# 2022-23 Risk Assessment: Available Data

Last updated: December 16, 2022

## Contents

Items with updated information are followed by an *.



## TRIGGERS REQUIRING MANAGEMENT ACTION

### Confirmed Entanglements: §132.8(c)(1)

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

There have been no additional confirmed reports of entangled humpback whales, blue whales, or leatherback sea turtles since the last risk assessment. Therefore, the December 7, 2022 Available Data document represents the best available information regarding current entanglements, with one exception. Upon further consideration, NMFS has determined that 20220526Mn should be classified as an unconfirmed entanglement with unidentified gear. Available documentation will be reviewed in January 2023, after which NMFS will make a final determination regarding classification of this entanglement.

Therefore, current totals for calendar year 2022 are 15 confirmed humpback whale entanglements reported off California (seven in known gear types and eight in unidentified gear types), with 11 reports originating in Fishing Zone 4, two reports from Fishing Zone 6, and one report each in Fishing Zones 1 and 3 (Table 1).

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

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

After review of available information (see the October 25, 2022 Available Data document and December 7, 2022 Available Document) CDFW has assigned the following Impact Scores:

- 20221008Mn: 0.38
- 20221010Mn: 0
- 20221125Mn: 0

CDFW had previously assigned an Impact Score of 0 to 20220526Mn (see the October 25, 2022 Available Data document), so the reclassification as an unconfirmed entanglement does not affect the current Impact Score Calculation (Table 2).

**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 | 4.53 |
| 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 4.53 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 | 4.53 | 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: Monterey Bay Whale Watch (processed by Karin Forney, NOAA SWFSC), Scott Benson and Karin Forney (NOAA SWFSC and Upwell), John Calambokidis (Cascadia Research Collective, in collaboration with The Marine Mammal 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 | NA; pre-season risk assessments complete | NA |
| Zone 2 | NA; pre-season risk assessments complete | NA |
| Zone 3 | NMFS Aerial Survey, Cascadia Vessel Survey | Yes |
| Zone 4 | MBWW, NMFS Aerial Survey, Cascadia Vessel Survey | No |
| Zone 5 | None | NA |
| Zone 6 | None | NA |

### Monterey Bay Whale Watch *(Fishing Zone 4)*

- Monterey Bay Whale Watch conducted whale-watching trips in southern Monterey Bay on four of seven days during the week of December 7-13, 2022.
- The average number of humpback whales-per-trip during the last seven days (December 7-13, 2022) was 4.5, with a peak of eight whales observed on a single half-day trip on December 7, 2022.
- No blue whales have been observed since November 16, 2022.

