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OBSERVATION OF A WINTERTIME CONCENTRATION OF CATFISH IN THE MISSISSIPPI RIVER

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Observation of a Wintertime Concentration of Catfish in the Mississippi River

By

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INTRODUCTION

Winter concentrations including flathead catfish (Pylodictis olivaris) and channel catfish (Ictalurus punctatus) occur at traditional locations in the Upper Mississippi River. Fishermen and natural resource agencies have known about some of the concentrations since the early 1960's, but no formal investigation has ever been conducted to determine their characteristics.

An investigation of one of these winter catfish concentrations was made in February 1979. This wintering area was discovered by sport fishermen through incidental snagging of catfish while angling for other species during March and April of 1971. Subsequent snagging and deepwater electrofishing have substantiated the existence of an annual winter concentration at the site.

The purpose of the investigation was to gather information to assist in management of catfish populations in the Upper Mississippi River and to evaluate SCUBA gear for use in scientific observation in the Mississippi River in wintertime.

The project was initiated by the Minnesota Department of Natural Resources and was joined by the Wisconsin Department of Natural Resources and the Marine Studies Division of the University of Wisconsin as cooperators.

The study area was located in Pool 4 of the Mississippi River upstream of Red Wing, Minnesota. Five transects were investigated along

a 1500 foot section of the main channel border. Transects 1,2 and 3 were adjacent to rip-rap bank areas. Transect 4 was adjacent to a natural bank area and transect 5 was located on the channel end of a submerged rock wing dam.

METHODS AND EQUIPMENT

Three boats were used in the project; one from which the divers operated, one which provided safety line support and one to keep the area free of boat traffic. An anchored transect line 85 feet long was used to establish area calculations, for diver orientation and as a safety line support. Information collected during the dives included flow measurements, water depth and temperature and visual and photographic observations. Dissolved oxygen was measured from the surface with a Yellow Springs Model 54 meter.[1/] Turbidity was measured by use of a Secchi disc.

A Nephric current meter[1/] was used by the divers at transect 3 to obtain current readings relative to bottom habitat used by individuals and groups of catfish. Divers measured current velocities near fishes' heads, at 6 inches and 30 inches above the substrate, at midwater (7 feet) and at the surface. The current meter had a long earphone cable which enabled the boat crew to record the readings. The meter was positioned and held by one diver while another diver swam between the surface and bottom to coordinate meter position, site conditions and meter operation. Water temperatures were taken by the divers at transect 1 using a hand held mercury thermometer. Underwater photographs were taken along all transects with a Nikonas underwater camera[1/] equipped with a strobe type flash.

1/ Mention of brand names does not constitute endorsement of product by user agencies

Divers made one dive along each transect to observe fish present in various habitat types and take photographs. Dives began at the downstream end of a transect and proceeded upstream to avoid turbidity resulting from the divers' activity.

FINDINGS

Physical and chemical characteristics of the water at transect 1 were assumed to be representative of all other transects. The dissolved oxygen level was 13 ppm. Water temperature was 33° F. from top to bottom and the Secchi disc reading was 9 feet.

Current velocities varied from 0 to 0.09 feet per second near fishes' heads, from 0.20 to 0.30 six inches above the substrate and from 0.21 to 0.27 thirty inches above the substrate. Current velocity was 0.31 feet per second at midwater and varied from .38 to .75 feet per second at the surface.

Water depth in the study area ranged from 16 to 25 feet. Enough light penetrated to the bottom throughout the study area so that artificial lighting was not needed to observe the fish.

Substrate in the study area included rip-rap areas, areas of scattered rocks over sand and areas of gently undulating silty sand with no rocks.

Divers made the following observations along each transect:

Transect #1 (February 26, 1979; 12:30 p.m.; 28 minute dive)

Rip-rap bank protection extended down at a 20° to 30° slope and consisted of 8 to 20 inch rubble with a fine, thin silt-algal coating. Where river bottom and bank met, scattered rocks had fallen off the slope and lay strewn across the bottom for a distance of 20 feet from the bank. Rocks were generally isolated on an otherwise flat, sandy bottom. Toward

midchannel the bottom consisted of gently undulating or flat, silty sand with no rocks present. Only small amounts of woody debris were evident at this dive site.

Twelve adult flathead and one small channel catfish were sighted while swimming the transect. No other fish species were sighted during this dive. All catfish were located within 20 feet of the base of the bank slope and were positioned directly on the bottom. With the exception of a single fish located in a shallow depression, all fish faced upstream and were positioned immediately behind rocks. In some cases two or more fish were located behind a large rock, or directly to the rear of other fish behind a rock.

Fish appeared to be dormant, remaining motionless with their pectoral fins canted on a downward plane. Little or no opercular movement was noted. Divers could gently stroke or tilt the fish with no response. Only when the divers firmly grasped the tail did fish react and attempt escape. Divers were able to bring large catfish to the surface in this manner.

