

Title: Where Do The Fish Go? Incorporating Home Range Size In Marine Protected Area Design
 PMIS# 190530

Contact: Dr. Tim Clark, NPSA Marine Ecologist

This project is to investigate the movement patterns and home range of reef fish species that are caught for local consumption (approximately 12 species) in American Samoa. Of the twelve proposed target species, only *Variola louti* and *Lutjanus bohar* were captured and tagged in 2015 (Table 1). One GS-7 biotech was hired and seven Samoan students were involved in the project this year. Scholarships were obtained for students through the Short-Term Research Experience for Underrepresented Persons (STEP-UP), and the Highly Engaged Learning Placement (HELP) programs. Receivers were downloaded this year, with data from five of six fish tagged in 2015. Data from the three *V. louti* tagged show extensive movements up and down the coast, with short tag life. This is highly suggestive of consumption by a predator, most likely a shark. Data from *L. bohar* tag# 24571 suggested limited movement from its home receiver and a strong diel cycle in habitat use over 210 days of tag returns. *Lutjanus bohar* tag# 24566 had 146 days of tag returns, and also showed high site fidelity except for occasional movements up to 11 km along the coast lasting 3-5 days. These movements appear to follow a lunar cycle, suggesting migration to a spawning aggregation site. See Appendix 1 for receiver locations and Appendix 2 for details of tracking results.

Table 1. Data from six fish captured and tagged in 2015.

Date	Time Caught	Time Released	Species	Transmitter ID	# of Pings	# Days Pinged	Sphetti Tag #	TL	FL	SL	Lat	Long	Location
7/6/15	12:56	13:35	Lutjanus bohar	24566	1957	146	None	56	53	43	-14.25350	-170.70238	Agapie
8/6/15	14:32	15:01	Variola louti	24567	243	10	101	30	26	21	-14.251903	-170.690276	Tafeu
8/12/15	13:33	14:05	Variola louti	24574	344	8	126	37	32	26	-14.25710	-170.70491	Agapie
8/20/15	11:23	11:55	Lutjanus bohar	24571	40361	210	None	58	54	44	-14.25924	-170.70419	Agapie
8/25/15	12:04	12:35	Variola louti	24575	0	0	103	56	48	37	-14.26104	-170.71252	Agapie
8/25/15	13:51	14:15	Variola louti	24568	789	13	128	38	33	26	-14.26053	-170.70804	Agapie

Accomplishments to date:

- Scholarship obtained for one local high school student through STEP-UP program
 - Cassie Mahuka
- Scholarship obtained for five UH Hilo student through HELP program
 - Natasha Ripley
 - Leilua Watson
 - Anthony Sagapolutele
 - Taisi Kulberg
 - Valentine Vaeoso
- One ASCC students volunteer
 - Johann Vollrath
- Student presentations were given for their various scholarship programs

- Fifteen receivers downloaded
- Three *V. louti* tracked, although tracks suggest shark predation
- Two *L. bohar* tracked, showing diel movement cycles and possible migration to spawning area

Tasks and Schedule:

Research tasks are delayed from the original DIP by approximately one year due to difficulty starting the first year while dealing with a crown of thorn starfish outbreak. A 29-month tracking project is still desired, with a start date of March 2015 and ending September 2017. In general, research activities will follow the schedule in Table 2.

Table 2. Schedule of research activities.

