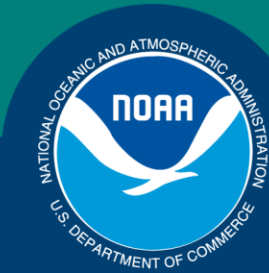


Science, Service, Stewardship



MOVEMENT PATTERNS OF A SOUTHERN CALIFORNIA ABALONE SPECIES, *HALIOTIS KAMTSCHATKANA*, WITH IMPLICATIONS TO MANAGEMENT AND RECOVERY OF ABALONE IN THE EASTERN PACIFIC

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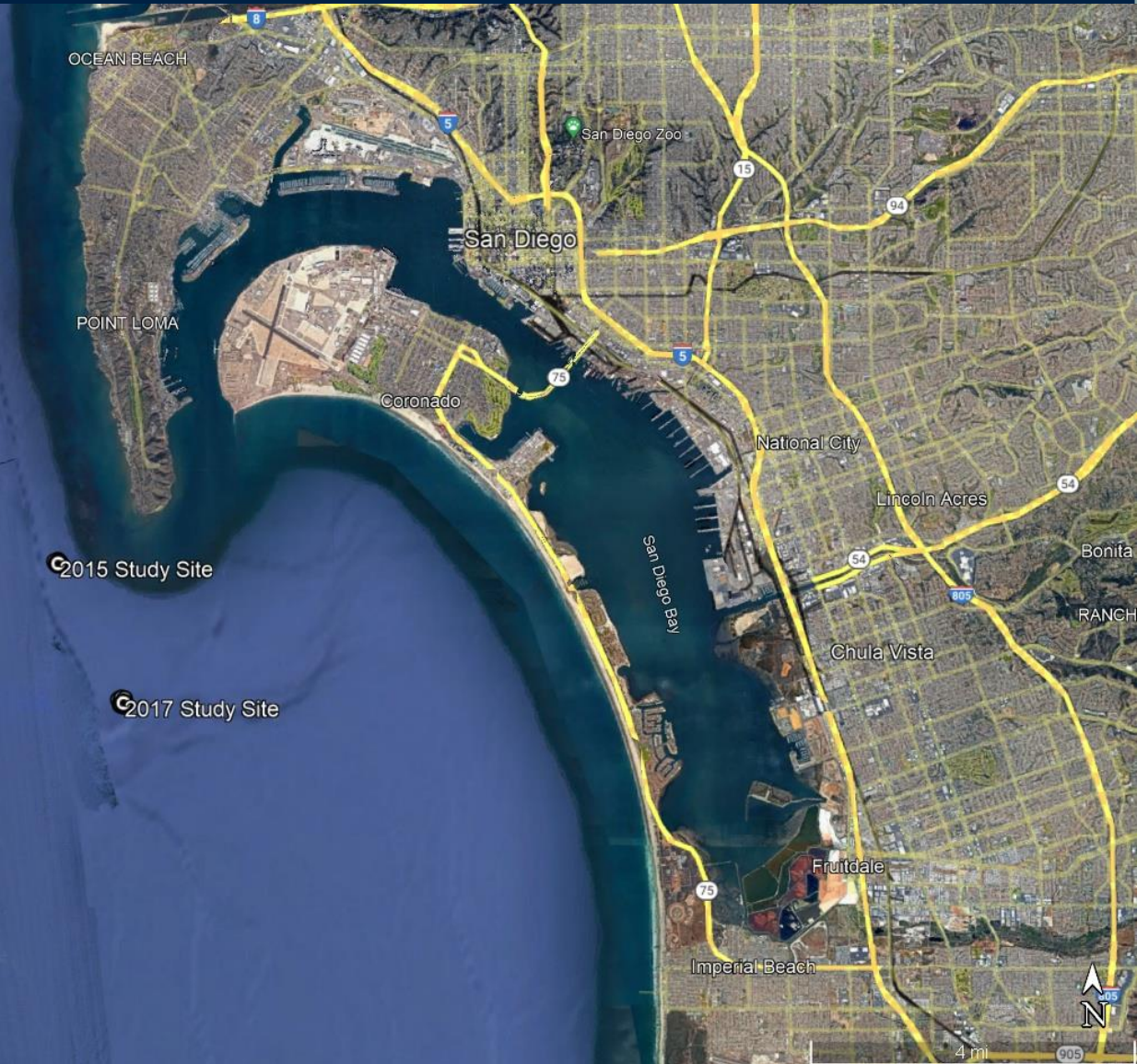


**NOAA
FISHERIES
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COMPLETED TWO PINTO ABALONE TRACKING STUDIES 2014 AND 2017

Tracking Study sites

2015 and 2017

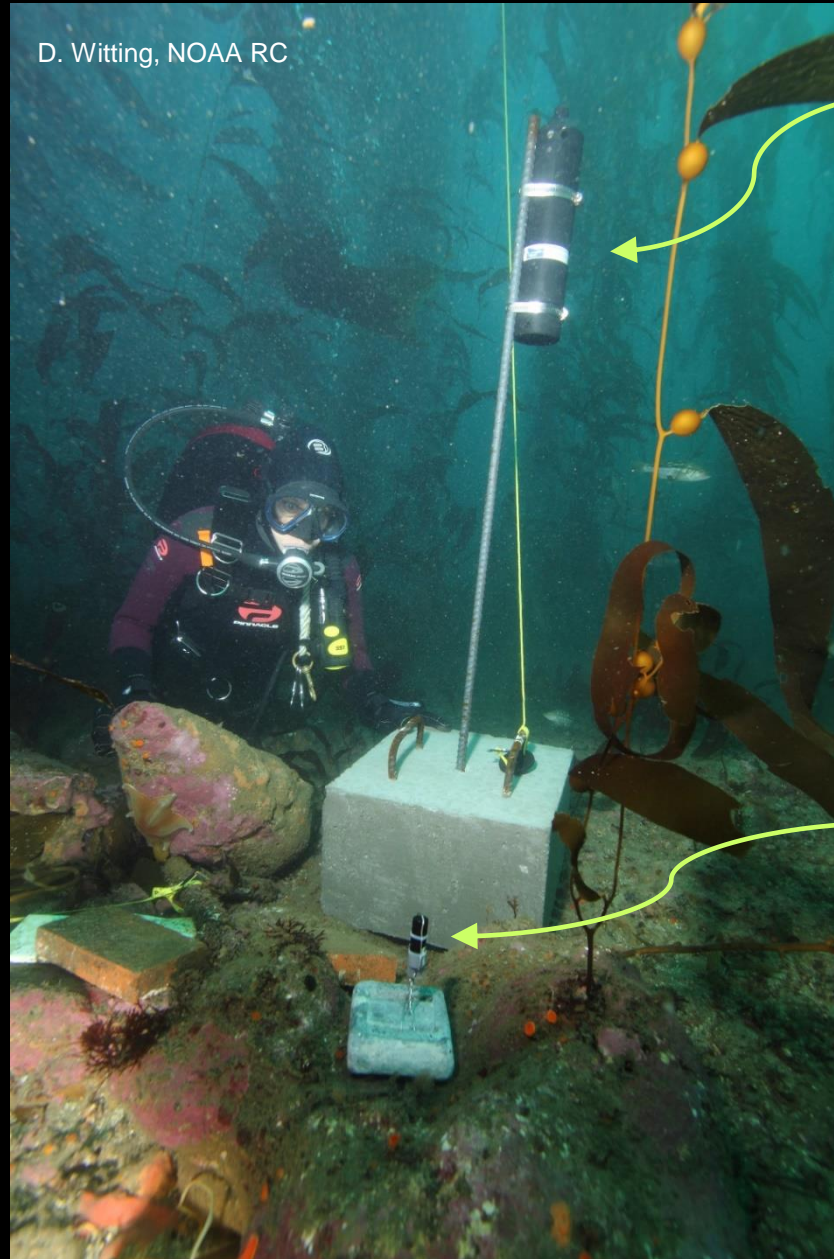


Google Earth

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

METHODS: ARRAY TEST

- Array Test at study site off of Pt. Loma
- Vemco Hydrophone (VR2W-69kHz)
- Range test tag
- 70-m radius based on a preliminary range test



