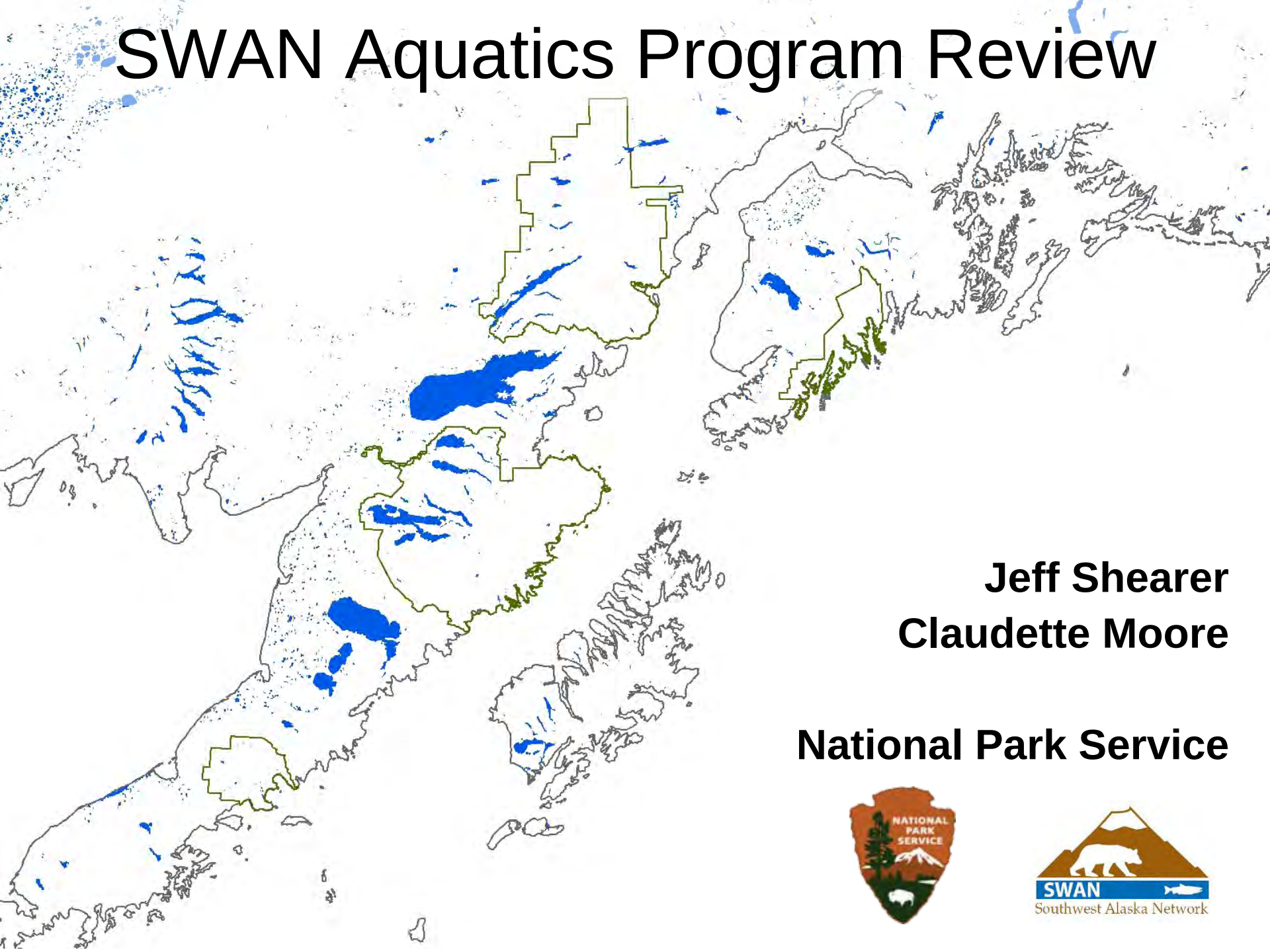
SWAN Aquatics Program Review



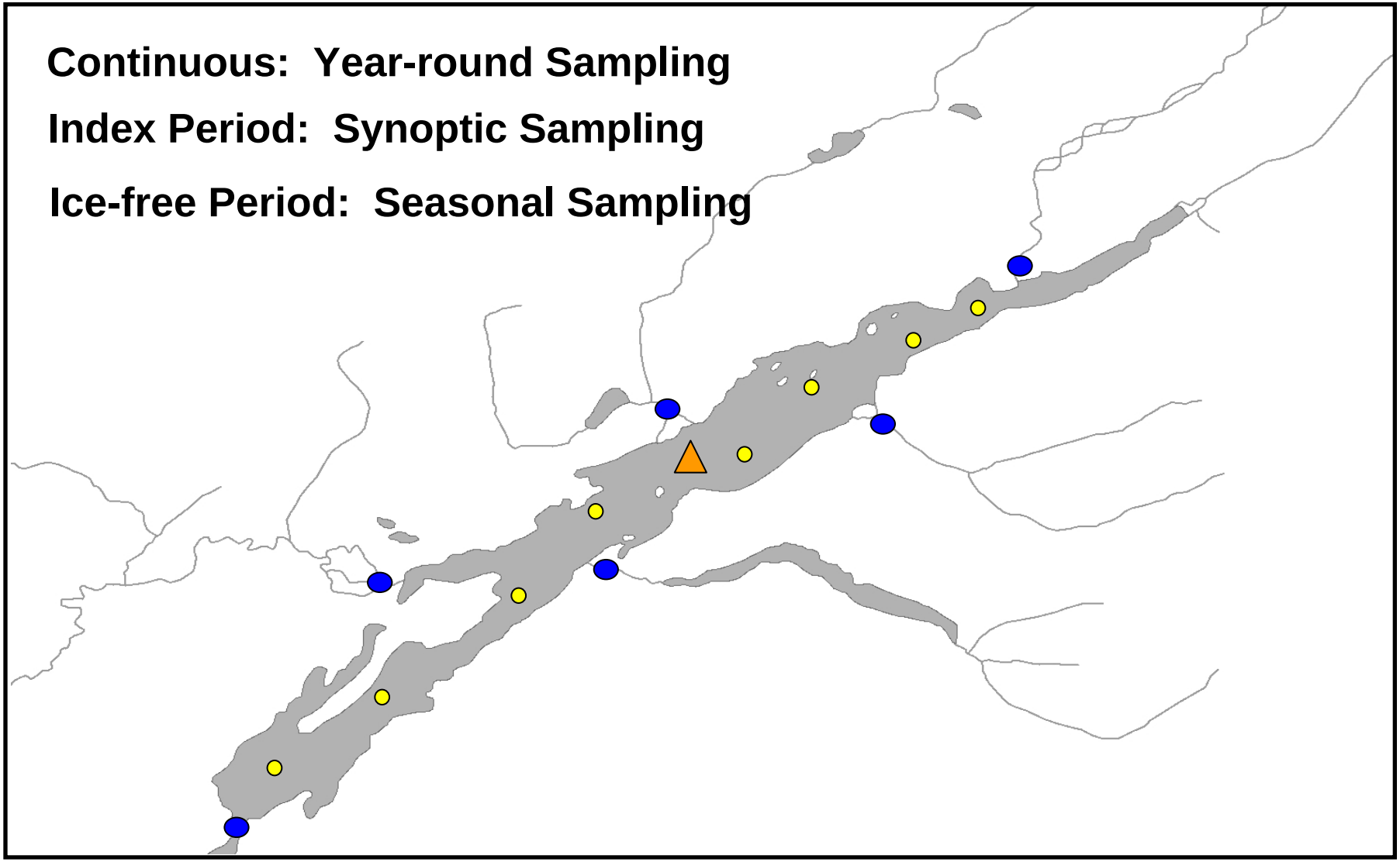
Jeff Shearer
Claudette Moore

National Park Service

