

# GLEN CANYON HIGH FLOW EXPERIMENT NOVEMBER 2013

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Southern Nevada Water Authority

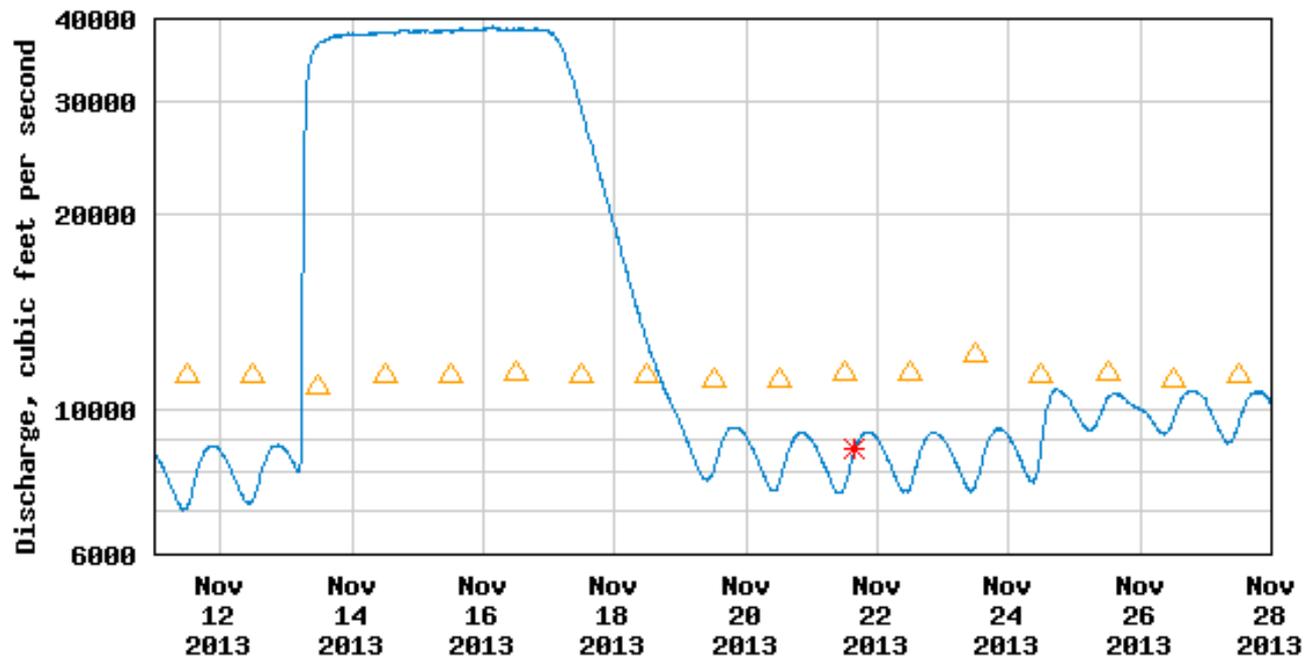
# Glen Canyon HFE, 2013

- ▣ Approximately 4 days of sustained flow above 38,000 cfs.
- ▣ Peak of 39,000 cfs arrived at USGS gage above Diamond Creek on November 16<sup>th</sup> @ 03:30.
- ▣ High flow first arrived at Lake Mead the night of November 13<sup>th</sup>.
- ▣ Lake Mead sampling began on November 14<sup>th</sup>.

# Peak of 39,000 cfs on November 16<sup>th</sup> @ 03:30



USGS 09404200 COLORADO RVR ABV DIAMOND CREEK NR PEACH SPRINGS AZ



---- Provisional Data Subject to Revision ----

△ Median daily statistic (25 years) \* Measured discharge  
— Discharge

# Glen Canyon HFE, 2013

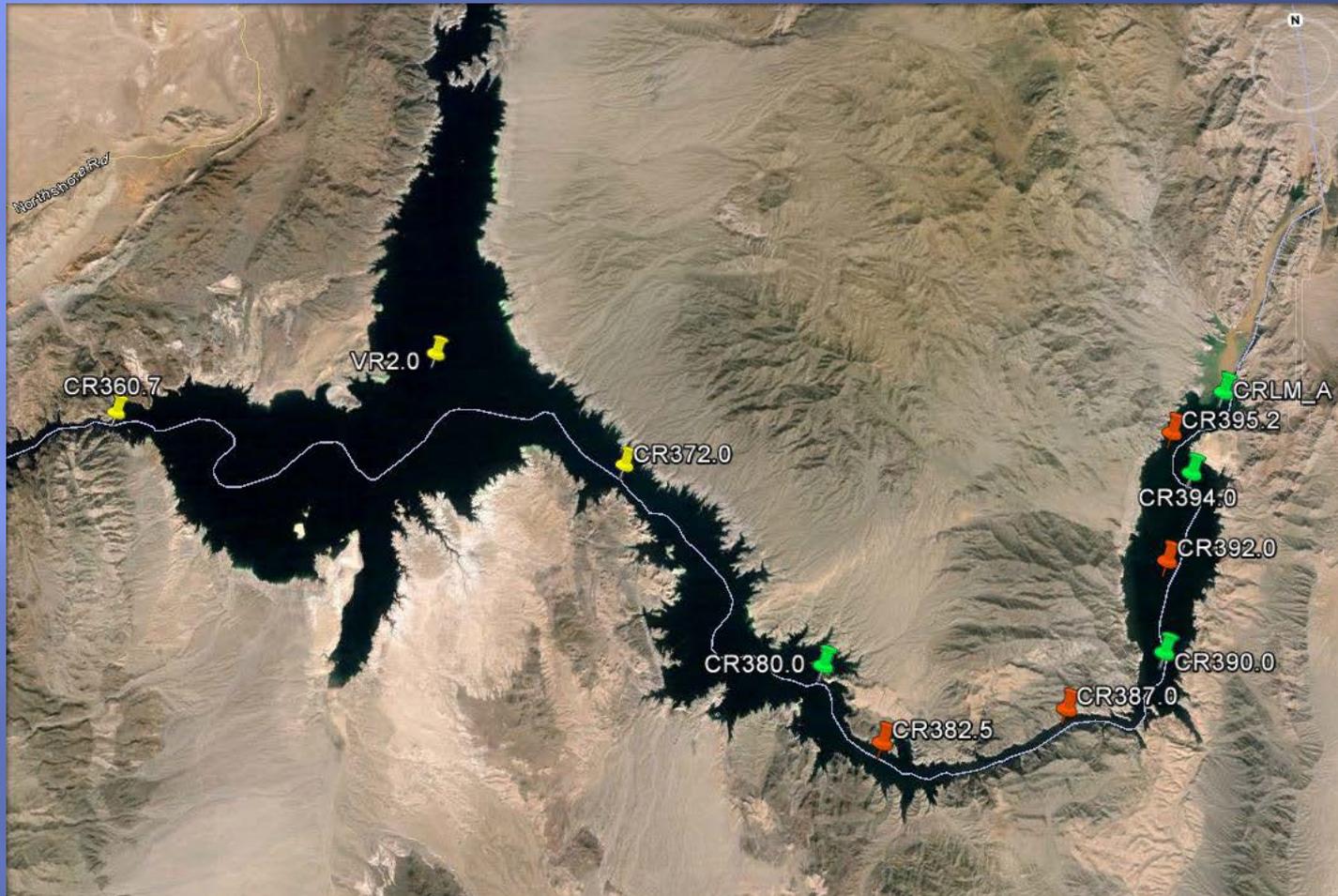
- ▣ Samples were collected on November 14<sup>th</sup>, 15<sup>th</sup>, 16<sup>th</sup>, 18<sup>th</sup>, 20<sup>th</sup>, and 26<sup>th</sup>.
- ▣ Four primary sites were CRLMA, CR394.0, CR390.0, and CR380.0.
- ▣ Total Nitrogen and Total Phosphorus samples were collected at depth of highest turbidity on November 14<sup>th</sup>, 15<sup>th</sup>, and 16<sup>th</sup>.
- ▣ Additional profiles collected at CR372.0, VR2.0, and CR346.7 (dependent on weather conditions and data from upper sites).

# Glen Canyon HFE, 2013

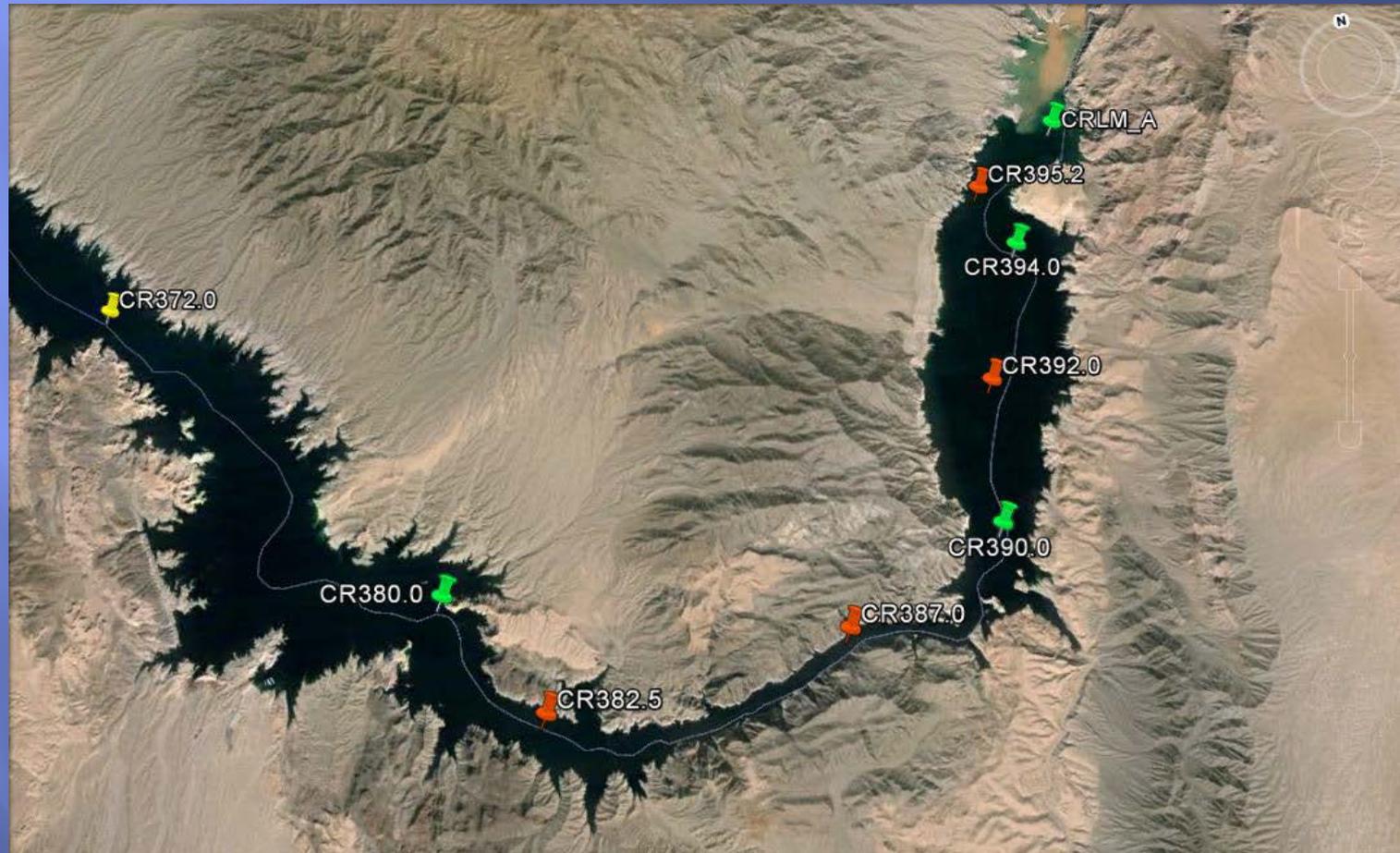
- ▣ An additional 4 sites were profiled for Temperature and Conductivity only using Castaway© CTD (Conductance Temperature Depth).



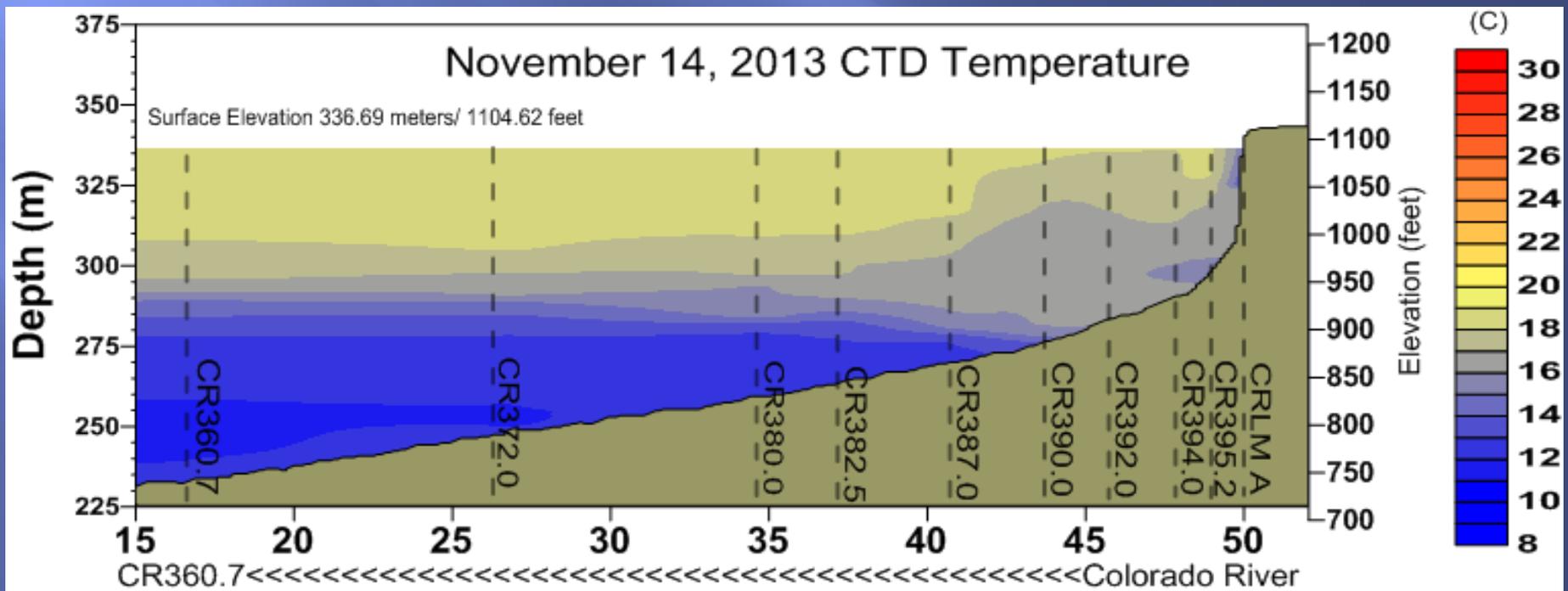
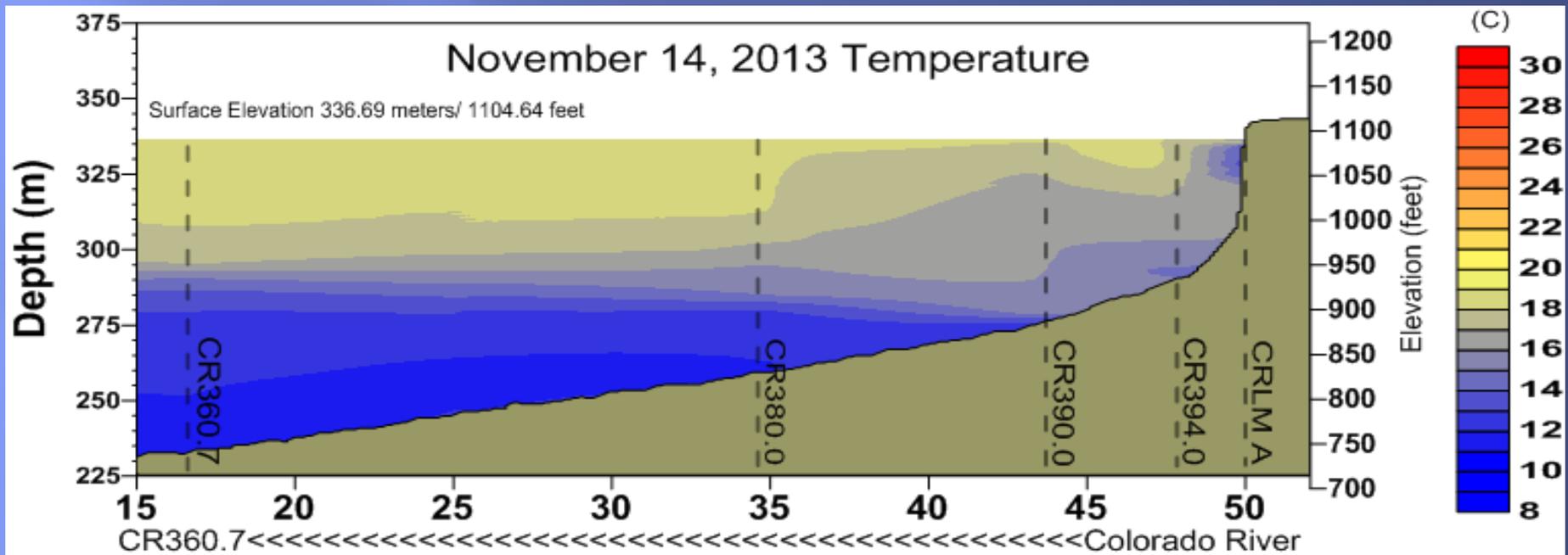
# 2013 HFE Sites