Acoustic receiver

Stationary Test Tag

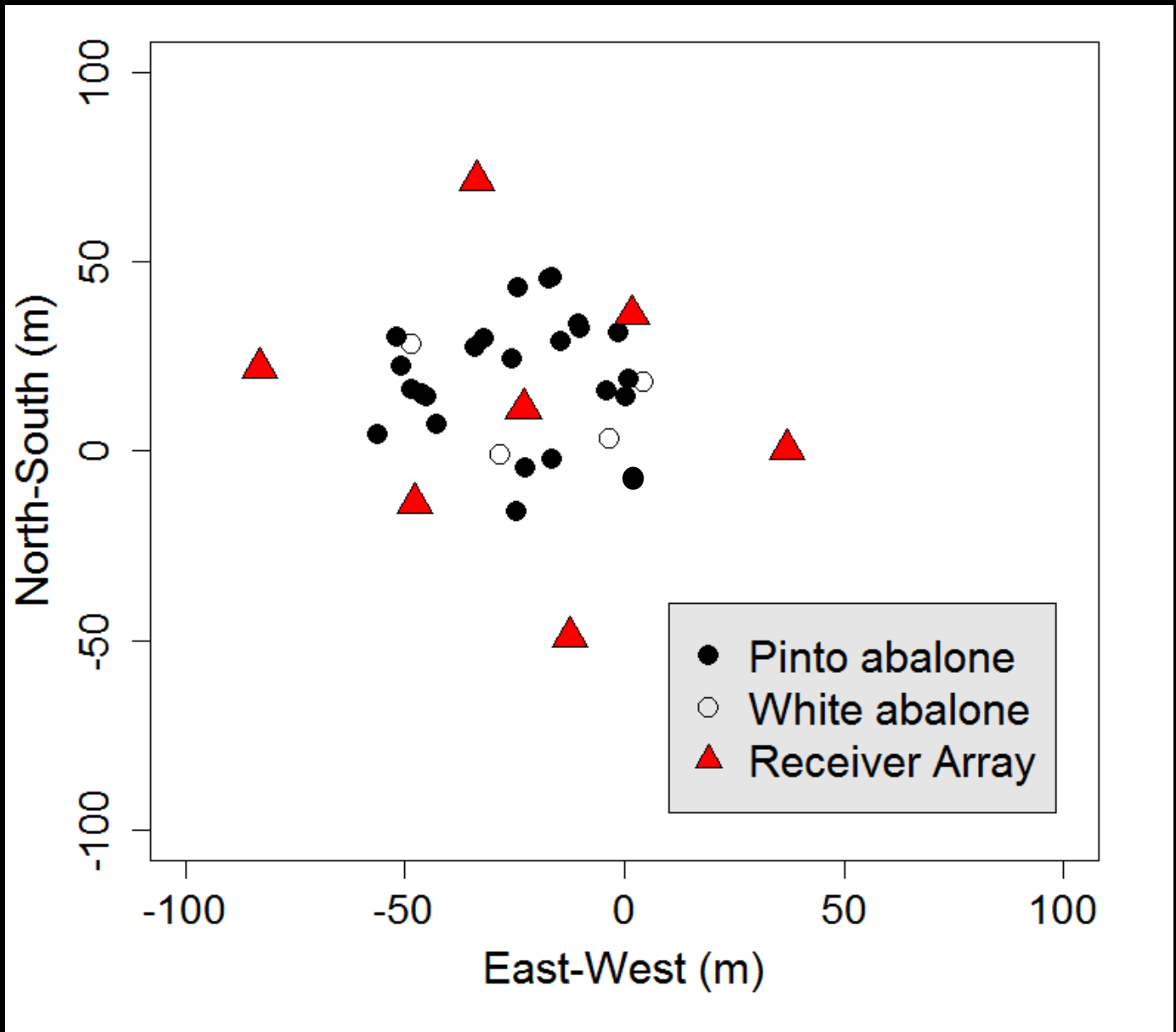
METHODS 2015: TAGGING

Vemco V9 acoustic tags placed on 26 abalone (95-142 mm SL) in Nov. 2015

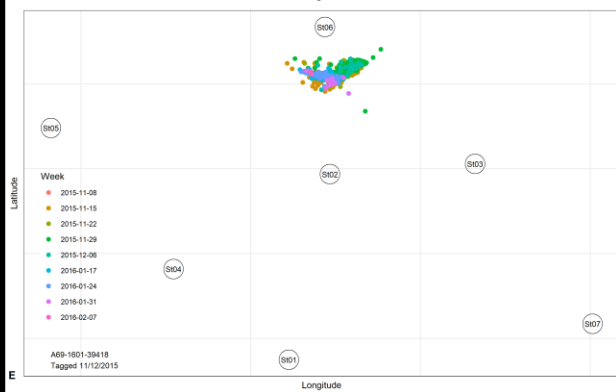
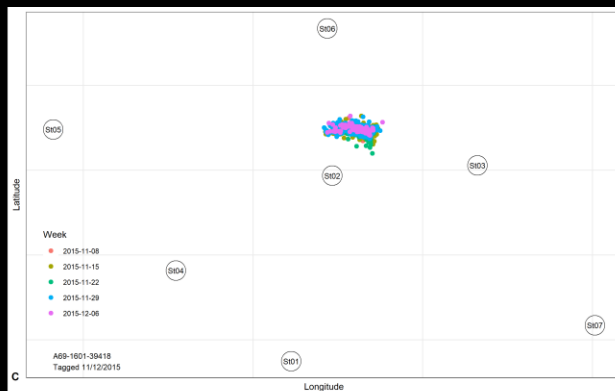
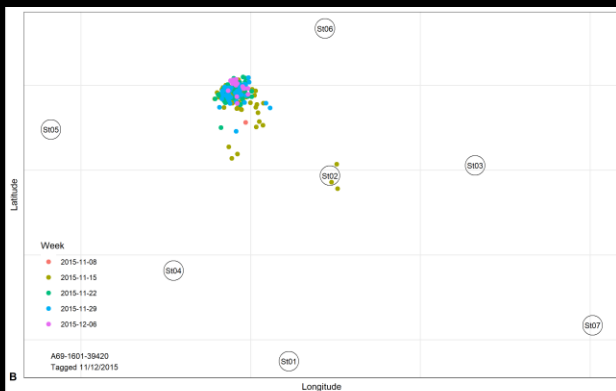


RESULTS 2015: INITIAL SET-UP

- Initial positions of 26 pinto abalone within the array
- Site area ~9,100 m²
- Site was visited regularly over 180 d period, empty shells were collected
- June 2016- receivers & tags removed
- Movement data was obtained from 10 abalone

