

2022-23 Risk Assessment: Available Data

Last updated: June 16, 2023

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TRIGGERS REQUIRING MANAGEMENT ACTION

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

Data provided by: Lauren Saez, National Marine Fisheries Service (NMFS)

Table 1. Actionable Species Entanglements during 2023, 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 | 1 | 2 |
| Blue whales | 0 | 0 |
| Leatherback sea turtles | 0 | 0 |

On June 11, 2023, there was a confirmed humpback whale entanglement (20230611Mn) in California commercial Dungeness crab gear. This brings both the current fishing season Impact Score and the calendar year Impact Score for humpback whales to 1.51. During 2022 and 2023 there have been no confirmed entanglements of either blue whales or leatherback sea turtles, therefore the cumulative Impact Score for 2023 and the current fishing season is 0 for these two species.

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 (2023) |
|-------------------------|---|---|
| Humpback whales | 1.51 | 1.51 |
| 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 Impact Score for 2022 was 5.28 for humpback whales and 0 for blue whales and leatherback sea turtles. The 2023 calendar year Impact Score is 1.51 for humpback whales and 0 for blue whales and leatherback sea turtles. Therefore, the 3-year Average Impact Score is now 2.89 for humpback whales.

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 Average |
|-------------------------|---------------------------------|---------------------------------|---------------------------------|----------------|
| Humpback whales | 1.89 | 5.28 | 1.51 | 2.89 |
| Blue whales | 0 | 0 | 0 | 0 |
| Leatherback sea turtles | 0 | 0 | 0 | 0 |

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

Data provided by: California Department of Fish and Wildlife, Monterey Bay Whale Watch (processed by Karin Forney, NOAA SWFSC), and John Calambokidis (Cascadia Research)

Table 44. 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 | Cascadia Research | Yes |
| Zone 2 | CDFW Aerial Survey (limited) | No |
| Zone 3 | CDFW Aerial Survey | NA, Fishing Zone Closed |
| Zone 4 | CDFW Aerial Survey, Monterey Bay Whale Watch | NA, Fishing Zone Closed |
| Zone 5 | No | NA, Fishing Zone Closed |
| Zone 6 | No | NA, Fishing Zone Closed |

Cascadia Research Collective and The Marine Mammal Center (Fishing Zones 1 and 3)

On June 8, 2023, Cascadia Research conducted a survey out of Crescent City in Fishing Zone 1. There were 11 sightings of 14 humpback whales, with three sightings (four animals total) in 109 fathoms and eight sightings (10 animals total) in shallower waters (42 to 57 fathoms) (Figure 1). The number of humpback whales recorded has increased since the survey conducted in Crescent City in late April, which had three sightings of five humpback whales in 43 to 547 fathoms.

Surveys were also conducted by The Marine Mammal Center in Fishing Zone 3 on May 30, 2023, June 8, 2023, and June 13, 2023. Surveys were mostly associated with their efforts to monitor whales in the shipping lanes (Table 5; Figure 2) The results revealed large numbers of humpback whales in the Gulf of the Farallon's distributed broadly in both shallower and deeper waters. They also saw a concentration of blue whales generally closer to the shelf edge on their June 13, 2023, survey.

Table 5. Summary of vessel surveys in June 2023 in Fishing Zones 1 and 3 by Cascadia Research and The Marine Mammal Center.

| Date | Vessel | Zone | Area | Humpback Whales Sighted | Number of blue whales sighted | Comments |
|---------------|--------------------------|------|---------------|-------------------------|-------------------------------|---|
| June 8, 2023 | Rob | 1 | Crescent City | 11 | 0 | Three sightings of four whales near 109 fathoms, rest of sightings from 42-57 fathoms |
| May 30, 2023 | The Marine Mammal Center | 3 | San Francisco | 18 | 0 | Mostly shipping lane survey, two sightings of two unidentified whales. |
| June 8, 2023 | The Marine Mammal Center | 3 | San Francisco | 34 | 0 | Mostly shipping lane survey, two sightings of two unidentified whales. |
| June 13, 2023 | The Marine Mammal Center | 3 | San Francisco | 22 | 5 | Mostly shipping lane survey, three sightings of three unidentified whales. |

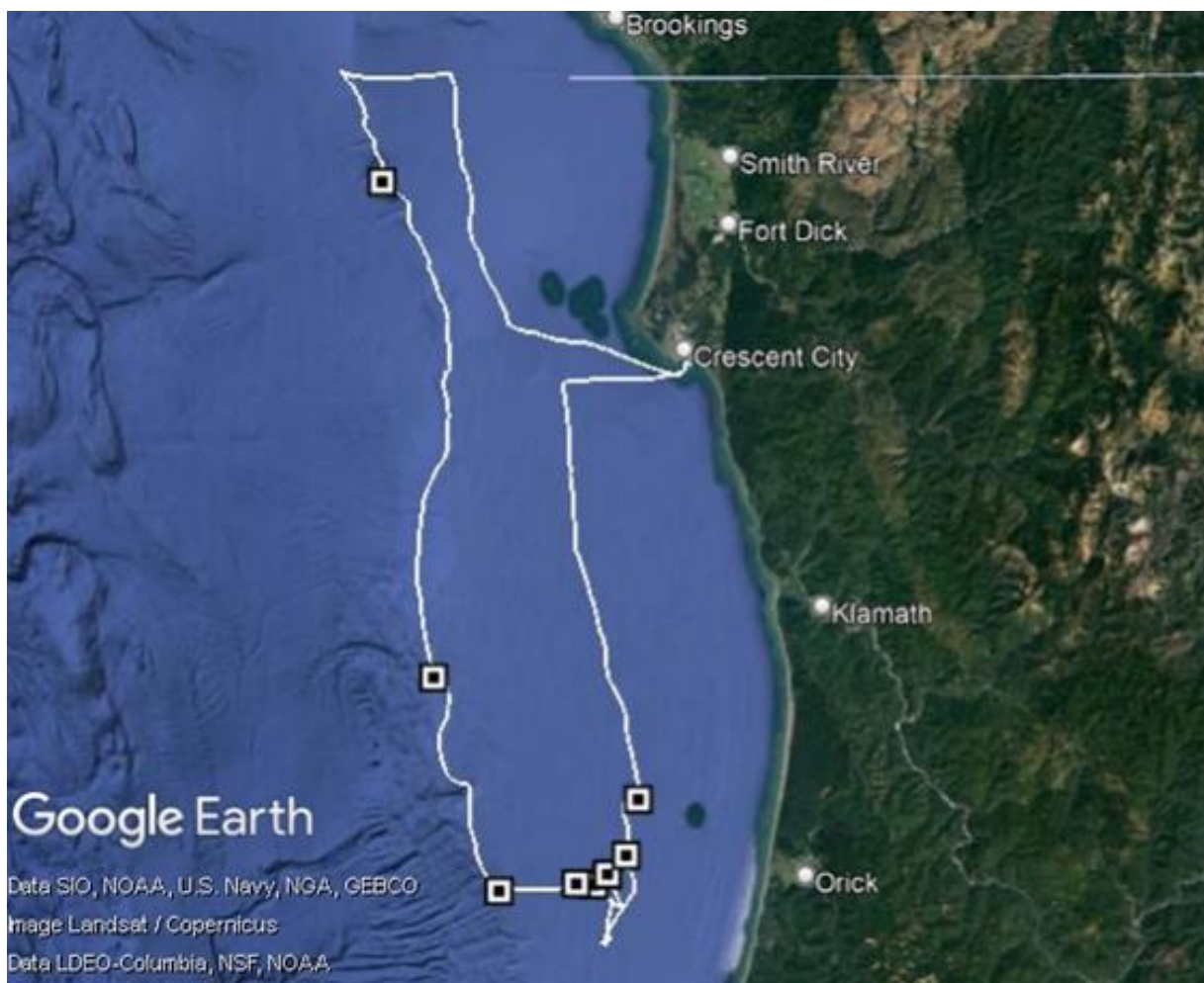


Figure 1. Tracks and humpback whale sightings from June 8, 2023 survey.

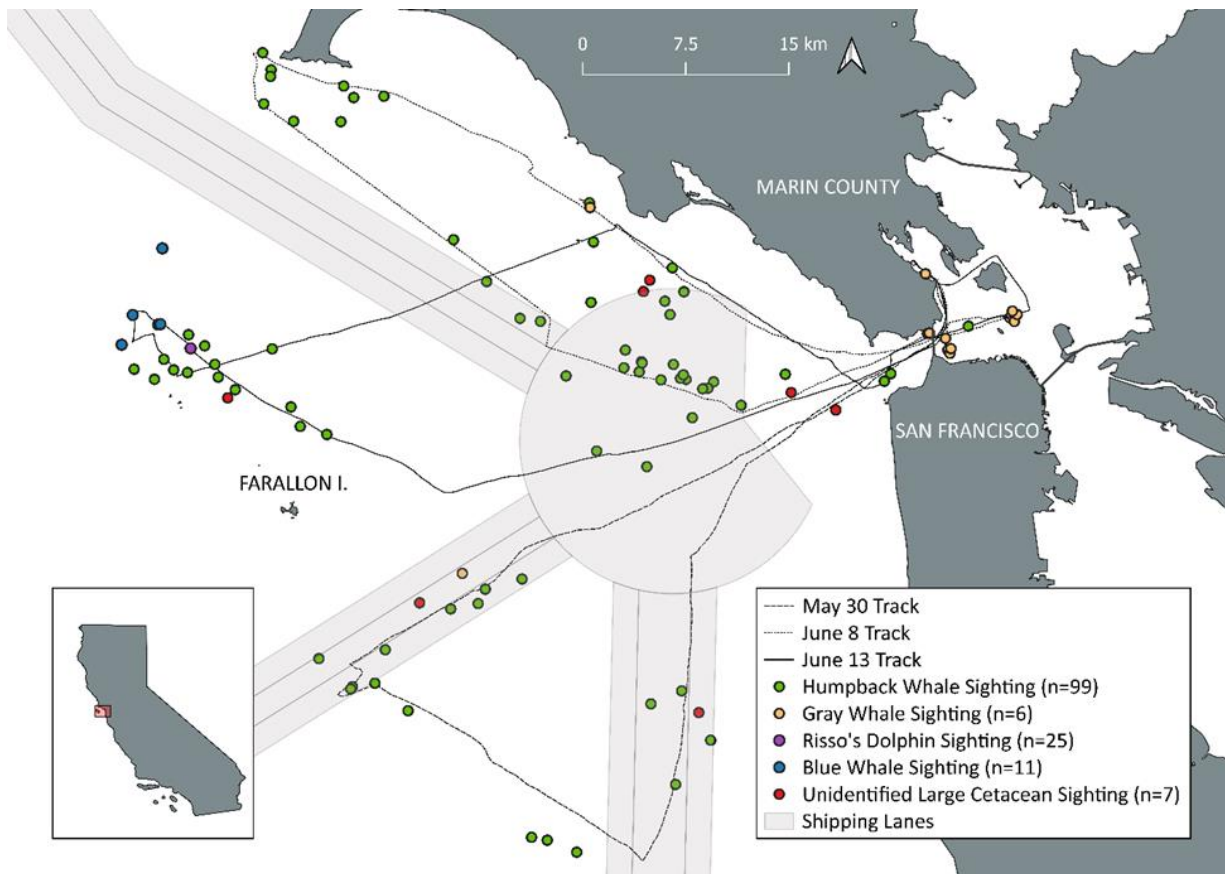


Figure 2. Tracks and sightings in Zone 3 from The Marine Mammal Center surveys May 30 to June 13, 2023.

