

# 2023-2024 Risk Assessment Preliminary Assessment and Available Data for Risk Assessment Mitigation Program

Last updated: December 15, 2023

## PRELIMINARY ASSESSMENT

This Preliminary Assessment and Management Recommendation has been developed by California Department of Fish and Wildlife (CDFW) Marine Region staff for consideration by the California Dungeness Crab Fishing Gear Working Group for the Risk Assessment Mitigation Program (RAMP; Section 132.8, Title 14, California Code of Regulations) regarding Management Actions to address marine life entanglement risk in the commercial and recreational Dungeness crab fishery. CDFW will prepare a Final Assessment and Management Recommendation after review of the Working Group Recommendation and other relevant data.

### Recommended Management Actions

#### Commercial Fishery:

- Fishing Zones 1 and 2:
  - Season Opener with 50% Gear Reduction (trap reduction) on January 5, 2024, at 12:01 am (gear setting period to begin on Jan. 2, 2024, at 8:01 am)
  - Issue Fleet Advisory
- Fishing Zones 3, 4, 5, and 6: Continue Season Delay

#### Recreational Fishery:

- Fishing Zones 3 and 4: Continue Crab Trap Prohibition
- All Fishing Zones (1, 2, 3, 4, 5 and 6): Continue Fleet Advisory

## Contents

PRELIMINARY ASSESSMENT .....	- 1 -
I. Management Recommendation Summary Rationale .....	- 2 -
II. Alternative Management Actions for the Commercial Fishery .....	- 3 -
AVAILABLE DATA .....	- 4 -
III. Triggers Requiring Management Action .....	- 4 -
IV. Management Considerations .....	- 12 -

Table 1. Fishing Zones and current management status in the California commercial and recreational Dungeness crab fisheries.

<b>Fishing Zone</b>	<b>Commercial Fishery: Current Management Status</b>	<b>Commercial Fishery: Proposed Management Status</b>	<b>Recreational Fishery: Current Management Status</b>	<b>Recreational Fishery: Proposed Management Status</b>
1	Season Delay	Season Open with 50% Gear Reduction; Fleet Advisory	Fleet Advisory	Fleet Advisory
2	Season Delay	Season Open with 50% Gear Reduction; Fleet Advisory	Fleet Advisory	Fleet Advisory
3	Season Delay	Season Delay	Crab Trap Prohibition; Fleet Advisory	Crab Trap Prohibition; Fleet Advisory
4	Season Delay	Season Delay	Crab Trap Prohibition; Fleet Advisory	Crab Trap Prohibition; Fleet Advisory
5	Season Delay	Season Delay	Fleet Advisory	Fleet Advisory
6	Season Delay	Season Delay	Fleet Advisory	Fleet Advisory

### I. Management Recommendation Summary Rationale

*Entanglements:* No new entanglements were reported during this risk assessment period. Confirmed humpback whale entanglements in California commercial Dungeness crab fishing gear and Unknown Fishing Gear bring the three-year rolling average Impact Score to 3.64. Additionally, the three-year rolling average Impact Score for leatherback sea turtles is 0.33.

*Marine Life Concentrations:* Based on Marine Life Concentration surveys for Fishing Zones 1-4 conducted by CDFW, US Coast Guard, NOAA, and Cascadia Research Collective between December 9-14, 2023, and Monterey Bay Whale Watch data, humpback whale sightings exceeded the Marine Life trigger in Fishing Zones 3 and 4 as defined by RAMP for the recreational and commercial Dungeness crab fisheries.

Marine Region's preliminary recommendation is for the Director to open the commercial season in Fishing Zones 1 and 2 on January 5, 2024, at 12:01 am (gear setting period to begin on Jan. 2, 2024, at 8:01 am) with a 50% Gear Reduction under a Fleet Advisory, and to continue the season delay in Fishing Zones 3, 4, 5, and 6. Marine Region also recommends continuing the temporary crab trap prohibition for the recreational fishery in Fishing Zones 3 and 4 and continuing the Fleet Advisory in all Fishing Zones. These recommendations are based on confirmed entanglements for humpback whales and leatherback sea turtles and the resulting Impact Scores, exceedance of Marine Life Concentration data triggers in Zones 3 and 4 and known migration patterns for

humpback whales.

