Kootenay Lake Fisheries Update and Action Plan

BC Ministry of Forests Lands and Natural Resource Operations - Fish and Wildlife Branch
Balfour Community Hall June 16, 2016

Outline

- Background
  - Kokanee and Gerrard Rainbow update
  - Kokanee collapse
  - Action Plan lead-up
- Action Plan
  - Development and Objectives
  - Plan Summary
  - Actions 2016-2017
  - Path forward
- Questions

Kokanee Update

- Kokanee are key:

Jim Lawrence, Cooper Creek

- Kokanee are key:

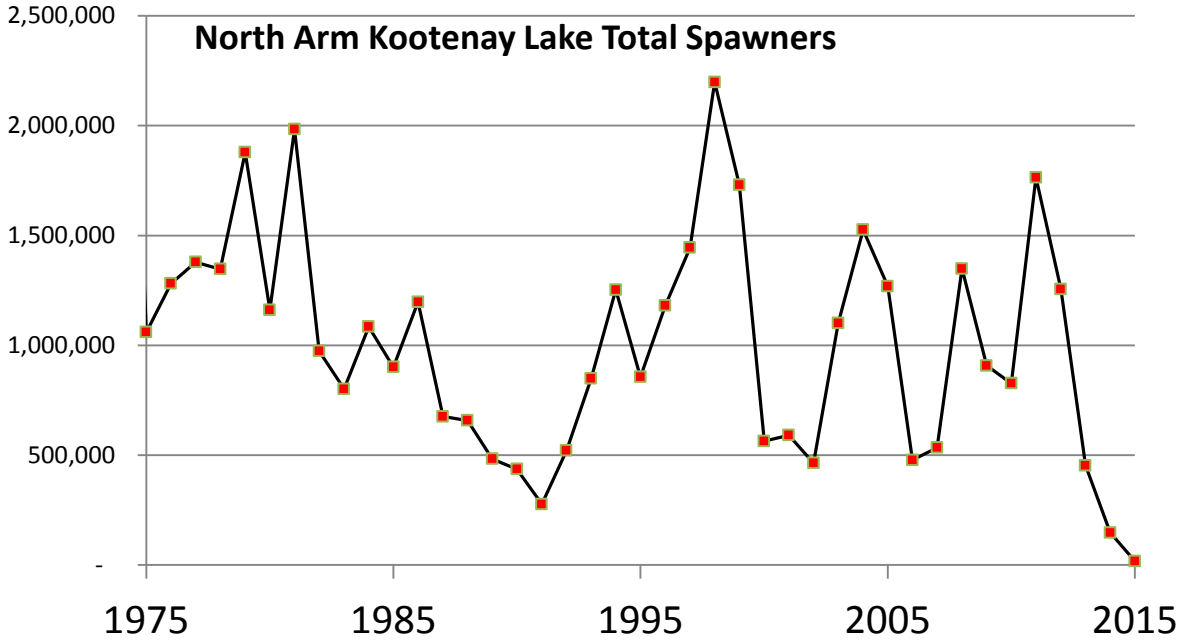
Boots Brown photography, Barry Kovish, JB

Main Lake Kokanee update - spawners

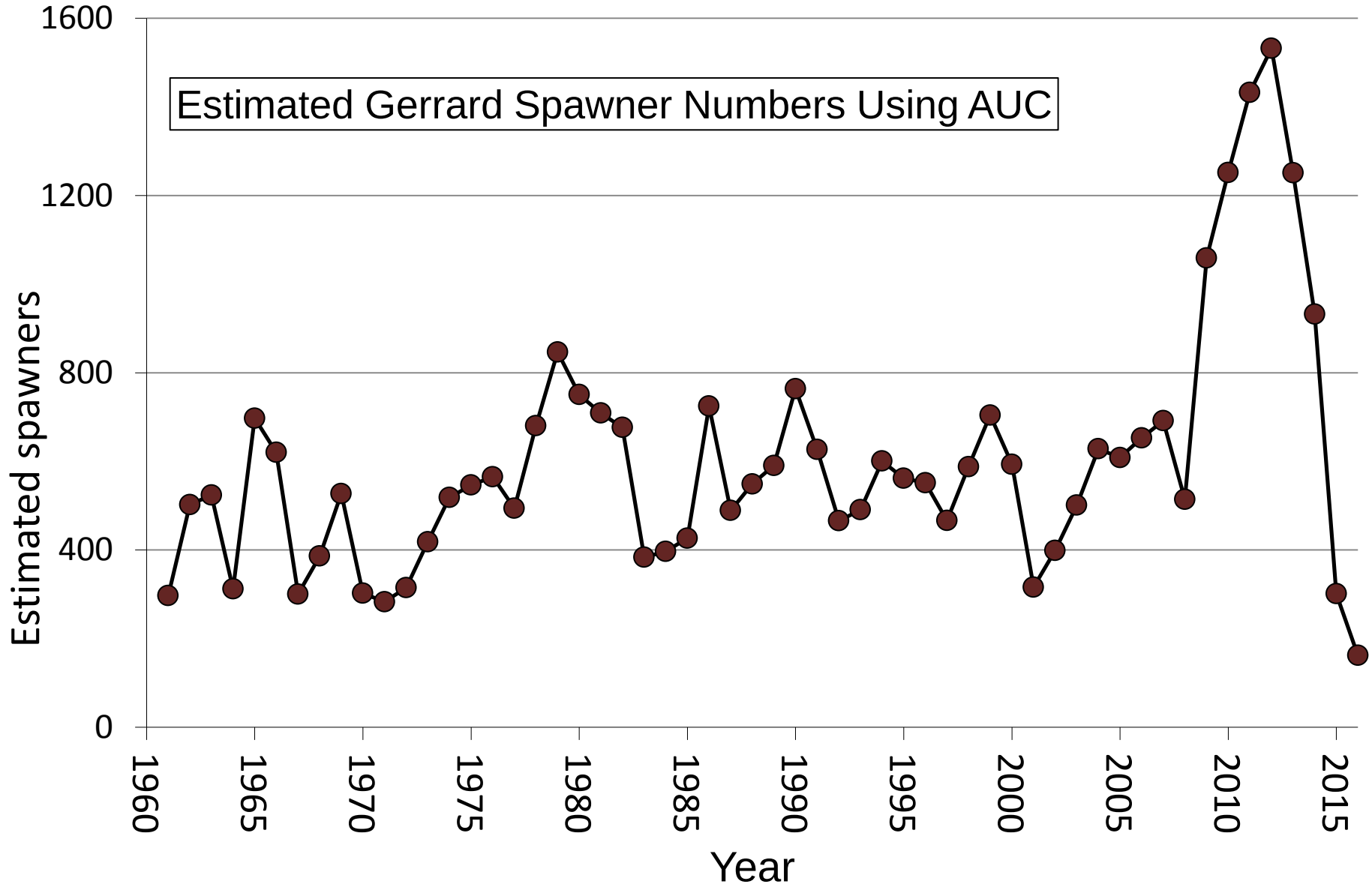
Fall 2015

- Meadow Creek Spawners = 7600
- Largest ever, most eggs/female = 570 total eggs = 1.3 M
- Duncan & Lardeau Spawners = 10300 total eggs = 2.9 M

