2022-23 Risk Assessment: Available Data

Last updated: October 25, 2022

Contents

RAMP DATA SUMMARY

For additional details and analysis, see the relevant subsections in the main portion of the Available Data document.

Evaluation of RAMP triggers in subsection (c)

Confirmed Entanglements in California Commercial Dungeness Crab Trap Gear are as follows:

- During the current Fishing Season: Not applicable
- During the current calendar year: Three humpback whales

Confirmed Entanglements in Unknown Fishing Gear reported from California are as follows:

- During the current Fishing Season: Not applicable
- During the current calendar year: Eight humpback whales (two additional entanglements are under review)

The current Impact Score for calendar year 2022 is 4.15 for humpback whales. Combined with an Impact Score for calendar year 2021 of 1.89 for humpback whales, CDFW anticipates a running 3-year average Impact Score of at least 2.01 for humpback whales at the start of 2023.

Marine Life Concentrations Surveys and/or Satellite Telemetry Observations:

- **Fishing Zone 1:** A joint USCG/CDFW aerial survey on October 18, 2022 documented three blue whales, exceeding the trigger pursuant to Title 14, CCR, Section 132.8(c)(2)(A)(2)(b).
- **Fishing Zone 2:** A CDFW aerial survey on October 18, 2022 documented 23 humpback whales, exceeding the trigger pursuant to Title 14, CCR, Section 132.8(c)(2)(A)(2)(a).
- **Fishing Zone 3:** A CDFW aerial survey on October 18, 2022 documented 73 humpback whales, and NMFS aerial surveys on October 16-19 documented between 27 and 128 humpback whales each day. Small vessel surveys conducted by Cascadia Research and The Marine Mammal Center on October 18, documented 43 humpback whales. These survey findings exceed the trigger pursuant to Title 14, CCR, Section 132.8(c)(2)(A)(2)(a).
- **Fishing Zone 4:** Small vessel surveys conducted by Cascadia Research and The Marine Mammal Center on October 16, 2022, documented 112 humpback whales, and Monterey Bay Whale Watch data shows a weekly running average of 30.6 humpback whales (with a peak of 50 humpback whales). Both data sets exceed the trigger pursuant to Title 14, CCR, Section 132.8(c)(2)(A)(2)(a).
- **Fishing Zone 5:** Vessel surveys conducted by California Coast Crab Association in collaboration with Cascadia Research on October 20, 2022, documented 30 humpback whales, exceeding the trigger pursuant to Title 14, CCR, Section 132.8(c)(2)(A)(2)(a).

Evaluation of RAMP Management Considerations in subsection (d)

Section 132.8(d)(2): Information from NOAA

- No additional information was made available for this risk assessment.

Section 132.8(d)(3): Effectiveness of management measures to reduce entanglement risk

- CDFW considers that a commercial fishery delay and recreational trap restriction will provide the greatest reduction in entanglement risk. Other Management Actions available under RAMP either would not provide adequate risk reduction given the Marine Life Concentrations observed during recent aerial and vessel-based surveys (Fleet Advisory, vertical line reduction, depth constraint) or cannot be used at the beginning of the fishing season (Alternative Gear).

Section 132.8(d)(4): Total economic impact to the fleet and fishing communities

- The RAMP regulations specify that, when deciding among multiple management measures which would equivalently reduce entanglement risk, CDFW shall consider total economic impact to the fleet and fishing communities. CDFW has not identified any other management measure that would equivalently reduce entanglement risk, so this consideration does not apply.

Section 132.8(d)(5): Data availability within and across Fishing Zones

- USCG, CDFW, and/or NMFS aerial survey information are available for Fishing Zones 1-5. Small vessel survey data are available for Fishing Zones 1-5. Monterey Bay Whale Watch data are available for Fishing Zone 4, Point Blue Conservation Science data portal information are available for Fishing Zones 3 and 6, and Whale Watch 2.0 predictions are available for all Fishing Zones. Satellite telemetry data are available for leatherback sea turtles, both of which were tagged within Fishing Zone 3 in mid-September and are now located outside the Fishing Grounds.

Section 132.8(d)(6) and (d)(11): Known historic marine life migration patterns and Actionable Species migration into or out of Fishing Grounds and across Fishing Zones

- Humpback whales are still present in all Fishing Zones, and recently documented abundances indicate migration to their wintering areas has yet to commence.
- Monterey Bay Whale Watch data indicate the high number of humpback whales seen in Fishing Zone 4 is well above historical patterns for this time of year.
- Monterey Bay Whale Watch data indicate low presence of blue whales in Fishing Zone 4, which is consistent with historical patterns for this time of year. However, aerial surveys have documented multiple blue whales within Fishing Zone 1, and Whale Watch 2.0 habitat suitability predictions indicate high habitat suitability for blue whales is present throughout Fishing Zones 1-6.
- Given recent blue whale sightings and continued presence of high-quality leatherback sea turtle foraging habitat, it is premature to conclude migration out of the Fishing Grounds has occurred for these species.

Section 132.8(d)(7): Fishing Season dynamics

- Based on latest results, Fishing Zones 1, 3 and 4 have cleared for domoic testing. Additional results are pending which will inform status of Fishing Zones 2, 5, and 6.
- High levels of effort are anticipated for the recreational crab season opener on November 5, 2022 and the commercial crab season opener on November 15, 2022 unless a RAMP Management Action is applied.
- Quality testing results (only applicable for Fishing Zones 1 and 2) are anticipated to be available the week of October 31, 2022.

Section 132.8(d)(8): Known distribution and abundance of key forage

- CDFW and NMFS aerial surveys and small vessel surveys indicate humpback whales are generally foraging on schooling fish, although in Fishing Zone 1 humpback whales were observed feeding on both krill (offshore) and fish (inshore).
- Suitable leatherback sea turtle foraging habitat is still present within Fishing Zone 3.

Section 132.8(d)(9): Ocean conditions

- There is generally high habitat compression during the month of October, which is associated with increased entanglement risk.
- There is a 75% chance of La Niña conditions during December 2022 – February 2023, which is typically associated with high upwelling and productive nearshore waters.

Section 132.8(d)(10): Current Impact Score Calculation

- The current Impact Score for calendar year 2022 is 4.15 for humpback whales. Combined with an Impact Score for calendar year 2021 of 1.89 for humpback whales, CDFW anticipates a running 3-year average Impact Score of at least 2.01 for humpback whales at the start of 2023. This will exceed the entanglement trigger in RAMP.
- The current Impact Score calculation for 2022 is 0 for blue whales and leatherback sea turtles.

TRIGGERS FOR MANAGEMENT ACTION

Confirmed Entanglements: §132.8(c)(1)

Data provided by: Lauren Saez and Dan Lawson (National Marine Fisheries Service)

Between January 1 and October 20, 2022 there have been 15 confirmed entanglements of humpback whales reported off California during 2022. Eleven of the confirmed humpback whale entanglements were reported in Fishing Zone 4, two were reported in Fishing Zone 6, and one each were reported in Fishing Zones 1 and 3. Three of the humpback whale entanglements have been confirmed in California commercial Dungeness crab gear, two were confirmed in Oregon commercial Dungeness crab gear, and two were confirmed in gillnet gear (Table 1). The National Marine Fisheries Service (NMFS) has classified the remainder as occurring in unidentified pot/trap gear. There have been no confirmed entanglements of blue whales or leatherback sea turtles during this period.

Table 1. Actionable Species Entanglements during 2022, prepared by West Coast Region.

Actionable Species	Confirmed Entanglements in California Commercial Dungeness Crab Gear	Confirmed Entanglements in Unknown Fishing Gear Reported off California
Humpback whales	3	8
Blue whales	0	0
Leatherback sea turtles	0	0

The 2022-23 fishing season has not opened, so the cumulative Impact Score for the current fishing season is 0 for all three species (Table 2). There have been no confirmed entanglements of either blue whales or leatherback sea turtles in California commercial Dungeness crab gear (reported from any location) or unidentified fishing gear (reported from California) during the current calendar year, so the cumulative Impact Score for the current calendar year is 0 for these two species.

For humpback whales, there have been multiple confirmed entanglements during the current calendar year for which CDFW has assigned an Impact Score. As described in the April 4, 2022 Available Data document, CDFW assigned the following Impact Scores to humpback whale entanglements confirmed during the 2021-22 season, all of which occurred during the 2022 calendar year:

- 20220127Mn: 0.38
- 20220311Mn: 0.75
- 20220319Mn: 0.75
- 20220321Mn: 0.38
- 20220328Mn: 0.75

There are six additional confirmed entanglements which are subject to CDFW's Impact Score Calculations for the current calendar year, all of which are confirmed entanglements of humpback

whales reported off California which NMFS has classified as occurring in unidentified pot/trap gear:

- 20220520Mn: One orange and one white/yellow buoy trailing approximately 30 feet behind animal; no gear removed; reported off Monterey, Fishing Zone 4.
- 20220526Mn: Green line loosely wrapped around the left fluke tip that had lost of barnacles. Lots of dark lines seen draped on the top of fluke when animal surfaced once, then not visible anymore; potential self-release; reported off Monterey, Fishing Zone 4.
- 20220724Mn: Two bullet buoys that are purple on the bottom half and red on the top half. The trailer buoy also has small white oval shaped buoy at the end of approximately three feet of line; self-release; reported off Asilomar/Monterey, Fishing Zone 4.
- 20220830Mn: Entangled around the peduncle or flukes, trailing an orange buoy only a few feet from the tail; no gear removed; reported off Monterey, Fishing Zone 4.
- 20221008Mn: Blue line wrapped around body and left pectoral flipper, fresh injuries along the back, tangle of line trailing behind fluke; gear partially removed and recovered; reported off Dana Point, Fishing Zone 6.
- 20221010Mn: Yellow line around right pectoral flipper, digging into flipper; no gear removed; reported off Moss Landing, Fishing Zone 4.