CDFW Aerial Survey (Fishing Zone 2-4)

CDFW staff conducted two aerial surveys in Fishing Zones 2-4, both flights were prevented from surveying to the Oregon border as planned because of poor weather conditions.

- CDFW conducted a survey on May 25, 2023, between the Monterey Peninsula (Fishing Zone 4) and Point Cabrillo (Fishing Zone 2; Figure 3). Conditions were mixed with Beaufort conditions of two or less and limited visibility from fog between Point Reyes and Point Cabrillo. Fog prevented the survey from continuing to the Oregon border as planned. Two humpback whales, two blue whales, and two unidentified whales were sighted in Fishing Zone 3 and one unidentified whale was sighted in Fishing Zone 4. No blue or humpback whales were seen in Fishing Zone 2.

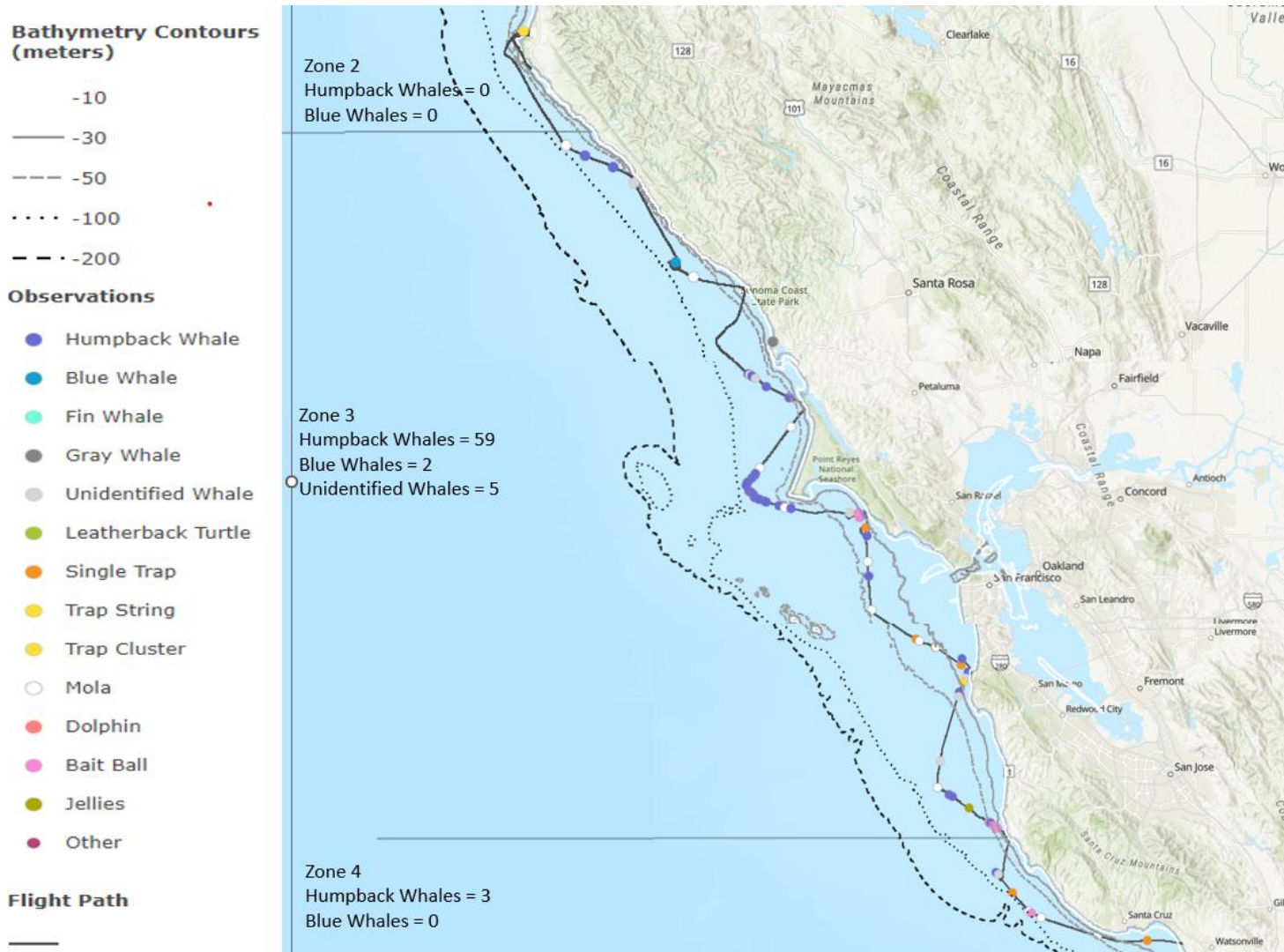


Figure 3. Map showing track lines and observations from CDFW aerial survey of Fishing Zones 2, 3, and 4 on May 25, 2023.

- CDFW conducted an aerial survey on June 8, 2023, between northern Monterey Bay (Fishing Zone 4) and just north of Point Arena (Fishing Zone 2; Figure 4). Conditions were good with Beaufort conditions of one or less until entering Fishing Zone 2, where fog prevented the survey from continuing. 59 humpback whales, two blue whales, and five unidentified whales were sighted in Fishing Zone 3 and three humpback whales, and no blue whales were sighted in Fishing Zone 4. No humpback or blue whales were sighted in the portion of Fishing Zone 2 that was surveyed.

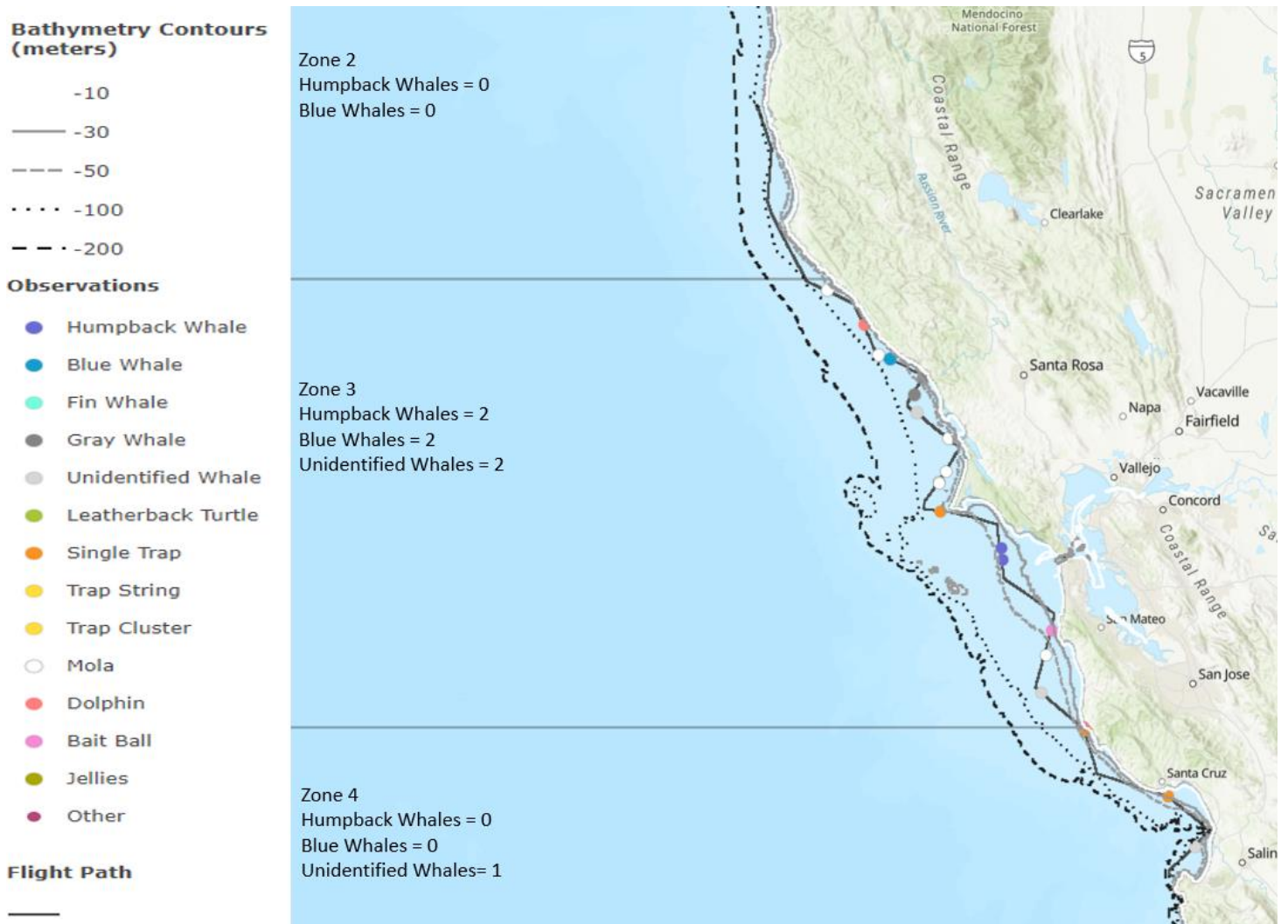


Figure 4. Map showing track lines and observations from CDFW aerial survey of Fishing Zones 2, 3, and 4 on June 8, 2023.

Monterey Bay Whale Watch (Fishing Zone 4)

During the seven-day period between June 6 and June 12, 2023, the average number of humpback whales per half day trip was six, with a peak of 22 whales observed during an all-day trip on June 12, 2023.