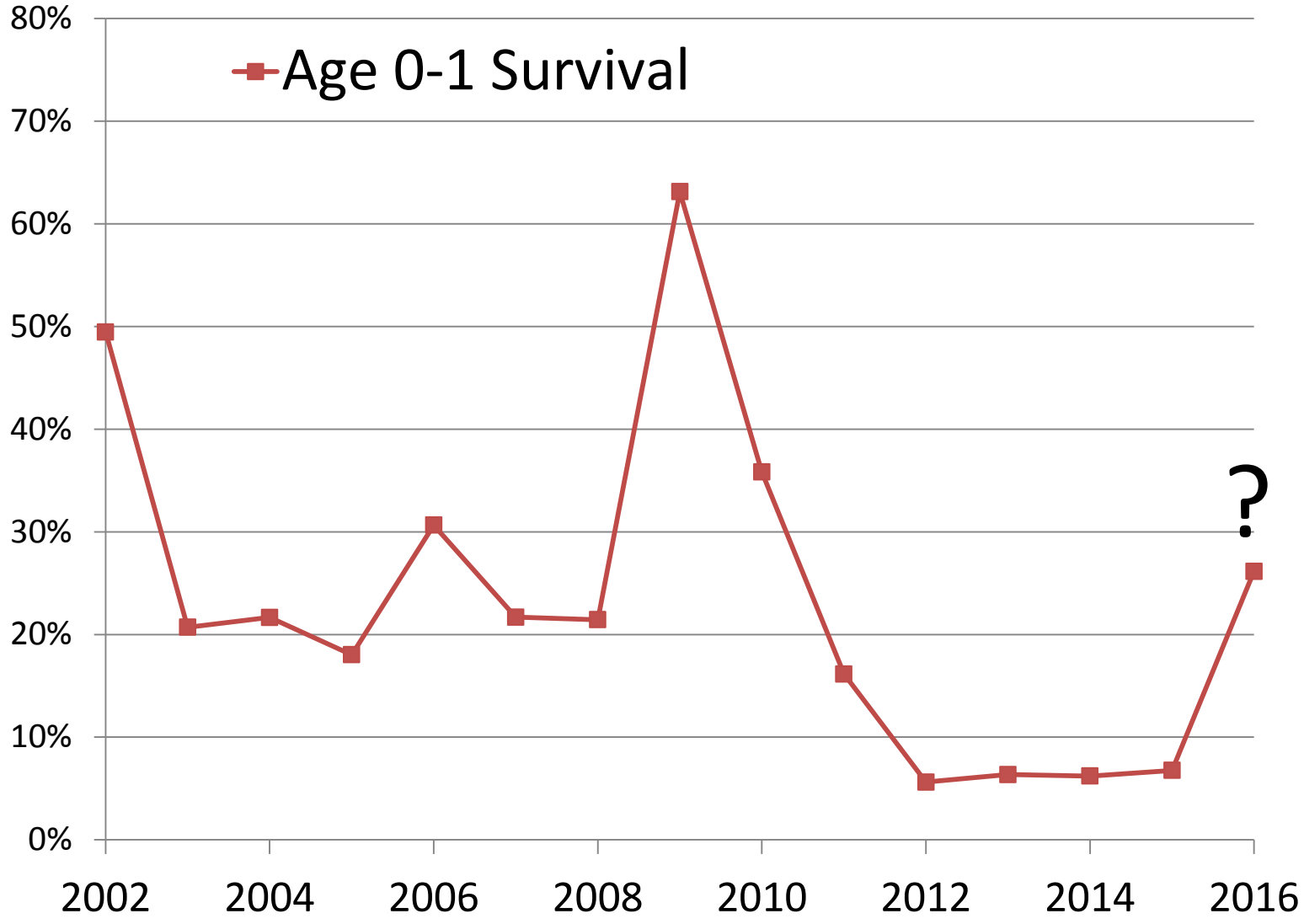
- **Total North Arm Kootenay Lake Spawners = 18,000**
- **2015 eggs = 4.26 M**
- **Historical context**
  - Lowest = 35 M
  - Highest = 250 M



