

## 2021-22 Risk Assessment: Available Data

Last updated: December 13, 2021

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### TRIGGERS REQUIRING MANAGEMENT ACTION

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

*Data provided by: Lauren Saez and Dan Lawson, NMFS*

- Between January 1 and December 12, 2021 there have been 14 confirmed humpback whale entanglements, 0 confirmed blue whale entanglements, and 0 confirmed leatherback sea turtle entanglements reported to NMFS West Coast Region.
- Humpback whales:
  - 14 confirmed entanglements (9 reported in California, two reported from Mexico, one reported in Oregon, and two reported in Washington)
  - Fishery confirmations

- One confirmed humpback whale entanglement with California commercial Dungeness crab gear, reported from Mexico, gear set Fishing Zone unknown
- One confirmed humpback whale entanglement with Washington commercial Dungeness crab gear, reported from Mexico
- Of the nine confirmed reported in California, five were contributed to fisheries other than California commercial Dungeness crab: one spot prawn, one experimental box crab, one Washington commercial Dungeness crab gear, one gillnet, and one commercial lobster pending review
- Of the nine confirmed reported in California, four are currently considered entanglements in unidentified gear
  - Fishery Zone: Of the nine confirmed humpback whale entanglements in California, eight were reported in Fishing Zone 6 and 1 in Fishing Zone 5
- Blue whales: 0 confirmed entanglements
- Leatherback turtles: 0 confirmed entanglements

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

Actionable Species	Number Confirmed Entanglements in CA commercial Dungeness crab gear	Number Confirmed Entanglements in Unknown Fishing Gear Reported off California
Humpback whales	1	4
Blue whales	0	0
Leatherback sea turtles	0	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	Current Calendar Year Impact Score
Humpback whales	0	0.75 + 0.38 = 1.13 *Preliminary total
Blue whales	0	0
Leatherback sea turtles	0	0

- Thus far, there have been no entanglements of Actionable Species either confirmed in California commercial Dungeness crab gear (reported from any location) or confirmed in Unknown Fishing Gear (reported from California), so the current Fishing Season Impact Score 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 Unknown 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.
- See the [November 17, 2021 Available Data document](#) for additional details regarding the current Calendar Year Impact Score calculation for humpback whales.

#### **Marine Life Concentrations: §132.8(c)(1) \***

*Data provided by: Karin Forney, NOAA SWFSC and Upwell; Monterey Bay Whale Watch (processed by Karin Forney, NOAA SWFSC); Cascadia Research and The Marine Mammal Center; Scott Benson, NOAA SWFSC*

Table 3. Summary of available CDFW-approved survey data for marine life concentrations for Fishing Zones 1-6, 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	NA
Zone 2	NA	NA
Zone 3	NMFS Aerial Survey, Cascadia/TMMC Survey	Yes (NMFS Aerial Survey)
Zone 4	NMFS Aerial Survey, MBWW, Cascadia/TMMC Survey	No
Zone 5	NA	NA
Zone 6	NA	NA

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

- Aerial surveys were conducted from Santa Cruz to just north of Pt. Reyes on December 10, 2021 in a Partenavia P68 Observer aircraft. The survey covered east-west lines spaced every 6 nautical miles between the coast an approximately 200 m (110 fm) water depth (see Figure 1).
- Surveys were led by Karin Forney, with a team that included three trained Upwell observers. The observers search on both sides of the aircraft and downward through a belly window, and a data recorder entered sighting and effort data directly into a GPS-linked laptop computer (see the [RAMP Data Sources document](#) for additional details).
- Weather conditions were good to fair, with clear skies and winds ranging from about 6-8 knots nearshore to 12-16 knots offshore.
- Humpback whales were observed in two broad areas (see Figure 1) within water depths of approximately 25-100 fm. During the systematic east-west transect lines, 24 sightings of 41 humpback whales were recorded, including 33 humpback whales on the 10 transect lines within Fishing Zone 3, and eight humpback whales on the two transect lines in the northern portion of Fishing Zone 4.
- Five additional unidentified whales that probably were humpback whales were also recorded (four in Fishing Zone 3, one in Fishing Zone 4).
- No blue whales or leatherback sea turtles were observed during the aerial surveys.