# Colorado Arm Locations

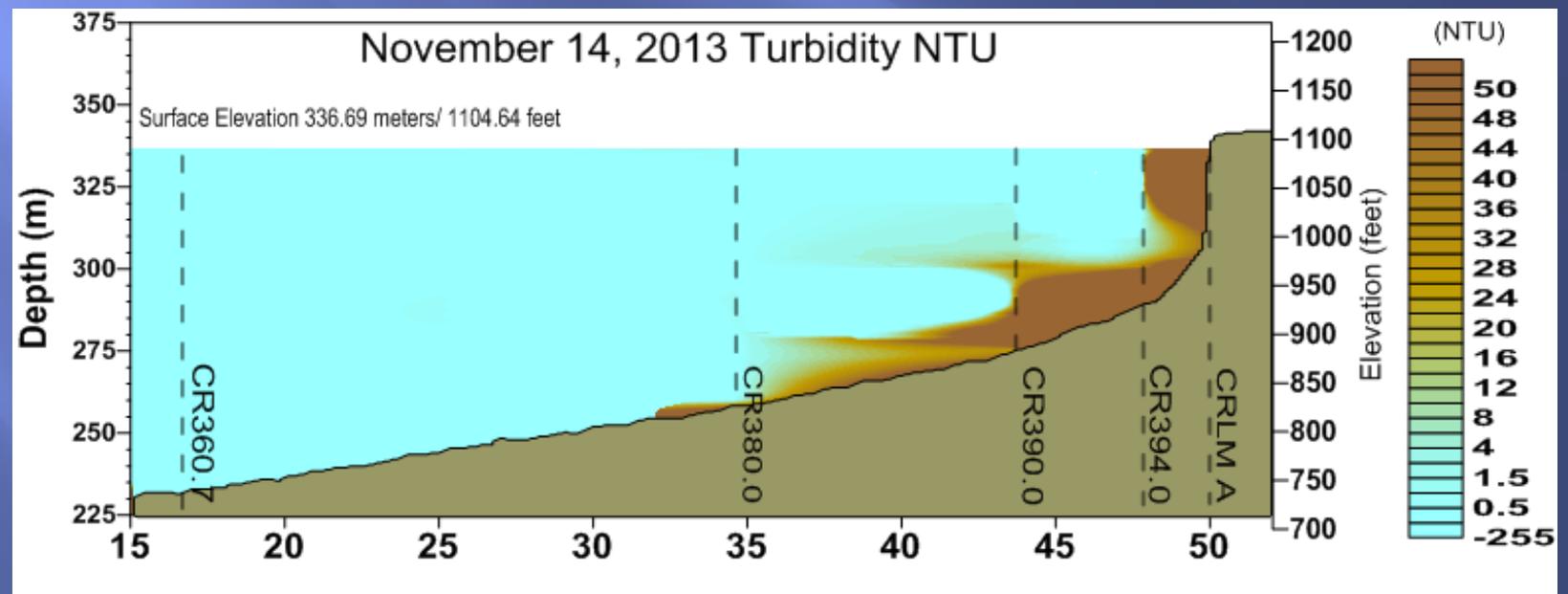
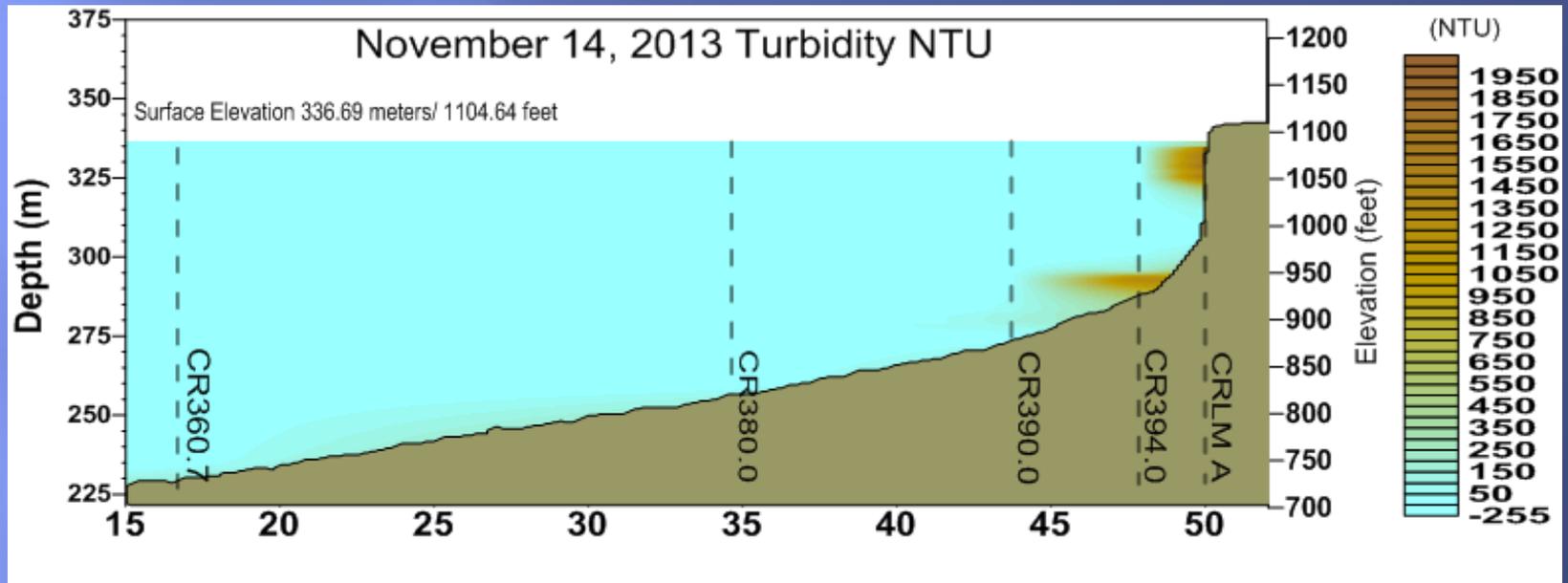


November 14, 2013

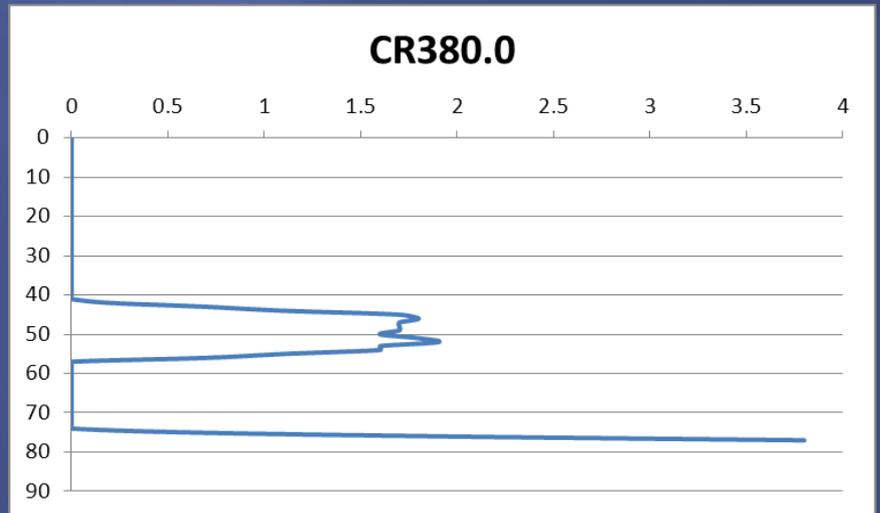
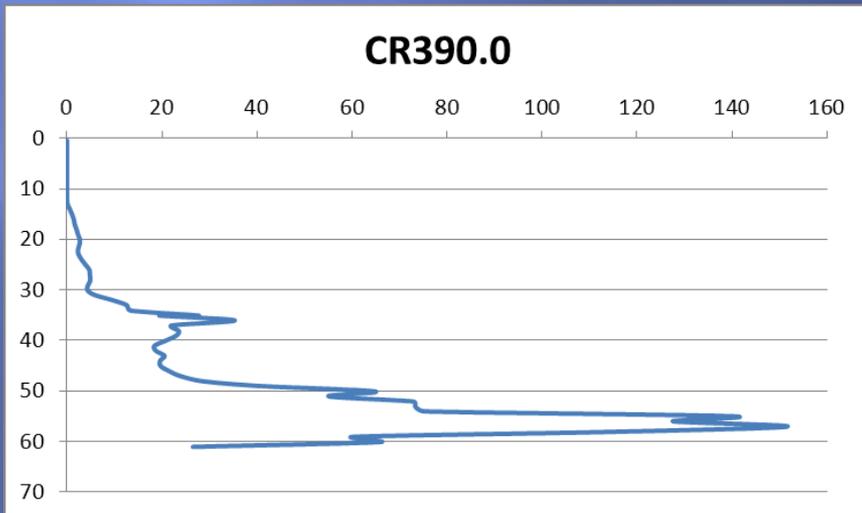
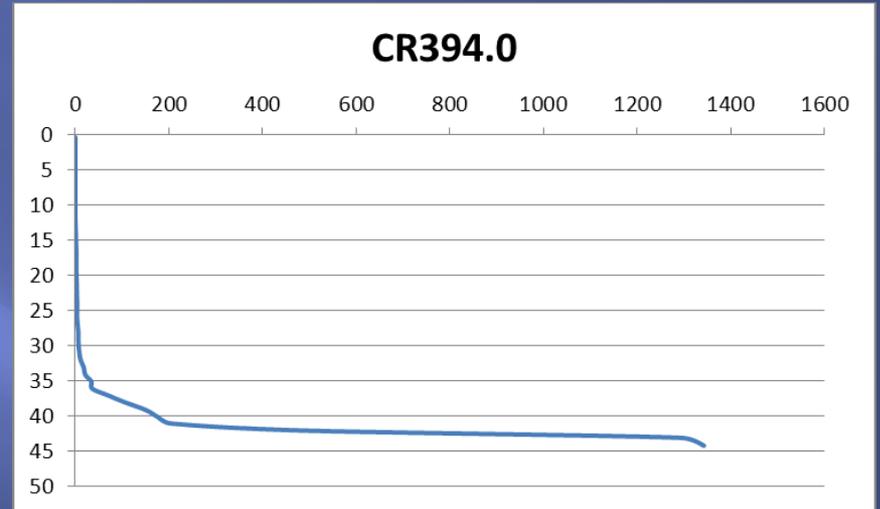
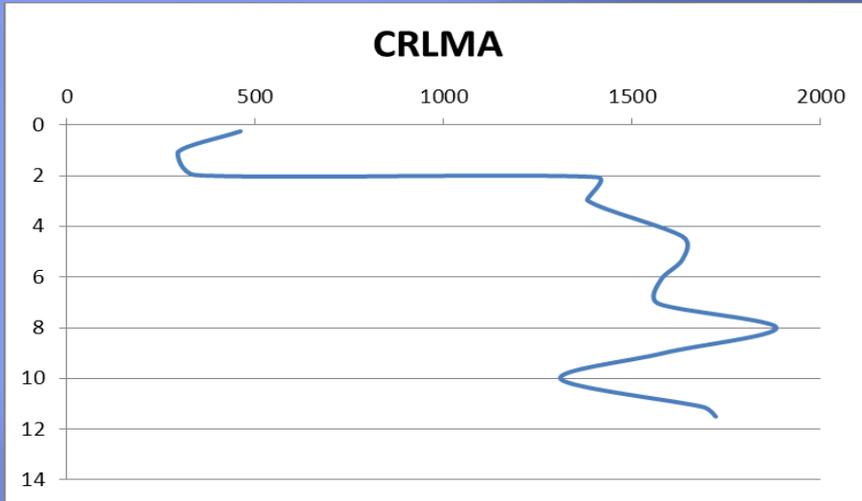








# Turbidity Profiles for November 14

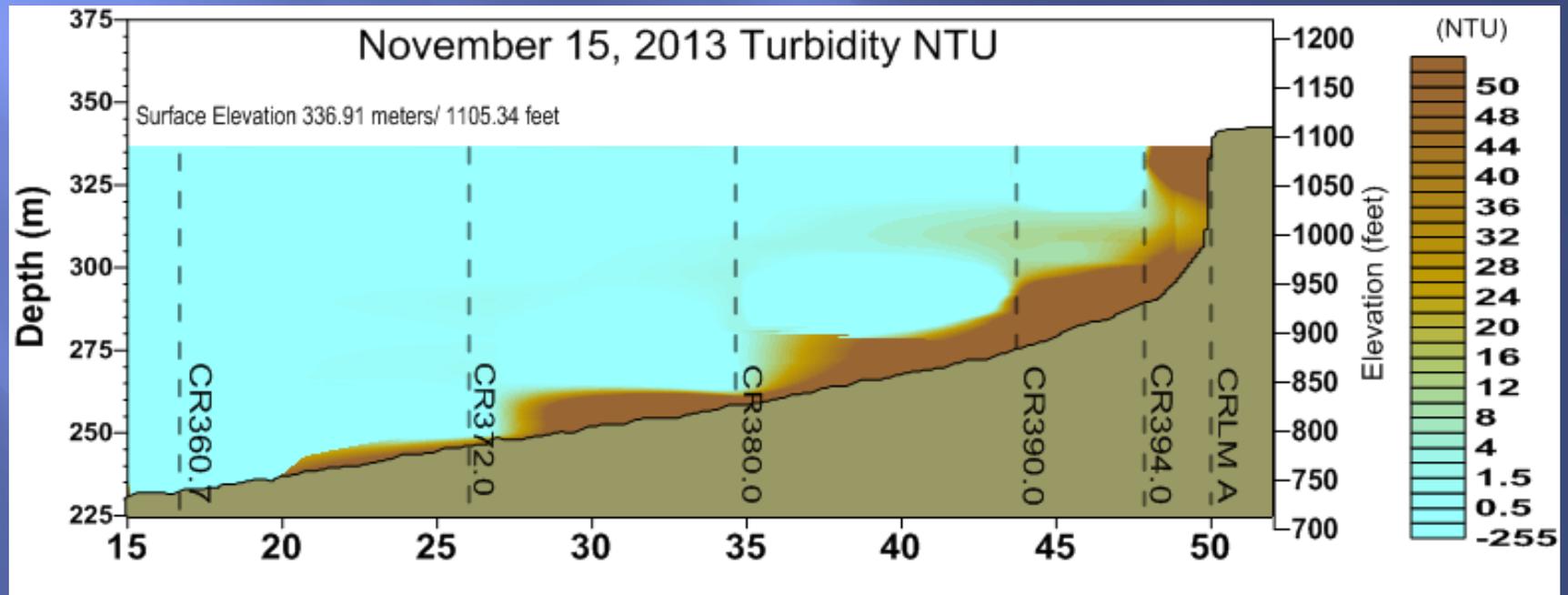
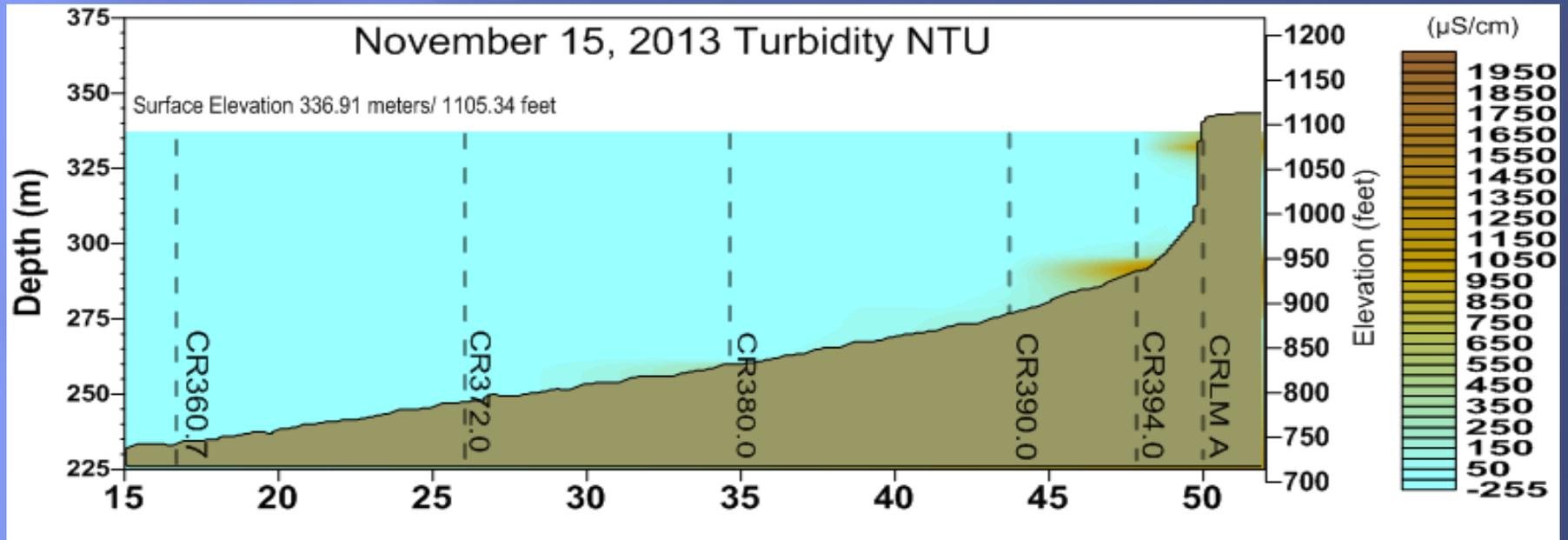


November 15, 2013

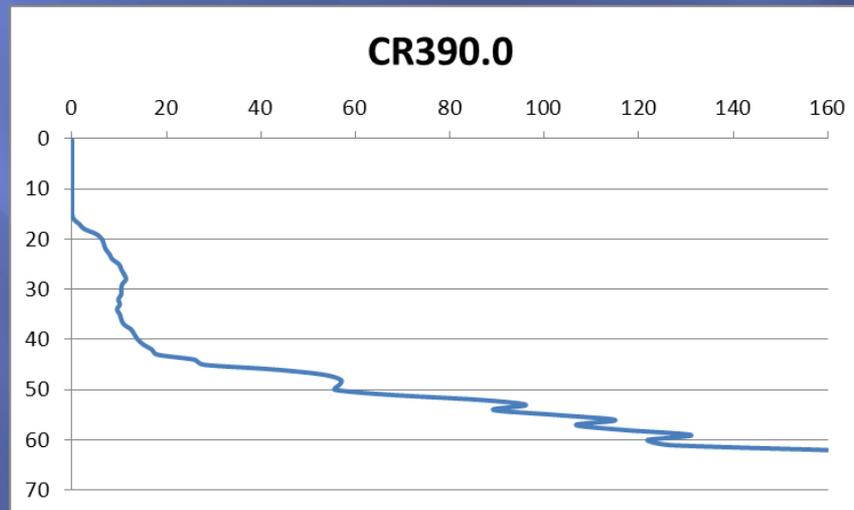
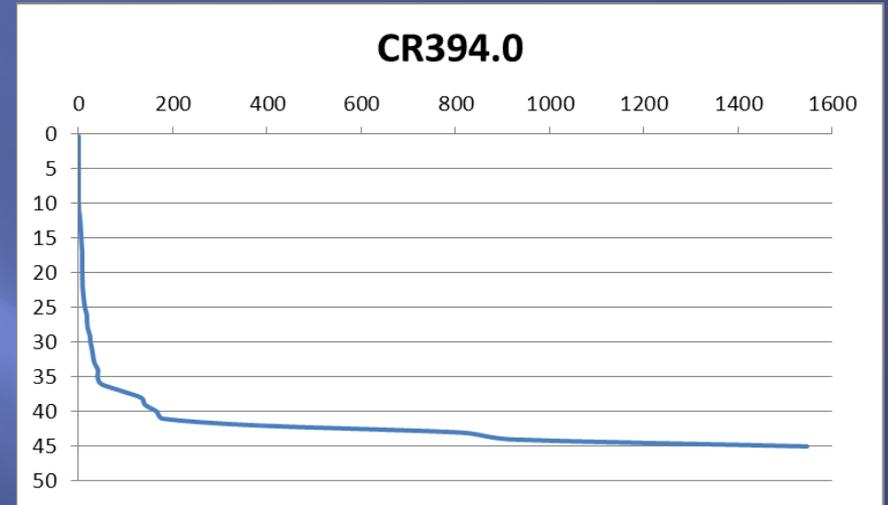
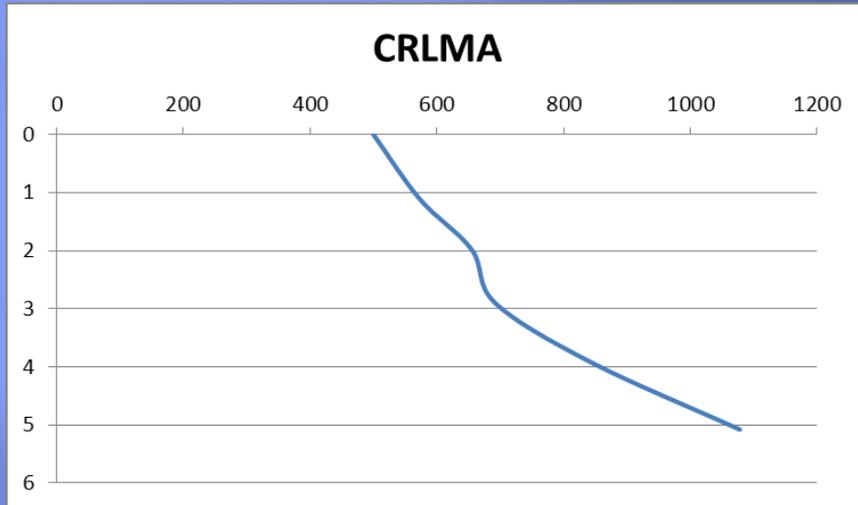