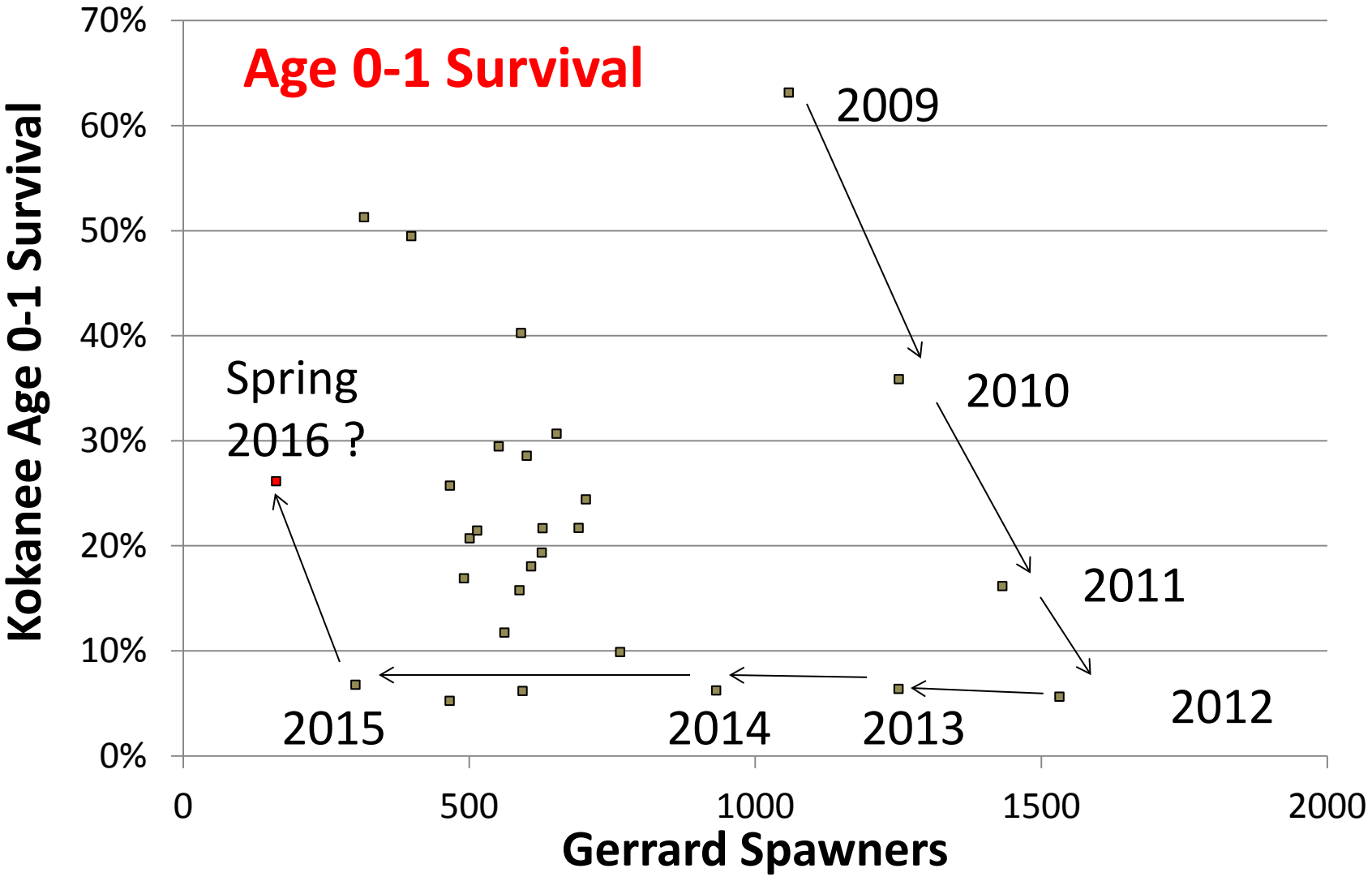
Gerrard rainbow trout update



Kokanee Collapse



Kokanee Collapse



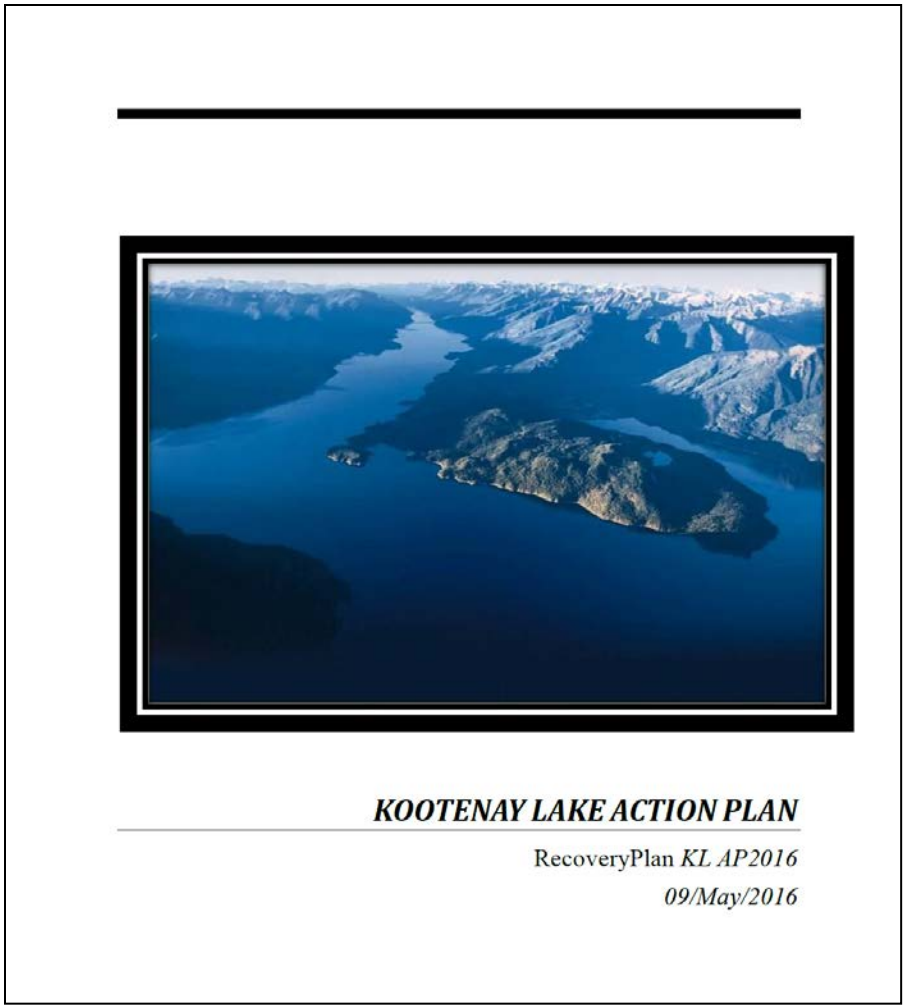
Kootenay Lake Action Plan

Lead up:

- established an advisory team - October 2014
- adjusted fishing regulations (decreased kokanee quota, increased Gerrard trout quota) - April 2015
- extended the nutrient restoration program's fall season (aimed at replacing nutrients lost through the creation of upstream impoundments) – September 2015
- supplemented Kootenay Lake with kokanee collected from other waterbodies in B.C.
- assessed other possible kokanee survival limitations (e.g., virus assessments and virus management)
- Team constructed an Action Plan – May 2016

Kootenay Lake Action Plan

- Who
- Objectives
- Summary and key actions
- 2016 Implementation



www.env.gov.bc.ca/kootenay/fsh/main/mainfish.htm

Action Plan Development - Who

- Experts from around the Province contributed to significant data summary, analysis, modelling and recommendations; summarized in the Plan
  - 6 Stock Assessment Specialists, 11 Fish Biologists, 6 Lake Nutrient Experts and 2 Provincial Managers
  - Broad representation of organizations: Freshwater Fisheries Society of BC, Ministry of Environment, Ministry of Forests Lands and Natural Resource Operations, Academics, First Nations, BC Wildlife Federation

Action Plan Objectives

- The Action Plan is aimed at a rapid kokanee recovery and minimizing further declines to the predator populations
- The main objective was to identify key management actions in the next 5 years that will contribute to:
  - Recovery of the Kokanee population.
  - Recovery of the primary predator populations - Gerrard Rainbow and Bull Trout and restore the provincially significant large lake fishery for them.

Action Plan Summary

Plan Includes:

- a review of kokanee collapse mechanism
- Summary of historic data and future predictions with and without actions
- Actions Identified: risk and benefits considered (kokanee stocking, angling regulations, extra monitoring)
- Highlights the need for flexible implementation (action may change with incoming data)

Action Plan Summary

- Identifies the primary recovery tools available to managers
  - supplementation of Kokanee eyed eggs and/or fry
  - ensure that lake conditions support Kokanee survival through continued nutrient additions
  - sport fishing regulations that support recovery objectives.

- Identification of Actions and their triggers:
  - Kokanee Spawners; > 65,000-140,000 limited benefit to kokanee stocking and re-opening of kokanee harvest possible (angling regulations and stocking)
  - Gerrard Spawners – trigger of < 50-100 (angling regulations and potentially conservation aquaculture)
  - Bull Trout Spawners – trigger < 50/500 redds in the Kaslo/Main Lake estimates (angling regulations)

Kootenay Lake Action Plan Implementation

Given Current Data and Triggers - Actions 2016:

Kokanee Supplementation

Due to low Kokanee spawner returns in fall 2015 and predicted low numbers in fall 2016, **transplants from external BC sources outside Kootenay Lake may promote faster recovery** of these two cohorts. Supplementation for 2015 and 2016 brood years will use stocks as closely related as possible to Kootenay Lake to mitigate risks related to kokanee stock genetics.

Kokanee fishery closure to continue

Ensure that minimal mortality from angling occurs on the main lake Kokanee population during the recovery, and will promote a quicker recovery.

Nutrient Restoration program

Continue replacing nutrients lost to upstream reservoirs, to sustain lake conditions that support zooplankton and hence ensuring kokanee food supply to support quick recovery.

Monitoring Program

Monitoring to better inform recovery efforts (trigger actions) and identify associated limitations; including **increased frequency** of current monitoring efforts, and **additional new monitoring efforts** for kokanee, rainbow trout, bull trout, non-native *Mysis* shrimp and the sport fishery.

Ongoing Monitoring Program

Kokanee

- Spawner abundance (Meadow Creek, Lardeau/Duncan), egg deposition estimates, fry emigration estimates, acoustic/trawl surveys (in-lake abundance), and others.

Gerrard Rainbow and Bull Trout

- Adult spawner abundance indexing (Gerrard spawner bank counts, Kaslo redd surveys), fishery monitoring (angler mailout survey)

Nutrient Restoration Program

- water quality, algae and primary production, zooplankton and Mysid abundance, biomass

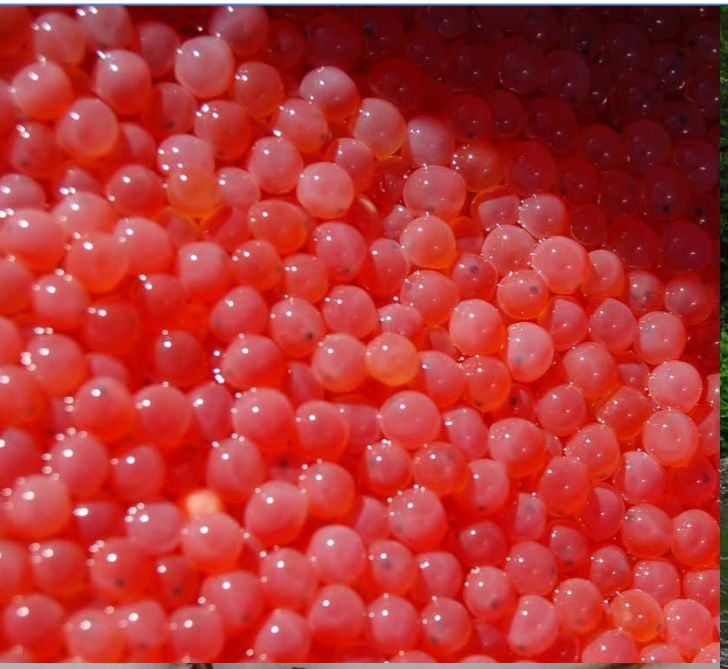
Enhanced Monitoring- What's New

- Kokanee – Additional echosounding/trawling in April and June, improved Fall kokanee escapement estimates (Lardeau/Duncan, north and south arm tributaries), survival of hatchery fry releases, egg plant survival.

