

# The Okanagan Lake Action Plan: A Ten-Year Review



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# DFO vs. MOE

- DFO
  - Management of anadromous species
  - Federal Fisheries Act
  - Compliance and Enforcement: Fish Act (primarily with anadromous species)
  - Screening and review of major projects: Canadian Environmental Assessment Act
  - Authorization for destruction of fish habitat
- MOE
  - Management of resident species
  - Provincial Water Act
  - Compliance and Enforcement: Water Act and Fish Act (for resident species)
  - Provide resident species expertise to DFO

**Ministry of  
Environment  
Okanagan  
Region**

**Environmental  
Stewardship  
Division**

**Water  
Stewardship  
Division**

**Environmental  
Protection  
Division**

**Fish and Wildlife  
Section**

**Ecosystems  
Section**

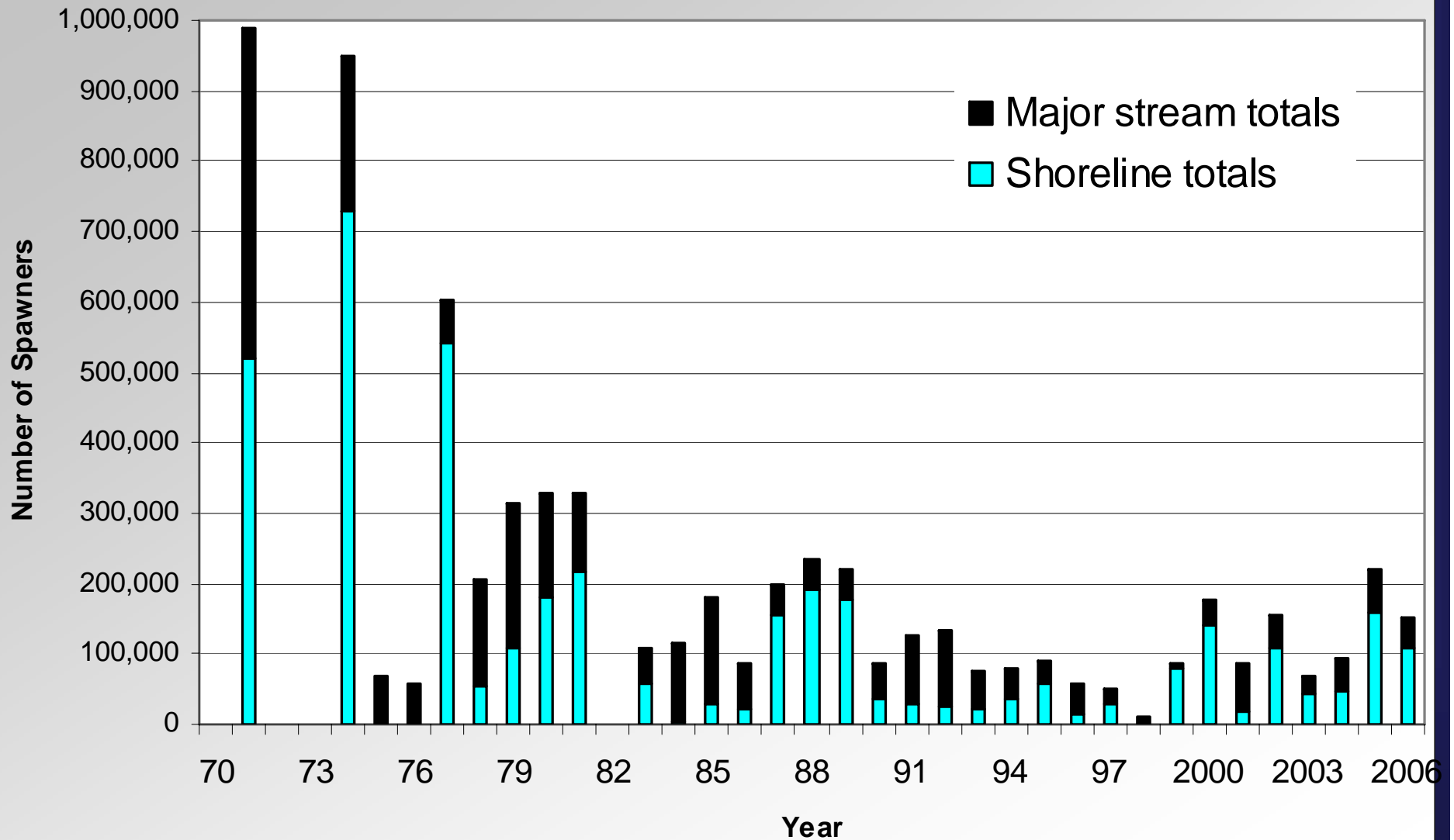
**Parks and  
Protected Areas**

# Kokanee Stock Status

- Pre-1970 - 1 million+ spawning kokanee
- Post-1970 – major decline in both kokanee populations
- 1971: 188,000 angler hours
  - 178,000 kokanee caught
- 1992: 250,000 angler hours
  - 37,000 kokanee caught
- 1995: kokanee fishery closed



