Available Data: 2019-20 Pre-Season Risk Assessment
Compiled for October 31, 2019 Working Group Discussion

Last updated: October 31, 2019[1]

FACTOR: ENTANGLEMENTS

Data provided by: Dan Lawson and Lauren Saez

Entanglements, known CA commercial Dungeness crab

- 2018-19 season: 1 humpback whale, 0 blue whales, 0 leatherbacks
- After close of 2018-19 season: 3 humpback whales, 0 blue whales, 0 leatherbacks
- During 2019-20 season: n/a for pre-season risk assessment

Entanglements, confirmed, unknown gear

- 2018-19 season: 1 humpback whale (likely other fishery), 0 blue whales, 0 leatherbacks
- After close of 2018-19 season: 3 humpback whales (1 likely other fishery), 0 blue whales, 1 leatherback (likely other fishery, not Dungeness crab)
- During 2019-20 season: n/a for pre-season risk assessment

FACTOR: OCEAN AND FORAGE

Data provided by: Karin Forney and Scott Benson; see Appendix

- Bait balls of schooling fish (likely anchovies) observed in many areas with humpback whales.
- No surface krill observed.
- Abundant sea nettles (main leatherback prey species) and many medium and large molas (feed on sea nettles, often co-occur with leatherback turtles) observed between Farallon Islands and Año Nuevo.

FACTOR: MARINE LIFE CONCENTRATIONS

Data provided by: Karin Forney and Scott Benson; see Appendix

Species: Humpback Whales

Aerial Surveys, National Marine Fisheries Service (October 22-24, 2019)

- Most whales were observed in the central coast (104 individuals), although some were also spotted between Cape Mendocino and Crescent City (11 individuals) and between Port Sal and Port San Luis (7 individuals)

Species: Blue Whales

Aerial Surveys, National Marine Fisheries Service

- 6 blue whales were observed in waters 100-110 fathoms between Monterey Canyon and Año Nuevo

Species: Leatherback Sea Turtles

Aerial Surveys, National Marine Fisheries Service (October 22-24, 2019)

- No leatherback turtles observed, despite good habitat between the Farallon Islands and Año Nuevo

[1] Most recent domoic acid testing results included

Tagging Data, National Marine Fisheries Service

- Of the two leatherbacks which were still foraging in the Gulf of the Farallones in mid-October, one departed coastal waters on 10/27 and appears to have initiated it's winter migration. One was still foraging in the Gulf of the Farallones as of 10/28.
- A third turtle, which initially swam to Southern California after tagging, swam up the coast to Piedras Blancas before turning south and offshore on 10/27; currently 50 miles WNW of Point Arguello.

FACTOR: FISHING DYNAMICS

Data provided by: California Department of Fish and Wildlife and California Department of Public Health