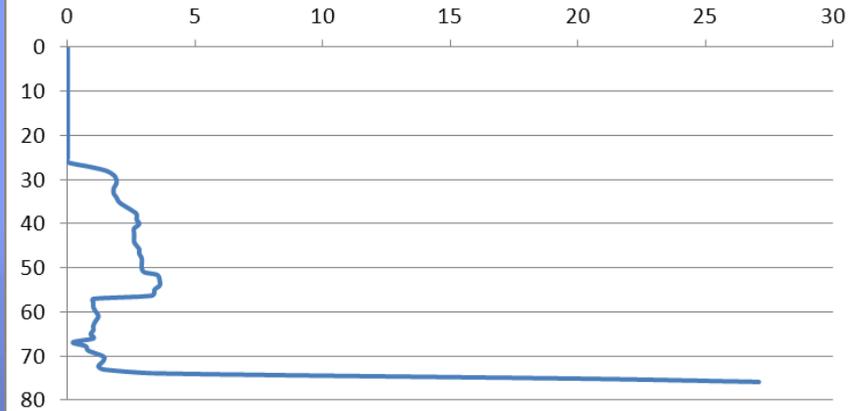


# Turbidity Profiles for November 15

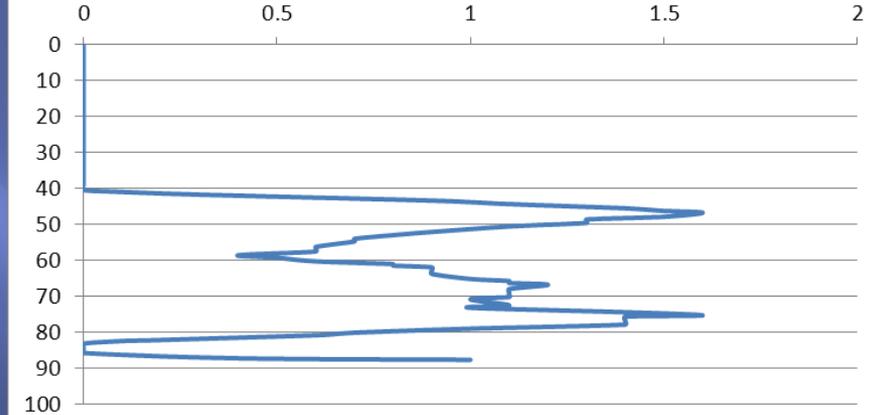


# Turbidity Profiles for November 15

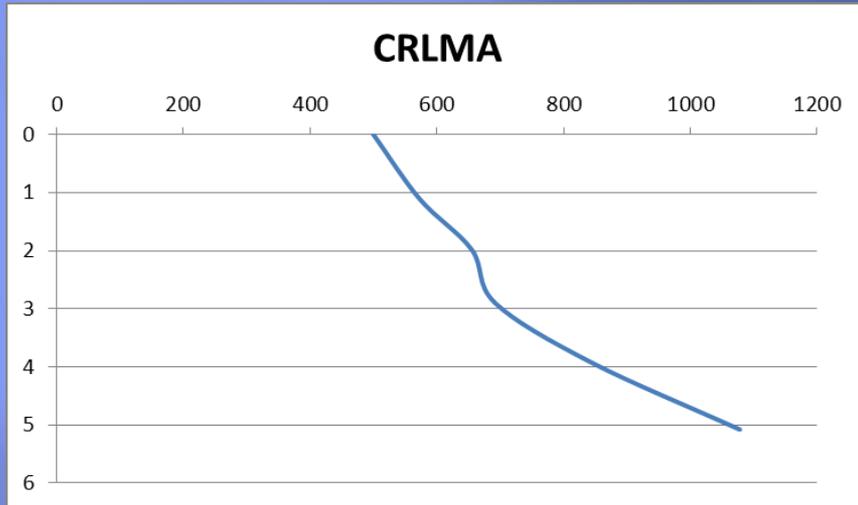
**CR380.0**



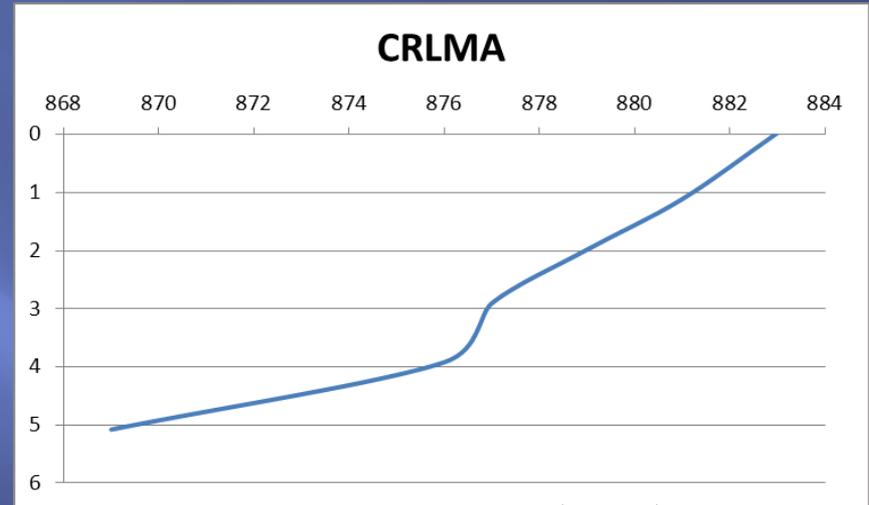
**CR372.0**



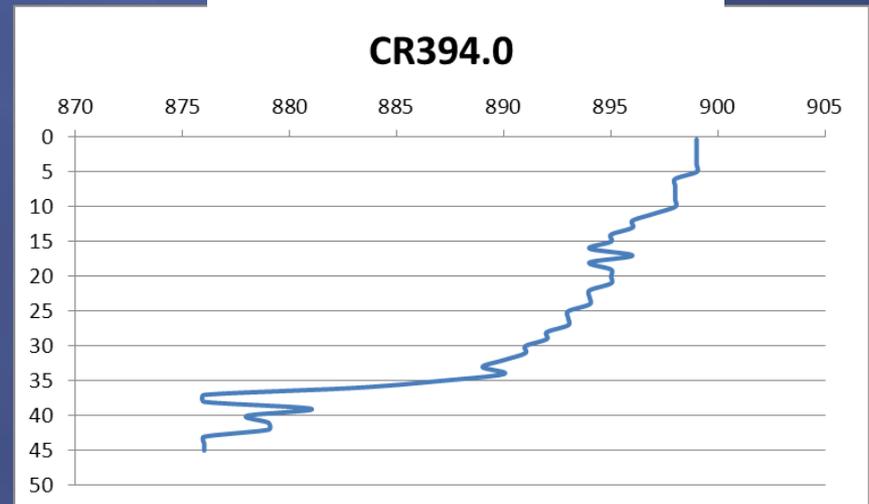
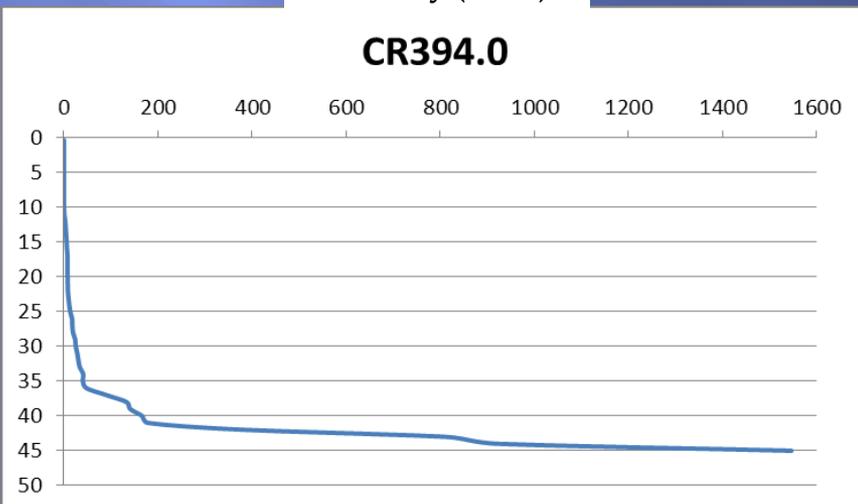
# Turbidity and Conductivity Profiles for November 15



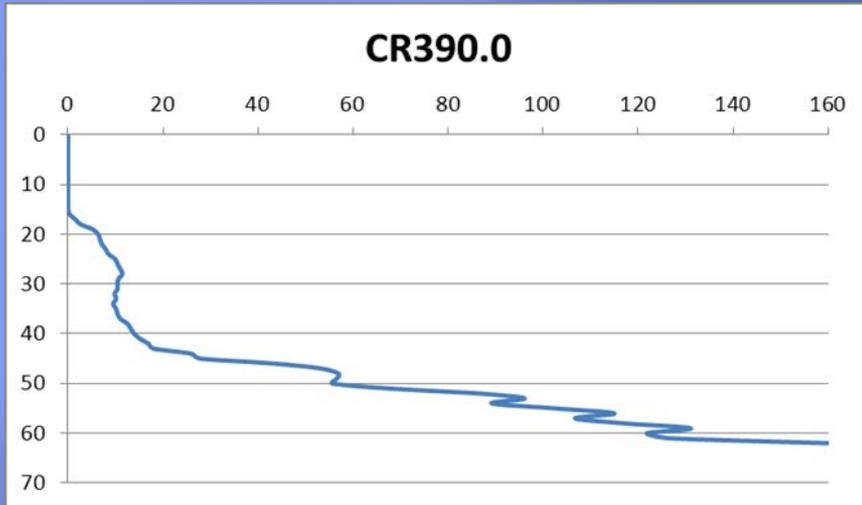
Turbidity (NTU)



Specific Conductance (µS/cm)



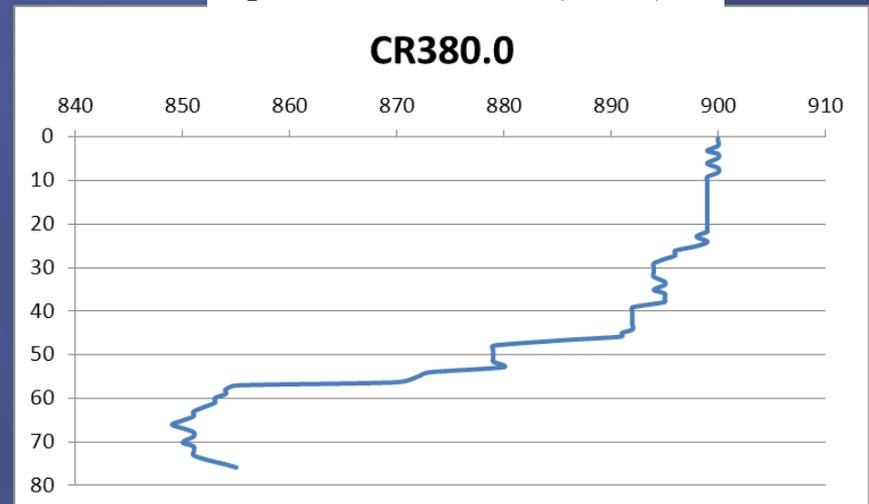
# Turbidity and Conductivity Profiles for November 15



Turbidity (NTU)



Specific Conductance ( $\mu\text{S/cm}$ )

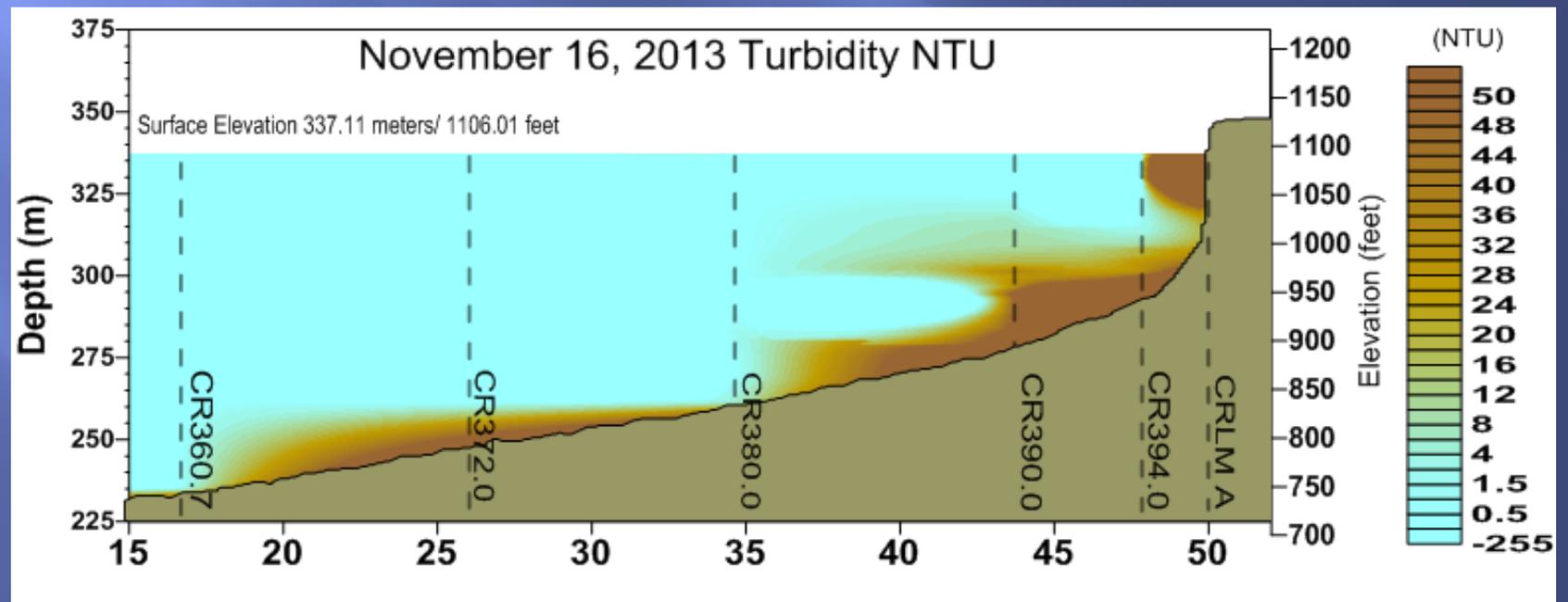
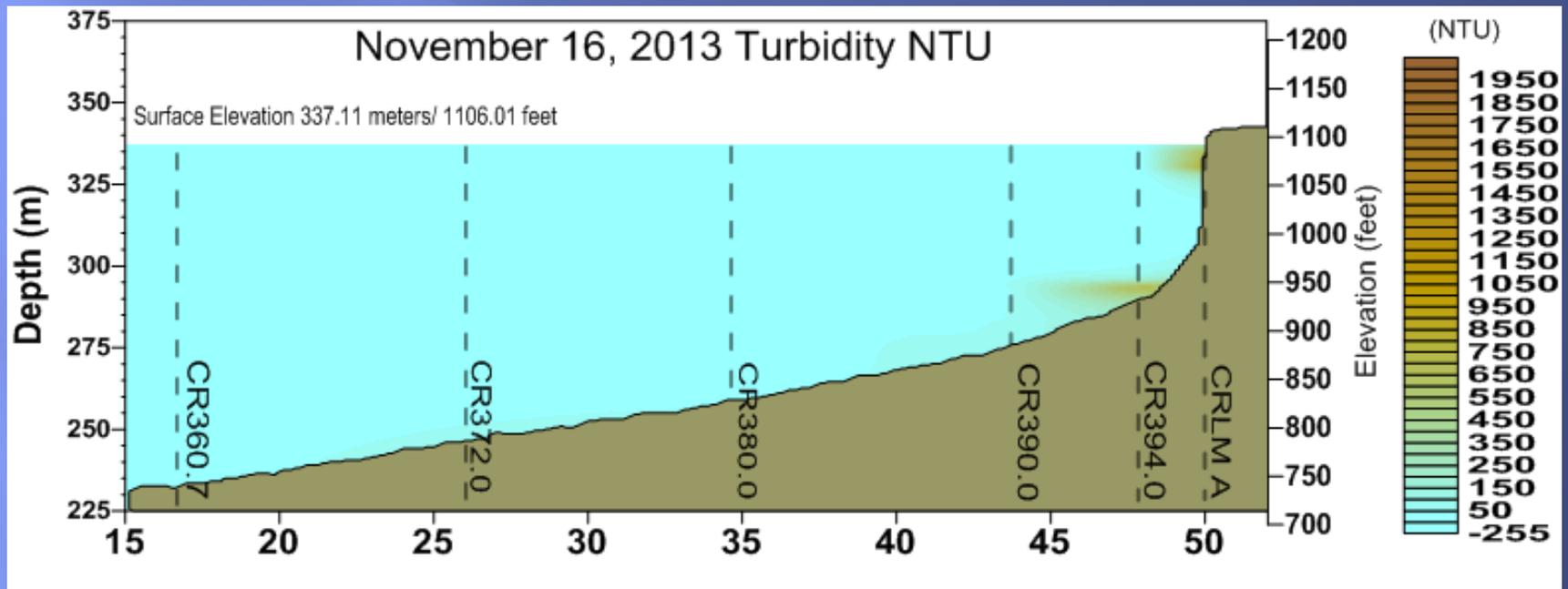


