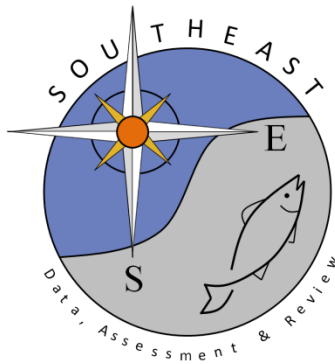


Evaluating the Efficacy of Descender Devices in Increasing the Survival of Deepwater Groupers Using Telemetry

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SEDAR73-RD13

Received: 12/3/2020



Evaluating the Efficacy of Descender Devices in Increasing the Survival of Deepwater Groupers Using Telemetry

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Acknowledgements



P. Rudershausen,
J. Krause,
C. Luck,
R. Lyon,
UNCW R/V Cape Fear,
SeaQualizer,
N. Wegner,
J. Curtis,
C. Conroy.

Discards and trauma – overall trends

Reasons for discards – regulations

- Size limits
- Bag limits
- Seasonal closures
- Total closures

Potential causes of injury → mortality

- Exhaustion or fatigue
- Water column predators
- **Barotrauma**

Immediate mortality is easier to determine – severe injuries, floating

Delayed is difficult – better estimates needed in US southeast

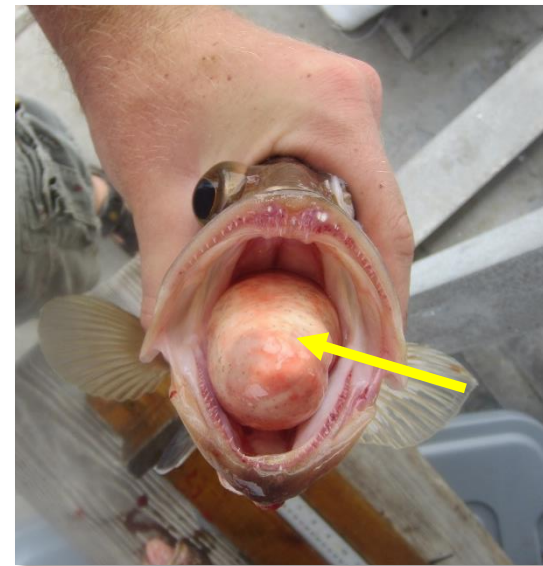
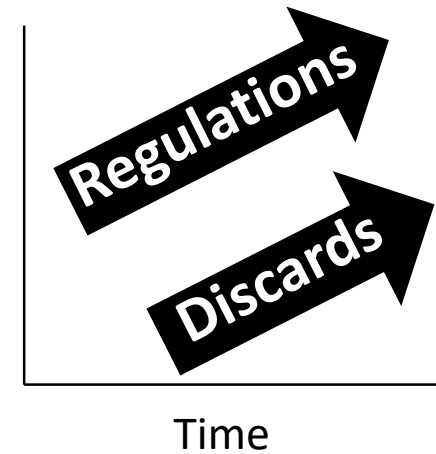


Photo: Personal

Deepwater groupers

Snowy
grouper



Scamp



Speckled
hind



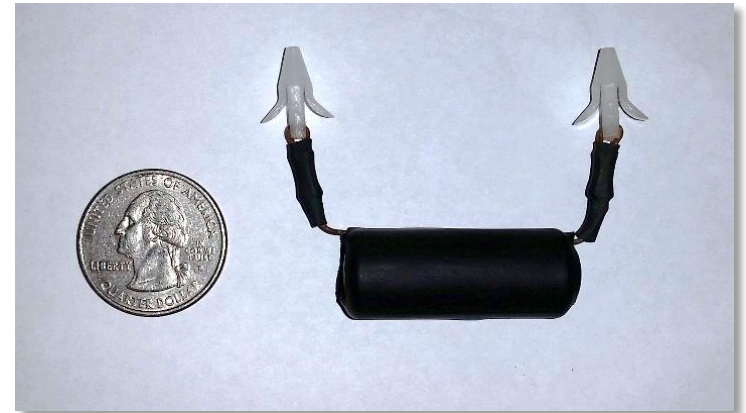
- Deeper water → severe barotrauma
 - Higher discard mortality rates (near 100%)
 - Some regulations reflect this rate
 - e.g. no size limit for snowy grouper

Can we increase survival by forced recompression using a descender device?

Photos: Personal, Pat Lyon

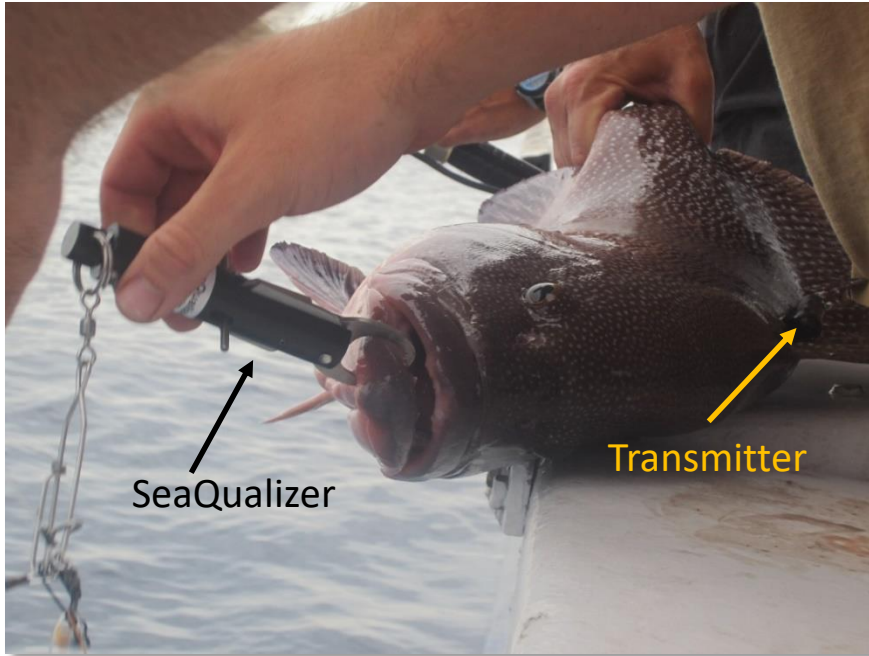
Acoustic telemetry methods

- Conventional tagging would not be effective – low sample sizes
- V13AP tags record acceleration and depth
 - Behavior → proxy for fate (survival or death)
- External attachment to avoid venting, long deck time, anesthesia