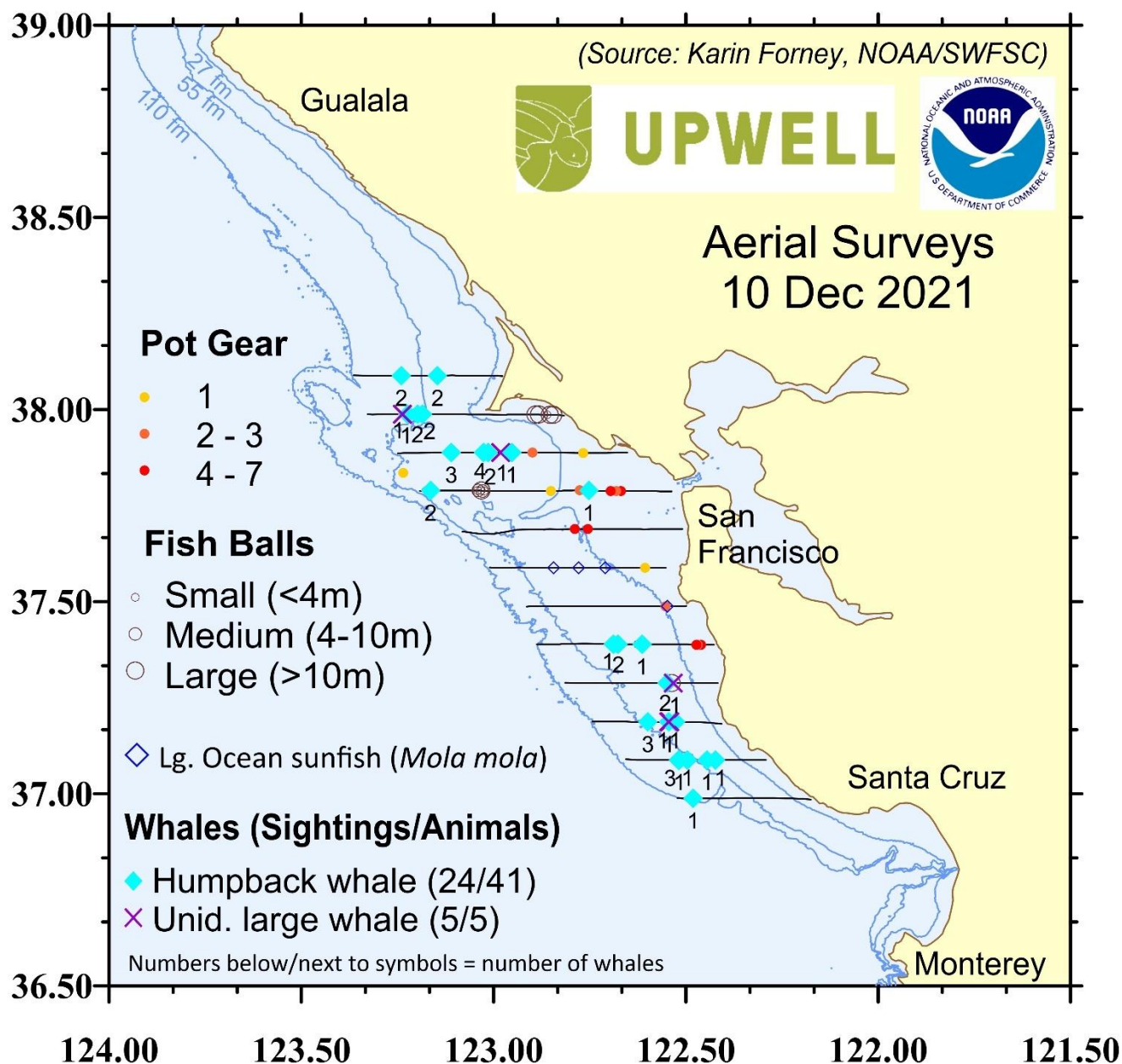


Figure 1. Aerial survey track lines and observations of humpback whales, unidentified whales, large molas (ocean sunfish), fish balls (anchovies), and unidentified fishing gear within in Fishing Zones 3 and 4 on December 10, 2021. The number of whales in each sighting is shown below the symbols.

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

- MBWW conducted whale-watching trips in southern Monterey Bay on all 7 days during the week of December 5 - December 11, 2021.
- The average number of humpback whales-per-trip during the last seven days (December 5-11) was 4.9, with a peak of 9 whales observed on a single trip on December 9.
- No blue whales have been observed by MBWW since November 13, when one whale was documented.

#### Cascadia Research/TMMC Small Vessel Surveys (Fishing Zones 3 and 4)

- Additional surveys have been conducted since those shared in the [December 8, 2021 Available Data document](#). Four small vessel surveys conducted on December 10 and 11, 2021 covered a total of 426.7 miles in Fishing Zones 3 and 4 (Table 4). Total number of humpback whales observed per survey date were:

- December 10
  - Robustus, Zone 4 = 9 humpback whales
  - Musculus, Zone 4 = 5 humpback whales
- December 11
  - Current'Sea, Zone 3 = 4 humpback whales
  - Robustus, Zone 3 = 15 humpback whales
  - Current'Sea, Zone 4 = 16 humpback whales
- Humpback whales continued to be sighted in widely distributed areas of Fishing Zones 3 and 4 (Figures 2-3).
- Overall sighting rates of large whales have dropped and for both transect and non-transect legs now averaged 0.2 whales per nautical mile compared to sightings rates that were 0.8-0.9 in September and 0.3 to 0.5 in late October to early December for some of the same areas.
- A higher proportion of juvenile animal compared to adults were seen in the most recent surveys.

**Table 4. Summary of small boat effort survey effort on December 10 and 11, 2021.**

Date	Vessel	Zone	Area	Type	Hrs	NMi	Hump.	UnWh
10-Dec	Robustus	4	MB Area	Non transect	7.1	72	9	1
10-Dec	Musculus	4	MB Area	Non transect	6.9	83.4	5	0
11-Dec	Current'Sea	4	Davenport - Pigeon Point	70 m transect	1.1	17.6	10	4
11-Dec	Current'Sea	4	Pigeon Point - Moss Landing	200 m transect	3.1	51.5	6	0
11-Dec	Current'Sea	4	Pigeon Point - Moss Landing	Non transect	2.7	34.6	0	0
11-Dec	Current'Sea	3	Pigeon Point - Half Moon Bay	70 m transect	0.9	21.2	2	5
11-Dec	Current'Sea	3	Half Moon Bay - Pigeon Point	200 m transect	1.9	15.5	0	0
11-Dec	Current'Sea	3	Half Moon Bay - Pigeon Point	Non transect	1.45	10.3	2	0
11-Dec	Robustus	3	Half Moon Bay - Point Reyes	70 m transect	2.3	28.4	1	0
11-Dec	Robustus	3	Point Reyes - Half Moon Bay	200 m transect	3	42.1	13	0
11-Dec	Robustus	3	Point Reyes - Half Moon Bay	Off Effort	2.8	50.1	1	0