Some fish had a fine layer of silt over their backs, suggesting they had remained motionless for some length of time. The divers estimated that 75 percent of the fish sighted had a white, fluffy, nodule-like infection present on the fins.

Transect #2 (February 26, 1979; 3:00 p.m.; 26 minute dive)

Rocks were scattered evenly over the bottom along this transect affording more cover than along transect 1. Divers sighted 39 flathead and 8 channel catfish along the transect line. Fish were located both singly and in groups behind rocks.

Fish were all in contact with the bottom and were positioned side to

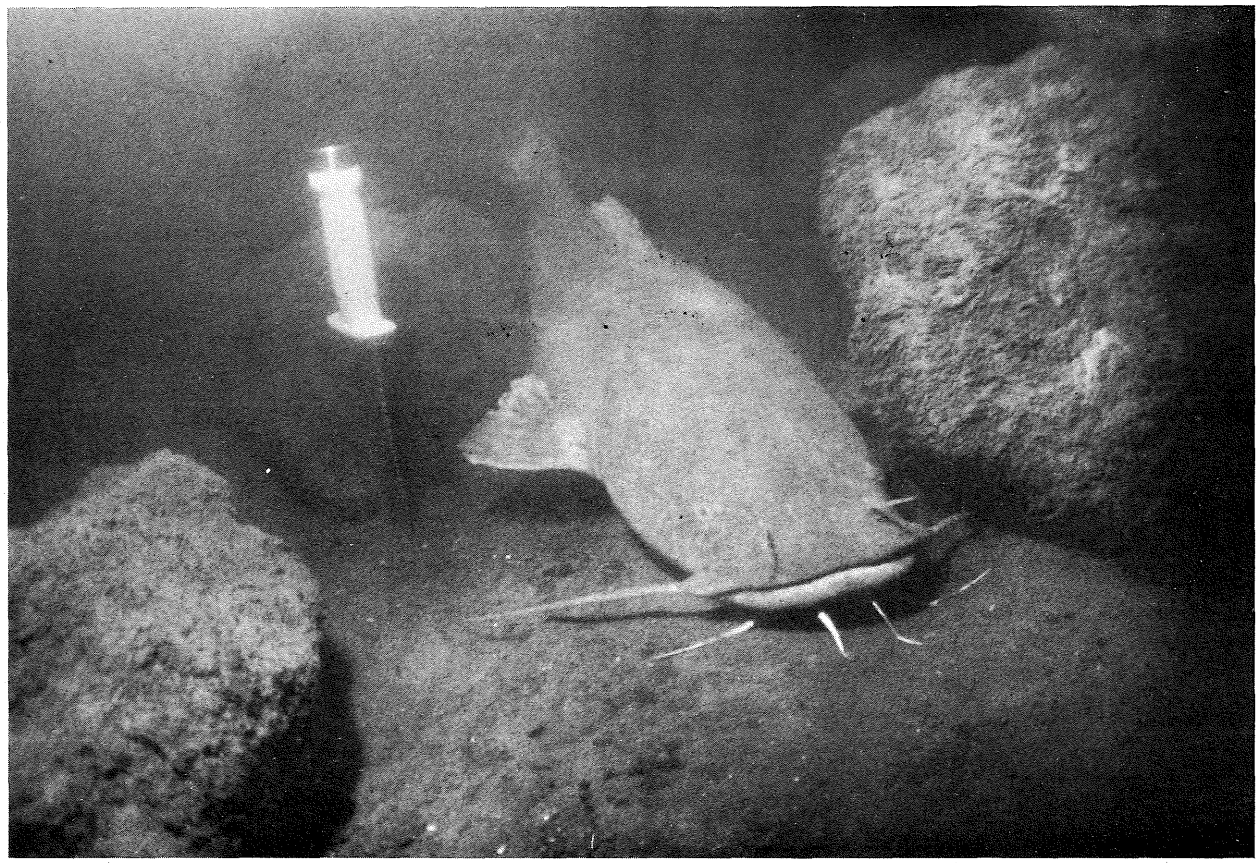

Figure 1 - Flathead catfish located between large rocks

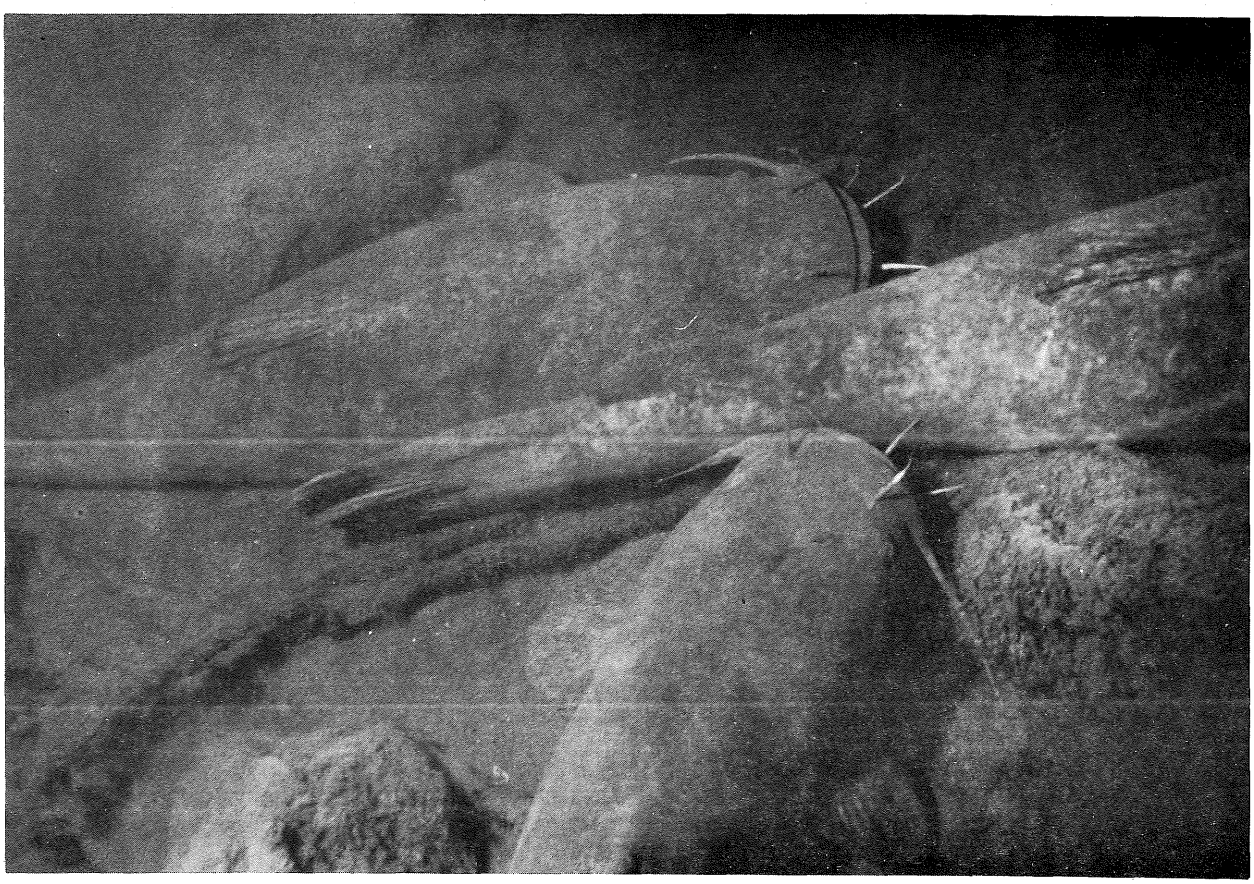

Figure 2 - Several flatheads located among rocks and sticks

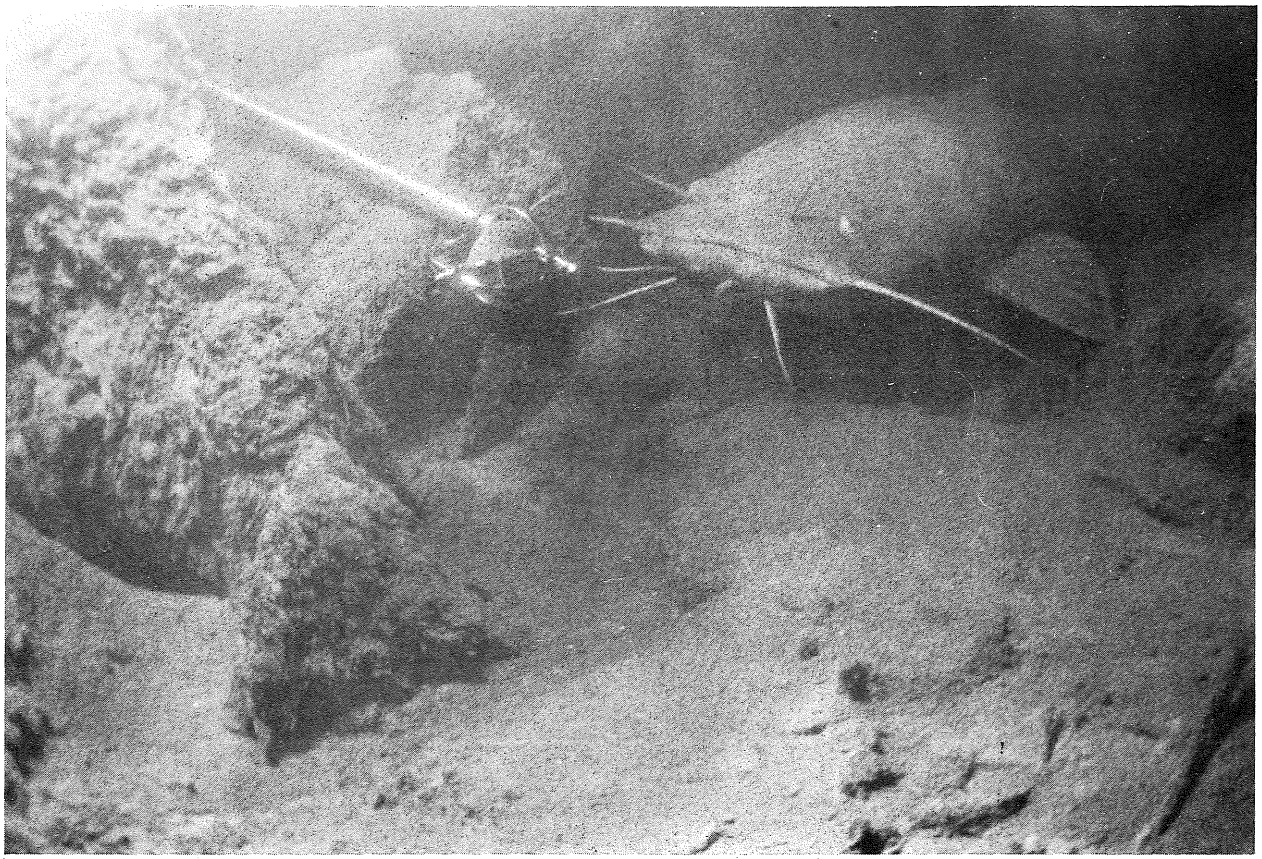

Figure 3 - Current meter used for taking velocity measurements near fishes' heads

