NOCA NRPP Amphibian Inventory
Bridge Creek Watershed
1997 - Progress Report

Ronald E. Holmes and Reed S. Glesne

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

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ABSTRACT

The 1997 amphibian inventory in Bridge Creek watershed was funded 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. This report presents methods and data collected during the 1997 field season in Bridge Creek watershed, and an update on frogs of Big Beaver valley.

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*.

Table of Contents

List of Figures

List of Tables

NOCA NRPP Amphibian Inventory
Bridge Creek Watershed
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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 (1997) 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, Northern Red-legged frog *Rana aurora aurora*, and Cascades frog *Rana cascadae* as a federal candidates and the Columbian Spotted Frog as a 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. This study, conducted from 1989-1993, documented three salamanders: *Ambystoma*

macrodactylum in both east and west slope lakes, *Ambystoma gracile*, and *Taricha granulosa* only in west slope lakes. In addition, four Anuran amphibians were found: *Bufo boreas* in both east and west slope lakes, *Hyla regilla* west slope, *Ascaphus truei* both east and west, and *Rana luteiventris* in east only.

In 1991 a Stehekin Valley Vertebrate Inventory (east slope) 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 (west slope). 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 an arthropod study using pitfall traps was initiated 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, Pseudacris (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 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.

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, Pseudacris regilla, Rana aurora, Rana cascadae, Rana (pretiosa) 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. The objectives of this report are to only present methods and data collected

during the 1997 field season in Bridge Creek watershed. Relationships between species distributions and environmental attributes will be analyzed in the final report following the last field season of this four year study.

STUDY AREA

Bridge Creek watershed is a pristine natural area located in the northwestern portion of Washington State on the east slope of the North Cascade Mountain Range (Figure 1). The crest of this mountain range runs along the northern boundary of Bridge Creek watershed. A total of 28 stream reaches, 6 seep sites, and 15 lake/ponds were sampled during 1997. Specific sampling locations are shown in Figure 2, Appendix Tables A1 to A3, and Appendix Figures A1 to A12. The entire Bridge Creek watershed encompasses approximately 23,800 hectares. Approximately 20,000 hectares including the tributary drainages of North Fork, Grizzly, Maple, South Fork, McAlester, and East Fork Creeks are within NOCA boundaries. The headwaters of Bridge, State, and Copper Creeks (3,800 ha) between Rainy and Washington Pass lie just outside the Park boundary (Figure 2).

The elevation of the study area ranges from 475 m on the southwest where Bridge Creek flows into the Stehekin River to 2805 m at the summit of Goode Mountain on the western boundary of the watershed. The Stehekin River flows into Lake Chelan which drains into the Columbia River. Within the Bridge Creek watershed there are 288 km of streams represented on the USGS 7.5' topographical maps and 45 lake/ponds of which 34 are on the USGS maps and an additional 11 which were mapped from aerial photos and field visits. Still more areas of small seeps and wetlands were encountered in the 1997 field season. Some of these were included in our survey and subsequently included in NOCA GIS and databases. Streams range from first order headwaters to fourth order mainstem of lower Bridge Creek. Most reaches sampled were in first and second order streams with five third order reaches sampled and one fourth order reach.

The climate in Bridge Creek watershed is determined by general weather patterns in the North Cascades, which are modified by topographic features in and around the valley. 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 a rainshadow effect for Bridge Creek. U.S. Weather Bureau data shows a moisture gradient within the valley, with the west end receiving more moisture than the east end. Based on records from nearby weather stations rainfall is estimated to range from approximately 150 cm in the eastern end of the valley to 250 cm in the western end of the watershed.

The bedrock geology of the Bridge Creek watershed is composed Primarily late Cretaceous and early Tertiary metamorphic and granitic rocks of the Chelan Mountains terrane. Grizzly and North Fork creeks on the west end of the watershed are composed of Skagit Gneiss. In the central watershed a band of Gabriel Peak Orthogneiss runs north - south through South Fork and Maple creeks. Dominating the geology of the eastern end of the watershed in East Fork and McAlester creeks is the granodioiritic Black Peak Batholith (Misch 1966).

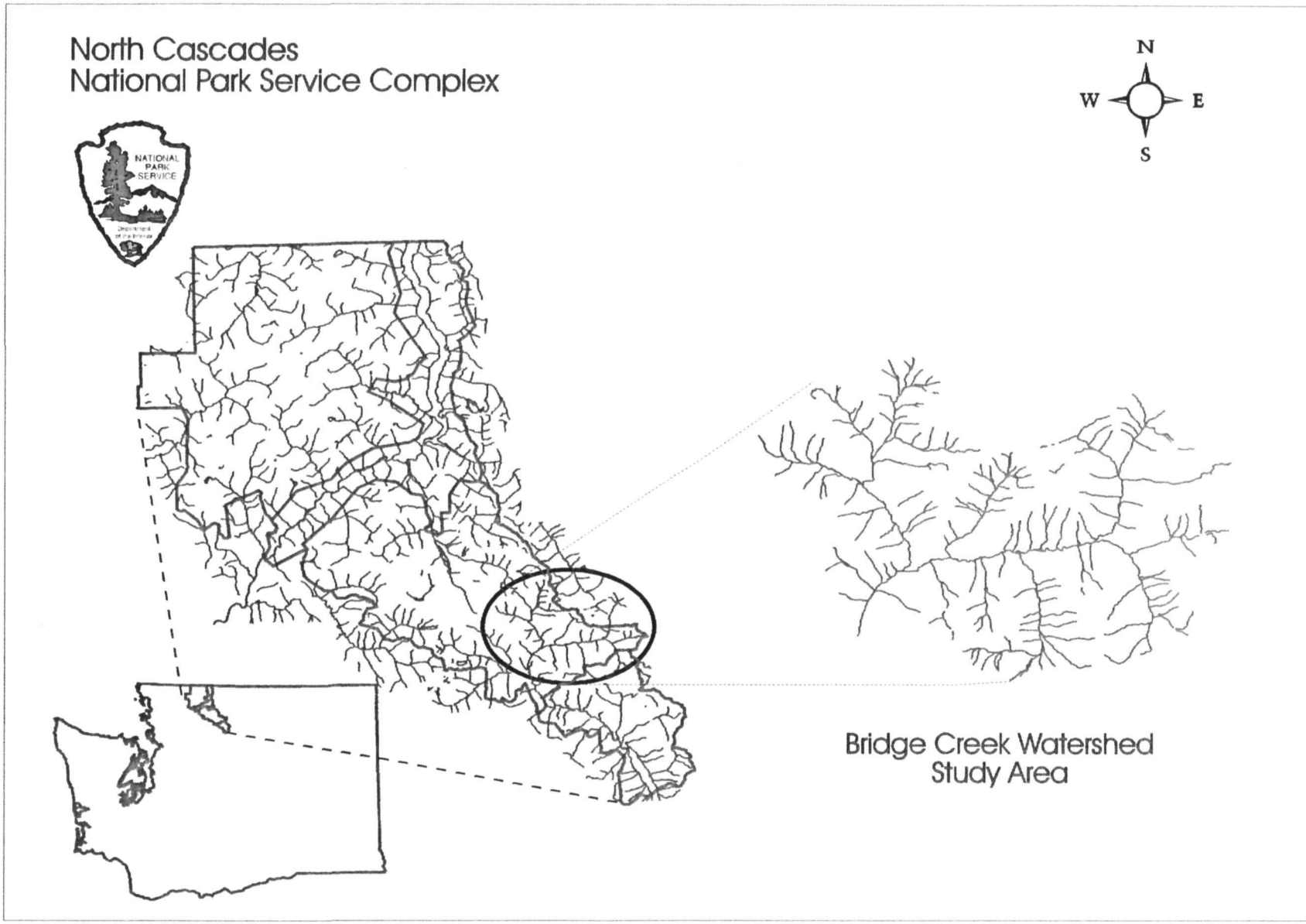

Figure 1. Location of the Bridge Creek study area in North Cascades National Park Service Complex, and Washington state.

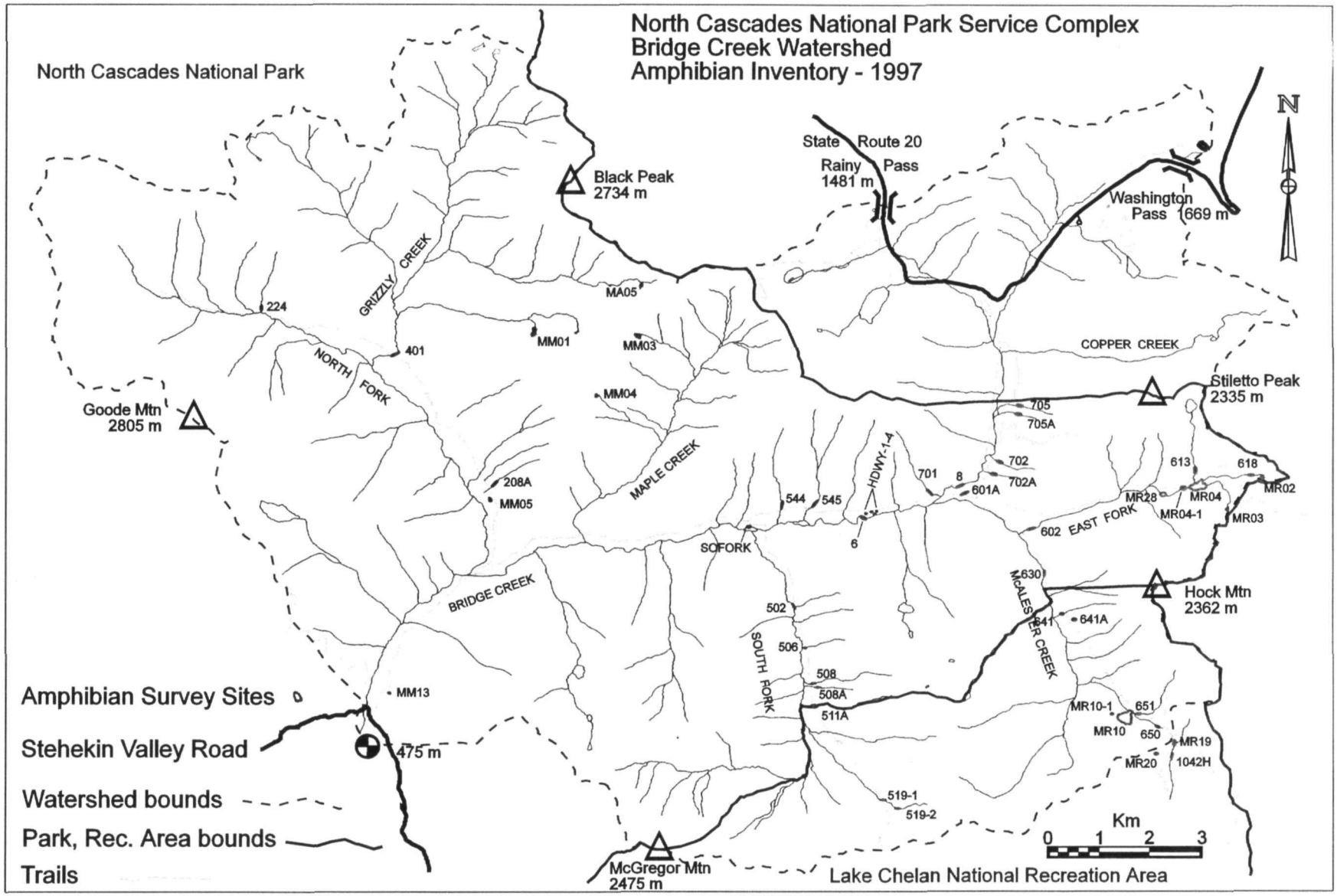

Figure 2. Bridge Creek watershed with amphibian survey sites - 1997, North Cascades National Park Service Complex, Washington.

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 to Bridge Creek 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).

Bridge Creek watershed 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*), Sitka alder (*Alnus sinuata*), Douglas' maple (*Acer glabrum* var. *douglasii*), Sitka willow (*Salix sitchensis*), and a few Big-leaf maple (*Acer macrophyllum*).

The 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*), and several Blueberry and Huckleberry species (*Vaccinium* spp.)

The stream reaches surveyed ranged in elevation from 927 meters at a lower North Fork tributary to 1817 meters at headwater of Rainbow Creek (just outside Bridge Creek watershed), and 1768 meters at the inlet to McAlester Lake (Appendix Table A1). Average gradients of these reaches ranged from 1% to 28%. Average wetted width ranged from 0.8 m in first order headwaters to 14.5 m in fourth order mainstem of Bridge Creek (Table 1). The dominant substrates were quite varied from boulder to sand as were subdominants (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 2% at headwaters of South Fork (site # 519-2) (alpine meadow) to 96% at Bridge Creek tributary (site # 702A) through an even-aged mature forested slope (Table 3). Bank stability as measured using a method developed by Pfankuch (1974) showed most reaches (23) in the good range, four were rated fair (Table 4). 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 5). Water temperature in streams at time of surveys ranged from 37° to 58° F. Stream pH ranged from 5.64 at a tributary of South Fork (site # 508) to 7.12 at a tributary of North Fork (site # 208A) and conductivity from 8.2 to 75.6 uS/cm (Table 6).

A total of 6 individual seeps were sampled at three different locations near Hideaway and South Fork camps and South Fork tributary (Figure 2, Table A2). These sites ranged in elevation from 969 meters at South Fork Camp (site # SOFORK) to 1109 meters at seep off South Fork trail (site # 506). Water temperature at these seeps ranged from 41° F at (site # 506) on 7/8/97 to 45° F (site # HDWY-2) on 7/2/97. The pH of seeps where water samples were collected ranged from

5.61 at South Fork camp (site # SOFORK) to 6.69 at the seep off South Fork trail (site # 506). Descriptive data for seeps are shown in Tables 7 and 8.

A total of 13 ponds and 2 lakes were surveyed for amphibians. These 15 bodies of water were sampled using the same techniques so were lumped into a single lake/pond category. The two which are referred to as lakes were so designated based on greater depth, size, and permanence of landform creating impoundment. Physical and chemical data for lake/ponds are found in Tables 9 and 10. These bodies of water ranged in size from 0.1 acre upper Woody Creek pond (MA05) to 12.5 acres McAlester Lake (MR10). The range of elevations for the lake/pond sites was from 777 m at pond near lower Bridge Creek trailhead (MM13) to 1932 m at upper Maple Creek pond (MM04). Fish presence was noted in four of the 15 lake/ponds. The pH of all lake/ponds ranged from 4.58 at pond near lower Bridge Creek trailhead (MM13) to 7.07 at Falls Creek headwater pond (MM01). The water temperature of the lake/ponds ranged from 39° F at Twisp Pass pond (MR03) on 7/15/97 to 70° F at pond near lower Bridge Creek trailhead (MM13) on 8/14/97.

TABLE 1. STREAM WIDTH, DEPTH, VELOCITY, & GRADIENT SUMMARY

NOCA - AMPHIBIAN SURVEY BRIDGE CREEK - 1997

SITE NUMBER	REACH NUMBER	SURVEY DATE	WETTED WIDTH METERS	BANKFUL WIDTH METERS	AVG. DEPTH CM	AVG. VELOCITY MPS	AVG. GRADIENT %	STREAM ORDER
6	1	9/8/97	14.5	16.5	33	2.9	2	4
8	1	9/5/97	9.7	11.3	33	3.4	3	3
224	1	8/12/97	0.8	0.8	4	0.7	10	1
401	1	8/12/97	9.4	12.5	24	3.1	4	3
502	1	9/9/97	5.9	7.6	26	1.4	2	3
508	1	7/10/97	1.4	1.7	9	1.2	7	1
519	1	7/9/97	6.8	5.0	44	2.5	1	1
519	2	7/9/97	1.4	1.4	10	1.1	3	1
544	1	7/1/97	1.8	2.5	10	1.4	19	1
545	1	6/26/97	4.5	4.6	17	3.3	13	2
602	1	9/2/97	2.9	3.3	15	1.0	8	3
613	1	8/20/97	1.2	1.2	13	0.6	17	1
618	1	7/15/97	1.4	1.5	7	0.6	15	1
630	1	9/10/97	6.0	6.6	20	2.0	5	3
641	1	9/4/97	1.0	1.0	5	0.7	7	1
650	1	7/31/97	1.1	1.2	12	0.4	10	1
651	1	7/31/97	1.9	2.1	17	2.3	2	1
701	1	7/2/97	0.8	1.1	4	0.6	10	1
702	1	7/23/97	1.1	1.5	6	2.0	19	1
705	1	9/3/97	1.5	1.7	7	0.6	21	1
1042H	1	7/29/97	1.3	1.3	12	1.3	3	1
208A	1	8/13/97	1.3	1.5	7	1.0	10	1
508A	1	7/10/97	1.1	1.1	7	0.7	6	1
511A	1	7/10/97	1.7	2.6	6	0.9	14	1
601A	1	6/27/97	1.6	1.9	8	0.5	3	1
641A	1	9/7/97	1.4	1.6	7	1.8	10	1
702A	1	7/23/97	1.1	1.5	4	0.6	28	1
705A	1	9/3/97	1.1	1.3	5	1.0	21	1

TABLE 2. STREAM SUBSTRATE DESCRIPTION AVERAGE - SUMMARY

NOCA - AMPHIBIAN SURVEY BRIDGE CREEK - 1997

SITE NUMBER	REACH 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
6	1	9/8/97	B	0.82	B	0.55	LC	0.47	B	0.30
8	1	9/5/97	B	0.78	LC	0.28	B	0.41	LC	0.30
224	1	8/12/97	P	0.61	SC	0.30	P	0.58	LG	0.38
401	1	8/12/97	B	0.61	LC	0.29	SC	0.50	SC	0.27
502	1	9/9/97	P	0.49	P	0.26	LG	0.37	P	0.24
508	1	7/10/97	MG	0.53	LG	0.27	SG	0.56	SG	0.28
519	1	7/9/97	SD	0.56	VEG	0.26	SG	0.54	VEG	0.23
519	2	7/9/97	SD	0.70	SD	0.47	SG	0.45	P	0.28
544	1	7/1/97	LC	0.60	B	0.38	SC	0.53	P	0.28
545	1	6/26/97	B	0.63	LC	0.24	SC	0.45	P	0.28
602	1	9/2/97	LC	0.40	LG	0.24	WD	0.35	P	0.26
613	1	8/20/97	B	0.58	B	0.45	SC	0.51	SC	0.29
618	1	7/15/97	B	0.60	SC	0.34	SG	0.50	SG	0.34
630	1	9/10/97	B	0.57	LC	0.35	P	0.43	SC	0.24
641	1	9/4/97	SG	0.58	LL	0.40	LL	0.61	ST	0.46
650	1	7/31/97	VEG	0.87	B	0.80	VEG	0.82	VEG	0.66
651	1	7/31/97	SC	0.55	P	0.28	P	0.53	P	0.24
701	1	7/2/97	B	0.67	P	0.37	P	0.57	LG	0.39
702	1	7/23/97	LL	0.55	B	0.42	VEG	0.45	LG	0.35
705	1	9/3/97	SC	0.48	P	0.20	P	0.37	SC	0.22
1042H	1	7/29/97	SC	0.61	LC	0.36	P	0.48	MG	0.33
208A	1	8/13/97	P	0.51	LC	0.26	P	0.48	MG	0.28
508A	1	7/10/97	LL	0.73	LL	0.59	SD	0.79	SG	0.66
511A	1	7/10/97	LL	0.53	SD	0.48	SD	0.42	LL	0.34
601A	1	6/27/97	LL	0.55	SC	0.48	LL	0.65	P	0.44
641A	1	9/7/97	MG	0.61	SG	0.46	SG	0.65	SG	0.50
702A	1	7/23/97	LL	0.63	LG	0.50	SG	0.60	SG	0.50
705A	1	9/3/97	B	0.44	LG	0.24	LL	0.41	LG	0.28

SUBSTRATE KEY:

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

TABLE 3. STREAM HABITAT TYPE, INSTREAM & OVERSTORY COVER - SUMMARY

NOCA - AMPHIBIAN SURVEY BRIDGE CREEK - 1997

SITE			HABITAT TYPE %					INSTREAM COVER %			DENSIOMETER CANOPY COVER %				
SITE NUMBER	REACH NUMBER	SURVEY DATE	OBSC	CASCD	RIFFLE	POOL	TAIL-OUT	WOODY DEBRIS	ORGANIC DEBRIS	UNDER-CUT BANK	CANOPY AVERAGE	CANOPY UP STREAM	CANOPY DOWN STREAM	CANOPY LEFT	CANOPY RIGHT
6	1	9/8/97	0	19	81	0	0	0	0	0	10	2	0	16	19
8	1	9/5/97	0	0	100	0	0	1	0	0	38	30	19	34	68
224	1	8/12/97	0	5	85	5	5	3	1	0	60	57	65	48	72
401	1	8/12/97	0	0	100	0	0	7	1	0	31	28	20	31	46
502	1	9/9/97	0	0	70	25	5	11	1	13	60	59	49	70	63
508	1	7/10/97	0	0	89	6	6	8	9	22	84	84	85	80	89
519	1	7/9/97	0	0	100	0	0	11	0	20	21	13	16	25	29
519	2	7/9/97	0	0	100	0	0	10	15	50	2	2	0	5	2
544	1	7/1/97	0	32	58	10	0	1	4	10	11	10	3	17	14
545	1	6/26/97	0	50	50	0	0	3	3	30	12	5	1	18	22
602	1	9/2/97	0	0	81	19	0	19	11	15	87	84	83	90	91
613	1	8/20/97	0	40	50	10	0	13	4	15	58	54	56	55	65
618	1	7/15/97	0	20	52	28	4	2	12	15	37	30	30	51	36
630	1	9/10/97	0	15	72	6	7	6	1	0	60	53	48	60	78
641	1	9/4/97	0	0	100	0	0	13	27	20	81	81	72	81	89
650	1	7/31/97	0	25	30	45	0	0	0	15	22	23	14	13	37
651	1	7/31/97	0	0	94	6	0	5	1	45	35	38	28	41	34
701	1	7/2/97	0	9	86	5	0	9	8	35	95	97	90	98	94
702	1	7/23/97	0	54	37	5	0	0	37	0	84	82	85	88	81
705	1	9/3/97	5	25	54	16	0	18	21	40	91	93	85	94	93
1042H	1	7/29/97	0	11	89	0	0	0	3	76	26	20	7	27	49
208A	1	8/13/97	0	8	40	14	38	14	15	47	90	94	84	87	95
508A	1	7/10/97	0	0	90	5	5	2	53	35	86	85	79	90	92
511A	1	7/10/97	0	0	95	0	5	10	43	6	59	71	34	56	76
601A	1	6/27/97	0	0	60	40	0	10	42	0	77	89	56	77	86
641A	1	9/7/97	5	10	73	12	0	14	9	56	79	75	77	85	79
702A	1	7/23/97	0	28	68	5	0	0	61	35	96	97	93	97	96
705A	1	9/3/97	3	16	81	0	0	10	22	35	84	85	74	89	88

