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# The Natural Propagation of Northern Pike in Small Drainable Ponds

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# THE NATURAL PROPAGATION OF NORTHERN PIKE IN SMALL DRAINABLE PONDS

by

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To obtain information on the hatching success and fingerling survival of the northern pike (Esox lucius) in small drainable ponds, experiments were initiated at the State Fish Hatchery, Valentine, Nebraska, during the spring seasons of 1955 and 1956.

All the ponds used in this work were winter-fallowed, providing areas without fish populations. At no time in 1955 or 1956 were forage fish added to the ponds.

Adult spawner pike for the ponds were obtained from Mothers Lake (in Cherry County, Nebraska) in 1955 and from Big Alkali Lake (also in Cherry County) during 1956. All breeder pike were ripe when they were placed in the ponds. The average length of the females in 1955 was 26 inches; that of the males, 22 inches. The spawners used during 1956 were larger, the females averaging 32 inches and the males 25 inches in length. Female pike from Big Alkali Lake, in the 30 to 35 inch group, represented the 1952-year-class.

## INDIVIDUAL POND HISTORIES

### POND A (1955)

Pond A, containing about 2.6 surface acres, was stocked on March 30, 1955, with 4 female pike (average length 28 inches) and 7 males (average length 22 inches). All females were ripe.

Spawning was not observed along the shore, but the spawning period was believed to be April 15 through April 18. On the basis of a normal 14-day hatching period at 52° F., fry would have appeared from April 29 through May 2. Fingerling pike were first observed along the shore of the pond on May 9. These averaged 31 millimeters in length, the maximum being 37 millimeters. On May 14, the fish had grown to an average size of 1.6 inches. All the adult pike except one female were removed from the pond. Removal by hook and line proved time-consuming; a 250-foot gill net was used with excellent results.

On May 18 this pond was drained. The advanced size of several fingerlings indicated the occurrence of cannibalism. The largest pike fingerling removed was 3.3 inches in length, whereas the average was only 1.7 inches.

Total reproduction of fingerling pike for this pond was 4,900, or a percentage survival of 3.3 from an estimated egg production (see Carbine 1944) of 148,000. All females were in a spent condition upon their removal from the pond.

Predation on the young northerns by the adult did not appear excessive until the fry were about 20 millimeters in length. Analysis of the stomachs of the adults showed some fingerlings longer than 20 millimeters, though the numbers were insignificant. The adult pike were feeding mostly on the various species of frogs that inhabited the pond and marginal area. The predation of water beetle larvae, Dytiscidae, on pike fingerlings was observed during the draining but, because of the limited number of the larvae in the pond, should not be considered a limiting factor. Frogs, turtles and fish-eating birds--all took their toll of young pike, in numbers undetermined.

In Pond A, as in the other ponds, a large population of Conchostraca was present from May 1 to the draining dates. No species of Cladocera or Amphipoda were noted in the pond. The tadpole stage of frogs and toads was common from April 27 through May 10.

Submergent aquatic vegetation in the pond was limited to Chara, Potamogeton pectinatus, and filamentous algae. Emergent vegetation was primarily broad-leaf cattail (Typha latifolia).

The pH reading was 8.8.

POND B (1955)

This pond was partially fertilized by the addition of 300 pounds of barnyard manure.

Pond B, about one acre in surface water, was stocked with four male and two female pike on April 3. The average length of the males was 22 inches; that of the females 24 inches. Both female fish were ripe with egg flow upon handling.

The estimated spawning period here was the same as for Pond A, or April 15 through April 18. The hatching period in this pond was also similar to that in pond A, through the last fry did not appear until about May 4.

On May 9 the first fingerlings, averaging 29 millimeters in length, were noted. Throughout the fingerling stage in this pond, the averages were consistently 3 to 22 millimeters smaller than those of the fingerlings reared in pond A.

All the adult pike were removed before this pond was drained. Hook-and-line-fishing accounted for only one pike; the remaining adults were harvested with a gill net. That both females had successfully spawned was evident upon examination of the ovaries.

The stomach of the 25-inch female pike contained 2 Dytiscidae larvae, 3 fingerling pike and one frog. The stomach of the 23.5-inch pike contained one fingerling pike (34 millimeters) and one frog.