Domoic Acid

CDPH SUMMARY OF DOMOIC ACID LEVELS IN CRABS **JULY 1, 2019 - OCTOBER 28, 2019**

PORT	AREA	SAMPLE COLLECTION DATE	CRAB TYPE VISCERA	INDIVIDUAL SAMPLE RESULTS (FDA ACTION LEVEL >30 PPM)	AVERAGE LEVEL (Information Only)	PERCENT OF SAMPLES EXCEEDING ACTION LEVEL
Crescent City	George Reef	10/2/2019	Dungeness	<2.5, 3.6, 7.1, 5.6, 8.5, 4.3	4.9 ppm	0%
	Klamath River	10/3/2019	Dungeness	4.8, 2.7, <2.5, <2.5, <2.5, 6.0	2.3 ppm	0%
Trinidad	Trinidad North	10/2/2019	Dungeness	3.7, <2.5, <2.5, <2.5, 2.6, <2.5	1.1 ppm	0%
	Trinidad South	10/2/2019	Dungeness	2.7, <2.5, <2.5, 2.5, <2.5, <2.5	0.9 ppm	0%
Eureka	LP Eureka	10/2/2019	Dungeness	<2.5, <2.5, 3.0, <2.5, 3.0, 5.2	1.9 ppm	0%
	Eel River	10/2/2019	Dungeness	<2.5, <2.5, <2.5, <2.5, <2.5, 3.5	0.9 ppm	0%
Fort Bragg	**Usal**	10/12/2019	Dungeness	6.1, **32**, 4.1, 8.1, 13, 5.1	11.4 ppm	17%
	Point Arena	10/11/2019	Dungeness	3.8, 2.6, <2.5, 3.3, 4.4, 4.2	3.1 ppm	0%
Bodega Bay	Point Reyes	9/25/2019	Dungeness	4.9, 4.7, 6.1, 2.5, 4.3, <2.5	3.8 ppm	0%
	Bodega Head	9/25/2019	Dungeness	11, 9.5, 4.5, 19, **43**, **58**	24 ppm	33%
	Russian River	9/21/2019	Dungeness	24, <2.5, <2.5, <2.5, <2.5, <2.5	4 ppm	0%
	Salt Point	9/21/2019	Dungeness	<2.5, <2.5, <2.5, <2.5, 12, <2.5	2 ppm	0%
	Bodega Head	10/8/2019	Dungeness	27, 10, 6.9, 5.9, <2.5, 20	12 ppm	0%
	Bodega Head	10/19/2019	Dungeness	8.4, 7.8, 8.1, <2.5, 3.3, 7.2	5.8 ppm	0%
Half Moon Bay/ San Francisco	Pillar Point	9/27/2019	Dungeness	<2.5, <2.5, <2.5, <2.5, <2.5, <2.5	Non-Detectable	0%
	Pigeon Point	9/27/2019	Dungeness	2.6, <2.5, <2.5, <2.5, <2.5, <2.5	0.4 ppm	0%
	Farallones/ Golden Gate		Dungeness			
	Duxbury	10/15/2019	Dungeness	**39**, <2.5, <2.5, <2.5, 4.9, <2.5	7.3 ppm	17%
Monterey	Monterey Bay	9/29/2019	Dungeness	5.8, 3.4, 2.9, 14, 5.9, 13	7.5 ppm	0%
	Monterey Bay		Rock			
Morro Bay	Avila Beach	9/25/2019	Dungeness	<2.5, <2.5, <2.5, <2.5, <2.5, 3.5	0.6 ppm	0%
	Avila Beach	9/25/2019	Rock	<2.5, <2.5, <2.5, <2.5, <2.5, <2.5	Non-Detectable	0%

1 SET = 6 SAMPLES

Figure 1. Domoic Acid Testing Results for Dungeness and Rock Crabs as of October 28, 2019.

APPENDIX

CALIFORNIA DUNGENESS CRAB FISHING GEAR WORKING GROUP (WG)
2019-20 RISK ASSESSMENT AND MITIGATION PROGRAM (RAMP)
Summary of 22-25 Oct 2019 pre-season aerial survey and leatherback telemetry

(Prepared by Karin Forney and Scott Benson, NOAA/SWFSC; scientific advisors to the WG)

Survey Logistics:

The survey was conducted over three days (10/22. 10/24 and 10/25), completing all of the target transects for this pre-season survey (Southern Option B and Northern Option A). The transect lines included a zig-zag pattern between the coast and the 50-fm (92-m) isobath from Pt Conception to Monterey, and from about Gualala to the CA/OR border. Along the central coast, a more detailed survey was conducted along parallel east-west lines spaced every 6 nautical miles between Monterey and Gualala and extending from the coast offshore to the 110-fm (200-m) isobath. Surveys were led by Karin Forney, with a team that included one fisherman and one experienced aerial observer each day (see Table 1).

Table 1. Aerial survey teams for the three survey days.

DATE	REGION	COORDINATOR	AERIAL OBSERVER	FISHERMAN
10/22/19	Pt Conception to Año Nuevo	Karin Forney, NOAA/SWFSC	Lauren Saez, NOAA/WCR	Calder Deyerle, Moss Landing
10/24/19	Tamales Bay to CA/OR border	Karin Forney, NOAA/SWFSC	Melinda Nakagawa Upwell	Dick Ogg, Bodega Bay
10/25/19	Salt Pt. to just south of Pigeon Pt	Karin Forney, NOAA/SWFSC	Scott Benson, NOAA/SWFSC	Dick Ogg, Bodega Bay