After review of available information (summarized above), CDFW has assigned the following Impact Scores:

- 20220520Mn: 0.38
- 20220526Mn: 0
- 20220724Mn: 0.38
- 20220830Mn: 0.38

Impact Scores for 20221008Mn and 20221010Mn have not yet been assigned, pending additional information from NMFS. CDFW did not receive sufficient documentation from NMFS regarding 20220526Mn to evaluate whether the entanglement was potentially caused by California commercial Dungeness crab gear, and therefore has assigned an Impact Score of 0.

Table 2. Impact Score Calculations based on Confirmed Entanglements in California commercial Dungeness crab gear and confirmed entanglements in Unknown Fishing Gear reported off California.

Actionable Species	Current Fishing Season Impact Score (2022-23)	Current Calendar Year Impact Score (2022)
Humpback whales	0	4.15 **two additional Impact Score assignments pending*
Blue whales	0	0
Leatherback sea turtles	0	0

The total calendar year impact score for 2021 was 1.89 for humpback whales and 0 for blue whales and leatherback sea turtles. The current total calendar year impact score for 2022 is 4.15

for humpback whales and 0 for blue whales and leatherback sea turtles. Beginning in 2023, CDFW will also evaluate risk based on a 3-year rolling average impact score.

Table 3. Impact Score Calculations based on Confirmed Entanglements in California commercial Dungeness crab gear and confirmed entanglements in Unknown Fishing Gear reported off California underlying calculation of a 3-year rolling average.

Actionable Species	2021 Calendar Year Impact Score	2022 Calendar Year Impact Score	2023 Calendar Year Impact Score	3-Year Rolling Average
Humpback whales	1.89	4.15 * *two additional Impact Score assignments pending*	NA	NA
Blue whales	0	0	NA	NA
Leatherback sea turtles	0	0	NA	NA

Marine Life Concentrations: §132.8(c)(1)

Data provided by: US Coast Guard, California Department of Fish and Wildlife, Karin Forney and Scott Benson (NOAA Southwest Fisheries Science Center and Upwell), John Calambokidis (Cascadia Research in collaboration with The Marine Mammal Center), Monterey Bay Whale Watch (processed by Karin Forney, NOAA Southwest Fisheries Science Center)

Table 4. Summary of available CDFW-approved survey data for marine life concentrations for each Fishing Zone, and whether the triggers established in Section 132.8(c)(2) have been met for any Fishing Zone.

Fishing Zone	CDFW-approved survey data	Triggers attained?
Zone 1	USGC Aerial Survey	Yes
Zone 2	USGC Aerial Survey, CDFW Aerial Survey, NMFS Aerial Survey	Yes
Zone 3	CDFW Aerial Survey, NMFS Aerial Survey	Yes
Zone 4	CDFW Aerial Survey, NMFS Aerial Survey, MBWW	Yes
Zone 5	CDFW Aerial Survey	Yes
Zone 6	NA	Yes – No Data

USCG/CDFW Aerial Survey *(Fishing Zones 1-2)*

USCG and CDFW flew a joint aerial survey on October 18, 2022 from McKinleyville (north of Eureka) to the Oregon border (Fishing Zone 1) and from Cape Mendocino to Shelter Cove (Fishing Zone 2). A total of six humpback whales and three blue whales were observed in Fishing Zone 1; one blue whale was observed in Fishing Zone 2.

CDFW Aerial Surveys *(Fishing Zones 2-5)*

On October 18, 2022 CDFW flew an aerial survey between Cape Mendocino and the Farallon Islands (Fishing Zones 2-4) which included east-west transect lines between San Francisco and Bodega Bay and survey lines which paralleled the coast north of Bodega Bay (Figure 1). A total of 23 humpback whales were observed in Fishing Zone 2 and 73 humpback whales were observed in Fishing Zone 3. Humpback whales were generally observed between the 30m and 50m depth contours, and were particularly abundant between Fort Bragg and Bolinas. Molas and bait balls were also observed during both flights.

On October 20, 2022 CDFW flew an additional aerial survey between Pacific Grove and Cayucos (southern portion of Fishing Zone 4 and northern portion of Fishing Zone 5; Figure 2). A total of three humpback whales were observed in Fishing Zone 4. No blue whales or leatherback sea turtles were observed on either survey.

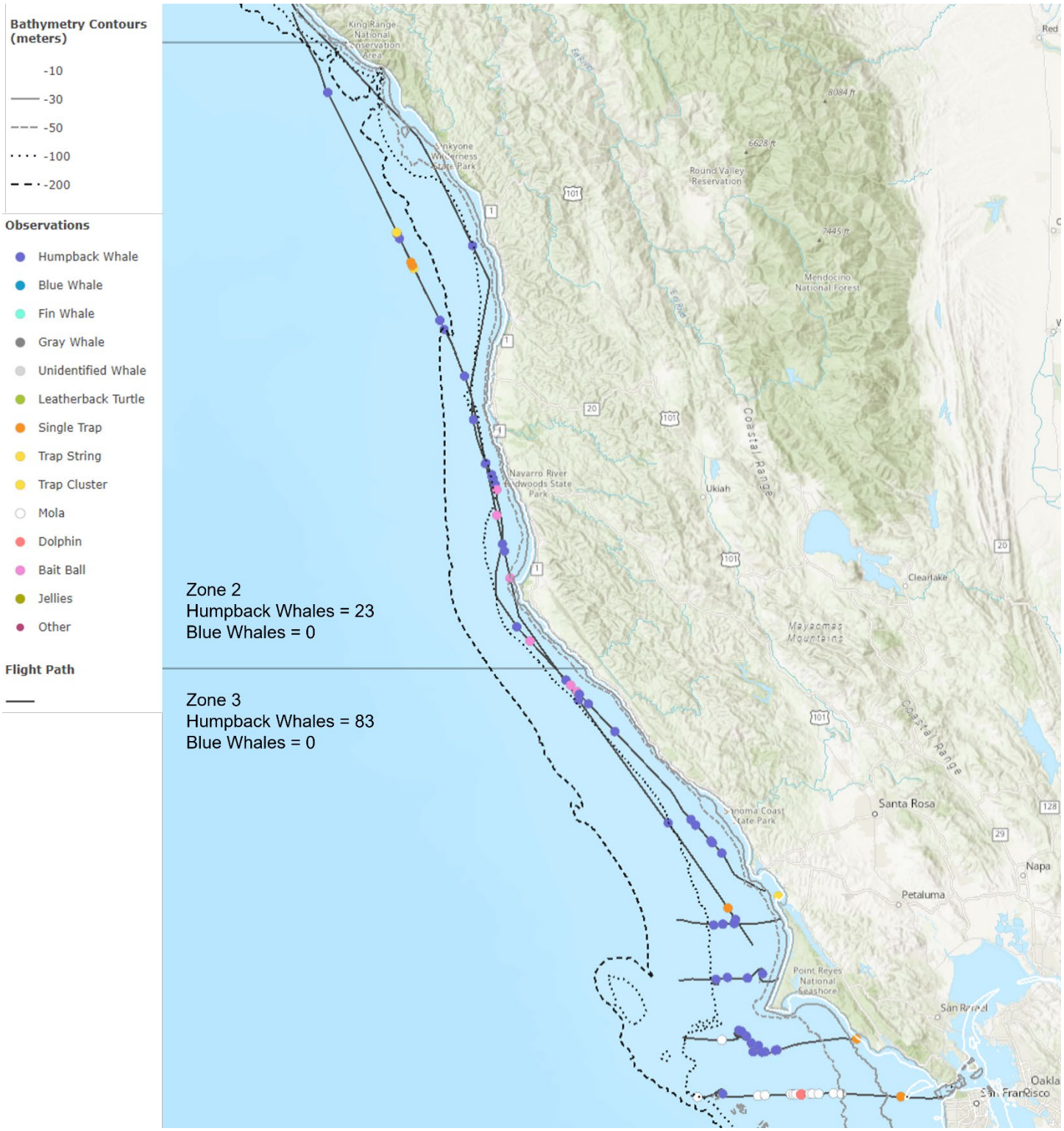

Figure 1. Map showing track lines and observations from CDFW aerial survey of Fishing Zones 2 and 3 on October 18, 2021. Survey information is overlaid onto contours showing the 10m, 30m, 50m, 100m, and 200m bathymetry lines.