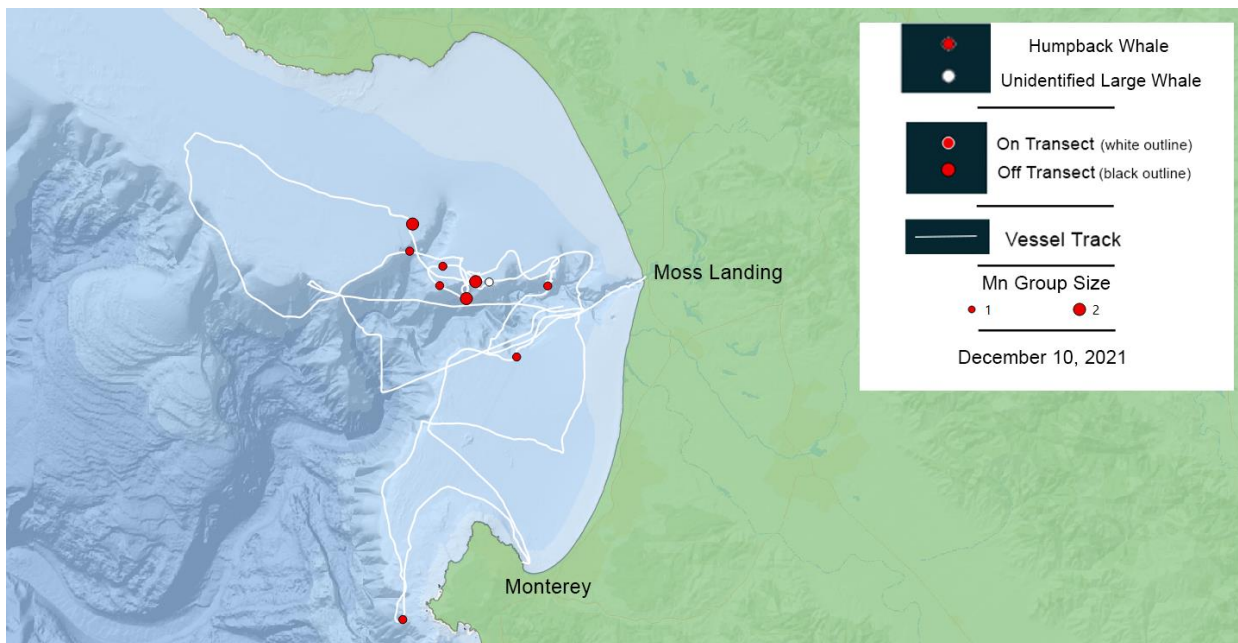


Figure 2. Tracks and sightings from survey conducted on December 10, 2021 by two Cascadia RHIBs.

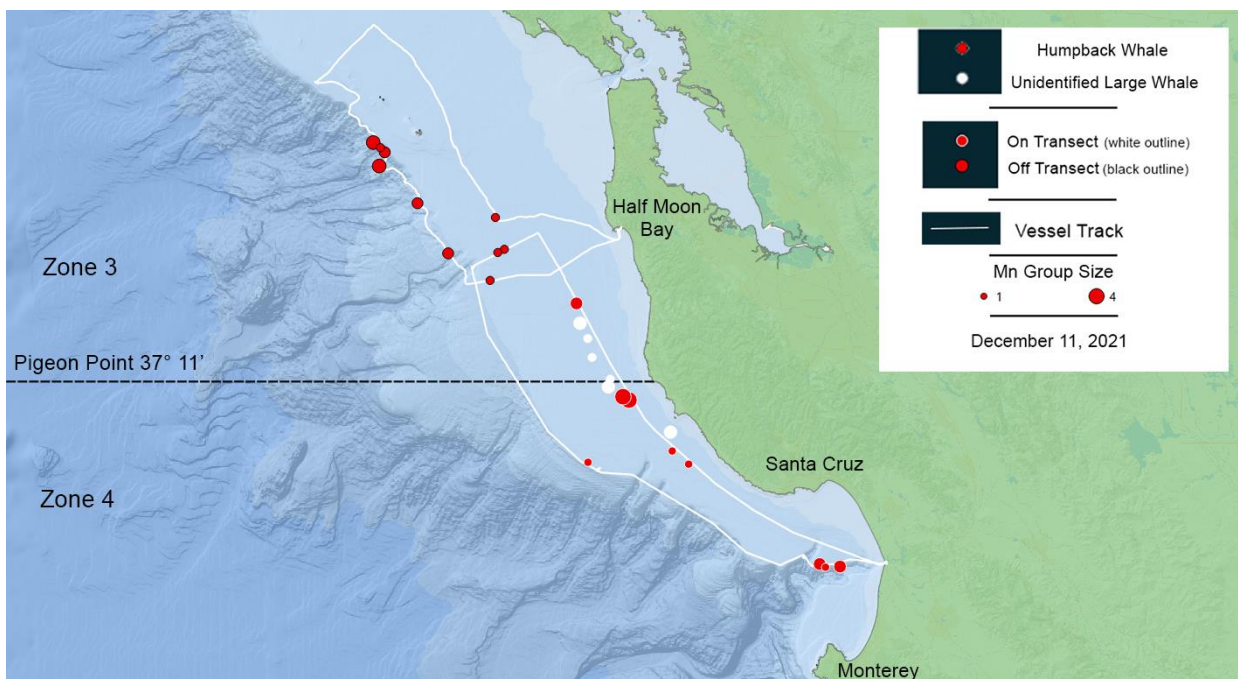


Figure 3. Tracks and sightings from surveys conducted on 11 December 2021 in Zone 3 and 4 by both Current'Sea (MLS) and Cascadia RHIB.

