

Fish Species Occurrence on Four Rivers and Three Ponds of Hagemeister Island, Alaska, 2003.

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Abstract

The resident fish species assemblages were inventoried in four rivers and three ponds on Hagemeister Island in 2003. This was the first effort to inventory resident fish species on this island, which is the largest in Bristol Bay and is separated from the mainland by ~6 km at the nearest point. Fish were collected using dipnet, minnow trap, and seine. Fish were identified to species and released alive or retained as voucher specimens and genetic samples. Species identified were coho salmon *Oncorhynchus kisutch*, slimy sculpin *Cottus cognatus*, Alaska blackfish *Dallia pectoralis*, rainbow smelt *Osmerus mordax*, ninespine stickleback *Pungitius pungitius*, and Dolly Varden *Salvelinus malma*.

Introduction

The resident fish of the Togiak National Wildlife Refuge play an important role in the ecology and economy of the Bristol Bay region. In recognition of this importance, the Alaska National Interest Lands Conservation Act (P.L. 96-487) charged the Togiak Refuge with conserving fish and wildlife populations in their natural diversity while continuing to provide subsistence opportunities to the local people. This directive is implemented in the Fisheries Management Plan for the Refuge (USFWS 1990) which establishes a wild stock management policy specifically for resident fish species. The wild stock management concept emphasizes providing opportunities to catch fish from naturally reproducing populations while preserving the historic size and age structure of stocks. To meet the directive of conserving fish populations, baseline information on species distributions is essential.

Togiak Refuge personnel have conducted surveys of resident fish since 1984 (e.g. MacDonald and Lisac 1998, MacDonald 1997, Lisac and MacDonald 1996, MacDonald 1996, Nelle 2002a). The refuge has surveyed 26 lakes and 20 rivers throughout its history. In many cases the information gathered during these surveys provides the only site specific documentation of fish species within the surveyed systems. These studies have provided baseline information for future comparisons and have led to other biologically interesting questions (Nelle 2002b, Hartman and Margraf 2003). Furthermore, these inventories continue to provide managers with the vital biological information needed to support sound management decisions for aquatic resources.

Hagemeister Island is located in Togiak Bay at approximately 58° 29' north latitude and 160° 54' west longitude. The island is a part of Alaska Maritime National Wildlife Refuge, but due to its proximity to the Togiak Refuge, is administratively managed by the Togiak Refuge. As the largest island in Bristol Bay, Hagemeister measures 37 km in length and 11 km in maximum width and encompasses ~27,000 ha. There are ten mountains on the island above 300 m in elevation.

Hagemeister Island has four major watersheds that are drained by second order river systems (Figure 1). In addition, the island has many small streams and small ponds that appear to be shallow and may be vulnerable to seasonal drying or complete freezing. In July 2002, refuge staff visited Hagemeister Island to identify water bodies for future investigation of aquatic organisms. Helicopter reconnaissance flights were taken along each of the major drainages. South Creek (58° 44' N, 160° 58' W) flows in a north-to-south direction with the mouth located on the south end of the island. Chum salmon *Oncorhynchus keta* carcasses and live fish were observed in this system. Herder's Creek (58° 44' N, 160° 53' W) flows in a south-to-north direction with the mouth located on the northwest side of the island. Chum salmon were observed spawning as well as other smaller fish that were not identified. One Dolly Varden was collected. Tractor Creek (58° 37' N, 161° 04' W) flows in a northeast-to-southwest direction with the mouth located on the west side of the island, ~2 km south of a narrow sand spit that extends ~7km from the island into Hagemeister Strait. Chum salmon carcasses and live fish were observed in this system. Brushy Creek (58° 43' N, 161° 01' W) flows in a south-to-north direction with the mouth located on the northwest side of the island. Chum salmon carcasses and live fish were observed in this system.

