

SAWTOOTH

27. Surprise Valley RNA

28. Smiley Mountain RNA



Surprise Valley Lake and Pond

Surprise Valley Research Natural Area Salmon-Challis National Forest

Fred Rabe and Mabel Jones sampled a pond and a lake in the RNA on August 20, 1998.

Location

The RNA is located north of Standhope Peak in the Pioneer Mountains about 19 air miles northeast of Ketchum, Idaho.

Ecoregion Section: CHALLIS VOLCANICS (M332F), Custer County; USGS Quad: STANDHOPE PEAK

From Mackay, Idaho travel northwest on U.S. Route 93 for 16 miles to the junction with the Trail Creek Road. Turn left onto this road and travel 19 miles to the junction with FS Road 135. Turn left on 135, go 2 miles; then turn right on FS Road 136, driving up Wildhorse Creek for about 3 miles to the mouth of Fall Creek. Take FS Trail 059 up Fall Creek for about 2 miles to the junction with FS Trail 045. Take this trail up Fall Creek for another mile to its junction with the Moose Lake Trail 068. Shortly beyond this junction the trail forks again. One fork continues to Angel Lake and the east fork goes to Surprise Valley. Continue on the east fork of FS Trail 045 for another mile to the entrance to Surprise Valley and the lower lake. The upper lake is about 2 1/2 miles above the lower lake (Wellner 1991).



USGS Quad: STANHOPE PEAK.



Trail along Fall Creek. View south of Pioneer Mountains.

Geology

Surprise Valley RNA is a glacially-formed, high elevation hanging valley perched some 1,000 feet above Fall Creek and bordered by rugged ridges especially on the eastern side. The granitic rocks are composed of calcium rich minerals formed in the late Cretaceous to Tertiary periods (60-80 million years ago). These granitoids commonly have xenoliths or inclusions of a separate rock type averaging one foot in length (Dover 1966, Dover and Hall 1976). A stream leaves the lake, cascades down the slope as a waterfall over part of a moraine and flows down valley.



Standhope Peak 3621 m (11,878 ft).

Classification

Upper Surprise Valley Lake

- Alpine, small, deep, cirque lake
- Medium production potential
- Circumneutral water in granitoid basin
- Inlets: 4 seeps; Outlet: 1 stream

Lower Surprise Valley Pond

- Subalpine, small, shallow, cirque-scour pond
- Medium-high production potential
- Circumneutral water in granitoid basin
- Inlets: none; Outlet: none

Aquatic physical - chemical factors

Lower Surprise Valley Pond

Area (hectares): 0.6 (1.42 acres)
Length of shoreline (m): 288 (945 ft)
Maximum depth (m): estimate 1 (3 ft)
Elevation (m): 3000 (9840 ft)
Aspect: SE
Percent shallow littoral zone: 100
Dominant substrate: soft sediment
Shoreline development: 1.058
Lake edge %: herbaceous-90, conifer-5, shrub- 5
Inlets: none
Outlets: none

The organic sediment in the lower pond measures 35 cm deep. Water temperature was 18 degrees C. The pond is probably spring fed; no inlets or outlets were observed. It is classed as a semi-drainage pond.



View north of Lower Surprise Valley Pond. Standhope Peak is in background.



View south of Lower Surprise Valley Pond.

Upper Surprise Valley Lake

Area (hectares): 2.3 (5.7 acres)
Length of shoreline (m): 685 (2247 ft)
Maximum depth (m): estimate 5 (16 ft)
Elevation (m): 3098 (10,160 ft)
Aspect: SE
Percent shallow littoral zone: estimate 40
Dominant substrate: boulders
Shoreline development: 1.255
Lake edge %: talus rock-60, herbaceous-40
Alkalinity (mg/l): 25
Conductivity (micromhos/cm): 40
pH: 7.6
Inlets: 1 stream, 4 seeps
Outlets: 1 stream

The lake surface water temperature was 14 degrees C, 4 degrees cooler than the lower lake. Extensive wet meadows surrounding the lake are intersected by seeps. The relatively high alkalinity, pH and conductivity readings in the upper lake might relate to the calcium rich granitoid rock basin.



Upper Surprise Valley Lake at an elevation of 3098 m (10,160 ft) view north. Standhope Peak is in background.



View south. Herbaceous plants including forbs, sedges and grasses grow extensively around the lake shore.



