State of Alaska
Department of Fish and Game
Nomination for Waters
Important to Anadromous Fish

AWC Volume SE SC SW W AR (IN) USGS Quad Fairbanks D-1

Anadromous Water Catalog Number of Waterway 334-40-11000-2490-3301-4010

Name of Waterway Chena Slough (aka Badger Slough) USGS name Chena Local name Badger

Addition X Deletion ___ Correction ___ Backup Information ___

For Office Use

Nomination # 96 026	Regional Supervisor ____ Date 10-26-95
Revision Year: 96	Dean W. DuRas Date 1-25-96
Revision to: Atlas ___ Catalog ___ Both X	Drafted ____ Date 1/30/96
Revision Code: A-2	

OBSERVATION INFORMATION

Species	Date(s) Observed	Spawning	Rearing	Migration	Anadromous
Chinook Salmon	7/6, 7/14, 7/21, 7/30, 8/10	4, 13, 4, 6	1, 13, 18, 4, 15,		✓
	8/18, 8/27, 9/4/81	9, 3, 12	9, 3, 12		

IMPORTANT: Provide all supporting documentation that this water body is important for the spawning, rearing or migration of anadromous fish, including: number of fish and life stages observed; sampling methods, sampling duration and area sampled; copies of field notes; etc. Attach a copy of a map showing location of mouth and observed upper extent of each species, as well as any other information such as: specific stream reaches observed as spawning or rearing habitat; locations, types, and heights of any barriers; etc.

Comments: This nomination is based on the thesis of Robert J. Walker, M.S., UAF. The attached pages from the thesis document sample location on Chena (Badger) Slough below the Nordale Crossing. We have not resampled Chena Slough but know of no physical barrier to rearing chinooks. Rearing could well extend further upstream than Walker's sample location.

Name of Observer (please print) Roger A. Post HB 111

Date: 9/7/95 Signature: Roger A Post

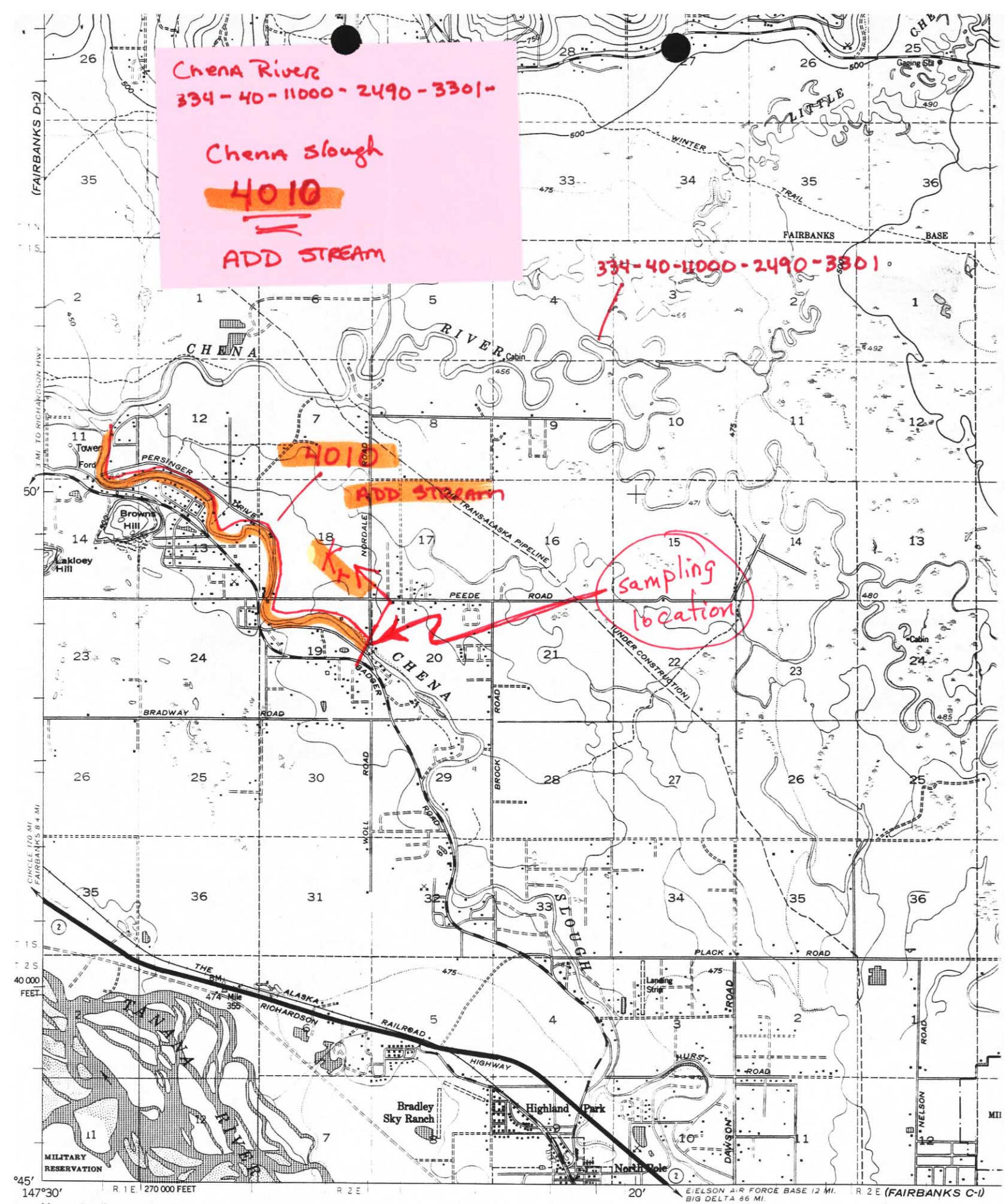
Address: 1300 College Rd.
Fairbanks, AK 99701