Additional fish inventory records for Hagemeister Island include a report by Metsker (1967), who documented approximately 3,800 chum salmon in South and Herder's Creeks. Also, coho salmon have been reported by local residents (R. Grant, Tikchik Airventures, Dillingham, personal communication). We are unaware of any records of resident fish species previously catalogued in the rivers and ponds of Hagemeister Island.

The goal of this project was to document fish species occurrence, to collect genetic samples, and to collect representative specimens of resident, landlocked, and morphologically unique fish on Hagemeister Island within the four main drainages and selected ponds.

Methods

Sampling locations

Sampling areas were located on the four main creeks (South, Herder's, Tractor, and Brushy Creeks) and three ponds. The three ponds were selected for sampling based on size and depth. Relatively large deep ponds were targeted because these ponds are more likely occupied by fish. Ponds were selected from a map based on size and viewed from the air to determine relative depth. Pond #1 is located on the far north end of the island at 58° 48' N, 160° 44' W. This pond is approximately 40 m from the shoreline of the island and may be tidally affected at extremely high tides. Pond #2 consists of a cluster of small ponds approximately 1.5 km west of Herder's Creek. The largest pond of this cluster is located at 58° 34' N, 161° 00' W. Pond #3 (58° 40' N, 160° 54' W) is located at the headwaters of South Creek.

Sampling method

Sampling proceeded from 17 through 20 June 2003. Four different methods were used to sample fish on the island. Fish were sampled by seine, dip netting, angling, and baited minnow traps. Minnow traps were baited and set at the end of each day. On the following day sampling

