

Overlap of Humpback Whale (*Megaptera novaeangliae*) Habitat and Vessel Traffic in San Francisco Bay with Insights from Tagging

Rebekah S. Lane

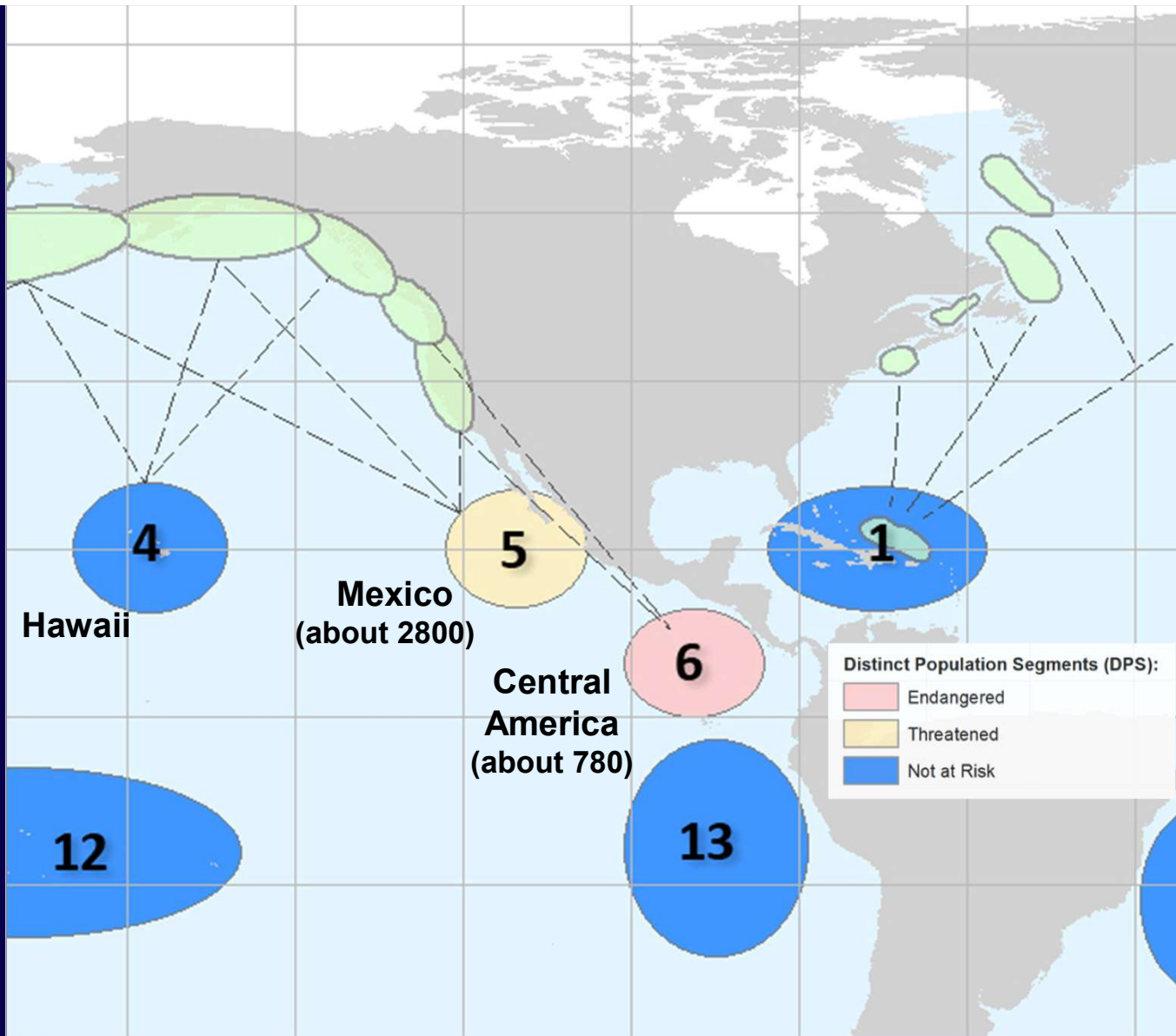
James Fahlbusch, John Calambokidis, Allison Payne, Thomas J. Moore, William Keener, Isidore D. Szczepaniak, Tim M. Markowitz, Marc A. Webber, and Ellen Hines