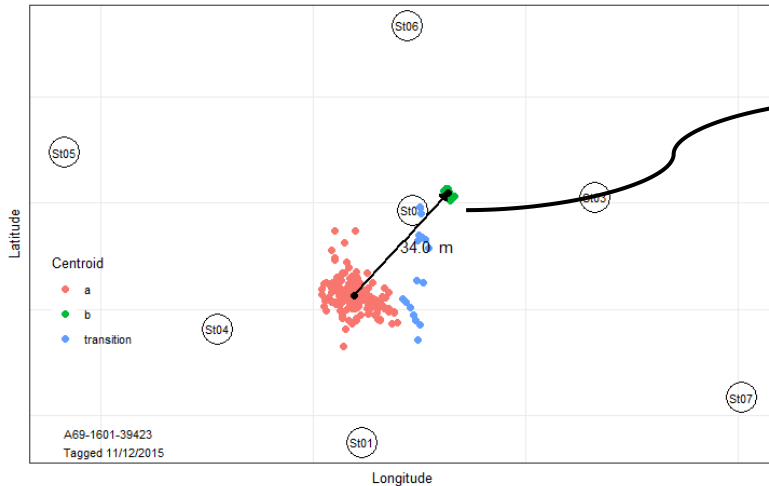
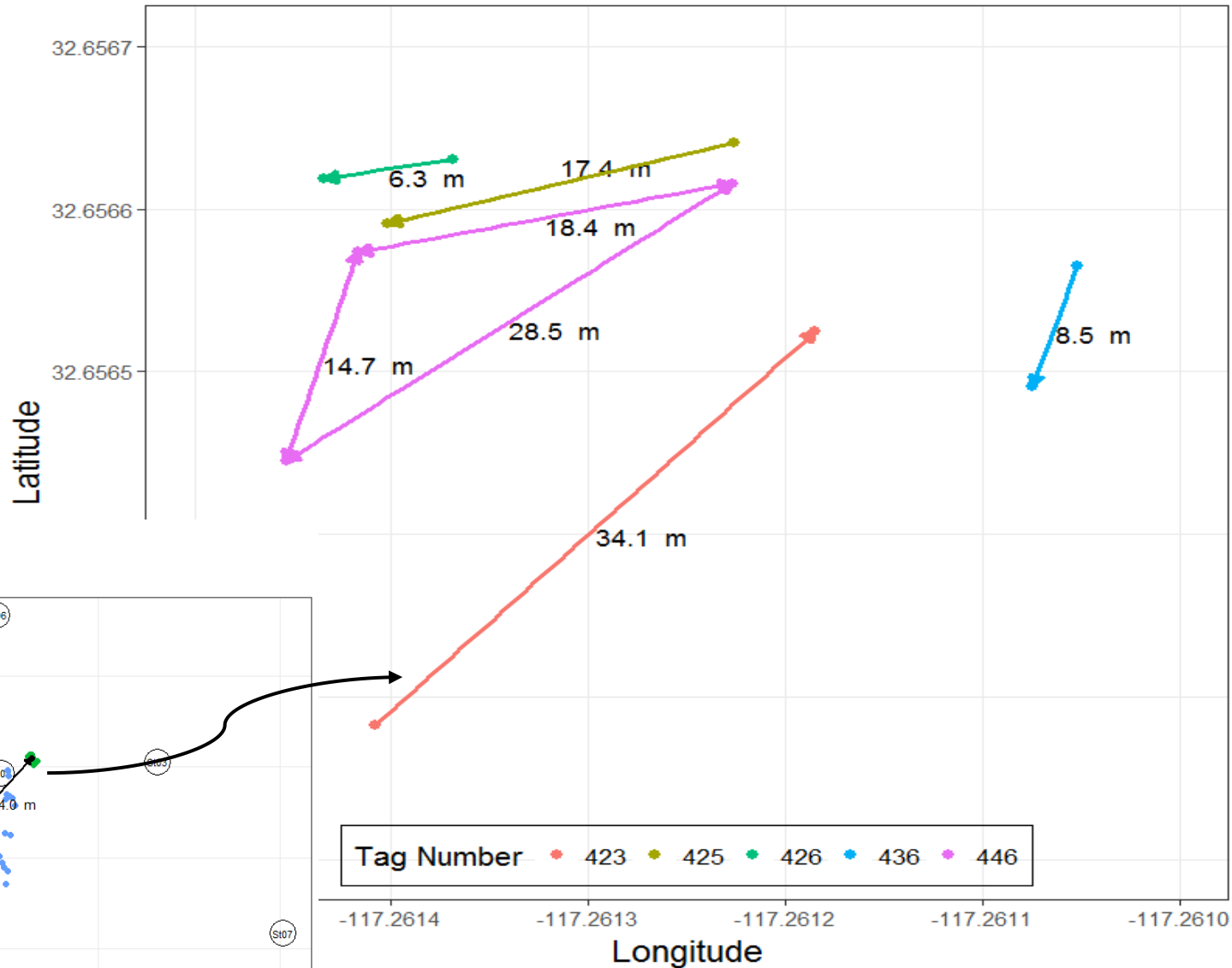


RESULTS 2015: ABALONE THAT DID NOT MOVE (N=5)



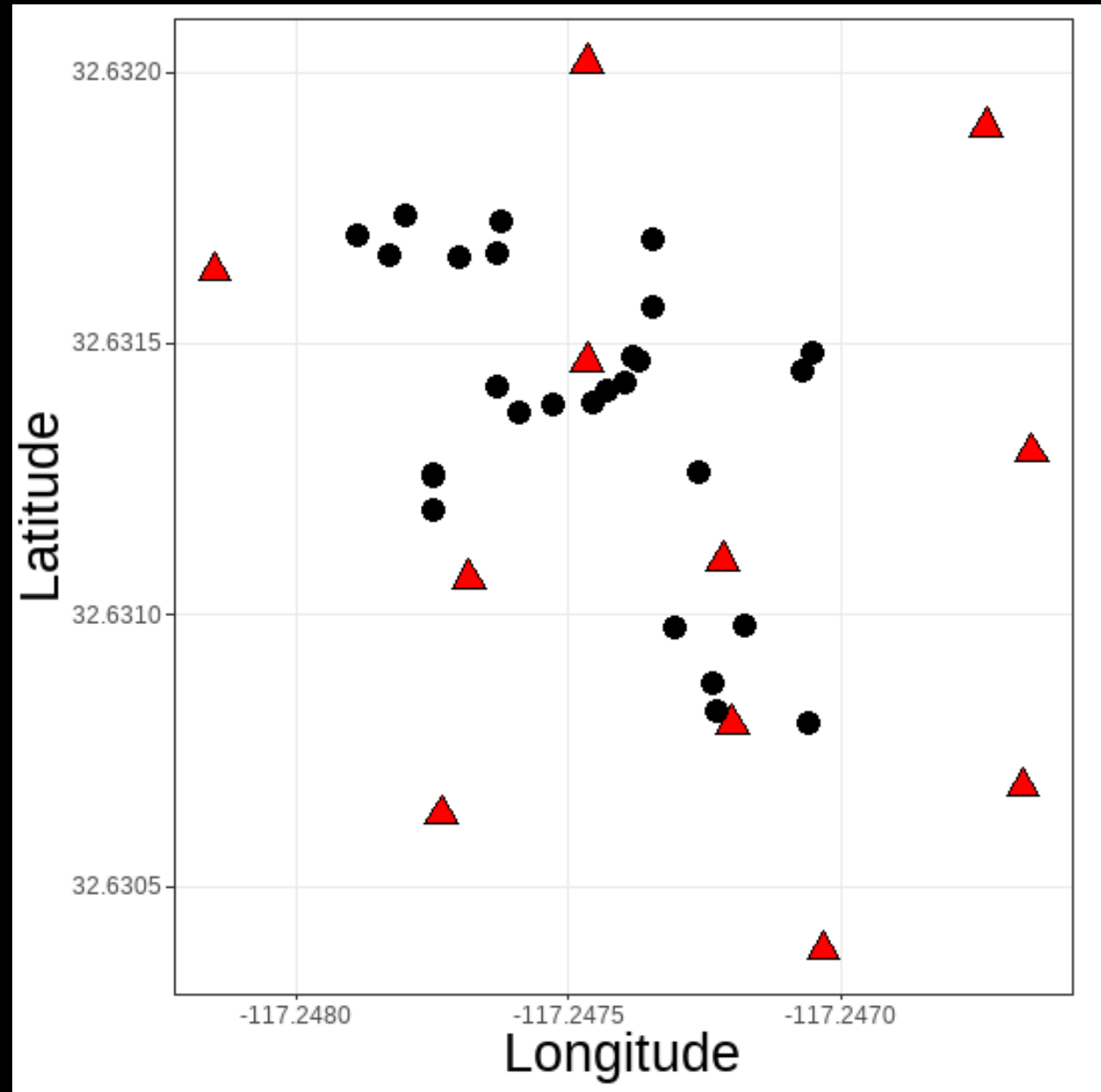
RESULTS 2015: MOVEMENT

- Average of estimated locations
- Distances between average locations & direction



RESULTS 2017: INITIAL SET-UP

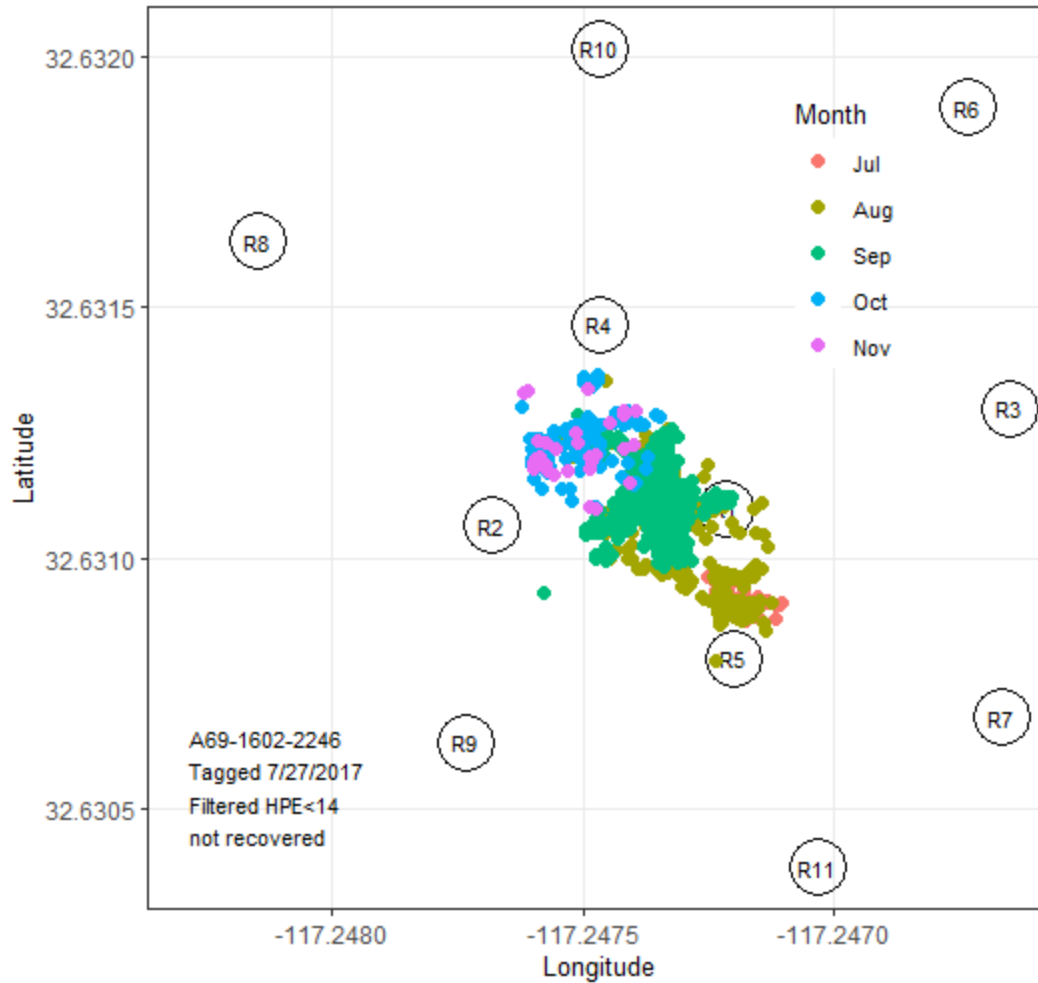
- Initial positions of abalone within the array (n=30)
- Site area ~18,700 m²
- Site was visited regularly over 210 d period, empty shells were collected
- January 2018-receivers & tags removed
- Movement data from all 30 abalone