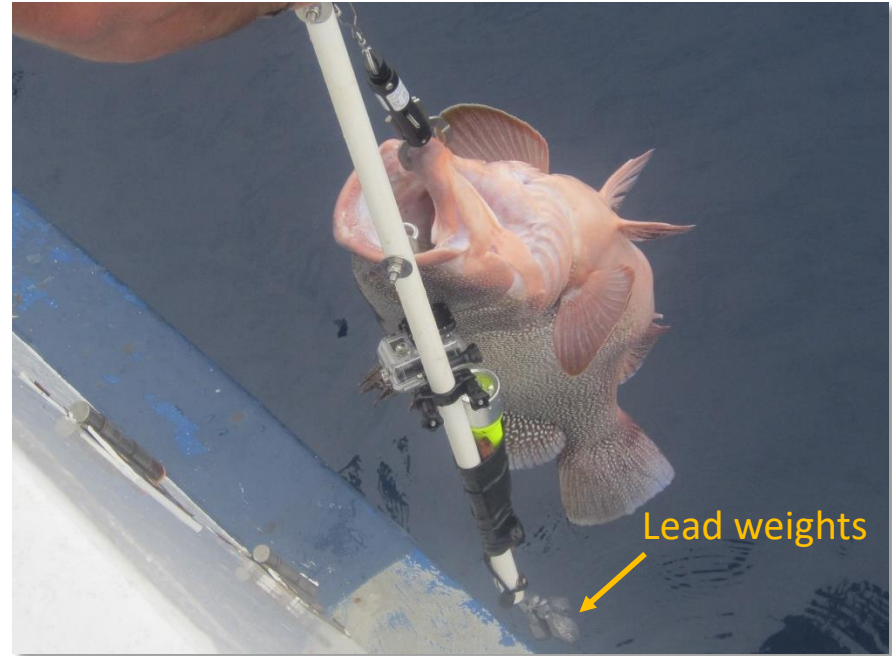


Photos: Personal, Pat Lyon

Recompression – *SeaQualizer*



Device attached to lower jaw



Weighted rig lowered into ocean

Photos: Personal, Pat Lyon

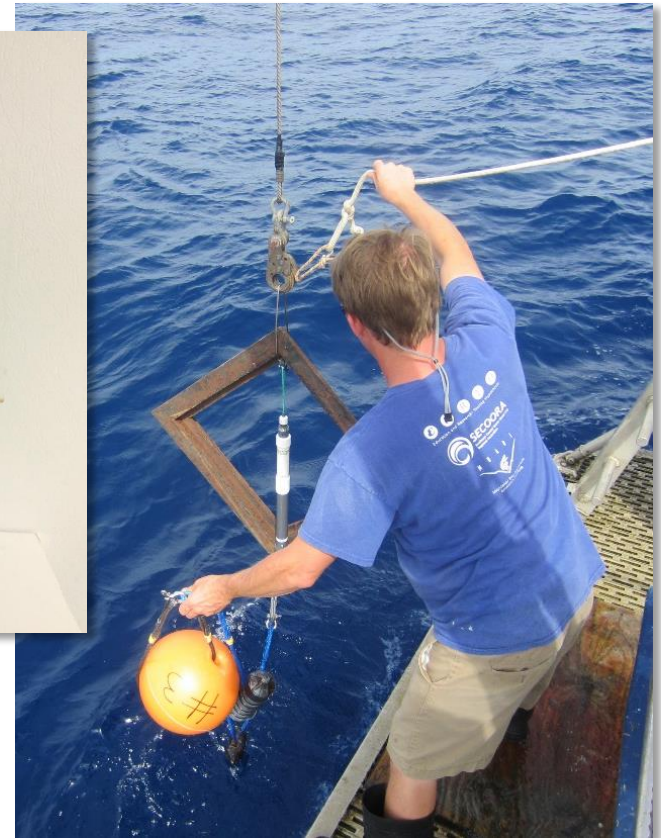
(This is a video)

NC STATE
UNIVERSITY

CMAST

Acoustic receiver deployment

- VR2W receivers moored to SubSeaSonics acoustic releases (AR-50-AA)



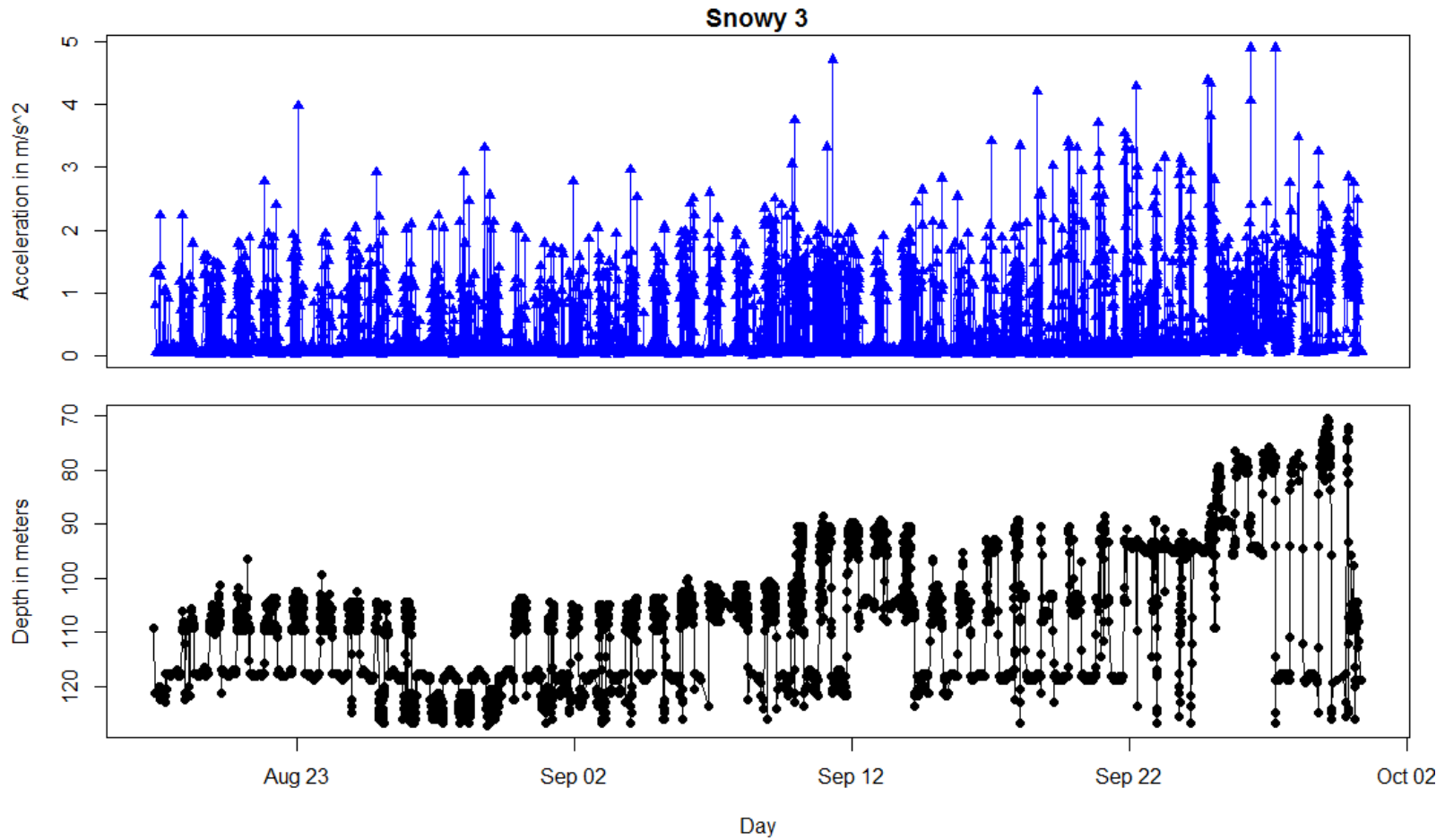
- Moorings retrieved by signaling acoustic release on September 30, 2015 (44 day study)