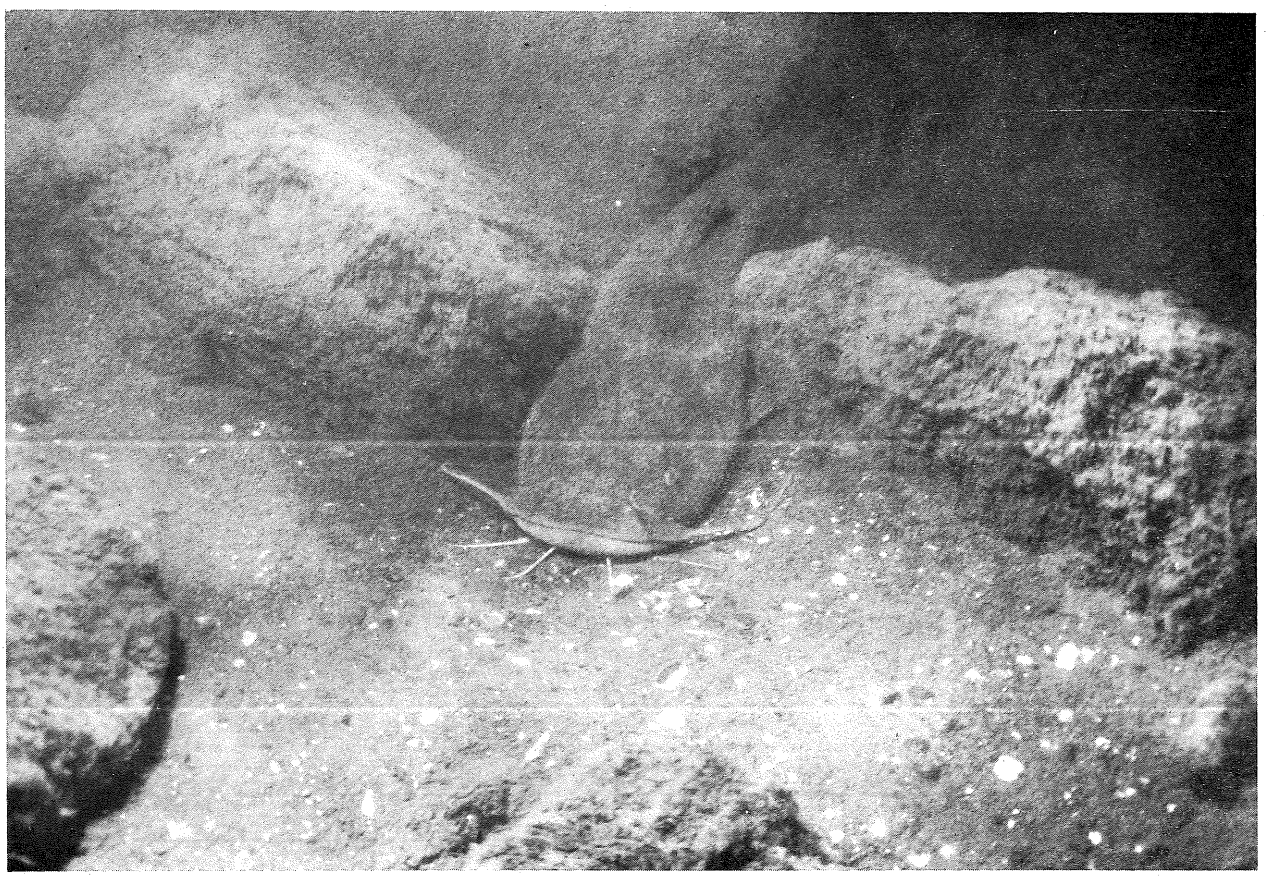

Figure 4 - Flathead catfish "wedged" between two rocks

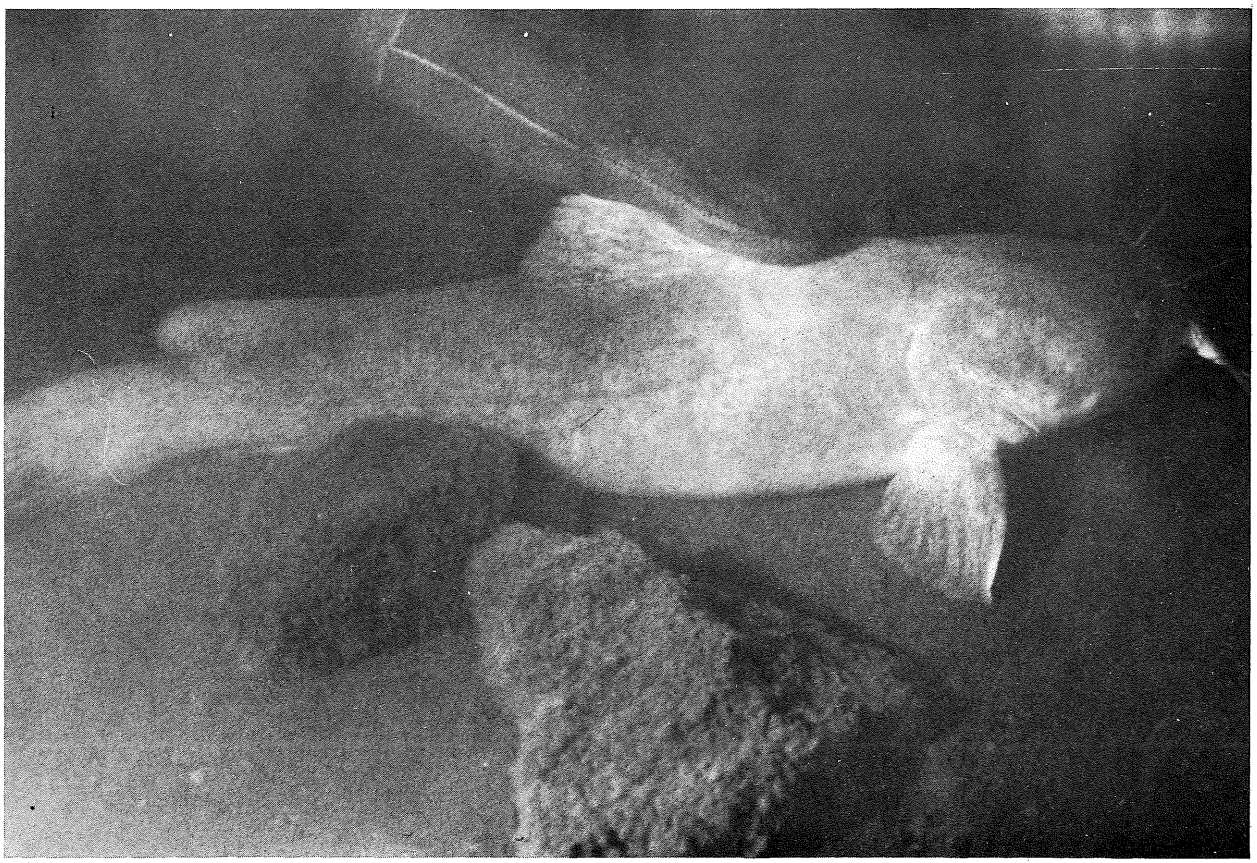

Figure 5 - Diver stroking back of large flathead