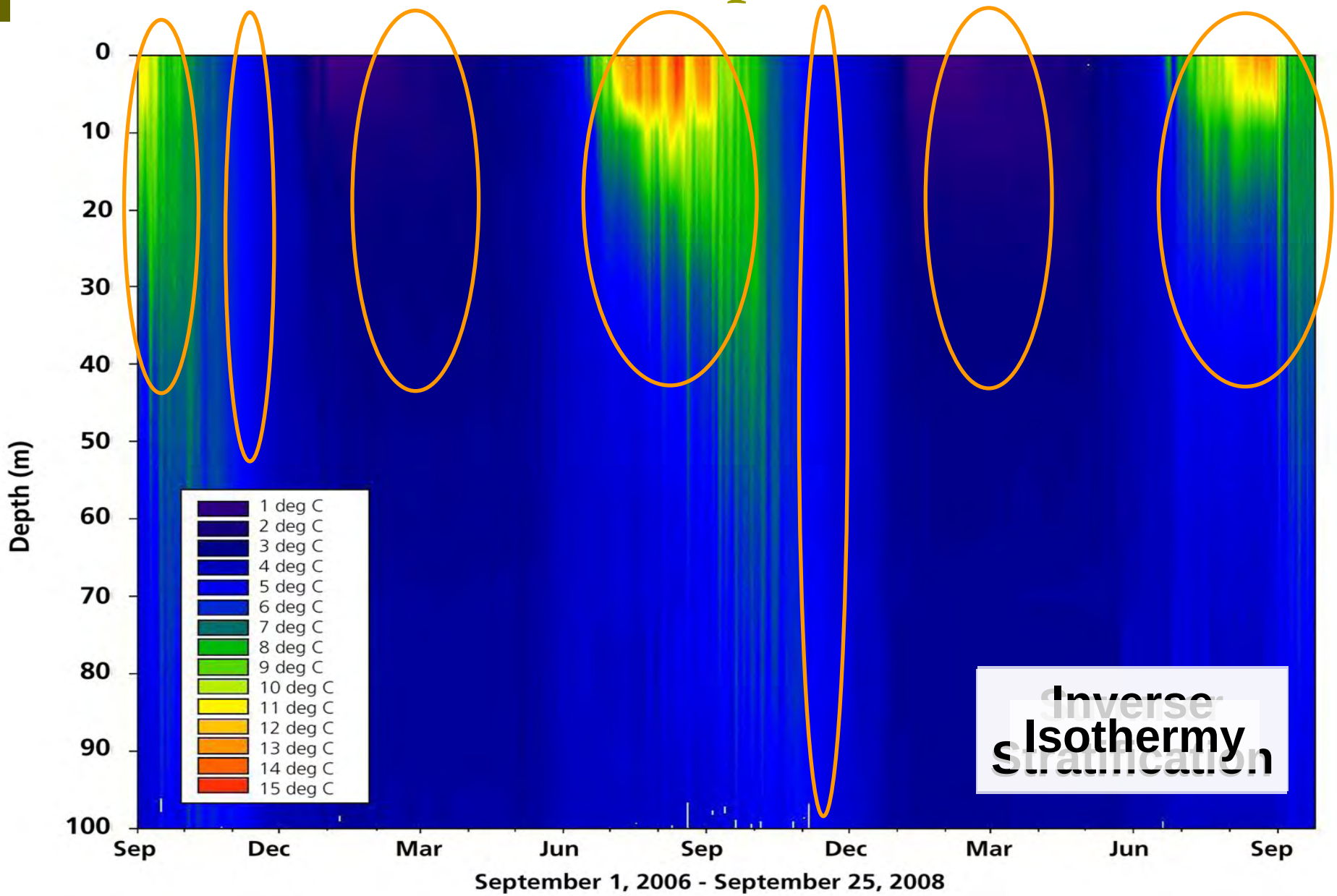
Talk Outline

- Review of water quality work to date.
- Water quality and hydrologic monitoring plans for summer 2009.
- Resident lake fish vital sign review.