Photos: Personal, subseasonics.com

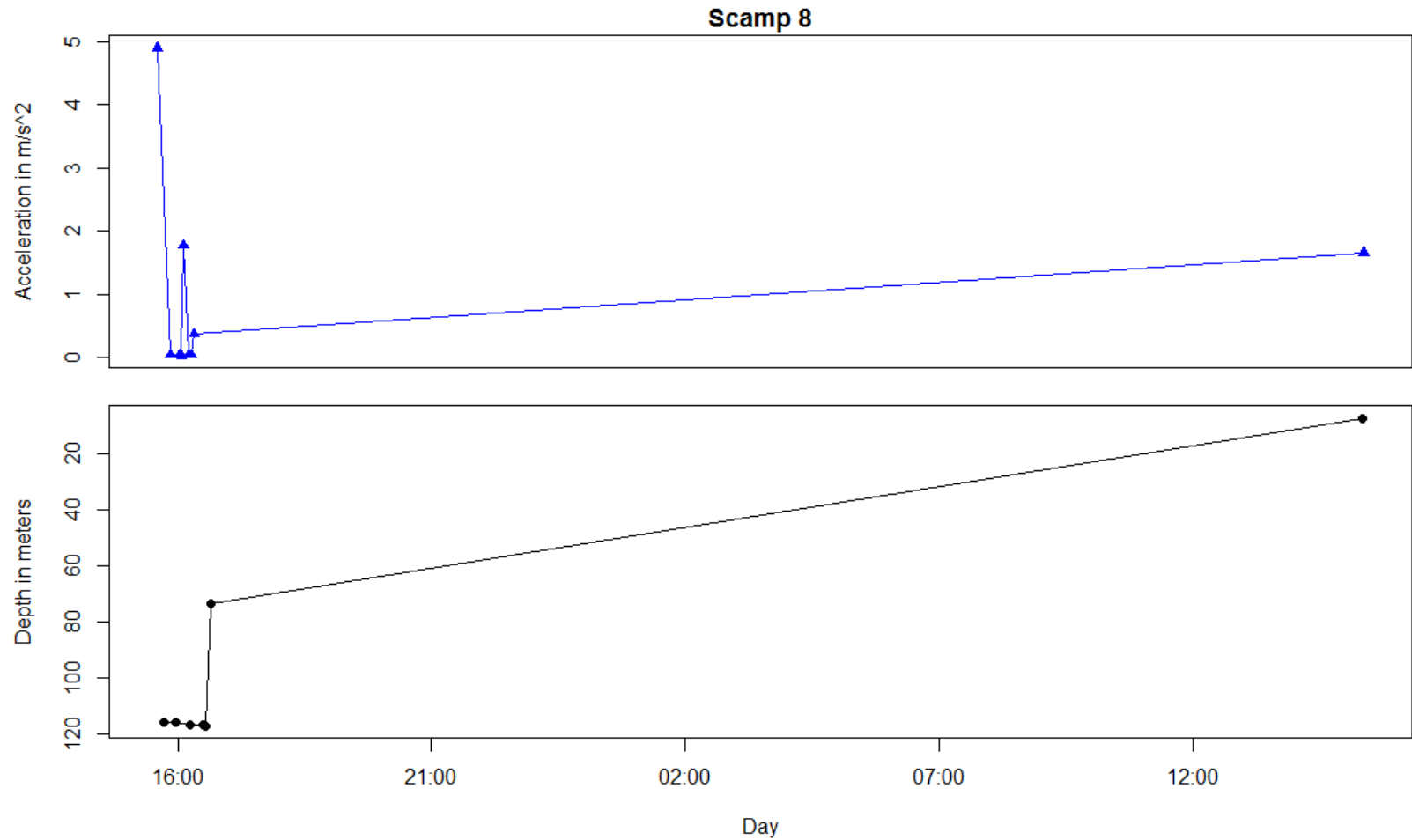
60,000 detections over 44 days

	A	B	C	D	E	F	G	H	I	J
1	Date and Time (UTC)	Receiver	Transmitter	Transmitter Name	Transmitt	Sensor Value	Sensor Unit	Station Name	Latitude	Longitude
2	8/17/2015 10:18	VR2W-102532	A69-9004-1893	Control 1 depth	1221344	0.0002	m			
3	8/17/2015 11:33	VR2W-102532	A69-9004-1893	Control 1 depth	1221344	0.0002	m			
4	8/17/2015 11:36	VR2W-102532	A69-9004-1892	Control 1 acc	1221344	4.9011	m/s ²			
5	8/17/2015 11:38	VR2W-102532	A69-9004-1893	Control 1 depth	1221344	95.2207	m			
6	8/17/2015 11:41	VR2W-102532	A69-9004-1892	Control 1 acc	1221344	0.05766	m/s ²			
7	8/17/2015 11:43	VR2W-102532	A69-9004-1893	Control 1 depth	1221344	95.2207	m			
8	8/17/2015 11:46	VR2W-102532	A69-9004-1892	Control 1 acc	1221344	0.05766	m/s ²			
9	8/17/2015 11:50	VR2W-102532	A69-9004-1892	Control 1 acc	1221344	0.05766	m/s ²			
10	8/17/2015 11:54	VR2W-102532	A69-9004-1893	Control 1 depth	1221344	95.2207	m			
11	8/17/2015 11:56	VR2W-102532	A69-9004-1892	Control 1 acc	1221344	0.03844	m/s ²			
12	8/17/2015 11:58	VR2W-102532	A69-9004-1893	Control 1 depth	1221344	95.8272	m			
13	8/17/2015 12:00	VR2W-102532	A69-9004-1892	Control 1 acc	1221344	0.03844	m/s ²			
14	8/17/2015 12:02	VR2W-102532	A69-9004-1893	Control 1 depth	1221344	95.2207	m			
15	8/17/2015 12:04	VR2W-102532	A69-9004-1892	Control 1 acc	1221344	0.03844	m/s ²			
16	8/17/2015 12:08	VR2W-102532	A69-9004-1892	Control 1 acc	1221344	0.03844	m/s ²			
