SAMPLE FISH REPORT FOR BIOL310

Note that there are several cases where information needs to be cited in here, but overall this is an excellent example of a fish paper for this class.

Longnose Dace (*Rhinichthys cataractae*)

Longnose dace (*Rhinichthys cataractae*) is a fish species that is found ubiquitously throughout much of North America. It belongs to the class Actinopterygii, which includes the ray-finned fishes. Longnose dace are in the order Cypriniformes, which is comprised of the minnows and suckers. Its family is Cyprinidae and is comprised of the carps and minnows. Their genus is *Rhinichthys* and includes the riffle daces. Their species scientific name is *cataractae* which means "of the Cataract" in Greek.

The range of longnose dace is thought to be one of the widest of any of the members of the Cyprinidae family and stretches from the Atlantic Ocean to the Pacific Ocean, and from northern Mexico up into the Arctic Circle of Canada (Jenkins and Burkhead, 1994). It is most prevalent along the east coast of the United States from the Appalachian Mountains south to Georgia (McPhail and Lindsey, 1970). Populations of this species of dace appear to be secure.

Longnose dace are characterized by their elongate, cylindrical bodies and ventrally flattened, scaleless heads. On average, they are approximately 60-90 mm in length, but some have been reported at well over 150 mm. They usually exhibit a mottled, olive green to brown coloration with a silvery white belly; however, lake dwelling species may appear grayish. In addition, adults will have a dark stripe that appears ahead of the eye, and juveniles will have a

stripe that continues posteriorly to a blotch of pigment located at the anterior portion of the caudal fin. For the most part, adults will lack lateral stripes due to an increase in pigmentation on the dorsal half of the body which develops with age. Other features of the longnose dace include short, cone-shaped, widely spaced gill rakers, hooked pharyngeal teeth in a 2, 4-4, 2 pattern, a forked tail, and a single, small barbel at each corner of the mouth. Typically longnose dace have 8 dorsal fin rays, 7 anal fin rays, 13-15 pectoral fin rays, and 8 pelvic fin rays. Their lateral line is complete and almost straight, with 61-75 cycloid scales.

There are several ways to differentiate longnose dace from each other and from other minnow species. Since longnose dace exhibit sexual dimorphism, males and females can be externally identified. The difference between males and females is determined by the distance between the end of the pectoral fin to the origin of the pelvic fin in relation to the diameter of the eye. In males, the distance between the end of the pectoral fin and the origin of the pelvic fin is less than the diameter of the eye, and in females it is greater. In order to distinguish longnose dace from other members of the Cyprinidae family, it is important to note that the upper lip groove, or frenum, is not continuous over the width of the snout. In addition, longnose dace can be further separated from other similar dace species, primarily the blacknose dace *(Rhinichthys atratulus*), by their elongate snouts which overhang their mouth by up to 3 mm or more. Also, unlike the longnose dace, the dark lateral stripe along the length of the blacknose dace's body persists into adulthood.

Longnose dace begin spawning around two years of age. Spawning generally occurs between late-April and mid-June. Spawning peaks when the water temperature is between 14° and 19 °C. Morphological changes in males and females can be observed prior to the onset of spawning. Males will develop small tubercles on the top of their heads and strongly pointed

tubercles on the first 4-5 rays of their pectoral fins. Males will also develop an orange to salmon coloration on their premaxillary, check, pectoral and pelvic fins, and at the base of the anal and caudal fins. Females will undergo color changes in similar areas as males but will be more yellow to orange in color.

Spawning tends to take place in shallow (5-10 cm), fast-flowing water with a fine gravel substrate. Multiple spawning strategies have been observed in longnose dace. One strategy, observed by Greeley and Bishop (1933) indicates that during spawning, a group of males will follow a single female to the spawning grounds. Once the female arrives she will descend toward the bottom of the lake or river, and a group of at least six males will crowd around her sides and head. After this, the males will search the nearby substrate for deposited eggs in order to fertilize them. The second strategy according to Brazo et al. (1978), suggests that male longnose dace establish territories and guard them until the arrival of a female. Once the female arrives she will broadcast her eggs on a nest created by the male, and the male will subsequently fertilize them. In this strategy several females may utilize a single nest. In both strategies, the females will lay between 200 and 1200 eggs on average. The eggs are adhesive, lack color and are transparent which makes them appear virtually invisible. It is assumed that the eggs are guarded by one of the parents until the eggs hatch (~7-10 days). Once they do hatch, and the yolk sac is absorbed (~7 days later), the juveniles will rise to the surface of the water and will inflate the posterior lobe of their gas bladder. From there, they will become pelagic and live in shallow, slow-moving water for up to 4 months. After 4 months, they will begin inhabiting deeper waters with faster currents (McPhail and Lindsey, 1970). Longnose dace typically live up to 3 years in the wild.