Water Quality and Hydrologic Monitoring Strategy

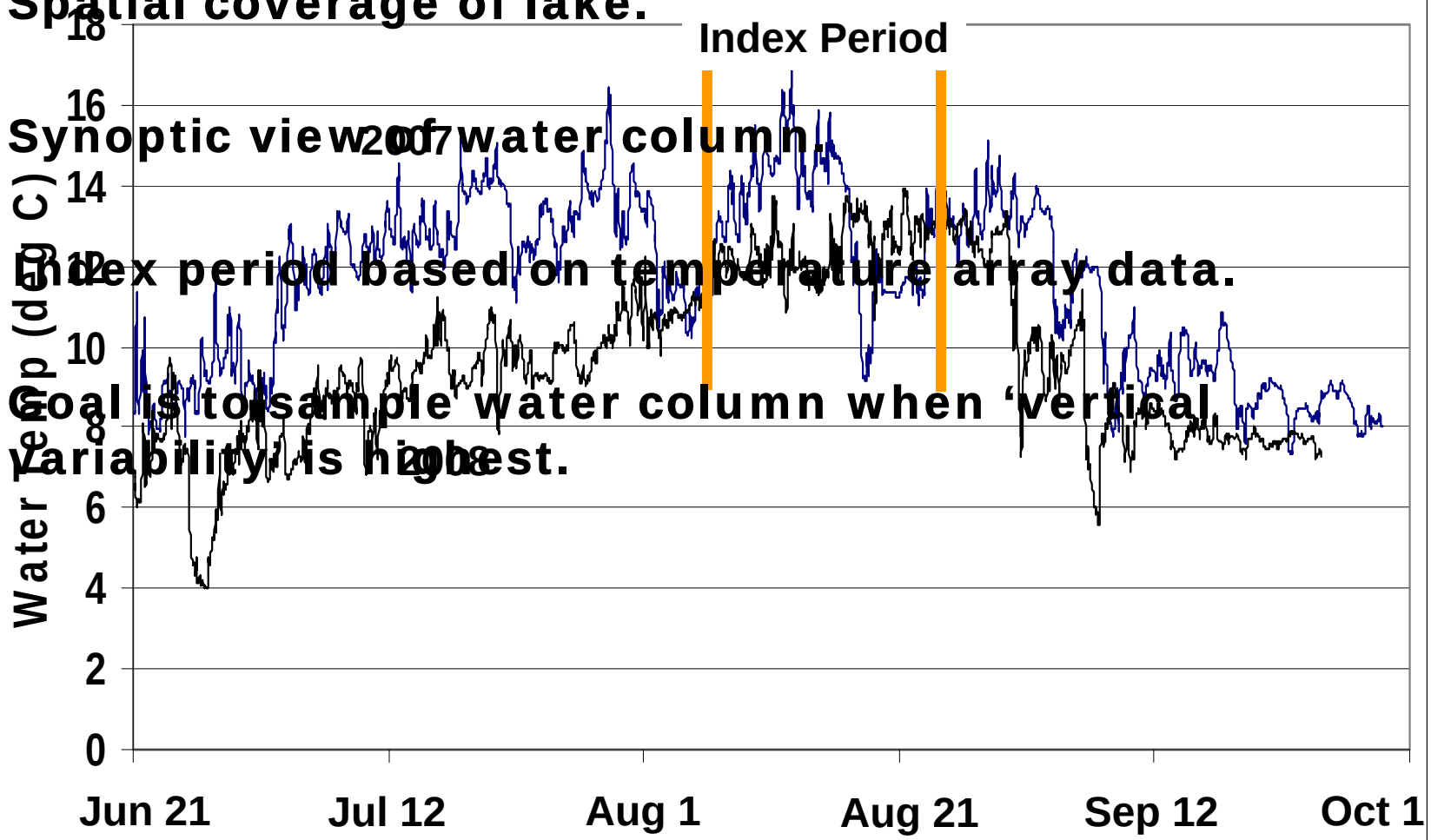


Lake Clark Water Temp Isotherm

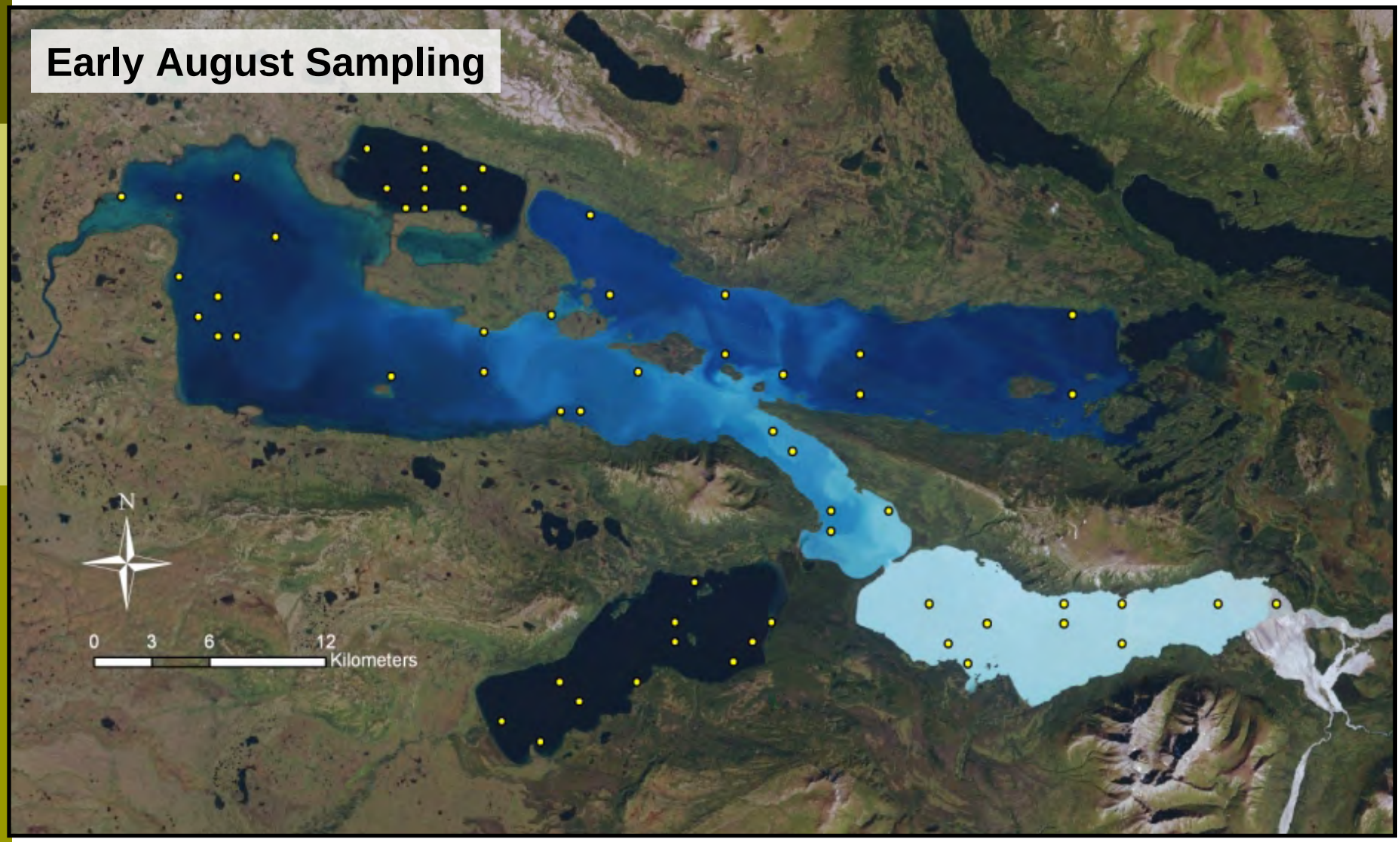


Vertical Lake Profile Sampling