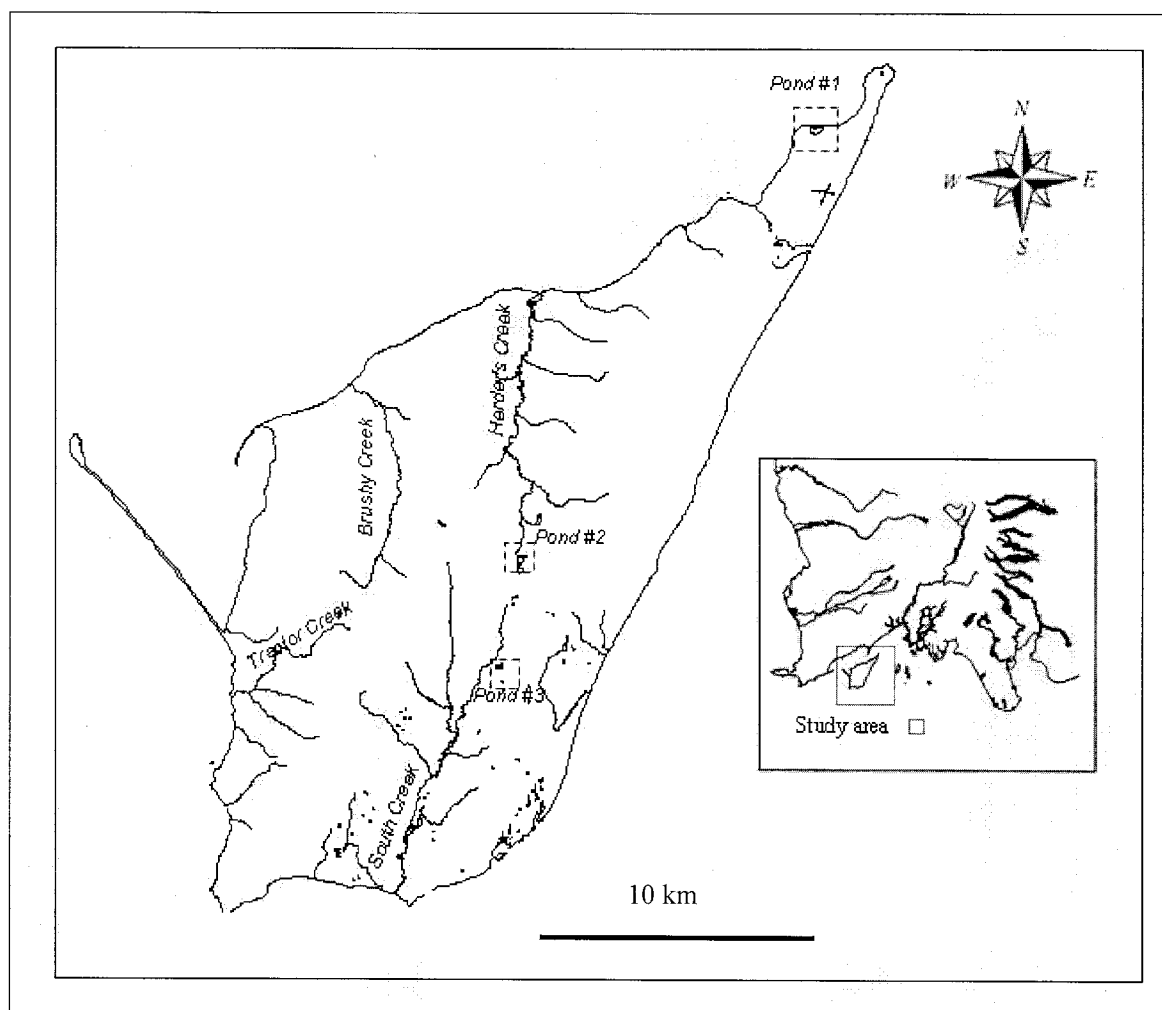


Figure 1.-Hagemeister Island and sampling areas.

occurred in a manner as to allow the checking and collecting of minnow traps while sampling the system with other methods.

Captured fish were sorted to identify species and representative specimens were retained. Collected specimens were preserved in 95% ethanol and identified to the lowest taxonomic level at a later date. Date and location of capture were recorded.

Results

A total of six fish species were caught and collected on Hagemeister Island (Table 1). The creeks had the greatest diversity of species while only ninespine stickleback were found in Pond 1 and no fish were found in Ponds 2 and 3. A number of salmonid smolt were collected that were too small to identify to species but were identified to genus *Oncorhynchus* and are reported as *Oncorhynchus sp.* Length statistics are presented in Tables 2-5 for each stream or pond where fish were caught.

TABLE 1. Number of fish collected by species, location, and date in selected streams and ponds of Hagemester Island.

Water Body location	Collection dates	Fish species						
		Dolly Varden	Slimy sculpin	Coho salmon	Alaska blackfish	Ninespine stickleback	Rainbow smelt	Oncorhynchus sp.
South Creek	6/17/2003	0	10	6	1	0	0	26
Brushy Creek	6/18/2003	4	5	6	0	0	3	14
Tractor Creek	6/19/2003	2	4	2	0	0	0	39
Herder's Creek	6/20/2003	8	0	0	0	0	0	54
Pond 1	6/17/2003	0	0	0	0	23	0	0
Pond 2	6/18/2003	0	0	0	0	0	0	0
Pond 3	6/19/2003	0	0	0	0	0	0	0

TABLE 2. Summary statistics of length (mm) of fish sampled in South Creek.

	Oncorhynchus			Alaska blackfish
	Coho salmon	sp.	Slimy sculpin	
Mean	83.67	48.29	46.20	98.00
SE	19.19	1.30	4.60	0.00
Minimum	34	40	28	na
Maximum	140	61	72	na
n	6	24	10	1

TABLE 3. Summary statistics of length (mm) of fish sampled in Brushy Creek.

	Coho Salmon	Dolly Varden	Rainbow	Oncorhynchus	
			Smelt	sp.	Slimy Sculpin
Mean	100.67	89.50	190.00	47.55	65.60
SE	9.44	24.48	6.00	1.05	9.94
Minimum	71	53	178	43	48
Maximum	121	160	196	52	99
n	6	4	3	11	5

TABLE 4. Summary statistics of length (mm) of fish sampled in Tractor Creek.