### Leatherback Sea Turtle Telemetry

The adult male leatherback turtle that was captured approximately 3 miles northwest of Pillar Point (Half Moon Bay, CA) and tagged with a satellite-linked transmitter on October 16, 2021 is outside the US EEZ and approximately 345 miles southwest of Pt. Conception, CA. The turtle continues to move in a southwest direction.

### 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: CDFW*

CDFW's effectiveness evaluation for the management actions specified in §132.8(e) will be provided in the December 13, 2021 Initial Assessment.

### **For equally effective measures, total economic impact to the fleet: §132.8(d)(4)**

*Data provided by: CDFW*

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 provide this evaluation in the December 13, 2021 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, NOAA SWFSC), NOAA Environmental Research Division, Cascadia Research*

#### **Monterey Bay Whale Watch – Fishing Zone 4**

- The semi-monthly average number of whales-per-half-day-trip during the first half of December is lower than in late November, but above average for this time of year compared to the overall 2003-2020 record (Figure 4).
- The absence of blue whales during the last several weeks is largely consistent with their historical seasonal migration patterns during late summer and fall (Figure 5).

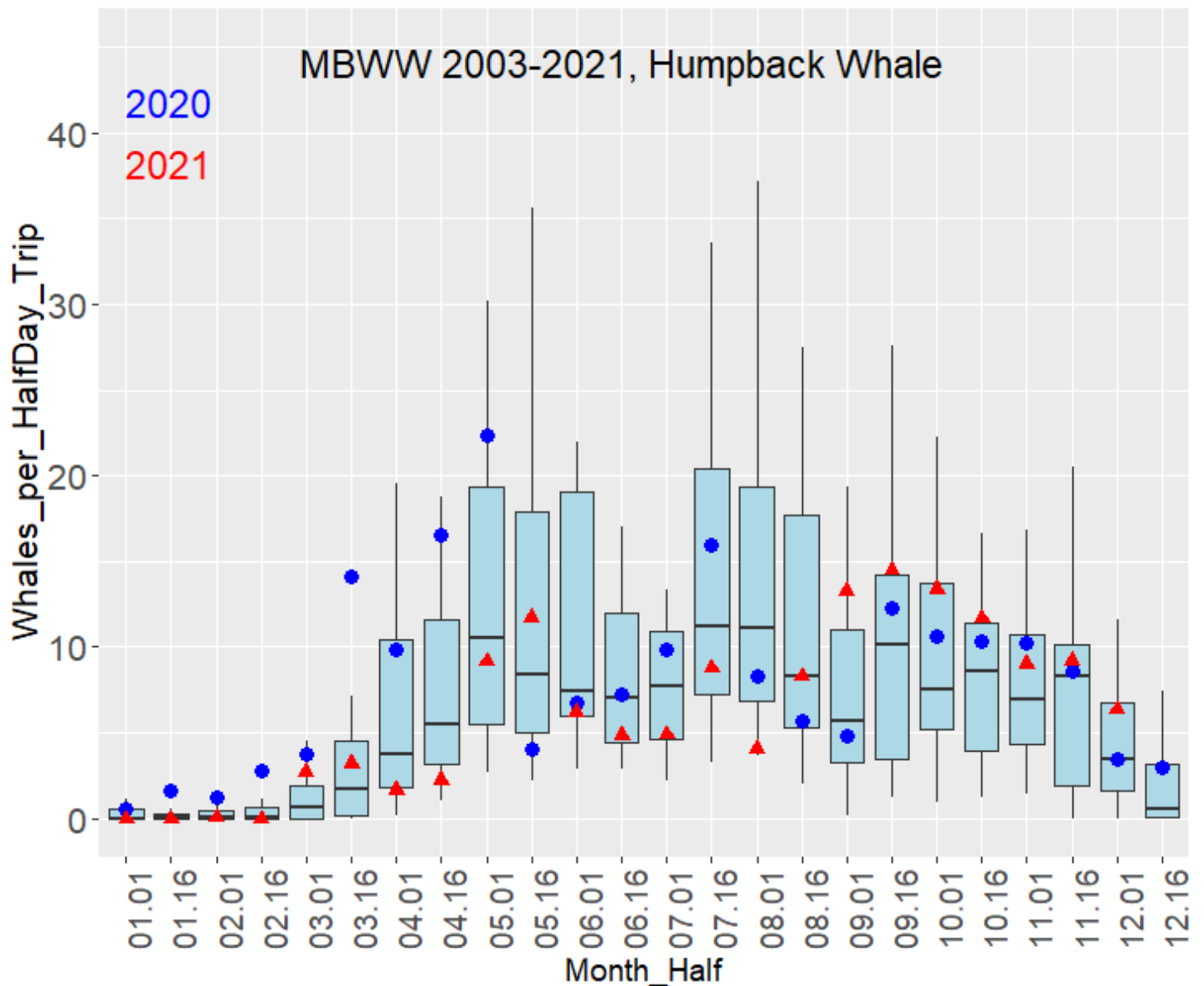


Figure 4. Historical Monterey Bay Whale Watch data for 2003-2021, summarizing the average and variation in the number of humpback whales per half-day trip on a semi-monthly basis (1st- 15th, 16th- end of month). This boxplot follows standard statistical practice in that the black horizontal line is the 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 2020 (large blue dots) and 2021 (red triangles) and are provided for reference, placing recent whale numbers in a historical context.