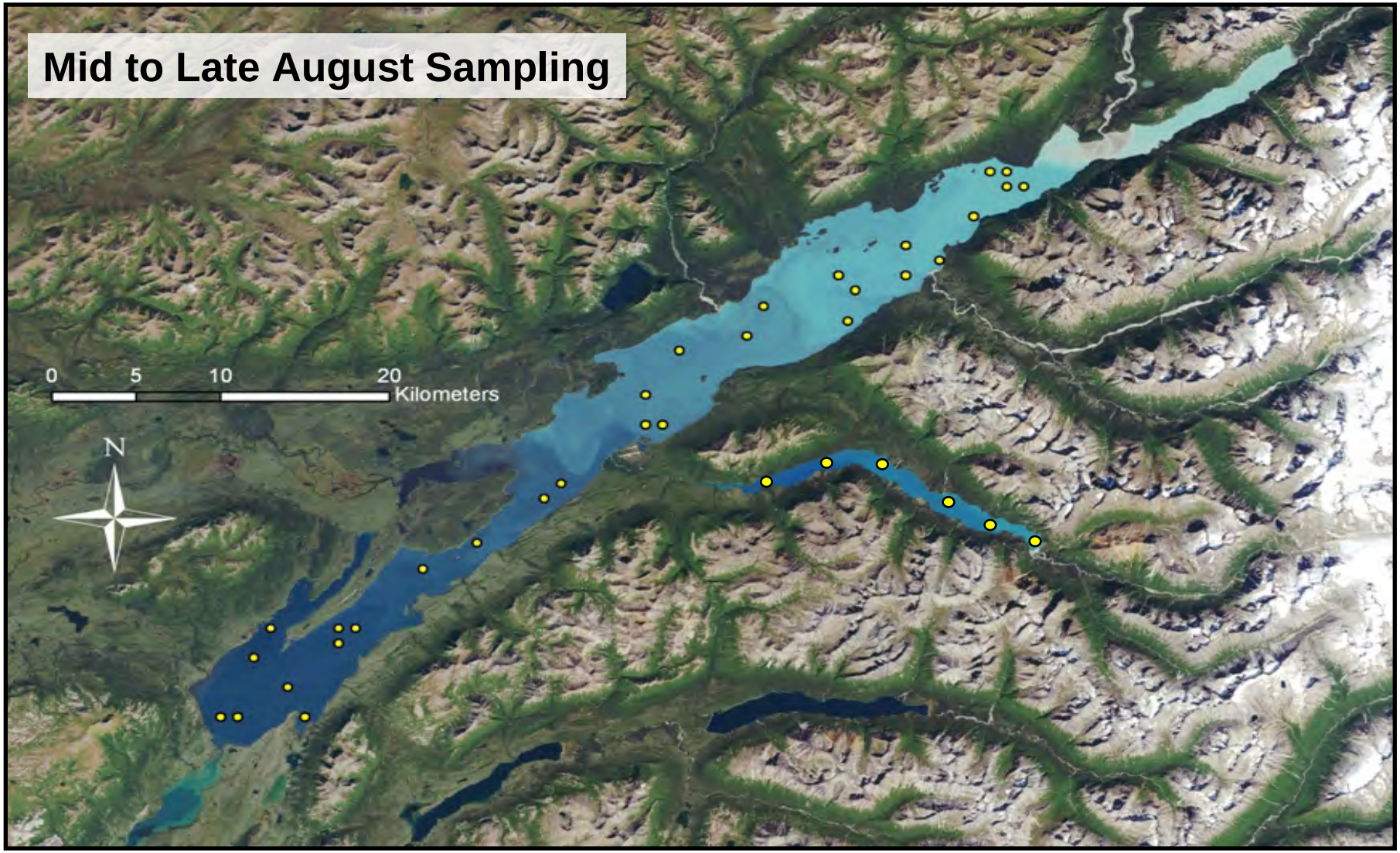
- Spatial coverage of lake.
- Synoptic view of water column.
- Index period based on temperature array data.
- Goal is to sample water column when 'vertical variability' is highest.



