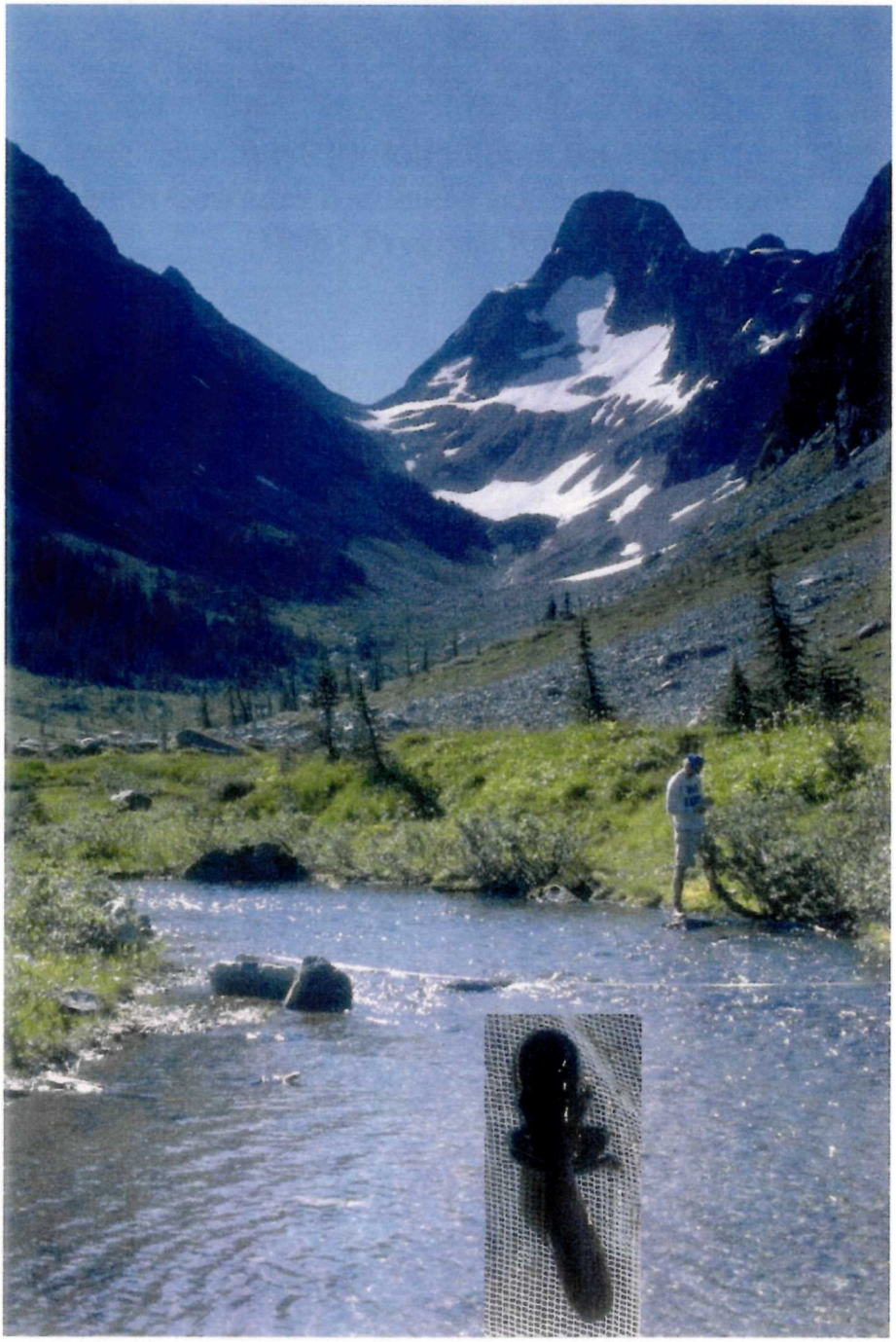
NOCA NRPP Amphibian Inventory
North Cascades National Park Service Complex
1998 - Progress Report



Ronald E. Holmes and Reed S. Glesne

North Cascades National Park Service Complex
2105 State Route 20
Sedro-Woolley, Washington 98284-9314

May 1999

NOCA NRPP Amphibian Inventory
North Cascades National Park Service Complex
1998 - Progress Report

Ronald E. Holmes and Reed S. Glesne

North Cascades National Park Service Complex
2105 State Route 20
Sedro-Woolley, Washington 98284-9314

May 1999

ABSTRACT

The 1998 amphibian inventory in the North Cascades National Park Service Complex (NOCA) was funded through the National Park Service Natural Resource Preservation Program in cooperation with Dr. Bruce Bury, Biological Resource Division, Forest and Range Ecosystems Science Center, Corvallis, Oregon as the part of a four-year program to inventory amphibians in Pacific northwest National Parks. The objectives of this study were to conduct a baseline inventory, evaluate environmental factors affecting distribution of amphibians, and develop protocols for both extensive and intensive monitoring. In 1996, the first year of this program, National Park Service staff conducted an amphibian inventory of the Big Beaver watershed. In 1997, the second year of this program, the amphibian inventory continued in Bridge Creek watershed, and included an update on frogs of Big Beaver valley. This report includes information collected in 1998 focusing on finishing Bridge Creek and Thunder Creek watersheds and data collected in conjunction with the Seattle City Light funded lake ecology project.

Physical, chemical, and amphibian abundance and distribution data were collected at nineteen stream reaches, and seventy-two lake/ponds. The tailed frog *Ascaphus truei*, and Cascades frog *Rana cascadae* were the only amphibians captured in stream habitats. Nine species of amphibians were found in the lake/ponds surveyed. They included: *Ambystoma gracile, Ambystoma macrodactylum, Ascaphus truei, Bufo boreas, Hyla regilla, Rana aurora, Rana cascadae, Rana luteiventris, and Taricha granulosa*. Six stream reaches in Thunder Creek and Fisher Creek watersheds were intensively sampled for tailed frog tadpoles in an effort to determine the number of age class cohorts present. It appears that three or possibly four age classes are represented in these streams. Small sample sizes (25-56) are not adequate to make a reliable assessment of age classes. Ascaphus tadpole length frequency data are presented.

Tissue samples collected in 1997 from frogs in Big Beaver Valley were DNA typed by Mike Blouin of the Zoology Department at Oregon State University, Corvallis, Oregon and determined to be *Rana luteiventris,* Columbian spotted frog. A few additional samples from frogs captured at McMillan Creek (a main tributary of Big Beaver) beaver ponds were collected in 1998 and have been sent in for DNA testing.

Table of Contents

List of Figures

List of Tables

NOCA NRPP Amphibian Inventory
1998 - Progress Report

INTRODUCTION

There are several goals concerning amphibians in North Cascades National Park (NOCA) which are reflected in management plans and various research proposals and programs. These include inventory and habitat characterization, development of a long-term monitoring program, and evaluation of the effects of fish stocking on lake amphibian populations.

NOCA has been selected as one of ten of the NPS National Prototype Long-term Ecological Monitoring (LTEM) parks. NOCA was selected to represent the lake and stream category of the LTEM program. In the NOCA LTEM proposal, a watershed approach that addresses park and regional needs for watershed management was selected. The approach focuses on the stream-riparian corridor, but also tracks processes and environmental influences occurring within the target watersheds. Amphibians were selected as one of the biological components of the monitoring program. LTEM objectives for amphibians include the examination of spatio-temporal changes in species occurrence in representative stream and lake habitats and associated riparian zones. Sampling design considerations require that data be collected in a manner that would support spatial and temporal analysis of distributional patterns, changes in relative abundance, and factors influencing these attributes.

Amphibians are important components in many ecosystems. They can occupy key trophic positions in food webs of both aquatic and terrestrial systems. As adults they can be top carnivores, and as larvae or juveniles, they may be the major food source of many other species including birds, mammals, fish, and invertebrates. In some forest ecosystems, amphibians may comprise the major component of the vertebrate biomass (Burton and Likens 1975, Bury 1988). Moreover, under certain conditions, amphibians may be good "bioindicators" of environmental stress because of various aspects of their life histories, including their physiological and behavioral characteristics, morphogenetic patterns, and aspects of their population biology. The decline in amphibians may be an early warning signal that, ultimately, other organisms also may be in danger of decline and extinction.

The Washington Department of Fish and Wildlife (1998) has listed for protection two species of Spotted Frog, the Oregon Spotted Frog *Rana pretiosa* as endangered, and the Columbian Spotted Frog *Rana luteiventris* as a candidate. The U.S. Fish and Wildlife Service has listed the Oregon Spotted Frog as a federal candidate and the Columbian Spotted Frog, Northern Red-legged frog *Rana aurora aurora*, and Cascades frog *Rana cascadae* as species of concern.

The National Park Service provided support to Oregon State University through a cooperative agreement to conduct a study of the ecological effects of stocked trout in naturally fishless lakes in NOCA (Liss et al 1995). This study, conducted from 1989 to present, documented three salamanders: *Ambystoma macrodactylum* in both east and westslope lakes, *Ambystoma gracile*, and *Taricha granulosa* only in westslope lakes. In addition, four Anuran amphibians were

found: *Bufo boreas* in both east and westslope lakes, *Hyla regilla* westslope, *Ascaphus truei* both east and west, and *Rana luteiventris* in east only.

In 1991 a Stehekin Valley Vertebrate Inventory (eastslope) was conducted by NOCA staff (Kuntz and Glesne 1993). Pitfall traps in this study yielded five amphibian species: *Rana cascadae*, *Hyla regilla*, *Rana luteiventris, Bufo boreas,* and *Ambystoma macrodactylum.* In 1993-1994 pitfall traps were installed and monitored by NOCA staff at Park Slough near Newhalem (westslope). The Park Slough pitfall traps produced *Ensatina eschscholtzii* and *Rana aurora.* Nearby fish traps in the Park Slough spawning channels caught *Bufo boreas*.

In 1995-1996 an arthropod study using pitfall traps was conducted in lower Big Beaver Valley, a drainage to the west of Ross Lake. This trapping effort resulted in the incidental take of nine species of amphibians: *Bufo boreas, Ascaphus truei, Hyla regilla, Rana cascadae, Rana pretiosa, Ambystoma macrodactylum, Ambystoma gracile, Taricha granulosa,* and *Ensatina eschscholtzii.*

The current study began in 1996 with an amphibian inventory in Big Beaver watershed and was funded as part of a four year program to inventory amphibians in Pacific northwest National Parks, including Olympic (OLYM), Mount Rainier (MORA), and North Cascades (NOCA). The objectives of this study were to conduct a baseline inventory, evaluate environmental factors affecting distribution of amphibians, and develop protocols for both extensive and intensive monitoring. Funding is from the Natural Resource Preservation Program (NRPP) and is administered by Dr. R. Bruce Bury of the Biological Resources Division (BRD), United States Geological Survey (USGS) at the Forest and Rangeland Ecosystem Science Center (FRESC), Oregon State University (OSU) Corvallis, Oregon. Additional sampling in lakes and ponds has been supported in part by funds from Seattle City Light through the wildlife settlement agreement for relicensing of the Skagit River Hydroelectric Project.

During 1996, physical, chemical, and amphibian abundance and distribution data were collected at twenty-seven stream reaches, thirty individual seeps, and twenty-one lake/ponds in the Big Beaver Creek watershed (Holmes and Glesne 1997). The only amphibian captured in streams was the tailed frog *Ascaphus truei*. Two species of amphibians were found at seep locations: *Rana cascadae* and *Ambystoma gracile*. Eight species of amphibians were found in the lake/ponds surveyed. They were: *Ambystoma gracile, Ambystoma macrodactylum, Bufo boreas, Hyla regilla, Rana aurora, Rana cascadae, Rana luteiventris, and Taricha granulosa. Ensatina eschscholtzii* which was collected in pitfall traps in another study, brings to ten the number of amphibians found in Big Beaver Valley to date. All 1996 identifications of *Rana cascadae, Rana pretiosa*, and *Rana aurora* in Big Beaver Valley are unconfirmed. The reason for the ambiguity in these ranid frog identifications is the intergradation of field mark characteristics between these species.

In 1997, the second year of this study a NOCA amphibian crew conducted an inventory of Bridge Creek watershed (Holmes and Glesne 1998). Physical, chemical, and amphibian abundance and distribution data were collected at twenty-eight stream reaches, seven individual seeps, and fifteen lake/ponds . The only amphibian captured in streams was the tailed frog *Ascaphus truei.* One amphibian, *Ambystoma macrodactylum,* was found at a seep location. Five species of

amphibians were found in the lake/ponds surveyed. They were: *Ambystoma macrodactylum, Bufo boreas, Hyla regilla, Rana cascadae, and Rana luteiventris*. The objectives of this report are to only present methods and data collected during the 1998 field season in watersheds over a wide range of the North Cascades National Park Service Complex. Relationships between species distributions and environmental attributes will be analyzed in a final report.

STUDY AREA

A total of 19 stream reaches and 72 lake/ponds were sampled during 1998. Specific sampling locations are shown in Figure 1, Appendix Table A1, and Appendix Figures A1 to A28. Streams sites ranged from first order headwaters to third order mainstem reaches of Fisher Creek in the Thunder Creek watershed and Grizzly Creek in the Bridge Creek watershed. Most reaches sampled were in first and second order streams with three third order reaches sampled.

The climate the North Cascades are modified by topographic features in and around the Park. Air masses originating as frontal systems over the Pacific Ocean release moisture in the form of rain or snow as they are forced to rise over the crest of the Cascade mountain range. This results in higher precipitation on the west slope and lower precipitation on the east slope. Based on records from nearby weather stations rainfall is estimated to range from approximately 150 cm in the eastern side to250 cm in the western side.

Several periods of glaciation during the past 1.5 million years has given the valleys typical straight, flat-bottomed, steep-walled valleys. Headwaters of the larger streams begin in cirques, some of which contain small glaciers. Smaller tributary streams begin on the steep upper slopes of the valley walls. Cirques and lower valley slopes are choked with debris produced by glacial erosion and mass-wasting processes (pers.comm. Jon Riedel 1998).

The lakes and ponds surveyed have a variety of geophysical factors at work in their formation. Some have had glacial influence either in the scouring out of a depression which now traps water or by deposition of morraine material which blocks water drainage to form an impoundment. Landslides have been responsible for damming some waterways and causing lake or pond formation. River meanders become detached when the channel shifts, leaving a curved body of water near a river channel but without significant flow. Lastly another major contributor to lake/pond formation is the activity of beaver. In several low-gradient stream or river courses beaver have constructed dams from trees and branches which cause the formation of ponds and pond complexes.

The vegetation is primarily subalpine forests including Pacific Silver Fir (*Abies amabalis*), Subalpine Fir (*Abies lasiocarpa*), and Mountain Hemlock (*Tsuga mertensiana*) Zones (Franklin and Dyrness 1973). In addition to these tree species, some parts of the study area contain varying proportions of Douglas-fir (*Pseudotsuga menziesii*), Englemann spruce (*Picea englemannii*), lodgepole pine (*Pinus contorta*), white pine (*Pinus monticola*), and at higher elevations subalpine larch (*Larix lyalli*), and white-bark pine (*Pinus albicaulis*). Broad-leaved trees encountered, mostly in the riparian areas and avalanche chutes, were: Black cottonwood (*Populus balsamifera*), Red alder (Alnus rubra), Sitka alder (*Alnus sinuata*), Douglas' maple

(*Acer glabrum* var. *douglasii*), Vine maple (Acer circinatum), Sitka willow (*Salix sitchensis*), and a few Big-leaf maple (*Acer macrophyllum*).

The typical shrub layer in drier open areas contained Snowbrush ceanothus (*Ceanothus velutinus*), Western serviceberry (*Amelanchier alnifolia*), Oceanspray (*Holodiscus discolor*), Oregon boxwood (*Pachistima myrsinites*), and Red mountain heather (*Phyllodoce empetriformis*) at higher elevations. In forested areas common shrubs were: Salmonberry (*Rubus spectabilus*), Devil's club (*Oplopanax horridum*), Elderberrry (*Sambucus racemosa*), Fool's huckleberry (*Menziesia ferruginea*), salal, (*Gaultheria shallon*), and several Blueberry and Huckleberry species (*Vaccinium* spp.)

The stream reaches surveyed ranged in elevation from 463 meters at a lower Thunder Creek tributary to 1646 meters at headwater of Fisher Creek on the east side of Fisher Pass. (Appendix Table A1). Stream gradients of these reaches ranged from 1% to 42%. Average wetted width ranged from 0.9 m in first order headwaters to 10.5 m in second order mainstem of Fisher Creek (west)(Table 1). The dominant substrates were quite varied from boulder to medium gravel and subdominants were boulder to sand (Table 2). The general habitat types represented in these reaches were primarily riffle, cascades, and pools. Instream cover was provided primarily by undercut banks and organic debris. Densiometer canopy cover ranged from 0% at upper Fisher Creek (west) in an alpine meadow to 100% at Berry Creek, a tributary of lower Bridge Creek. (Table 3). Vegetation forest types at stream sites ranged from open krumholz through various stages of young (including avalanche thickets) and mature to old-growth coniferous forests (Table 4). Water temperature in streams at time of surveys ranged from 40° to 64° F. Stream pH ranged from 6.91 at North Fork (site # 222) to 7.53 at a tributary of Fisher Creek (site # 202) and conductivity from 12.19 to 58.4 uS/cm (Table 5).

A total of 57 ponds and 15 lakes were surveyed for amphibians. These 72 bodies of water were sampled using the same techniques so were lumped into a single lake/pond category. Physical and chemical data for lake/ponds are found in Tables 6 and 7. These bodies of water ranged in size from 0.01 acre ponds to 55 acre Lower Thornton Lake (MR10). The elevations of the lake/pond sampling sites range from 286 m at pond BD02 near the Skagit River to 2082 m at pond MR07 on a ridge above Kettling Lakes in the Bridge Creek watershed. Fish presence was noted in 12 of the 72 lake/ponds. The pH of all lake/ponds ranged from 5.03 at lower Middle Lake (MC16-2) to 7.49 at Firn Lake (MP02). The water temperature of the lake/ponds ranged from 40° F at a pond at the confluence of Fisher Creek (west) and Logan Creek (ML09-05) on 9/03/98 to 78° F at pond in Skymo Creek basin (PM05-02) on 8/04/98.

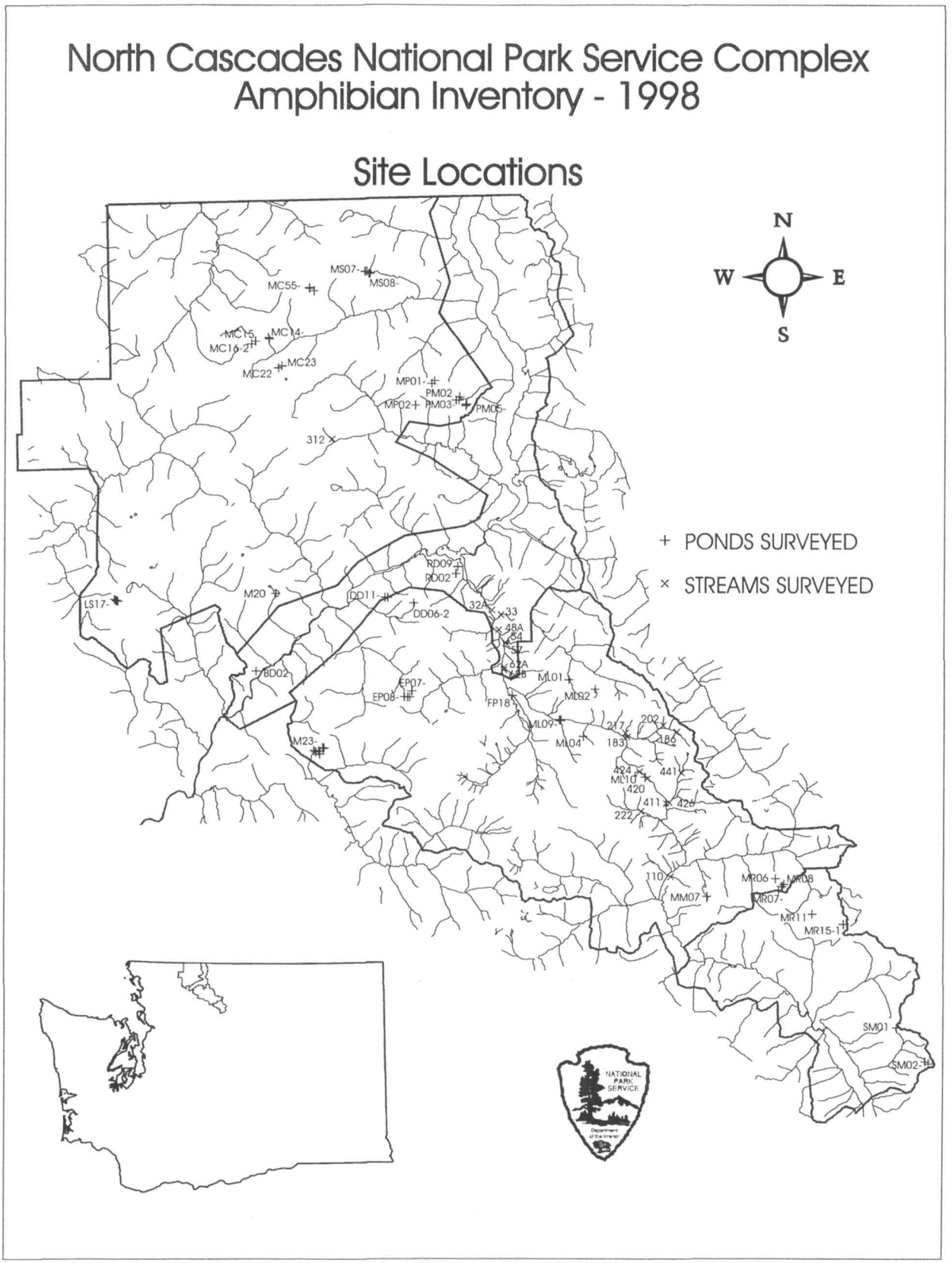


Figure 1. Location of 1998 amphibian inventory sites, North Cascades National Park Service Complex, Washington.

METHODS

Photo Documentation

Photos were taken at each amphibian survey site. Notes recorded on a photo log form (Attachment 1) include date, roll #, picture #, site #, reach #, stream meter, and a comment field description of subject. At each stream reach photos were taken at stream meter 0, 50, and 100 one each upstream and downstream. At ponds two to four photos were taken to document littoral habitat types and surrounding vegetation. The photos were developed into color slides and photo CD format. A flat database Photo Catalog (Appendix Table A2) was developed for these photos which includes a photo CD # and image # in addition to the above data fields. The photos from our study are also referenced in Accessory Data Tables (Appendix Tables A3, A4) listing all sites surveyed with ancillary data such as crewmembers and weather conditions. A series of 1:12,000 color aerial photographs in 9"x9" format, taken in July - August 1998, were used to map the exact locations of each survey site for future reference to assist in locating these same sites again. These photos were scanned at 600 dpi, sharpened, and zoomed in to show local landmarks (boulders, logs). Then site number labels added to indicate specific survey sites (Appendix Figures A1 to A28).

Water Chemistry

Water samples were collected at most amphibian survey sites, and analyzed to determine pH, conductivity. Samples were collected in sterilized nalgene bottles, capped immediately after collection, and refrigerated upon being brought in from the field. Water temperature was also taken at each sampling site. Conductivity was read using a YSI ™ model 35 conductance meter. The pH of water samples was determined using an Altex ™ 70 pH meter standardized with 4.0 and 7.0 pH buffers. Water samples were brought to 25° C prior to pH and conductivity analysis.

Pond Amphibian Sampling

Sampling of ponds for amphibians was done using two survey methods: shoreline search (visual encounter), and funnel trapping with collapsible nylon mesh minnow traps (unbaited).

Visual

Visual searches were done during daylight only. No nighttime searches were done due to the remoteness of most sites and danger to crewmembers involved in off trail travel in darkness. During our shoreline visual survey, one to three persons slowly walked the complete perimeter of ponds, with dip nets in hand, focusing on an area from the 1 m depth contour in water to the shore, then 2 m landward from shoreline. The perimeter of the lake/pond was divided up between the observers with each crewmember surveying a portion of the shoreline. Time spent and number of people performing visual searches was recorded. All observations and captures of amphibians during visual searches were recorded on Lake/Pond Amphibian Survey Data Form 3b-NOCA (Attachment 2).

TABLE 1. STREAM WIDTH, DEPTH, VELOCITY, & GRADIENT SUMMARY
NOCA - AMPHIBIAN SURVEY - 1998

WATERSHED	SITE NUMBER	SURVEY DATE	WETTED WIDTH METERS	BANKFUL WIDTH METERS	AVG. DEPTH CM	AVG. VELOCITY MPS	AVG. GRADIENT %	STREAM ORDER
THUNDER CK.	32A	07/01/1998	1.9	2.4	14.7	0.6	13	1
THUNDER CK.	33	06/18/1998	1.6	2.7	11.5	0.4	10	1
THUNDER CK.	48A	07/08/1998	1.3	2.3	5.6	0.3	14	1
THUNDER CK.	54	07/07/1998	0.9	1.8	8.1	0.1	9	1
THUNDER CK.	57	07/07/1998	1.8	2.0	9.7	0.6	10	2
THUNDER CK.	62A	06/25/1998	1.8	2.0	15.7	1.0	3	1
THUNDER CK.	62B	06/26/1998	3.0	3.1	22.9	1.4	10	2
BRIDGE CK.	110	08/13/1998	1.0	1.0	4.7	1.7	42	1
THUNDER CK.	183	07/21/1998	7.0	8.1	34.0	2.4	4	3
THUNDER CK.	186	07/23/1998	4.9	4.9	21.2	1.7	1	1
THUNDER CK.	202	07/22/1998	1.6	2.4	7.3	1.4	16	1
THUNDER CK.	217	07/21/1998	2.1	3.2	6.3	0.5	14	1
BRIDGE CK.	222	08/12/1998	10.5	11.1	34.0	8.0	3	2
BIG BEAVER CK.	312	08/04/1998	4.1	5.2	14.9	n.d.	5	2
BRIDGE CK.	411	08/11/1998	4.6	6.0	19.9	3.3	6	2
BRIDGE CK.	420	09/15/1998	2.4	3.6	7.1	1.0	11	1
BRIDGE CK.	424	09/14/1998	1.6	1.8	7.4	0.7	11	1
BRIDGE CK.	426	08/11/1998	8.5	9.1	29.0	5.1	5	3
BRIDGE CK.	441	09/16/1998	3.2	3.7	16.0	3.9	3	3

TABLE 2. STREAM SUBSTRATE DESCRIPTION AVERAGE - SUMMARY
NOCA - AMPHIBIAN SURVEY - 1998

WATERSHED	SITE NUMBER	SURVEY DATE	1ST DOMINANT SUBSTRATE	1ST DOM PERCENT	2ND DOM SUBSTRATE	2ND DOM PERCENT	1ST SUBDOM SUBSTRATE	1ST SUBDOM PERCENT	2ND SUBDOM SUBSTRATE	2ND SUBDOM PERCENT
THUNDER CK.	32A	07/01/1998	B	0.5114	OD	0.2122	SC	0.4359	B	0.2356
THUNDER CK.	33	06/18/1998	LC	0.4228	LC	0.2785	P	0.4529	SC	0.2619
THUNDER CK.	48A	07/08/1998	B	0.5344	LC	0.261	B	0.3685	P	0.2976
THUNDER CK.	54	07/07/1998	B	0.5066	SC	0.2981	P	0.4432	P	0.3648
THUNDER CK.	57	07/07/1998	B	0.5123	SC	0.3195	B	0.4414	SC	0.3097
THUNDER CK.	62A	06/25/1998	SC	0.4016	LG	0.24	SG	0.4341	MG	0.2767
THUNDER CK.	62B	06/26/1998	B	0.3946	LC	0.2515	LC	0.3546	SC	0.234
BRIDGE CK.	110	08/13/1998	W	1	W	1	SD	1	SD	1
THUNDER CK.	183	07/21/1998	LC	0.4262	B	0.2377	P	0.3785	SC	0.2798
THUNDER CK.	186	07/23/1998	P	0.4566	P	0.2655	LG	0.5041	MG	0.3798
THUNDER CK.	202	07/22/1998	P	0.4358	SC	0.2655	P	0.286	LC	0.286
THUNDER CK.	217	07/21/1998	SC	0.4183	P	0.2669	LG	0.435	MG	0.2808
BRIDGE CK.	222	08/12/1998	B	0.6148	LC	0.27	B	0.4322	LC	0.2921
BIG BEAVER CK.	312	08/04/1998	LG	0.6	B	0.4664	LC	0.6002	B	0.333
BRIDGE CK.	411	08/11/1998	B	0.4822	LC	0.326	LC	0.3672	B	0.2532
BRIDGE CK.	420	09/15/1998	SC	0.6078	B	0.4092	P	0.511	SC	0.3142
BRIDGE CK.	424	09/14/1998	P	0.545	MG	0.3383	SC	0.3866	SC	0.2833
BRIDGE CK.	426	08/11/1998	B	0.4648	SC	0.3083	LC	0.4226	B	0.2776
BRIDGE CK.	441	09/16/1998	SC	0.4664	LC	0.2765	SC	0.3943	SC	0.2489

SUBSTRATE KEY:

B = BOULDER	MG = MEDIUM GRAVEL	OD = ORGANIC DEBRIS	SG = SMALL GRAVEL
LC = LARGE COBBLE	LG = LARGE GRAVEL	SC = SMALL COBBLE	VEG = VEGETATION
LL = LEAF LITTER	P = PEBBLE	SD = SAND	W = WOODY DEBRIS

TABLE 3. STREAM HABITAT TYPE, INSTREAM & OVERSTORY COVER - SUMMARY
NOCA - AMPHIBIAN SURVEY - 1998

SITE		HABITAT TYPE %					INSTREAM COVER %			DENSIOMETER CANOPY COVER %				
SITE NUMBER	SURVEY DATE	OBSC	CASCD	RIFFLE	POOL	TAIL-OUT	WOODY DEBRIS	ORGANIC DEBRIS	UNDER-CUT BANK	CANOPY UP STREAM	CANOPY DOWN STREAM	CANOPY LEFT	CANOPY RIGHT	CANOPY AVERAGE
32A	07/01/1998	0	25	28	35	12	3	3	26	98	99	99	98	98
33	06/18/1998	0	0	70	30	0	8	2	10	97	97	98	97	97
48A	07/08/1998	0	71	24	5	0	7	8	0	98	99	98	99	98
54	07/07/1998	0	27	32	34	7	2	12	5	99	99	99	99	99
57	07/07/1998	0	48	18	30	4	10	8	20	97	94	97	96	96
62A	06/25/1998	7	0	79	9	5	8	2	55	97	97	97	98	97
62B	06/26/1998	0	46	32	0	22	2	6	25	94	93	95	94	94
110	08/13/1998	50	50	0	0	0	80	20	100	100	100	100	100	100
183	07/21/1998	0	20	75	5	0	7	7	20	42	46	70	71	57
186	07/23/1998	0	0	100	0	0	1	1	20	0	0	0	0	0
202	07/22/1998	0	100	0	0	0	0	2	5	0	0	0	0	0
217	07/21/1998	0	75	10	15	0	2	8	0	88	87	90	94	90
222	08/12/1998	0	81	19	0	0	0	0	0	1	3	5	4	3
312	08/04/1998	0	35	58	7	0	9	9	0	40	40	40	40	40
411	08/11/1998	0	26	70	4	0	0	0	10	65	47	73	71	64
420	09/15/1998	0	25	53	22	0	4	1	0	10	8	34	22	18
424	09/14/1998	0	9	51	22	10	9	6	15	2	0	10	4	4
426	08/11/1998	0	87	10	3	0	1	0	20	46	44	69	91	62
441	09/16/1998	0	0	80	0	20	14	5	45	26	35	31	54	36

TABLE 4. RIPARIAN VEGETATION - CANOPY COVERAGE & SPECIES
NOCA - AMPHIBIAN SURVEY - 1998

			OVERSTORY			UNDERSTORY			GENERAL FOREST DESCRIPTION
WATERSHED	SITE NUMBER	DATE	% OVER STORY	FIRST DOMINANT SPECIES	SECOND DOMINANT SPECIES	% UNDER STORY	FIRST DOMINANT SPECIES	SECOND DOMINANT SPECIES	CANOPY CLOSURE, AGE - STRUCTURE, TYPE
THUNDER CK.	32A	07/01/1998	84	THPL	PSME	15	ACCI	THPL	CLOSED, MATURE, MIXED-AGE, CONIFEROUS
THUNDER CK.	33	06/18/1998	84	THPL	PSME	70	ACCI	THPL	CLOSED, MATURE, MIXED-AGE, CONIFEROUS
THUNDER CK.	48A	07/08/1998	90	THPL	TSHE	57	TSHE	OPHO	CLOSED, OLD-GROWTH, MIXED-AGE, CONIFEROUS
THUNDER CK.	54	07/07/1998	90	THPL	TSHE	70	TSHE	OPHO	CLOSED, OLD-GROWTH, MIXED-AGE, CONIFEROUS
THUNDER CK.	57	07/07/1998	90	TSHE	THPL	63	TSHE	OPHO	CLOSED, YOUNG, EVEN-AGE, CONIFEROUS
THUNDER CK.	62A	06/25/1998	90	TSHE	THPL	84	TSHE	ACCI	CLOSED, YOUNG, EVEN-AGE, CONIFEROUS
THUNDER CK.	62B	06/26/1998	91	TSHE	THPL	63	TSHE	ACCI	CLOSED, YOUNG, EVEN-AGE, CONIFEROUS
BRIDGE CK.	110	08/13/1998	63	PSME	ACMA	99	ALSI	OPHO	CLOSED, YOUNG, EVEN-AGE, MIXED FOREST
THUNDER CK.	183	07/21/1998	85	ABAM	TSHE	55	ABAM	TSHE	CLOSED, YOUNG, EVEN-AGE, CONIFEROUS
THUNDER CK.	186	07/23/1998	17	ABLA	ABLA	91	HERB	WILL	OPEN,YOUNG, EVEN-AGED, CONIFEROUS
THUNDER CK.	202	07/22/1998	0	NONE	NONE	90	HERB	SOSI	OPEN, YOUNG, AVALANCHE CHUTE
THUNDER CK.	217	07/21/1998	90	ABAM	TSHE	37	TSHE	PIEN	CLOSED, OLD-GROWTH, MIXED-AGE, CONIFEROUS
BRIDGE CK.	222	08/12/1998	0	NONE	NONE	90	WILL	ALSI	OPEN, YOUNG, EVEN-AGED, RIPARIAN DECIDUOUS
BIG BEAVER CK.	312	08/04/1998	0	NONE	NONE	90	WILL	ALSI	OPEN, YOUNG, AVALANCHE CHUTE
BRIDGE CK.	411	08/11/1998	70	ABAM	PIEN	57	ALSI	HERB	CLOSED, YOUNG, EVEN-AGED CONIFEROUS
BRIDGE CK.	420	09/15/1998	70	TSME	ABLA	84	SOSI	WILL	CLOSED, YOUNG, EVEN-AGED CONIFEROUS
BRIDGE CK.	424	09/14/1998	36	TSME	ABLA	88	WILL	SOSI	OPEN, MIXED-AGE, KRUMHOLTZ, MIXED FOREST
BRIDGE CK.	426	08/11/1998	91	ABLA	ABAM	90	ALSI	ABAM	CLOSED, MATURE, EVEN-AGED, CONIFEROUS
BRIDGE CK.	441	09/16/1998	43	ABLA	TSME	90	WILL	ALSI	OPEN, YOUNG, EVEN-AGED, CONIFEROUS

PLANT SPECIES KEY:

ABAM PACIFIC SILVER FIR
ABLA SUBALPINE FIR
ACCI VINE MAPLE
ACMA BIG-LEAF MAPLE
ALSI SITKA ALDER
HERB HERB MEADOW
OPHO DEVIL'S CLUB
PIEN ENGLEMANN SPRUCE
PSME DOUGLAS-FIR
SOSI MOUNTAIN ASH
THPL WESTERN REDCEDAR
TSHE WESTERN HEMLOCK
TSME MOUNTAIN HEMLOCK
WILL WILLOW

TABLE 5. CHEMICAL CHARACTERISTICS OF WATER AT STREAM SURVEY SITES
NOCA - AMPHIBIAN SURVEY - 1998

WATERSHED	SITE NUMBER	DATE	TURB.	pH	CONDUCTIVITY (uS/cm)	WATER TEMP F.
THUNDER CK	32A	07/01/1998	0.14	7.3	55.3	54
THUNDER CK	33	06/18/1998	0.12	7.14	38.4	46
THUNDER CK	48A	07/08/1998	0.07	6.97	30.4	54
THUNDER CK	54	07/07/1998	0.12	6.85	58.4	53
THUNDER CK	57	07/07/1998	0.2	7.36	55.6	55
THUNDER CK	62A	06/25/1998	0.12	7.34	53.7	49
BRIDGE CK	110	08/13/1998	n.d.	n.d.	n.d.	55
THUNDER CK	183	07/21/1998	0.3	7.14	20.2	44
THUNDER CK	186	07/23/1998	0.19	7.07	12.19	45
THUNDER CK	202	07/22/1998	0.13	7.53	37.5	59
THUNDER CK	217	07/21/1998	0.11	7.5	35	64
BRIDGE CK	222	08/12/1998	0.84	6.91	15.1	51
THUNDER CK	62B	06/26/1998	0.1	7.28	43.3	47
BIG BEAVER CK	312	08/04/1998	n.d.	n.d.	n.d.	60
BRIDGE CK	411	08/11/1998	0.1	7.14	24.4	52
BRIDGE CK	420	09/15/1998	0.2	7.31	28.8	55
BRIDGE CK	424	09/14/1998	0.11	7.05	18.4	52
BRIDGE CK	426	08/11/1998	0.27	7.21	22.9	51
BRIDGE CK	441	09/16/1998	0.49	7.16	22.8	40