# Kokanee Escapement





# Okanagan Lake Action Plan

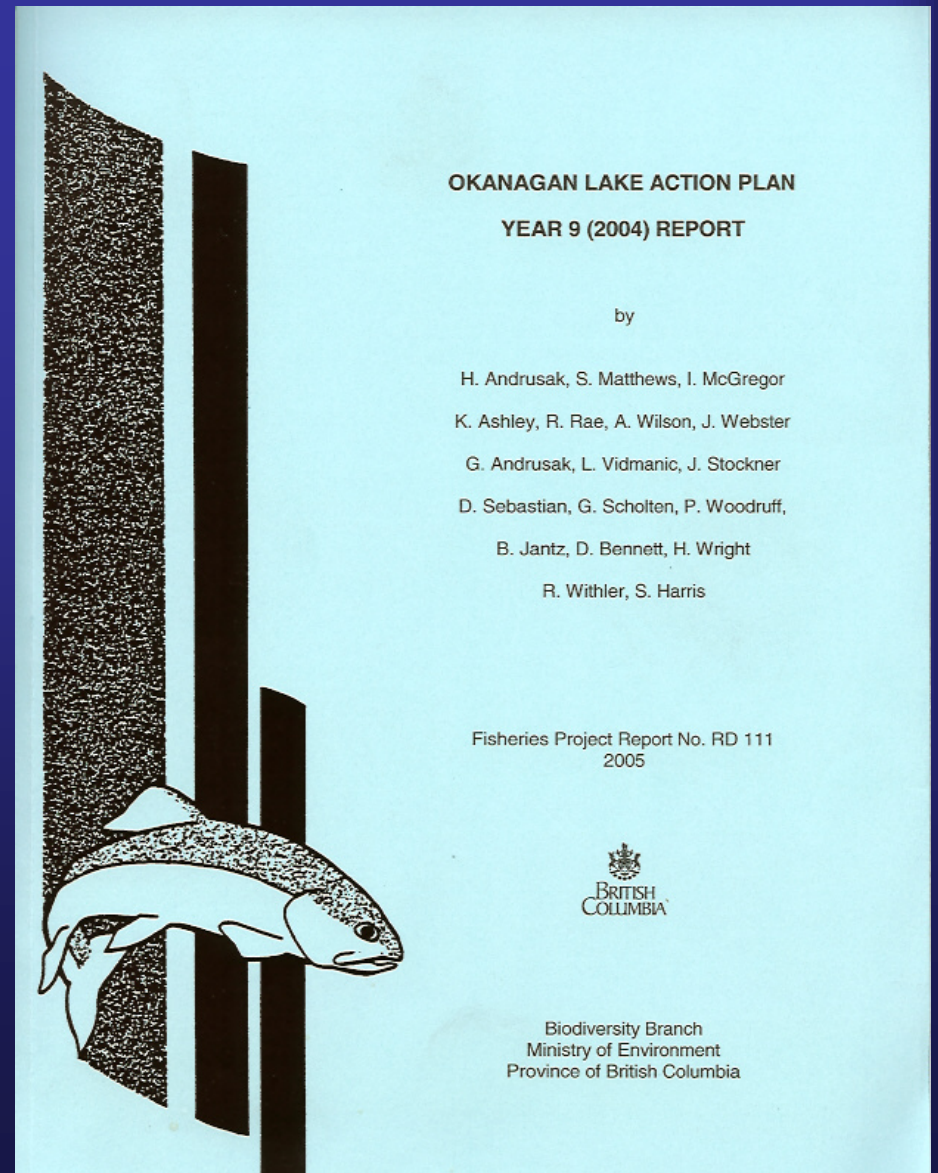
Developed in 1995

Comprehensive 20 year plan

Delivered through agency  
Technical Committee

Stakeholder input and  
involvement

Currently completing Year 11 of  
HCTF funding commitment





An underwater photograph showing a large number of kokanee fish swimming in a shallow stream. The stream bed is composed of numerous small, light-colored rocks and pebbles. The water is clear, and the fish are visible in various positions throughout the frame. The text is overlaid on this image.

# Okanagan Lake Action Plan Stated Objective

*“To rebuild and maintain the wild kokanee in Okanagan Lake”*

*“The Plan seeks to determine the biological relationships, define the causal problems and implement innovative solutions to remediate the declining kokanee population”*

# Okanagan Lake Action Plan Progress to Date

## *“Define Causal Problems”*

Sustained monitoring and research have provided the tools to qualify and quantify the key limiting factors to kokanee production:

- Reduced shore and stream spawning capacity
- Low in-lake survival



# Stream Spawner Impacts

90% of salmonid stream habitat lost due to flood protection, agriculture, logging and urbanization





