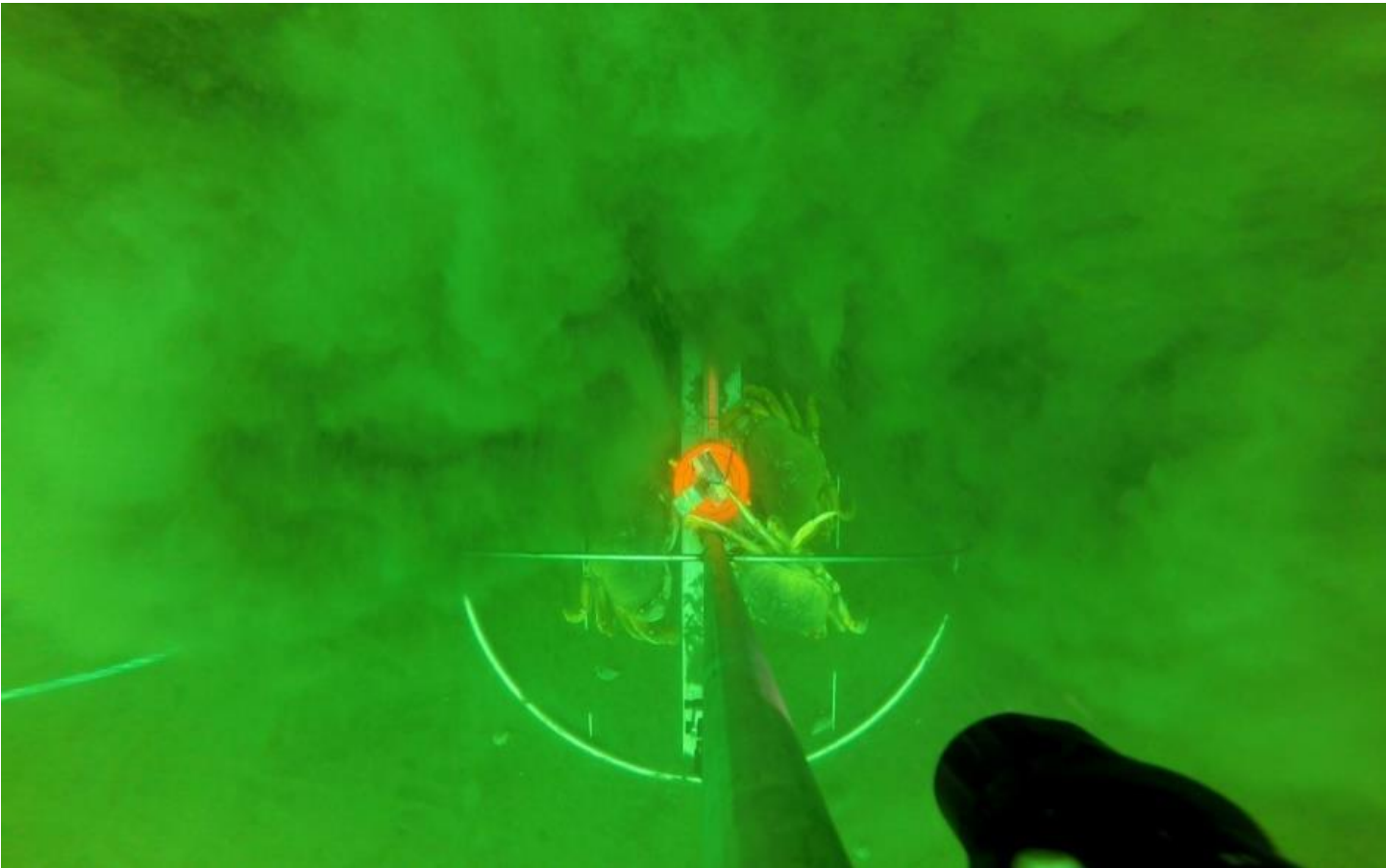


MOUTH OF THE COLUMBIA RIVER BENTHIC IMPACT STUDY



CURTIS ROEGNER



MCR
SCIENCE-POLICY
WORKSHOP

~

ILWACO, WA
10 MAY 2018

COMPARISON OF METHODS USED IN BENTHIC MCR BENTHIC IMPACT STUDY

METHOD	PURPOSE & ORGANISMS	DATA TYPE	PROS	CONS	FINDINGS
BENTHIC VIDEO SLED	- DETERMINE DENSITY AND SPATIAL DISTRIBUTION - LARGER MOBILE EPIFAUNA AND SESSILE INVERTEBRATES	- SURVEY - BEFORE-IMPACT-AFTER EXPERIMENTAL DESIGN	- RAPID SAMPLING - HIGH REPRODUCIBILITY	- VISIBILITY-LIMITED - SPECIALIZED ANALYSIS	- TEMPORAL EFFECT > TREATMENT EFFECT - N LOWER AT SJS THAN DWS
BAITED CRAB POTS WITH FINE MESH LINING	- TIME SERIES OF ABUNDANCE & SIZE - PRIMARILY CRAB, SOME GASTROPODS, FISH	- SIZE FREQUENCY DATA - INDIVIDUAL METRICS (SEX, LIMB LOSS, ECT)	"HANDS ON" DATA - COMPATIBLE WITH OLDER DATA SETS. - VISIBILITY-INDEPENDENT	REQUIRES 2 CONSECUTIVE CRUISE DAYS FOR 24-H SOAK	- NO TREATMENT EFFECT - MAINLY ADULTS - MALES > FEMALES
BENTHIC VIDEO LANDER (CAMPOD)	- ACUTE EFFECTS OF DEPOSITION - MOBILE MACROINVERTEBRATES & FISH	- PRESENCE/ABSENCE RELATIVE TO DEPOSITION - IMPACT-CONTROL EXPERIMENTS	- EASILY DEPLOYED AND ANALYZED - BEHAVIORAL OBSERVATIONS	- LIMITED BATTERY LIFE - VISIBILITY-LIMITED	- SIG IMPACT EFFECT - SEDIMENT LEVEL MINIMAL - SHORT DURATION
ACOUSTIC TAGS	- ACUTE AND LONG-TERM MOVEMENTS - DUNGENESS CRABS (STURGEON, SHARKS)	- IMPACT-CONTROL DESIGN - FINE SCALE, INDIVIDUAL BEHAVIOR	- VISIBILITY-INDEPENDENT - LONG TERM BEHAVIORAL DATA	- SPECIALIZED ANALYSIS - SPATIAL SCALE RECEIVER-LIMITED	- SLIGHT IMPACT EFFECT - HIGHLY MOBILE - MIGRATION NORTH? - CUMULATIVE EFFECT?
ENVIRONMENTAL BUOY	COLLECT BIOPHYSICAL METRICS	- TIME SERIES - DEPTH STRATIFIED	- PROVIDES CONTEXT TO ALL DATA COLLECTION - CAPTURES EVENT SCALE - LONG TERM DATA (CLIMATE CHANGE)	- VISIBILITY-INDEPENDENT - LONG TERM DATA	PHYSICAL CONDITIONS (HIGH TEMP, LOW DO) MAY EFFECT BEHAVIOR