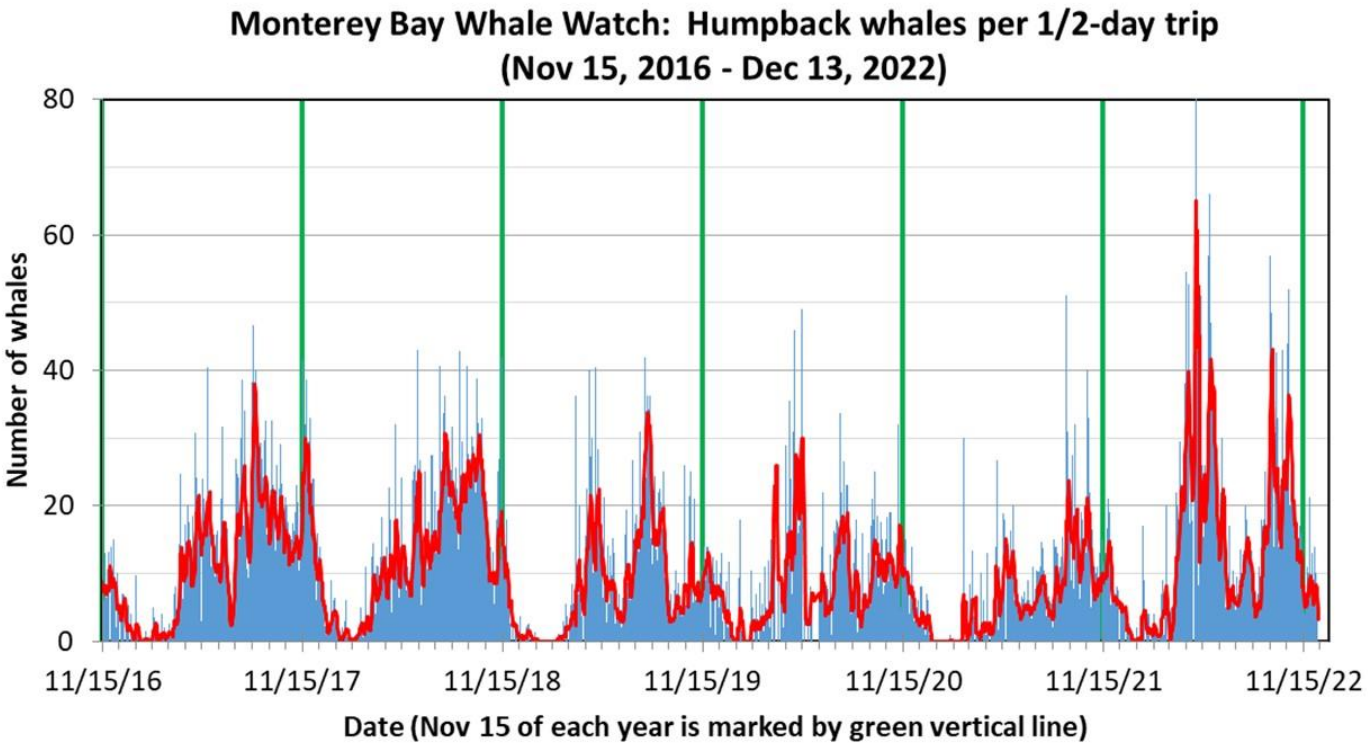
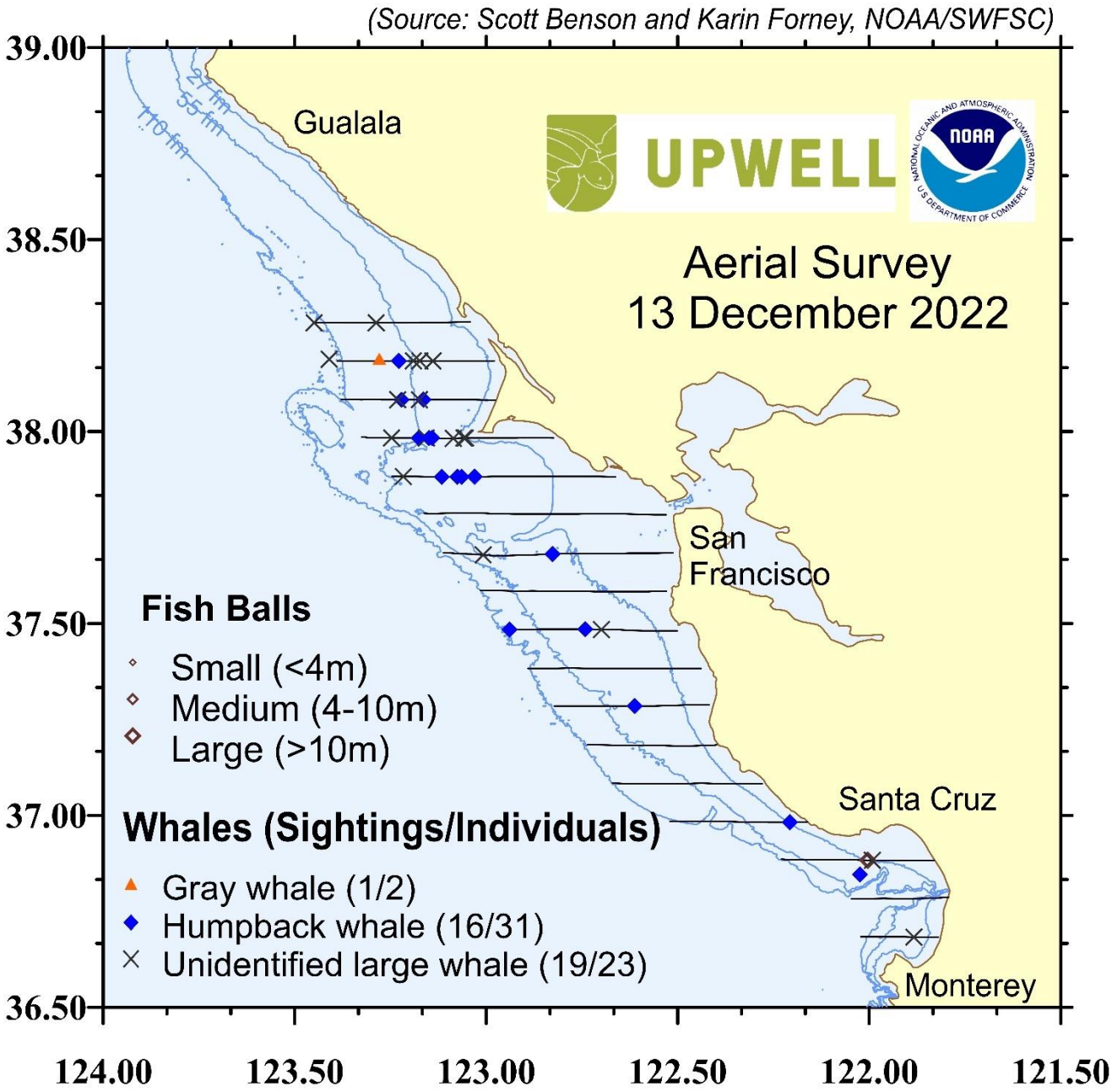



**Figure 1. Standardized number of humpback whale sightings for Monterey Bay Whale Watch from November 15, 2016 – December 13, 2022. The y-axis is the number of whales per half-day trip; the thin blue bars are the average daily whale numbers, and the red line is a 7-day running average to make the patterns a bit easier to see. A vertical green line has been added at November 15 of each year for reference. Each tick mark is one month.**

## NMFS Aerial Survey *(Fishing Zones 3 and 4)*

- An aerial survey was conducted on December 13, 2022 within Fishing Zones 3 and 4, covering east-west transect lines spaced 6 nmi apart from Bodega Bay to Monterey (Figure 2). The observation team consisted of two observers (Morgan Ivens-Duran, Vicky Vasquez) who searched through bubble windows, plus a data recorder (Scott Benson). Standardized survey methods were applied from a chartered Partenavia P-68 Observer aircraft 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 turtles and also feed on jellies). Weather was sunny with light to moderate winds (Beaufort sea states 2-4).
- A total of 31 humpback whales were observed in 16 sightings, including 15 sightings of 29 individuals in Fishing Zone 3, and one sighting of 2 individuals in Fishing Zone 4. In addition, 23 unidentified large whales that were probably humpback whales were documented in 19 sightings (17 sightings of 21 individuals in Fishing Zone 3, and 2 sightings of 2 individuals in Fishing Zone 4).
- The whales were most concentrated in an area off Pt. Reyes in water depths ranging from about 30 – 110 fathoms, with some additional whales documented off the San Mateo County coastline in similar water depths. The whales appeared to be feeding on schooling fish (based on their co-occurrence with fish-eating seabirds).
- No blue whales or leatherback sea turtles were observed.