Spatial Sampling on Naknek and Brooks Lakes

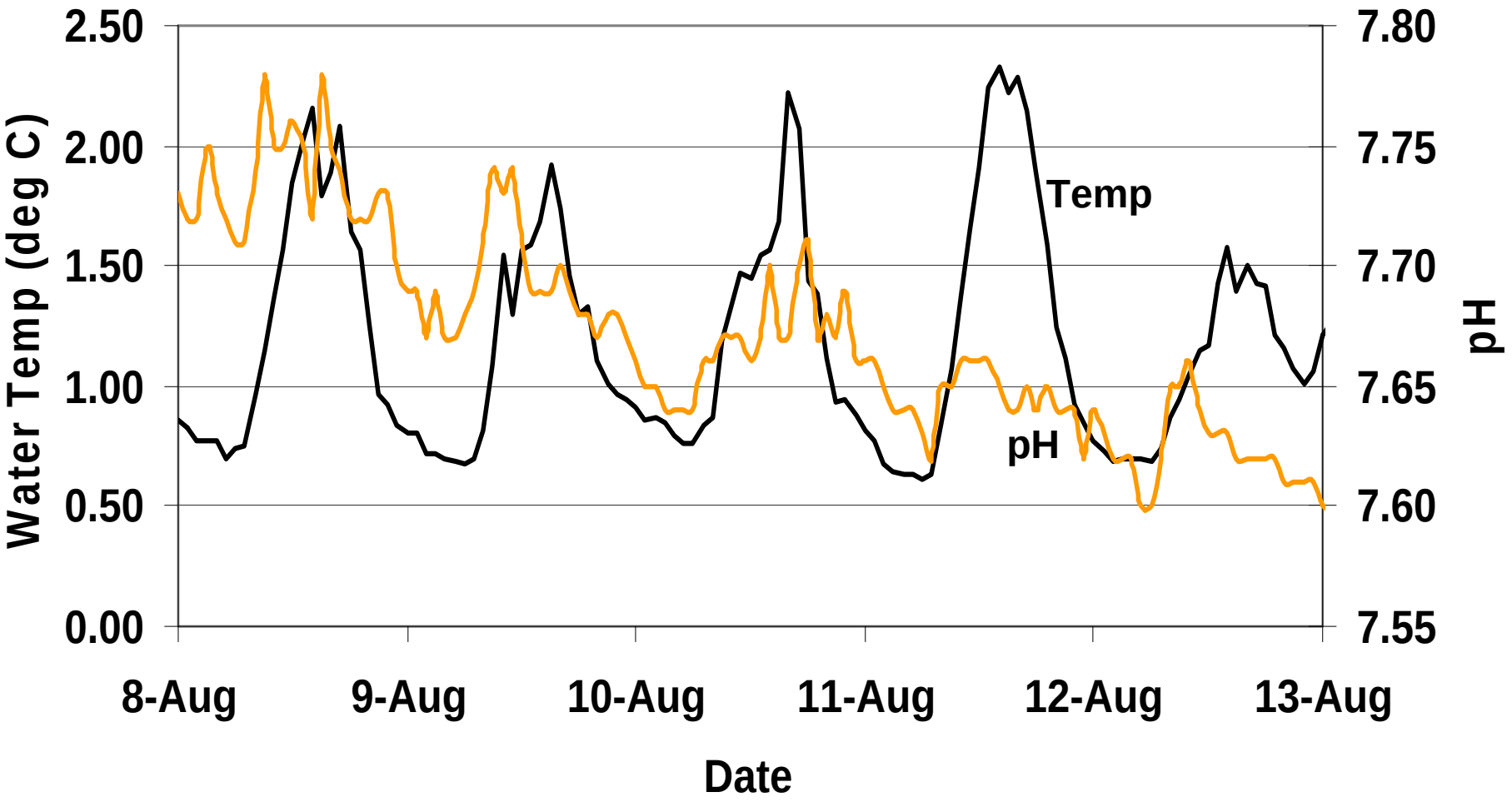


Spatial Sampling on Lakes Clark and Kontrashibuna