RESULTS: MOVEMENT

Pt. Loma Receiver Array - Pinto Tracking II

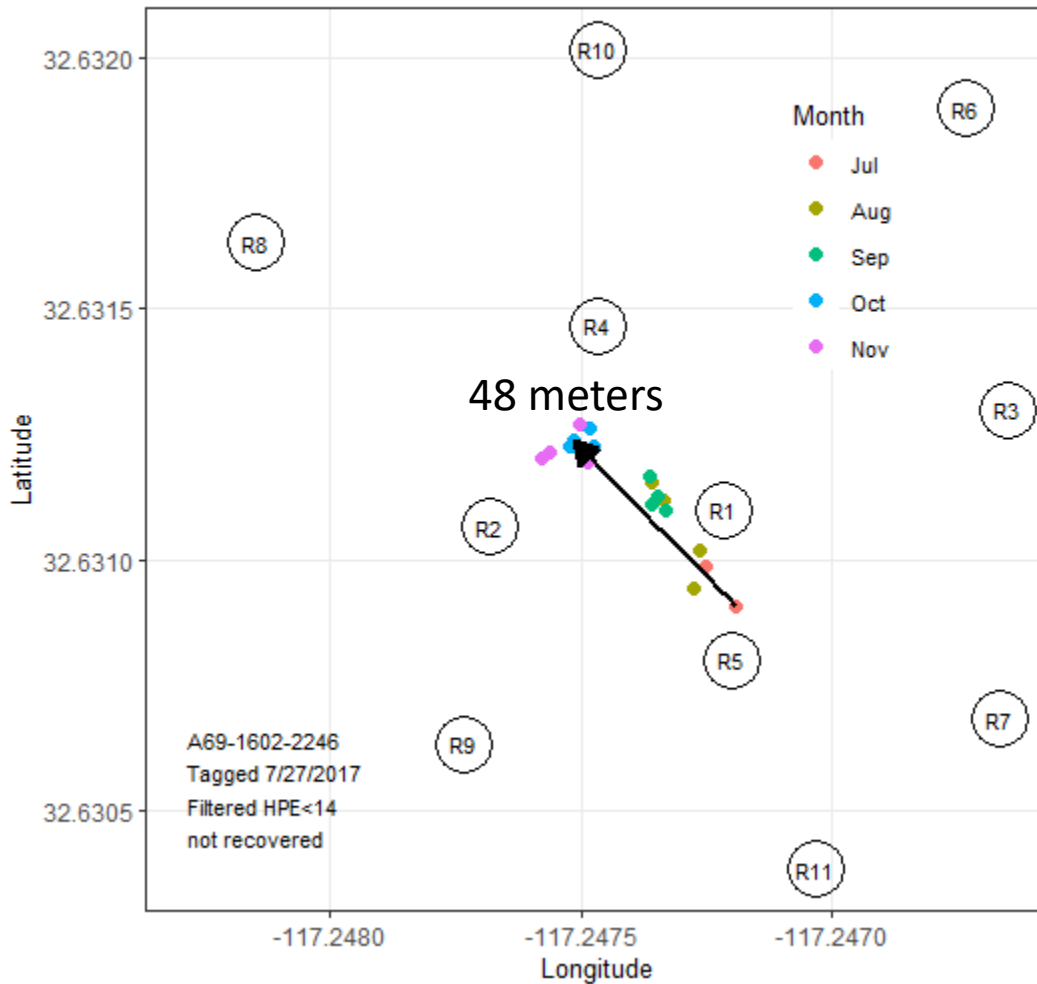
Abalone A69-1602-2246, Raw Data



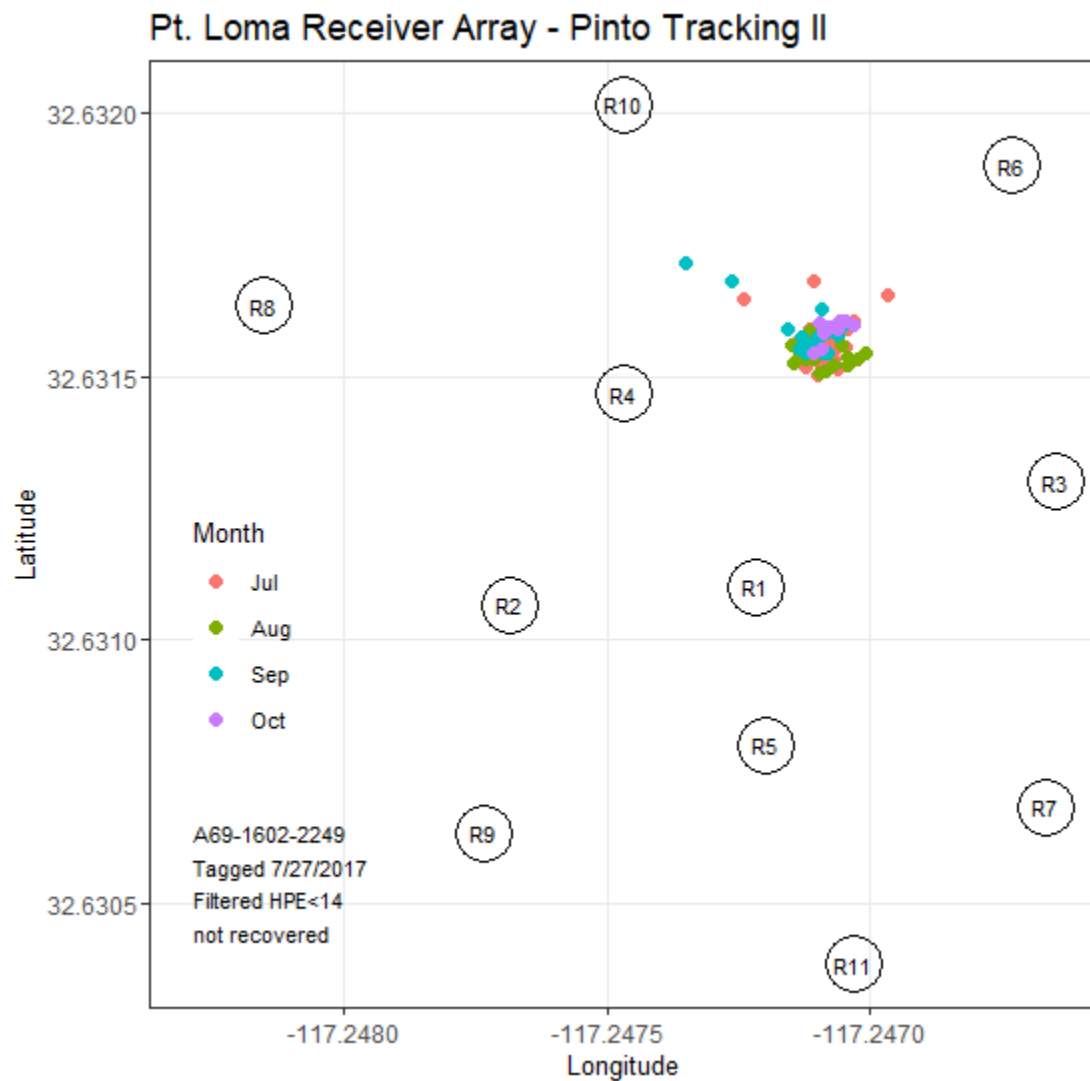
RESULTS: MOVEMENT

Pt. Loma Receiver Array - Pinto Tracking II

Abalone A69-1602-2246, Raw Data