17	8/17/2015 12:11	VR2W-102532	A69-9004-1892	Control 1 acc	1221344	0.03844	m/s ²			
18	8/17/2015 12:12	VR2W-102532	A69-9004-1893	Control 1 depth	1221344	95.2207	m			
19	8/17/2015 12:17	VR2W-102532	A69-9004-1893	Control 1 depth	1221344	95.2207	m			
20	8/17/2015 12:20	VR2W-102532	A69-9004-1892	Control 1 acc	1221344	0.03844	m/s ²			
21	8/17/2015 12:22	VR2W-102532	A69-9004-1893	Control 1 depth	1221344	95.8272	m			
22	8/17/2015 12:24	VR2W-102532	A69-9004-1892	Control 1 acc	1221344	0.03844	m/s ²			
23	8/17/2015 12:26	VR2W-102532	A69-9004-1893	Control 1 depth	1221344	95.8272	m			
24	8/17/2015 12:27	VR2W-102532	A69-9004-1892	Control 1 acc	1221344	0.01922	m/s ²			
25	8/17/2015 12:28	VR2W-102532	A69-9004-1893	Control 1 depth	1221344	95.8272	m			
26	8/17/2015 12:30	VR2W-102532	A69-9004-1892	Control 1 acc	1221344	0.03844	m/s ²			
27	8/17/2015 12:32	VR2W-102532	A69-9004-1893	Control 1 depth	1221344	95.2207	m			
28	8/17/2015 12:34	VR2W-102532	A69-9004-1892	Control 1 acc	1221344	0.01922	m/s ²			
29	8/17/2015 12:36	VR2W-102532	A69-9004-1893	Control 1 depth	1221344	95.8272	m			
30	8/17/2015 12:38	VR2W-102532	A69-9004-1892	Control 1 acc	1221344	0.01922	m/s ²			
31	8/17/2015 12:39	VR2W-102532	A69-9004-1893	Control 1 depth	1221344	95.2207	m			
32	8/17/2015 12:41	VR2W-102532	A69-9004-1892	Control 1 acc	1221344	0.01922	m/s ²			
33	8/17/2015 12:44	VR2W-102532	A69-9004-1893	Control 1 depth	1221344	95.2207	m			

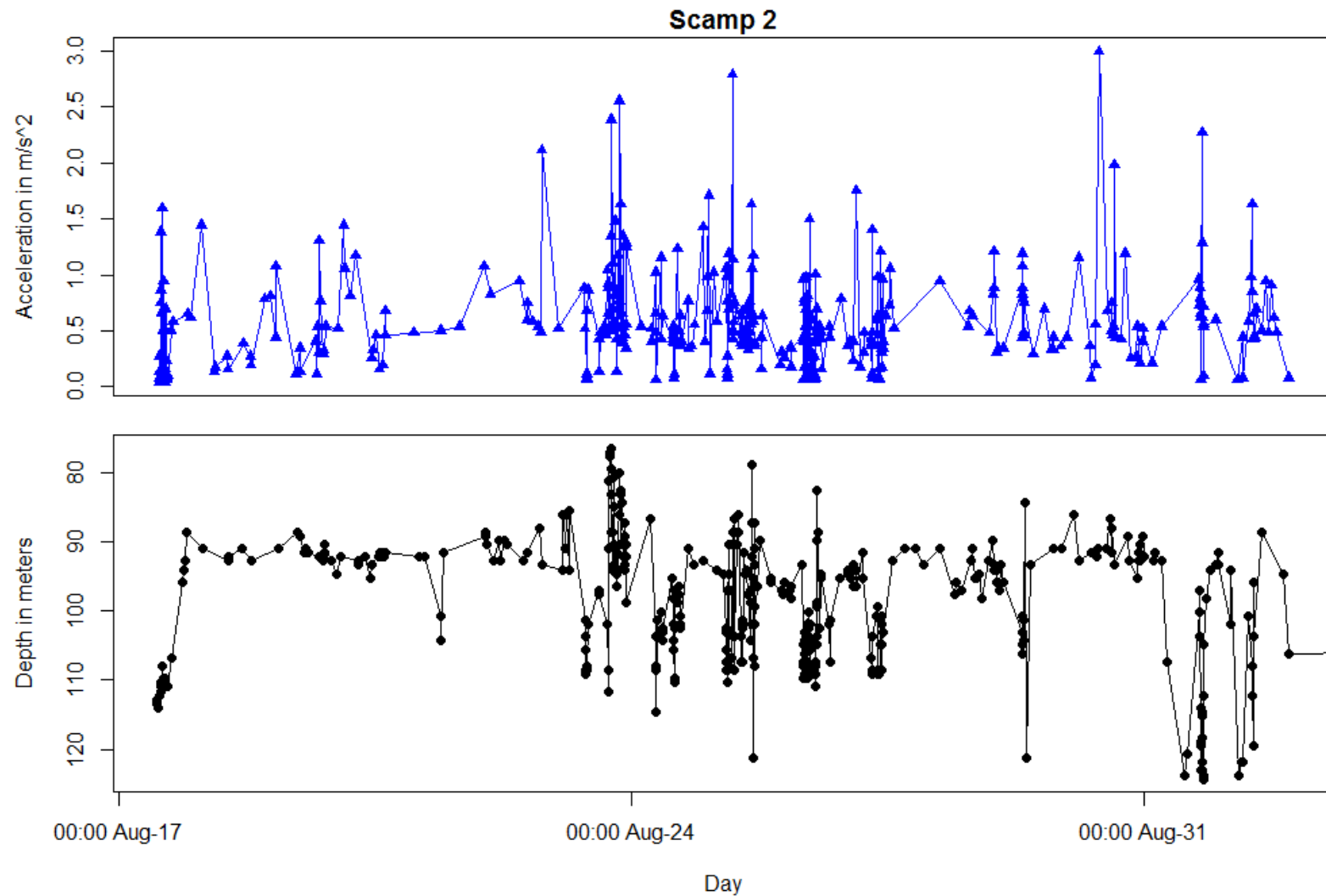
Dead or alive?



