



Water Quality Monitoring

- Three Components:
 - Lake Chelan Water Chemistry
 - Coliform Evaluation (using existing data)
 - Tailrace & Bypass Reach Water Chemistry



Lake Chelan Water Quality Monitoring - 1999

Preliminary Findings





Lake Chelan Water Chemistry

- Eight sampling events from May through September
- 4 Wapato stations, 1 Lucerne station
- Sampled surface (0.3 m), 10 m, 20 m, 40 m, 70 m, 100 m, and 112 m
- Water column temp/chemistry profiles



Coliform Evaluation

- Evaluate correlation between lake level and coliform counts
 - use existing data from 1986 to present

Tailrace and Bypass Reach

- Water chemistry monitored at 50, 80, 100, 250, 300, 2000, and 3600 cfs
- Detailed analysis of water chemistry at 80 cfs

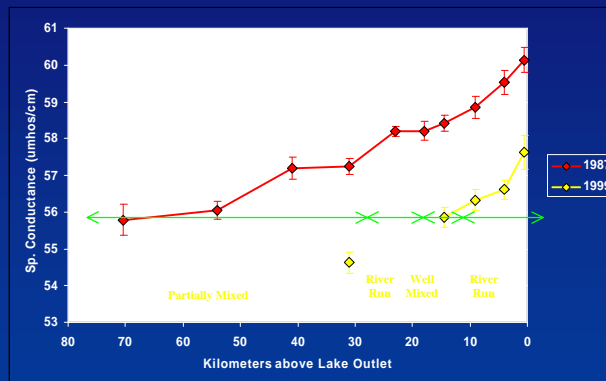


Water Chemistry Data Analysis

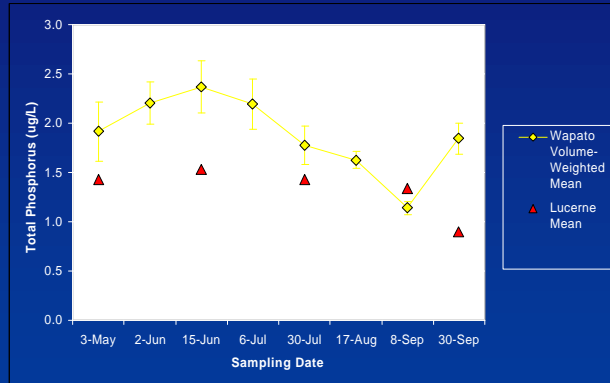
- Trends over 1999 sampling season
- Comparisons with 1987, 1995, and 1996 data



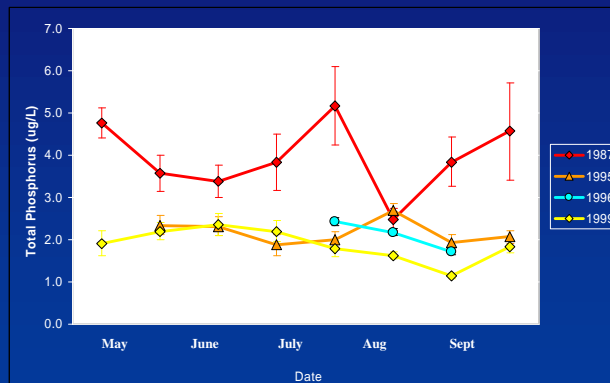
Lake Chelan Mixing Characteristics Specific Conductance



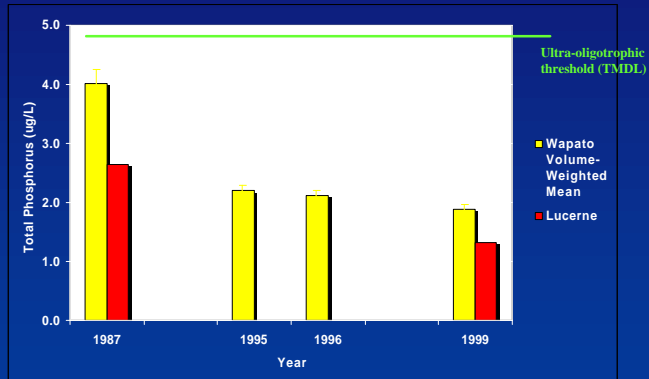
Epilimnetic Total Phosphorus (1999)