ACOUSTIC TAGS

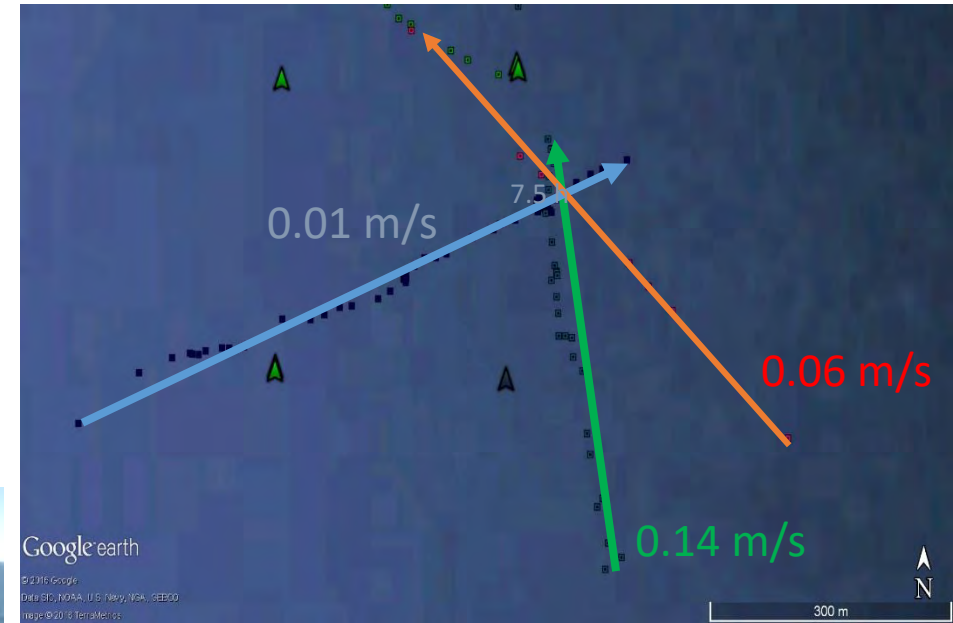


RECEIVER



TAGGED CRABS

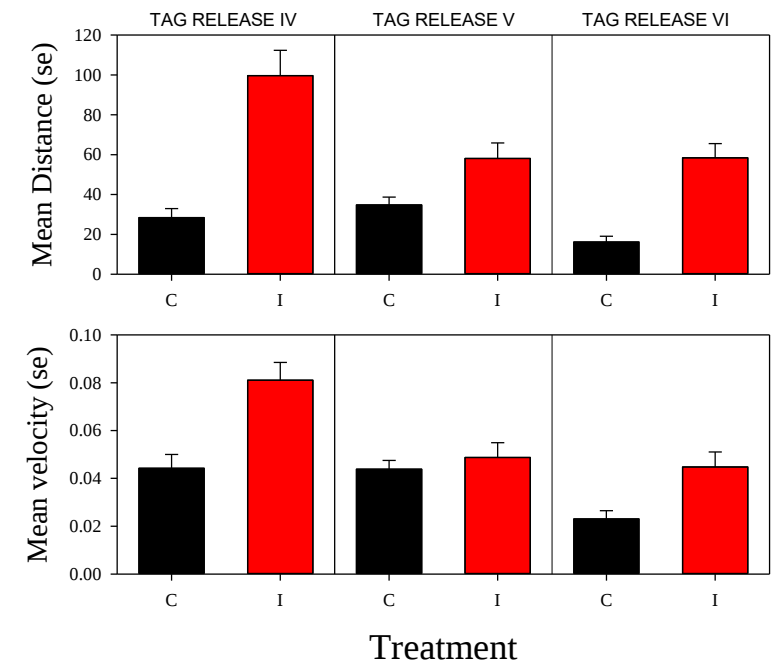
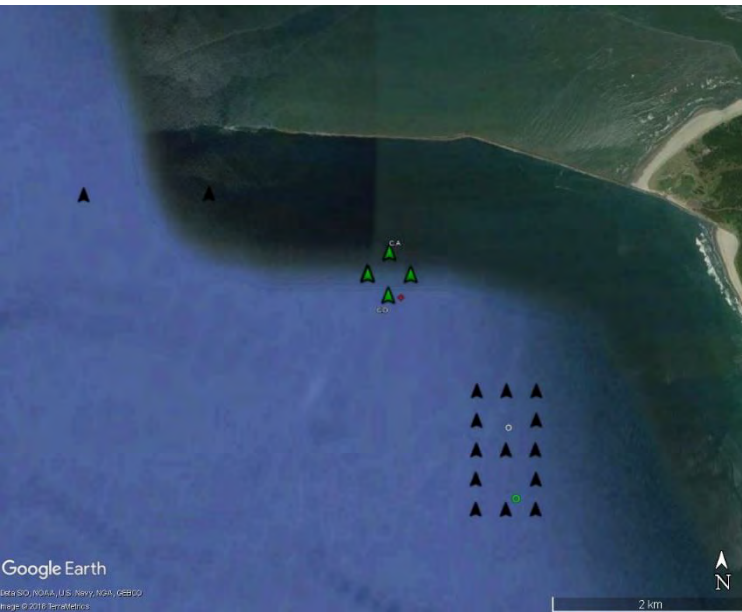
IMPACT-CONTROL STATISTICS AND BEHAVIOR



