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Agenda Item #11
REPORT #RWSC 2010 - 04

REPORT TO REGIONAL WATER SUPPLY COMMISSION
MEETING OF WEDNESDAY, 20 JANUARY 2010

SUBJECT WATER QUALITY TRENDS IN SOOKE RESERVOIR IN NOVEMBER AND DECEMBER 2009

SUMMARY

The water quality tests conducted for Sooke Reservoir in November and December 2009 continued to show good quality source water with no water quality issues.

PURPOSE

This report provides information on the water quality conditions observed in Sooke Reservoir during November and December 2009 and compares these data with those from previous years and long-term averages.

REPORT

Physical Parameters

Water Levels. In November 2009, the water level in Sooke Reservoir increased by a substantial 4.7 metres (**Figure 1**). During December the water level increased a further 0.74 metres reaching a level of 185.7 metres (approximately 1 metre short of the full pool level).

Water Temperature. In November and December, the weekly average temperature of the water entering the Japan Gulch Treatment Plant was similar to both the post-inundation and pre-inundation average temperatures for the same time period. During 2009, the average water temperature of the water entering Japan Gulch plant was 10.4°C, slightly lower than the post-inundation average of 10.9°C and a full degree lower than the pre-inundation average of 11.4°C (**Figure 2**).

Water Clarity

Turbidity. During November the turbidity of the water in Sooke Reservoir averaged 0.67 NTU in front of the intake, 0.65 NTU in the south basin (**Figure 3)** and 0.58 NTU in the north basin. These readings were higher (slightly worse) than both the long term post-inundation average and the pre-inundation (1995-2002) average. The high turbidity was due to the low water level in Sooke Reservoir just before the start of the winter rains. During December, the turbidity levels throughout the reservoir dropped to just below (better) than both the post-inundation and the pre-inundation averages.

Water Transparency. During November through December 2009, similar to the past few months, the transparency of the water in front of the intake was, on average, better than both the long-term, pre-inundation average and the post-inundation average (2003-2007) **(Figure 4)**. In the south basin, the water transparency was similar to the long-term average and better than the post-inundation (2003-2007) average. In the north basin, the water transparency was better than the post-inundation (2003-2007) average albeit slightly poorer than the pre-inundation average.

Bacteria

Total Coliform Bacteria. During most of November through December, the total coliform concentrations in the raw source water entering the Japan Gulch Treatment Plant from Sooke Reservoir remained relatively low. This was similar to 2008 and below the post-inundation average for the same period (**Figure 5**). In addition, the *E. coli* concentrations were very low for the majority of this time and indicative of good bacterial quality for a source water reservoir (see **insert in Figure 5**). During mid-December the Kapoor tunnel was shut down for the annual inspection and water from the Goldstream system was used as the raw source water feeding the treatment plant. The spike in both total coliforms and *E. coli* concentrations was due to this change in raw water source (**Figure 5**).

Nutrients

Phosphorus. During November and December 2009, the total phosphorus concentrations in both the south and north basins were slightly higher than the long term pre-inundation averages and similar to the post-inundation averages **(Figures 6 and 7)**. However, for 2009 as a whole, the total phosphorus concentrations in both basins were lower than the post-inundation averages, albeit still slightly higher than the pre-inundation averages. The 2009 total phosphorus average for the south basin was 4.2 µg/L (versus 5.6 µg/L post-inundation) and for the north basin 4.4 µg/L (versus 5.8 µg/L post-inundation). (**Note**: In the charts, the bars on each data point indicate the range of data observed from triplicate samples).

Nitrogen. The total nitrogen levels in both the south and north basins were on average, slightly higher than the long term pre-inundation averages but lower than the post-inundation averages (**Figures 8 and 9**) for November and December 2009. However, the 2009 total nitrogen levels in both the south and north basins were on average, much lower than the post-inundation averages (79.6 µg/L and 78.3 µg/L versus 93 µg/L and 92.4 µg/L for the south and north basins respectively).

Chlorophyll-a

Chlorophyll-a concentrations were generally slightly above the lower pre-inundation average throughout Sooke Reservoir in November and December well below the higher post-inundation average (**Figures 10-12**). The relatively low chlorophyll levels throughout the reservoir indicate that there was no particular problem with algal concentrations.

Algae

There were no significant algal blooms during November and December 2009. Diatoms continued to dominate the Sooke Reservoir algal flora in November and December. Overall algal concentrations were relatively low throughout during this time.

RECOMMENDATION

That the Regional Water Supply Commission receive the staff report for information.

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Concurrence

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Figure 1. Water Level Elevation in Sooke Reservoir, 2006-2009