Aerial and vessel surveys conducted by CDFW, US Coast Guard, NOAA, Cascadia Research Collective and The Marine Mammal Center in Fishing Zones 1, 2, 3 and 4 observed concentrations of humpback whales on December 9-14, 2023. NOAA aerial observers reported up to 24 humpback whales in Fishing Zone 3. Vessel surveys conducted on December 9-14, 2023, by Cascadia Research Collective and The Marine Mammal Center also observed aggregations of humpback whales, up to 58 in Fishing Zone 3, where whales were documented to be feeding on fish near the surface. In Fishing Zone 3, whales were primarily inshore near Pt. Reyes in waters depths of 27-38 fathoms (50-70m) and near Half Moon Bay in shallower waters around the 38 fathom (70m) line, where 28 whales were observed. Monterey Bay Whale Watch data in Fishing Zone 4 indicated an average number of humpback whales per half-day trip during the last seven days was 8, with a peak of 11 whales observed during a single half-day trip.

Oceanographic model data did not change from the last risk assessment. El Niño is still anticipated to continue through the Northern Hemisphere with a 62% chance during late spring 2024. For Fishing Zone 6, lack of available data prior to the season opener requires Management Action, pursuant to 132.8(c)(2)(A) and 29.80(c)(7)(A).

CDFW will conduct another assessment in early January 2024 to inform a potential season opener in Fishing Zones 3, 4, 5 and 6 and a modification of the 50% trap reduction in Fishing Zones 1 and 2. The next risk assessment is expected to occur on or around January 11, 2024, subject to data availability.

For additional details, see the Entanglement and Marine Life Concentration sections of this Available Data document.

## **II. Alternative Management Actions for the Commercial Fishery**

### Alternatives Considered by Rejected

- Gear Reduction in Fishing Zones 3, 4, 5 and 6- due to the number of humpback whales in Fishing Zones 3 and 4 and elevated Impact Scores for humpback whales and leatherback sea turtles, this action was considered but rejected as a recommended management action.
- Fishery Closure in Zones 1 and 2 – most protective but in consideration of not attaining marine life concentration triggers and economic impacts to the fleet it was not the recommended management option.
- Depth Restriction by Fishing Zone- may concentrate crab trap gear thereby increasing entanglement risk.
- Alternative Gear- can only be authorized after April 1<sup>st</sup>.

## AVAILABLE DATA

### III. Triggers Requiring Management Action

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

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

The table below outlines the confirmed entanglements under RAMP and their associated Impact Score for the year 2023. See "[FAQ: Impact Scoring for the Risk Assessment and Mitigation Program](#)" for information about the RAMP Impact Score.

Table 2. Actionable Species Entanglements during 2023 pursuant to RAMP regulations.

Entanglement ID	Date	Species	Fishery	Impact Score
20230417Mn	04/17/23	Humpback whale	Unknown Fishing Gear	0.38
20230420Mn	04/20/23	Humpback whale	Unknown Fishing Gear	0.38
20230611Mn	06/11/23	Humpback whale	CA commercial Dungeness crab	0.75
20230719Mn	07/19/23	Humpback whale	CA commercial Dungeness crab	0.75
20230819Mn	08/19/23	Humpback whale	CA commercial Dungeness crab	0.75
20231111Mn	11/11/23	Humpback whale	CA commercial Dungeness crab	0.75
20231124Dc	11/24/23	Leatherback sea turtle	CA commercial Dungeness crab	1.0

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.

Actionable Species	Current Fishing Season Impact Score (2023-24)	Current Calendar Year Impact Score (2023)	3-Year Rolling Average
Humpback whales	0	3.76	3.64
Leatherback sea turtles	0	1.0	0.33

As of December 15, 2023, there have been zero Confirmed Entanglements of blue whales during the 2023-2024 Fishing Season.

## II. Marine Life Concentrations: §132.8(c)(1)

Data provided by: California Department of Fish and Wildlife, United States Coast Guard, Scott Benson and Karin Forney (NOAA SWFSC and Upwell), John Calambokidis (Cascadia Research Collective, in collaboration with the Marine Mammal Center), Monterey Bay Whale Watch (processed by Karin Forney, NOAA SWFSC)

### CDFW Survey Data Map Viewer

CDFW and USCG/CDFW aerial survey data are available as an interactive web map through ESRI Map Viewer for the [December 19, 2023, Risk Assessment](#). A map with current and past Risk Assessment survey data have been combined in a [2023-2024 Season RAMP survey map](#).

For assistance with using ESRI Map Viewer, please see the [How to Guide](#).