November 16, 2013

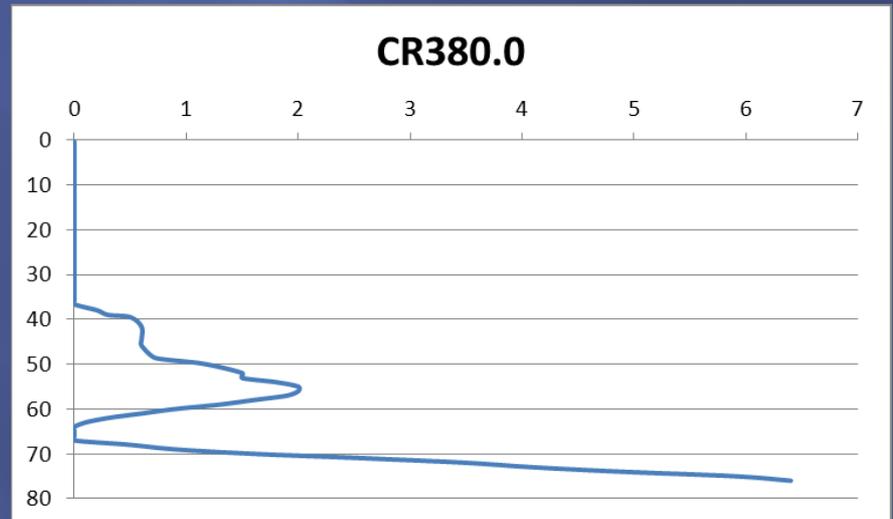
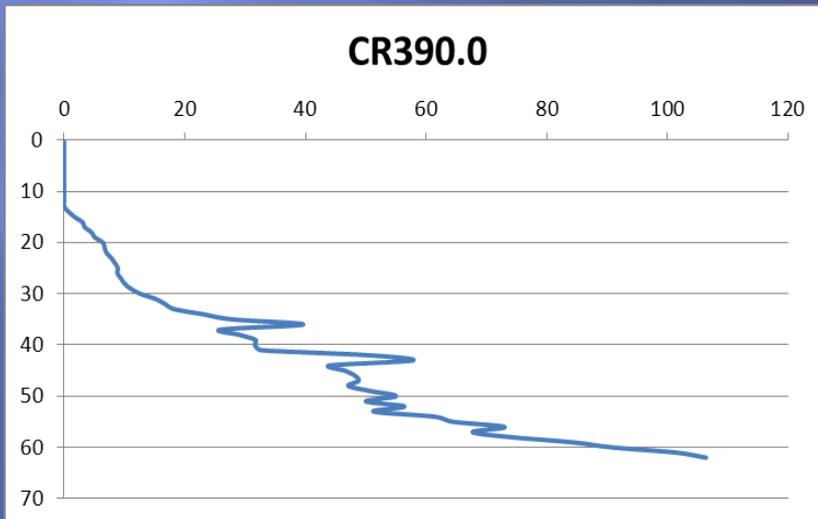
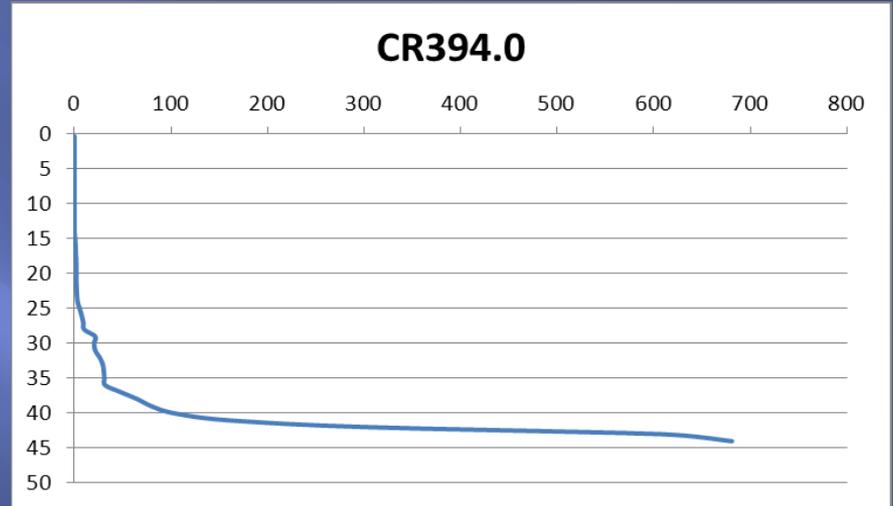
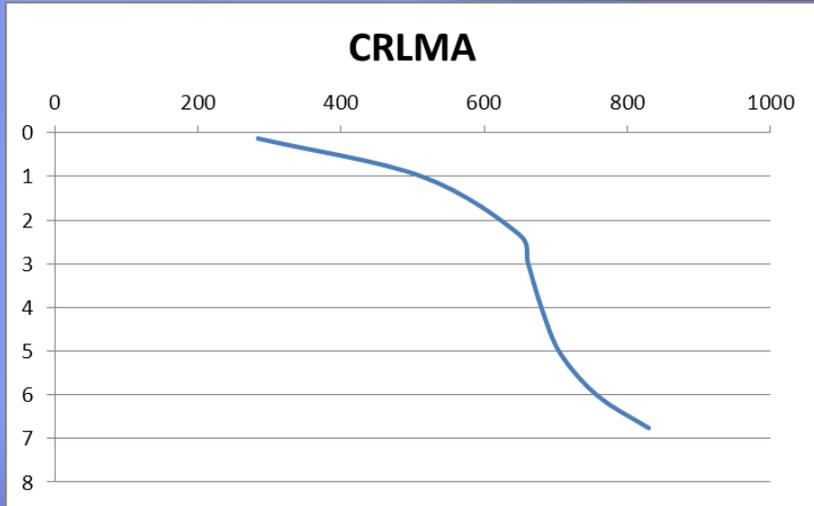








# Turbidity Profiles for November 16

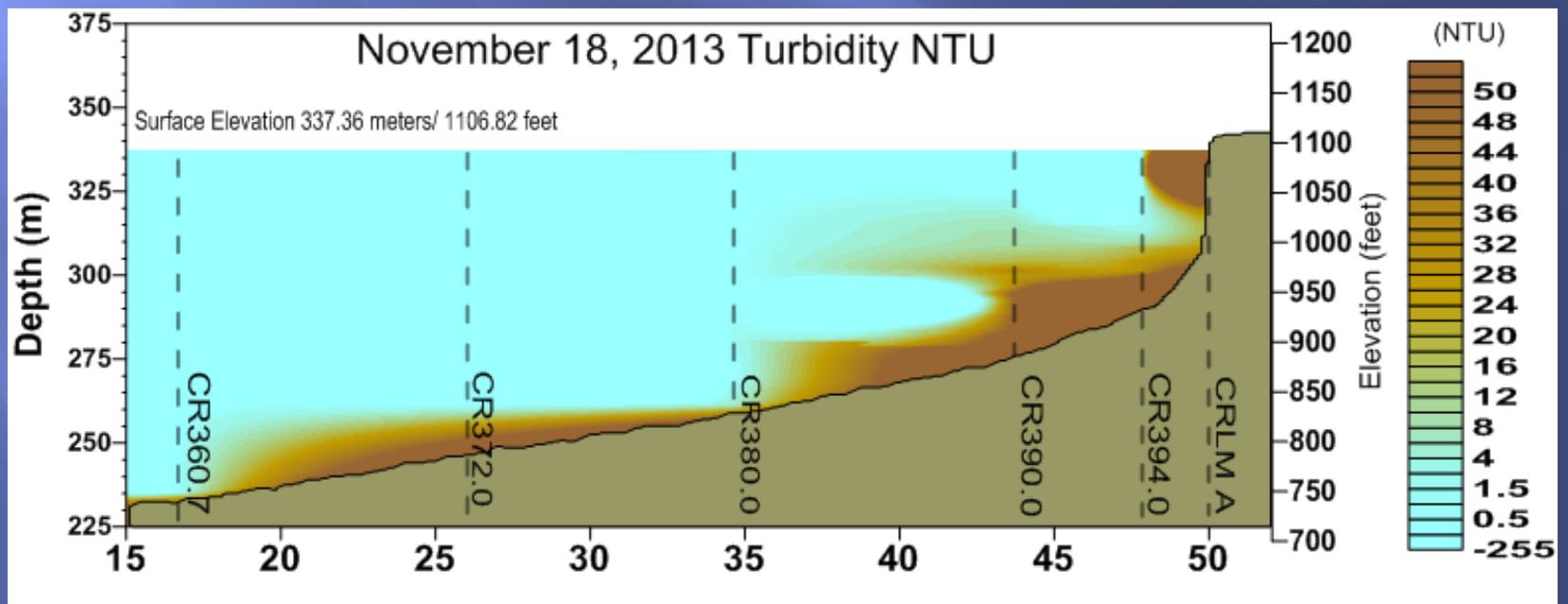
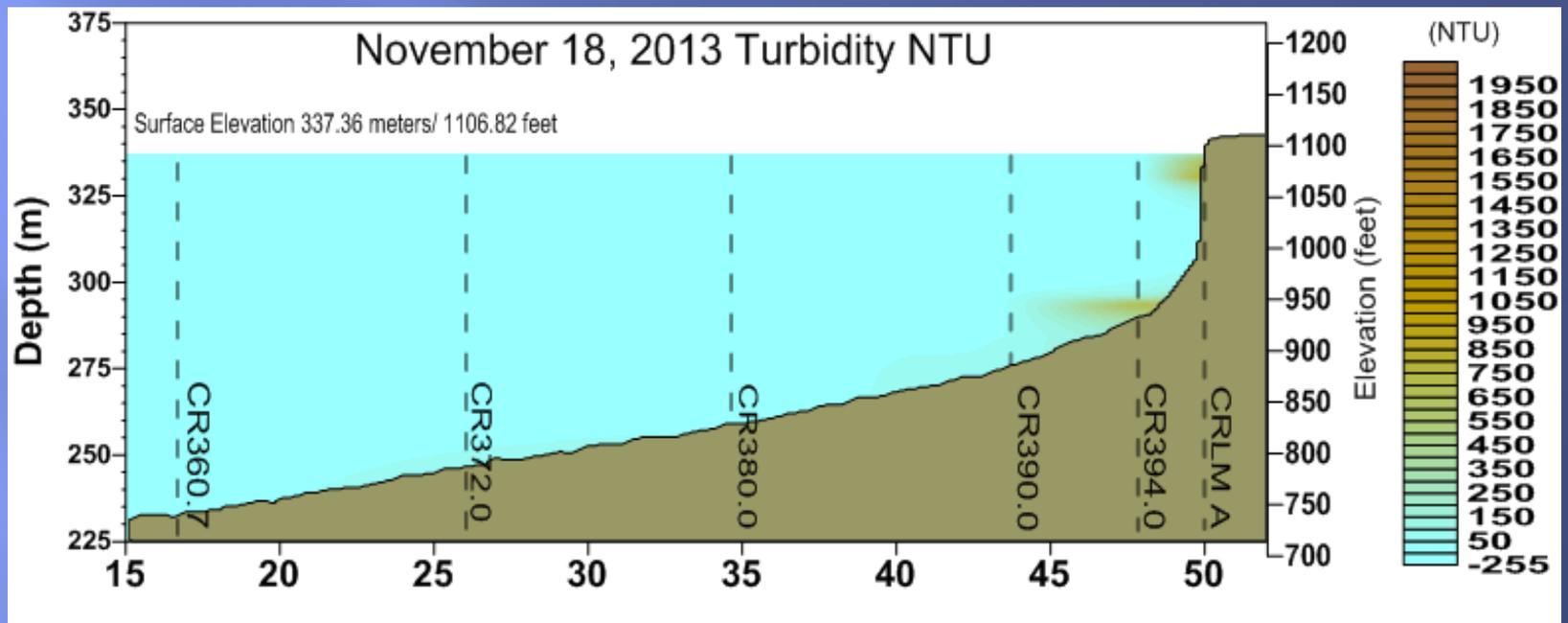


November 18, 2013

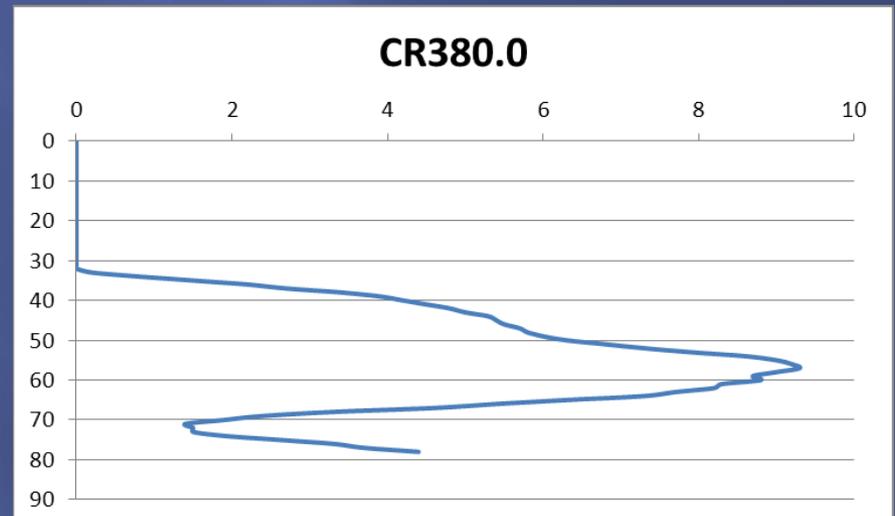
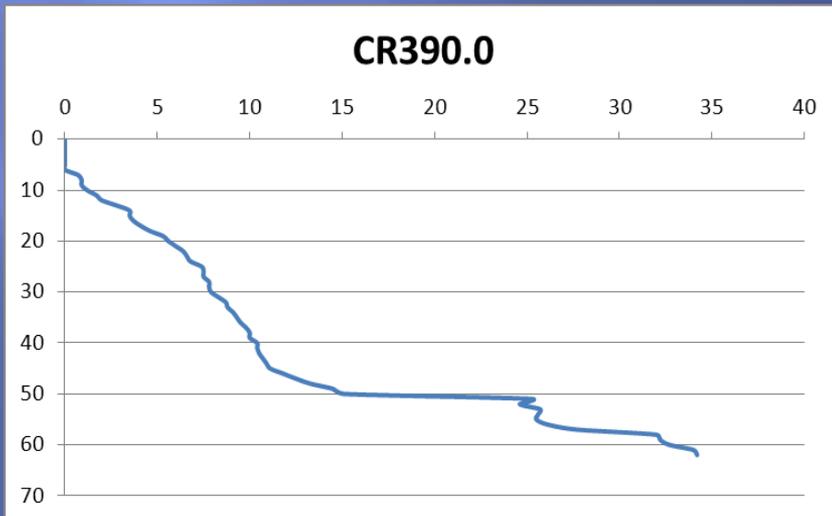
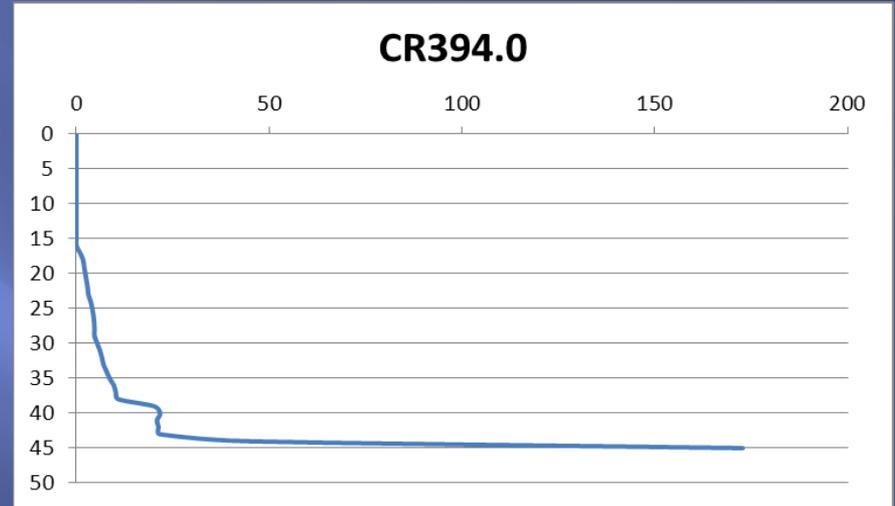
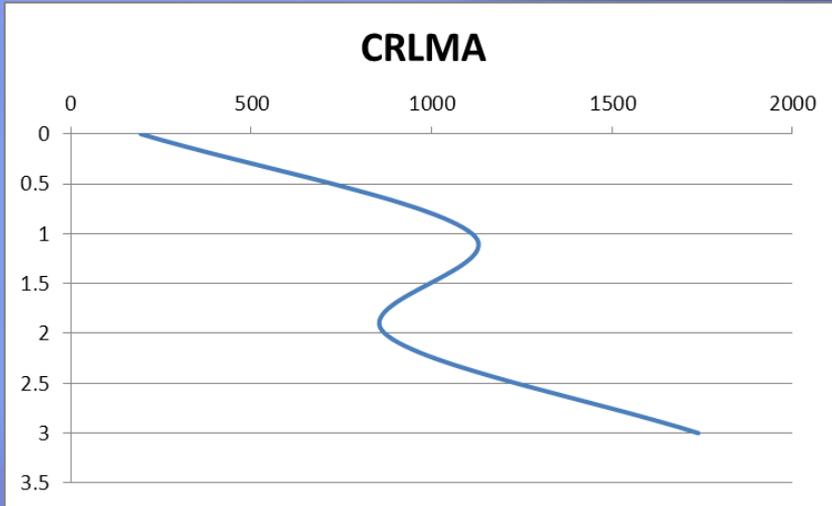