The surveys were flown at 700 ft altitude and 100kts in a twin-engine, high-wing aircraft (Partenavia P-68), chartered from Aspen Helicopters, Inc. in Oxnard, CA. Karin Forney recorded all data into a laptop connected to a GPS, while the observers and fisherman searched through 1) a downward facing belly window and 2) through bubble windows on the non-glare side of the plane. We systematically recorded all whales, dolphins, porpoises, surface-visible 'bait balls' of anchovies or other fish, ocean sunfish (*Mola mola*), turtles, and any fishing gear, covering a strip that extended from directly below the plane (90 degrees declination angle) out to an angle of 35 degrees (about 300 m or 0.16 nautical miles to the side). Dolphins and porpoises were also recorded when on transect lines. To provide additional spatial information on whales, we also recorded any whales outside of that strip as 'opportunistic' sightings. These opportunistic sightings are coded differently in our data file, allowing them to be excluded from any analyses that relies on the systematic strip-survey data. To provide the most complete information for the Working Group, all systematic and opportunistic sightings are included in the plots below; however, they could be plotted separately or with different symbols if desired.

Figure 1. One of the two Partenavia P-68 aircraft used during the surveys, with the October 22, 2019 aerial survey team: Calder Deyerle, Karin Forney, and Lauren Saez.

Survey Results:

Weather was mostly good to excellent, with light winds and mostly sunny skies. The only exceptions were two windy sections near Pt. Sur and around Cape Mendocino (Beaufort sea state 5), and portions of the lines between Bodega Bay and Pt. Arena, where smoke from the Kincade Fire reduced visibility somewhat. Overall, however, conditions were very good for observing whales and other marine life. The combined surveys required just over 24 hrs of flight time (including transits to/from aircraft base in Oxnard, CA).

Key observations:

1. **Humpback whales:** During the combined surveys, there were 68 sightings of an estimated 122 humpback whales. Most of these whales (104 individuals) were observed in the central coast region, but 11 humpback whales were documented from Cape Mendocino to Crescent City, and 7 humpback whales were observed between Pt. Sal and Pt San Luis in the southern area.
2. **Other whales:** Four groups of six total blue whales were documented in waters of about 100-110 fm depth between Monterey Canyon and Año Nuevo. One fin whale was observed just north of Cape Mendocino, and a group of four killer whales was documented near Pt. Arena.
3. **Whale prey:** Bait balls of schooling fish (most likely anchovies) were observed in many of the areas with humpback whales, suggesting that these whales were feeding on anchovies. No surface krill was documented.
4. **Leatherback turtles:** No leatherback turtles were observed during the Oct 22-25 surveys, but the flights documented good leatherback habitat from about the Farallon Islands to Año Nuevo, with abundant sea nettles (the leatherback's main prey species) and many medium/large molas (ocean sunfish, which also feed on sea nettles and are often found in the same areas as leatherback turtles). Two of the previously tagged leatherback turtles continued to forage within the Gulf of the Farallones, although one of the two turtles left coastal waters on 10/27/2019 and appears to have initiated the winter migration to subtropical waters of the eastern North

Pacific. The other foraging leatherback turtle remains in the Gulf of the Farallones as of 10/28/2019 (see Figure 5 below). A third turtle, which initially swam southward into waters of Southern California after tagging, spent the last week swimming back up the coast to about Pt. Piedras Blancas and then turned south and offshore on 10/27/2019. The most recent position is about 50 miles WNW of Pt. Arguello, and it is unknown whether this animal will return to coastal waters or start the southward migration.

5. **Fishing activity:** There were several areas with active or apparent derelict fishing gear. Fishermen Calder Deyerle and Dick Ogg on our flights noted likely rock crab, slime eel, spot prawn, and coonstrip shrimp gear, along with individual pots that were consistent with Dungeness crab gear.
6. **Other species:** We also observed numerous sightings of smaller marine mammal species, including harbor porpoises, Dall's porpoises, Risso's dolphins, common dolphins, bottlenose dolphins, sea otters, and pinnipeds (seals and sea lions).