ALASKA DEPT. OF FISH & GAME
OCT 31 1995
REGION II HABITAT AND RESTORATION DIVISION

This certifies that in my best professional judgement and belief the above information is evidence that this waterbody should be included in or deleted from the Catalog of Waters Important for Spawning, Rearing or Migration of Anadromous Fishes per AS 16.05.870.

Signature of Area Biologist: 10·26·95

Rev. 7/93



Mapped, edited, and published by the Geological Survey

Control by USGS and USC&GS

Topography by photogrammetric methods from aerial photographs taken 1949. Map not field checked

Universal Transverse Mercator projection, 1927 North American datum
10,000-foot grid based on Alaska coordinate system, zone 3

SCALE 1:63360

Robert J. Walker
1983
M.S. Thesis UAF

GROWTH OF YOUNG-OF-THE-YEAR SALMONIDS

IN THE CHENA RIVER, ALASKA

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ABSTRACT

Growth of young-of-the-year Arctic grayling (*Thymallus arcticus*), chinook salmon (*Oncorhynchus tshawytscha*) and round whitefish (*Prosopium cylindraceum*), was examined in the Chena River during 1981 and 1982. Each species exhibited a gradient of growth within the main river; faster growing fish were found downstream. Highest growth rates occurred in Badger Slough, a clearwater tributary that parallels the lower river. Fish condition followed a similar pattern; faster growing fish were heavier at a given size. Between year differences in environmental conditions affected the first appearance, distribution and growth of these species.

Growth pattern was reflected on the scales of Arctic grayling. Faster growing fish had a greater number of circuli that were more widely spaced. For fish from the lower river and Badger Slough, the number of circuli formed by the end of the growing year was not significantly different between years. This characteristic may be used to identify Chena River Arctic grayling stocks.