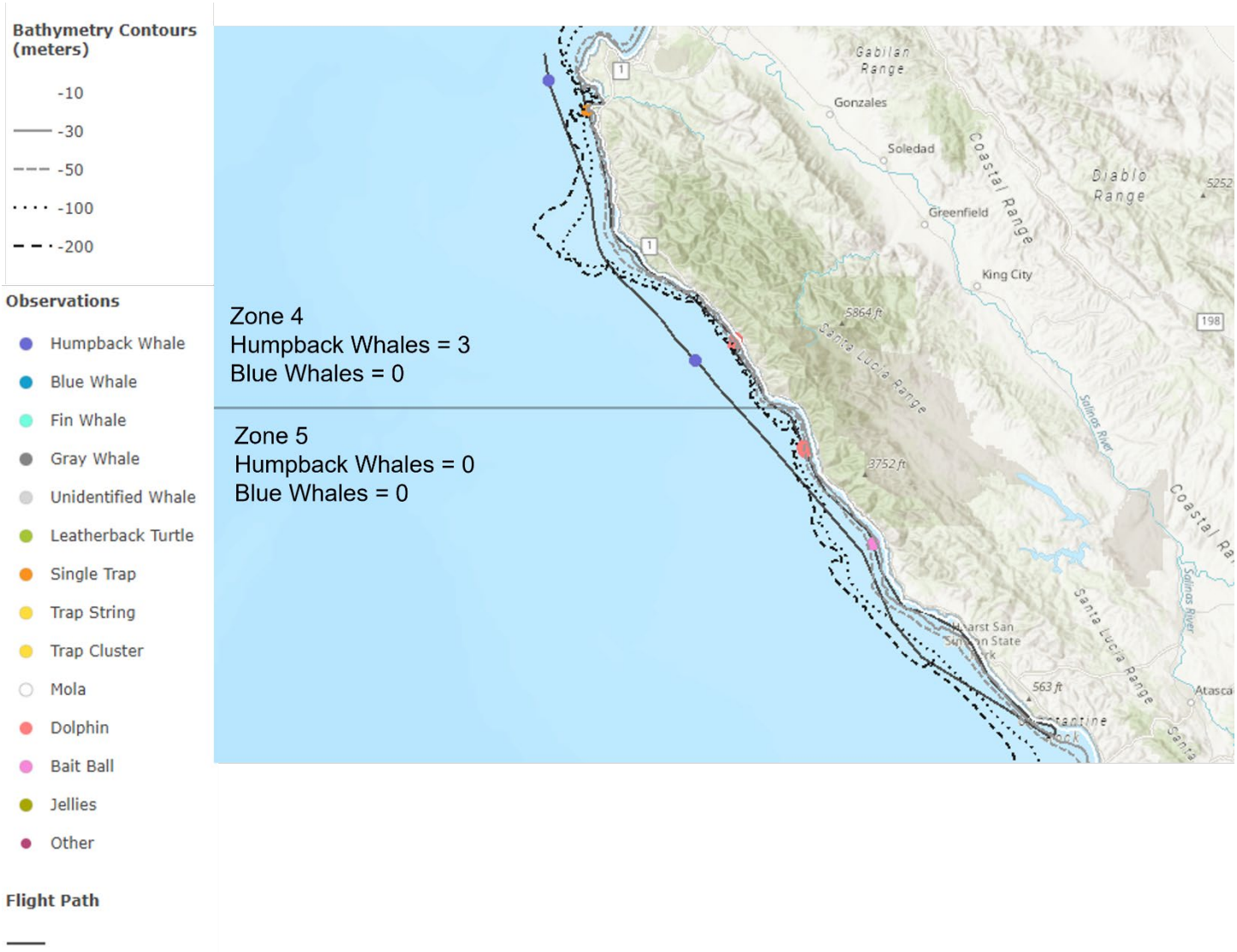

Figure 2. Map showing track lines and observations from CDFW aerial survey of Fishing Zones 4 and 5 on October 20, 2021. Survey information is overlaid onto contours showing the 10m, 30m, 50m, 100m, and 200m bathymetry lines.

NMFS Aerial Surveys *(Fishing Zones 2-4)*

Four aerial surveys were conducted on October 16, 17 and 18, 2022 within Fishing Zone 3 and on October 19, 2022 within Fishing Zones 2-4 (Figure 3). During October 16-18, the primary purpose of the surveys was to document leatherback sea turtle foraging habitat within the Gulf of the Farallones, and to locate leatherback sea turtles for potential capture and tagging. On October 19, surveys were conducted from Point Sur to Cape Mendocino to document marine wildlife throughout a broader area.

The observation team consisted of two observers plus a data recorder on October 16-17, 2022 and three observers plus a data recorder on October 18-19, 2022. The surveys were conducted aboard a specialized Partenavia aircraft with bubble windows and a belly port for optimal visibility. Standardized line-transect survey methods that followed established NOAA methodology were used to record whales, turtles, and ecosystem indicator species such as forage fish, sea nettles and moon jellies (leatherback prey), and ocean sunfish (which are found in the same habitat as leatherback sea turtles and also feed on jellies).

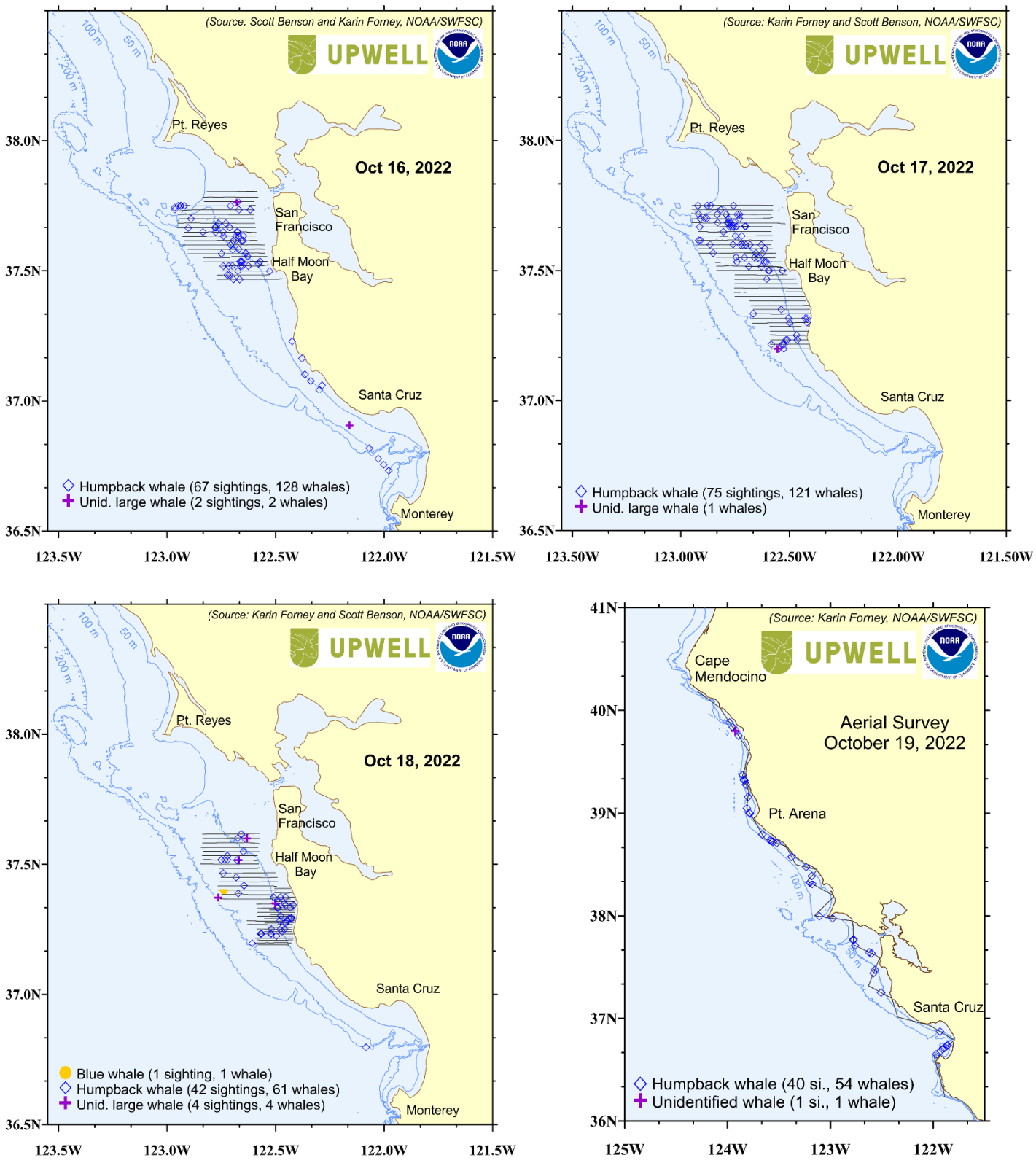

Figure 3. Plots for the October 16, 17, 18 and 19, 2022 aerial surveys, showing transects lines flown (black lines) and sighting locations of humpback whales, blue whales and unidentified large whales that were likely also humpback whales. The depth contours shown are 50m (28 fathoms), 100m (56 fathoms), and 200m (112 fathoms). Symbols shown off the transect lines are whales observed while transiting to and from Monterey airport or between transects.

Humpback Whales

- During the fine-scale surveys of Fishing Zone 3 on October 16-18, 2022, 128 humpback whales were observed on October 16, 121 humpback whales were observed on October 17, and 61 humpback whales were observed on October 18. During the nearshore zig-zag transects flown on October 19, 15 humpback whales were observed in Fishing Zone 2, 27 humpback whales were observed in Fishing Zone 3, and 12 humpback whales were observed in Fishing Zone 4. These counts include both on-effort (while flying transect lines) and off-effort (when transiting to and from the Monterey airport) sightings.
- Although a few whales may have been recorded multiple times during the fine-scale surveys when covering adjacent or overlapping transect lines, most whales within each survey day were likely unique based on location and timing of the observations.
- The humpback whales were concentrated in water depths ranging from 10 to 50 fathoms (approximately 20-100m).

