246 (7367 ft)
Aspect: SE
Percent shallow littoral zone: 20
Dominant substrate: boulders and cobble
Shoreline development: 1.190
Lake edge %: rock-70, conifers-20, herbaceous-10
Inlets: riffle-pool type stream
Outlets: 1 stream



View SE across Grave Peak Lake.

View southeast at Grave Peak Lake. Note the inlet stream. The lake is a much larger, deeper water body than either of the two ponds studied.



Northeast view of Grave Peak Pond 2.

Water cascades down bedrock slope emptying into Pond 2.

Grave Peak Pond 2
Area (hectares): 0.8 (2.1 acres)
Length of shoreline (m): 419 (1375 ft)
Maximum depth (m): Estimate 2 (7 ft)
Elevation (m): 2197(7207 ft)
Aspect: E
Percent shallow littoral zone: 100
Dominant substrate: bedrock, silt
Shoreline development: 1.306
Lake edge %: rock-55, shrubs-35, herbaceous-10
Alkalinity (mg/l): 2
Conductivity (micromhos/cm): <5
pH: 7
Inlet: cascades
Outlet: 1 stream

After inlet stream cascades down a steep slope it levels out for a short distance and enters Pond 2.

Vegetation

Subalpine coniferous vegetation in the Graves Peak area consists of subalpine fir (*Abies lasiocarpa*), whitebark pine (*Pinus albicaulis*), subalpine larch (*Larix lyallii*), and Engelmann spruce (*Picea engelmannii*).

Sedge meadows occur adjacent to the water bodies. Wellner and Bernatas (1991) reported yellow bog sedge (*Carex dioica*), Raynold's sedge (*Carex raynoldsii*), Ross sedge (*Carex rossii*), and Drummond's rush (*Juncus drummondii*).

Raynold's sedge
(*Carex raynoldsii*)
Hurd et al. 1998.

Macroinvertebrates

Grave Peak Pond 1
Trichoptera
Psychoglypha sp.
Coleoptera
Uvarus sp.
Diptera
Subfamily Orthocladiinae

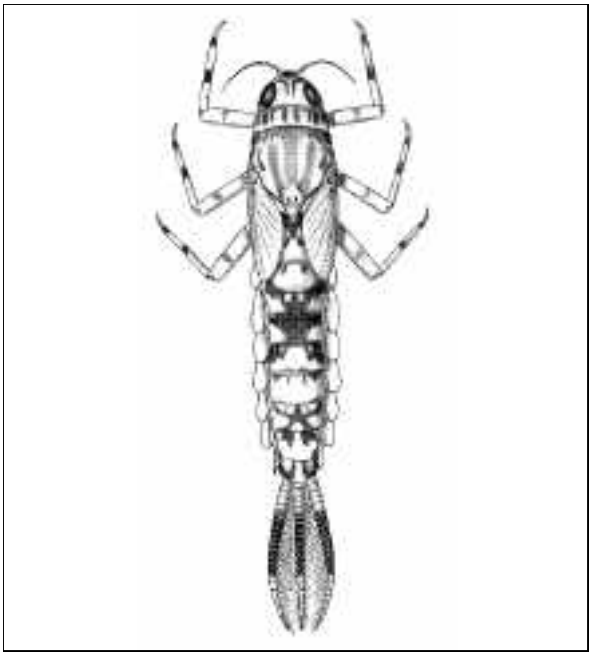
Grave Peak Pond 1 inlet

Trichoptera
Psychoglypha sp.
Allomyia sp.
Diptera
Polypedilum sp.
Rheotanytarsus sp.

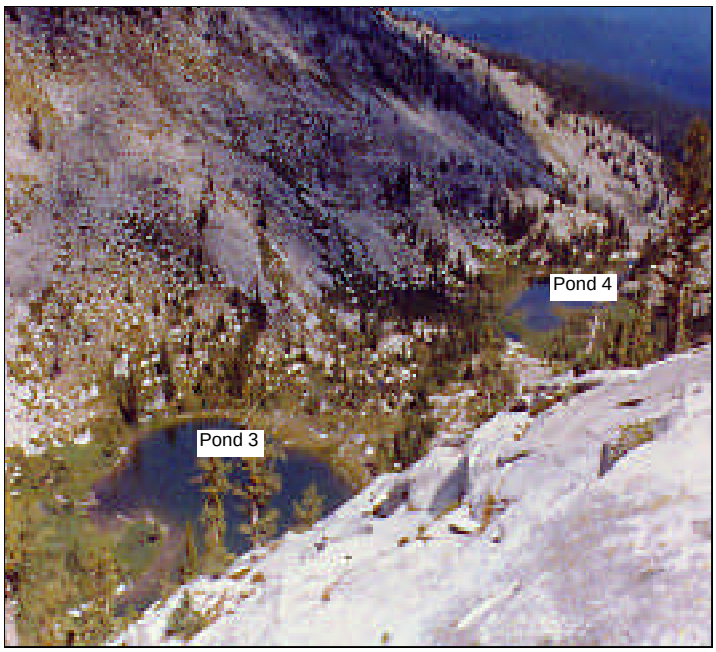
Grave Peak lake
Trichoptera
Clistorina sp.
Desmona sp.
Hesperophylax sp.
Psychoglypha sp.
Megaloptera
Sialis sp.
Diptera
Polypedilum sp.
Prosimulium sp.
Rheotanytarsus sp.
Platyhelminthes
Polycelis coronata
Pelecypoda
Pisidium sp.