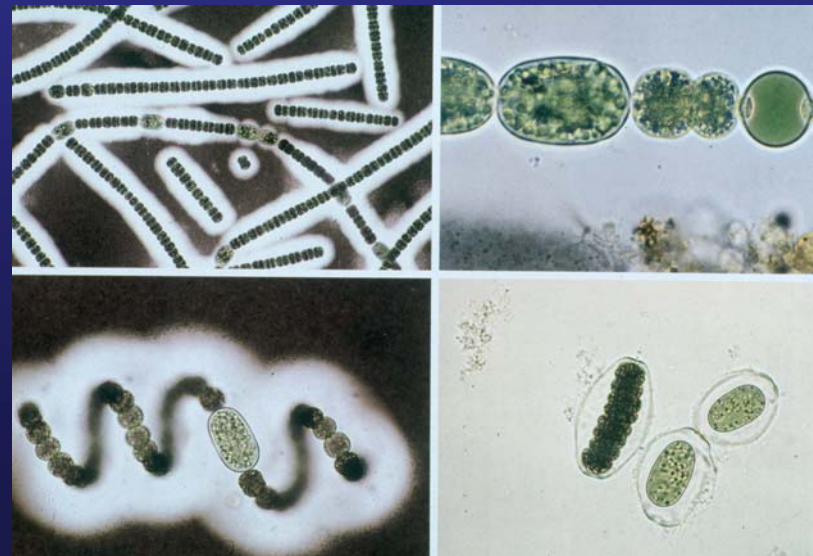
# Shore Spawner Impacts

- Mortality from lake drawdown
- Habitat loss from development



# Low In-Lake Survival

- Competition with *Mysis relicta*
- Nutrient changes



# Okanagan Lake Action Plan Accomplishments

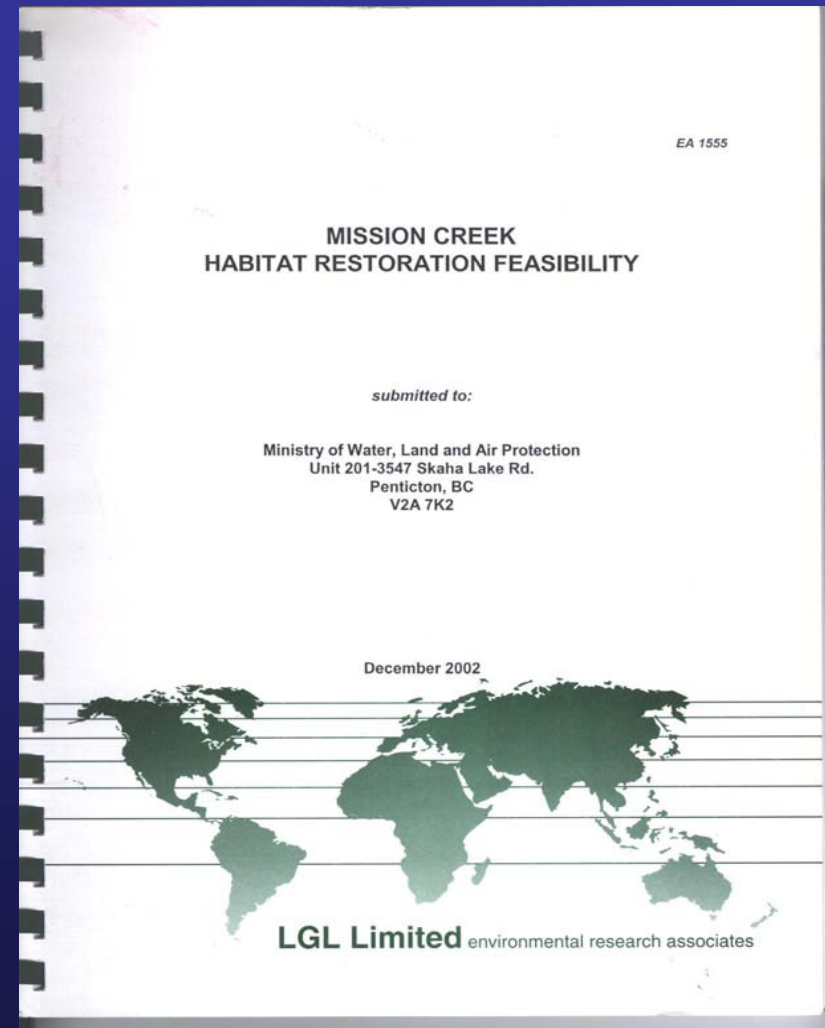
## *“Implement Innovative Solutions”*

- Multi-faceted approach key to success
- 5 primary areas of focus



# 1. Habitat Protection / Restoration

- Tools to guide development
  - Shore spawner habitat protocols
- Flows for fish
  - Trout Creek
  - Trepanier Creek
  - Powers Creek
  - Mission Creek
- Stream restoration
  - Mission Creek
  - Penticton Creek



# Tools to guide development

**BMP's, guidelines and  
standards to protect  
kokanee shore  
spawning habitat:**

- **Top 1m of lake**
- **Angular  
substrate**
- **Wave action**
- **Interstitial  
spaces**



# Tools for Development

## Draft Foreshore Habitat Protocol – Ecosystems Section

- **Red zones = critical kokanee habitat**
- **Development in red zones that alters, disrupts or destroys habitat requires an authorization from DFO [Section 35(2)].**
- **Qualified Environmental Professional required to make determination and sign-off on statement indicating whether development results in a HADD**
- **Examples: breakwaters, docks, marinas, retaining walls, riparian clearing, groynes, in-fills, dredging**
- **Avoid (relocate, redesign) – Minimize – Compensate (last resort).**