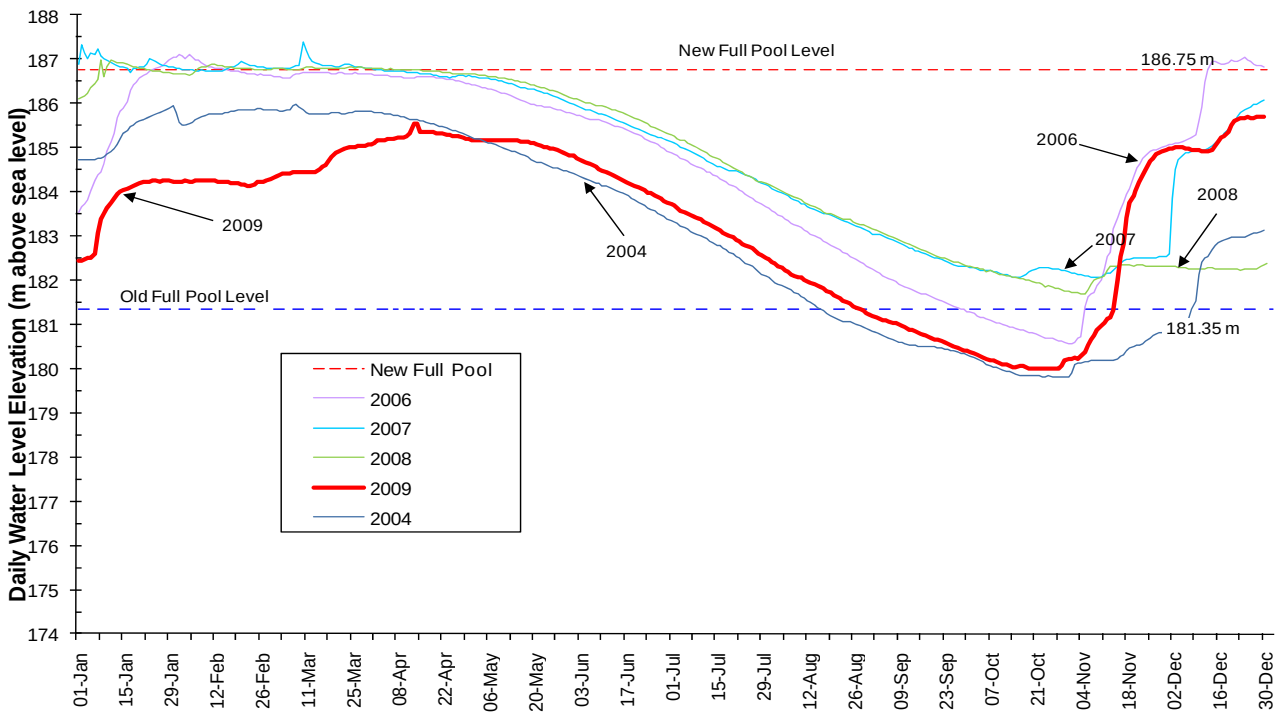

Figure 2. 2009 Temperature of Raw Water entering Japan Gulch Plant (Weekly Average)

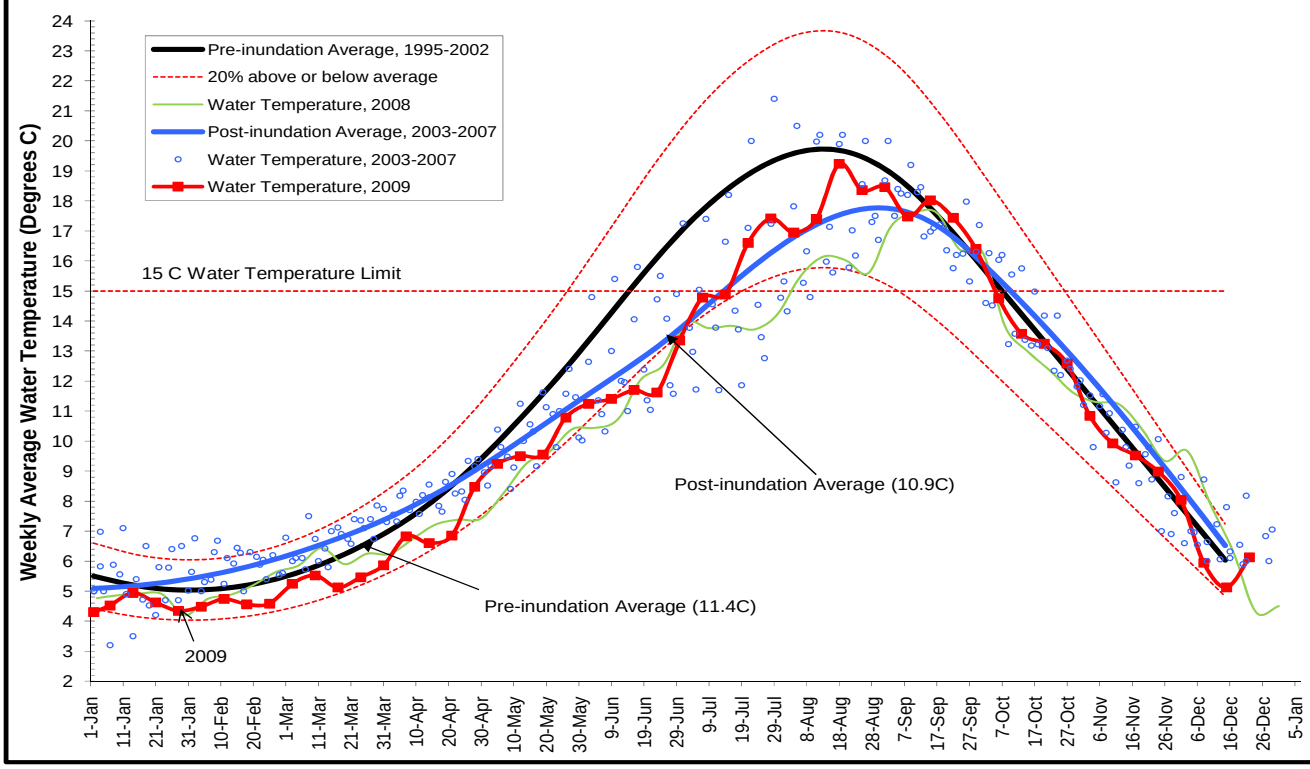

Figure 3. 2009 Turbidity in Sooke Reservoir
South basin, 1m depth (SOL-01-01)

