Mapping Lake Michigan Fish Catch Data

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Introduction

The only Great Lake completely contained in the U.S., Lake Michigan offers an abundance of recreational fishing to local fisherman. However, the vastness of Lake Michigan makes it difficult for average fisherman to know what locations are generally good fishing spots for certain species at any given time of the year. Trustworthy information on potential fish locations can make all the difference when it comes to a fisherman or a family making the decision whether or not spend a day on the lake.

Purpose

- Organize decades of fish catch data for Brown Trout, Lake Trout, Rainbow Trout, Coho Salmon, and Chinook Salmon species on Lake Michigan
- Create maps to represent data on a decadal and annual basis
- Publish maps to a web app that allows users to actively display data of their choosing to aid in fishing efforts

Brown Trout

Lake Trout

Rainbow Trout

Data Collection

- Charter boats on Lake Michigan report fish catch data to local DNR's for Illinois, Michigan and Wisconsin
- Data are recorded according to a 10 minute by 10 minute standardized grid system.
- State DNR's collect and store data and transfer it to Illinois-Indiana Sea Grant

Coho Salmon

Chinook Salmon

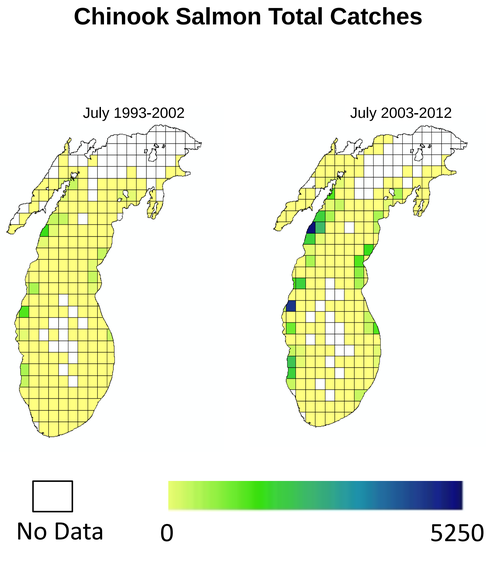
Lake Michigan imagery with fishing grid overlay

Displaying the Data

- By 5 species of fish
  - Total catch of species per grid
  - Catch per Unit Effort per grid
    - Catch per Trip
    - Catch per Angler Hour
- By Total Effort per grid
  - Trips to Grid
  - Angler Hours on Grid
- Decadal representation of data
  - 1993-2002 or 2003-2012
    - May - Sept
- Annual representation of Data
  - 1992 up to 2012
    - May - Sept

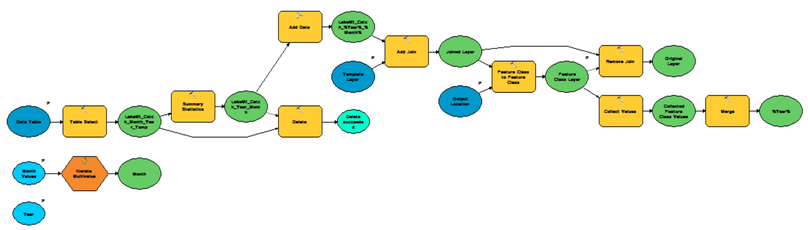
Decadal Map Process

- Organize data in Excel using pivot table
- Extract queries from pivot table to make monthly data tables
- Join geodatabase tables to separate layer templates containing "bare" grid data.
- Final result is one decade's worth of data for 5 main months one species
- 5 months x 2 decades x 5 species x 3 catch type summaries yields 150 unique maps



Annual Map Process

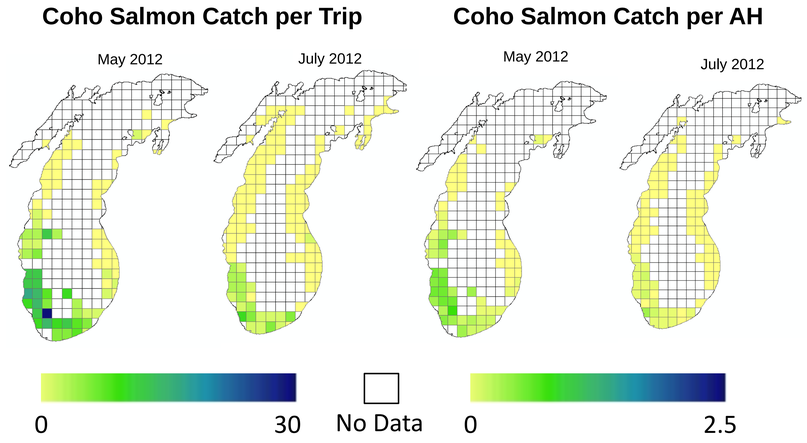
- Automate majority of the process used in making decadal maps
- Redefined multiple models from decadal process into one extensive model in ArcGIS



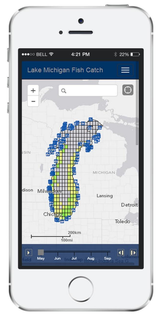
Model Explanation

- Multivalue iteration for desired monthly values
- For each iteration, Month and Year input determines a selection from a desired data table
- Summary Statistics tool finds the sum of total catches for 5 species, trips taken, and angler hours for selected data
- Data with statistics are joined to a template layer containing geospatial data for grids
- Joined layers are collected for all iterations and merged into one Feature Class layer for the year

Annual Map Results

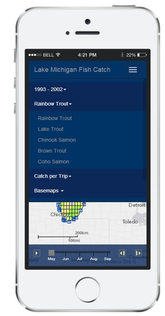


- Maps for catch per trip, catch per angler hour, and total catches for each of the 5 species for the years of 1992-2012 and the months of May – September
- 5 months x 21 years x 5 species x 3 catch type summaries for a total of 1575 maps



Web App

- The web app allows users to view the catch data using a web browser on desktop and mobile devices
- Users are able to select what data they wish to view using a series of drop down lists and a time slider to scroll between months



Conclusion.

- This work represents the first time that catch data from states around Lake Michigan have been combined in a spatial format
- Created at total of 150 unique decadal maps and 1575 annual maps for displaying the fish catch data
- Anglers can now use the maps to visualize and compare catch data for Lake Michigan between different years/decades, examine catch per unit effort in multiple ways, and view changes in the amount of effort spent fishing different parts of the lake

Acknowledgments

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