

Lordosis in Gila, Yampa River, Colorado

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As part of an ongoing study of the fishes of the Upper Colorado River system, we conducted surveys of YOY fishes in the Yampa River, Moffat Co., Colorado during 1980 and 1981. Fishes were collected from backwaters and other low-velocity habitats along a 97 km reach from the confluence with the Green River (Dinosaur National Monument) upriver to the upper end of Cross Mountain Canyon. Collections were made with a dip-net (1/32 in) and sein (1/16 in). In August 1980, 106 samples were collected and processed, and 127 samples were collected in 1981. Lordosis (dorsoventral curvature of the spine) was observed in YOY roundtail chubs (Gila robusta) from the August Yampa surveys during both years. A preliminary analysis of July, 1981 YOY roundtails from a 40 km reach of the mainstem Colorado River (Mesa Co., Colorado) revealed lordosis at <2%. Counts are incomplete.

In 1980, deformed chubs were found in 68 of the 106 samples (64.1%). A total of 3497 YOY chubs were examined of which 360 (10.3%) were deformed. In 1981, 101 of 127 samples (79.5%) contained deformed specimens. A total of 4032 specimens were examined of which 667 (16.5%) were deformed. For 1981, YOY roundtails ranged from 14.5 mm - 48.0 mm in length (T.L.) and were probably 17-84 days old. Deformed specimens were 23.0 mm - 41.0 mm T.L. suggesting that spinal curvature appeared at 34-70 days. A number of yearling roundtails (>48 mm T.L.) were collected, but lordosis was not observed in this group. Examination of cleared and stained whole specimens indicates a gradual spinal curvature beginning around the 10th trunk vertebra through the 11th caudal. Maximum ventral depression is at the 3rd and 4th caudal. Vertebral rupture, separation, or compression are not evident. Preliminary microscopic examination has not revealed any readily noticeable gross differences in vertebral structure between normal and deformed fish. Examinations for two parasites known to be associated with fish spinal deformities (Myxosoma cerebrialis and Ichthyosporidium hoferi) were negative.

We know of few reports of lordosis in wild fish populations; however, it has been frequently observed in hatchery and laboratory conditions. A number of factors have been implicated in both lordosis and scoliosis (lateral curvature) including disease, heavy metals, nutritional deficiencies, pesticides, electroshock, fluctuations in oxygen and temperature, radiation, and genetic aberrations. Necropsy

results suggest that neither disease nor lead or zinc were the causative factors in this situation. Further, organophosphate pesticides have been shown to act as acetylcholinesterase inhibitors and often result in traumatic vertebral damage which is not evident in these specimens. Based on our preliminary examinations, we can only speculate that the cause of lordosis in these fish is one of the other factors. We assume that, since curvature occurs in the same area in each specimen, the condition can probably be attributed to one type of factor. Hopefully, ongoing analysis of possible pesticide and metal content in addition to bone composition, amino acids, and vitamin C levels (USFWS Fish - Pesticide Research Laboratory, Columbia, Mo.) will provide additional insight into this condition.