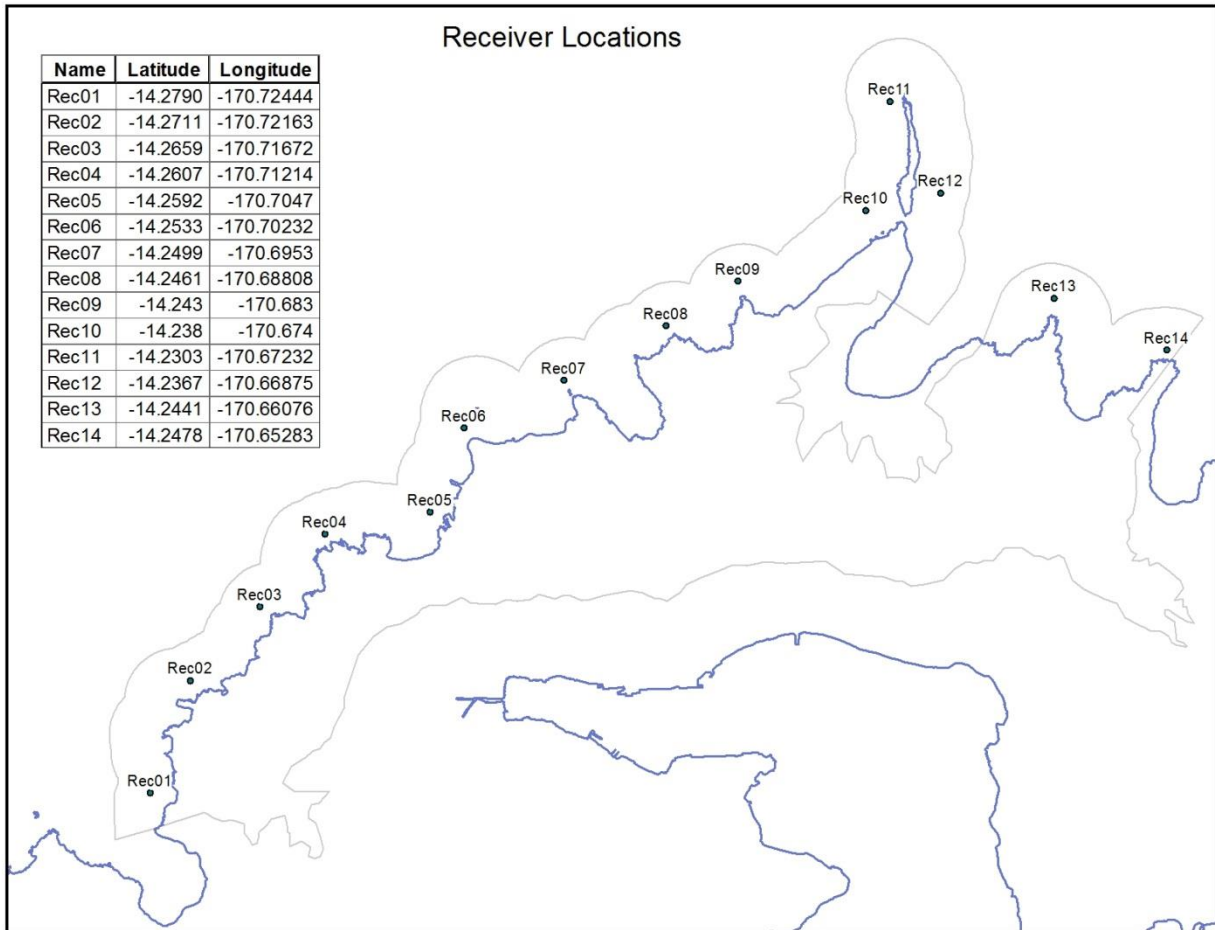
<i>Date</i>	<i>Activity</i>
Month 1 – March 2015	Year 1 students start project
	NPS IACAUC due
	NEPA due
	ASCC agreement due
	DMWR permit due
	Purchase supplies for year 1
	Deploy Receivers
	Develop fish capture methods
Month 2	Start capture and tagging of fish for year 1
Month 6	Download Receivers
Month 12	Year 2 students start project
	Purchase supplies for year 2
	Download and re-battery Receivers
Month 13	Start capture and tagging of fish for year 2
Month 18	Download Receivers
Month 24	Year 3 students start project
	Purchase supplies for year 3
	Download and re-battery Receivers
Month 25	Start capture and tagging of fish for year 3
Month 30 – September 2017	Download Receivers – Active tracking ends

Justification for Project Delay:

