Delivering local and regional trend data on stream fishes to facilitate collaborative management of Great Lakes and inland fisheries

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Information sharing: a key part of collaborative management

- Collaborative management in Michigan includes
  - Inland and Great Lakes-consent decrees, multi-agency groups
  - Smaller waterbodies (e.g., watershed groups, lake associations, & public)
  - MiCorps volunteers
- Regional trend data for stream fish populations would aid management
  - Provides context for interpreting individual surveys
  - Predict expectations for un-surveyed waters

Au Sable River brown trout total biomass
Regional synchrony in...
Zorn and Nuhfer (2007b)

- Swim-up dates for brown trout
- Spring flows
- Brown trout abundance at age

**Explanation**
- New record high for day
- ≥ 90th percentile
- 75th - 89th percentile
- 25th - 74th percentile
- 10th - 24th percentile
- < 10th percentile
- New record low for day
- Not ranked

Correlated brown trout age class densities
Assessing population trends in streams

- Michigan DNR’s Status & Trends Program
  - >40 fixed sites are sampled
  - Great Lakes accessible and landlocked streams
  - 50+ years of data at some sites
  - Local and regional-scale trend data
    - Understanding regional patterns = better management

SSTP fixed sites
This project:

- Serves key data from fixed sites
  - Mapped trends in species abundance, growth, and survival
    - Regional and local scales
  - Graphs and tables of above
  - Database updated annually
- Collaboration among Michigan DNR, Michigan DTMB, & MSU
- Funding: Great Lakes Fishery Trust and MDNR Fisheries Division
- [http://www.mcgi.state.mi.us/fishpop/](http://www.mcgi.state.mi.us/fishpop/)

MDNR Fisheries Division fixed sites circa 2012
Available data summaries

**Abundance estimates (per acre)**
- Total biomass, total numbers, and numbers by size-group
  - Brown trout, brook trout, rainbow trout, coho salmon, smallmouth bass
- Numbers by age group up to age-:
  - Browns (4+), brooks (3+), rainbows (1), cohos (1), smallmouths (4+)

**Growth** (mean length at age)
- Browns, brooks, smallmouths- ages 0-3
- Rainbows- ages 0-1

**Survival**
- Browns, brooks, smallmouths- from ages 0, 1, and 2 to the following year
- Rainbows, cohos- from age-0 to age-1
Welcome to the Stream Fish Population Trend Viewer

Instructions

1. READ FIRST: Background Info

- Use to display spatial patterns in species-specific trends and select map layers.

- Use to obtain graphs or tables of site trends in species abundance, growth, or survival at individual sampling sites.

- Map Navigation Information is available above the map using the Navigation Info dropdown menu.
Welcome to the Stream Fish Population Trend Viewer

Instructions
READ FIRST: Background Info

The Michigan DNR Fisheries Division initiated a statewide Status and Trends Program (STP) in 2002 to assess fish populations and aquatic habitat in Michigan's inland waters. A key component of the STP is a network of fixed (index) sites in streams and rivers across the state that are rotationally sampled through time to assess temporal trends in and describe the regional-scale dynamics of salmonid and centrarchid populations. Fixed site surveys employ standardized methods and provide high-quality data on many of the state's most renowned fisheries.

The data collected from STP fixed site surveys include population parameters such as total abundance estimates and abundance estimates by age or size groups, age-specific growth, and survival for important species including steelhead, coho salmon, brown trout, largemouth bass, and others.
Map view: Total brown trout biomass

Map View
Choose a species and trend type to display on the map:

SPECIES: Brown Trout
TREND TYPE: Total biomass (pounds/acre)

Update Map

Sample Sites
- Species does not occur at site
- Species not observed in most recent survey
- >90% above the long-term average
- >75% above the long-term average
- >50% above the long-term average
- Within 50% above or below the long-term average
- >50% below the long-term average
- >75% below the long-term average

Map Navigation Tools: Zoom Extents Navigation Info
Map view: Rainbow trout growth & site info

Stream Fish Population Trend Viewer
Michigan DNR

Map View
Choose a species and trend type to display on the map:

SPECIES:
Rainbow Trout

TREND TYPE:
Age Class 1 (inches)