Badger Slough- Badger Slough (previously Chena Slough) is a groundwater drainage that enters the Chena River 35 km from its mouth. The slough was originally a 37-km long side channel of the Tanana River which contributed approximately 70% (100 m^3/second) of the Chena River flow through Fairbanks during periods of high water (Collins 1982). Completion of the Moose Creek Dike in 1945 prevented turbid Tanana River water from entering the slough, and the area has atrophied considerably over the years. Badger Slough is now much smaller (27 km) with less flow (228 m^3/day) than previously (Frey et al 1970).

The springs and seepage of Badger Slough are sufficiently warm to keep portions of it open throughout the winter (Mack 1976), though long reaches of the slough may be frozen to the substrate. Because of the slightly warmed water in the slough, ice in the lower stretches melts out before ice in the main Chena River breaks up. By the first week in April there is usually enough open water to provide angling. Badger Slough has one of the earliest Arctic grayling fisheries to commence in the Fairbanks area each spring and, historically, provided one of the highest angling success rates (Roguski and Winslow 1969). Both catch rate and angler utilization diminish as the season progresses and very little fishing occurs after mid-July. For the period 1968-1977, the average annual harvest of Badger Slough grayling was estimated to be 9,540 (Roguski

and Winslow 1969; Roguski and Tack 1970; Tack 1971, 1973, 1974, 1976; Hallberg 1977, 1978).

The movement of Arctic grayling into Badger Slough was originally thought not to be for spawning (Roguski and Winslow 1969). This was probably due to the small average fork length (200 mm) of angler-caught Arctic grayling and decrease in average size of in-migrating fish during the season. Tack (1971) found that most Chena River Arctic grayling 270 mm FL and longer were mature. Seventeen percent of 105 Badger Slough Arctic grayling sampled by Tack (1973) were mature in the 1972 spring fishery. The later presence of Y-O-Y Arctic grayling several kilometers up the slough supported the contention that fish spawn in Badger Slough. By establishing a weir at the mouth of Badger Slough in 1975, Tack (1976) was able to monitor the spawning migration until the weir washed out in late April. He noted that the spawning run began shortly after the weir was put in place (April 8) and peaked one week later (April 14). All sizes of Arctic grayling were present, but adults were more abundant early in the migration. Yearlings became more abundant later in April. Local residents have reported that longnose sucker, northern pike, burbot and slimy sculpin also inhabit the slough.

In the present study, salmonids from Badger Slough were dipnetted or seined from a pool and riffle immediately

downstream of the Nordale Road crossing, approximately 8 km upstream from the slough's confluence with the Chena River. The pool substrate consisted of sand and cobble and graded into hard-packed gravel in the riffle area. Nostoc covered much of the cobble while aquatic macrophytes bordered either side of the stream. Overhanging vegetation consisted of alder (Alnus sp.) and willow (Salix sp.) Discharge was 1.85, 1.75 and 1.65 m^3/second on July 30, August 10, and August 27, 1981, respectively. Maximum velocity recorded below the crossing was 0.6 m/second. For the 2-week periods between sampling dates, differences in maximum and minimum water temperature were from 6 to 13 C. Maximum temperature recorded was 19 C; minimum recorded temperature was 1.5 C. Water temperature was consistently 2 to 4 C warmer than was the Chena River at the Nordale Road crossing.

University Avenue Bridge- The lowermost sampling site on the main Chena River was University Avenue Bridge, 9.6 km above the confluence with the Tanana River. Fish were seined from a 30-m wide shelf immediately downstream of the bridge. Substrate consisted of silt and sand over hard-packed gravel. Grasses along the bank were frequently inundated and provided habitat for small fish. There was very little overhanging vegetation in the area.