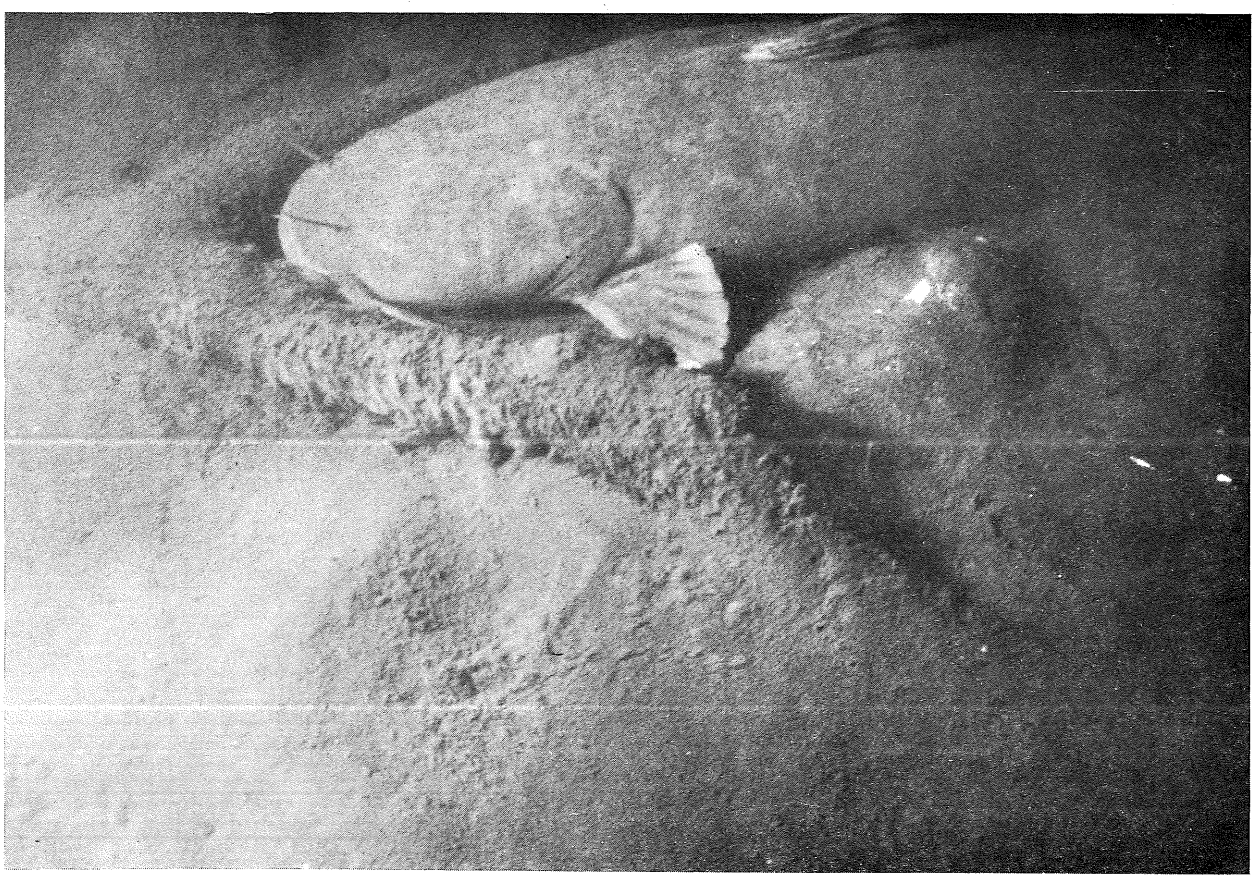

Figure 6 - Flathead using a crotch of a branch to break the current

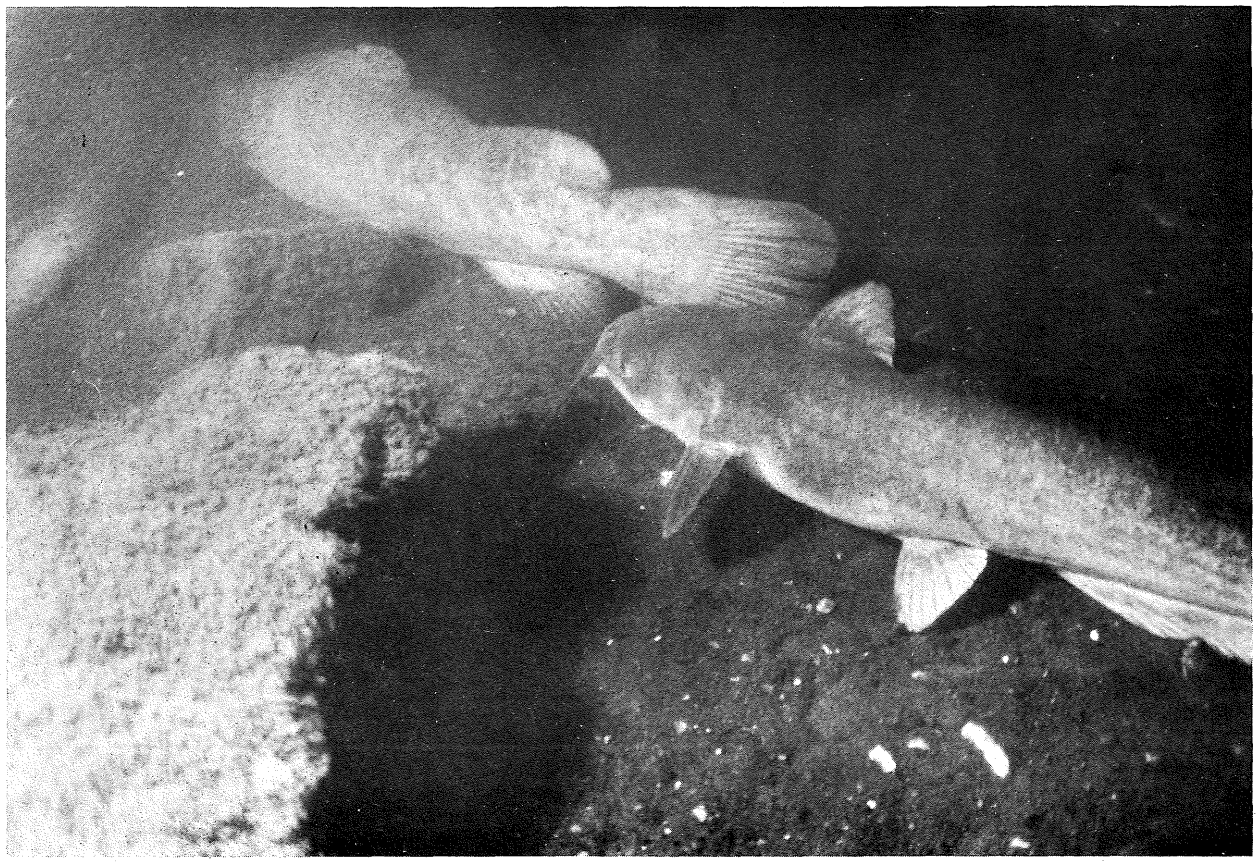

Figure 7 - Channel catfish (foreground) using