For the period of November 1 until the Fishing Season opens statewide a RAMP Marine Life Concentration trigger has been met when:

- The number of humpback whales is greater than or equal to 20, or there is a running average of five or more animals over a one-week period within a single Fishing Zone.
- The number of blue whales is greater than or equal to three, or there is a running average of three or more animals over a one-week period within a single Fishing Zone
- A Pacific leatherback sea turtle is seen in any Fishing Zone

Table 41. 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	CDFW Aerial Survey, USCG/CDFW Aerial Survey	No
Zone 2	CDFW Aerial Survey*, Cascadia Research Collective	No
Zone 3	CDFW Aerial Survey, NOAA Aerial Survey, Cascadia Vessel Survey	Yes
Zone 4	CDFW Aerial Survey, NOAA Aerial Survey, Cascadia Vessel Survey, MBWW	Yes
Zone 5	None	No Surveys
Zone 6	None	No Surveys

\*partial coverage due to fog

### A. CDFW Surveys (Fishing Zone 1-4)

On December 11, 2023, CDFW conducted an aerial survey from Monterey to the California/Oregon border (Fishing Zones 1-4) at an altitude of 1500 ft following a zig-zag pattern between the 30 and 100 fathom (55-183m) contour lines. Conditions were variable with Beaufort state of less than 2, however, fog limited visibility from Shelter

Cove to Cape Mendocino. Technical issues resulted in an inaccurate aerial survey track line from Shelter Cove to Eureka. Observation data was recorded accurately.

Table 5. Counts of Actionable Species seen by CDFW aerial survey conducted on December 11, 2023.

<b>Fishing Zone</b>	<b>Humpback whales</b>	<b>Unidentified whales</b>
Zone 1	0	0
Zone 2	2	1
Zone 3	5	0
Zone 4	0	0

### **B. USCG/CDFW Joint Surveys (Fishing Zone 1)**

On December 13, 2023, USCG and CDFW conducted a joint flight along the 50-fathom (91m) contour from California/Oregon border to Conica Point in Fishing Zone 1. One unidentified whale and three gray whales were observed.

Table 6. Counts of Actionable Species and unidentified whales seen by the USCG/CDFW joint aerial survey conducted on December 13, 2023.

<b>Fishing Zone</b>	<b>Humpback whales</b>	<b>Unidentified whales</b>
Zone 1	0	1

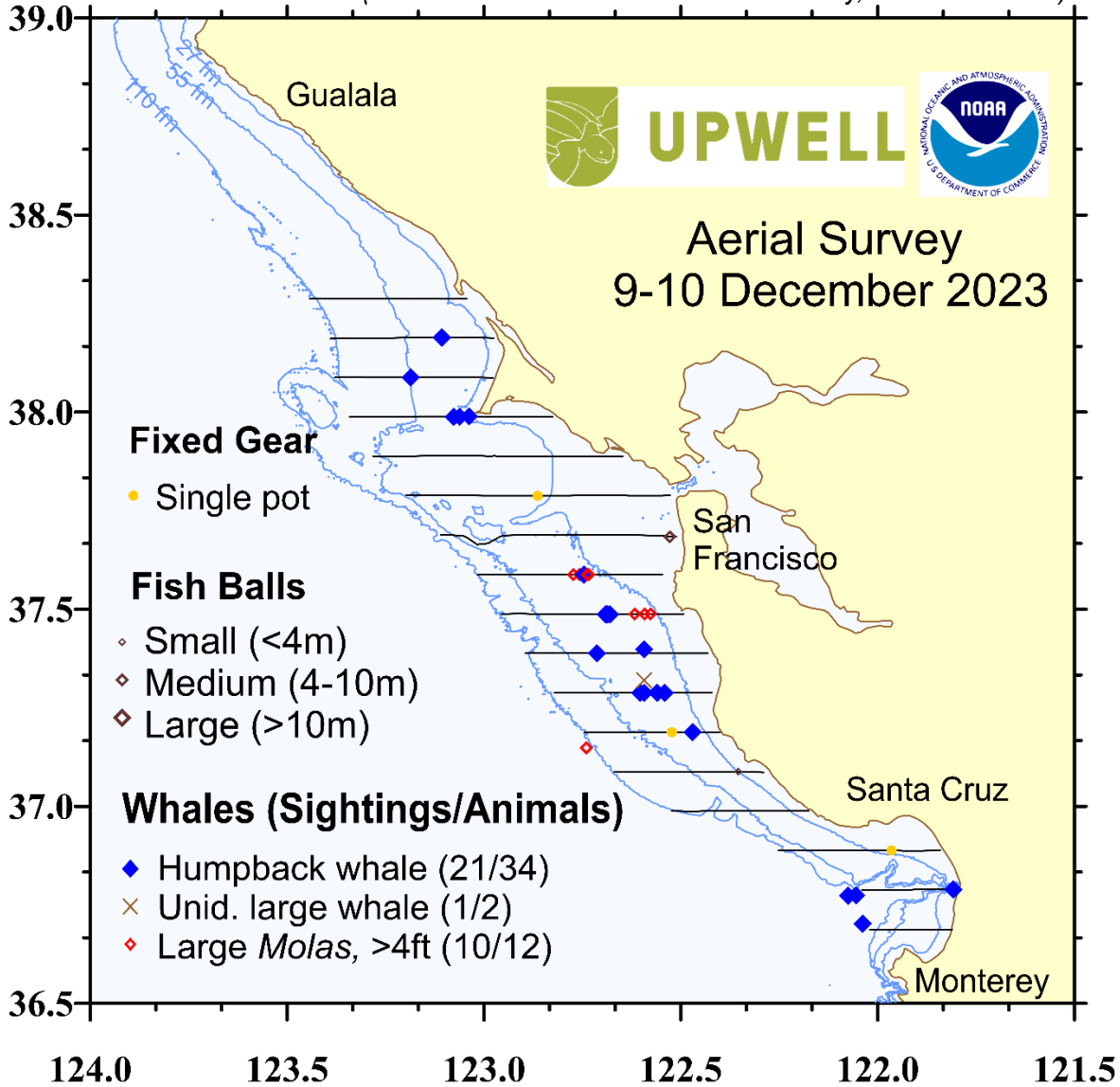
### **C. NOAA NMFS Aerial Surveys (Fishing Zones 3 and 4)**