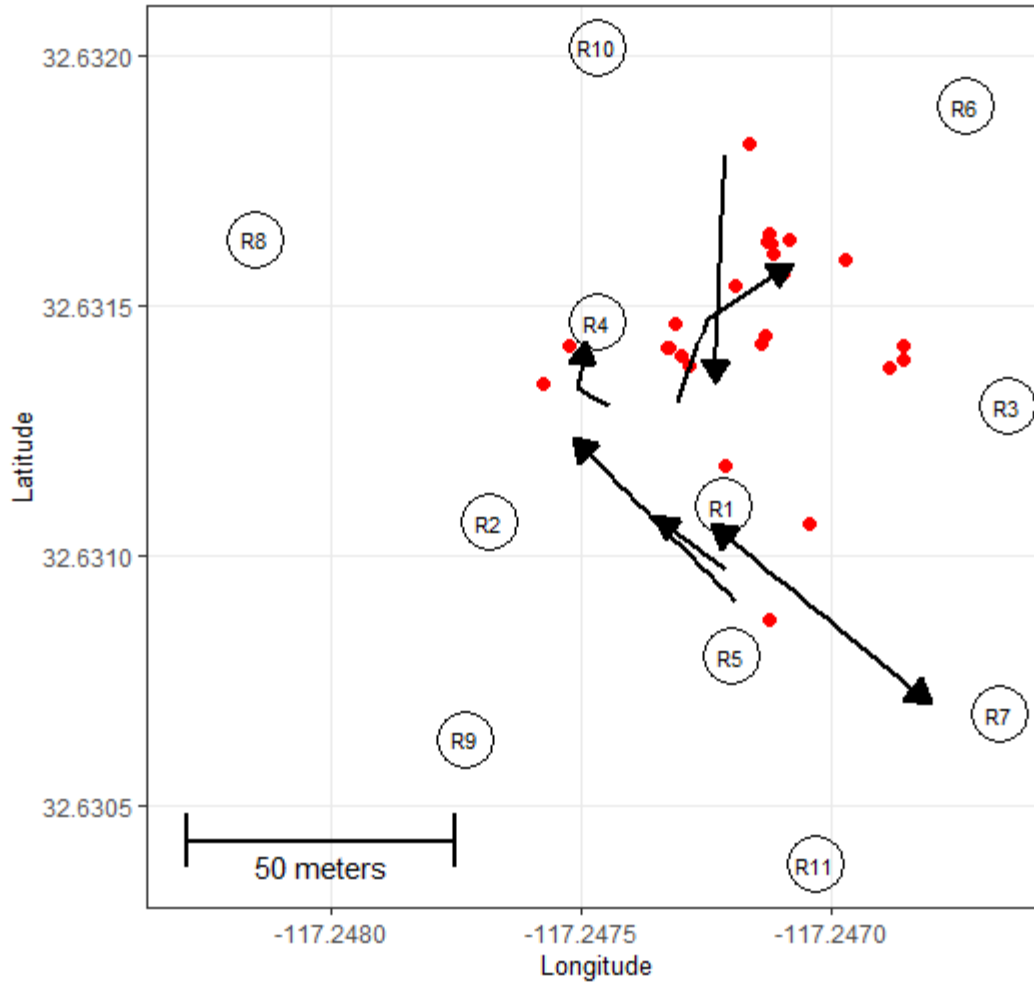
RESULTS 2017: MOVEMENT



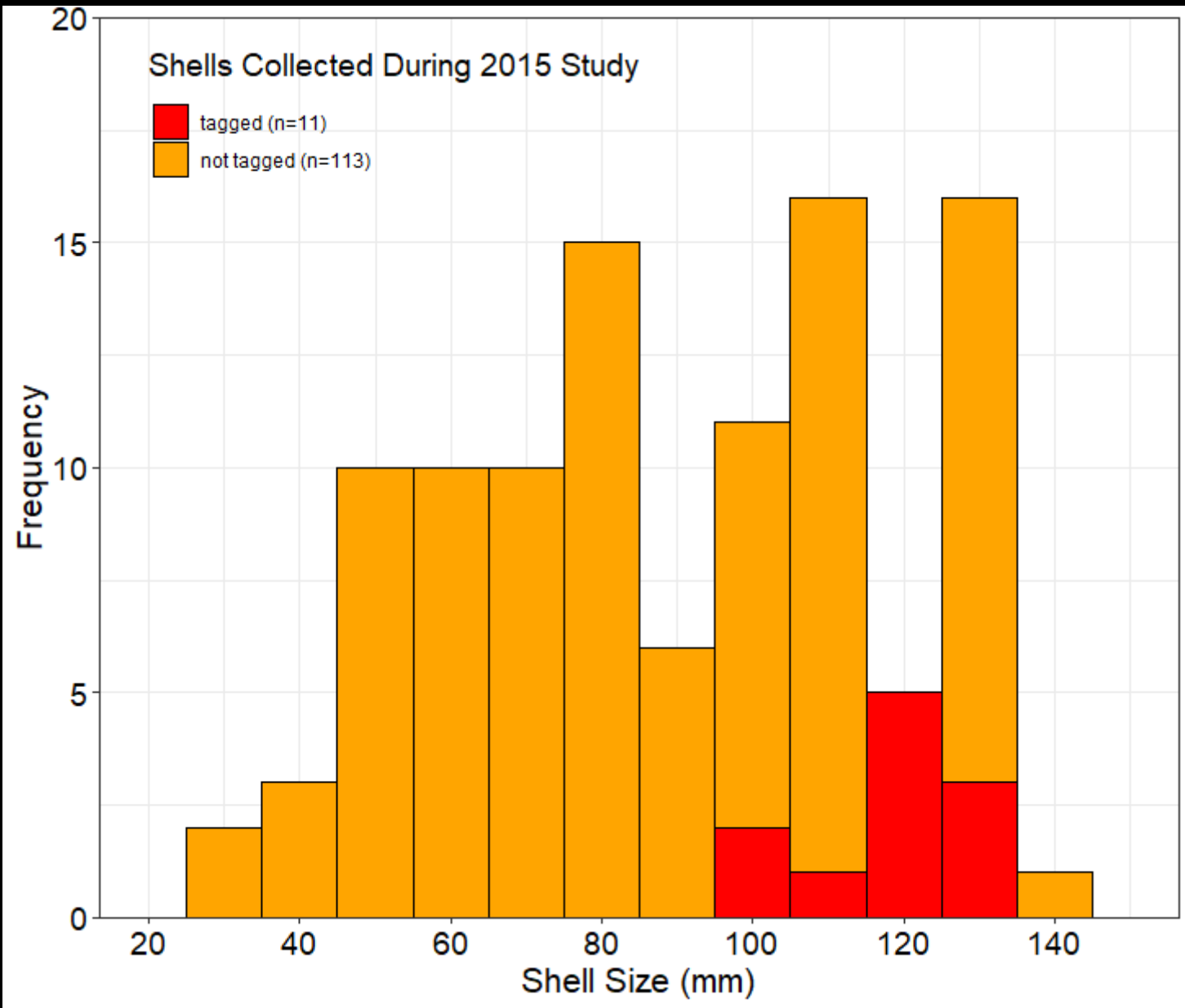
RESULTS: MOVEMENT

Pt. Loma Receiver Array - Pinto Tracking II

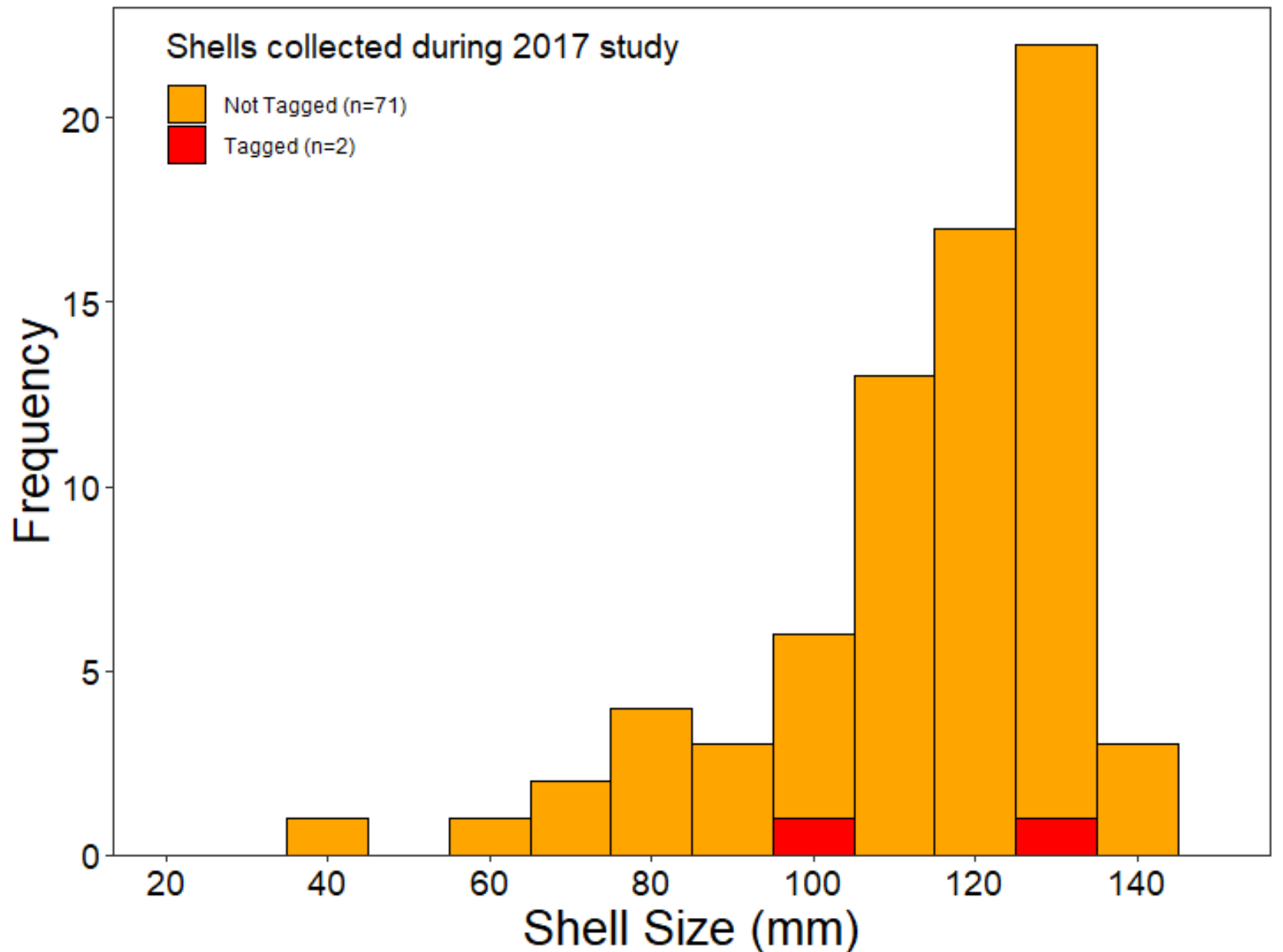
Stationary Abalone (n=24) with mobile abalone trajectories (n=6)