DEPOSITION EVENT



EXPERIMENTAL DESIGN



2014-2015
SJS

CONTROL



IMPACT



Google Earth

Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Image © 2018 TerraMetrics

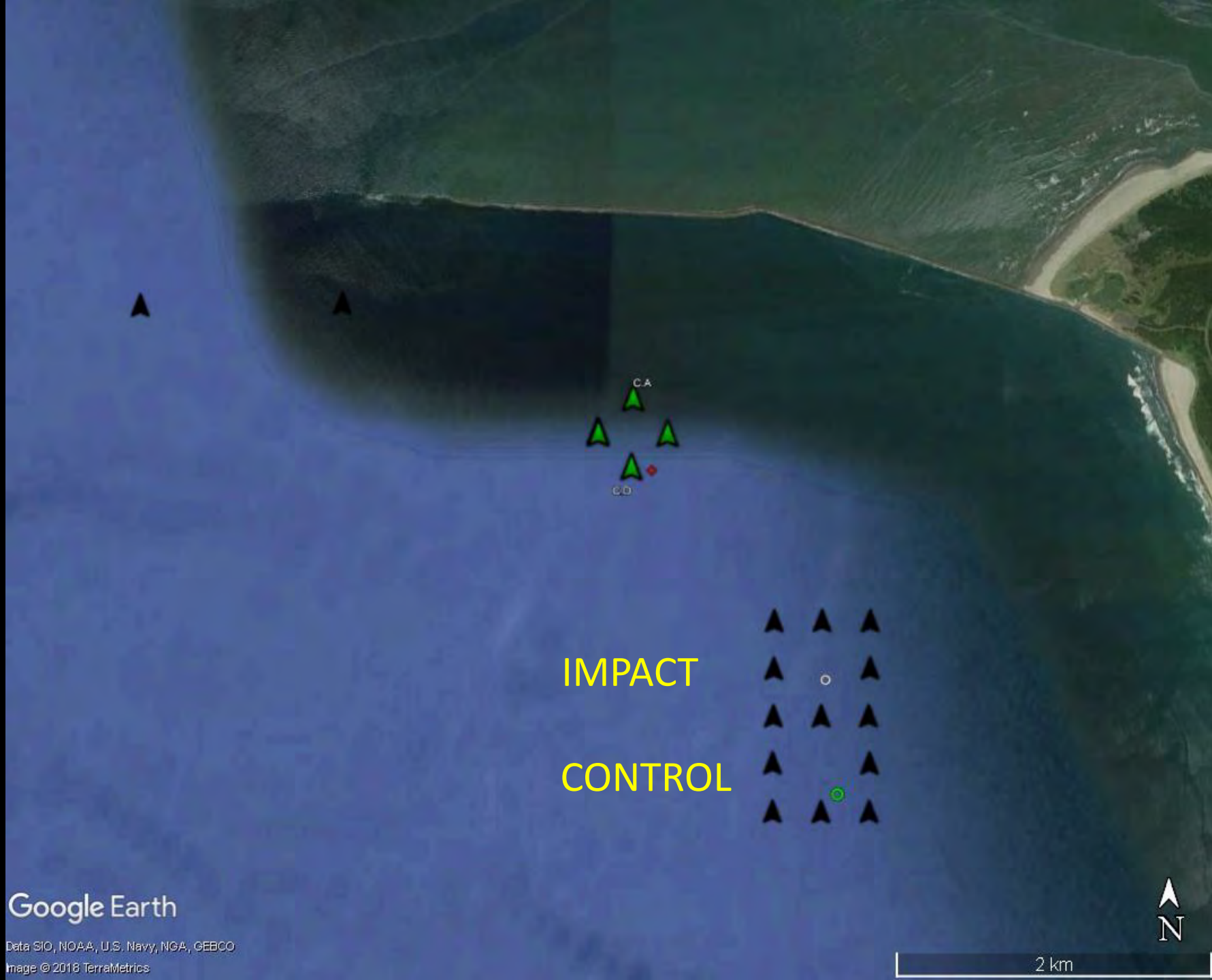


2 km

2015 RELEASE 4



2016-2017
SJS



2015 & 2016 SJS

2015

2016

Google Earth

Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Image © 2018 TerraMetrics



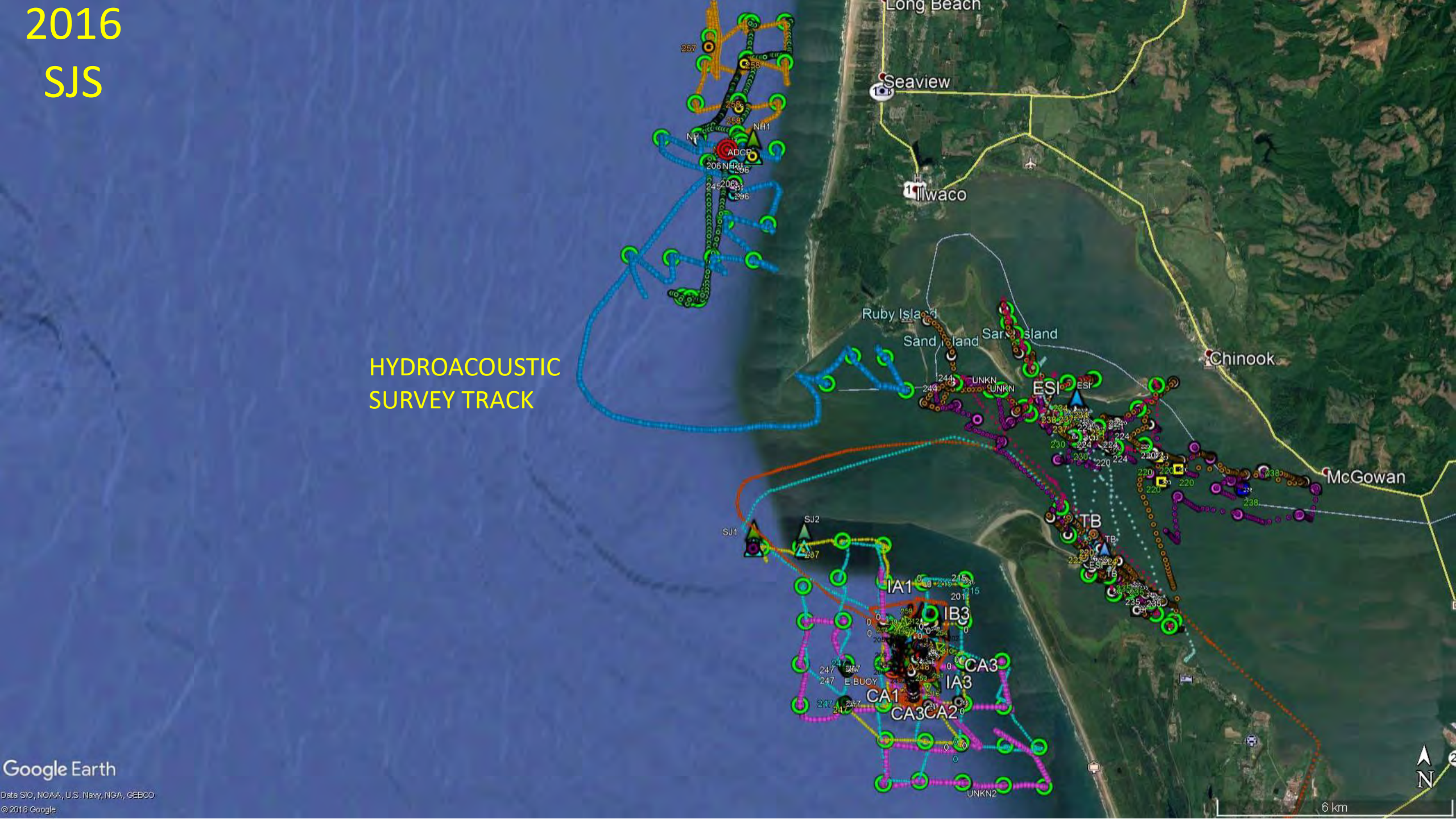
2 km

2016
SJS



2016
SJS

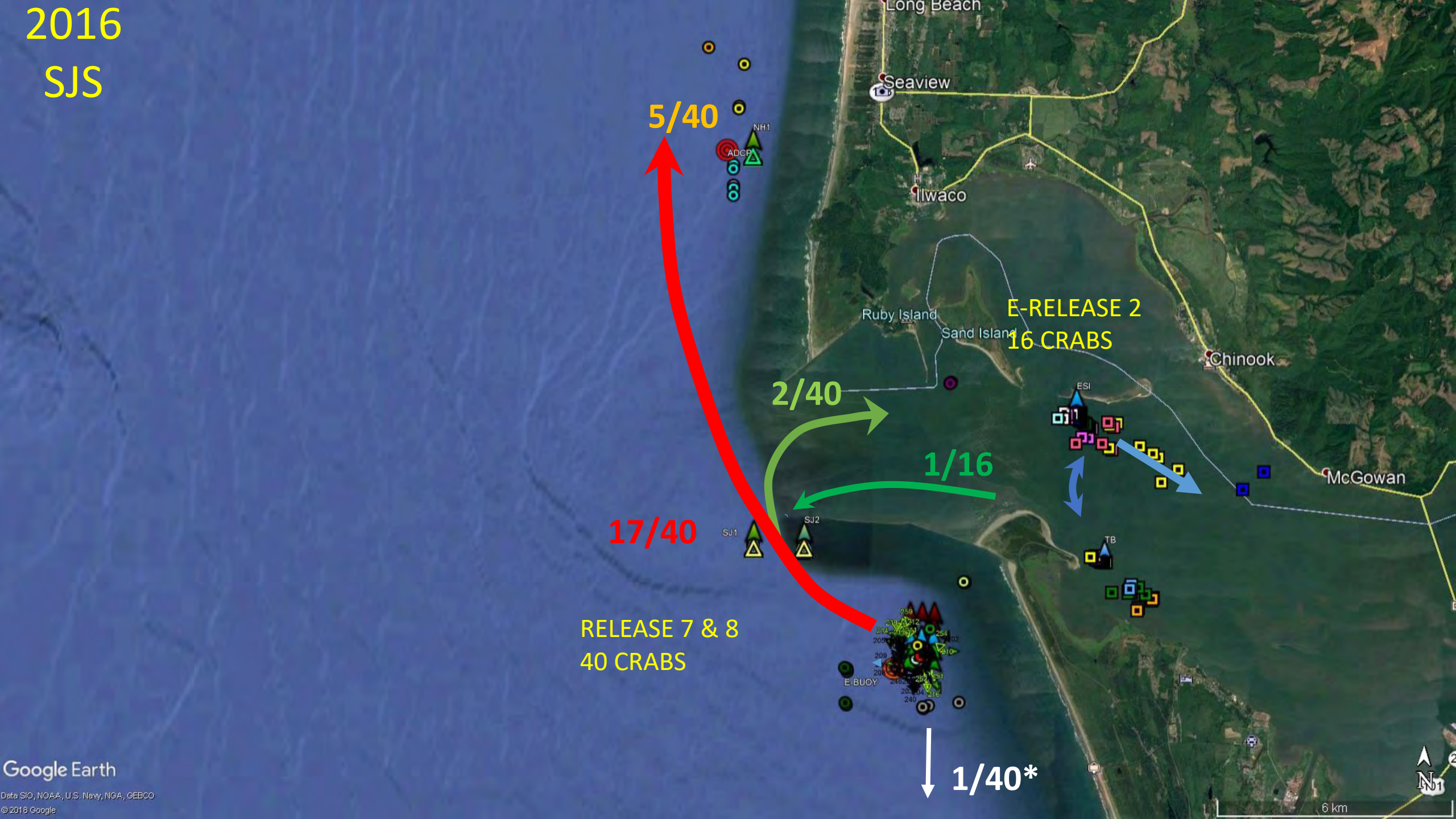
HYDROACOUSTIC
SURVEY TRACK



2016
SJS



2016
SJS



2017
SJS

SENTINEL ▲

GATE ▲ ▲

ARRAY ▲▲▲
▲▲▲

GATE ▲ ▲

Google Earth