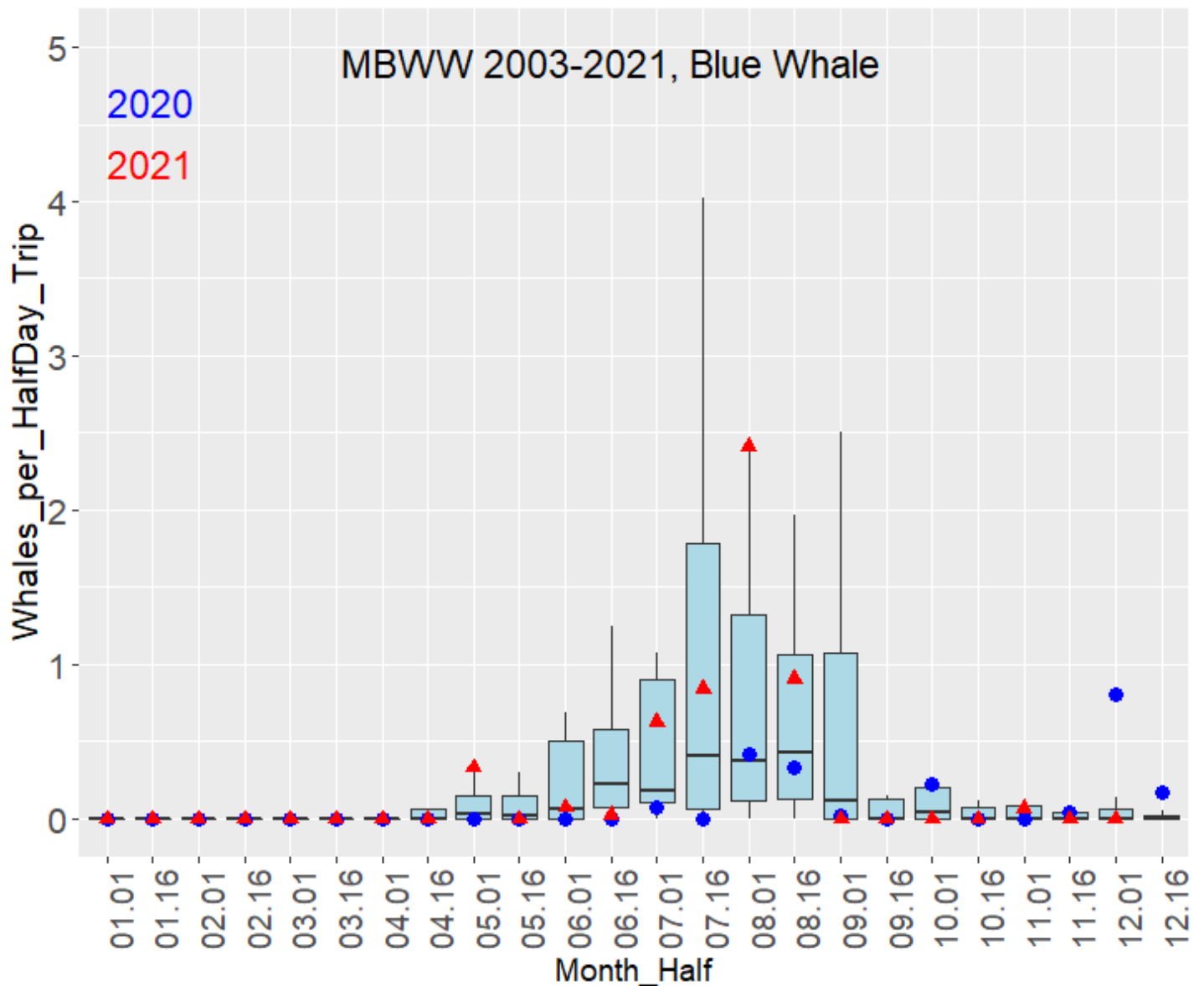


Figure 5. Historical Monterey Bay Whale Watch data for 2003-2021, summarizing the average and variation in the number of blue whales per half-day trip on a semi-monthly basis (1st- 15th, 16th- end of month). This boxplot follows standard statistical practice in that the black horizontal line is the average 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 2020 (large blue dots) and 2021 (red triangles) and are provided for reference, placing recent whale numbers in a historical context.