a flathead to break the current

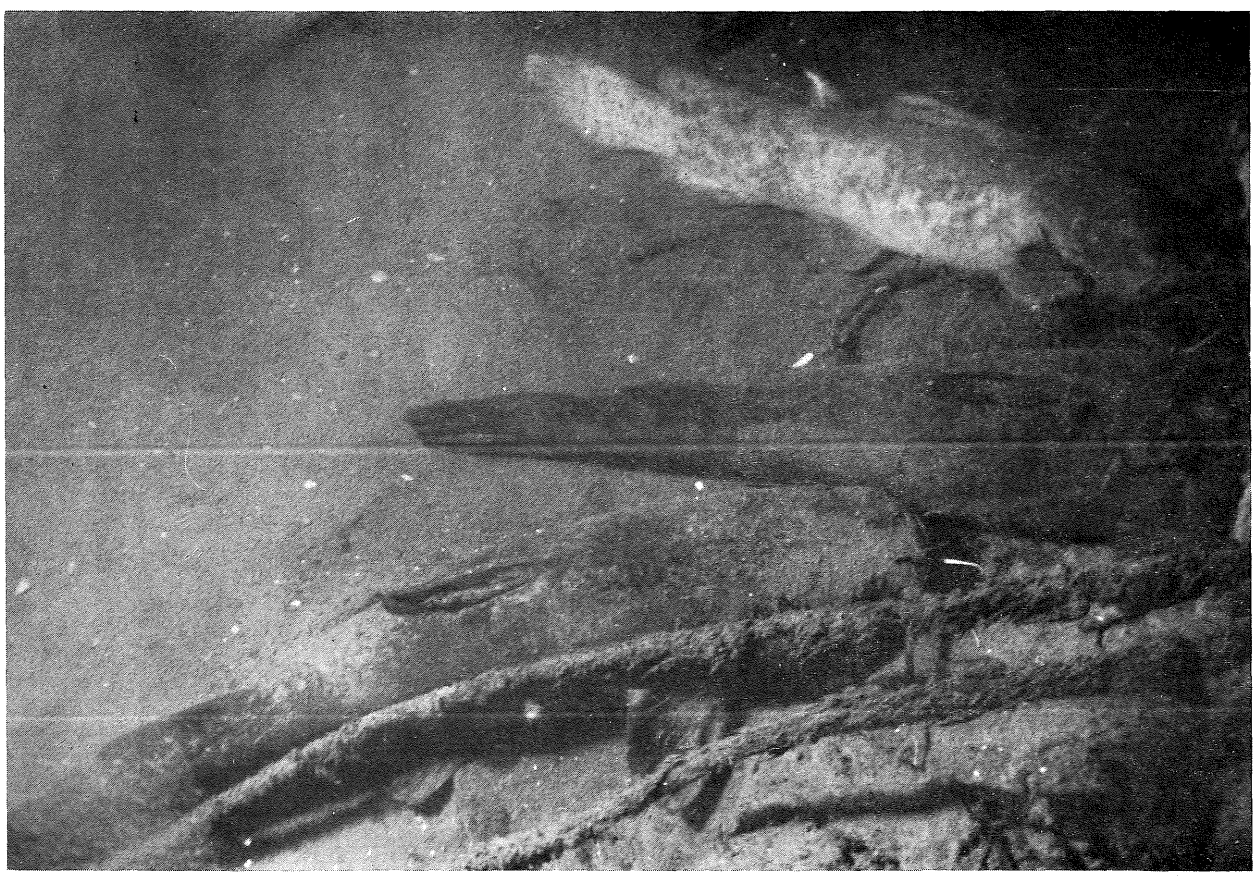

Figure 8 - Silt deposit on back of flathead (foreground) indicates a long period of inactivity

side as well as head to tail. Channel catfish were often in mixed groups with flathead catfish. Both species were intermingled as to size. No fish were sighted on substrate without rock, or on the rocky bank slope.