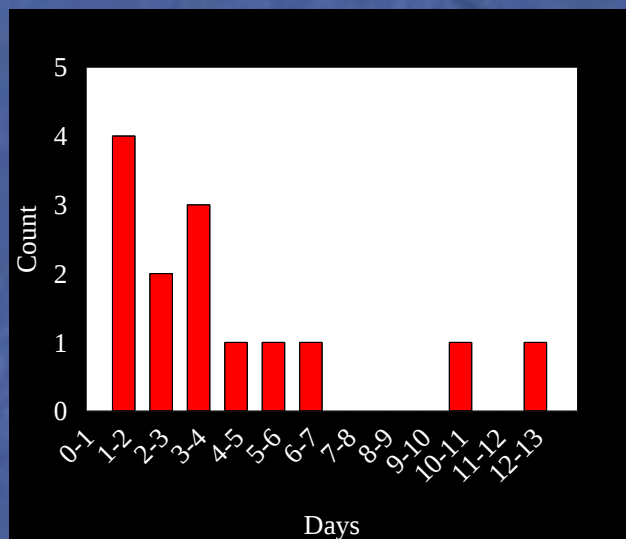
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
©2018 Google

8 km

Oregon Coast Hwy
N



Mean time = 4.52 ± 3.61 days
Range = 1.14 – 12.19 days



Google Earth

Data SIO, NOAA, U.S. Navy, NGA, GEBCO
© 2018 Google

LaPUSH 219

205

247

217

245

RELEASE

NH1

ESI

ADCP

SJ2

SJ1

E-BUOY

TB

249

SEASIDE

206

Google Earth

Data SIO, NOAA, U.S. Navy, NGA, GEBCO

Image Landsat / Copernicus

Data LDEO-Columbia, NSF, NOAA



100 km

SUMMARY OF TAG STUDIES

- ACUTE IMPACT VARIABLE
- NO EVIDENCE OF INCREASED MORTALITY
- CRABS HIGHLY MOBILE
- NORTHWARD MIGRATION
- IMPORT/EXPORT FROM ESTUARY