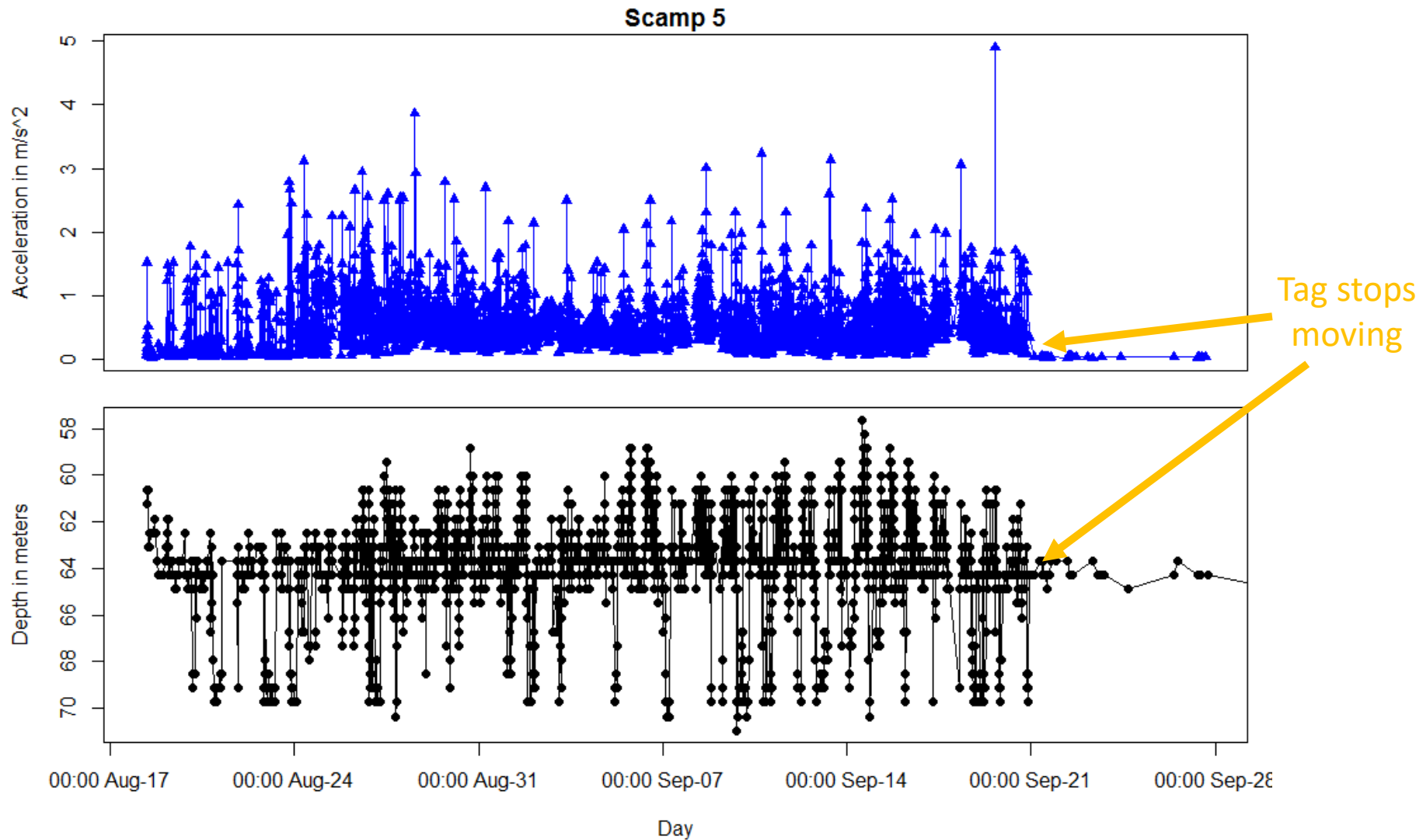
Dead or alive?