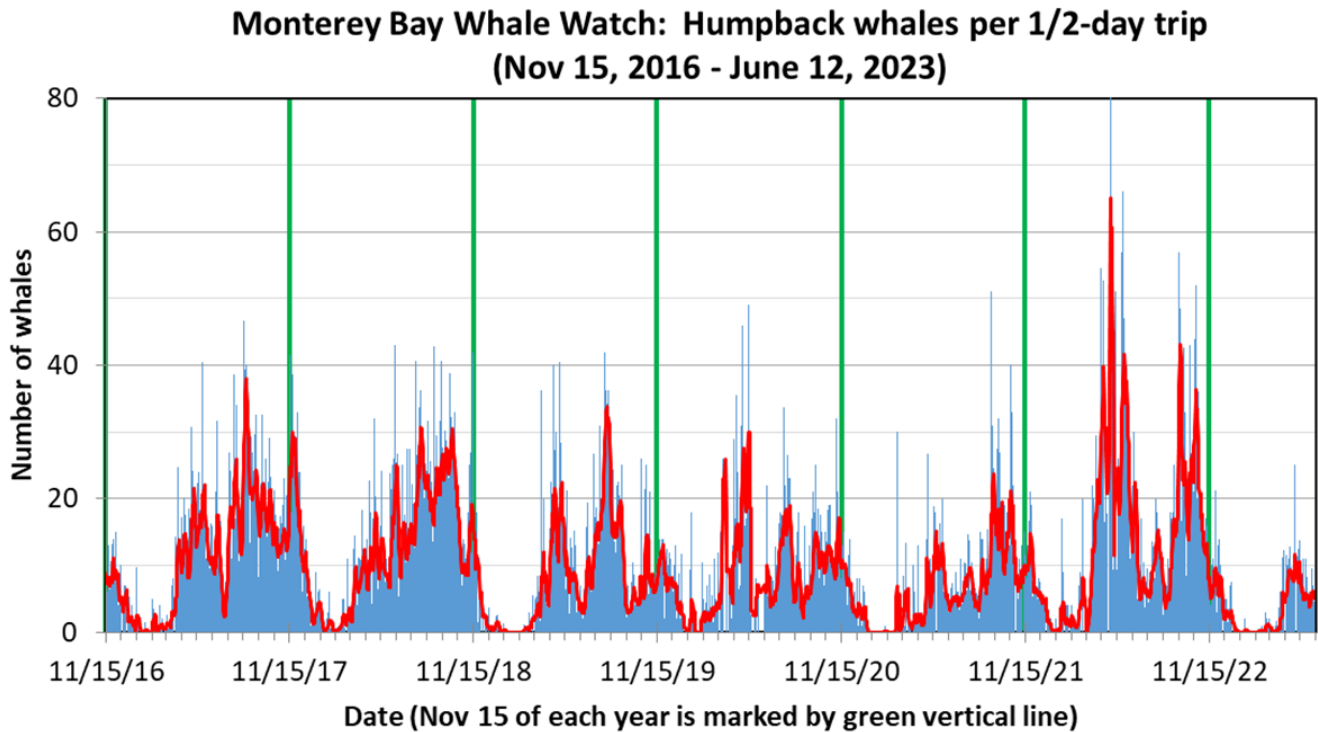


Figure 5. Standardized number of humpback whale sightings for Monterey Bay Whale Watch from November 15, 2016 – June 5, 2023. The y-axis is the number of whales per half-day trip; the thin blue bars are the average daily whale numbers, and the red line is a 7-day running average to make the patterns a bit easier to see. A vertical green line has been added at November 15 of each year for reference. Each tick mark is one month.

MANAGEMENT CONSIDERATIONS

Information from NOAA: §132.8(d)(2)*

Data provided by: Lauren Saez, National Marine Fisheries Service (NMFS)

On June 11, 2023, there was a confirmed humpback whale entanglement (20230611Mn) in commercial California Dungeness crab gear.

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) will be provided in the June 16, 2023, Preliminary 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.

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

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

California Coast Crab Association (Fishing Zones 1 and 5)

The California Coast Crab Association conducted surveys on June 5, 8, and 9th, 2023 out of Morro Bay, Port San Luis, Eureka and Crescent City.

- Surveys were conducted by two industry vessels out of Crescent City (F/V Little Vicki and F/V Spirit of America) and two industry vessels out of Eureka (F/V Celtic Aire and F/V Sally Kay), in Fishing Zone 1.
- An observer from Cal Poly Humboldt was on the F/V Celtic Aire, resulting in 25% observer coverage.
- Visibility was nearly unlimited, and the swell was 3-4 feet.
- A total of five humpback whales and one unidentified whale were observed at one location between Patrick's Point and Trinidad (Figure 6). All humpback whale sightings occurred at 75 fathoms.

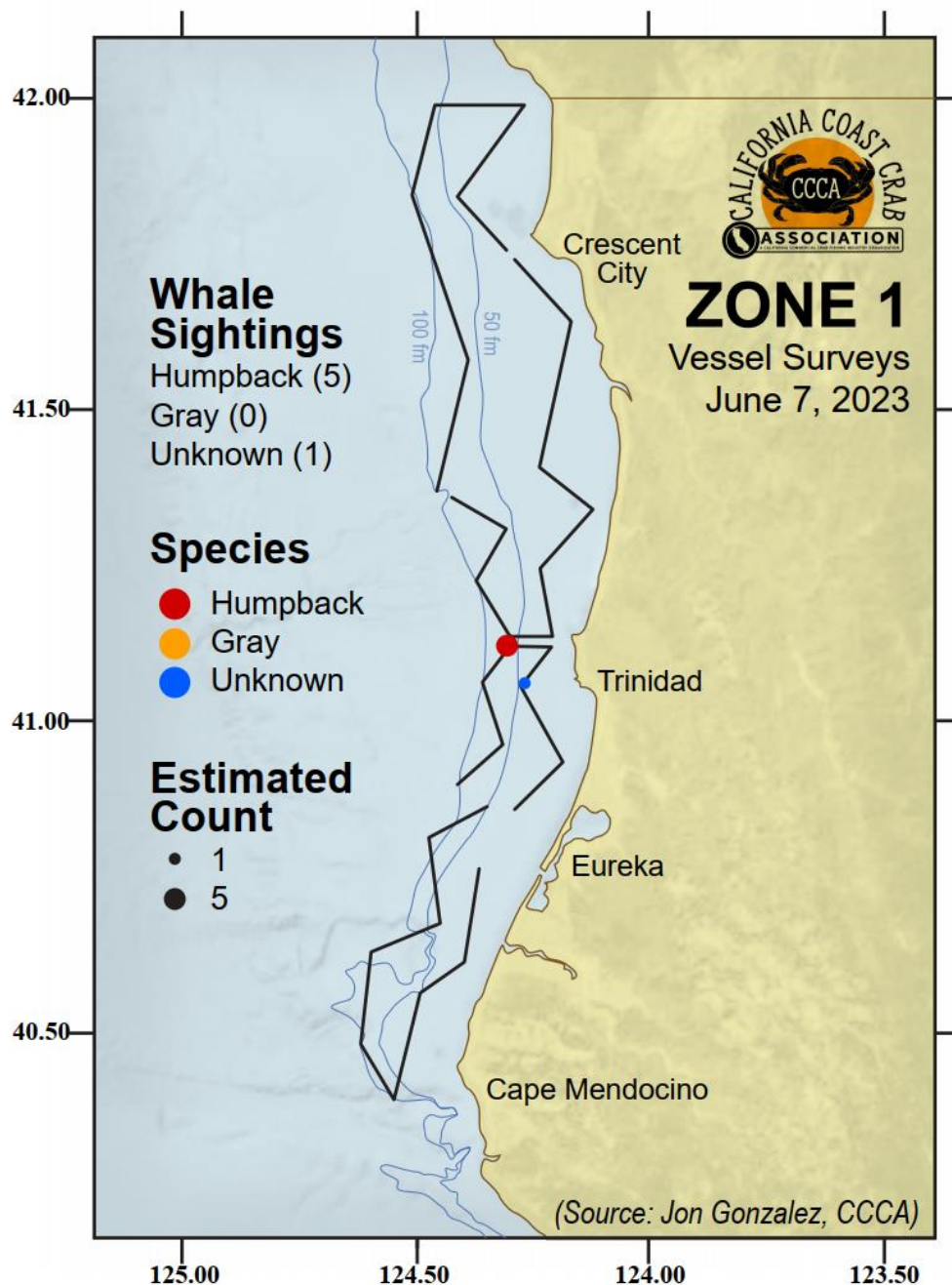


Figure 6. Map showing track lines and observations for vessel survey conducted on June 7, 2023 using two industry vessels out of Crescent City (F/V Little Vicki, F/V Spirit of America) and two industry vessels out of Eureka (F/V Celtic Aire, F/V Sally Kay) in Fishing Zone 1.

- Surveys were conducted by one industry vessel out of Morro Bay (F/V Brita Michelle) and one out of Port San Luis (F/V Sky) in Fishing Zone 5.
- An observer from CDFW was on the F/V Sky resulting in 50% observer coverage.
- Visibility ranged from 5-20 miles depending on fog, and the swell was 1-3 feet.
- A total of 33 humpbacks and five unidentified whales were observed. The majority of sightings (27) were between Purisima Point and Point Arguello (Figure 7) at 50-90 fathoms. Four killer whales (three adults and one calf) were also observed.