Inlet stream into Upper Surprise Valley Lake. Temperature was 9 degrees C.



First order tributary (riffle-pool stream type) of Fall Creek from upper lake. Standhope Peak in the background.



Swift flowing outlet stream from Upper Surprise Valley Lake. Temperature was 13 degrees C. The substrate was dominated by large boulders. Dense amounts of algae in stream channel may be due to nutrients from decomposition of large amounts of herbaceous growth surrounding the lake.

Vegetation

Salix planifolia var. *monica* (plane-leaf willow) and *Carex aquatilis* (water sedge) were the dominant shrub and herbaceous plants surrounding the lower lake. *Carex limosa* (mud sedge) and *Eleocharis pauciflora* (few-flowered spikerush) were also present in the area. *Sparganium emersum* (Bur-reed) was noted in the lake. No aquatic plants were observed in the upper lake and sedges and other wetland forms were not collected there.



Edge of Lower Surprise Valley Pond. *Carex aquatilis* (water sedge) is dominant.



Taking a plant transect adjacent to Lower Surprise Valley pond. A list of terrestrial plants and aquatic species can be obtained from the Conservation Data Center in Boise, Idaho.

Inlet to Upper Surprise Valley Lake

Diptera

- Diamesa* sp.
- Prosimulium* sp.

Trichoptera

- Lenarchus* sp.

Outlet to Upper Surprise Valley Lake

Diptera

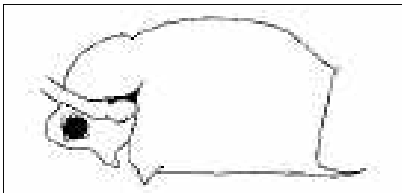
- Diamesa* sp.
- Family Chironomidae

Ephemeroptera

- Baetis bicaudatus*

Zooplankton

The only taxa observed in Lower Surprise Valley Pond was *Scapholeberis kingi*. This form is common in weedy waters such as occurs in the lower pond. *S. kingi* swims on its back near or at the surface (Brooks 1959). No plankton sample was collected from the upper lake.



Scapholeberis kingi was the only zooplankton observed in the lower pond sample. Sketch credit: Melanie Abell.



Diamesa sp. was the dominant chironomid larvae from the inlet and outlet of Upper Surprise Valley Lake.

Macroinvertebrates

Lower Surprise Valley Pond

Diptera

Family Orthoclaadiinae

Bezzia sp.

Ephemeroptera

Callibaetis sp.

Amphipoda

Hyalolella azteca

Gammarus lacustris

Hemiptera

Notonecta undulata

Family Gerridae

Pelecypoda

Pisidium sp.

Literature Cited

Brooks, J. L. 1959. Cladocera. In: Fresh water biology. New York: Wiley Press. 1248 p.

Dover, J. H. 1966. Bedrock geology of the Pioneer Mountains. Seattle, WA: University of Washington. 138 p. Dissertation.

Dover, J. H.; Hall, W. E. 1976. Geologic map of the Pioneer Mountains region. Blaine and Custer Counties, Idaho. U.S. Department of Agriculture, Forest Service. Open file report: 75-76

Wellner, C. A. 1991. Establishment record for Surprise Valley Research Natural Area within Challis National Forest, Custer County, ID. U.S. Department of Agriculture, Forest Service. Unpublished report on file at Intermountain Region, Ogden, UT. 25 p.