FIGURES 2-4: WHALE AND FISHING GEAR PLOTS:

Completed survey transects (gray lines), locations of whales, fishing gear and anchovy balls. Light blue lines show the 27 fm, 55 fm and 110 fm (= 50m, 100m and 200m) isobaths. Whale numbers indicated in the plots represent a minimum number of animals present, because whales that are diving when the plane passes overhead cannot be detected. A few whales could not be identified because they dove or were too distant when seen.

SOUTH-CENTRAL REGION (Pt. Conception to Monterey)

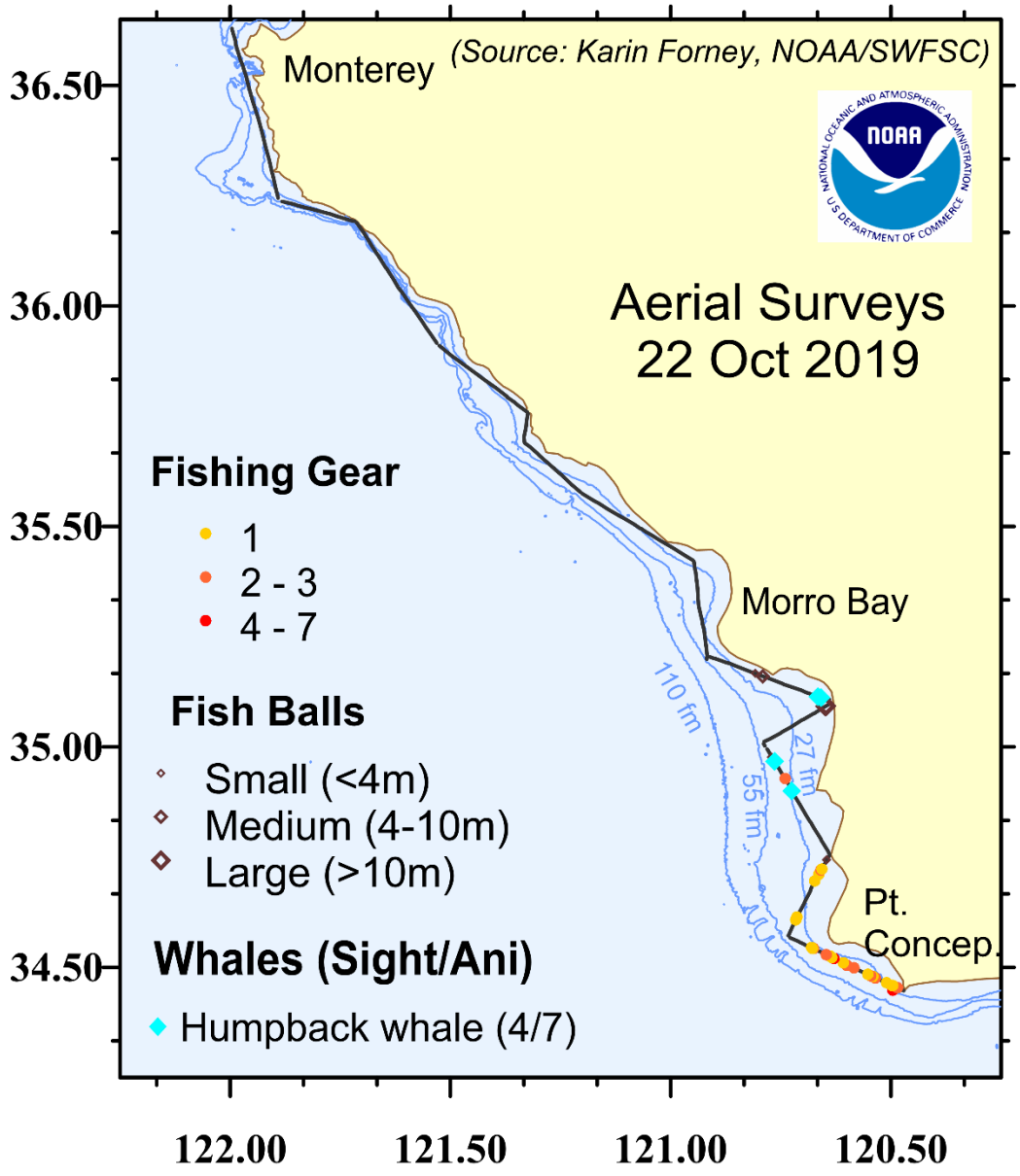

Figure 2. South-central coast aerial surveys, 22 Oct 2019

CENTRAL COAST REGION (Monterey to Gualala):