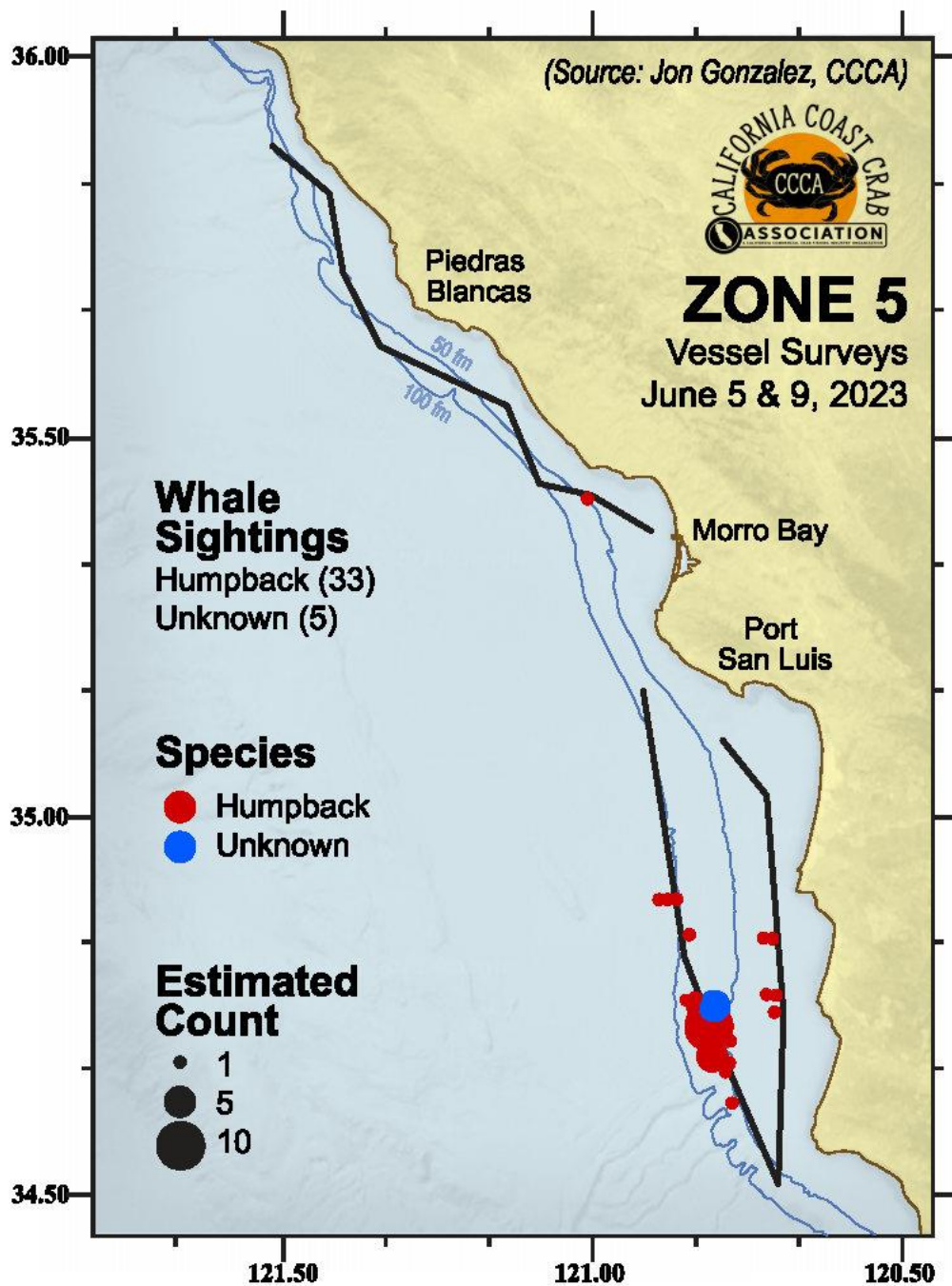


Figure 7. Map showing track lines and observations for vessel surveys conducted on June 5 and 9, 2023 using one industry vessel out of Morro Bay (F/V Brita Michelle) in Fishing Zone 4 and one industry vessel out of Port San Luis (F/V Sky) in Fishing Zone 5.

Monterey Bay Whale Watch (Fishing Zone 4)

Monterey Bay Whale Watch conducted whale-watching trips in southern Monterey Bay on all seven days during the week of June 6, 2023, to June 12, 2023.

The semi-monthly average number of humpback whales per half day trip in southern Monterey Bay dropped below the historical average levels during May and has remained lower through early June (Figure 8), suggesting many whales are currently feeding elsewhere.

During three half-day trips on June 10, 2023, two to three blue whales were observed per trip. The average number of blue whales per half day trip during the last seven days (June 6-12, 2023) was 0.4, which is similar to the historic average number at this time of year (Figure 9).

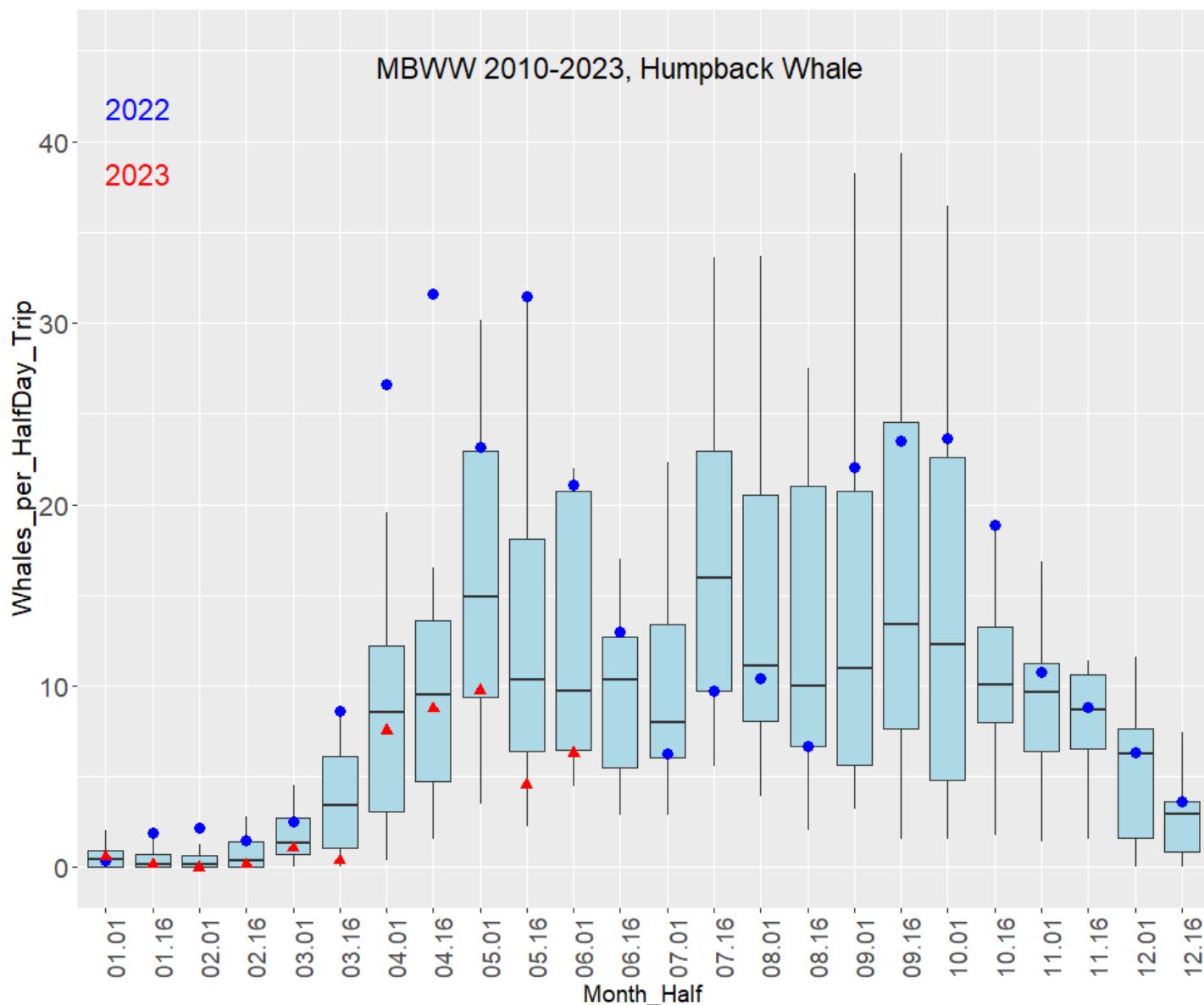


Figure 8. Historical Monterey Bay Whale Watch data for 2010-2023, summarizing the average and variation in the number of humpback whales per half-day trip on a semi-monthly basis (1st- 15th, 16th- end of month). This boxplot follows standard statistical practice in that the black horizontal line is the 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) and are provided for reference, placing recent whale numbers in a historical context.

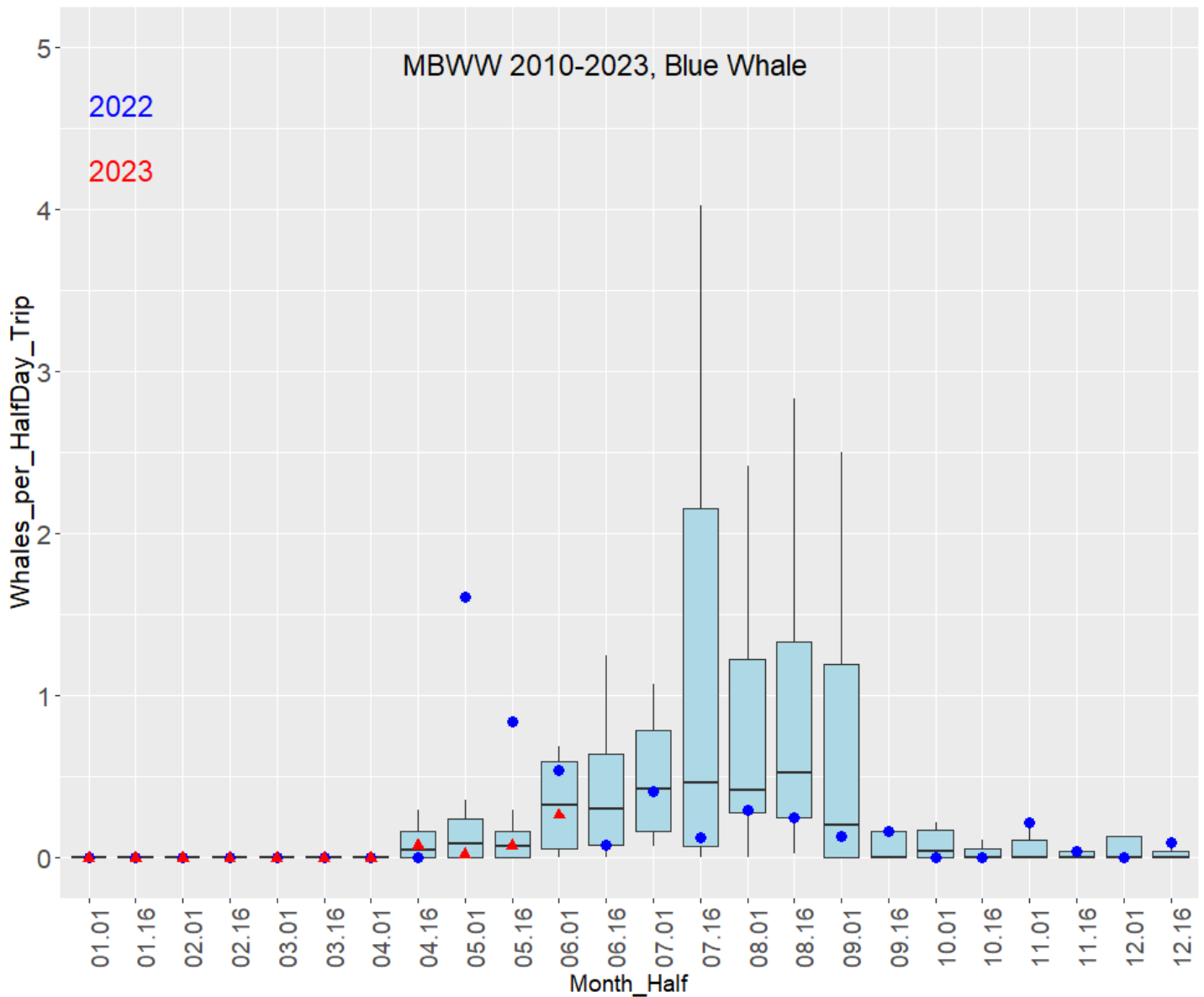


Figure 9. Historical Monterey Bay Whale Watch data for 2010-2023, summarizing the average and variation in the number of blue whales per half-day trip on a semi-monthly basis (1st- 15th, 16th- end of month). This boxplot follows standard statistical practice in that the black horizontal line is the average 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 2022 (large blue dots) and 2023 (red triangles) are provided for reference, placing recent whale numbers in a historical context.