- Gerrards/Bull Trout – Genetic analysis (what % small RB Gerrards?), predator food habits, rainbow trout age structure (spawners and in-lake), angler harvest (exploitation), juvenile and adult indexing projects

- Other – e.g. Mysid shrimp vertical distribution, investigating feasibility of Mysid control (in the event they increase significantly)

2015/16 Kokanee Supplementation



> 1 million eggs and fry released fall 2015 and spring 2016

2016/17 Kokanee Supplementation

- Genetic analysis and feasibility assessment on all available locations in Province complete (16 populations)
- Collection Location Recommendation – Lussier River, Whatshan Reservoir, Kinbasket Reservoir
- Plan recommends 5-7 million egg request – predicted supply 2-10 million dependent on 2016 returns to supply locations (and allowing for adequate natural recruitment at source locations)

Kokanee Fishery Closure

"Know your fish" sign - posted around the lake

download from website

www.env.gov.bc.ca/kootenay/fsh/main/mainfish.htm

BRITISH COLUMBIA

Attention Kootenay Lake Anglers

Main Body Kootenay Lake Kokanee
Daily Quota = 0

Know Your Fish: Rainbow and Kokanee ID

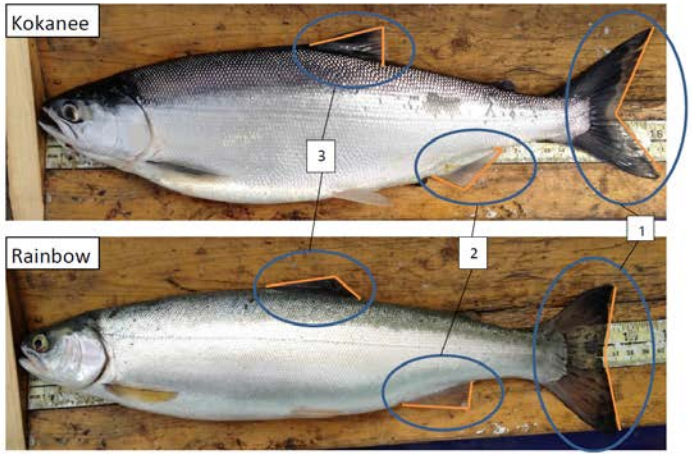
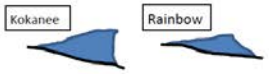


Photo credit: Karen Frazer (both)

1. **Caudal fin (tail):** Kokanee have a much deeper fork and pointier tips.

2. **Anal fin:** Rainbow trout have a triangle shape, where the tip of the leading fin ray extends back to the rear insertion of the fin when folded down. Kokanee have rectangular shape, more rays (13 or more), and the leading fin ray tip is not close to the rear end of the fin.

3. **Dorsal fin:** This is basically the opposite of the anal fin, but less obvious: Kokanee have the more triangle shaped dorsal fin, where the leading fin ray tip is almost directly above the rear fin ray tip. Rainbow is slightly more rectangular and the tip of the leading ray is ahead of the the more posterior rays.



For further information contact the Ministry of Forests, Lands and Natural Resource Operations: 250-354-6333

Nutrient Program

- **Continue replacing nutrients lost to upstream reservoirs**, to sustain lake conditions that support zooplankton and hence ensuring kokanee food supply to support quick recovery.
- Similar to 2015, extra week[s] of nutrient addition in the fall if environmental conditions favourable

Path forward – Plan Implementation

- Plan broadly **guides activities** over the next 5 years; **triggers and actions** identified

- However we will adjust implementation using monitoring data collected to drive decisions (may vary from current planned actions)

- Advisory team will continue, to provide annual advice and ideas on implementation

Path forward – Action Plan Recovery Time Forecasts

- All involved in plan preparation acknowledged that future predictions had significant uncertainty (could be better or worse than predicted)

- Best available Kokanee population predictions showed significant improvement by 2017 (stocking likely not required; maybe > 400,000) and full recovery of all cohorts in 6 or more years (some cohorts earlier).

- Gerrard and Bull Trout Recovery harder to predict, will likely lag behind kokanee slightly, but could be rapid along with kokanee recovery (if kokanee recover as currently expected)

Path forward – Other Projects

- Ministry is working to deliver the recommended actions in the Plan (focus on recovery of Meadow and Lardeau kokanee – Gerrard and Bull Trout)

- Not all that we do though - Ministry still supports other ongoing projects and commitments;

  - South and North Arm kokanee indexing to assess distribution, abundance and genetics; Habitat restoration in South Arm (Ktunaxa, NGOs, identified priority)

Summary and Acknowledgements

1. Biological update since last Balfour meeting
2. Finished an Action Plan
3. Covered key features of Action Plan

People

- 25 technical expert contributors
- Redfish Consulting
- VOX Communications
- Lotic Environmental

Funding

- Freshwater Fisheries Society of BC
- Fish and Wildlife Compensation Program
- Habitat Conservation Trust Foundation
- BC Ministry of FLNRO
- Kootenai Tribe of Idaho
- BC Hydro - WLR