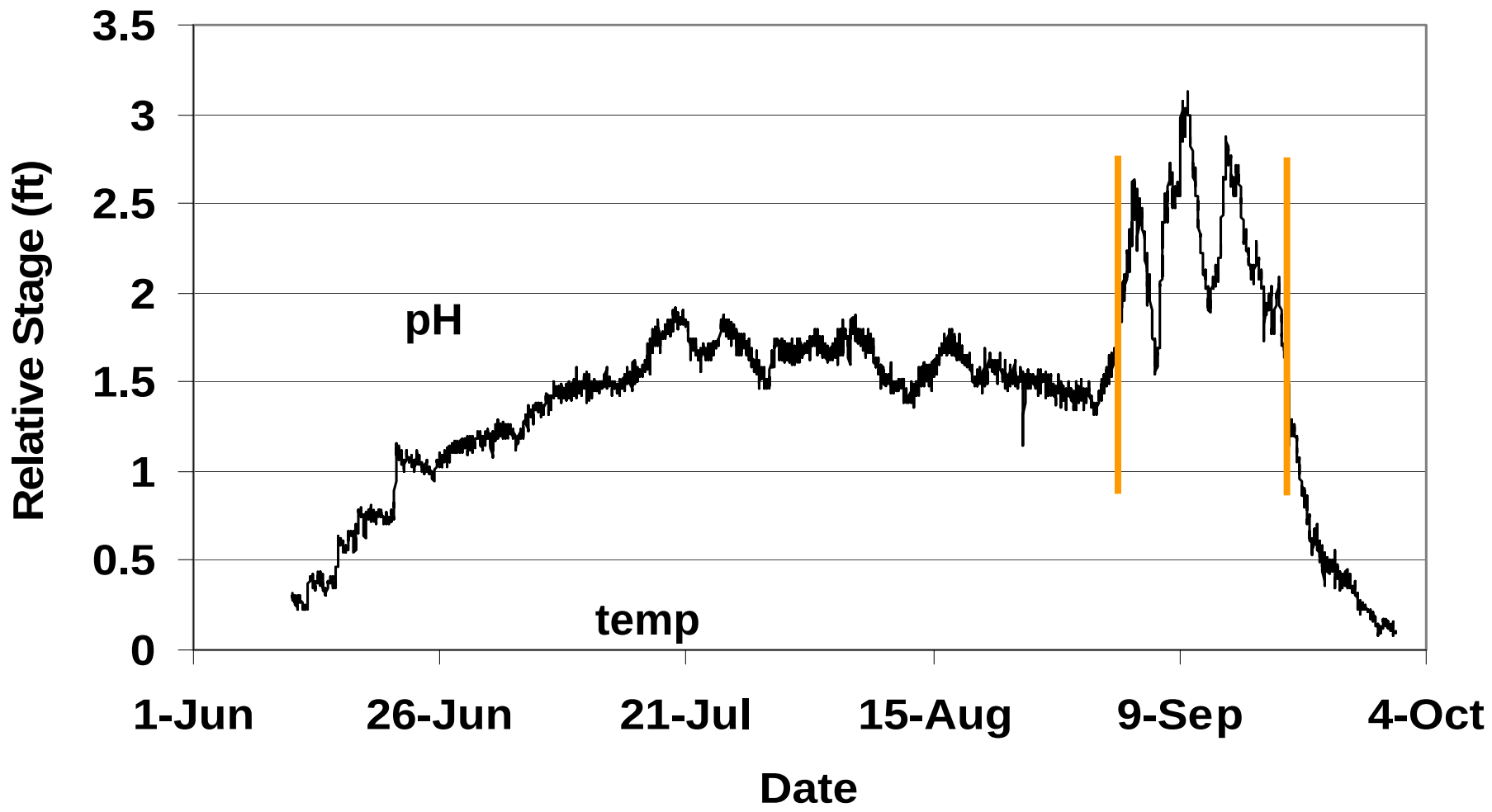


Continuous Water Quality Monitoring

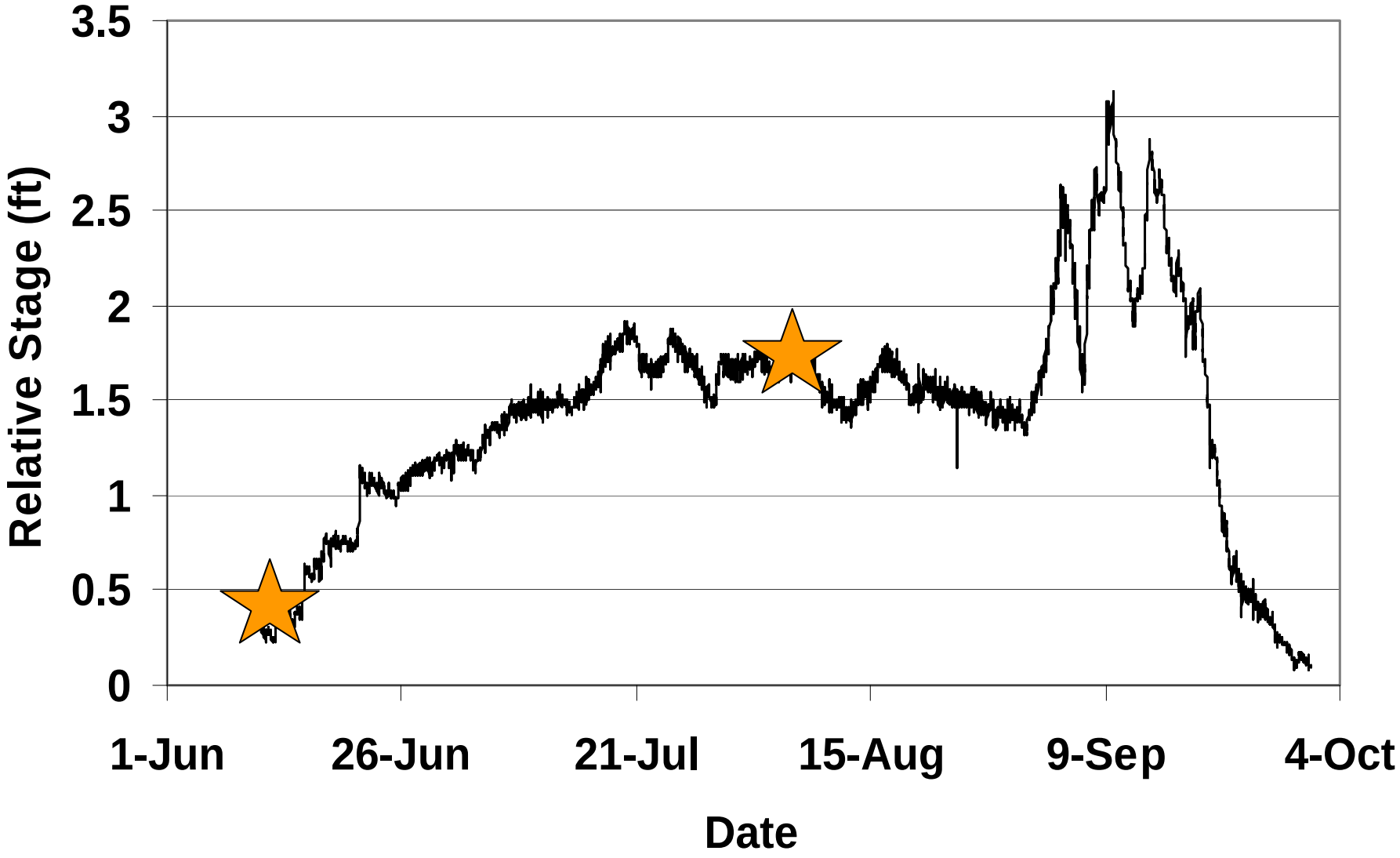
Need for Continuous Water Quality Monitoring?