Smiley Mountain Lake and Ponds

Smiley Mountain Research Natural Area Salmon-Challis National Forest

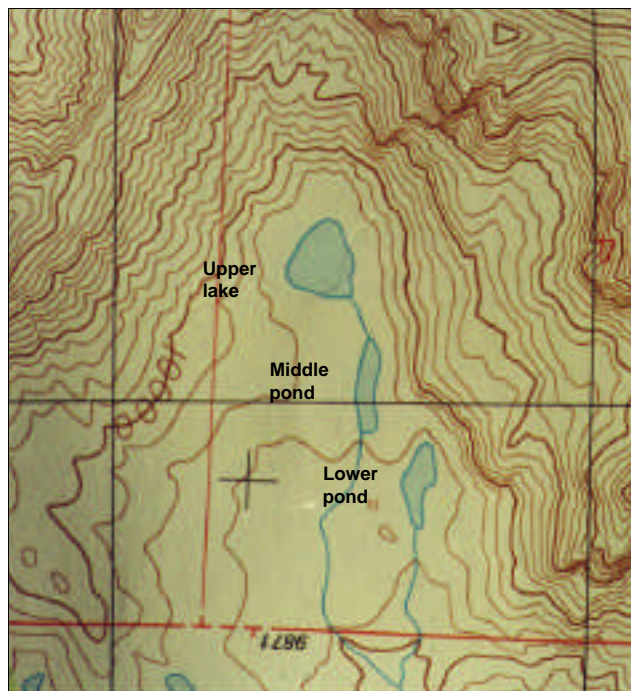
One lake and two large ponds occur in the RNA together with smaller ponds and wetlands at a lower elevation. Fred Rabe and Mabel Jones sampled the large ponds and lake along with a number of interconnecting streams on August 19 - 20, 1998.

Location

The RNA is located at the southeastern end of the Pioneer Mountains approximately 27 air miles east of Ketchum Idaho.

Ecoregion Section: CHALLIS VOLCANICS (M332F), Custer County; USGS Quad: SMILEY MOUNTAIN

From Mackay, Idaho go southeast on U.S. Route 93 for 16 miles. Turn right on Antelope Road and travel southwest for 18 miles to Antelope Guard Station. Turn right onto FS Road 135 and go 17 miles crossing Antelope Pass to the junction with FS Road 138 near the Copper Basin Guard Station. Turn left onto FS Road 138 and go 4.5 miles to Lake Creek. Park at the Lake Creek trailhead and take FS Trail 064 up Lake Creek for 5 miles to the point near Round Lake where the trail divides. One branch goes to the south end of Long Lake and the other goes past the north end of Long Lake and on to Rough Lake and Big Lake. The western boundary of the RNA is about 0.2 miles southeast of the point where the trail divides (Wellner 1991).



USGS Quad: SMILEY MOUNTAIN.

Geology

The RNA is located in the extreme southeastern of the Pioneer Mountains. The main rock formations in the area are Challis volcanics and granitics (Dover 1981). Mountain glaciation has resulted in sharp and broad ridges, cliffs, ledges, talus slopes, rock glaciers and cirque basins.



Small ponds and wetlands in the RNA are downstream of study site. These ponds were not sampled.

Classification

Upper Smiley Lake

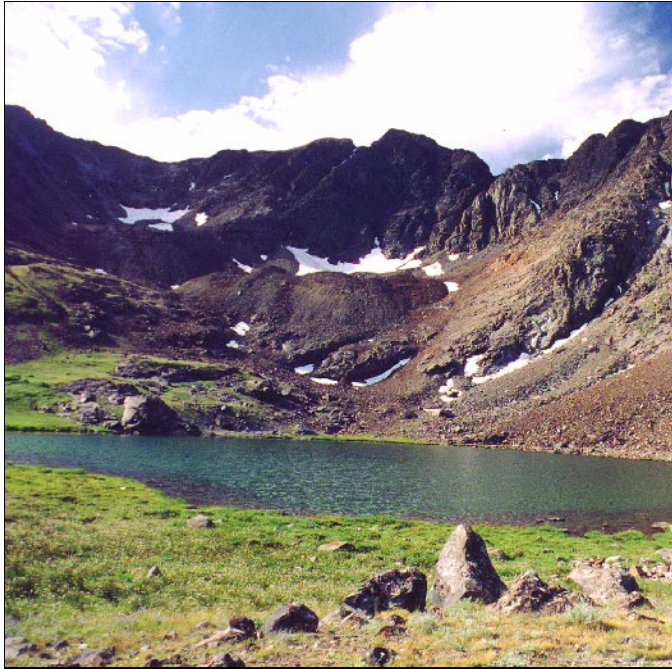
- Alpine, small, shallow, cirque lake
- Medium production potential
- Circumneutral water in volcanic-granitic basin
- Inlet: seep; Outlet: stream

Middle Smiley Pond

- Alpine, small, shallow, cirque-scour pond
- Medium production potential
- Circumneutral water in volcanic-granitic basin
- Inlet: stream; Outlet: stream

Lower Smiley Pond

- Alpine, small, shallow, cirque pond
- Medium production potential
- Circumneutral water in volcanic-granitic basin
- Inlet: stream; Outlet: stream



View north of Upper Smiley Mountain Lake in the Pioneer Mountains. The elevation is 3024 m (9920 ft).