	Coho Salmon	Dolly Varden	Oncorhynchus	
			sp.	Slimy Sculpin
Mean	50.00	52.00	51.74	47.00
SE	4.00	4.00	0.89	0.71
Minimum	46	48	41	45
Maximum	54	56	63	48
n	2	2	38	4

TABLE 5. Summary statistics of length (mm) of fish sampled in Herder's Creek.

	Oncorhynchus	
	Dolly Varden	sp.
Mean	152.88	50.31
SE	6.83	0.87
Minimum	134	34
Maximum	186	63
n	8	54

Discussion

The resident fish species documented on Hagemeister Island during this study were slimy sculpin, Alaska black fish, and ninespine stickleback. The level of isolation of these populations is unclear. The preferred habitat of slimy sculpin and Alaska blackfish is freshwater systems (Mecklenburg *et al.* 2002). On the other hand, ninespine stickleback commonly inhabit estuarine systems and also have anadromous forms (Mecklenburg *et al.* 2002). To determine the level of isolation of these fishes, a genetics study would be necessary.

Although adult chum salmon were observed on Hagemeister Island in large numbers in the past (Metsker 1967, R. D. Nelle, U.S. Fish and Wildlife Service, Leavenworth, Washington, personal communication), no observations were made during this study. This study took place in mid-June when adult salmonids such as chum salmon could be expected to enter freshwater systems, but the run timing of these specific stocks may occur later due to the small size of the creeks. A number of small salmon smolt could not be identified, but were unlikely chum salmon due to the early emigration from freshwater of this species. Due to the small size of the river systems and no previous documentation of king salmon, it is likely that these smolt were coho salmon.

References

- Hartman, K.J. and J. Margraf. 2003. A hydroacoustic survey of Hole Lake, Togiak Refuge, Alaska. Report to: Togiak National Wildlife Refuge.
- Lisac, M.J. and R.D. MacDonald. 1996. Age, weight, and length statistics of Togiak River drainage resident fish species, Togiak National Wildlife Refuge, Alaska, 1993-1995. U.S. Fish and Wildlife Service, Alaska Fishery Data Series Number 96-3. Dillingham, Alaska.
- MacDonald, R.D. 1996. Baseline physical, biological, and chemical parameters of 21 lakes, Togiak National Wildlife Refuge, 1984-1990. U.S. Fish and Wildlife Service, Alaska Fishery Data Series Number 96-5. Dillingham, Alaska.
- MacDonald, R.D. 1997. Length frequency and age distribution of resident fish collected from rivers within Togiak National Wildlife Refuge, Alaska, 1996. U.S. Fish and Wildlife Service, Alaska Fishery Data Series Number 97-4. Dillingham, Alaska.
- MacDonald, R.D. and M.J. Lisac. 1998. Species occurrence, length frequency and age distribution of resident fish collected from rivers within Togiak National Wildlife Refuge,

Alaska, 1997. U.S. Fish and Wildlife Service, Alaska Fishery Data Series Number 98-5. Dillingham, Alaska.

Mecklenburg, C.W., T.A. Mecklenburg, and L.K. Thorsteinson. 2002. Fishes of Alaska. American Fisheries Society, Bethesda Maryland: 1037pp.

Metsker, H. 1967. Information Leaflet 108. Red salmon spawning ground surveys in the Nushagak and Togiak Districts, Bristol Bay 1964. State of Alaska Department of Fish and Game, Division of Commercial Fisheries, Dillingham, Alaska.

Nelle, R.D. 2002a. Species occurrence and length frequency distribution of fish in six lakes and five streams of Togiak National Wildlife Refuge, Alaska, 2000-2002. U.S. Fish and Wildlife Service, Final Report. Dillingham, Alaska.

Nelle, R.D. 2002b. Seasonal movement and distribution of rainbow trout in the Togiak River watershed, Togiak National Wildlife Refuge. U.S. Fish and Wildlife Service, Final Report. Dillingham, Alaska.

USFWS. 1990. Fishery Management Plan. Togiak National Wildlife Refuge. Togiak National Wildlife Refuge and King Salmon Fisheries Assistance Office, Alaska.