Pond B was drained on June 2. The crop of fingerlings numbered 1,946, indicating a percentage survival of 3.3 from an estimated egg production of 58,000.

The average size of these fingerlings was 2.3 inches; the largest recorded was 3.3 inches.

Predation by adult fish and aquatic invertebrates was not considered an important limiting factor in this pond. Dytiscidae larvae appeared more numerous than in Pond A, and there was a notable number of crayfish.

A heavy "bloom" of Conchostraca appeared on April 30 and persisted until drainage on May 2. Though Amphipoda had been introduced into the pond on April 11, few were observed two days later.

The pH reading was 8.6 on April 16; 8.1 on June 2.

POND C (1956)

This rearing unit contained one surface acre of water and had an average depth of 2.5 feet. Pond C was stocked on March 23 with five adult females and ten adult males. The first sac fry were observed 19 days later (April 12). Visual examination of the fry revealed that they were four to five days old. It became apparent that all the spawners were in a spent condition within one week after their introduction to the pond.

This pond was not fertilized with manure.

Plankton samples were made several times. The findings revealed only a moderate zooplankton throughout the study. Cladocera were most numerous; then the Copepoda.

On May 29 this unit was drained and 1,700 fingerling pike were harvested. As the egg production had been estimated as 330,000, this crop represented a percentage survival of 0.5. The average length of the fingerlings was 2.6 inches, their range being from 1.5 to 3.1 inches.

All ripe female pike were known to have spawned in this pond.

The water chemistry of pond C showed a mean pH of 8.6 and a total alkalinity of 125 parts per million.

POND D (1956)

Pond D contained 1.5 surface acres and had a mean depth of 2.7 feet. Sago pondweed Potamogeton pectinatus, and Chara were thriving four weeks after the initial filling of the pond.

The pond was stocked with four females and nine males.

Barnyard manure (1,600 pounds) was broadcast throughout the pond basin.

Sac fry were first located on April 25, or 32 days after the introduction of the breeders. When the fry were located, their mean length was 11 millimeters. On May 6, the fry were 15 to 17 millimeters. On May 6, the fry were 15 to 17 millimeters long; on May 17, the mean length was 25 millimeters.

On May 24, the pond was drained and 5,050 pike fingerlings were harvested. As the egg production had been estimated as 240,000, this crop represented a percentage survival of 2.1. The mean total length of these fingerlings was 1.5 inches.

External examination of adult females revealed a successful spawning effort in Pond D.

## FOOD OF YOUNG PIKE IN THE VALENTINE REARING PONDS

The food habits of young pike changed drastically as they increased in size; the young pike often displayed several food-preference stages. After the pike had absorbed the yolk sac and until they were 1.2 inches in length, they readily consumed entomostracans (mainly Copepoda). In the next feeding stage, which occurred during the period of growth from 1.3 to 2.6 inches in length, the food appeared to consist mostly of aquatic insect larvae (Odonata, Chironomidae). When the fish were 2.6 inches and larger, the diet was composed almost entirely of other young pike and available invertebrates.

It was interesting to note that the entomostracan (Conchostraca), though plentiful in all rearing units, was seldom utilized by the growing pike.

The foregoing statements are based on the examination of 220 fingerling pike stomachs during the two year period.

## CONCLUSIONS

The use of ripe northern pike spawners in hatchery ponds offers great promise as an economical and efficient method of production. Though the resultant production of fingerling pike is not high in comparison with that of standard egg-hatching procedures used by hatcheries, it does indicate that controlled natural production will furnish, for stocking purposes, a number of fingerling fish.

Implications are that the fingerlings should be cropped when the pike have reached two inches in length. To attempt to rear the fingerlings to a larger size is feasible, but in doing so the total number of pike per pond is greatly reduced. The question often arises, whether it is more economical (an administrative expression) to stock a few hundred 6 or 7-inch or several thousand 2-3 inch pike in a lake.

Present results do not suggest using more than five females per pond (one acre). There is apparently no direct correlation between the use of additional females and the total crop of fingerlings produced. There undoubtedly is a relationship between the fecundity of the brood stock and the total number of fingerlings produced; therefore, it is especially desirable to use only ripe fish in this method of propagation.

## LITERATURE CITED

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