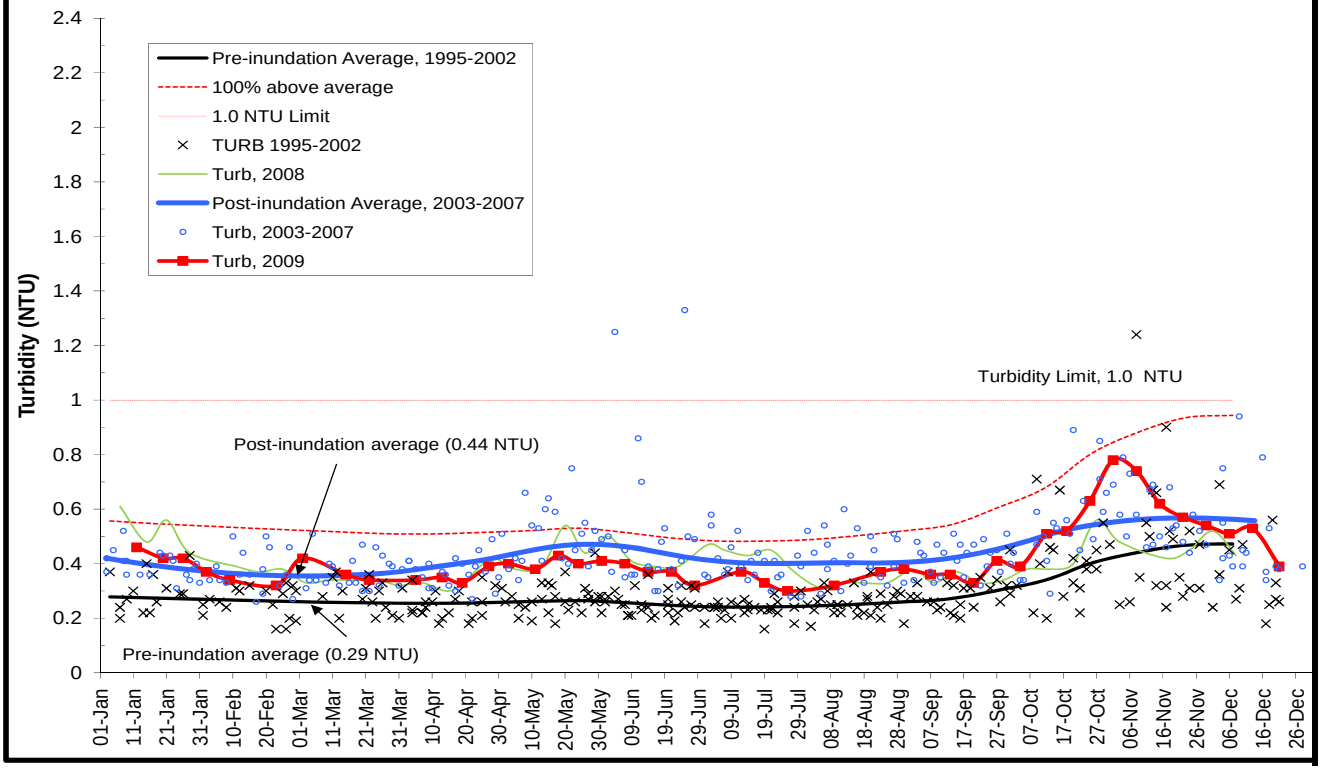

Figure 4. 2009 Water Transparency in Sooke Reservoir
Intake tower, (SOL-00-01)