TABLE 4. STREAM CHANNEL STABILITY RATINGS (PFANKUCH 1975)

NOCA - AMPHIBIAN SURVEY BRIDGE CREEK- 1997

			Upper Banks				Lower Banks					Bottom						Total Scores			
Site Number	Reach	Date	Slope	Mass Wasting	Debris Jam Potential	Vegetative Banks	Channel Capacity	Bank Rock Content	Flow Deflectors	Cutting	Deposition	Rock Angularity	Brightness	Particle Packing	Stable Materials	Scouring Deposition	Aquatic Vegetation	**Grand Total**	Upper Total	Lower Total	Bottom Total
6	1	9/8/97	2	6	2	3	1	2	2	6	4	4	2	4	8	6	3	**55**	13	15	27
8	1	9/5/97	2	9	2	3	1	2	2	8	4	3	2	4	8	6	3	**59**	16	17	26
224	1	8/12/97	2	3	2	3	1	4	2	4	4	1	1	2	4	6	2	**41**	10	15	16
401	1	8/12/97	2	6	6	9	2	2	2	6	6	2	3	2	6	12	3	**69**	23	18	28
502	1	9/9/97	2	3	8	3	1	3	4	6	12	2	2	4	10	18	4	**82**	16	26	40
508	1	7/10/97	2	3	4	6	1	7	5	4	4	1	4	4	9	14	3	**71**	15	21	35
508A	1	7/10/97	2	3	4	6	1	8	4	4	4	1	3	4	8	12	2	**66**	15	21	30
511A	1	7/10/97	2	3	4	3	2	6	2	4	4	1	1	3	6	12	2	**55**	12	18	25
519	1	7/9/97	2	3	2	3	3	6	2	6	4	1	4	6	12	15	3	**72**	10	21	41
519	2	7/9/97	2	3	4	3	1	8	4	4	4	1	3	5	10	12	1	**65**	12	21	32
544	1	7/1/97	2	6	6	6	2	4	2	4	4	1	3	4	4	7	4	**59**	20	16	23
545	1	6/26/97	2	9	4	9	2	2	5	12	6	3	3	5	10	16	2	**90**	24	27	39
601A	1	6/27/97	2	3	5	9	1	4	2	4	4	1	1	2	4	6	3	**51**	19	15	17
602	1	9/2/97	2	7	6	6	1	3	4	4	10	2	3	4	6	12	3	**73**	21	22	30
613	1	8/20/97	2	3	8	3	1	2	2	4	4	1	1	2	8	12	3	**56**	16	13	27
618	1	7/15/97	2	3	4	3	1	2	2	4	4	1	1	2	4	6	1	**40**	12	13	15
630	1	9/10/97	2	3	6	6	1	2	4	8	8	3	2	5	10	18	3	**81**	17	23	41
641	1	9/4/97	2	3	6	6	2	6	4	4	4	1	3	8	14	18	3	**84**	17	20	47
650	1	7/31/97	2	3	2	3	2	4	2	4	4	2	1	2	4	6	1	**42**	10	16	16
651	1	7/31/97	2	6	6	5	1	6	6	6	8	3	3	7	12	18	4	**93**	19	27	47
701	1	7/2/97	2	6	8	3	1	5	4	4	4	2	1	5	12	15	4	**76**	19	18	39
702	1	7/23/97	2	3	4	6	2	2	2	4	4	1	2	4	4	6	3	**49**	15	14	20
702A	1	7/23/97	2	3	4	10	1	2	4	4	4	1	3	4	12	12	3	**69**	19	15	35
705	1	9/3/97	2	3	6	6	1	2	2	4	4	2	1	2	4	8	2	**49**	17	13	19
1042H	1	7/29/97	2	3	2	3	1	2	2	4	4	1	1	2	4	6	1	**38**	10	13	15
208A	1	8/13/97	2	3	6	3	2	4	4	4	4	1	3	2	8	18	1	**65**	14	18	33
641A	1	9/4/97	2	3	4	3	1	6	4	4	10	1	3	5	12	15	1	**74**	12	25	37
705A	1	9/3/97	2	3	4	8	2	4	5	4	4	2	1	4	8	12	1	**64**	17	19	28

GRAND TOTAL SCORE RANGE: [38 Excellent; 39 - 76 Good; 77 - 114 Fair; 115+ Poor]

TABLE 5. RIPARIAN VEGETATION - CANOPY COVERAGE & SPECIES

NOCA - AMPHIBIAN SURVEY - BRIDGE CREEK - 1997

SITE NUMBER	REACH	DATE	OVERSTORY % OVER STORY	OVERSTORY FIRST DOMINANT SPECIES	OVERSTORY SECOND DOMINANT SPECIES	UNDERSTORY % UNDER STORY	UNDERSTORY FIRST DOMINANT SPECIES	UNDERSTORY SECOND DOMINANT SPECIES	GENERAL FOREST DESCRIPTION CANOPY CLOSURE, AGE - STRUCTURE, TYPE
6	1	9/8/97	90	ABLA	PIEN	90	ALSI	WILL	CLOSED, YOUNG, EVEN-AGED, CONIFEROUS
8	1	9/5/97	90	ABLA	PIEN	90	ALSI	ABAM	CLOSED, MATURE, MIXED-AGE, CONIFEROUS
224	1	8/12/97	90	ALSI	WILL	90	ALSI	WILL	CLOSED, YOUNG, AVALANCHE THICKET
401	1	8/12/97	70	ABAM	PIEN	70	WILL	ABAM	CLOSED, YOUNG, EVEN-AGED CONIFEROUS
502	1	9/9/97	90	PIEN	ABLA	90	PIEN	ABLA	CLOSED, MATURE, MIXED-AGE, CONIFEROUS
508	1	7/10/97	60	PIEN	ABLA	80	ALSI	HEME	CLOSED, MATURE, MIXED-AGE, CONIFEROUS
508A	1	7/10/97	90	PIEN	ABLA	60	ALSI	VAME	CLOSED, YOUNG, EVEN-AGED, CONIFEROUS
511A	1	7/10/97	90	WILL	PIEN	70	ALSI	HEME	CLOSED, YOUNG, MIXED-AGE, MIXED FOREST
519	1	7/9/97	50	ABLA	PIEN	50	PHEM	ABLA	OPEN, MATURE,MIXED-AGE,CONIFEROUS
519	2	7/9/97	30	ABLA	PIEN	80	WILL	HEME	OPEN, MATURE, KRUMHOLZ, CONIFEROUS
544	1	7/1/97	30	WILL	PREM	50	HEME	WILL	OPEN, YOUNG, AVALANCHE CHUTE
545	1	6/26/97	10	ACGL	ACGL	90	WILL	COST	OPEN, YOUNG, AVALANCHE CHUTE
601A	1	6/27/97	70	ABAM	PIEN	30	ALSI	ABAM	OPEN, YOUNG, EVEN-AGED, CONIFEROUS
602	1	9/2/97	90	ABAM	PIEN	70	ALSI	HEME	CLOSED, MATURE, MIXED-AGE, CONIFEROUS
613	1	8/20/97	70	ABLA	PIEN	90	HEME	ALSI	CLOSED, MIXED-AGE, YOUNG, CONIFEROUS
618	1	7/15/97	50	ABLA	ABLA	70	HEME	ABLA	OPEN, EVEN-AGED,YOUNG, CONIFEROUS
630	1	9/10/97	90	ABLA	PIEN	70	ALSI	HEME	CLOSED, EVEN-AGED, MATURE, CONIFEROUS
641	1	9/4/97	90	PIEN	ABAM	90	HEME	SARA	CLOSED, EVEN-AGED, MATURE, CONIFEROUS
650	1	7/31/97	70	ABLA	TSME	90	PHEM	HEME	CLOSED, EVEN-AGED, YOUNG, CONIFEROUS
651	1	7/31/97	60	ABLA	PIEN	90	HEME	WILL	CLOSED, EVEN-AGED, YOUNG, CONIFEROUS
701	1	7/2/97	90	ALSI	ALSI	90	ALSI	ALSI	CLOSED, YOUNG, AVALANCHE THICKET
702	1	7/23/97	70	POBA	PSME	50	ALSI	ACGL	CLOSED, YOUNG,EVEN-AGED, MIXED FOREST
702A	1	7/23/97	90	THPL	PIEN	50	OPHO	THPL	CLOSED, EVEN-AGED, MATURE, CONIFEROUS
705	1	9/3/97	90	ABLA	PIEN	90	OPHO	HEME	CLOSED, MIXED-AGE, MATURE,CONIFEROUS
1042H	1	7/29/97	70	TSME	LAOC	80	PHEM	HEME	CLOSED, EVEN-AGED, MATURE, CONIFEROUS
208A	1	8/13/97	90	ALSI	COST	90	ALSI	COST	OPEN, YOUNG, EVEN-AGED, DECIDIOUS
641A	1	9/4/97	80	ABAM	PIEN	90	HEME	ABAM	CLOSED, EVEN-AGED, MATURE, CONIFEROUS
705A	1	9/3/97	90	ABAM	PIEN	70	ALSI	OPHO	CLOSED, EVEN-AGED, YOUNG, CONIFEROUS

PLANT SPECIES KEY:

ABAM SILVER FIR
ABLA SUB-ALPINE FIR
ACGL DOUGLAS MAPLE
ALSI SITKA ALDER
COST RED-OSIER DOGWOOD
HEME HERB MEADOW
LAOC MT LARCH
OPHO DEVIL'S CLUB
PHEM HEATHER
PIEN SITKA SPRUCE
POBA BLACK COTTONWOOD
PREM BITTER CHERRY
PSME DOUGLAS-FIR
SARA ELDERBERRY
THPL REDCEDAR
TSHE WESTERN HEMLOCK
TSME MOUNTAIN HEMLOCK
VAME BIG HUCKLEBERRY
WILL WILLOW

TABLE 6. CHEMICAL CHARACTERISTICS OF WATER AT STREAM SURVEY SITES

NOCA - AMPHIBIAN SURVEY BRIDGE CREEK - 1997

Site Number	Reach	Date	WATER TEMP	pH	CONDUCTIVITY (uS/cm)
6	1	9/8/97	50	6.56	38.0
8	1	9/5/97	47	6.52	33.0
224	1	8/12/97	58	6.84	45.9
401	1	8/12/97	45	6.61	19.4
502	1	9/9/97	47	6.14	20.2
508	1	7/10/97	42	5.64	10.5
508A	1	7/8/97	39	6.45	12.0
511A	1	7/10/97	38	6.40	14.4
519	1	7/9/97	43	6.49	11.1
519	2	7/9/97	43	6.45	11.5
544	1	7/1/97	49	6.36	13.8
545	1	6/26/97	43	6.75	21.9
601A	1	6/27/97	37	6.60	23.9
602	1	9/2/97	49	6.72	39.3
613	1	8/20/97	49	6.78	17.3
618	1	7/15/97	39	6.15	16.8
630	1	9/10/97	44	6.67	37.9
641	1	9/4/97	40	no	sample
650	1	7/31/97	50	6.16	8.2
651	1	7/31/97	39	6.15	14.3
701	1	7/2/97	46	6.56	22.0
702	1	7/23/97	47	6.62	37.9
702A	1	7/23/97	43	6.96	75.6
705	1	9/3/97	48	6.73	54.7
1042H	1	7/29/97	46	5.99	12.7
208A	1	8/13/97	55	7.12	62.4
641A	1	9/4/97	39.5	6.84	50.8
705A	1	9/3/97	47	7.07	55.8

TABLE 7. CHEMICAL CHARACTERISTICS OF WATER AT SEEP SURVEY SITES

NOCA - AMPHIBIAN SURVEY BRIDGE CREEK - 1997

SITE NUMBER	DATE	WATER TEMP	pH	CONDUCTIVITY (uS/cm)
HDWY-1	7/2/97	42	no	sample
HDWY-2	7/2/97	45	no	sample
HDWY-3	7/2/97	42	no	sample
HDWY-4	7/2/97	42	6.08	21.1
506	7/8/97	41	6.69	19.1
434A	9/25/97	no data	7	18.5
SOFORK	7/8/97	43	5.61	16.7

TABLE 8.

INTERMITTENT POOLS AND SEEPS DESCRIPTION

NOCA - AMPHIBIAN SURVEY BRIDGE CREEK - 1997

SITE		DEPTH	AREA	FLOW	COVER			CANOPY					SUBSTRATE
NUMBER	DATE	CM	M2	MPS	%CWD	%OD	%UB	UP STREAM	DOWN STREAM	LEFT	RIGHT	AVERAGE	DOMINANT/ SUBDOMINANT
HDWY-1	7/2/97	6	3	0	0	90	0	87	72	89	82	83	LL/LL
HDWY-2	7/2/97	7	12	0	30	80	0	85	78	86	82	83	LL/LL
HDWY-3	7/2/97	28	2	0	30	30	50	92	90	89	88	90	LL/B
HDWY-4	7/2/97	15	6	0	10	100	30	86	71	89	65	78	LL/ST
506	7/8/97	4	4	0.6	0	30	50	40	43	18	84	46	SD/W
434A	9/25/97	35	7	0	0	40	0						ST/LL
SOFORK	7/8/97	50	100	0.1	30	40	0	64	47	65	39	54	ST/LL

SUBSTRATE: B = BOULDER, SD = SAND, LL = LEAF LITTER, ST = SILT, W = WOOD

TABLE 9.
POND PHYSICAL CHARACTERISTICS AND FISH PRESENCE
NOCA - AMPHIBIAN SURVEY BRIDGE CREEK - 1997

SITE				SIZE	DEPTH		LAKE/POND	FISH			LITTORAL ZONE SUBSTRATE (% OF SHORELINE DISTANCE)								
NUMBER	DATE	# INLETS	INLET TYPE	ACRES	METERS	%LITTORAL	TYPE	SPECIES	SIZE	ABUND	%SAND	%SILT	%GRAVEL	%COBBLE	%BOULDER	%BEDROCK	%VEG	%LITTER	%CWD
MA04	9/24/97	5	CLEAR PERM	0.1	0.6	100	GLACIAL	0	0	0	30	30	30	0	0	10	0	0	0
MM-13	8/14/97	0	SUBTERR	0.6	1	100	GLACIAL	0	0	0	0	55	0	0	0	0	40	0	5
MM01	9/24/97	1	CLEAR PERM	1.5	2	100	GLACIAL	0	0	0	0	75	0	5	0	0	0	0	20
MM03	9/24/97	1	CLEAR PERM	1	2	100	MORRAINE	0	0	0	40	0	5	10	40	5	0	0	0
MM04	9/24/97	1	CLEAR PERM	0.2	1	100	GLACIAL	0	0	0	40	40	0	10	5	0	0	0	5
MM05	8/13/97	1	CLEAR PERM	0.7	4+	60	GLACIAL	0	0	0	0	50	0	0	5	0	30	0	15
MR-28	8/20/97	1	CLEAR PERM	1	1	100	MARSH	CUT	SA,FGL	LOW, HIGH	10	40	10	0	0	0	30	0	10
MR02	7/15/97	3	CLEAR EPHE	0.83	3	100	MORRAINE	0	0	0	0	70	0	0	10	0	0	10	10
MR03	7/15/97	0	CLEAR EPHE	0.35	4	100	MORRAINE	0	0	0	0	70	0	0	25	0	0	5	0
MR04	7/16/97	2	CLEAR PERM	9.2	4	100	LANDSLIDE	CUT	SA, FGL	HIGH	0	50	0	0	0	0	30	10	10
MR04-1	7/16/97	2	CLEAR PERM	1	1	100	MARSH	CUT	SA, FGL	HIGH	0	30	30	0	0	0	30	0	10
MR10	7/30/97	2	CLEAR PERM	12.5	7	10	GLACIAL	CUT	SA, FGL	HIGH, MOD	0	65	0	0	5	0	20	0	20
MR10-2	7/30/97	1	SUBTERR	0.25	1.5	100	LANDSLIDE	0	0	0	0	65	0	0	5	0	0	5	25
MR19	7/29/97	3	CLEAR PERM	0.25	1	100	MARSH	0	0	0	10	70	5	0	0	0	10	5	0
MR20	7/29/97	0	SUBTERR	0.25	1	100	GLACIAL	0	0	0	0	60	0	0	5	0	20	0	15

KEY: INLET TYPE

SUBTERR = SUBTERRANEAN
GLACIAL = INLET CONTAINS GLACIAL TILL
CLEAR PERM = CLEAR PERMANENT
CLEAR EPHE = EPHEMERAL

LAKE/POND TYPE

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

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 10. CHEMICAL CHARACTERISTICS OF WATER AT LAKE/POND SURVEY SITES

NOCA - AMPHIBIAN SURVEY BRIDGE CREEK - 1997

SITE NUMBER	DATE	WATER TEMP	pH	CONDUCTIVI (uS/cm)
MA04	9/24/97	47	6.85	10.8
MM01	9/24/97	43	7.07	32
MM03	9/24/97	45	6.91	21
MM04	9/24/97	41	6.8	12.1
MM05	8/13/97	60	5.28	30.9
MM13	8/14/97	70	4.58	12.6
MR02	7/15/97	51	6.09	15.0
MR02	8/6/97	N/A	5.71	16.7
MR03	7/15/97	39	5.35	4.3
MR03	8/6/97	N/A	4.78	4
MR04	7/16/97	55	5.60	16.4
MR04-1	7/16/97	50	5.86	14.5
MR10	7/30/97	58	5.58	10.6
MR10-2	7/30/97	49	5.73	7.9
MR19	7/29/97	49	6.04	9.2
MR20	7/29/97	59	5.88	6.2
MR28	8/20/97	59	6.37	21.9

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 A4) was developed for these photos which includes a photo CD # and image # in addition to the above data fields. The photos on CD can be opened in any photo finishing software which handles the Kodak photo CD file format (*.pcd) such as Corel Photo CD Lab, Corel Photo-Paint, Corel Draw, Adobe Photoshop, or Microsoft Image Composer. Corel Photo CD Lab can view the images on the CD then save the image in a different format (*.bmp, *.eps, *.pcx, *.tif) with several resolution, color, and rotation choices. Then the new file can be opened in a photo finishing program and manipulated by the many tools available for image enhancement (sharpen, lighten, darken etc.) The photos from our study are also referenced in an Accessory Data Tables (Appendix Tables A5, A6) listing all sites surveyed with ancillary data such as crew members and weather conditions. A series of 1:24,000 color aerial photographs in 9"x9" format 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 A12).

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 crew members 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 crew member 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).

While observers were conducting the visual search, another crew member (the recorder) drew a map of the outline of the pond on Lake/pond Amphibian Survey Data Form 3a - NOCA (Attachment 3), noting vegetation present in the vicinity of the pond and marking locations of the individual minnow traps as they were placed in position. Several additional items of data describing the pond and habitat, fish presence, and physical characteristics were entered on this form.

Trapping

Minnow traps were placed at the surface of the water 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 to allow 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

Over half of the streams shown on the 7.5' USGS topographical maps as crossing the trail were dry when visited during the June to September season. Off-trail cross-country hiking in this region is extremely difficult and time consuming. Streams were chosen in the Bridge Creek watershed by their accessibility from trail. All streams that crossed the one trail through the watershed were sampled for amphibians if there was water flowing in them at the time of sampling during the season from 6/26/97 to 9/10/97 and water was not considered to be too dangerous (high gradient/velocity) to be in. In total, 28 reaches were sampled for amphibians in 1997 (Figure 2).

Streams that flowed across the 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 crew member stretched a measuring tape (stream rope) upstream taking care to not disturb the stream bed. Along this route stations were marked (flagging tape) at preselected random meter intervals. Ten belt transects one meter wide were sampled in each 100 m stream reach. In two of the 28 reaches 100 m of stream was not available so a shorter (50-70 m) reach was done using the 10% rule (1 m belt transect for every 10 m).

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).

A Streambank and Bed Stability form (Pfankuch 1975) (Attachment 9) was used to record many factors influencing these stream characteristics. Landform slope, mass wasting or failure, debris jam potential, and vegetative bank protection were evaluated for the upper banks of each stream reach. Five characteristics of lower banks were evaluated and included: channel capacity, bank rock content, obstructions, cutting, and deposition. Similarly streambed bottom was rated on six factors: rock angularity, brightness, particle packing, bottom size distribution, scouring and deposition, and clinging aquatic vegetation. These data present a picture of the susceptibility of the stream channel to erosion and change.

Seep Sampling

Intermittent pools and seeps were surveyed for amphibians and data was collected about the characteristics of these sites on Stream Amphibian Survey Data Form 2 - NOCA (Attachment 10). Habitat descriptors such as depth, area, flow, In stream cover, canopy cover, and substrate were all recorded and summarized in Intermittent Pools and Seeps Characteristics Table 8. On data form 2 a box was provided to sketch in a map of the seep site. Other general site information such as weather, crew, time, date and location are all included in Appendix Table A2 and Table A6. Seeps were sampled using a timed search method with start and stop times recorded along with any captures made. Seep searches included the use of visual search, dip net, kick net, and overturning substrate.

RESULTS

Streams

A total of 28 stream reaches were surveyed. The only amphibian species captured in streams was the tailed frog *Ascaphus truei*. Life stages found included tadpole, metamorph, juvenile, and adult both male and female. Tailed frogs were found in 9 of the 28 reaches surveyed. In four of these reaches only one individual was found, in four others just two individuals, and in one reach eight were found (Table 11, and Appendix Table A8).