Blue Whales

- One blue whale was observed southwest of Half Moon Bay (Fishing Zone 3) during the October 18, 2022 survey in waters of about 50 fathom (90m) water depth.

Leatherback Sea Turtles

- Although suitable foraging habitat for leatherback sea turtles was identified between Pigeon Point and the Farallon Islands (see Figure 10), no leatherback sea turtles were encountered during the four aerial surveys.

Small vessel surveys – Cascadia and California Coast Crab Association *(Fishing Zones 1-5)*

Surveys are currently underway and will be continuing through the end of this month and into November as weather allows. Additional analysis and survey results will be shared during the Working Group meeting on October 27, 2022 and incorporated into an updated version of this document. Preliminary findings are included in Table 5 and described below.

- In Fishing Zone 1, lower humpback whale abundances (as compared to other Fishing Zones) may partly reflect more limited coverage and some poor survey conditions. Additional surveys conducted by Oregon State University for a separate joint Oregon State University/Cascadia project revealed higher numbers of humpback whales both in inshore waters <100m deep and in waters near the shelf edge at 200m.
- In Fishing Zone 2, a survey conducted out of Fort Bragg at the end of August 2022 revealed high concentrations of humpback whales in waters at and <100m. This has also been supported by reports of sightings of humpback whales made from shore in nearshore waters.
- In Fishing Zone 3, surveys both north and south of Bodega Bay and in the Gulf of the Farallones have revealed high concentrations of humpback whales generally in waters 100m and shallower. Sightings and track lines from the October 8, 2022 survey are shown in Figure 4.
- In Fishing Zone 4, surveys out of Monterey Bay have revealed concentrations of humpback whales broadly through the region including shallower inshore and waters >200m off the shelf.
- In Fishing Zone 5, surveys were conducted off commercial fishing vessels on October 19 and 20, 2022 as part of the industry surveys organized by California Coast Crab Association.

Table 5. Summary of vessel surveys conducted during October 2022 including the three surveys in Fishing Zone 5 in collaboration with industry organized surveys with Cascadia observers. Note: additional surveys were conducted in late August and September are described in the narrative above but are not included here.

Date	Vessel	Zone	Area	Blue/fin whales (Total)	Humpback whales (Total)	Unid whales (Total)
08-Oct-22	NOVA	3	Gulf of the Farallones	0	53	0
18-Oct-22	NOVA	3	Gulf of the Farallones	0	43	5
01-Oct-22	MUS	4	Monterey Bay area	4	32	0
16-Oct-22	MUS	4	Monterey Bay area	2	112	0
19-Oct-22	F/V Migrator (CRC obs.)	5	Morro Bay area and North	0	15	0
20-Oct-22	F/V Sky (CRC obs.)	5	Pt San Luis - Arguello, inshore	0	21	0
20-Oct-22	F/V Migrator (CRC obs.)	5	Pt San Luis - Arguello, offshore	0	9	6

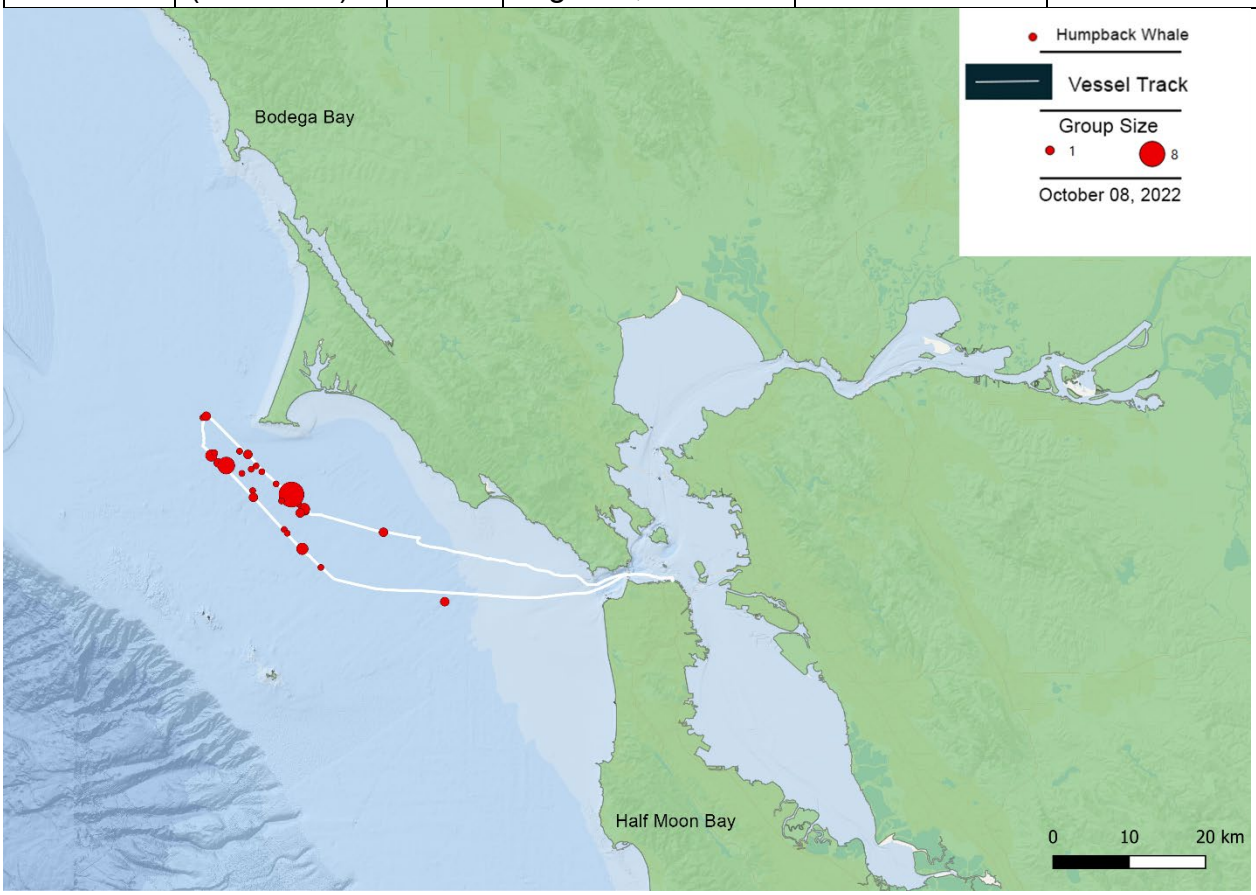

Figure 4. Example of one survey from Nova on 8 October 2022 in Zone 3 showing distribution of humpback whales along transect lines.

Monterey Bay Whale Watch *(Fishing Zone 4)*

- MBWW conducted whale-watching trips in southern Monterey Bay on six of seven days during the week of October 11-17, 2022.

- The average number of humpback whales-per-trip during the last seven days (October 11-17) was 30.6, with a peak of 50 whales observed on a single half-day trip on October 16.
- Up to six blue whales were observed by MBWW during several trips in August and September, but no blue whales have been observed during October.

Satellite Telemetry *(All Fishing Zones)*

Two adult male leatherback sea turtles were captured seven to 10 miles west of the San Francisco Peninsula and tagged with satellite-linked transmitters on September 15 and 16, 2022. As of October 20, 2022 one turtle is approximately 130 miles west of Morro Bay, CA and the other is 1,125 miles ESE of Hawaii. The most distant turtle is migrating in a southwest direction toward western Pacific nesting beaches. The leatherback that still resides in the California Current is engaged in foraging behavior in deep offshore water.

MANAGEMENT CONSIDERATIONS

Information from NOAA: §132.8(d)(2)

No additional information was shared.

Effectiveness of management measures: §132.8(d)(3)

Data provided by: California Department of Fish and Wildlife

CDFW considers that a commercial fishery delay and recreational trap restriction will provide the greatest reduction in entanglement risk. Other Management Actions available under RAMP either would not provide adequate risk reduction given the Marine Life Concentrations observed during recent aerial and vessel-based surveys (Fleet Advisory, vertical line reduction, depth constraint) or cannot be used at the beginning of the fishing season (Alternative Gear).

Total economic impact to the fleet: §132.8(d)(4)

Data provided by: California Department of Fish and Wildlife

The RAMP regulations specify that, when deciding among multiple management measures which would equivalently reduce entanglement risk, CDFW shall consider total economic impact to the fleet and fishing communities. CDFW has not identified any other management measure that would equivalently reduce entanglement risk, so this consideration does not apply.

Historic patterns and current Actionable Species migration: §132.8(d)(6) and (11)

Data provided by: Monterey Bay Whale Watch (processed by Karin Forney, NOAA Southwest Fisheries Science Center), Point Blue Conservation Science Data Portal, NOAA Coast Watch

Monterey Bay Whale Watch *(Fishing Zone 4)*

- The semi-monthly average number of whales-per-half-day-trip is very high compared to historical patterns for this time of the year (Figure 5).
- The semi-monthly average number of blue whales-per-half-day-trip is consistent with historical patterns for this time of the year (Figure 6).