TABLE 6. POND PHYSICAL CHARACTERISTICS AND FISH PRESENCE
NOCA - AMPHIBIAN SURVEY - 1998

SITE				SIZE	DEPTH		LAKE/POND	FISH			LITTORAL ZONE SUBSTRATE (% OF SHORELINE DISTANCE) *								
NUMBER	DATE	# INLETS	INLET TYPE	ACRE	METERS	%LITTORAL	TYPE	SPECIES	SIZE	ABUND	%SAND	%SILT	%GRAVEL	%COBBLE	%BOULDER	%BEDROCK	%VEG	%LITTER	%CWD
BD-02-01	07/13/1998	1	CLEAR PERM	0.20	1.0	100	MORRAINE	0	0	0	0	20	0	0	0	0	10	40	30
EP-07-04	08/24/1998	1	CLEAR EPHEM	0.10	1.0	100	SCOUR	0	0	0	0	80	0	0	0	10	0	5	5
EP-07-12	08/24/1998	1	CLEAR EPHEM	0.10	2.0	100	SCOUR	0	0	0	0	20	0	0	20	60	0	0	0
EP-07-14	08/24/1998	3	CLEAR PERM	0.25	1.0	100	SCOUR	0	0	0	0	30	10	0	30	30	0	0	0
EP-08-01	08/24/1998	1	CLEAR EPHEM	0.10	1.0	100	SCOUR	0	0	0	5	80	5	10	0	0	0	0	0
FP-18-01	06/29/1998	1	GLACIAL	0.10	0.4	100	OXBOW	0	0	0	0	95	0	0	0	0	0	0	5
LS-17-01	08/26/1998	2	CLEAR PERM	0.50	3.0	100	SCOUR	0	0	0	0	20	20	20	20	20	0	0	0
LS-17-02	08/26/1998	0	SNOWMELT	0.10	1.5	100	MORRAINE	0	0	0	0	0	0	70	20	10	0	0	0
LS-17-03	08/26/1998	1	GLAC PERM	0.30	3.0	100	SCOUR	0	0	0	0	0	0	40	30	30	0	0	0
LS-17-04	08/25/1998	1	GLAC EPHEM	0.10	2.0	100	SCOUR	0	0	0	0	0	0	50	25	25	0	0	0
LS-17-05	08/25/1998	0	SNOWMELT	0.10	2.0	100	SCOUR	0	0	0	0	0	0	50	25	25	0	0	0
LS-17-07	08/25/1998	1	CLEAR PERM	0.10	0.4	100	SCOUR	0	0	0	0	60	0	20	20	0	0	0	0
LS-17-08	08/25/1998	1	GLAC PERM	0.10	2.0	100	SCOUR	0	0	0	0	0	0	50	25	25	0	0	0
M-20-01	07/30/1998	1	CLEAR PERM	56.00	30+	10	SCOUR	CUT		LOW	0	0	0	10	80	0	0	0	10
M-23-01	08/18/1998	1	CLEAR PERM	29.00	37.0	10	SCOUR	CUT		HIGH	10	40	5	10	25	0	0	0	10
M-23-05	08/18/1998	0	SNOWMELT	0.01	0.1	100	LANDSLIDE	0	0	0	0	100	0	0	0	0	0	0	0
M-23-07	08/18/1998	0	SNOWMELT	0.13	2.0	50	MORRAINE	0	0	0	0	80	0	0	10	0	0	0	10
M-23-08	08/18/1998	0	SNOWMELT	0.04	1.0	100	MORRAINE	0	0	0	0	80	0	0	10	0	0	0	10
M-23-10	08/17/1998	1	CLEAR PERM	0.02	0.8	100	MORRAINE	0	0	0	0	0	0	30	30	0	0	0	40
M-23-11	08/17/1998	1	CLEAR PERM	0.01	0.1	100	MARSH	CUT	FGL	LOW	0	0	20	10	20	0	0	30	20
M-23-12	08/17/1998	0	SNOWMELT	0.01	0.5	100	MORRAINE	0	0	0	0	100	0	0	0	0	0	0	0
MC-14-2	09/02/1998	8	CLEAR E,P	7.40	>5.0	60	SCOUR	0	0	0	10	0	0	50	30	10	0	0	0
MC-14-5	09/02/1998	1	CLEAR EPHEM	0.25	1.3	100	MORRAINE	0	0	0	0	100	0	0	0	0	0	0	0
MC-15-01	09/02/1998	0	SNOWMELT	0.25	2.0	100	SCOUR	0	0	0	0	20	25	40	15	0	0	0	0
MC-16-02	09/03/1998	1	CLEAR PERM	4.20	3.0	50	SCOUR	0	0	0	0	60	10	10	10	0	0	0	10
MC-22-01	09/17/1998	9	GLACIAL	3.00	1.5	100	MORRAINE	0	0	0	50	30	20	0	0	0	0	0	0
MC-23-01	09/17/1998	1	CLEAR PERM	2.00		100	MORRAINE	0	0	0	45	25	0	0	10	0	0	20	0
MC-55-04	09/14/1998	0	SNOWMELT	0.10	0.3	100	MARSH	0	0	0	0	80	0	0	0	0	0	20	0
MC-55-06	09/15/1998	0	SNOWMELT	0.05	0.6	100	MARSH	0	0	0	0	70	0	0	10	0	20	0	0
MC-55-07	09/15/1998	1	CLEAR EPHEM	0.07	0.5	100	OXBOW	0	0	0	0	70	0	10	0	0	0	20	0

KEY: INLET TYPE

GLACIAL = INLET CONTAINS GLACIAL TILL
CLEAR PERM = CLEAR PERMANENT
CLEAR EPHE = EPHEMERAL
SNOWMELT = SEEPAGE, NO CHANNEL

LAKE/POND TYPE
BEAVER/MARSH = MARSH FILLING IN BEAVER IMPOUNDMENT
BEAVER POND = BEAVER IMPOUNDMENT
BEAVER/BOG = SPHAGNUM BOG DEVELOPED IN BEAVER IMPOUNDMENT
GLACIAL SCOUR
LANDSLIDE = LANDSLIDE DAM
MARSH = MARSH FILLING IN; NO EVIDENCE OF BEAVER IMPOUNDMENT
MORRAINE = MORRAINE DEPOSITS SIGNIFICANT IN POND IMPOUNDMENT
OXBOW

FISH: SPECIES, SIZE, ABUNDANCE
CUT = CUTTHROAT
RBT = RAINBOW TROUT
DV/BT = DOLLY VARDEN/BULL TROUT
FRY = LESS THAN 3"
FGL = FINGERLING = 3"- 6"
SA = SUBADULT = >6" AND <10"
AD = ADULT = 10" OR GREATER
LOW = LESS THAN 10 FISH OBSERVED
MOD = 10 TO 20 FISH OBSERVED
HIGH = MORE THAN 20 FISH OBSERVED

TABLE 6. POND PHYSICAL CHARACTERISTICS AND FISH PRESENCE CONTINUED
NOCA - AMPHIBIAN SURVEY - 1998

SITE				SIZE	DEPTH		LAKE/POND	FISH			LITTORAL ZONE SUBSTRATE (% OF SHORELINE DISTANCE) *								
NUMBER	DATE	# INLETS	INLET TYPE	ACRE	METERS	%LITTORAL	TYPE	SPECIES	SIZE	ABUND	%SAND	%SILT	%GRAVEL	%COBBLE	%BOULDER	%BEDROCK	%VEG	%LITTER	%CWD
ML-01-01	07/14/1998	3	CLEAR P, E	1.00	1.0	100	MORRAINE	0	0	0	40	40	10	0	0	0	0	0	10
ML-02-01	07/15/1998	2	GLACIAL	8.00	7.0	50	SCOUR	RBT	A	LOW	0	20	20	30	20	5	0	2	3
ML-04-01	07/13/1998	1	SNOWMELT	10.00	8.0	65	SCOUR	0	0	0	0	40	5	10	40	2	0	1	2
ML-09-01	09/02/1998	1	CLEAR PERM	0.25	1.5	100	OXBOW	CUT	SA	LOW	0	60	0	0	0	0	0	0	40
ML-09-02	09/02/1998	1	CLEAR PERM	0.40	2.0	100	OXBOW	CUT	A	LOW	0	70	0	0	0	0	5	0	25
ML-09-03	09/02/1998	1	CLR/GLAC PERM	1.00	2.5	100	OXBOW	CUT	SA,A	LOW	0	60	0	0	0	0	15	0	25
ML-09-05	09/02/1998	1	GLACIAL PERM	0.05	1.0	100	MARSH	0	0	0	0	40	0	0	0	0	60	0	0
ML-10-01	09/14/1998	1	CLEAR PERM	0.80	1.5	100	SCOUR	0	0	0	0	90	0	0	5	0	0	0	5
MM-07-01	09/10/1998	1	CLEAR EPHEM	2.00	3.0	25	MORRAINE	0	0	0	0	65	0	5	0	0	0	20	10
MP-01-01	08/03/1998	1	CLEAR EPHEM	0.01	1.0	100	SCOUR	0	0	0	10	10	20	30	30	0	0	0	0
MP-01-03	08/03/1998	1	CLEAR EPHEM	0.01	1.0	100	SCOUR	0	0	0	10	50	10	30	0	0	0	0	0
MP-02-01	08/04/1998	1	CLEAR PERM	5.00	11.0	60	SCOUR	CUT	FGL,SA	MOD	0	20	0	5	50	5	0	0	20
MR-06-01	09/09/1998	5	CLEAR P, E	1.67		20	MORRAINE	0	0	0	0	50	0	5	10	0	20	10	5
MR-07-01	09/08/1998	1	CLEAR EPHEM	0.32		50	MORRAINE	0	0	0	0	30	0	25	40	0	0	5	0
MR-07-02	09/08/1998	0	CLEAR EPHEM	0.01	1.0	100	SCOUR	0	0	0	0	90	0	0	0	0	0	10	0
MR-07-03	09/08/1998	0	CLEAR EPHEM	0.01	1.0	100	SCOUR	0	0	0	0	90	0	0	0	0	0	10	0
MR-08-01	09/08/1998	1	CLEAR EPHEM	0.90		30	MORRAINE	0	0	0	0	80	0	0	15	0	0	5	0
MR-11-01	08/11/1998	1	CLEAR EPHEM	2.69	7.0	40	SCOUR	RBT	A	LOW	0	10	10	0	0	40	0	0	40
MR-15-02	08/10/1998	0	SNOWMELT	12.00	27.0	90	SCOUR	CUT	SA	HIGH	0	0	0	35	60	0	0	0	5
MS-07-01	09/15/1998	1	CLEAR PERM	0.01	0.8	100	BOG	0	0	0	0	0	0	0	0	0	100	0	0
MS-07-02	09/15/1998	0	SNOWMELT	0.01	0.3	100	BOG	0	0	0	0	0	0	0	0	0	80	20	0
MS-07-03	09/15/1998	0	SNOWMELT	0.01	0.2	100	BOG	0	0	0	0	75	0	0	0	0	0	25	0
MS-08-03	09/15/1998	0	SNOWMELT	0.01	1.0	100	BOG	0	0	0	0	65	0	0	0	0	30	5	0
MS-08-04	09/15/1998	0	SNOWMELT	0.01	1.0	100	MORRAINE	0	0	0	0	90	0	0	0	0	0	0	10
PM-02-01	08/05/1998	3	CLEAR EPHEM	0.25	1.5	100	SCOUR	0	0	0	40	40	0	10	5	0	0	0	5
PM-03-01	08/06/1998	2	CLEAR PERM	10.90	8.0	50	SCOUR	CUT	SA,A	HIGH	0	0	5	20	20	50	0	0	5
PM-03-02	08/05/1998	0	SNOWMELT	0.10	1.0	100	SCOUR	0	0	0	0	70	0	15	15	0	0	0	0
PM-05-02	08/04/1998	0	SNOWMELT	0.75	1.5	100	SCOUR	0	0	0	0	80	0	0	10	0	0	0	10
PM-05-03	08/04/1998	0	SNOWMELT	0.08	2.0	100	SCOUR	0	0	0	0	60	10	10	10	0	0	0	10
PM-05-04	08/04/1998	0	SNOWMELT	0.07	3.0	100	SCOUR	0	0	0	0	60	10	0	20	0	0	0	10
RD-02-01	07/13/1998	2	CLEAR PERM	6.70	8.3	80	SCOUR	CUT	SA	LOW	0	60	0	0	0	0	20	0	20
RD-09-01	08/12/1998	0	SNOWMELT	0.01	0.1	100	SCOUR	0	0	0	0	40	0	0	0	0	40	0	20

KEY: INLET TYPE

GLACIAL = INLET CONTAINS GLACIAL TILL
CLEAR PERM = CLEAR PERMANENT
CLEAR EPHE = EPHEMERAL
SNOWMELT = SEEPAGE, NO CHANNEL

LAKE/POND TYPE
BEAVER/MARSH = MARSH FILLING IN BEAVER IMPOUNDMENT
BEAVER POND = BEAVER IMPOUNDMENT
BEAVER/BOG = SPHAGNUM BOG DEVELOPED IN BEAVER IMPOUNDMENT
GLACIAL SCOUR
LANDSLIDE = LANDSLIDE DAM
MARSH = MARSH FILLING IN; NO EVIDENCE OF BEAVER IMPOUNDMENT
MORRAINE = MORRAINE DEPOSITS SIGNIFICANT IN POND IMPOUNDMENT
OXBOW

FISH: SPECIES, SIZE, ABUNDANCE
CUT = CUTTHROAT
RBT = RAINBOW TROUT
DV/BT = DOLLY VARDEN/BULL TROUT
FRY = LESS THAN 3"
FGL = FINGERLING = 3"- 6"
SA = SUBADULT = >6" AND <10"
AD = ADULT = 10" OR GREATER
LOW = LESS THAN 10 FISH OBSERVED
MOD = 10 TO 20 FISH OBSERVED
HIGH = MORE THAN 20 FISH OBSERVED

TABLE 7. CHEMICAL CHARACTERISTICS OF WATER AT LAKE/POND SURVEY SITES
NOCA - AMPHIBIAN SURVEY - 1998

SITE NUMBER	DATE	TURB.	pH	CONDUCTIVITY (uS/cm)	WATER TEMP F.
BD02	07/12/1998	0.87	6.41	108.3	55
EP07-04	08/24/1998	0.55	5.79	3.6	63
EP07-12	08/24/1998	0.36	5.62	2.04	62
EP07-14	08/24/1998	0.26	7.14	9.25	64
EP08-1	08/24/1998	1.6	5.53	2.37	66
FP18	06/30/1998	1.16	6.59	129.5	66
LS17-1	08/25/1998	1.39	6.73	3.65	45
LS17-2	08/27/1998	0.84	6.4	1.85	54
LS17-3	08/26/1998	n.d.	n.d.	n.d.	43
LS17-4	08/25/1998	n.d.	n.d.	n.d.	63
LS17-5	08/25/1998	n.d.	n.d.	n.d.	57
LS17-7	08/26/1998	0.12	5.72	2.69	60
LS17-8	08/27/1998	1.85	6.38	2.69	43
M20	07/30/1998	0.26	6.45	4.87	64
M23-05	08/18/1998	n.d.	n.d.	n.d.	49
M23-07	08/19/1998	0.58	6.33	5.43	57
M23-08	08/18/1998	n.d.	n.d.	n.d.	57
M23-10	08/19/1998	0.18	7.04	13.1	61
M23-11	08/17/1998	n.d.	n.d.	n.d.	54
M23-12	08/19/1998	n.d.	n.d.	n.d.	54
MC14-2	09/02/1998	0.78	7.16	24.5	60
MC14-5	09/02/1998	n.d.	n.d.	n.d.	67
MC15	09/02/1998	0.7	5.59	3.05	68
MC16-2	09/03/1998	0.25	5.03	53.2	n.d.
MC22	09/17/1998	n.d.	6.82	7.91	48
MC23	09/17/1998	n.d.	7.15	13.9	45
MC55-4	09/14/1998	n.d.	n.d.	n.d.	54
MC55-6	09/15/1998	n.d.	6.04	7.1	52
MC55-7	09/15/1998	3.5	6.29	8.83	52
ML01	07/14/1998	0.36	6.65	24.8	46
ML02	07/15/1998	0.58	6.65	17.9	43
ML04	07/13/1998	0.84	6.47	17.8	50
ML09-1	09/03/1998	0.19	6.83	16.12	54
ML09-2	09/03/1998	n.d.	n.d.	n.d.	54
ML09-3	09/03/1998	1.29	6.9	17.91	54
ML09-5	09/03/1998	20	6.84	13	40
ML-10	09/15/1998	0.38	7.05	30	52
MM07	09/10/1998	0.18	7.02	15.8	56
MP01-01	08/03/1998	n.d.	n.d.	n.d.	68
MP01-03	08/03/1998	n.d.	n.d.	n.d.	73
MP02	08/05/1998	0.12	7.49	28.8	48-60
MR06	09/09/1998	0.3	7.22	31.5	60
MR07	09/09/1998	0.33	7.09	9.8	60
MR07-2	09/08/1998	n.d.	n.d.	n.d.	n.d.
MR07-3	09/08/1998	n.d.	n.d.	n.d.	n.d.
MR08	09/08/1998	0.25	7.33	11.31	64
MR11	08/11/1998	n.d.	n.d.	n.d.	68
MR15-2	08/10/1998	n.d.	n.d.	n.d.	64
MS07-1	09/15/1998	0.31	5.46	12	56
MS07-2	09/15/1998	0.25	5.76	11.79	52
MS07-3	09/15/1998	n.d.	n.d.	n.d.	64
MS08-3	09/15/1998	1.8	5.39	7.28	52
MS08-04	09/16/1998	n.d.	7.12	75	57
PM02	08/05/1998	0.22	7.07	12.76	72
PM03	08/06/1998	0.45	7.09	12.9	57
PM03-2	08/06/1998	0.76	5.71	3.7	75
PM05-2	08/04/1998	0.63	6.27	5.15	78
PM05-3	08/05/1998	0.37	6.15	4.59	77
PM05-4	08/05/1998	0.39	6.13	4.3	75
RD02	07/13/1998	0.39	7.48	61	72
RD09	08/12/1998	1.7	5.45	9.45	74

n.d. = no data

While observers were conducting the visual search, another crewmember (the recorder) drew a map of the outline of the pond on Lake/pond Amphibian Survey Data Form 3a - NOCA (Attachment 3). Vegetation in the vicinity of the pond was noted. Locations of the individual minnow traps and time they were placed in position were recorded. Several additional items of data describing the pond and habitat, fish presence, and physical characteristics were entered on this form.

Trapping

Collapsible nylon net minnow traps were placed in pond/lakes with the openings of the funnels 10-20 cm below the surface, and with a portion of the top of the trap 2-5 cm above the surface. This position allows non-gilled amphibians (adult frogs, toads) to survive several hours in the trap without drowning. Six traps were usually placed in small ponds and twelve in larger ponds allowing at least 25 square meters per trap. An effort was made in placing the traps to try and sample as much of the heterogeneity of the habitat types as possible. Traps were placed in the pond one day, left overnight, and picked up the following day. Time and dates traps were placed into and taken out of the pond were recorded. Dominant substrate was noted along with amphibians captured and their measurements. Data on trap effort and captures was recorded on Lake/pond Amphibian Survey Data Form 3d - NOCA (Attachment 4).

Stream Sampling

Streams were chosen in the Thunder Creek watershed by their accessibility from trail. Many of the stream reaches were selected for inventorying amphibians because tailed frogs had been found in a prior year. In total, 19 reaches were sampled for amphibians in 1998 in six watersheds (Figure 1, Table A1).

Streams that flowed across a trail were sampled beginning approximately 10-50 m upstream of the trail to minimize impacts of trail use on the reach sampled. At the starting point one crewmember stretched a measuring tape (stream rope) upstream taking care to not disturb the streambed. Along this route stations were measured out at preselected random meter intervals. Ten belt transects one meter wide were sampled in each 100 m stream reach.

First a visual observation of the one meter wide belt transect was done. Then it was sampled by placing a kick net in the stream securely against the substrate while picking up and examining all moveable substrate upstream within 1 meter of the net. Large or unmoveable substrate was rubbed by hand or kicked to dislodge any amphibians present. Substrate, which was moved, was replaced as near to its original position as possible to minimize disruption to the habitat. The net was moved across the stream until all the wetted width had been searched. All amphibians captured were identified, measured, and recorded on data sheet Amphibian Survey: Capture Data (Bury and Major 1996) (Attachment 5).

Stream depth was measured in three places, the center of each third of the wetted width. These measurements were recorded to nearest centimeter as left, middle, and right depths (facing

downstream). Flow velocity was measured in these same places at 0.6 of the total depth with a digital flowmeter to 0.01 mps. Gradient was measured with a clinometer in % taken at stream meter 000, 050, 100. The gradient was measured upstream and downstream at each of these three stations for a 25 m distance, then averaged to produce one reading at each station.

Percent of seven habitat types were recorded for each transect; obscured, cascade, riffle, pool, tailout, subsurface, and wetland. Instream cover percent was recorded for coarse woody debris, organic debris, and undercut banks. Densiometer overstory canopy cover was measured and recorded for upstream, downstream, left and right banks.

Characterization of substrate was done at each of the belt transects along the upstream edge of the transect, following amphibian sampling. Dominant and subdominant substrate type codes were recorded at intervals that vary with the bankfull width at any particular site. A sample interval of 0.2 m was used for transect sites with a wetted perimeter of less than 1 m, 0.3 m was used for transect sites with a wetted perimeter of 1-2 m, 0.5 m intervals were used for streams that were 2 to 5 m wide, and 1 m intervals were used for streams greater than 5 and less than 10 m wide, 2 m intervals for streams greater than 10 m wide. For each transect we recorded 1) stream meter for transect location; 2) bankfull width in meters at the transect; 3) bank starting location (left and right banks are always determined facing downstream); 4) distance (interval start point) from starting bank, dominant substrate type code and subdominant substrate type code for each interval across the channel. These data were recorded on Stream Amphibian Survey Data Form 1a - NOCA (Attachment 6).

At three places (000 m, 050 m, and 100 m) in each transect a riparian vegetation survey was done. The vegetation survey covered a 20 m square on left bank and right bank. Data were recorded on a Riparian Vegetation form (Attachment 7). Percent cover of both overstory and understory species was recorded as well as total overstory and understory canopy closure. Additionally dbh size classes were recorded for overstory as a whole to give an indication of forest age structure.

On Stream Amphibian Survey Data Form 1b - NOCA (Attachment 8) blocks representing transect intervals were sketched in with major instream cover items (logs, boulders, under cut banks). Start and stop times were recorded for each transect's amphibian search. Any amphibians found were identified to species, life stage, and sex when possible. On form Amphibian Survey: Capture Data (Bury and Major 1996) we recorded additional head, body, and limb measurements for each amphibian captured (Attachment 5).

In addition to the regular belt transects we targeted streams which had higher numbers of tailed frog tadpoles to do more kick net sampling. Six stream reaches in Thunder Creek and Fisher Creek watersheds were intensively sampled for tailed frog tadpoles in an effort to determine the number of age class cohorts present. Three streams targeted in lower Thunder Creek watershed were 32A, 33, and 62B; three stream reaches in upper Fisher Creek were 186, 202, and 217. The total numbers of tadpoles caught both inside and outside of transects were 38, 33, 56, 25, 34, and 39 respectively.

RESULTS and DISCUSSION

Streams

A total of 19 stream reaches were surveyed. The amphibian species captured in streams were the tailed frog *Ascaphus truei* and, one Cascades frog *Rana cascadae*. Life stages found included tadpole, metamorph, juvenile, and adult both male and female tailed frogs; and one adult female Cascades frog. Tailed frogs were found in 12 of the 19 reaches surveyed. The number of tailed-frogs found ranged from 1 to 29 per 100 m reach, with a mean of 8.83. (Table 8). In addition to these, two lake outlet streams were briefly sampled with the kick net. Both of these yielded tailed frog tadpoles numbering 2 and 13. Stream measurements were not taken at these abbreviated surveys.

Additional kick net sampling was done outside the prescribed transects of streams where tailed frogs seemed plentiful. Six such streams produced from 11 to 42 individuals in addition to those captured in transects. These "extra" captures were measured in order to try and determine the number of age-class cohorts present (Table 11, Figures 2-7). The sample sizes of 25 to 56 may not be large enough to make definitive statements about the number of age classes present. It does appear that there are at least three and possibly four age classes represented in the tadpoles we captured. More sampling needs to be done to increase sample size, and sampling at more than one time period throughout the season.

In Thunder Creek watershed *Ascaphus truei*, tailed frogs were found in ten of the eleven stream reaches sampled. They were found in six of the seven tributary reaches sampled below McAllister Creek and all four reaches sampled in upper Fisher Creek, a major tributary of Thunder Creek. One juvenile tailed frog was found in one of six stream reaches sampled in Bridge Creek watershed. Two tailed frog tadpoles were found in the one stream reach sampled in Big Beaver watershed.

Lake/Ponds

Amphibians were caught in 11 of the 43 lake/ponds where minnow traps were placed overnight. Only one species was captured in traps at any one of the lake/ponds. The number of individuals captured at any one site ranged from 1 to 29. Amphibians caught in traps included: one *Ascaphus truei* at ML-10-01 (west side), seven *Ambystoma gracile* at RD-02-01 (west side), one to twelve *Ambystoma macrodactylum* at seven ponds (1 pond east of the crest, 6 on west side), 26 *Hyla regilla* at FP-18-01 (west side), and 29 *Rana aurora* at BD-02-01 (west side).

Lake/pond amphibian captures from visual searches are summarized in Table 9, and captures from trapping in Tables 10a and 10b. Visual searches of 65 lake/ponds detected amphibians at 21 of these sites. In these, five species of amphibian were identified, and one unidentified salamander was observed at 3 sites and one unidentified frog at one site. *Rana aurora*, red-legged frog was seen at one pond, *Hyla regilla*, Pacific treefrog was seen at 2 ponds, *Ambystoma macrodactylum,* long-toed salamander was seen at 13 sites, one *Rana luteiventris*, Columbian, spotted frog was observed at one site, *Bufo boreas*, western toad was seen at 3 sites. In addition,

one *Taricha granulosa*, rough-skinned newt larvae (M-20-01) and two *Ambystoma macrodactylum*, long-toed salamander hatchlings (RD-05-01 and M-23-01) were caught incidentally in invertebrate sweeps.

About one mile above McAllister Creek at the lower end of Thunder Meadows an off channel oxbow pond is where Pacific treefrog, *Hyla regilla* was captured. Thunder Lake is in the very lowest part of Thunder Creek watershed, which is now inundated by Diablo Lake, this is the only location that *Ambystoma gracile*, Northwestern salamander was found in 1998. A pond (BD-02-01) near State Route 20 is the only location that *Rana aurora*, red-legged frog was found in 1998.

Summary

Nine species of amphibians were found in the lake/ponds and streams surveyed in 1998. They were : *Ambystoma gracile, Ambystoma macrodactylum, Ascaphus truei, Bufo boreas, Hyla regilla, Rana aurora, Rana cascadae, Rana luteiventris, and Taricha granulosa.*

A total of six species of amphibians have been found in Bridge Creek watershed (1997) so far. In comparison, the Big Beaver valley (1996) amphibian inventory found nine species of amphibians from pond and stream surveys, plus one terrestrial salamander, *Ensatina eschscholtzii*, from pitfall traps. The lower number of amphibian species is consistent with the higher and drier habitat found in Bridge Creek watershed. Bridge Creek watershed lacks extensive low elevation wetland habitats including beaver ponds and bogs which are common in lower Big Beaver.

Big Beaver Update

On a trip to Big Beaver Valley in August 1997, the NOCA crew was joined by herpetologist Mike Adams of USGS-BRD-FRESC, Corvallis, Oregon and the amphibian inventory crew from Olympic National Park and their leader Patrick Loafman. This combined crew went back to ponds PM07-1 and PM07-2 and caught some adult and juvenile frogs and juvenile toads. From these specimens we collected toe clipped tissue samples which Mike Adams took to send off for DNA analysis. Recently we were informed by Mike Blouin of Oregon State University Zoology department that all of the ranid frogs sampled in lower Big Beaver Valley proved to be *Rana luteiventris*, Columbian spotted frog (pers. comm. Mike Blouin 1999). Additional tissue testing needs to be done on specimens from McMillan and Luna Creek portions of the Big Beaver watershed to determine if any frogs other than *Rana luteiventris* inhabit this watershed. Tissue samples were collected from frogs caught in McMillan Creek beaver pond complex(MC-54-08). These samples have been sent to Mike Blouin at OSU, Corvallis, Oregon for testing.

TABLE 8. STREAM SEARCH EFFORT & CAPTURES - SUMMARY
NOCA - AMPHIBIAN SURVEY - 1998
INSIDE TRANSECTS

WATERSHED	SITE NUMBER	DATE	AREA M2 SAMPLED	SPECIES	NUMBER INDIVIDUALS	LIFE STAGE
THUNDER CK	32A	07/01/1998	19	ASTR	8	T,A
THUNDER CK	33	06/18/1998	15.8	ASTR	10	T
THUNDER CK	48A	07/08/1998	12.6	ASTR	3	T,T/M
THUNDER CK	54	07/07/1998	8.5	ASTR	1	T
THUNDER CK	57	07/07/1998	17.6	ASTR	5	T
THUNDER CK	62A	06/25/1998	18.2	0		
THUNDER CK	62B	06/26/1998	29.5	ASTR	14	T
BRIDGE CK	110	08/13/1998	10	0		
THUNDER CK	183	07/21/1998	70.1	ASTR	7	T,T/M,M
THUNDER CK	186	07/23/1998	48.6	ASTR	11	T,T/M
THUNDER CK	202	07/22/1998	15.8	ASTR	15	T
THUNDER CK	217	07/21/1998	20.5	ASTR	29	T,A
BRIDGE CK	222	08/12/1998	105.1	0		
BIG BEAVER CK	312	08/04/1998	40.8	ASTR	2	T
BRIDGE CK	411	08/11/1998	45.8	0		
BRIDGE CK	420	09/15/1998	23.7	ASTR	1	J
BRIDGE CK	424	09/14/1998	16.4	0		
BRIDGE CK	426	08/11/1998	84.8	0		
BRIDGE CK	441	09/16/1998	32.3	0		

INCIDENTAL CAPTURES OUTSIDE TRANSECTS

BRIDGE CK	121	09/10/1998	ASTR	2	T
BRIDGE CK	552	09/09/1998	ASTR	13	T
THUNDER CK	32A	07/01/1998	ASTR	34	31T,3A
THUNDER CK	33	06/18/1998	ASTR	27	24T,3A
THUNDER CK	62B	06/26/1998	ASTR	42	T
THUNDER CK	186	07/23/1998	ASTR	14	T
THUNDER CK	202	07/22/1998	ASTR	19	T
THUNDER CK	217	07/21/1998	ASTR	11	T
BRIDGE CK	411	08/11/1998	ASTR	1	T
BRIDGE CK	411	08/11/1998	RACA	1	A

ASTR = *ASCAPHUS TRUEI*, TAILED FROG
RACA = *RANA CASCADAE*, CASCADES FROG

A = ADULT
J = JUVENILE
M = METAMORPH
T = TADPOLE

TABLE 9. POND SHORELINE VISUAL SEARCH & AMPHIBIAN CAPTURES
NOCA - AMPHIBIAN SURVEY - 1998

SITE NUMBER	DATE	START	END	OBSERV. HOURS*	# OF OBSERVERS	TOTAL M	SPECIES	AGE	SUBST	OBS/CAP	SEX	TOT_MM	SVL_MM	TIBFIB HL MM	ENVIRON	COUNT
BD-02-01	07/13/1998	10:10	11:10	2:00	2	100	RAAU	T	SILT	CAP	UNK	55	25		WATER	1
EP-07-04	08/24/1998	13:45	14:10	0:25	1	80	0									
EP-07-12	08/24/1998	15:20	15:50	0:30	1	80	0									
EP-07-14	08/24/1998	17:30	18:00	0:30	1	120	0									
EP-08-01	08/24/1998	16:30	17:00	0:30	1	80	0									
FP-18-01	06/29/1998	15:11	15:30	0:38	2	80	HYRE	T	SILT/VEG	OBS	UNK				WATER	3
LS-17-01	08/26/1998	11:00	11:30	1:00	2	200	0									
LS-17-02	08/26/1998	10:00	10:40	0:40	1	80	0									
LS-17-03	08/26/1998	10:40	11:00	0:20	1	150	0									
LS-17-04	08/25/1998	15:15	15:40	0:25	1	80	0									
LS-17-05	08/25/1998	15:40	16:05	0:25	1	80	0									
LS-17-07	08/25/1998	13:30	14:15	1:30	2	80	0									
LS-17-08	08/25/1998	16:05	16:30	0:25	1	80	0									
M-20-01	07/30/1998	16:20	19:20	3:00	1	400	AMSP	L		OBS	UNK					1
M-20-01	07/30/1998		CAUGHT IN INVERTEBRATE SWEEP				TAGR	L		CAP	UNK	35	25			1
M-23-01	08/18/1998		CAUGHT IN INVERTEBRATE SWEEP				AMMA	H	SILT	CAP	UNK	17				
M-23-01	08/18/1998	14:00	15:00	2:00	2	600	0									
M-23-05	08/18/1998	11:49	12:26	1:51	3	20	AMMA	L	SILT	CAP	UNK	11			WATER	1
M-23-05	08/18/1998	11:49	12:26	1:51	3	20	AMMA	L	SILT	CAP	UNK	13			WATER	4
M-23-05	08/18/1998	11:49	12:26	1:51	3	20	AMMA	L	SILT	CAP	UNK	14			WATER	1
M-23-05	08/18/1998	11:49	12:26	1:51	3	20	AMMA	L	SILT	CAP	UNK	15			WATER	2
M-23-05	08/18/1998	11:49	12:26	1:51	3	20	AMMA	L	SILT	CAP	UNK	16			WATER	7
M-23-05	08/18/1998	11:49	12:26	1:51	3	20	AMMA	L	SILT	CAP	UNK	17			WATER	3
M-23-05	08/18/1998	11:49	12:26	1:51	3	20	AMMA	L	SILT	CAP	UNK	18			WATER	1
M-23-05	08/18/1998	11:49	12:26	1:51	3	20	AMMA	L	SILT	CAP	UNK	20			WATER	1
M-23-07	08/18/1998	9:15	9:45	1:30	3	140	AMMA	L	SILT	OBS	UNK				WATER	4
M-23-07	08/18/1998	9:15	9:45	1:30	3	140	AMMA	L	SILT	CAP	UNK	64	38		WATER	1
M-23-07	08/18/1998	9:15	9:45	1:30	3	140	AMMA	L	SILT	CAP	UNK	80	40		WATER	1
M-23-07	08/18/1998	9:15	9:45	1:30	3	140	AMMA	L	SILT	CAP	UNK	72	35		WATER	1
M-23-07	08/18/1998	9:15	9:45	1:30	3	140	AMMA	L	SILT	CAP	UNK	23	8		WATER	1

AGE: A = ADULT
H = HATCHLING
J = JUVENILE
L = LARVAE
T = TADPOLE

OBS = OBSERVED
CAP = CAPTURED

AMMA = AMBYSTOMA MACRODACTYLUM - LONG-TOED SALAMANDER
AMSP= AMBYSTOMA UNKNOWN SPECIES - SALAMANDER
BUBO= BUFO BOREAS - WESTERN TOAD
HYRE= HYLA REGILLA - PACIFIC TREE FROG
RAAU= RANA AURORA - RED-LEGGED FROG
RALU= RANA LUTEIVENTRIS - COLUMBIAN SPOTTED FROG
RASP= RANA UNKNOWN SPECIES - FROG
TAGR= TARICHA GRANULOSA - ROUGH-SKINNED NEWT

TABLE 9. POND SHORELINE VISUAL SEARCH & AMPHIBIAN CAPTURES - CONTINUED
NOCA - AMPHIBIAN SURVEY - 1998

SITE NUMBER	DATE	START	END	OBSERV. HOURS*	# OF OBSERVERS	TOTAL M	SPECIES	AGE	SUBST	OBS/CAP	SEX	TOT_MM	SVL_MM	TIBFIB HL MM	ENVIRON	COUNT
M-23-08	08/18/1998	9:15	9:45	1:30	3	60	0									
M-23-10	08/17/1998	16:00	16:20	1:00	3	70	0									
M-23-11	08/17/1998	16:30	16:35	0:15	3	45	0									
M-23-12	08/17/1998	14:29	14:36	0:21	3	45	0									
MC-14-2	09/02/1998	10:30	12:20	3:40	2	200	0									
MC-14-5	09/02/1998	11:55	12:15	0:40	2	80	0									
MC-15-01	09/02/1998	15:20	16:20	2:00	2	90	0									
MC-16-02	09/03/1998	8:10	9:40	3:00	2	487	0									
MC-22-01	09/17/1998	9:09	10:55	3:32	2	440	0									
MC-23-01	09/17/1998	11:19	11:35	0:32	2	365	0									
MC-54-08	08/03/1998	11:30	12:05	1:10	2	80	AMSP	L	SILT/VEG	CAP	UNK	42	25		WATER	
MC-54-08	08/03/1998	11:30	12:05	1:10	2	80	RASP	A,J	SILT/VEG	CAP	UNK		59,26	30,13	WATER	
MC-54-08	08/03/1998	11:30	12:05	1:10	2	80	RASP	T	SILT/VEG	CAP	UNK	70	30		WATER	
MC-55-04	09/14/1998	16:50	17:06	0:32	2	15	AMMA	L	SILT	CAP	UNK	32	18		WATER	1
MC-55-04	09/14/1998	16:50	17:06	0:32	2	15	AMMA	L	SILT	CAP	UNK	35	18		WATER	1
MC-55-04	09/14/1998	16:50	17:06	0:32	2	15	AMMA	L	SILT	CAP	UNK	37	22		WATER	1
MC-55-04	09/14/1998	16:50	17:06	0:32	2	15	AMMA	L	SILT	CAP	UNK	34	22		WATER	1
MC-55-04	09/14/1998	16:50	17:06	0:32	2	15	AMMA	L	SILT	CAP	UNK	34	19		WATER	1
MC-55-06	09/15/1998	9:30	10:06	1:12	2	18	AMMA	L	SILT	CAP	UNK	66	33		WATER	2
MC-55-06	09/15/1998	9:30	10:06	1:12	2	18	AMMA	L	SILT	CAP	UNK	68	34		WATER	1
MC-55-07	09/15/1998	10:07	10:18	0:22	2	100	0									
ML-01-01	07/14/1998	9:37	11:35	1:58	1	100	0									
ML-02-01	07/15/1998	18:30	19:30	1:00	1	365	0									
ML-04-01	07/13/1998	14:30	17:30	3:00	1	200	0									
ML-09-01	09/02/1998	14:10	14:30	0:40	2	60	0									
ML-09-02	09/02/1998	13:00	14:05	2:10	2	80	0									
ML-09-03	09/02/1998	11:30	12:30	2:00	2	250	0									
ML-09-05	09/02/1998	13:10	13:30	0:40	2	30	0									
ML-10-01	09/14/1998	16:00	16:30	1:00	2	244	0									
MM-07-01	09/10/1998	10:40	12:10	3:00	2	339	0									
MP-02-01	08/04/1998	12:30	15:30	3:00	1	500	0									
MP-01-01	08/03/1998	13:08	14:12	2:08	2	35	0									
MP-01-03	08/03/1998	14:57	15:52	1:50	2	35	0									

AGE: A = ADULT
H = HATCHLING
J = JUVENILE
L = LARVAE
T = TADPOLE

OBS = OBSERVED
CAP = CAPTURED

AMMA = AMBYSTOMA MACRODACTYLUM - LONG-TOED SALAMANDER
AMSP= AMBYSTOMA UNKNOWN SPECIES - SALAMANDER
BUBO= BUFO BOREAS - WESTERN TOAD
HYRE= HYLA REGILLA - PACIFIC TREE FROG
RAAU= RANA AURORA - RED-LEGGED FROG
RALU= RANA LUTEIVENTRIS - COLUMBIAN SPOTTED FROG
RASP= RANA UNKNOWN SPECIES - FROG
TAGR= TARICHA GRANULOSA - ROUGH-SKINNED NEWT

TABLE 9. POND SHORELINE VISUAL SEARCH & AMPHIBIAN CAPTURES - CONTINUED
NOCA - AMPHIBIAN SURVEY - 1998

SITE NUMBER	DATE	START	END	OBSERV. HOURS*	# OF OBSERVERS	TOTAL M	SPECIES	AGE	SUBST	OBS/CAP	SEX	TOT_MM	SVL_MM	TIBFIB HL MM	ENVIRON	COUNT
MR-06-01	09/09/1998	11:48	16:05	8:34	2	339	AMMA	L	SILT	CAP	UNK	39	21		WATER	1
MR-06-01	09/09/1998	11:48	16:05	8:34	2	339	RALU	A	CWD	CAP	UNK		59	95/26	WATER	1
MR-06-01	09/09/1998	11:48	16:05	8:34	2	339	AMMA	L	SILT	CAP	UNK	56	29		WATER	1
MR-06-01	09/09/1998	11:48	16:05	8:34	2	339	AMMA	L	SILT	CAP	UNK	62	32		WATER	1
MR-06-01	09/09/1998	11:48	16:05	8:34	2	339	AMMA	L	SILT	CAP	UNK	57	28		WATER	1
MR-06-01	09/09/1998	11:48	16:05	8:34	2	339	AMMA	L	SILT	CAP	UNK	67	34		WATER	1
MR-07-01	09/08/1998	15:20	16:30	2:20	2	139	0									
MR-07-02	09/08/1998	14:30	14:55	0:50	2	60	0									
MR-07-03	09/08/1998	14:55	15:00	0:10	2	5	0									
MR-08-01	09/08/1998	12:40	13:40	2:00	2	245	AMSP	L	CWD	OBS	UNK				WATER	1
MR-11-01	08/11/1998	15:30	16:20	0:50	1	400	0									
MR-15-02	08/10/1998	14:30	15:40	1:10	1	215	0									
MS-07-01	09/15/1998	15:35	16:03	0:56	2	25	AMMA	L	VEG	CAP	UNK	23	12			1
MS-07-01	09/15/1998	15:35	16:03	0:56	2	25	AMMA	L	VEG	CAP	UNK	19	9			2
MS-07-01	09/15/1998	15:35	16:03	0:56	2	25	AMMA	L	VEG	CAP	UNK	16	6			1
MS-07-01	09/15/1998	15:35	16:03	0:56	2	25	AMMA	L	VEG	CAP	UNK	20	10			1
MS-07-02	09/15/1998	16:10	16:25	0:30	2	30	0									
MS-07-03	09/15/1998	16:30	16:40	0:20	2	10	0									
MS-08-03	09/15/1998	13:56	14:30	1:08	2	40	AMMA	L	BIOFILM	CAP	UNK	39	21		WATER	1
MS-08-03	09/15/1998	13:56	14:30	1:08	2	40	AMMA	L	BIOFILM	CAP	UNK	47	25		WATER	1
MS-08-03	09/15/1998	13:56	14:30	1:08	2	40	AMMA	L	BIOFILM	OBS	UNK				WATER	2
MS-08-04	09/15/1998	17:25	17:31	0:12	2		AMMA	A	SILT	CAP	UNK	78	38			1
PM-02-01	08/05/1998	12:30	13:00	1:00	2	170	AMMA	L	SILT	OBS	UNK					6
PM-02-01	08/05/1998	12:30	13:00	1:00	2	170	BUBO	J	SAND,GVL	OBS	UNK		25,35		BANK	2
PM-03-01	08/06/1998	11:00	12:30	4:30	3	600	BUBO	J	SAND,GVL	OBS	UNK		25,35		BANK	2
PM-03-02	08/05/1998	13:30	13:40	0:20	2	70	BUBO	J	SILT	OBS	UNK				WATER	2
PM-05-02	08/04/1998	16:30	16:35	0:10	2	30	0									
PM-05-03	08/04/1998	15:01	15:05	0:08	2	100	AMMA	L	SILT	OBS	UNK				WATER	12
PM-05-04	08/04/1998	13:15	13:20	0:10	2	50	AMMA	L	SILT	OBS	UNK				WATER	7
RD-02-01	07/13/1998	13:30	15:00	3:00	2	877	0									
RD-05-01	07/15/1998		CAUGHT IN INVERTEBRATE SWEEP				AMMA	H	BIOFILM	CAP	UNK	16,18				
RD-09-01	08/12/1998	11:00	12:02	1:02	1	17	HYRE	A	VEG	OBS	UNK				EDGE	8
RD-09-01	08/12/1998	11:00	12:02	1:02	1	17	HYRE	A	VEG	CAP	UNK		12	21	EDGE	1
RD-09-01	08/12/1998	11:00	12:02	1:02	1	17	HYRE	A	VEG	CAP	UNK		16	25	EDGE	1
RD-09-01	08/12/1998	11:00	12:02	1:02	1	17	HYRE	A	VEG	CAP	UNK		17	24	EDGE	1
SM-01-01	07/22/1998	13:15	15:51	5:12	2	200	0									
SM-02-01	07/21/1998	15:25	17:09	3:28	2	330	0									
SM-02-02	07/21/1998	15:25	17:09	3:28	2	330	0									