Seeps

Only one amphibian was found at one of the seven seep locations sampled during 1997. An *Ambystoma macrodactylum* larva was found in a pothole (434A) along upper Woody Creek in a subalpine willow meadow. A summary of seep effort and results are listed in Table 12.

Lake/Ponds

Amphibians were caught in 9 of the 15 lake/ponds surveyed. A total of 5 species of amphibians were found in the lake/ponds surveyed. They were *Ambystoma macrodactylum, Bufo boreas, Hyla regilla, Rana cascadae, Rana luteiventris*. The highest number of species found in any one

pond was 3 in lower North Fork pond MM05. This same pond yeilded the first capture of a reptile in our nylon mesh minnow traps. One juvenile snake most likely a Wandering Garter Snake, *Thamnophsis elegans vagrans* was caught and released alive. Visual searches yielded one species of amphibians at five lake/ponds (1 to 49 individuals), two species at three places (2 to 9 individuals). Traps produced one species at six sites (1 to 6 individuals), and two species at one pond (30 individuals, MM13), and three species at one pond (108 individuals, MM05) Lake/pond amphibian captures from visual searches are summarized in Table 13, and captures from trapping in Table 14.

Big Beaver Revisited

Twice during the 1997 field season the NPS-NOCA amphibian inventory crew visited Big Beaver Valley where an inventory was conducted in 1996. The first trip was in early August when two of the streams previously surveyed were resurveyed. The two streams were a second order Thirty-nine Mile Creek (146) and a small first order permanent tributary of lower Big Beaver (128). In both streams tailed frogs *Ascaphus truei* were found in 1996 and in 1997. On the last day of the week we were joined by herpetologist Don Major from USGS-BRD-FRESC, Corvallis, Oregon. We went to a lower Big Beaver permanent pond/wet meadow complex (PM07-1,2) with Don to determine the identity of the ranid frogs and salamanders which were observed and reported in 1996. The NOCA crew had tentatively identified the frogs as *Rana cascadae* and the salamanders as *Ambystoma gracile*. Don concurred with the *A. gracile* identification but was not certain about the *Rana* species we found. These frogs seemed to be somewhere between *R. cascadae* and *R. luteiventris* in field mark characteristics. We decided it was worth the effort to come back and collect some tissue samples for DNA analysis to determine the identity of these frogs.

A second trip to Big Beaver Valley was scheduled for the last week in August. On this trip 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. Other survey efforts of the USGS-BRD-FRESC crew included catch and release of over 200 *Ascaphus truei* tadpoles in Happy Creek which appear to represent three age classes, mark-recapture of *R. luteiventris* population at Dagger Lake suggests multiple capture intervals over short time period can provide valid population estimates (ie., model assumptions were met) (pers.comm. Mike Adams 1997).

DISCUSSION

Bridge Creek

Overall five species of amphibians were found in lake/ponds, one in seeps, and one in streams. A total of six species of amphibians have been found in Bridge Creek watershed so far. In comparison, the Big Beaver valley (1996) amphibian inventory found nine species of amphibians from pond and stream surveys, plus one 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. Some areas of the Bridge Creek watershed were not sampled due to remoteness. Unavailability of helicopter support prevented our crew from reaching some areas scheduled for the 1997 inventory. Pitfall traps have not been used in Bridge Creek watershed. This method could possibly yield additional species of amphibians, though no other species are expected to be in Bridge Creek based on present known distributions. A total of three species of reptiles were observed during the 1997 field season in Bridge Creek. The previously mentioned garter snake, 3 Rubber Boas, *Charina bottae*, and 2 Northern Alligator Lizards, *Elgaria coerulea* were seen along the Bridge Creek Trail near Hideaway camp. The mainstem of Bridge Creek, trubutaries of Maple, North Fork, and Grizzly Creeks need more extensive amphibian inventory coverage.

Big Beaver

It should be noted that after observations by many researchers, the Ranid complex in Big Beaver Valley remains somewhat of a mystery. The former Spotted Frog, *Rana pretiosa*, was split into two species, the Oregon Spotted Frog, *Rana pretiosa*, and the Columbian Spotted Frog, *Rana luteiventris* (Green 1996). It is generally thought that the Oregon Spotted Frog's distribution does not presently extend into the Big Beaver Valley and is limited to southwestern Washington (McAllister and Leonard 1997). Historical records show the Oregon Spotted Frog in Concrete, Skagit County in 1930. This is 50 km southwest of Big Beaver Valley and 415 m lower elevation, both sites are within the Skagit River watershed. Historical records show the Columbian Spotted Frog as close as 15 km to the southeast and similar elevation to Big Beaver Valley, within the Skagit Valley watershed. Records show the Cascade Frog occurring in all directions around Big Beaver Valley. Red-legged frogs have been found at Newhalem, which is 18 km southwest and 340 m lower than Big Beaver Valley also in the Skagit River watershed. The frogs identified as Red-legged Frogs in this report were 2 tadpoles, that were 71 mm total length which according to some guide books *Rana aurora* is the only species tadpole to attain that size. Later we were told that length may not be a reliable indicator. Big Beaver Valley is within the range of *R. aurora, R. cascadae, R. luteiventris*, so any or all could be or have been present in this valley. There is the possibility of hybridization between *R. cascadae* and *R. pretiosa* (Green 1985, Haertel and Storm 1970). Four species of Ranid frogs have been found in the Skagit River watershed within a 50 km radius of Big Beaver Valley. Three species have been found recently within 20 km. There is presently a thriving population of Ranid frogs in Big Beaver Valley. Just what their lineage is remains to be discovered. The Ranid frogs of Big Beaver Valley seem to have a mixture of *cascadae, aurora,* and *luteiventris* characteristics that have made positive identification impossible by field marks alone. Tissue samples have been collected in 1997 from frogs in Big Beaver Valley (west slope) and Bridge Creek watershed (east slope) and are in line to be processed by DNA analysis. The results of these tests will not be available for a couple years but should shed some light on this interesting group. So meanwhile, these ranid identifications listed in the NOCA NRPP Amphibian Inventory, Big Beaver Watershed, 1996 - Progress Report should be taken as unconfirmed. We are looking forward to test results with great anticipation.

TABLE 11. STREAM SEARCH EFFORT & CAPTURES

NOCA - AMPHIBIAN SURVEY BRIDGE CREEK - 1997

SITE NUMBER	REACH	DATE	AREA M2 SAMPLED	SPECIES	NUMBER INDIVIDUALS	LIFE STAGE
6	1	9/8/97	165	ASTR	1	T
8	1	9/5/97	113	ASTR	1	T
224	1	8/12/97	8	0		
401	1	8/12/97	125	0		
502	1	9/9/97	76	0		
508	1	7/10/97	15	0		
519	1	7/9/97	50	0		
519	2	7/9/97	14	0		
544	1	7/1/97	25	0		
545	1	6/26/97	46	0		
602	1	9/2/97	33	ASTR	5,3	T,M
613	1	8/20/97	12	ASTR	1	T
618	1	7/15/97	15	0		
630	1	9/10/97	66	ASTR	2	T
641	1	9/4/97	10	0		
650	1	7/31/97	12	0		
651	1	7/31/97	21	0		
701	1	7/2/97	11	ASTR	1	J
702	1	7/23/97	15	0		
705	1	9/3/97	17	ASTR	1,1	J,A
1042H	1	7/29/97	13	0		
208A	1	8/13/97	15	ASTR	2	M
508A	1	7/10/97	11	0		
511A	1	7/10/97	26	0		
601A	1	6/27/97	10	0		
641A	1	9/7/97	16	0		
702A	1	7/23/97	15	0		
705A	1	9/3/97	13	ASTR	2	A

ASTR = ASCAPHUS TRUEI, TAILED FROG

TABLE 12. SEEP SEARCH EFFORT & CAPTURES
NOCA - AMPHIBIAN SURVEY BRIDGE CREEK - 1997

SEGMENT NUMBER SITENUMBER	DATE	START	END	ELAPSED	M2 AREA	SPECIES
HDWY-1	7/2/97	14:30	14:33	0:03	3	0
HDWY-2	7/2/97	15:02	15:10	0:08	12	0
HDWY-3	7/2/97	15:15	15:17	0:02	2	0
HDWY-4	7/2/97	15:49	15:54	0:05	6	0
506	7/8/97	9:31	9:37	0:06	4	0
434A	9/25/97	12:00	12:30	0:30	7	AMMA, L
SOFORK	7/8/97	16:30	17:00	0:30	100	0

TABLE 13. POND SHORELINE VISUAL SEARCH & AMPHIBIAN CAPTURES - ALL DAYTIME

NOCA - AMPHIBIAN SURVEY BRIDGE CREEK - 1997

SITE NUMBER	DATE	START	END	OBSERV. HOURS*	# OF BSERVE	TOTAL M	SPECIES	AGE	SUBST	OBS/CAP	SEX	TOT_MM	SVL_MM	HL MM	ENVIRON	COUNT
MR02	7/15/97	13:30	14:15	2:15	3	600	AMMA	A	ST	CAP	U	110	58		W	1
MR02	7/15/97	13:30	14:15	2:15	3	600	BUBO	A	B	OBS	U				B	1
MR03	7/15/97	16:10	16:20	0:30	3	250	0									0
MR04	7/16/97	14:30	16:00	4:30	3	280	RALU	A	VEG	OBS	U				E	6
MR04	7/16/97	14:30	16:00	4:30	3	280	RALU	A	VEG	CAP	M		66	28	W	1
MR04	7/16/97	14:30	16:00	4:30	3	280	RALU	A	VEG	CAP	F		76	36	W	1
MR04	7/16/97	14:30	16:00	4:30	3	280	RALU	A	VEG	CAP	F		73	35	W	1
MR04	7/16/97	14:30	16:00	4:30	3	280	RALU	A	VEG	CAP	M		65	31	W	1
MR04	7/16/97	14:30	16:00	4:30	3	280	RALU	EM/H	VEG	OBS	U				W	2
MR04	7/17/97	8:15	8:30	0:15	1	280	RALU	EM/H	VEG	OBS	U				W	2
MR04-1	7/15/97	17:00	17:20	1:00	3	75	0									0
MR10	7/30/97	12:58	15:00	6:06	3	1000	RALU	A	VEG	OBS	U				E	19
MR10	7/30/97	12:58	15:00	6:06	3	1000	RALU	A	BANK	OBS	U				B	8
MR10	7/30/97	12:58	15:00	6:06	3	1000	RALU	J	VEG	OBS	U				E	10
MR10	7/30/97	12:58	15:00	6:06	3	1000	RALU	J	BANK	OBS	U				B	1
MR10	7/30/97	12:58	15:00	6:06	3	1000	RALU	A	VEG	CAP	F		67	33	W	1
MR10	7/30/97	12:58	15:00	6:06	3	1000	RALU	A	VEG	CAP	U				W	1
MR10	7/30/97	12:58	15:00	6:06	3	1000	RALU	A	VEG	CAP	F		71	33	W	1
MR10	7/30/97	12:58	15:00	6:06	3	1000	RALU	J	VEG	CAP	F		36	20	W	1
MR10	7/30/97	12:58	15:00	6:06	3	1000	RALU	T	W	OBS	U	14-16			W	1
MR10-2	7/30/97	12:10	12:30	0:40	2	80	RALU	A	LL	CAP	F		69	34	B	1
MM-13	8/14/97	14:45	15:40	2:45	3	100	BUBO	A	VEG	OBS	U					1
MM-13	8/14/97	14:45	15:40	2:45	3	100	HYRE	J	ST,VEG	CAP	U		18		W	1
MM-13	8/14/97	14:45	15:40	2:45	3	100	HYRE	T	ST,V	CAP	U				W	1
MM-13	8/14/97	14:45	15:40	2:45	3	100	HYRE	T	ST,V	CAP	U				W	1
MM-13	8/14/97	14:45	15:40	2:45	3	100	HYRE	M	ST,V	CAP	U	37	14		W	1
MM-13	8/14/97	14:45	15:40	2:45	3	100	HYRE	J	ST,V	CAP	U		13		W	1
MA04	9/24/97	15:50	16:50	1:00	1	150	0									
MM01	9/24/97	9:30	11:00	1:30	1	300	0									
MM03	9/24/97	9:20	10:20	1:00	1	200	0									
MM04	9/24/97	11:50	13:00	1:10	1	80	0									
MM05	8/13/97	9:30	10:45	2:30	2	200	0									
MR28	8/20/97	8:53	10:53	8:00	4	400	RACA	A	V	CAP	M		50	30	W	1
MR28	8/20/97	8:53	10:53	8:00	4	400	RALU	A	V	CAP	F		69	30	W	1
MR28	8/20/97	8:53	10:53	8:00	4	400	RALU	T	V	CAP	U	36	18		W	1
MR28	8/20/97	8:53	10:53	8:00	4	400	RALU	T	V	CAP	U	45	20		W	1
MR28	8/20/97	8:53	10:53	8:00	4	400	RALU	T	V	CAP	U	28	14		W	1
MR28	8/20/97	8:53	10:53	8:00	4	400	RALU	T	V	CAP	U	44	19		W	1
MR28	8/20/97	8:53	10:53	8:00	4	400	RALU	T	V	CAP	U	48	20		W	1
MR28	8/20/97	8:53	10:53	8:00	4	400	RALU	T	V	CAP	U	40	19		W	1
MR28	8/20/97	8:53	10:53	8:00	4	400	RALU	T	V	CAP	U	35	15		W	1
MR19	7/29/97	8:20	9:20	3:00	3	400	RALU	A	ST	OBS	4M, 12F				15B, 30ST	45
MR19	7/29/97	8:20	9:20	3:00	3	400	RALU	A	ST	CAP	F		70	32	W	1
MR19	7/29/97	8:20	9:20	3:00	3	400	RALU	A	ST	CAP	F		78	36	W	1
MR19	7/29/97	8:20	9:20	3:00	3	400	RALU	A	ST	CAP	F		77	35	W	1
MR19	7/29/97	8:20	9:20	3:00	3	400	RALU	A	ST	CAP	F		75	34	W	1
MR20	7/29/97	10:00	10:20	0:40	2	60	AMSP?	L	ST	OBS	U					1

* = (TIME) X (# OF OBSERVERS)

SPECIES:
AMGR = AMBYSTOMA GRACILE, NORTHWESTERN SALAMANDER
AMSP = UNKNOWN AMBYSTOMA SPECIES
BUBO = BUFO BOREAS, WESTERN TOAD
HYRE = HYLA REGILLA, PACIFIC TREE FROG
RACA = RANA CASCADAE, CASCADES FROG
RALU = RANA LUTEIVENTRIS, COLUMBIAN SPOTTED FROG

AGE:
A = ADULT
EM = EGG MASS
H = HATCHLING
L = LARVAE
M = METAMORPH
N = NEOTENE

SUBSTRATE:
L = LITTER(ORGANIC)
B = BOULDER
GVL = GRAVEL
ST = SILT
VEG = VEGETATION

ENVIRONMENT:
B = BANK
E = EDGE OF WATER
W = WATER
OBS/CAP:
OBS = OBSERVED
CAP = CAPTURED

TABLE 14. POND AMPHIBIAN TRAP EFFORT & CAPTURES

NOCA - AMPHIBIAN SURVEY BRIDGE CREEK - 1997

MINNOW TRAPS AT SURFACE - OVERNIGHT

SITE NUMBER	TRAP	START_DAY	START_HR	END_DAY	END_HR	TRAP HOURS	SPECIES	AGE	SUBST	COUNT	SEX
MR02	1	7/15/97	13:24	7/16/97	9:20	19.93	0		W,B	0	
MR02	2	7/15/97	13:35	7/16/97	9:26	19.85	0		SG,W,B	0	
MR02	3	7/15/97	13:53	7/16/97	9:32	19.65	0		ST, W	0	
MR02	4	7/15/97	14:18	7/16/97	9:36	19.30	0		ST, VEG	0	
MR02	5	7/15/97	14:26	7/16/97	9:40	19.23	0		ST, B, VEG	0	
MR02	6	7/15/97	14:33	7/16/97	9:46	19.22	0		B, SG	0	
MR02	7	7/15/97	14:38	7/16/97	10:45	20.12	0		ST, VEG	0	
MR02	8	7/15/97	14:42	7/16/97	9:53	19.18	AMMA	L	ST, VEG	1	U
MR02	9	7/15/97	14:54	7/16/97	10:42	19.80	0		W, ST	0	
MR02	9					**176.28**				**1**	
MR03	1	7/15/97	16:04	7/16/97	11:52	19.80	0		B, OD	0	
MR03	2	7/15/97	16:08	7/16/97	11:53	19.75	0		ST, LC	0	
MR03	3	7/15/97	16:24	7/16/97	11:59	19.58	0		W, SG	0	
MR03	4	7/15/97	16:24	7/16/97	12:00	19.60	0		W, VEG	0	
MR03	5	7/15/97	16:26	7/16/97	12:05	19.65	AMMA	L	VEG, ST	2	U
MR03	6	7/15/97	16:28	7/16/97	12:16	19.80	0		OD, B	0	
MR03	7	7/15/97	16:37	7/16/97	12:20	19.72	AMMA	L	LL, SD, SC	1	U
MR03	8	7/15/97	16:28	7/16/97	12:17	19.82	0		B, B	0	
MR03	9	7/15/97	16:38	7/16/97	12:20	19.70	AMMA	L	B, SC	3	U
MR03	9					**177.42**				**6**	
MR04	1	7/16/97	14:38	7/17/97	7:46	17.13	0		VEG, W	0	
MR04	2	7/16/97	14:50	7/17/97	7:49	16.98	0		W, VEG	0	
MR04	3	7/16/97	15:20	7/17/97	7:51	16.52	0		ST, VEG	0	
MR04	4	7/16/97	15:25	7/17/97	7:53	16.47	0		W, VEG	0	
MR04	5	7/16/97	15:28	7/17/97	7:55	16.45	0		ST, VEG	0	
MR04	6	7/16/97	15:32	7/17/97	8:03	16.52	0		W, VEG	0	
MR04	7	7/16/97	15:42	7/17/97	8:05	16.38	RALU	A	W, ST	2	F
MR04	8	7/16/97	15:45	7/17/97	8:30	16.75	0		W, LT	0	
MR04	9	7/16/97	16:05	7/17/97	9:06	17.02	0		VEG, W	0	
MR04	10	7/16/97	16:11	7/17/97	9:11	17.00	0		W, VEG	0	
MR04	11	7/16/97	16:23	7/17/97	9:12	16.82	0		ST, LT	0	
MR04	12	7/16/97	16:30	7/17/97	9:15	16.75	0		W, VEG	0	
MR04	12					**200.79**				**2**	
MR04-1	1	7/16/97	17:36	7/17/97	9:20	15.73	0		W, VEG, ST	0	
MR04-1	2	7/16/97	17:35	7/17/97	9:23	15.80	0		W, VEG, ST	0	
MR04-1	3	7/16/97	17:31	7/17/97	9:24	15.88	0		W, VEG, ST	0	
MR04-1	4	7/16/97	17:27	7/17/97	9:29	16.03	0		W, VEG	0	
MR04-1	5	7/16/97	17:24	7/17/97	9:27	16.05	0		VEG, ST	0	
MR04-1	6	7/16/97	17:20	7/17/97	9:31	16.18	0		W, VEG, OD	0	
MR04-1	6					**95.67**				**0**	
MR10	1	7/30/97	13:01	7/31/97	8:48	19.78	0		CWD, LB, BD	0	
MR10	2	7/30/97	13:02	7/31/97	8:44	19.70	0		LB, CWD, BD	0	
MR10	3	7/30/97	13:04	7/31/97	8:50	19.77	0		BD	0	
MR10	4	7/30/97	13:35	7/31/97	8:54	19.32	0		CWD, ST	0	

NOCA - AMPHIBIAN SURVEY BRIDGE CREEK - 1997
MINNOW TRAPS AT SURFACE - OVERNIGHT

SITE NUMBER	TRAP	START_DAY	START_HR	END_DAY	END_HR	TRAP HOURS	SPECIES	AGE	SUBST	COUNT	SEX
MR10	5	7/30/97	13:47	7/31/97	8:56	19.15	0		ST, CWD, VEG	0	
MR10	6	7/30/97	14:12	7/31/97	8:57	18.75	0		ST, CWD	0	
MR10	7	7/30/97	15:08	7/31/97	9:14	18.10	0		ST, CWD	0	
MR10	8	7/30/97	15:11	7/31/97	9:15	18.07	0		CWD, ST	0	
MR10	9	7/30/97	15:18	7/31/97	9:18	18.00	RALU	A	ST, VEG, CWD	1	M
MR10	10	7/30/97	15:30	7/31/97	9:22	17.87	0		ST, VEG	0	
MR10	11	7/30/97	16:10	7/31/97	9:28	17.30	RASP	T	ST, VEG	2	U
MR10	12	7/30/97	16:15	7/31/97	9:36	17.35	0		ST, VEG	0	
MR10	12					**223.16**				**3**	
MR10-2	1	7/30/97	12:18	7/31/97	8:29	20.18	RALU	A	B/ST	1	F
MR10-2	2	7/30/97	12:19	7/31/97	8:31	20.20	0		ST	0	
MR10-2	3	7/30/97	12:21	7/31/97	8:34	20.22	0		W/ST	0	
MR10-2	4	7/30/97	12:22	7/31/97	8:35	20.22	0		ST/W	0	
MR10-2	5	7/30/97	12:26	7/31/97	8:38	20.12	0		LL/W	0	
MR10-2	6	7/30/97	12:28	7/31/97	8:37	20.15	0		ST/W	0	
MR10-2	6					**121.09**				**1**	
MM13	1	8/14/97	14:47	8/15/97	7:53	17.10	HYRE	T,M	ST,V	7	U
MM13	2	8/14/97	14:53	8/15/97	8:05	17.20	HYRE	5T,1M	ST,V	6	U
MM13	3	8/14/97	15:03	8/15/97	8:56	17.88	0		ST,V	0	
MM13	4	8/14/97	15:06	8/15/97	8:45		BUBO	A	ST,V	1	F
MM13	4	8/14/97	15:06	8/15/97	8:45	17.65	HYRE	2T,3M	ST,V	5	U
MM13	5	8/14/97	15:11	8/15/97	8:42	17.52	HYRE	T	ST,V	2	U
MM13	6	8/14/97	15:15	8/15/97	8:36	17.35	0			0	
MM13	7	8/14/97	15:20	8/15/97	8:39	17.32	0			0	
MM13	8	8/14/97	15:05	8/15/97	8:12	17.12	HYRE	4T,1M	ST/V	5	U
MM13	9	8/14/97	15:15	8/15/97	8:17	17.03	HYRE	M	ST/V	1	U
MM13	10	8/14/97	15:24	8/15/97	8:21	16.95	0			0	
MM13	11	8/14/97	15:26	8/15/97	8:27	17.02	HYRE	T/M	ST/V	3	U
MM13	12	8/14/97	15:29	8/15/97	8:32	17.05	0			0	
MM13	12					**190.14**				**30**	
MA04	1	9/24/97	16:00	9/25/97	8:00	16.00	0		SG/SD	0	
MA04	2	9/24/97	16:04	9/25/97	8:04	16.00	0		ST/B/W	0	
MA04	3	9/24/97	16:08	9/25/97	8:08	16.00	0		ST/SD/SG	0	
MA04	4	9/24/97	16:15	9/25/97	8:10	15.92	0		SG/SD/ST	0	
MA04	5	9/24/97	16:20	9/25/97	8:12	15.87	0		B/ST/SG	0	
MA04	6	9/24/97	16:25	9/25/97	8:15	15.83	0		ST/B	0	
MA04	7	9/24/97	16:35	9/25/97	8:15	15.67	0		ST/SG/SD	0	
						111.29				0	
MM01	1	9/24/97	15:00	9/25/97	9:40	18.67	0		ST	0	
MM01	2	9/24/97	15:05	9/25/97	9:50	18.75	0		ST	0	
MM01	3	9/24/97	15:10	9/25/97	10:00	18.83	0		ST	0	
MM01	4	9/24/97	15:00	9/25/97	10:10	19.17	0		ST	0	
MM01	5	9/24/97	15:05	9/25/97	10:20	19.25	0		ST	0	
MM01	6	9/24/97	15:10	9/25/97	10:30	19.33	0		ST	0	
MM01	6					**114.00**	**0**			**0**	