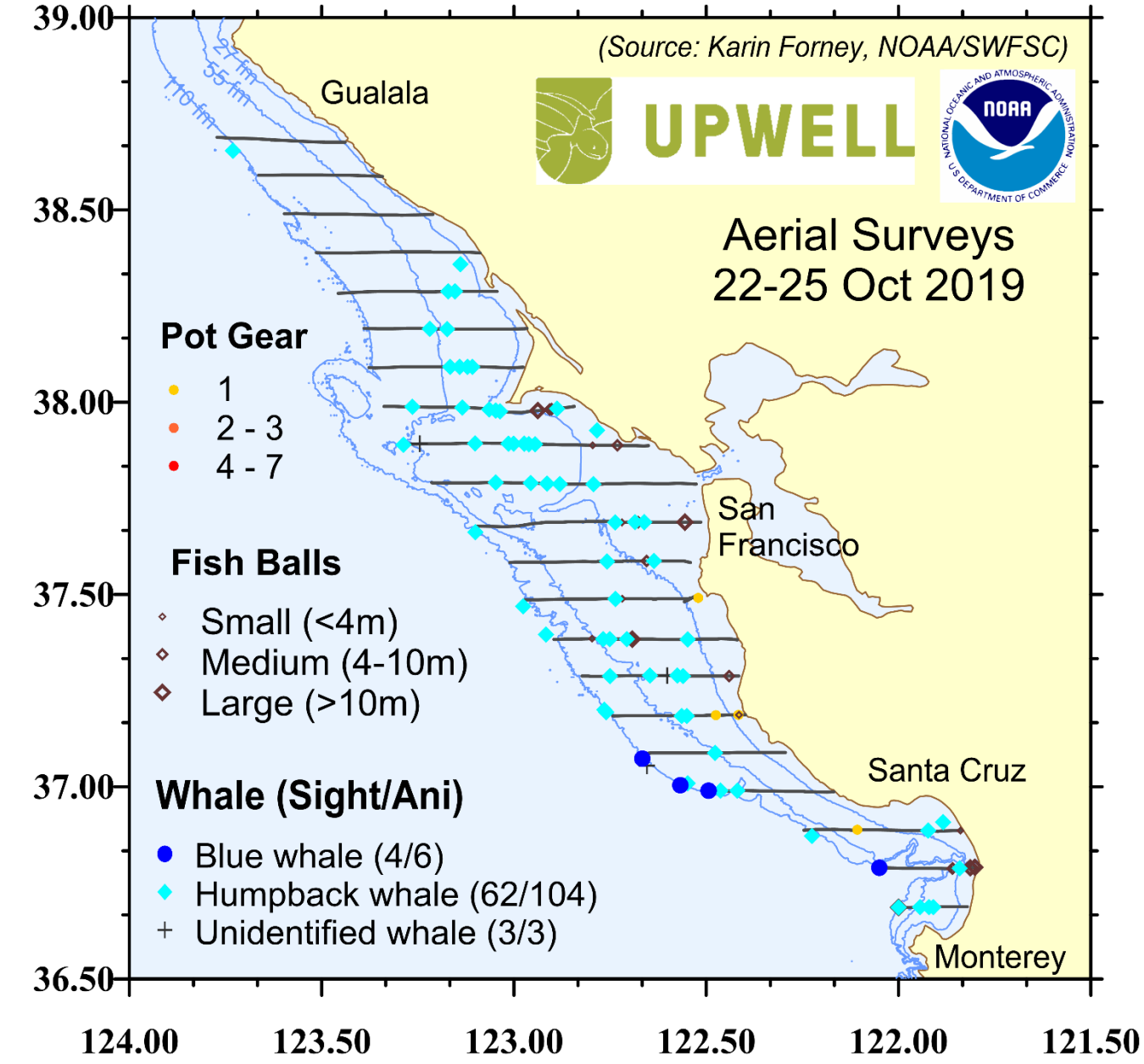

Figure 3. Central coast aerial surveys, 24-25 Oct 2019.