Need for Continuous Water Quality Monitoring?



River Stage Constraints on Sampling



2009 Summer Plans for WQ and Hydrology

- **Surface Hydrology**
  - Water Level Monitoring – all Tier 1 Lake Outlets, Exit Cr, Lower Twin & Telaquana Lakes
  - Start to Monitor Inflowing Tribs – Chulitna River
    - Goal: Quantify Outflow and Inflow

- **Freshwater Chemistry**
  - Water Temperature Monitoring – Lake Clark and Naknek
  - Vertical Lake Profiling – all Tier 1 Lakes
  - Start to Monitor Inflowing Tribs – Chulitna River
  - Grab Samples for Nutrients and Ion Analysis

Resident Lake Fish

- What we said we would do.
- What we can presently do.
- Options for long-term monitoring.

Resident Lake Fish

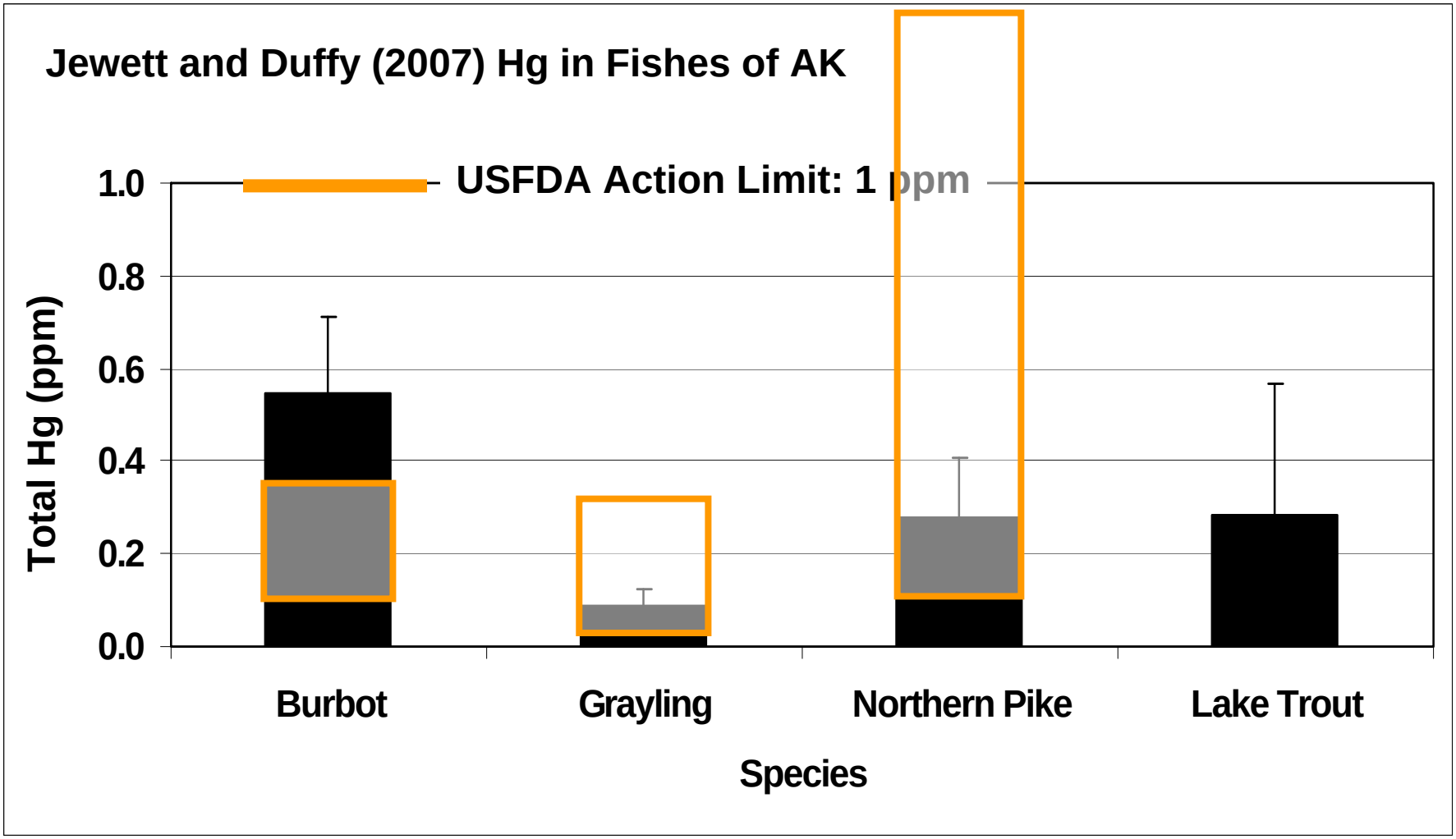
- Objectives as listed in Vital Signs Monitoring Plan:
  - Estimate long-term trends in relative species richness of resident lake fish communities.
  - Collect and archive tissue samples for later biocontaminant analysis.
  - Estimate occupancy of important recreational, subsistence, and other endemic species.
  - Annually monitor influx of nonendemic fish species.