AGE: A = ADULT
H = HATCHLING
J = JUVENILE
L = LARVAE
T = TADPOLE

OBS = OBSERVED
CAP = CAPTURED

AMMA = AMBYSTOMA MACRODACTYLUM - LONG-TOED SALAMANDER
AMSP= AMBYSTOMA UNKNOWN SPECIES - SALAMANDER
BUBO= BUFO BOREAS - WESTERN TOAD
HYRE= HYLA REGILLA - PACIFIC TREE FROG
RAAU= RANA AURORA - RED-LEGGED FROG
RALU= RANA LUTEIVENTRIS - COLUMBIAN SPOTTED FROG
RASP= RANA UNKNOWN SPECIES - FROG
TAGR= TARICHA GRANULOSA - ROUGH-SKINNED NEWT

TABLE 10A. SUMMARY OF POND AMPHIBIAN TRAP EFFORT & CAPTURES
NOCA - AMPHIBIAN SURVEY - 1998

SITE NUMBER	TRAP HOURS	SPECIES	NUMBER CAPTURED
BD-02-01	139.03	RAAU	29
EP-07-04	93.80		0
EP-07-12	100.50		0
EP-07-14	114.66		0
EP-08-01	48.12		0
FP-18-01	160.25	HYRE	26
LS-17-01	144.90		0
LS-17-02	130.93		0
LS-17-03	129.08		0
LS-17-04	88.35		0
LS-17-05	87.72		0
LS-17-07	75.25		0
LS-17-08	87.75		0
M-23-01	111.89		0
M-23-07	98.03		0
M-23-08	48.70		0
M-23-10	102.07		0
M-23-11	48.95		0
M-23-12	53.95		0
MC-55-07	64.55	AMMA	3
ML-02-01	92.41		0
ML-04-01	111.22		0
ML-09-01	77.32		0
ML-09-02	103.26		0
ML-09-03	163.67		0
ML-09-05	42.80		0
ML-10-01	100.70	ASTR	1
MM-07-01	160.32		0
MP-02-01	215.24		
MR-06-01	141.37	AMMA	1
MR-08-01	146.51		0
MR-11-01	100.25		0
MR-15-02	110.34		0
MS-07-02	34.32		0
MS-07-03	33.42		0
MS-08-04	60.62	AMMA	4
PM-02-01	120.04	AMMA	12
PM-03-01	355.84		0
PM-03-02	121.65		0
PM-05-02	34.74	AMMA	1
PM-05-03	37.01	AMMA	10
PM-05-04	39.37	AMMA	7
RD-02-01	262.89	AMGR	9
TOTALS	4593.79	5	103

AMGR = AMBYSTOMA MACRODACTYLUM - LONG-TOED SALAMANDER
AMMA = AMBYSTOMA UNKNOWN SPECIES - SALAMANDER
ASTR = ASCAPHUS TRUEI - TAILED FROG
HYRE = HYLA REGILLA - PACIFIC TREE FROG
RAAU = RANA AURORA - RED-LEGGED FROG

TABLE 10B. POND AMPHIBIAN TRAP EFFORT & CAPTURES

NOCA - AMPHIBIAN SURVEY - 1998 MINNOW TRAPS AT SURFACE - OVERNIGHT

SITE NUMBER	TRAP	START DAY	START HOUR	END DAY	END HOUR	TRAP HOURS	T. HRS DECIMAL	SPECIES	AGE	SUBST	CAP_NUM	SEX	TOT_MM	SVL_MM	HW_MM
BD-02-01	1	07/13/1998	10:50	07/14/1998	9:54	23.07	23.07	RAAU	T	VEG	5	U	47	16	12
BD-02-01	2	07/13/1998	10:52	07/14/1998	9:57	23:05	23.08	RAAU	T	W	1	U	54	23	15
BD-02-01	3	07/13/1998	10:54	07/14/1998	10:00	23:06	23.10	RAAU	T	W,B	3	U	50	19	13
BD-02-01	4	07/13/1998	10:56	07/14/1998	10:04	23:08	23.13	RAAU	T	W,OD	9	U	58	25	15
BD-02-01	5	07/13/1998	10:58	07/14/1998	10:13	23:15	23.25	RAAU	T	W,OD	7	U	49	22	13
BD-02-01	6	07/13/1998	11:00	07/14/1998	10:24	23:24	23.40	RAAU	T	W,OD	4	U	40	18	12
BD-02-01						**TOTAL**	**139.03**	**RAAU**			**29**				
EP-07-04	1	08/24/1998	13:45	08/25/1998	8:35	18:50	18.83	0		LC,B					
EP-07-04	2	08/24/1998	13:50	08/25/1998	8:40	18:50	18.83	0		ST,B					
EP-07-04	3	08/24/1998	13:55	08/25/1998	8:41	18:46	18.77	0		BR,P					
EP-07-04	4	08/24/1998	14:00	08/25/1998	8:42	18:42	18.70	0		BR,ST					
EP-07-04	5	08/24/1998	14:05	08/25/1998	8:45	18:40	18.67	0		BR,ST					
EP-07-04						**TOTAL**	**93.80**				**0**				
EP-07-12	1	08/24/1998	15:20	08/25/1998	8:15	16:55	16.92	0		B,ST					
EP-07-12	2	08/24/1998	15:25	08/25/1998	8:16	16:51	16.85	0		BR,ST					
EP-07-12	3	08/24/1998	15:30	08/25/1998	8:17	16:47	16.78	0		BR,ST					
EP-07-12	4	08/24/1998	15:35	08/25/1998	8:18	16:43	16.72	0		BR,ST					
EP-07-12	5	08/24/1998	15:40	08/25/1998	8:19	16:39	16.65	0		BR,ST					
EP-07-12	6	08/24/1998	15:45	08/25/1998	8:20	16:35	16.58	0		B,ST					
EP-07-12						**TOTAL**	**100.50**				**0**				
EP-07-14	1	08/24/1998	17:30	08/25/1998	7:50	14:20	14.33	0		ST,B					
EP-07-14	2	08/24/1998	17:33	08/25/1998	7:55	14:22	14.37	0		ST,B					
EP-07-14	3	08/24/1998	17:36	08/25/1998	7:58	14:22	14.37	0		ST,B					
EP-07-14	4	08/24/1998	17:39	08/25/1998	8:01	14:22	14.37	0		ST,B					
EP-07-14	5	08/24/1998	17:41	08/25/1998	8:04	14:23	14.38	0		ST,B					
EP-07-14	6	08/24/1998	17:44	08/25/1998	8:01	14:17	14.28	0		ST,B					
EP-07-14	7	08/24/1998	17:46	08/25/1998	8:03	14:17	14.28	0		ST,B					
EP-07-14	8	08/24/1998	17:48	08/25/1998	8:05	14:17	14.28	0		ST,B					
EP-07-14						**TOTAL**	**114.66**				**0**				
EP-08-1	1	08/24/1998	16:30	08/25/1998	8:40	16:10	16.17	0		ST					
EP-08-1	2	08/24/1998	16:40	08/25/1998	8:42	16:02	16.03	0		ST					
EP-08-1	3	08/24/1998	16:50	08/25/1998	8:45	15:55	15.92	0		ST					
EP-08-1						**TOTAL**	**48.12**				**0**				
FP-18-01	1	06/29/1998	15:21	06/30/1998	10:44	19:23	19.38	HYRE	M	VEG	2	U	49	20	10
FP-18-01	2	06/29/1998	15:19	06/30/1998	11:06	19:47	19.78	HYRE	M	VEG	1	U	49	19	11
FP-18-01	3	06/29/1998	15:15	06/30/1998	11:11	19:56	19.93	HYRE	M	VEG	3	U	38	14	9
FP-18-01	4	06/29/1998	15:11	06/30/1998	11:22	20:11	20.18	HYRE		VEG	0	U			
FP-18-01	5	06/29/1998	15:15	06/30/1998	11:26	20:11	20.18	HYRE		VEG	0	U			
FP-18-01	6	06/29/1998	15:20	06/30/1998	11:29	20:09	20.15	HYRE	T,M	VEG	3	U	42	17	10
FP-18-01	7	06/29/1998	15:25	06/30/1998	11:44	20:19	20.32	HYRE	M	VEG	1	U	45	12	11
FP-18-01	8	06/29/1998	15:28	06/30/1998	11:48	20:20	20.33	HYRE	T,M	VEG	16	U	28	12	8
FP-18-01						**TOTAL**	**160.25**	**HYRE**			**26**				
LS-17-01	1	08/26/1998	11:02	08/27/1998	7:49	20:47	20.78	0		ST,C					
LS-17-01	2	08/26/1998	11:03	08/27/1998	7:50	20:47	20.78	0		ST					
LS-17-01	3	08/26/1998	11:05	08/27/1998	7:45	20:40	20.67	0		SD,C					
LS-17-01	4	08/26/1998	11:06	08/27/1998	7:46	20:40	20.67	0		C,ST					
LS-17-01	5	08/26/1998	11:10	08/27/1998	7:47	20:37	20.62	0		ST,G					
LS-17-01	6	08/26/1998	11:12	08/27/1998	7:53	20:41	20.68	0		ST,G					
LS-17-01	7	08/26/1998	11:13	08/27/1998	7:55	20:42	20.70	0		G,C					
LS-17-01						**TOTAL**	**144.90**				**0**				
LS-17-02	1	08/26/1998	10:10	08/27/1998	8:06	21:56	21.93	0		ST,C					
LS-17-02	2	08/26/1998	10:12	08/27/1998	8:05	21:53	21.88	0		C,G					
LS-17-02	3	08/26/1998	10:13	08/27/1998	8:04	21:51	21.85	0		C,G					
LS-17-02	4	08/26/1998	10:14	08/27/1998	8:03	21:49	21.82	0		C,G					
LS-17-02	5	08/26/1998	10:17	08/27/1998	8:02	21:45	21.75	0		ST,G					
LS-17-02	6	08/26/1998	10:18	08/27/1998	8:00	21:42	21.70	0		C,ST					
LS-17-02						**TOTAL**	**130.93**				**0**				
LS-17-03	1	08/26/1998	10:42	08/27/1998	8:11	21:29	21.48	0		B,C					
LS-17-03	2	08/26/1998	10:44	08/27/1998	8:14	21:30	21.50	0		C,G					
LS-17-03	3	08/26/1998	10:45	08/27/1998	8:16	21:31	21.52	0		C,G					
LS-17-03	4	08/26/1998	10:47	08/27/1998	8:17	21:30	21.50	0		C,G					
LS-17-03	5	08/26/1998	10:48	08/27/1998	8:20	21:32	21.53	0		C,G					
LS-17-03	6	08/26/1998	10:50	08/27/1998	8:23	21:33	21.55	0		G,C					
LS-17-03						**TOTAL**	**129.08**				**0**				
LS-17-04	1	08/25/1998	15:20	08/26/1998	9:02	17:42	17.70	0		LC,B					
LS-17-04	2	08/25/1998	15:22	08/26/1998	9:03	17:41	17.68	0		SC,B					
LS-17-04	3	08/25/1998	15:23	08/26/1998	9:05	17:42	17.70	0		LC,SC					
LS-17-04	4	08/25/1998	15:27	08/26/1998	9:06	17:39	17.65	0		B,LC					
LS-17-04	5	08/25/1998	15:30	08/26/1998	9:07	17:37	17.62	0		SC,B					
LS-17-04						**TOTAL**	**88.35**				**0**				

TABLE 10B. POND AMPHIBIAN TRAP EFFORT & CAPTURES - CONTINUED

NOCA - AMPHIBIAN SURVEY - 1998 MINNOW TRAPS AT SURFACE - OVERNIGHT

SITE NUMBER	TRAP	START DAY	START HOUR	END DAY	END HOUR	TRAP HOURS	T. HRS DECIMAL	SPECIES	AGE	SUBST	CAP_NUM	SEX	TOT_MM	SVL_MM	HW_MM
LS-17-05	1	08/25/1998	15:40	08/26/1998	9:16	17:36	17.60	0		BR,B,C					
LS-17-05	2	08/25/1998	15:42	08/26/1998	9:17	17:35	17.58	0		BR,B,C					
LS-17-05	3	08/25/1998	15:45	08/26/1998	9:19	17:34	17.57	0		BR,B,C					
LS-17-05	4	08/25/1998	15:50	08/26/1998	9:20	17:30	17.50	0		BR,B,C					
LS-17-05	5	08/25/1998	15:55	08/26/1998	9:23	17:28	17.47	0		BR,B,C					
LS-17-05						**TOTAL**	**87.72**				**0**				
LS-17-07	1	08/25/1998	13:45	08/26/1998	8:36	18:51	18.85	0		LC,ST					
LS-17-07	2	08/25/1998	13:47	08/26/1998	8:39	18:52	18.87	0		ST,LC					
LS-17-07	3	08/25/1998	13:50	08/26/1998	8:37	18:47	18.78	0		BR,ST					
LS-17-07	4	08/25/1998	13:55	08/26/1998	8:40	18:45	18.75	0		LC,ST					
LS-17-07						**TOTAL**	**75.25**				**0**				
LS-17-08	1	08/25/1998	16:05	08/26/1998	9:37	17:32	17.53	0		BR,B,C					
LS-17-08	2	08/25/1998	16:06	08/26/1998	9:38	17:32	17.53	0		BR,B,C					
LS-17-08	3	08/25/1998	16:08	08/26/1998	9:41	17:33	17.55	0		BR,B,C					
LS-17-08	4	08/25/1998	16:09	08/26/1998	9:43	17:34	17.57	0		BR,B,C					
LS-17-08	5	08/25/1998	16:11	08/26/1998	9:45	17:34	17.57	0		BR,B,C					
LS-17-08						**TOTAL**	**87.75**				**0**				
M-20-01	0	07/30/1998	no traps				0.00	0			0				
M-23-01	1	08/18/1998	14:00	08/19/1998	9:01	19:01	19.02	0		SD					
M-23-01	2	08/18/1998	14:20	08/19/1998	9:03	18:43	18.72	0		SD,LC					
M-23-01	3	08/18/1998	14:30	08/19/1998	8:55	18:25	18.42	0		SD					
M-23-01	4	08/18/1998	14:40	08/19/1998	9:20	18:40	18.67	0		SD,ST					
M-23-01	5	08/18/1998	14:50	08/19/1998	9:25	18:35	18.58	0		W					
M-23-01	6	08/18/1998	15:00	08/19/1998	9:29	18:29	18.48	0		LC					
M-23-01						**TOTAL**	**111.89**				**0**				
M-23-05	0	08/18/1998	no traps	08/19/1998			0.00	0		ST	0				
M-23-07	1	08/18/1998	9:15	08/19/1998	9:48	0:33	24.55	0		BIO					
M-23-07	2	08/18/1998	9:17	08/19/1998	9:50	0:33	24.55	0		BIO,LC					
M-23-07	3	08/18/1998	9:19	08/19/1998	9:49	0:30	24.50	0		BIO					
M-23-07	4	08/18/1998	9:21	08/19/1998	9:47	0:26	24.43	0		BIO,B					
M-23-07						**TOTAL**	**98.03**				**0**				
M-23-08	1	08/18/1998	9:23	08/19/1998	9:46	0:23	24.38	0		LC,BIO					
M-23-08	2	08/18/1998	9:25	08/19/1998	9:44	0:19	24.32	0		BIO					
M-23-08						**TOTAL**	**48.70**				**0**				
M-23-10	1	08/17/1998	16:00	08/18/1998	9:05	17:05	17.08	0		LC					
M-23-10	2	08/17/1998	16:02	08/18/1998	9:05	17:03	17.05	0		W					
M-23-10	3	08/17/1998	16:04	08/18/1998	9:05	17:01	17.02	0		B					
M-23-10	4	08/17/1998	16:06	08/18/1998	9:07	17:01	17.02	0		B					
M-23-10	5	08/17/1998	16:10	08/18/1998	9:08	16:58	16.97	0		W					
M-23-10	6	08/17/1998	16:12	08/18/1998	9:08	16:56	16.93	0		W					
M-23-10						**TOTAL**	**102.07**				**0**				
M-23-11	1	08/17/1998	16:30	08/18/1998	8:47	16:17	16.28	0		SD					
M-23-11	2	08/17/1998	16:30	08/18/1998	8:49	16:19	16.32	0		B					
M-23-11	3	08/17/1998	16:30	08/18/1998	8:51	16:21	16.35	0		W					
M-23-11						**TOTAL**	**48.95**				**0**				
M-23-12	1	08/17/1998	14:29	08/18/1998	8:30	18:01	18.02	0		ST					
M-23-12	2	08/17/1998	14:34	08/18/1998	8:34	18:00	18.00	0		ST					
M-23-12	3	08/17/1998	14:36	08/18/1998	8:32	17:56	17.93	0		ST					
M-23-12						**TOTAL**	**53.95**				**0**				
MC-14-2	0	09/02/1998					no traps	0		C,B	0				
MC-14-5	0	09/02/1998					no traps	0		ST	0				
MC-15-01	0	09/02/1998					no traps	0		C,G	0				
MC-16-02	0	09/03/1998					no traps	0		C,G	0				
MC-22-01	0	09/17/1998					no traps	0		SD,G	0				
MC-23-01	0	09/17/1998					no traps	0		SD,ST	0				
MC-55-04	0	09/14/1998					no traps	0		ST	0				
MC-55-06	0	09/15/1998					no traps	0		BIO,VEG	0				
MC-55-07	1	09/14/1998	18:04	09/15/1998	10:09	16:05	16.08	0		BIO,ST					
MC-55-07	2	09/14/1998	18:05	09/15/1998	10:12	16:07	16.12	AMMA	L	ST,OD	2	U	51	24	
MC-55-07	3	09/14/1998	18:06	09/15/1998	10:17	16:11	16.18	0		OD,ST					
MC-55-07	4	09/14/1998	18:09	09/15/1998	10:19	16:10	16.17	AMMA	L	ST,OD	1	U	43	21	
MC-55-07						**TOTAL**	**64.55**	**AMMA**			**3**				

TABLE 10B. POND AMPHIBIAN TRAP EFFORT & CAPTURES - CONTINUED

NOCA - AMPHIBIAN SURVEY - 1998 MINNOW TRAPS AT SURFACE - OVERNIGHT

SITE NUMBER	TRAP	START DAY	START HOUR	END DAY	END HOUR	TRAP HOURS	T. HRS DECIMAL	SPECIES	AGE	SUBST	CAP_NUM	SEX	TOT_MM	SVL_MM	HW_MM
ML-01-01	0	07/14/1998	no traps					0		ST	0				
ML-02-01	1	07/14/1998	18:30	07/15/1998	9:20	14:50	14.83	0		G,C					
ML-02-01	2	07/14/1998	18:40	07/15/1998	9:30	14:50	14.83	0		G,C					
ML-02-01	3	07/14/1998	18:50	07/15/1998	9:45	14:55	14.92	0		B,W					
ML-02-01	4	07/14/1998	19:10	07/15/1998	11:00	15:50	15.83	0		B					
ML-02-01	5	07/14/1998	19:20	07/15/1998	11:20	16:00	16.00	0		B					
ML-02-01	6	07/14/1998	19:30	07/15/1998	11:30	16:00	16.00	0		B					
ML-02-01						**TOTAL**	**92.41**				**0**				
ML-04-01	1	07/13/1998	14:30	07/14/1998	6:00	15:30	15.50	0		SD,B					
ML-04-01	2	07/13/1998	15:30	07/14/1998	6:05	14:35	14.58	0		ST,B					
ML-04-01	3	07/13/1998	16:17	07/14/1998	6:10	13:53	13.88	0		ST,B					
ML-04-01	4	07/13/1998	17:04	07/14/1998	6:15	13:11	13.18	0		C,B					
ML-04-01	5	07/13/1998	17:15	07/14/1998	6:20	13:05	13.08	0		C,B					
ML-04-01	6	07/13/1998	17:20	07/14/1998	6:25	13:05	13.08	0		B,C					
ML-04-01	7	07/13/1998	16:30	07/14/1998	6:30	14:00	14.00	0		VEG					
ML-04-01	8	07/13/1998	16:35	07/14/1998	6:30	13:55	13.92	0		VEG					
ML-04-01						**TOTAL**	**111.22**				**0**				
ML-09-01	1	09/02/1998	14:10	09/03/1998	9:30	19:20	19.33	0		VEG					
ML-09-01	2	09/02/1998	14:15	09/03/1998	9:35	19:20	19.33	0		VEG					
ML-09-01	3	09/02/1998	14:20	09/03/1998	9:40	19:20	19.33	0		W,ST					
ML-09-01	4	09/02/1998	14:25	09/03/1998	9:45	19:20	19.33	0		W,ST					
ML-09-01						**TOTAL**	**77.32**				**0**				
ML-09-02	1	09/02/1998	13:10	09/03/1998	10:02	20:52	20.87	0		W,ST					
ML-09-02	2	09/02/1998	13:20	09/03/1998	10:05	20:45	20.75	0		W,ST					
ML-09-02	3	09/02/1998	13:30	09/03/1998	10:09	20:39	20.65	0		W,ST					
ML-09-02	4	09/02/1998	13:40	09/03/1998	10:11	20:31	20.52	0		W,ST					
ML-09-02	5	09/02/1998	13:50	09/03/1998	10:18	20:28	20.47	0		W,ST					
ML-09-02						**TOTAL**	**103.26**				**0**				
ML-09-03	1	09/02/1998	11:30	09/03/1998	11:08	23:38	23.63	0		W,ST					
ML-09-03	2	09/02/1998	11:32	09/03/1998	11:13	23:41	23.68	0		W,ST					
ML-09-03	3	09/02/1998	11:33	09/03/1998	11:12	23:39	23.65	0		W,ST					
ML-09-03	4	09/02/1998	11:45	09/03/1998	11:11	23:26	23.43	0		W,ST					
ML-09-03	5	09/02/1998	11:50	09/03/1998	11:10	23:20	23.33	0		W,ST					
ML-09-03	6	09/02/1998	12:00	09/03/1998	11:05	23:05	23.08	0		W,ST					
ML-09-03	7	09/02/1998	12:10	09/03/1998	11:02	22:52	22.87	0		W,ST					
ML-09-03						**TOTAL**	**163.67**				**0**				
ML-09-05	1	09/02/1998	13:15	09/03/1998	10:40	21:25	21.42	0		VEG,ST					
ML-09-05	2	09/02/1998	13:18	09/03/1998	10:41	21:23	21.38	0		VEG,ST					
ML-09-05						**TOTAL**	**42.80**				**0**				
ML-10-01	1	09/14/1998	16:05	09/15/1998	8:50	16:45	16.75	0		ST					
ML-10-01	2	09/14/1998	16:10	09/15/1998	8:45	16:35	16.58	ASTR		ST	1	M		40	
ML-10-01	3	09/14/1998	16:10	09/15/1998	9:17	17:07	17.12	0		ST					
ML-10-01	4	09/14/1998	16:15	09/15/1998	9:13	16:58	16.97	0		ST					
ML-10-01	5	09/14/1998	16:15	09/15/1998	8:54	16:39	16.65	0		ST					
ML-10-01	6	09/14/1998	16:17	09/15/1998	8:55	16:38	16.63	0		ST					
ML-10-01						**TOTAL**	**100.70**	**ASTR**			**1**				
MM-07-01	1	09/10/1998	10:47	09/11/1998	7:28	20:41	20.68	0		W,OD					
MM-07-01	2	09/10/1998	11:09	09/11/1998	7:30	20:21	20.35	0		W,ST					
MM-07-01	3	09/10/1998	11:20	09/11/1998	7:31	20:11	20.18	0		ST,B					
MM-07-01	4	09/10/1998	11:23	09/11/1998	7:32	20:09	20.15	0		ST					
MM-07-01	5	09/10/1998	11:38	09/11/1998	7:33	19:55	19.92	0		ST					
MM-07-01	6	09/10/1998	11:41	09/11/1998	7:36	19:55	19.92	0		ST,W					
MM-07-01	7	09/10/1998	12:01	09/11/1998	7:38	19:37	19.62	0		ST,LG					
MM-07-01	8	09/10/1998	12:10	09/11/1998	7:40	19:30	19.50	0		ST,OD					
MM-07-01						**TOTAL**	**160.32**				**0**				
MP-02-01	1	08/04/1998	12:30	08/05/1998	7:40	19:10	19.17	0		W,ST					
MP-02-01	2	08/04/1998	12:45	08/05/1998	7:47	19:02	19.03	0		OD,ST					
MP-02-01	3	08/04/1998	12:55	08/05/1998	7:49	18:54	18.90	0		OD,C					
MP-02-01	4	08/04/1998	13:10	08/05/1998	7:51	18:41	18.68	0		W,C,S					
MP-02-01	5	08/04/1998	13:30	08/05/1998	7:55	18:25	18.42	0		B,OD					
MP-02-01	6	08/04/1998	13:50	08/05/1998	7:57	18:07	18.12	0		ST,B					
MP-02-01	7	08/04/1998	14:15	08/05/1998	8:15	18:00	18.00	0		C,B					
MP-02-01	8	08/04/1998	14:23	08/05/1998	8:17	17:54	17.90	0		C,B					
MP-02-01	9	08/04/1998	14:30	08/05/1998	8:19	17:49	17.82	0		B,ST					
MP-02-01	10	08/04/1998	14:50	08/05/1998	6:45	15:55	15.92	0		ST					
MP-02-01	11	08/04/1998	15:15	08/05/1998	8:12	16:57	16.95	0		B,W,C					
MP-02-01	12	08/04/1998	15:25	08/05/1998	7:45	16:20	16.33	0		OD,B					
MP-02-01						**TOTAL**	**215.24**				**0**				

TABLE 10B. POND AMPHIBIAN TRAP EFFORT & CAPTURES - CONTINUED

NOCA - AMPHIBIAN SURVEY - 1998 MINNOW TRAPS AT SURFACE - OVERNIGHT

SITE NUMBER	TRAP	START DAY	START HOUR	END DAY	END HOUR	TRAP HOURS	T. HRS DECIMAL	SPECIES	AGE	SUBST	CAP_NUM	SEX	TOT_MM	SVL_MM	HW_MM
MR-06-01	1	09/09/1998	11:48	09/10/1998	7:15	19:27	19.45	0		BIO,OD					
MR-06-01	2	09/09/1998	12:01	09/10/1998	7:17	19:16	19.27	0		B,BIO					
MR-06-01	3	09/09/1998	12:14	09/10/1998	7:18	19:04	19.07	0		BIO,OD					
MR-06-01	4	09/09/1998	12:25	09/10/1998	7:19	18:54	18.90	0		BIO,OD					
MR-06-01	5	09/09/1998	12:45	09/10/1998	7:24	18:39	18.65	AMMA		BIO,OD	1	U	39	29	
MR-06-01	6	09/09/1998	16:05	09/10/1998	7:34	15:29	15.48	0		BIO,OD					
MR-06-01	7	09/09/1998	16:17	09/10/1998	7:38	15:21	15.35	0		BIO,OD					
MR-06-01	8	09/09/1998	16:28	09/10/1998	7:40	15:12	15.20	0		BIO,OD					
MR-06-01						**TOTAL**	**141.37**	**AMMA**			**1**				
MR-07-01		09/08/1998					no traps	0		B,ST,C	0				
MR-07-02		09/08/1998					no traps	0		B,ST,C	0				
MR-07-03		09/08/1998					no traps	0		B,ST,C	0				
MR-08-01	1	09/08/1998	12:35	09/09/1998	7:30	18:55	18.92	0		BIO,B					
MR-08-01	2	09/08/1998	12:47	09/09/1998	7:34	18:47	18.78	0		BIO,C					
MR-08-01	3	09/08/1998	13:20	09/09/1998	7:37	18:17	18.28	0		BIO,C					
MR-08-01	4	09/08/1998	13:22	09/09/1998	7:41	18:19	18.32	0		BIO,B					
MR-08-01	5	09/08/1998	13:24	09/09/1998	7:43	18:19	18.32	0		BIO,B					
MR-08-01	6	09/08/1998	13:38	09/09/1998	7:45	18:07	18.12	0		BIO,ST					
MR-08-01	7	09/08/1998	13:50	09/09/1998	7:47	17:57	17.95	0		BIO,B					
MR-08-01	8	09/08/1998	14:00	09/09/1998	7:49	17:49	17.82	0		BIO,B					
MR-08-01						**TOTAL**	**146.51**				**0**				
MR-11-01	1	08/11/1998	15:30	08/12/1998	8:25	16:55	16.92	0		B					
MR-11-01	2	08/11/1998	15:40	08/12/1998	8:30	16:50	16.83	0		W					
MR-11-01	3	08/11/1998	15:50	08/12/1998	8:35	16:45	16.75	0		W					
MR-11-01	4	08/11/1998	16:00	08/12/1998	8:40	16:40	16.67	0		W,ST					
MR-11-01	5	08/11/1998	16:10	08/12/1998	8:45	16:35	16.58	0		B,W					
MR-11-01	6	08/11/1998	16:20	08/12/1998	8:50	16:30	16.50	0		G,W					
MR-11-01						**TOTAL**	**100.25**				**0**				
MR-15-02	1	08/10/1998	14:30	08/11/1998	9:00	18:30	18.50	0		B					
MR-15-02	2	08/10/1998	14:40	08/11/1998	9:10	18:30	18.50	0		C,W					
MR-15-02	3	08/10/1998	14:50	08/11/1998	9:20	18:30	18.50	0		C,W					
MR-15-02	4	08/10/1998	15:00	08/11/1998	9:30	18:30	18.50	0		C,W					
MR-15-02	5	08/10/1998	15:30	08/11/1998	9:40	18:10	18.17	0		B,W					
MR-15-02	6	08/10/1998	15:40	08/11/1998	9:50	18:10	18.17	0		B,W					
MR-15-02						**TOTAL**	**110.34**				**0**				
MS-07-01		09/15/1998					no traps				0				
MS-07-02	1	09/15/1998	16:14	09/16/1998	9:24	17:10	17.17	0		OD,VEG					
MS-07-02	2	09/15/1998	16:16	09/16/1998	9:25	17:09	17.15	0		OD,VEG					
MS-07-02						**TOTAL**	**34.32**				**0**				
MS-07-03	1	09/15/1998	16:30	09/16/1998	9:13	16:43	16.72	0		ST,OD					
MS-07-03	2	09/15/1998	16:32	09/16/1998	9:14	16:42	16.70	0		ST,OD					
MS-07-03						**TOTAL**	**33.42**				**0**				
MS-08-03		09/15/1998					no traps				0				
MS-08-04	1	09/15/1998	17:25	09/16/1998	8:30	15:05	15.08	AMMA	L	ST	2	U	54	30	
MS-08-04	2	09/15/1998	17:28	09/16/1998	8:37	15:09	15.15	0		ST					
MS-08-04	3	09/15/1998	17:30	09/16/1998	8:40	15:10	15.17	AMMA	L	ST	2	U	45	22	
MS-08-04	4	09/15/1998	17:31	09/16/1998	8:44	15:13	15.22	0		ST,W					
MS-08-04						**TOTAL**	**60.62**	**AMMA**			**4**				
PM-02-01	1	08/05/1998	12:30	08/06/1998	8:04	19:34	19.57	AMMA	L	ST,B	7	U	70	34	
PM-02-01	2	08/05/1998	12:34	08/06/1998	8:55	20:21	20.35	AMMA	L	B,C	1	U	75	37	
PM-02-01	3	08/05/1998	12:37	08/06/1998	8:52	20:15	20.25	0		ST					
PM-02-01	4	08/05/1998	12:45	08/06/1998	8:50	20:05	20.08	AMMA	L	W,C	3	U	72	33	
PM-02-01	5	08/05/1998	12:50	08/06/1998	8:45	19:55	19.92	AMMA	L	ST	1	U	74	35	
PM-02-01	6	08/05/1998	12:55	08/06/1998	8:47	19:52	19.87	0		ST,B					
PM-02-01						**TOTAL**	**120.04**	**AMMA**			**12**				
PM-03-01	1	08/06/1998	11:15	08/07/1998	7:20	20:05	20.08	0		W,ST					
PM-03-01	2	08/06/1998	11:20	08/07/1998	7:23	20:03	20.05	0		W,ST					
PM-03-01	3	08/06/1998	11:25	08/07/1998	7:26	20:01	20.02	0		W,ST					
PM-03-01	4	08/06/1998	11:30	08/07/1998	7:30	20:00	20.00	0		B					
PM-03-01	5	08/06/1998	11:40	08/07/1998	7:32	19:52	19.87	0		W,ST					
PM-03-01	6	08/06/1998	11:45	08/07/1998	7:35	19:50	19.83	0		B,W					
PM-03-01	7	08/06/1998	11:54	08/07/1998	7:38	19:44	19.73	0		B,W					
PM-03-01	8	08/06/1998	11:58	08/07/1998	7:40	19:42	19.70	0		W,LC					
PM-03-01	9	08/06/1998	11:25	08/07/1998	7:23	19:58	19.97	0		W,C					
PM-03-01	10	08/06/1998	11:35	08/07/1998	7:26	19:51	19.85	0		W,C					
PM-03-01	11	08/06/1998	11:45	08/07/1998	7:28	19:43	19.72	0		LC,W					
PM-03-01	12	08/06/1998	11:53	08/07/1998	7:30	19:37	19.62	0		W,LC					
PM-03-01	13	08/06/1998	11:57	08/07/1998	7:40	19:43	19.72	0		W,B					
PM-03-01	14	08/06/1998	12:00	08/07/1998	7:38	19:38	19.63	0		W,B					
PM-03-01	15	08/06/1998	12:10	08/07/1998	7:43	19:33	19.55	0		BR,W					
PM-03-01	16	08/06/1998	12:15	08/07/1998	7:46	19:31	19.52	0		BR					
PM-03-01	17	08/06/1998	12:19	08/07/1998	7:48	19:29	19.48	0		BR,G					
PM-03-01	18	08/06/1998	12:20	08/07/1998	7:50	19:30	19.50	0		G,W					
PM-03-01						**TOTAL**	**355.84**				**0**				

TABLE 10B. POND AMPHIBIAN TRAP EFFORT & CAPTURES - CONTINUED

NOCA - AMPHIBIAN SURVEY - 1998 MINNOW TRAPS AT SURFACE - OVERNIGHT

SITE NUMBER	TRAP	START DAY	START HOUR	END DAY	END HOUR	TRAP HOURS	T. HRS DECIMAL	SPECIES	AGE	SUBST	CAP_NUM	SEX	TOT_MM	SVL_MM	HW_MM
PM-03-02	1	08/05/1998	13:30	08/06/1998	9:49	20:19	20.32	0		ST					
PM-03-02	2	08/05/1998	13:32	08/06/1998	9:50	20:18	20.30	0		ST					
PM-03-02	3	08/05/1998	13:34	08/06/1998	9:52	20:18	20.30	0		ST					
PM-03-02	4	08/05/1998	13:36	08/06/1998	9:53	20:17	20.28	0		ST					
PM-03-02	5	08/05/1998	13:38	08/06/1998	9:54	20:16	20.27	0		ST					
PM-03-02	6	08/05/1998	13:40	08/06/1998	9:51	20:11	20.18	0		ST					
PM-03-02						**TOTAL**	**121.65**				**0**				
PM-05-02	5	08/04/1998	16:30	08/05/1998	9:49	17:19	17.32	AMMA	L	ST	1	U			
PM-05-02	6	08/04/1998	16:35	08/05/1998	10:00	17:25	17.42	0		ST					
PM-05-02						**TOTAL**	**34.74**	**AMMA**			**1**				
PM-05-03	3	08/04/1998	15:01	08/05/1998	9:27	18:26	18.43	AMMA	L	ST,W	7	U	got away		
PM-05-03	4	08/04/1998	15:05	08/05/1998	9:40	18:35	18.58	AMMA	L	ST,W	3	U	83	37	
PM-05-03						**TOTAL**	**37.01**	**AMMA**			**10**				
PM-05-04	1	08/04/1998	13:15	08/05/1998	8:57	19:42	19.70	AMMA	L	BIO	4	U	75	36	
PM-05-04	2	08/04/1998	13:20	08/05/1998	9:00	19:40	19.67	AMMA	L	BIO	3	U	74	39	
PM-05-04						**TOTAL**	**39.37**	**AMMA**			**7**				
RD-02-01	1	07/13/1998	13:25	07/14/1998	11:24	21:59	21.98	AMGR	N	ST,VEG	1	U	130	63	
RD-02-01	2	07/13/1998	13:30	07/14/1998	11:33	22:03	22.05	AMGR	N	ST,W	1	U	96	49	13
RD-02-01	3	07/13/1998	13:40	07/14/1998	11:39	21:59	21.98	0							
RD-02-01	4	07/13/1998	13:45	07/14/1998	11:43	21:58	21.97	AMGR	N	ST,W	3	U	81	41	12
RD-02-01	5	07/13/1998	13:50	07/14/1998	11:50	22:00	22.00	0							
RD-02-01	6	07/13/1998	14:00	07/14/1998	12:03	22:03	22.05	AMGR	N	ST,VEG	1	U	113	60	15
RD-02-01	7	07/13/1998	14:10	07/14/1998	12:06	21:56	21.93	0		ST,VEG					
RD-02-01	8	07/13/1998	14:22	07/14/1998	12:10	21:48	21.80	AMGR	N	ST,W	1	U	93	45	13
RD-02-01	9	07/13/1998	14:30	07/14/1998	12:14	21:44	21.73	AMGR	N	B,W	1	U	99	52	14
RD-02-01	10	07/13/1998	14:35	07/14/1998	12:22	21:47	21.78	AMGR	N	ST,OD	1	U	118	58	15
RD-02-01	11	07/13/1998	14:41	07/14/1998	12:30	21:49	21.82	0		VEG,ST					
RD-02-01	12	07/13/1998	14:47	07/14/1998	12:35	21:48	21.80	0		VEG,ST					
RD-02-01						**TOTAL**	**262.89**	**AMGR**			**9**				
RD-09-01		08/12/1998	no traps					0		BIO,VEG	0				
SM-01-01		07/22/1998	no traps					0		BIO,W	0				
SM-02-01		07/21/1998	no traps					0		BIO,W	0				
SM-02-02		07/21/1998	no traps					0		ST,BIO	0				