NOCA - AMPHIBIAN SURVEY BRIDGE CREEK - 1997
MINNOW TRAPS AT SURFACE - OVERNIGHT

SITE NUMBER	TRAP	START_DAY	START_HR	END_DAY	END_HR	TRAP HOURS	SPECIES	AGE	SUBST	COUNT	SEX
MM03	1	9/24/97	9:20	9/25/97	9:00	23.67	0		P/SD	0	
MM03	2	9/24/97	9:23	9/25/97	9:03	23.67	0		SD/LG	0	
MM03	3	9/24/97	9:27	9/25/97	9:07	23.67	0		B/SG	0	
MM03	4	9/24/97	9:29	9/25/97	9:09	23.67	0		ST/W/B	0	
MM03	5	9/24/97	9:32	9/25/97	9:12	23.67	0		B/W/LC	0	
MM03	6	9/24/97	9:35	9/25/97	9:15	23.67	0		B	0	
MM03	6					**142.02**				**0**	
MM04	1	9/24/97	11:55	9/25/97	9:18	21.38	0		LC/ST/W	0	
MM04	2	9/24/97	12:00	9/25/97	9:20	21.33	0		ST/SC	0	
MM04	3	9/24/97	12:05	9/25/97	9:22	21.28	0		ST/SC/W	0	
MM04	4	9/24/97	12:08	9/25/97	9:24	21.27	0		ST/W	0	
MM04	5	9/24/97	12:10	9/25/97	9:26	21.27	0		ST/LC	0	
MM04	6	9/24/97	12:12	9/25/97	9:28	21.27	0		ST/LC	0	
MM04	6					**127.80**	**0**			**0**	
MM05	1	8/13/97	9:43	8/14/97	8:32	22.82	*THEL	J	VEG	1	
MM05	1	8/13/97	9:43	8/14/97	8:32		HYRE	T	VEG	8	
MM05	1	8/13/97	9:43	8/14/97	8:32		AMMA	L	VEG	1	
MM05	2	8/13/97	9:58	8/14/97	8:32	22.57	HYRE	T	VEG	0	
MM05	3	8/13/97	10:03	8/14/97	8:58	22.92	HYRE	T	VEG	15	
MM05	4	8/13/97	10:12	8/14/97	9:14	23.03	RACA	T	W/VEG	1	
MM05	4	8/13/97	10:12	8/14/97	9:14		HYRE	T	W/VEG	16	
MM05	4	8/13/97	10:12	8/14/97	9:14		AMMA	L	W/VEG	1	
MM05	5	8/13/97	10:18	8/14/97	9:52	23.57	HYRE	T	V/B	5	
MM05	6	8/13/97	10:22	8/14/97	10:00	23.63	HYRE	T	V/ST	9	
MM05	6	8/13/97	10:22	8/14/97	10:00		AMMA	L	V/ST	1	
MM05	7	8/13/97	9:45	8/14/97	11:08	25.38	HYRE	T	ST	5	
MM05	8	8/13/97	9:50	8/14/97	11:13	25.38	HYRE	T	V	26	
MM05	9	8/13/97	10:00	8/14/97	11:19	25.32	HYRE	T	W, ST	9	
MM05	10	8/13/97	10:08	8/14/97	11:25	25.28	HYRE	T	V/ST	2	
MM05	11	8/13/97	10:24	8/14/97	10:10	23.77	HYRE	T	V/ST	5	
MM05	12	8/13/97	9:50	8/14/97	8:45	22.92	HYRE	T	ST	4	
MM05	12					**286.59**	**4**			**109**	
MR28	1	8/20/97	8:53	8/21/97	9:00	24.12	0		ST/W	0	
MR28	2	8/20/97	9:26	8/21/97	9:04	23.63	AMMA	L	ST/W	1	U
MR28	3	8/20/97	9:34	8/21/97	9:17	23.72	0		V/ST	0	
MR28	4	8/20/97	9:47	8/21/97	9:55	24.13	0		V/GR	0	
MR28	5	8/20/97	9:50	8/21/97	9:58	24.13	0		ST/V	0	
MR28	6	8/20/97	10:00	8/21/97	10:04	24.07	0		ST/V	0	
MR28	7	8/20/97	10:13	8/21/97	9:28	23.25	RASP	J	ST/V	1	
MR28	8	8/20/97	10:19	8/21/97	9:27	23.13	RALU	T	W	2	U
MR28	9	8/20/97	10:30	8/21/97	10:02	23.53	0		ST/V	0	
MR28	10	8/20/97	10:33	8/21/97	10:19	23.77	0		ST/V	0	
MR28	11	8/20/97	10:38	8/21/97	9:31	22.88	0		ST/V	0	
MR28	12	8/20/97	10:46	8/21/97	9:41	22.92	0		B/V	0	
MR28	13	8/20/97	10:51	8/21/97	10:16	23.42	0		ST/V	0	

NOCA - AMPHIBIAN SURVEY BRIDGE CREEK - 1997
MINNOW TRAPS AT SURFACE - OVERNIGHT

SITE NUMBER	TRAP	START_DAY	START_HR	END_DAY	END_HR	TRAP HOURS	SPECIES	AGE	SUBST	COUNT	SEX
MR28	14	8/20/97	10:53	8/21/97	9:45	22.87	0		ST/V	0	
MR28	14					**329.57**	**2**			**4**	
MR19	1	7/29/97	10:49	7/30/97	8:28	21.65	0		ST/W		
MR19	2	7/29/97	10:51	7/30/97	8:24	21.55	0		ST/SC		
MR19	3	7/29/97	10:54	7/30/97	8:28	21.57	0		ST/V		
MR19	4	7/29/97	10:56	7/30/97	8:30	21.57	0		ST/V		
MR19	5	7/29/97	10:58	7/30/97	8:32	21.57	0		ST/V		
MR19	6	7/29/97	11:01	7/30/97	8:34	21.55	RALU	A	SG/LL	3	2M,1F
MR19	7	7/29/97	10:50	7/30/97	8:24	21.57	0		ST/V		
MR19	8	7/29/97	10:52	7/30/97	8:28	21.60	0		ST/W		
MR19	9	7/29/97	10:55	7/30/97	8:32	21.62	RALU	A	ST/W	2	1M,1F
MR19	10	7/29/97	11:00	7/30/97	8:36	21.60	0		W/ST		
MR19	11	7/29/97	11:04	7/30/97	8:38	21.57	0		ST/V		
MR19	12	7/29/97	11:05	7/30/97	8:41	21.60	RALU	A	W/ST	1	M
MR19	12					**259.02**	**1**			**6**	
MR20	1	7/29/97	13:04	7/30/97	10:07	21.05	0		ST/V		
MR20	2	7/29/97	13:05	7/30/97	9:56	20.85	0		W/ST		
MR20	3	7/29/97	13:07	7/30/97	9:59	20.87	0		ST/V		
MR20	4	7/29/97	13:08	7/30/97	10:01	20.88	0		B/ST		
MR20	5	7/29/97	13:09	7/30/97	10:09	21.00	0		ST/V		
MR20	6	7/29/97	13:10	7/30/97	10:03	20.88	0		W/ST		
MR20	6					**125.53**	**0**				

AMMA = AMBYSTOMA GRACILE
BUBO = BUFO BOREAS
HYRE = HYLA REGILLA
RACA = RANA CASCADAE
RALU = RANA LUTEIVENTRIS
RASP = RANA SPECIES
*THEL = THAMNOPHIS ELEGANS (REPTILE)

B = BOULDER
CWD = W = WOOD
LC = LARGE COBBLE
OD = ORGANIC DEBRIS
SC = SMALL COBBLE
SD = SAND
SG = SMALL GRAVEL
ST = SILT
V = VEGETATION

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APPENDIX

TABLE A1. LOCATION OF SAMPLING SITES - STREAMS

NOCA - AMPHIBIAN SURVEY BRIDGE CREEK -1997

SITE NUMBER	REACH	DATE	WATER SHED	SITENAME	UTM EAST	UTM NORTH	ELEV METERS	ASPECT
6	1	9/8/97	1066	BRIDGE CK NEAR HIDEAWAY	667100	5370200	1048	W
8	1	9/5/97	1067	BRIDGE CK UP FROM FIREWEED	668770	5370800	1122	S
224	1	8/12/97	1062	1 MILE W OF GRIZZLY CK	655380	5374220	1073	S
401	1	8/12/97	1064	GRIZZLY CK	657300	5373950	963	W
502	1	9/9/97	1065	S.FORK E.BRAID NEAR TRAIL	665660	5368500	1073	NW
508	1	7/10/97	1065	S. FORK TRIB N.EDGE OF DAN'S CAMP	665980	5367000	1170	W
508A	1	7/10/97	1065	S. FORK TRIB S.EDGE OF DAN'S CAMP	666050	5366960	1189	W
511A	1	7/10/97	1065	S. FORK TRIB S. OF DANS	666010	5366710	1195	W
519	1	7/9/97	1065	S. FORK HEADWATER RAINBOW PASS	667300	5364800	1591	NW
519	2	7/9/97	1065	S. FORK HEADWATER RAINBOW PASS	667450	5364760	1597	NW
544	1	7/1/97	1065	FRISCO CK	665440	5370450	1073	S
545	1	6/26/97	1065	TRIB OF BRIDGE CK	666050	5370450	1082	SW
601A	1	6/27/97	1066	NEAR FIREWEED CAMP	668780	5370670	1125	SW
602	1	9/2/97	1066	DRAINAGE FROM DAGGER LK	670150	5369950	1231	W
613	1	8/20/97	1066	STILLETO	673250	5371100	1707	S
618	1	7/15/97	1066	MR02 OUTLET	674420	5371010	1829	W
630	1	9/10/97	1066	MCALESTER CK	670440	5369180	1280	N
641	1	9/4/97	1066	23M ABOVE TR. CROSSING	670950	5368430	1402	NW
650	1	7/31/97	1066	S. INLET TO MCALESTER LK	672200	5366420	1768	W
651	1	7/31/97	1066	N. INLET TO MCALESTER LK	672150	5366420	1682	W
701	1	7/2/97	1067	TRIB OF BRIDGE CK	668310	5370640	1122	S
702	1	7/23/97	1067	TRIB OF BRIDGE CK	669580	5371270	1219	W
702A	1	7/23/97	1067	TRIB OF BRIDGE CK	669450	5371060	1189	W
705	1	9/3/97	1067	1ST TRIB S OF NPS BOUNDARY	669900	5372330	1280	W
1042H	1	7/29/97	1042	RAINBOW CK HEADWATER	672800	5365650	1817	W
208A	1	8/13/97	1062	N. FORK TRIB .25 MI N OF MM05	659900	5370750	927	W
641A	1	9/7/97	1066	100M DNST MCAL.TR. CROSS	670850	5368270	1463	W
705A	1	9/3/97	1067	10M UP FROM TRAIL	669900	5372200	1250	W,SW

TABLE A2. LOCATION OF SAMPLING SITES - SEEPS

NOCA - AMPHIBIAN SURVEY BRIDGE CREEK -1997

SITE NUMBER	DATE	WATER SHED	SITENAME	UTM EAST	UTM NORTH	ELEV METER	ASPECT
HDWY-1	7/2/97	1065	SEEP NEAR HIDEAWAY CAMP	667250	5370310	1052	W
HDWY-2	7/2/97	1065	SEEP NEAR HIDEAWAY CAMP	667240	5370310	1052	W
HDWY-3	7/2/97	1065	SEEP NEAR HIDEAWAY CAMP	667230	5370300	1052	W
HDWY-4	7/2/97	1065	SEEP NEAR HIDEAWAY CAMP	667150	5370320	1052	W
506	7/8/97	1065	SEEP OFF SOUTH FORK TRAIL	665950	5367730	1109	N
434A	9/25/97	1064	SEEP POTHOLE NEAR 434	661400	5374740	5820	W
SOFORK	7/8/97	1065	SEEP BY SOUTH FORK CAMP	665090	5369990	969	W

TABLE A3. LOCATION OF SAMPLING SITES - LAKES/PONDS

NOCA - AMPHIBIAN SURVEY BRIDGE CREEK -1997

SITE NUMBER	DATE	WATER SHED	SITENAME	UTM EAST	UTM NORTH	ELEV METER	ASPECT
MA04	9/24/97	1064	OODY CK HEADWATER POND	662142	5374634	1871	W
MM01	9/24/97	1064	FALLS CK HEADWATER PONDS	660693	5373729	1716	W
MM03	9/24/97	1063	UNNAMED, LAST CHANCE	662683	5373653	1896	E
MM04	9/24/97	1063	UNNAMED, MAPLE CK	661881	5372519	1932	E
MM05	8/13/97	1062	POND BETWEEN TR. & N. FORK	659851	5370526	899	S
MM13	8/14/97	1061	POND NR BRIDGE CK TRAILHD	657900	5366900	777	S
MR02	7/15/97	1066	TWISP PASS NW LK	674638	5370950	1871	W
MR03	7/15/97	1066	TWISP PASS SW LK	673969	5370352	1871	N
MR04	7/16/97	1066	DAGGER LAKE	673403	5370790	1679	W
MR04-1	7/16/97	1066	DAGGER LK OUTLET	673200	5370800	1679	W
MR-28	8/20/97	1066	WETLAND BELOW DAGGERLK	673403	5370790	1676	W
MR10	7/30/97	1066	MCALESTER LAKE	672023	5360325	1678	NW
MR10-2	7/30/97	1066	POND NEAR MCALESTER LAKE	671810	5366410	1678	NW
MR19	7/29/97	1042	WETLAND AT MCALESTER PAS	672990	5365790	1826	SW
MR20	7/29/97	1042	POND SW MCALESTER PASS	672650	5365410	1823	S

TABLE A 4. PHOTO CATALOG - 1997

NOCA - AMPHIBIAN SURVEY BRIDGE CREEK - 1997

PHOTO CD#	PHOTO #	DATE	ROLL #	SITENUMBER	STMETER	SUBJECT
4849	1		1			PARK SLOUGH SPAWNING CHANNEL
4849	2		1			PARK SLOUGH SPAWNING CHANNEL
4849	3		1			PARK SLOUGH SPAWNING CHANNEL
4849	4		1			CHRISTMAS BIRD COUNT DEC. 1996
4849	5		1			CHRISTMAS BIRD COUNT DEC. 1996
4849	6		1			CHRISTMAS BIRD COUNT DEC. 1996
4849	7		1	DIABLO LAKE		CHRISTMAS BIRD COUNT DEC. 1996
4849	8		1	DIABLO LAKE		CHRISTMAS BIRD COUNT DEC. 1996
4849	9		1	DIABLO LAKE		CHRISTMAS BIRD COUNT DEC. 1996
4849	10	7/1/97	1	545	TRAIL	
4849	11	7/1/97	1	545	TRAIL	
4849	12	7/1/97	1	545	3	UPSTREAM
4849	13	7/1/97	1	545	3	DOWNSTREAM
4849	14	7/1/97	1	545	9	UPSTREAM
4849	15	7/1/97	1	545	9	DOWNSTREAM
4849	16	7/1/97	1	545	16	UPSTREAM
4849	17	7/1/97	1	545	16	DOWNSTREAM
4849	18	7/1/97	1	545	32	UPSTREAM
4849	19	7/1/97	1	545	32	DOWNSTREAM
4849	20	7/1/97	1	545	50	UPSTREAM
4849	21	7/1/97	1	545	50	DOWNSTREAM
4849	22	7/1/97	1	545	100	UPSTREAM
4849	23	7/1/97	1	545	100	DOWNSTREAM
4849	24	7/1/97	1	544	TRAIL	TRAIL CROSSING WESTBOUND
4849	25	7/1/97	1	544	TRAIL	UPSTREAM FROM TRAIL
4849	26	7/1/97	1	544	0	UPSTREAM
4849	27	7/1/97	1	544	0	DOWNSTREAM
4849	28	7/1/97	1	544	50	UPSTREAM
4849	29	7/1/97	1	544	50	DOWNSTREAM
4849	30	7/1/97	1	544	100	UPSTREAM
4849	31	7/1/97	1	544	100	DOWNSTREAM
4849	32	7/1/97	1	544	100	DOWNSTREAM
4849	33	7/2/97	1	701	TRAIL	TRAIL CROSSING WESTBOUND
4849	34	7/2/97	1	701	TRAIL	UPSTREAM FROM TRAIL
4849	35	7/2/97	1	701	0	UPSTREAM
4849	36	7/2/97	1	701	0	DOWNSTREAM
4849	37	7/2/97	1	701	50	UPSTREAM
4849	38	7/2/97	1	701	50	DOWNSTREAM
4849	39	7/2/97	1	701	100	UPSTREAM
4849	40	7/2/97	1	701	100	DOWNSTREAM
4849	41	7/2/97	1	FIREWEED	TRAIL	TRAIL CROSSING WESTBOUND
4849	42	7/2/97	1	FIREWEED	TRAIL	TRAIL CROSSING WESTBOUND
4849	43	7/2/97	1	FIREWEED	0	UPSTREAM FROM TRAIL
4849	44	7/2/97	1	FIREWEED	25	UPSTREAM
4849	45	7/2/97	1	FIREWEED	25	DOWNSTREAM
4849	46	7/30/97	6	MR10		RALU DORSAL VIEW
4849	47	7/30/97	6	MR10		RALU VENTRAL VIEW
4849	48	7/30/97	6	MR10		RALU VENTRAL VIEW
4849	49	7/30/97	6	MR10		RALU DORSAL VIEW
4849	50	7/30/97	6	MR10		RALU VENTRAL VIEW
4849	51	7/30/97	6	MR10		RALU VENTRAL VIEW
4849	52	7/30/97	6	MR10		RALU DORSAL VIEW
4849	53	7/30/97	6	MR10		RALU VENTRAL VIEW
4849	54	7/30/97	6	MR10		RALU VENTRAL VIEW
4849	55	7/30/97	6	MR10		RALU DORSAL VIEW
4849	56	7/30/97	6	MR10		RALU VENTRAL VIEW
4849	57	7/30/97	6	MR10		RALU DORSAL VIEW
4849	58	7/30/97	6	MR10		RALU VENTRAL VIEW
4849	59	7/30/97	6	MR10		RALU DORSAL VIEW
4849	60	7/30/97	6	MR10		RALU VENTRAL VIEW
4849	61	7/30/97	6	MR10		RALU VENTRAL VIEW
4849	62	7/31/97	6	MR10		FROM SE SHORE LOOKING NE
4849	63	7/31/97	6	MR10		FROM SE SHORE LOOKING N
4849	64	7/31/97	6	MR10		FROM SE TOWARDS TALUS SLOPE
4849	65	7/31/97	6	MR10		FROM GRAVEL BAR TOWARDS TALUS SLOPE NW
4849	66	7/31/97	6	651	0	UPSTREAM
4849	67	7/31/97	6	651	0	DOWNSTREAM