Resident Lake Fish

- Continue ADEC Fish Contaminants Analysis
- Naknek Lake – Coordinate with Lake & Peninsula Borough
- Lake Clark – 2005 and 2009

Resident Lake Fish

Lake Clark Fish Contaminant Results



Resident Lake Fish

- Fish contaminants assessment provides general indication if a problem exists.
- Current assessment does <u>not</u> identify source(s) of problem.
- Rely on other vital signs monitoring to ID sources.

Contaminants and Resident Lake Fish

- Air Quality Monitoring (NADP Site)
- Water Quality Monitoring (Lab Analysis – Trace Metals)
- Lake Sediment Core Projects

Fish Population Monitoring and Modeling

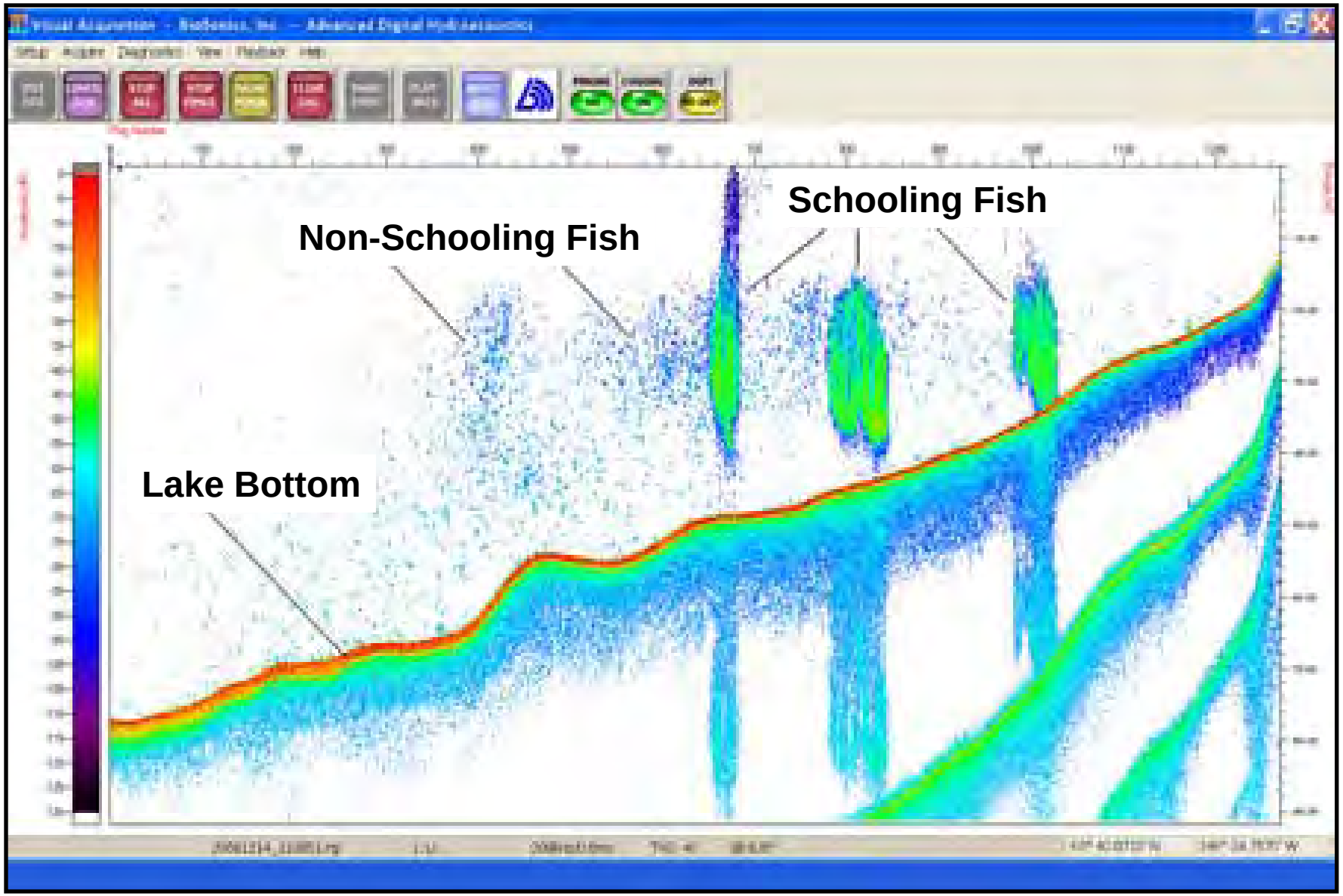
- Abundance, biomass, and occupancy models all require accurate population-level data.
- 2005-06 pilot testing of gill netting and seining on Lake Clark.
- Results: patchy distribution of fish led to very high CVs.
- Need: alternative sampling technique that would allow a 2-3 person crew to cover a large lake in 1-2 weeks.

Resident Lake Fish
Hydroacoustics Surveys

- Common method in oceans, Great Lakes, and large lakes.
- Ability to cover large area without altering fish behavior.
- Still requires some trawling or gill netting effort to verify species present.
- Works best for simple fish communities, pelagic species.
- Biggest downfall: upfront cost of technology.

Basic hydroacoustic concept.

Hydroacoustics Surveys



Resident Lake Fish

- Objectives as listed in Vital Signs Monitoring Plan:
  - Estimate long-term trends in relative species richness of resident lake fish communities.

Periodic Fish Inventories

  - Collect and archive tissue samples for later biocontaminant analysis.

Contaminants Screening w/ ADEC

  - Estimate occupancy of important recreational, subsistence, and other endemic species.

Need population-level data. Hydroacoustics offers most promise, but cost prohibitive at this point

  - Annually monitor influx of nonendemic fish species.

Annual monitoring of major pathways not feasible, education / outreach on aquatic invasive prevention