Aerial surveys were conducted on December 9-10, 2023, in Fishing Zones 3 and 4 along east-west transect lines (Figure 1). In Fishing Zone 3, a total of 24 individuals were observed in 17 sightings. In Fishing Zone 4, 10 individuals were observed in 4 sightings. Additionally, one group of two unidentified large whales, which were likely humpback whales, was documented in Fishing Zone 3. Humpback whales were most concentrated off Pt. Reyes in water depths of about 25-60 fathoms (46-110m), and off the San Mateo County coastline from Pillar Point to Pigeon Point in water depths ~30-50 fathoms (55-92m). Most of the whales observed were associated with seabird feeding flocks and some sea lions, suggesting that the whales were foraging on schooling fish. A few ocean sunfish ('Molas') were recorded, however no jellies were visible, and no turtles were observed.

Table 7. Counts of whales seen on NOAA aerial survey conducted from December 9-10, 2023.

<b>Fishing Zone</b>	<b>Number of sightings</b>	<b>Number of humpback whales</b>
3	17	24
4	4	10

(Source: Scott Benson and Karin Forney, NOAA/SWFSC)



**Zone 3:** 17 sightings of 24 humpback whales  
+ 1 sighting of 2 unidentified whales

**Zone 4:** 4 sightings of 10 humpback whales

Figure 1. Plot for the aerial surveys conducted during December 9-10, 2023, showing transect lines flown (black lines) and sighting locations of humpback whales, unidentified whales, ocean sunfish (Molas), and fish bait balls. The depth contours shown are 50m (~27 fathoms), 100m (~55 fathoms), and 200m (~110 fathoms).

#### D. Cascadia Research Collective (Fishing Zones 2, 3 and 4)

Cascadia Research Collective (CRC) and The Marine Mammal Center (TMMC) conducted five vessel surveys out of Fishing Zones 2, 3, and 4 on December 9-14, 2023 (Table 8). Figures are included below for surveys conducted on Decembers 9-10, but not for those conducted on December 13-14 as results were submitted after the data

contribution deadline. A narrative of the observations for all five surveys is included below.

The survey conducted by CRC on December 9, 2023, out of Fort Bragg (Fishing Zone 2) observed 18 humpback whales (Figure 2). Whales were primarily feeding on concentrations of fish near the surface. A third of the whales (6) were seen inshore in water depths of 69-132m (~37-72 fathoms) with the majority (12) seen offshore in water depths of 290-600m (~158-328 fathoms). Eight killer whales in two groups were also observed.

The survey conducted by CRC on December 10, 2023, out of Bodega Bay (Fishing Zone 3) observed 36 humpback whales and 3 unidentified large whales (Figure 3). Whale concentrations were primarily inshore near Pt. Reyes in waters from 50 to 70m (~27-38 fathoms) deep, though there were also scattered sightings offshore as well. Seven of the groups were identified to be feeding on fish near the surface, often associated with large numbers of birds, especially off Pt. Reyes. While the total number of whales (17) in the Pt. Reyes area may seem high, given the concentration of prey, the number was much lower than what would typically be seen in summer and fall with this level of prey.

TMMC conducted a survey on December 13 out of San Francisco (Fishing Zone 3) and sighted 16 humpback whales and 3 additional unidentified large whales (suspected to be humpbacks). The main sightings were in the Pt Reyes area and overlapped with Cascadia's survey zone from their December 10 survey.