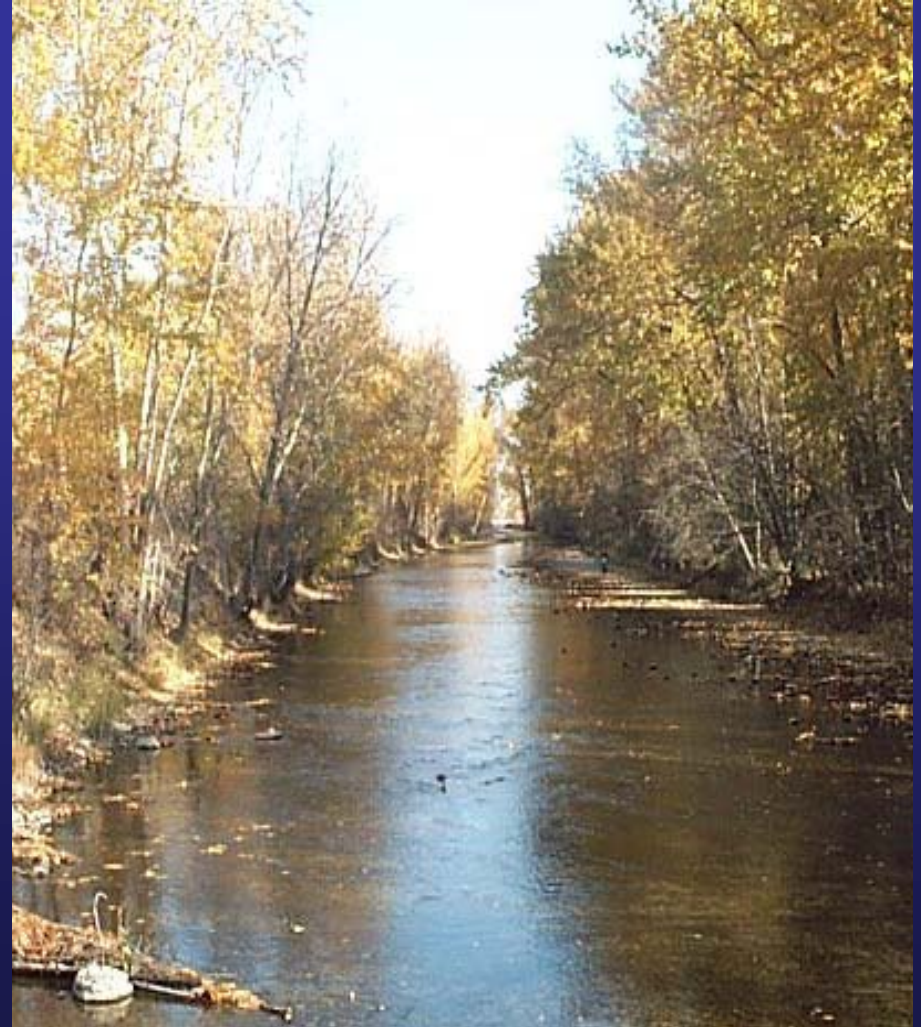
# Flows for Fish

- Water Use Plan in place for Trout Creek
  - Partnership with MOE and District of Summerland
  - Conservation triggers, naturalized flow (Camp Creek)
- Water Management Plan under development on Trepanier Creek
  - MOE, Brenda Mines, Peachland, Water Purveyors
- Flow information gathered on Mission and Powers Creeks in preparation of WUP process in 2007
  - Flow measurement
  - Determining flow needs for fish
  - Determining natural base flows