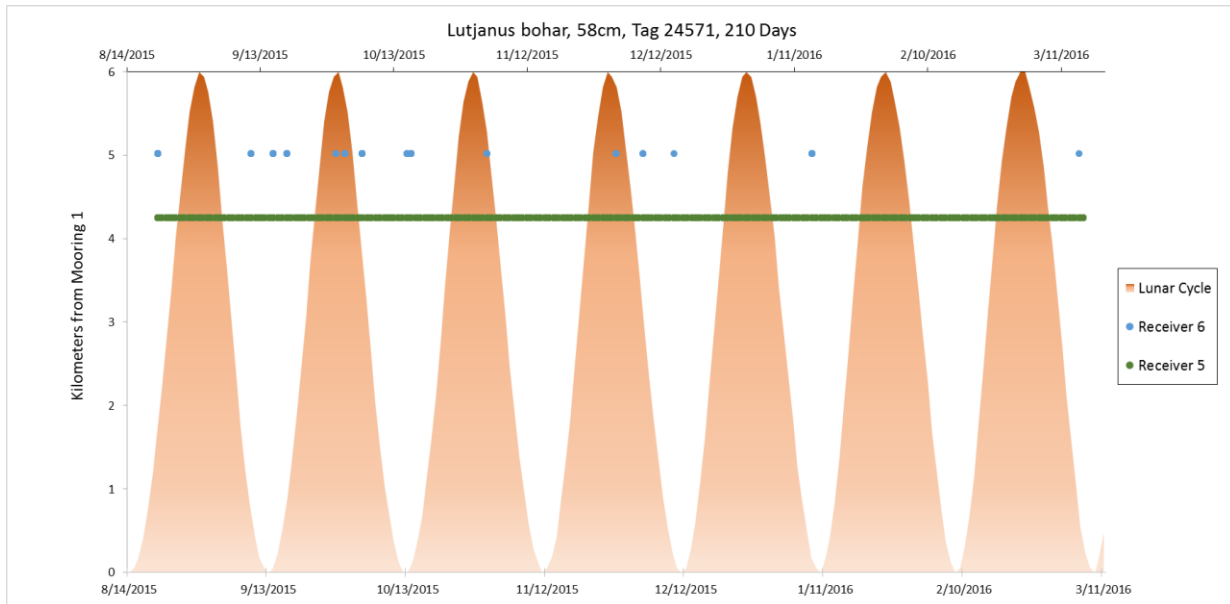
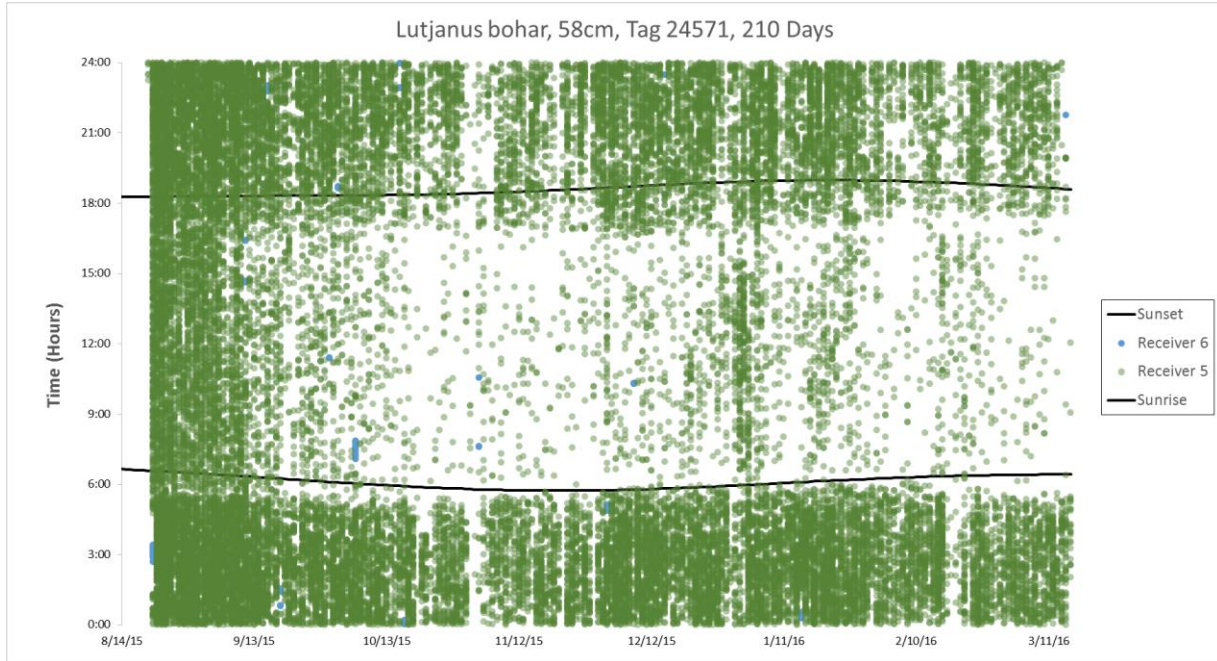
Outbreak levels of crown of thorn starfish (COTs) were detected in American Samoa in November 2011 on the South side of Tutuila. In August 2013 COTs were detected on the North side of Tutuila, including in park waters. Base funds for the park’s marine program were also reduced during this period, making it difficult to run multiple projects at the same time. Park staff made the decision to concentrate all marine efforts on COTs eradication in order to protect park reefs. These efforts have proven successful, with current surveys showing no current outbreaks in park waters. COTs control efforts are continuing outside