NORTHERN COAST REGION (Gualala to California/Oregon border):

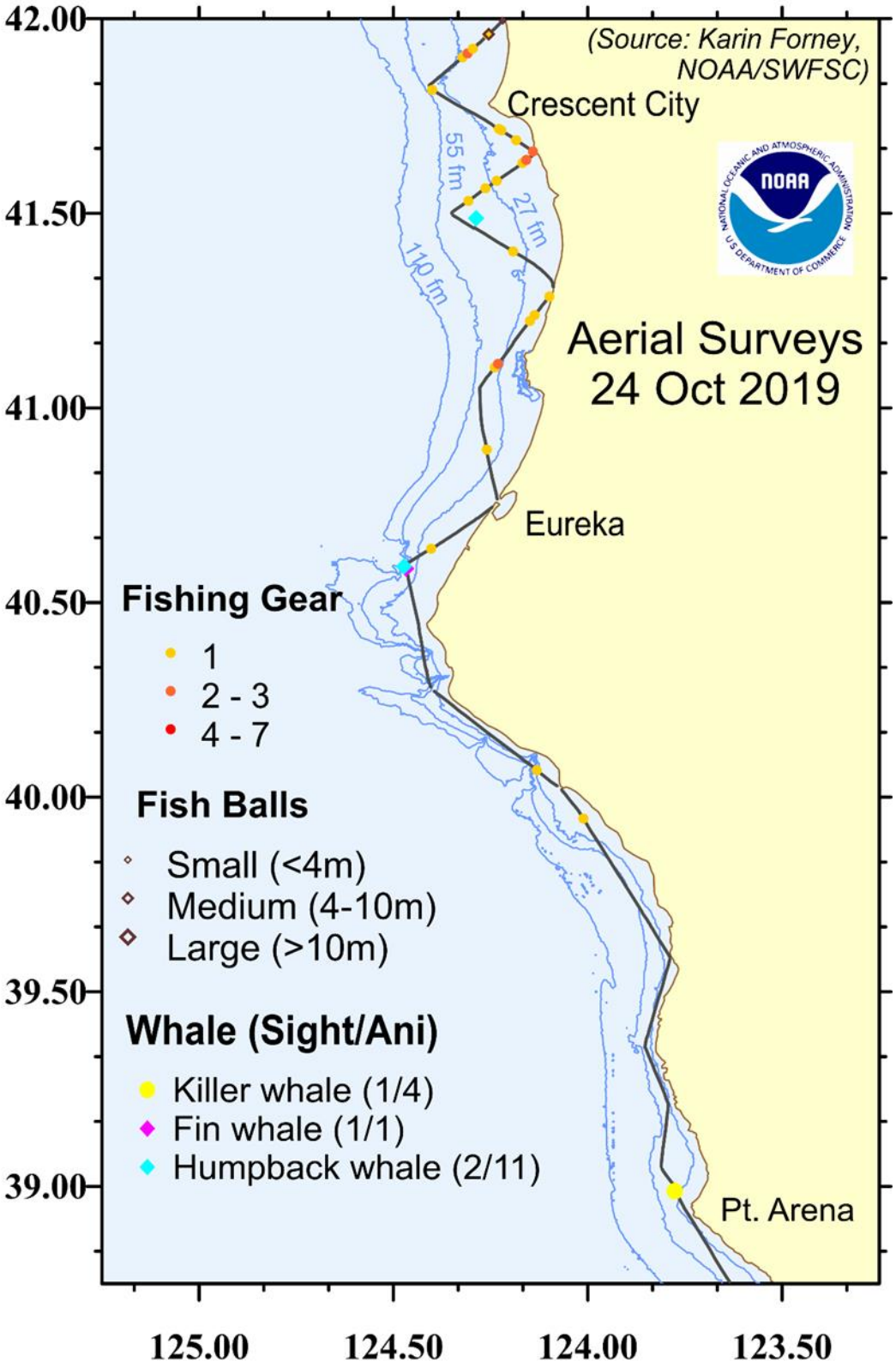

Figure 4. North coast aerial surveys, 24 Oct 2019.

