R/V Barnes Cruise Plan July 2008

Cruise dates: July 7-24
Captain: Ray McQuin
Lead scientist: Joseph Needoba (needobaj@stccmop.org)
Funding source: NSF – PI Antonio Baptista
Organization: NSF Center for Coastal Margin Observation & Prediction

A. Science team Participants:

Leg 1 July 9 - 15

1) Joseph Needoba (OHSU)
2) Melissa Rohde (OHSU)
3) Florian Moeller (OHSU)
4) Julia Schoen (OHSU/Cornell)
5) Jami Goldman (OHSU)
6) Jim Postel (UW)

Leg 2 July 16 -22

1) Joseph Needoba (OHSU)
2) David Needham (OHSU)
3) Mariya Smit (OHSU)
4) Kaitlin Tyrol (OHSU)
5) Shana Radford (OHSU)
6) Jim Postel (UW)

B. Purpose of mission:

1) Evaluate CMOP ocean observatory infrastructure and instrumentation. Ground-truth SATURN-01 and 03 stations and instrumentation.
2) Collect samples for microbial ecology investigations (extension of 2007 sampling program)
3) Biogeochemistry measurements across river-to-ocean domain
4) Adaptive sampling exercises to measure salt intrusion and ETM dynamics

C. Area of operation:

Columbia River and Columbia River Estuary between mouth of estuary and Portland, Oregon.

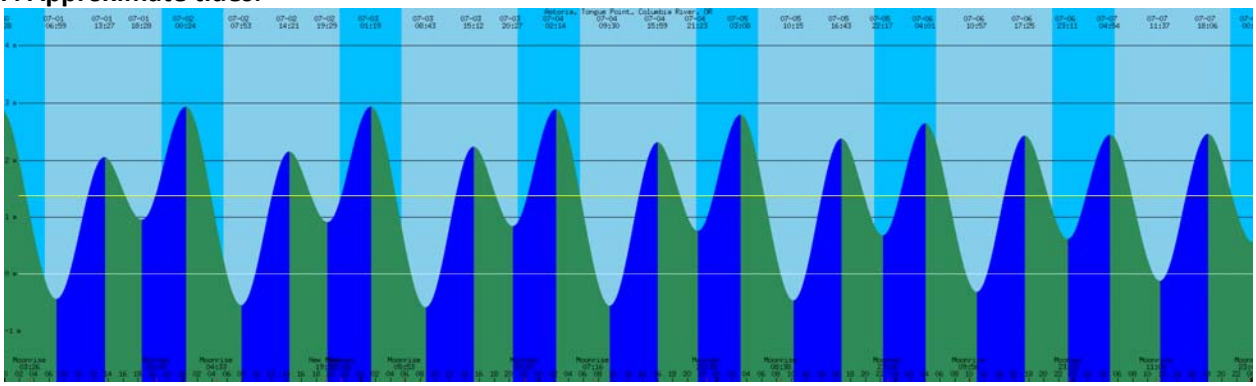
D. Major Equipment:

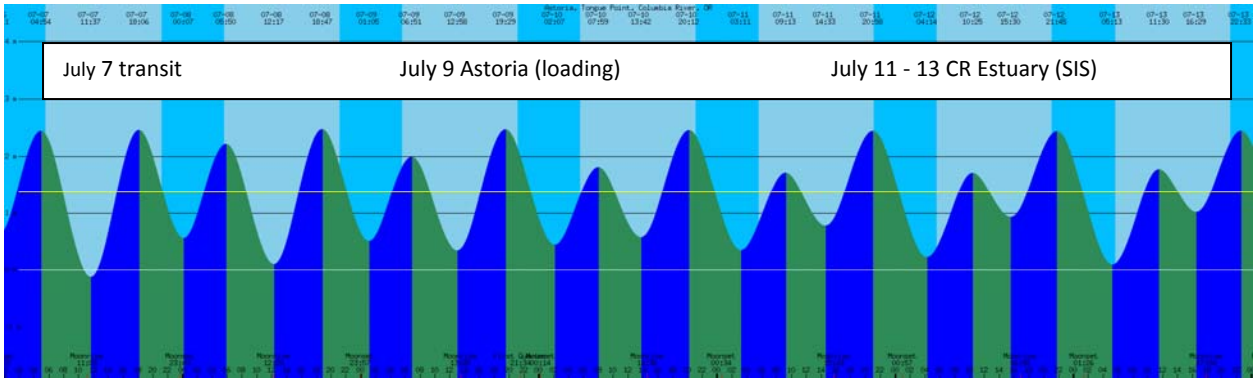
1) CTD with fluorometer, transmissometer, oxygen electrode, pH (University of Washington) and variable fluorescence fluorometer (OHSU)
2) Pacer S –series electric pump with 100 ft 1 1-2" pvc pump hose
3) On deck incubator plumbed to surface water flow through system
4) Freezer
5) ADCP
6) Bacterial productivity incubator