Grave Peak lake inlet
Trichoptera
Desmona sp.
Psychoglypha sp.
Diptera
Hydrobaenus sp.
Prosimulium sp

Grave Peak Pond 2 inlet
Trichoptera
Neothremma sp.
Plecoptera
Setvena bradleyi
Sweltza sp.
Ephemeroptera
Nixe sp.
Ameletus sp.
Baetis bicaudatus
Diptera
Cryptolabis sp.
Subfamily Orthocladiinae
Simulium sp.
Coleoptera
Uvarus sp.
Platyhelminthes
Polycelis coronata



Ameletus, a mayfly from inlet of Grave Peak Pond 2. Sketch from McCafferty (1983).



Ponds 3 and 4 further downstream were not studied. Photo credit: Charles Wellner.

View from ridge looking at Pond 1 and lake.

Macroinvertebrates (continued)

Literature Cited

McCafferty, W. F. 1983. Aquatic entomology. Boston: Jones and Bartlett Publishers. 448 p.

Hurd, E. G.; Shaw, N. L.; Mastrogiuseppe, J (and others). 1998. Field guide to intermountain sedges. GTR-10 Department of Agriculture, Forest Service, Intermountain Research Station, Ogden, UT. 282 p.

Wellner, C. A.; Bernatus, S. 1991. RNA Establishment Record for Grave Peak RNA, Idaho County. U.S. Department of Agriculture, Forest Service. Unpublished report on file at Intermountain Region, Ogden, UT. 22 p.

Fenn Mountain Lakes

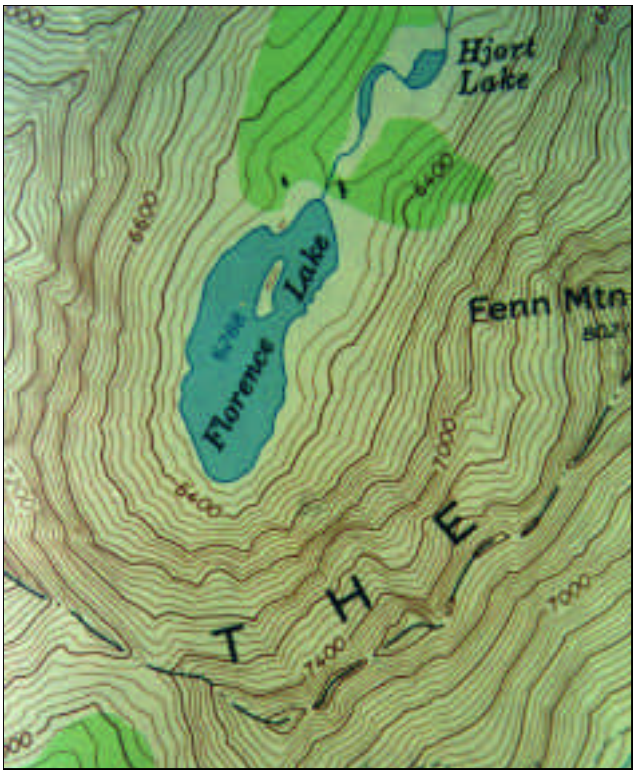
Fenn Mountain Proposed Research Natural Area
Clearwater National Forest

Florence Lake was surveyed by Peter Bahls on July 23-24, 1991. Hjort Lake, also in the RNA, was not sampled.

Location

Florence Lake and Hjort Lake part of the Selway Bitterroot Wilderness are located in the Craig Mountain Range about 13 air miles from the Fenn Ranger Station on the Selway River. Florence Lake is 9.5 miles from the nearest road (Bahls 1992). Access to the lake is very difficult. It is inaccesible by horseback.

Ecoregion Section: IDAHO BATHOLITH (M332A), Idaho County; USGS Quad: FENN MOUNTAIN.



USGS Quad: FENN MOUNTAIN.