of the park, but demands on the marine ecologist have lessened and NPSA is now investigating fish movement patterns and home range.

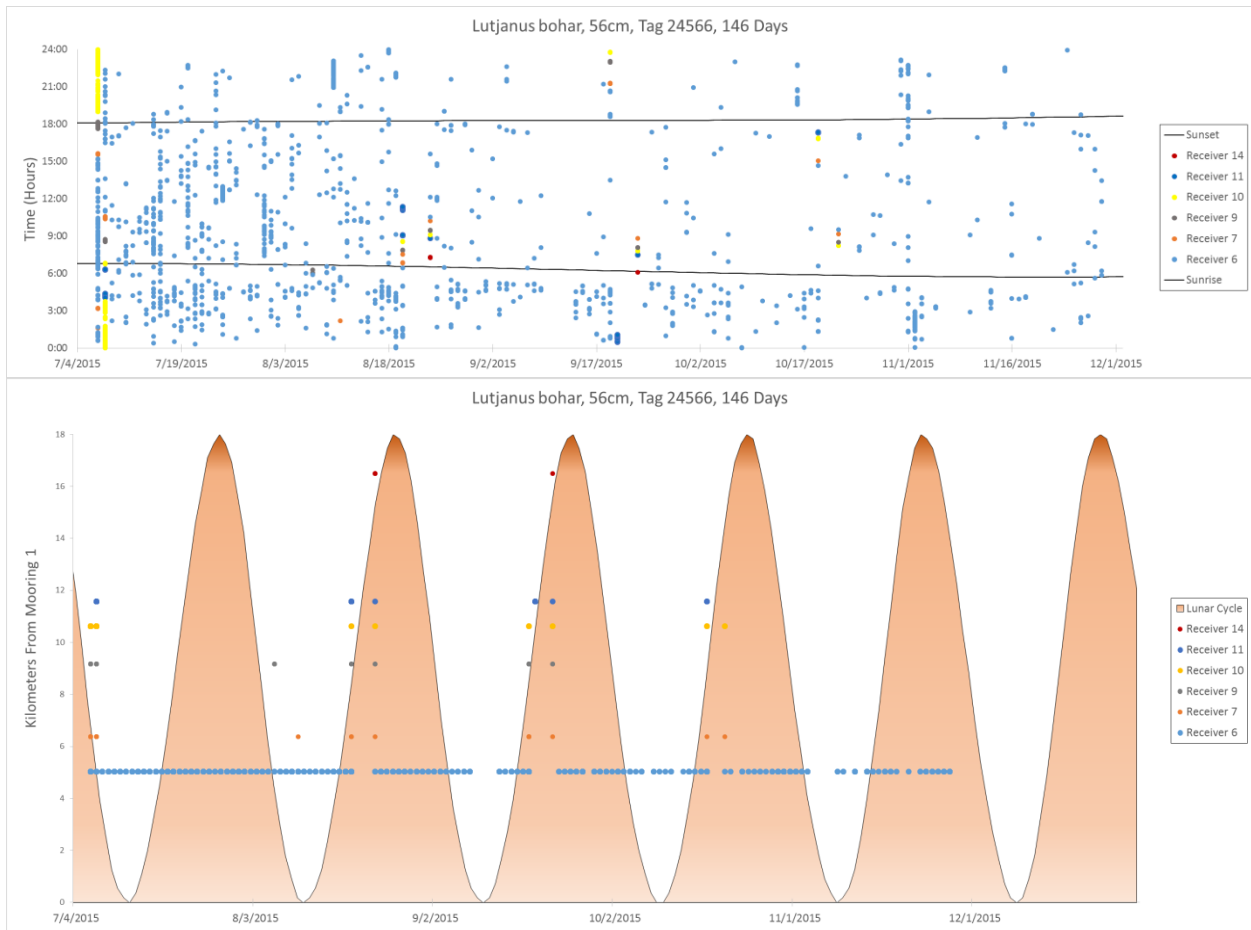
Appendix 1: VR2W Receiver locations



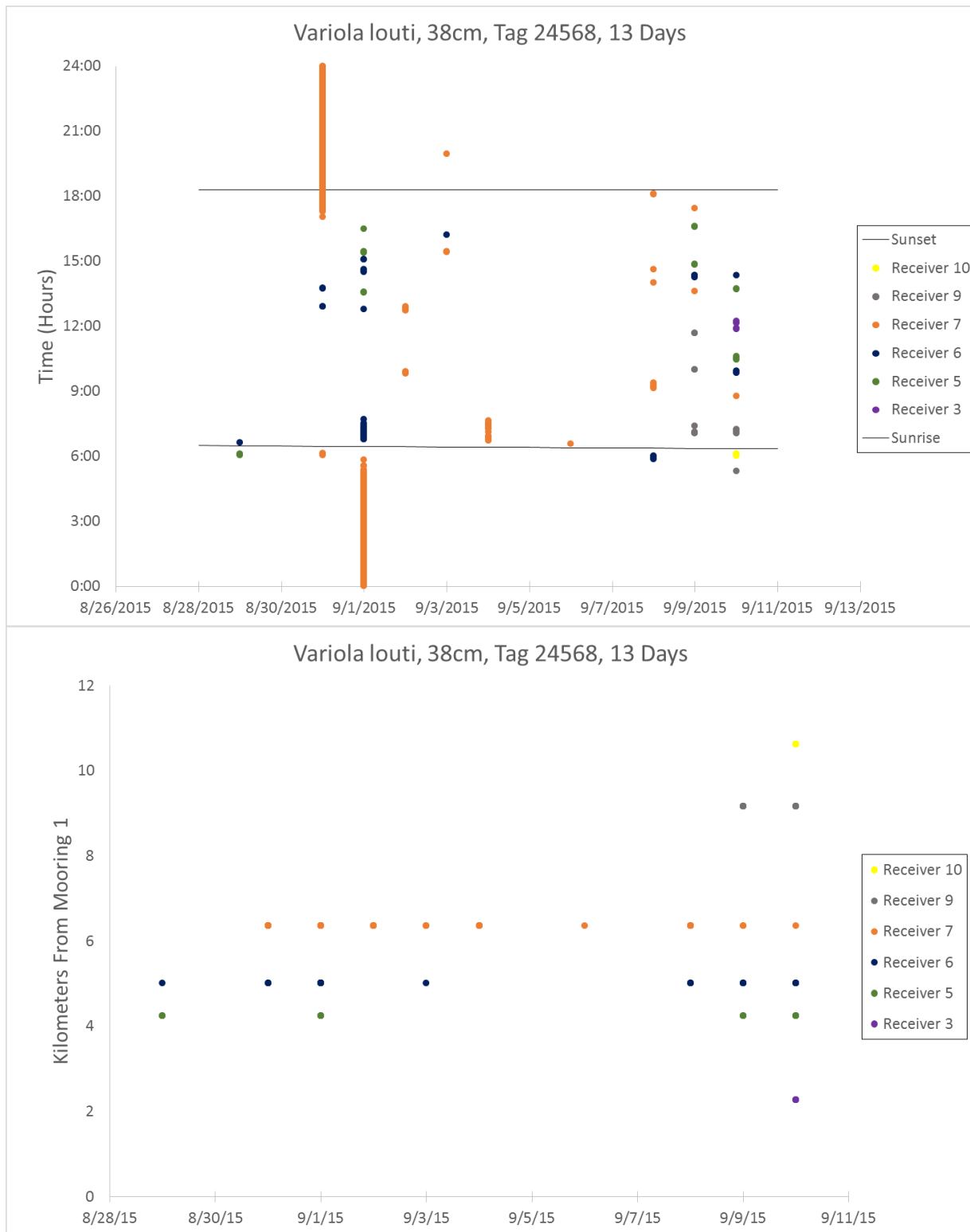
Appendix 2: Tracking data from five tagged fish