AMGR = AMBYSTOMA GRACILE
AMMA = AMBYSTOMA MACRODACTYLUM
ASTR = ASCAPHUS TRUEI
HYRE = HYLA REGILLA
RAAU = RANA AURORA

B = BOULDER
BIO = BIOFILM
BR = BEDROCK
C = COBBLE
G = GRAVEL
LC = LARGE COBBLE
LG = LARGE GRAVEL
OD = ORGANIC DEBRIS
SD = SAND
ST = SILT
VEG = VEGETATION
W = WOODY DEBRIS

TABLE 11. ASCAPHUS TRUEI CAPTURES OUTSIDE TRANSECTS
NOCA - AMPHIBIAN SURVEY - 1998

WATERSHED	SITE NUMBER	DATE	#	SEX	STAGE	TOTAL LENGTH	SNOUTVENT HEADWIDTH	HL_MM	FL_MM
THUNDER CK	32A	07/01/1998	1	U	T	34	7		
THUNDER CK	32A	07/01/1998	2	U	T	32	6		
THUNDER CK	32A	07/01/1998	3	F	A	110	45	65	29
THUNDER CK	32A	07/01/1998	4	U	T	34	7		
THUNDER CK	32A	07/01/1998	5	U	T	32	7		
THUNDER CK	32A	07/01/1998	6	U	T	31	6		
THUNDER CK	32A	07/01/1998	7	U	T	36	9		
THUNDER CK	32A	07/01/1998	8	U	T	35	7		
THUNDER CK	32A	07/01/1998	9	F	A	113	47	66	29
THUNDER CK	32A	07/01/1998	10	U	T	46	12	5	
THUNDER CK	32A	07/01/1998	11	U	T	44	11		
THUNDER CK	32A	07/01/1998	12	U	T	44	11		
THUNDER CK	32A	07/01/1998	13	U	T	35	8		
THUNDER CK	32A	07/01/1998	14	U	T	47	11		
THUNDER CK	32A	07/01/1998	15	U	T	42	10		
THUNDER CK	32A	07/01/1998	16	U	T	43	11		
THUNDER CK	32A	07/01/1998	17	U	T	31	8		
THUNDER CK	32A	07/01/1998	18	F	A	110	45	65	31
THUNDER CK	32A	07/01/1998	19	U	T	42	10		
THUNDER CK	32A	07/01/1998	20	U	T	47	12	10	
THUNDER CK	32A	07/01/1998	21	U	T	33	9		
THUNDER CK	32A	07/01/1998	22	U	T	47	11	9	
THUNDER CK	32A	07/01/1998	23	U	T	30	7		
THUNDER CK	32A	07/01/1998	24	U	T	39	9		
THUNDER CK	32A	07/01/1998	25	U	T	45	11	10	
THUNDER CK	32A	07/01/1998	26	U	T	45	11	6	
THUNDER CK	32A	07/01/1998	27	U	T	35	9		
THUNDER CK	32A	07/01/1998	28	U	T	38	10		
THUNDER CK	32A	07/01/1998	29	U	T	43	10		
THUNDER CK	32A	07/01/1998	30	U	T	28	7		
THUNDER CK	32A	07/01/1998	31	U	T	47	12	6	
THUNDER CK	32A	07/01/1998	32	U	T	39	10		
THUNDER CK	32A	07/01/1998	33	U	T	44	11		
THUNDER CK	32A	07/01/1998	34	U	T	42	11		
THUNDER CK	33	06/18/1998	1	U	T	26	4		
THUNDER CK	33	06/18/1998	2	U	T	40	9		
THUNDER CK	33	06/18/1998	3	U	T	25	6		
THUNDER CK	33	06/18/1998	4	U	T	25	6		
THUNDER CK	33	06/18/1998	5	U	T	38	9		
THUNDER CK	33	06/18/1998	6	M	A	90	40	50	25
THUNDER CK	33	06/18/1998	7	U	T	26	7		
THUNDER CK	33	06/18/1998	8	U	T	47	12	7	
THUNDER CK	33	06/18/1998	9	U	T	46	12	9	
THUNDER CK	33	06/18/1998	10	U	T	33	6		
THUNDER CK	33	06/18/1998	11	U	T	43	10		
THUNDER CK	33	06/18/1998	12	U	T	32	7		
THUNDER CK	33	06/18/1998	13	U	T	46	12	3	
THUNDER CK	33	06/18/1998	14	U	T	31	7		
THUNDER CK	33	06/18/1998	15	U	T	38	10		
THUNDER CK	33	06/18/1998	16	U	T	38	10		
THUNDER CK	33	06/18/1998	17	U	T	36	9		
THUNDER CK	33	06/18/1998	18	U	T	32	6		
THUNDER CK	33	06/18/1998	19	U	T	31	7		
THUNDER CK	33	06/18/1998	20	F	A	110	44	66	24

TABLE 11. ASCAPHUS TRUEI CAPTURES OUTSIDE TRANSECTS - CONTINUED
NOCA - AMPHIBIAN SURVEY - 1998

WATERSHED	SITE NUMBER	DATE	#	SEX	STAGE	TOTAL LENGTH	SNOUTVENT HEADWIDTH	HL_MM	FL_MM
THUNDER CK	33	06/18/1998	21	U	T	40	10		
THUNDER CK	33	06/18/1998	22	U	T	39	9		
THUNDER CK	33	06/18/1998	23	U	T	30	6		
THUNDER CK	33	06/18/1998	24	U	T	39	9		
THUNDER CK	33	06/18/1998	25	U	T	33	7		
THUNDER CK	33	06/18/1998	26	M	A		37	55	25
THUNDER CK	33	06/18/1998	27	U	T	32	7		
THUNDER CK	62B	06/26/1998	1	U	T	30	7		
THUNDER CK	62B	06/26/1998	2	U	T	42	9		
THUNDER CK	62B	06/26/1998	3	U	T	51	10		
THUNDER CK	62B	06/26/1998	4	U	T	52	11	6	
THUNDER CK	62B	06/26/1998	5	U	T	33	9		
THUNDER CK	62B	06/26/1998	6	U	T	43	11		
THUNDER CK	62B	06/26/1998	7	U	T	52	12	7	
THUNDER CK	62B	06/26/1998	8	U	T	43	10		
THUNDER CK	62B	06/26/1998	9	U	T	44	12		
THUNDER CK	62B	06/26/1998	10	U	T	31	6		
THUNDER CK	62B	06/26/1998	11	U	T	52	13	11	
THUNDER CK	62B	06/26/1998	12	U	T	43	11		
THUNDER CK	62B	06/26/1998	13	U	T	34	7		
THUNDER CK	62B	06/26/1998	14	U	T	53	12	10	
THUNDER CK	62B	06/26/1998	15	U	T	37	8		
THUNDER CK	62B	06/26/1998	16	U	T	33	8		
THUNDER CK	62B	06/26/1998	17	U	T	53	13	11	
THUNDER CK	62B	06/26/1998	18	U	T	30	8		
THUNDER CK	62B	06/26/1998	19	U	T	49	12		
THUNDER CK	62B	06/26/1998	20	U	T	46	11		
THUNDER CK	62B	06/26/1998	21	U	T	29	6		
THUNDER CK	62B	06/26/1998	22	U	T	35	7		
THUNDER CK	62B	06/26/1998	23	U	T	46	11		
THUNDER CK	62B	06/26/1998	24	U	T	45	11		
THUNDER CK	62B	06/26/1998	25	U	T	44	10		
THUNDER CK	62B	06/26/1998	26	U	T	34	7		
THUNDER CK	62B	06/26/1998	27	U	T	53	12	11	
THUNDER CK	62B	06/26/1998	28	U	T	48	11		
THUNDER CK	62B	06/26/1998	29	U	T	45	10		
THUNDER CK	62B	06/26/1998	30	U	T	44	10		
THUNDER CK	62B	06/26/1998	31	U	T	31	6		
THUNDER CK	62B	06/26/1998	32	U	T	31	7		
THUNDER CK	62B	06/26/1998	33	U	T	30	7		
THUNDER CK	62B	06/26/1998	34	U	T	54	12	13	
THUNDER CK	62B	06/26/1998	35	U	T	55	13	11	
THUNDER CK	62B	06/26/1998	36	U	T	32	7		
THUNDER CK	62B	06/26/1998	37	U	T	46	11		
THUNDER CK	62B	06/26/1998	38	U	T	46	11		
THUNDER CK	62B	06/26/1998	39	U	T	45	11		
THUNDER CK	62B	06/26/1998	40	U	T	32	7		
THUNDER CK	62B	06/26/1998	41	U	T	54	13	13	
THUNDER CK	62B	06/26/1998	42	U	T	53	13	11	

TABLE 11. ASCAPHUS TRUEI CAPTURES OUTSIDE TRANSECTS - CONTINUED
NOCA - AMPHIBIAN SURVEY - 1998

WATERSHED	SITE NUMBER	DATE	#	SEX	STAGE	TOTAL LENGTH	SNOUTVENT HEADWIDTH	HL_MM	FL_MM
FISHER CK	186	07/23/1998	1	U	T	25	5		
FISHER CK	186	07/23/1998	2	U	T	25	5		
FISHER CK	186	07/23/1998	3	U	T	51	14	7	
FISHER CK	186	07/23/1998	4	U	T	32	7		
FISHER CK	186	07/23/1998	5	U	T	26	5		
FISHER CK	186	07/23/1998	6	U	T	25	4		
FISHER CK	186	07/23/1998	7	U	T	31	7		
FISHER CK	186	07/23/1998	8	U	T	34	7		
FISHER CK	186	07/23/1998	9	U	T	22	5		
FISHER CK	186	07/23/1998	10	U	T	23	5		
FISHER CK	186	07/23/1998	11	U	T	32	8		
FISHER CK	186	07/23/1998	12	U	T	25	5		
FISHER CK	186	07/23/1998	13	U	T	35	8		
FISHER CK	186	07/23/1998	14	U	T	45	11	2	
FISHER CK	202	07/22/1998	1	U	T	24	5		
FISHER CK	202	07/22/1998	2	U	T	25	6		
FISHER CK	202	07/22/1998	3	U	T	34	7		
FISHER CK	202	07/22/1998	4	U	T	42	9		
FISHER CK	202	07/22/1998	5	U	T	34	7		
FISHER CK	202	07/22/1998	6	U	T	49	11		
FISHER CK	202	07/22/1998	7	U	T	22	5		
FISHER CK	202	07/22/1998	8	U	T	26	6		
FISHER CK	202	07/22/1998	9	U	T	39	9		
FISHER CK	202	07/22/1998	10	U	T	33	8		
FISHER CK	202	07/22/1998	11	U	T	32	8		
FISHER CK	202	07/22/1998	12	U	T	48	10	11	
FISHER CK	202	07/22/1998	13	U	T	44	11		
FISHER CK	202	07/22/1998	14	U	T	47	10	4	
FISHER CK	202	07/22/1998	15	U	T	47	11	10	
FISHER CK	202	07/22/1998	16	U	T	43	10	10	
FISHER CK	202	07/22/1998	17	U	T	29	7		
FISHER CK	202	07/22/1998	18	U	T	30	7		
FISHER CK	202	07/22/1998	19	U	T	48	7	7	
FISHER CK	217	07/21/1998	1	U	T	30	7		
FISHER CK	217	07/21/1998	2	U	T	28	7		
FISHER CK	217	07/21/1998	3	U	T	38	8		
FISHER CK	217	07/21/1998	4	U	T	37	9		
FISHER CK	217	07/21/1998	5	U	T	30	7		
FISHER CK	217	07/21/1998	6	U	T	34	7		
FISHER CK	217	07/21/1998	7	U	T	32	7		
FISHER CK	217	07/21/1998	8	U	T	34	8		
FISHER CK	217	07/21/1998	9	U	T	32	7		
FISHER CK	217	07/21/1998	10	U	T	34	8		
FISHER CK	217	07/21/1998	11	U	T	22	4		
BRIDGE CK	411	08/11/1998	1	U	T	56	12	5	
BRIDGE CK	411	08/11/1998	1	RACA	A		61	34	

RACA = RANA CASCADAE

A = ADULT
T = TADPOLE

DATA FROM TABLES 8 AND 11.

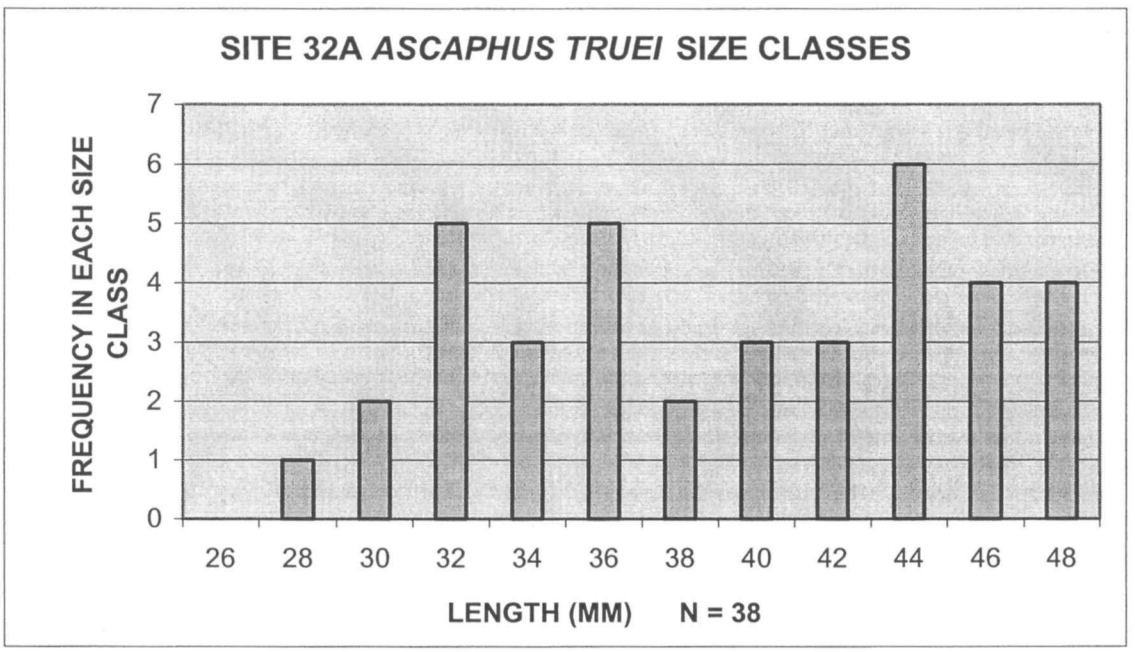


Figure 2. Tailed frog tadpole size distribution in lower Thunder Creek Tributary site # 32A, 7/1/98.

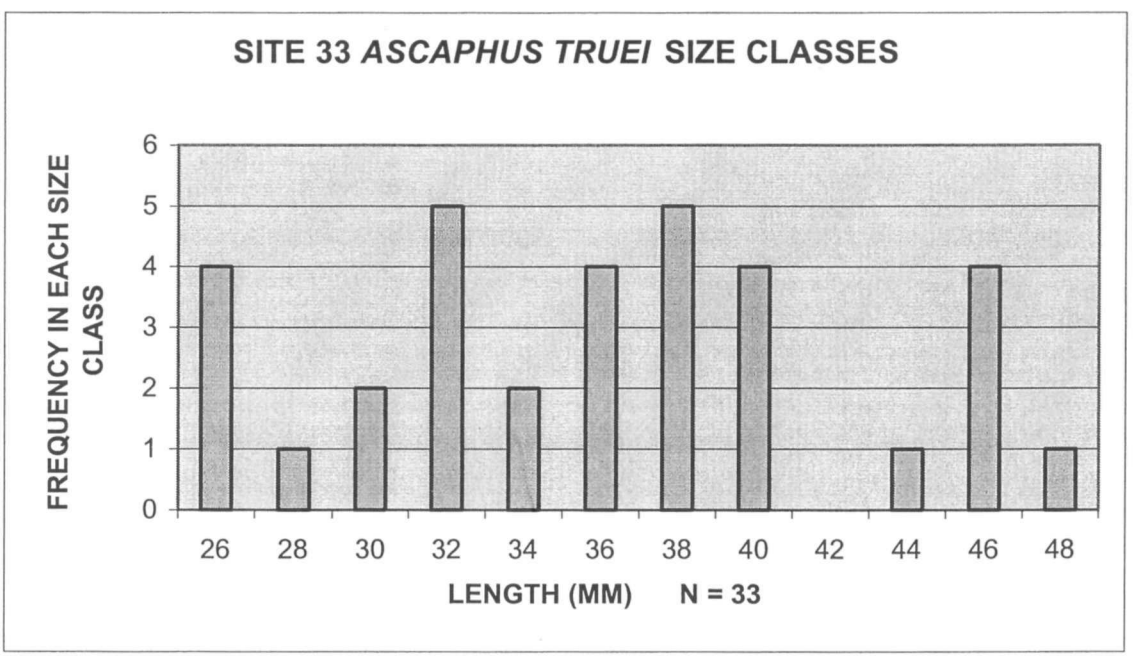


Figure 3. Tailed frog tadpole size distribution in lower Thunder Creek Tributary site #33, 6/18/98.

DATA FROM TABLES 8 AND 11

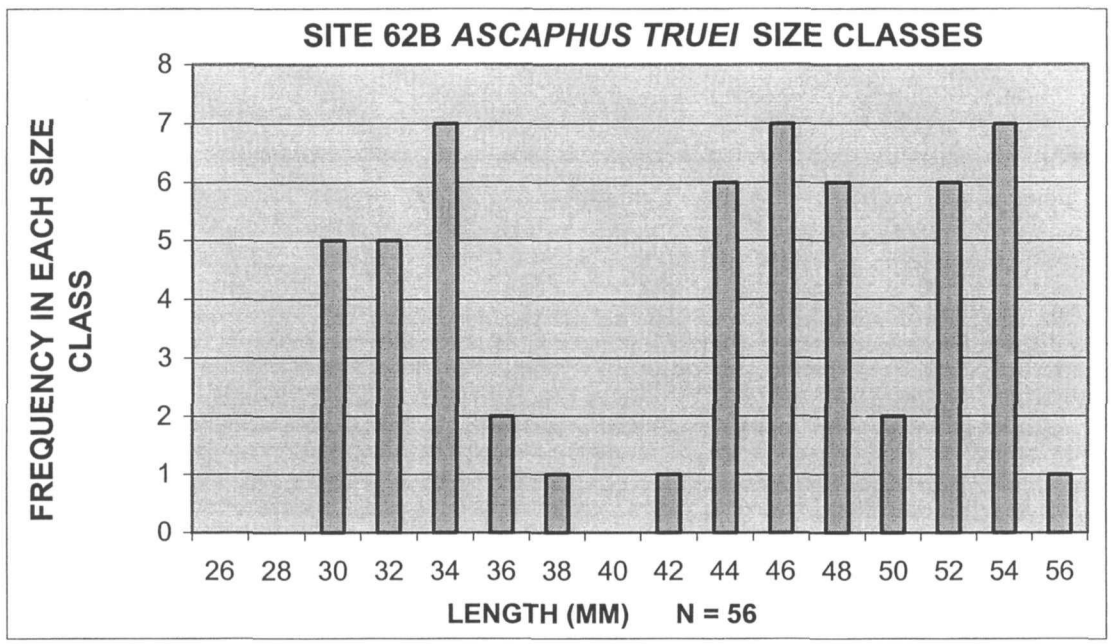


Figure 4. Tailed frog tadpole size distribution in lower Thunder Creek Tributary site # 62B, 6/26/98.

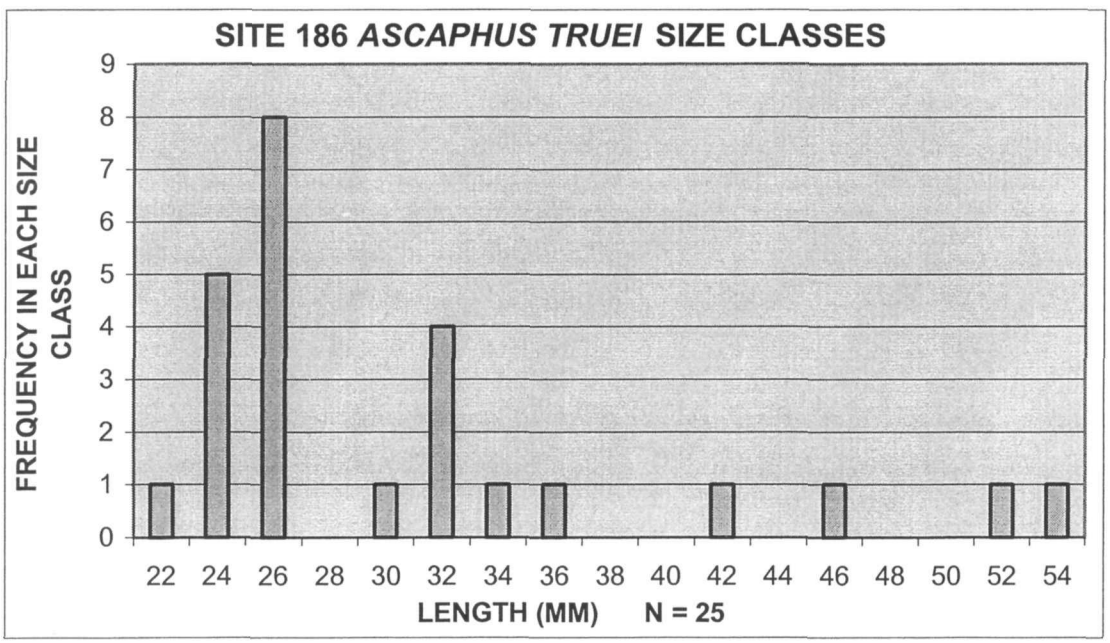


Figure 5. Tailed frog tadpole size distribution in upper Fisher Creek mainstem site # 186, 7/23/98.

DATA FROM TABLES 8 AND 11

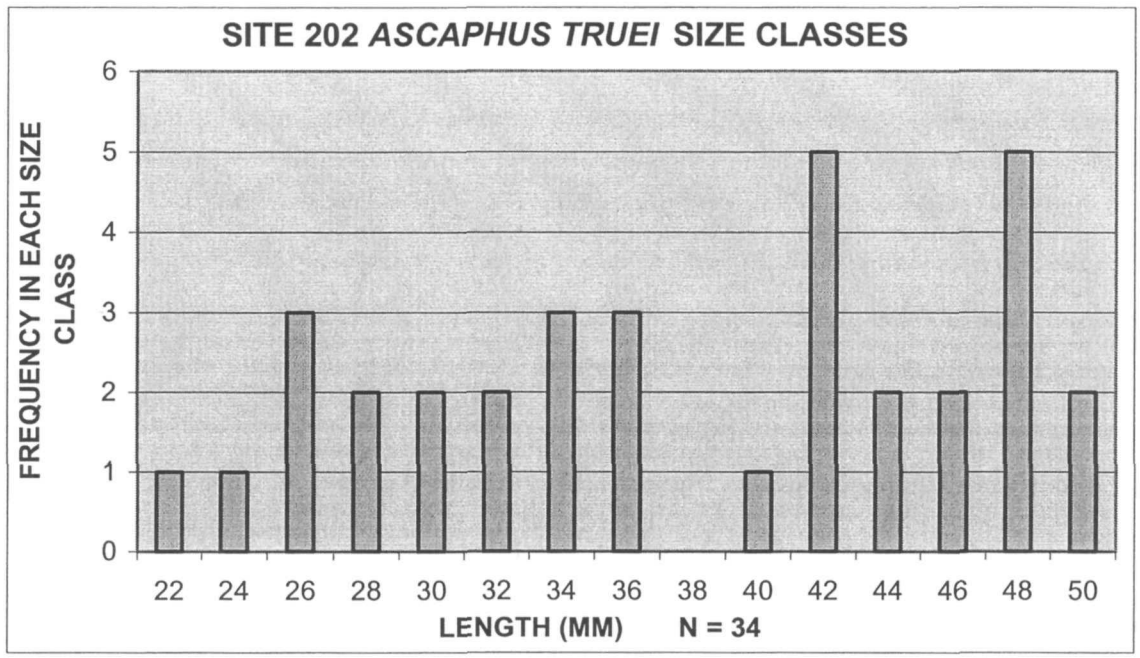


Figure 6. Tailed frog tadpole size distribution in upper Fisher Creek (west) tributary site # 202, 7/22/98.

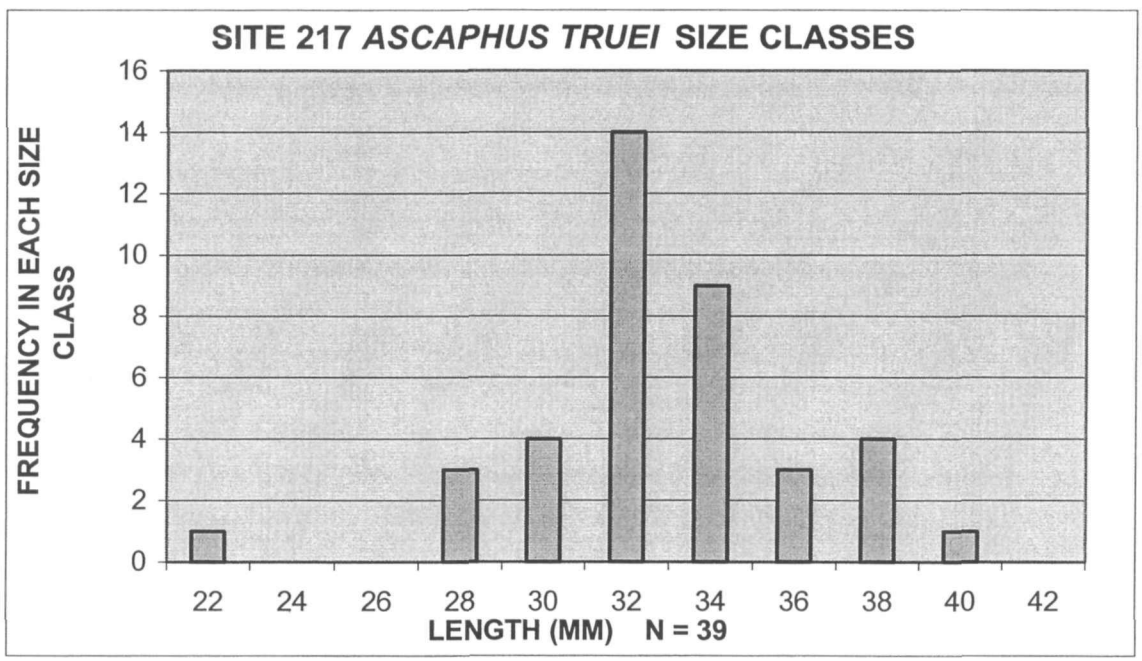


Figure 7. Tailed frog tadpole size distribution in upper Fisher Creek (west) tributary site # 217, 7/21/98.

LITERATURE CITED

Burton, Thomas A. and Gene E. Likens. 1975. Salamander populations and biomass in the Hubbard Brook Experimental Forest, New Hampshire. Copeia: 541-546.

Bury, R. Bruce. 1988. Habitat relationships and ecological importance of amphibians and reptiles. In: Raedke, Kenneth J., ed. Streamside management: Riparian wildlife and forestry interactions. Inst. Resour. Contrib. 59. Seattle, WA: University of Washington: 61-76.

Franklin, J.F. and C.T. Dyrness. 1973. Natural vegetation of Oregon and Washington, U.S. Forest Service Technical Report PNW 8. 417 p.

Holmes, R.E. and R.S. Glesne. 1998. NOCA NRPP Amphibian Inventory, Bridge Creek Watershed, 1997 - Progress Report. 67 p.

Holmes, R.E. and R.S. Glesne. 1997. NOCA NRPP Amphibian Inventory, Big Beaver Watershed, 1996 - Progress Report. 50 p + attachments.

Kuntz, Robert C. II and R.S. Glesne. 1993. Stehekin Valley Vertebrate Inventory. National Park Service Technical Report NPS/PNRNOCA/NRTR-93/010.Sedro-Woolley,WA.36 p.

Liss, William J., et al. 1995. Ecological effects of stocked trout in naturally fishless high mountain lakes North Cascades National Park Service Complex, WA, USA. National Park Service Technical Report NPS/PNROSU/NRTR-95-03. 285 p.

Washington Department of Fish and Wildlife. 1998. Wildlife Diversity. Olympia, WA. 16 p.

APPENDIX

TABLE A1. LOCATION OF SAMPLING SITES

NOCA - AMPHIBIAN SURVEY -1998

SITE NUMBER	DATE	WATER SHED	SITENAME	UTM EAST	UTM NORTH	ELEV METERS	ASPECT
STREAMS							
32A	07/01/1998	3081	THUNDER CK TRIB	642500	5391990	463	W
33	06/18/1998	3081	THUNDER CK TRIB	643300	5391600	707	SW
48A	07/08/1998	3081	THUNDER CK TRIB	643120	5390230	488	SW
54	07/07/1998	3081	THUNDER CK TRIB	643740	5389040	549	W
57	07/07/1998	3081	THUNDER CK TRIB	643850	5388940	549	NW
62A	06/25/1998	3081	THUNDER CK TRIB	643570	5386880	585	W
62B	06/26/1998	3081	THUNDER CK TRIB	643550	5386630	597	NW
110	08/13/1998	1061	BERRY CK (BRIDGE CK)	658480	5368150	841	W
183	07/21/1998	3084	FISHER CK (WEST) MAINSTEM	654550	5380660	1183	W
186	07/23/1998	3084	FISHER CK (WEST) MAINSTEM	659000	5381100	1586	W
202	07/22/1998	3084	FISHER CK (WEST) TRIB	657770	5381700	1585	S
217	07/21/1998	3084	FISHER CK (WEST) TRIB	654380	5381000	1219	S
222	08/12/1998	1062	NO.FORK (BRIDGE CK)	655810	5373980	1134	SE
312	08/04/1998	4012	McMILLAN CK (B.BEAV.) TRIB	628140	5407340	780	SE
411	08/11/1998	1064	FISHER CK (EAST)	658050	5374700	1164	S
420	09/15/1998	1064	FISHER CK (EASTSIDE)	656350	5376920	1646	SE
424	09/14/1998	1064	FISHER CK (EASTSIDE)	655650	5377550	1591	SE
426	08/11/1998	1064	GRIZZLY CK	658330	5374770	1176	SW
441	09/16/1998	1064	GRIZZLY CK	659410	5377420	1506	S
LAKES							
BD-02-01	07/13/1998	3050	MINER'S POND ABOVE HWY 20 MP114.5	621390	5386540	286	S
DD-06-02	08/25/1998	3061	UNNAMED UPPER LADDER CK TARN	635473	5392606	1908	S
DD-11-03	08/25/1998	3062	UNNAMED UPPER GORGE/LADDER CK POND	633150	5393100	1628	N
DD-11-07	08/25/1998	3061	UNNAMED UPPER LADDER CK POND	632910	5393120	1597	S
EP-07-03	08/24/1998	3042	EAST OF LILLIE LAKE EP06	635290	5384730	1704	S
EP-07-04	08/24/1998	3042	EAST OF LILLIE LAKE EP06	635315	5384730	1704	E
EP-07-12	08/24/1998	3042	EAST OF EPO7-14	635110	5384210	1664	E
EP-07-14	08/24/1998	3042	SOUTH OF LILLIE LAKE EP06	634930	5384200	1664	N
EP-08-01	08/24/1998	3042	SOUTH OF SANDIE LAKE EP05-1	634620	5384230	1664	N
FP-18-01	06/29/1998	3083	SWAMP ABOVE TRICOUNI CAMP	644280	5384360	597	N
LS-17-01	08/26/1998	2010	LARGEST POND	608970	5392870	1737	N
LS-17-02	08/26/1998	2010	ABOVE AND NORTH OF LS17-1	609000	5392900	1742	N
LS-17-03	08/26/1998	2010	UPSTREAM OF LS17-1	609050	5392830	1740	N
LS-17-04	08/25/1998	2010	DISCONNECTED	609110	5392810	1742	N
LS-17-05	08/25/1998	2010	DISCONNECTED	609150	5392790	1740	N
LS-17-07	08/25/1998	2010	ON KNOLL ABOVE & W OF LS17-1	608840	5392960	1753	N
LS-17-08	08/25/1998	2010	UPSTREAM OF LS17-3	609090	5392790	1742	N
M-20-01	07/30/1998	3050	LOWER THORNTON LAKE	623146	5393493	1367	S
M-23-01	08/18/1998	3021	MONOGRAM LAKE	626971	5379400	1485	SW
M-23-02	08/18/1998	3021	MONOGRAM TARN	627310	5379710	1591	SW
M-23-03	08/18/1998	3021	MONOGRAM TARN	627340	5379650	1591	SW
M-23-04	08/18/1998	3021	MONOGRAM TARN	627460	5379680	1591	SW
M-23-05	08/18/1998	3021	MONOGRAM TARN	627380	5379620	1591	SW
M-23-07	08/18/1998	3021	MONOGRAM TARN	627070	5379120	1512	SW
M-23-08	08/18/1998	3021	MONOGRAM TARN	627040	5379150	1512	SW
M-23-10	08/17/1998	3021	MONOGRAM TARN	626720	5379310	1481	SW
M-23-11	08/17/1998	3021	MONOGRAM TARN	626680	5379320	1481	SW
M-23-12	08/17/1998	3021	MONOGRAM TARN	626540	5379450	1512	S

TABLE A1. LOCATION OF SAMPLING SITES - CONTINUED

NOCA - AMPHIBIAN SURVEY -1998

SITE NUMBER	DATE	WATER SHED	SITENAME	UTM EAST	UTM NORTH	ELEV METERS	ASPECT
MC-14-02	09/02/1998	4054	LOWER EAST LAKE	622452	5416417	1664	S
MC-14-05	09/02/1998	4054	LOWER EAST LAKE POND	622520	5416300	1670	S
MC-15-01	09/02/1998	4054	TINY LAKE	621294	5416099	1859	S
MC-16-02	09/03/1998	4054	LOWER MIDDLE LAKE	620960	5415853	1705	S
MC-22-01	09/17/1998	4054	LITTLE BEAVER/MT CHALLENGER POND	623320	5413708	1618	NW
MC-23-01	09/17/1998	4054	LITTLE BEAVER/MT CHALLENGER POND	623642	5413880	1641	NW
MC-55-04	09/14/1998	4053	REDOUBT CK POND	626530	5420600	1362	SE
MC-55-06	09/15/1998	4053	REDOUBT CK POND	626130	5420790	1402	SE
MC-55-07	09/15/1998	4053	REDOUBT CK POND	626080	5420880	1402	SE
ML-01-01	07/14/1998	4022	UNNAMED (SOURPUSS) LAKE	649318	5385768	1474	N
ML-02-01	07/15/1998	4022	UNNAMED (SWEET PEA) LAKE	651653	5384916	1689	N
ML-04-01	07/13/1998	3084	VULCAN LAKE	650619	5380703	1579	N
ML-09-01	09/02/1998	3084	WESTERNMOST POND NORTH OF FISHER	648630	5382200	1067	W
ML-09-02	09/02/1998	3084	MIDDLE POND NORTH OF FISHER CK	648500	5382200	1067	W
ML-09-03	09/02/1998	3084	EASTERN MOST POND N OF FISHER CK	648500	5382200	1067	W
ML-09-05	09/02/1998	3084	SOUTH OF FISHER CK	648600	5382120	1067	W
ML-10-01	09/14/1998	1064	POND ON EAST SIDE OF FISHER PASS	656150	5377050	1612	SE
MM-07-01	09/10/1998	1061	MIDDLE WADDELL LAKE	661748	5366341	1641	N
MP-01-01	08/03/1998	4031	PND ABOVE NONAME LK, LRGR UPPER ONE	637083	5412291	1847	NE
MP-01-03	08/03/1998	4031	PND ABOVE NONAME LK, LRGR LOWER ONE	637332	5412529	1774	NE
MP-02-01	08/04/1998	4011	FIRN LAKE	635619	5410353	1668	SE
MR-06-01	09/09/1998	1065	UPPER KETTLING LAKE	667911	5367936	1692	N
MR-07-01	09/08/1998	1066	POND ON RIDGE SE OF KETTLING LKS	668208	5366936	2082	E
MR-07-02	09/08/1998	1066	POND ON RIDGE SE OF KETTLING LKS	668470	5367240	1952	E
MR-07-03	09/08/1998	1066	POND ON RIDGE SE OF KETTLING LKS	668550	5367230	1951	E
MR-08-01	09/08/1998	1066	POND ON RIDGE SE OF KETTLING LKS	668685	5367433	1969	E
MR-11-01	08/11/1998	1042	ON RAINBOW RIDGE	671227	5364750	1863	SE
MR-15-02	08/10/1998	1042	DEE DEE LAKE (UPPER)	674032	5363841	1921	N
MS-07-01	09/15/1998	4052	PERRY CK POND	631090	5422350	1257	E
MS-07-02	09/15/1998	4052	PERRY CK POND	631110	5422350	1257	E
MS-07-03	09/15/1998	4052	PERRY CK POND	631270	5422320	1256	E
MS-08-03	09/15/1998	4052	PERRY CK POND	631570	5422180	1244	E
MS-08-04	09/15/1998	4052	PERRY CK POND	631460	5422100	1262	E
PM-02-01	08/05/1998	4033	POND BELOW SKYMO LAKE	639593	5411086	1591	E
PM-03-01	08/06/1998	4033	SKYMO LAKE	639270	5410795	1608	NE
PM-03-02	08/05/1998	4033	POND ABOVE & E OF SKYMO LAKE	639510	5410790	1658	E
PM-05-02	08/04/1998	4033	SKYMO CREEK PONDS	640224	5410431	1386	NE
PM-05-03	08/04/1998	4033	SKYMO CREEK PONDS	640155	5410416	1386	NE
PM-05-04	08/04/1998	4033	SKYMO CREEK PONDS	640131	5410289	1396	NE
RD-02-01	07/13/1998	3081	THUNDER LAKE BESIDE HWY 20	639266	5395255	411	S
RD-09-01	08/12/1998	3081	THUNDER KNOB POND	639420	5395870	536	S
SM-01-01	07/22/1998	1021	JUANITA LAKE	678805	5354558	2031	SW
SM-02-01	07/21/1998	1021	LOWER TRIPLET LAKE	681339	5351545	1930	NW
SM-02-02	07/21/1998	1021	UPPER TRIPLET LAKE	681650	5351370	1997	NW