Beyond the Golden Gate Symposium

January 20th, 2022

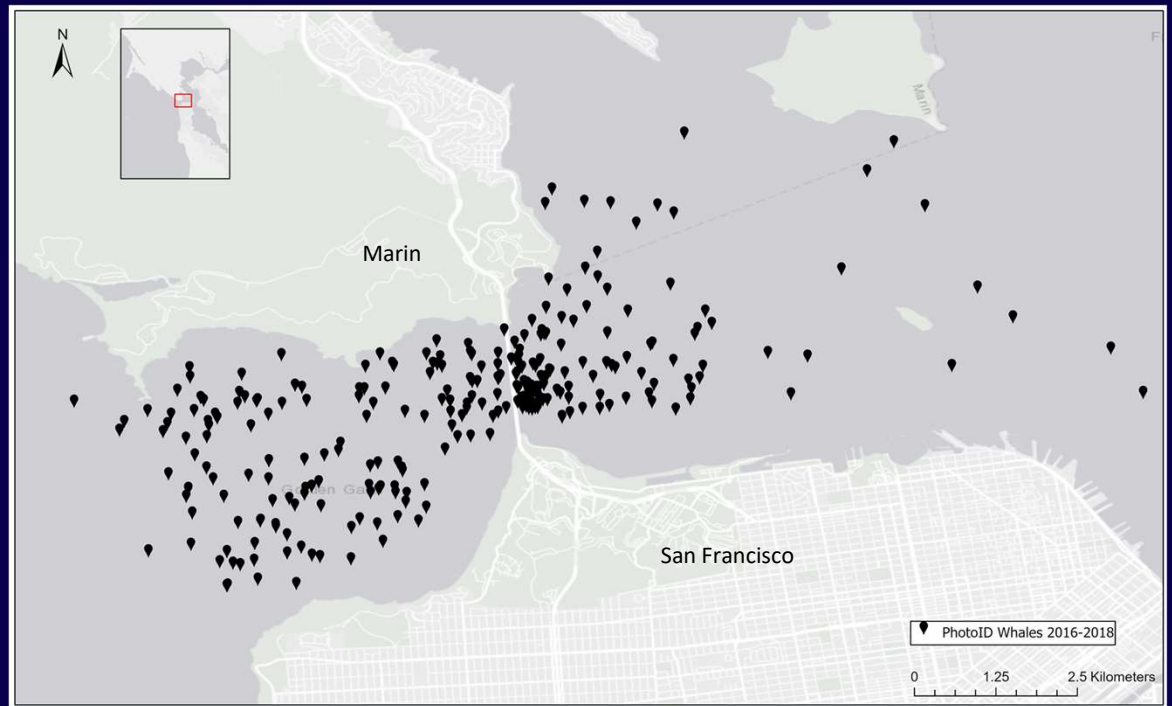


photo: Bekah Lane





Tim Markowitz, NOAA Fisheries Permit # 21678



Whale-apalooza off SF! Unprecedented numbers of humpbacks

Kayakers Spot Humpback Whales Hunting Off Alcatraz Island


Unusual number of whales seen in San Francisco Bay



Humpback Whale Struck and Killed by Ship on SF Bay



Close Call By Boaters Watching Whales In San Francisco Bay
Raises Concerns



Cope et al., 2020
Marine Exchange, 2015
Zabin et al., 2014



Bill Keener, from Golden Gate Bridge

Bill Keener, from Golden Gate Bridge
Santora et al., 2020

Objective

Use our preliminary tagging data to quantify three-dimensional overlap of whales and vessels in San Francisco Bay



