

STATE OF ALASKA

William A. Egan, Governor



Annual Progress Report for

LIFE HISTORY INVESTIGATIONS OF NORTHERN PIKE
IN THE TANANA RIVER DRAINAGE

by

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RESEARCH PROJECT SEGMENT

State: Alaska

Project No.: F-9-3

Name: Sport Fish Investigations of Alaska.

Study No.: R-111

Study Title: Life History Investigations of Northern Pike in the Tanana River Drainage.

Period Covered: July 1, 1970 to June 30, 1971.

ABSTRACT

During 1970, 378 northern pike, Esox lucius Linnaeus, were tagged in the Minto Flats. Thirty-six were recaptured.

Test netting showed pike are more abundant in the northwestern and southeastern sections of Minto Flats.

Creeel census data showed a decrease in fishing effort and catch in 1970 compared to 1969. Subsistence fishermen took approximately 800 pike.

Some pike spawning grounds were located and their charactersitics assessed. Spawning occurred from approximately May 10 to June 15.

Age and growth studies utilizing scales and vertebrae from pike were begun. Aging by vertebrae appears to be more accurate than the scale method.

Water temperatures and chemistry were monitored during the summer in Minto Flats.

Food habit studies showed that fish were the most important food item, followed by invertebrates.

RECOMMENDATIONS

1. A statistically based creel census should be continued and arranged so the entire Minto Flats can be censused. The subsistence fishery should be intensely monitored.
2. The tagging program should be continued to further define winter and summer movements.
3. Major spawning areas should be located, delimited, and assessed. Fecundity studies should be initiated.
4. Attempts should be made to estimate pike populations in various areas of Minto Flats.
5. Food habits studies should be continued.
6. Surveys of other pike waters throughout the Tanana River drainage should be initiated.

TECHNIQUES USED

Northern pike were captured using graduated mesh gill nets, four- and five-inch stretched mesh gill nets, fyke nets, beach seines, and sport angling gear. All fish taken alive were weighed, measured, and tagged. Pike movements were determined by tagging and recovery. Floy yellow plastic dart tags were used and recaptures were made by Department personnel and subsistence and sport fishermen.

Creel census information was collected by interviewing anglers. Aerial boat counts were made and correlated with ground counts. Subsistence fishery estimates were made by interviewing fishermen and counting nets and fish.

Spawning grounds were located by foot and boat.

Scales, sections of dorsal fin rays, and the first four to eight vertebrae were taken for age determination. Pike were aged using scales and vertebrae. Scales were mounted between glass slides and read with a microprojector. Vertebrae were cleaned, dried, separated, placed in a clearing agent, and read with a binocular microscope.

Water temperatures were taken with hand and electric thermometers. Water chemistry was determined with a Hach Model AC-36-WR test kit. Some water samples were also analyzed by the Federal Water Pollution Control Administration, Alaska Water Laboratory.

Objectives

1. To develop satisfactory methods for aging pike.
2. To determine age and growth and age at sexual maturity of Minto Flats pike.

Aging Techniques

It is difficult to determine age of pike in Alaska by scales. The search for a satisfactory aging method has led to the use of dorsal fin ray cross sections. This method has not been fully investigated but appears to offer some advantages over the scale method. Processing fin rays however, is time consuming and requires complex instruments such as an ultraviolet microscope. Vertebrae were also investigated. These appear to be good indicators of age, especially in fish less than age XV. After this age annuli are crowded and difficult to distinguish.

Vertebrae were processed and read as follows: the first four to eight vertebrae are removed and cleaned of flesh. The spines are cut off close to the centrum. They are then dried or preserved in glycerin, which also acts as a clearing agent. For reading, the vertebrae are separated, and the faces of the centra are cleaned of all connective tissue by scraping with a knife blade. They are then placed in a clearing agent and read under a binocular microscope using reflected light on a black background. If vertebrae are kept in glycerin, it should also be used as a clearing agent, otherwise cedarwood oil is the best clearing agent. The winter checks show as thin translucent rings between wide, white, summer growth zones.

Minto Flats Age and Growth

A total of 265 pike of known sex (123 females, 142 males) was used in the age and growth study. These fish ranged in length from 36.5 - 106.7 cm and from 0.75 - 25.75 pounds. Ages ranged from 4 - 26 years. Figure 3 gives the length frequency distribution for these 265 pike. Twenty-five age 0, seven age I, and one age II fish were also used although the sexes of the age 0 and age I pike were unknown. No age III pike were captured. All age IV fish of both sexes were mature and in spawning condition. From these limited data, it appears that Minto Flats pike begin maturing at age III or IV.