Nordale Road Crossing- The next site upstream from the University Avenue Bridge was where Nordale Road crosses the Chena River, 42 km above the mouth of the river. McFadden

METHODS AND MATERIALS

Fish were collected approximately every ten days from shortly after break-up until mid-September with small dipnets (0.5 mm mesh), common sense minnow seines (4.6 m long x 1.2 m wide with 1.6 mm mesh, 6.1 m x 1.2 m with 3.1 mm mesh, 7.6 m x 1.2 m with 6.4 mm mesh) and standard minnow traps (6.4 mm mesh) baited with salmon eggs. After a minimum of two weeks preservation in 10% formalin, specimens were blotted dry with paper towels, weighed to the nearest 0.01 g and fork lengths measured to the nearest 1 mm. Among the characteristics noted for each fish were the presence or absence of dorsal fin rays, parr marks and scales on the caudal peduncle. From Y-O-Y Arctic grayling collected late in the summer, five scales centered on the "key scale" (directly below the posterior insertion of the dorsal fin, two rows above the lateral line) were taken. From the largest, best preserved scale projected at 150x magnification, focus radius and distances between circuli were measured to the nearest 1 mm along the posterior long axis. In addition, scales were collected from other age classes in the field and measured in a similar manner.

To investigate and compare the early morphology of Arctic grayling and round whitefish (Appendix A), I cleared and dyed preserved specimens with Alizarine red, a stain specific for calcium. Formalin preserved specimens were placed into a solution of 1 liter water, 10 g potassium

Table B.1. Species compositon (AG=Arctic grayling, CS=chinook salmon, RWF=round whitefish) of Y-O-Y salmonids collected from Badger Slough, 1981. Given are sample sizes (N), relative abundances (%N) and means, standard deviations (SD) and ranges of fork lengths and weights.

			Fork length (mm)			Weight (g)		
Date	N	%N	Mean	SD	Range	Mean	SD	Range
June 03								
AG	15	100	18.5	2.1	14–22	0.053	0.018	0.02–0.09
June 10								
AG	35	100	23.3	3.3	15–28	0.128	0.057	0.03–0.22
June 16								
AG	40	100	33.7	2.9	26–39	0.411	0.094	0.20–0.58
June 26								
AG	38	100	46.7	3.6	37–52	1.378	0.273	0.69–1.79
July 06								
AG	44	98	55.8	3.7	44–66	2.335	0.452	1.08–3.91
CS	1	2	66.0	6.9*		3.700	1.091*	
July 14								
AG	66	84	61.8	4.5	49–71	2.895	0.651	1.50–4.40
CS	13	16	55.2	4.6	47–63	2.098	0.528	1.21–3.16
July 21								
AG	42	69	69.3	4.1	61–76	4.208	0.714	2.75–5.60
CS	18	30	59.4	3.9	54–69	2.774	0.535	1.98–4.02
RWF	1	2	50.0	3.9*		1.320	0.296*	
July 30								
AG	20	77	75.3	6.8	64–90	5.063	1.410	3.11–8.13
CS	4	15	64.3	4.0	60–69	3.634	0.300	3.14–3.95
RWF	2	8	57.5	9.2	51–64	1.925	1.181	1.09–2.76
Aug 10								
AG	76	76	83.3	7.9	55–99	6.536	1.809	1.82–11.08
CS	15	15	66.2	8.1	52–77	3.738	1.354	1.61–5.84
RWF	9	9	70.1	8.0	56–79	3.674	1.226	1.81–5.01
Aug 18								
AG	23	62	86.3	6.3	72–96	6.640	1.425	3.88–9.23
CS	9	24	72.3	3.7	66–79	4.802	0.838	3.50–6.33
RWF	5	14	76.4	5.0	69–83	4.474	0.895	3.34–5.80
Aug 27								
AG	62	93	88.2	8.7	65–111	7.643	2.267	3.20–15.07
CS	3	7	73.7	4.2	69–77	5.013	0.767	4.17–5.67
Sept 04								
AG	80	87	89.5	9.1	57–105	7.858	2.174	1.95–12.45
CS	12	13	78.3	6.5	68–92	6.193	1.851	3.87–10.54

* Estimated from empirical mean–standard deviation relation for the species.