UNKNOWNS

- EXTENT OF MOVEMENT THROUGH NHS
- CUMULATIVE EFFECT OF IMPACTS

LaPUSH 219

205

247

217

245

RELEASE

NH1
ESI
ADCP
Sj2
Sj1
E-BUOY
TB
249
251
250
252

SEASIDE

206

Google Earth

Data SIO, NOAA, U.S. Navy, NGA, GEBCO

Image Landsat / Copernicus

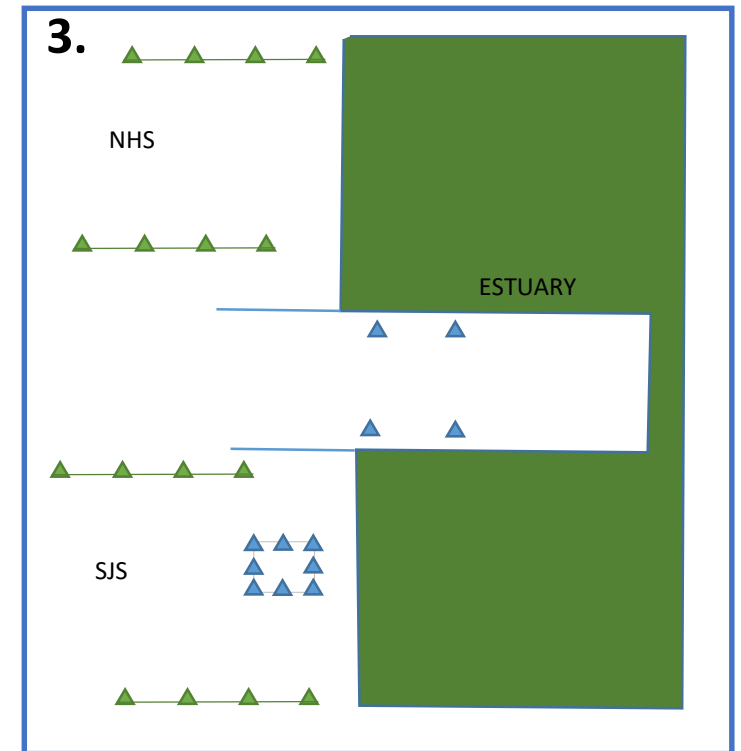
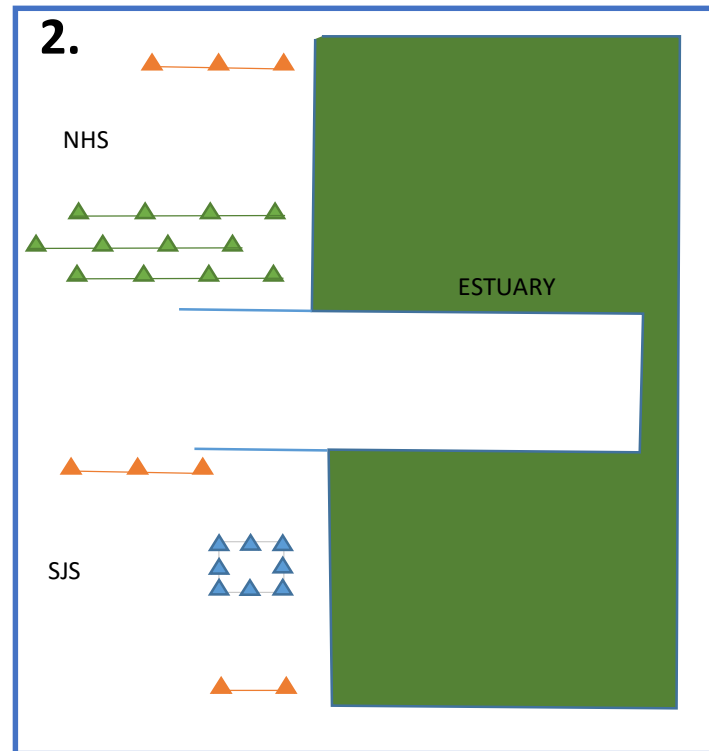
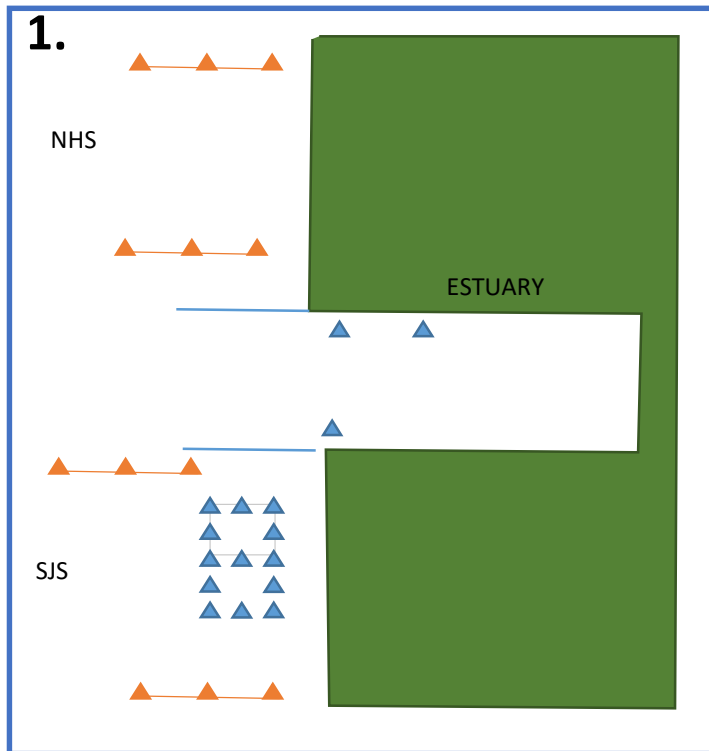
Data LDEO-Columbia, NSF, NOAA

100 km

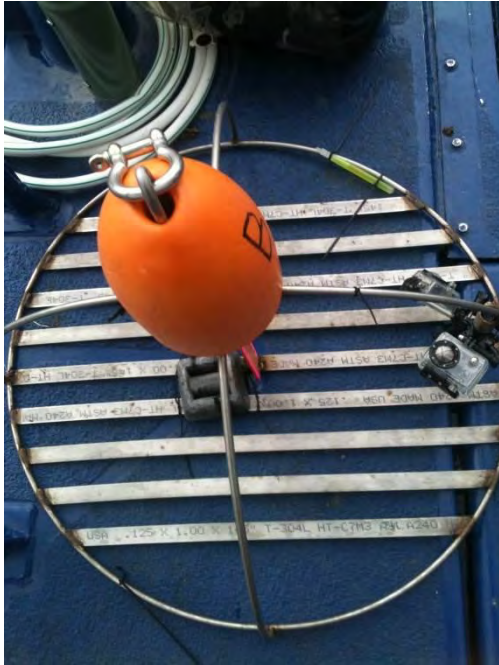
N

2018 OPTIONS: 10-14 additional receivers (32)

1. Repeat SJS experiments w/ increased gates
2. Mound experiment at NHS: cumulative impact
3. Small impact array at SJS and increased gates N & S