Zone 3: 15 sightings of 29 humpback whales
+ 17 sightings of 21 unidentified large whales

Zone 4: 1 sighting of 2 humpback whales
+ 2 sighting of 2 unidentified large whales

**Figure 2. Plot for the aerial survey conducted on December 13, 2022, showing transects lines flown (black lines) and sighting locations of humpback whales, gray whales, unidentified large whales, and schooling fish balls. The depth contours shown are 50 m (~27 fathoms), 100 m (~55 fathoms), and 200 m (~110 fathoms). Symbols plotted off the transect lines represent sightings made while transiting between transects.**

## Cascadia Small Vessel Surveys *(Fishing Zones 3 and 4)*

Since the last risk assessment, Cascadia conducted additional small-vessel surveys in Fishing Zones 3 and 4. Surveys were conducted on December 6-7 and 14, 2022 in Fishing Zone 3 and December 5 and 13, 2022 in Fishing Zone 4 (Table 5).

In Fishing Zone 3, along the Gulf of the Farallones transect humpback whale sightings have continued to decline from the 49 individuals observed on November 30, 2022 (see the December 7, 2022 Available Data document) to 28 individuals on December 7 (Figure 4) and no individuals on December 14, 2022 (Figure 5). Along the Bodega Bay/Point Reyes transect, sightings declined substantially between the December 6, 2022 survey (64 individuals; Figure 3) and the December 14, 2022 survey (24 individuals; Figure 5). However, sightings remain above the RAMP trigger of 20 individuals on a given survey.

In Fishing Zone 4, humpback whale sightings along the Monterey Bay/North transect have continued to decline from surveys conducted in mid/late November (59 and 64 sightings; see the December 7, 2022 Available Data document), with 18 individuals seen on the December 5, 2022 survey (Figure 6) and eight individuals seen on the December 13, 2022 survey (Figure 7). Sightings from the most recent survey are now below the RAMP trigger of 20 individuals on a given survey.

**Table 5. Summary of vessel surveys conducted in early and mid-December 2022 in Fishing Zones 3 and 4 by Cascadia Research and The Marine Mammal Center.**

| Date | Vessel | Zone | Area | Hump. Whales (Total) | Unid. Whales (Total) | Comments |
|---|---|---|---|---|---|---|
| 5-Dec | MUS | 4 | Monterey Bay & N | 18 | 1 | 102 nmi |
| 6-Dec | MUS | 3 | Bodega - Pt Reyes | 64 | 7 | 84 nmi |
| 7-Dec | TMMC RHIB | 3 | Gulf of the Faral. | 28 | 0 | 104 nmi |
| 13-Dec | MUS | 4 | Monterey Bay & N | 8 | 0 | 86 nmi |
| 14-Dec | MUS | 3 | Bodega - Pt Reyes | 24 | 1 | 108 nmi |
| 14-Dec | TMMC RHIB | 3 | Gulf of the Faral. | 0 | 0 | 86 nmi |