TABLE A 2. PHOTO CATALOG - 1998

NOCA - AMPHIBIAN SURVEY - 1998

PHOTO CD#	PHOTO #	DATE	ROLL #	SITENUMBER	STMETER	SUBJECT
1299	1	07/01/1998	2	32A	100	DOWNSTREAM
1299	2	07/01/1998	2	32A	100	DOWNSTREAM
1299	3	07/01/1998	2	32A	0	UPSTREAM
1299	4	07/01/1998	2	32A	0	DOWNSTREAM
1299	5	07/07/1998	2	57	0	DOWNSTREAM
1299	6	07/07/1998	2	57	0	UPSTREAM
1299	7	07/07/1998	2	57	50	UPSTREAM
1299	8	07/07/1998	2	57	50	DOWNSTREAM
1299	9	07/07/1998	2	57	100	UPSTREAM
1299	10	07/07/1998	2	57	100	DOWNSTREAM
1299	11	07/07/1998	2	54	0	DOWNSTREAM
1299	12	07/07/1998	2	54	0	UPSTREAM
1299	13	07/07/1998	2	54	50	UPSTREAM
1299	14	07/07/1998	2	54	50	DOWNSTREAM
1299	15	07/07/1998	2	54	100	UPSTREAM
1299	16	07/07/1998	2	54	100	DOWNSTREAM
1299	17	07/08/1998	2	48A	0	UPSTREAM
1299	18	07/08/1998	2	48A	0	DOWNSTREAM
1299	19	07/08/1998	2	48A	50	UPSTREAM
1299	20	07/08/1998	2	48A	50	DOWNSTREAM
1299	21	07/08/1998	2	48A	100	UPSTREAM
1299	22	07/08/1998	2	48A	100	DOWNSTREAM
1299	23	07/13/1998	2	BD-02-01		MINER'S POND OFF HWY 20 @ MP114.5
1299	24	07/13/1998	2	BD-02-01		MINER'S POND OFF HWY 20 @ MP114.5
1299	25	07/13/1998	2	BD-02-01		MINER'S POND OFF HWY 20 @ MP114.5
1299	26	07/13/1998	2	RD-02-01		THUNDER LAKE WESTSIDE LOOKING SOUTH
1299	27	07/13/1998	2	RD-02-01		THUNDER LAKE WESTSIDE LOOKING EAST
1299	28	07/13/1998	2	RD-02-01		THUNDER LAKE WESTSIDE LOOKING NORTH
1299	29	07/13/1998	2	RD-02-01		? GARTER SNAKE AT SOUTH END
1299	30	07/13/1998	2	RD-02-01		? GARTER SNAKE BODY COLOR PATTERN
1299	31	07/13/1998	2	RD-02-01		? GARTER SNAKE 47 CM TL, 12 CM DIA. 10 MM HW
1299	32	07/13/1998	2	RD-02-01		? GARTER SNAKE AT SOUTH END
1299	33	07/13/1998	2	RD-02-01		? GARTER SNAKE AT SOUTH END
1299	34	07/13/1998	2	RD-02-01		? GARTER SNAKE DORSAL HEAD VIEW
1299	35	07/13/1998	2	RD-02-01		? GARTER SNAKE DARK VENTRAL SCALES
1299	36	07/13/1998	2	RD-02-01		THUNDER LAKE FROM SOUTH LOOKING NORTH
1299	37	07/13/1998	2	RD-02-01		THUNDER LAKE OVERVIEW FROM SW
1299	38	07/13/1998	2	RD-02-01		THUNDER LAKE OVERVIEW FROM SW
1299	39	06/18/1998	1	33	0	UPSTREAM, LOWER THUNDER TRIBUTARY BELOW PANTHER POTHOLES
1299	40	06/18/1998	1	33	0	UPSTREAM, LOWER THUNDER TRIBUTARY BELOW PANTHER POTHOLES
1299	41	06/18/1998	1	33	0	DOWNSTREAM, LOWER THUNDER TRIBUTARY BELOW PANTHER POTHOLES
1299	42	06/18/1998	1	33	50	UPSTREAM, LOWER THUNDER TRIBUTARY BELOW PANTHER POTHOLES
1299	43	06/18/1998	1	33	50	DOWNSTREAM, LOWER THUNDER TRIBUTARY BELOW PANTHER POTHOLES
1299	44	06/18/1998	1	33	100	UPSTREAM, LOWER THUNDER TRIBUTARY BELOW PANTHER POTHOLES
1299	45	06/18/1998	1	33	100	DOWNSTREAM, LOWER THUNDER TRIBUTARY BELOW PANTHER POTHOLES
1299	46	06/25/1998	1	62A	0	UPSTREAM, LOWER THUNDER TRIBUTARY
1299	47	06/25/1998	1	62A	0	DOWNSTREAM, LOWER THUNDER TRIBUTARY
1299	48	06/25/1998	1	62A	50	UPSTREAM, LOWER THUNDER TRIBUTARY
1299	49	06/25/1998	1	62A	50	DOWNSTREAM, LOWER THUNDER TRIBUTARY
1299	50	06/25/1998	1	62A	100	UPSTREAM, LOWER THUNDER TRIBUTARY
1299	51	06/25/1998	1	62A	100	DOWNSTREAM, LOWER THUNDER TRIBUTARY
1299	52	06/26/1998	1	62B	0	UPSTREAM, LOWER THUNDER TRIBUTARY
1299	53	06/26/1998	1	62B	0	DOWNSTREAM, TRAIL CROSSING, LOWER THUNDER TRIBUTARY
1299	54	06/26/1998	1	62B	50	UPSTREAM, LOWER THUNDER TRIBUTARY
1299	55	06/26/1998	1	62B	50	DOWNSTREAM, LOWER THUNDER TRIBUTARY
1299	56	06/26/1998	1	62B	100	UPSTREAM, LOWER THUNDER TRIBUTARY
1299	57	06/26/1998	1	62B	100	DOWNSTREAM, LOWER THUNDER TRIBUTARY
1299	58	06/26/1998	1	62B	0	ADULT MALE ASTR (TAILED FROG) DORSAL AT TRAIL, LOWER THUNDER TRIBUTARY
1299	59	06/26/1998	1	62B	0	ADULT MALE ASTR (TAILED FROG) VENTRAL AT TRAIL, LOWER THUNDER TRIBUTARY
1299	60	06/29/1998	1	FP-18-01		TRICOUNI POND LOOKING WEST
1299	61	07/01/1998	1	32A	50	UPSTREAM, LOWER THUNDER TRIBUTARY
1299	62	07/01/1998	1	32A	50	DOWNSTREAM, LOWER THUNDER TRIBUTARY
1299	63	07/01/1998	1	32A	100	UPSTREAM, LOWER THUNDER TRIBUTARY
1299	64	07/01/1998	1	32A	100	DOWNSTREAM, LOWER THUNDER TRIBUTARY
1299	65					BLURRED IMAGE
1299	66	08/03/1998	4	312+		WATERFALL WEST OF MCMILLAN PONDS
1299	67	08/03/1998	4			MCMILLAN PONDS CAMP - RSG
1299	68	08/04/1998	4	MP-02-01		FIRN LAKE LOOKING WEST
1299	69	08/04/1998	4	MP-02-01		FIRN LAKE LOOKING NORTHWEST
1299	70	08/04/1998	4	MP-02-01		FIRN LAKE LOOKING SOUTHWEST
1299	71	08/05/1998	4	MP-02-01		POND BELOW SKYMO LK LOOKING NORTH
1299	72	08/05/1998	4	MP-02-01		POND BELOW SKYMO LK LOOKING EAST
1299	73	08/05/1998	4	MP-02-01		POND BELOW SKYMO LK LOOKING NORTHWEST
1299	74	08/05/1998	4	PM-03-02		POND ABOVE SKYMO LK LOOKING NORTH
1299	75	08/05/1998	4	PM-03-02		POND ABOVE SKYMO LK LOOKING EAST
1299	76	08/05/1998	4	PM-03-01		SKYMO LK LOOKING SOUTHWEST
1299	77	08/05/1998	4	PM-04-01		UPPER SKYMO LK W/50% ICE
1299	78	08/05/1998	4	PM-03-01		SKYMO LK LOWER END LOOKING NORTHWEST
1299	79	08/05/1998	4	PM-03-01		SKYMO LK OUTLET LOOKING NORTHWEST
1299	80	08/06/1998	4	PM-03-01		SKYMO LK LOWER END LOOKING WEST

TABLE A 2. PHOTO CATALOG - 1998 -CONTINUED

NOCA - AMPHIBIAN SURVEY - 1998

PHOTO CD#	PHOTO #	DATE	ROLL #	SITENUMBER	STMETER	SUBJECT
1299	81	08/06/1998	4	PM-03-01		SKYMO LK OUTLET LOOKING NORTHWEST
1299	82	08/06/1998	4	PM-02-01		AMMA LARVAE FROM POND BELOW SKYMO LK
1299	83	08/06/1998	4	PM-02-01		AMMA LARVAE FROM POND BELOW SKYMO LK
1299	84	08/06/1998	4			MOONRISE OVER JACK MOUNTAIN FROM RIDGE EAST OF SKYMO LK
1299	85	08/06/1998	4			MOONRISE OVER JACK MOUNTAIN FROM RIDGE EAST OF SKYMO LK
1299	86	08/06/1998	4			MOONRISE OVER JACK MOUNTAIN FROM RIDGE EAST OF SKYMO LK
1299	87	08/06/1998	4			MOONRISE OVER JACK MOUNTAIN FROM RIDGE EAST OF SKYMO LK
1299	88	08/06/1998	4			MOONRISE OVER JACK MOUNTAIN FROM RIDGE EAST OF SKYMO LK
1299	89	08/06/1998	4			MOONRISE OVER JACK MOUNTAIN FROM RIDGE EAST OF SKYMO LK
1299	90	08/06/1998	4			MOONRISE OVER JACK MOUNTAIN FROM RIDGE EAST OF SKYMO LK
1299	91	08/11/1998	4	411	0	DOWNSTREAM
1299	92	08/11/1998	4	411	0	UPSTREAM
1299	93	08/11/1998	4	411		RACA ADULT ON 411 FISHER CK (EASTSIDE) DORSAL
1299	94	08/11/1998	4	411		RACA ADULT ON 411 FISHER CK (EASTSIDE) VENTRAL
1299	95	08/11/1998	4	411		RACA ADULT ON 411 FISHER CK (EASTSIDE) LATERAL
1299	96	08/11/1998	4	411		RACA ADULT FISHER CK(EASTSIDE) LATERAL/GROIN
1299	97	08/11/1998	4	411		RACA ADULT FISHER CK HINDFOOT WEBBING
1299	98	08/11/1998	4	411		RACA ADULT ON 411 FISHER CK (EASTSIDE) VENTRAL
1299	99	08/11/1998	4	411	50	DOWNSTREAM FISHER CK (EASTSIDE)
1299	100	08/11/1998	4	411	50	UPSTREAM FISHER CK (EASTSIDE)
1311	1	08/11/1998	4	411	100	DOWNSTREAM FISHER CK (EASTSIDE)
1311	2	08/11/1998	4	411	100	UPSTREAM, FISHER CK (EASTSIDE)
1300	1	07/14/1998	3			BLURRED IMAGE
1300	2	07/14/1998	3	RD-05-01,02		PANTHER POTHOLES OVERVIEW FROM NE
1300	3	07/14/1998	3	RD-05-01,02		PANTHER POTHOLES OVERVIEW FROM NE
1300	4	07/20/1998	3			MTN GOAT AT EASY PASS, RESTING
1300	5	07/20/1998	3			MTN GOAT AT EASY PASS, RETREATING
1300	6	07/21/1998	3	183	0	DOWNSTREAM FISHER CK WEST
1300	7	07/21/1998	3	183	0	UPSTREAM FISHER CK WEST
1300	8	07/21/1998	3	183	50	UPSTREAM FISHER CK WEST - JAS
1300	9	07/21/1998	3	183	50	DOWNSTREAM FISHER CK WEST - BMH
1300	10	07/21/1998	3	183		ASTR TADPOLE/METAMORPH FISHER CK WEST
1300	11	07/21/1998	3	183		ASTR TADPOLE/METAMORPH FISHER CK WEST
1300	12	07/21/1998	3	183		ASTR TADPOLE/METAMORPH FISHER CK WEST
1300	13	07/21/1998	3	183		ASTR TADPOLE/METAMORPH FISHER CK WEST
1300	14	07/21/1998	3	183	100	UPSTREAM FISHER CK WEST
1300	15	07/21/1998	3	183	100	DOWNSTREAM FISHER CK WEST - BMH, JAS
1300	16	07/21/1998	3	217	0	UPSTREAM, FISHER CK (WESTSIDE) TRIBUTARY- BMH, JAS
1300	17	07/21/1998	3	217	0	DOWNSTREAM, FISHER CK (WESTSIDE) TRIBUTARY
1300	18	07/21/1998	3	217	50	DOWNSTREAM, FISHER CK (WESTSIDE) TRIBUTARY
1300	19	07/21/1998	3	217	50	UPSTREAM, FISHER CK (WESTSIDE) TRIBUTARY
1300	20	07/22/1998	3	202	0	UPSTREAM, FISHER CK (WESTSIDE) TRIBUTARY
1300	21	07/22/1998	3	202	0	DOWNSTREAM, FISHER CK (WESTSIDE) TRIBUTARY
1300	22	07/22/1998	3	202	50	UPSTREAM, FISHER CK (WESTSIDE) TRIBUTARY
1300	23	07/22/1998	3	202	50	DOWNSTREAM, FISHER CK (WESTSIDE) TRIBUTARY
1300	24	07/23/1998	3	186	0	DOWNSTREAM, FISHER CK (WESTSIDE)
1300	25	07/23/1998	3	186	0	UPSTREAM , FISHER CK, FISHER PEAK
1300	26	07/24/1998	3	186		OVERVIEW FISHER BASIN MEADOWS LOWER (186)
1300	27	07/24/1998	3	186		OVERVIEW FISHER BASIN MEADOWS UPPER (186)
1300	28		3			BLURRED IMAGE
1300	29	08/11/1998	5	426	0	DOWNSTREAM, GRIZZLY CK
1300	30	08/11/1998	5	426	0	UPSTREAM, GRIZZLY CK
1300	31	08/11/1998	5	426	100	UPSTREAM, GRIZZLY CK
1300	32	08/11/1998	5	426	100	DOWNSTREAM GRIZZLY CK
1300	33	08/11/1998	5	426	50	UPSTREAM, GRIZZLY CK
1300	34	08/11/1998	5	426	50	DOWNSTREAM GRIZZLY CK
1300	35	08/12/1998	5	222	0	UPSTREAM, NORTH FORK/BRIDGE CK
1300	36	08/12/1998	5	222	0	DOWNSTREAM, NORTH FORK/BRIDGE CK
1300	37	08/12/1998	5	222	100	UPSTREAM NORTH FORK/BRIDGE CK
1300	38	08/12/1998	5	222	100	DOWNSTREAM NORTH FORK MEADOWS
1300	39	08/24/1998	5	EP-07-03		WILCOX TARNS AREA BLC INVERTEBRATE SWEEP
1300	40	08/24/1998	5	EP-07-03		WILCOX TARNS AREA BLC INVERTEBRATE SWEEP
1300	41	08/24/1998	5	EP-07-04		WILCOX TARNS AREA LOOKING TO MCALLISTER GLACIER
1300	42	08/24/1998	5	EP-07-04		WILCOX TARNS AREA LOOKING TO MCALLISTER GLACIER
1300	43	08/25/1998	5	EP-07-12		WILCOX TARN ON RIDGE
1300	44	08/25/1998	5	EP-07-12		WILCOX TARN ON RIDGE
1300	45	08/25/1998	5			PIAL SEEDLING WHITEBARK PINE NEAR EP07-4
1300	46	08/25/1998	5			PIAL SAPLING WHITEBARK PINE
1300	47	08/25/1998	5			YOUNG PIAL WHITEBARK PINE SOUTH OF EP07-4
1300	48	08/25/1998	5			YOUNG PIAL WHITEBARK PINE SOUTH OF EP07-4
1300	49	08/25/1998	5	LS-17-07		LOOKING NORTHEAST
1300	50	08/25/1998	5	LS-17-04		LOOKING SOUTH TOWARD BACON PEAK
1300	51	08/25/1998	5	LS-17-05		LOOKING NORTHEAST MT TRIUMPH BACKGROUND
1300	52	08/26/1998	5	LS-17-08,-03,-01		LOOKING NORTHWEST LS17-8 FORE,-3 MID, -1 BACK
1300	53	08/26/1998	5			GREEN LAKE LOOKING NORTHEAST, BERDEEN LK IN BACKGROUND
1300	54	08/26/1998	5			GREEN LAKE LOOKING NORTHEAST
1300	55	08/26/1998	5			MEADOW BELOW CAMP LOOKING SOUTH TO BACON PK
1300	56	08/26/1998	5			STREAM ABOVE GREEN LK WHERE ASTR TADPOLES WERE FOUND
1300	57	08/26/1998	5			BACON PEAK FROM NORTH LOOKING SOUTH
1300	58	08/27/1998	5			GREEN LAKE FROM CAMP
1300	59	08/27/1998	5			MOUNT BAKER AT SUNRISE FROM CAMP ON BACON PK
1300	60	08/27/1998	5	LS-17-02		MOUNT BAKER IN BACKGROUND - BLC

TABLE A 2. PHOTO CATALOG - 1998 -CONTINUED

NOCA - AMPHIBIAN SURVEY - 1998

PHOTO CD#	PHOTO #	DATE	ROLL #	SITENUMBER	STMETER	SUBJECT
1300	61	08/27/1998	5			MOUNT SHUKSAN, SULPHIDE GLACIER LOOKING NORTHWEST
1300	62	08/27/1998	5			MOUNT BAKER FROM CAMP ON BACON PK
1300	63	09/02/1998				LOOKING TO WHERE PONDS ML09-1-5 ARE FROM TRAIL
1300	64	09/02/1998		ML-09-03		POND AT CONFLUENCE OF FISHER AND LOGAN CREEKS
1300	65	09/02/1998		ML-09-03		POND AT CONFLUENCE OF FISHER AND LOGAN CREEKS
1300	66	09/02/1998		ML-09-03		POND AT CONFLUENCE OF FISHER AND LOGAN CREEKS
1300	67	09/02/1998		ML-09-02		POND AT CONFLUENCE OF FISHER AND LOGAN CREEKS
1300	68	09/02/1998		ML-09-02		POND AT CONFLUENCE OF FISHER AND LOGAN CREEKS
1300	69	09/02/1998		ML-09-02		POND AT CONFLUENCE OF FISHER AND LOGAN CREEKS
1300	70	09/02/1998		ML-09-02		POND AT CONFLUENCE OF FISHER AND LOGAN CREEKS
1300	71	09/02/1998		ML-09-02		POND AT CONFLUENCE OF FISHER AND LOGAN CREEKS - PLS
1300	72	09/02/1998		ML-09-01		POND AT CONFLUENCE OF FISHER AND LOGAN CREEKS
1300	73	09/02/1998		ML-09-01		POND AT CONFLUENCE OF FISHER AND LOGAN CREEKS
1300	74	09/02/1998				ROCK SHELTER CABIN FROM EAST
1300	75	09/02/1998				ROCK SHELTER CABIN FROM EAST
1300	76	09/02/1998				ROCK SHELTER CABIN FROM WEST
1300	77	09/14/1998		424	0	UPSTREAM, FISHER CK (EASTSIDE) HEADWATERS - PLS
1300	78	09/14/1998		424	0	DOWNSTREAM, FISHER CK (EASTSIDE) HEADWATERS
1300	79	09/14/1998		424	50	UPSTREAM, FISHER CK (EASTSIDE) HEADWATERS
1300	80	09/14/1998		424	50	DOWNSTREAM, FISHER CK (EASTSIDE) HEADWATERS
1300	81	09/14/1998		424	100	UPSTREAM, FISHER CK (EASTSIDE) HEADWATERS
1300	82	09/14/1998		ML-10-01		FROM SE END LOOKING NW TO FISHER PASS
1300	83	09/15/1998		420	0	DOWNSTREAM, FISHER CK (EASTSIDE) HEADWATERS BELOW ML10
1300	84	09/15/1998		420	0	UPSTREAM, FISHER CK (EASTSIDE) HEADWATERS BELOW ML10
1300	85	09/15/1998		420	100	UPSTREAM, FISHER CK (EASTSIDE) HEADWATERS BELOW ML10
1300	86	09/15/1998		420	100	DOWNSTREAM, FISHER CK (EASTSIDE) HEADWATERS BELOW ML10
1300	87	09/15/1998		ML-10-01		FROM TALUS SLOPE ON SOUTH LOOKING NORTH
1300	88	09/15/1998		ML-10-01		FROM TALUS SLOPE ON SOUTH LOOKING NORTH
1300	89	09/16/1998		441	0	UPSTREAM, GRIZZLY CK HEADWATERS
1300	90	09/16/1998		441	0	DOWNSTREAM, GRIZZLY CK HEADWATERS
1300	91	09/16/1998		441	100	UPSTREAM, GRIZZLY CK HEADWATERS
1300	92	09/16/1998		441	100	DOWNSTREAM, GRIZZLY CK HEADWATERS
1300	93	09/17/1998				OVERVIEW GRIZZLY CK HEADWATERS LOOKING NW
1300	94	09/17/1998				OVERVIEW GRIZZLY CK HEADWATERS LOOKING NORTH
1300	95	09/17/1998		441		OVERVIEW 441 LOOKING SOUTH GRIZZLY CREEK

TABLE A 3. ACCESSORY DATA TABLE - STREAMS

NOCA - AMPHIBIAN SURVEY THUNDER CREEK, AND OTHER LOCATIONS -1998

SITE NUMBER	REACH	DATE	QUAD	1ST CREW	2ND CREW	3RD CREW	4TH CREW	START	END	SURVEY TIME	CLOUDS	PRECIP	WIND	AIR TEMP	COMMENTS	REFERENCE PHOTOS CD#	PHOTO # 'S
THUNDER CREEK WATERSHED																	
32A	1	07/01/1998	ROSS DAM	JAS	BLC			7:59	12:11	4:12	CLR	DRY	C	57	STREAM NEAR NEVE CAMP	1299	1-4
33	1	06/18/1998	ROSS DAM	KAM	JAS	REH		12:50	15:45	2:55	OVC	D	C	55	DRAINS FROM PANTHER POTHOLES	1299	39-45
48A	1	07/08/1998	ROSS DAM	JAS	REH			8:50	11:10	2:20	PC	D	C	58	1KM SOUTH OF 32A	1299	17-22
54	1	07/07/1998	ROSS DAM	JAS	REH			14:30	16:30	2:00	PC	D	LB	64	TRIB FROM EAST	1299	11-16
57	1	07/07/1998	ROSS DAM	JAS	REH			10:15	12:45	2:30	PC	D	C	62	TRIB FROM SOUTHEAST	1299	5-10
62A	1	06/25/1998	FORBIDDEN PK	JAS	BLC	REH		14:45	17:00	2:15	OVC	LR	C	54	TRIB FROM EAST, S. OF McALLISTER CK.	1299	46-51
62B	1	06/26/1998	FORBIDDEN PK	JAS	BLC	KAM	REH	7:45	10:00	2:15	OVC	D	C	49	TRIB NEAR McALLISTER HORSE CAMP	1299	52-59
186	1	07/23/1998	MT ARRIVA	JAS	BMH	REH		9:35	12:00	2:25	CLR	D	LB	64	MAINSTEM IN FISHER BASIN MEADOW	1300	24-27
202	1	07/22/1998	MT ARRIVA	JAS	REH			12:35	16:15	3:40	PC	D	C	71	START AT TOP END OF WILLOW CLUMP	1300	20-23
217	1	07/21/1998	MT LOGAN	JAS	BMH	REH		14:14	17:30	3:16	C	D	C	66	TRIB FROM NORTH, KATSUK PK	1300	16-19
183	1	07/21/1998	MT LOGAN	JAS	BMH	REH		9:50	13:15	3:25	C	D	C	58	MAINSTEM FISHER CK.	1300	6-15
BRIDGE CREEK WATERSHED																	
110	1	08/13/1998	McGREGOR MTN	JAS	REH			11:15	12:00	0:45	C	D	C	68	BERRY CK., TRIB OF L. BRIDGE CK.		
222	1	08/12/1998	MT LOGAN	JAS	REH	RB	CJJ	10:45	14:00	3:15	C	D	C	69	UPPER NORTH FORK (MEADOWS AREA)	1300	35-38
411	1	08/11/1998	MT ARRIVA	JAS	REH	RB	CJJ	10:45	13:30	2:45	PC	D	C	63	EASTSIDE FISHER CK. (GRIZZLY CK)	1299	91-100
420	1	09/15/1998	MT ARRIVA	PLS	REH			12:15	14:45	2:30	C	D	LB	65	0M 200M BELOW POND ML10 OUTLET	1300	83-86
424	1	09/14/1998	MT LOGAN	PLS	REH			12:45	15:45	3:00	C	D	LB	69	EASTSIDE FISHER CK NEAR FISHER PASS	1300	77-81
426	1	08/11/1998	MT ARRIVA	JAS	REH	RB	CJJ	14:30	16:45	2:15	PC	D	C	66	GRIZZLY CK. JUST ABOVE FISHER CK.	1300	29-34
441	1	09/16/1998	MT ARRIVA	PLS	REH			11:30	14:30	3:00	C	D	C	56	UPPER GRIZZLY CK.	1300	89-92
BIG BEAVER CREEK WATERSHED																	
312	1	08/04/1998	MT CHALLENGER	RSG	REH			9:30	10:30	1:00	C	D	C	69	McMILLAN TRIB NEAR PONDS	1299	66

CREW:

BLC	BRENDA L. CUNNINGHAM
BMH	BENJAMIN M. HOLMES
CJJ	CATHY J. JONES
JAS	JAY A. STENEHJEM
KAM	KATHRYN A. McDONALD
RB	ROB BUCHWALD
REH	RONALD E. HOLMES
RSG	REED S. GLESNE

CLOUD COVER:

CLR = CLEAR
PC = PARTLY CLOUDY
CO = CLOUDY OVERCAST

PRECIPITATION:

D = DRY
LR = LIGHT RAIN

WIND:

C = CALM
LB = LIGHT BREEZE
MB = MODERATE BREEZE

TABLE A4. ACCESSORY DATA TABLE - LAKES, PONDS

NOCA - AMPHIBIAN SURVEY -1998

SITE NUMBER	DATE	QUAD	1ST CREW	2ND CREW	3RD CREW	4TH CREW	SURVEY START	SURVEY END	SURVEY TIME	CLOUDS	PRECIP	WIND	AIR TEMP	COMMENTS	REFERENCE PHOTOS CD#	REFERENCE PHOTOS PHOTO # 'S	AERIAL PHOTO	SCANNED ZOOMED-IN AERPHOTO
LAKES																		
BD02	07/13/1998	BIG DEVIL PK	BLC	REH			10:10	11:10	1:00	CO	D	D	65	MINER'S POND ABOVE HWY 20 MP114.5	1299	23-25	NC-C-98-6-14-92	
DD06-2	08/25/1998	DIABLO DAM	BLC	REH			11:04	11:39	0:35	CO	D	LB		UNNAMED UPPER LADDER CK TARN	1323	15,16	NC-C-98-2-23-115	DD0698.TIF
DD11-3	08/25/1998	DIABLO DAM	BLC	REH			12:10	12:34	0:24	CO	D	LB		UNNAMED UPPER LADDER CK POND	1323	17	NC-C-98-2-22-166	DD1198.TIF
DD11-7	08/25/1998	DIABLO DAM	BLC	REH			12:30	12:40	0:10	CO	D	LB		UNNAMED UPPER LADDER CK POND	no photo		NC-C-98-2-22-166	DD1198.TIF
EP07-2	08/24/1998	ELDORADO PK	BLC	REH			12:16	12:56	0:40	CLR	D	LB		EAST OF LILLIE LAKE EP06	1323	12	NC-C-98-7-23-26	SANDIE98.CDR
EP07-3	08/24/1998	ELDORADO PK	BLC	REH			13:40	14:51	1:11	CLR	D	MB		EAST OF LILLIE LAKE EP06	1300, 1323	39,40; 13	NC-C-98-7-23-26	SANDIE98.CDR
EP07-04	08/24/1998	ELDORADO PK	BLC	REH			13:40	14:10	0:30	CLR	D	LB	65	EAST OF LILLIE LAKE EP06	1300	41,42	NC-C-98-7-23-26	SANDIE98.CDR
EP07-12	08/24/1998	ELDORADO PK	BLC	REH			15:20	15:50	0:30	CLR	D	LB	68	EAST OF EP07-14	1300	43,44	NC-C-98-7-23-26	SANDIE98.CDR
EP07-14	08/24/1998	ELDORADO PK	BLC	REH			17:30	18:00	0:30	CO	D	LB	64	SOUTH OF LILLIE LAKE EP06	1323	14	NC-C-98-7-23-26	SANDIE98.CDR
EP08-1	08/24/1998	ELDORADO PK	BLC	REH			16:30	17:00	0:30	CO	D	LB	66	SOUTH OF SANDIE LAKE EP05-1	no photo		NC-C-98-7-23-26	SANDIE98.CDR
FP18	06/29/1998	FORBIDDEN PK	JAS	BLC			15:11	15:30	0:19	CLR	D	C	77	SWAMP ABOVE TRICOUNI CAMP	1299	60	NC-C-98-7-28-163	FP1898.TIF
LS17-1	08/26/1998	BACON PK	BLC	REH			11:00	11:30	0:30	PC	D	LB	50	LARGEST POND	1300, 1323	52; 18	NC-C-98-5-7-138	GRNTRN98.TIF
LS17-2	08/26/1998	BACON PK	BLC	REH			10:00	10:40	0:40	PC	D	LB	50	ABOVE AND NORTH OF LS17-1	1300	60	NC-C-98-5-7-138	GRNTRN98.TIF
LS17-3	08/26/1998	BACON PK	BLC	REH			10:40	11:00	0:20	PC	D	LB	50	UPSTREAM OF LS17-1	1300	52	NC-C-98-5-7-138	GRNTRN98.TIF
LS17-4	08/25/1998	BACON PK	BLC	REH			15:15	15:35	0:20	CO	D	LB	60	DISCONNECTED	1300	50	NC-C-98-5-7-138	GRNTRN98.TIF
LS17-5	08/25/1998	BACON PK	BLC	REH			15:35	16:00	0:25	CO	D	LB	60	DISCONNECTED	1300	51	NC-C-98-5-7-138	GRNTRN98.TIF
LS17-7	08/25/1998	BACON PK	BLC	REH			13:30	14:15	0:45	CO	D	LB	49	ON KNOLL ABOVE & W OF LS17-1	1300	49	NC-C-98-5-7-138	GRNTRN98.TIF
LS17-8	08/25/1998	BACON PK	BLC	REH			16:00	16:20	0:20	CO	D	LB	60	UPSTREAM OF LS17-3	1300	52	NC-C-98-5-7-138	GRNTRN98.TIF
M20	07/30/1998	MT TRIUMPH	RSG	SHG			16:00	20:00	4:00	CO	D	LB		LOWER THORNTON LAKE			NC-C-98-4-15-8	
M23-02	08/18/1998	BIG DEVIL PK	JAS	PLS	BLC									MONOGRAM TARN	1323	10	NC-C-98-6-18-148	MONOGR98.TIF
M23-03	08/18/1998	BIG DEVIL PK	JAS	PLS	BLC									MONOGRAM TARN	1323	8, 9	NC-C-98-6-18-148	MONOGR98.TIF
M23-04	08/18/1998	BIG DEVIL PK	JAS	PLS	BLC									MONOGRAM TARN	1323	7	NC-C-98-6-18-148	MONOGR98.TIF
M23-05	08/18/1998	BIG DEVIL PK	JAS	PLS	BLC		11:49	12:26	0:37	CO	F	C	46	MONOGRAM TARN	1323	6	NC-C-98-6-18-148	MONOGR98.TIF
M23-07	08/18/1998	BIG DEVIL PK	JAS	PLS	BLC		9:15	9:30	0:15	CO	D	C	46	MONOGRAM TARN	1323	4, 5	NC-C-98-6-18-148	MONOGR98.TIF
M23-08	08/18/1998	BIG DEVIL PK	JAS	PLS	BLC		9:30	9:45	0:15	CO	D	C	46	MONOGRAM TARN	1323	4	NC-C-98-6-18-148	MONOGR98.TIF
M23-10	08/17/1998	BIG DEVIL PK	JAS	PLS	BLC		16:00	17:00	1:00	CO	LR	LB	47	MONOGRAM TARN	1323	1, 2	NC-C-98-6-18-148	MONOGR98.TIF
M23-11	08/17/1998	BIG DEVIL PK	JAS	PLS	BLC		16:30	16:35	0:05	CO	LR	LB	44	MONOGRAM TARN	1323	3	NC-C-98-6-18-148	MONOGR98.TIF
M23-12	08/17/1998	BIG DEVIL PK	JAS	PLS	BLC		14:29	14:36	0:07	CO	LR	LB	64	MONOGRAM TRAIL POND	1323	11	NC-C-98-6-18-148	MONOGR98.TIF
MC14-2	09/02/1998	MT REDOUBT	RSG				10:30	12:30	2:00	C	D	LB	85	LOWER EAST LAKE			NC-C-98-4-15-37	EASTLAKE.CDR
MC14-5	09/02/1998	MT REDOUBT	CD	FI			11:55	12:15	0:20	C	D	MB	85	LOWER EAST LAKE POND			NC-C-98-4-15-37	EASTLAKE.CDR
MC15	09/02/1998	MT REDOUBT	RSG	CD	FI		15:20	16:20	1:00	CO	D	MB	80	TINY LAKE			NC-C-98-4-13-133	
MC16-2	09/03/1998	MT REDOUBT	RSG				8:00	9:45	1:45	C	D	LB		LOWER MIDDLE LAKE			NC-C-98-4-14-83	MIDDLAK.TIF
MC22	09/17/1998	MT CHALLENGER	CD	BLC			9:09	10:55	1:46	CO	D	C	52	LITTLE BEAVER/MT CHALLENGER POND	1323	53,54,56,57,59,61	NC-C-98-3-16-224	MC222398.TIF
MC23	09/17/1998	MT CHALLENGER	CD	BLC			11:19	11:35	0:16	CO	D	C	52	LITTLE BEAVER/MT CHALLENGER POND	1323	55, 64-68	NC-C-98-3-16-224	MC222398.TIF
MC55-4	09/14/1998	MT REDOUBT	CD	BLC			16:50	17:06	0:16	C	D	C	54	REDOUBT CK POND			NC-C-98-3-18-134	MC5598.TIF
MC55-6	09/15/1998	MT REDOUBT	CD	BLC			9:30	10:06	0:36	C	D	C	62	REDOUBT CK POND	1323	39	NC-C-98-3-18-134	MC5598.TIF
MC55-7	09/15/1998	MT REDOUBT	CD	BLC			10:07	10:18	0:11	C	D	C	65	REDOUBT CK POND	1323	40, 41	NC-C-98-3-18-134	MC5598.TIF
ML01	07/14/1998	MT LOGAN	RSG				9:30	11:40	2:10	CO	LR	LB		UNNAMED (SOURPUSS) LAKE			NC-C-98-9-32-23	ML0198.TIF
ML02	07/15/1998	MT LOGAN	RSG				18:20	19:40	1:20	CO	LR	LB	50	UNNAMED (SWEET PEA) LAKE			NC-C-98-9-33-148	ML0298.TIF
ML04	07/13/1998	MT LOGAN	RSG				14:30	17:30	3:00	PC	D	LB	60	VULCAN LAKE			NC-C-98-9-33-144	ML0498.TIF
ML09-1	09/02/1998	MT LOGAN	PLS	REH			14:10	14:30	0:20	C	D	LB	72	WESTERNMOST POND NORTH OF FISHER	1300	72,73	NC-C-98-7-31-189	FSHLOG98.TIF
ML09-2	09/02/1998	MT LOGAN	PLS	REH			13:00	14:05	1:05	C	D	LB	72	MIDDLE POND NORTH OF FISHER CK	1300	68-71	NC-C-98-7-31-189	FSHLOG98.TIF
ML09-3	09/02/1998	MT LOGAN	PLS	REH			11:30	12:30	1:00	C	D	LB	72	EASTERN MOST POND N OF FISHER CK	1300	64-66	NC-C-98-7-31-189	FSHLOG98.TIF
ML09-4	09/02/1998	MT LOGAN	PLS	REH			13:10	13:30	0:20	C	D	LB	72	SOUTH OF FISHER CK			NC-C-98-7-31-189	FSHLOG98.TIF
ML10	09/14/1998	MT LOGAN	PLS	REH			16:00	16:30	0:30	C	D	C	56	POND ON EAST SIDE OF FISHER PASS	1300	82,87,88	NC-C-98-9-36-173	FISHPS98.TIF
MM07	09/10/1998	MT McGREGOR	CD	BLC			10:40	12:10	1:30	C	D	LB		MIDDLE WADDELL LAKE	1323	32, 33	NC-C-98-10-40-13	WADELL98.TIF
MP01-1	08/03/1998	MT PROPHET	SLB	JAS			13:08	14:12	1:04	C	D	LB		POND ABOVE NONAME LK, LRG UPPER			NC-C-98-2-24-86	MP01S98.TIF
MP01-3	08/03/1998	MT PROPHET	SLB	JAS			14:57	15:52	0:55	C	D	MB		POND ABOVE NONAME LK, LRG LOWER			NC-C-98-2-24-86	MP01S98.TIF
MP02	08/04/1998	MT PROPHET	REH				12:30	15:30	3:00	C	D	LB	74	FIRN LAKE	1299	68-70	NC-C-98-2-23-136	FIRNLK98.TIF
MR06	09/09/1998	McALESTER MTN	CD	BLC			11:30	12:50	1:20	C	D	LB		UPPER KETTLING LAKE	1323	30, 31	NC-C-98-10-44-125	KETTLI98.TIF
MR07	09/08/1998	McALESTER MTN	CD	BLC			15:20	16:30	1:10	CO	D	MB		POND ON RIDGE SE OF KETTLING LKS	1323	29	NC-C-98-10-44-128	
MR07-2	09/08/1998	McALESTER MTN	CD	BLC			14:30	15:00	0:30	CO	D	MB		POND ON RIDGE SE OF KETTLING LKS			NC-C-98-10-44-128	
MR07-3	09/08/1998	McALESTER MTN	CD	BLC			14:30	15:00	0:30	CO	D	MB		POND ON RIDGE SE OF KETTLING LKS			NC-C-98-10-44-128	
MR08	09/08/1998	McALESTER MTN	CD	BLC			12:40	13:40	1:00	CO	D	LB		POND ON RIDGE SE OF KETTLING LKS	1323	28	NC-C-98-10-44-128	
MR11	08/11/1998	McALESTER MTN	SLB				15:15	16:30	1:15	CO	D	MB	68	ON RAINBOW RIDGE			NC-C-98-10-45-151	
MR15-2	08/10/1998	McALESTER MTN	SLB				14:15	15:50	1:35	C	D	C	68	DEE DEE LAKE (UPPER)			NC-C-98-10-47-198	
MS07-1	09/15/1998	MT SPICKARD	CD	BLC			15:35	16:03	0:28	C	D	MB		PERRY CK POND	1323	44	NC-C-98-3-20-37	
MS07-2	09/15/1998	MT SPICKARD	CD	BLC			16:10	16:25	0:15	CO	D	LB		PERRY CK POND	no photo		NC-C-98-3-20-37	
MS07-3	09/15/1998	MT SPICKARD	CD	BLC			16:30	16:40	0:10	C	D	LB		PERRY CK POND	1323	47	NC-C-98-3-20-37	
MS08-3	09/15/1998	MT SPICKARD	CD	BLC			13:56	14:30	0:34	C	D	LB		PERRY CK POND	1323	42, 50	NC-C-98-3-20-37	
MS08-4	09/15/1998	MT SPICKARD	CD	BLC			16:50	17:40	0:50	CO	D	LB		PERRY CK POND	1323	43, 45, 48,49	NC-C-98-3-20-37	
PM02	08/05/1998	PUMPKIN MTN	JAS	REH			12:30	13:15	0:45	CO	D	LB	70	POND BELOW SKYMO LAKE	1299	71-73,82,83	NC-C-98-1-26-234	SKYMO98.TIF
PM03	08/06/1998	PUMPKIN MTN	JAS	REH	SLB		11:00	12:15	1:15	CO	D	LB	65	SKYMO LAKE	1299	76,78-81	NC-C-98-1-26-234	SKYMO98.TIF
PM03-2	08/05/1998	PUMPKIN MTN	JAS	REH			13:30	13:50	0:20	CO	D	LB	69	POND ABOVE & E OF SKYMO LAKE	1299	74,75	NC-C-98-1-26-234	SKYMO98.TIF
PM05-2	08/04/1998	PUMPKIN MTN	SLB	JAS			16:20	16:40	0:30	C	D	LB	78	SKYMO CREEK PONDS			NC-C-98-1-26-234	PM05S98.TIF
PM05-3	08/04/1998	PUMPKIN MTN	SLB	JAS			15:00	15:15	0:15	C	D	LB	77	SKYMO CREEK PONDS			NC-C-98-1-26-234	PM05S98.TIF
PM05-4	08/04/1998	PUMPKIN MTN	SLB	JAS			13:00	13:30	0:30	C	D	LB	75	SKYMO CREEK PONDS			NC-C-98-1-26-234	PM05S98.TIF
RD02	07/13/1998	ROSS DAM	BLC	REH			13:30	15:00	1:30	PC	D	MB	65	THUNDER LAKE BESIDE HWY 20	1299	26-38	NC-C-98-2-25-12	THUNDRLK.TIF
RD09	08/12/1998	ROSS DAM	BLC				11:00	12:30	1:30	C	D	LB	75	THUNDER KNOB POND			NC-C-98-2-25-12	
SM01	07/22/1998	SUN MOUNTAIN	BLC	TM			13:13	15:51	2:38	PC	D	MB		JUANITA LAKE			NC-C-98-10-50-245	SM0198.TIF
SM02-1	07/21/1998	SUN MOUNTAIN	BLC	TM			15:25	17:09	1:44	C	D	C		LOWER TRIPLET LAKE			NC-C-98-10-51-273	SM0298.TIF
SM02-2	07/21/1998	SUN MOUNTAIN	BLC	TM			12:44	14:30	1:46	C	D	C		UPPER TRIPLET LAKE			NC-C-98-10-52-281	SM0298.TIF

CREW:
BLC= BRENDA L. CUNNINGHAM
CD= CEDAR DRAKE
FI= F. INMAN
JAS= JAY A. STENEHJEM
PLS= PHILLIP L. SMITH
REH= RONALD E. HOLMES
RSG= REED S. GLESNE
SLB= SHERRY L. BOTTOMS

CLOUD COVER:
CLR = CLEAR
PC = PARTLY CLOUDY
CO = CLOUDY OVERCAST

PRECIPITATION:
D = DRY
F = FOG
LR = LIGHT RAIN

WIND:
C = CALM
LB = LIGHT BREEZE
MB = MODERATE BREEZE

TABLE A 5. STREAM SEARCH EFFORT & CAPTURES

NOCA - AMPHIBIAN SURVEY - 1998

CAPTURES IN TRANSECTS

WATERSHED	SITE NUMBER	DATE	STREAM METER	START TIME	END TIME	ELAPSED TIME	SPECIES	SEX	STAGE	NUMBER INDIVIDUALS	TOTAL LENGTH TOTLGTH	SNOUTVENT HEADWIDTH SVL/HW	HL_MM	FL_MM	ENV	POS	SUBSTR	COVER SIZE_CM
THUNDER CK	32A*	07/01/1998	7	8:29	8:31	0:02												
THUNDER CK	32A	07/01/1998	13	8:47	8:50	0:03	ASTR		T	1	44	10						
THUNDER CK	32A	07/01/1998	28	9:24	9:26	0:02												
THUNDER CK	32A	07/01/1998	37	9:41	9:43	0:02	ASTR		T	2	38,46	9,11						
THUNDER CK	32A	07/01/1998	47	10:05	10:07	0:02	ASTR		T	2	30,31	7,7						
THUNDER CK	32A	07/01/1998	56	10:36	10:38	0:02	ASTR		T	1	39	9						
THUNDER CK	32A	07/01/1998	63	10:50	10:53	0:03	ASTR		T	1	36	9						
THUNDER CK	32A	07/01/1998	71	11:08	11:10	0:02												
THUNDER CK	32A	07/01/1998	80	11:26	11:29	0:03												
THUNDER CK	32A	07/01/1998	95	11:51	11:52	0:01	ASTR		A	1	68	27	41	17	P	U	B	
THUNDER CK	33*	06/18/1998	3	13:03	13:05	0:02	0											
THUNDER CK	33	06/18/1998	17	13:24	13:29	0:05	ASTR		T	3	36,38,45	8,9,12	4		R			
THUNDER CK	33	06/18/1998	25	13:54	13:57	0:03	0											
THUNDER CK	33	06/18/1998	32	14:05	14:09	0:04	ASTR		T	2	35,37	7,8			R			
THUNDER CK	33	06/18/1998	42	14:22	14:25	0:03	0											
THUNDER CK	33	06/18/1998	56	14:45	14:48	0:03	ASTR		T	2	28,30	5,6			R			
THUNDER CK	33	06/18/1998	63	15:00	15:04	0:04	0											
THUNDER CK	33	06/18/1998	79	15:14	15:16	0:02	ASTR		T	1	ESC				P			
THUNDER CK	33	06/18/1998	84	15:20	15:24	0:04	0											
THUNDER CK	33	06/18/1998	99	15:30	15:33	0:03	ASTR		T	2	36,46	9,12	5		R			
THUNDER CK	48A	07/08/1998	8	9:10	9:13	0:03												
THUNDER CK	48A	07/08/1998	22	9:19	9:21	0:02												
THUNDER CK	48A	07/08/1998	31	9:28	9:30	0:02												
THUNDER CK	48A	07/08/1998	36	9:36	9:38	0:02												
THUNDER CK	48A	07/08/1998	51	9:48	9:51	0:03												
THUNDER CK	48A	07/08/1998	57	10:06	10:09	0:03	ASTR	U	T	2	31,32	7,7						
THUNDER CK	48A	07/08/1998	66	10:15	10:18	0:03												
THUNDER CK	48A	07/08/1998	80	10:26	10:31	0:05												
THUNDER CK	48A	07/08/1998	90	10:38	10:40	0:02												
THUNDER CK	48A	07/08/1998	97	10:46	10:49	0:03	ASTR	U	M/T	1	45	11	9					
THUNDER CK	54	07/07/1998	0	14:42	14:45	0:03												
THUNDER CK	54	07/07/1998	16	14:54	14:57	0:03												
THUNDER CK	54	07/07/1998	28	15:03	15:06	0:03												
THUNDER CK	54	07/07/1998	35	15:12	15:14	0:02												
THUNDER CK	54	07/07/1998	40	15:19	15:21	0:02												
THUNDER CK	54	07/07/1998	54	15:43	15:45	0:02												
THUNDER CK	54	07/07/1998	62	15:51	15:53	0:02												
THUNDER CK	54	07/07/1998	69	15:56	15:58	0:02	ASTR	U	T	1	38	8						
THUNDER CK	54	07/07/1998	92	16:08	16:10	0:02												
THUNDER CK	54	07/07/1998	97	16:13	16:16	0:03												

* CAPTURES OUTSIDE TRANSECT REPORTED IN TABLE 11.