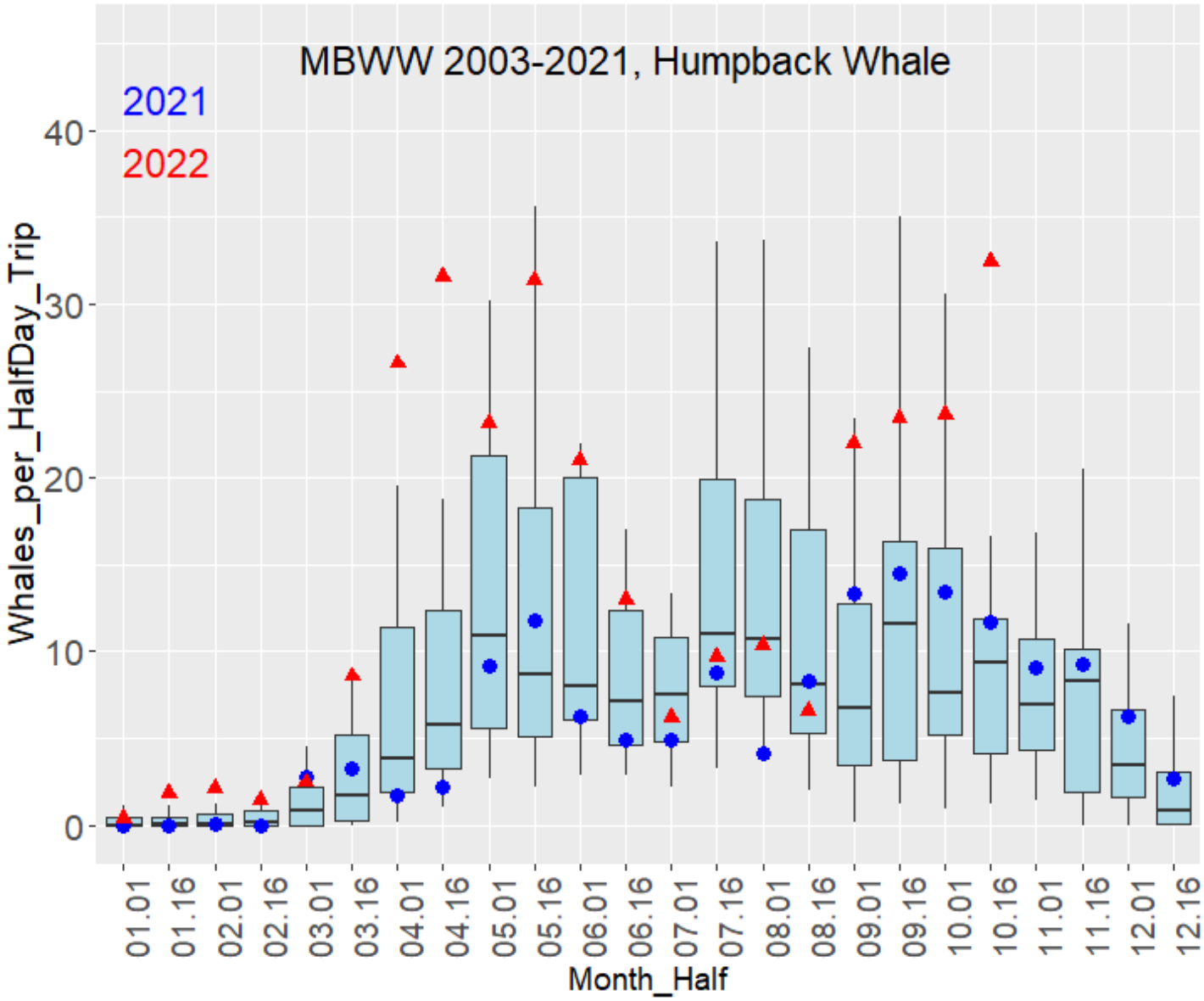

Figure 5. Historical Monterey Bay Whale Watch data for 2003-2022, summarizing the average and variation in the number of humpback whales per half-day trip on a semi-monthly basis (1st- 15th, 16th- end of month). This boxplot follows standard statistical practice in that the black horizontal line is the average number of whales; the blue box shows the 25th-75th percentiles (i.e., half of all past whale numbers are within the blue box); the vertical lines show the range of whale numbers excluding outliers, and outliers are shown as small black dots. Values for 2021 (large blue dots) and 2022 (red triangles) and are provided for reference, placing recent whale numbers in a historical context.

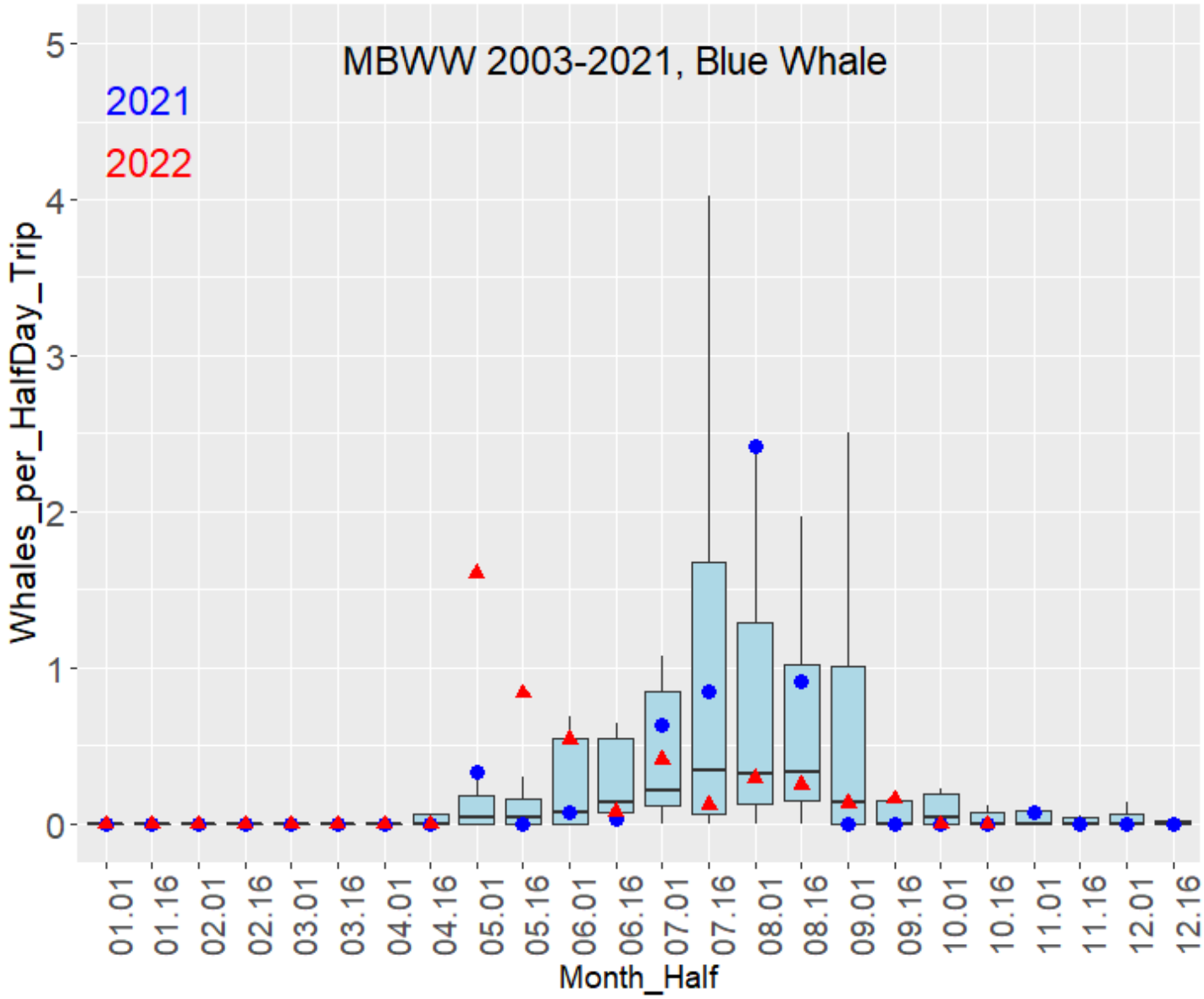

Figure 6. Historical Monterey Bay Whale Watch data for 2003-2022, summarizing the average and variation in the number of blue whales per half-day trip on a semi-monthly basis (1st- 15th, 16th- end of month). This boxplot follows standard statistical practice in that the black horizontal line is the average number of whales; the blue box shows the 25th-75th percentiles (i.e., half of all past whale numbers are within the blue box); the vertical lines show the range of whale numbers excluding outliers, and outliers are shown as small black dots. Values for 2021 (large blue dots) and 2022 (red triangles) and are provided for reference, placing recent whale numbers in a historical context.

Point Blue Conservation Science Data Portal *(Fishing Zones 3, 6)*

During the seven-day period ending October 21, 2022 trained observers at the Farallon Islands reported 72 humpback whale sightings within Fishing Zone 3, and trained naturalists from the Channel Islands National Marine Sanctuary and National Park Service reported 35 humpback whale sightings within Fishing Zone 6 (Figure 7). No blue whales were reported in either Fishing Zone during this period.