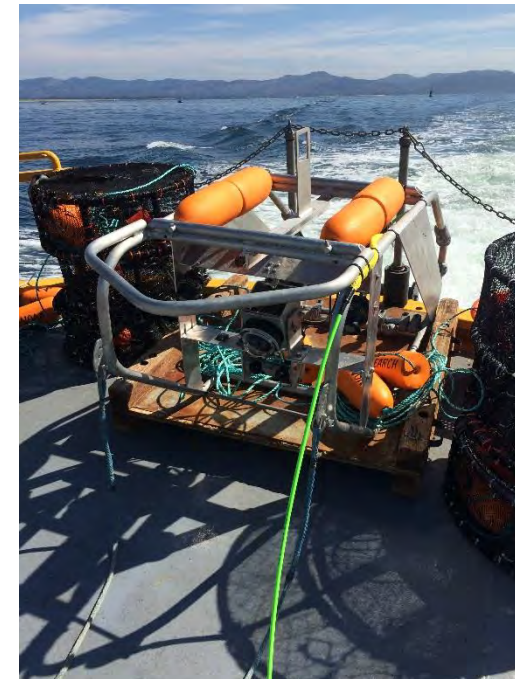
VIDEO AND ACOUSTIC TELEMETRY TECHNIQUES



1. CamPod
Used to measure acute effects of disposal including sediment depth & Impact on fauna

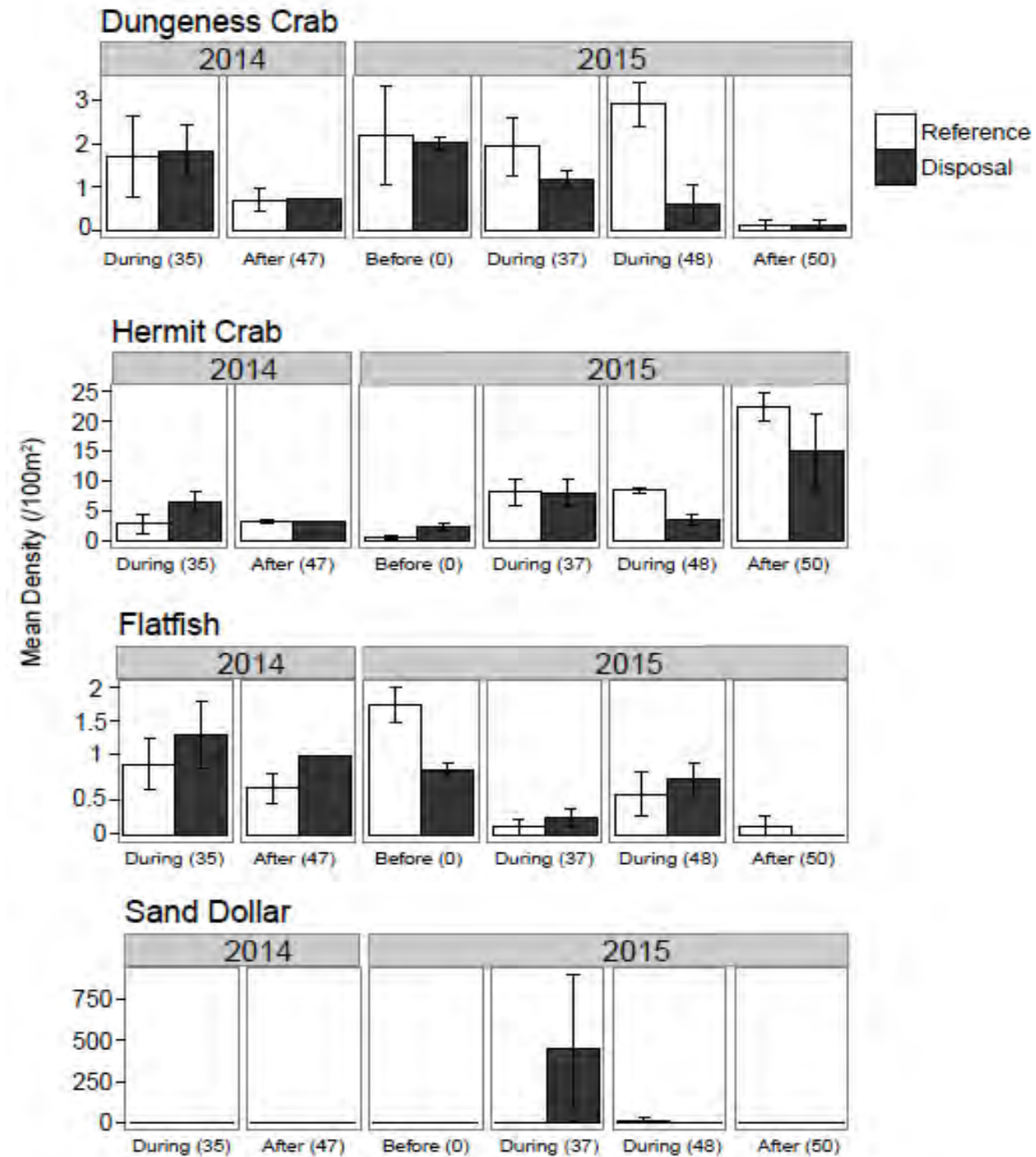


2. Acoustic Tracking
Used to measure acute & cumulative impacts on crabs

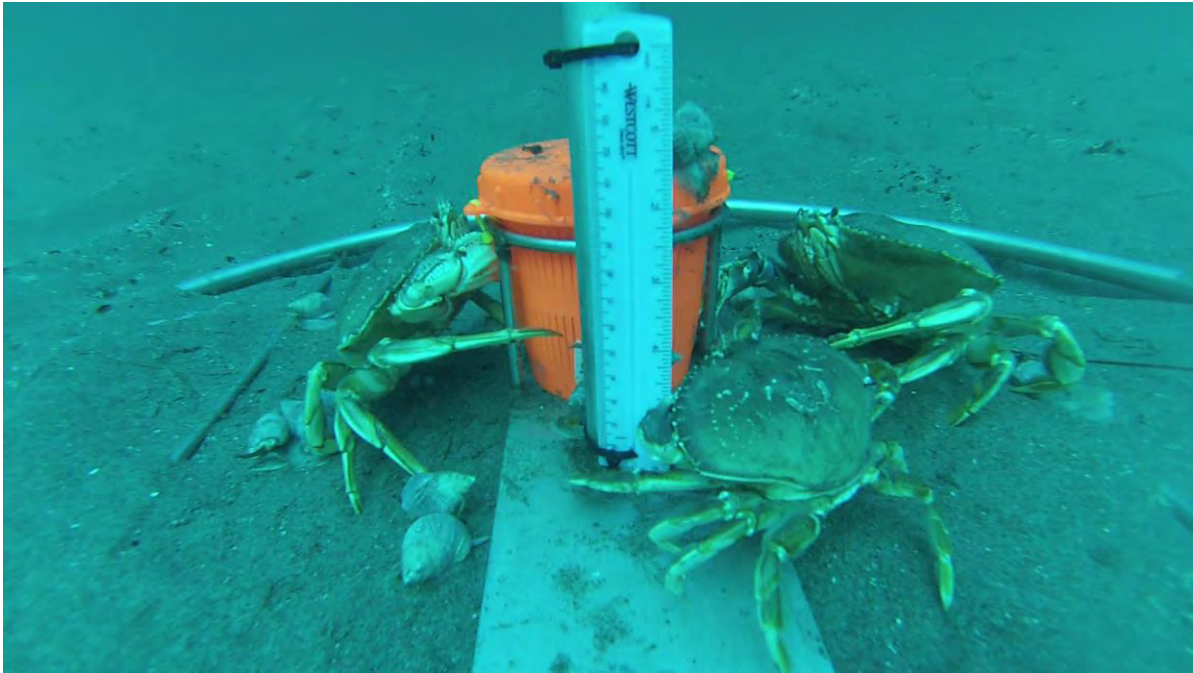


3. Benthic video sled
Used to compare invertebrate and fish abundances in different habitats

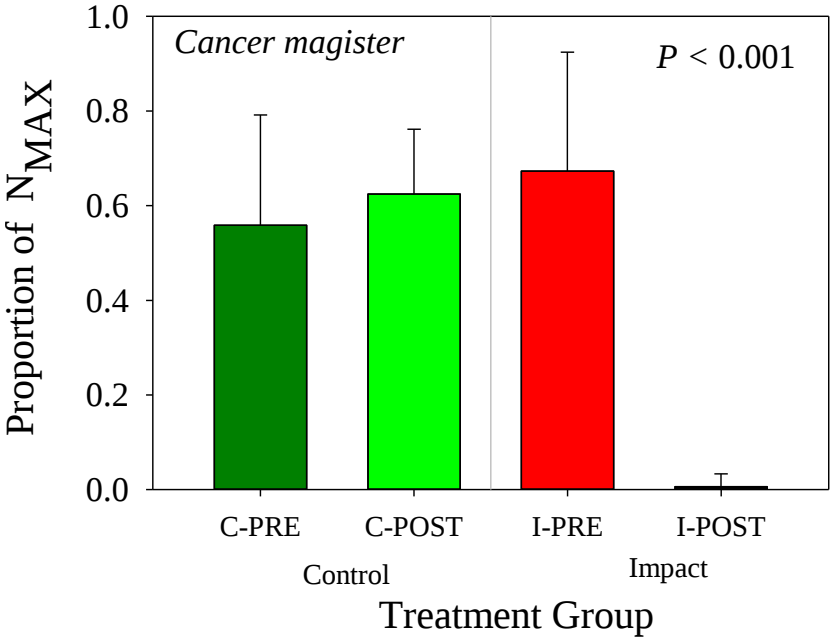
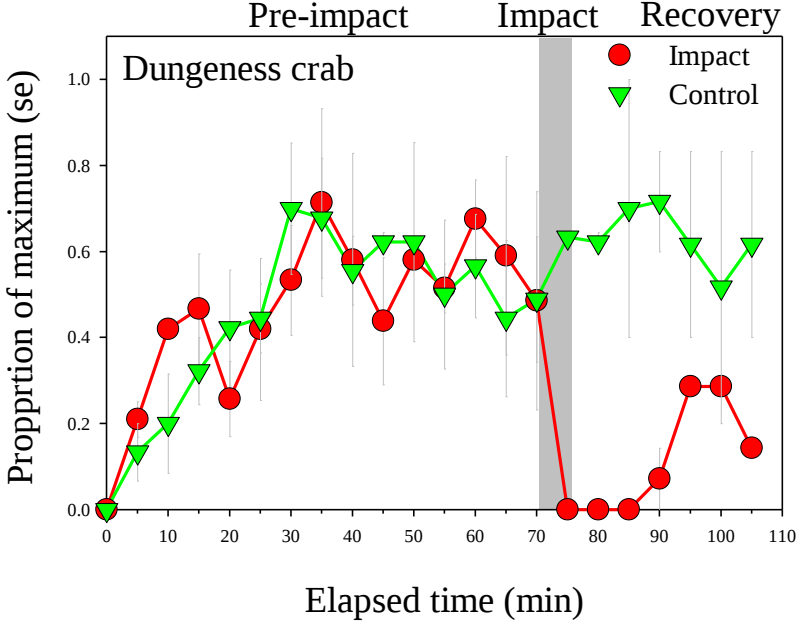
BENTHIC VIDEO SLED



