

Sturgeon River (SR) Aquatic Ecosystem Health Assessment



Why Aquatic Ecosystem Health Matters

- Ecosystems should operate similarly to how they functioned before human alteration
- Issues that impact ecosystem health: The SR watershed has undergone a lot of land use change, population growth, and has low flow during the summer months

Survey components: Aquatic Environment + Living Organisms

AQUATIC ENVIRONMENT: Combines physical and chemical data

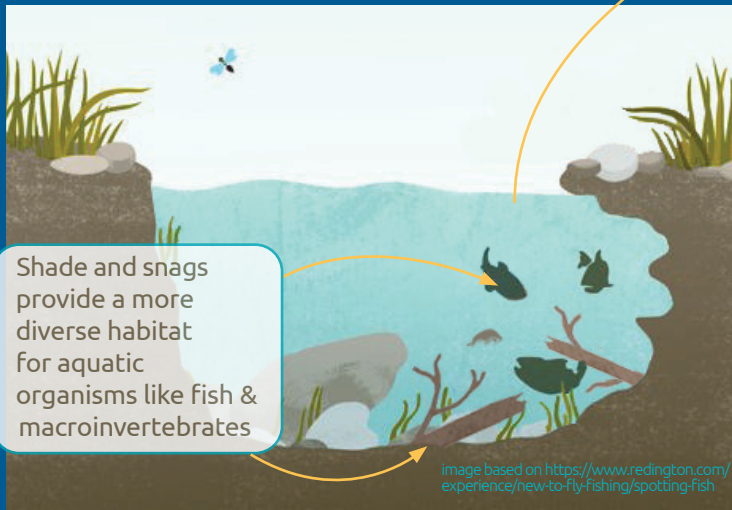
PHYSICAL HABITAT:

- Shade cover
- Aquatic plant cover
- Diversity of habitat
- Makeup of river bottom (substrate)



WATER QUALITY (Chemical) — Water is tested for:

- nitrogen (N)
- phosphorus (P)
- dissolved oxygen (DO)
- suspended solids
- pesticides
- metals
- chloride salts.

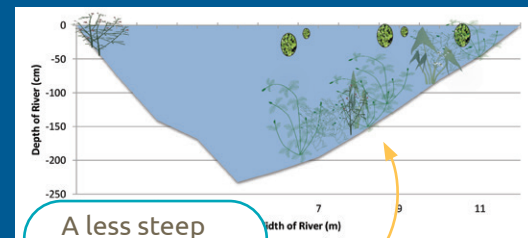


Shade and snags provide a more diverse habitat for aquatic organisms like fish & macroinvertebrates

image based on <https://www.redington.com/experience/new-to-fly-fishing/spotting-fish>

RIVER SIZE & SHAPE + AQUATIC VEGETATION

These components strongly influence the presence or absence of aquatic organisms



A less steep bank allows for light to infiltrate and encourages aquatic plant growth.

LIVING ORGANISMS: Macroinvertebrate & Fish Surveys

FISH SURVEYS: The presence or absence of fish — and combination of specific species — indicates water quality.



Percent of total fish captures & Pollution tolerance
 White suckers: 61% - Tolerant
 Northern Pike: 22% - Moderate
 Yellow Perch (8.2%) - Moderate

Winter kill affects the SR System every 2-3 years. What causes it?

- Low oxygen
- Too many nutrients (N & P)
- Shallow water bodies
- Extended time of ice cover
- Lower flows

SUMMARY: Fish species that indicate poor habitat conditions (White sucker and Brook stickleback) dominate the SR system

Poor water quality, poor physical habitat quality (in some areas) and, low dissolved oxygen concentrations are all creating stressful conditions for the SR's fish populations.

*DELTS = deformity, disease eroded fins, lesions and tumours

27%
of fish captures had DELTS*, which reflects stress

MACROINVERTEBRATE (MI) SURVEYS:

Like fish, MIs indicate water quality and they are intermediaries between plant and fish life.

Most of the sites indicated a system with high levels of nutrients and organics and low levels of dissolved oxygen in the winter.



Scuds are a MI species that have high pollution tolerance.

Further Studies & Some Key Recommendations

- Collect more instream physical data to improve understanding of aquatic habitat throughout the SR
- Create site-specific goals for areas where metals, salts, or pesticides are too high (e.g. pesticides downstream of St. Albert or nutrients in Rivière Qui Barre)
- Conserve the good habitat and water quality in the Middle Reach
- Monitor spring runoff for metals, nutrients and pesticides and salts downstream of high road density areas
- Exploration of the relationship between water quality parameters and flow for water quality
- Strategize to reduce nutrients by educating landowners about riparian area BMPs

12 Sampling Stations along the Sturgeon River

- Stations M1-M12 were based on location relative to features such as lakes, urban areas, and historical water measurement locations
- Tributaries (T1-T6) were only tested for water quality

LEGEND

- Physical Habitat = green
- Water quality = blue
- Macroinvertebrates
- Fish Surveys