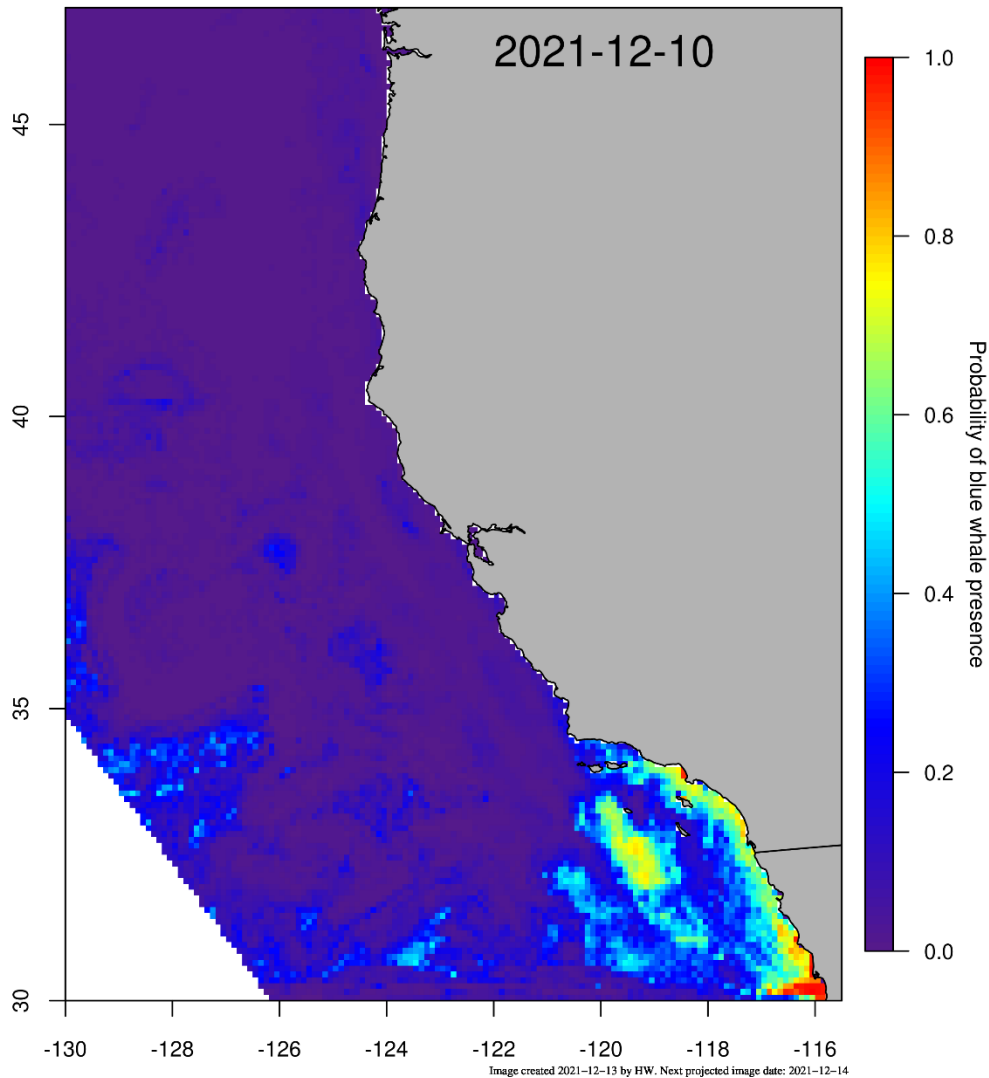
#### WhaleWatch 2.0 (All Fishing Zones)

Blue whale habitat predictions for December 10, 2021 (Figure 6) indicate low habitat suitability in Fishing Zones 1-5, with some suitable habitat remaining within the Southern California Bight (Fishing Zone 6).

# WhaleWatch 2.0



Experimental Product



WhaleWatch 2.0 [or future product name] 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. ([link to website](#))

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Figure 6. WhaleWatch 2.0 map for December 10, 2021. [View a current map.](#)

## Breeding Ground Reports

Sightings and identification of humpback whales on wintering grounds in Mexico from late October to December continue to confirm many humpback whales from California have already migrated south.

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

Data provided by: CDFW

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

## Marine Landings Data System (All Fishing Zones)

Fishing Zones 5 and 6 opened under a Fleet Advisory on November 15, 2021 and Fishing Zones 1 and 2 opened under a Fleet Advisory on December 1, 2021. Nearly all of the fishing activity thus far has been in the Northern Management Area, with 96% of harvest from Fishing Zone 1 and over half of the landings made into Crescent City (58.4%) followed by Eureka (28.5%), Trinidad (9.6%), and Fort Bragg (3.5%).

Trends in vessel activity generally track those of landing volume, with 79 vessels making landings into Crescent City, 61 vessels making landings into Eureka, 26 vessels making landings into Fort Bragg, and 15 vessels making landings into Trinidad.

**Table 5. Summary of commercial fleet dynamics information, as of December 10, 2021.**

Metric	Value	Additional Info
Season status	Partially open	Open in Fishing Zones 1-2 and 5-6 under a Fleet Advisory, will open in Fishing Zone 4 under a Depth Restriction on December 16, 2021
Number of daily landings	732	NA
Total volume (pounds)	3,746,835	NA
Total Ex-Vessel Value	17,913,003	NA
Average unit price	\$4.60	NA
Total number of active vessels	181	NA
Maximum potential traps (based on active permits)	265,425	NA

## Bi-Weekly Fishing Activity Reports (All Fishing Zones)

Bi-weekly fishing activity reports are being received and entered; summaries will be made available in January 2022.

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

Data provided by: Karin Forney, NOAA SWFSC and Upwell

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

- Anchovy schools and piscivorous (fish-eating) seabird feeding flocks were observed during the survey, especially in or near the areas where humpback whales were documented. A few of the humpback whales were observed lunge-feeding on near-surface schooling fish.

- No sea nettles (leatherback turtle prey) were observed, and only a few large ocean sunfish (*Mola mola*), a sea nettle predator that often co-occurs with leatherback turtles, were observed during this survey.

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

- Humpback whales continue to feed mostly on fish at a variety of water depths including observed surface feeding though other whales were seen not feeding and either traveling or engaged in reproductive behaviors.