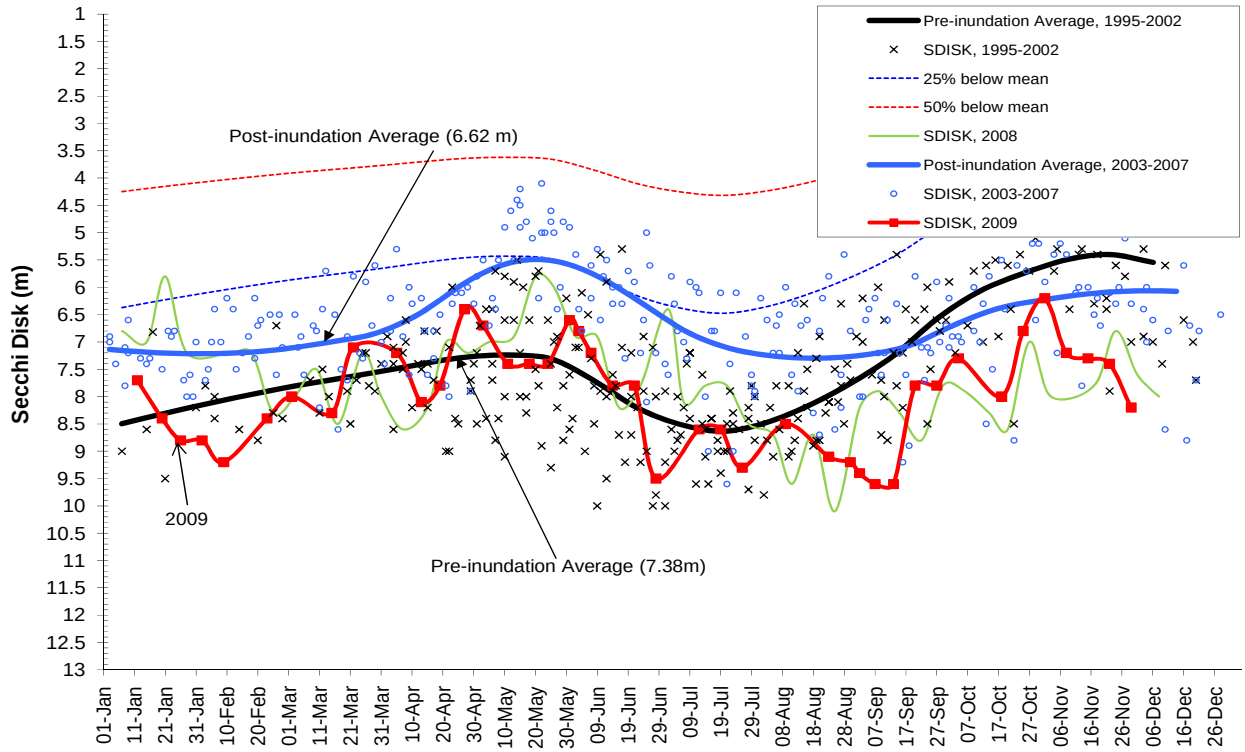

Figure 5. Total Coliforms in Raw Water Entering Japan Gulch Plant, 2004-2009

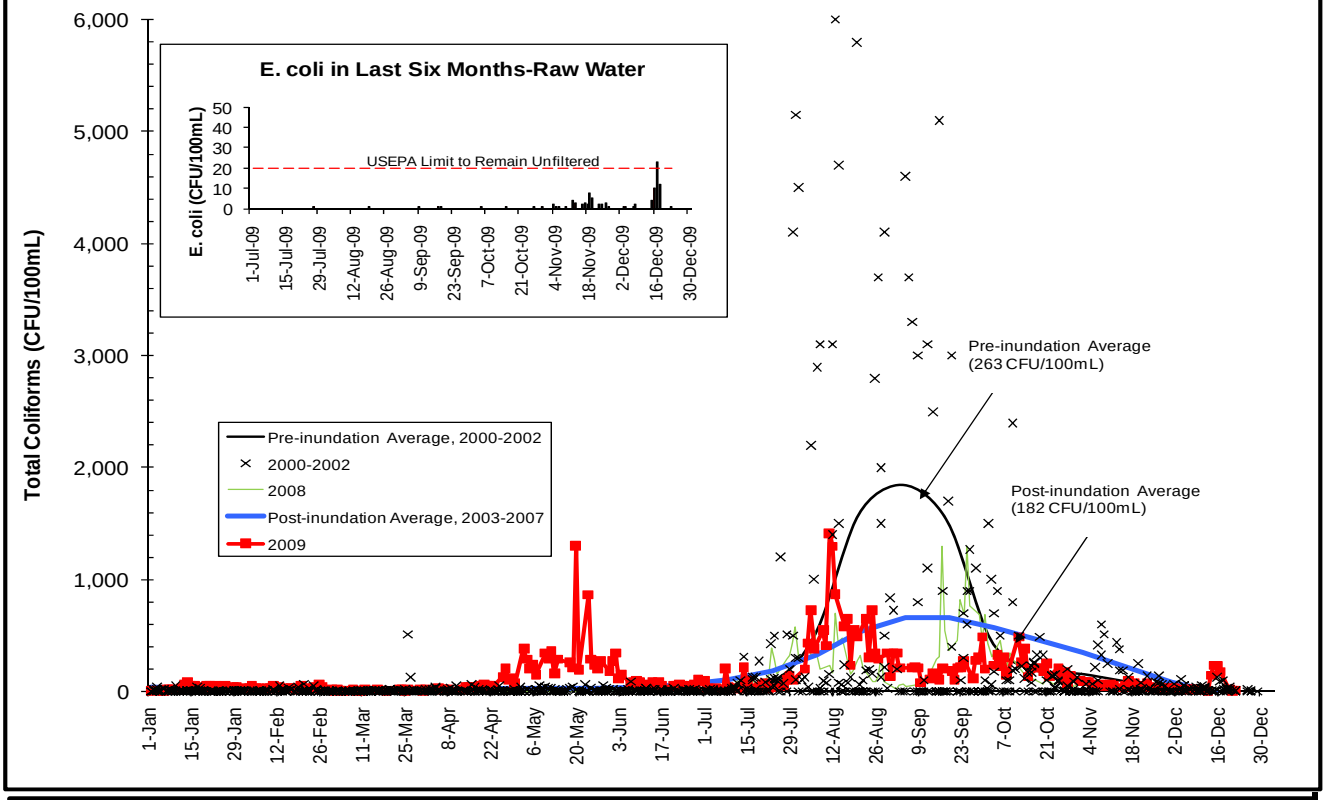

Figure 6. 2009 Total Phosphorus for Sooke Reservoir South basin, 1 m depth (SOL-01-01)