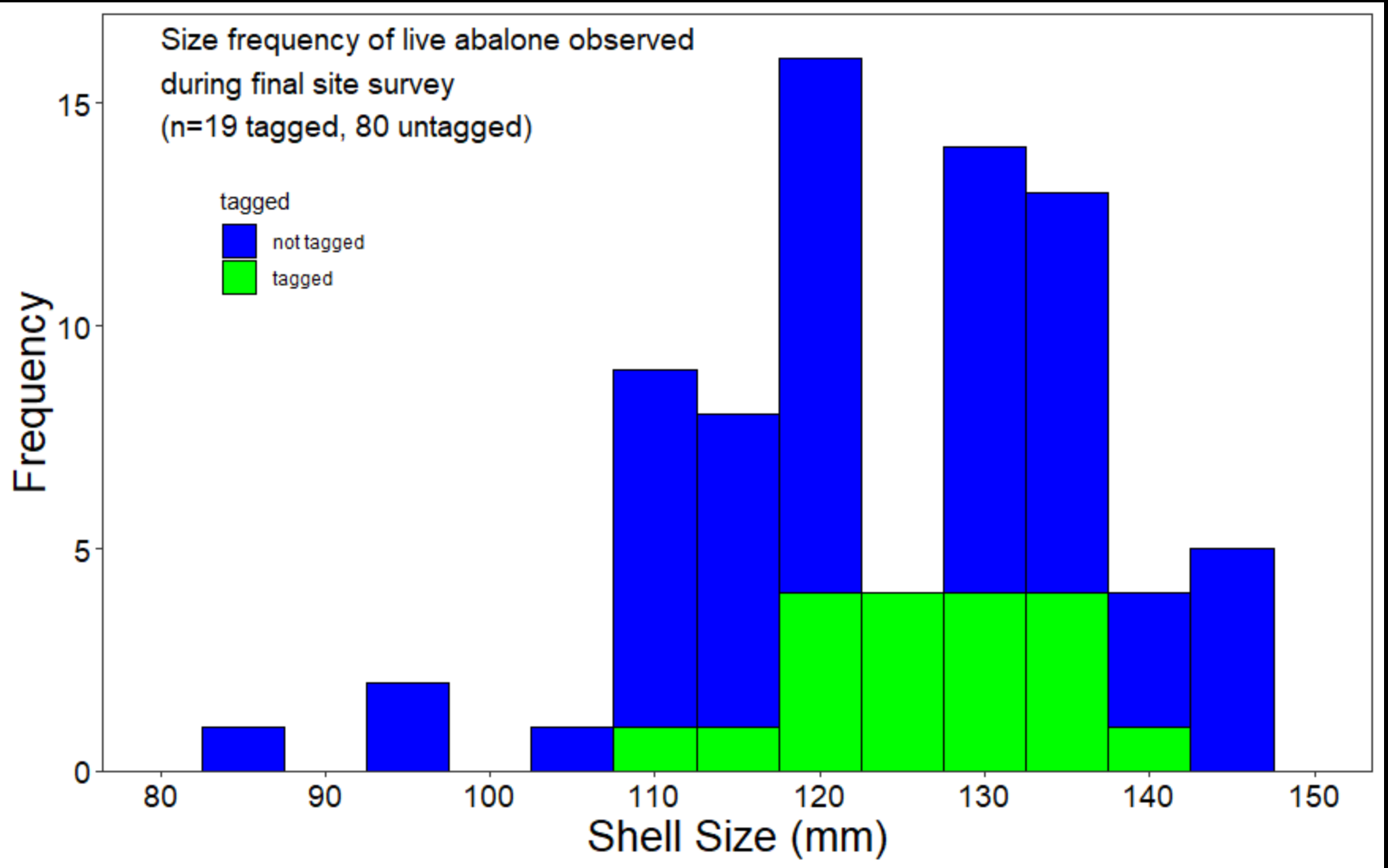
RESULTS 2015: MORTALITY



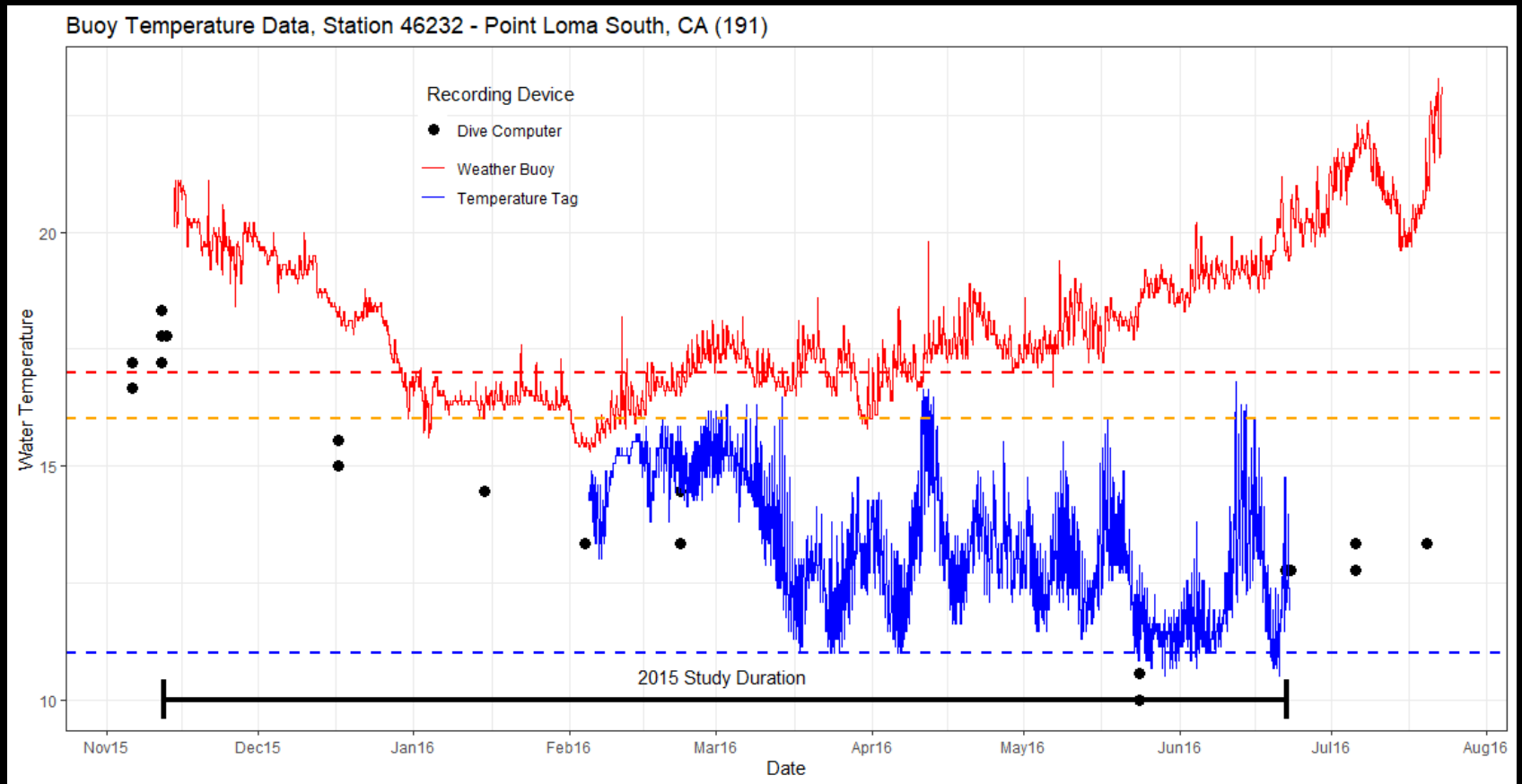
RESULTS 2017: MORTALITY



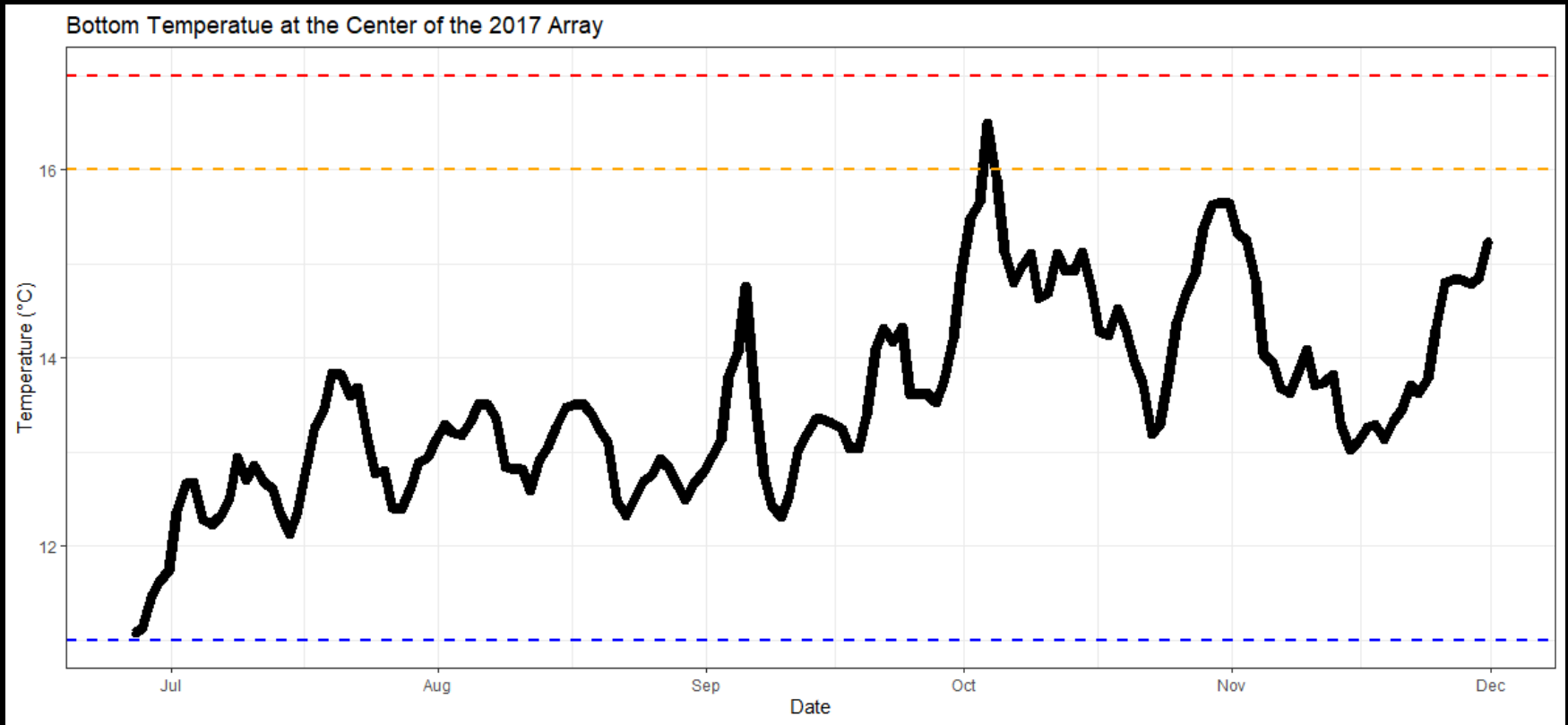
RESULTS 2017: SURVIVAL



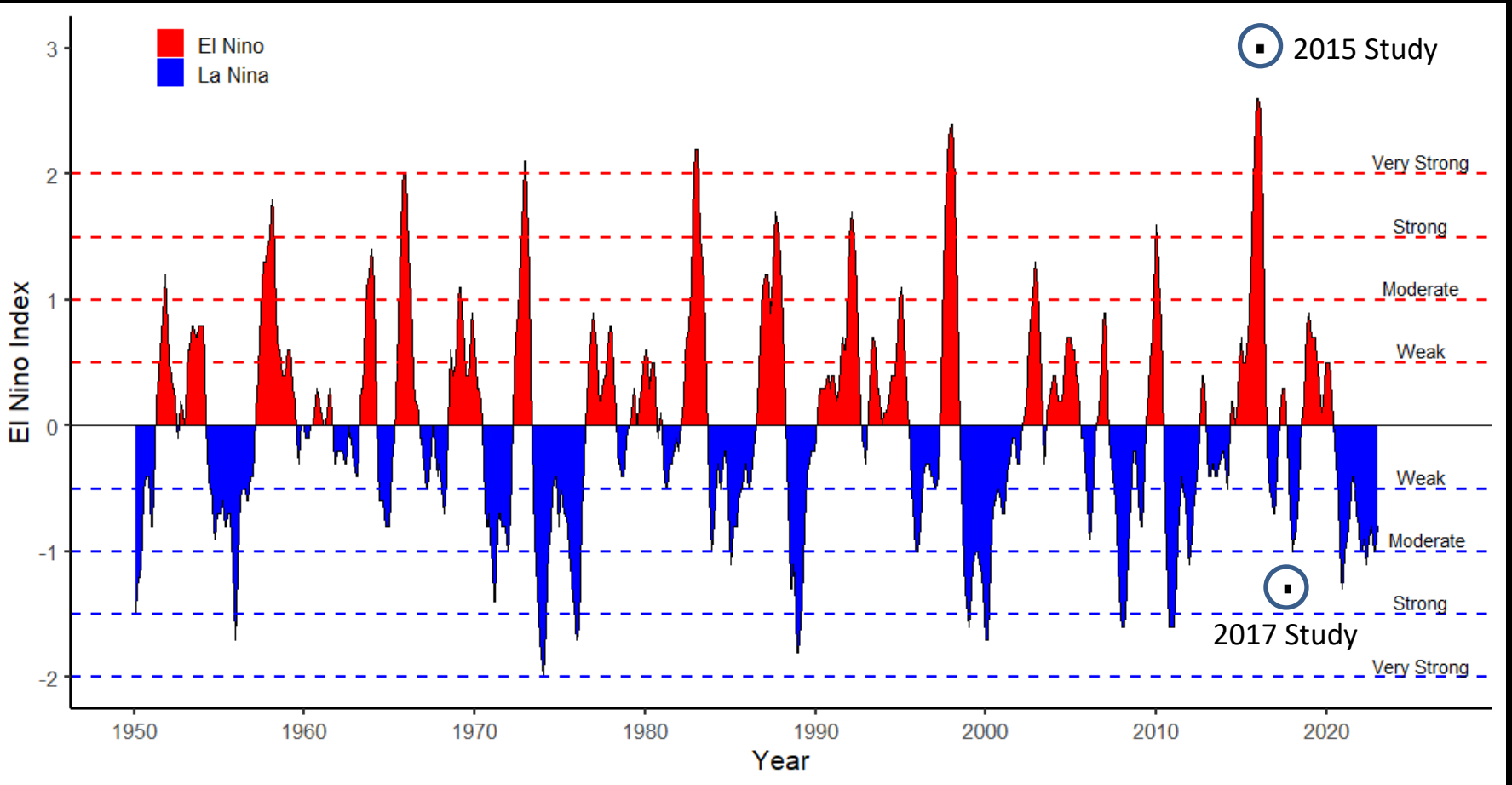
RESULTS 2015: TEMPERATURE



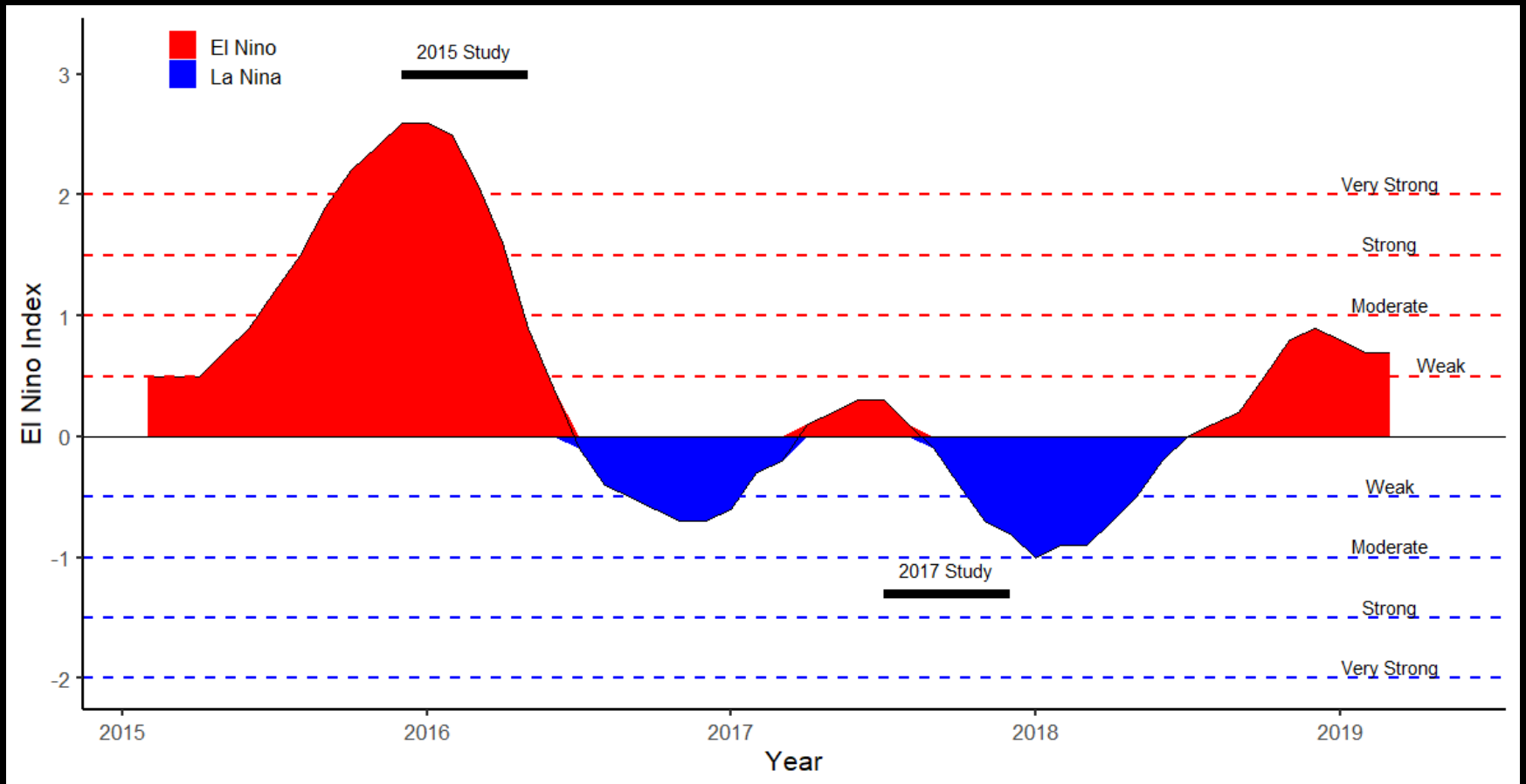
RESULTS 2017: TEMPERATURE



OCEANOGRAPHIC CONDITIONS



OCEANOGRAPHIC CONDITIONS



RESULTS 2015: DRAMATIC KELP REDUCTION



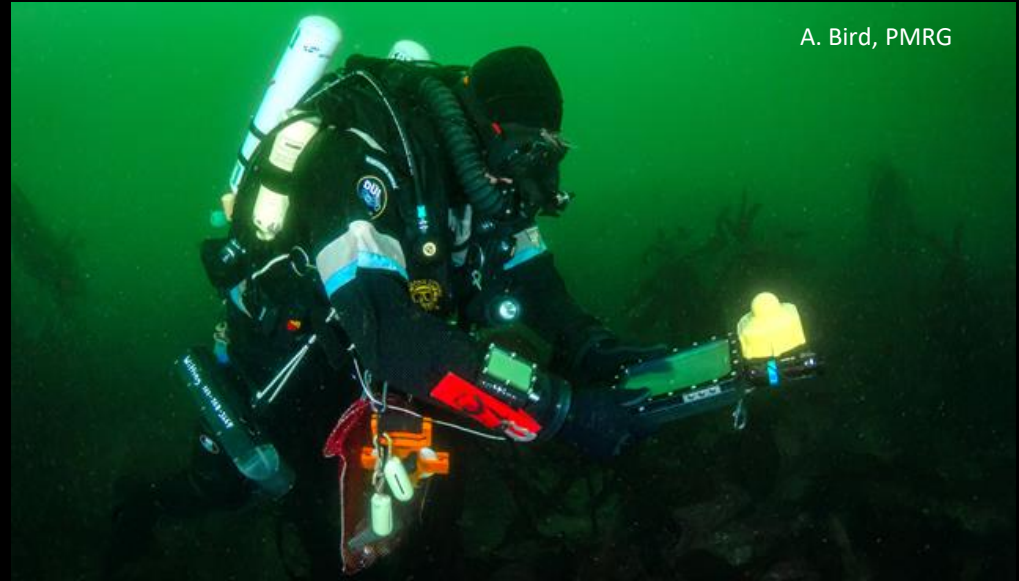
RESULTS: SUMMARY

Parameter	2015 Study	2017 Study
Study Duration (Days)	180	210
Site area (m ²)	9,100	18,700
Tagged pinto abalone	26	30
Size range (mm)	95-142	98-166
Average size (mm)	120	127
Usable location data	10	30