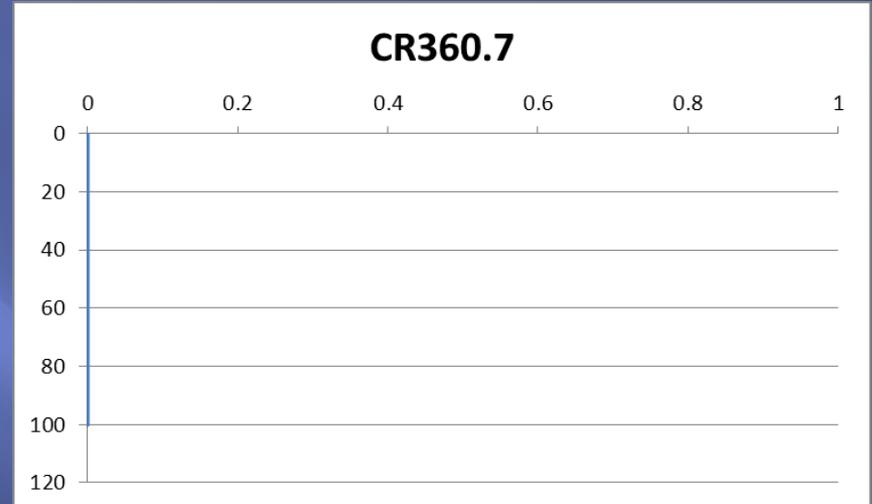
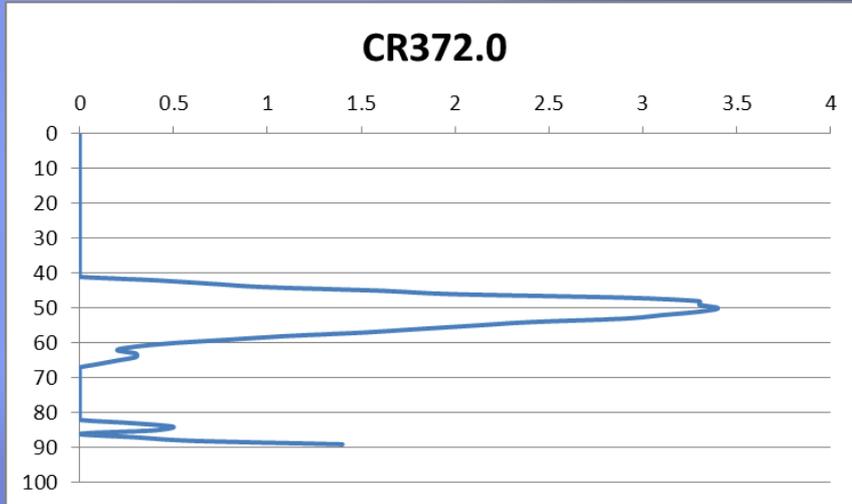




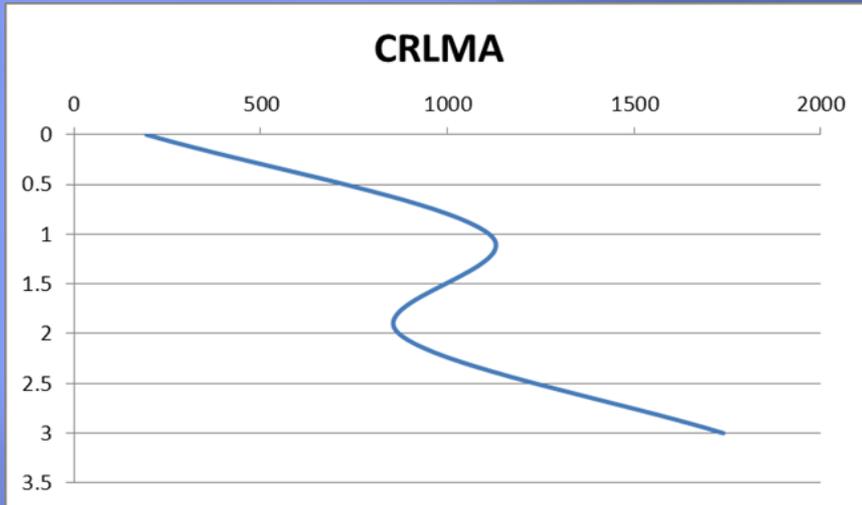
# Turbidity Profiles for November 18



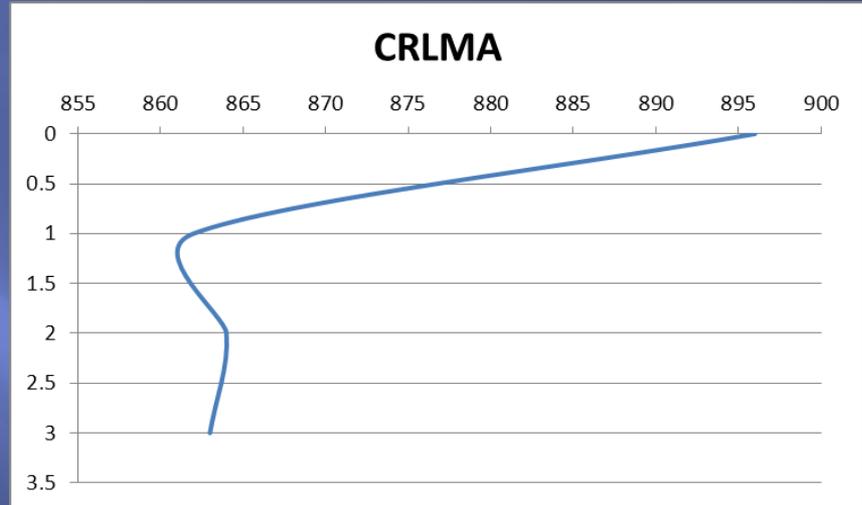
# Turbidity Profiles for November 18



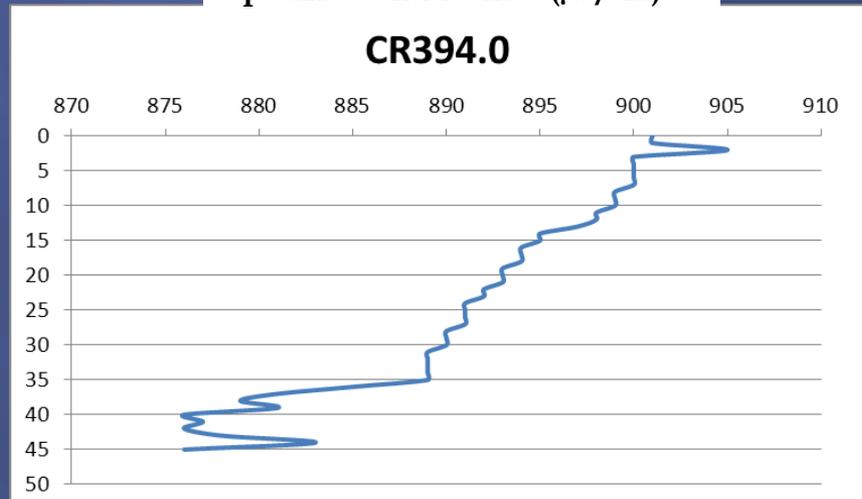
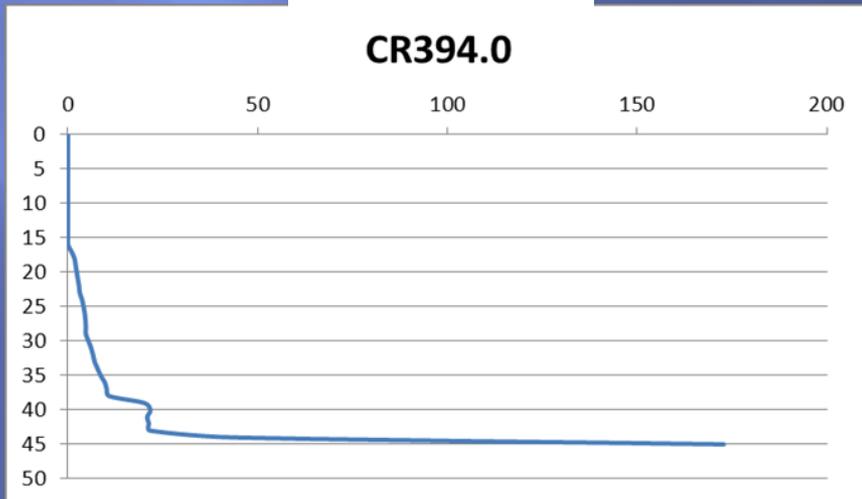
# Turbidity and Conductivity Profiles for November 18



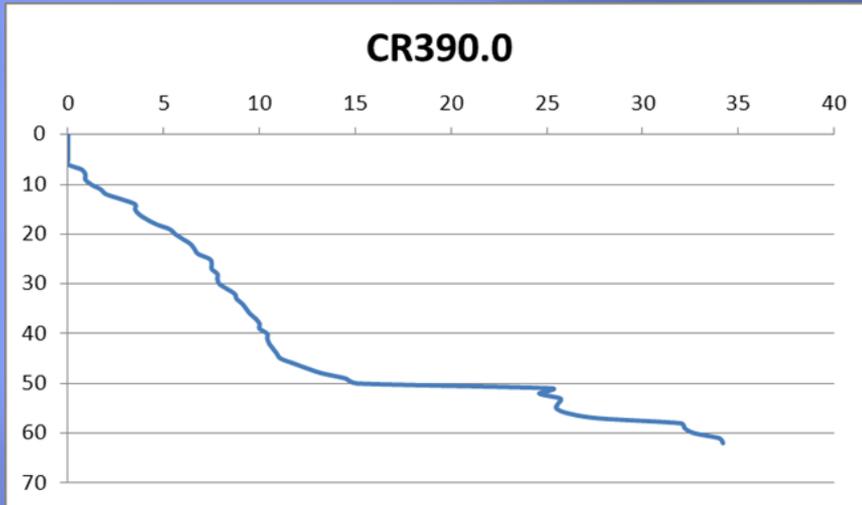
Turbidity (NTU)



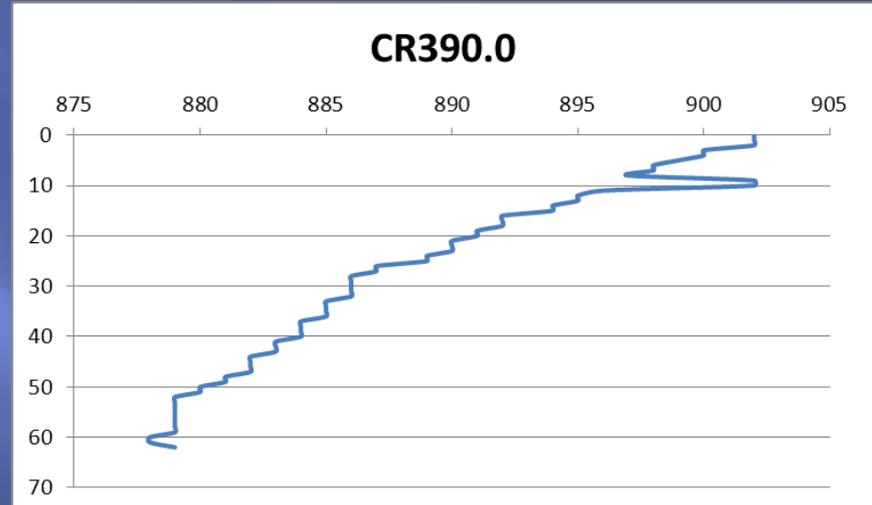
Specific Conductance ( $\mu\text{S}/\text{cm}$ )



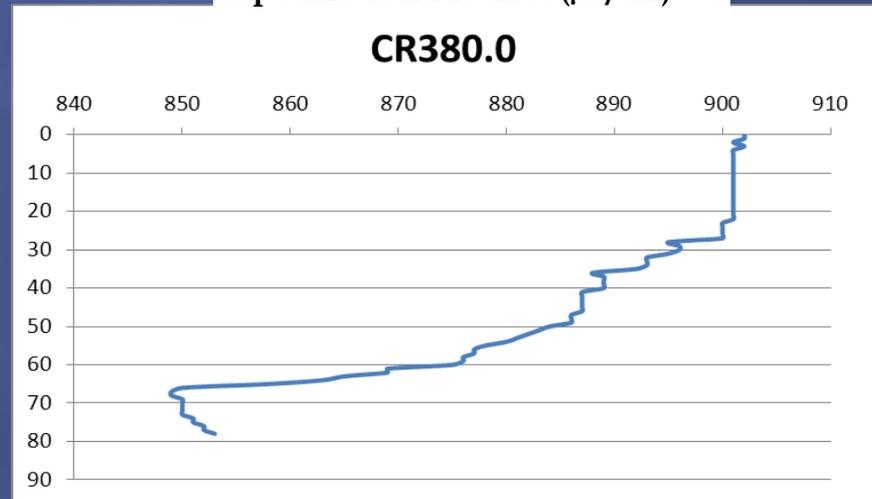
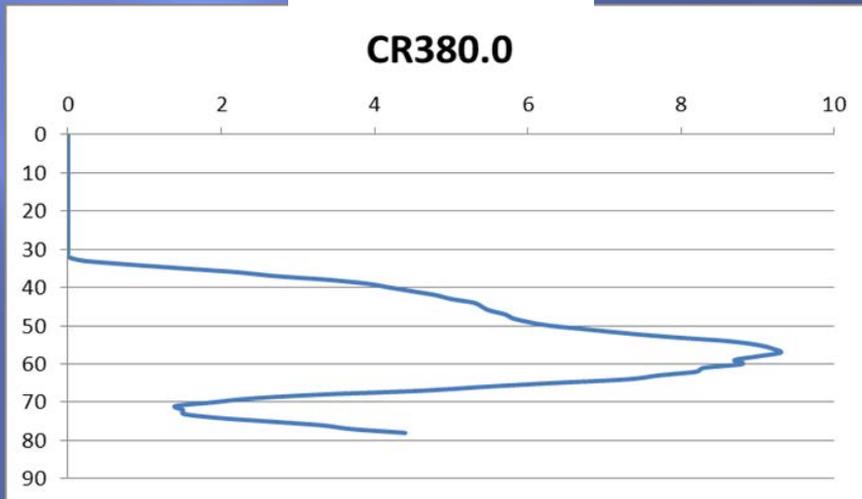
# Turbidity and Conductivity Profiles for November 18



Turbidity (NTU)



Specific Conductance ( $\mu\text{S}/\text{cm}$ )

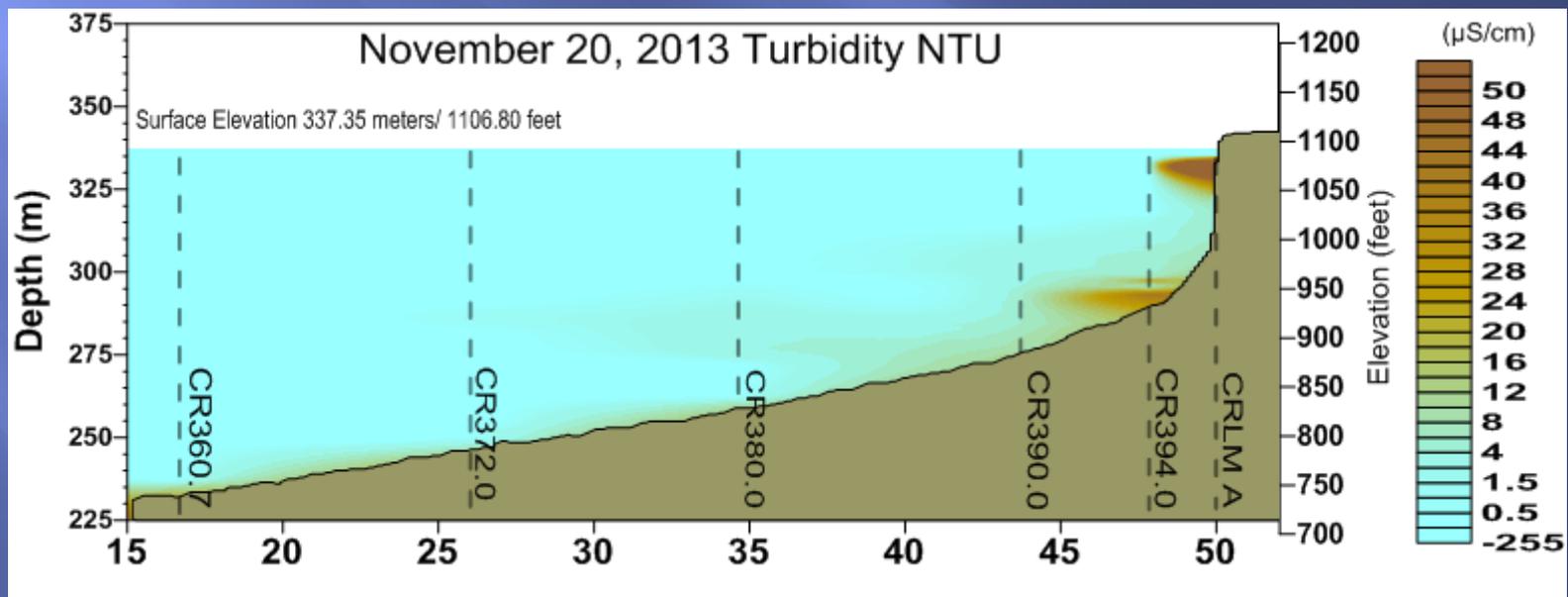
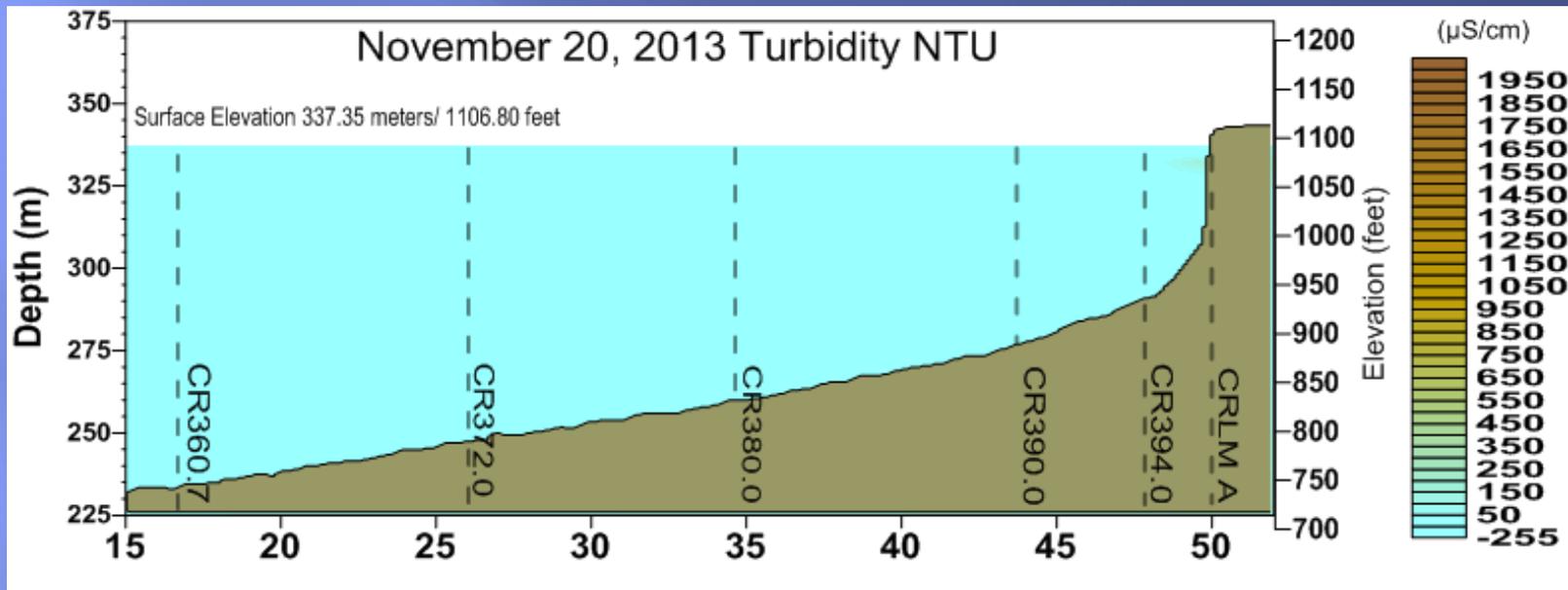