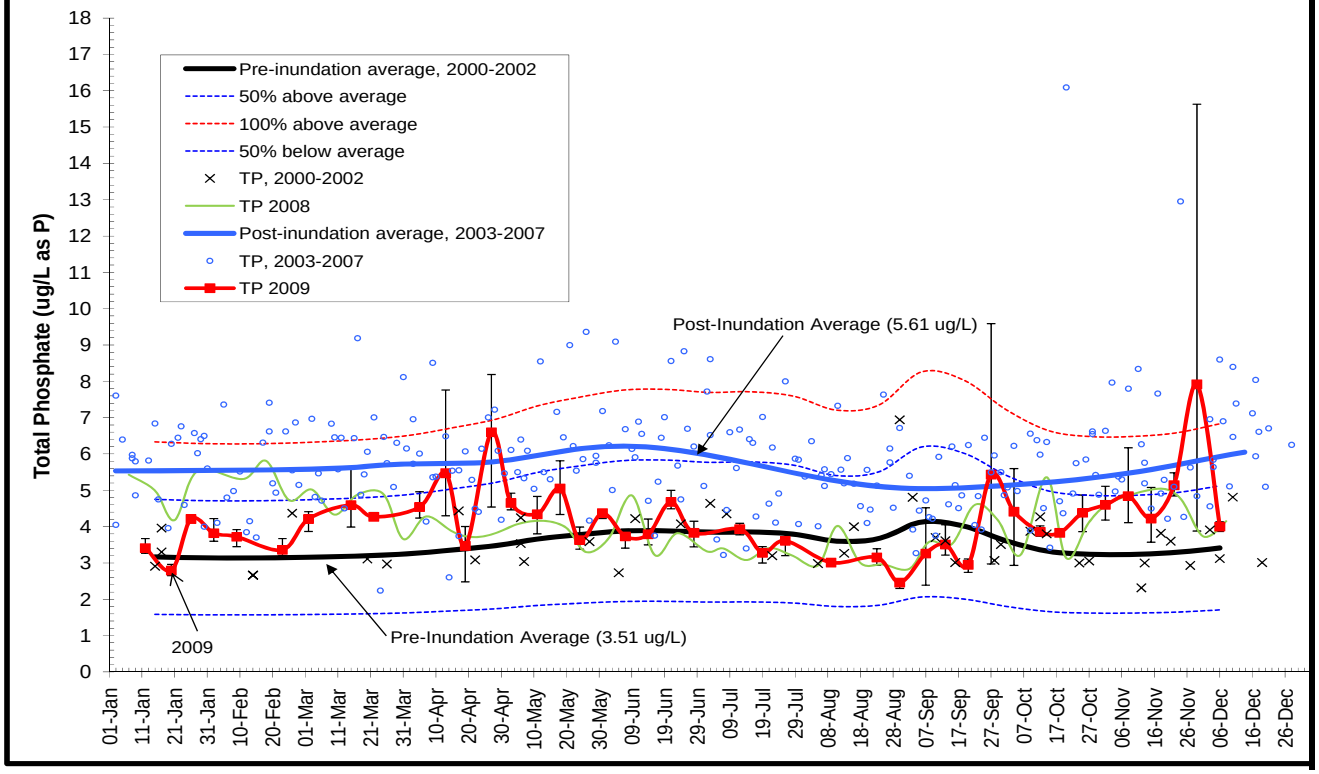

Figure 7. 2009 Total Phosphorus for Sooke Reservoir North basin, 1m depth (SOL-04-01)

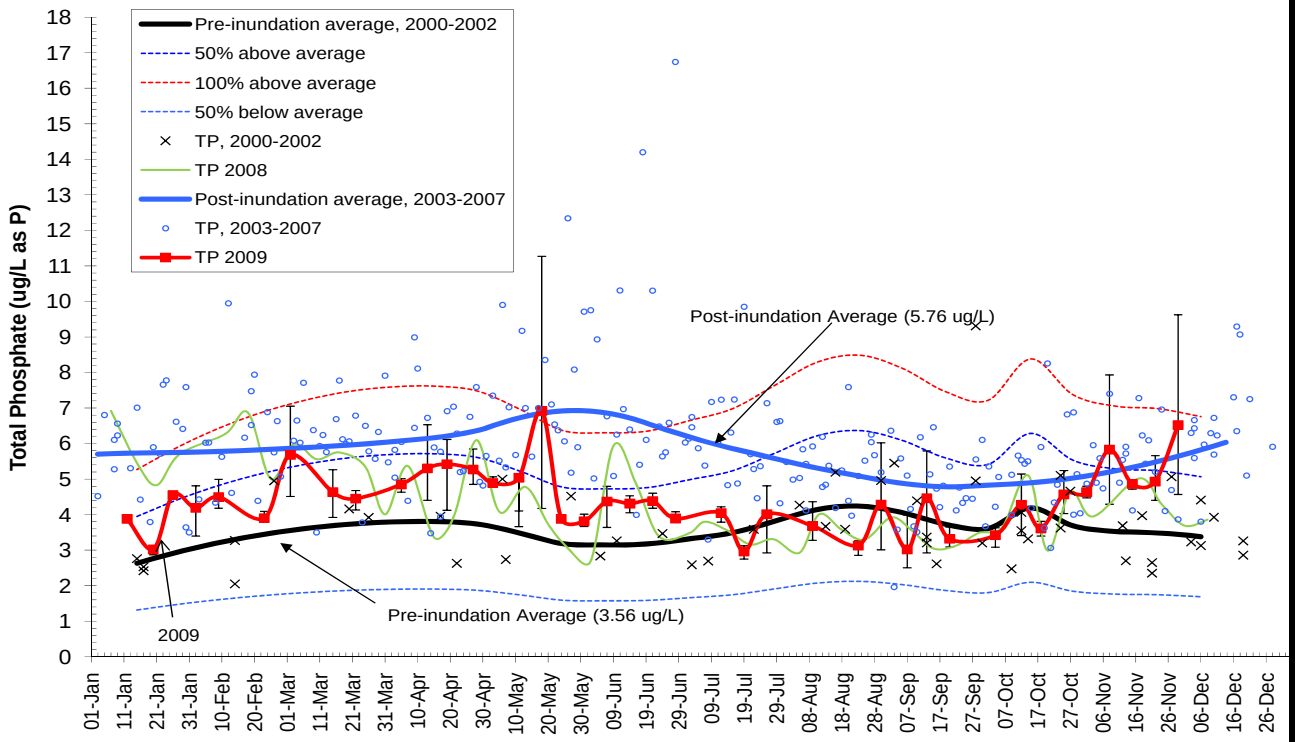

Figure 8. 2009 Total Nitrogen in Sooke Reservoir south basin, 1m depth (SOL-01-01)