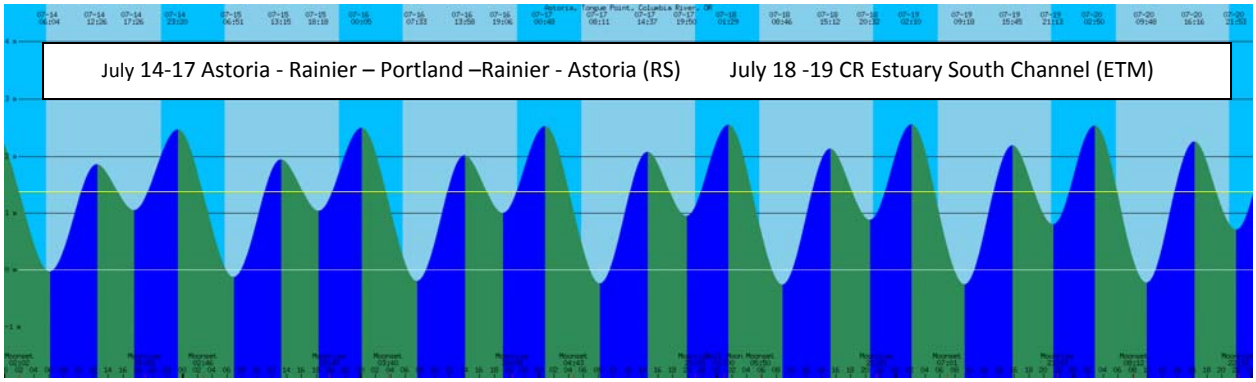
E. Radioactivity usage

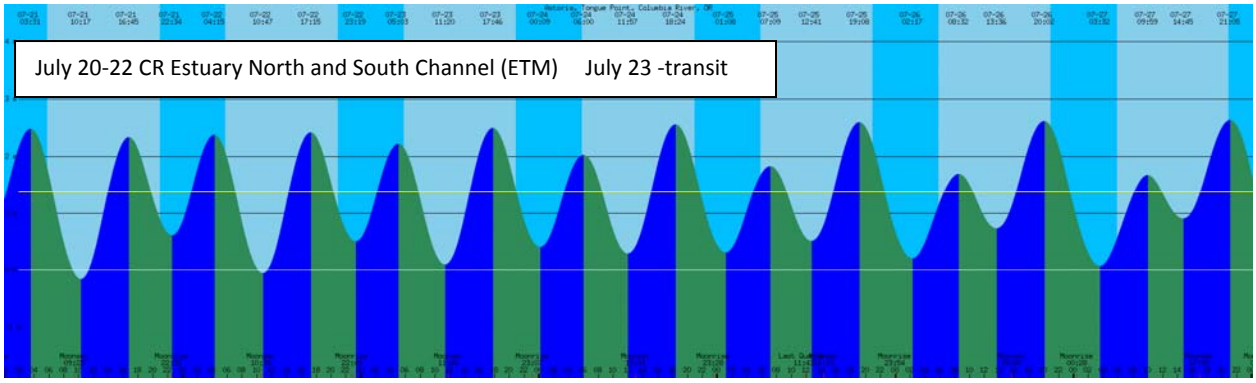
^{3}H bacterial productivity measurements (Mariya Smit)