View south of Upper Smiley Mountain Lake with seep entering lake.

Aquatic physical - chemical factors

Upper Smiley Mountain Lake

Area (hectares): 1.6 (4.0 acres)
 Length of shoreline (m): 483 (1585 ft)
 Maximum depth (m): 3 (10 ft)
 Elevation (m): 3024 (9920 ft)
 Aspect: SE

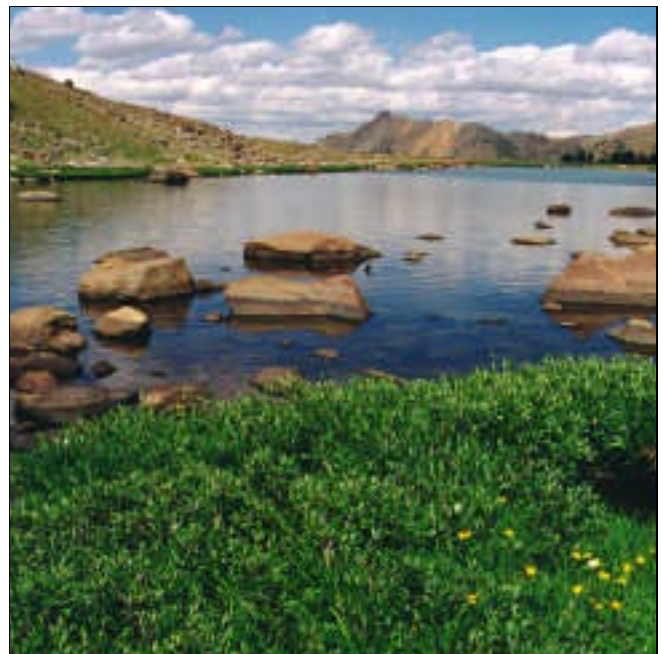
Percent shallow littoral zone: 100
 Dominant bottom substrate: soft sediments, silt
 Shoreline development: 1.059
 Lake edge %: herbaceous / willow-80, talus, cliffs-20
 Alkalinity (mg/l): 7
 pH: 7.0
 Conductivity (micromhos/cm): 15
 Inlets: 1 seep
 Outlets: 1 stream

Rock in the littoral zone is covered with a fine layer of silt. Temperature of the lake is 12 degrees C. The outlet from the upper lake flows about 200 m to the middle pond. The first section of stream has no perceptible flow and was about 2 m wide and 20 cm deep. Downstream the current increased; stream averages 10 cm deep and 70 cm wide. Substrate in the stream consists of boulders and cobble. No coarse particulate organic matter are observed. Temperature was 14 degrees C.

Middle Smiley Mountain Pond

Area (hectares): 0.6 (1.4 acres)
 Length of shoreline (m): 288 (945)
 Maximum depth (m): estimate 3 (10)
 Elevation (m): 3012 (9880 ft)
 Aspect: S

Percent shallow littoral zone: 100
 Dominant bottom substrate: boulders and cobble
 Shoreline development: 1.054
 Lake edge %: herbaceous-99, rock-1
 Inlets: 1 stream
 Outlet: 1 stream



Middle Smiley Mountain Pond. Note inlet to the right. *Salix planifolia* var. *monica* (plane-leaf willow) visible in foreground.

A meandering glide stream flows from the middle pond. Boulders with some rubble constitute the stream substrate. Width and depth averages about 1 m. No coarse particulate organic material exists. Silt covers the rocks in the stream similar to the upper pond and lake. Water temperature was 16 degrees C. The riparian zone consists of herbaceous plants and low growing willows.



Outlet from Middle Smiley Mountain Pond. Note preponderance of boulders in channel.



Origin of inlet to Lower Smiley Mountain Pond. Accumulated snow and ice insulated by rock provide runoff into the pond.

Lower Smiley Mountain Pond

Area (hectares): 0.7 (1.8 acres)

Length of shoreline (m): 408

Maximum depth (m): 4

Elevation (m): 2982 (9780 ft)

Aspect: S

Percent shallow littoral zone: 80

Dominant substrate: soft sediment and silt.