Two surveys were conducted on December 14 by CRC and TMMC. CRC surveyed Fishing Zone 3 and the northern portion of Fishing Zone 4 out of Half Moon Bay and observed a total of 58 humpback whales mostly in shallower waters around the 70 m (38 fathom) line and all within Fishing Zone 3. One important element of this survey was that the biggest concentration of whales was along a 4 nm stretch of the survey in 50-70 m (27-38 fathoms) west of Half Moon Bay, where observers sighted 28 humpback whales and at least 18 small boats that appeared to be recreational crab fishing in the same area. TMMC also conducted a partial survey in Fishing Zone 4 and observed 7 humpbacks.

In addition, collaborative researchers continue to report humpback whales arriving to the Mexico breeding grounds, however, there is some variation in how these reports compare to last year. Observations from last year indicated that many of the early arrivers in November and early December were from California feeding areas. Typically, the peak period for whales on the Mexico and Central America breeding grounds is January to March.



Table 8. Summary of vessel surveys by Cascadia Research off northern and central California.

Survey Date	Surveyor	Fishing Zone	Humpback whales	Unidentified whales
Dec 9	CRC	Zone 2	18	0
Dec 10	CRC	Zone 3	36	3
Dec 13	TMMC	Zone 3	16	3
Dec 14	CRC	Zone 3	58	0
Dec 14	TMMC	Zone 4	7	0

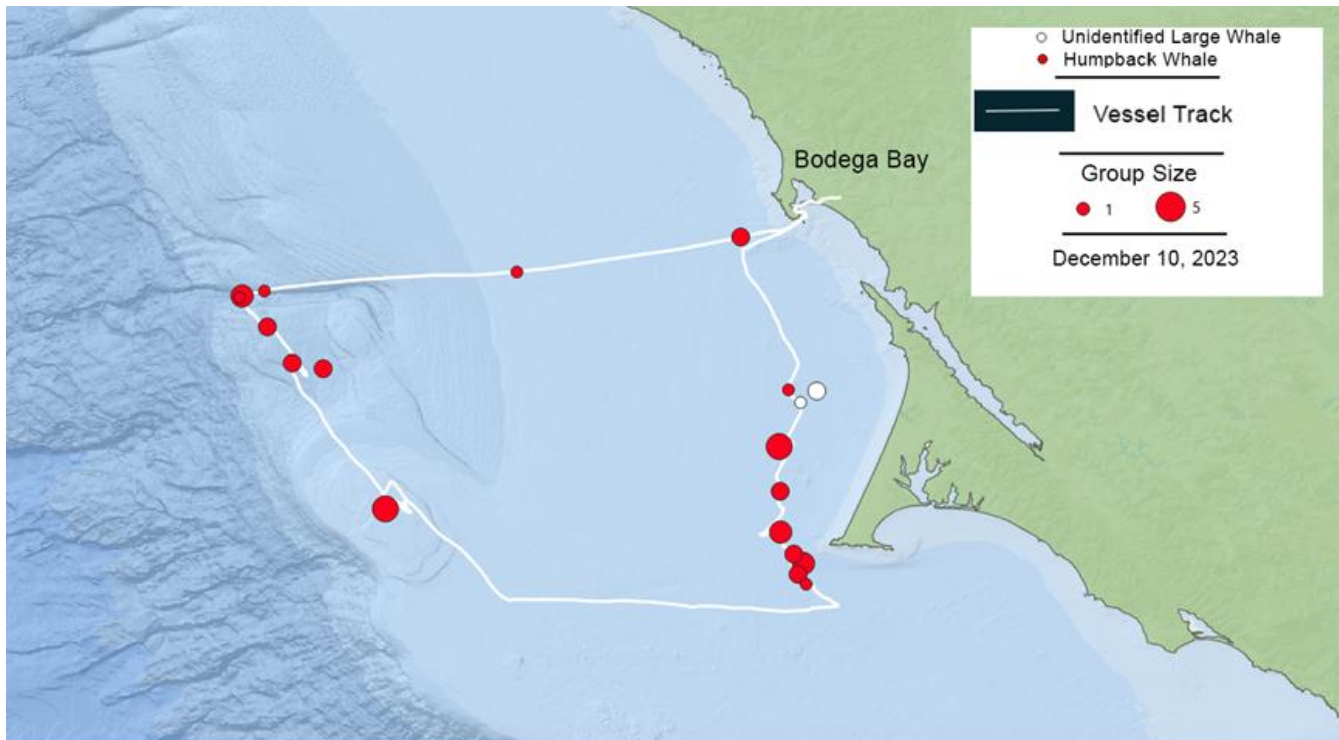


Figure 2. Plot of vessel track lines and locations of sightings for the survey in Fishing Zone 3 on December 9, 2023, by Cascadia Research Collective.