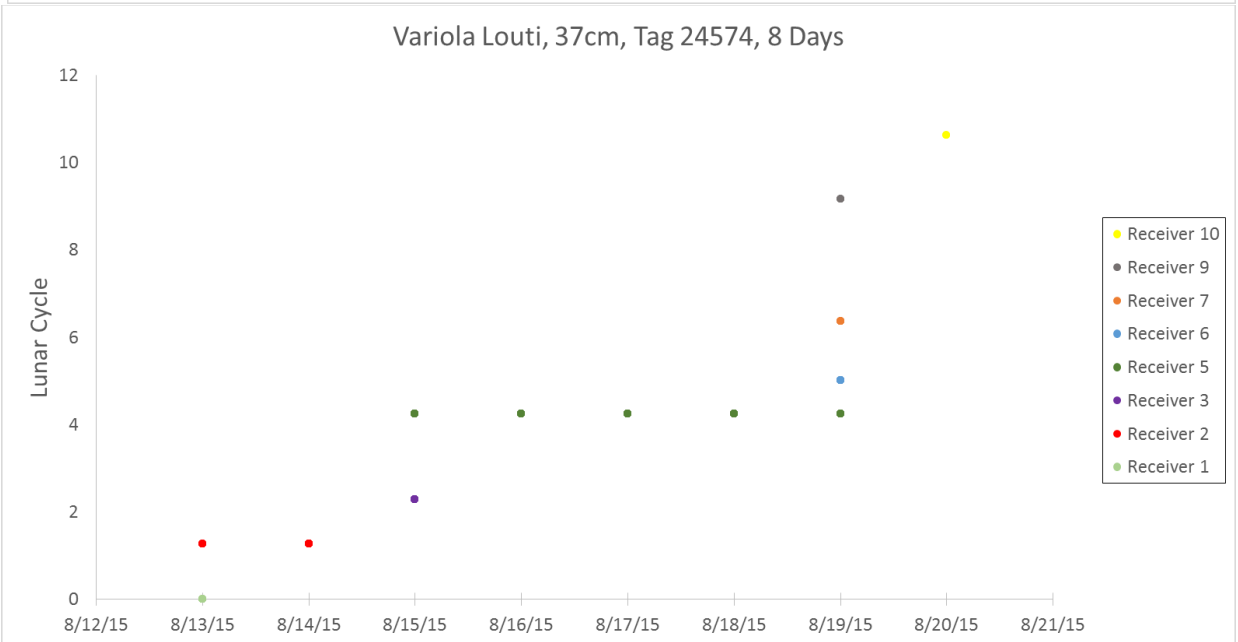
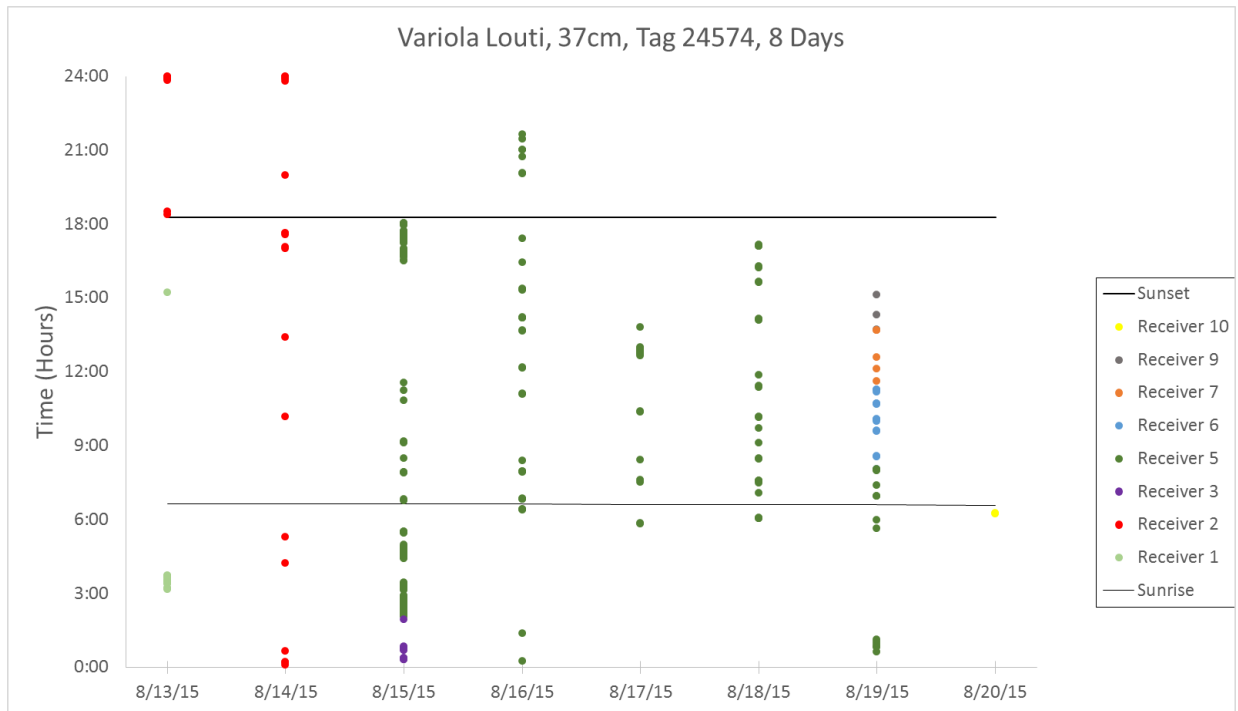
Tag 24571 was a 58 cm L. boar tracked for 210 days. Individual showed high site fidelity to Receiver 5, with occasional forays to Receiver 6. Residency at Receiver 5 suggested a diel cycle with higher presence during nighttime hours and lower presence during daytime.