CAMPOD



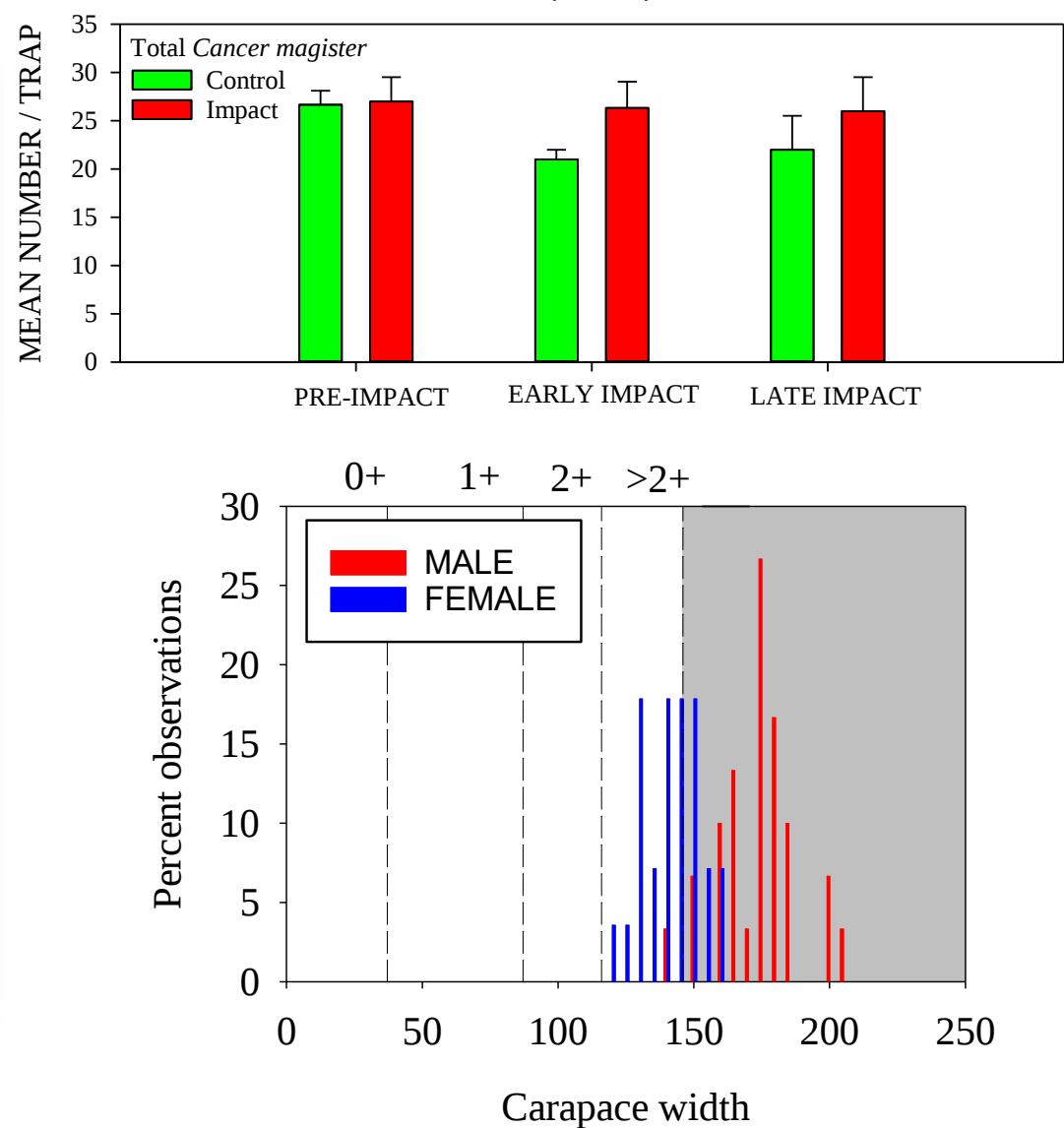
IMPACT-CONTROL RESULTS



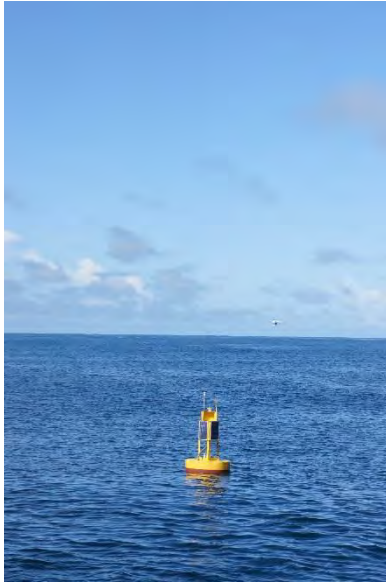
CRAB TRAP



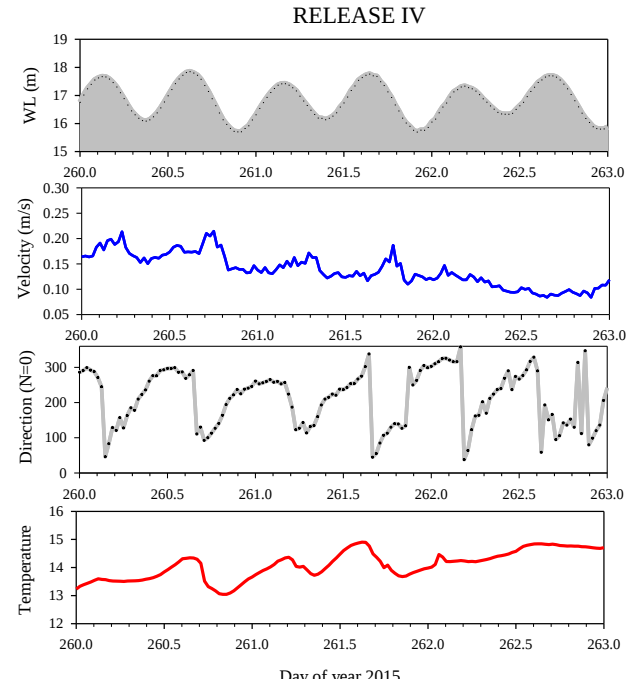
CRAB ABUNDANCE, SEX, & SIZE FREQUENCY



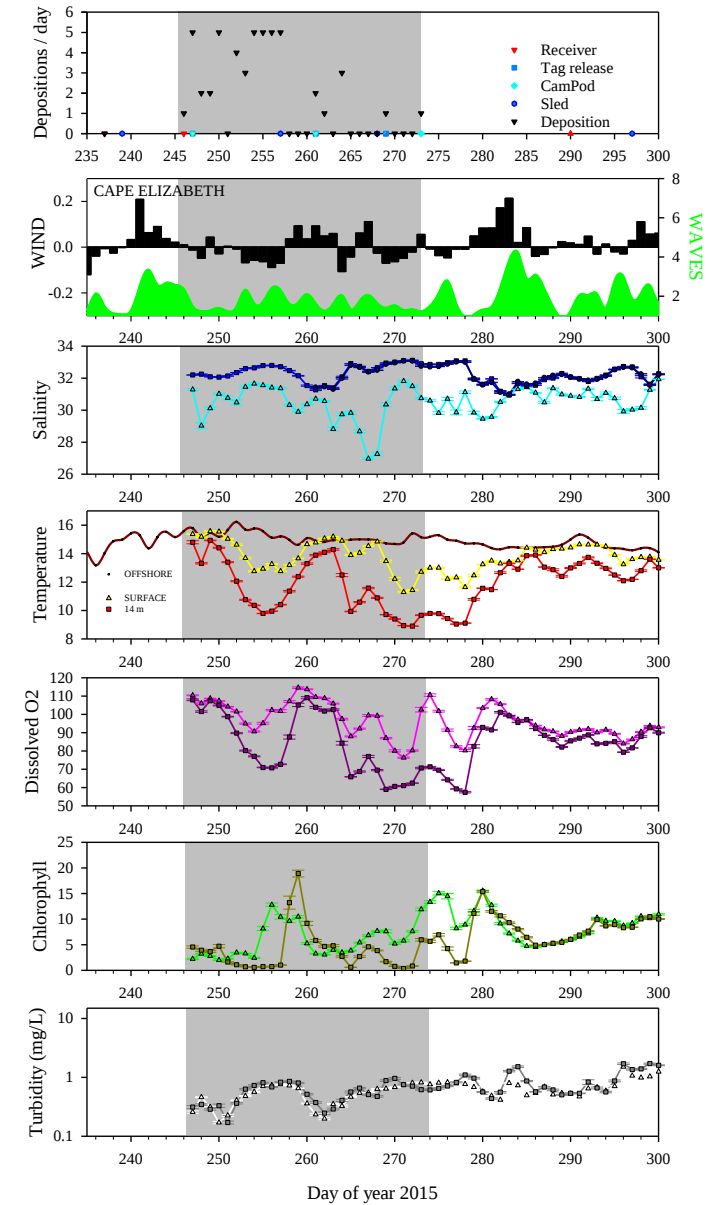
ENVIRONMENTAL BUOY