TABLE A 5. STREAM SEARCH EFFORT & CAPTURES - CONTINUED

NOCA - AMPHIBIAN SURVEY - 1998

CAPTURES IN TRANSECTS

WATERSHED	SITE NUMBER	DATE	STREAM METER	START TIME	END TIME	ELAPSED TIME	SPECIES	SEX	STAGE	NUMBER INDIVIDUALS	TOTAL LENGTH TOTLGTH	SNOUTVENT HEADWIDTH SVL/HW	HL_MM	FL_MM	ENV	POS	SUBSTR	COVER SIZE_CM
THUNDER CK	57	07/07/1998	13	10:29	10:31	0:02	ASTR	U	T	1	30	7						
THUNDER CK	57	07/07/1998	26	10:42	10:45	0:03												
THUNDER CK	57	07/07/1998	34	10:53	10:55	0:02	ASTR	U	T	1	37	9						
THUNDER CK	57	07/07/1998	45	11:05	11:08	0:03												
THUNDER CK	57	07/07/1998	51	11:17	11:20	0:03	ASTR	U	T	1	32	8						
THUNDER CK	57	07/07/1998	59	11:42	11:45	0:03												
THUNDER CK	57	07/07/1998	66	11:53	11:57	0:04												
THUNDER CK	57	07/07/1998	74	12:06	12:10	0:04	ASTR	U	T	2	32,35	8,8						
THUNDER CK	57	07/07/1998	87	12:18	12:24	0:06												
THUNDER CK	57	07/07/1998	95	12:29	12:36	0:07												
THUNDER CK	62A	06/25/1998	1	15:07	15:10	0:03	0											
THUNDER CK	62A	06/25/1998	7	15:18	15:21	0:03	0											
THUNDER CK	62A	06/25/1998	12	15:34	15:37	0:03	0											
THUNDER CK	62A	06/25/1998	24	15:43	15:46	0:03	0											
THUNDER CK	62A	06/25/1998	29	15:54	15:57	0:03	0											
THUNDER CK	62A	06/25/1998	39	16:05	16:07	0:02	0											
THUNDER CK	62A	06/25/1998	54	16:19	16:22	0:03	0											
THUNDER CK	62A	06/25/1998	77	16:29	16:32	0:03	0											
THUNDER CK	62A	06/25/1998	82	16:39	16:41	0:02	0											
THUNDER CK	62A	06/25/1998	98	16:48	16:51	0:03	0											
THUNDER CK	62B*	06/26/1998	8	7:58	8:01	0:03												
THUNDER CK	62B	06/26/1998	13	8:07	8:10	0:03												
THUNDER CK	62B	06/26/1998	18	8:20	8:22	0:02	ASTR	U	T	2	29,48	6,11			R			
THUNDER CK	62B	06/26/1998	36	8:28	8:32	0:04	ASTR	U	T	3	52,52,50	13,13,12	14,8,0		R			
THUNDER CK	62B	06/26/1998	46	8:42	8:45	0:03												
THUNDER CK	62B	06/26/1998	58	9:02	9:05	0:03												
THUNDER CK	62B	06/26/1998	65	9:11	9:13	0:02	ASTR	U	T	1	48	11			C			
THUNDER CK	62B	06/26/1998	78	9:21	9:24	0:03	ASTR	U	T	2	48,54	11,15	,14		C			
THUNDER CK	62B	06/26/1998	87	9:34	9:38	0:04	ASTR	U	T	1	34	8			T			
THUNDER CK	62B	06/26/1998	97	9:44	9:50	0:06	ASTR	U	T	5	34,48,33,48,35	7,11,7,15,8			T			
BRIDGE CK	110	08/13/1998	0-50	11:15	12:00	0:45	0											
FISHER CK	183	07/21/1998	8	10:11	10:15	0:04												
FISHER CK	183	07/21/1998	17	10:30	10:34	0:04												
FISHER CK	183	07/21/1998	22	10:45	10:49	0:04												
FISHER CK	183	07/21/1998	29	10:57	11:01	0:04												
FISHER CK	183	07/21/1998	37	11:11	11:15	0:04	ASTR	U	T	1	50	14						
FISHER CK	183	07/21/1998	55	12:01	12:05	0:04	ASTR	U	T	1	50	11						
FISHER CK	183	07/21/1998	69	12:09	12:14	0:05	ASTR	U	T/M	1	54	15	20					
FISHER CK	183	07/21/1998	74	12:22	12:27	0:05	ASTR	U	T,M	2	47,55	12,12	,23	10				
FISHER CK	183	07/21/1998	83	12:36	12:41	0:05	ASTR	U	M,T/M	2	52,53	11,11	12,20	,8				
FISHER CK	183	07/21/1998	93	12:55	13:01	0:06												

* CAPTURES OUTSIDE TRANSECT REPORTED IN TABLE 11.

TABLE A 5. STREAM SEARCH EFFORT & CAPTURES - CONTINUED

NOCA - AMPHIBIAN SURVEY - 1998

CAPTURES IN TRANSECTS

WATERSHED	SITE NUMBER	DATE	STREAM METER	START TIME	END TIME	ELAPSED TIME	SPECIES	SEX	STAGE	NUMBER INDIVIDUALS	TOTAL LENGTH TOTLGTH	SNOUTVENT HEADWIDTH SVL/HW	HL_MM	FL_MM	ENV	POS	SUBSTR	COVER SIZE_CM
FISHER CK	186*	07/23/1998	16	9:43	9:48	0:05												
FISHER CK	186	07/23/1998	21	9:57	10:00	0:03	ASTR	U	T	2	24,41	5,10						
FISHER CK	186	07/23/1998	26	10:10	10:14	0:04	ASTR	U	T	2	23,24	5,5						
FISHER CK	186	07/23/1998	52	10:27	10:30	0:03	ASTR	U	T	1	25	6						
FISHER CK	186	07/23/1998	58	10:40	10:44	0:04	ASTR	U	T/M	1	53	12	11					
FISHER CK	186	07/23/1998	64	10:49	10:52	0:03	ASTR	U	T	4	23,25,25,30	5,5,5,7						
FISHER CK	186	07/23/1998	69	11:05	11:08	0:03	ASTR	U	T	1	32	8						
FISHER CK	186	07/23/1998	85	11:19	11:23	0:04												
FISHER CK	186	07/23/1998	93	11:30	11:35	0:05												
FISHER CK	186	07/23/1998	99	11:49	11:53	0:04												
FISHER CK	202*	07/22/1998	13	12:52	12:58	0:06	ASTR	U	T	2	41,46	10,10						
FISHER CK	202	07/22/1998	21	13:12	13:17	0:05	ASTR	U	T	1	26	5						
FISHER CK	202	07/22/1998	27	13:26	13:32	0:06	ASTR	U	T	2	45,49	11,12						
FISHER CK	202	07/22/1998	33	13:42	13:45	0:03												
FISHER CK	202	07/22/1998	38	13:50	13:54	0:04	ASTR	U	T	1	32	8						
FISHER CK	202	07/22/1998	47	14:15	14:20	0:05												
FISHER CK	202	07/22/1998	70	14:55	14:59	0:04	ASTR	U	T	1	35	8						
FISHER CK	202	07/22/1998	76	15:15	15:21	0:06	ASTR	U	T	3	27,27,36	6,7,8						
FISHER CK	202	07/22/1998	83	15:31	15:39	0:08	ASTR	U	T	3	35,42,48	8,9,12	12					
FISHER CK	202	07/22/1998	93	15:51	15:59	0:08	ASTR	U	T	2	41,42	10,10	2					
FISHER CK	217*	07/21/1998	1	14:22	14:27	0:05	ASTR	U	T	5	27,29,30,35,40	7,7,7,8,9						
FISHER CK	217	07/21/1998	13	14:36	14:40	0:04	ASTR	U	T	2	27,32	6,8						
FISHER CK	217	07/21/1998	19	14:45	14:50	0:05	ASTR	U	T	5	32,32,32,36,38	7,7,8,9,9,						
FISHER CK	217	07/21/1998	30	14:59	15:03	0:04	0											
FISHER CK	217	07/21/1998	49	15:10	15:14	0:04	0											
FISHER CK	217	07/21/1998	58	15:22	15:26	0:04	ASTR	U	T	6	31,32,32,33,33,34	8,7,7,8,8,8						
FISHER CK	217	07/21/1998	63	15:35	15:40	0:05	ASTR	U	T	6	31,32,32,33,36,37	6,7,8,8,7,8,8						
FISHER CK	217	07/21/1998	73	15:51	15:56	0:05	ASTR	U	T,A	2	32	44,7	55	20				
FISHER CK	217	07/21/1998	80	16:20	16:26	0:06	ASTR	U	T	3	32,33,33							
FISHER CK	217	07/21/1998	94	16:35	16:40	0:05	0											
BRIDGE CK	222	08/12/1998	5	10:55	11:01	0:06	0											
BRIDGE CK	222	08/12/1998	15	11:14	11:19	0:05	0											
BRIDGE CK	222	08/12/1998	21	11:23	11:28	0:05	0											
BRIDGE CK	222	08/12/1998	27	11:36	11:41	0:05	0											
BRIDGE CK	222	08/12/1998	37	11:52	11:57	0:05	0											
BRIDGE CK	222	08/12/1998	64	12:37	12:45	0:08	0											
BRIDGE CK	222	08/12/1998	71	13:05	13:10	0:05	0											
BRIDGE CK	222	08/12/1998	81	13:15	13:20	0:05	0											
BRIDGE CK	222	08/12/1998	86	13:25	13:30	0:05	0											
BRIDGE CK	222	08/12/1998	97	13:40	13:48	0:08	0											

* CAPTURES OUTSIDE TRANSECT REPORTED IN TABLE 11.

TABLE A 5. STREAM SEARCH EFFORT & CAPTURES - CONTINUED

NOCA - AMPHIBIAN SURVEY - 1998

CAPTURES IN TRANSECTS

WATERSHED	SITE NUMBER	DATE	STREAM METER	START TIME	END TIME	ELAPSED TIME	SPECIES	SEX	STAGE	NUMBER INDIVIDUALS	TOTAL LENGTH TOTLGTH	SNOUTVENT HEADWIDTH SVL/HW	HL_MM	FL_MM	ENV	POS	SUBSTR	COVER SIZE_CM
BIG BEAVER CK	312	08/04/1998	10	9:30	9:33	0:03	0											
BIG BEAVER CK	312	08/04/1998	20	9:37	9:40	0:03	0											
BIG BEAVER CK	312	08/04/1998	30	9:45	9:48	0:03	0											
BIG BEAVER CK	312	08/04/1998	40	9:52	9:56	0:04	ASTR	U	T	1	46	11	2					
BIG BEAVER CK	312	08/04/1998	50	9:57	10:00	0:03	0											
BIG BEAVER CK	312	08/04/1998	60	10:02	10:05	0:03	ASTR	U	T	1	45	11	2					
BIG BEAVER CK	312	08/04/1998	70	10:06	10:08	0:02	0											
BIG BEAVER CK	312	08/04/1998	80	10:10	10:13	0:03	0											
BIG BEAVER CK	312	08/04/1998	90	10:14	10:17	0:03	0											
BIG BEAVER CK	312	08/04/1998	100	10:18	10:19	0:01	0											
BRIDGE CK	411*	08/11/1998	2	10:56	11:00	0:04	0											
BRIDGE CK	411	08/11/1998	19	11:28	11:32	0:04	0											
BRIDGE CK	411	08/11/1998	27	11:37	11:39	0:02	0											
BRIDGE CK	411	08/11/1998	35	11:49	11:53	0:04	0											
BRIDGE CK	411	08/11/1998	41	11:58	12:01	0:03	0											
BRIDGE CK	411	08/11/1998	50	12:26	12:30	0:04	0											
BRIDGE CK	411	08/11/1998	66	12:35	12:39	0:04	0											
BRIDGE CK	411	08/11/1998	72	12:50	12:54	0:04	0											
BRIDGE CK	411	08/11/1998	82	13:02	13:07	0:05	0											
BRIDGE CK	411	08/11/1998	98	13:15	13:20	0:05	0											
BRIDGE CK	420	09/15/1998	8	12:30	12:33	0:03	0											
BRIDGE CK	420	09/15/1998	17	12:50	12:53	0:03	0											
BRIDGE CK	420	09/15/1998	22	13:00	13:03	0:03	0											
BRIDGE CK	420	09/15/1998	29	13:11	13:15	0:04	ASTR	F	J	1		23						
BRIDGE CK	420	09/15/1998	38	13:20	13:23	0:03	0											
BRIDGE CK	420	09/15/1998	43	13:29	13:33	0:04	0											
BRIDGE CK	420	09/15/1998	48	13:37	13:40	0:03	0											
BRIDGE CK	420	09/15/1998	74	14:10	14:14	0:04	0											
BRIDGE CK	420	09/15/1998	83	14:24	14:27	0:03	0											
BRIDGE CK	420	09/15/1998	93	14:34	14:37	0:03	0											
BRIDGE CK	424	09/14/1998	4	13:08	13:10	0:02	0											
BRIDGE CK	424	09/14/1998	15	13:30	13:33	0:03	0											
BRIDGE CK	424	09/14/1998	29	13:54	13:57	0:03	0											
BRIDGE CK	424	09/14/1998	41	14:01	14:04	0:03	0											
BRIDGE CK	424	09/14/1998	46	14:12	14:15	0:03	0											
BRIDGE CK	424	09/14/1998	52	14:39	14:42	0:03	0											
BRIDGE CK	424	09/14/1998	60	15:01	15:04	0:03	0											
BRIDGE CK	424	09/14/1998	74	15:09	15:12	0:03	0											
BRIDGE CK	424	09/14/1998	81	15:19	15:22	0:03	0											
BRIDGE CK	424	09/14/1998	90	15:24	15:27	0:03	0											

* CAPTURES OUTSIDE TRANSECT REPORTED IN TABLE 11.

TABLE A 5. STREAM SEARCH EFFORT & CAPTURES - CONTINUED

NOCA - AMPHIBIAN SURVEY - 1998

CAPTURES IN TRANSECTS

WATERSHED	SITE NUMBER	DATE	STREAM METER	START TIME	END TIME	ELAPSED TIME	SPECIES	SEX	STAGE	NUMBER INDIVIDUALS	TOTAL LENGTH TOTLGTH	SNOUTVENT HEADWIDTH SVL/HW	HL_MM	FL_MM	ENV	POS	SUBSTR	COVER SIZE_CM
BRIDGE CK	426	08/11/1998	4	14:30	14:35	0:05	0											
BRIDGE CK	426	08/11/1998	13	14:50	14:55	0:05	0											
BRIDGE CK	426	08/11/1998	22	15:05	15:10	0:05	0											
BRIDGE CK	426	08/11/1998	32	15:20	15:25	0:05	0											
BRIDGE CK	426	08/11/1998	45	15:33	15:38	0:05	0											
BRIDGE CK	426	08/11/1998	53	15:45	15:50	0:05	0											
BRIDGE CK	426	08/11/1998	68	15:57	16:05	0:08	0											
BRIDGE CK	426	08/11/1998	79	16:08	16:13	0:05	0											
BRIDGE CK	426	08/11/1998	85	16:19	16:23	0:04	0											
BRIDGE CK	426	08/11/1998	98	16:30	16:35	0:05	0											
BRIDGE CK	441	09/16/1998	5	11:58	12:01	0:03	0											
BRIDGE CK	441	09/16/1998	12	12:12	12:15	0:03	0											
BRIDGE CK	441	09/16/1998	21	12:23	12:26	0:03	0											
BRIDGE CK	441	09/16/1998	28	12:34	12:37	0:03	0											
BRIDGE CK	441	09/16/1998	41	12:46	12:49	0:03	0											
BRIDGE CK	441	09/16/1998	48	12:59	13:02	0:03	0											
BRIDGE CK	441	09/16/1998	65	13:40	13:44	0:04	0											
BRIDGE CK	441	09/16/1998	73	13:55	13:58	0:03	0											
BRIDGE CK	441	09/16/1998	80	14:03	14:06	0:03	0											
BRIDGE CK	441	09/16/1998	97	14:15	14:18	0:03	0											
BRIDGE CK	106121	09/10/1998					ASTR	U	T	2	50,55	12,13	WADDELL CK BETWEEN MIDDLE AND LOWER WADDELL LAKE					
BRIDGE CK	106552	09/09/1998					ASTR	U	T		46	10	OUTLET STREAM BELOW UPPER KETTLING LK (MR06)					
BRIDGE CK	106552	09/09/1998					ASTR	U	T		34	8						
BRIDGE CK	106552	09/09/1998					ASTR	U	T		40	10						
BRIDGE CK	106552	09/09/1998					ASTR	U	T		37	9						
BRIDGE CK	106552	09/09/1998					ASTR	U	T		40	10						
BRIDGE CK	106552	09/09/1998					ASTR	U	T		40	10						
BRIDGE CK	106552	09/09/1998					ASTR	U	T		32	7						
BRIDGE CK	106552	09/09/1998					ASTR	U	T		38	9						
BRIDGE CK	106552	09/09/1998					ASTR	U	T		36	9						
BRIDGE CK	106552	09/09/1998					ASTR	U	T		38	9						
BRIDGE CK	106552	09/09/1998					ASTR	U	T		33	8						
BRIDGE CK	106552	09/09/1998					ASTR	U	T		36	9						
BRIDGE CK	106552	09/09/1998					ASTR	U	T		40	10						

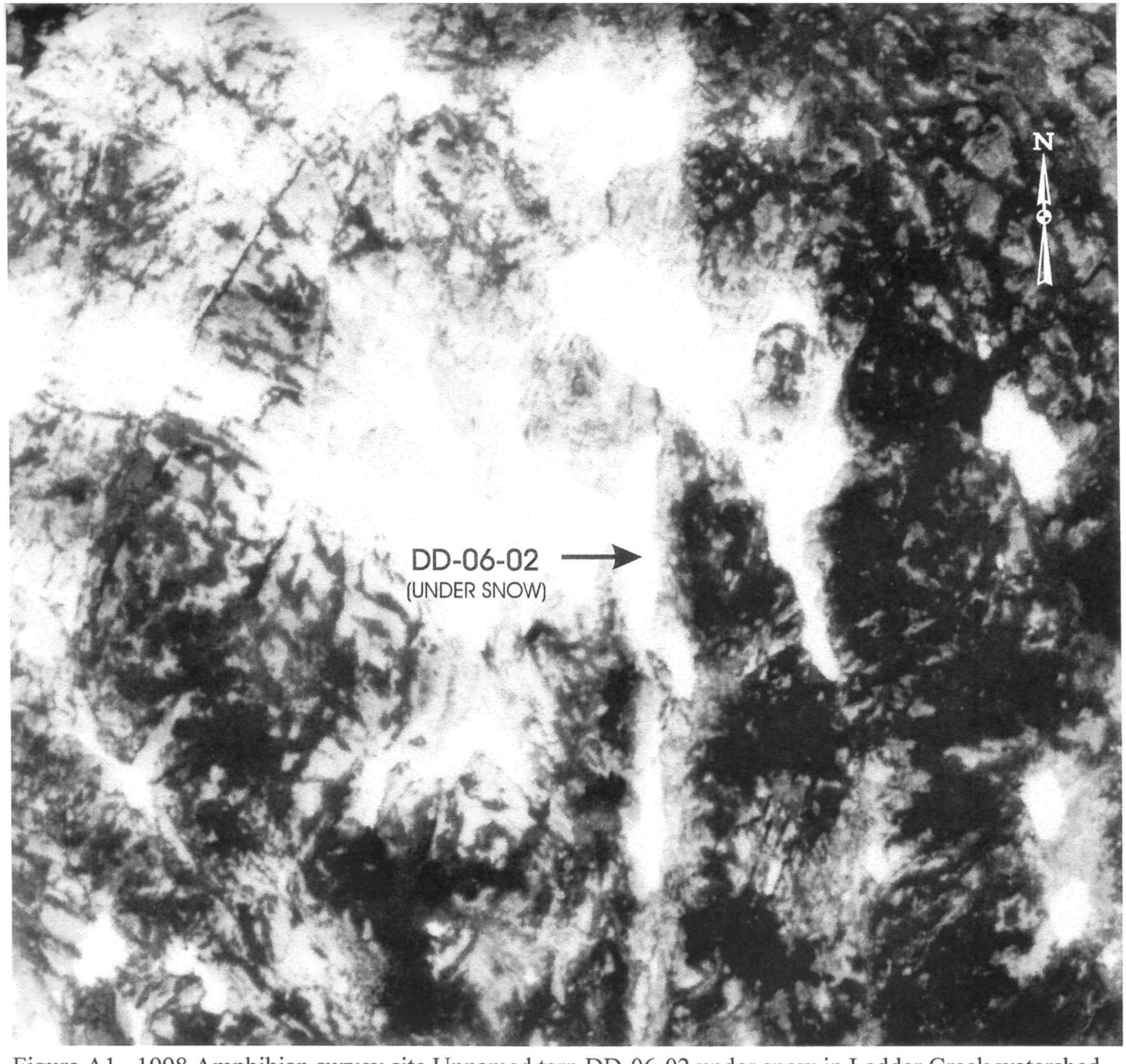


Figure A1. 1998 Amphibian survey site Unnamed tarn DD-06-02 under snow in Ladder Creek watershed.

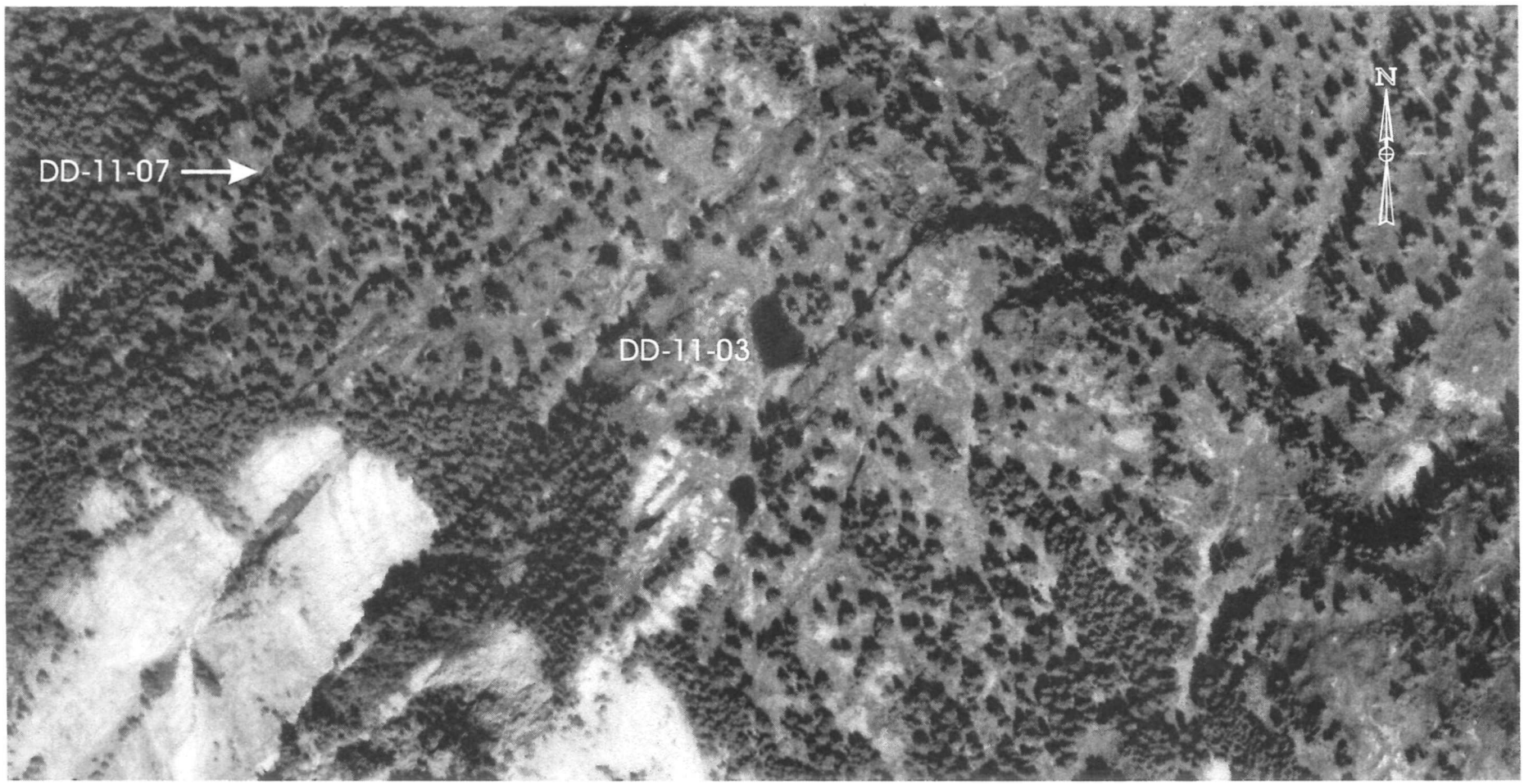


Figure A2. 1998 amphibian survey sites unnamed ponds DD-11-03 and DD-11-07on ridge betweek Bouck Lake and Ladder Ck.

Figure A3. 1998 amphibian survey sites Wilcox Lakes and nearby ponds EP-07's and -08's in east fork of Newhalem Creek watershed.

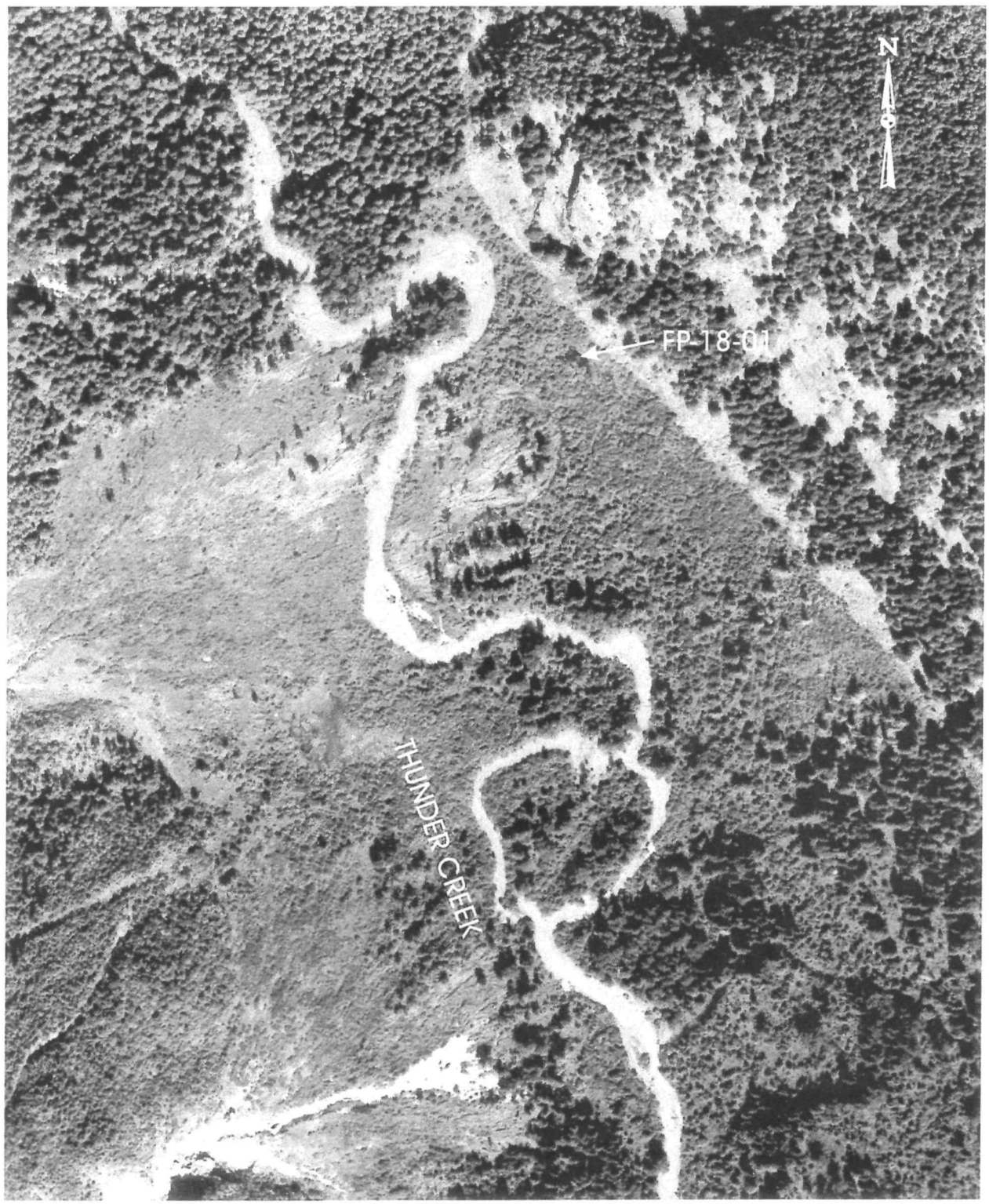


Figure A4. 1998 amphibian survey site pond FP-18 upstream from Tricouni Camp.

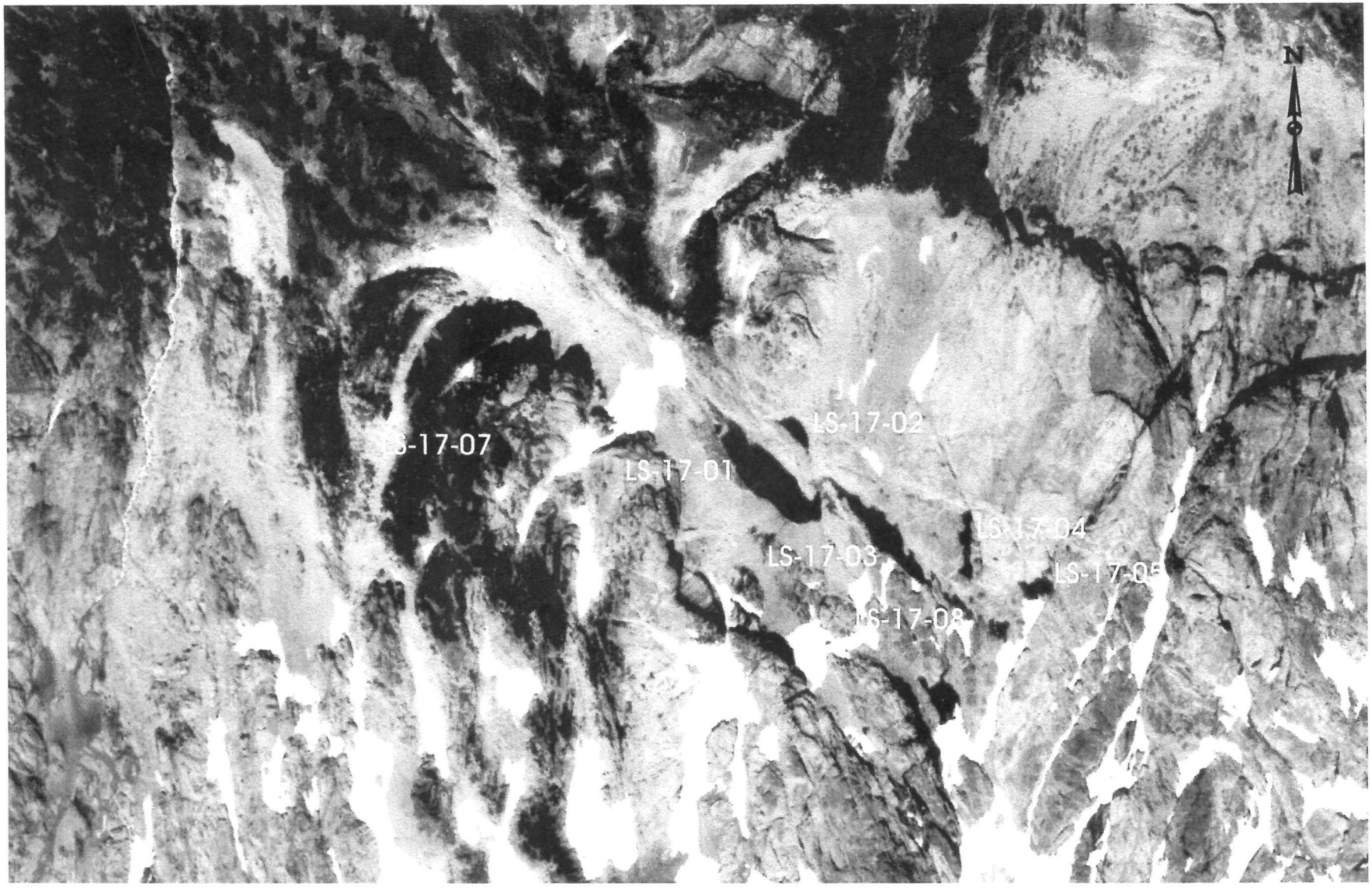


Figure A5. 1998 amphibian survey sites unnamed ponds LS-17-01 to Ls-17-08 on north side of Bacon Peak in Noisy Creek watershed.

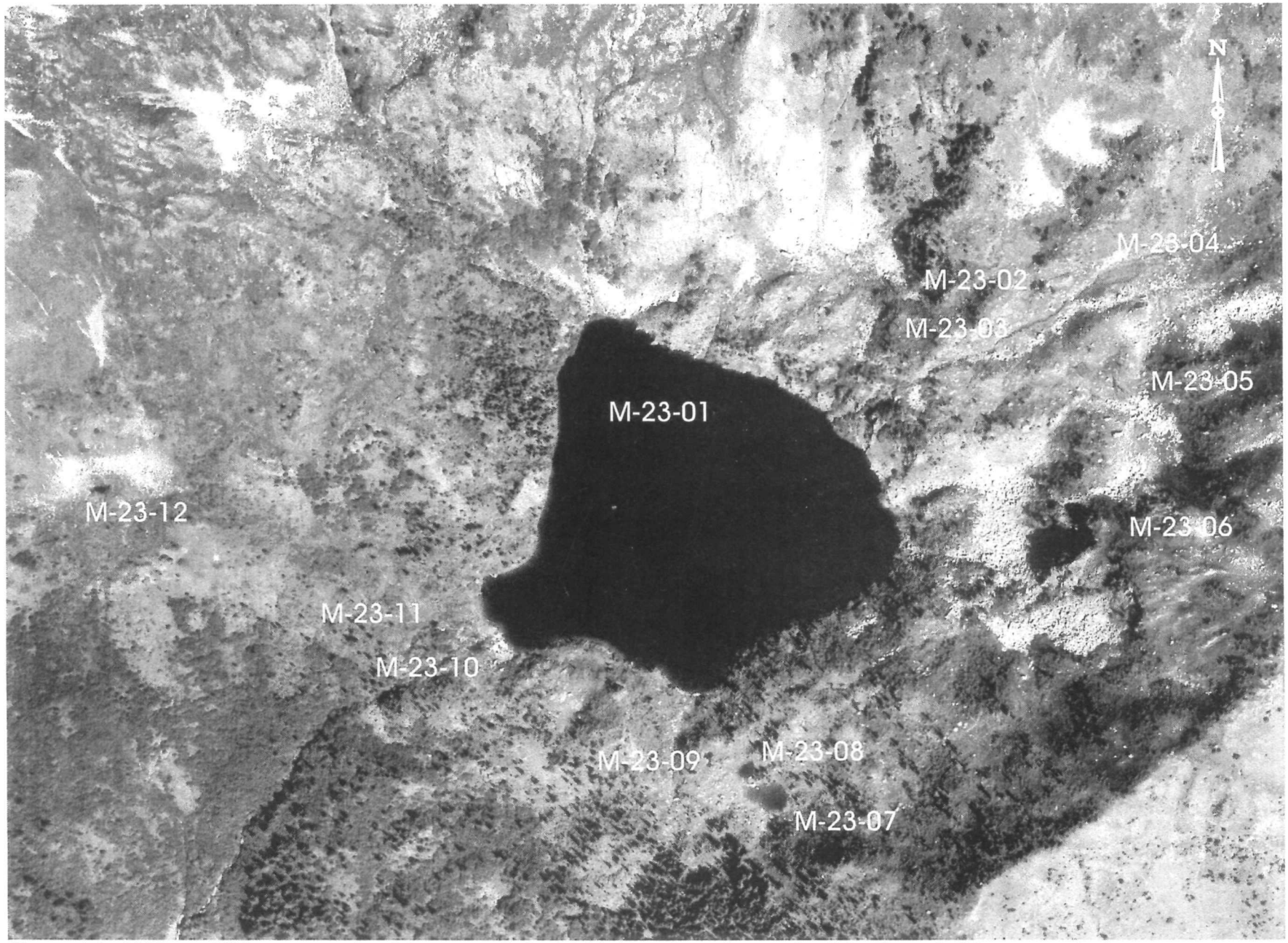


Figure A6. 1998 amphibian survey sites Monogram Lake M-23-01 and nearby ponds of the Cascade River watershed.

