



Using strain-specific genetic information to estimate the reproductive potential of lake trout spawning biomass in southern Lake Michigan

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Funding Agency: GLFT and GLFC

Active Dates: 2023 – 2025



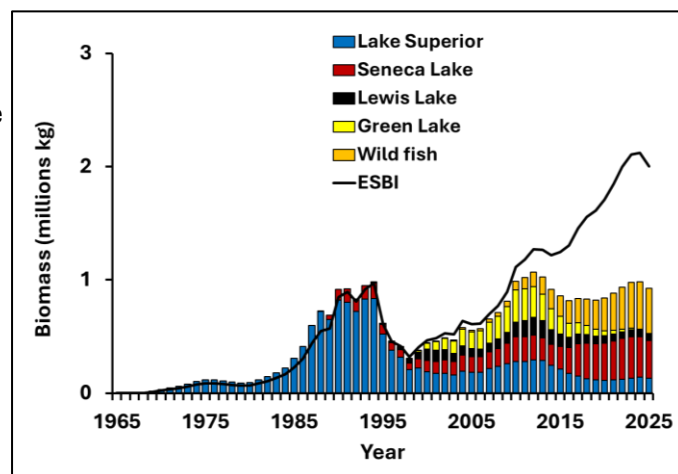
Mature lake trout.

Goal: To improve spawner-recruitment models for lake trout in southern Lake Michigan.

- Objectives:**
- Estimate annual biomass and strain composition of lake trout spawners in southern Lake Michigan.
 - Estimate the relative reproductive potential of each strain by comparing the observed strain-specific genetic compositions of wild recruits to the expected compositions based on relative abundances of parent strains.
 - Use the strain-specific reproductive potential to adjust spawner biomass for strain effectiveness and compare the result to unadjusted biomass estimates.

- Management Implications:**
- Understanding and quantifying the relative reproductive success of various genetic strains of lake trout has the potential to improve spawner-recruit models and to provide guidance for managing the rehabilitation of the species.

- Methods:**
- Use stock assessment models to estimate the composition of spawners by strain.
 - Summarize the observed strain-specific genetic composition of wild young produced.
 - Develop a **Reproductive Power Index** reflecting the relative genetic contribution of each parent strain to wild fish production.
 - Use the **RPI** to develop an **Effective Spawning Biomass Index** which weights spawner biomass of each strain based on their relative genetic contribution to wild recruits.



*Comparison of unadjusted spawning biomass by strain (bars) to biomass that has been adjusted for strain-specific spawning effectiveness (**ESBI**) for lake trout in Southern Lake Michigan 1965-2025.*

- Key Findings:**
- Seneca Lake strain fish were by far the most effective spawners. The estimated **RPI** was 2.56 for Seneca Lake, 0.74 for Lake Superior, 0.50 for Lewis Lake, and 0.32 for Green Lake strains.
 - The annual **ESBI** increased much faster than the total annual spawner biomass due largely to the increasing portion of Seneca Lake strain in the spawner biomass (see Figure).

Deliverables: Ebener, M. P., J. R. Bence, R. D. Clark, Jr. K. T. Scribner. 2024. Using strain-specific genetic information to estimate the reproductive potential of lake trout spawning in southern Lake Michigan. *J. Great Lakes Res.* 51(1).

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