

## Lake Sturgeon Spawning Activity in the Lower Black River: Phase II

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Lake sturgeon (*Acipenser fulvescens*) are the largest freshwater fish inhabiting the waters of New York (Smith 1985). Lake sturgeon historically inhabited the lower Black River and supported a limited local fishery through the 1950's. Over-fishing, spawning bed degradation, and poor water quality were likely causes of decline of this species. Currently listed as threatened in New York, the lake sturgeon has been a focal species for restoration and enhancement in New York since 1993.

Future lake sturgeon population enhancement in Lake Ontario may depend upon procuring broodstock for propagation. Spawning activity was verified below the hydropower facility at Dexter in 2005 by NYSDEC (Klindt and Adams 2006). Collection of broodstock at the spawning site would be inappropriate due to highly variable physical conditions related to discharge. This study focused on delineating collection sites for spawning lake sturgeon in mid migration, which would provide a safe working environment to collect fish prior to final gamete maturation.

### Methods

The Black River drains approximately 1900 square miles of upstate New York and empties into Lake Ontario, 6 miles West of the City of Watertown. The study reach is approximately 0.6 mi in length, starting approximately 0.1 miles downstream of the Village of Dexter, and extending to the lower-most islands above the confluence with Lake Ontario (Lat 44° 0' 06", Long 76° 3' 20").

Prior to the predicted mid-May spawning period, survey reach substrate and depth were evaluated primarily for successful gill net (gear) retrieval and navigation hazards. Interference with navigation is a concern in this area, as boats up to 25' are common in this section of river.

Substrate was classified visually using a SeaView® underwater video camera while drifting the thalweg of the river and recording substrate changes on a handheld GPS receiver. Since the project focus was gear retrieval, not spawning, substrate classes were generalized as bedrock, boulder, and cobble. A total of 34 data points were recorded and plotted using ArcGIS®. Substrate zones were evaluated by determining the linear distance between data points.

Depth soundings were recorded in the lowermost part of the river reach where substrate was characterized as predominantly bedrock and cobble and therefore designated promising for gill net deployment and retrieval. A total of 290 data points were taken using a Humminbird® portable depth finder and a handheld GPS unit. Data were plotted using ArcGIS® to determine proper net orientation and to avoid shallow areas where nets might interfere with navigation.

Gill nets were set from 5-12 May to capture mature sturgeon in spawning condition. Monofilament gill nets (8'x150'x10" stretch mesh) were set obliquely to the current in one location daily. Nets were set on substrate dominated by bedrock and cobble as determined by underwater video. Due to potential gear fouling from anglers, nets were deployed only during daylight hours (0900-1500 hours). Nets were fished for an average of 6.2 hours per day.

All sturgeon captured were held for a maximum of 10 minutes in river water while being assessed for gender, stage of maturity, and total length (TL). Individually numbered yellow Floy Tags® were attached on the dorsal side of the right pectoral fin of all sturgeon collected. Discharge was recorded daily by the USGS gage (#04260500) in Watertown.

## **Results and Discussion**

Studies in 2005 documented lake sturgeon spawning in the Black River (Klindt and Adams 2006), and those efforts elucidated the need for additional reconnaissance to facilitate the capture of pre-spawning female sturgeon. Capture of fish prior to final gamete maturation is a critical element of the egg take protocol as defined by Klindt (2005).

Due to limited snow-pack in the watershed, discharge during the study period (2230-2700 cfs) fell below the 83 year median values. Median discharge is approximately 4500-5000cfs for this time period. Water temperatures ranged from 58-64°F during the survey period. Physical conditions throughout the survey period are presented in Table 1.

In choosing the net site, both bottom composition and depth were considered. Substrates were classified as bedrock, boulder, and cobble. Bedrock dominated bottom composition at 56%, with boulder and cobble each at 21% (Table 2). One deep hole was encountered which occupied approximately 2% of the study reach. Figure 1 shows the survey boundary with substrate sample point locations.

Depth soundings were restricted to the lower portion of the survey area. A portion of the survey area, 0.1 mi upstream of the lower boundary, having the largest expanse of appropriate bedrock-cobble substrate, was determined to be the preferred gill netting site (Figure 1). A deeper portion of this area allowed approximately 75% of the available travel corridor to be fished effectively for sturgeon without obstructing navigation. A single net site with minor variation was used to capture all fish (Figure 1).

Substrate composition in the study reach was consistent with the area immediately below the hydropower facility (Klindt and Adams, 2006). Annual high flows in excess of 20,000 cfs continually scour the bottom to the existing bedrock.

Five sturgeon (total length 48-61 inches) were captured in this study. Weight data was not collected. Catch per unit effort (CUE) was 0.07 fish/hour. Four sturgeon were identified as males by extrusion of sperm by abdominal palpation. One fish was presumed to be a female from physical characteristics (length, body form) and the inability to extrude gametes. By-catch was minimal and consisted of two common carp (*Cyprinus carpio*). Biological data for all sturgeon captured appears in Table 3, and is also recorded in the New York Statewide Fisheries Database.

Underwater video was an efficient means of characterizing substrate and locating a bedrock/cobble area devoid of large angular boulders and shelf area that would inhibit retrieval of or cause excessive damage to gill nets.

Site selection, as tested, was adequate under low flow conditions. A few problems were encountered with woody debris but nets appeared to fish effectively. Net efficiency may be compromised under higher discharge rates (>6000cfs) as the oblique angle will subject it to fouling and potential collapse.