F. Approximate tides:









G. Operational Details:

July 7: Barnes travel day
July 8: Barnes travel day
July 9 9:00: Loading in Astoria
-loading and setup (all participants)
-install ADCP (Wilkin)
- install incubator (Needoba/ Postel)
-test CTD, ADCP, pump (Needoba/Wilkin/Postel)
July 10: Point Adams transects
6:00 – transit to Point Adams (6 miles) (46° 12' 33"N, 123°56'57"W)
7:00 – primary production (PP) collection
8:00 – 4:00 - ADCP survey, CTD and water sample surveys. South channel near Point Adams
Collect water for salinity experiments on the 15th
4:30- 6:00 transit back to Astoria (6 miles)
July 11: Salt Intrusion Survey 1 (SIS 1)
6:00 – transit to region of predicted salt intrusion (SI) (Up to 10 miles) (46°15'27"N, 123°39'24"W)
7:00 – PP collection
8:00 - 4:00 – SI survey
4:00 - 6:00 - transit back to Astoria (Up to 10 miles)
July 12: SIS 2
6:00 – transit to SI (Up to 10 miles)((46°15'27"N, 123°39'24"W)
7:00 –PP collection
8:00 – 4:00 – SI survey
4:00 – 6:00 transit back to Astoria (Up to 10 miles)
July 13: SIS 3
6:00 – transit to upper extent of SI (Up to 10 miles) ((46°15'27"N, 123°39'24"W)
7:00 – PP collection
8:00 – 4:00 SI survey
4:00 – 6:00 transit back to Astoria (Up to 10 miles)
July 14: River survey (RS)
6:00 – leave Astoria
7:00 – PP collection
8:00 – 4:00 River survey
4:00 -6:00 – Arrive in Rainier (50 miles total trip) (46°05'40"N, 122°56'25"W)
July 15: RS 2
6:00 – leave Rainier
7:00 – Salinity experiment set-up
8:00- 4:00 – River survey Columbia east of Portland (45 miles) (46°36'05"N 122°35'18"W)
4:00 –Arrive in Portland/Vancouver (45°37'20"N 122°41'07"W)
July 16: Crew change, RS 3
12:00 – Sample Willamette, Columbia, back to Rainier (45 miles) (46°05'40"N, 122°56'25"W)
July 17: RS 4
6:00 – leave Rainier
8:00 – 4:00 – Survey back to Astoria (50 miles)

July 18: ETM 1

6:00 – travel to South Channel ETM (7 miles) (46° 12’ 33”N, 123°56’57”W)
7:00 – PP collection
8:00 – 4:00 survey/chase ETM

July 19 ETM 2

6:00 – travel to South Channel ETM (7 miles) (46° 12’ 33”N, 123°56’57”W)
7:00 – PP collection
8:00 – 4:00 survey/chase ETM

July 20 ETM 3

6:00 – transit to North channel near Saturn 01 (14 miles)(46°14’08”N 123°53’26”W)
7:00 – PP collection
9:00– 4:00 survey/chase ETM
4:00-6:00 transit to Astoria/Warrenton

July 21 ETM 4

6:00 - transit to North channel near Saturn 01 (14 miles)(46°14’08”N 123°53’26”W)
7:00 - PP collection
9:00 – 4:00 survey/chase ETM near Saturn 01
4:00-6:00 – transit to Astoria/Warrenton

July 22 ETM 5

6:00 – transit to South Channel ETM (7 miles) (46° 12’ 33”N, 123°56’57”W)
7:00-12:00 – ETM Survey
1:00 – 4:00 – Unload ship, science team finished

July 23 – Barnes travel day
July 24 – Barnes travel day

H. Overnight locations:

July 7 – transit
July 8 - transit
July 9 – Astoria (MERTZ or Maritime Museum)
July 10 – Astoria
July 11 - Astoria
July 12 - Astoria
July 13 - Astoria
July 14 – Rainier
July 15 – Portland
July 16 – Rainier
July 17 - Astoria
July 18 - Astoria
July 19 – Astoria
July 20 - Astoria
July 21 – Astoria
July 22 - Astoria
July 23 - transit
July 24 – transit

I. Study descriptions:

Point Adams survey (July 10) – Purpose of this one day survey is to conduct cross-channel surveys of the South Channel of the Columbia River Estuary near Point Adams. The ADCP will collect velocity data. The CTD/pump system will be used to collect water column profiles of water properties at specified regions along the transect. The transect data will be used to calibrate and characterize the Saturn 03 suite of instruments located near Point Adams.