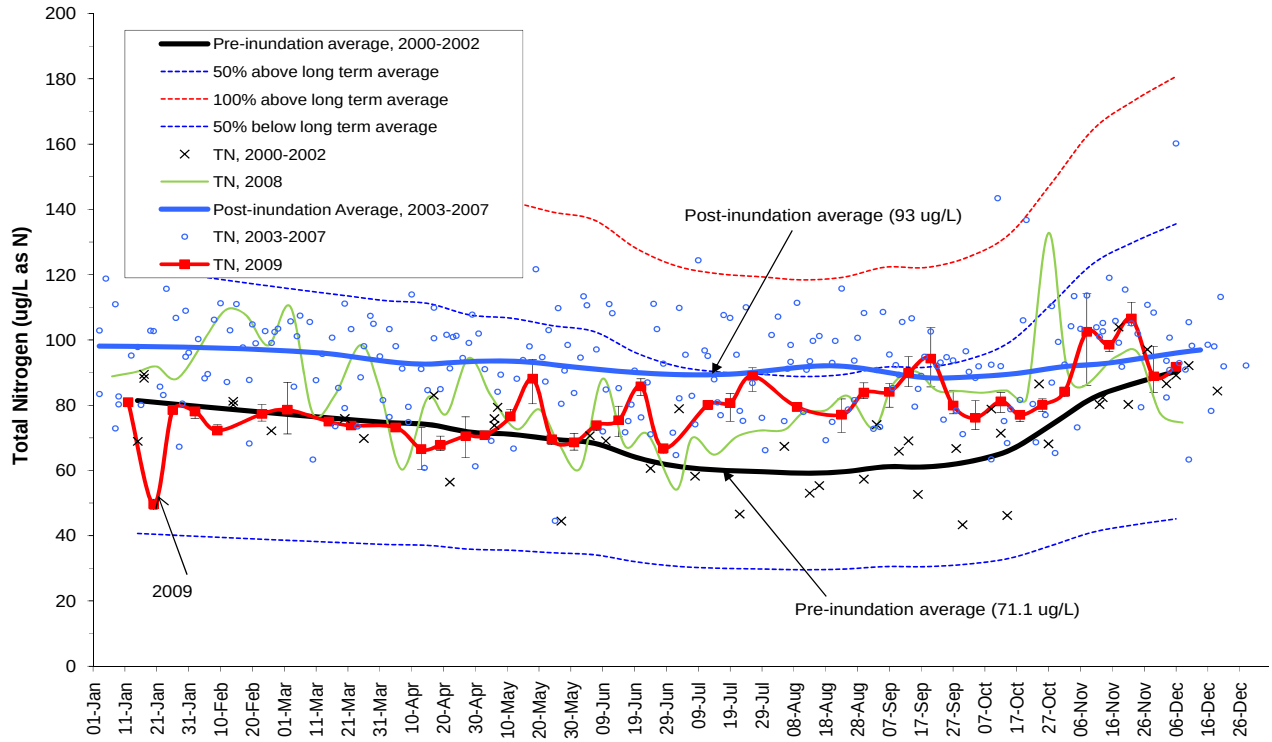

Figure 9. 2009 Total Nitrogen in Sooke Reservoir
North basin, 1m depth (SOL-04-01)