One channel catfish was collected at this site by the divers and sent to the Minnesota Department of Natural Resources Fish Pathologist for examination. Later examination revealed the fins of the catfish to have myxobacterial columnaris disease (Economon 1979).

Transect #3 (February 27, 1979; noon; 35 minute dive)

Rocks were less prevalent along this transect than along transects 1 or 2. Divers sighted 5 adult flathead catfish. All were oriented to rock substrate and faced upstream.

Transect #4 (February 27, 1979; 2:30 p.m.; 22 minute dive)

Minnesota DNR deepwater electrofishing at this site had previously collected freshwater drum but no catfish. The underwater habitat at this site differed markedly from the previous sites. Rock substrate was not present along the transect and only a few scattered rocks were present in the area. More woody debris was present. Flows were noticeably reduced and increased turbidity limited visibility from 4 to 6 ft. The bottom substrate consisted of gently undulating sand with substantially greater silt cover than in previous areas.

Divers observed no fish while swimming upstream along this transect. The search was expanded to include the shallowest and deepest parts of an area approximately three times the width of the transect. One flathead catfish was sighted behind a rock and four behind woody debris. In one case three flathead catfish were oriented behind a single 1.5 inch diameter stick. Two flatheads were resting on the bottom in an open area. The orientation

of fish varied relative to current direction but was always related to rocks or sticks.

Transect #5 (February 27, 1979; 3:30 p.m.; 20 minute dive)

The dive transect was positioned diagonally to a submerged wing dam. It extended from just upstream of the mid-channel end of the wing dam shoreward to a 25 foot scour hole downstream of the wing dam.

Substrate in the scour hole downstream and behind the wing dam consisted of clean sand with scattered rubble. As the wing dam extended toward mid-channel, the downstream face consisted predominately of rock rubble. Water depths on the upstream side of the wing dam were very shallow (about 3 feet) and the bottom consisted of coarse, clean sand except for exposed rock rip-rap on the apex of the wing dam.

Divers counted 27 adult flathead and three channel catfish as they swam the transect. All fish faced into the current and appeared to be oriented to scattered rock at the base of the dam. The majority of the fish were sighted near the mid-channel end of the dam where scattered rock was most abundant. No catfish were seen on either the upstream or downstream slope of the dam. The only other fish sighted were one dead gizzard shad and one freshwater drum. One large flathead catfish had an unidentified lamprey attached near its dorsal fin.

Figures 1-8 show various types of catfish scenes observed by divers in the concentration area.

DISCUSSION

Divers observed a mixture of flathead and channel catfish in the study area. Flatheads comprised over 80 percent of all fish sighted. Although

no fish were actually weighed, most of the flatheads were estimated to be 5 to 15 pounds with a few individuals over 25 pounds. The majority of channel catfish were estimated to be from 2 to 8 pounds.

The study area obviously is a winter concentration site for catfish. Extrapolation from the divers' sightings along the transect yields a calculated fish density of 2,350 fish per acre in the area of greatest concentration (transect 2). At other transects along the rip-rapped shoreline fish densities varied from 250-625 per acre. Fewest catfish were sighted where rock substrate was absent. Fish density at the wing dam was estimated to be 1,450 fish per acre. Larson and Ranthum (1977) reported 2,732 catfish per acre based on a commercial seine haul in a winter concentration area in Pool 7 of the Mississippi River.

Catfish were most abundant in large areas of widely scattered rock over a silt-sand substrate. Catfish evidently select this type of area to break the current and reduce energy output. Current velocities at catfish resting spots were generally 1/3 to 1/4 of the velocity in unprotected areas. Fish were not found along the irregular or steeply sloping bank or on the upstream face of the wing dam.

CONCLUSIONS AND RECOMMENDATIONS

Adequate oxygen and the existence of rocks or woody debris to break the current appear to be the main factors attracting catfish to this area during the winter months.

Deposition of dredged material into this area would drastically reduce its ability to hold catfish over the winter since the bottom would be leveled. All major catfish wintering areas should be identified and protected from spoil deposition.

Because of their lethargic behavior in the winter months, catfish would be extremely vulnerable to commercial harvest or harvest with SCUBA gear. These activities should be carefully controlled in these areas since an unscrupulous operator could virtually wipe out the entire concentration.

Other potential threats to winter catfish concentrations include turbulence resulting from winter navigation, heated discharges from power plants or activities which would result in habitat alterations in concentration areas.

SCUBA gear has proven to be a valuable tool for studying winter catfish concentrations. Underwater observations and photographs have produced evidence substantiating former ideas. These observations and resulting management decisions could not have been made with conventional sampling gear. The use of SCUBA gear in the Mississippi is limited most of the year because of high turbidity levels, but during periods of high water clarity it could be used to gather information on other fish species, to tag fish underwater, to evaluate fish kills or to evaluate fish habitat.

ACKNOWLEDGMENTS

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