FIGURE 5. LEATHERBACK PLOT

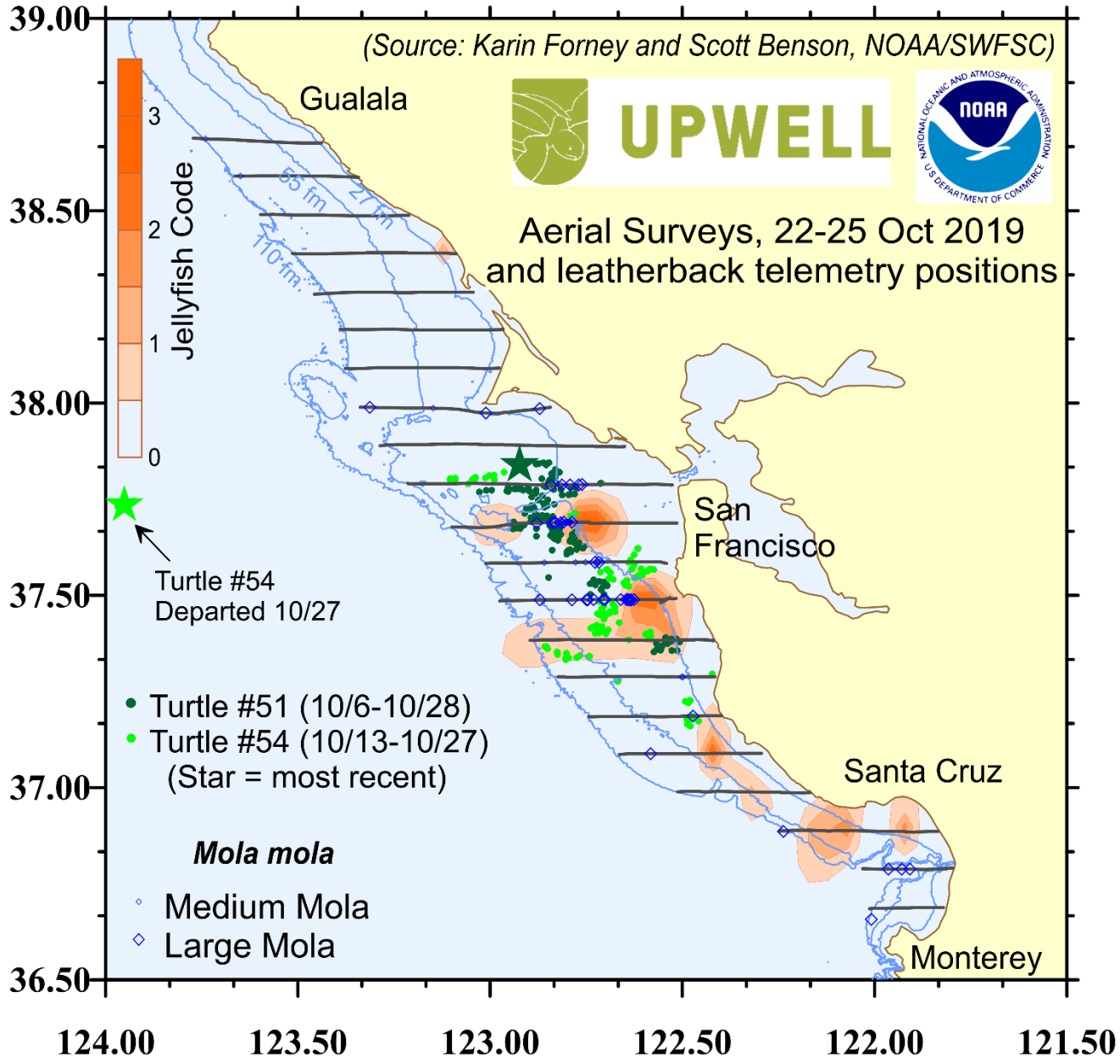

Figure 5. Leatherback habitat (jellyfish and molas) documented during the 24-25 October 2019 central coast aerial surveys, and telemetry positions for two tagged leatherbacks showing foraging movements during October 2019. Most recent leatherback positions are indicated with the star symbol. There was little evidence of leatherback habitat in the south-central and northern regions.