

## “Squeeze Play”: The Role of Temperature, Oxygen, and Annual Climate Variations in Controlling Habitat Utilization by Juvenile Sockeye Salmon (*Oncorhynchus nerka*) in Osoyoos Lake, British Columbia



Fisheries and Oceans Canada / Pêches et Océans Canada

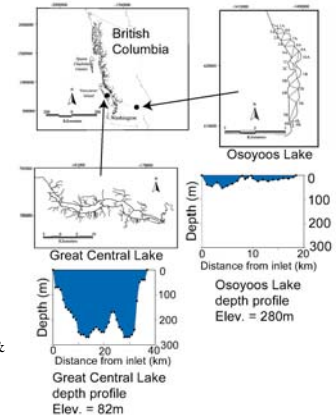
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## Great Central and Osoyoos Lakes



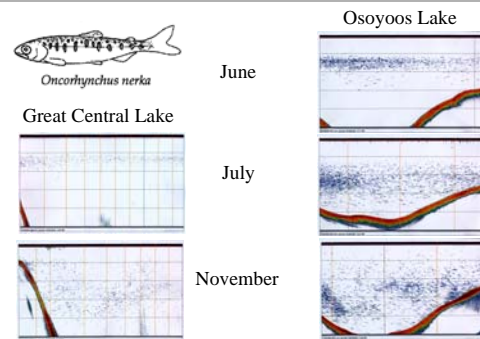
- GCL - 1 basin, deep & cool
- Osoyoos - 3 basins, shallow & warm



## Scientific echosounders, midwater trawls and small boats are used to sample juvenile sockeye in lakes

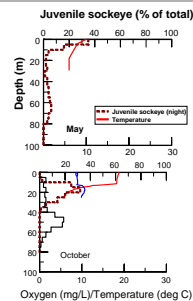
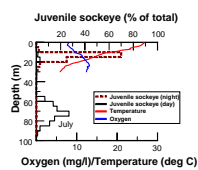