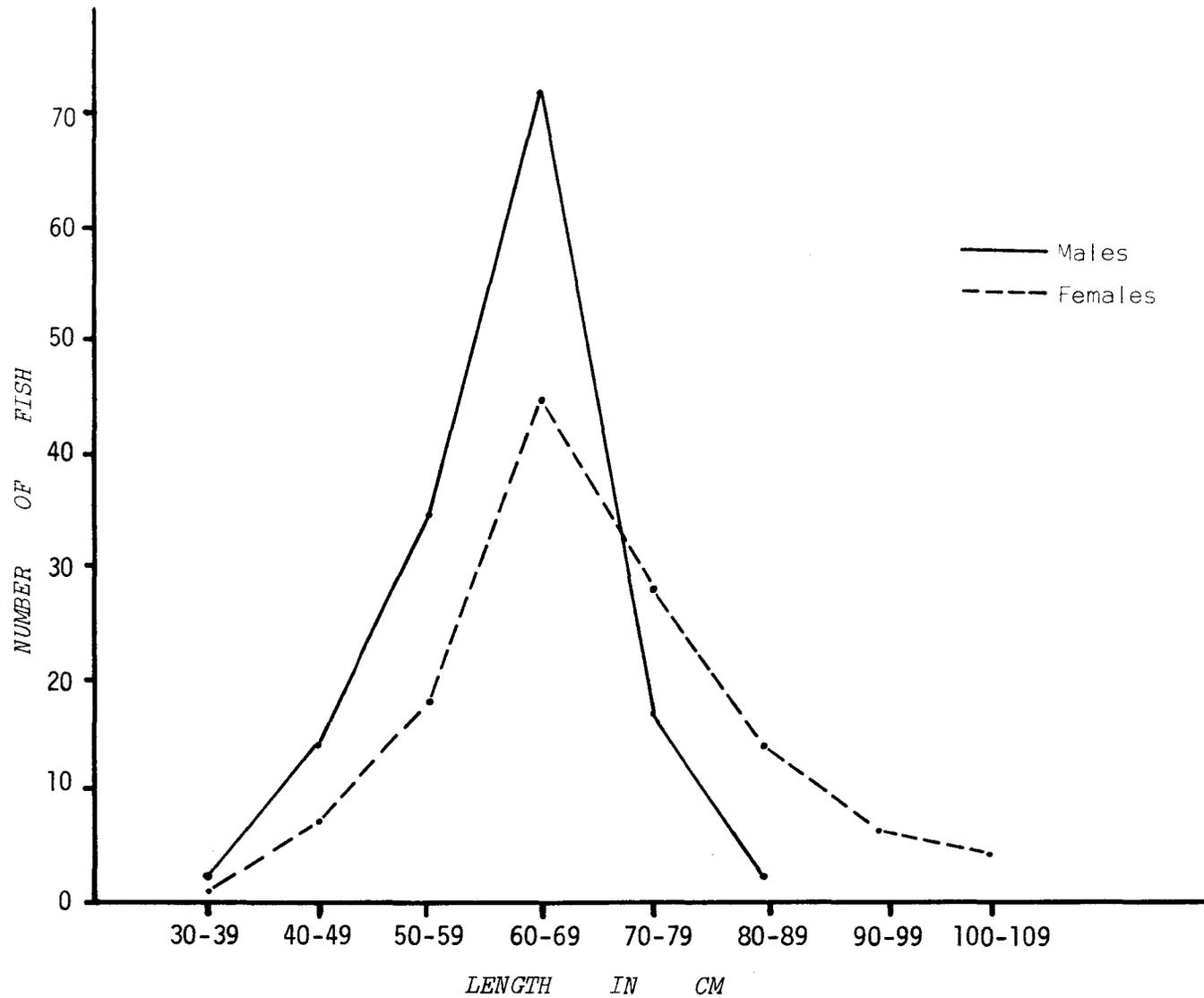


FIGURE 3 LENGTH FREQUENCY OF 265 MINTO FLATS PIKE CAPTURED BY GILL NET, FYKE NET, AND ANGLING, 1970.