Moved	5	6
Stationary	7	24
Distance moved (range, meters)	6-34	17-50
Recovered live	3	19
Recovered dead	11	2
Still at large	12	9
Depth of site (meters)	18	23
Distance between the two sites = 3 km		

CONCLUSIONS

- Acoustic telemetry an effective tool for examining emergent abalone movement, but is better at detecting movements that exceed 10 meters.
- Movement was measured in multiple tagged pinto abalone during both tracking studies, but the drivers for movement were likely different.
- These movements are sufficient to increase the encounter rates.
- High pinto abalone mortality in 2015 likely related to El Niño conditions
- El Niño conditions appear to have variable impacts on abalone and their habitat at small spatial scales.

ONGOING AND FUTURE WORK



- Continue to examine abalone movement at a range of spatial scales.
- Acoustic pinger/interrogator
- Diver-held underwater GPS
- Time-lapse cameras





ACKNOWLEDGEMENTS



We would like to thank all those who contributed to hours of field work especially:

Bill Hagey (Pisces Design), Scott Mau (SWFSC), Cleridy Lennert (UCSD), Brian Sterling (SDSU), Julia Coates, Mo Sedarat, Jenny Hofmeister, Ian Taniguchi and Chuck Dobbins (CDFW), Noah Desrosiers (volunteer), Johnny Lawson and Shad Catarius (F/V Nicole Ann)

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A. Obaza, PMRG

A pair of tagged pinto abalone- hopefully a male & female !