Station Results

PHYSICAL HABITAT

Upper Reach **13-44%**
--> M3 lowest score overall (13%)

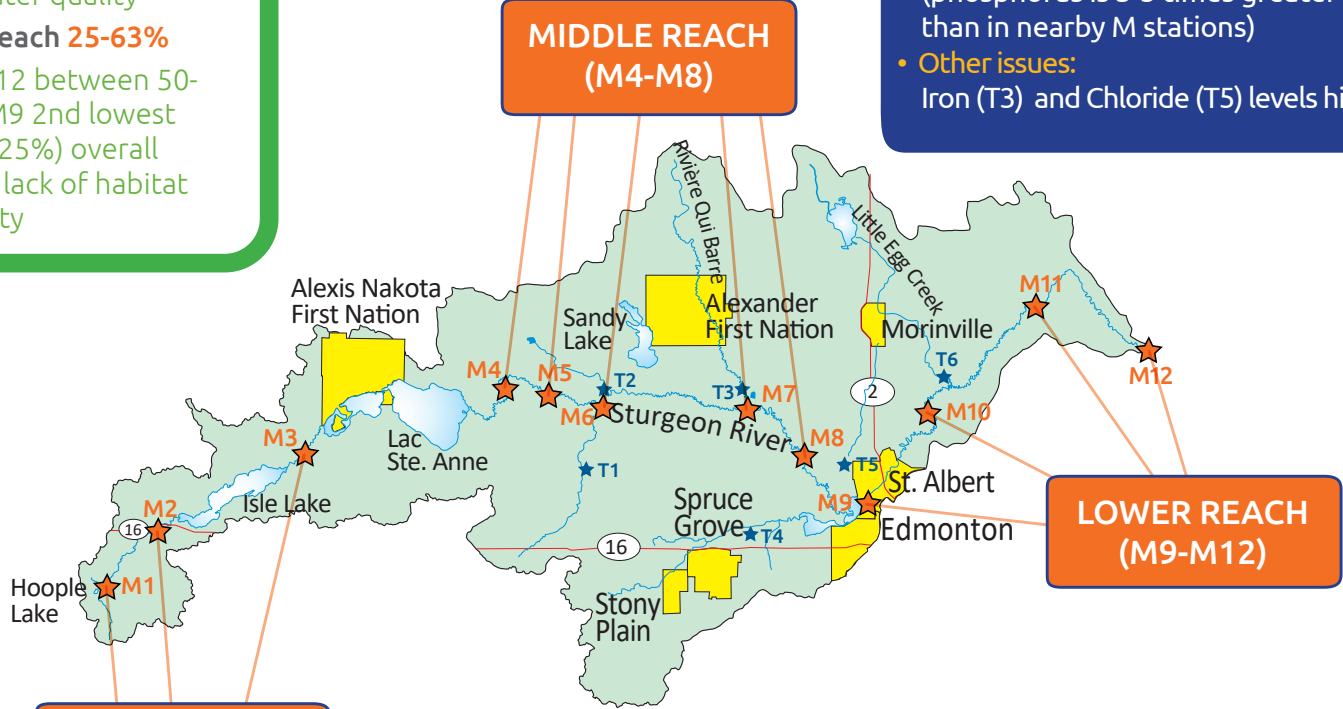
Middle Reach **50-69%**
--> better overall habitat and water quality

Lower Reach **25-63%**
--> M10-12 between 50-60%. M9 2nd lowest score (25%) overall due to lack of habitat diversity

Flow increases as elevation drops and river moves from west to east (M1-M12)

TRIBUTARIES

- Highly variable flows in short time periods
- **Agricultural impacts:** Nutrient levels high and dissolved oxygen low in T2, T3, T5 (phosphorus is 3-5 times greater than in nearby M stations)
- **Other issues:** Iron (T3) and Chloride (T5) levels high



UPPER REACH (M1-M3)

MIDDLE REACH (M4-M8)

LOWER REACH (M9-M12)

WATER QUALITY

Upper Reach **Lowest quality**
--> high pesticides, metals and nutrient levels

Middle Reach **Best quality**
--> Increased flow (10x Upper) and lower nutrient levels

Lower Reach **Medium quality**
--> Salt levels 4-5 times higher downstream of Big Lake. Pesticide levels high downstream of St. Albert

MACROINVERTEBRATES

Upper Reach **Lowest Rank**
--> Indicates poor to very poor water quality

Middle Reach **Good (M6) to poor (M4/5/8) water quality**
--> M8 indicates high nutrients and suspended solids

Lower Reach **Reflects fair to poor water quality**
--> Quality drops for Stations M10-12 (downstream of St. Albert) due to sediment, pesticides, and nutrients

FISH SURVEYS

Upper Reach **Lowest Rank**
--> mostly minnows rather than large sized fish

Middle Reach **Best Rank**
--> More diversity of fish, some that are sensitive to poor conditions, which indicates better water quality

Lower Reach **Medium Rank**
--> Walleye are common. Minnows with low pollution tolerance found closer to the mouth of the watershed due to more diverse habitat and water quality