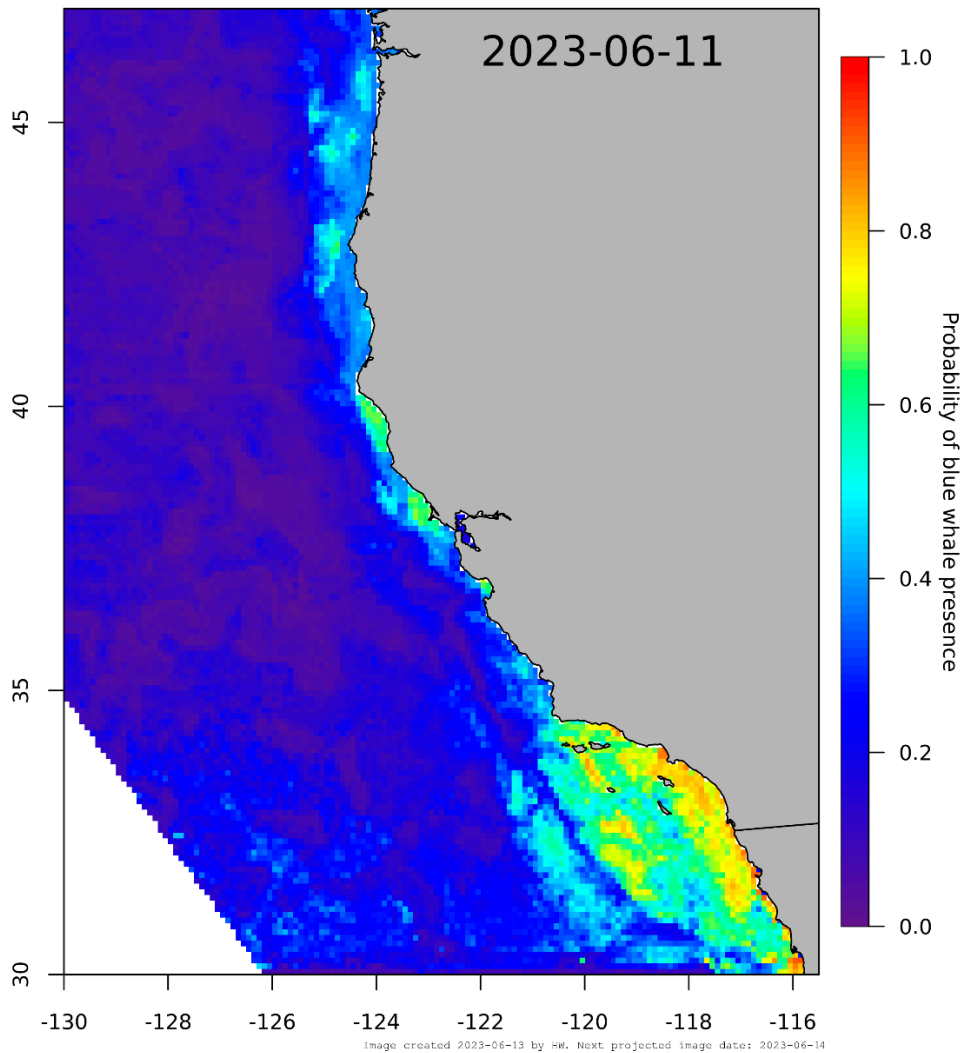
Whale Watch 2.0 (All Fishing Zones)

Blue whale habitat predictions for June 3, 2023, indicate moderate to high habitat suitability along the southern California coast, and moderate habitat suitability along the central and northern California coast (Figure 10).

WhaleWatch 2.0



Experimental Product



WhaleWatch 2.0 is a dynamic ocean management tool that aims to provide information on suitable whale habitat in real-time to minimize ship strike risk. Map shows predicted daily blue whale habitat suitability at 10km resolution which represents where whales are most likely to be based on environmental conditions. For more information visit: <https://coastwatch.pfeg.noaa.gov/projects/whalewatch2/>

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Figure 10. WhaleWatch 2.0 map for June 11, 2023. [View a current map.](#)

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

During the seven-day period ending June 15, 2023, trained observers at the Farallon Islands reported 302 humpback whales in Fishing Zone 3 and 10 blue whales. Observers from the Channel Islands National Marine Sanctuary and National Park Service reported one blue whale and 80 humpback whales in Fishing Zone 6 (Figure 11).

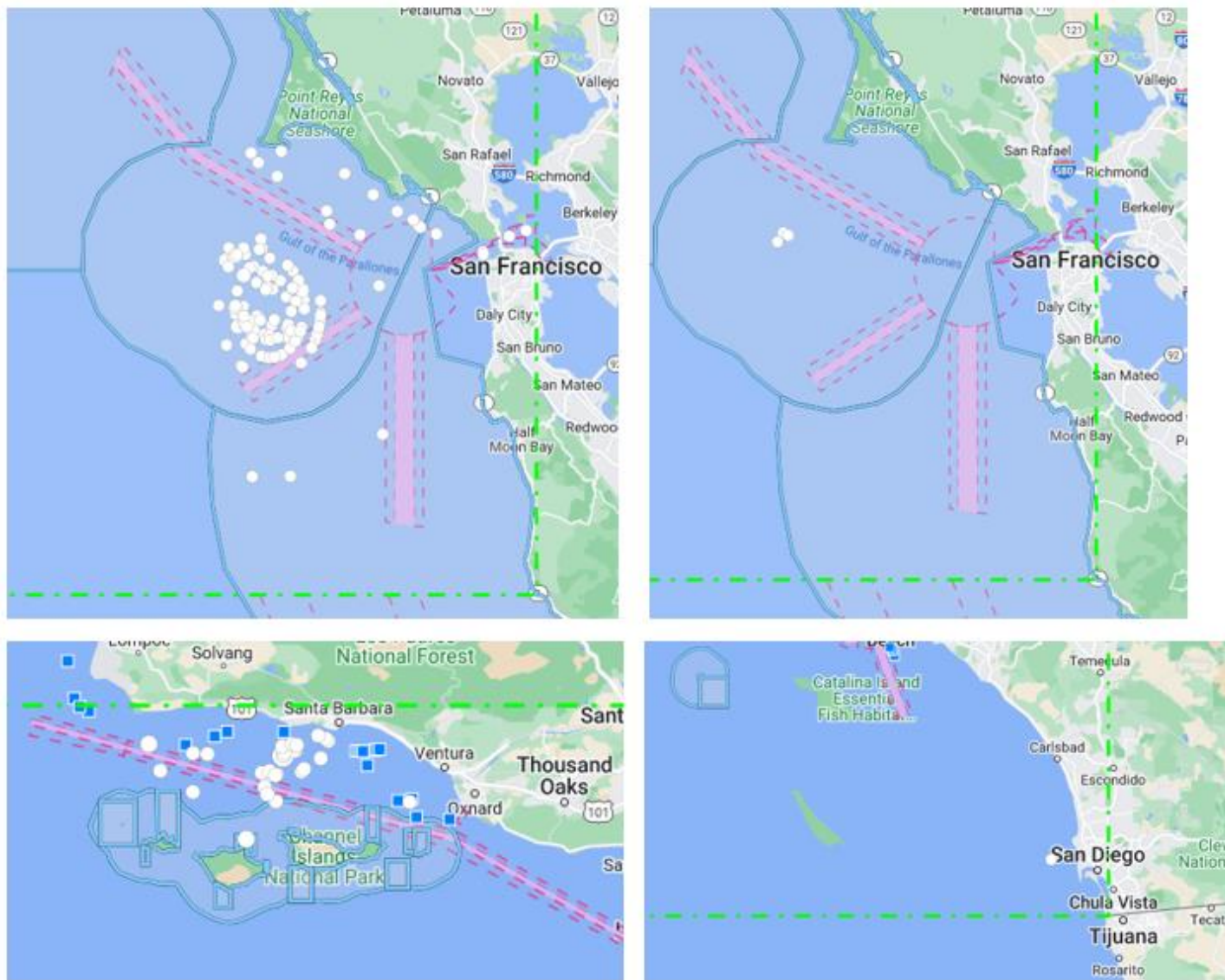


Figure 11. Locations of humpback whale sightings in Fishing Zone 3 (upper left) and Fishing Zone 6 (bottom left) and blue whale sightings in Fishing Zone 3 (upper right) and in Fishing Zone 6 (bottom right). Reporting locations are represented by white circles. A given report may or may not represent multiple individuals. Fishing Zone boundaries are represented by green dashed lines.

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.

Marine Landings Data System (*All Fishing Zones*)

Fishing Zones 1 and 2 are currently open and all other Fishing Zones are closed, a summary of landings from all Fishing Zones is provided below (Table 6).

Available Data, June 16, 2023

Weekly total landings volume has decreased since the beginning of January, with the highest harvest coming from Fishing Zone 1, followed by Fishing Zone 3 (Figure 12). So far, 73% of the total volume harvested for this season has been from Fishing Zone 1, with 19% from Fishing Zone 3, seven percent from Fishing Zone 2 and the remainder coming from the other Fishing Zones. Vessel activity by Fishing Zone follows the same pattern, with the highest activity in Fishing Zones 1 and 3, and less activity in the remaining Fishing Zones (Figure 13). All Fishing Zones have had a continued decrease in vessel activity since mid-February. After the closure of the Fishing Zones 3-6 in April, Fishing Zone 1 has continued to have higher vessel activity than Fishing Zone 2.

Weekly landings by port have declined since the beginning of January with the highest activity in Crescent City, Eureka, Bodega Bay, Half Moon Bay, and San Francisco (Figure 14). Overall, 47% of the total volume harvested for this season has been landed into Crescent City, 23% landed in Eureka, six percent landed into Bodega Bay, Half Moon Bay, Trinidad, and San Francisco, and five percent or less landed into Fort Bragg, Monterey, and Morro Bay. After the closure of Fishing Zones 3-6, the majority of landings have been in Crescent City and Eureka.