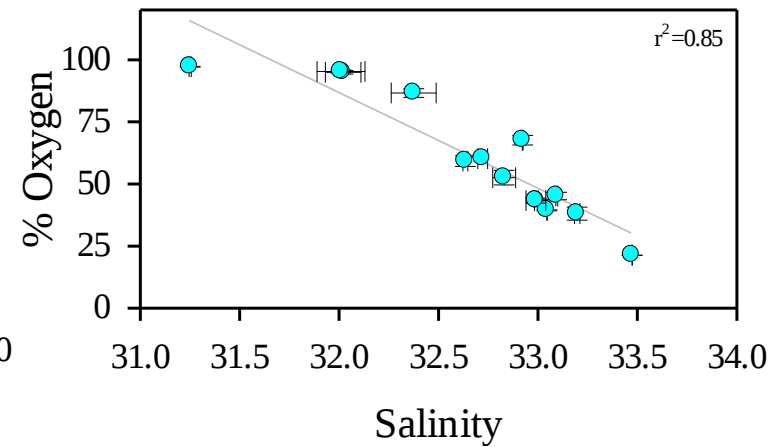
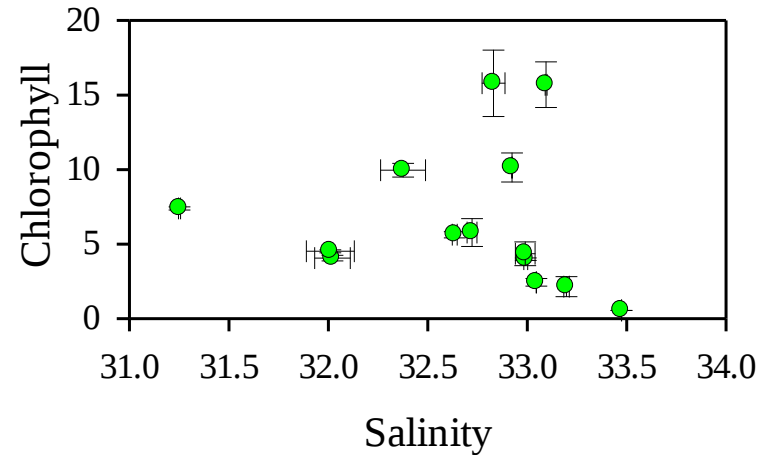
VELOCITY



TIME SERIES DATA



CHLOROPHYLL AND OXYGEN



2016 TAG RELEASES



2015 TAG RELEASES



Google Earth

Data SIO, NOAA, U.S. Navy, NGA, GEBCO
© 2018 Google

8 km

Oregon Coast Hwy
N