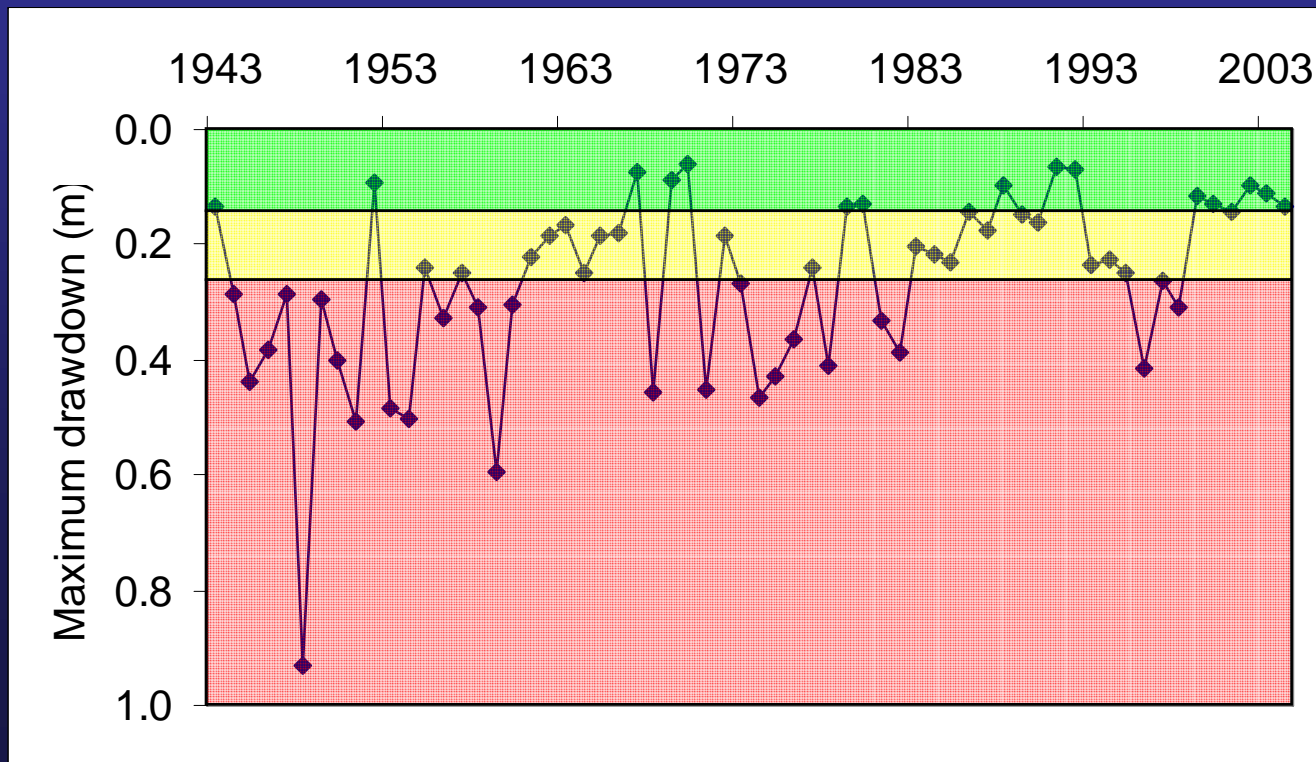
# Mission Creek Restoration

- **Channelized and dyked for flood protection in 1950s**
- **Restore natural river processes and habitats in lower 12 km:**
  - set-back dykes
  - meander construction
  - Improved sediment management
- **Maintain goals of flood protection while accommodating water withdrawal infrastructure**



## 2. Improved Lake Level Management

- >30% of spawning areas affected in some years
- Partnership approach
- Need for tools to assist water managers
- Internet-accessible simulation model
- Operational as of 2004-05



### 3. *Mysis relicta* Removal

- Introduced into Okanagan Lake in 1966
- Okanagan Lake mysid biomass estimated at ~3,000 metric tons
- Fishery developed to reduce competition with kokanee
- Target 50% reduction based on modelling work



# Ok Lake *M. relictus* Test Fishery Results to Date

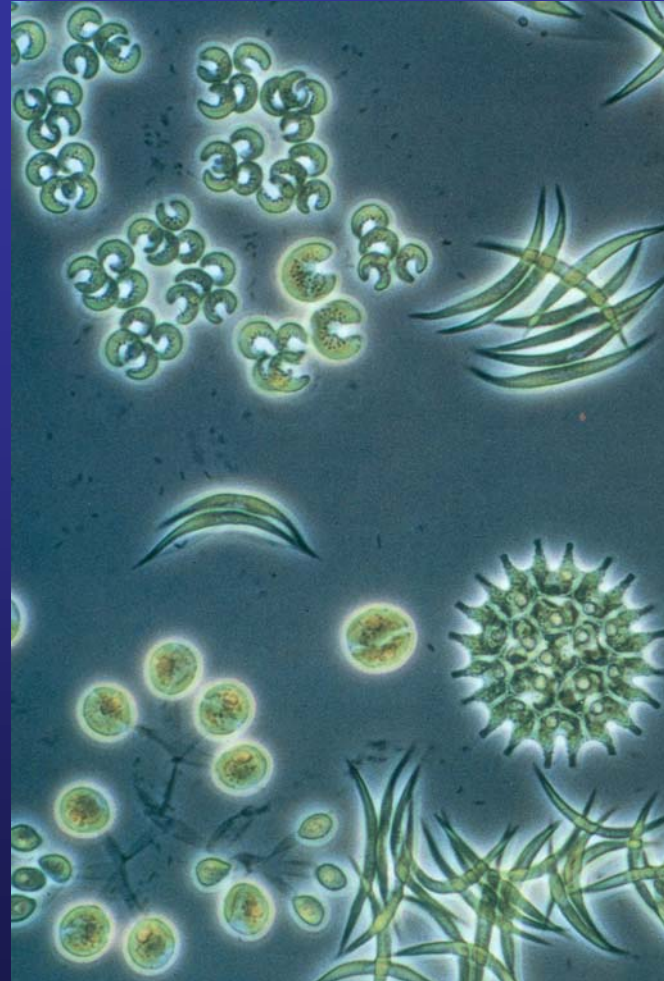
- Catches up to 1,200 kg/net/day
- Typical catch 500 kg/net/day
- Highest annual catch 80,000 kg (2001)
- 2006 catch to date: 22,000 kg
- Target for 2007: 310,000 kg
- Potential for significant area based impacts
- Low kokanee by-catch - < 0.5%