Looking at vessel activity by port, over the course of the season, the highest activity has been in Crescent City (98 vessels) and Eureka (72 vessels), followed by Half Moon Bay (35 vessels), San Francisco (34 vessels), and Bodega Bay (32 vessels; Figure 15). Vessels have also made landings into Fort Bragg (25), Trinidad (14), Monterey (13), and Morro Bay (withheld due to confidentiality; Figure 15). Vessel activity by Fishing Zone has significantly decreased since the beginning of April. After the closure of Fishing Zones 3-6 vessel activity has been the highest in Crescent City and Eureka. Trinidad and Fort Bragg have maintained steady but low numbers of active boats, with less than ten active vessels per port since mid-May.

Table 6. Summary of 2022-23 season fleet dynamics information, as of June 15, 2023.

| Metric | Value | Additional Info |
|---|-----------------|--|
| Season status | Partial Closure | Fishing Zones 1 and 2 Open |
| Number of daily landings | 6,498 | NA |
| Total volume (pounds) | 21,050,553 | NA |
| Total Ex-Vessel Value | \$54,083,072 | NA |
| Average unit price | \$2.92 | NA |
| Total number of active vessels | 367 | NA |
| Maximum potential traps (based on active permits) | 121,775 | Estimates are also provided in the Bi-Weekly Fishing Activity Reports Subsection |

Volume of Landings (Pounds), by Week and Fishing Zone, 2022-23 Season

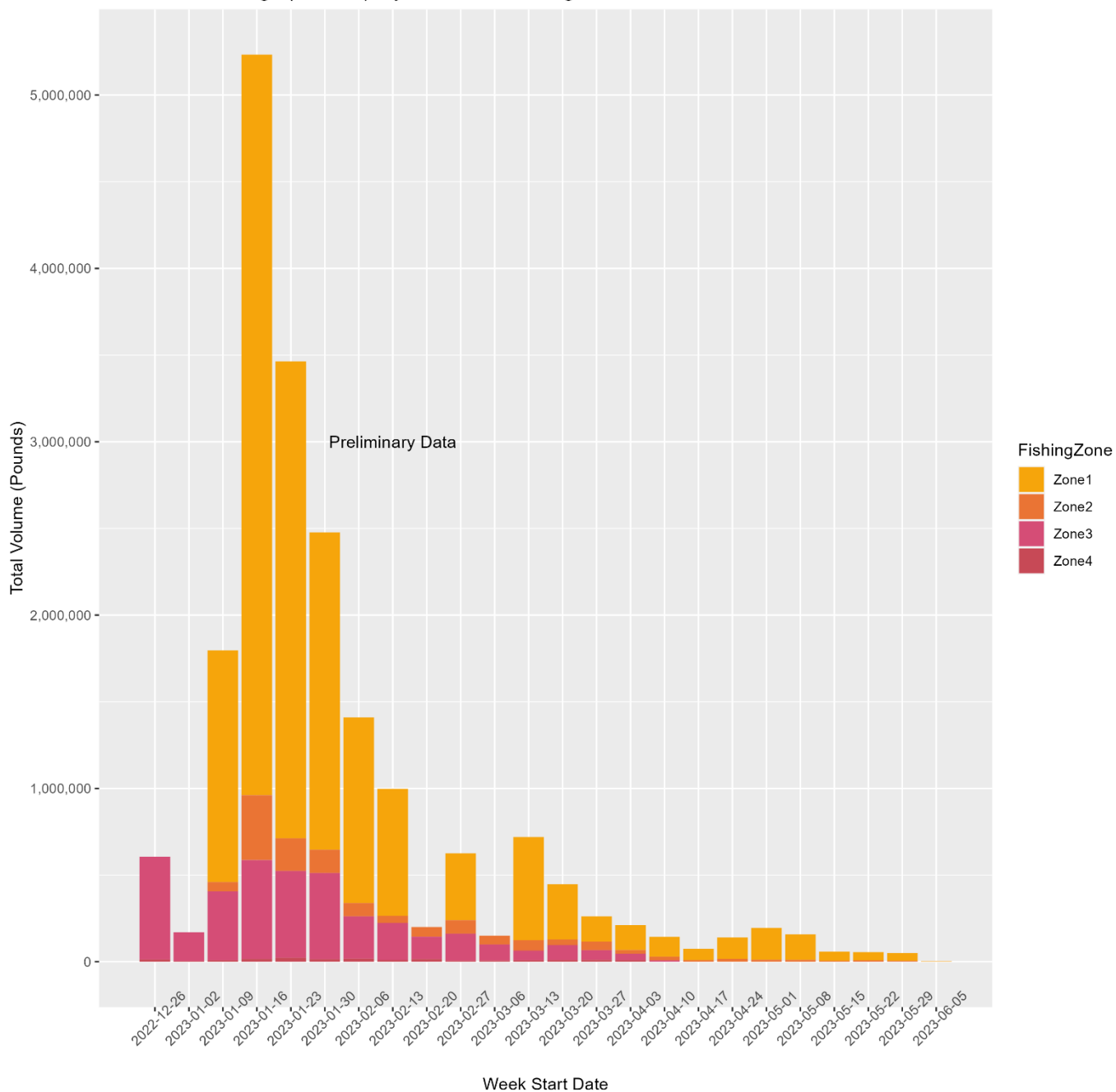


Figure 12. Cumulative volume (pounds) harvest by week and Fishing Zone. Week 1 starts with the first day the commercial Dungeness crab fishery was open in any area, December 31, 2022. All data are preliminary and subject to change.

Number of Active Vessels, by Week and Fishing Zone, 2022-23 Season

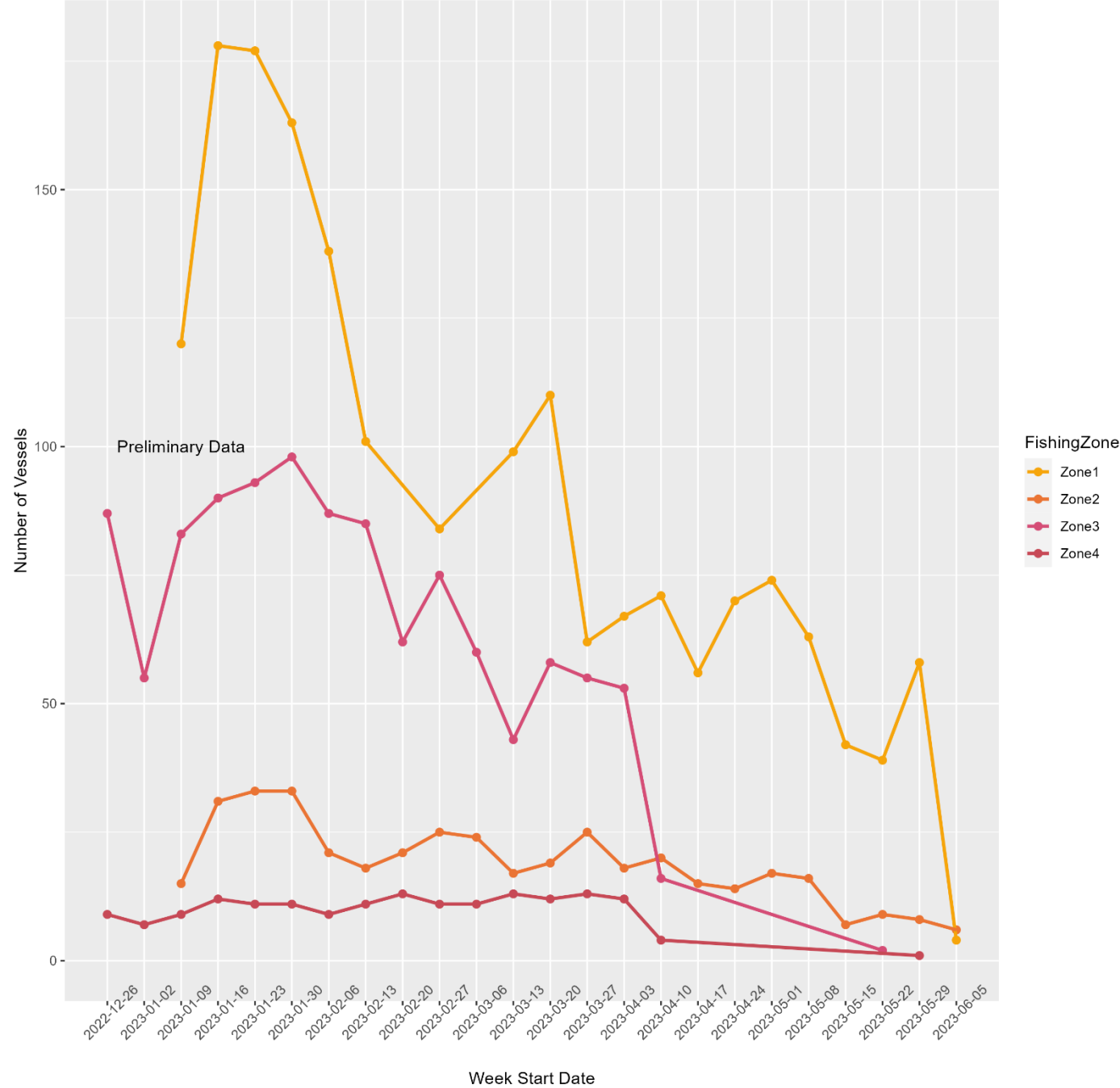


Figure 13. Number of active vessels by week and Fishing Zone. Week 1 starts with the first day the commercial Dungeness crab fishery was open in any area, December 31, 2022. All data are preliminary and subject to change. Some week*Fishing Zone complex combinations are withheld due to confidentiality constraints.

