# 2020-21 Risk Assessments Available Data for October 23, 2020 Working Group Discussion

# Last updated: October 20, 2020

# TRIGGERS REQUIRING MANAGEMENT ACTION

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

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

# Evaluation of RAMP Triggers (by CDFW)

Total number of Confirmed Entanglements in California Commercial Dungeness Crab Gear:

- During the current Fishing Season: NA
- During the current calendar year: 1 Humpback Whale

Total number of Confirmed Entanglements in Unknown Fishing Gear reported from California:

- During the current Fishing Season: NA
- During the current calendar year: 3

# Summary of 2020 Entanglements (as provided by NMFS)

Total entanglements for calendar year 2020 (January 1 to October 14):

- 16 confirmed (10 humpback whales, 5 gray whales, and 1 sperm whale)
- 9 unconfirmed (3 humpback whales, 4 gray whales, and 2 unidentified whales)

Total entanglements for calendar year 2020 (January 1 to October 14) by species:

- Humpback whales: 10 confirmed entanglements
  - One confirmed humpback whale entanglement involved California commercial Dungeness crab gear; the gear was set in Fishing Zone 3 (Bodega Bay to Point Reyes- 38-45 fathoms) and reported in Fishing Zone 4 on May 15, 2020
- Blue whales: 0 confirmed entanglements
- Leatherback sea turtles: 0 confirmed entanglements

Additional details regarding confirmed Humpback whale entanglements:

- Feb 14, 2020: reported off San Diego (Zone 6), entangled with gillnet

- Feb 28, 2020: reported off Monterey (Zone 4), entangled with unidentified gear (line only) Available Data, October 23, 2020 Working Group Discussion - 1 -

- April 13, 2020: reported off Santa Barbara (Zone 6), entangled with CA spot prawn gear
- April 15, 2020: reported off Orange county (Zone 6), entangled with gillnet
- May 15, 2020: reported off Monterey (Zone 4), entangled with CA commercial Dungeness crab gear (set in Zone 3)
- June 13, 2020: dead stranding in Marin county (Zone 3), entangled with OR commercial Dungeness crab gear
- July 3, 2020: reported off Monterey (Zone 4), entangled with unidentified gear (line only)
- July 30, 2020: reported off Oregon, entangled with unidentified gear (line + buoys)
- Aug 31, 2020: reported off Washington, entangled with unidentified gear (line only)
- October 13, 2020: reported off Monterey (Zone 4), entangled with unidentified gear (line only)

## Section 132.8(c)(2): Marine Life Concentrations

Data provided by: Monterey Bay Whale Watch (compiled by Karin Forney, NOAA Southwest Fisheries Science Center), Scott Benson (NOAA Southwest Fisheries Science Center), Jaime Jahncke (Point Blue Conservation Science), Karen Grimmer (Monterey Bay National Marine Sanctuary), California Department of Fish and Wildlife

# Leatherback Sea Turtle Observations and Satellite Telemetry - Fishing Zone 7

- No aerial surveys were performed and no transmitters were deployed during 2020 due to the COVID-19 pandemic
- Scott Benson received sighting data during June-October 2020 from whale watch operators in Monterey Bay and Gulf of the Farallones. The most recent sighting occurred on 17 October in the Gulf of the Farallones (37° 26.5 N/122° 52.5 W, approximately 70 fathoms). At least 10 sightings of unique individuals were reported in Monterey Bay during June-September 2020. This is a relatively high number of reported sightings, however, it is unknown if it is a consequence of greater leatherback abundance or a result of enhanced outreach efforts to whale watch operators.
- Sea nettles (Leatherback sea turtle prey) are abundant in Monterey Bay. The majority of reported leatherback sightings included ancillary reports of associated dense concentrations of sea nettles. During a half-day field effort in Monterey Bay on 18 October 2020, Scott Benson encountered multiple large aggregations of sea nettles. The sea nettles spanned a range of sizes from small fist-sized individuals to large (>35 cm diameter bell size) mature individuals. Most sea nettles appeared healthy although a few of the larger animals showed signs of senescence.

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- A leatherback that was tagged with a satellite-linked transmitter on 20 September 2019 has continued to report daily. The individual began approaching Half Moon Bay in late July, but returned to deeper waters in early August and remains ~ 200 miles offshore.
- Based on these observations, it seems likely that leatherbacks remain present between Pt.
  Reyes and Monterey Bay; however, it is not possible to estimate how many may be present with the available data.