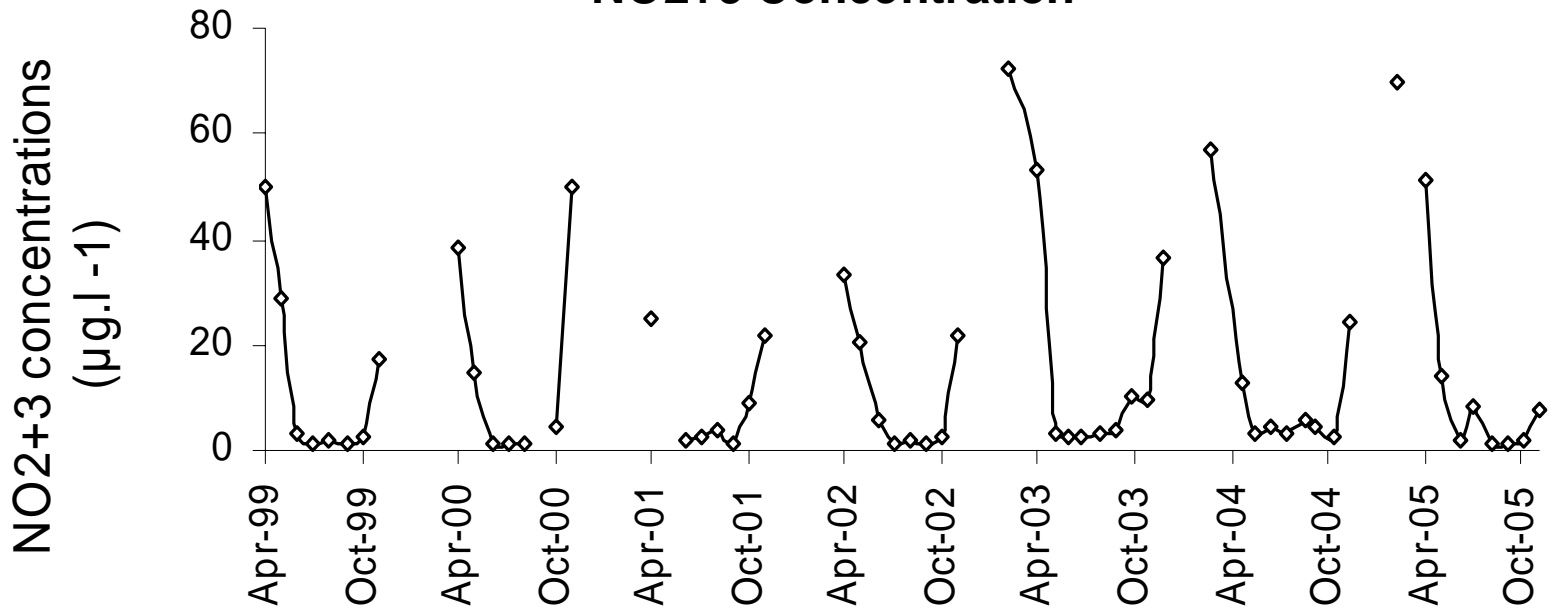


## 4. Nutrient Balance

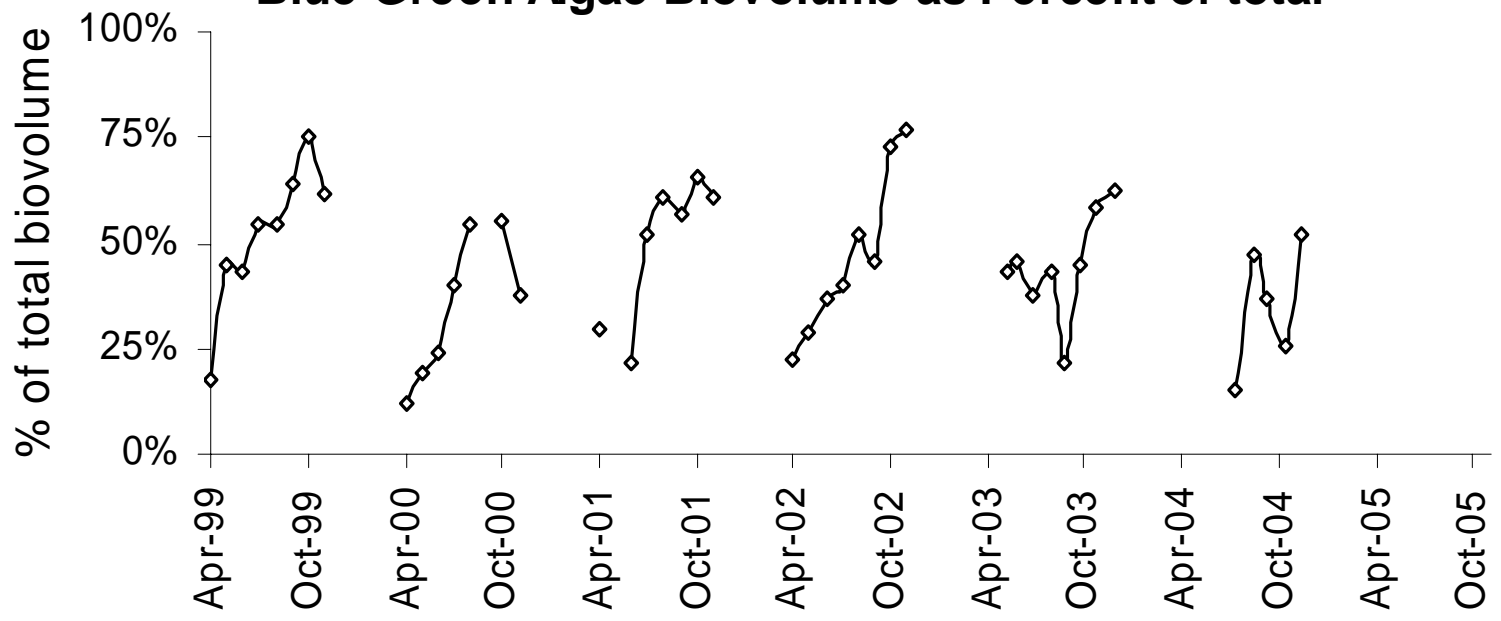
- Low in-lake kokanee survival potentially tied to diet
- N:P ratio in Okanagan Lake very low (< 3:1)
- Tends to favour dominance of blue-green algae
- Blue-green algae have low nutritional value
- Increase concentration of N to shift algal community by reconfiguring STP's