Volume of Landings (Pounds), by Week and Port Complex, 2022-23 Season

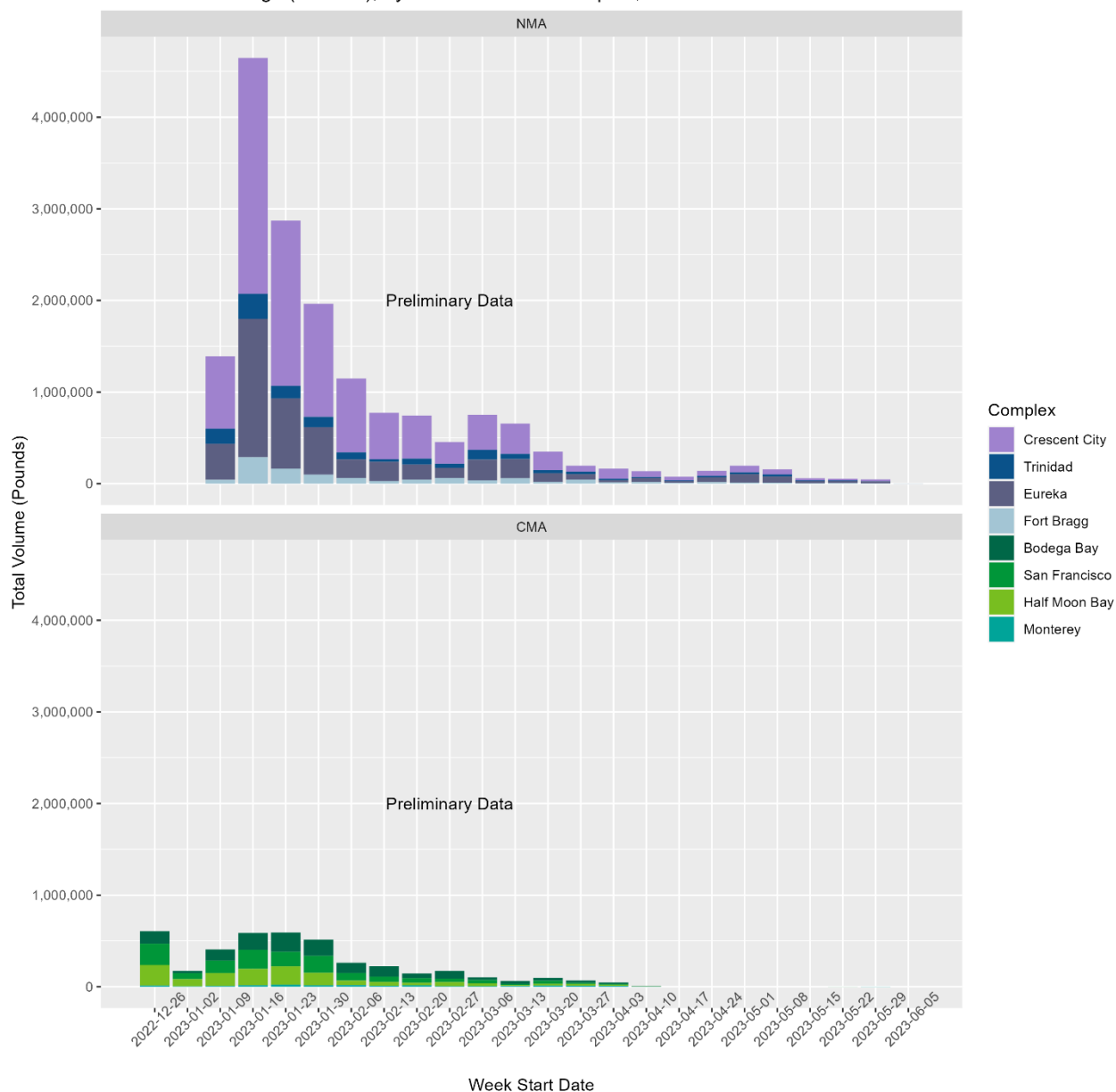


Figure 14. Cumulative volume (pounds) landed by week and port complex. Week 1 starts with the first day the commercial Dungeness crab fishery was open in any area, December 31, 2022. All data are preliminary and subject to change. Certain week*port complex combinations are withheld due to confidentiality constraints.

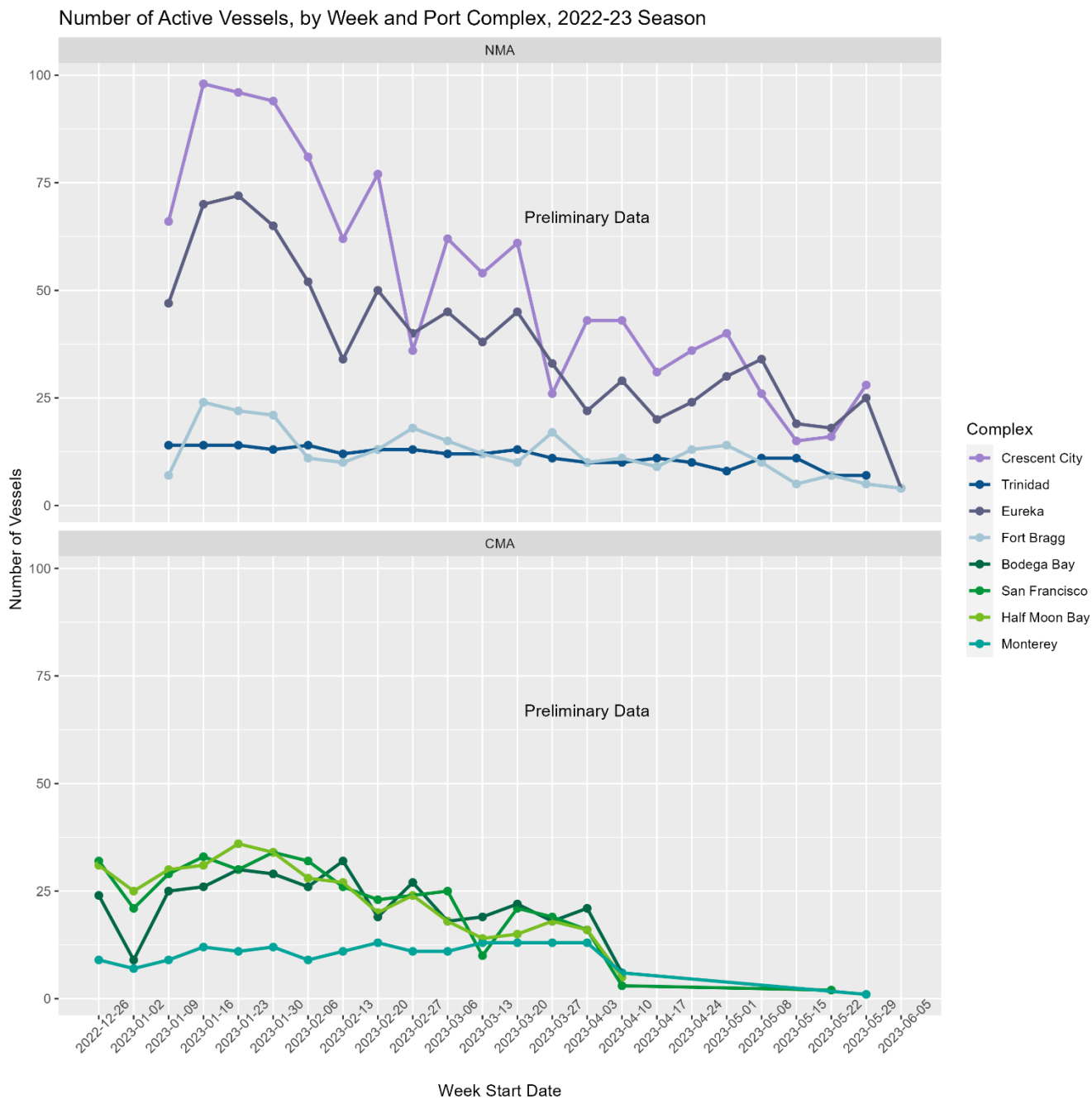


Figure 15. Number of active vessels by week and port complex. Week 1 starts with the first day the commercial Dungeness crab fishery was open in any area, December 31, 2022. All data are preliminary and subject to change. Some week*port complex combinations are withheld due to confidentiality constraints.

Bi-Weekly Fishing Activity Reports (All Fishing Zones)

CDFW has received bi-weekly reports since the first reporting period on January 1, 2023, through the most recent reporting period of June 1, 2023. A summary of reports received for May 16, 2023, is provided in Table 6 and those received for June 1, 2023, are provided

in Table 7; note this summary may not reflect all permitted vessels participating in the fishery due to compliance issues.

Table 7. Summary of information provided for the May 16, 2023, bi-weekly reporting period by Fishing Zone (1-6). Accessed from CDFW's Bi-Weekly Reporting database on June 15, 2023. NR-C refers to data withheld due to confidentiality and all data are preliminary and subject to change.

| Fishing Zone | Permits Reporting | Avg. Trap Number | Total Traps | Avg. Min. Depth (fa.) | Avg. Max. Depth (fa.) | Max. Depth (fa.) | Final Report | Number of Lost Traps |
|--------------|-------------------|------------------|-------------|-----------------------|-----------------------|------------------|--------------|----------------------|
| Zone 1 | 51 | 287 | 13,487 | 11 | 23 | 40 | 11 | 72 |
| Zone 2 | 20 | 165 | 3,290 | 13 | 24 | 30 | 3 | 11 |
| Zone 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Zone 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Zone 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Zone 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 71 | | 16,777 | | | | 14 | 83 |

Table 8. Summary of information provided for the June 1, 2023, bi-weekly reporting period by Fishing Zone (1-6). Accessed from CDFW's Bi-Weekly Reporting database on June 15, 2023. NR-C refers to data withheld due to confidentiality and all data are preliminary and subject to change.

| Fishing Zone | Permits Reporting | Avg. Trap Number | Total Traps | Avg. Min. Depth (fa.) | Avg. Max. Depth (fa.) | Max. Depth (fa.) | Final Report | Number of Lost Traps |
|--------------|-------------------|------------------|-------------|-----------------------|-----------------------|------------------|--------------|----------------------|
| Zone 1 | 58 | 289 | 16,712 | 10 | 21 | 50 | 9 | 56 |
| Zone 2 | 22 | 150 | 3,150 | 13 | 24 | 30 | 3 | 16 |
| Zone 3 | NR-C | NR-C | NR-C | NR-C | NR-C | NR-C | NR-C | NR-C |
| Zone 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Zone 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Zone 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals | 80 | | 19,862 | | | | 12 | 72 |

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

Data provided by: Monterey Bay Research Institute

MBARI Krill Model

Modeled zooplankton conditions for May 2023 indicate below average conditions from the CA/OR border to Point Arena, and pockets of above average zooplankton conditions between Point Area and Point Conception (Figure 16).