# Monterey Bay Whale Watch (MBWW) Data - Fishing Zone 4

 Commercial MBWW whale-watching trips have been conducted from Monterey throughout the summer and fall. Karin Forney has standardized these research trips to the same 'whales per half-day-trip' unit used in previous summaries.

# Humpback Whales

- The number of documented humpback whales has been variable during the summer and early fall (Figure 1). The most recent 7-day average is 12 whales per half-day-trip during Oct 11 – 17. The most recent 14-day average is 11 whales during Oct 4 – 17.
- Compared to historical patterns (Figure 2), the most recent whale numbers are aboveaverage.



Figure 1. Standardized number of humpback whale sightings from 15 November 2014 – 17 Oct 2020 for Monterey Bay Whale Watch. 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.



Figure 2. Historical Monterey Bay Whale Watch data for 2003-2020, 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 2019 (red triangles) and 2020 (large blue dots) are provided for reference, placing recent whale numbers in a historical context.

### **Blue Whales**

- The number of documented blue whales has been low (Figure 3). During the most recent 7-day period (Oct 11 17), no blue whales were observed. The most recent sightings were Oct 9 10, and the 14-day average for Oct 4 17 is 0.3 blue whales per half-day trip.
- The most recent blue whale numbers are comparable to historical patterns during the same period (Figure 4).



### Monterey Bay Whale Watch: Blue whales per 1/2-day trip (Nov 15, 2014 - Oct 17, 2020)

Figure 3. Standardized number of blue whale sightings from 15 November 2014 – 17 Oct 2020 for Monterey Bay Whale Watch. 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.



Figure 4. Historical Monterey Bay Whale Watch data for 2003-2020, 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 2019 (red triangles) and 2020 (large blue dots) are provided for reference, placing recent whale numbers in a historical context.

### Point Blue Conservation Science - Fishing Zones 3, 4 and 6

Current observations and additional details are available at https://geo3.pointblue.org/whale-

### map/index.php?nms=mb

### Gulf of the Farallones – Fishing Zone 3

 Observations by trained biologists at the Farallon Islands show 143 Humpback whales were reported through the Spotter/WhaleAlert app over the last thirty days (September 19 to October 18, 2020; Figure 5), and 74 over the past seven days (October 13 to October 18, 2020; Figure 6)

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- 15 Blue whales were reported during the last thirty days (Figure 7) with no sightings in the past 7 days.



Figure 5. 143 Humpback whale sightings in the Gulf of the Farallones from Sept 19 to Oct 18, 2020. Reporting locations are represented by white circles. A given report may represent multiple individuals. Right hand panel shows total counts by species and time period.



Figure 6. 74 Humpback whale sightings in the Gulf of the Farallones from Oct 12 to Oct 18, 2020. Reporting locations are represented by white circles. A given report may represent multiple individuals. Right hand panel shows total counts by species and time period.



Figure 7. 15 Blue whale sightings in the Gulf of the Farallones from Sept 19 to Oct 18, 2020, and zero sightings over the past seven days from Oct 12 to Oct 18, 2020. Reporting locations are represented by white circles. A given report may represent multiple individuals. Right hand panel shows total counts by species and time period.

### Monterey Bay – Fishing Zone 4

- In the Monterey Bay region, 174 Humpback whale sightings were reported through the Spotter/WhaleAlert app over the last thirty days (September 19 to October 18, 2020; Figure 8), and 53 sighted over the past 7 days (October 13 to October 18, 2020; Figure 9).
- Two Blue whales were reported over the last 30 days (Figure 10), with no sightings over the past 7 days.



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Data Results for custom polygon: 126 Humpback Whale Oct 2020 48 Humpback Whale Sep 2020

Last Updated: 2020-08-10 19:50:11.31449

Figure 8. 174 reported Humpback whale sightings in the Monterey Bay area from Sept 19 to Oct 18, 2020. Reporting locations are represented by white circles. A given report may represent multiple individuals, and the same individual may be included in multiple reports. Right hand panel shows total counts by species and time period. Sightings were reported during research surveys by Nancy Black/Monterey Bay Whale Watch and Peggy Stap/Marine Life Studies.



Figure 9. 53 reported Humpback whale sightings in the Monterey Bay area from Oct 12 to Oct 18, 2020. Reporting locations are represented by white circles. A given report may represent multiple individuals, and the same individual may be included in multiple reports.





Data Results for custom polygon: 2 Blue Whale Oct 2020

Last Updated: 2020-08-10 19:50:11.31449

Figure 10. 2 Blue whale sightings were reported in the Monterey Bay area from Sept 19 to Oct 18, 2020, with zero sightings over the past seven days. Reporting locations are represented by white circles. A given report may represent multiple individuals, and the same individual may be included in multiple reports.