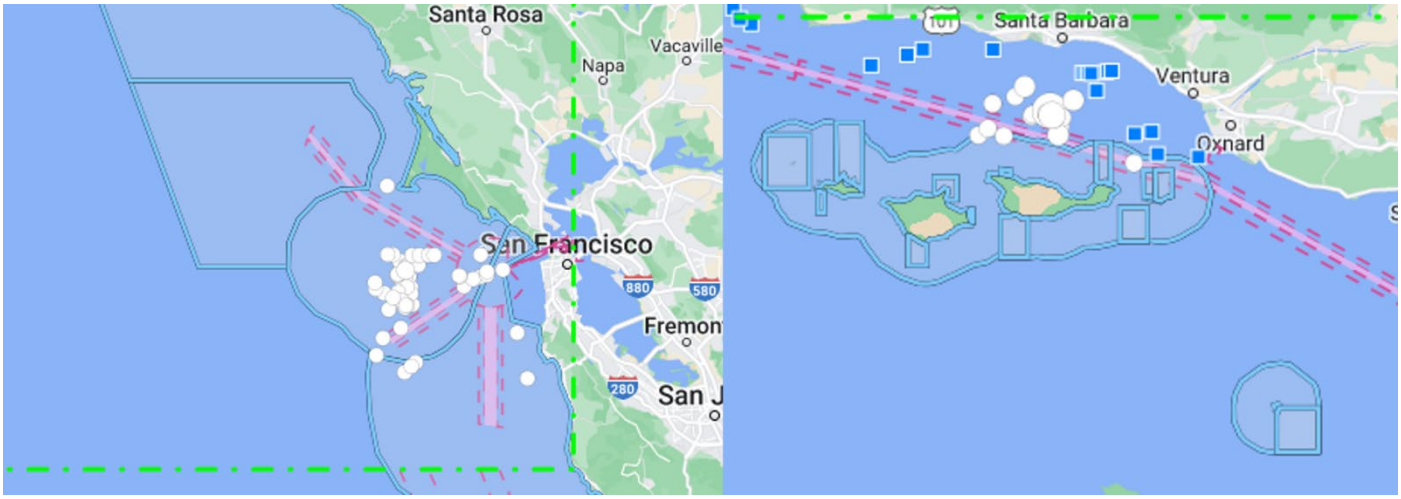

Figure 7. Locations of humpback whale sightings within Fishing Zones 3 and 6. Reporting locations are represented by white circles. A given report may or may not represent multiple individuals. Fishing Zone boundaries are represented by the dashed green line.

Whale Watch 2.0 *(All Fishing Zones)*

Blue whale habitat predictions for October 18, 2022 indicate high habitat suitability along most of the California coast (Figure 8).

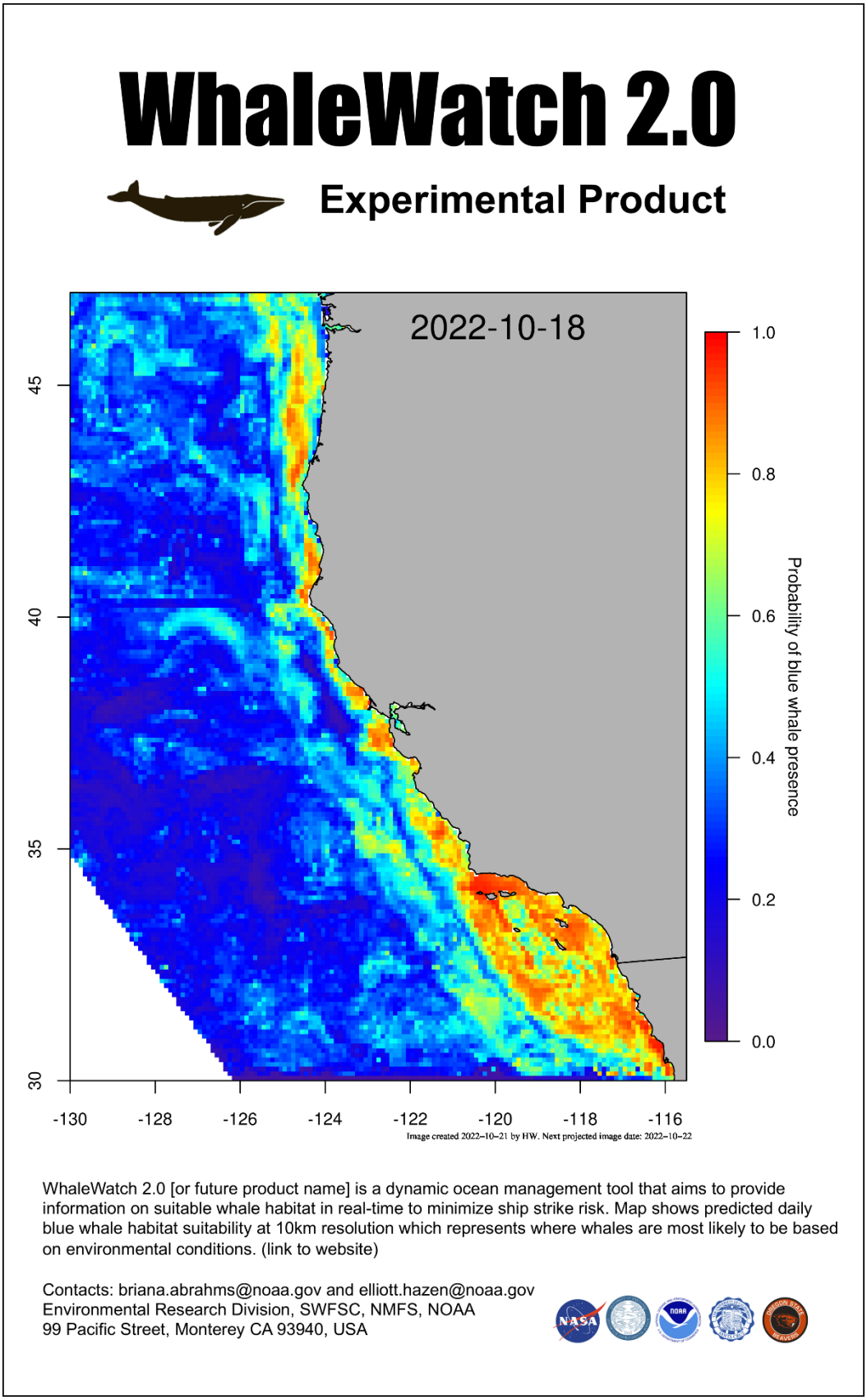

Figure 8. WhaleWatch 2.0 map for October 18, 2022. View a current map.

Fishing Season dynamics: §132.8(d)(7)

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

CDFW data presented in this section is preliminary and subject to revision.

Domoic Acid and Quality Testing

- Most samples from collection sites have been submitted to the California Department of Public Health (CDPH) and results through October 24, 2022 have been posted (Figure 9) with no locations requiring retesting at this time. The last remaining site of Manchester Beach is expected to be submitted to the CDPH laboratory the week of October 24, 2022 and this last sample will conclude the first round of domoic testing for each site. Based on latest results, Fishing Zones 1, 3 and 4 have cleared for domoic testing. Usal and Manchester Beach results will inform Zone 2 while Avila Beach result will inform Fishing Zones 5 and 6.
- Quality testing results are anticipated to be available the week of November 7, 2022. Low crab quality only affects Fishing Zones 1 and 2.

CDPH SUMMARY OF DOMOIC ACID LEVELS IN CRABS **JULY 1, 2022 - OCTOBER 24, 2022**

PORT	COLLECTION SITE	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	10/9/2022	Dungeness Crab	<2.5	4.1	9.5	<2.5	<2.5	<2.5	2.3 ppm	0%
Crescent City	Klamath River	10/9/2022	Dungeness Crab	<2.5	<2.5	4.2	3.0	<2.5	<2.5	1.2 ppm	0%
Trinidad	Lagoons	9/11/2022	Dungeness Crab	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	Non-Detect	0%
Trinidad	Trinidad Head	9/11/2022	Dungeness Crab	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	Non-Detect	0%
Eureka	LP Eureka	10/9/2022	Dungeness Crab	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	Non-Detect	0%
Eureka	Eel River	10/9/2022	Dungeness Crab	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	Non-Detect	0%
Fort Bragg	Usal		Dungeness Crab								
Fort Bragg	Manchester Beach		Dungeness Crab								
Bodega Bay	Salt Point	10/3/2022	Dungeness Crab	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	Non-Detect	0%
Bodega Bay	Russian River	10/3/2022	Dungeness Crab	<2.5	<2.5	<2.5	<2.5	3.3	<2.5	0.6 ppm	0%
Bodega Bay	Bodega Head	10/3/2022	Dungeness Crab	<2.5	12	<2.5	<2.5	<2.5	<2.5	2 ppm	0%
Bodega Bay	Point Reyes	10/3/2022	Dungeness Crab	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	Non-Detect	0%
Half Moon Bay/ San Francisco	Duxbury Reef	9/22/2022	Dungeness Crab	4.4	<2.5	<2.5	<2.5	<2.5	<2.5	0.7 ppm	0%
Half Moon Bay/ San Francisco	Pillar Point	9/24/2022	Dungeness Crab	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	Non-Detect	0%
Half Moon Bay/ San Francisco	Pigeon Point	9/25/2022	Dungeness Crab	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	Non-Detect	0%
Monterey	Monterey Bay	9/24/2022	Dungeness Crab	<2.5	<2.5	<2.5	<2.5	16	<2.5	2.7 ppm	0%
Monterey	Monterey Bay	9/24/2022	Rock Crab	<2.5	3.0	12	<2.5	<2.5	<2.5	2.5 ppm	0%
Morro Bay	Avila Beach		Dungeness Crab								
NA	CDFW Block 745	9/29/2022	Box Crab	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	Non-Detect	0%
NA	CDFW Block 745	9/29/2022	King Crab	<2.5	<2.5	<2.5	<2.5	<2.5	NA	Non-Detect	0%
NA	CDFW Block 652	9/28/2022	Rock Crab	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	Non-Detect	0%

1 SET = 6 SAMPLES

Figure 9. California Department of Public Health Domoic Acid Test Results for Crab, Updated October 24, 2022.