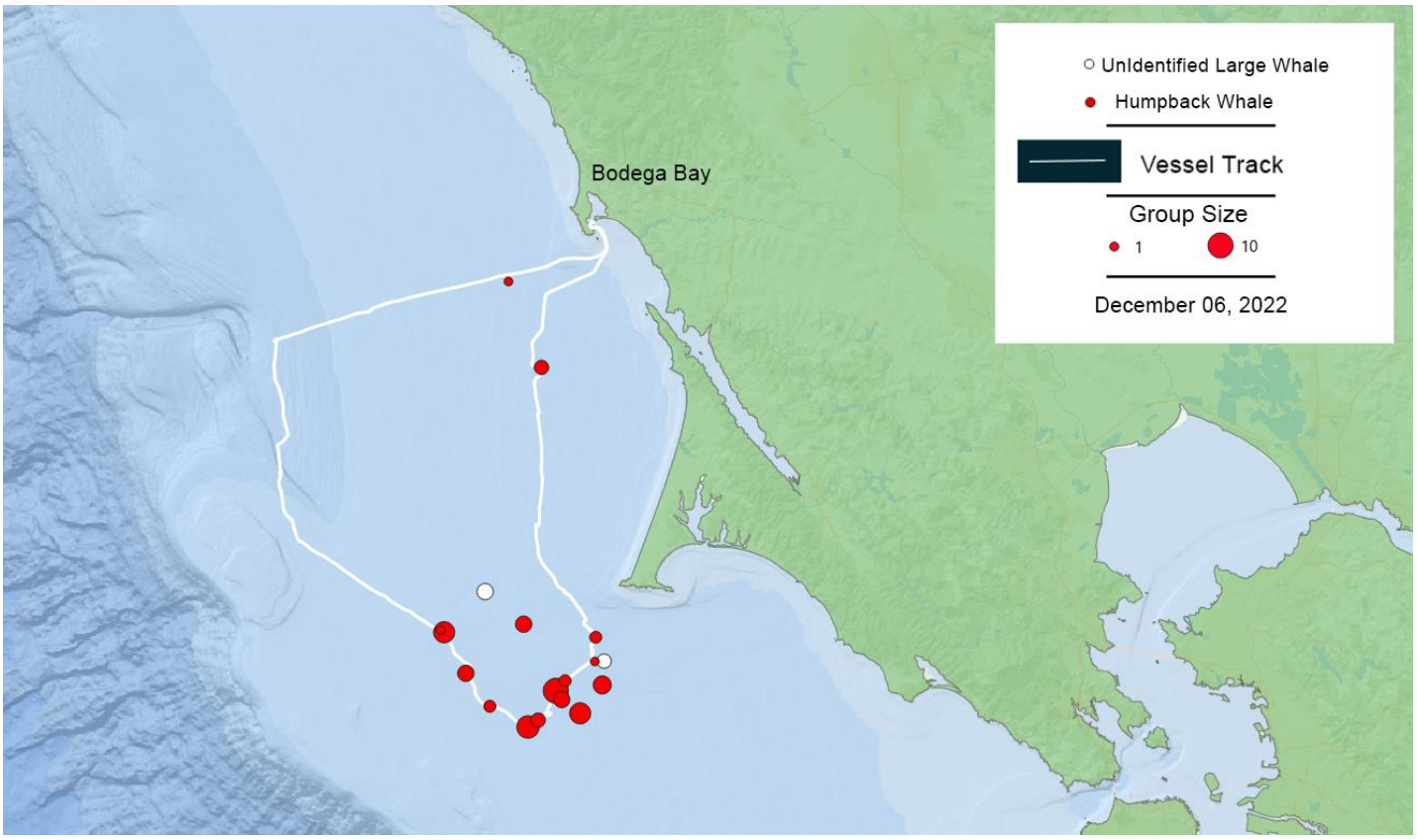



**Figure 3. Track and sightings from survey out of Bodega Bay (Fishing Zone 3) on December 6, 2022.**


**Figure 4. Track and sightings from survey out of San Francisco (Fishing Zone 3) on December 7, 2022.**

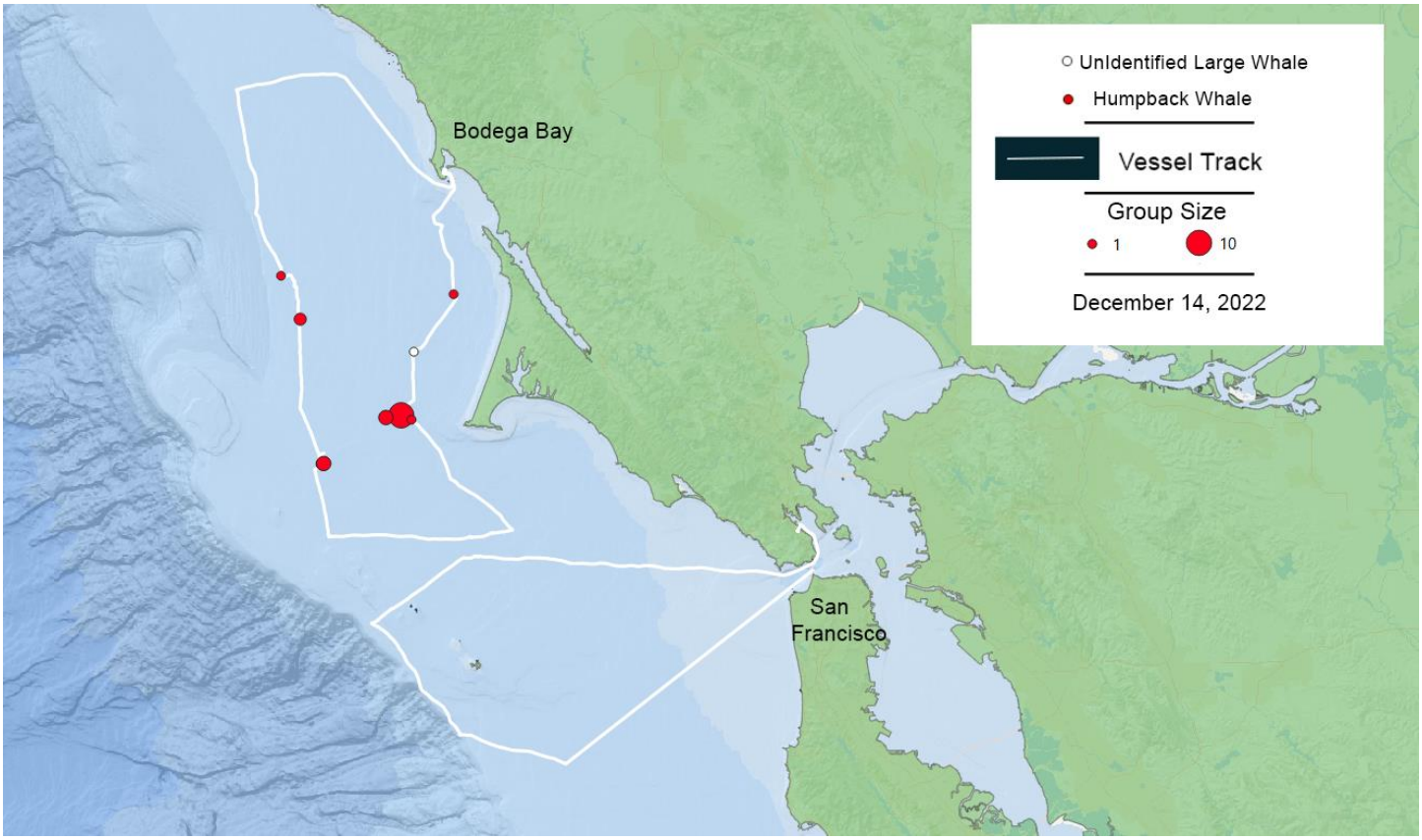



**Figure 5. Track and sightings from surveys out of Bodega Bay and San Francisco (Fishing Zone 3) on December 14, 2022.**