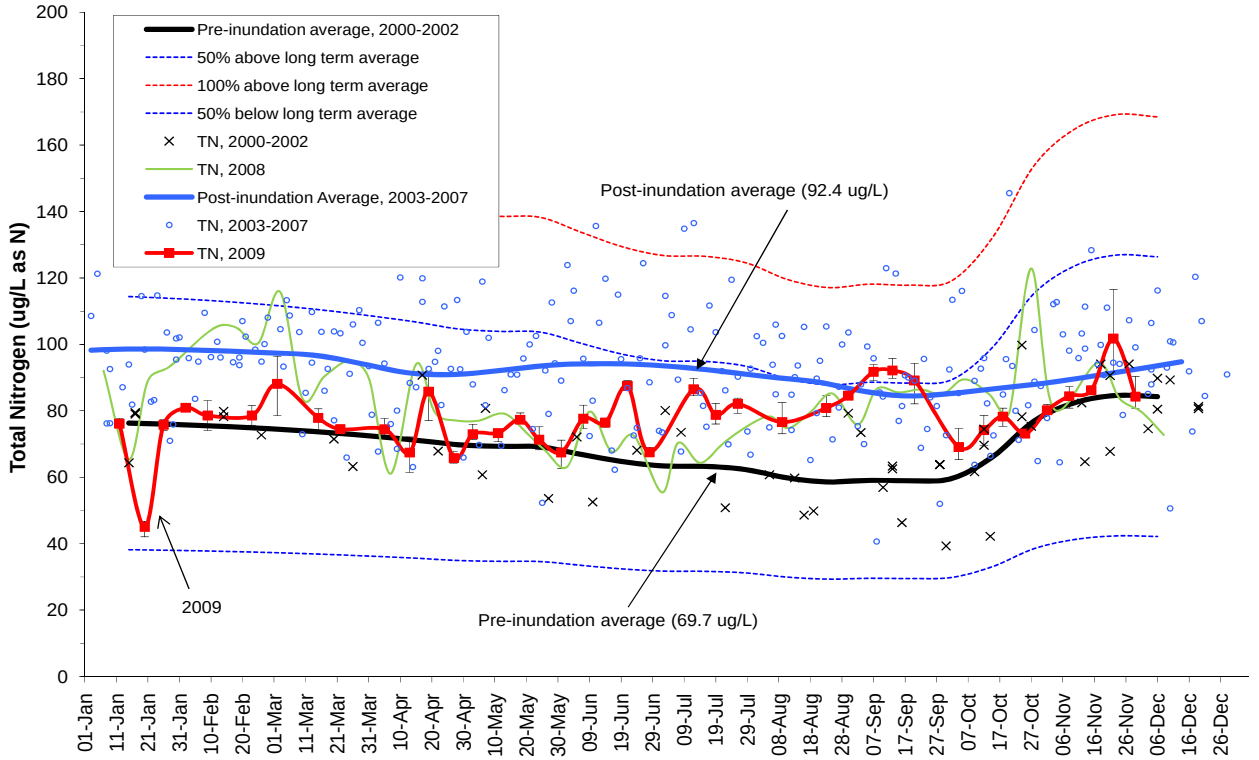

Figure 10. 2009 Chlorophyll-a in Sooke Reservoir
Intake Tower, 1 m depth (SOL-00-01)

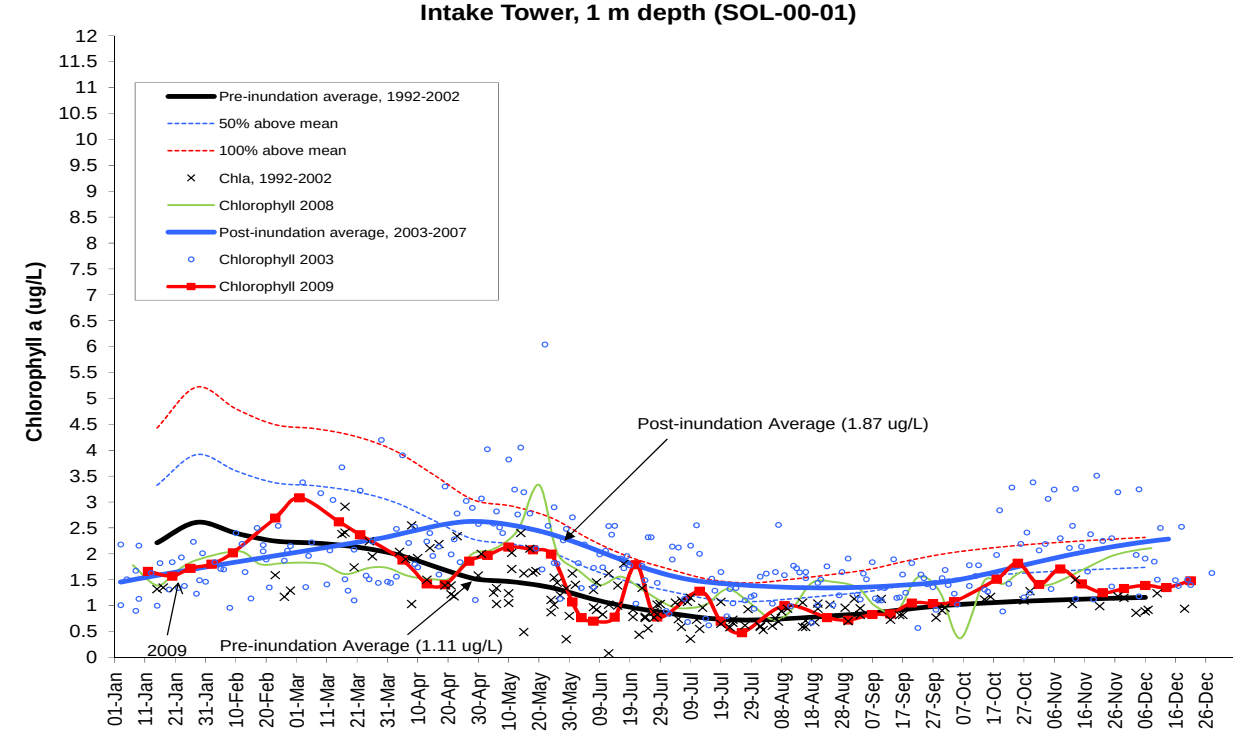

Figure 11. 2009 Chlorophyll-a in Sooke Reservoir South Basin, 1 m depth (SOL-01-01)