Lake edge %: Sedge-90, talus and boulders-10

Inlets: 1 stream

Outlets: 1 stream

The inlet stream into Lower Smiley Mountain Pond originated from snow and ice accumulated under loose rock. At its beginning the inlet is about 1 m wide and 8 cm deep. It flows rapidly 100 m downhill into a shallow pool which then empties into the pond. At this point, the stream is about 45 cm deep.



View south of Lower Smiley Mountain Pond.

The low gradient outlet from the lower pond with a boulder-rubble substrate averages about 61 cm wide and 13 cm deep. The riparian vegetation is primarily sedges and other herbaceous growth.



Low gradient outlet from Lower Smiley Mountain Pond. Herbaceous growth provides the riparian cover. Note lack of coarse particulate organic matter in stream channel.



A large number of interconnected ponds within an extensive wet meadow occur below the study site.

Vegetation

Mabel Jones from the Conservation Data Center in Boise, Idaho identified the plants in the Smiley Mountain area. Willows are *Salix arctica* (arctic willow) which forms mats in snowmelt areas and *Salix planifolia* var. *monica* (plane-leaf willow) dominant along outlet channels. When mature, *S. planifolia* is only about 1 m tall.



Salix arctica (arctic willow) observed in vicinity of upper lake.

Sedges common as riparian vegetation surrounding lakes and streams were *Carex scopulorum* (Holm's Rocky Mountain sedge), *Carex aquatilis* (water sedge) and *Carex utriculata* (bladder sedge). Tufted hairgrass (*Deschampsia cespitosa*) was also common in some of these aquatic habitats.



Sedges, forbs, grasses and willows line the edge of Upper Smiley Mountain Lake. Note the scarlet paintbrush (*Castilleja miniata*).

Zooplankton

A calanoid copepod (*Diaptomus* sp.) was the only taxa observed in all three water bodies. This was somewhat unexpected since a minimum of at least three species of zooplankton are usually found in high mountain lakes. No rotifers were present in the samples. The most dense population of zooplankton occurred in the lower pond and least dense was observed in the upper lake. The presence of these large *Diaptomus* may be due to the lack of fish populations.

Macroinvertebrates

Upper Smiley Mountain Lake

Trichoptera

Brachycentrus sp.

Lenarchus sp.

Diptera

Subfamily Chironominae

Coleoptera

Uvarus sp.

Ephemeroptera

Baetis bicaudatus

Amphipoda

Gammarus lacustris

Hyallela azteca

Outlet Upper Smiley Mountain Lake

Ephemeroptera

Baetis bicaudatus - dominant

Plecoptera

Family Chloroperlidae

Diptera

Subfamily Tanypodinae

Subfamily Chironominae

Simulium sp.

Trichoptera

Lenarchus sp.

Platyhelminthes

Procotyla sp.

Middle Smiley Mountain Pond

Trichoptera

Lenarchus sp.

Diptera

Subfamily Orthoclaadiinae

Subfamily Chironominae

Amphipoda

Gammarus lacustris

Outlet Middle Smiley Mountain Pond

Ephemeroptera

Baetis bicaudatus

Plecoptera

Unidentified

Diptera

Simulium sp. - dominant

Pseudodiamesa sp.

Amphipoda

Hyallela azteca

Lower Smiley Mountain Pond

Ephemeroptera

Baetis bicaudatus

Trichoptera

Dicosmoecus sp.

Diptera

Prosimulium sp.

Coleoptera

Rhantus sp.

Hydroporus sp.

Oligochaeta

Family Tubificidae

Pelecypoda

Pisidium sp.

Outlet Lower Smiley Pond

Ephemeroptera
Baetis bicaudatus
Trichoptera
Dicosmoecus sp.
Diptera
Simulium sp.
Subfamily Orthocladiinae
Platyhelminthes
Procotyla sp.

Inlet Lower Smiley Pond

Ephemeroptera
Baetis bicaudatus
Trichoptera
Rhycophyla albertae
Diptera
Subfamily Orthocladiinae

First order tributary of Lake Creek below Lower Smiley Pond.

Ephemeroptera
Baetis bicaudatus
Ameletus sp.
Plecoptera
Zapada sp.
Trichoptera
Chyranda sp.
Dicosmoecus sp.
Psychoglypha sp.
Diptera
Pseudodiamesa sp.
Simulium sp.
Triboles sp.
Pagastea sp.
Diamesa sp.
Platyhelminthes
Proctyla sp.