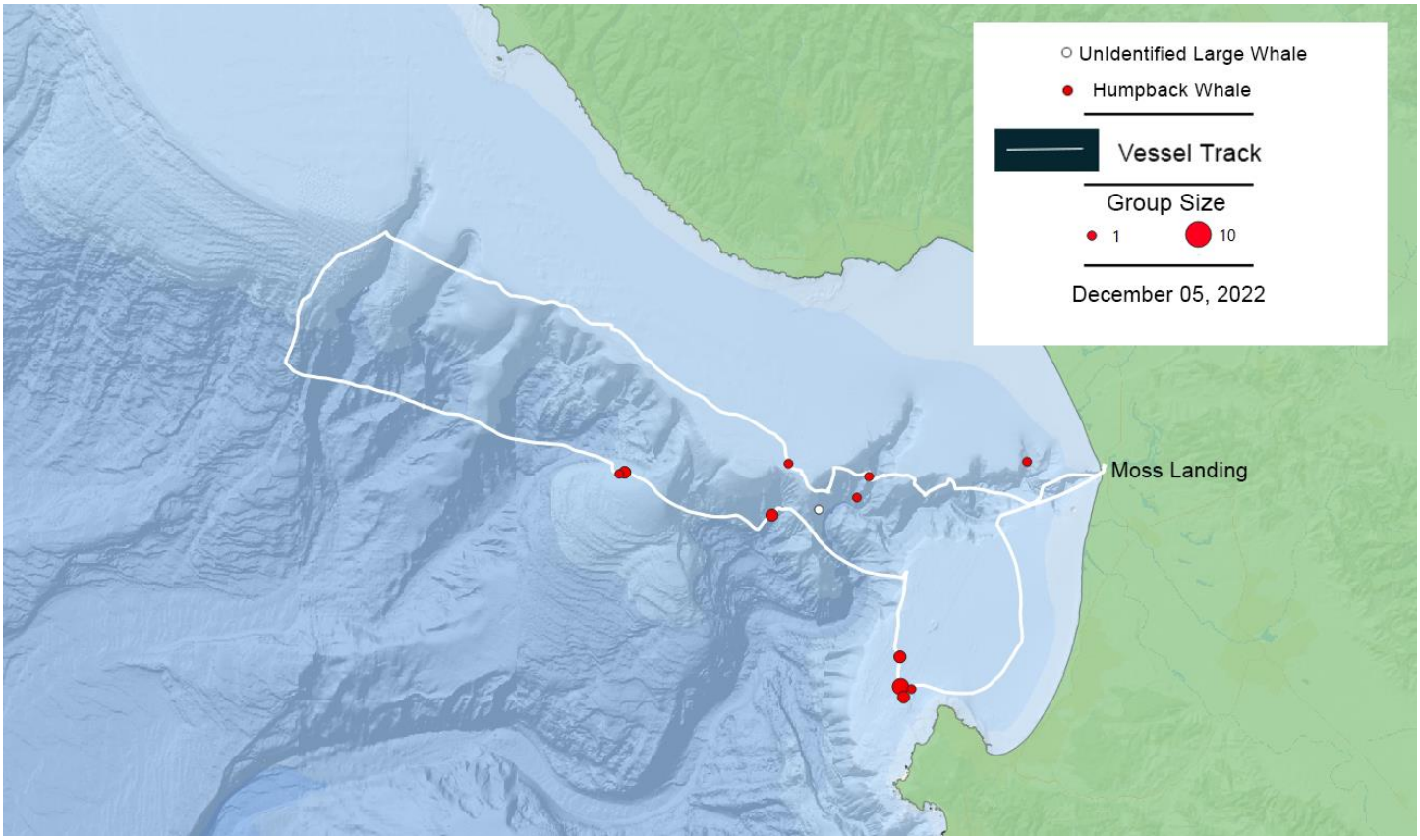



**Figure 6. Track and sightings from survey out of Moss Landing (Fishing Zone 4) on December 5, 2022.**

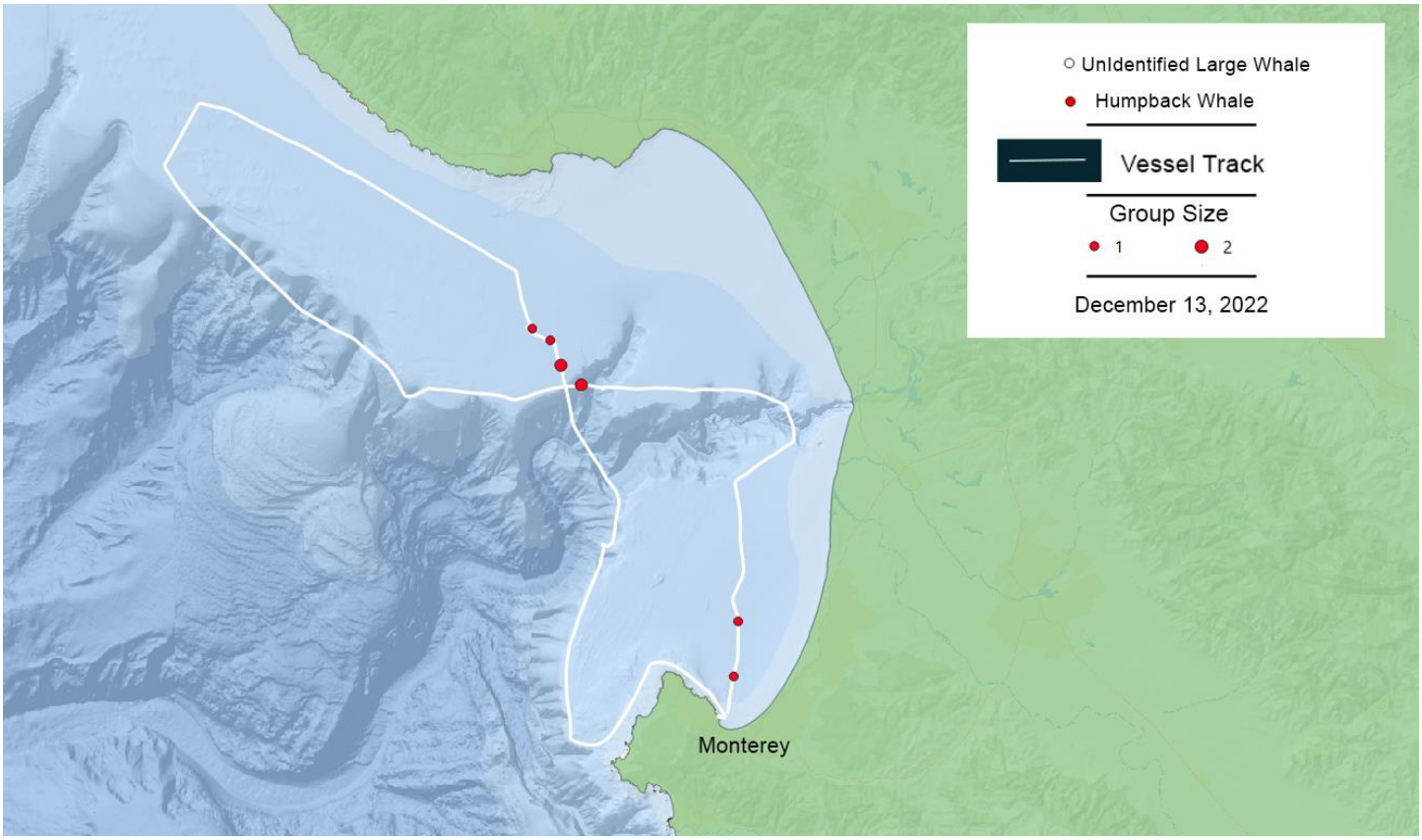



**Figure 7. Track and sightings from survey out of Monterey (Fishing Zone 4) on December 13, 2022.**

## MANAGEMENT CONSIDERATIONS

### Information from NOAA: §132.8(d)(2)

No additional information was provided for this Risk Assessment.

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

*Data provided by: California Department of Fish and Wildlife*

Given the high number of confirmed entanglements which have occurred during 2022, avoidance of any additional entanglements is a priority for CDFW. The recommended management measure must limit the potential for interactions between humpback whales and commercial Dungeness crab gear to minimize risk of additional entanglements. CDFW will put forward it's recommended approach in the December 16, 2022 Initial Assessment.

### 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 amongst multiple management measures which would equivalently reduce entanglement risk, CDFW shall consider total economic impact to the fleet and fishing communities. CDFW will consider economic impacts when developing a management recommendation for the December 16, 2022 Initial Assessment.

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

*Data provided by: Monterey Bay Whale Watch (processed by Karin Forney, NMFS), Point Blue Conservation Science, NOAA CoastWatch*

### Monterey Bay Whale Watch *(Fishing Zone 4)*

The semi-monthly average number of whales-per-half-day-trip is similar to the average historical value at this time of the year (Figure 8). The 7-day running average has decreased during the last two weeks (Figure 1) as more whales head south to their breeding grounds.

