

Growth of Fishes in the Missouri River and Lower Yellowstone River, and Factors Influencing Recruitment of Freshwater Drum in the Lower Channelized Missouri River

by

Patrick John Braaten

B.S., University of North Dakota, 1988
M.S., South Dakota State University, 1993

ABSTRACT

The first goal of this study was to discern patterns of growth and other life history characteristics of five fish species (emerald shiner *Notropis atherinoides*, Sicklefin chub *Macrhybopsis meeki*, freshwater drum *Aplodinotus grunniens*, river carpsucker *Carpionodes carpio*, sauger *Stizostedion canadense*) samples from 18 Missouri River segments varying from 38° 47' North to 48° 03' North. Populations in southern latitudes were shorter-lived, and had higher life-span growth rates than northern latitude populations. Growth increments (mm) of all species during the first and second growing seasons varied among latitudes, but growth rates (mm/degree-day, mm/day) increased from south to north for all species except sauger for which growth rates declined from south to north. Species exhibited differential growth responses to water velocity. Within river segments, growth increments were related to median discharge during the growing season in 30% of the species by river segment analyses; however, growth responses to discharge varied among species and river segments. Results suggest growth and life-history patterns of fishes in the Missouri River are strongly influenced by the thermal regime which varies directly with latitude. At reduced spatial scales (i.e., within segments), interannual variations in river discharge mediate differential fish growth.

The second goal of this study was to examine factors influencing recruitment of freshwater drum in the channelized Missouri River. Larval and age-0 freshwater drum were sampled during 1997 and 1998 at four study sites located 514, 581, 699, and 788 km downstream from Lewis and Clark Lake - an upstream spawning area and source of larval freshwater drum. Larval density declined from upstream to downstream in 1998, providing evidence that upstream areas were the primary spawning locations and sources of freshwater drum. This pattern was not observed in 1997; however, Lewis and Clark Lake was the primary source of larval freshwater drum available for colonization at all sites during both years. Catch per effort of age-0 freshwater drum during fall was positively related to larval density during both years. There was little evidence for size-selective overwinter mortality. Results emphasize the importance of upstream to downstream linkages in the recruitment dynamics of fishes in demographically open aquatic systems.