Salt Intrusion Survey (SIS) (July 11-13) – Purpose of the SIS to identify and characterize the limits of Salt intrusion associated with the estuarine salt wedge. Location and sample collection will be determined using CMOP modeling capabilities. ADCP and CTD/pump samples will be collected at high resolution to characterize the physical, chemical, and biological properties of the salt wedge. Once identified, the salt wedge will be characterized through CTD measurements and water sample collection

River Survey (RS) (July 14-17) – Purpose of the RS is to collect biological and chemical data along the lower Columbia River between Astoria and Portland. CTD/pump samples will be collected each hour during transit.

Estuarine Turbidity maximum (ETM) (July 18-22) – Purpose of the ETM survey is to collect physical, biological and chemical data to characterize the ETM in both the South and North Channel. The North Channel samples will also be used to characterize the Saturn 01 suite of instruments located on Pier 11 of the AM bridge. Sample frequency of ETM is defined by microbiology requirements. If first day is successful, the second day in each channel will be devoted to cross-channel ADCP and CTD surveys.

J. Cast details and maximum water samples

July 7 – transit
July 8 - transit
July 9 – loading/ practice casts
July 10 – 6 ADCP/CTD across channel transects (3 casts per transect), water samples from 3 transects surface, middle, bottom (3 x 3 x 3 = 27)
July 11 – CTD every hour, WS from 3 points across salt wedge at 3 depths, morning and afternoon (18)
July 12 – CTD every hour, WS from 3 points across salt wedge at 3 depths, morning and afternoon (18)
July 13 - CTD every hour, WS from 3 points across salt wedge at 3 depths, morning and afternoon (18)
July 14 – CTD and water samples every hour from 2 depths (8 x 2 = 16)
July 15 – CTD and water samples every hour from 2 depths (8 x 2 = 16)
July 16 – CTD and water samples every hour from 2 depths (4 x 2 = 8)
July 17 – CTD and water samples every hour from 2 depths (8 x 2 = 16)
July 18 – CTD 30 min water sample at low tide, peak etm, post etm 3 depths (9) more if possible (9)
July 19 – 6 ADCP/CTD across channel transects (3 casts per transect), water samples from 3 transects surface, middle, bottom (3 x 3 x 3 = 27)
July 20 - CTD 30 min water sample at low tide, peak etm, post etm 3 depths (9) more if possible (9)
July 21 – 6 ADCP/CTD across channel transects (3 casts per transect), water samples from 3 transects surface, middle, bottom (3 x 3 x 3 = 27)
July 22 - CTD every hour, WS from 3 points across salt wedge at 3 depths (9)
July 23 - transit
July 24 – transit
Total water samples = 218

K. Sample description

CTD – Salinity, temperature, depth, light transmission, fluorescence, oxygen, variable fluorescence

ADCP – Current velocity

WS – Water sample: Macro Nutrients, chl a, DOC, TDN, TDP, POC, PON, SPM, RNA, DNA, HPLC, CDOM, FISH