TABLE A 4. PHOTO CATALOG - 1997

NOCA - AMPHIBIAN SURVEY BRIDGE CREEK - 1997

PHOTO CD#	PHOTO #	DATE	ROLL #	SITENUMBER	STMETER	SUBJECT
4849	68	7/31/97	6	651	50	DOWNSTREAM
4849	69	7/31/97	6	651	50	UPSTREAM
4849	70	7/31/97	6	651	100	UPSTREAM
4849	71	7/31/97	6	651	100	DOWNSTREAM
4849	72	7/31/97	6	650	0	DOWNSTREAM
4849	73	7/31/97	6	650	0	UPSTREAM
4849	74	7/31/97	6	650	50	DOWNSTREAM
4849	75	7/31/97	6	650	50	UPSTREAM
4849	76	7/31/97	6	650	100	DOWNSTREAM
4849	77	7/31/97	6	650	100	UPSTREAM
4849	78	7/31/97	6			MCALESTER-SOUTH PASS LAURA, LIN
4849	79	7/31/97	6			MCALESTER-SOUTH PASS LAURA, LIN
4849	80	7/31/97	6			MCALESTER-SOUTH PASS
4849	81	7/31/97	6			MCALESTER-SOUTH PASS
4849	82	7/31/97	6			MCALESTER-SOUTH PASS
4849	83	7/31/97	6			MCALESTER-SOUTH PASS
4849	84	7/31/97	6			MCALESTER-SOUTH PASS
3653	1	7/2/97	2	HDWY-1		SEEP E. OF HIDEAWAY CAMP TOILET
3653	2	7/2/97	2	HDWY-1		SEEP E. OF HIDEAWAY CAMP TOILET
3653	3	7/2/97	2	HDWY-2		SEEP W. OF HIDEAWAY CAMP TOILET
3653	4	7/2/97	2	HDWY-3		SEEP E. OF HIDEAWAY CAMP TRAIL TO TOILET
3653	5	7/2/97	2	HDWY-4		SEEP W. OF TRAIL INTO CAMP
3653	6	7/2/97	2			BLUE BUTTERFLIES AT HIDEAWAY CAMP JUNCTION
3653	7	7/2/97	2			BLUE BUTTERFLIES AT HIDEAWAY CAMP JUNCTION
3653	8	7/2/97	2			BLUE BUTTERFLIES AT HIDEAWAY CAMP JUNCTION
3653	9	7/8/97	2	506		SEEP N. 506
3653	10	7/8/97	2	506		SEEP N. 506
3653	11	7/8/97	2	508A	0	DOWN
3653	12	7/8/97	2	508A	0	UP
3653	13	7/8/97	2	508A	50	DOWN
3653	14	7/8/97	2	508A	50	UP
3653	15	7/8/97	2	508A	100	UP
3653	16	7/8/97	2	508A	100	DOWN
3653	17	7/8/97	2	519-1	0	DOWN
3653	18	7/8/97	2	519-1	0	UP
3653	19	7/8/97	2	519-1	0	UP
3653	20	7/8/97	2	519-1	40	SURROUNDINGS EAST - RAINBOW PASS
3653	21	7/8/97	2	519-1	40	SURROUNDINGS SOUTH - RAINBOW PASS
3653	22	7/8/97	2	519-1	50	DOWN
3653	23	7/8/97	2	519-1	50	UP
3653	24	7/8/97	2	519-1	100	DOWN
3653	25	7/8/97	2	519-1	100	UP
3653	26	7/9/97	2	519-2	0	DOWN
3653	27	7/9/97	2	519-2	0	UP
3653	28	7/9/97	2	519-2	50	DOWN
3653	29	7/9/97	2	519-2	50	UP
3653	30	7/9/97	2	519-2	100	DOWN
3653	31	7/9/97	2	519-2	100	UP
3653	32	7/9/97	2	519-2	100	UP
3653	33	7/10/97	2	511A	0	DOWN
3653	34	7/10/97	2	511A	0	UP
3653	35	7/10/97	2	511A	50	DOWN TRAIL CROSSING
3653	36	7/10/97	2	511A	50	UP TRAIL CROSSING
3653	37	7/10/97	2	508	0	TRAIL CROSSING NORTHBOUND
3653	38	7/10/97	3	508	0	DOWN
3653	39	7/10/97	3	508	0	UP
3653	40	7/10/97	3	508	0	DOWN
3653	41	7/10/97	3	508	0	UP
3653	42	7/10/97	3	508	50	UP
3653	43	7/10/97	3	508	50	DOWN
3653	44	7/10/97	3	508	69	SPRING
3653	45	7/10/97	3	508	69	DOWN
3653	46	7/10/97	3	SOFORK		SEEP AT S. FORK CAMP FACING N. AT E. END
3653	47	7/10/97	3	SOFORK		SEEP AT S. FORK CAMP FACING W. AT E. END
3653	48	7/15/97	3	618	0	DOWN
3653	49	7/15/97	3	618	0	UP

TABLE A 4. PHOTO CATALOG - 1997

NOCA - AMPHIBIAN SURVEY BRIDGE CREEK - 1997

PHOTO CD#	PHOTO #	DATE	ROLL #	SITENUMBER	STMETER	SUBJECT
3653	50	7/15/97	3	618	50	DOWN
3653	51	7/15/97	3	618	50	UP
3653	52	7/15/97	3	618	100	DOWN
3653	53	7/15/97	3	618	100	UP
3653	54	7/15/97	3	MR02		1
3653	55	7/15/97	3	MR02		2
3653	56	7/15/97	3	MR02		3
3653	57	7/15/97	3	MR02		4
3653	58	7/15/97	3	MR02		5
3653	59	7/15/97	3	MR02		AMMA ADULT
3653	60	7/15/97	3	MR02		AMMA ADULT
3653	61	7/15/97	3	MR02		AMMA ADULT
3653	62	7/15/97	3	MR02		AMMA ADULT
3653	63	7/15/97	3	MR02		HORIZONTAL AMMA ADULT HABITAT
3653	64	7/15/97	3	MR02		VERTICAL AMMA ADULT HABITAT
3653	65	7/15/97	3	MR02		MRO2 - STILETTO PEAK N.W.
3653	66	7/15/97	3	MR02		MRO2 - STILETTO PEAK N.W.
3653	67	7/15/97	3	MR02		MRO2 - STILETTO PEAK N.W.
3653	68	7/15/97	3	MR03		MRO3 SW TWISP PASS LAKE LOOKING EAST
3653	69	7/15/97	3	MR03		MRO3 SW TWISP PASS LAKE LOOKING NORTHEAST
3653	70	7/15/97	3	MR03		MRO3 SW TWISP PASS LAKE LOOKING EAST
3653	71	7/15/97	3	MR03		MRO3 SW TWISP PASS LAKE LOOKING SOUTH
3653	72	7/16/97	3	MR02		TRAP 8 , AMMA LARVAE IN BAG
3653	73	7/16/97	3	MR02		TRAP 8 , AMMA LARVAE IN BAG
3653	74	7/16/97	3	MR02		TRAP 8 , AMMA LARVAE IN BAG
3653	75	8/20/97	9	MR28		RALU ADULT DORSAL
3653	76	8/20/97	9	MR28		RALU TADPOLE DORSAL
3653	77	8/20/97	9	MR28		RALU TADPOLE LATERAL
3653	78	8/20/97	9	MR28		OVERVIEW OF WETLAND BELOW DAGGER LAKE
3653	79	8/20/97	9	613	0	DOWNSTREAM JIGGLY
3653	80	8/20/97	9	613	0	DOWNSTREAM - FROM STILLETO TO DAGGER LAKE
3653	81	8/20/97	9	613	0	UPSTREAM
3653	82	8/20/97	9	613	50	DOWNSTREAM
3653	83	8/20/97	9	613	50	UPSTREAM
3653	84	8/20/97	9	613	100	DOWNSTREAM
3653	85	8/20/97	9	613	100	UPSTREAM
3653	86	8/21/97	9	MR28		RASP JUVENILE DORSAL
3653	87	8/21/97	9	MR28		RASP JUVENILE VENTRAL
3653	88	8/21/97	9	MR28		RASP JUVENILE LATERAL
3653	89	8/21/97	9	MR28		CUTTHROAT SUB-ADULT
3653	90	8/21/97	9	MR04		E SHORE OF DAGGER, RALU DORSAL
3653	91	8/21/97	9	MR04		E SHORE OF DAGGER, RALU VENTRAL
3653	92	8/21/97	9	MR04		RALU JUVENILE DORSAL E. SHORE DAGGER LAKE
3653	93	8/21/97	9	MR04		RALU JUVENILE VENTRAL E. SHORE DAGGER LAKE
3653	94	8/21/97	9	MR04		DAGGER L. FROM E. TO NW
3653	95	8/21/97	9	MR04		DAGGER L. FROM E . TO W
3653	96	8/21/97	9	MR04		DAGGER L. FROM E. TO S
3652	1	7/16/97	4	MR03		AMMA LARVAE DORSAL
3652	2	7/16/97	4	MR03		AMMA LARVAE DORSAL
3652	3	7/16/97	4	MR03		VIEW SOUTH
3652	4	7/16/97	4	MR03		VIEW NORTH
3652	5	7/16/97	4	MR04		RALU ADULT MALE DORSAL
3652	6	7/16/97	4	MR04		RALU ADULT MALE DORSAL
3652	7	7/16/97	4	MR04		RALU ADULT MALE DORSAL
3652	8	7/16/97	4	MR04		RALU ADULT VENTRAL
3652	9	7/16/97	4	MR04		RALU ADULT DORSAL IN NET
3652	10	7/16/97	4	MR04		RALU ADULT FEMALE VENTRAL
3652	11	7/16/97	4	MR04-1		HATCHLINGS FROM DAGGER POTHOLE
3652	12	7/16/97	4	MR04-1		HATCHLINGS FROM DAGGER POTHOLE
3652	13	7/16/97	4	MR04-1		EGG MASS FROM DAGGER OUTLET POTHOLE
3652	14	7/16/97	4	MR04-1		TRAP #6 IN DAGGER OUTLET
3652	15	7/16/97	4	MR04		DAGGER OUTLET LOOKING EAST
3652	16	7/16/97	4	MR04		DAGGER NORTH SHORE LOOKING SW
3652	17	7/16/97	4	MR04		DAGGER SPOTTED FROG HABITAT SHALLOW GRASS
3652	18	7/16/97	4	MR04		DAGGER SPOTTED FROG HABITAT SHALLOW GRASS
3652	19	7/16/97	4	MR04		CAP #1, RALU ADULT FEMALE VENTRAL
3652	20	7/16/97	4	MR04		CAP #1, RALU ADULT FEMALE VENTRAL

TABLE A 4. PHOTO CATALOG - 1997

NOCA - AMPHIBIAN SURVEY BRIDGE CREEK - 1997

PHOTO CD#	PHOTO #	DATE	ROLL #	SITENUMBER	STMETER	SUBJECT
3652	21	7/16/97	4	MR04		CAP #1, RALU ADULT FEMALE LATERAL
3652	22	7/16/97	4	MR04		CAP #2, RALU ADULT FEMALE VENTRAL
3652	23	7/16/97	4			SWALLOWTAIL BUTTERFLY
3652	24	7/23/97	4	FIREWEED	50	STREAM THROUGH EAST FIREWEED DOWNSTREAM
3652	25	7/23/97	4	FIREWEED	50	" UPSTREAM
3652	26	7/23/97	4	FIREWEED	50	" DOWNSTREAM
3652	27	7/23/97	4	FIREWEED	0	" UPSTREAM
3652	28	7/23/97	4	FIREWEED	0	" DOWNSTREAM
3652	29	7/23/97	4	702A	0	UPSTREAM
3652	30	7/23/97	4	702A	0	DOWNSTREAM
3652	31	7/23/97	4	702A	50	DOWNSTREAM
3652	32	7/23/97	4	702A	50	UPSTREAM
3652	33	7/23/97	4	702A	100	UPSTREAM
3652	34	7/23/97	4	702A	100	DOWNSTREAM
3652	35	7/23/97	4	702A	TRAIL	TRAIL CROSSING LOOKING SOUTH
3652	36	7/23/97	4	702	0	DOWNSTREAM
3652	37	7/23/97	4	702	0	UPSTREAM
3652	38	7/23/97	5	702	50	DOWNSTREAM
3652	39	7/23/97	5	702	50	UPSTREAM
3652	40	7/23/97	5	702	50	DOWNSTREAM
3652	41	7/23/97	5	702	50	UPSTREAM
3652	42	7/23/97	5	702	100	DOWNSTREAM
3652	43	7/23/97	5	702	100	UPSTREAM
3652	44	7/29/97	5	MR19		MCALESTER PASS PONDS CAP #1
3652	45	7/29/97	5	MR19		MCALESTER PASS PONDS CAP #2
3652	46	7/29/97	5	MR19		MCALESTER PASS PONDS CAP #3
3652	47	7/29/97	5	MR19		MCALESTER PASS PONDS CAP #1 ENVIRONMENT
3652	48	7/29/97	5	MR19		MCALESTER PASS PONDS CAP #1 ENVIRONMENT
3652	49	7/29/97	5	MR19		MCALESTER PASS PONDS CAP #1 ENVIRONMENT
3652	50	7/29/97	5	MR19		MCALESTER PASS PONDS TO SOUTH WEST
3652	51	7/29/97	5	MR19		MCALESTER PASS PONDS TO SOUTH WEST
3652	52	7/29/97	5	MR19		MCALESTER PASS PONDS CAP #4
3652	53	7/29/97	5	MR19		MCALESTER PASS PONDS TO WEST SOUTH WEST
3652	54	7/29/97	5	MR19		MCALESTER PASS PONDS TO WEST SOUTH WEST
3652	55	7/29/97	5	1042H	0	RAINBOW CK. HEADWATERS @MCALESTER PASS
3652	56	7/29/97	5	1042H	0	" DOWNSTREAM
3652	57	7/29/97	5	1042H	0	" UPSTREAM
3652	58	7/29/97	5	1042H	50	" DOWNSTREAM
3652	59	7/29/97	5	1042H	50	" UPSTREAM
3652	60	7/29/97	5	1042H	100	" UPSTREAM
3652	61	7/29/97	5	1042H	100	" DOWNSTREAM
3652	62	7/29/97	5	MR19		RALU ADULT W/DISTENDED ABDOMEN ON ONE SIDE
3652	63	7/29/97	5	MR19		RALU ADULT W/DISTENDED ABDOMEN ON ONE SIDE
3652	64	7/29/97	5	MR20		MCALESTER POND - 1/4 MI WEST OF PASS, PICT # 1
3652	65	7/29/97	5	MR20		MCALESTER POND - 1/4 MI WEST OF PASS, PICT # 2
3652	66	7/29/97	5	MR20		MCALESTER POND - 1/4 MI WEST OF PASS, PICT # 3
3652	67	7/30/97	5	MR10-2		POND NW OF MCALESTER LAKE TO NW
3652	68	7/30/97	5	MR10-2		POND NW OF MCALESTER LAKE TO N
3652	69	7/30/97	5	MR10-2		POND NW OF MCALESTER LAKE TO NE
3652	70	7/30/97	5	MR10		MCALESTER LAKE, SE TO MCALESTER PASS
3652	71	7/30/97	5	MR10		RALU IN HABITAT
3652	72	7/30/97	5	MR10		RALU ADULT VENTRAL CAP # 1
3652	73	7/30/97	5	MR10		RALU IN HABITAT
3652	74	7/30/97	5	MR10		RALU ADULT DORSAL CAP # 2
3652	75	8/13/97	8	208A	4	DOWNSTREAM
3652	76	8/13/97	8	208A	4	DOWNSTREAM
3652	77	8/13/97	8	208A	4	UPSTREAM
3652	78	8/13/97	8	208A	50	DOWNSTREAM
3652	79	8/13/97	8	208A	50	UPSTREAM
3652	80	8/13/97	8	208A	60	ASTR METAMORPH
3652	81	8/13/97	8	208A	60	ASTR METAMORPH
3652	82	8/13/97	8	208A	100	DOWNSTREAM
3652	83	8/13/97	8	208A	100	UPSTREAM
3652	84	8/14/97	8	MM05		RACA TADPOLE DORSAL
3652	85	8/14/97	8	MM05		RACA TADPOLE LATERAL IN BAG
3652	86	8/14/97	8	MM05		RACA TADPOLE LATERAL IN HAND
3652	87	8/14/97	8	MM05		AMMA LARVAE DORSAL

TABLE A 4. PHOTO CATALOG - 1997

NOCA - AMPHIBIAN SURVEY BRIDGE CREEK - 1997

PHOTO CD#	PHOTO #	DATE	ROLL #	SITENUMBER	STMETER	SUBJECT
3652	88	8/14/97	8	MM05		AMMA LARVAE DORSAL
3652	89	8/14/97	8	MM13		POND NEAR BRIDGE CK TRAILHEAD LOOKING SE
3652	90	8/14/97	8	MM13		POND NEAR BRIDGE CK TRAILHEAD LOOKING NE
3652	91	8/15/97	8	MM13		HYRE METAMORPH
3652	92	8/15/97	8	MM13		POND LILY HABITAT
3652	93	8/15/97	8	MM13		BUBO DORSAL OBLIQUE TOO DARK
3652	94	8/20/97	8	MR28		RACA ADULT DORSAL CAP # 1
3652	95	8/20/97	8	MR28		RACA ADULT VENTRAL CAP # 1
3652	96	8/20/97	8	MR28		RACA ADULT HIND FOOT WEBBING CAP # 1
3652	97	8/20/97	8	MR28		RACA ADULT IN HABITAT
3652	98	8/20/97	8	MR28		WETLAND LOOKING WEST
3652	99	8/20/97	8	MR28		RALU ADULT DORSAL
3652	100	8/20/97	8	MR28		RALU ADULT VENTRAL
125	1	8/27/97	11	PM07-1		RALU OR RACA? DORSAL
125	2	8/27/97	11	PM07-1		RALU OR RACA? VENTRAL
125	3	8/27/97	11	PM07-1		GARTER SNAKE IN HAND
125	4	8/27/97	11	PM07-1		GARTER SNAKE IN HAND
125	5	8/27/97	11	PM07-1		AMGR LARGE NEOTENE IN HAND
125	6	8/27/97	11	PM07-1		16" CUTTHROAT TROUT
125	7	8/27/97	11	PM07-1		16" CUTTHROAT TROUT
125	8	9/2/97	11	602	0	UPSTREAM
125	9	9/2/97	11	602	0	DOWNSTREAM
125	10	9/2/97	11	602	50	UPSTREAM
125	11	9/2/97	11	602	50	DOWNSTREAM
125	12	9/2/97	11	602	100	UPSTREAM
125	13	9/2/97	11	602	100	DOWNSTREAM
125	14	9/3/97	11	705	0	UPSTREAM
125	15	9/3/97	11	705	0	DOWNSTREAM
125	16	9/3/97	11	705	50	DOWNSTREAM
125	17	9/3/97	11	705	50	UPSTREAM
125	18	9/3/97	11	705	38	ASTR JUVENILE, INCIDENTAL
125	19	9/3/97	11	705	100	DOWNSTREAM
125	20	9/3/97	11	705	100	UPSTREAM
125	21	9/3/97	11	705	98	ASTR ADULT MALE DORSAL
125	22	9/3/97	11	705	98	ASTR ADULT MALE DORSAL
125	23	9/3/97	11	705	98	ASTR ADULT MALE DORSAL
125	24	9/3/97	11	705	98	ASTR ADULT MALE VENTRAL
125	25	9/3/97	11	705	98	ASTR INSTREAM
125	26	9/3/97	11	705	98	ASTR INSTREAM
125	27	9/10/97	13	630	0	UPSTREAM
125	28	9/10/97	13	630	0	DOWNSTREAM
125	29	9/10/97	13	630	50	UPSTREAM
125	30	9/10/97	13	630	50	DOWNSTREAM
125	31	9/10/97	13	630	100	DOWNSTREAM
125	32	9/10/97	13	630	100	UPSTREAM
125	33	9/18/97	13	M20		LOWER THORNTON LAKE
125	34	9/18/97	13	M20		LOWER THORNTON LAKE
125	35	9/18/97	13	M20		LOWER THORNTON LAKE
125	36	9/18/97	13	M20		LOWER THORNTON LAKE
125	37	9/24/97	13	MM03		LAST CHANCE LAKE WEST
125	38	9/24/97	13	MM03		LAST CHANCE LAKE WEST
125	39	9/24/97	13	MM03		LAST CHANCE LAKE SW
125	40	9/24/97	13	MM03		LAST CHANCE LAKE WNW
125	41	9/24/97	13	MM03		LAST CHANCE LAKE SW
125	42	9/24/97	13	MM03		LAST CHANCE LAKE W
125	43	9/24/97	13	MM03		LAST CHANCE LAKE NW
125	44	9/24/97	13	MM03		LAST CHANCE LAKE FROM AIR WEST
125	45	9/24/97	13	MM03		LAST CHANCE LAKE FROM AIR WEST
125	46	9/24/97	13	MM04		SOUTH
125	47	9/24/97	13	MM04		WEST
125	48	9/24/97	13	MM04		NORTH
125	49	9/24/97	13	MM04		NORTH
125	50	9/24/97	13	MM04		TOWARD MAPLE PASS NORTHEAST
125	51	9/24/97	13	MM04		BEAR CUB TRACKS IN MUD
125	52	9/24/97	13	MM04		BEAR CUB TRACKS IN MUD
125	53	9/24/97	13	305		DOWNSTREAM
125	54	9/24/97	13	305		UPSTREAM