## Seasonal Changes in Juvenile Sockeye Vertical Distribution

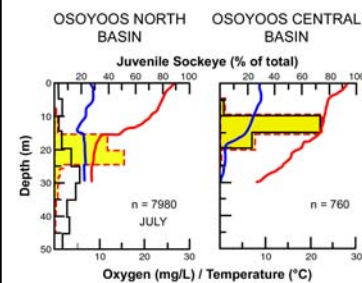


## Diel Distribution In Great Central Lake

- “17 degree rule”, night ascent limited by 17 degree isocline

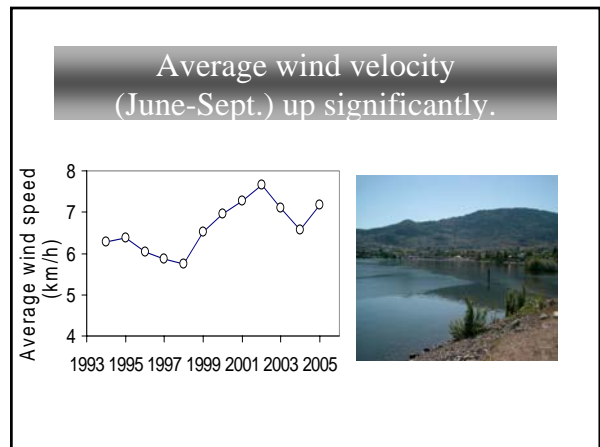
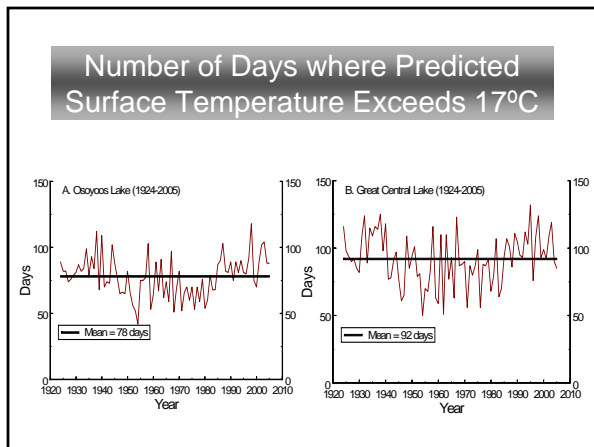
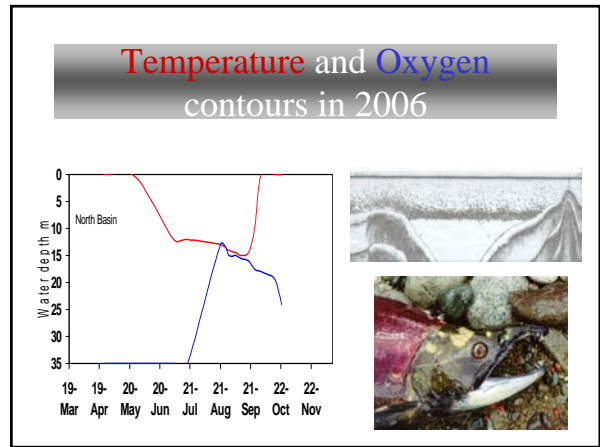
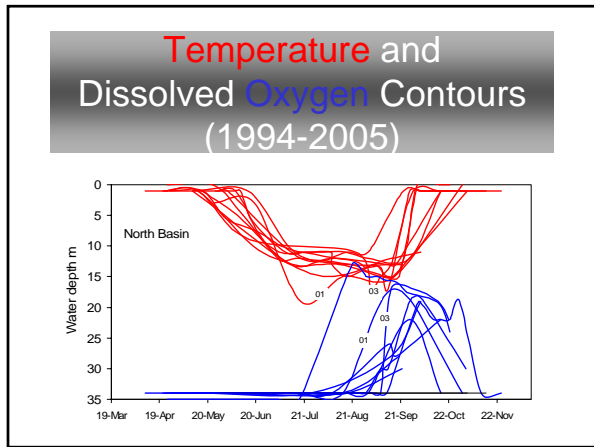
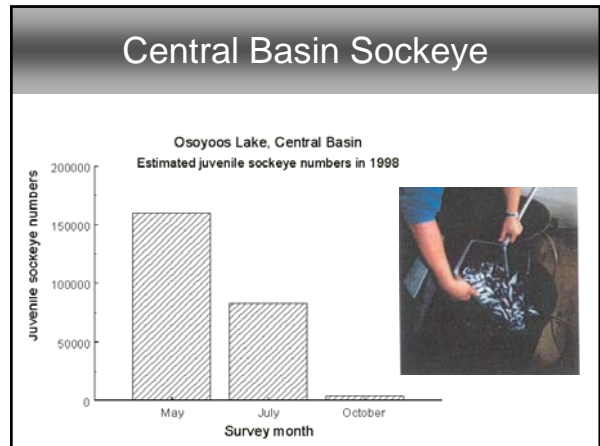
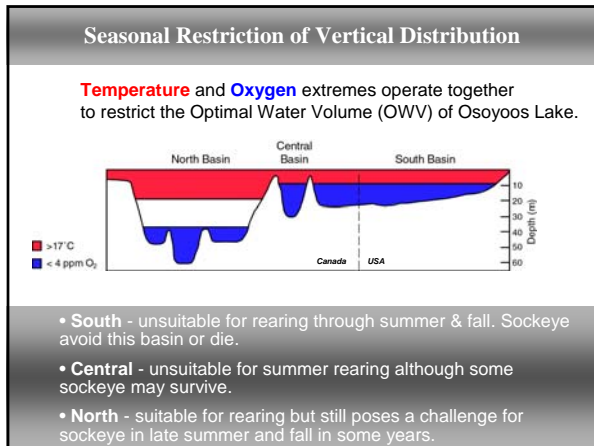


## Day versus Night Distribution Changes Reveal “Rules” for Seasonal Habitat Utilization by Juvenile Sockeye in Lakes

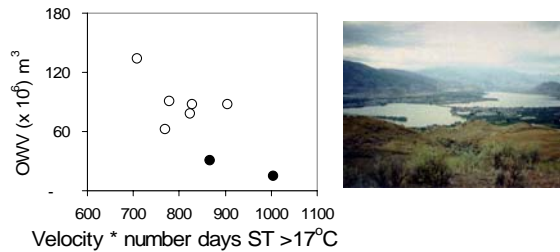


- “4 mg rule”, day time descent limited by 4 mg isocline

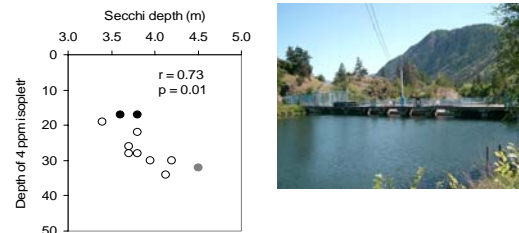
- “17 degree rule”: night ascent limited by 17 °C water



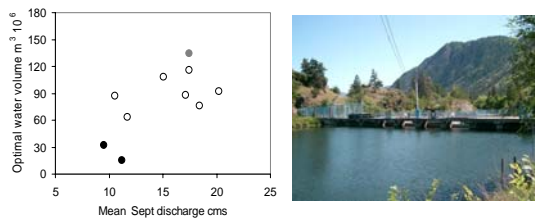
### Optimal water volume correlated with wind velocity and surface temperature



### 4 mg isopleth depth is correlated with Secchi depth



### Optimal water volume correlated with September discharge



### Conclusions

- Juvenile sockeye habitat is periodically restricted in Osoyoos Lake and may affect both growth and survival
- During the years (2001, 2003) when the OWV was lowest, daily juvenile sockeye losses were high (9 & 11 fish d<sup>-1</sup>) respectively
- Managers will have no control over wind velocity and surface temperatures.

### Conclusions

- However OWV may be managed by increasing September discharge during dry years (short term).
- Reducing point source phosphorus loading
- Oxygenating the deeper, cooler water in a safe, efficient and cost effective manner.