#### Ocean conditions: §132.8(d)(9) \*

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

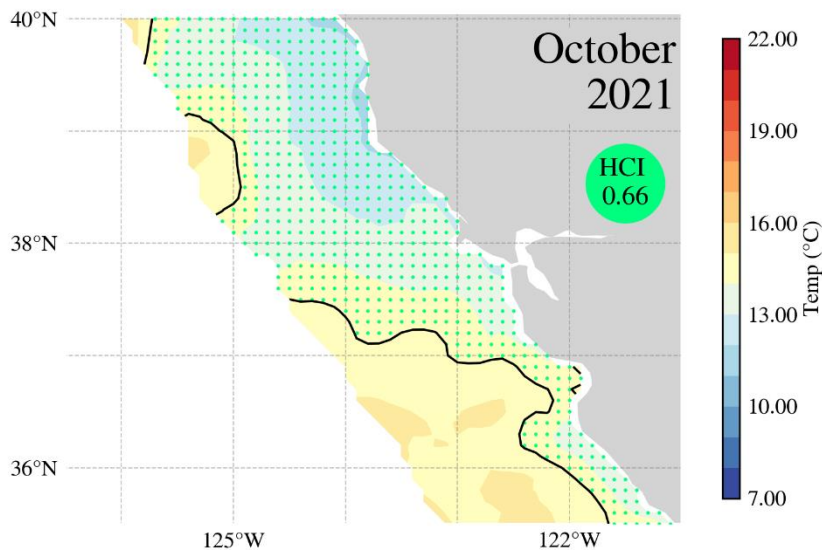
#### El Niño/Southern Oscillation Diagnostic Discussion

As of December 9, 2021, there is a 95% change of La Niña conditions continuing through the Northern Hemisphere winter 2021-22, with a 60% chance of transitioning to ENSO-neutral conditions during spring 2022.

#### Habitat Compression Index

The most recent Habitat Compression Index values are for October 2021 (Figure 7). At that time, there was low compression, with cooler water habitat available between 25 and 40°N.

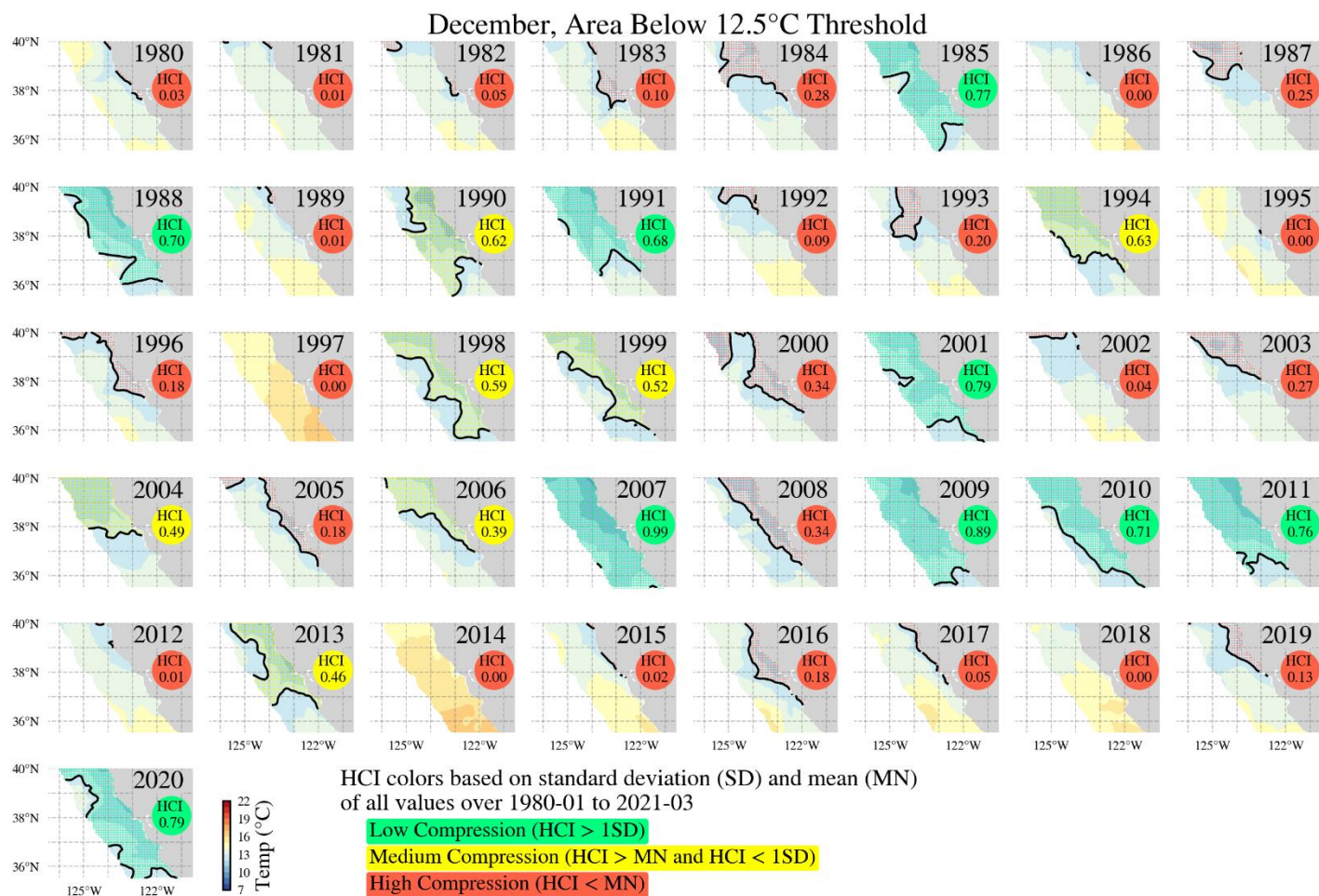
Compression is often variable during the month of December (Figure 8).