Questions and Discussion

Find the Plan and other Info @

www.env.gov.bc.ca/kootenay/fsh/main/mainfish.htm

or Google Search: Kootenay Fish

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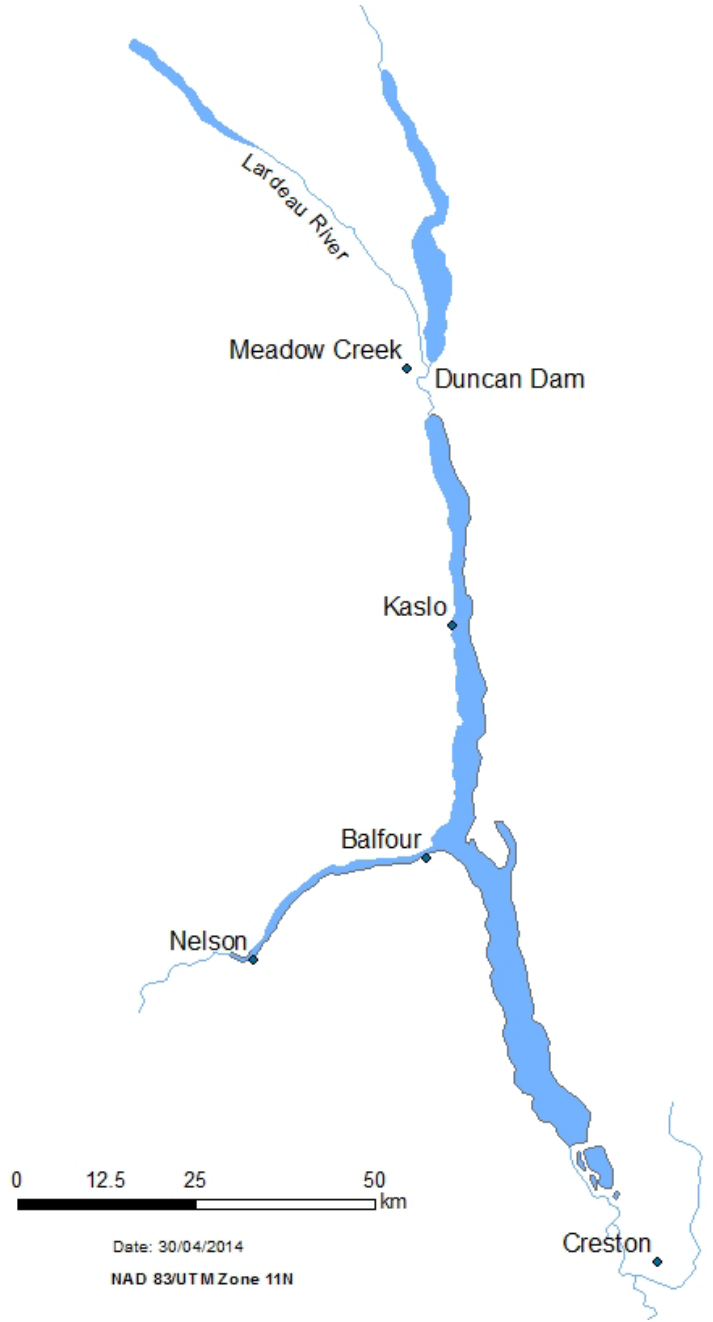
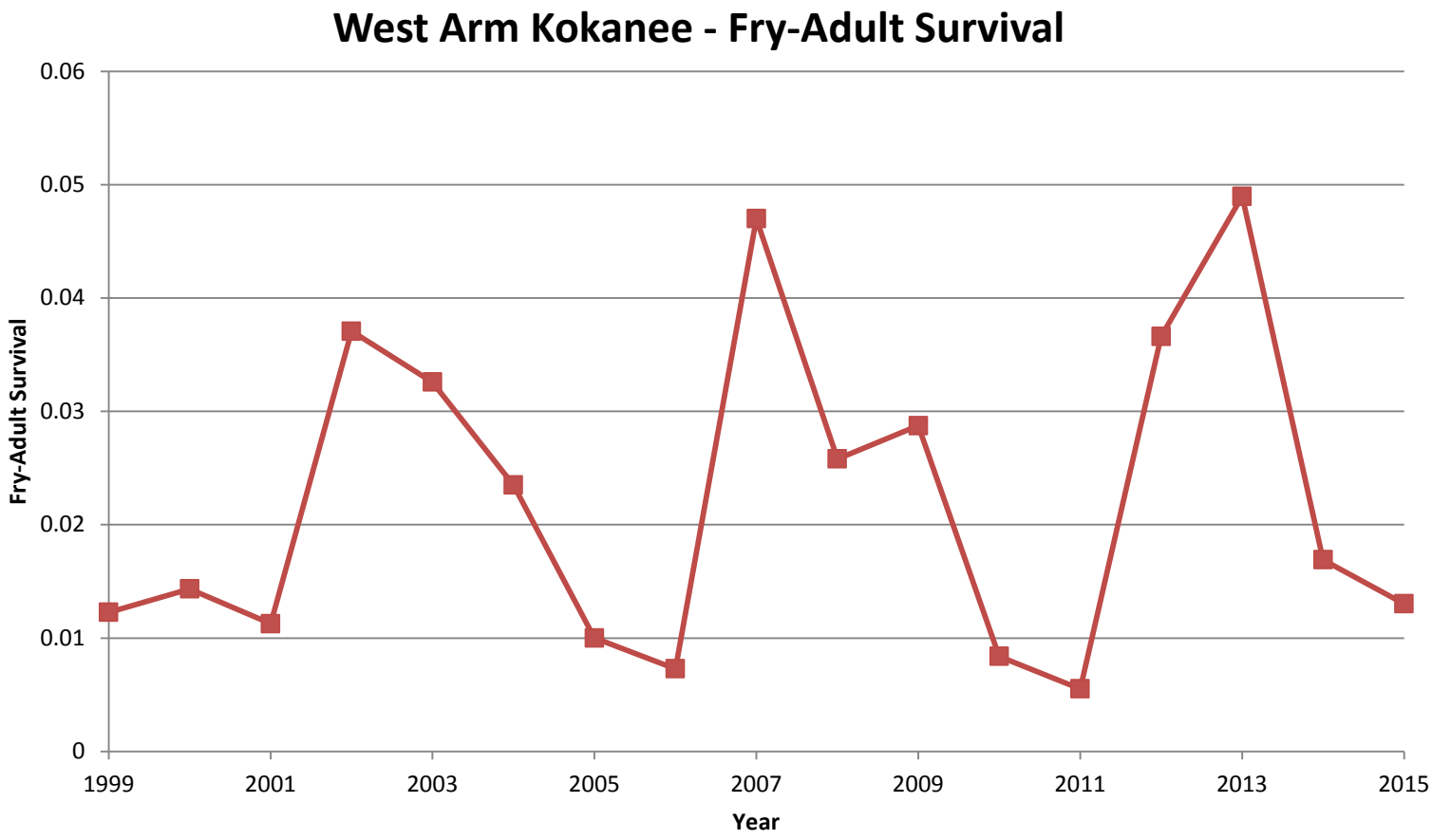
Following slides to assist with questions