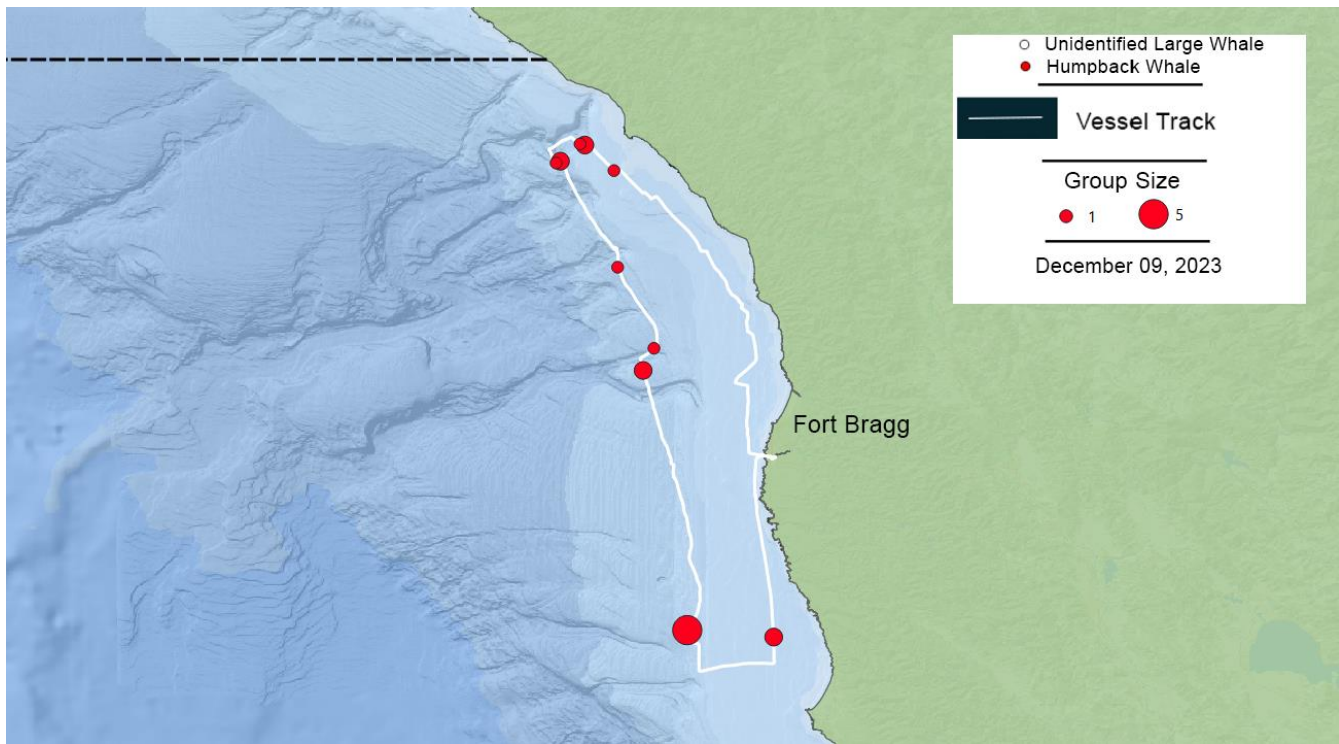


Figure 3. Plot of vessel track lines and locations of sightings for the survey in Fishing Zone 2 on December 10, 2023, by Cascadia Research Collective.

## E. Monterey Bay Whale Watch Surveys (Fishing Zone 4)

Monterey Bay Whale Watch conducted whale watching trips in southern Monterey Bay on six of seven days during the week of December 4-10, 2023.

The average number of humpback whales-per-half-day trip during the last seven days was 8, with a peak of 11 whales observed during half-day trips on December 4th and December 10th. Whale numbers appear to be dropping gradually as more whales migrate south to their breeding grounds (Figure 4).