HCI color based on standard deviation (SD) and mean (MN) of all values over 1980-01 to 2021-10

Low Compression (HCI > 1SD)

Figure 7. Map of October 2021 sea surface temperature and location of the Habitat Compression Index boundary (thin black line).



**Figure 8. Maps of historical December sea surface temperature and location of the Habitat Compression Index boundary (thin black line) between 1980 and 2020.**

## Large Marine Heatwave Tracker

The NEP21A large marine heatwave began in late April 2021 and as of October 26, 2021 continues to shrink in size and recede from the coast. The latest satellite imagery (Figure 9) shows some coastal warming separate from the marine heatwave, which is typical of the seasonal succession from summertime upwelling to wintertime downwelling.



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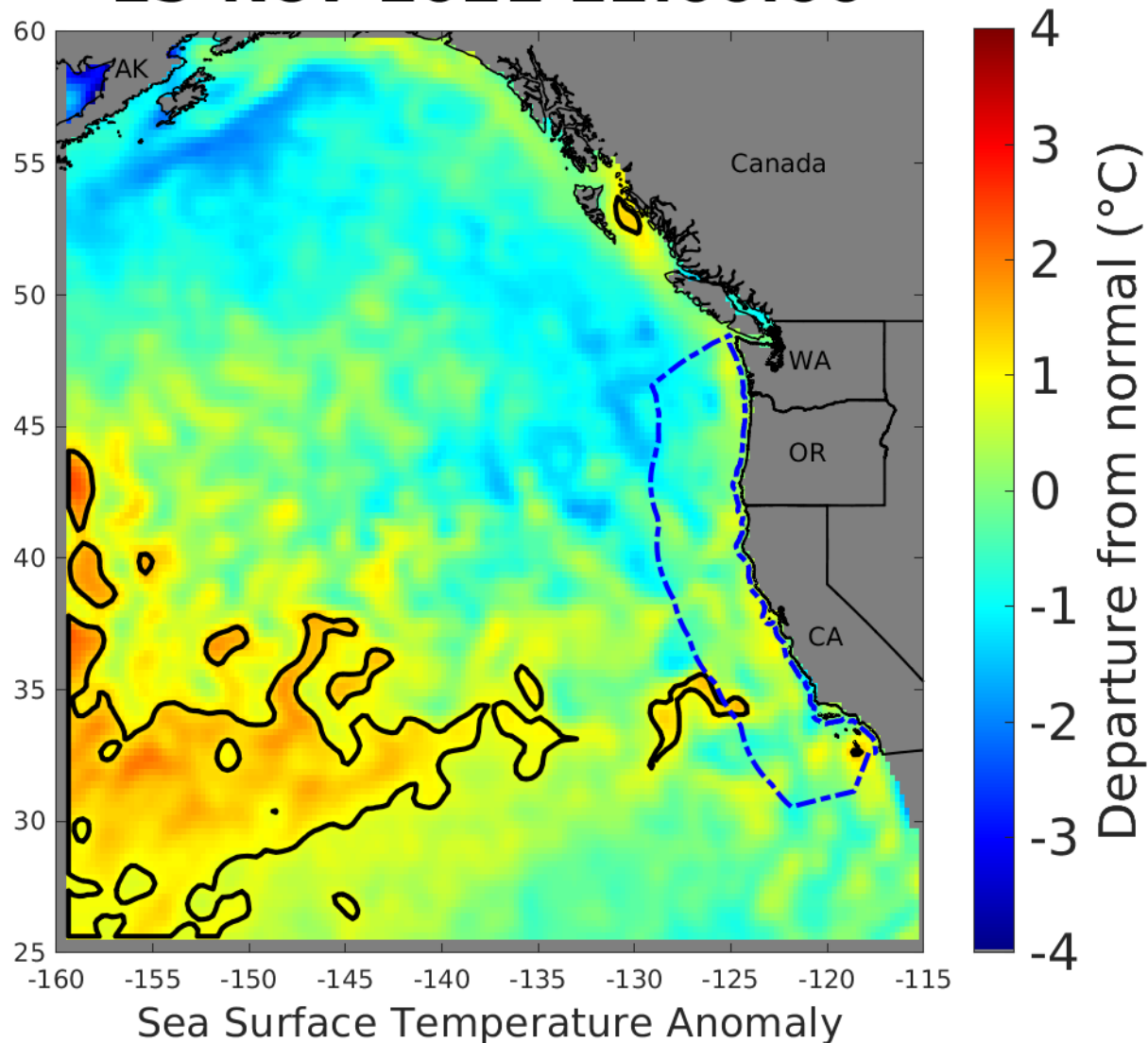


Figure 9. Science-quality (delayed 3-weeks), daily interpolated standardized sea surface temperature anomalies (SSTa) in the California Current ecosystem available for analysis of MHW presence. Dark outline shows the current extent of MHW conditions, as delineated by values of the normalized SST + 1.29 SD from normal. Blue dashed line represents the US West Coast EEZ. SST data from NOAA's Optimum interpolation Sea Surface Temperature analysis (OISST), 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: CDFW*

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 (2021-22) and calendar year (2021) are provided in Table 2 (see above).