Meadow Creek spawning channel

Main Lake vs West Arm



West Arm KO – low end of cycle



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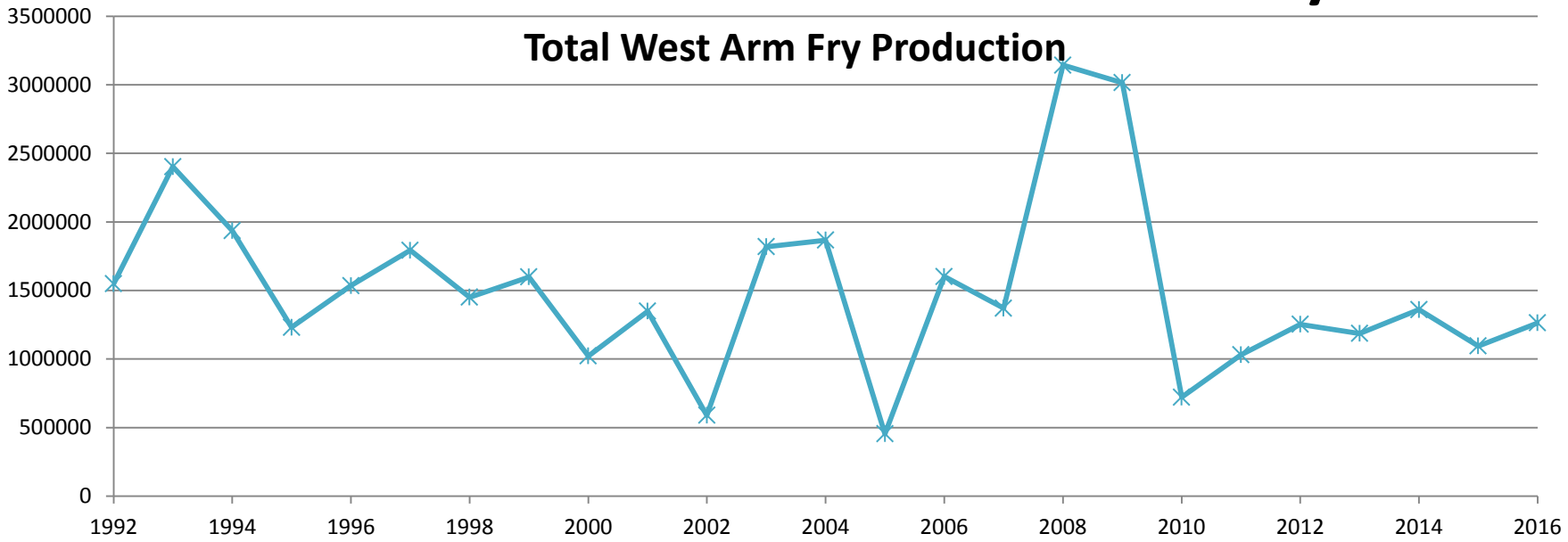
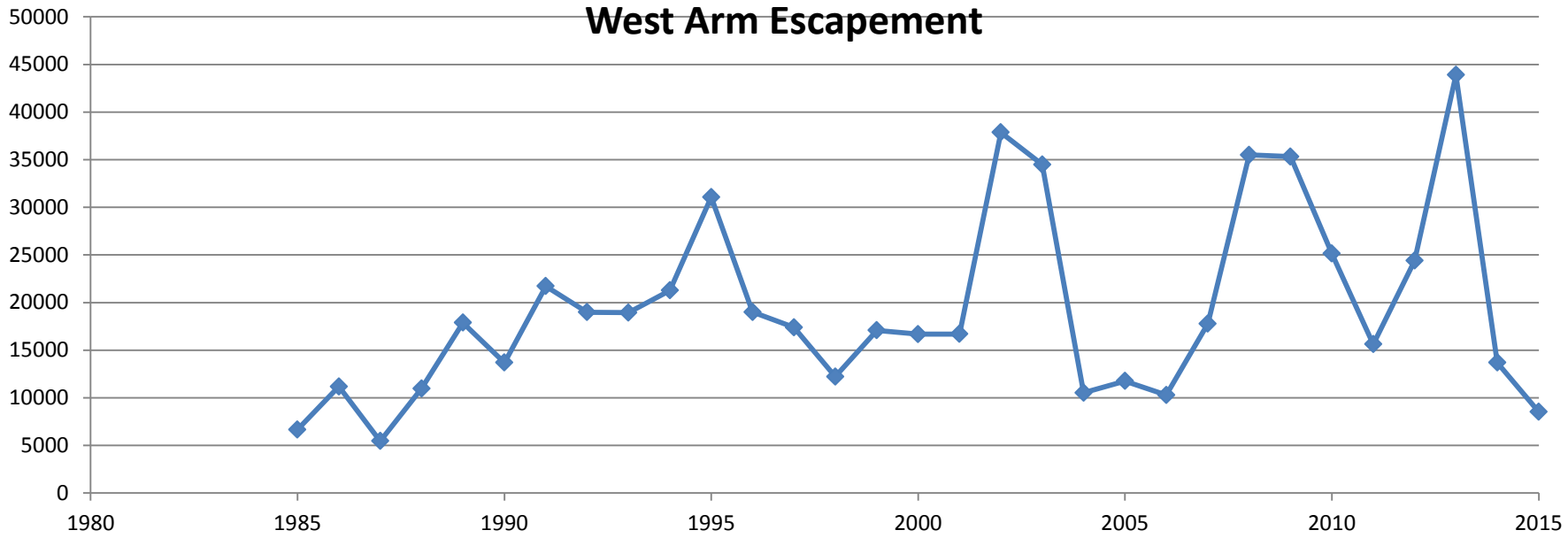
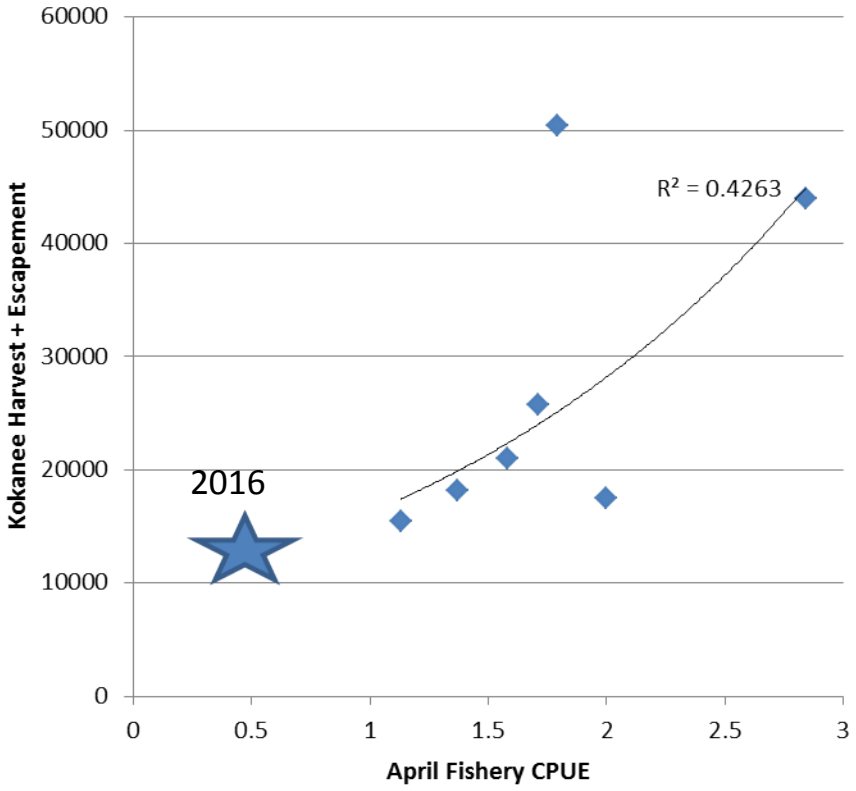
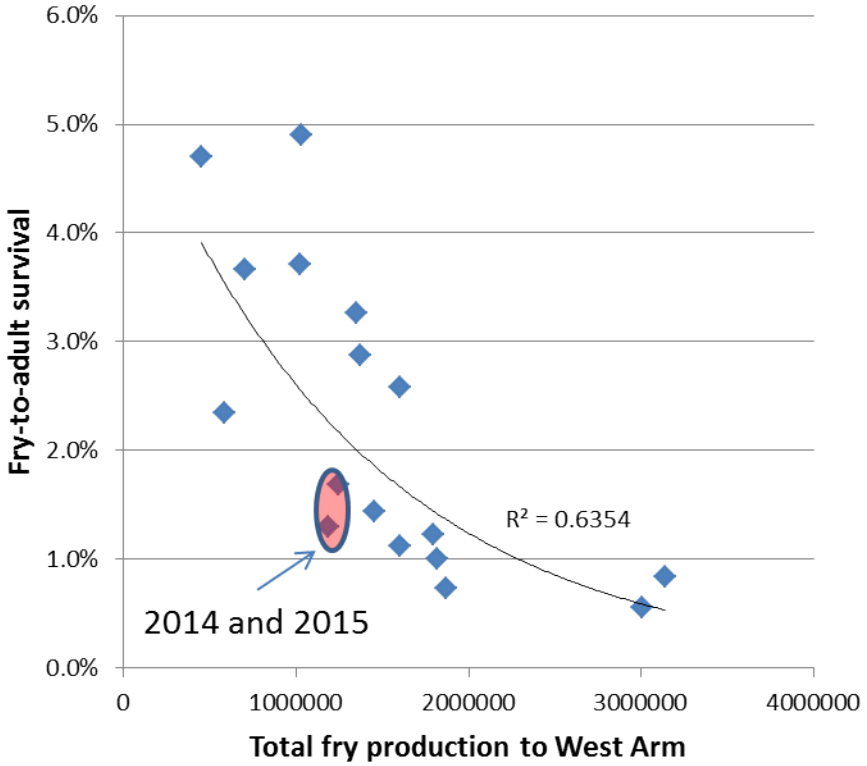