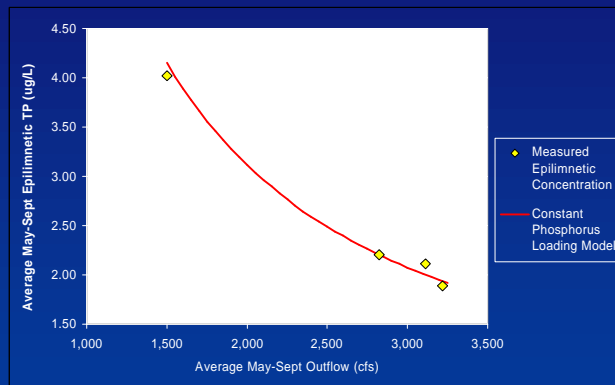
Total Phosphorus in Wapato Basin



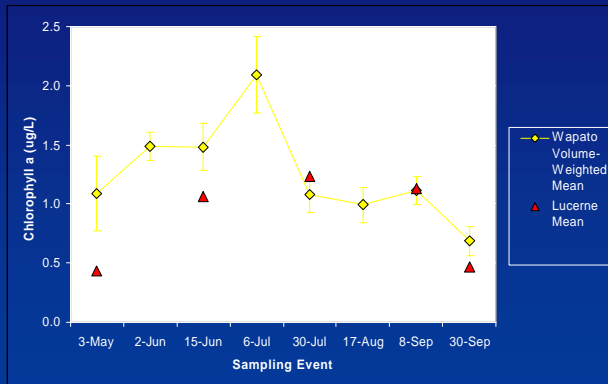
Seasonal Average Epilimnetic Total Phosphorus



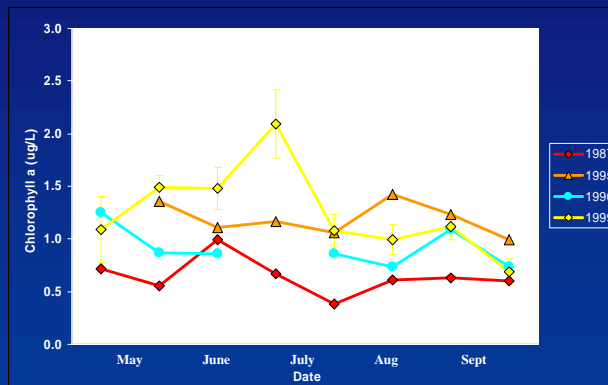
Seasonal Total Phosphorus Concentration vs. Discharge



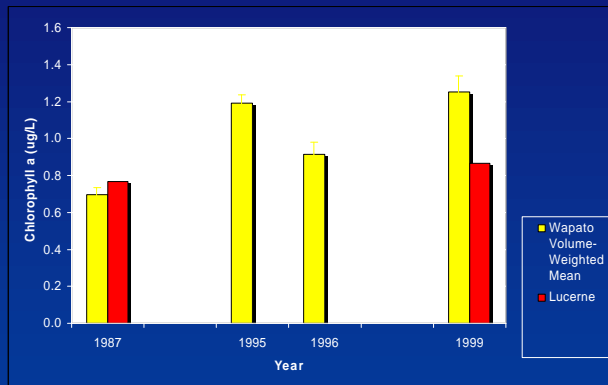
Epilimnetic Chlorophyll a (1999)



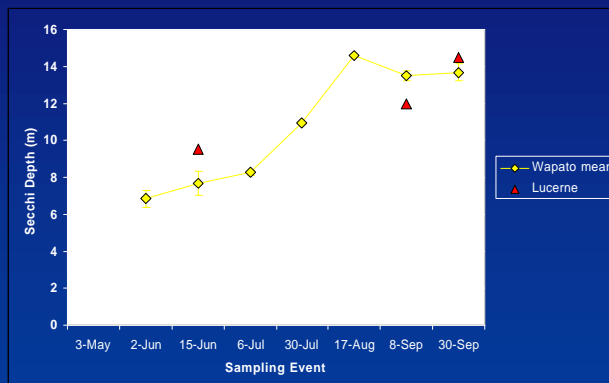
Average Epilimnetic Chlorophyll a



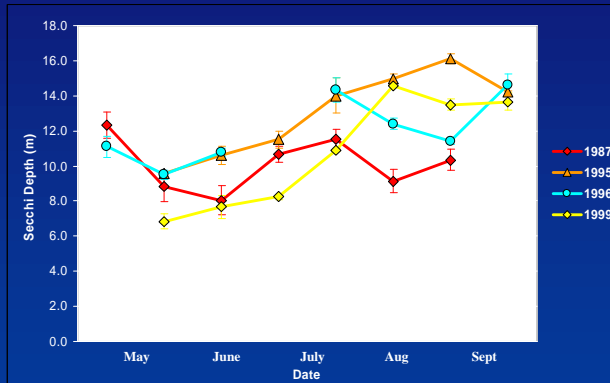
Seasonal Average Epilimnetic Chlorophyll a



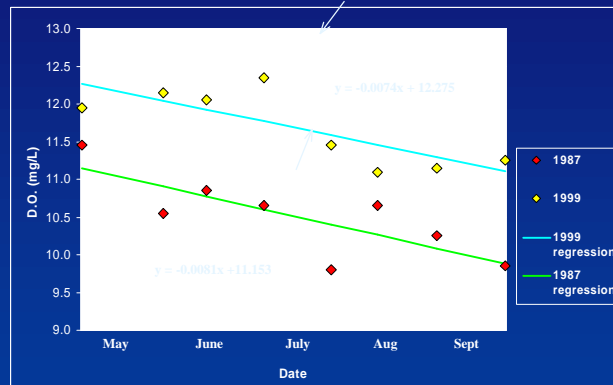
Water Transparency (1999)