### NO<sub>2</sub>+3 Concentration

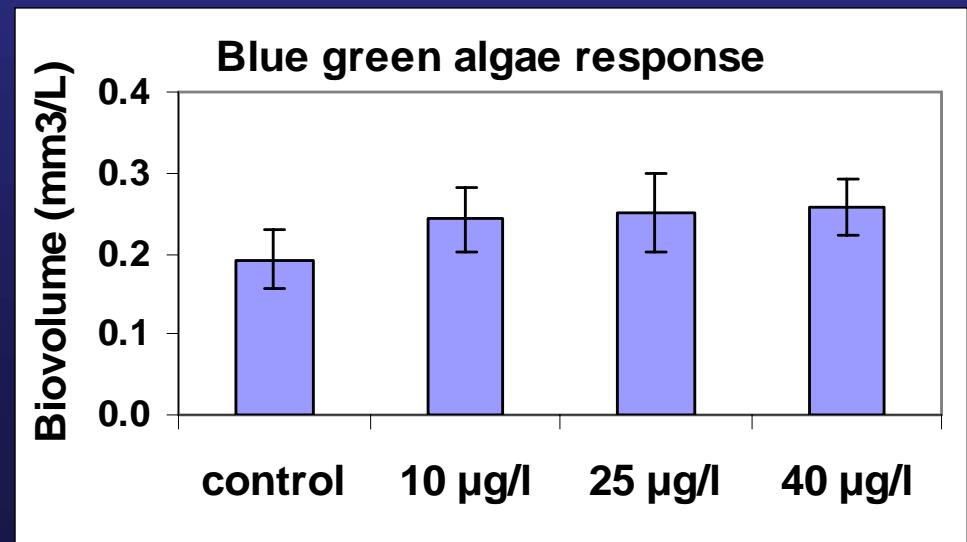
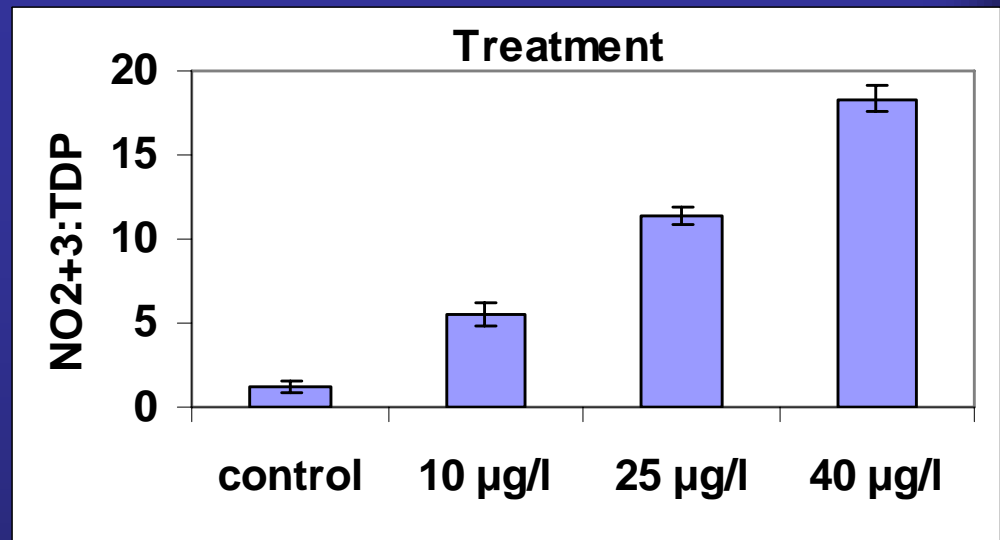