Automatic License Data System

As of September 20, 2022, over 37,000 crab trap validations have been sold for the 2022 calendar year. CDFW expects high effort during the recreational crab trap season opener.

Distribution and abundance of key forage: §132.8(d)(8)

Data provided by: California Department of Fish and Wildlife, Karin Forney and Scott Benson (NOAA Southwest Fisheries Science Center and Upwell), John Calambokidis (Cascadia Research in collaboration with The Marine Mammal Center)

Small vessel surveys – Cascadia and California Coast Crab Association *(Fishing Zones 1-5)*

Humpback whales in Fishing Zone 1 were observed feeding on both krill (offshore) and fish (inshore). Humpback whales were observed feeding on fish in Fishing Zones 2, 3 and 4, despite the broad depth distribution of humpback whales observed in Fishing Zone 4.

CDFW Aerial Surveys

Bait balls were observed in Fishing Zones 2, 3, and 5, and were generally located in close proximity to humpback whales.

NMFS Aerial Surveys

Dense aggregations of jellyfish (primarily brown sea nettles but also moon jellies) were documented between Pigeon Point and the Farallon Islands, providing abundant leatherback sea turtle forage. Numerous large ocean sunfish (*Mola mola*) were also concentrated along the offshore edge of the jellyfish aggregation (see Figure 10). Combined, this suggests that there is still suitable leatherback sea turtle foraging habitat, even though no leatherback sea turtles were documented during the October 2022 surveys.

Although few schooling fishing were documented directly by the aerial team, there were many feeding flocks of fish-eating seabirds, and multiple humpback whales were observed lunge-feeding on fish schools. Combined, this suggests that abundant forage fish were likely just below the surface (but too deep to be seen by the aerial team).

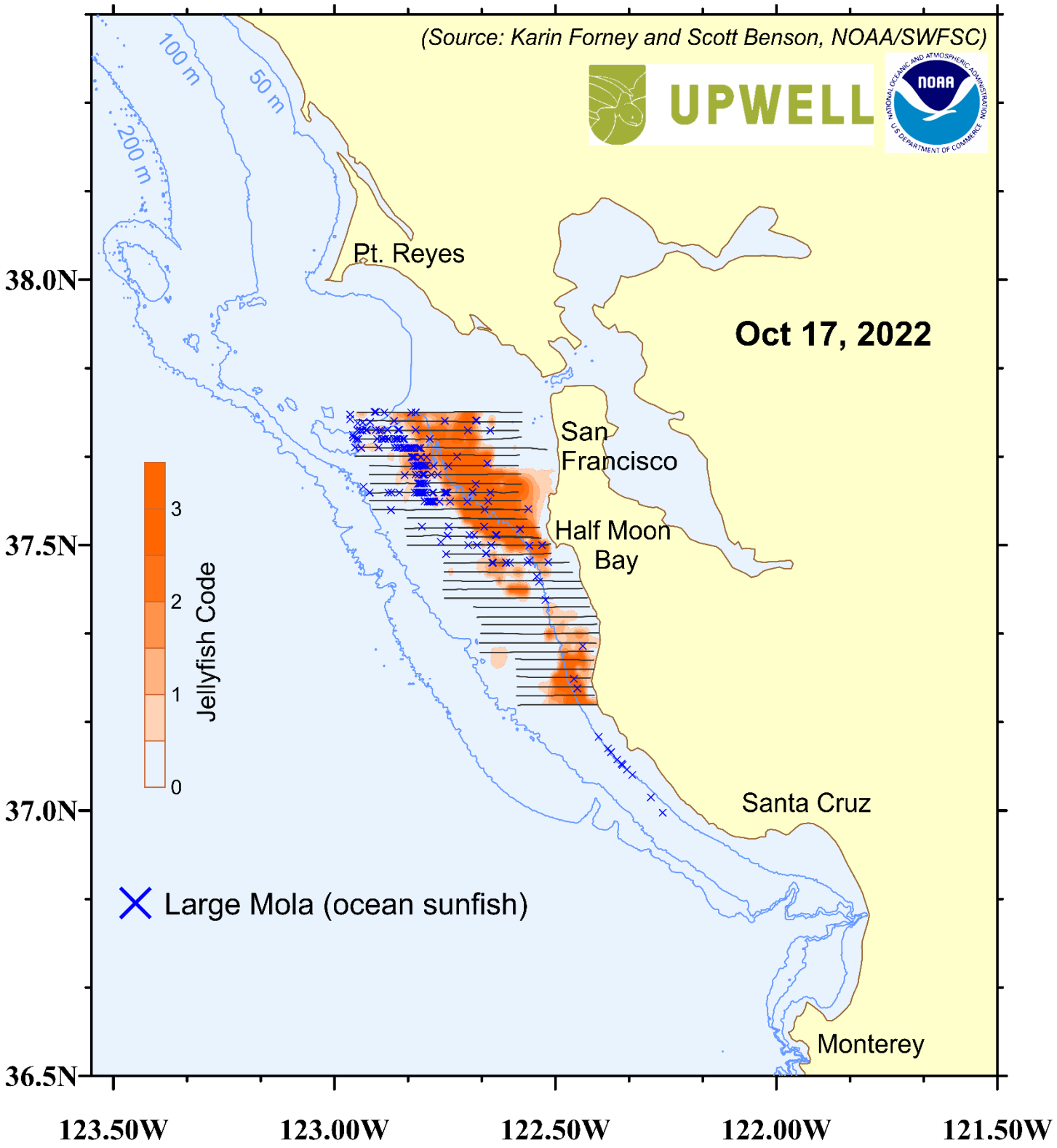

Figure 10. Plot for the October 17, 2022 aerial survey, showing the extent of dense jellyfish aggregations (leatherback prey) and large *Mola mola* (ocean sunfish, also a jellyfish predator that is often abundant within leatherback foraging habitat). The jellyfish code increases with jellyfish density and was interpolated from the along-transect scores. Depth contours shown are 50m (28 fathoms), 100m (56 fathoms), and 200m (112 fathoms).

Ocean conditions: §132.8(d)(9)

Data provided by: California Current Integrated Ecosystem Assessment Program, NOAA National Weather Service Climate Prediction Center

Habitat Compression Index

The most recent Habitat Compression Index values are for July 2022, during which there was moderate compression between 35.5 and 40°N (Figure 11). With the exception of 2021 (during which there was marginally low compression), compression has been either moderate or high during the month of October since 2010 (Figure 12).

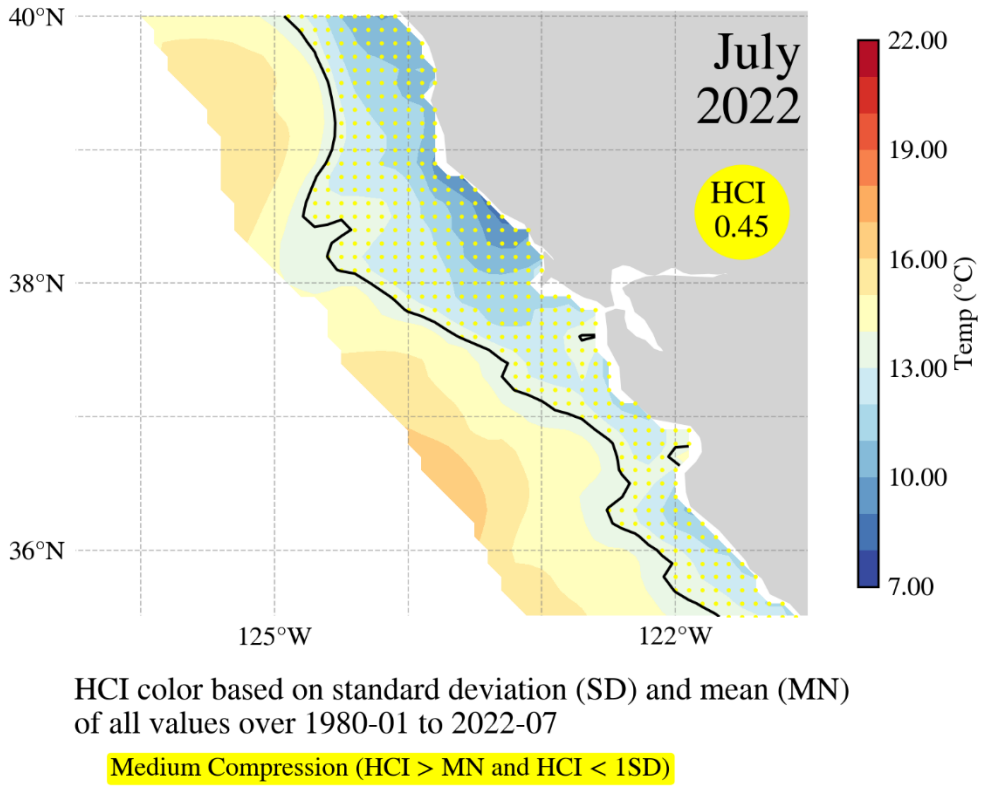

Figure 11. Map of July 2022 sea surface temperature and location of the Habitat Compression Index boundary (thin black line).