November 20, 2013

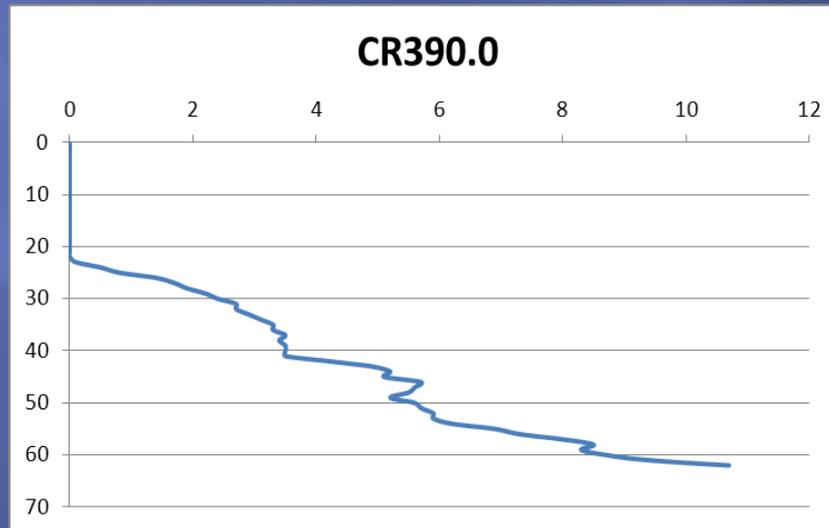
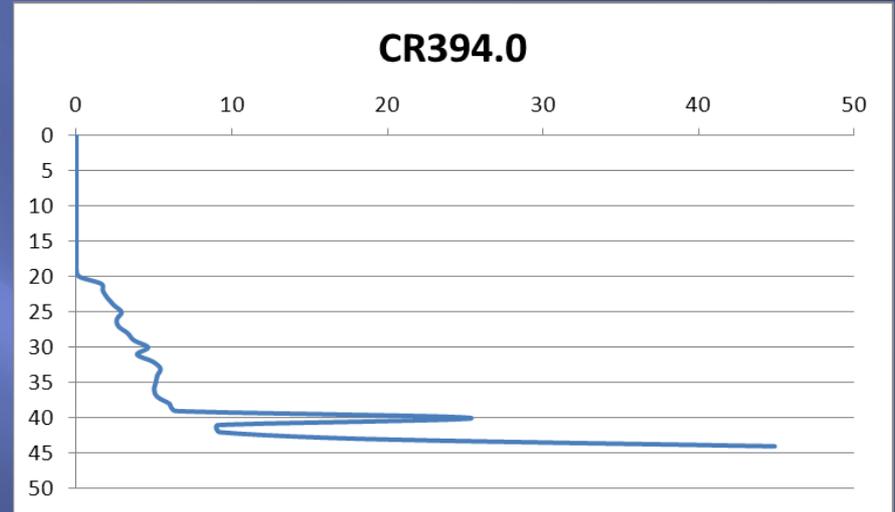
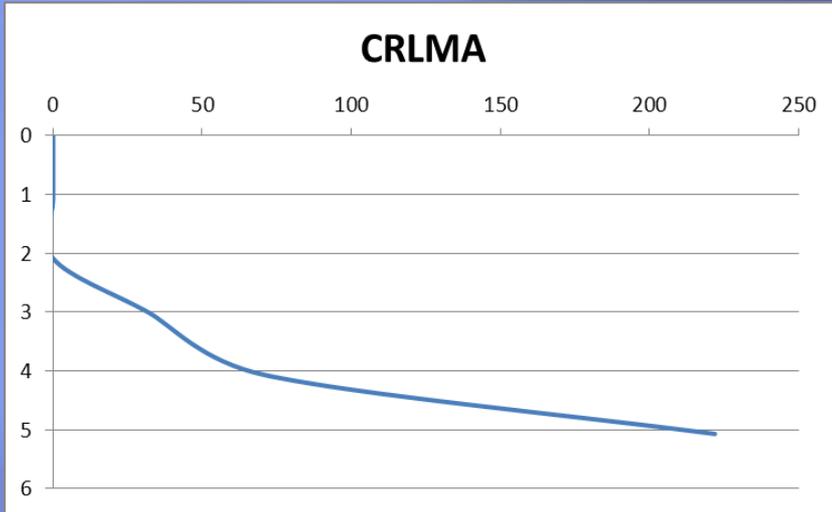




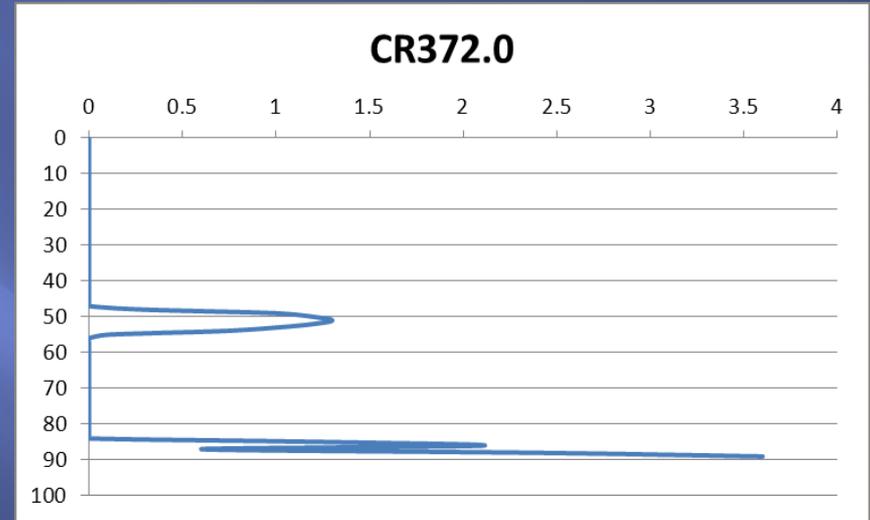
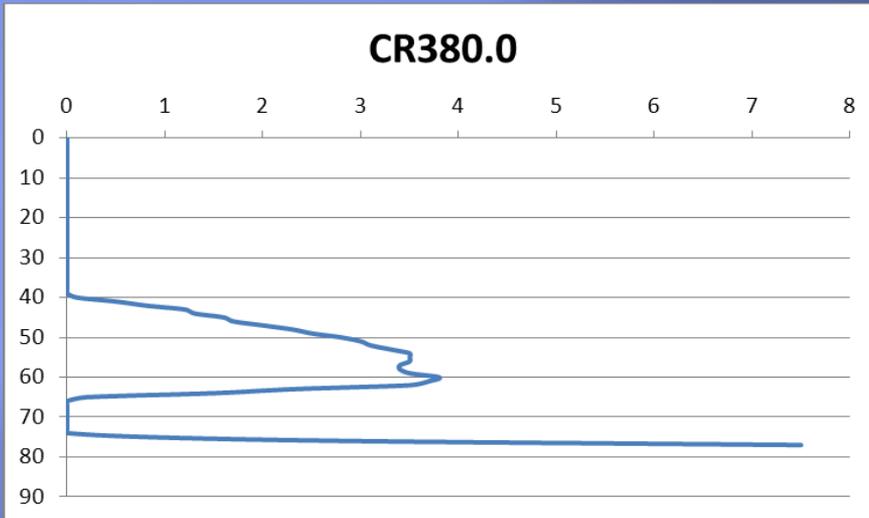




# Turbidity Profiles for November 20



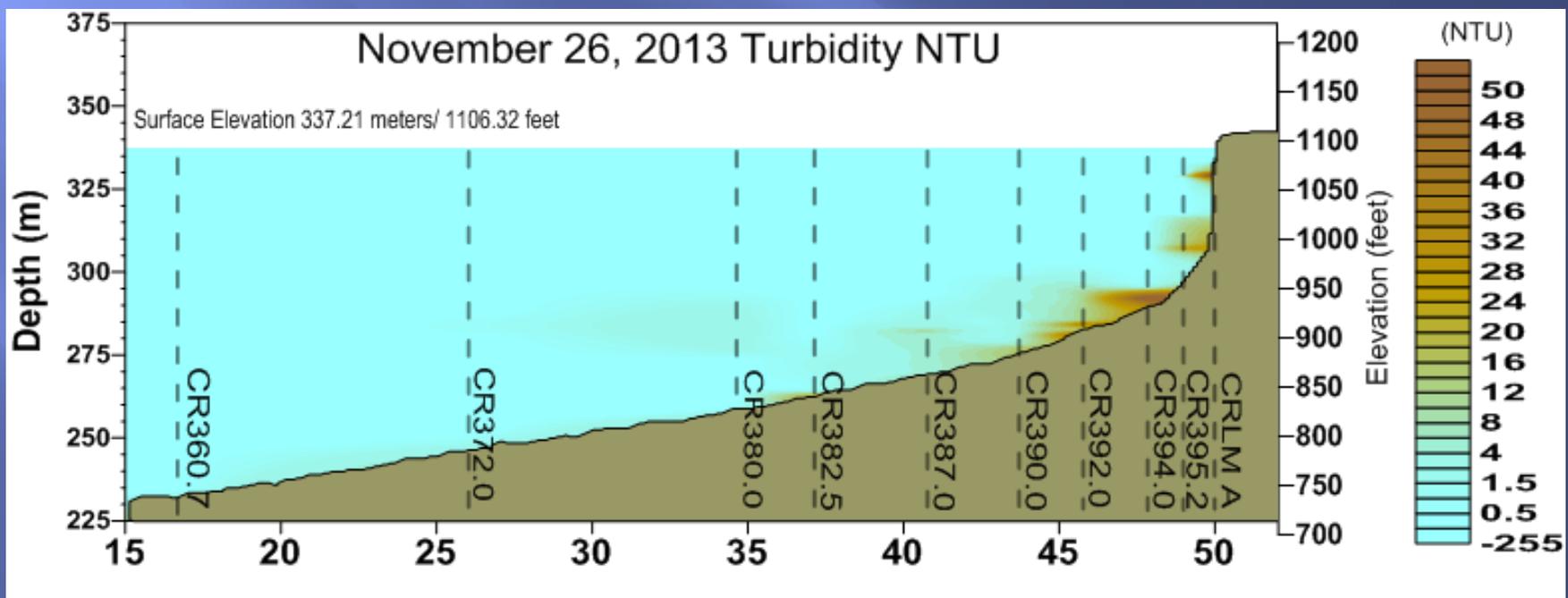
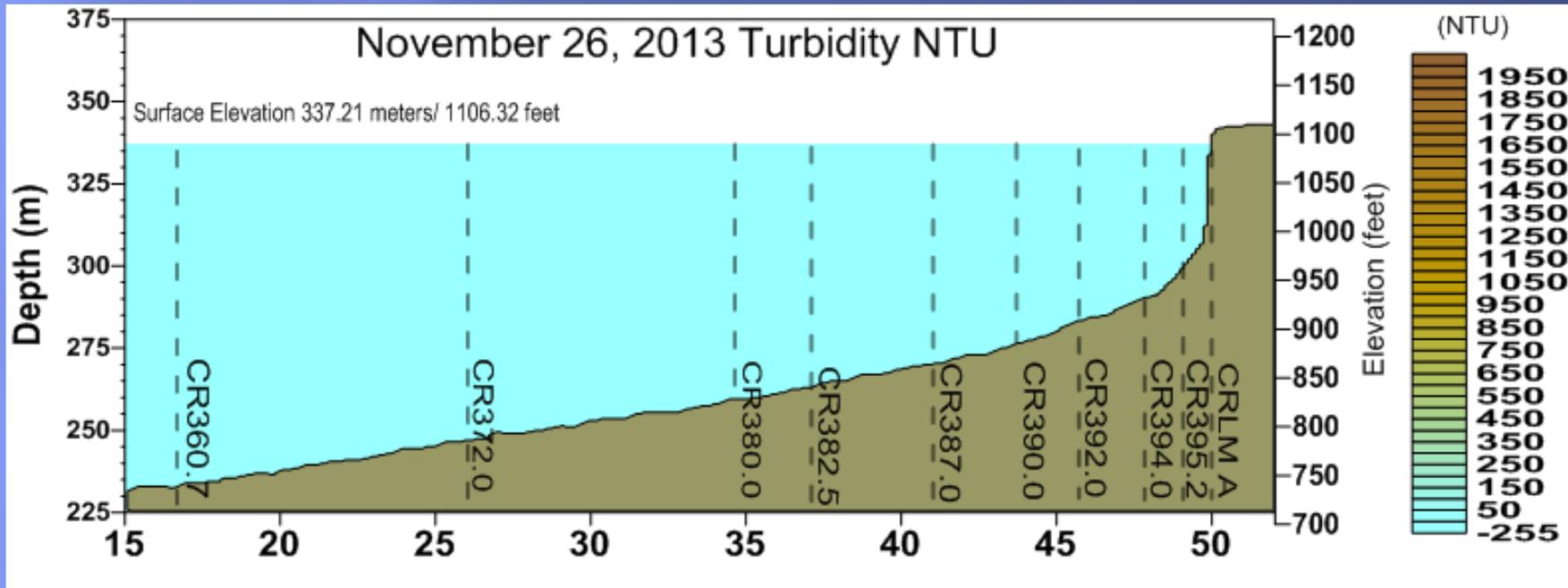
# Turbidity Profiles for November 20