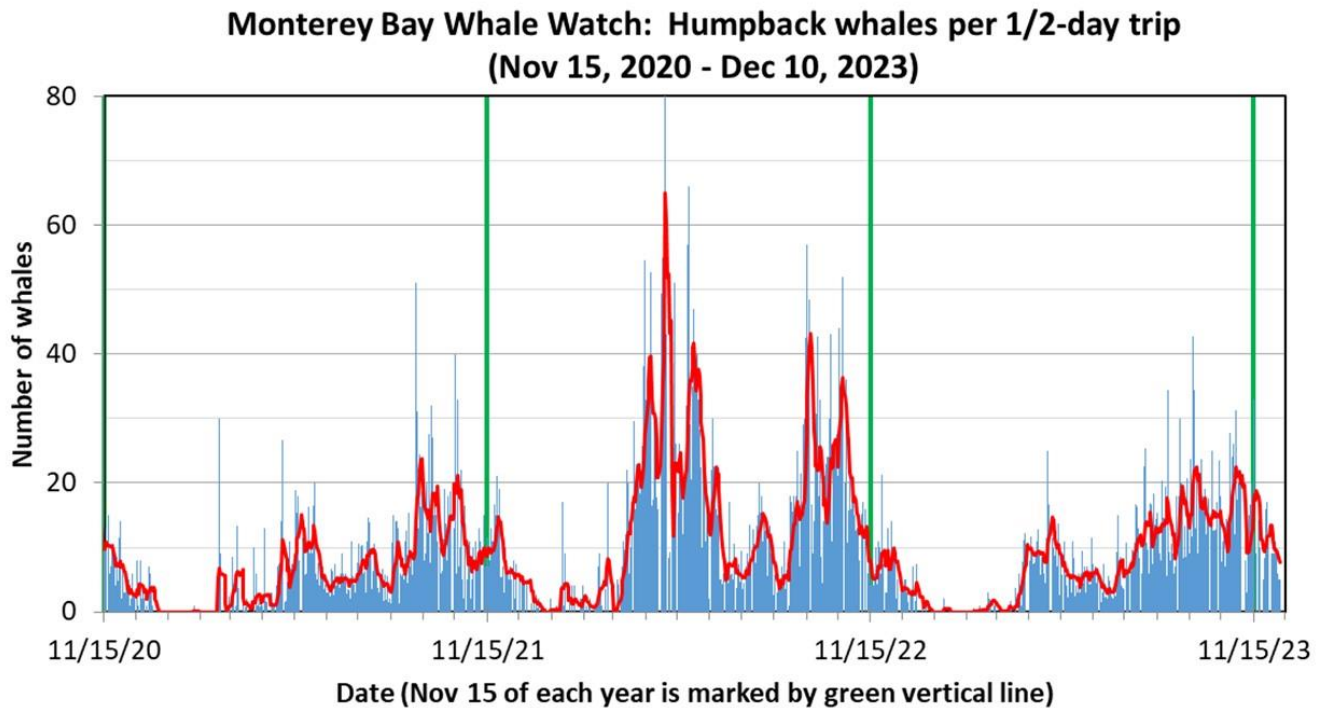


Figure 4. Standardized number of humpback whale sightings for Monterey Bay Whale Watch from 15 November 2020 – 10 December 2023. The y-axis is the number of whales per half-day trip; the thin blue bars are the average daily whale numbers, and the red line is a 7-day running average to make the patterns a bit easier to see. A vertical green line has been added on November 15 of each year for reference. Each tick mark is one month.

## IV. Management Considerations

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

No additional information was provided for this Risk Assessment.

### II. Historic patterns and current Actional Species migration: § 132.8(d)(6) and (11)

Data provided by: Point Blue Conservation Science and Monterey Bay Whale Watch (processed by Karin Forney NOAA SWFSC)

#### A. Point Blue Conservation Science (Fishing Zones 3, 4, and 6)

For current observation data please see the [Point Blue Whale Alert map](#).

Table 9. Summary of available humpback and blue whale recorded by observers and reported on via Point Blue Conservation in Fishing Zones 3, 4, and 6 during the seven-day period ending December 13, 2023.

<b>Fishing Zone</b>	<b>Number of humpback whales sighted</b>	<b>Number of blue whales sighted</b>
Zone 3	7	0
Zone 4	15	0
Zone 6	30	0

#### B. Monterey Bay Whale Watch (Fishing Zone 4)

The semi-monthly average number of whales-per-half-day-trip in southern Monterey Bay remains elevated compared to 2022 and the historical average for this time period (Figure 5).