TABLE A 4. PHOTO CATALOG - 1997

NOCA - AMPHIBIAN SURVEY BRIDGE CREEK - 1997

PHOTO CD#	PHOTO #	DATE	ROLL #	SITENUMBER	STMETER	SUBJECT
125	55	9/24/97	13	305		UPSTREAM CLOSE
125	56	9/24/97	13	305		DOWNSTREAM
125	57	9/24/97	13	305		UPSTREAM
125	58	9/24/97	13	305		DOWNSTREAM
125	59	9/24/97	13	MA04		LOWER POND AND CAMP
125	60	9/24/97	13	MA04		MIDDLE POND
125	61	9/25/97	14	MA04		UPPER, SOUTH POND
125	62	9/25/97	14	434		WOODY CK DOWNVALLEY TO MEADOW 434
125	63	9/25/97	14	434		WOODY CK DOWNVALLEY TO MEADOW 434
125	64	9/25/97	14	MM01		UPPER, SOUTH POND
125	65	9/25/97	14	MM01		UPPER, SOUTH POND
125	66	9/25/97	14	MM01		UPPER, SOUTH POND
125	67	9/25/97	14	MM01		UPPER, SOUTH POND
125	68	9/25/97	14	MM01		VIEW TO WEST , FALLS CREEK TO FISHER PASS
125	69	9/25/97	14	MM01		UPPER POND FOREGROUND LOWER IN BACK
125	70	9/25/97	14	MM01		BOTH PONDS TO NORTH
125	71	9/25/97	14	MM01		VIEW TO WEST , FALLS CREEK TO FISHER PASS
125	72	9/25/97	14	MM01		STREAM BETWEEN PONDS
125	73	9/25/97	14	MM01		NORTH, LOWER POND
125	74	9/25/97	14	MM01		NORTH, LOWER POND
125	75	9/25/97	14	434A		WOODY CK MEADOWS
125	76	9/25/97	14	434A		WOODY CK MEADOWS UPSTREAM FROM AIR
125	77	9/25/97	14	434A		WOODY CK MEADOWS UPSTREAM FROM AIR
125	78	9/25/97	14	434A		WOODY CK MEADOWS UPSTREAM FROM AIR
125	79	9/25/97	14	434A		WOODY CK MEADOWS UPSTREAM FROM AIR
125	80	9/25/97	14	434A		WOODY CK MEADOWS DOWN STREAM W FROM AIR
125	81	9/25/97	14	434A		WOODY CK MEADOWS NW FROM GROUND H
125	82	9/25/97	14	434A		WOODY CK MEADOWS NW FROM GROUND V
125	83	9/25/97	14	434A		WOODY CK MEADOWS NORTH SIDE AVALANCHE CHUTES
125	84	9/25/97	14	434A		WOODY CK EAST UPSTREAM
125	85	9/25/97	14	434A		WOODY CK EAST UPVALLEY
125	86	9/25/97	14	434A		AMMA LARVA FROM POTHOLE ON S SIDE 434
125	87	9/25/97	14	434A		AMMA LARVA FROM POTHOLE ON S SIDE 434
125	88	7/31/97	7	LANDSCAPE		McALESTER - SOUTH PASS RIDGE SUNSET
125	89	7/31/97	7	LANDSCAPE		McALESTER - SOUTH PASS RIDGE SUNSET
125	90	7/31/97	7	LANDSCAPE		McALESTER - SOUTH PASS RIDGE SUNSET
125	91	8/6/97	7	401-146		ASTR METAMORPH 39-MILE CREEK, BIG BEAVER
125	92	8/6/97	7	401-146		ASTR METAMORPH 39-MILE CREEK, BIG BEAVER
125	93	8/6/97	7	401-146		39-MILE CREEK, BIG BEAVER VALLEY
125	94	8/6/97	7	401-146		39-MILE CREEK, BIG BEAVER VALLEY
125	95	8/7/97	7	PM07-1		AMGR LARVA LATERAL, TRAP 2
125	96	8/7/97	7	PM07-1		AMGR LARVA LATERAL, TRAP 2
125	97	8/7/97	7	PM07-1		AMGR LARVA DORSAL, TRAP 2
125	98	8/7/97	7	PM07-1		RACA METAMORPH W/LONG TAIL
125	99	8/7/97	7	PM07-1		RACA METAMORPH W/LONG TAIL
125	100	8/7/97	7	PM07-2		RACA ADULT VENTRAL
137	1	8/7/97	7	PM07-2		RACA ADULT DORSAL
137	2	8/7/97	7	PM07-2		RACA ADULT DORSAL
137	3	8/7/97	7	PM07-2		RACA ADULT DORSAL
137	4	8/7/97	7	PM07-2		RACA ADULT VENTRAL
137	5	8/7/97	7			PM07-1,2 HABITAT
137	6	8/7/97	7			PM07-1,2 HABITAT
137	7	8/7/97	7			PM07-1,2 HABITAT
137	8	8/7/97	7			PM07-1,2 HABITAT
137	9	8/12/97	7	401	0	DOWNSTREAM
137	10	8/12/97	7	401	0	UPSTREAM
137	11	8/12/97	7	401	50	UPSTREAM
137	12	8/12/97	7	401	50	DOWNSTREAM
137	13	8/12/97	7	401	100	UPSTREAM
137	14	8/12/97	7	401	100	DOWNSTREAM
137	15	8/12/97	7	224	0	DOWNSTREAM
137	16	8/12/97	7	224	0	UPSTREAM
137	17	8/12/97	7	224	50	UPSTREAM
137	18	8/12/97	7	224	50	DOWNSTREAM
137	19	8/12/97	7	224	100	UPSTREAM
137	20	8/12/97	7	224	100	DOWNSTREAM
137	21	8/13/97	7	MM05		SE

TABLE A 4. PHOTO CATALOG - 1997

NOCA - AMPHIBIAN SURVEY BRIDGE CREEK - 1997

PHOTO CD#	PHOTO #	DATE	ROLL #	SITENUMBER	STMETER	SUBJECT
137	22	8/13/97	7	MM05		SW
137	23	8/13/97	7	MM05		SOUTH
137	24	8/13/97	7	MM05		FROM TRAIL
137	25	8/13/97	7	MM05		FROM TRAIL
4044	1	9/3/97	12	705A	0	DOWNSTREAM
4044	2	9/3/97	12	705A	0	UPSTREAM
4044	3	9/3/97	12	705A	50	UPSTREAM
4044	4	9/3/97	12	705A	50	DOWNSTREAM
4044	5	9/3/97	12	705A	88	UPSTREAM
4044	6	9/3/97	12	705A	88	DOWNSTREAM
4044	7	9/4/97	12	641A	0	UPSTREAM
4044	8	9/4/97	12	641A	0	DOWNSTREAM
4044	9	9/4/97	12	641A	50	UPSTREAM
4044	10	9/4/97	12	641A	50	DOWNSTREAM
4044	11	9/4/97	12	641A	100	DOWNSTREAM
4044	12	9/4/97	12	641A	100	UPSTREAM
4044	13	9/4/97	12	641	0	DOWNSTREAM
4044	14	9/4/97	12	641	0	UPSTREAM
4044	15	9/4/97	12	641	50	DOWNSTREAM
4044	16	9/4/97	12	641	50	UPSTREAM
4044	17	9/4/97	12	641	100	DOWNSTREAM
4044	18	9/4/97	12	641	100	UPSTREAM
4044	19	9/5/97	12	8	0	DOWNSTREAM
4044	20	9/5/97	12	8	0	UPSTREAM
4044	21	9/5/97	12	8	50	DOWNSTREAM
4044	22	9/5/97	12	8	50	UPSTREAM
4044	23	9/5/97	12	8	100	DOWNSTREAM
4044	24	9/5/97	12	8	100	UPSTREAM
4044	25	9/5/97	12	SKIP		
4044	26	9/8/97	12	6	0	UPSTREAM
4044	27	9/8/97	12	6	0	DOWNSTREAM
4044	28	9/8/97	12	6	50	UPSTREAM
4044	29	9/8/97	12	6	50	DOWNSTREAM
4044	30	9/8/97	12	6	100	UPSTREAM
4044	31	9/8/97	12	6	100	DOWNSTREAM
4044	32	9/9/97	12	502	0	DOWNSTREAM
4044	33	9/9/97	12	502	0	UPSTREAM
4044	34	9/9/97	12	502	50	UPSTREAM
4044	35	9/9/97	12	502	50	DOWNSTREAM
4044	36	9/9/97	12	502	100	DOWNSTREAM
4044	37	9/9/97	12	502	100	UPSTREAM

TABLE A 5. ACCESSORY DATA TABLE - STREAMS

NOCA - AMPHIBIAN SURVEY BRIDGE CREEK -1997

SITE				1ST	2ND	3RD	4TH			SURVEY				AIR		REFERENCE PHOTOS	
NUMBER	REACH	DATE	QUAD	CREW	CREW	CREW	CREW	START	END	TIME	CLOUDS	PRECI	WIND	TEMP	COMMENTS	CD#	PHOTO # 'S
6	1	9/8/97	McALESTER MTN	LMM	LAT	REH		15:45	17:00	1:15	CLR	D	C	74	BRIDGE CK NEAR HIDEAWAY	4044	26-31
8	1	9/5/97	McALESTER MTN	LMM	LAT	REH		8:15	11:15	3:00	PC	D	C	44	BRIDGE CK UP FROM FIREWEED	4044	19-24
224	1	8/12/97	MT LOGAN	LMM	LAT	REH		12:20	14:10	1:50	CLR	D	C	80	1 MILE W OF GRIZZLY CK	137	15-20
401	1	8/12/97	McGREGOR MTN	LMM	LAT	REH		8:20	11:00	2:40	PC	D	C	54	GRIZZLY CK ABOVE TRAIL	137	9-14
502	1	9/9/97	McGREGOR MTN	LMM	LAT	REH		13:40	16:00	2:20	CLR	D	LB	72	S.FORK E. BRAID NEAR TRAIL	4044	32-37
508	1	7/10/97	McGREGOR MTN	LMM	LAT	REH	ABH	13:00	14:40	1:40	CO	D	LB	50	S. FORK TRIB N.EDGE OF DAN'S CAM	3653	37-45
519	1	7/9/97	McALESTER MTN	LMM	LAT	REH	ABH	12:20	15:00	2:40	PC	D	C	53	S. FORK HEADWATER RAINBOW PASS	3653	17-25
519	2	7/9/97	McALESTER MTN	LMM	LAT	REH	ABH	15:10	17:10	2:00	PC	D	MB	52	S. FORK HEADWATER RAINBOW PASS	3653	26-32
544	1	7/1/97	McGREGOR MTN	LMM	LAT	REH		13:45	16:45	3:00	CO	D	LB	59	FRISCO CK ABOVE TRAIL	4849	24-32
545	1	6/26/97	McGREGOR MTN	LMM	LAT	REH		11:05	17:00	5:55	PC	D	MB	55	TRIB OF BRIDGE CK	4849	10-23
602	1	9/2/97	McALESTER MTN	LMM	LAT	REH		14:55	17:58	3:03	CLR	D	C	67	DRAINAGE FROM DAGGER LK	125	8-13
613	1	8/20/97	McALESTER MTN	LMM	LAT	REH		12:35	14:15	1:40	CO	LR	LB	58	FROM STILLETO LK TO DAGGER LK	3653	79-85
618	1	7/15/97	McALESTER MTN	LMM	LAT	REH		9:30	11:30	2:00	PC	D	LB	50	MR02 OUTLET	3653	48-53
630	1	9/10/97	McALESTER MTN	LMM	LAT	REH		9:35	12:08	2:33	OC	D	C	50	MCALESTER CK	125	27-32
641	1	9/4/97	McALESTER MTN	LMM	LAT	REH		15:20	17:30	2:10	CLR	D	C	54	23M ABOVE TR. CROSSING	4044	13-18
650	1	7/31/97	McALESTER MTN	LMM	LAT	REH		14:15	16:15	2:00	CLR	D	C	65	S. INLET TO MCALESTER LK	4849	72-77
651	1	7/31/97	McALESTER MTN	LMM	LAT	REH		10:00	12:00	2:00	CLR	D	C	57	N. INLET TO MCALESTER LK	4849	66-71
701	1	7/2/97	McALESTER MTN	LMM	LAT	REH		9:10	12:00	2:50	CLR	D	LB	54	TRIB OF BRIDGE CK	4849	33-40
702	1	7/23/97	McALESTER MTN	SLB	LAT	BLC	SC	14:13	16:10	1:57	CLR	D	C	69	TRIB OF BRIDGE CK	3652	36-43
705	1	9/3/97	McALESTER MTN	LMM	LAT	REH		9:20	12:30	3:10	CO	D	C	57	1ST TRIB S OF NPS BOUNDARY	125	14-26
1042H	1	7/29/97	McALESTER MTN	LMM	LAT	REH		13:44	15:30	1:46	CO	LR	LB	54	RAINBOW CK HEADWATER	3652	55-61
208A	1	8/13/97	McGREGOR MTN	LMM	LAT	REH		11:45	14:39	2:54	CO	D	C	75	N. FORK TRIB .25 MI N OF MM05	3652	75-83
508A	1	7/10/97	McGREGOR MTN	LMM	LAT	REH	ABH	11:10	13:00	1:50	CO	LR	LB	59	S. FORK TRIB S.EDGE OF DAN'S CAMP	3653	11-16
511A	1	7/10/97	McGREGOR MTN	LMM	LAT	REH	ABH	9:40	12:02	2:22	CO	D	C	44	S. FORK TRIB S. OF DANS	3653	33-36
601A	1	6/27/97	McALESTER MTN	LMM	LAT	REH		8:50	10:05	1:15	PC	D	C	43	NEAR FIREWEED CAMP	4849	41-45
641A	1	9/7/97	McALESTER MTN	LMM	LAT	REH		12:45	15:00	2:15	CLR	D	LB	53	100M DNST MCAL.TR. CROSS	4044	7-12
702A	1	7/23/97	McALESTER MTN	SLB	LAT	BLC	SC	10:45	13:18	2:33	CLR	D	C	57	TRIB OF BRIDGE CK	3652	29-35
705A	1	9/3/97	McALESTER MTN	LMM	LAT	REH		13:43	16:00	2:17	CO	D	C	54	10M UP FROM TRAIL	4044	1-6

CREW:

ABH AMY B.HILL
BLC BRENDA L. CUNNINGHAM
LAT LAURA A. THEL
LMM LIN M. MERGEN
PDB PATRICK D. BULLER
REH RONALD E. HOLMES
RSG REED S. GLESNE
SC SIMON COWAN
SLB SHERRY L. BOTTOMS

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 A 6. ACCESSORY DATA TABLE - LAKES, PONDS, SEEPS

NOCA - AMPHIBIAN SURVEY BRIDGE CREEK -1997

SITE NUMBER	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
LAKES																
MA04	9/24/97	MT ARRIVA	PDB	RSG	REH		15:30	16:50	1:20	CLR	D	LB	65	WOODY CK HEADWATER PONDS	125	59-61
MM01	9/24/97	McGREGOR MTN	PDB	RSG	REH		9:30	11:00	1:30	CLR	D	LB	47	FALLS CK HEADWATER PONDS	125	64-74
MM03	9/24/97	McGREGOR MTN	PDB	RSG	REH		9:20	10:20	1:00	CLR	D	C	57	UNNAMED, LAST CHANCE	125	37-45
MM04	9/24/97	McGREGOR MTN	PDB	RSG	REH		11:50	13:00	1:10	CLR	D	C	61	UNNAMED, MAPLE CK	125	46-52
MM05	8/13/97	McGREGOR MTN	LMM	LAT	REH		9:30	10:45	1:15	PC	D	C	69	POND BETWEEN TR. & N. FORK	3652, 167	84-88, 21-25
MM13	8/14/97	McGREGOR MTN	LMM	LAT	REH		2:45	3:30	0:45	CLR	D	LB	76	POND NR BRIDGE CK TRAILHEAD	3652	89-93
MR02	7/15/97	McALESTER MTN	LMM	LAT	REH		12:45	15:00	2:15	PC	D	LB	53	TWISP PASS NW LK	3653	54-67,72-74
MR03	7/15/97	McALESTER MTN	LMM	LAT	REH		16:02	16:45	0:43	PC	D	LB	59	TWISP PASS SW LK	3653, 3652	68-71, 1-4
MR04	7/16/97	McALESTER MTN	LMM	LAT	REH		14:30	16:40	2:10	PC	D	LB	65	DAGGER LAKE	3653, 3652	90-96, 5-10
MR04-1	7/16/97	McALESTER MTN	LMM	LAT	REH		17:00	17:40	0:40	C	D	C	65	DAGGER LK OUTLET	3652	11-14
MR10	7/30/97	McALESTER MTN	LMM	LAT	REH		12:58	16:00	3:02	PC	D	C	61	MCALESTER LAKE	4849	46-65
MR10-2	7/30/97	McALESTER MTN	LMM	LAT	REH		12:14	12:50	0:36	PC	D	LB	51	POND NEAR MCALESTER LAKE	3652	67-69
MR19	7/29/97	McALESTER MTN	LMM	LAT	REH		8:20	11:05	2:45	PC	D	C	61	WETLAND AT MCALESTER PASS	3652	44-54, 62-63
MR20	7/29/97	McALESTER MTN	LMM	LAT	REH		13:00	13:45	0:45	CO	LR	LB	54	POND SW MCALESTER PASS	3652	64-66
MR28	8/20/97	McALESTER MTN	LMM	LAT	REH	JEH	8:53	10:53	2:00	CO	D	C	60	WETLAND BELOW DAGGER LK	3653	75-78, 86-89
SEEPS																
HDWY-1	7/2/97	McALESTER MTN	LMM	LAT	REH		14:10	14:30	0:20	CLR	D	MB	67	SEEP NEAR HIDEAWAY CAMP	3653	1,2
HDWY-2	7/2/97	McALESTER MTN	LMM	LAT	REH		14:33	14:58	0:25	CLR	D	MB	65	SEEP NEAR HIDEAWAY CAMP	3653	3
HDWY-3	7/2/97	McALESTER MTN	LMM	LAT	REH		15:02	15:30	0:28	CLR	D	MB	65	SEEP NEAR HIDEAWAY CAMP	3653	4
HDWY-4	7/2/97	McALESTER MTN	LMM	LAT	REH		15:40	16:00	0:20	CLR	D	MB	65	SEEP NEAR HIDEAWAY CAMP	3653	5
506	7/8/97	McALESTER MTN	LMM	LAT	REH	ABH	9:31	9:37	0:06	CO	LR	LB	60	SEEP OFF SOUTH FORK TRAIL	3653	9,10
434A	9/25/97	MT ARRIVA	PDB	RSG	REH		12:00	12:30	:30	PC	D	LB		POTHOLE S SIDE 434 WOODY CK	125	75-87
SOFORK	7/8/97	McALESTER MTN	LMM	LAT	REH	ABH	16:30	17:00	0:30	CO	LR	LB	52	SEEP BY SOUTH FORK CAMP	3653	46,47

CREW:

ABH	AMY B.HILL
JEH	JEDIDIAH E. HOLMES
LAT	LAURA A. THEL
LMM	LIN M. MERGEN
PDB	PATRICK D. BULLER
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 A 7.

STREAM SEARCH EFFORT & CAPTURES

NOCA - AMPHIBIAN SURVEY BRIDGE CREEK - 1997

SITE NUMBER	REACH	DATE	AREA M2 SAMPLED	SPECIES	COUNT	LIFE STAGE	TOTLGTH	SVL/HW	HL_MM	FL_MM	ENV	POS	SUBSTR
6	1	9/8/97	165	ASTR	1	T	34	12, 9			W		B,SC
8	1	9/5/97	113	ASTR	1	T	52	15,13			W		B,SC
224	1	8/12/97	8	0									
401	1	8/12/97	125	0									
502	1	9/9/97	76	0									
508	1	7/10/97	15	0									
519	1	7/9/97	50	0									
519	2	7/9/97	14	0									
544	1	7/1/97	25	0									
545	1	6/26/97	46	0									
602	1	9/2/97	33	ASTR	5,3	T,M	36,50	11,8; 18,13			R	I	P,SC
613	1	8/20/97	12	ASTR	1	T	36	10/8				N	B
618	1	7/15/97	15	0									
630	1	9/10/97	66	ASTR	2	T	38	8			R		NET
641	1	9/4/97	10	0									
650	1	7/31/97	12	0									
651	1	7/31/97	21	0									
701	1	7/2/97	11	ASTR	1	J		22	33	14	B	N	SG
702	1	7/23/97	15	0									
705	1	9/3/97	17	ASTR	1,1	J,A		25, 44			Z	N	CWD
1042H	1	7/29/97	13	0									
208A	1	8/13/97	15	ASTR	2	M	47	18/8	20	10			P,SC
508A	1	7/10/97	11	0									
511A	1	7/10/97	26	0									
601A	1	6/27/97	10	0									
641A	1	9/7/97	16	0									
702A	1	7/23/97	15	0									
705A	1	9/3/97	13	ASTR	2	A					B	N	LL

SPECIES:

ASTR = ASCAPHUS TRUEI, TAILED FROG

LIFE STAGE:

A = ADULT
M = METAMORPH
T = TADPOLE

ENVIRONMENT:

B = BANK
C = CASCADE
P = POOL
R = RIFFLE
Z = SPLASH ZONE

SUBSTRATE:

B = BOULDER
CWD = COARSE WOODY DEBRIS
LL = LEAF LITTER
NET = KICK-NET
P = PEBBLE
SC = SMALL COBBLE
SG = SMALL GRAVEL

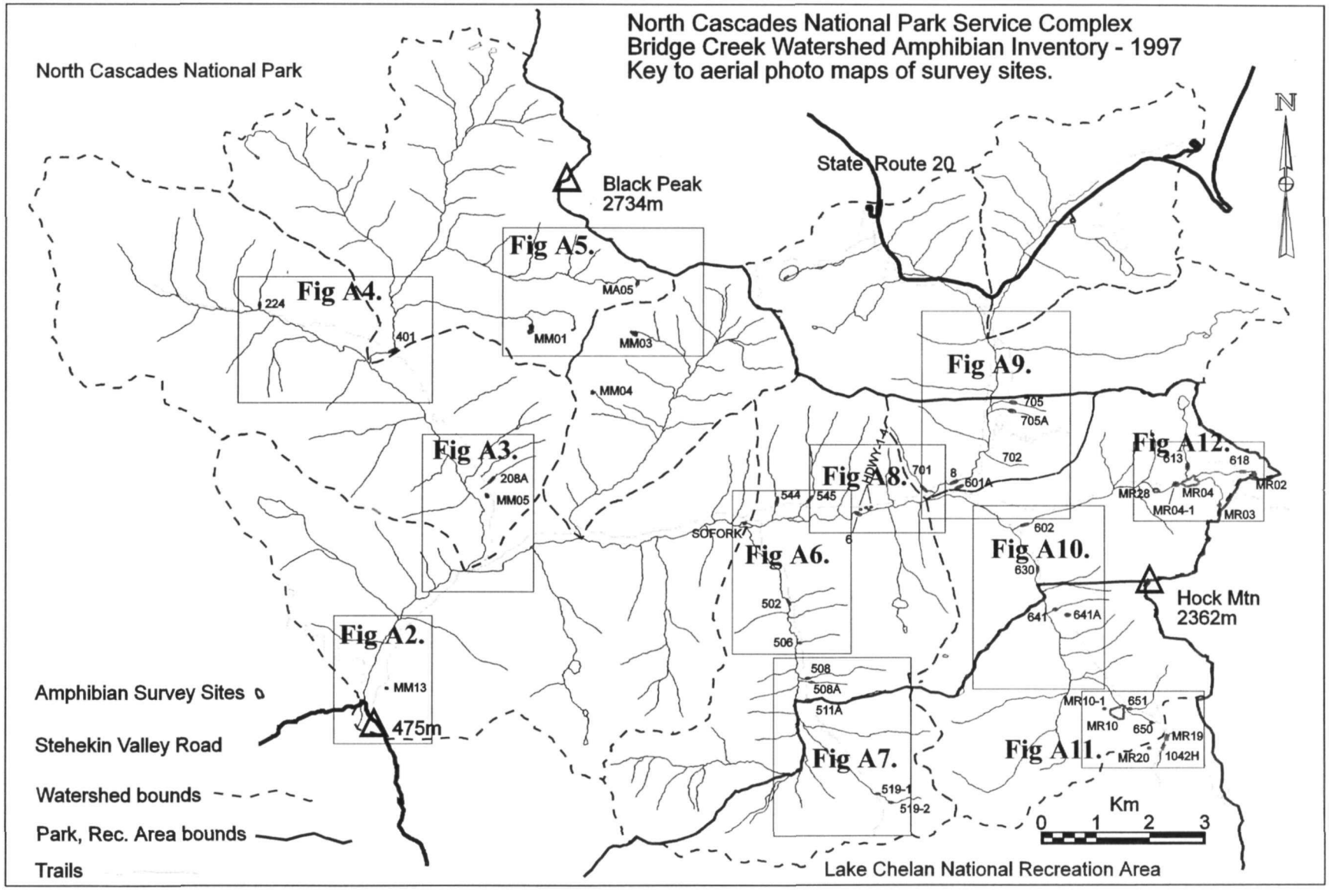

Figure A1. Bridge Creek watershed with subdrainages and key to aerial photo maps of amphibian survey sites - 1997 on following pages.