### Santa Barbara Channel – Fishing Zone 6

 73 Humpback whales and 61 Blue whales were observed and reported by trained naturalists from Channel Islands National Marine Sanctuary and the National Park Service over the past thirty days (September 19 to October 18, 2020).

## CDFW Aerial Survey – Fishing Zones 2 and 3

- CDFW conducted a nearshore aerial survey using a portion of the NMFS generated zig-zag pattern in the southern portion of Zone 2 and northern portion of Zone 3 on October 19, 2020 (Figure 11). No whales were observed in Zone 2. 7 Humpback Whales and 1 Unidentified Whale were observed in Fishing Zone 3.
- Numerous bait balls were observed over the flight area and were concentrated offshore at the mouth of the Russian River.

### 2020-21 RAMP Surveys



Esri, GEBCO, DeLorme, NaturalVue | Esri, HERE, Garmin, SafeGraph, FAO, METI/NASA, USGS, Bureau of Land Management, EPA, NPS

### Figure 11. Flight path and observations from October 19, 2020 CDFW aerial survey.

# MANAGEMENT CONSIDERATIONS

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

No additional information was shared.

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

CDFW will continue to engage with the fleet regarding this management consideration and provide available information for future Working Group discussions.

### Section 132.8(d)(6): Known historic marine life migration patterns

Data provided by: Monterey Bay Whale Watch (compiled by Karin Forney, NOAA Southwest Fisheries Science Center), Scott Benson (NOAA Southwest Fisheries Science Center)

See pages 2-7.

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

Data provided by: California Department of Fish and Wildlife, in collaboration with commercial Dungeness crab fishermen and California Department of Public Health

## September and October Domoic Acid Testing – All Fishing Zones

- Similar to the 2019-20 season, many sites passed on the first round of domoic acid sampling.
- In addition to the results below (Figure 12), the second round of re-tested samples for Duxbury (Zone 3) fell below the action level. Samples from Crescent City (Zone 1) and Usal (Zone 2) tested below the action level. Samples were collected in Avila and Point Arena and will arrive at the California Department of Public Health lab for testing later this week.
- Results from the first round of quality tests for the Northern Management Area are expected to be available around November 1. Low quality would not result in delays to the Central Management Area.

PORT	AREA	SAMPLE COLLECTION DATE	CRAB TYPE VISCERA	INDIVIDUAL SAMPLE RESULTS (FDA ACTION LEVEL >30 PPM)					: PPM)	AVERAGE LEVEL (Information Only)	PERCENT OF SAMPLES EXCEEDING ACTION LEVEL
Crescent City	George Reef	10/8/2020	Dungeness							Pending	
orescent only	Klamath River	10/8/2020	Dungeness							Pending	
	Lagoons	9/18/2020	Dungeness	6.8	3.1	8.0	<2.5	<2.5	<2.5	3.0	0%
Trinidad	Trinidad Head	9/18/2020	Dungeness	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	Non-Detected	0%
	LP Eureka	9/29/2020	Dungeness	<2.5	<2.5	<2.5	<2.5	5.0	3.7	1.5	0%
Eureka	Eel River	9/29/2020	Dungeness	3.3	4.7	4.6	<2.5	<2.5	<2.5	2.1	0%
Fort Bragg	Usal			Τ	[						
Fort Bragg	Manchester Beach										
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Bedese Bay	Salt Point	9/30/2020	Dungeness	<2.5	<2.5	<2.5	19	<2.5	<2.5	3.2	0%
	Russian River	9/30/2020	Dungeness	<2.5	<2.5	<2.5	12	<2.5	18	5.0	0%
водеда вау	Bodega Head	9/20/2020	Dungeness	<2.5	26	10	13	4.1	<2.5	8.9	0%
	Point Reyes	9/20/2020	Dungeness	<2.5	<2.5	<2.5	<2.5	<2.5	26	4.3	0%
	Duxbury Reef	9/29/2020	Dungeness	46	<2.5	5.6	3.7	2.6	<2.5	9.7	17%
Half Moon Bay/	Duxbury Reef	10/6/2020	Dungeness	4.8	9.2	<2.5	6.8	5.1	9.2	5.9	0%
San Francisco	HMB/Pillar Point	10/5/2020	Dungeness	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	Non-Detected	0%
	Pigeon Point	10/5/2020	Dungeness	<2.5	2.7	<2.5	<2.5	<2.5	<2.5	0.5	0%
	1.9									-10	
	Monterev Bay	9/30/2020	Dungeness	5.1	13	4.6	<2.5	<2.5	8.1	5.1	0%
Monterey	Monterey Bay	9/30/2020	Rock*	9.5	27	NA	NA	NA	NA	18.3	0%
	internoroy buy	0/00/2020	1,000	10.0		1.01	1.01	1.01	101	10.0	070
Morro Bay	Avila Beach	1		T							
mono bay	A da boaten				L	L	L	L			·