### Blue Green Algae Biovolume as Percent of total



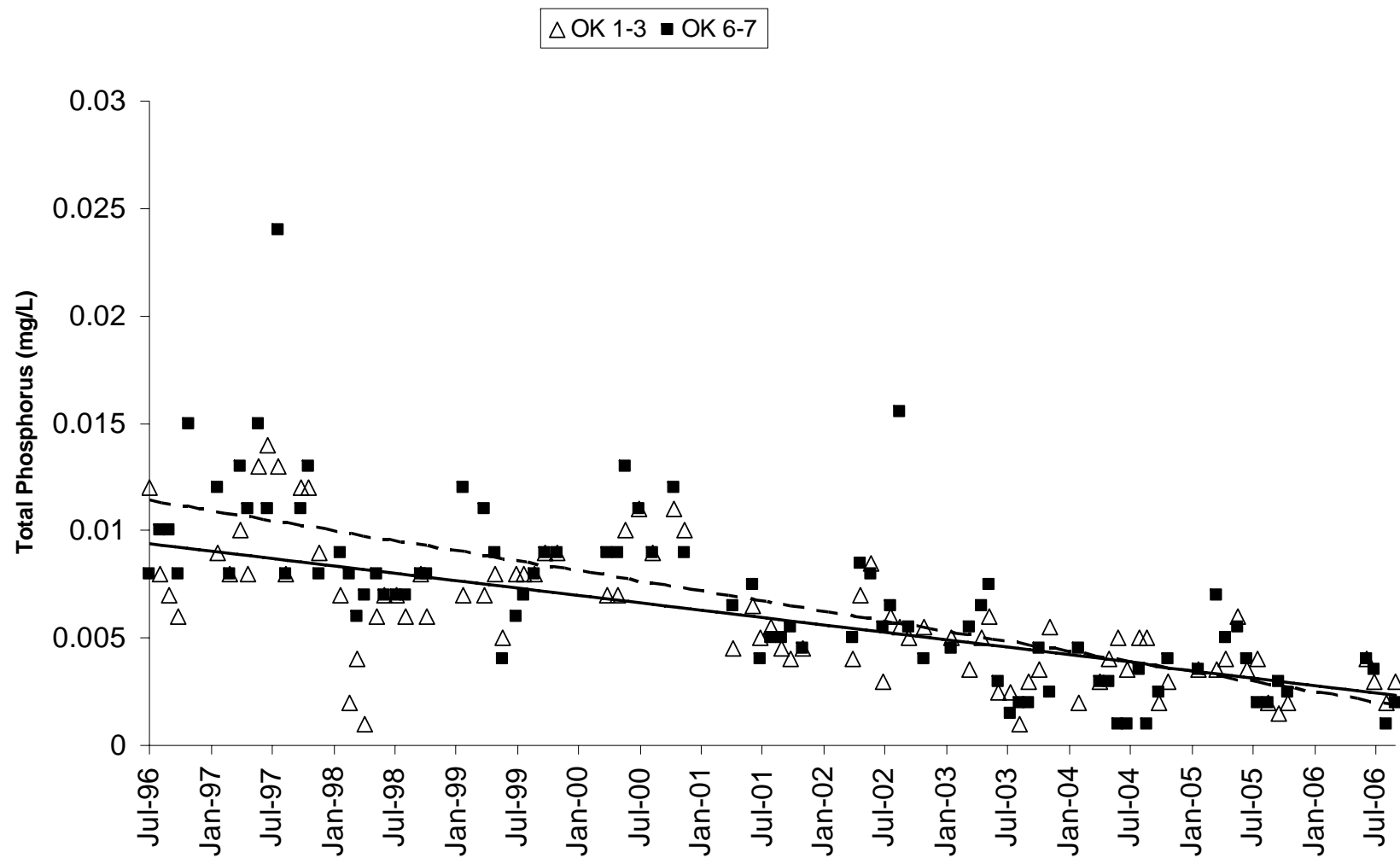
# Nutrient Balance

- Results inconclusive
- Tied to snow pack?
  - Dry years both N&P limiting (e.g. 2003-2006)
  - Wet years only N limiting (e.g. 1996-1999)
- Continue investigations and repeat experiments in wet years





# Total Nutrient Level?



# 5. Re-Opening Kokanee Fishery

- **Okanagan Lake kokanee fishery was closed in 1995**
- **Supported up to 70,000 angler days annually when fishery was open**
- **Economic value: \$3.4 million annually in direct expenditures (2000 sport fish survey)**
- **Conflicting objectives: ongoing kokanee recovery vs. access to recreational fishery**



# Next Steps

- Long term monitoring
- Habitat restoration/protection
- Establishment of water use plans for key tributaries
- Large-scale harvest of *Mysis relicta*
- Continue implementation of lake level management tools
- N:P ratio adjustment feasibility investigations in wet years
- Consult on and finalize fishery management plan
- Communication





# Conclusions

- **Recent trends in kokanee escapement positive**
- **Kokanee population still only 15-20% of 1970s levels**
- **Low flow and habitat loss still threats**
- **Multi-faceted approach to recovery being implemented**
- **Partnership approach key for achieving recovery**
- **Proactive management of fishery to achieve multiple objectives**



# Key Priorities for Working together:

- Promotion of Foreshore Habitat protocol
  - Guidelines, BMP's
- Water quality monitoring
  - E.g. Nutrients, endocrine disruptors (e.g. estrogen)
- Flow monitoring
  - Re-establishment of WSC stations
- Water use planning
  - Advocacy and involvement at round-tables