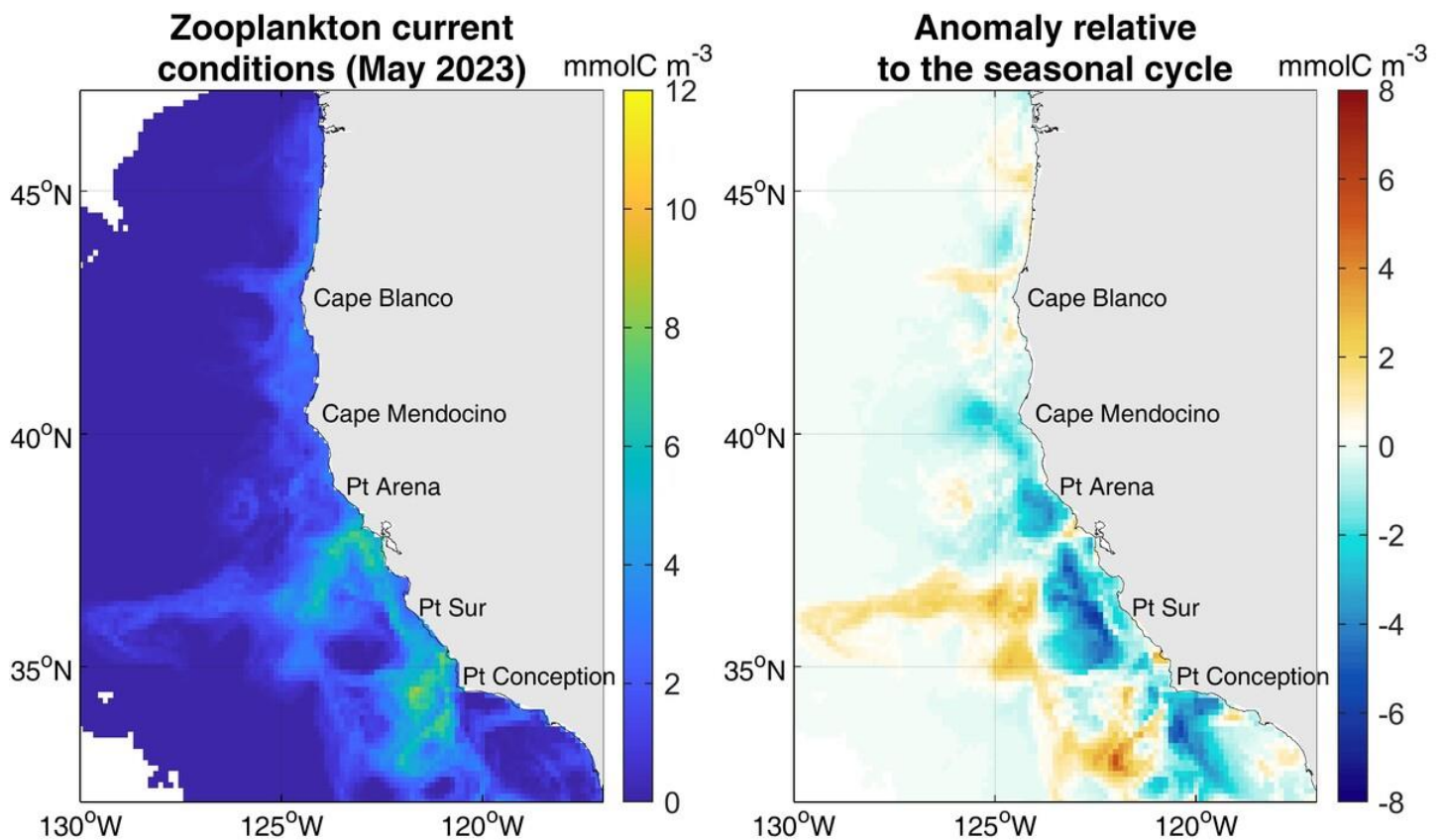


Figure 16. Latest modeled zooplankton concentrations in the California Current (left) and the corresponding anomaly relative to the 1993-2018 season cycle (right).

Ocean conditions: §132.8(d)(9)*

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

El Niño/Southern Oscillation (ENSO) Diagnostic

As of June 8, 2023, El Niño conditions are present and are expected to gradually strengthen into the Northern Hemisphere winter in 2023-2024.

Large Marine Heatwave Tracker

As of May 10, 2023, the current marine heatwave remains fairly strong but resides far offshore (>1,000 km) and nearshore conditions have generally been colder than normal during the past month. The current heatwave forecast suggests that the heatwave will continue in offshore waters through this summer (Figure 17). Looking forward, El Niño combined with the current large offshore marine heatwave may indicate the system is heading towards conditions like those encountered in 2014-2015, the last period there was a confluence of these two specific extremes.

May-25-2023

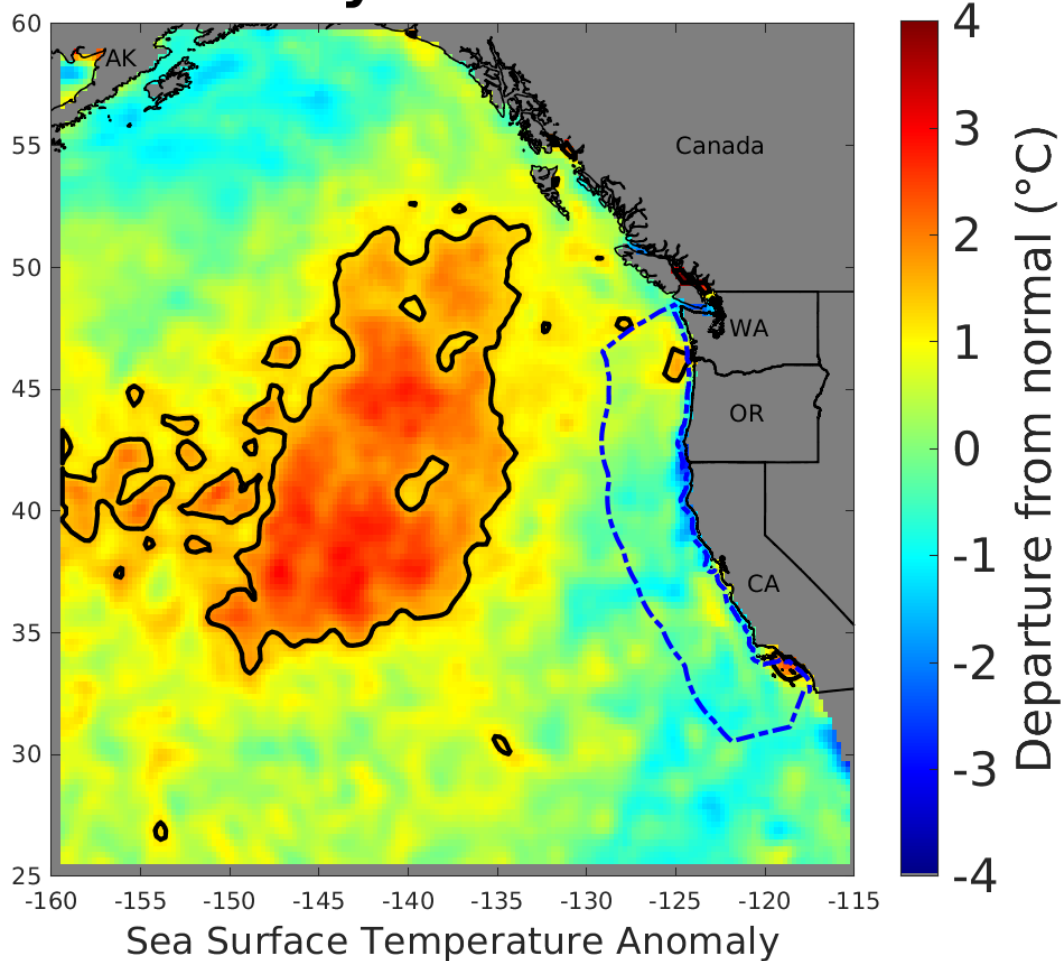


Figure 17. Science-quality (delayed 3 weeks), daily interpolated standardized sea surface temperature anomalies (SSTa) in the California Current ecosystem available for analysis of Marine Heatwave (MHW) presence. Dark outline shows the current extent of MHW conditions, as delineated by values of the 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 (OISST), with the SST anomaly calculated used climatology from NOAA's AVHRR-only OISST dataset.

Habitat Compression Index

The most recent habitat compression index values are for May 2023. For Region 2 between 40 and 43.5 degrees north (approximately Cape Mendocino to the CA/OR Border), habitat compression values show moderate compression (Figure 18). For Region 3 between 35.5 and 40 degrees north (approximately Morro Bay to Cape Mendocino), habitat compression values show moderate compression (Figure 18).

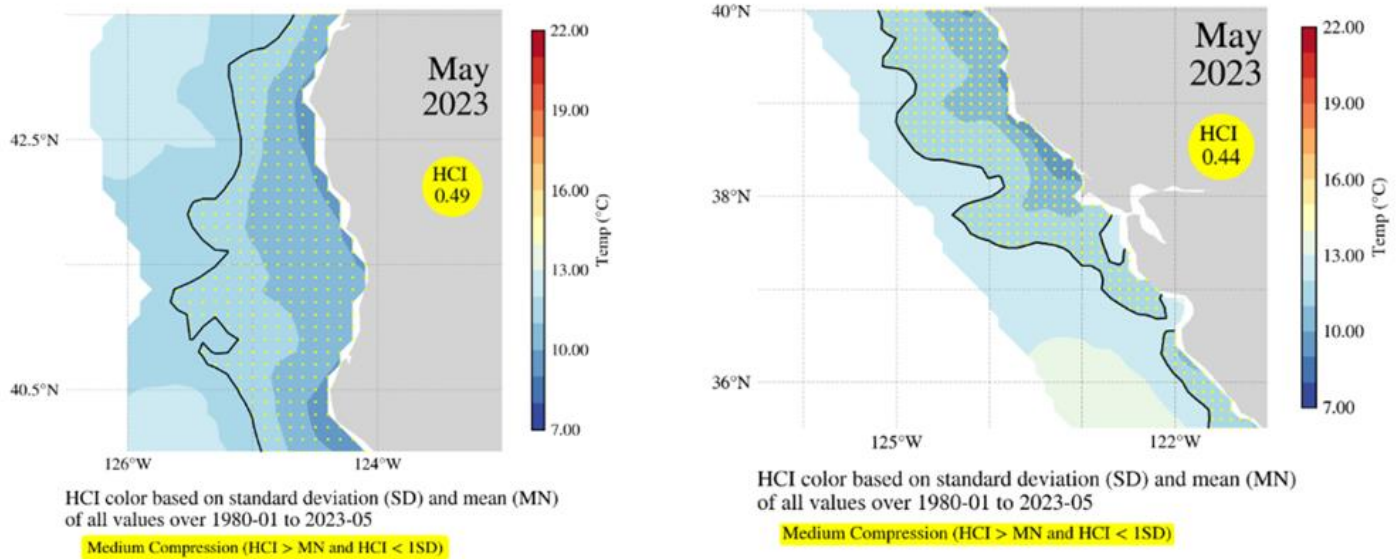


Figure 18. Spatial structure of the Habitat Compression Index for Region 3 (35.5 - 40 °N: right side) and Region 2 (40 to 43.5 °N: left side).

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

Data provided by: California Department of Fish and Wildlife

Impact Score totals for the current fishing season (2022-23) and calendar year (2023) are provided in Table 2 above. Impact Score totals for calendar year 2021 and 2022 are provided in Table 3 above.