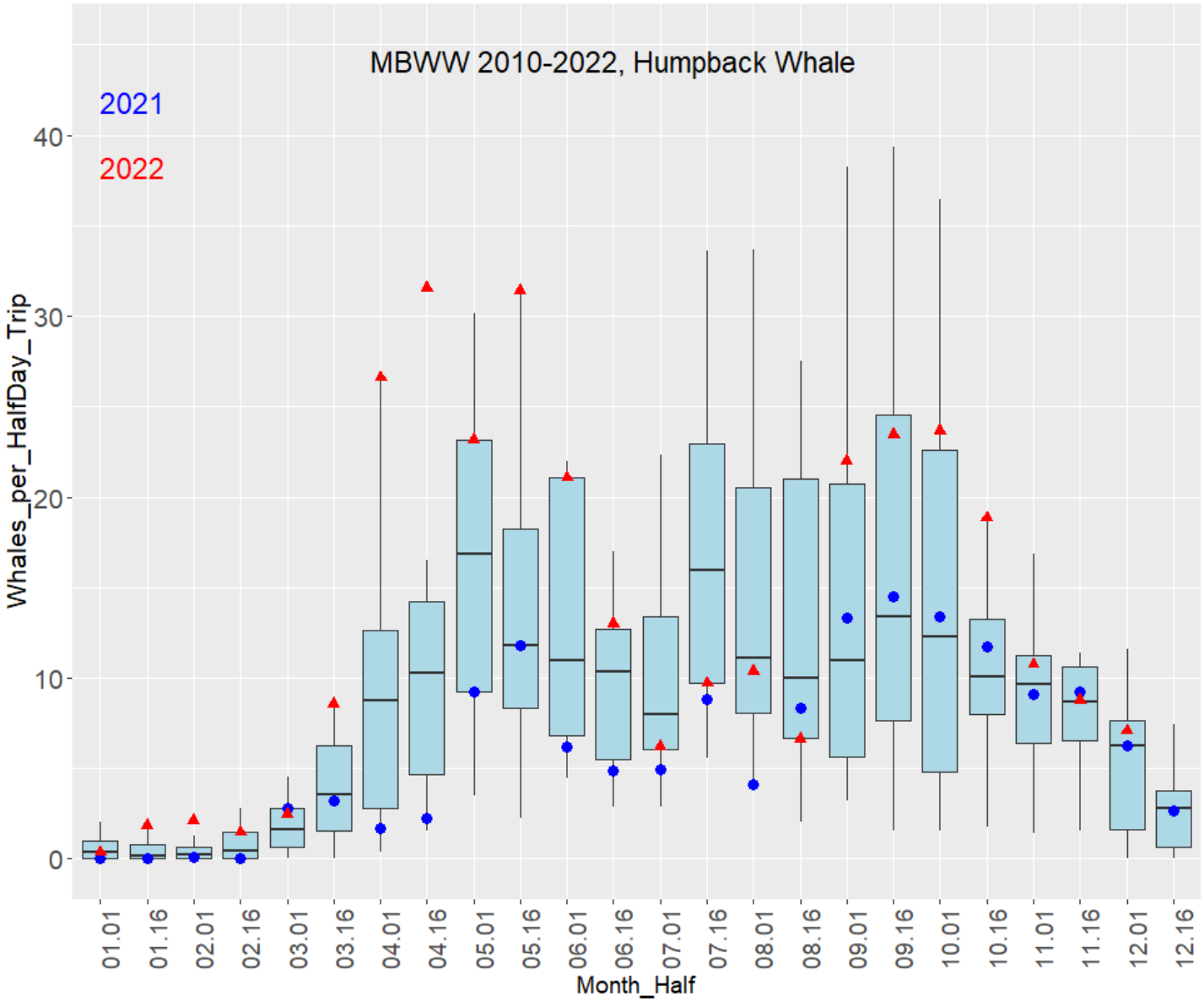



**Figure 8. Historical Monterey Bay Whale Watch data for 2010-2022, summarizing the average and variation in the number of humpback whales per half-day trip on a semi-monthly basis (1st- 15th, 16th- end of month). This boxplot follows standard statistical practice in that the black horizontal line is 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. [NOTE: To account for population growth of these recovering whale populations, the historical reference period includes only the more recent period of 2010-2022, rather than 2003-2022 as in plots provided during previous fishing seasons. This provides a more relevant comparison to the current conditions].**

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

During the seven-day period ending December 15, 2022 trained observers at the Farallon Islands reported 11 humpback whales in Fishing Zone 3 and trained naturalists from the Channel Islands National Marine Sanctuary and National Park Service reported six humpback whales within Fishing Zone 6 (Figure 9).

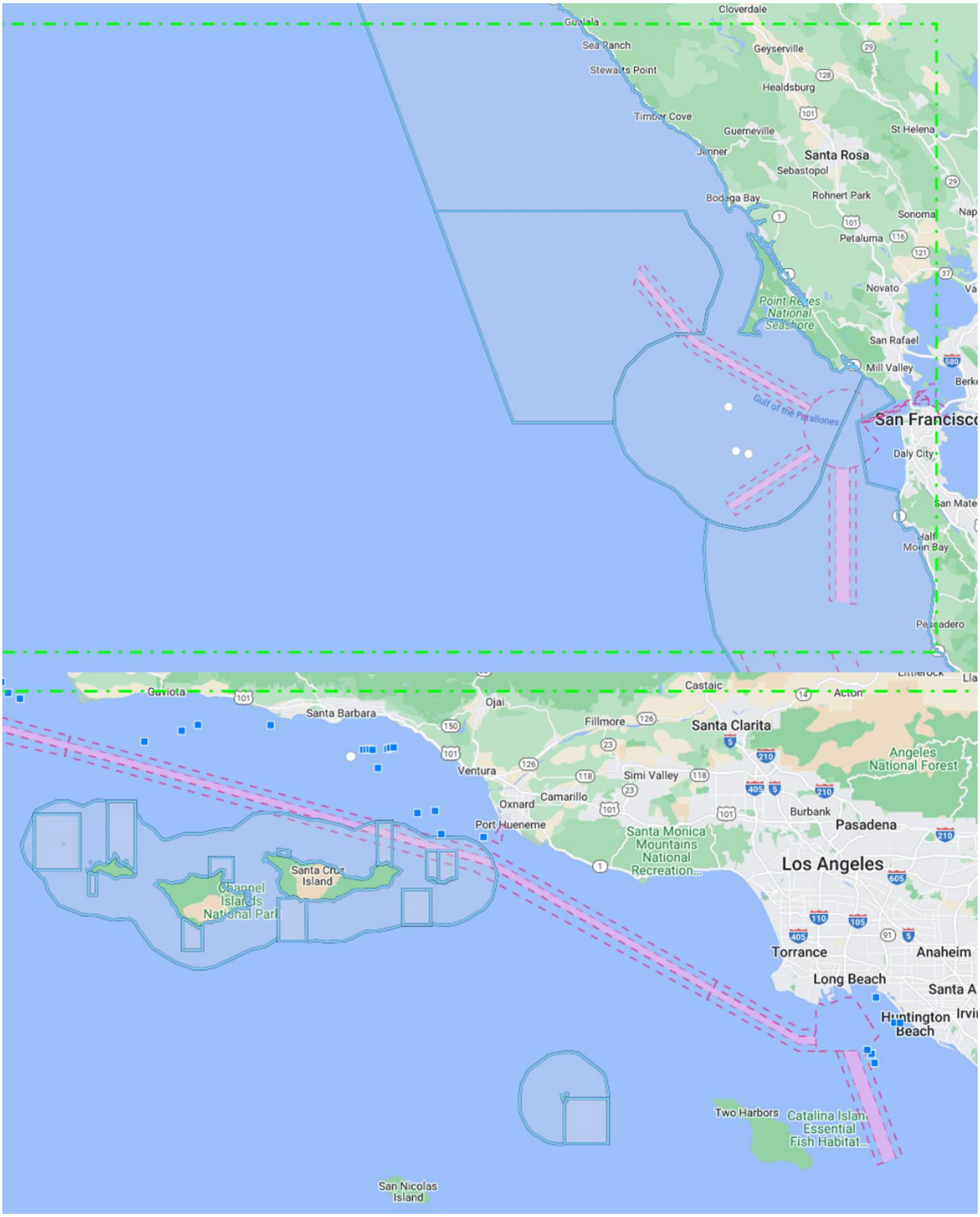



**Figure 9. Locations of humpback whale sightings within Fishing Zones 3 (top panel) and 6 (bottom panel). Reporting locations are represented by white circles. A given report may or may not represent multiple individuals. Fishing Zone boundaries are represented by the dashed lines.**

## WhaleWatch 2.0 *(All Fishing Zones)*

Blue whale habitat predictions for December 9, 2022 show low habitat suitability in Fishing Zones 1-5, with some suitable habitat remaining within Fishing Zone 6 (Figure 10).