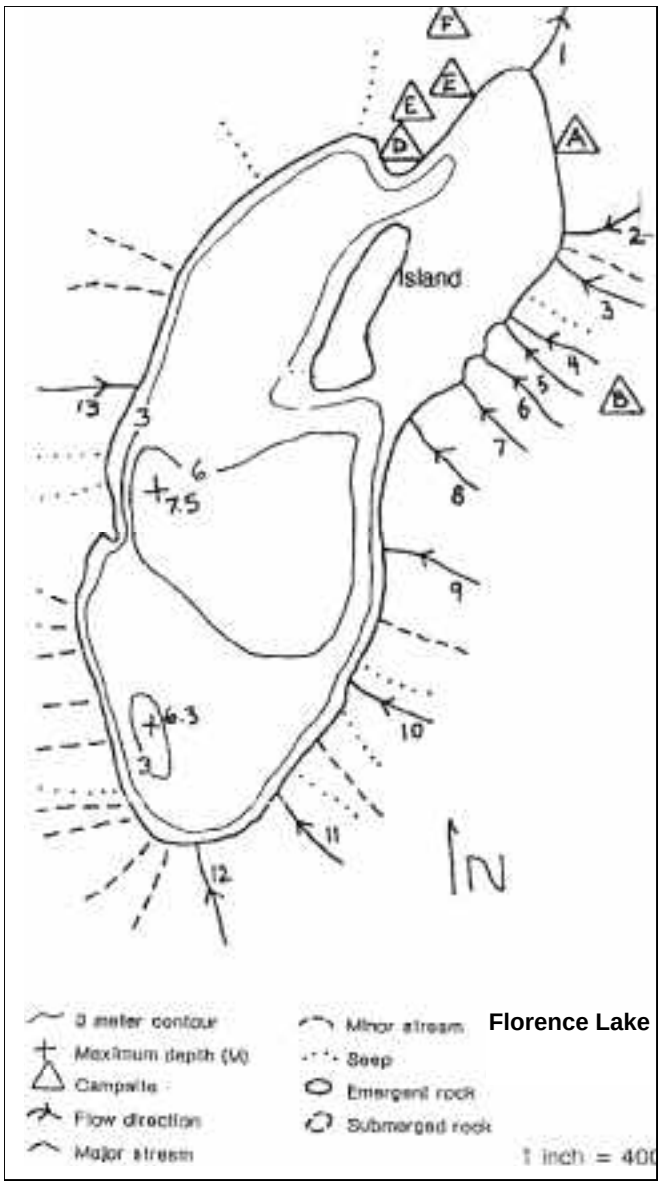
Geology

Foliated quartz monzonite is a granitic rock found in the area that has foliated texture from the parallel alignment of its mica mineral (biotite) as well as the other crystals in this rock (Greenwood and Morrison 1973).

The rock is Cretaceous in age and was emplaced as part of the Idaho batholith. It is uniform in this region and the main varying feature is the structure of the rock which can be uniform or foliated as here, depending on the stage of metamorphism (Greenwood and Morrison 1973).

Classification

- Subalpine, large, deep, cirque lake
- Medium production potential
- Circumneutral water
- Inlet: 13 major, 14 minor streams, 9 seeps
- Outlet: 1 stream



Bathymetric map of Florence Lake (Bahls 1992). Three meter contour level. 1 inch = 400 feet.

Aquatic physical-chemical factors

Area (hectares 12 (29.9 acres)
Length of shoreline (m): 1993 (6539 ft)
Maximum depth (m): 7.5 (25 feet)
Aspect: NE
Elevation (m): 1917 (6288 feet)
Percent shallow littoral zone: < 3
Dominant substrate: silt and rubble
Conductivity (micromhos/cm): 5
pH: 6.6
Inlet: 13 major and 14 minor streams, 9 seeps
Outlet: 1 stream

View north of the The Crags encircling Florence Lake. Notice the island in the water. A small portion of Hjort Lake is visible downstream (arrow). Photo credit: Sheryl Walker.

The littoral zone is limited especially on the west side of the lake (Bahls 1992). Ten percent of the bottom substrate is bedrock. The dominant sedge around the perimeter is *Carex rostrata*. Cutthroat trout (*Salmo clarki*) and rainbow trout (*Salmo gairdneri*) are reported to be large in size. Sheryl Walker, wilderness ranger, initiated campsite restoration measures at Florence Lake in 1992 (Wellner 1991).

Literature Cited

Bahls, P. F.1992. Report of the High Lake Fisheries Project Cooperative Project of Idaho Department of Fish and Game, Region 2, Clearwater National Forest, Orofino, Idaho. 67-72.

Greenwood, W. R.; Morrison, D. A. 1973. Reconnaissance geology of the Selway-Bitterroot Wilderness Area. Moscow , ID: University of Idaho, Bureau of Mines and Geology. l54 p.

Wellner, C. A. 1991. Letter to R. K. Moseley dated 9 September regarding elements occurring in Grave Peak proposed RNA, Fenn Mountain proposed RNA and Elk Creek proposed RNA. 2 p.

View towards west side of Florence Lake. The Crags in background. Photo credit: Sheryl Walker.