November 26, 2013

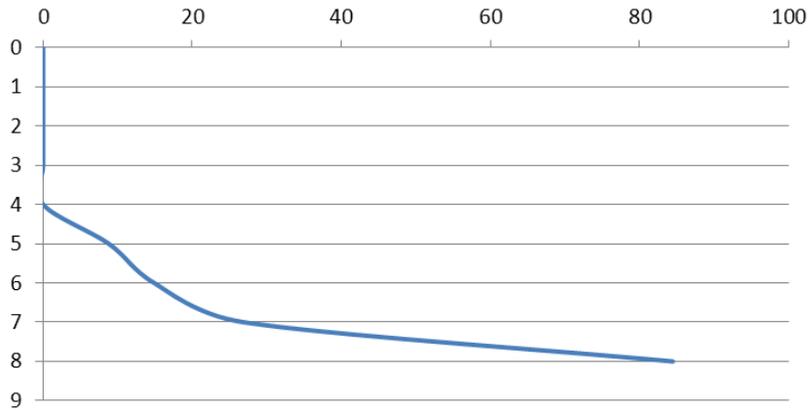




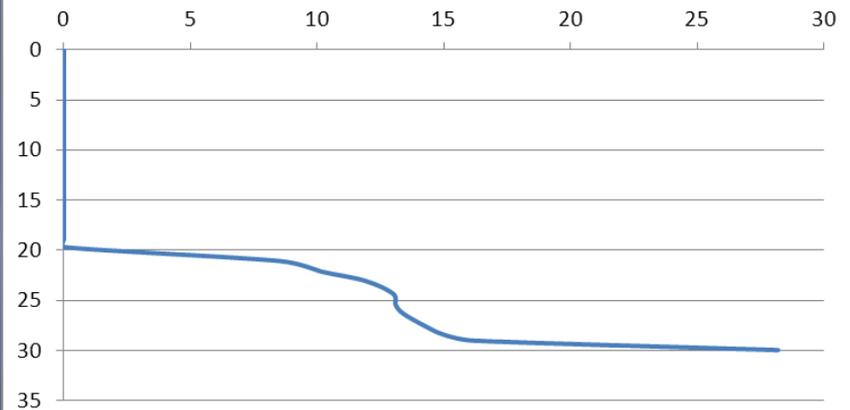


# Turbidity Profiles for November 26

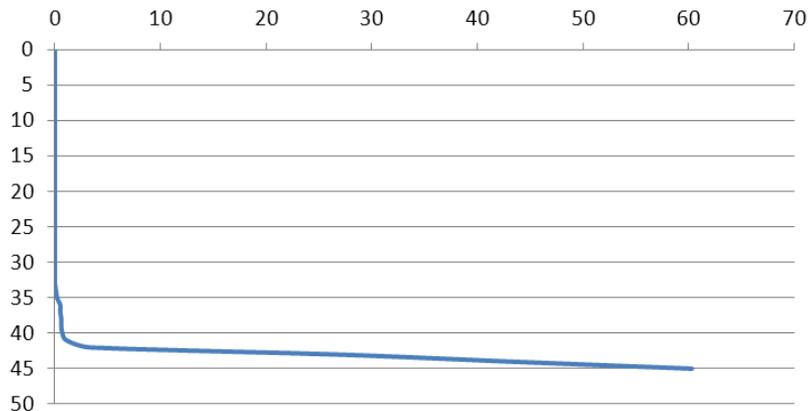
## CRLMA



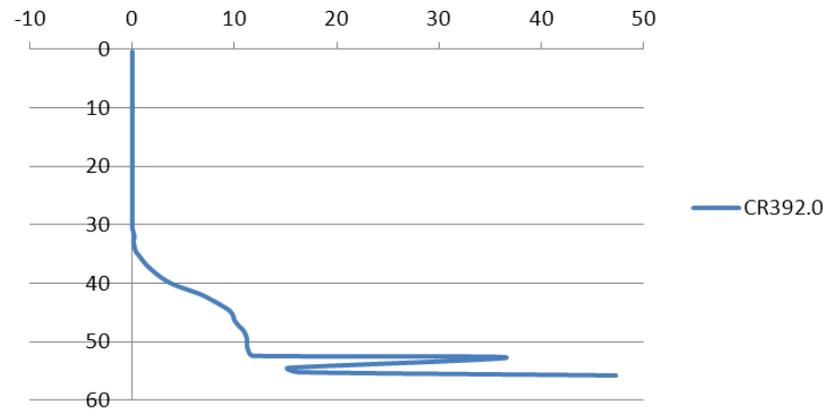
## CR395.2



## CR394.0

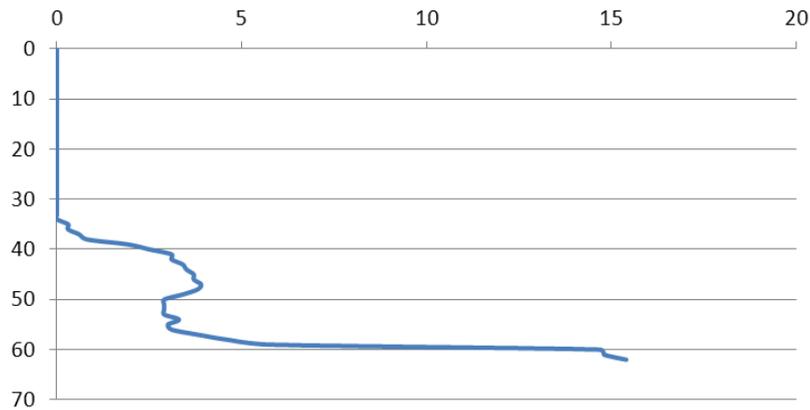


## CR392.0

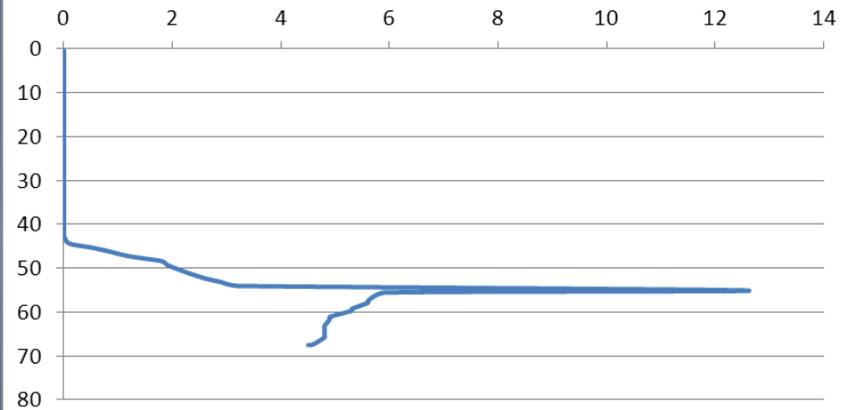


# Turbidity Profiles for November 26

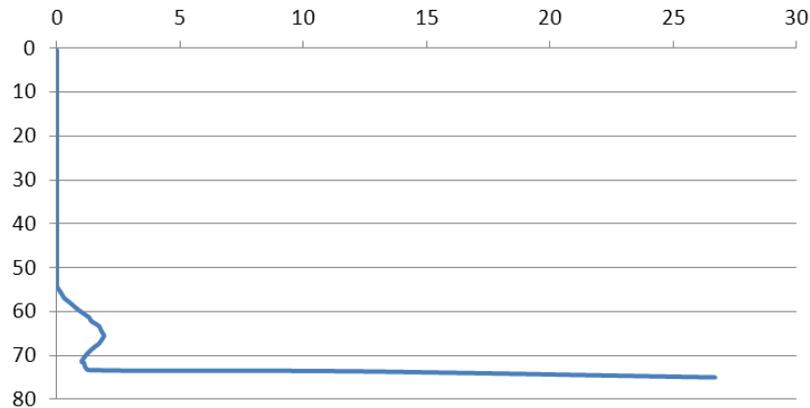
**CR390.0**



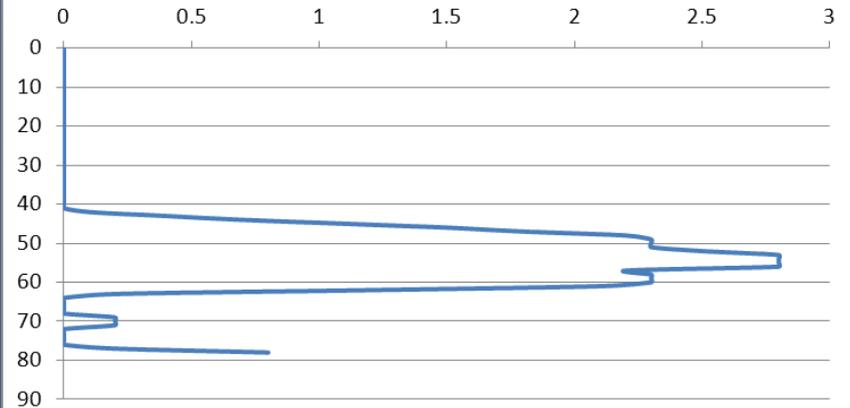
**CR387.0**



**CR382.5**

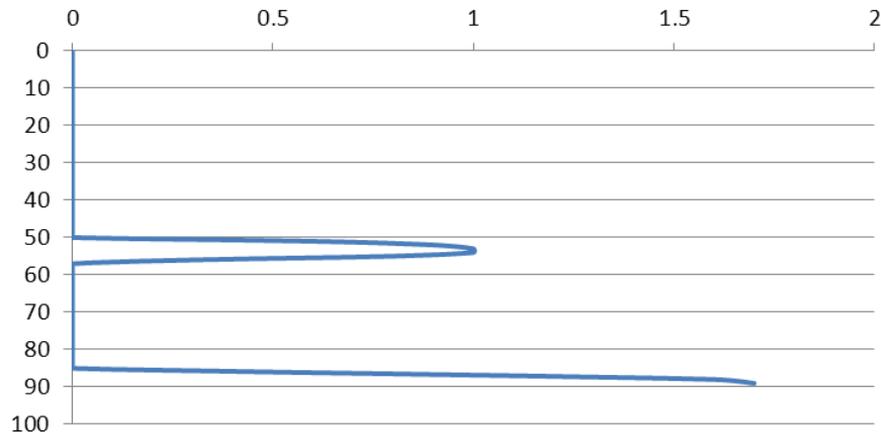


**CR380.0**

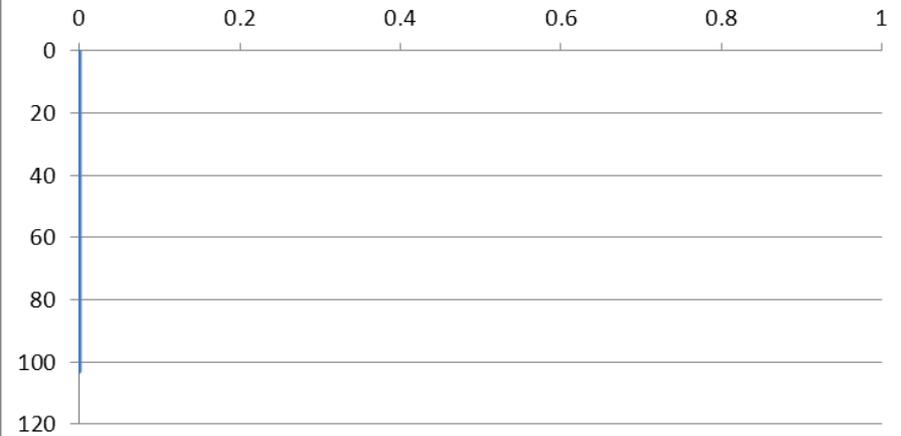


# Turbidity Profiles for November 26

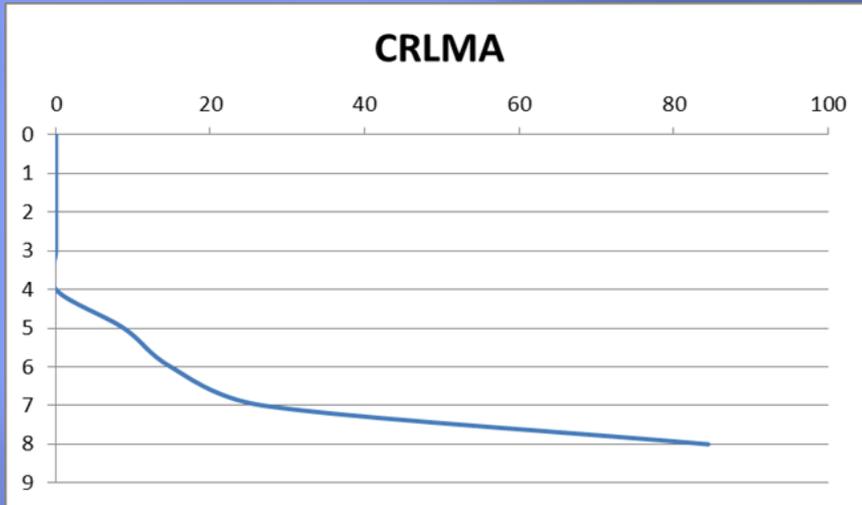
**CR372.0**



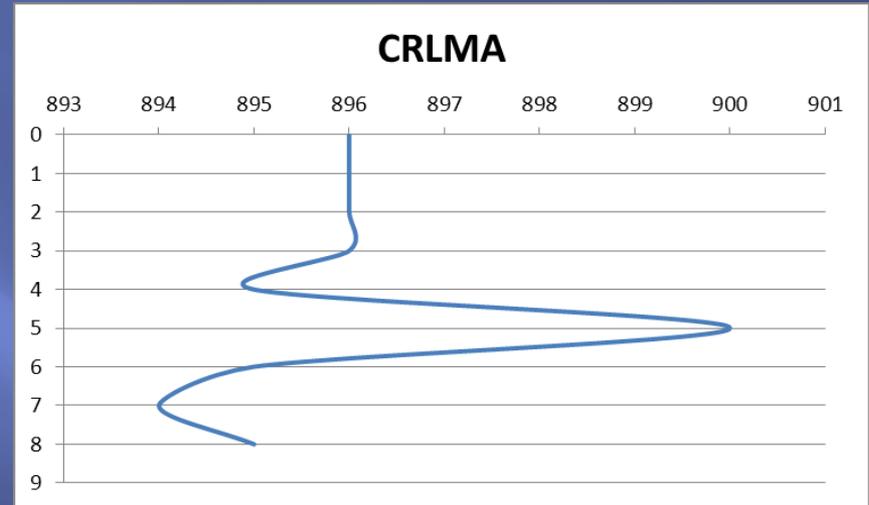
**CR360.7**



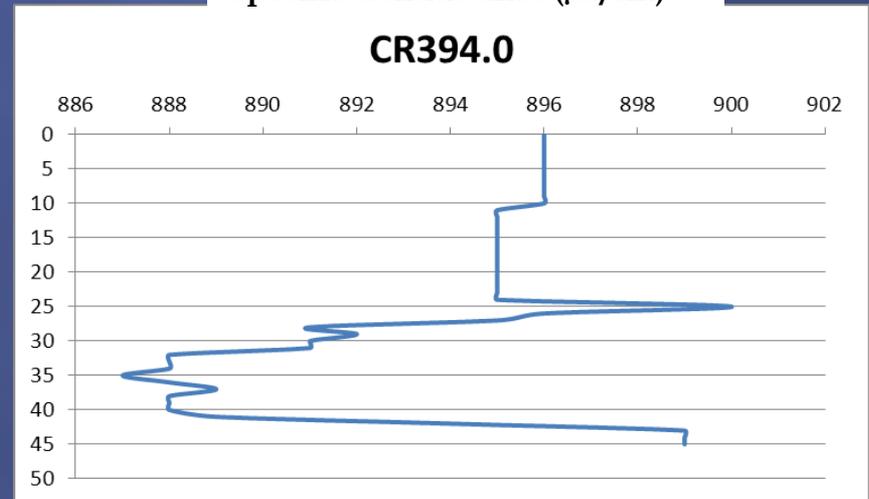
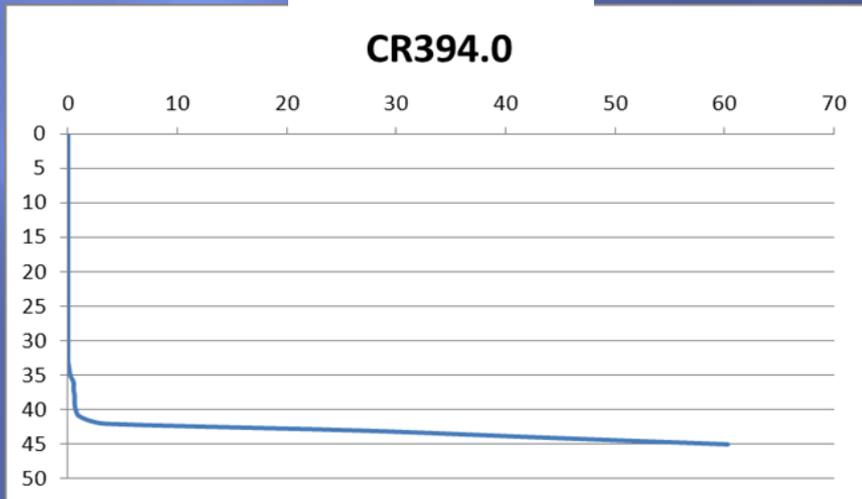
# Turbidity and Conductivity Profiles for November 26



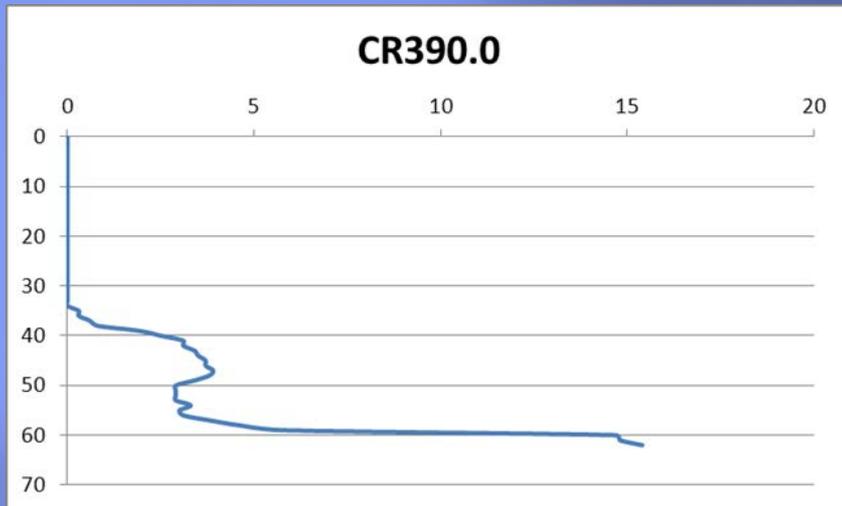
Turbidity (NTU)



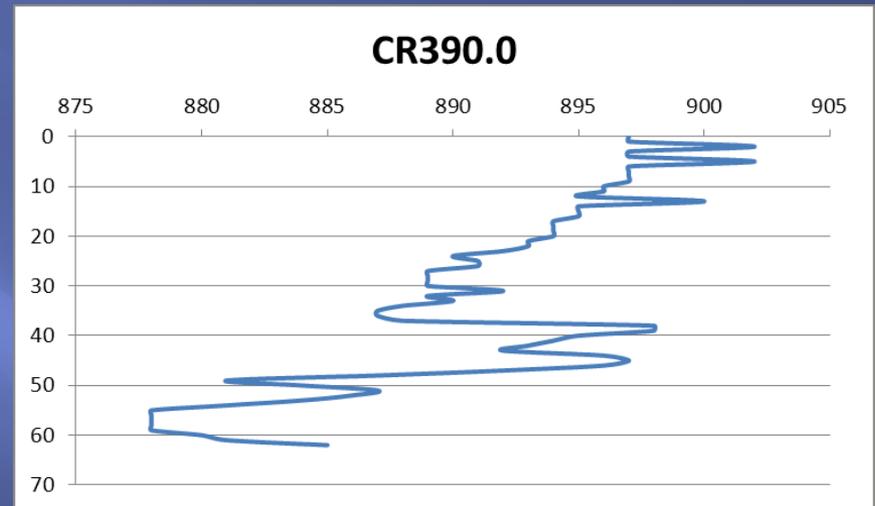
Specific Conductance ( $\mu\text{S}/\text{cm}$ )



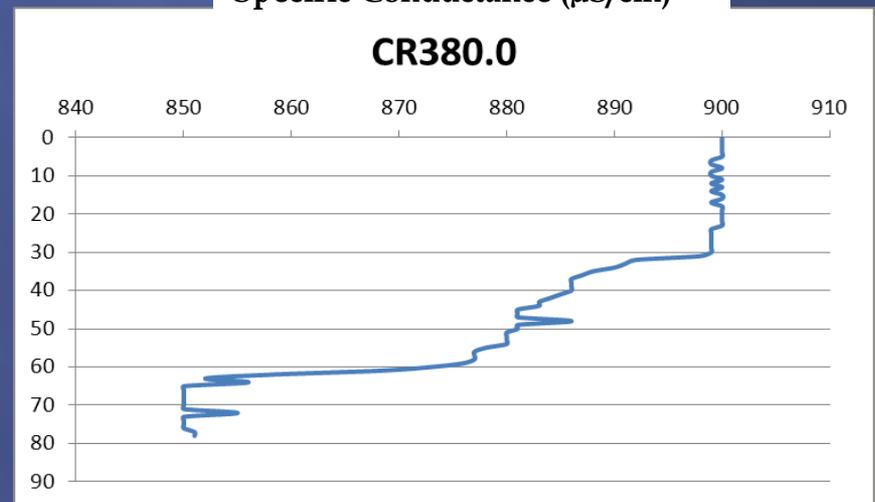
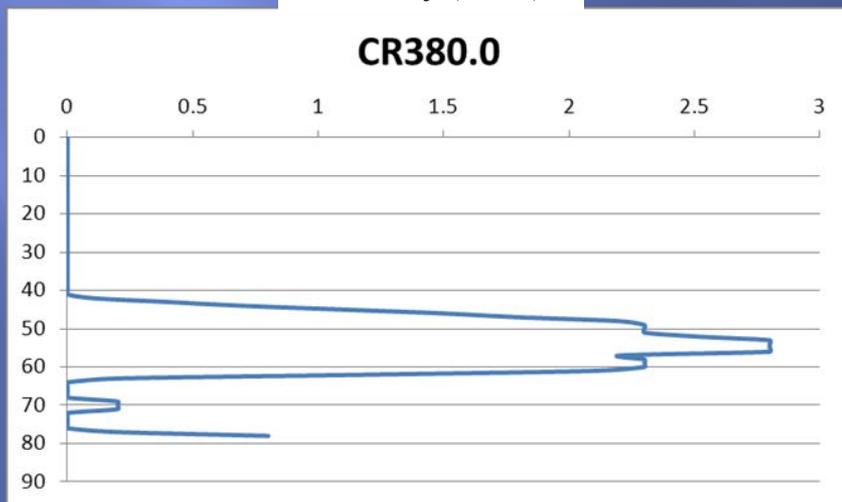
# Turbidity and Conductivity Profiles for November 26



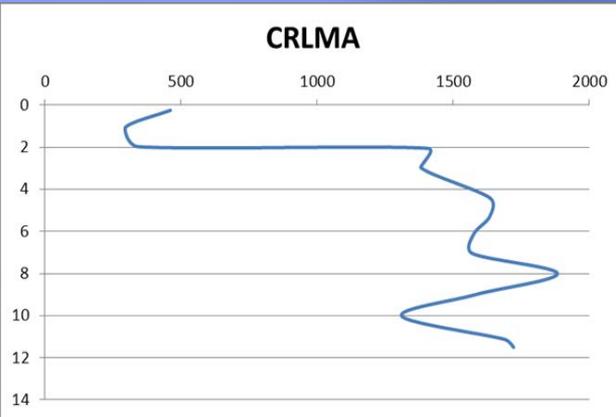
Turbidity (NTU)