Two additional stream reaches below Lower Smiley Mountain Pond were sampled. One site has a heavy riparian cover of willow (*Salix planifolia* var. *monica*) and the other site is a steep gradient cascade-pool type below the confluence of two streams.



First order tributary below Lower Smiley Mountain Pond with thick riparian cover of willow. Large rocks embedded in sediment and ample CPOM (coarse particulate organic matter). Channel varies in width. Water temperature was 11 degrees C. Soft water conditions (pH 7, alkalinity 7, conductivity 15). Large concentrations of flatworms and caddisfly larvae were sampled.



Second order tributary of Lake Creek averaged 2 m in width. Gradient about 7 percent. Pools up to 35 cm deep. Rapid flow. Water temperature was 14 degrees C. Many different kinds of mayflies and caddisflies were sampled.

Second order tributary of Lake Creek below confluence of stream draining Lower and Middle Smiley Mountain Ponds

Ephemeroptera

Baetis bicaudatus
Cinygmula sp.
Seratella tibialis
Epeorus albertae

Trichoptera

Rhyacophyla albertae
Rhyacophyla bettini
Dicosmoecus sp.
Parapsyche sp.
Arctopsyche sp.

Diptera

Simulium sp.



A freshwater shrimp (*Gammarus lacustris*) occurs in Upper Smiley Mountain Lake and Middle Smiley Pond. This crustacean is usually not found in high lakes where fish occur as was the case with the Smiley lakes. *Gammarus* is omnivorous. It browses on the film of diatoms and organic debris covering leaves such as might occur on the dense sedges along the lake shores. *Hyalolella azteca* is another freshwater shrimp sampled from the two lakes. It is considerably smaller in size than *Gammarus*.



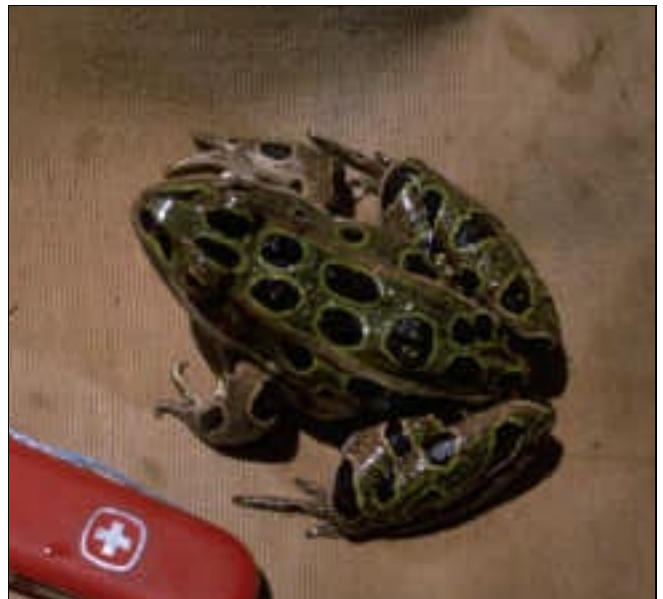
Chyranda sp. is a caddisfly whose case consists of pieces of thin bark arranged to form a straight tube with a prominent flange-like seam along each side. This taxa was dominant in the first order stream leaving Smiley Mountain Lower Pond.

Vertebrates

No fish species were observed in the relatively shallow alpine lake and ponds. The spotted frog (*Rana pretiosa*) was commonly seen along the water's edge.



Rhyacophyla albertae is a caddisfly common in the second order tributary of Lake Creek with a cascade-pool type flow. A relatively large proportion of aquatic insects from this stream reach were mayflies and caddisflies compared to the low gradient first order stream with a willow dominated riparian zone which had a different macroinvertebrate composition.



Spotted frog (*Rana pretiosa*) was common along the shore of the lake and ponds.

Literature Cited

Dover, J. H. 1981. Geology of the Boulder - Pioneer wilderness study area. Blaine and Custer Counties, Idaho. U.S. Geological Survey. Bulletin 1497-A: 16-75.

Wellner, C. A. 1991. Establishment record for Smiley Mountain Research Natural Area within Challis National Forest, Custer County, Idaho. U.S. Department of Agriculture, Forest Service, Unpublished report on file at Intermountain Region, Ogden, UT. 26 p.