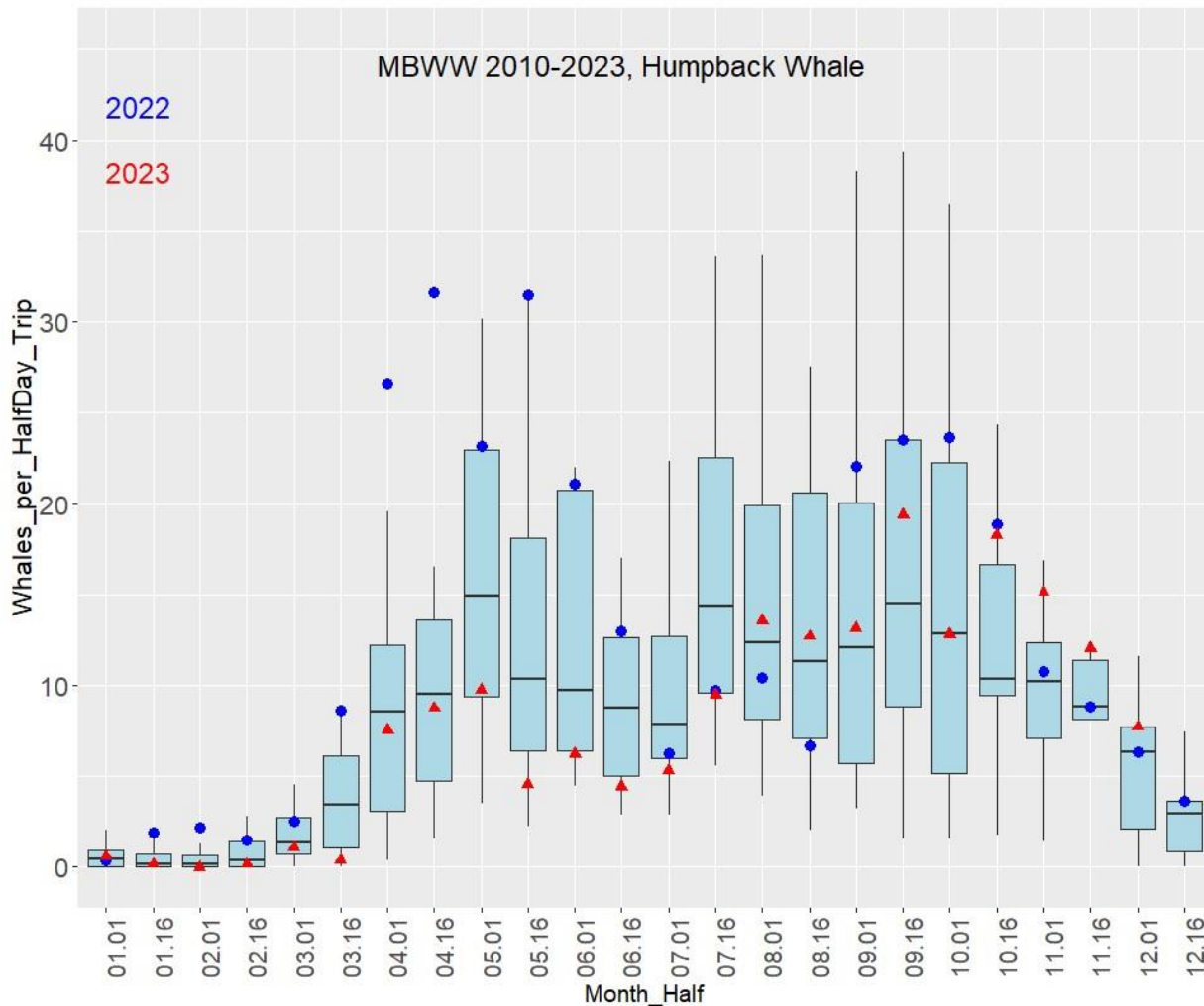


Figure 5. Historical Monterey Bay Whale Watch data for 2010-2023, summarizing the average and variation in the number of humpback whales per half-day trip on a semi-monthly basis (1st- 15th, 16th- end of month). This boxplot follows standard statistical practice in that the black horizontal line is the 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 2022 (large blue dots) and 2023 (red triangles) are provided for reference, placing recent whale numbers in a historical context.

### C. Whale Watch 2.0 (All Fishing Zones)

Blue whale habitat predictions for December 8, 2023, show low habitat suitability in Fishing Zones 1-5, with some suitable habitat remaining within Fishing Zone 6. For current habitat suitability check the [NOAA Coastwatch Habitat Suitability Map](#).

## III. 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.

### A. Quality Testing and Domoic Acid

No further delays due to quality or domoic acid testing. Refer to the [December 4, 2023 Available Data document](#) for more information.

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

##### **A. MBARI Krill Model**

No new available data, please see the [October 23, 2023 Available Data document](#) for the latest data or visit the [MBARI website](#).

#### V. Ocean conditions: §132.8(d)(9)

##### **A. El Niño/Southern Oscillation (ENSO) Diagnostic**

El Niño is anticipated to continue through the Northern Hemisphere spring with a 62% chance during April-June 2024. Please visit the [NOAA ENSO Diagnostic webpage](#) for more information.

##### **B. Large Marine Heatwave Tracker**

No new available data, please see the [December 4, Available Data document](#) for the latest data or visit the [NOAA Marine Heatwave Tracker webpage](#) for more information.

##### **C. Habitat Compression Index**

No new available data, please see the [December 4, Available Data document](#) for the latest data or visit the [NOAA Habitat Compression Index webpage](#) for more information.

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

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

CDFW's effectiveness evaluation for the Management Actions specified in §132.8(e) are provided above in the Initial Assessment.

#### VII. 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.

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

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

See Table 2 for the current fishing season and calendar year Impact Score. For more information about Impact scoring, please review the [Impact Score FAQ](#).