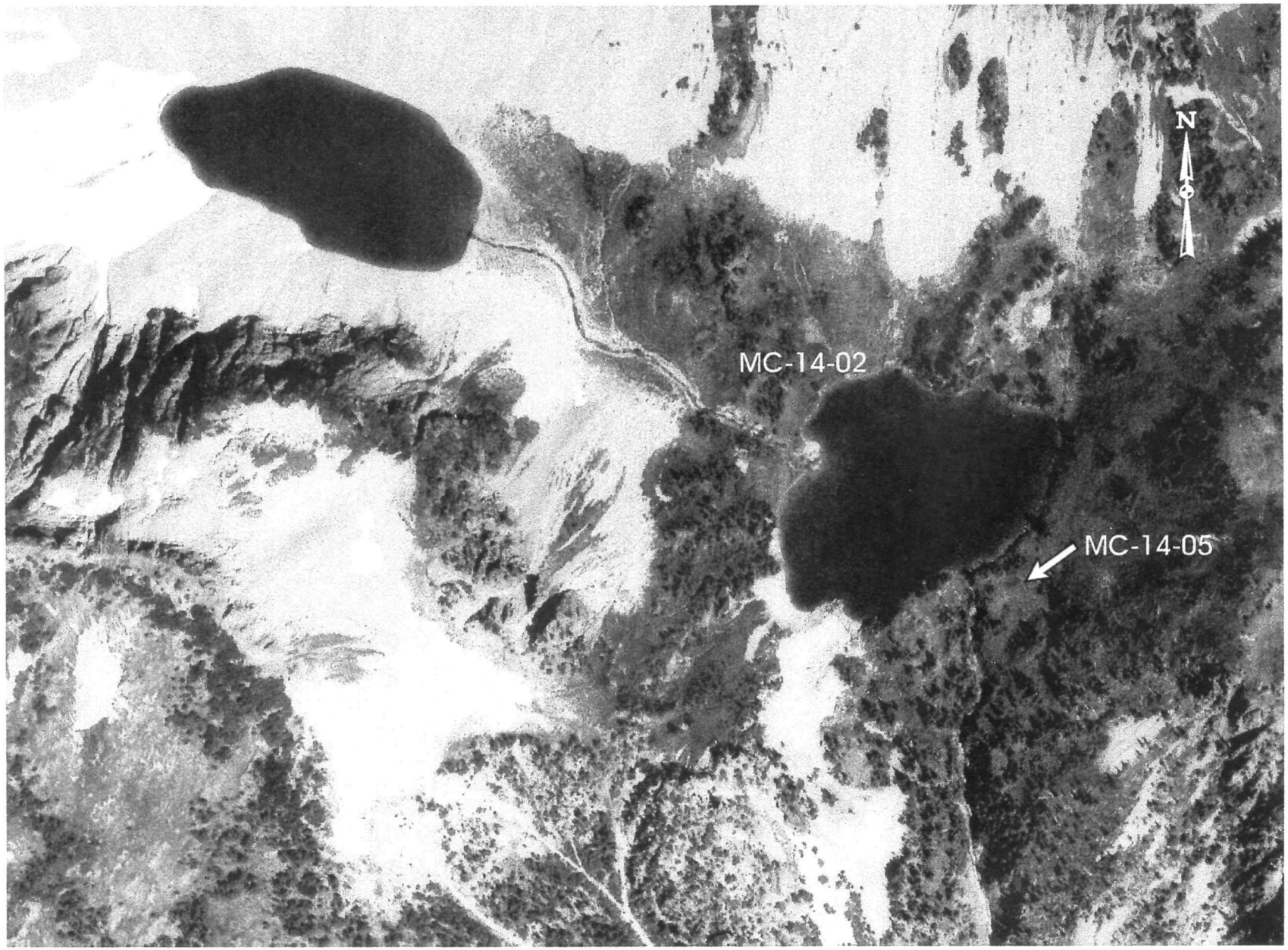


Figure A7. 1998 Amphibian survey site Lower East Lake MC-14-02 and pond MC-14-05 in Little Beaver Creek watershed.

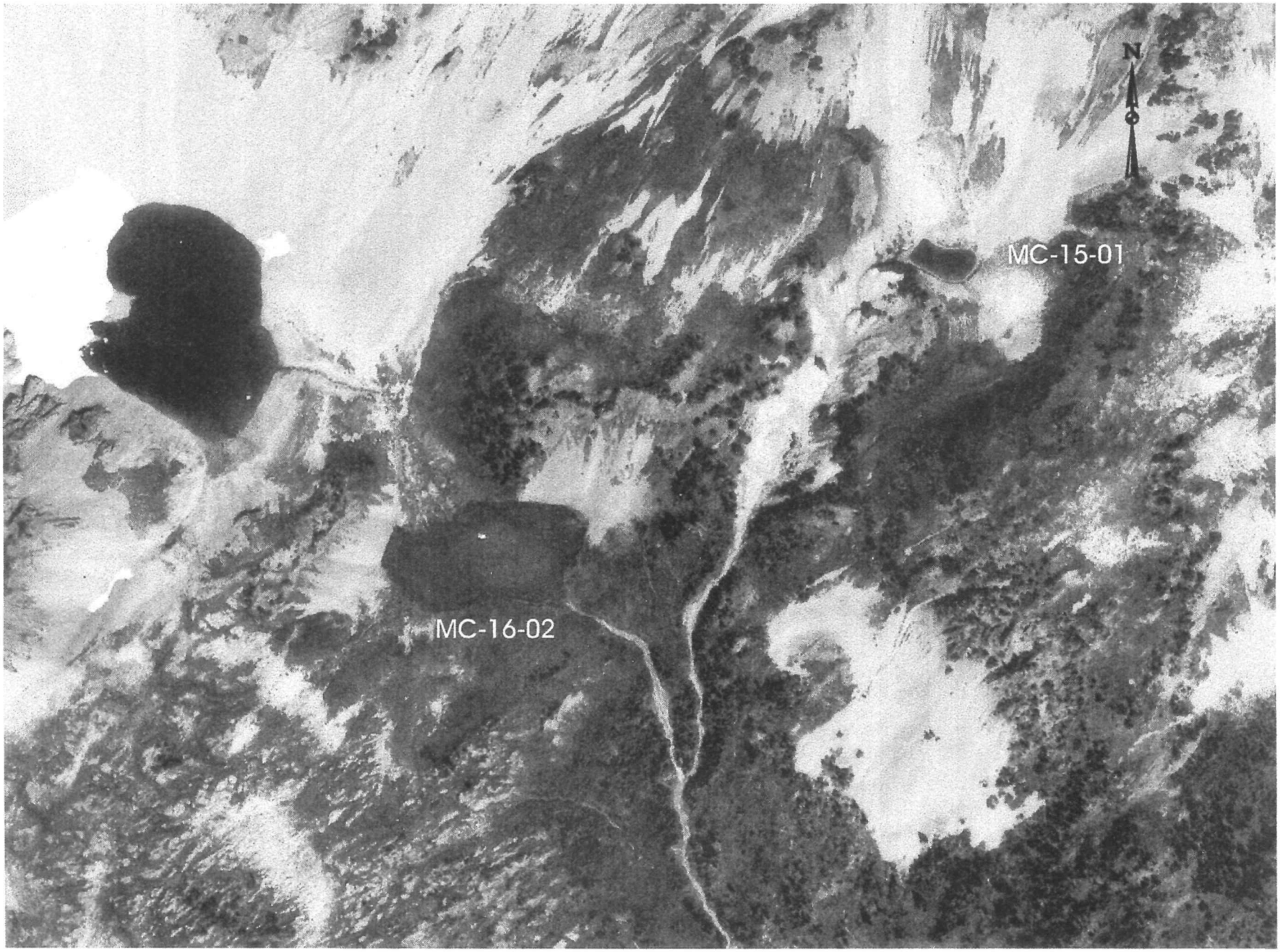


Figure A8. 1998 amphibian survey sites Lower Middle Lake MC-16-02, and Tiny Lake MC-15-01 in Little Beaver Creek watershed.

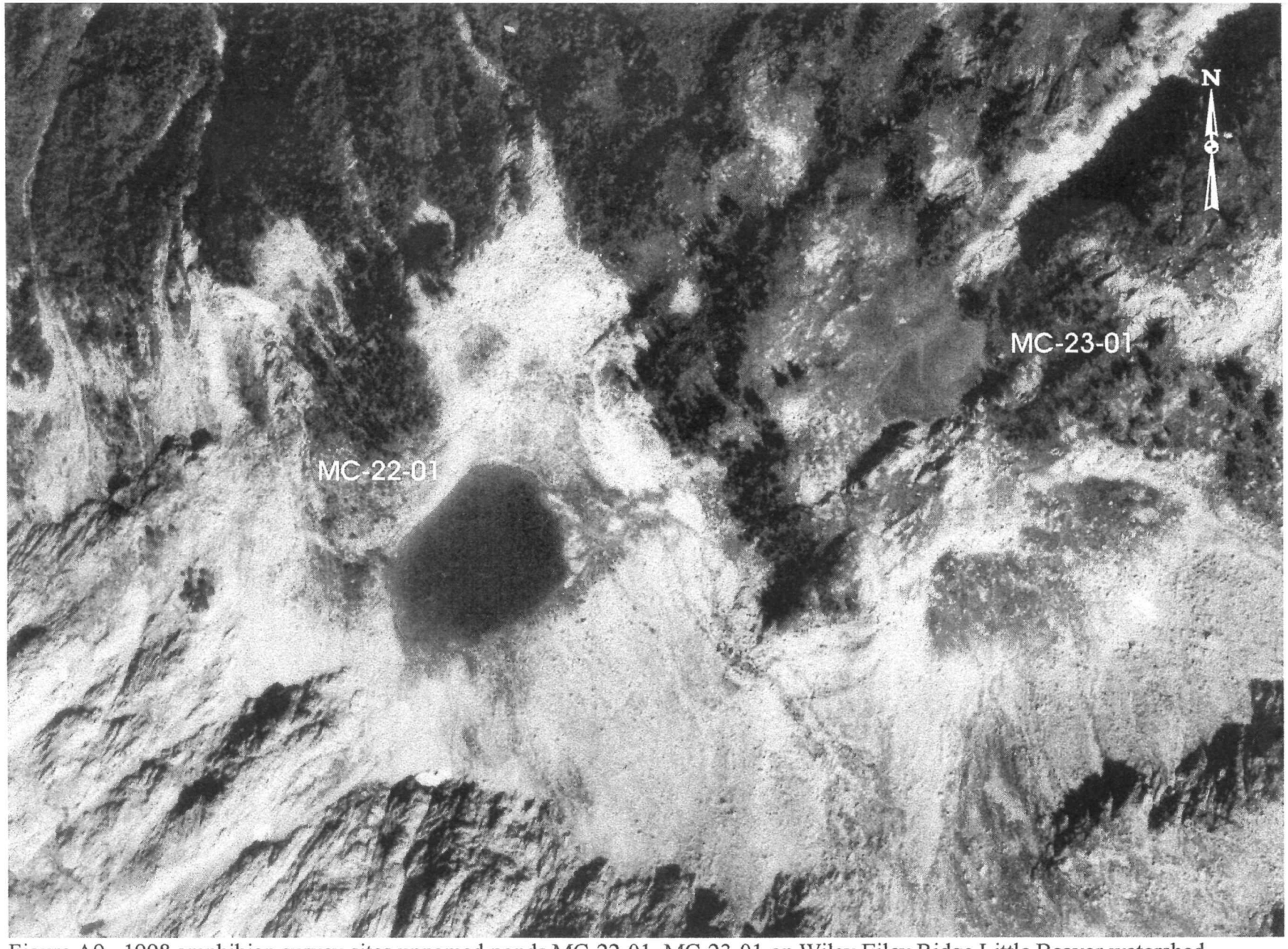


Figure A9. 1998 amphibian survey sites unnamed ponds MC-22-01, MC-23-01 on Wiley Eiley Ridge Little Beaver watershed.

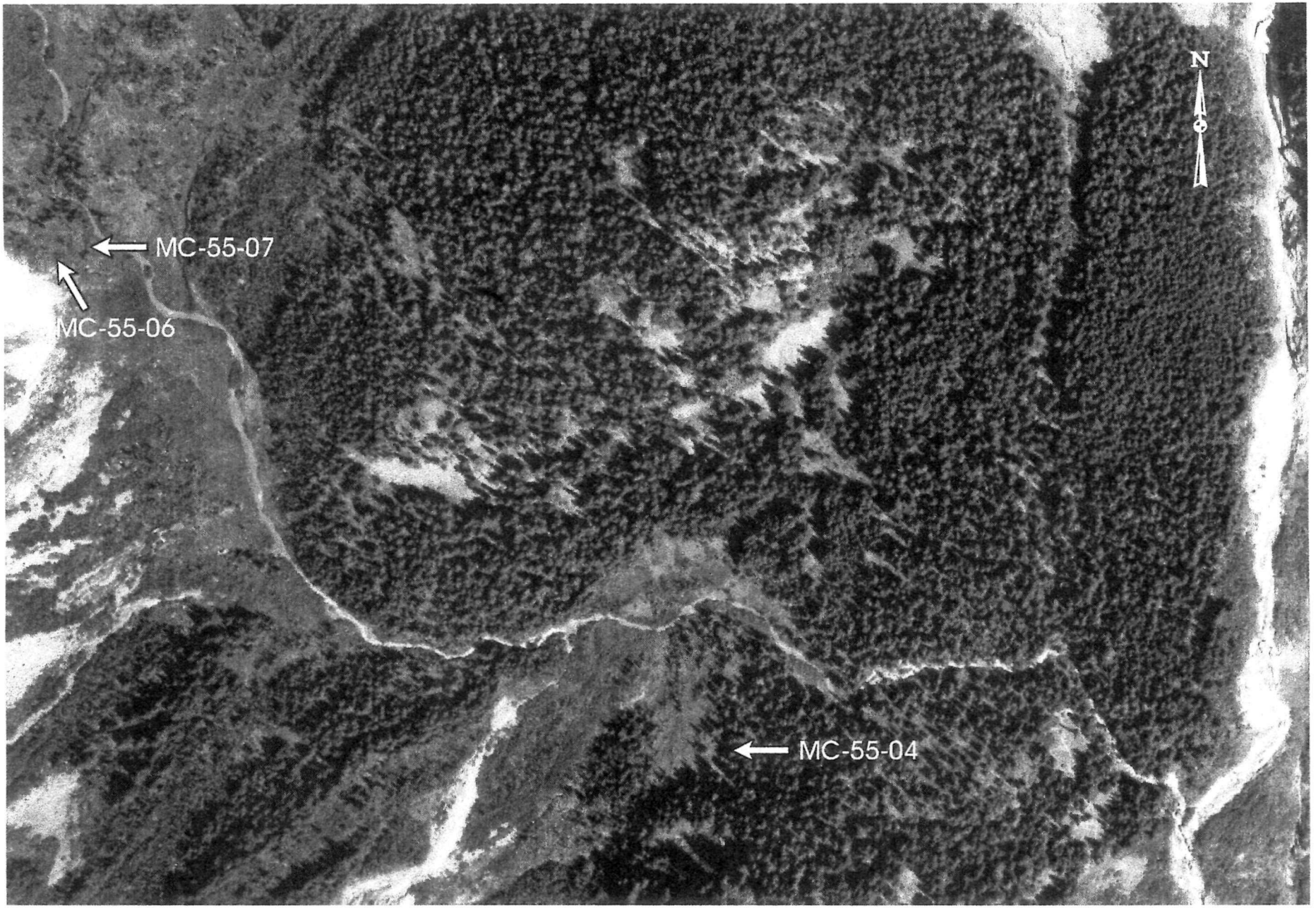


Figure A10. 1998 amphibian survey sites MC-55-04, -06, -07 in upper Redoubt Creek, Little Beaver watershed.

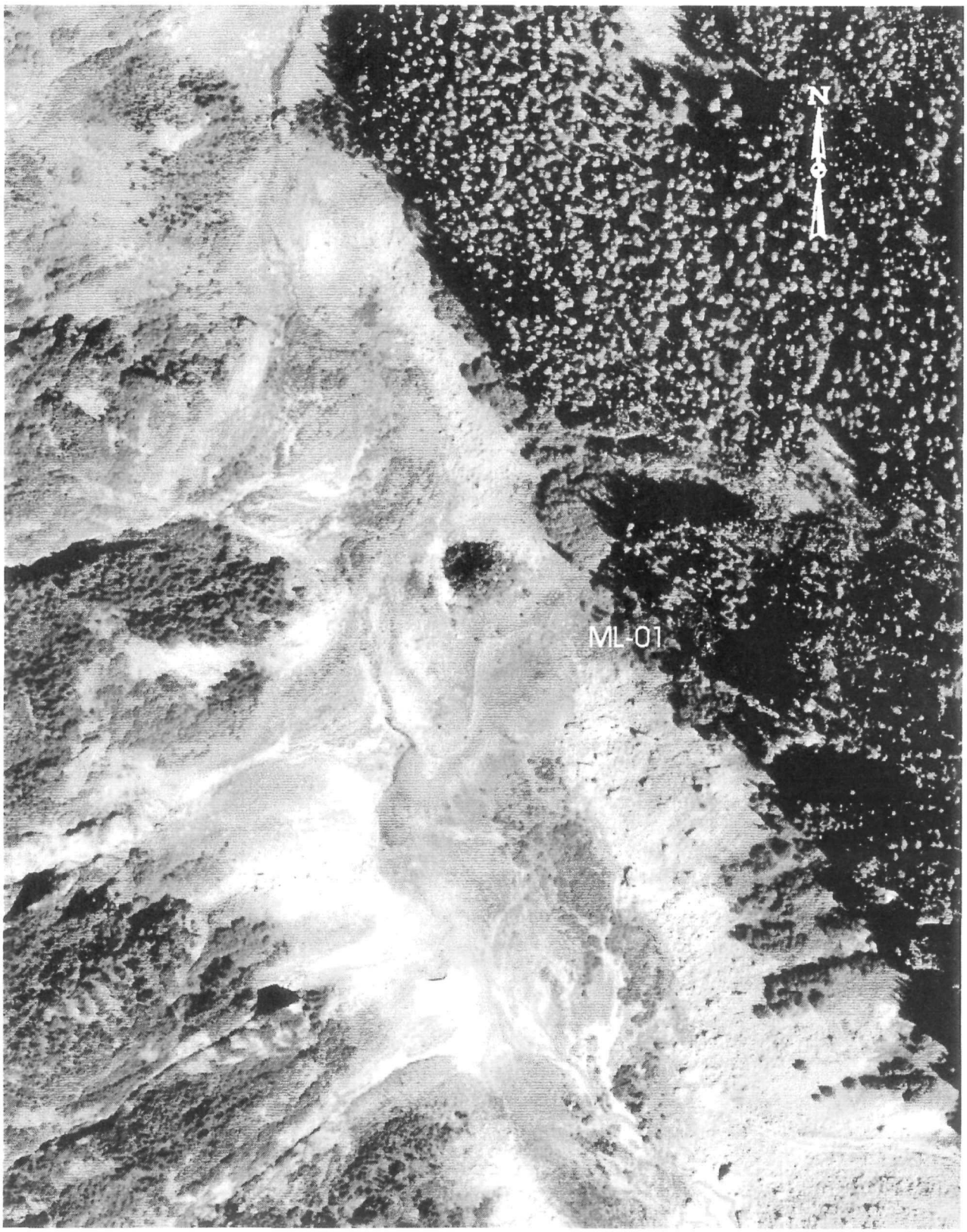


Figure A11. 1998 amphibian survey site Sourpuss Lake ML-01 in Panther Ck. watershed.

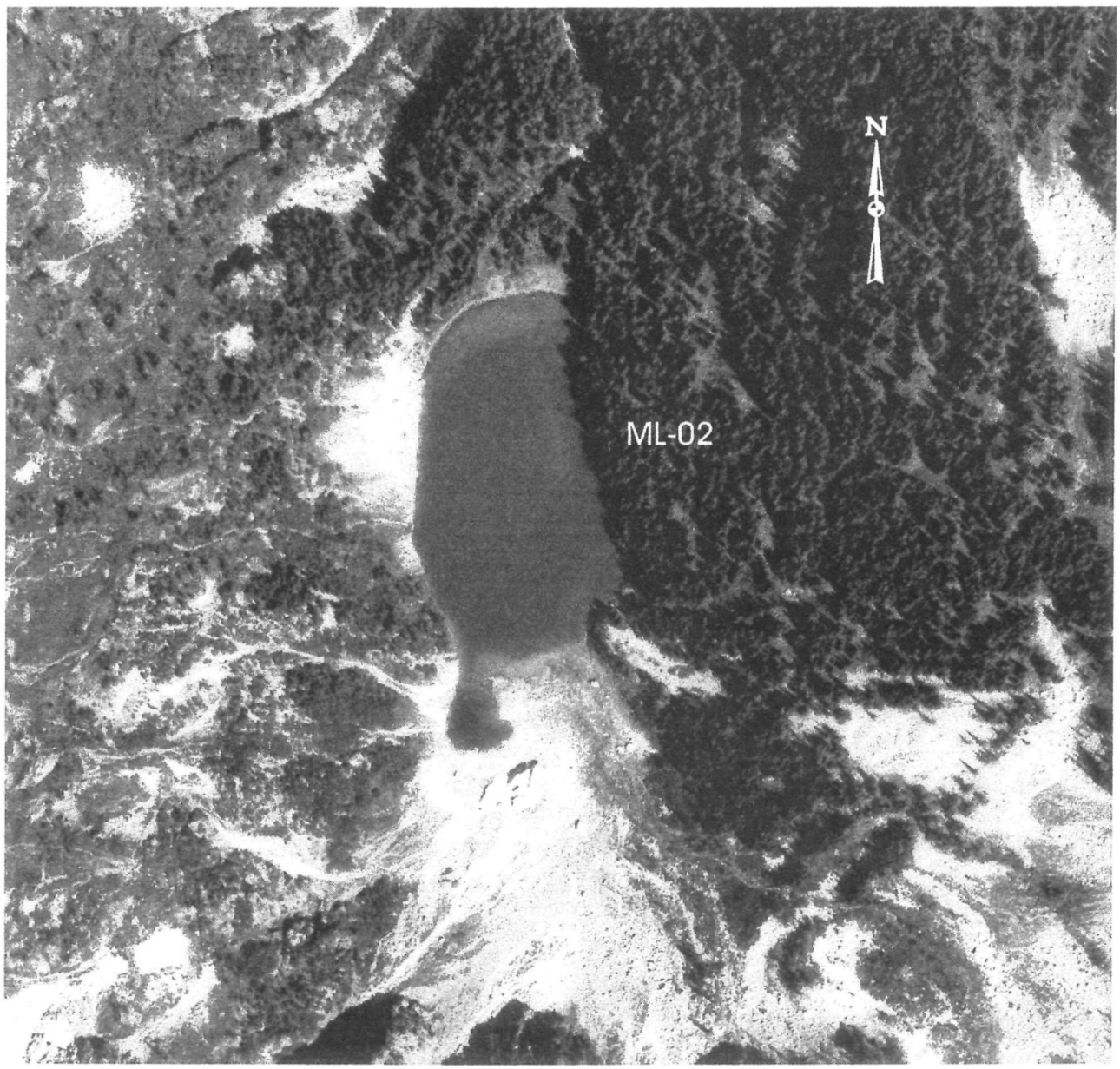


Figure A12. 1998 amphibian survey site Sweetpea Lake ML-02 in Panther Creek watershed.

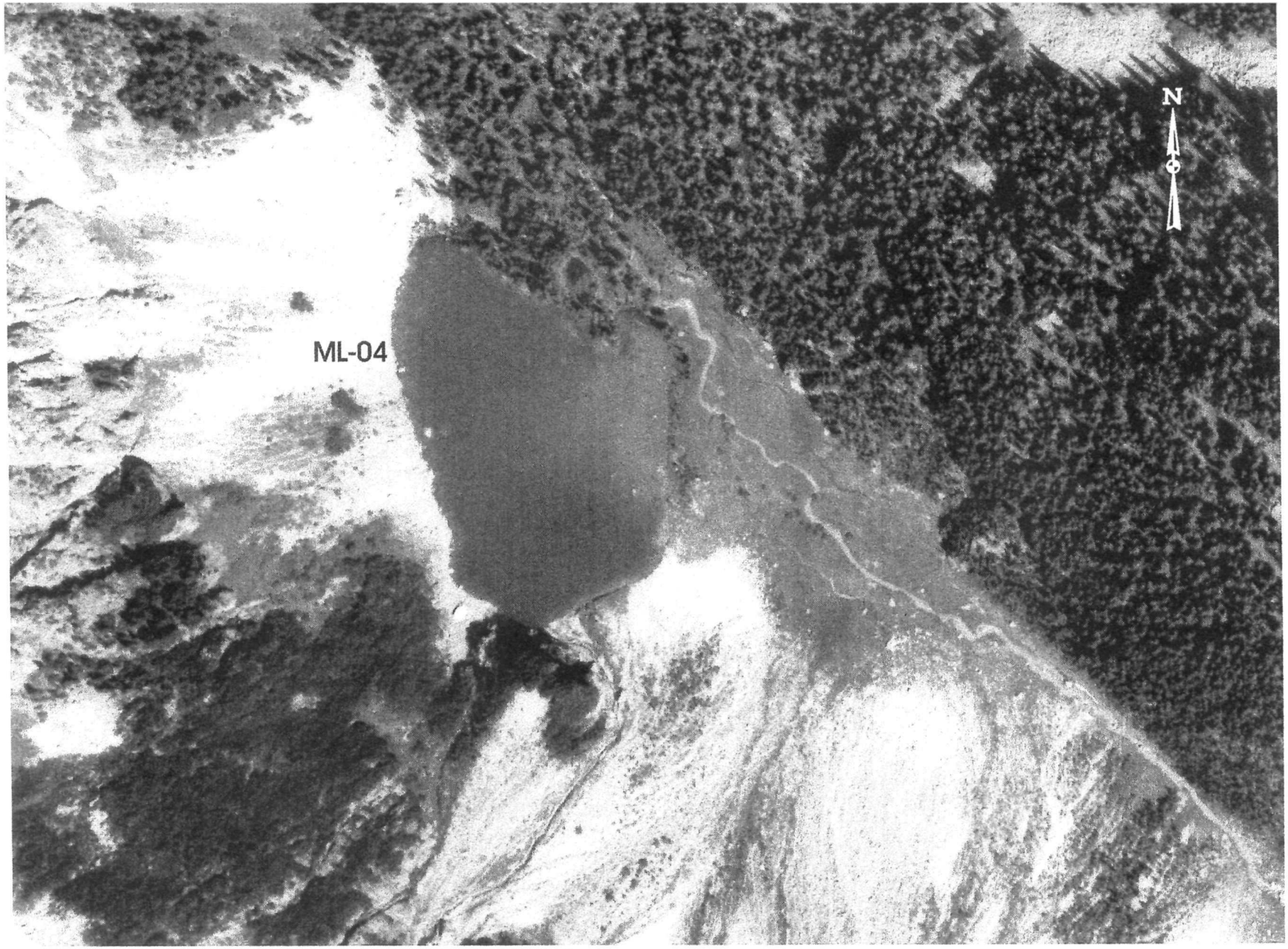


Figure A13. Vulcan Lake ML-04 in Panther Creek watershed.

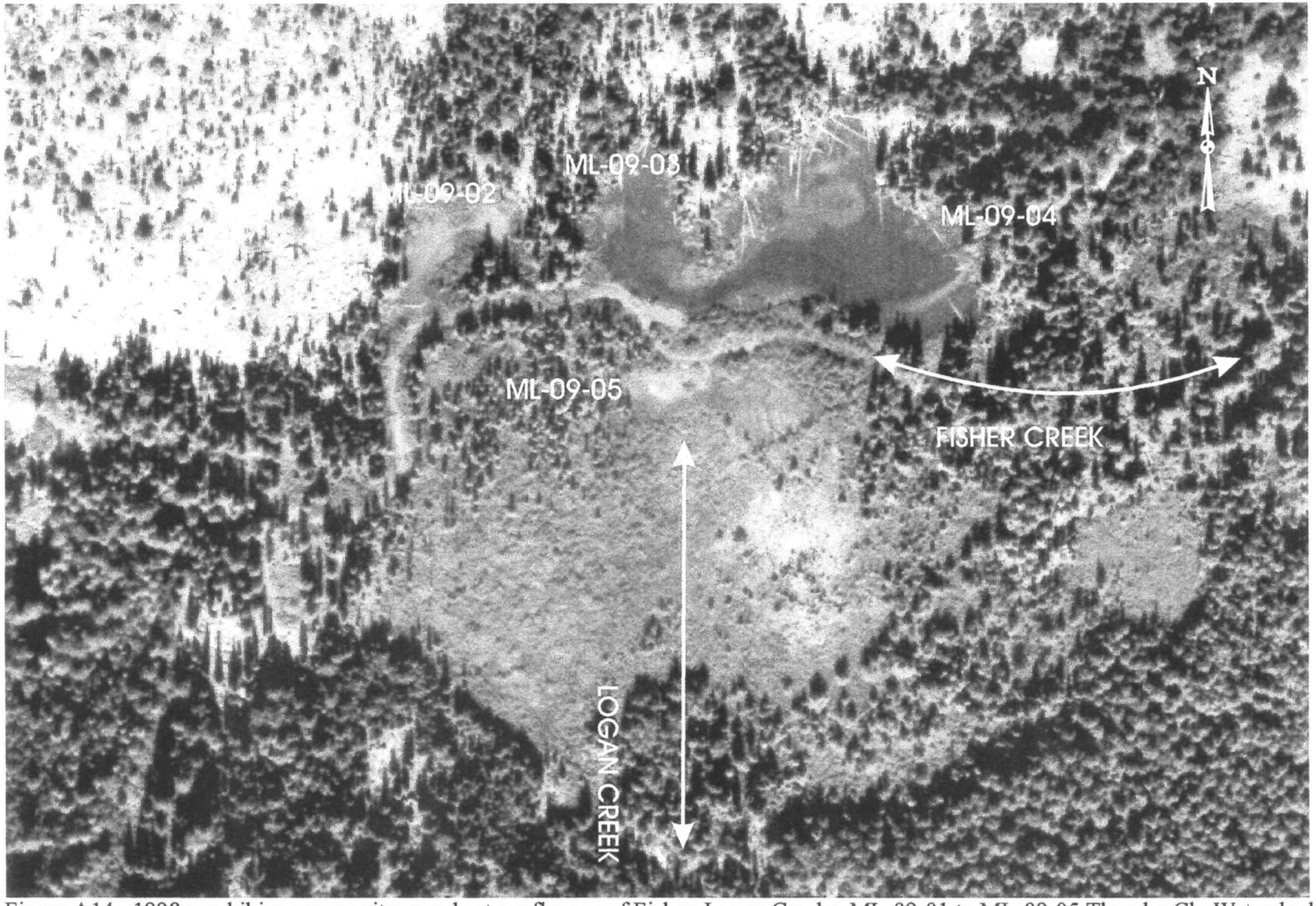


Figure A14. 1998 amphibian survey sites ponds at confluence of Fisher, Logan Creeks, ML-09-01 to ML-09-05 Thunder Ck. Watershed.

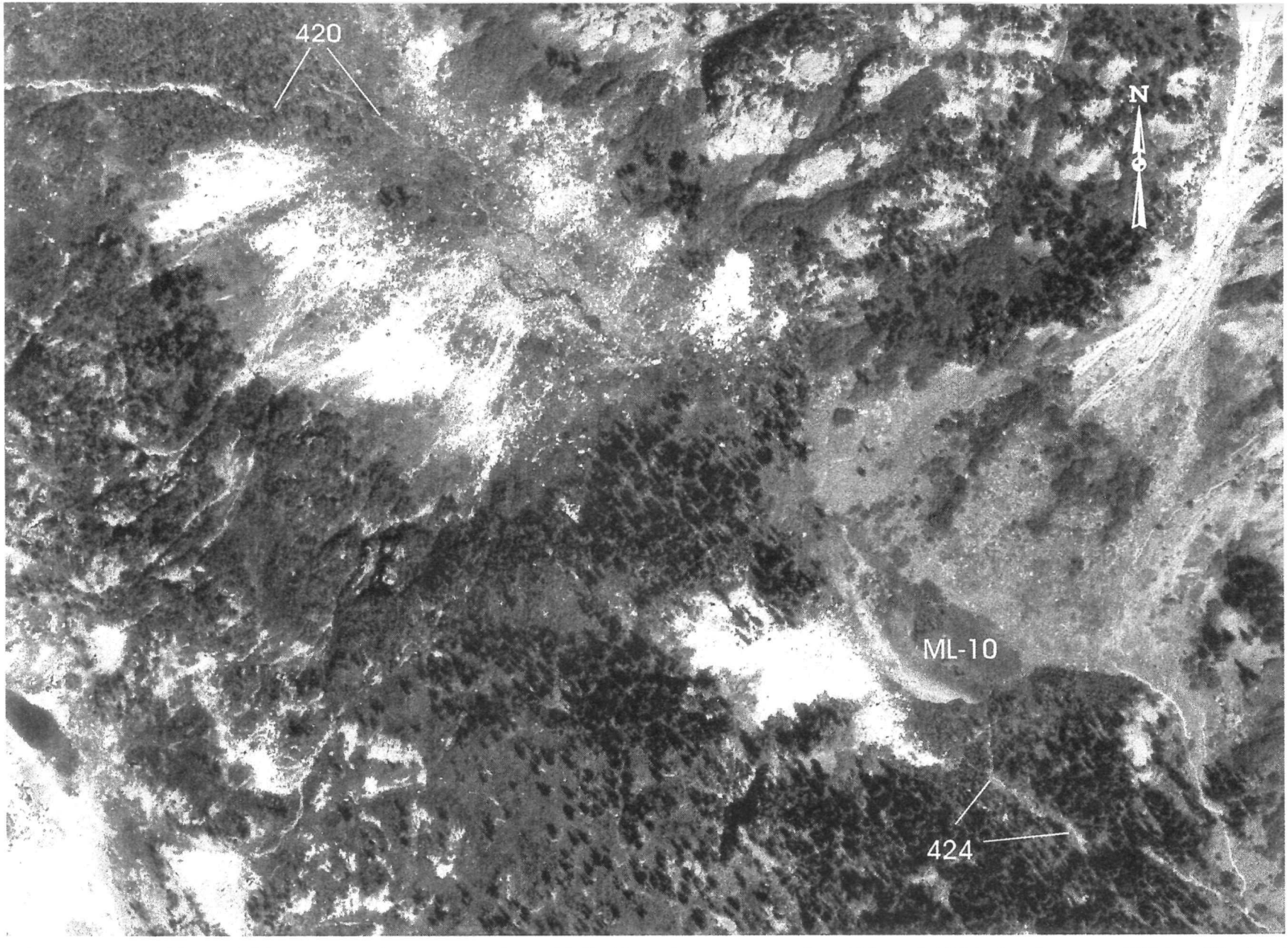


Figure A15. 1998 amphibian survey sites unnamed pond ML-10, and two stream sites 420, and 424 in headwaters of Fisher Ck. (east) of Grizzly, North Fork, and Bridge Ck. watersheds.

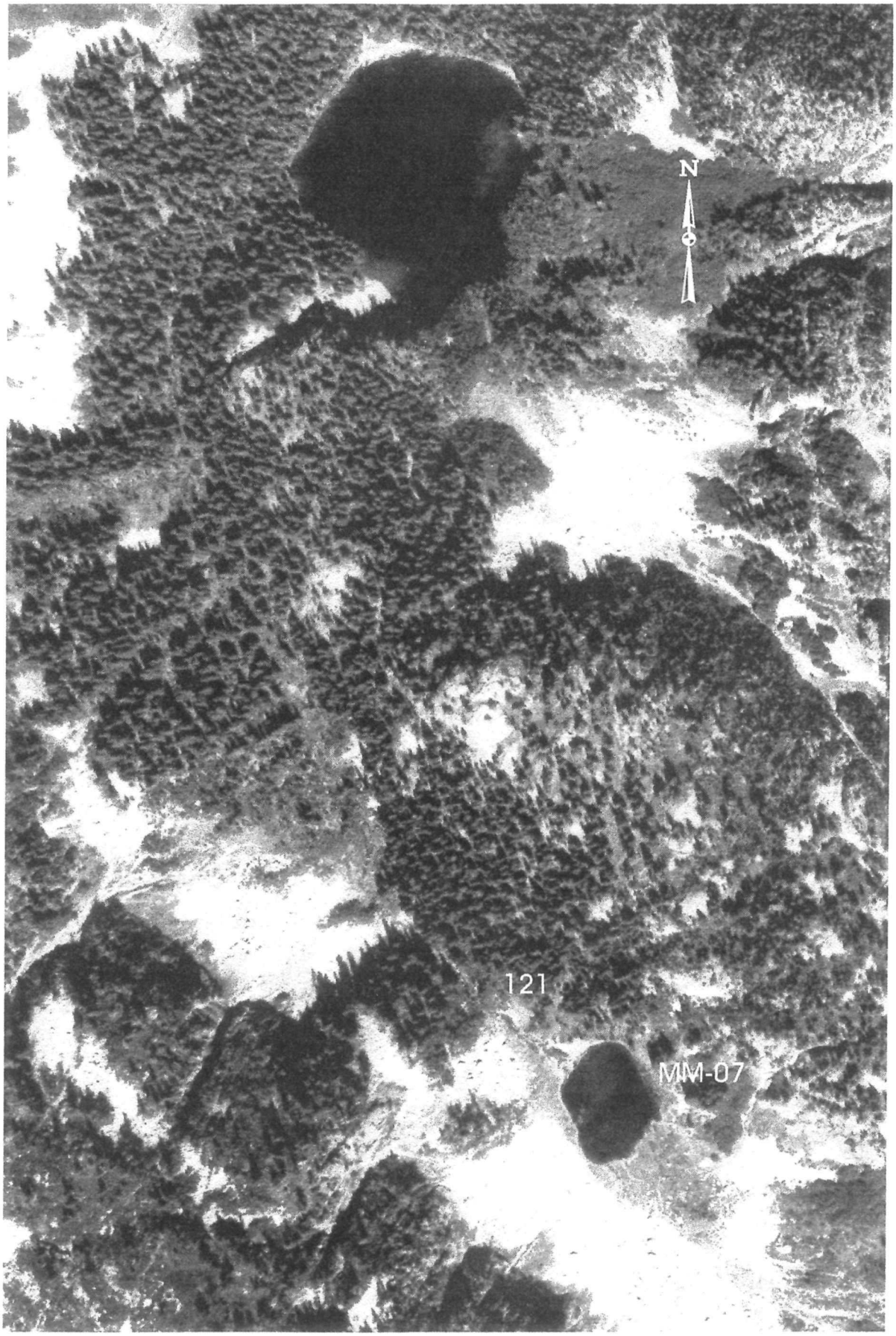


Figure A16. 1998 amphibian survey site Middle Waddell Lake MM-07 and stream site 121 in Bridge Creek watershed.