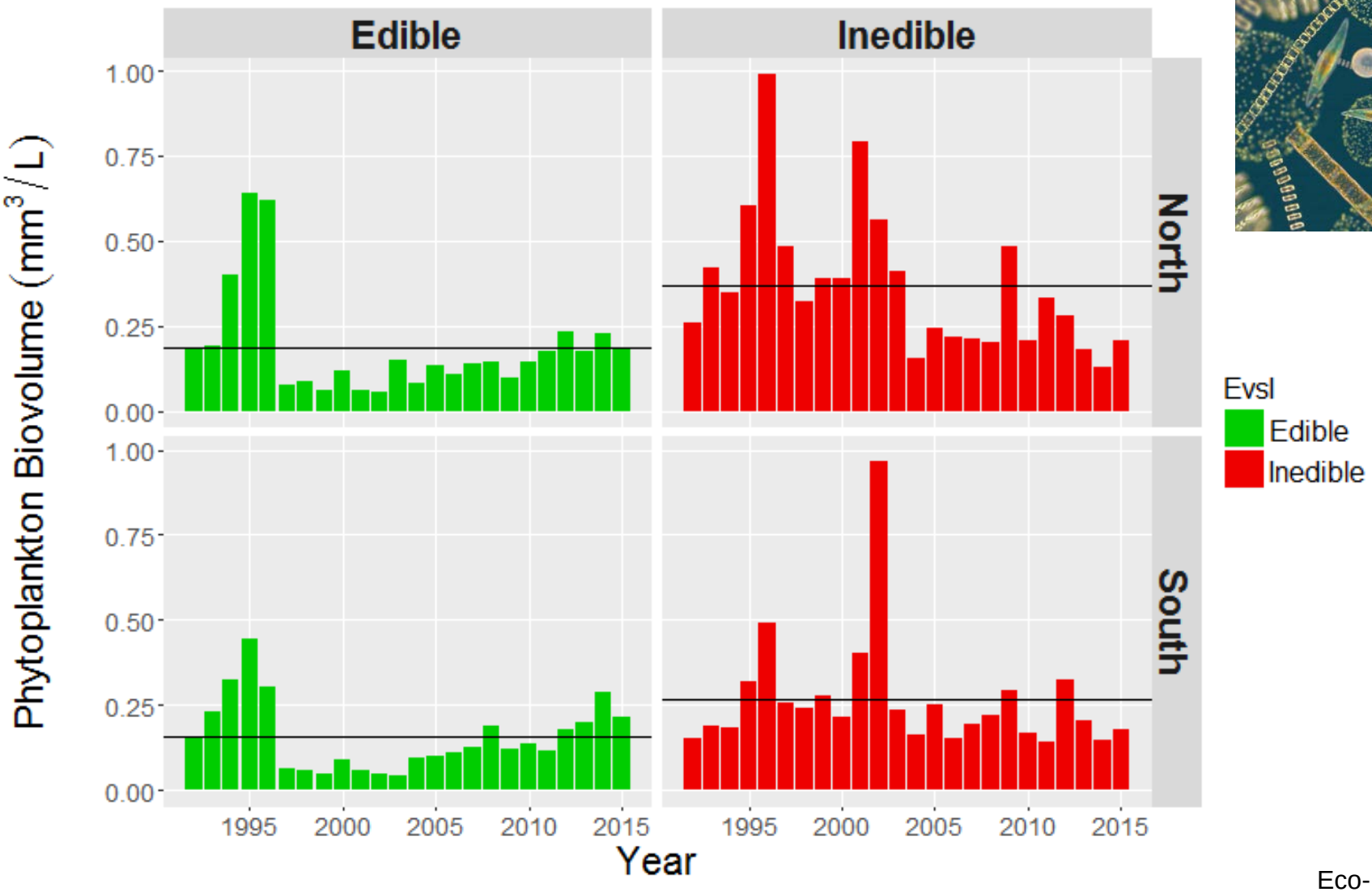


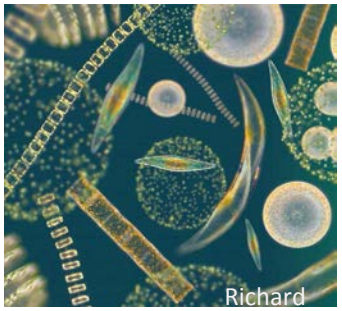
WA Kokanee - > 1M fry suggests enough for 2016 fishery – April CPUE low and suggested fishery closure