Bacterial productivity (BP) – ^{3}H-leucine incorporation - 1 hr incubations

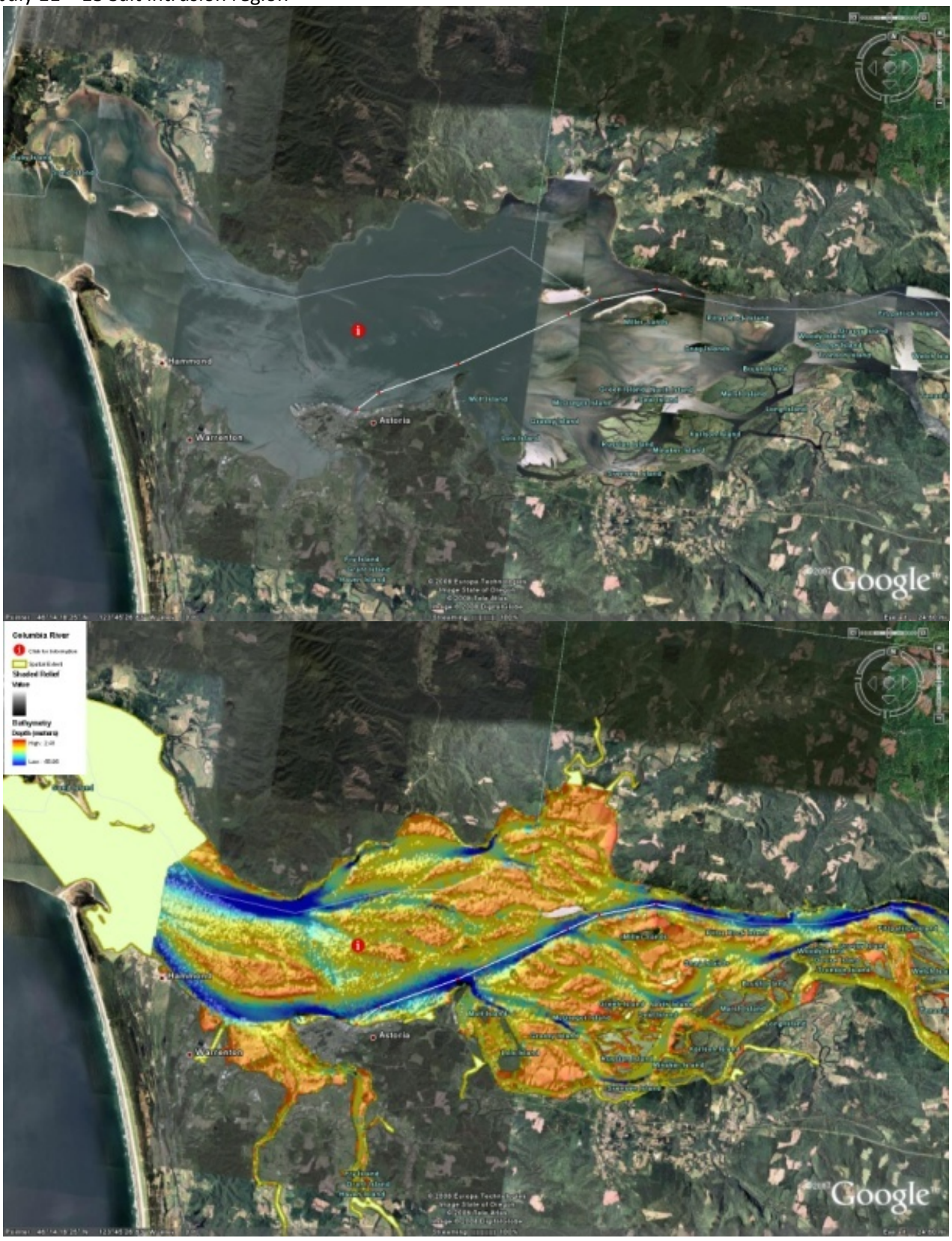
Primary productivity (PP) – $^{13}CO_2$, $^{15}NO_3^-$ and $^{15}NH_4^+$ incorporation - 24 hr dawn-dawn incubations