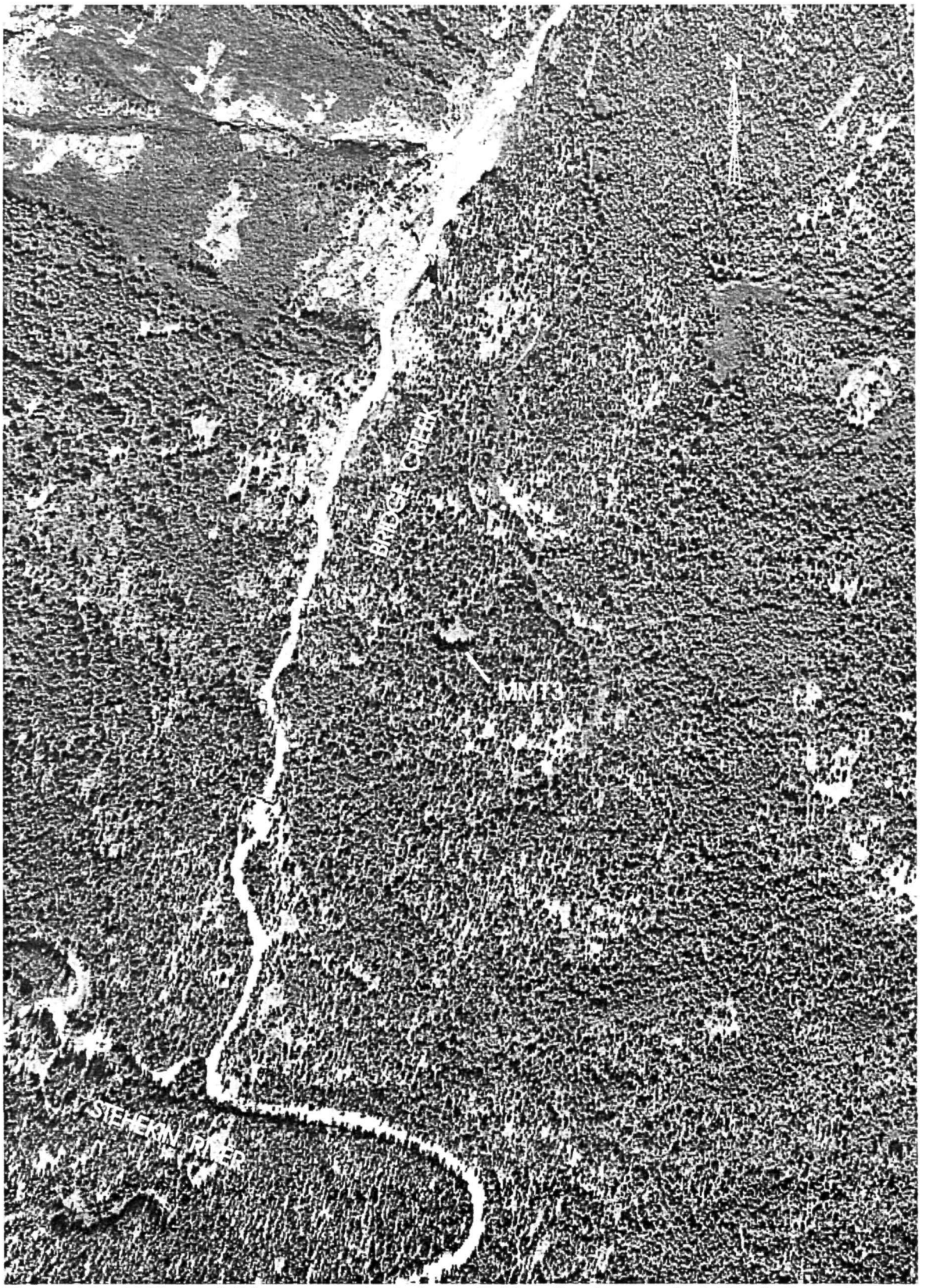

Figure A2. 1997 Amphibian survey site in lower Bridge Creek watershed, North Cascades National Park Service Complex, Washington.

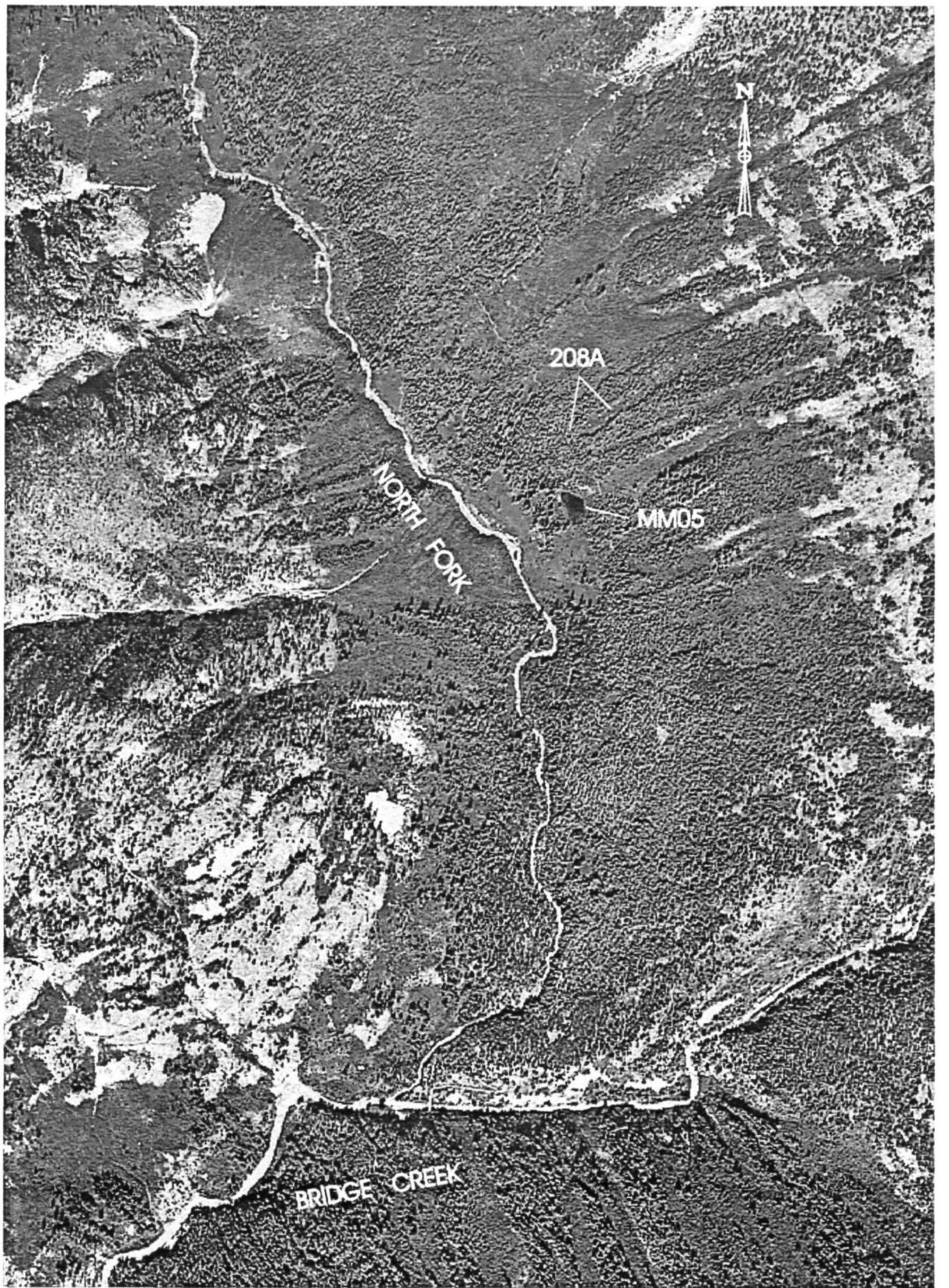

Figure A3. 1997 amphibian survey sites along North Fork of Bridge Creek, North Cascades National Park Service Complex, Washington.

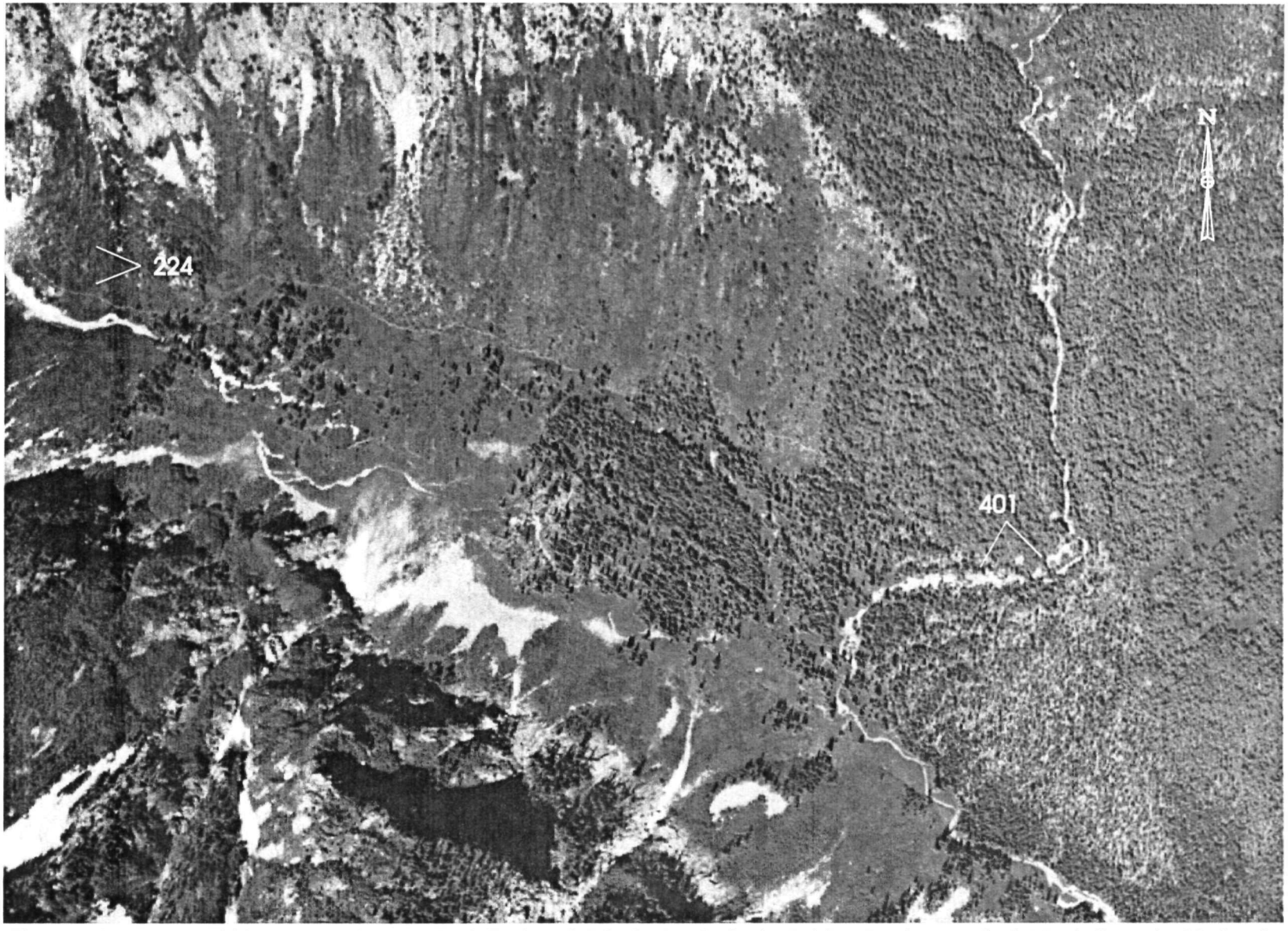

Figure A4. 1997 amphbian survey sites on North Fork and Grizzly Creeks in the Bridge Creek watershed, North Cascades National Park Service Complex, Washington.

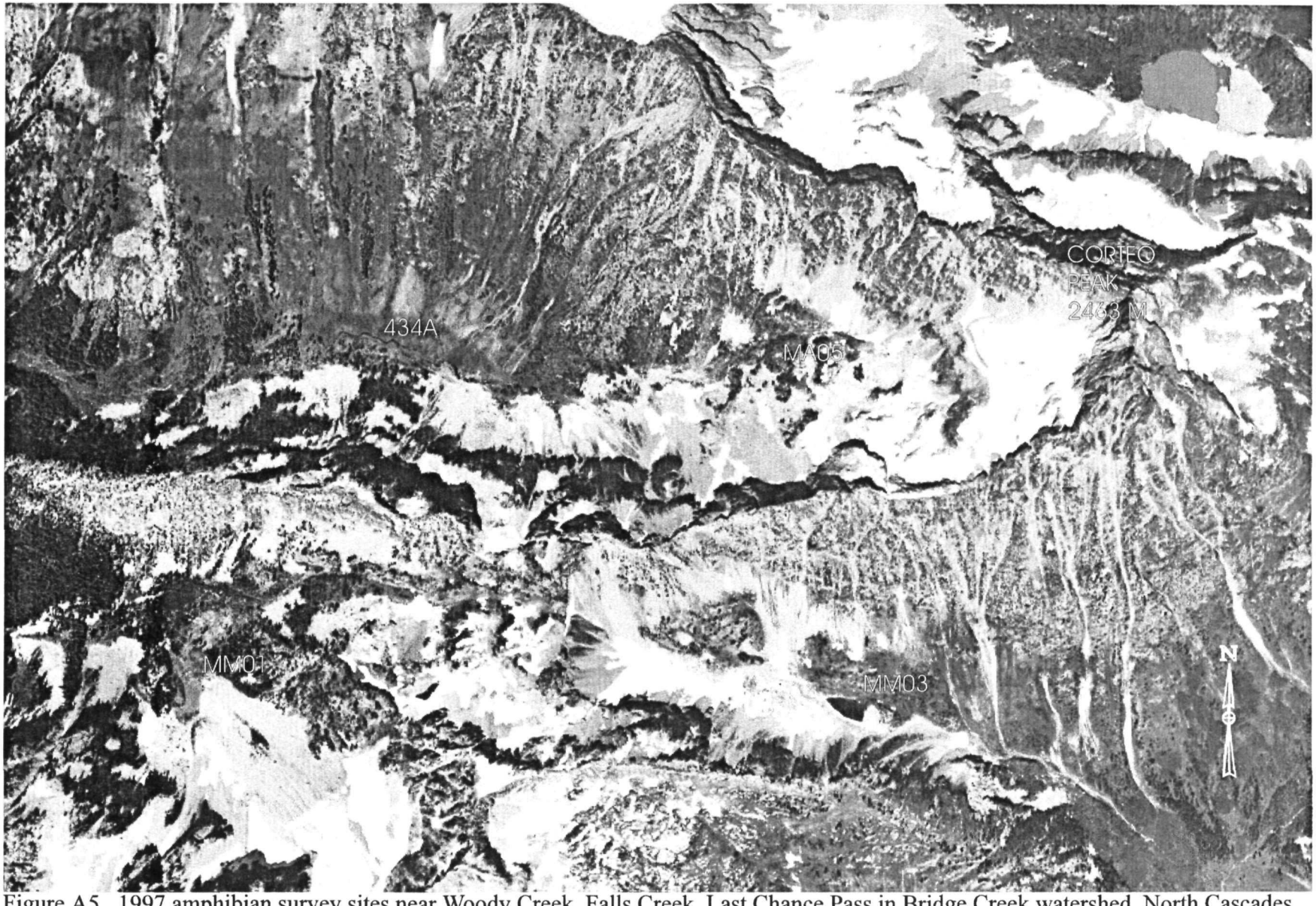

Figure A5. 1997 amphibian survey sites near Woody Creek, Falls Creek, Last Chance Pass in Bridge Creek watershed, North Cascades National Park Service Complex, Washington.

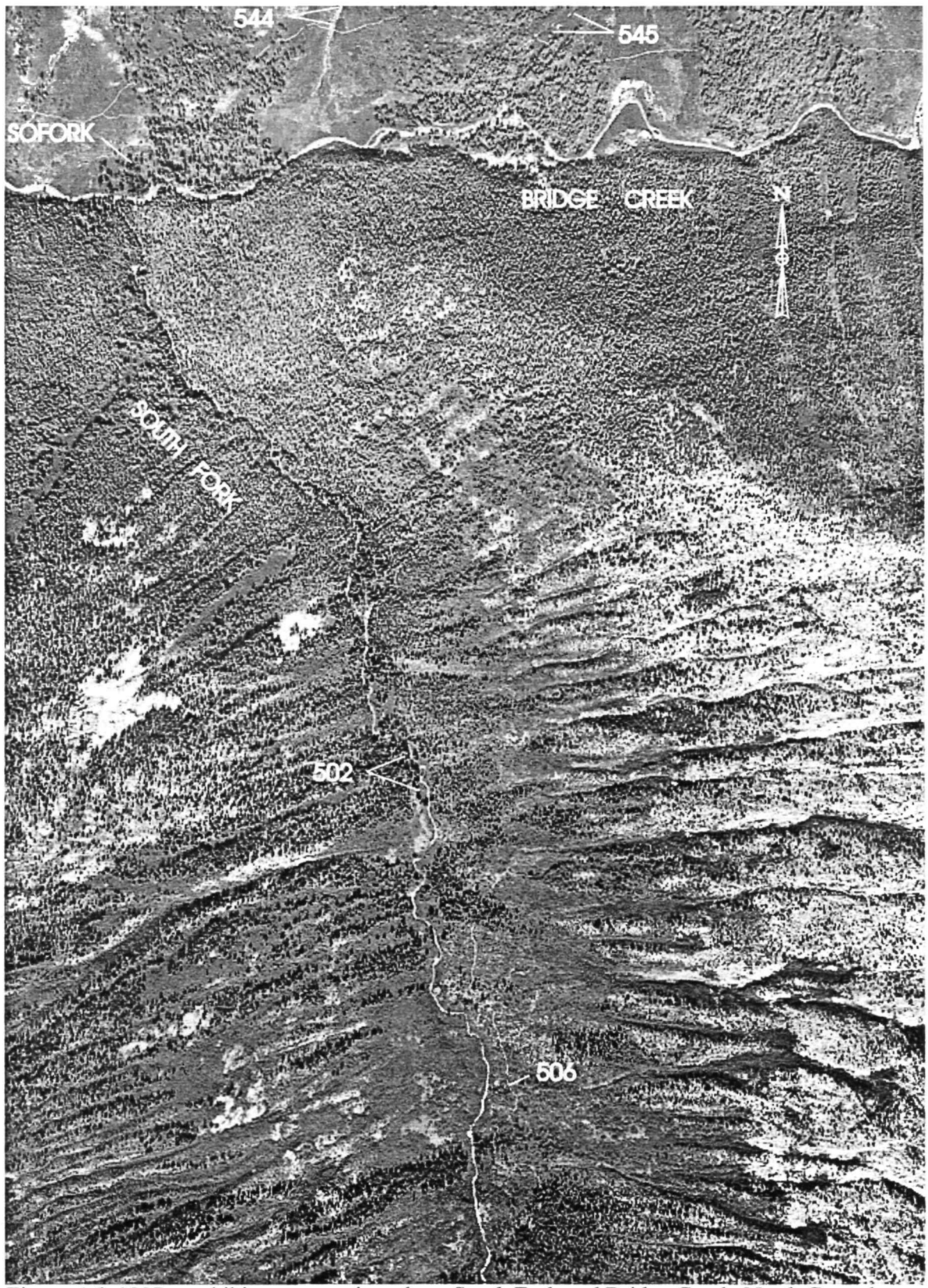

Figure A6. 1997 amphibian survey sites along South Fork and Bridge Creek, North Cascades National Park Service Complex, Washington.

Figure A7. 1997 amphibian survey sites along South Fork and near Rainbow Pass, North Cascades National Park Service Complex, Washington.