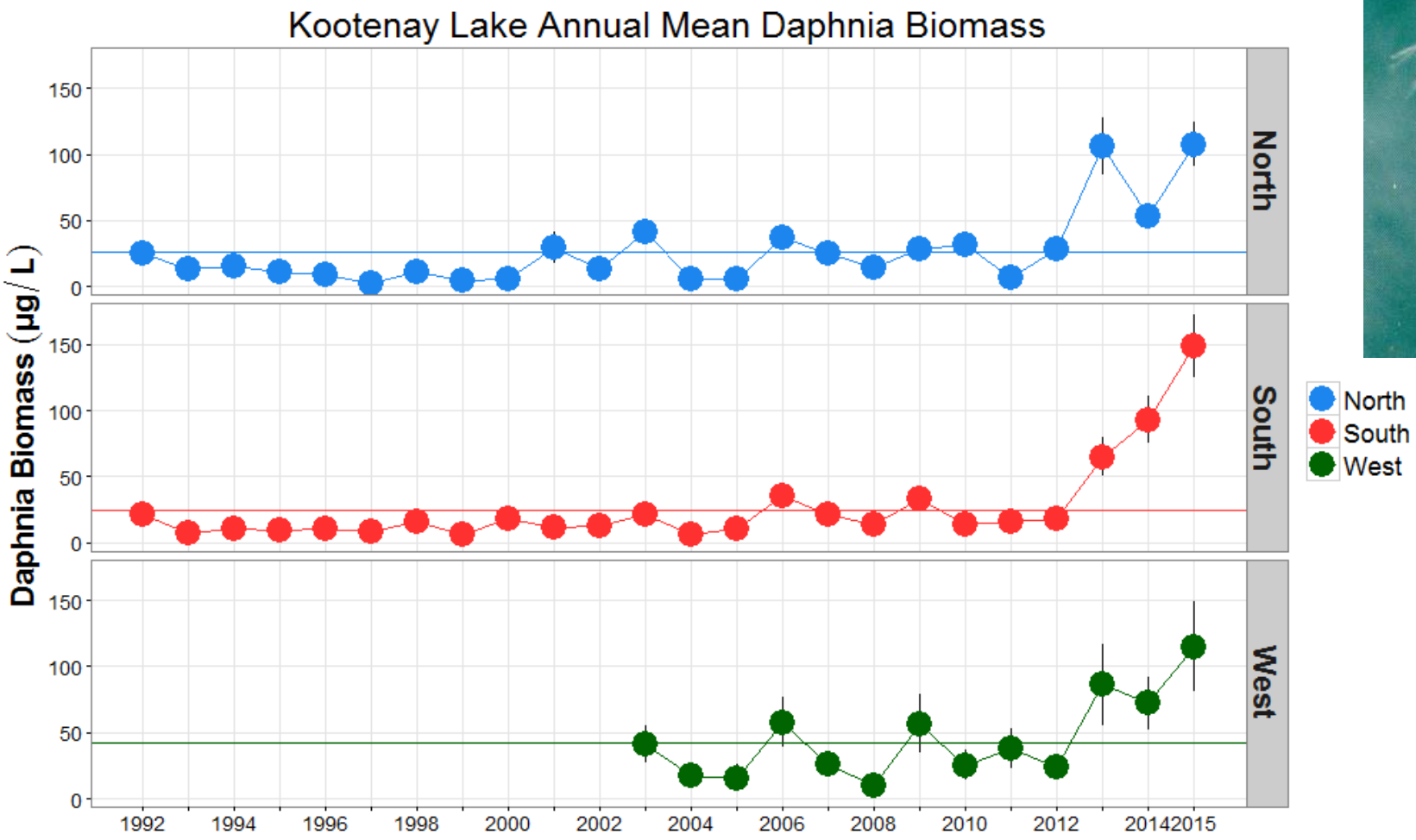


Kootenay Lake Results
phytoplankton



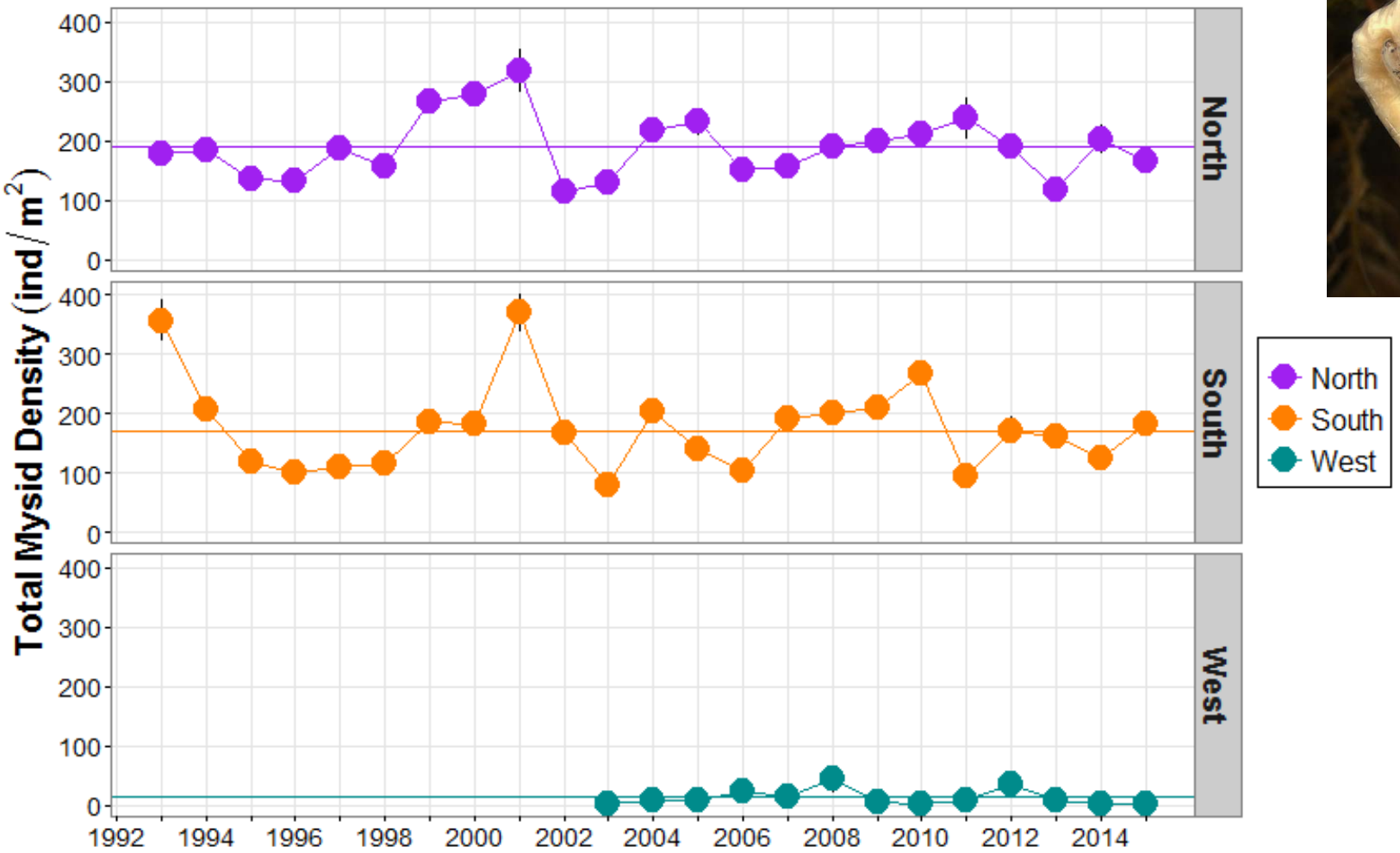


Kootenay Lake Results
Zooplankton



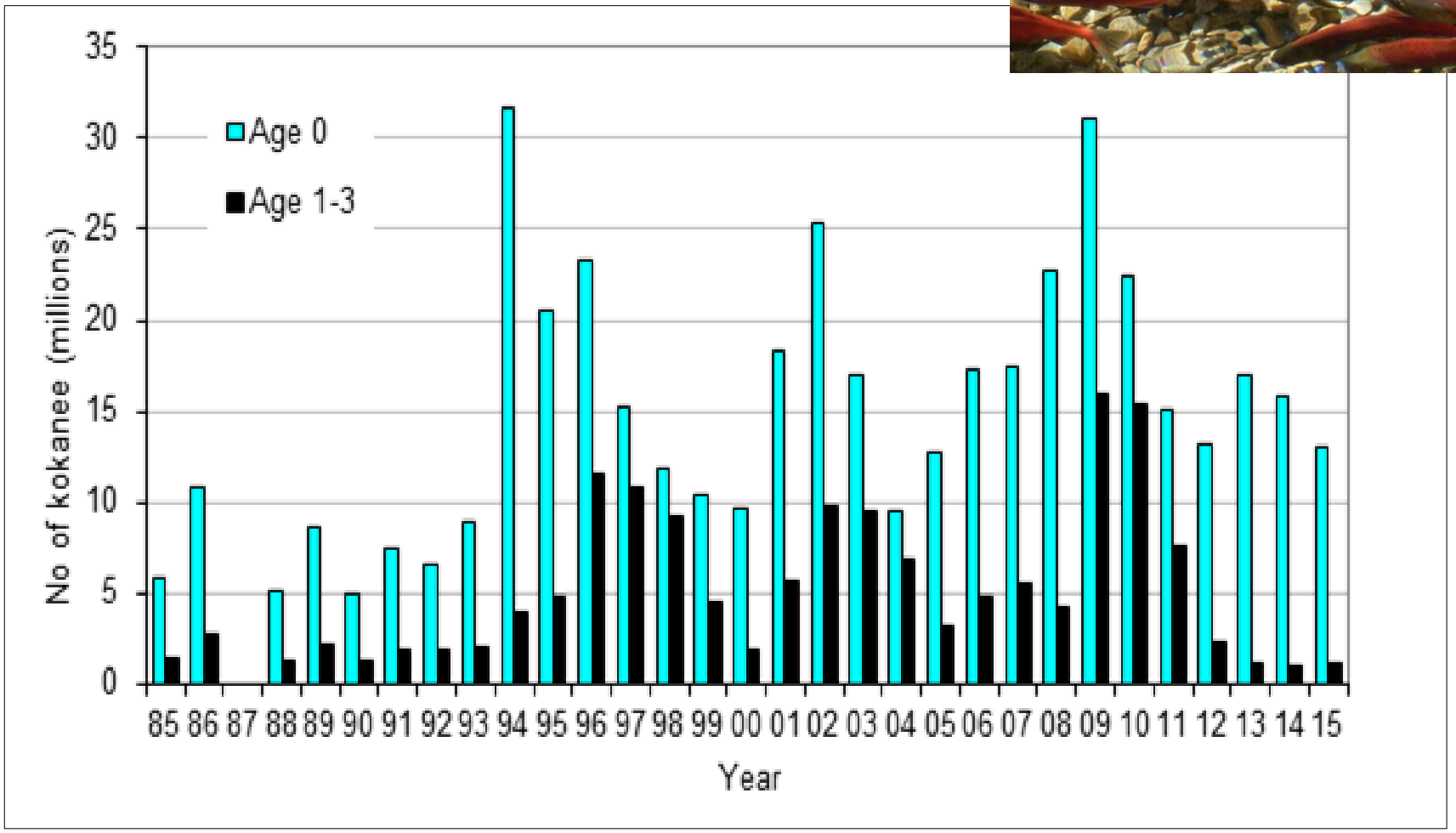
Kootenay Lake Results

Mysids



Kootenay Lake Results

Kokanee – September in-lake surveys



Allocation of 2015 kokanee eggs

Purpose	Fry / equivalent	Percent
Kootenay Lake Recovery	1,035,000	51.5%
Angling in 20 other BC lakes	700,000	34.5%
Angling and brood	250,000	12.5%
Restoration	30,000	1.5%
Total	**2,015,000**	