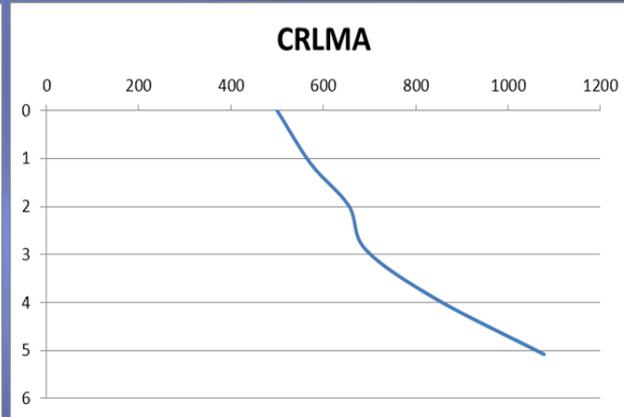
Specific Conductance ( $\mu\text{S}/\text{cm}$ )



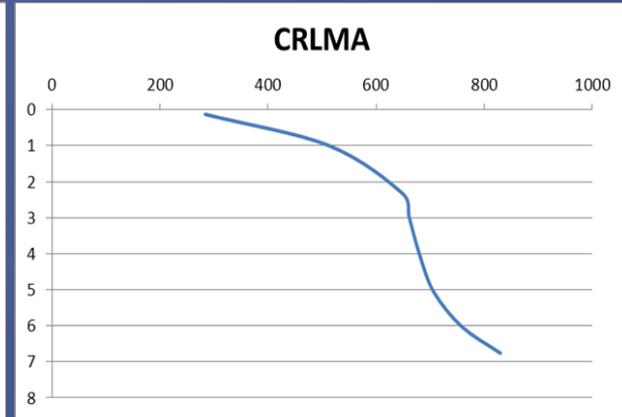
# Turbidity Profiles CRLMA



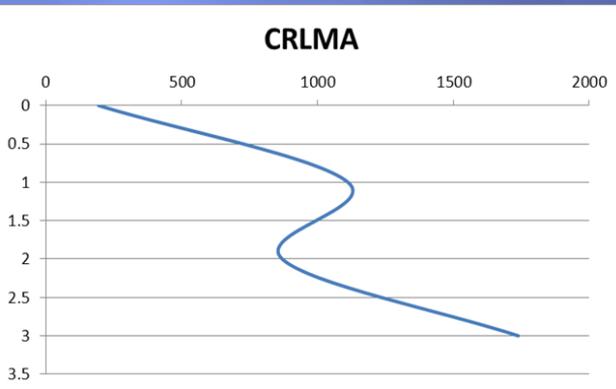
November 14



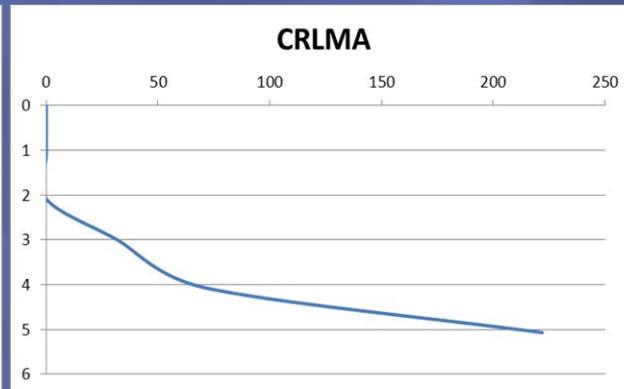
November 15



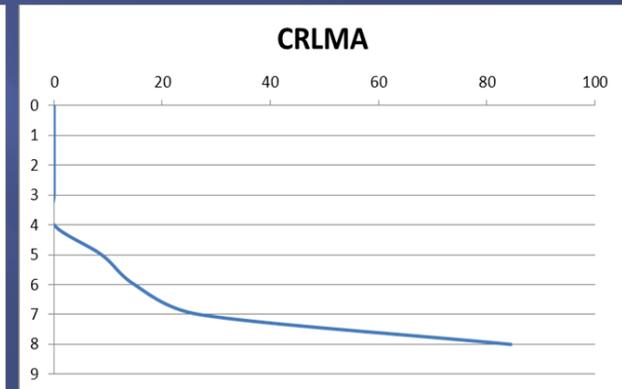
November 16



November 18



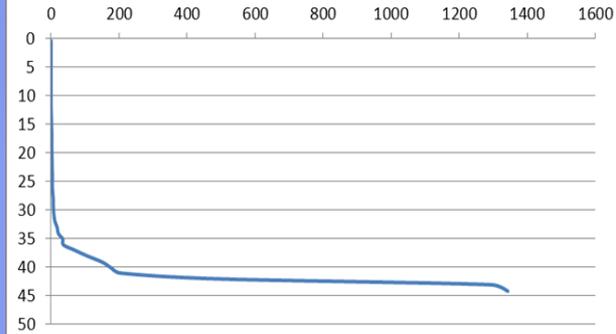
November 20



November 26

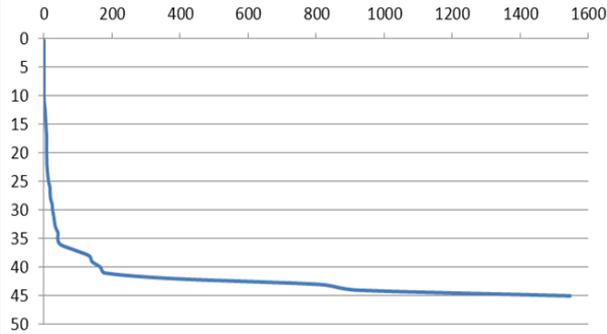
# Turbidity Profiles CR394.0

CR394.0



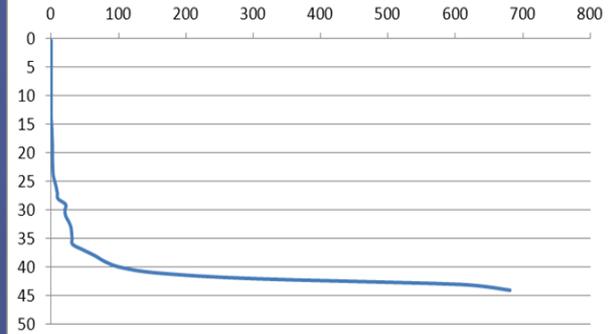
November 14

CR394.0



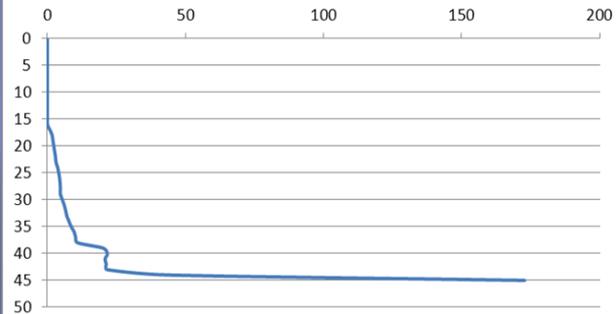
November 15

CR394.0



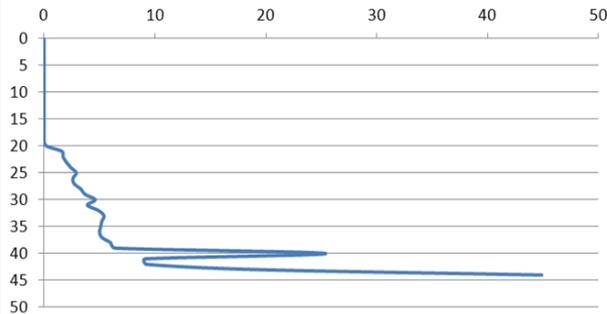
November 16

CR394.0



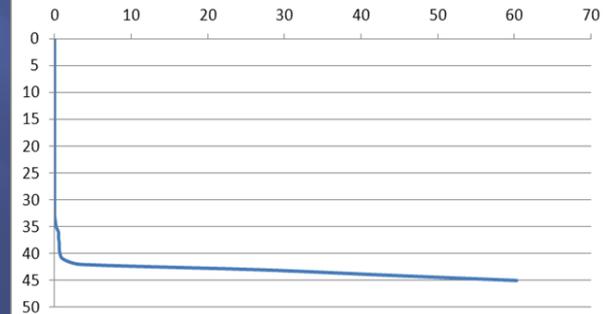
November 18

CR394.0



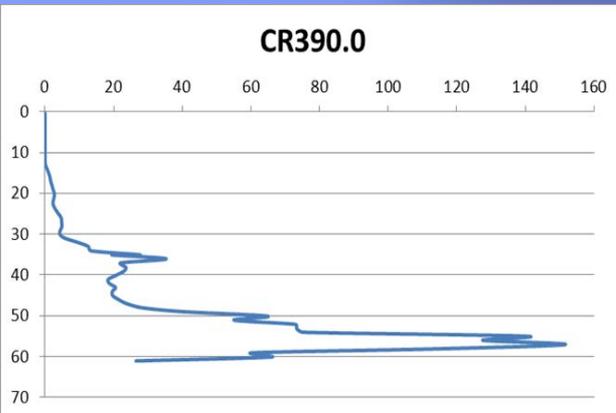
November 20

CR394.0

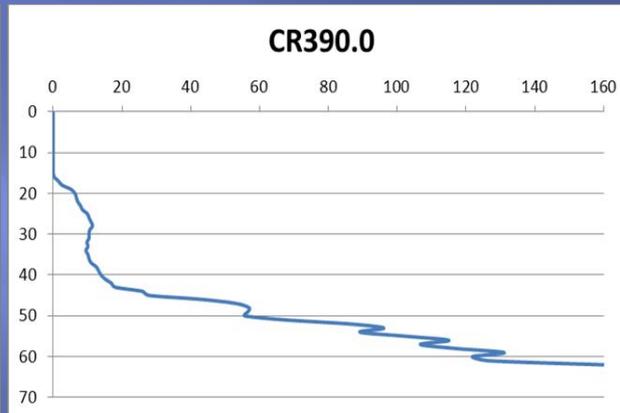


November 26

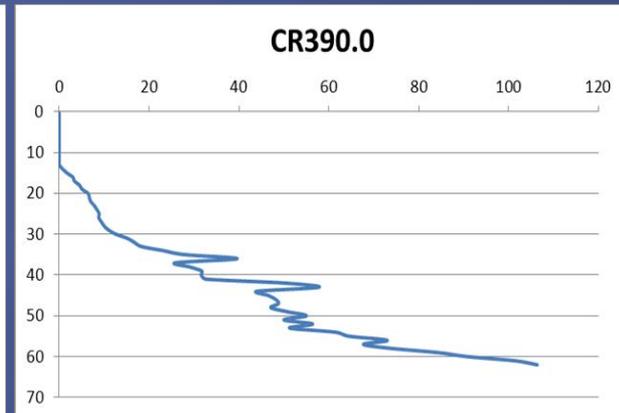
# Turbidity Profiles CR390.0



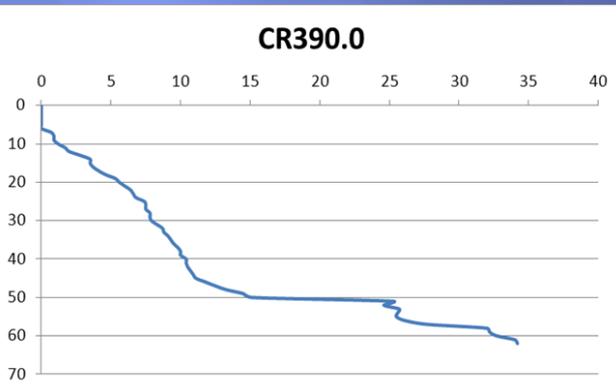
November 14



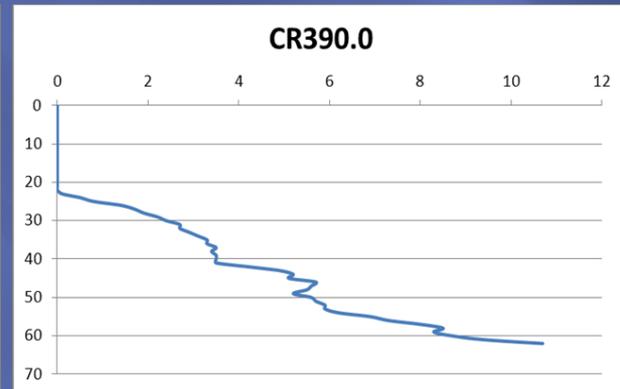
November 15



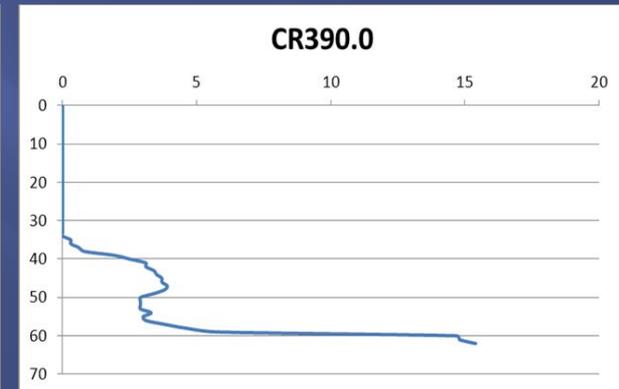
November 16



November 18

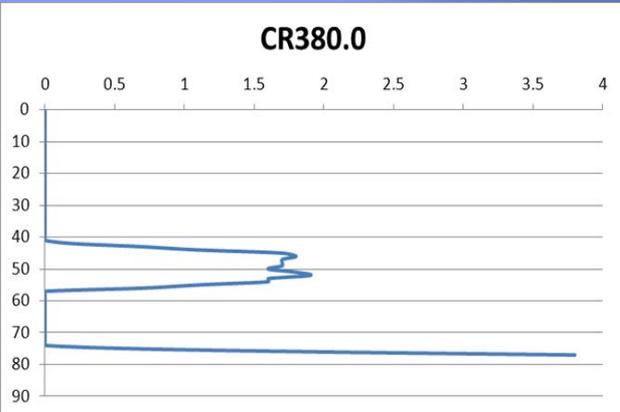


November 20

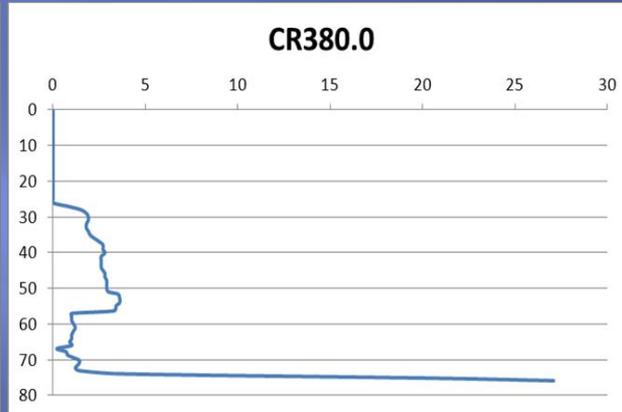


November 26

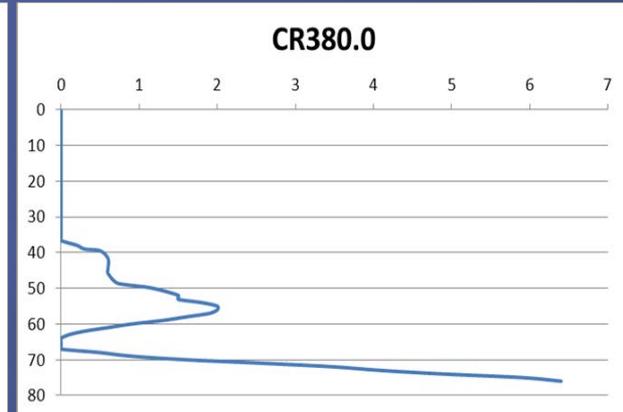
# Turbidity Profiles CR380.0



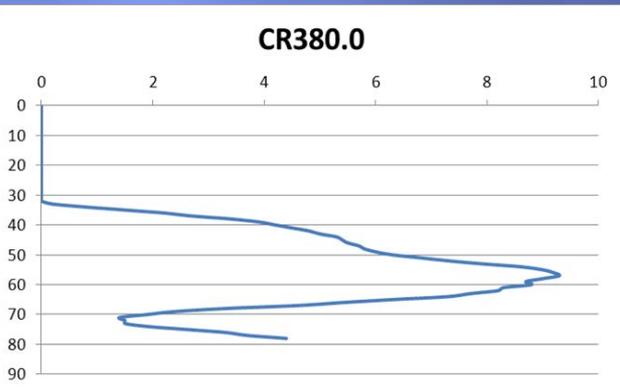
November 14



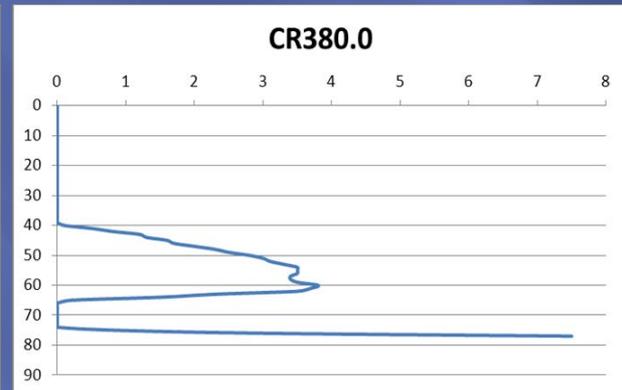
November 15



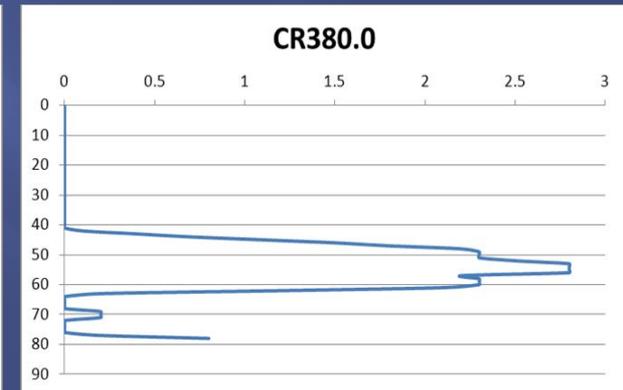
November 16



November 18



November 20



November 26

# Total Nitrogen and Phosphorus

	12-Nov		14-Nov		15-Nov		16-Nov	
	Nitrogen Total (mg/L as N)	Phosphorus Total (mg/L as P)	Nitrogen Total (mg/L as N)	Phosphorus Total (mg/L as P)	Nitrogen Total (mg/L as N)	Phosphorus Total (mg/L as P)	Nitrogen Total (mg/L as N)	Phosphorus Total (mg/L as P)
CRLM_A	<0.5	0.013	<0.5	0.014	<0.5	0.092	0.809	0.077
CR394.0	<0.5	0.018	<0.5	0.23	<0.5	0.16	0.569	0.12
CR390.0	<0.5	0.008	<0.5	0.18	<0.5	0.077	<0.5	0.062
CR380.0	<0.5	0.009	<0.5	0.01	<0.5	0.01	<0.5	0.014

# THANK YOU

- ▣ National Park Service and U.S. Geological Survey for providing boats and staff.
- ▣ Tom Culler and Bryan Moore (NPS)
- ▣ Erin Orozco and Ron Veley (USGS)



QUESTIONS???