In addition to spawning with members of the same species, it is common for longnose dace to readily hybridize with several different Cyprinid species including river chub (*Nocomis*

micropogon), creek chub (*Semotilus atromaculatus*), lake chub (*Couesius plumbeus),* central stoneroller (*Compostoma anomalum*), and common shiner (*Luxilus comutus*). Cooper (1980) hypothesized that crosses between longnose dace and other minnow species could be due to the lack of suitable spawning habitat for longnose dace. In rivers and lakes where fine substrate dominates and gravel substrate is lacking, longnose dace will utilize gravel nests created by chubs and stonerollers, which spawn at nearly the same time, as an alternative to spawning on finer substrate.

The longnose dace is a hardy fish that can survive in a wide range of environmental conditions including extreme temperatures and low oxygen conditions. Longnose dace are commonly found in the clear, shallow (10-50 cm), rocky areas of lakes and streams; however, they thrive in the cool waters of riffles in moderately fast-moving (> 0.5 m/s), medium-sized streams which contain substrates comprised of boulders, cobble, and gravel. They are predominantly found in riffles because they are not able to compete well with larger fish that prefer pools. Also, riffles act as a refuge to protect them from larger, predatory fish which are subject to avian and terrestrial predation in shallower water (Power, 1987).

Along with avoiding inter-specific competition, longnose dace will also try to minimize intra-specific competition when it comes to habitat selection. A study conducted by Mullein and Burton (1998) found that adult and juvenile longnose dace tend to segregate based on water velocity and substrate type. Although both juveniles and adults prefer stream reaches with moderately high velocities and course substrates, the study found a higher proportion of adults in areas with faster currents and large boulders. Since aquatic invertebrates are found in higher densities in fast, riffle areas it is believed that adult longnose dace out-compete juveniles in these areas, and this accounts for segregation between life history stages (Burton 1998).

The subterminal mouth and poorly developed swim bladder of longnose dace makes them well-suited for benthic feeding. Unlike most cyprinids, longnose dace are primarily nocturnal feeders, and are thought to use their barbels as a means of sensing prey (Beers and Culp, 1990). They are insectivorous, consuming primarily members of the order Diptera (black fly larvae). Simuliidae, which belong to the order Diptera, depend on rapid currents for their food supply and live in open areas which make them particularly conspicuous to feeding fish (Gerald 1966). The overlap in habitat between Simuliidae and longnose dace explains why they are a major constituent of the dace's diet. Other, less common, animal food sources of longnose dace include Tipulidae, Rhagionidae, Tabanidae, Psychodidae, and Anthomyiidae. Ephemeroptera nymphs and Tricoptera have also been reported in the stomachs of longnose dace. In addition to aquatic insects, longnose have been known to ingest small mollusks and crustaceans, annelid worms, water mites, and occasionally fish eggs. Although algae is commonly found in the stomachs of adult longnose dace, it is assumed to be the byproduct of the fish using its long snout in attempt to scrape off or dislodge aquatic insects from rocks. However, juveniles will feed on algae and diatoms during the early stages of their life until they develop a big enough gape to consume aquatic insects.

Longnose dace serve several important ecological functions. First, they are an important part of aquatic food chains. Since they tend to be more prevalent in lotic as opposed to lentic systems, longnose dace play a role in the forage base of river otters, some piscivorous birds (i.e. herons), and larger riverine fish species such as salmonids and smallmouth bass. It is believed that when alewives undergo population crashes, longnose dace are the next preferred forage fish of salmonid species (Brazo, Liston, and Anderson, 1978). Second, longnose dace are thought to play a role in controlling black fly populations. Finally, longnose dace play host to 13 parasitic

organisms including 3 flukes, 2 cestode species, 4 nematodes, 1 spiny-headed worm, and 3 protozoan species (Muzzall et al. 1992).

Although they are quite important ecologically speaking, longnose dace have very little economic importance. One economic use is as a baitfish among fisherman, but they are usually not the preferred option (Scott and Crossman, 1998). Another use is in laboratory experimentation. Longnose dace are quite hardy and can be kept alive for up to 2 years in laboratory tanks. In addition to that, they are not easily excitable, and can be handled and manipulated with ease.

References

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