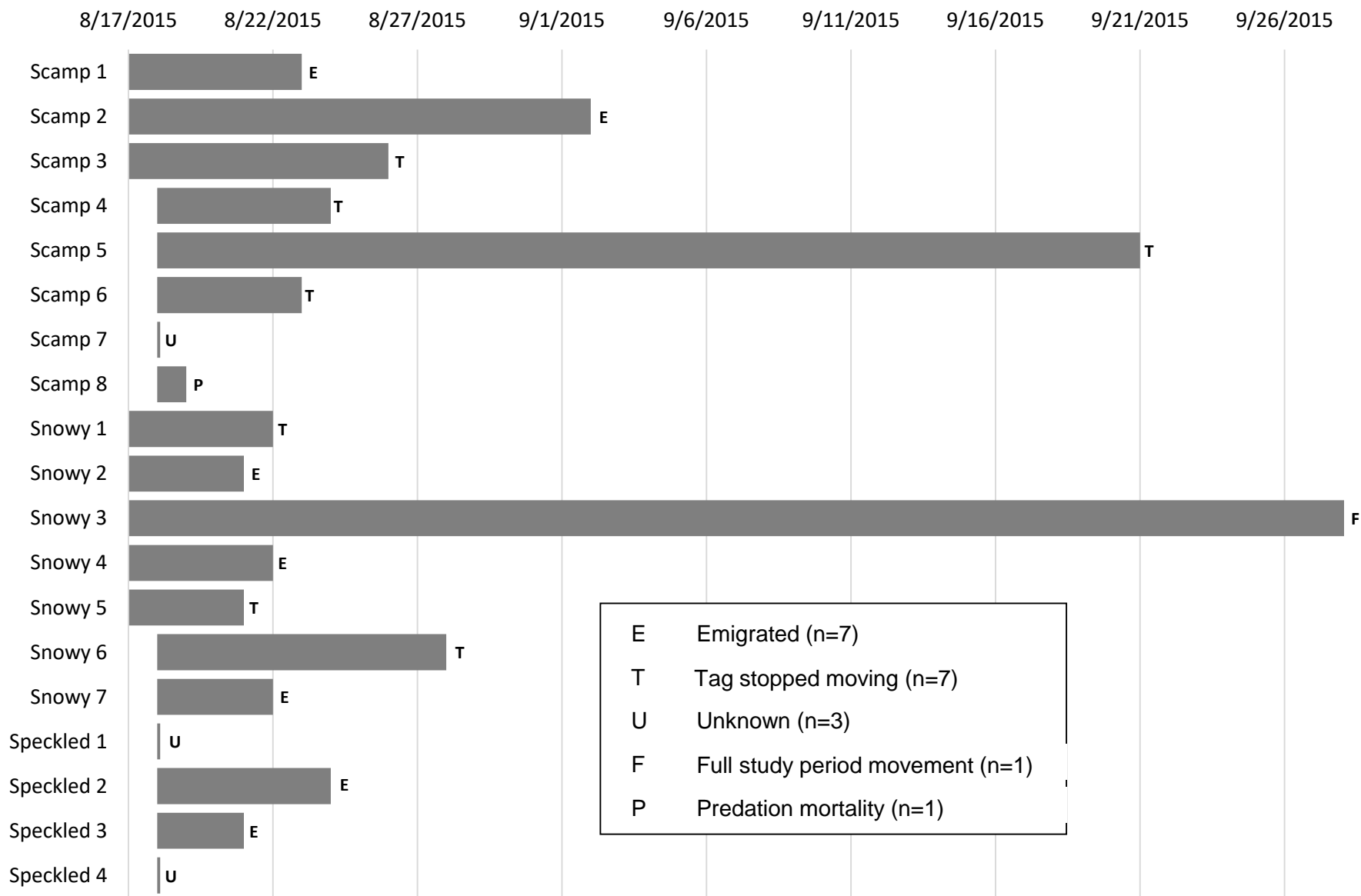


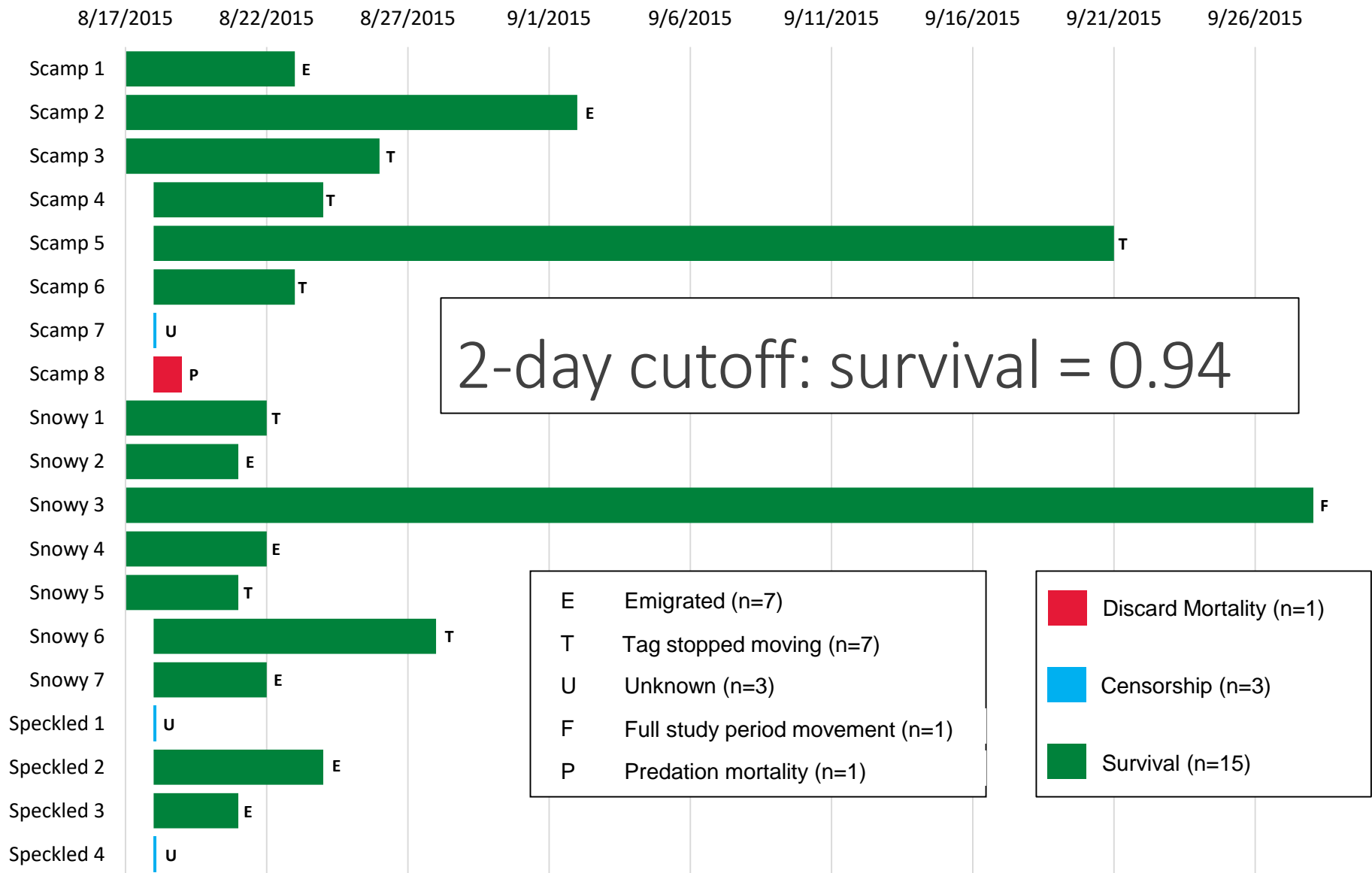
Dead or alive?