The 265 pike were divided into eight 10 cm length groups. When possible, five fish of each sex were aged from each age group using both vertebrae and scale methods. Table 4 shows the difference between pike aged with scales and the same fish aged by vertebrae.

TABLE 4 A Comparison of Age-Length Relationships of Pike as Determined by Scale and Vertebral Analysis, Minto Flats, 1970.

Age Group	Vertebral Analysis			Scale Analysis		
	No.	Length (cm) Range	Mean	No.	Length (cm) Range	Mean
IV	2	36.5 - 39.0	37.8	2	36.5 - 39.0	37.8
V	9	43.5 - 61.5	48.7	6	43.5 - 78.5	58.5
VI	5	49.5 - 67.5	58.3	16	42.8 - 77.0	63.1
VII	10	54.5 - 68.5	60.6	4	57.0 - 82.5	70.6
VIII	9	65.5 - 81.0	71.9	5	58.0 - 93.0	74.3
IX	5	69.5 - 85.5	77.1	4	59.5 - 85.5	75.1
X	3	74.5 - 78.5	76.7	1	86.5	--
XI	1	82.5	--	2	83.5 - 106.5	95.0
XII	4	83.5 - 93.0	87.6	1	91.5	--
XIII	0	---	--	2	92.5 - 103.2	97.8
XIV	1	91.5	--	1	106.7	--
XV	0	---	--	1	95.5	--
XVI	2	92.5 - 95.5	94.0	0	---	--
XVII	0	---	--	0	---	--
XVIII	0	---	--	0	---	--
XIX	1	94.5	--	0	---	--
XX	0	---	--	0	---	--
XXI	1	106.5	--	0	---	--
XXII	0	---	--	0	---	--
XXIII	1	103.2	--	0	---	--
XXIV	0	---	--	0	---	--
XXV	0	---	--	0	---	--
XXVI	1	106.5	--	0	---	--

Comparison of scale analysis (Alt, 1969) and vertebral analysis indicate that more annular marks are found on vertebrae than on scales. Samples of fish older than age X were too small to permit comparison of the two methods of age determination. All fish in age group X and older were females. Table 5 compares growth rates of male and female pike of ages VI - IX as determined by vertebral analysis. It appears that males up to age VI grow slower than females, but grow faster than females at ages VII through IX.

Table 6 summarizes data on age 0, I, and II pike captured in Minto Flats in 1970. No age I and II fish were captured prior to July 29.

TABLE 5 Age-Length Relationship of Male and Female Pike Age Determination by Vertebral Analysis, Minto Flats, 1970.

Age Group	Females			Males		
	No.	Length (cm)		No.	Length (cm)	
		Range	Mean		Range	Mean
IV	2	39.0 - 42.8	40.9	1	36.5	--
V	4	49.0 - 61.5	51.4	5	43.5 - 47.5	46.6
VI	2	49.5 - 67.5	58.5	2	56.5 - 59.0	57.8
VII	7	54.5 - 63.0	59.6	4	56.0 - 68.5	62.3
VIII	0	---	--	9	66.5 - 81.0	72.0
IX	3	70.5 - 83.5	76.8	2	69.5 - 85.5	77.5

TABLE 6 Age and Length of Immature Pike Captured in Minto Flats, 1970.

Date	Location	n	Length (mm)		Age Class
			Range	Mean	
6/24	Minto Lake	4	39 - 55	--	0
6/27	Tatalina River (near the mouth)	8	41 - 56	49.6	0
6/27	Rock Island Slough	17	35 - 73	52.3	0
7/ 1	Tatalina River (near the mouth)	6	46 - 55	50.8	0
7/ 4	Rock Island Slough	7	52 - 71	60.9	0
7/29 - 8/ 1	Minto Lake	7	103 - 164	112.0	I
8/ 3	Chatanika River (near the mouth)	1	202	--	II

Miller and Kennedy (1948) calculated that Canadian pike at age I were the following lengths: Great Bear Lake, 95 mm; Great Slave Lake, 106 mm; Lake Athabasca, 100 mm; and Lesser Slave Lake, 135 mm. At age II, pike from these same lakes were 153, 160, 154, and 212 mm in length, respectively. Minto Flats pike have a faster growth rate than pike from these four Canadian lakes. At age V Minto Flats pike are significantly longer than the Canadian fish (a mean length of 487 mm for the Minto Flats pike as compared to 388, 337, 350, and 422 mm, respectively, for the Canadian fish).