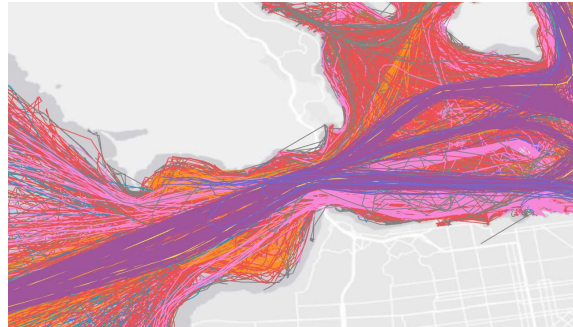
Tagging Whales in San Francisco Bay



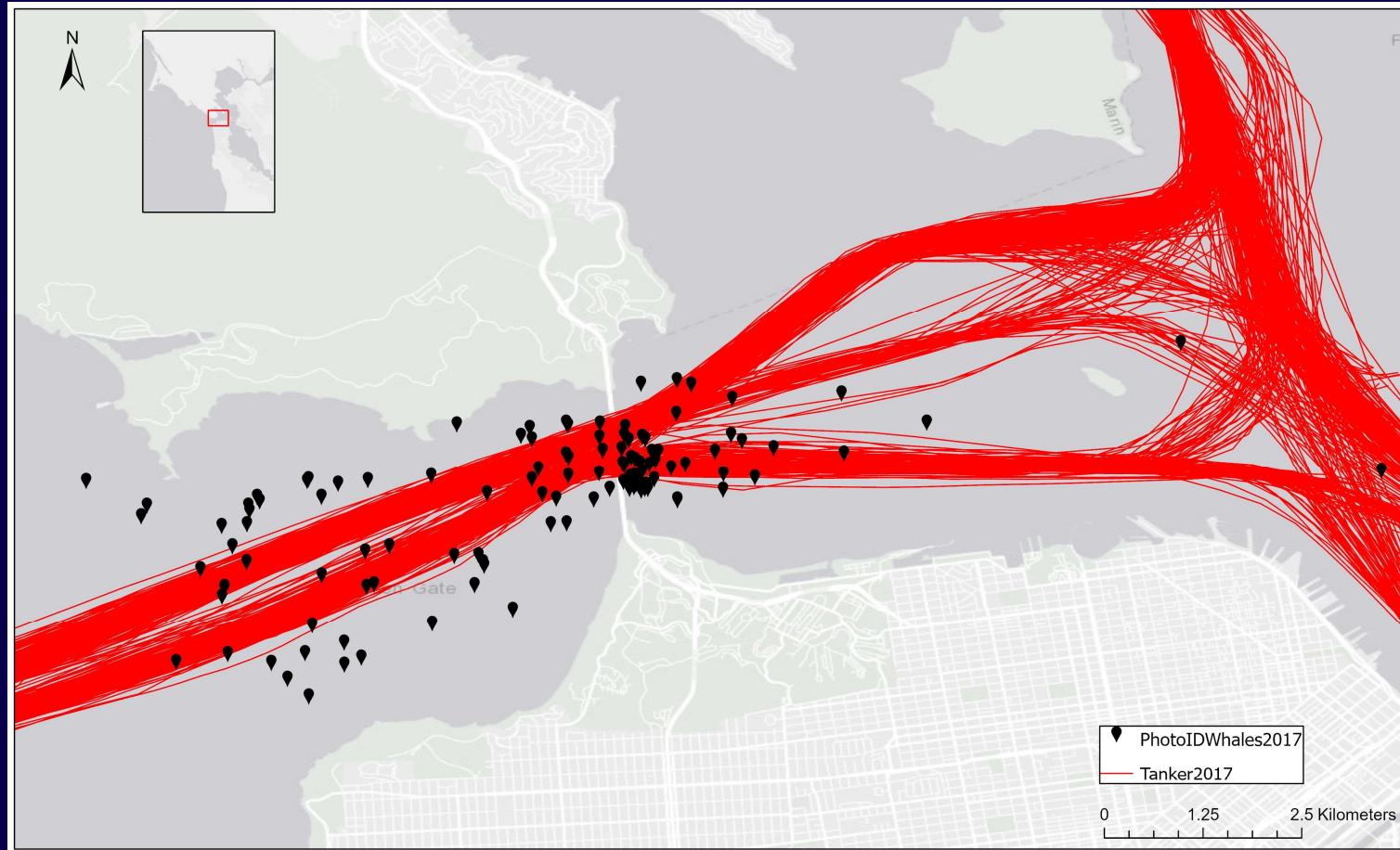


Tag 12 - Multiple Sensors:
Time, Depth, Temperature, Position, Kinematics

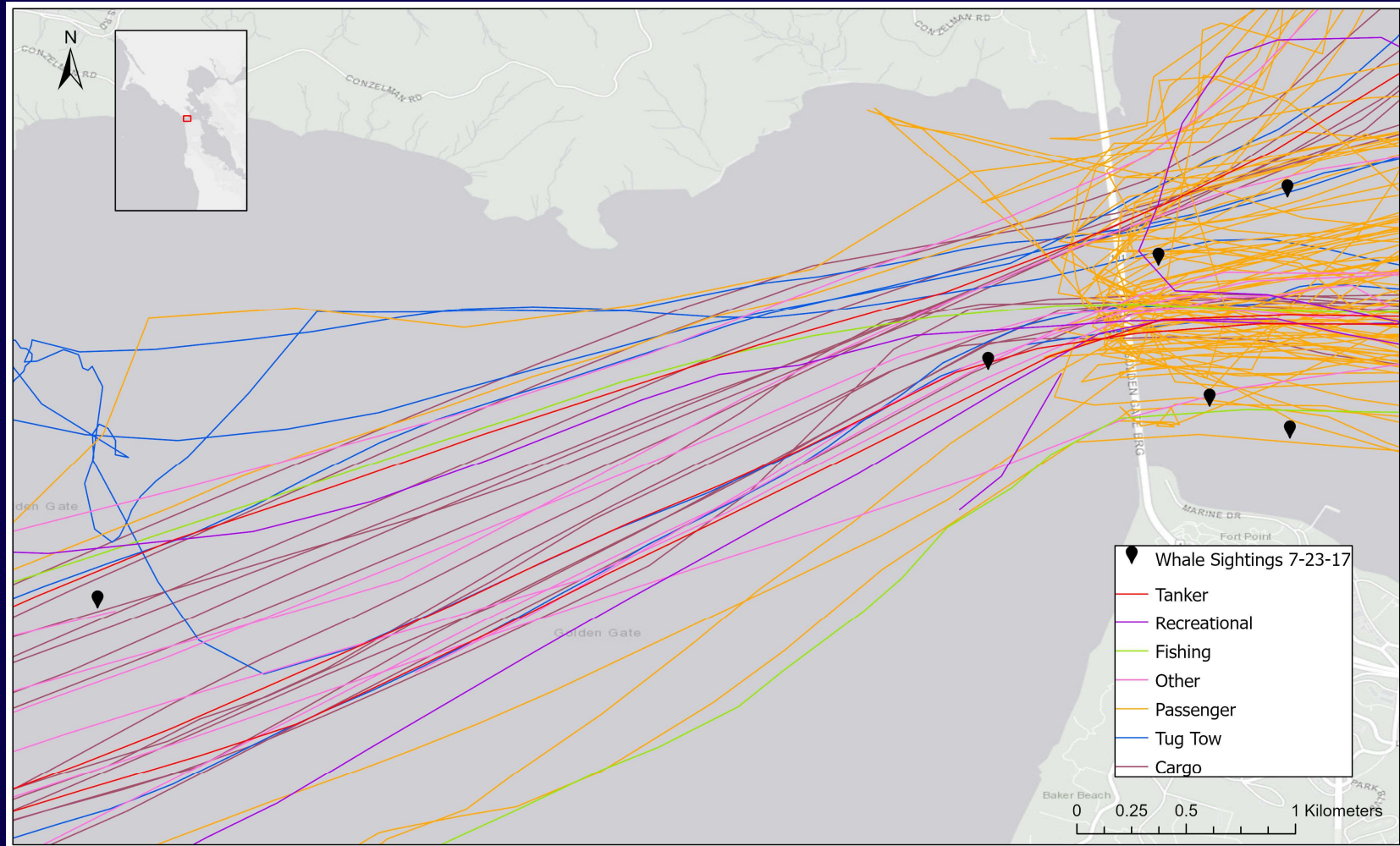




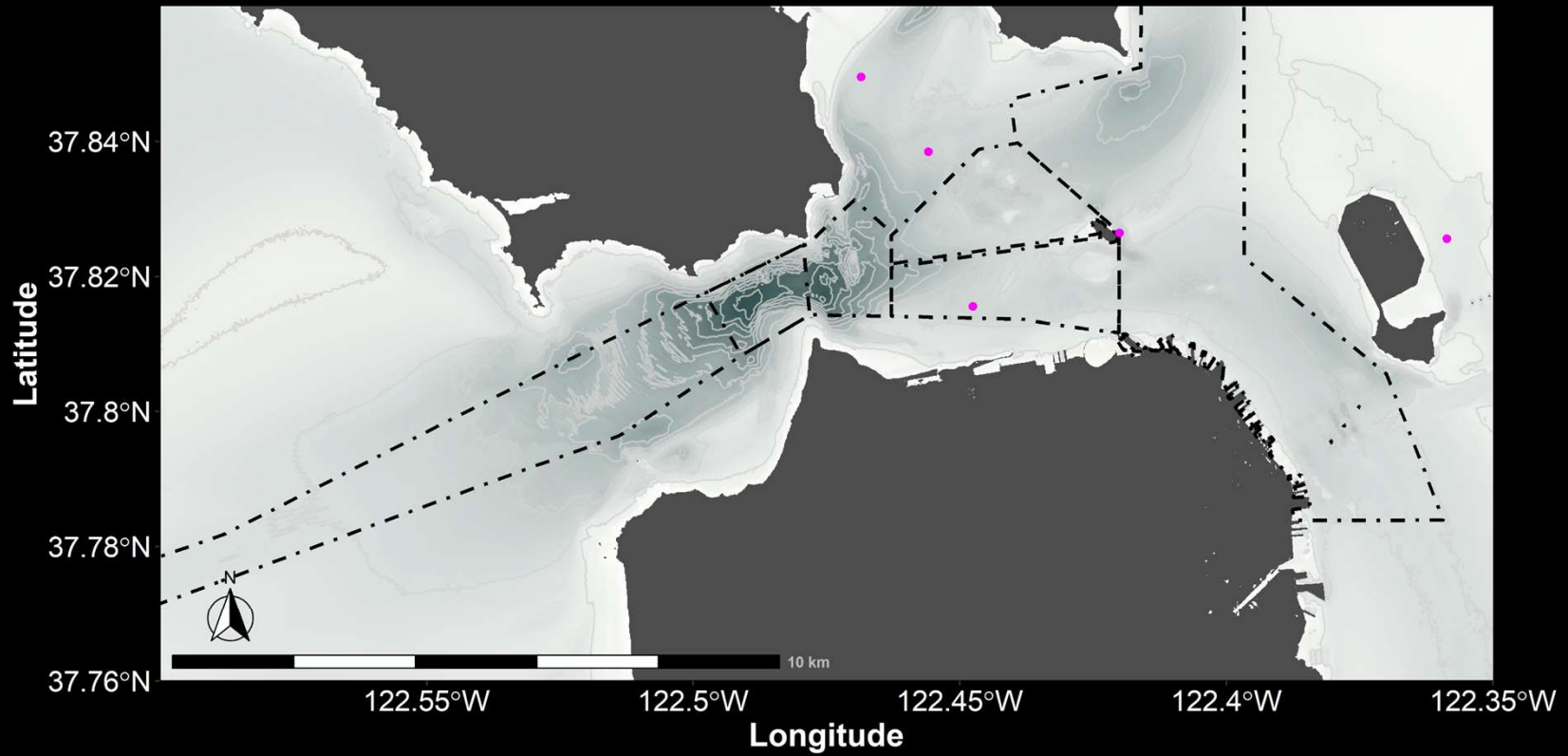
Vessel Activity



Preliminary Results - Tagging