Data View

Map Navigation Tools: Zoom Extents Navigation Info

Naomikong Creek
Site Name: Naomikong Creek
Fishery Management Unit Name: Eastern Lake Superior
Rainbow trout: age class 1 (inches) CLASS: Null
County: Chippewa
Mean width (feet): 11.5
Station length (feet): 925
Acres: 0.29
Strata: Small Great Lakes accessible, wild trout

Sample Sites
Species does not occur at site
Species not observed in most recent survey
>90% above the long-term average
>10% above the long-term average
>5% above the long-term average
Within 5% above or below the long-term average
>5% below the long-term average
>10% below the long-term average
Data view: age-0 brown trout density, Boardman & Platte

Map View  Data View

Brown trout: age 0 (fish/acre)

Data View
Enter information for two rivers to compare results on a graph

SITE 1:
Boardman River

SITE 2:
Platte River

SPECIES:
Brown Trout

TREND TYPE:
Age 0 (fish/acre)
Data view: Age-1 rainbow trout density, showing data values

Stream Fish Population Trend Viewer
Michigan DNR

Data View
Enter information for two rivers to compare results on a graph

SITE 1:
Pere Marquette River

SITE 2:
Little Manistee River

SPECIES:
Rainbow Trout

TREND TYPE:
Age 1 (fish/acre)

Pere Marquette River
Fishery Management Unit Name: Central Lake Michigan
County: Lake
Mean width: 54.31
Station length: 1047
Acres: 1.31
Strata: Medium, Great Lakes accessible, wild trout

<table>
<thead>
<tr>
<th>Survey date</th>
<th>Age 0 (fish/acre)</th>
<th>Age 1 (fish/acre)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1981</td>
<td>4340</td>
<td>94</td>
</tr>
<tr>
<td>1982</td>
<td>186</td>
<td>177</td>
</tr>
<tr>
<td>1983</td>
<td>547</td>
<td>92</td>
</tr>
</tbody>
</table>
Data view: Rainbow trout >4”, Export options

Stream Fish Population Trend Viewer
Michigan DNR

Data View
Enter information for two rivers and see the results on a graph.

SITE 1:
Little Manistee River

SITE 2:
Pere Marquette River

SPECIES:
Rainbow Trout

TREND TYPE:
> 4 inches (fish/acre)

Reset Graph

Fish Population Trend Report
Little Manistee River
Pere Marquette River

Rainbow trout: > 4 inches (fish/acre)

Little Manistee River
Fishery Management Unit Name: Central Lake Michigan
County: Lake
Mean width: 35.32
Station length: 984
Available online at:

- http://www.mcgi.state.mi.us/fishpop/
- DNR>Fishing>Fishing in Michigan
Habitat suitability tools for Michigan stream fishes

Relationships Between Habitat and Fish Density in Michigan Streams

Troy G. Zorn, Paul W. Seelbach, and Michael J. Wiley

Background

Objective: Develop an ecological atlas relating species abundance to key habitat variables.

- We've got lots of fish data for rivers
- We synthesized it for managers
Fish assemblage or trout abundance estimates
- 376 sites in LP
- 46 sites in UP

Game and non-game fishes

July temperatures measured at 351 sites
Habitat Suitability Index Models

Models (graphs)
- Species and family taxonomic levels
  - > 60 species
- Fish assemblage level
  - Total abundance & species richness

Primary Axes
- Stream size and hydrology (Low-Flow Yield)
- Mean and range in July temperatures
Habitat Suitability Models

- Uses
  - Provide state-wide perspective to local-scale data (benchmarks)
  - Support local-scale management decisions
  - Identify limiting factors for Michigan fishes
Example applications

- Assess potential of stream reaches:
  - for various fish species
  - under different management scenarios
- Quantitatively compare similar waters
- Justify management actions
Fish community attributes

Species Richness

90% Exceedence flow yield (cfs per mi²)

Catchment Area (mi²)
Compare performance of species

- Brook trout (lb/ac)
- White sucker (lb/ac)
- Blacknose dace (lb/ac)
Middle Branch River potential above and below Marion Impoundment
Salmonids (lb/ac)

July mean temperature (F)

Above pond (Shecks)
Below Brown Br Pond
Est. July weekly mean temperature (F)

Suckers (lb/ac)

Above pond (Shecks)

Below Brown Br Pond
Brown trout potential

Above pond (Shecks)

Below Brown Br Pond
Questions?

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