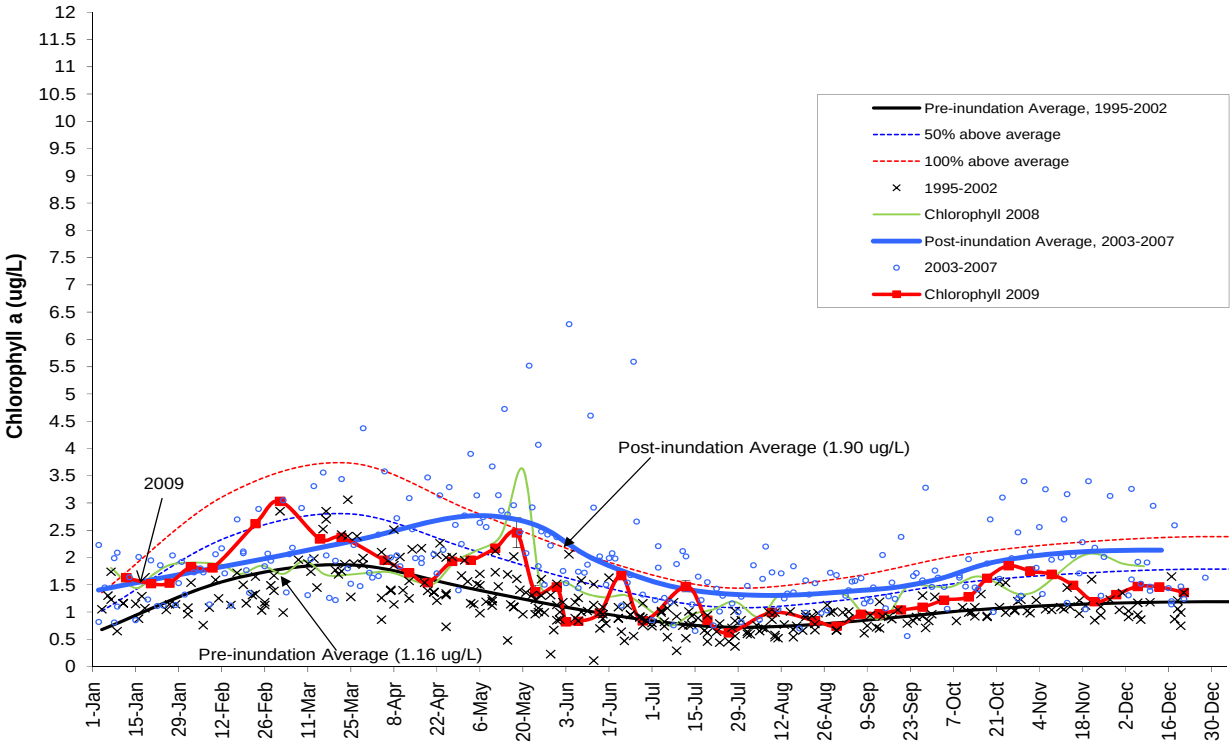
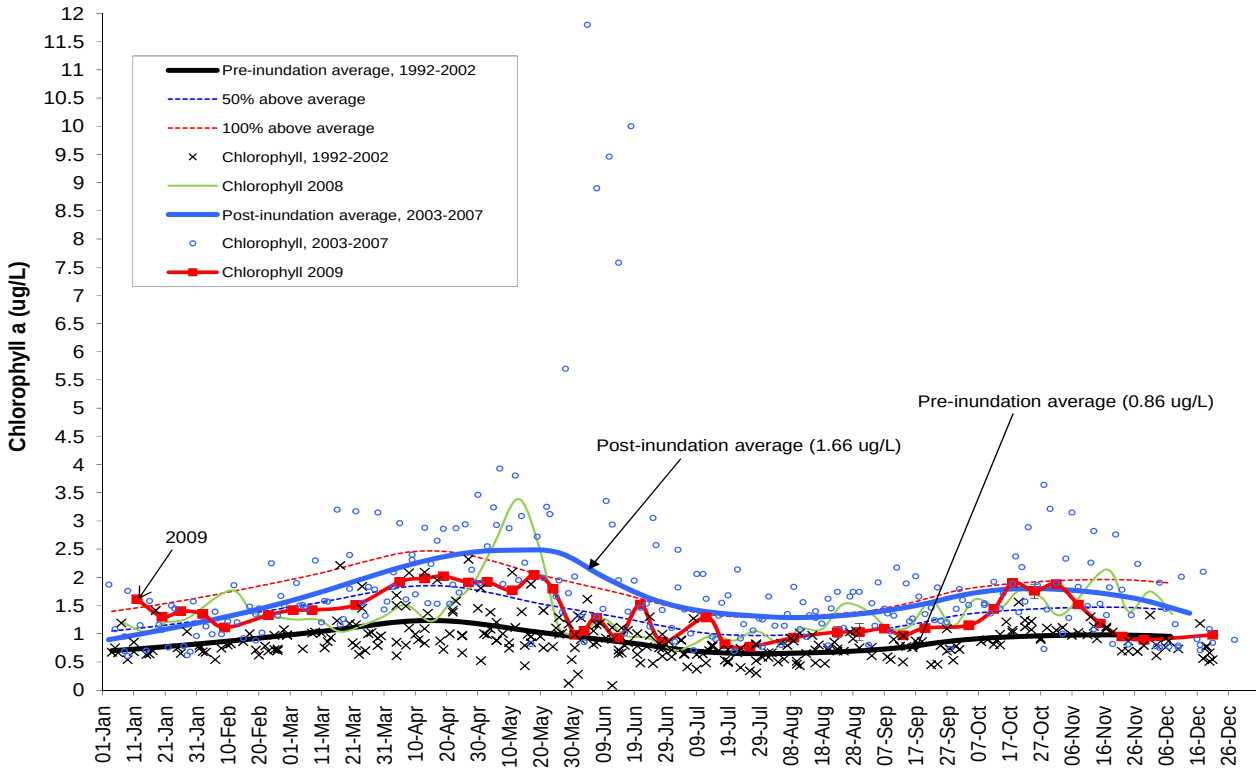
Figure 12. 2009 Chlorophyll-a in Sooke Reservoir North Basin, 1 m depth (SOL-04-01)