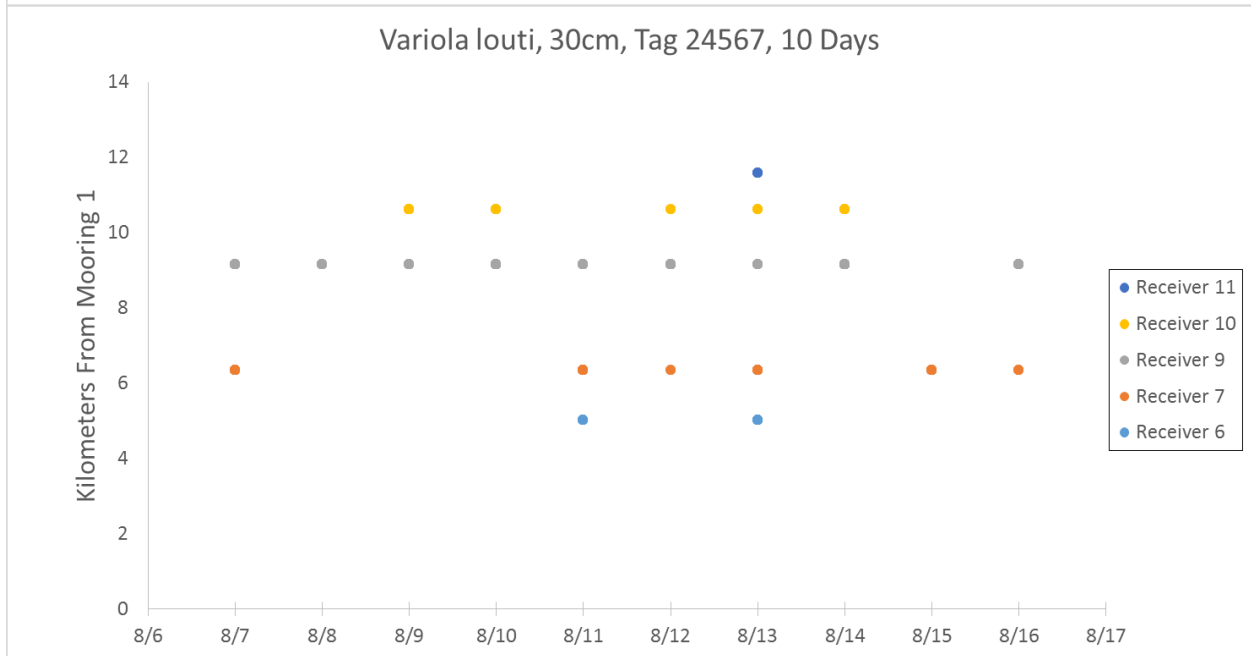
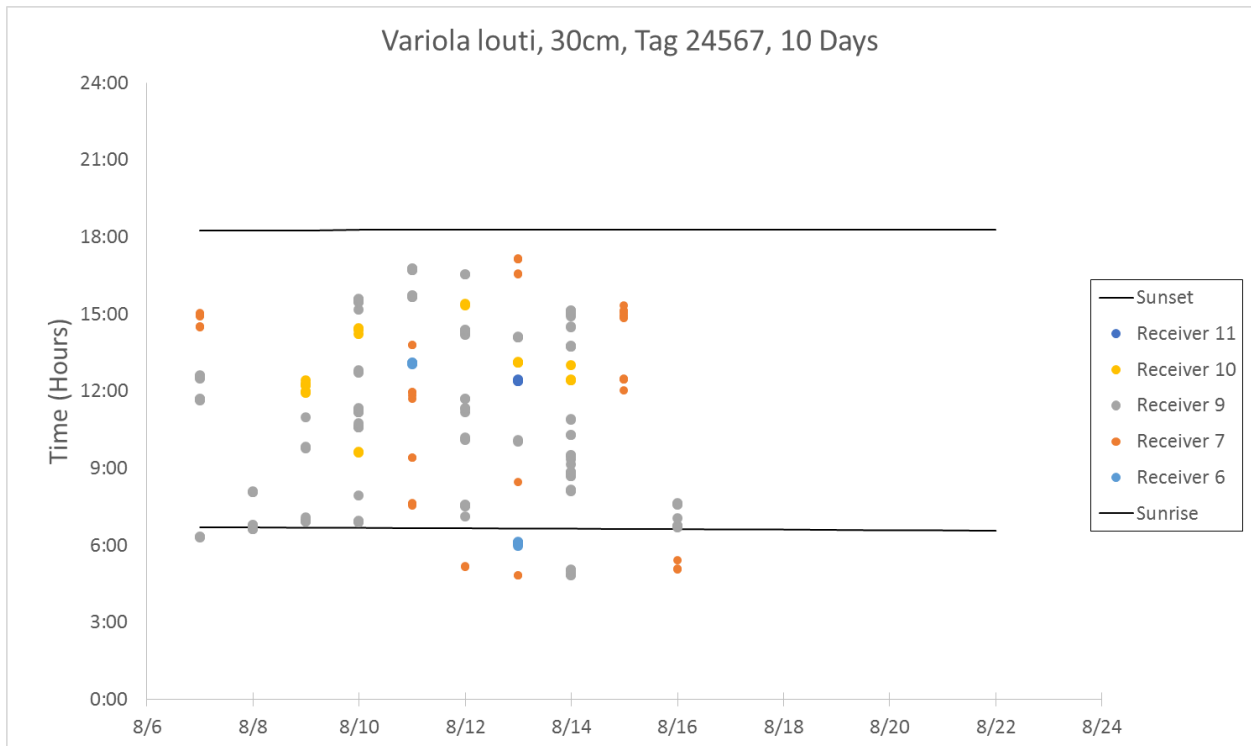
Tag 24566 was a 56 cm L. bohar tracked for 146 days. This individual had high site fidelity for Receiver 6 with what appear to be lunar forays along the coast as far as Receiver 14. These movements occurred once a month starting approximately 2 days before the first quarter moon, returning 2-3 days after the first quarter moon.



Tag 24568 was a 38 cm *V. louti* tracked for 13 days. This individual showed high site fidelity for Receiver 7 initially, but later in the track was recorded moving quickly between Receivers 3, 5, 6, 7, 9, and 10.



Tag 24574 was a 37 cm *V. louti* tracked for 8 days. This individual showed high site fidelity to Receiver 2 at the start of the track, then moved to Receiver 5 for five days before finally moving past Receivers 6, 7, 9, and 10 after which it was never detected again.



Tag 24567 was a 30 cm *V. louti* tracked for 10 days. This individual showed some site fidelity to Receiver 9, but moved both up and down the coast between Receiver 6, 7, 9, 10, and 11.