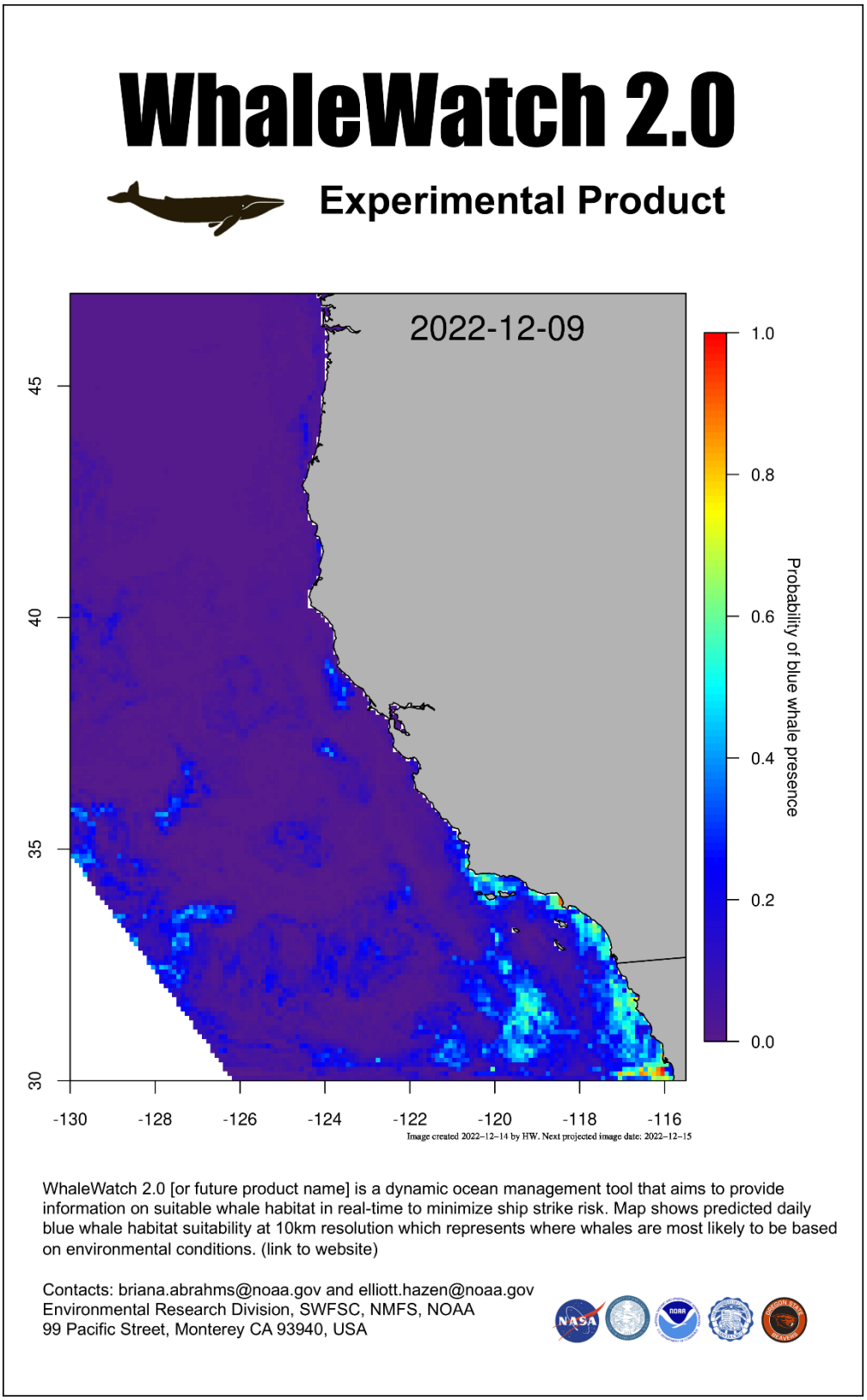



**Figure 10. WhaleWatch 2.0 map for December 1, 2022. View a current map.**

## Fishing Season dynamics: §132.8(d)(7)

*Data provided by: California Department of Fish and Wildlife*

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

### Domoic Acid and Quality Testing

Fishing Zones 1 and 2 are currently subject to a quality delay, and will open no sooner than December 31, 2022. Samples to inform a third round of quality testing will be collected on December 16 and 17, 2022. Managers from California, Oregon, and Washington will confer regarding the need for further delays under the Tri-State Agreement on December 22, 2022.

### Recreational Crab Fishery

See the December 7, 2022 Available Data document.

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

*Data Provided By: Scott Benson and Karin Forney (NOAA SWFSC and Upwell)*

### NMFS Aerial Survey *(Fishing Zones 3 and 4)*

- Several moderate aggregations of jellyfish (brown sea nettles and moon jellies) were documented during the survey.
- Two large ocean sunfish (*Mola mola*) were observed during the survey, which represents a large decrease in the abundance of this species since summer/fall.
- One medium-sized ball of schooling fish (likely anchovies) and a few feeding flocks of fish-eating seabirds were observed near areas where humpback whales were documented (see Figure 2).

## Ocean conditions: §132.8(d)(9)

See the December 7, 2022 Available Data document.

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

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.