L. Approximate Area of transit and operation

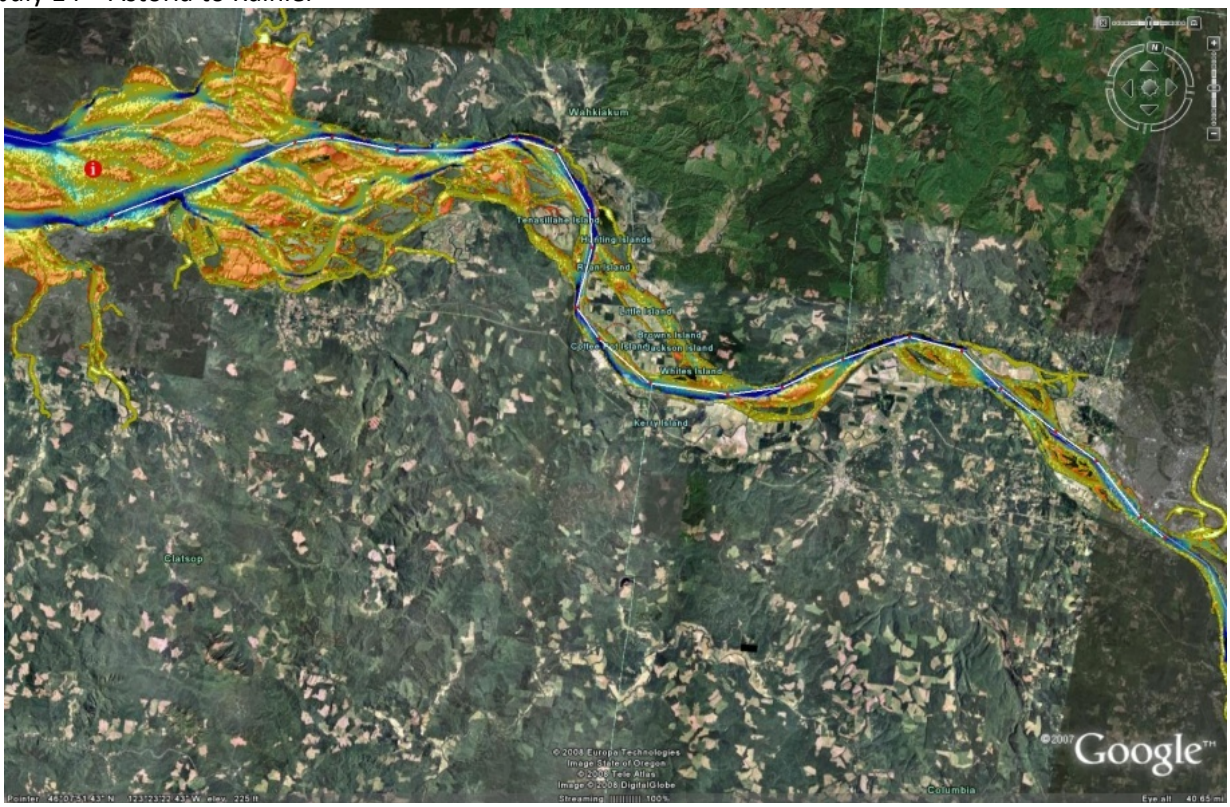
(White line with small red dots – look closely!)