Operations in 2006 demonstrated that sturgeon could be intercepted downstream of the primary spawning site on the Black River. Although fish captured were in spawning condition, it is unknown whether they were pre or post spawn. Water temperatures encountered were above the optimum spawning temperature, yet within an observed range (Auer 1996, Kempinger 1988).

Catch per unit effort (CUE) for this effort was 0.07 fish/hr, in comparison to the St. Lawrence River broodstock collections, which average 0.04 fish/net. The high CUE in the Black River is likely indicative of higher capture efficiency, rather than large numbers of fish. Further study will attempt to isolate the upstream migration based on spring temporal changes.

**References**

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Table 1: Physical conditions in the lower Black River, Dexter, 5-12 May, 2006.

Date	Max Water Temp (°F)	Discharge (cfs)
5/5	58	2700
5/8	58	2500
5/9	60	2690
5/10	60	2540
5/11	64	2230
5/12	64	2240

Table 2: Approximate linear distance and substrate class observed during thalweg drift of the study area.

Substrate Class	Linear Dist. (ft)	% of Total Survey Area
Bedrock	1702	56
Boulder	633	21
Cobble	626	21
Deep Hole	65	2

Table 3: Biological data from 5 lake sturgeon captured in the lower Black River, Dexter, from 5-12 May, 2006.

Capture Date	Sex	Stage	Total Length (in)	Floy Tag Applied
5/8	M	Ripe	48.4	1780
5/9	M	Ripe	48.0	1761
5/11	F*		61.0	1763
5/11	M	Ripe	47.2	1764
5/12	M	Ripe	50.0	1765

\* Gender not verified.

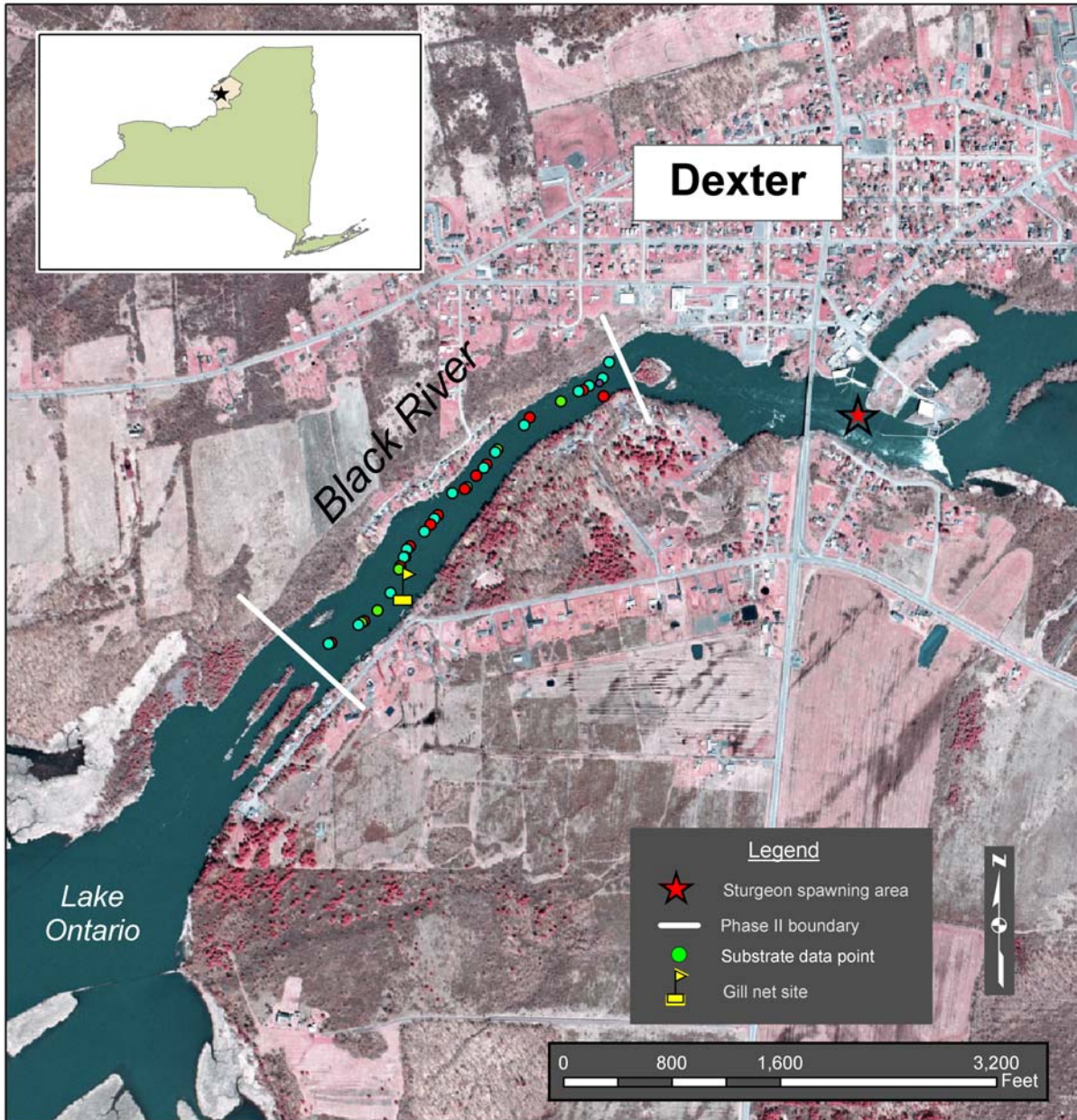


Figure 1: Study area for Phase II of the Black River Sturgeon Spawning Investigation indicating the reach evaluated for substrate and gill netting efficiency.