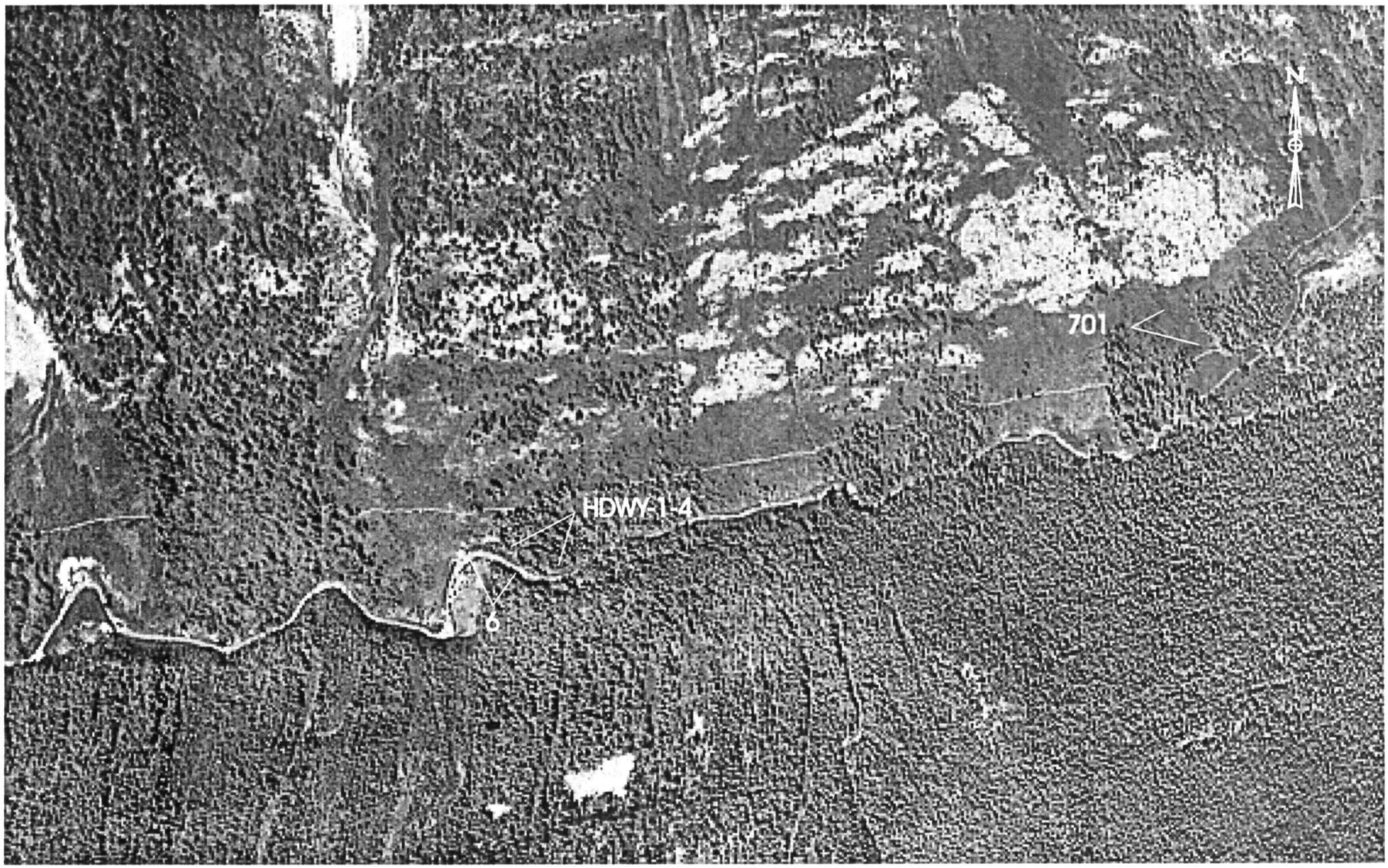

Figure A8. 1997 amphibian survey sites in Bridge Creek watershed near Hideaway camp, North Cascades National Park Service Complex, Washington.

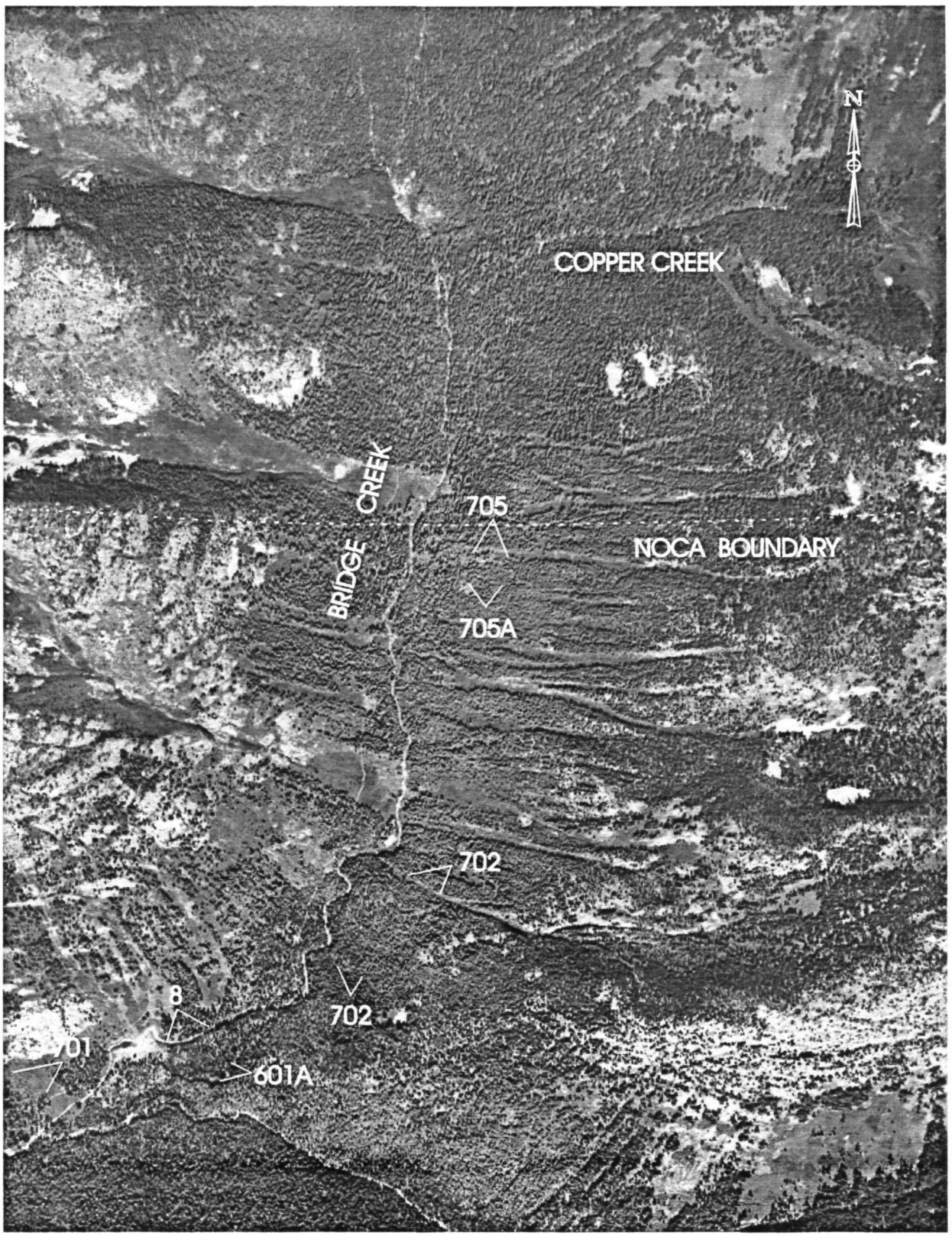

Figure A9. 1997 amphibian survey sites along upper Bridge Creek from Fireweed camp to boundary of North Cascades National Park Service Complex, Washington.

Figure A10. 1997 amphibian survey sites along McAlester and East Fork Creeks in Bridge Creek watershed, North Cascades National Park Service Complex, Washington.

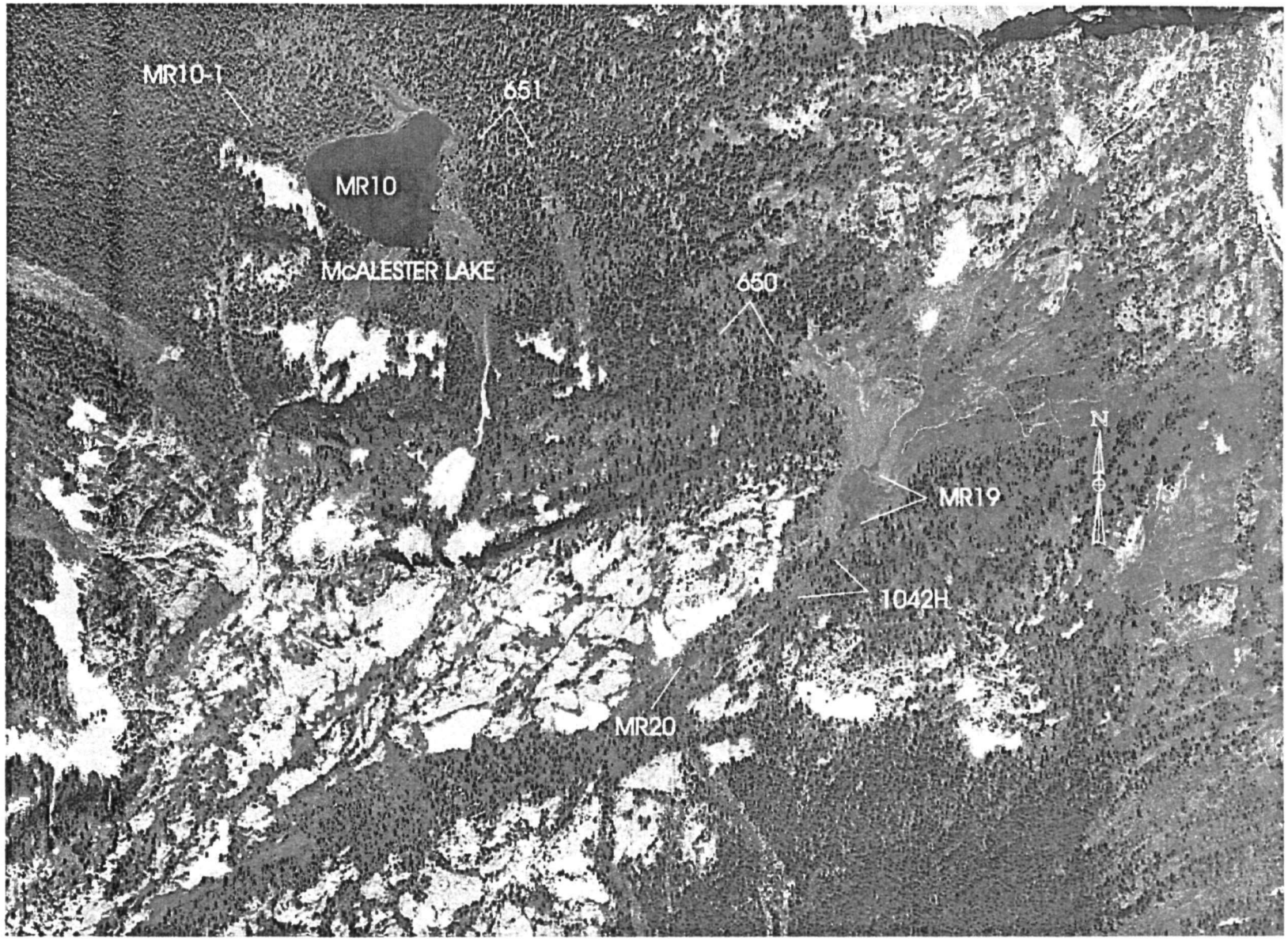

Figure A11. 1997 amphibian survey sites near McAlester Lake and McAlester Pass, of Bridge Creek watershed, North Cascades National Park Service Complex, Washington.

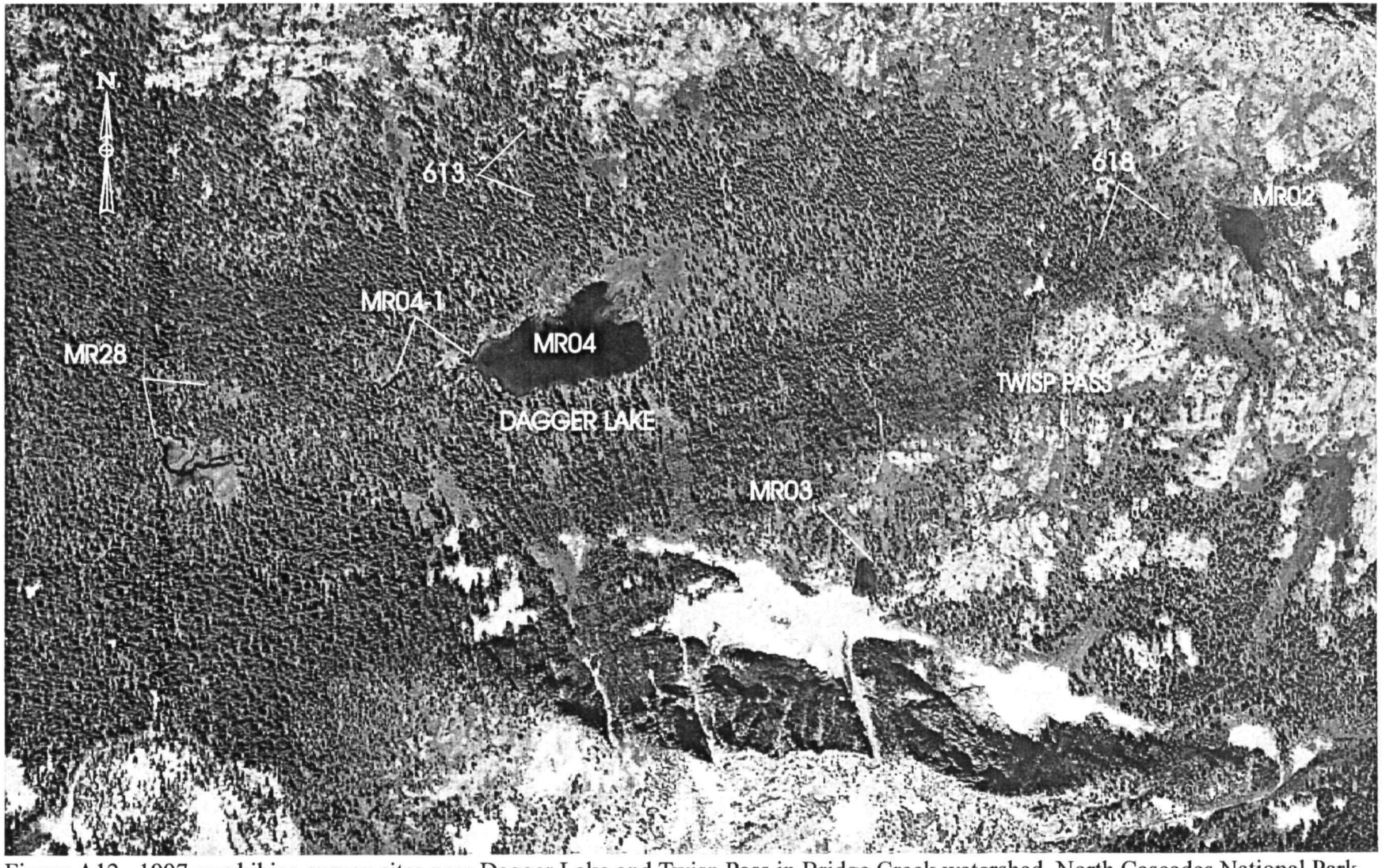

Figure A12. 1997 amphibian survey sites near Dagger Lake and Twisp Pass in Bridge Creek watershed, North Cascades National Park Service Complex, Washington.

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

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 - spalsh 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 Glesne 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. Glesne 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:

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.

STREAMBANK AND BED STABILITY

Stream Name _____ Site Number _____ Reach Number _____ Date _____ Comments: _____

UPPER BANKS	EXCELLENT		GOOD		FAIR		POOR	
Landform Slope	Bank slope gradient <30 %	(2)	Bank slope gradient 30 - 40 %	(4)	Bank slope gradient 40 - 60 %	(6)	Bank slope gradient >60 %	(8)
Mass Wasting or Failure (existing or potential)	No evidence of past or any potential for future mass wasting into channel.	(3)	Infrequent and/or very small. Mostly healed over. Low future potential.	(6)	Moderate frequency and size, with some raw spots eroded by water during high flows.	(9)	Frequent or large, causing sediment nearly yearlong or imminent danger of same.	(12)
Debris Jam Potential (floatable objects)	Essentially absent from immediate channel area.	(2)	Present but mostly small twigs and limbs.	(4)	Present, volume and size are both increasing.	(6)	Moderate to heavy amounts, predominantly larger sizes.	(8)
Vegetative Bank Protection	>90 % plant density. Vigor and variety suggests a deep, dense, soil binding, root mass.	(3)	70 - 90 % density. Fewer plant species or lower vigor suggests a less dense or deep root mass.	(6)	50 - 70 % density. Lower vigor and still fewer species form a somewhat shallow and discontinuous root mass.	(9)	<50 % density plus fewer species & less vigor indicate poor, discontinuous, and shallow root mass.	(12)
LOWER BANKS								
Channel Capacity	Ample for present plus some increases. Peak flows contained. Width to Depth ratio (W/D) less than 7.	(1)	Adequate. Overbank flows rare. W/D ratio 8 - 15.	(2)	Barely contains present peaks. Occasional overbank floods. W/D ratio 15 - 25.	(3)	Inadequate. Overbank flows common. W/D ratio >25.	(4)
Bank Rock Content	>65 % with large, angular boulders >12" numerous.	(2)	40 - 65 %, mostly small boulders to cobbles 6 - 12".	(4)	20 - 40 %, with most in the 3 - 6" diameter class.	(6)	<20 % rock fragments of gravel sizes, 1 - 3" or less.	(8)
Obstructions, Flow Deflectors, Sediment Traps	Rocks and logs firmly embedded. Flow pattern without cutting or deposition. Pools and riffles stable.	(2)	Some present, causing erosive cross currents and minor pool filling. Obstructions and deflection newer & less firm.	(4)	Moderately frequent, moderately unstable obstructions & deflectors move with high water causing bank cutting and filling.	(6)	Frequent obstructions and deflectors cause bank erosion yearlong. Sediment traps full, channel migration occurring.	(8)
Cutting	Little or none evident. Infrequent raw banks less than 6" high generally.	(4)	Some, intermittently at outcurves and constrictions. Raw banks may be up to 12".	(8)	Significant. Cuts 12 - 24" high. Root mat overhangs and sloughing evident.	(12)	Almost continuous cuts, some over 24" high. Failure of overhangs frequent.	(16)
Deposition	Little or no enlargement of channel or point bars.	(4)	Some new increases in bar formation, mostly from coarse gravels.	(8)	Moderate deposition of new gravel & coarse sand on old and some new bars.	(12)	Extensive deposits of predominantly fine particles. Accelerated bar development.	(16)
BOTTOM								
Rock Angularity	Sharp edges and corners, plane surfaces roughened.	(1)	Rounded corners and edges, surfaces smooth and flat.	(2)	Corners and edges well rounded in two dimensions.	(3)	Well rounded in all dimensions, surfaces smooth.	(4)
Brightness	Surfaces dull, darkened, or stained. Generally not bright.	(1)	Mostly dull, but may have up to 35% bright surfaces.	(2)	Mixture 50 - 50 % dull & bright, ±15 %, i.e. 35 - 65 %.	(3)	Predominantly bright, >65 % exposed or scoured surfaces.	(4)
Consolidation or Particle Packing	Assorted sizes tightly packed and/or overlapping.	(2)	Moderately packed with some overlapping.	(4)	Mostly a loose assortment with no apparent overlap.	(6)	No packing evident. Loose assortment, easily moved.	(8)
Bottom Size Distribution and % Stable Materials	No change in sizes evident. Stable materials 80 - 100 %.	(4)	Distribution shift slight. Stable materials 50 - 80 %.	(8)	Moderate change in sizes. Stable materials 20 - 50 %.	(12)	Marked distribution change. Stable materials 0 - 20 %.	(16)
Scouring and Deposition	Less than 5 % of the bottom affected by scouring and deposition.	(6)	5 - 30 % affected. Scour at constrictions and where grades steepen. Some deposition in pools.	(12)	30 - 50 % affected. Deposits & scour at obstructions, constrictions, and bends. Some filling of pools.	(18)	More than 50 % of the bottom in a state of flux or change nearly yearlong.	(24)
Clinging Aquatic Vegetation (moss and algae)	Abundant. Growth largely moss-like, dark-green, perennial. In swift water too.	(1)	Common. Algal forms in low velocity & pool areas. Moss here too & swifter waters.	(2)	Present but spotty, mostly in backwater areas. Seasonal blooms make rocks slick.	(3)	Perennial types scarce or absent. Yellow-green, short-term bloom may be present.	(4)
	COLUMN TOTALS							

Add values in each column for a **Total Reach Score**: _____ Score Range: 38 Excellent; 39-76 Good; 77-114 Fair; 115+ Poor

Circle only one of the numbers in parenthesis for each indicator. If condition falls between those described, cross out the given number and write in the intermediate value.

ATTACHMENT 10

STREAM AMPHIBIAN SURVEY DATA FORM 2 - NOCA (Intermittent pools/seeps) Page ____ of ____

R. Glesne 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:

Gradient (%) ________ **0m** ________ **50m** ________ **100m**

Stream M _______	Map SCALE

Air Temp _____ C or F
Wat, Temp _____ C or F
Max. Depth _____ (cm)
Tot. Area _____ (sq m)
Flow Vel _____ (mps)
%Cover-CWD _____
%Cover-OD _____
%Cover-UB _____

Canopy Cover:

Up	Down	Left	Right	Ave %

Dom. Substrate ________
Subdom. Substrate ________

Start: _______ **Stop:** _______

Species	Sex	Stage	No.

Stream M _______	Map SCALE

Air Temp _____ C or F
Wat, Temp _____ C or F
Max. Depth _____ (cm)
Tot. Area _____ (sq m)
Flow Vel _____ (mps)
%Cover-CWD _____
%Cover-OD _____
%Cover-UB _____

Canopy Cover:

Up	Down	Left	Right	Ave %

Dom. Substrate ________
Subdom. Substrate ________

Start: _______ **Stop:** _______

Species	Sex	Stage	No.

Stream M _______	Map SCALE

Air Temp _____ C or F
Wat, Temp _____ C or F
Max. Depth _____ (cm)
Tot. Area _____ (sq m)
Flow Vel _____ (mps)
%Cover-CWD _____
%Cover-OD _____
%Cover-UB _____

Canopy Cover:

Up	Down	Left	Right	Ave %

Dom. Substrate ________
Subdom. Substrate ________

Start: _______ **Stop:** _______

Species	Sex	Stage	No.