July 10 – Point Adams

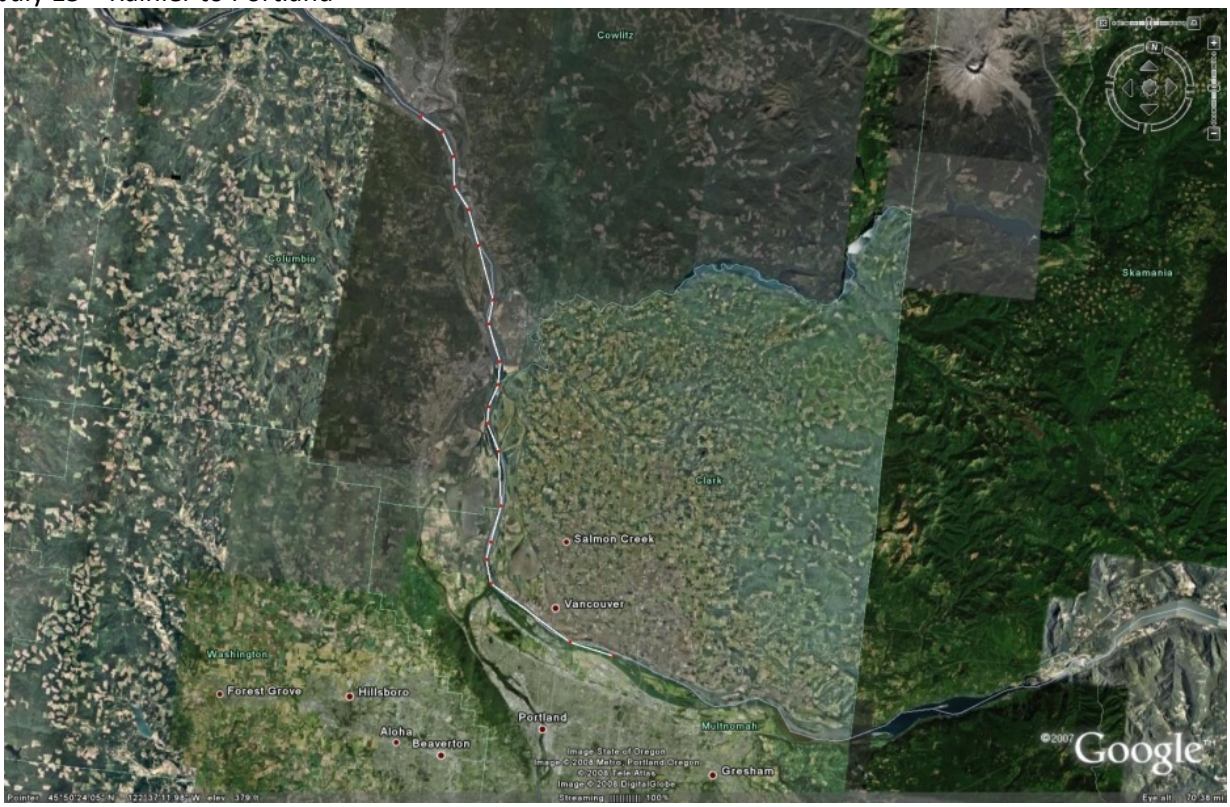
July 11 – 13 Salt intrusion region



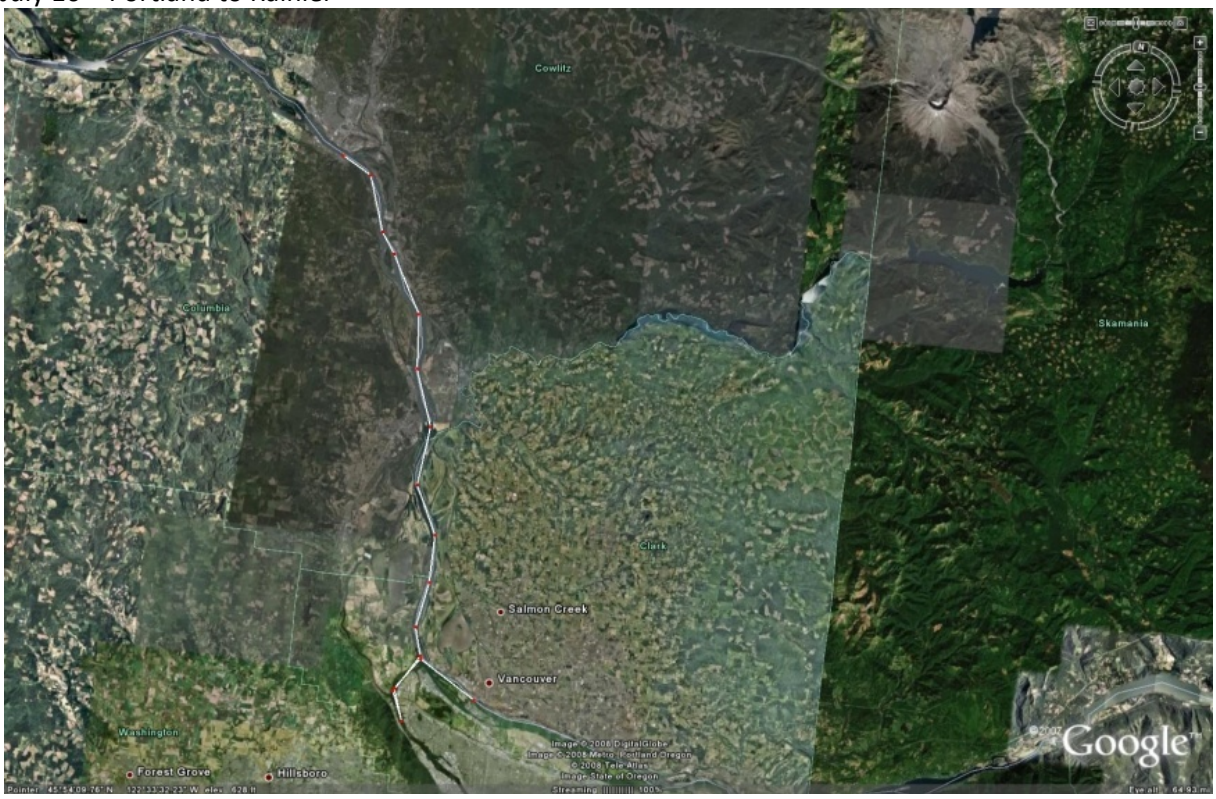
July 14 – Astoria to Rainier



July 15 – Rainier to Portland



July 16 – Portland to Rainier



July 17 Rainier to Astoria

July 19-22 North and South Channel ETM