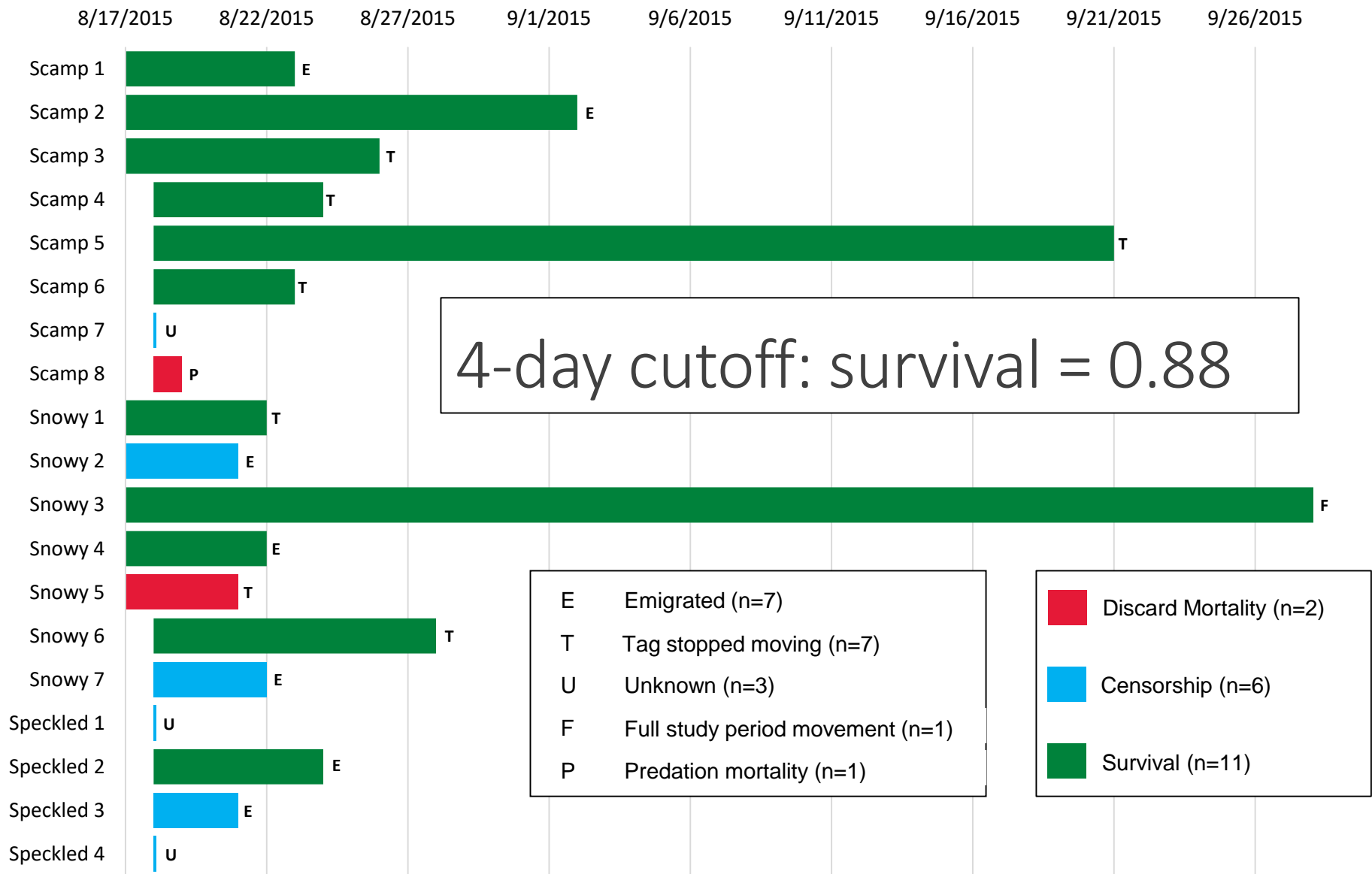


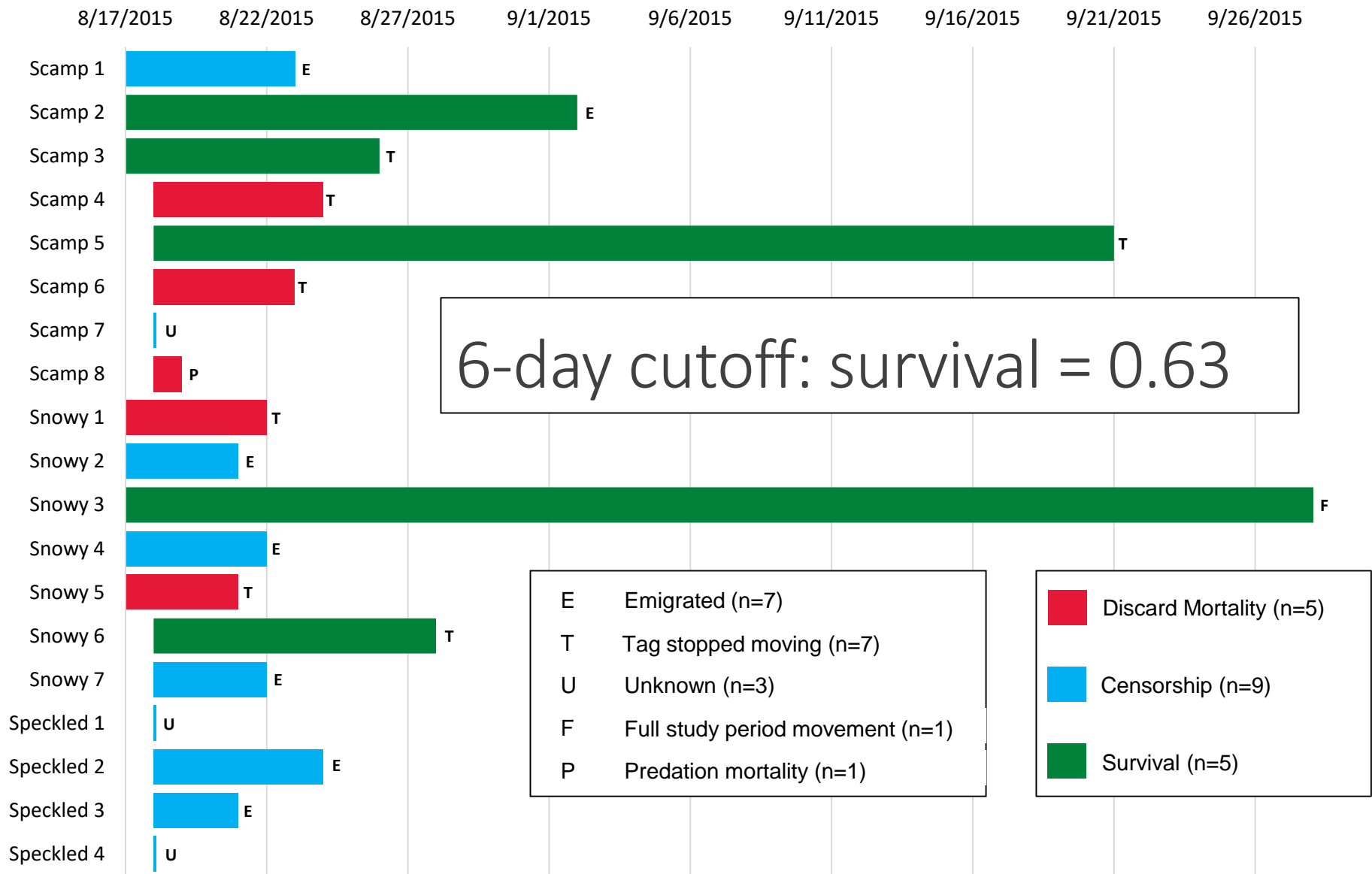
Dead or alive?



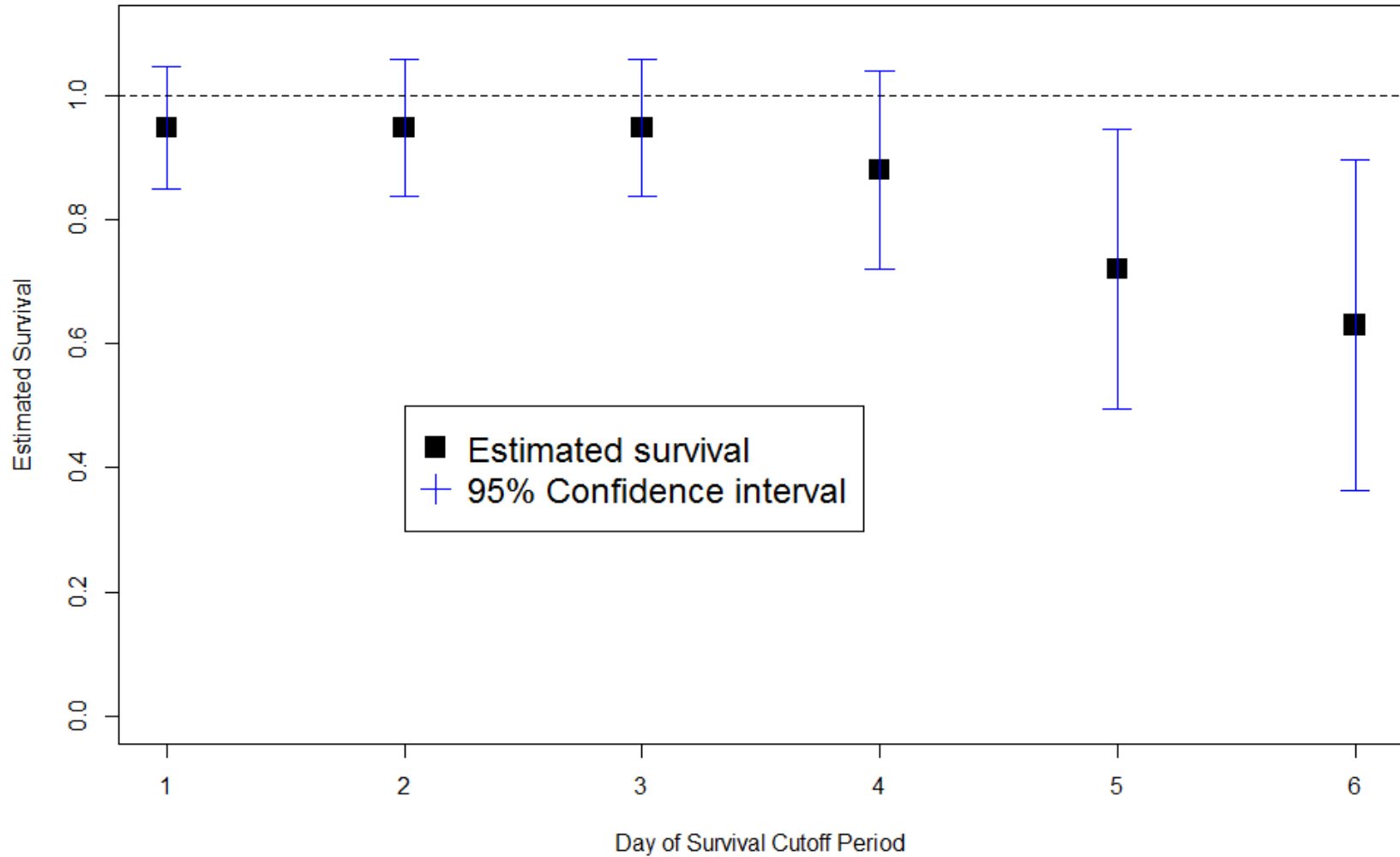








Kaplan-Meier survival changes with time



Conclusions

- Recompression appears to promote survival
- Management implications
 - Gear requirements in regulations not unprecedented
 - Circle hooks, dehooking tools, venting
- Future work
 - Grant proposal to repeat study with control group
 - More transmitters, more receivers – try to detect fish for longer periods (fewer emigrations)