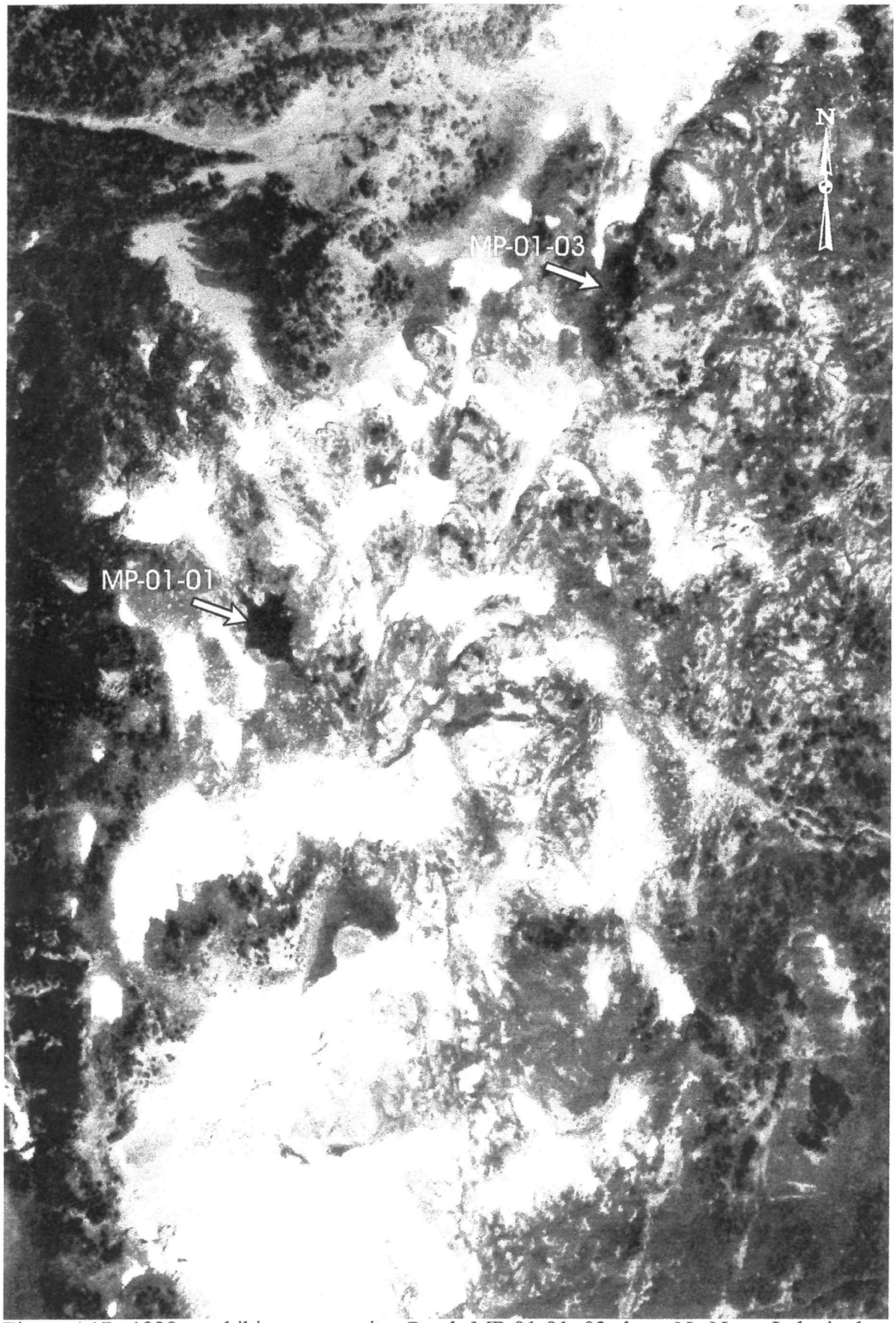


Figure A17. 1998 amphibian survey sites Ponds MP-01-01,-03 above No Name Lake in the Ross Lake watershed.

Figure A18. 1998 amphibian survey site Firn Lake MP-02-01 in headwaters of 39-mile Creek in the Big Beaver watershed.

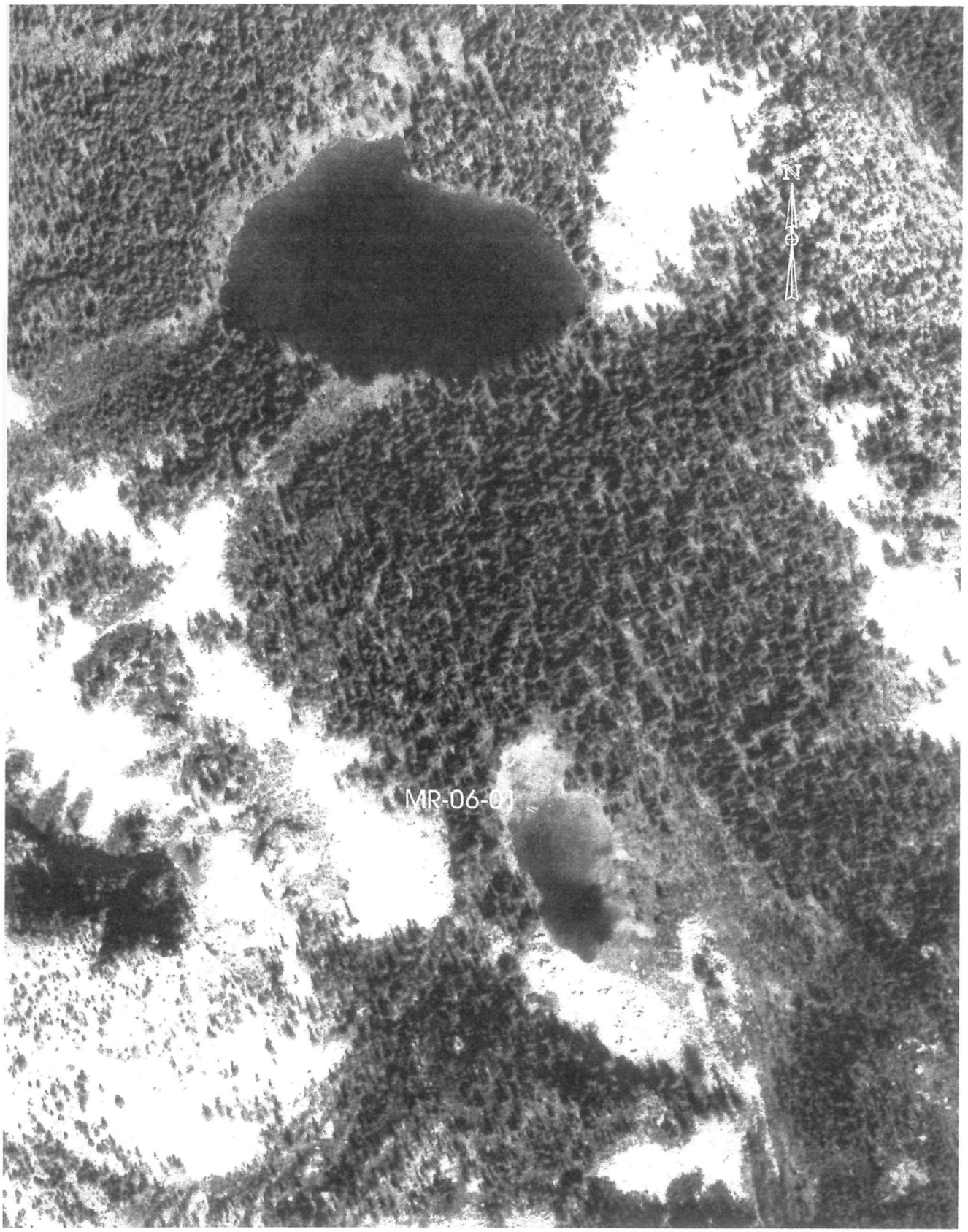


Figure A19. 1998 amphibian survey site upper Kettling Lake MR-06-01 in Bridge Ck watershed.

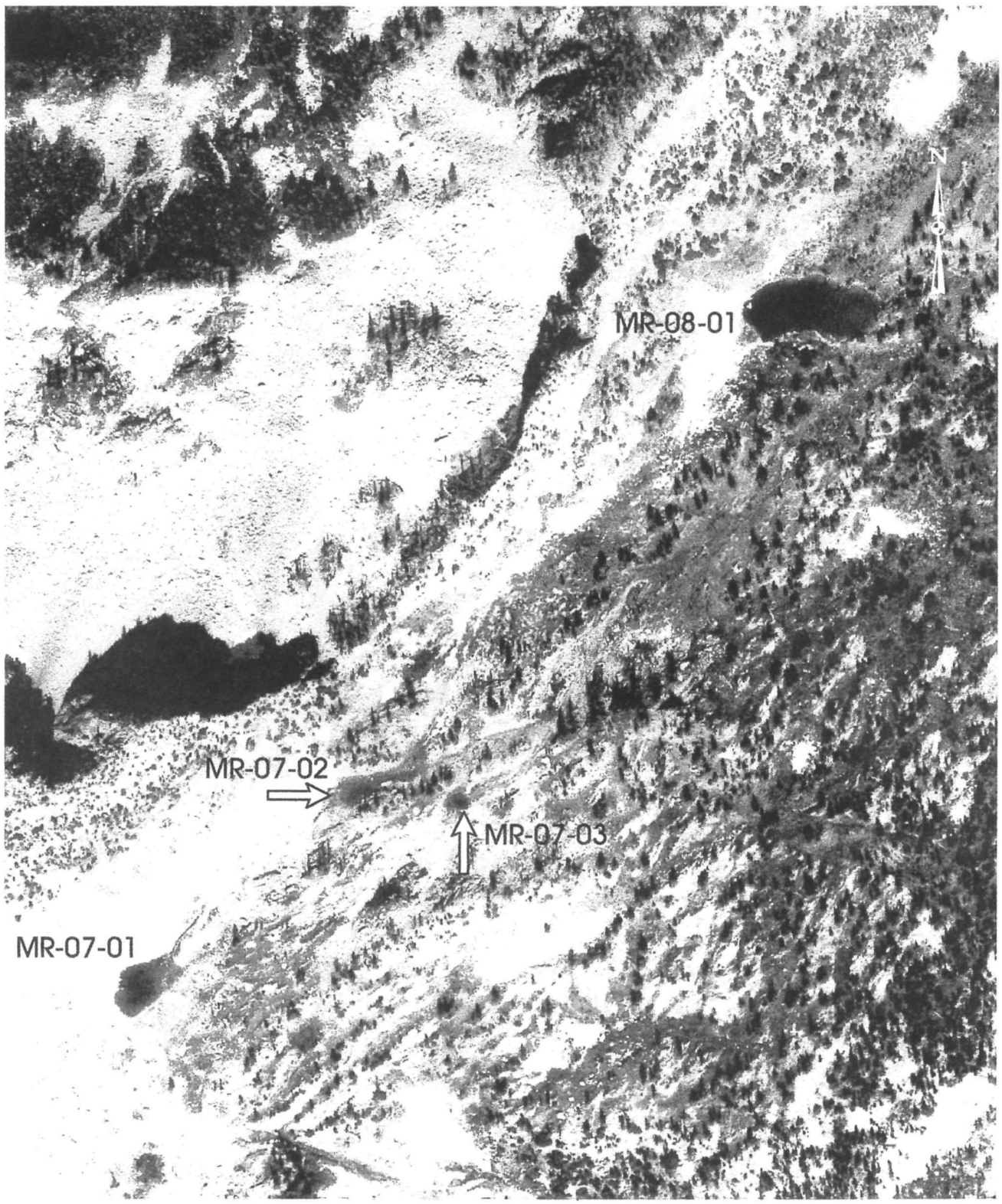


Figure A20. 1998 amphibian survey sites ponds MR-07-'s, and MR-08-'s on ridge southeast of Kettling Lakes in the Bridge Creek watershed.

Figure A21. 1998 amphibian survey site unnamed lake MR-11-01 on Rainbow Ridge in the Rainbow Creek watershed.

Figure A22. 1998 amphibian survey site Upper Dee Dee Lake MR-15-01in upper Rainbow Ck watershed.

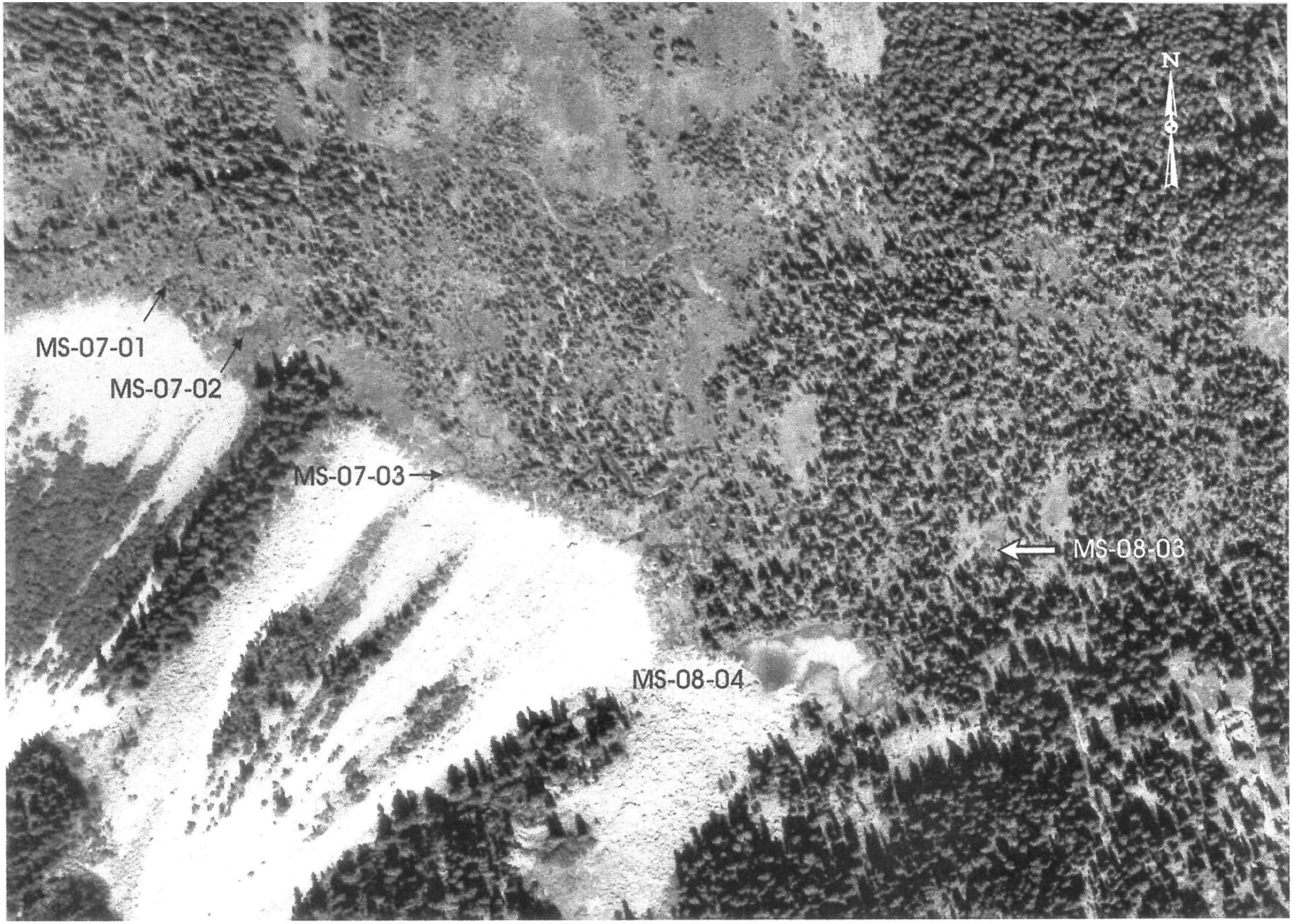


Figure A23. 1998 amphibian survey sites Upper Perry Creek ponds MS-07-'s and MS-08-'s in theLittle Beaver Creek watershed..

Figure A24. 1998 amphibian survey sites Skymo Lake PM-03-01 and ponds PM-02-01 and PM-03-02 in the Skymo Creek watershed.

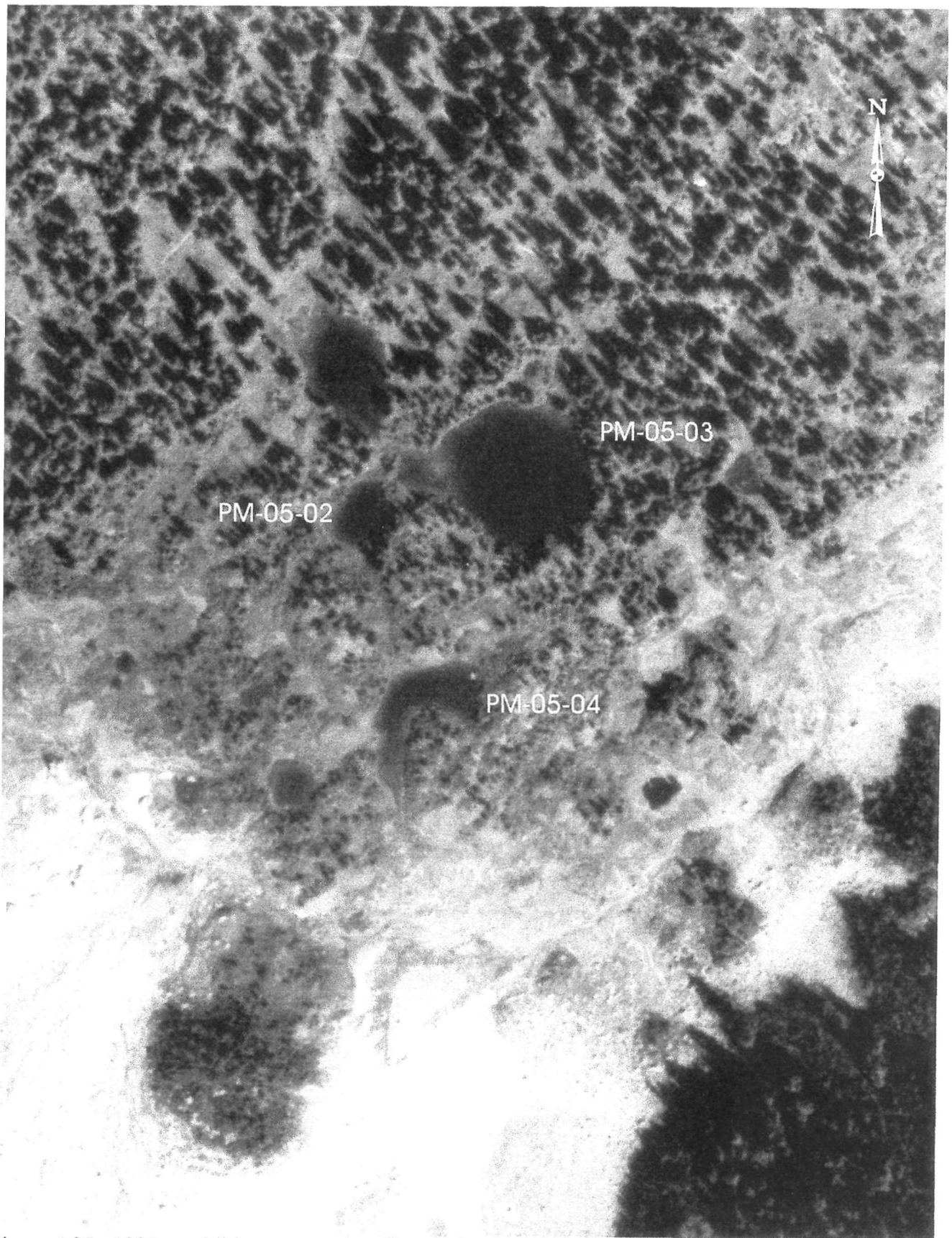


Figure A25. 1998 amphibian survey sites Skymo Creek ponds PM-05-02, -03, -04 in Skymo Creek/ west Ross Lake watershed.

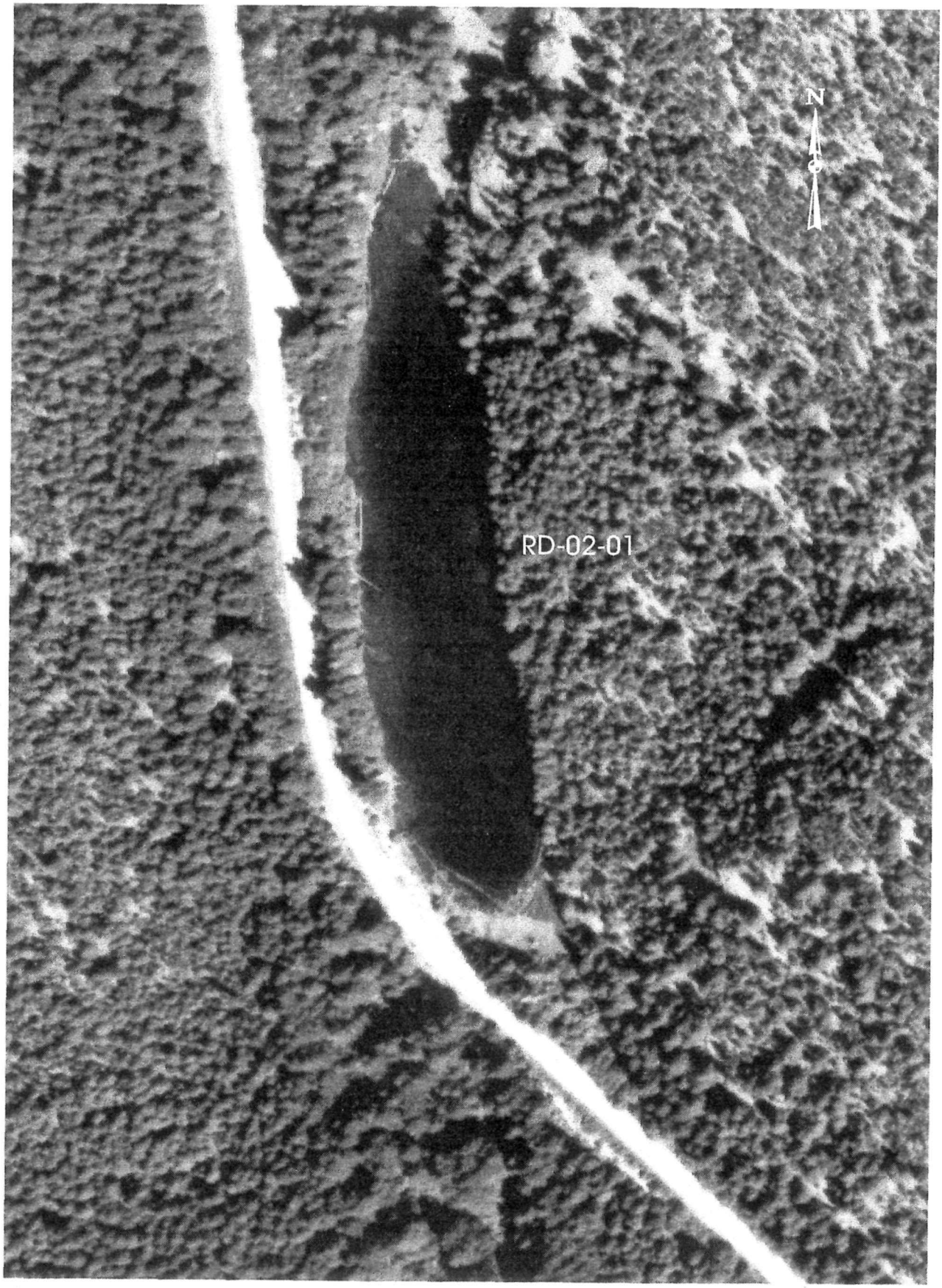


Figure A26. 1998 amphibian survey site Thunder Lake RD-02-01, SR 20, Skagit River watershed.

Figure A27. 1998 amphibian survey site Juanita Lake SM-01-01 in upper Four Mile Creek watershed, northeast Lake Chelan.

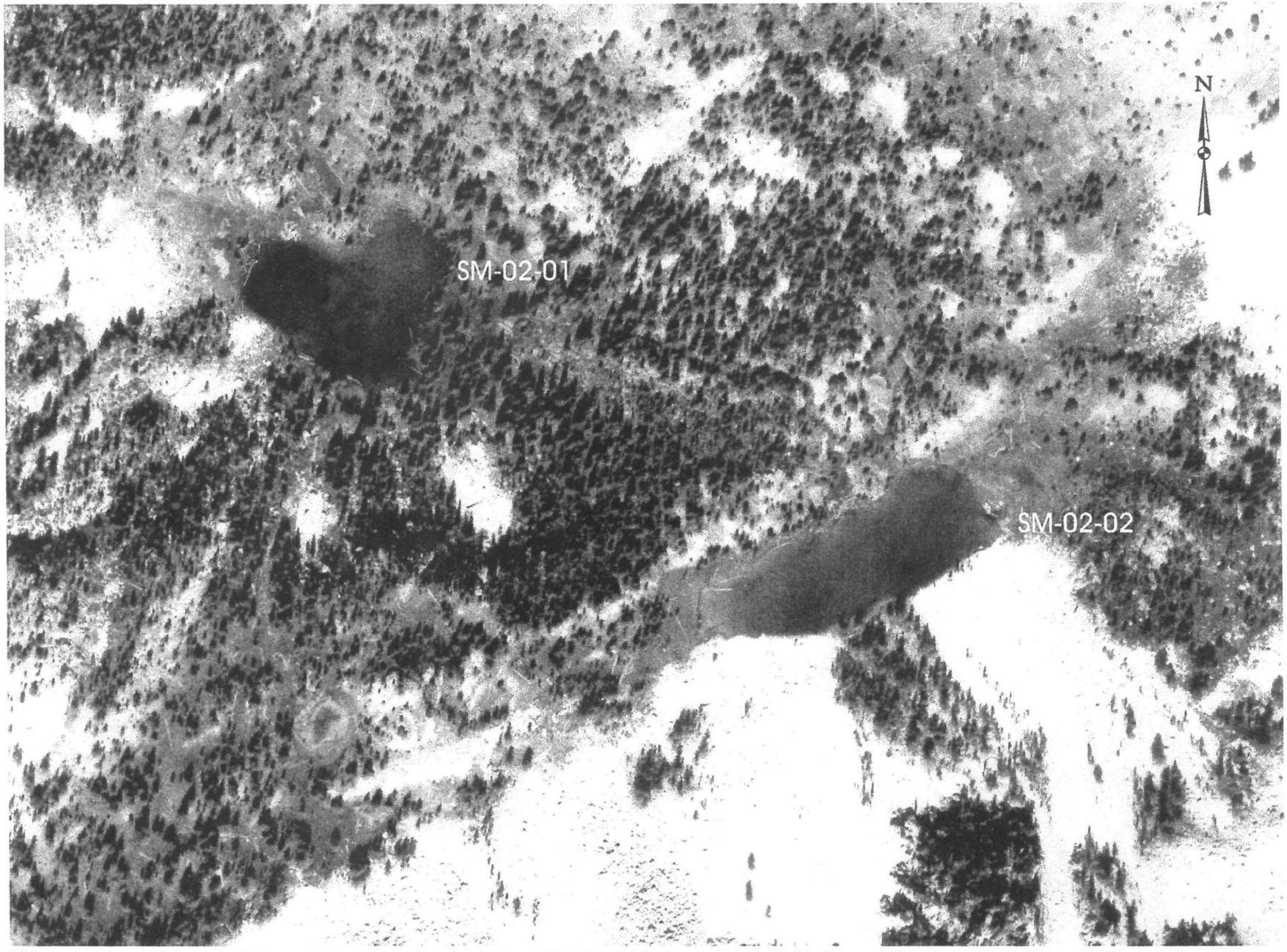


Figure A28. 1998 amphibian survey sites Triplet Lakes SM-02-01(lower), SM-02-02 (upper) headwaters of Four Mile Creek northeast of Lake Chelan..

ATTACHMENTS

ATTACHMENT 1

AMPHIBIAN SURVEY PHOTO LOG FORM Page ______

Day	Month	Year	Roll No.	Pict. No.	Segment No.	Reach No.	Stream M	Pond No.	* Subject:

*Subject - take photos looking upstream and downstream at minimum of Stream M 000, 050, and 100 at each reach, and include locational information in the subject box. Take other photos sufficient to document different habitat types, pond and stream, riparian vegetation, species collected, reference location benchmarks.

ATTACHMENT 2

LAKE/POND AMPHIBIAN SURVEY DATA FORM 3b - NOCA

Page ____ of ____

SHORELINE VISUAL SEARCH (entire shoreline or 100m , whichever is less)

R. Glesne June 1996

Drainage Name:		Lake/Pond Name:	NOCA Lake Code:		Day	Month	Year
UTM-N		USGS Quad Map Name:	Observers:	Recorder:			
UTM-E							

Start Time _____ Finish Time ______ Total Meters _______ Night or Day (circle one) No. of People ______

Species Observation Tally											
Species	Age	Bank	Sand	Silt	Gravel	Cobble	Bould.	edrock	Veg	Litter	CWD

Individual Capture Data											
Cap No.	Species	Age	Sex	Total th (mm	SVL (mm)	Head Width	HL (mm)	FL (mm)	ENV	Posit	Subst

Age	Environment
A-adult	W- In water
L-larvae	E - edge of wat
T-tadpole	B - on bank
M-metamorph	
N-neotene	**Substrate**
U-unknown	Sd-sand
	St-silt
	Gr-gravel
	Cb-cobble
Position	Bd-boulder
N-on	Br-bedrock
U-under	Veg-vegetation
I - in	Lt-litter
S-suspended	CWD-Woody d

ATTACHMENT 3

LAKE/POND AMPHIBIAN SURVEY DATA FORM 3a - NOCA

Page ____ of ____

R. Glesne June 1996

Drainage Name:		Lake/Pond Name:		NOCA Lake Code:		Day	Month	Year
UTM-N		USGS Quad Map Name:		Observers:		Recorder:		
UTM-E								

Survey Start Time:	Survey End Time:	Clouds:	Precipitation:	Wind:	Comments:

No of inlets: _____ Type of inlets (indicate -glacial, clear permanent, clear ephemeral) : _____ Size _____ acres or hectares

Air Temp:_____ C or F Water Temp:_____ C or F Aspect _____ Elevation: _____ m or ft (circle one) Max Depth _____ m %Littoral _____

Lake Type (check one):			Fish Species Present:		
Beaver Pd		Other (describe)	Species	Size	Abund
Oxbow					
Bog					
Marsh					
Glacial Scour					
Morraine					
Landslide dam					

Species Codes: RBT-rainbow trout, CUT-cutthroat, BKT-brook trout, GOT-golden trout, DV/BT-dolly varden/bull trout, UNK-unknown

Size Class: FRY- less than 3 inches in total length, FGL (fingerling) - 3 to 6 in., SA (subadult) - >6 and < 10 in., AD (adult) - 10 inches or greater.

Abundance: LOW - less than 10 fish observed, MOD - 10 to 20, HGH - greater than 20.

Littoral Zone Substrate (indicate % of total shoreline distance):

Sand ____ Silt ____ Gravel ____ Cobble ____ Boulder _____ Bedrock ___ Veg ___ Litter ____ CWD ____

LAKE/POND MAP

illustrate: lake outline, littoral zone, substrate types, sampling transects, inlets and type, outlet, trap locations, riparian vegetation, and geological conditions (ie. talus slopes, bedrocks, avalanche chutes etc.).

ATTACHMENTS 4

LAKE/POND AMPHIBIAN SURVEY DATA FORM 3d - NOCA Page ____ of ____

TRAPPING DATA COLLECTION FORM (6 traps per pond, set overnight)

R. Glesne June 1996

Drainage Name:		**Lake/Pond Name:**	**NOCA Lake Code:**	Day	Month	Year
UTM-N		**USGS Quad Map Name:**	**Observers:**	**Recorder:**		
UTM-E						

TRAP CAPTURE SUMMARIES

Transect 1			Transect 1			Transect 1			Transect 1			Transect 1			Transect 1		
Species	Age	No.	Species	Age	No.	Species	Age	No.	Species	Age	No.	Species	Age	No.	Species	Age	No.

TRAP LOCATION AND EFFORT DATA

	Date In	Time in	Date out	Time out	Total Hrs	Depth (m)	Substr type	Location of Trap (use compass headings and locate on Form 3a map):
TRAP 1								
TRAP 2								
TRAP 3								
TRAP 4								
TRAP 5								
TRAP 6								

Individual Capture Data

Trap No.	Cap No.	Species	Age	Sex	Total lgth (mm	SVL (mm)	Head Width	HL (mm)	FL (mm)	ENV	Posit	Subst

Age
- A-adult
- L-larvae
- T-tadpole
- M-metamorph
- N-neotene
- U-unknown

Position
- N-on
- U-under
- I - in
- S-suspended

Environment
- W- in water
- E - edge of water
- B - on bank

Substrate
- Sd-sand
- St-silt
- Gr-gravel
- Cb-cobble
- Bd-boulder
- Br-bedrock
- Veg-vegetation
- Lt-litter
- CWD-Woody deb

ATTACHMENT 5

AMPHIBIAN SURVEY: CAPTURE DATA - R.B. Bury & D.J. Major, NBS, Corvallis, OR 1996

Page ___ of ___

Site Name	T S P	Site Number	Day	Month	Year	Method	Recorder

Stream M /Object	Cap Num	Species	Age	Sex	Total Length (mm)	SVL / Head width (mm)	HL (mm)	FL (mm)	Env	Position	Substrate	Cover Size (cm) L x W
												x
												x
												x
												x
												x
												x
												x
												x
												x
												x
												x
												x
												x
												x
												x
												x
												x
												x

Age
A - adult
L - larvae
T - tadpole
M -metamorph
N - neotene
U - unknown

Environment
R - riffle
P - pool
Z - splash zone
S - seep
B - bank/soil

Position
N - on
U - under
I - in
S - suspended

COMMENTS:

Substrate
1 - Silt/Clay
2 - Fine sand (1 mm)
3 - Coarse sand (1-2 mm)
4 - Gravel 1 (3-4 mm)
5 - Gravel 2 (5-8 mm)
6 - Gravel 3 (9-16 mm)
7 - Gravel 4 (17-32 mm)
8 - Pebble (33-64 mm)
9 - S Cobble (65-160 mm)
10 - L Cobble (161-256 mm)
11 - Boulder (>256 mm)
12 - Wood
13 - Bark
14 - Soil
15 - Vegetation
16 - Leaf litter

ATTACHMENT 6

STREAM AMPHIBIAN SURVEY DATA FORM 1a - NOCA

Page ____ of ____

R Gresne June 1996 (Modified from B.Bury and D. Major, NBS, Corvallis, OR Ver. May 1996)

Drainage Name:		Stream Name:		NOCA Segment No.	Reach No.	Day	Month	Year
UTM-N		USGS Quad Map Name:		Observers:		Recorder:		
UTM-E								

Survey Start Time:	Survey End Time:	Clouds:	Precipitation:	Wind:	Comments and Description of Start Location:

Air Temp:_____ C or F Water Temp:_____ C or F Gradient (%) _____ 0m _____ 50m _____100m Aspect _____

Substrate (Use sample width of .3 m for streams < or = 5 m wide; sample width of .5 m for 5 to 10 m wide; and 1m width for streams > 10 m wide)

Stream M _____			Stream M _____			Stream M _____			Stream M _____			Stream M _____		
Bkfull Width _____ m			Bkfull Width _____ m			Bkfull Width _____ m			Bkfull Width _____ m			Bkfull Width _____ m		
Start Bank L R			Start Bank L R			Start Bank L R			Start Bank L R			Start Bank L R		
Dist. m	Dom.	SDom	Dist. m	Dom.	SDom	Dist. m	Dom.	SDom	Dist. m	Dom.	SDom	Dist. m	Dom.	SDom

Stream M	Wet Width (m)	Bnkfull Width (m)	Depth (cm)			Flow Velocity (mps)			Habitat Type (%)							Instream Cover %		
			L	M	R	L	M	R	Obsc	Cascd	Riffle	Pool	Tailout	Subsrf	Wetld	CWD	OD	UB

Stream M	Canopy Cover (dots counted)					Substrate					Subst. Int. W	Comments
	Up	Dwn	Left	Right	Ave %	Dom	DCnt	Sdom	SCnt	Total		

ATTACHMENT 7

RIPARIAN VEGETATION

(RECORD FOR BOTH BANKS AT STREAM M = 000, 050, 100)

Stream Name _____ W.R.I.A. _____
Basin Name _____ Segment # _____
Reference Point # _____ Survey Date _____
Stream Bank _____ Start Date _____
Recorder _____ End Date _____
(All estimates are for the first 20 meters on each bank.) Affiliation NOCA _____

OVERSTORY SPECIES (% OF EACH)				OVERSTORY CANOPY CLOSURE (AS SEEN FROM SATELLITE)		OVERSTORY SIZE CLASS (DIAMETER MEASURED AT BREAST HEIGHT DBH)	%
ROCK, SPARSE VEG.		MOUNTAIN HEMLOCK					
SNOW/ICE		WESTERN RED CEDAR		0 TO 20%		0 TO 3.9"	
HERB MEADOW		ALASKA YEL. CEDAR		21 TO 40%		4 TO 7.9"	
HEATHER		LODGEPOLE PINE		41 TO 60%		8 TO 20.9"	
SITKA ALDER		PONDEROSA PINE		61 TO 80%		21 TO 31.9"	
RED ALDER		WESTERN WHITE PINE		81 TO 100%		32 TO 47.9"	
BIG LEAF MAPLE		WHITE BARK PINE				> 48"	
BLACK COTTONWOOD		LARCH		PRIMARY GROUND COVER (% OF EACH)			
SUBALPINE FIR		SITKA SPRUCE					
PACIFIC SILVER FIR		ENGELMANN SPRUCE					
DOUGLAS FIR		YEW					
WESTERN HEMLOCK							

UNDERSTORY SPECIES (% OF EACH)				UNDERSTORY CANOPY CLOSURE (AS SEEN FROM SATELLITE)		UNDERSTORY SIZE CLASS (DIAMETER MEASURED AT BREAST HEIGHT DBH)	
ROCK, SPARSE VEG.		MOUNTAIN HEMLOCK					
SNOW/ICE		WESTERN RED CEDAR		0 TO 20%		0 TO 3.9"	
HERB MEADOW		ALASKA YEL. CEDAR		21 TO 40%		4 TO 7.9"	
HEATHER		LODGEPOLE PINE		41 TO 60%		8 TO 20.9"	
SITKA ALDER		PONDEROSA PINE		61 TO 80%		21 TO 31.9"	
RED ALDER		WESTERN WHITE PINE		81 TO 100%		32 TO 47.9"	
BIG LEAF MAPLE		WHITE BARK PINE				> 48"	
BLACK COTTONWOOD		LARCH		PRIMARY GROUND COVER (% OF EACH)			
SUBALPINE FIR		SITKA SPRUCE					
PACIFIC SILVER FIR		ENGELMANN SPRUCE					
DOUGLAS FIR		YEW					
WESTERN HEMLOCK							

ATTACHMENT 8

STREAM AMPHIBIAN SURVEY DATA FORM 1b - NOCA

Page ____ of ____

R. Giesne June 1996 (Modified from B.Bury and D. Major, NBS, Corvallis, OR Ver. May 1996)

Drainage Name:	Stream Name:	NOCA Segment No.	Reach No.	Day	Month	Year

		USGS Quad Map Name:	Observers:	Recorder:
UTM-N				
UTM-E				

Survey Start Time:	Survey End Time:	Clouds:	Precipitation:	Wind:	Comments and Description of Start Location:

MAP HABITAT TYPES, LOGS, UNDERCUT BANKS, BOULDERS, overhanging vegetation

SUMMARY

Stream M: ______

R.Bank (looking downstr)														**L.Bank**

Scale - 1 block = ______ meters

Start: ______		**Stop:** ______	
Species	**Sex**	**Stage**	**No.**

Stream M: ______

R.Bank (looking downstr)														**L.Bank**

Scale - 1 block = ______ meters

Start: ______		**Stop:** ______	
Species	**Sex**	**Stage**	**No.**

Stream M: ______

R.Bank (looking downstr)														**L.Bank**

Scale - 1 block = ______ meters

Start: ______		**Stop:** ______	
Species	**Sex**	**Stage**	**No.**

Stream M: ______

R.Bank (looking downstr)														**L.Bank**

Scale - 1 block = ______ meters

Start: ______		**Stop:** ______	
Species	**Sex**	**Stage**	**No.**

Stream M: ______

R.Bank (looking downstr)														**L.Bank**

Scale - 1 block = ______ meters

Start: ______		**Stop:** ______	
Species	**Sex**	**Stage**	**No.**