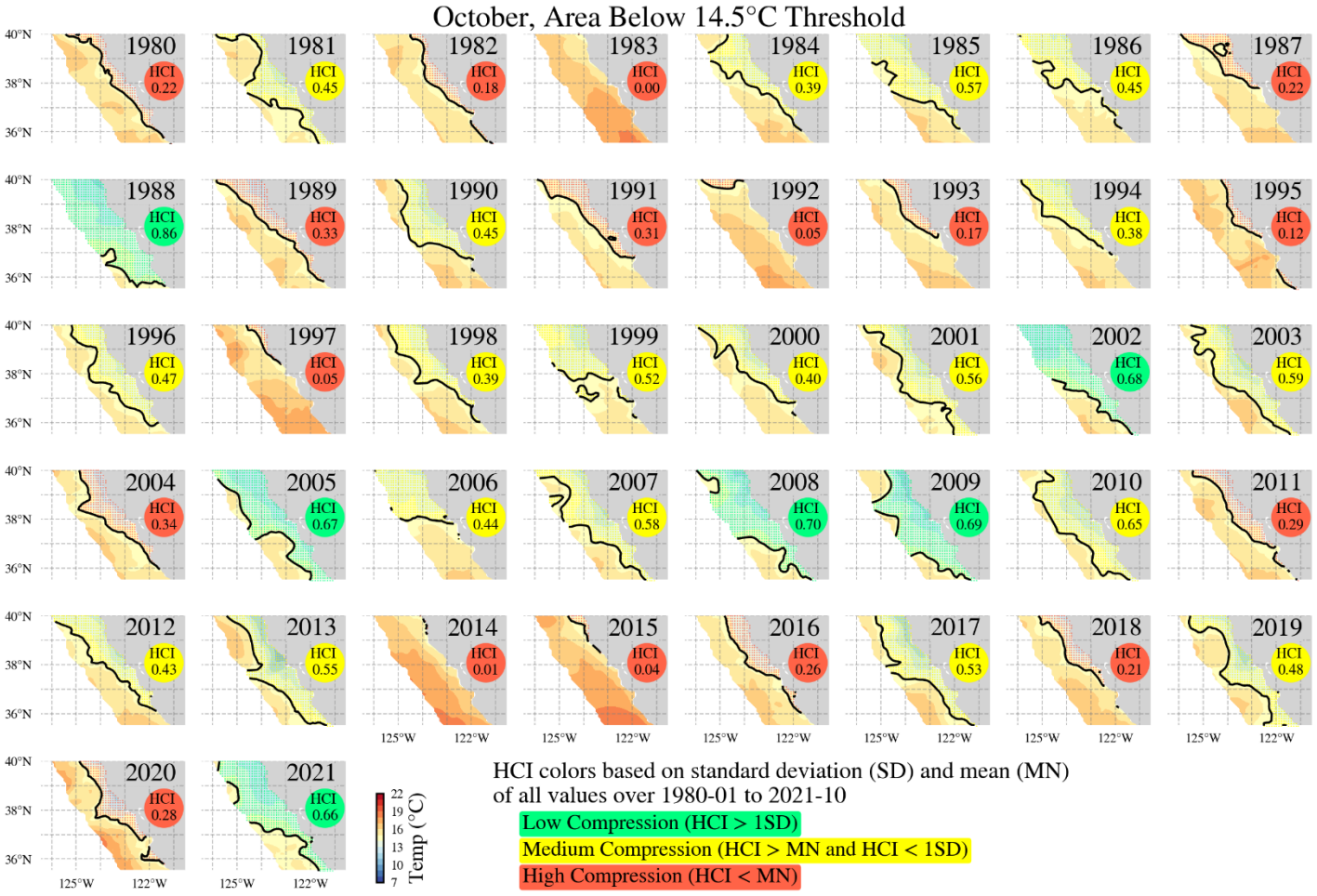

Figure 12. Maps of historical October sea surface temperature and location of the Habitat Compression Index boundary (think black line) between 1980 and 2021.

El Niño/Southern Oscillation (ENSO) Diagnostic

There is a 75% chance of La Niña during the Northern Hemisphere winter (December - February) 2022-23, with a 54% chance for ENSO-neutral in February - April 2023.

Large Marine Heatwave Tracker

As of September 12, 2022 the CCIEA program was continuing to track a large marine heatwave NEP22A which formed in late January 2022 (Figure 13). During late August 2022, a secondary large heatwave (NEP22B) re-merged with NEP22A. As of mid-September, the heatwave encompassed an area of roughly 7.6 million km^2, making this the 4th largest marine heatwave in this region since monitoring began in 1982. After only a brief period of upwelling in late July, these heatwaves have resided fairly close to shore for most of August and encompassed much of the coastline, although small patches of cool water remain in various locations and times due to local upwelling.

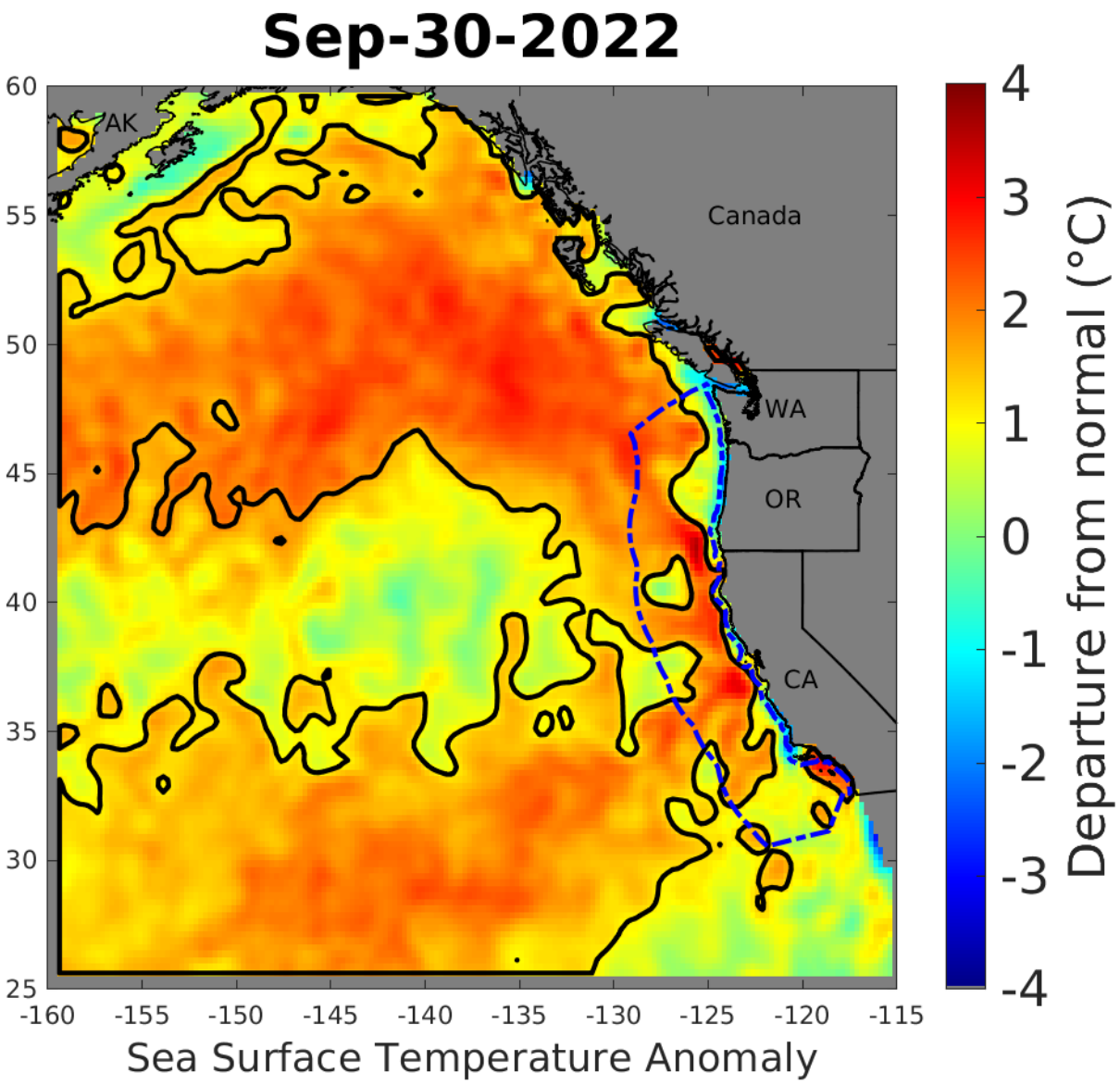

Figure 13. Science-quality (delayed 3-weeks), daily interpolated standardized sea surface temperature anomalies (SSTa) in the California Current ecosystem available for analysis of MHW presence. Dark outline shows the current extent of MHW conditions, as delineated by values of the normalized SST + 1.29 SD from normal. Blue dashed line represents the US West Coast EEZ. SST data from NOAA's Optimum interpolation Sea Surface Temperature analysis with the SST anomaly calculated using climatology from NOAA's AVHRR-only OISST dataset.

Current Impact Score Calculation: §132.8(d)(10)

Data provided by: California Department of Fish and Wildlife

Pursuant to the Risk Assessment and Mitigation Program (Section 132.8, Title 14, CCR), Impact Score Calculations will be assigned beginning with the 2021 calendar year based on confirmed entanglements of Actionable Species (humpback whales, blue whales, or leatherback sea turtles) reported to CDFW by NOAA. Impact Score totals for the current fishing season (2022-23) and calendar year (2022) are provided in Table 2 above. Impact Score totals for calendar year 2021 are provided in Table 3 above.