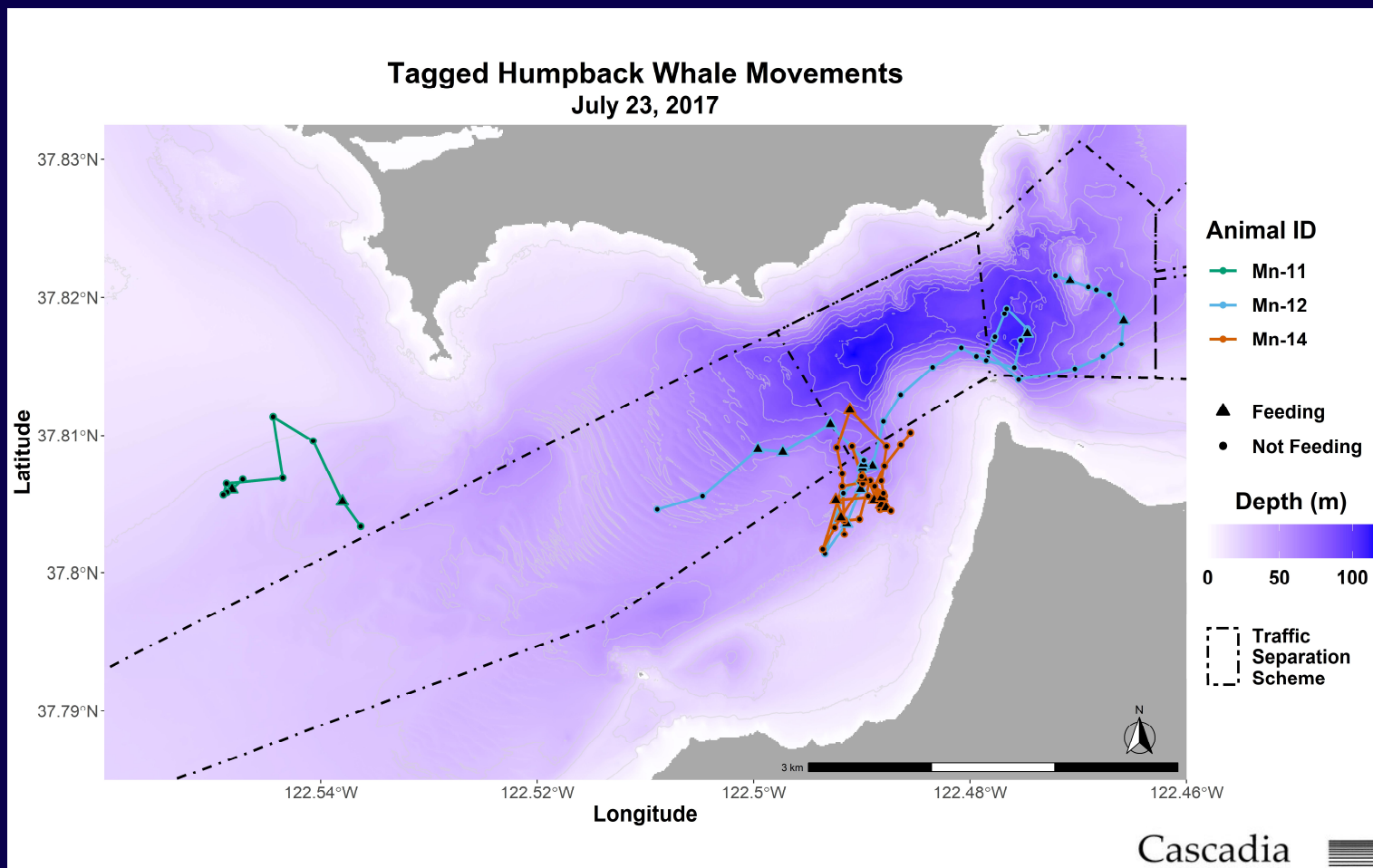


2017-07-23



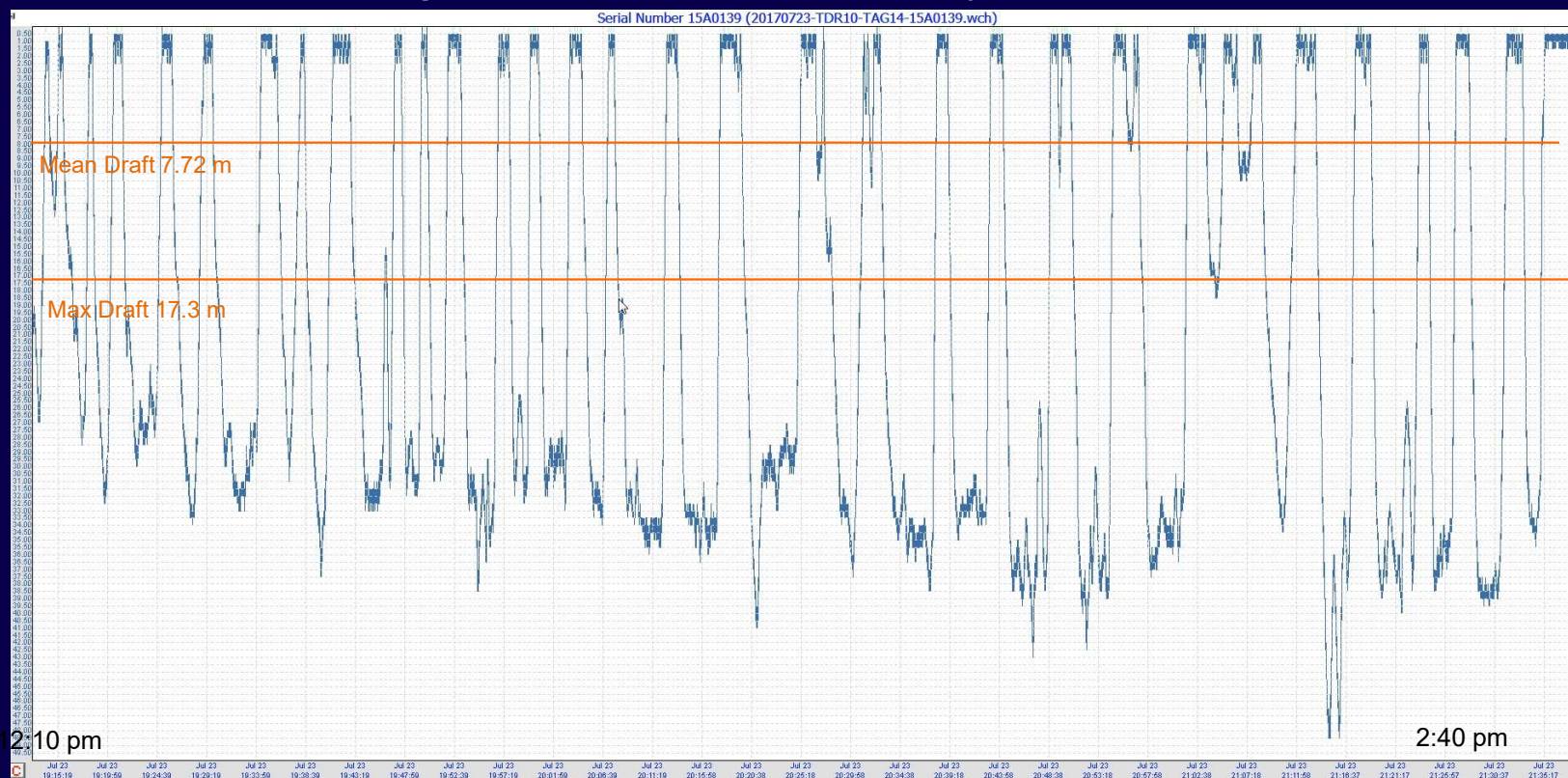
Animal ID	Depth (m)	Traffic Separation Scheme
⊕ Mn-11	0 50 100	[]
⊕ Mn-12		
⊕ Mn-14		

Preliminary Results - Tagging



James Fahlbusch

Tag 14 Dive Profile: 23 July 2017



Deployment				Dives				Foraging Lunges			Shipstrike	
Tag ID	Start Time	End Time	Duration (h)	Depth (m) Mean ± SD	# Dives	Max Depth (m) Mean ± SD	Duration (min) Min Mean Max	# Lunges	Rate (h ⁻¹)	Depth (m) Min Mean Max	% Time < 15 meters	% Time < 30 meters
11	8:58:00	9:36:42	0.64	8.2 ± 7.9	10	21.1 ± 5.3	0.9 1.8 3.5	2	3.1*	19 23 27	74.5	100
12	11:13:00	14:33:37	3.34	15.2 ± 13.2	41	28.5 ± 11.1	0.8 3.2 5.7	15	4.5	14 28 32	55.5	81.3
14	12:13:00	14:35:13	2.37	19.7 ± 13.8	32	32.9 ± 7.8	0.6 3.3 5.7	11	4.6	27 30 36	38	65

Still To Do...

Quantify time spent in presence of vessels, including time spent foraging

For Later...

- Tag more whales for more data!
- Continue to analyze overlap for each vessel type, season, and year
- Use of Marine Monitor to capture the overlap of non-AIS carrying vessels with whales in the Bay





Susan Kelly

Thank you!

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Ted Cheeseman, HappyWhale



Questions?
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