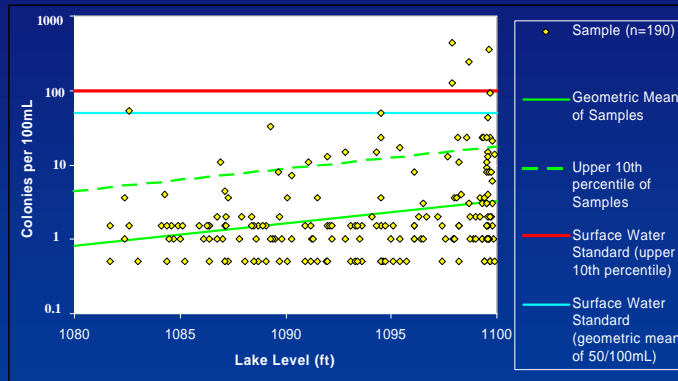
Water Transparency



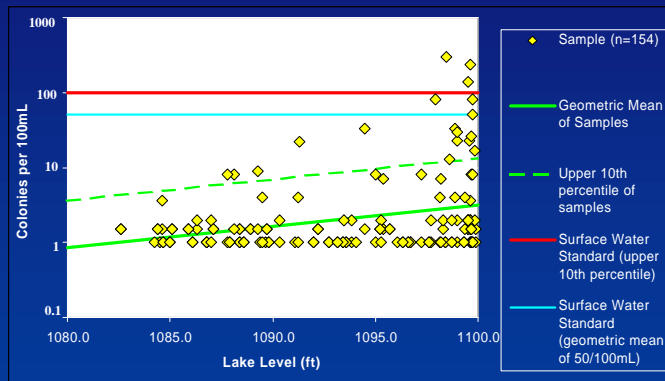
Hypolimnetic Dissolved Oxygen



Fecal Coliform Counts near Outlet as a Function of Lake Level

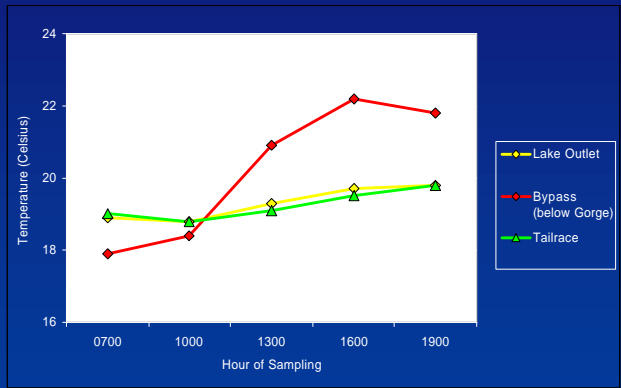


Fecal Coliform Counts near Manson as a Function of Lake Level



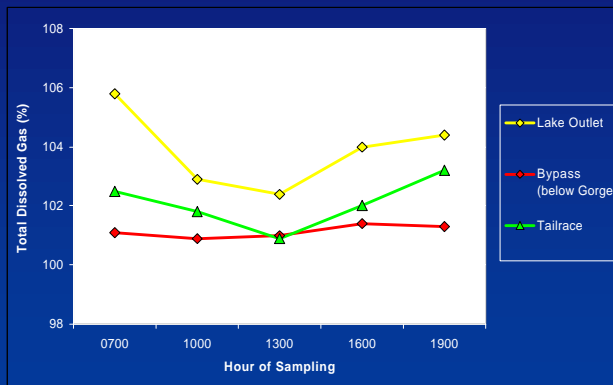
Water Temperature in the Bypass Reach and Tailrace

(Repeat sampling conducted June 16, 1999; bypass reach flow ~80cfs)



Total Dissolved Gas in the Bypass Reach and Tailrace

(Repeat sampling conducted June 16, 1999; bypass reach flow ~80cfs)





Preliminary Conclusions

- Constant Phosphorus Loading - 1987 to 1999
- Year-to-Year Variations in Phosphorus Concentrations, Algal Biomass, and Transparency are Associated with Runoff Differences
- No Change in Most Sensitive Parameter - Hypolimnetic Dissolved Oxygen Depletion Rate
- Few Changes in Water Chemistry with Different Tailrace and Bypass Reach Flows
 - up to 3°C temperature increase in bypass



Evaluation of Project Impacts

- Alternative Operational Scenarios
 - Existing Conditions
 - No Project
 - Preferred Alternative
- Water Quality Modeling
- Water Quality Certification