### CDPH SUMMARY OF DOMOIC ACID LEVELS IN CRABS

### JULY 1, 2020 - OCTOBER 13, 2020

#### \*Only 2 crabs available

### 1 SET = 6 SAMPLES

Figure 12. Domoic acid testing results for Dungeness and rock crab as of October 13, 2020. Updated documents will be posted at <u>https://www.cdph.ca.gov/Programs/CEH/DFDCS/Pages/FDBPrograms/FoodSafetyProgram/DomoicAcid.aspx</u>.

Section 132.8(d)(8): Known distribution and abundance of key forage Data provided by: California Current Integrated Ecosystem Assessment

 Prey abundance information for central California (krill, young-of-the-year anchovy, adult anchovy) is available at <u>https://oceanview.pfeg.noaa.gov/whale\_indices/</u>. Most recent values are from January 2019.

### Section 132.8(d)(9): Ocean conditions

Data provided by: California Current Integrated Ecosystem Assessment

 Oceanographic indicators are available at <a href="https://oceanview.pfeg.noaa.gov/whale\_indices/">https://oceanview.pfeg.noaa.gov/whale\_indices/</a>. Most recent values are from January 2020 (mean North Pacific High), February 2020 (Habitat Compression Index), May 2020 (Oceanic Nino Index), and July 2020 (Upwelling Index, 39°).

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

Data provided by: NA

## CDFW will provide Impact Score Calculations once the proposed RAMP regs are effective.

Section 132.8(d)(11): Actionable Species migration into or out of Fishing Grounds and across Fishing Zones Data provided by: Monterey Bay Whale Watch (compiled by Karin Forney, NOAA Southwest Fisheries Science Center), Scott Benson (NOAA Southwest Fisheries Science Center)

See pages 2-12.

# Risk Assessment and Mitigation Program Data Sources Last Updated: October 2020

This document provides an overview of key data sources frequently considered by the California Department of Fish and Wildlife (CDFW) and California Dungeness Crab Fishing Gear Working Group (Working Group) when assessing marine life entanglement risk and appropriate management actions under the Risk Assessment and Mitigation Program (Section 132.8, Title 14, California Code of Regulations (CCR)). Sources used to evaluate whether risk is elevated (i.e. triggers under Section 132.8(c)) are discussed first, followed by other available data which may inform assessment of management considerations under Section 132.8(d).

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

# National Marine Fisheries Service (NMFS) Reports

In close coordination with members of the West Coast Large Whale Entanglement Response Network, NMFS staff provide summaries of large whale and leatherback sea turtle entanglements that are reported to NMFS, along with any specific details or documentation from individual entanglement cases needed to support RAMP discussions. Summaries are typically provided for the current fishing season and calendar year, however data from previous years may also be shared to provide historical context (see Appendix 1 of the <u>April 7, 2020 Data</u> <u>Compilation</u> for an example).

Information provided may relate to both confirmed and unconfirmed reports. Confirmed reports are those reports which meet one or more of the following criteria (from Saez et al 2020):

- Photo or video of gear on the entangled animal
- Direct visual observation by NOAA staff
- Reported by a trusted source (trained or professional reporting party)
- Reporting source was interviewed by an experienced member of the large whale entanglement response network or NMFS expert, and the information provided is detailed and specific enough to confirm the entanglement
- Multiple sources provided reports with detailed descriptions of the animal and entanglement

Confirmed reports often, but not always, include sufficient information for NMFS to positively identify the species entangled; if not, these are categorized as "unidentified whale." Depending on the type of information available about the entangling material, NMFS may attribute the entanglement to a specific fishery (e.g. California commercial Dungeness crab), a general category (e.g. gillnet), or categorize it as "unidentified" (e.g. dark colored rope). Pursuant to Section 132.8(a)(4) and Section 132.8(c)(1)(A), Confirmed Entanglements will be evaluated separately depending on whether NOAA confirms them in California commercial Dungeness

crab gear or in Unknown Fishing Gear. For the purposes of evaluating elevated risk and need for management action under the RAMP, CDFW will not consider Confirmed Entanglements which NMFS attributes to other fisheries or non-fishery origins.

# Section 132.8(c)(2) Marine Life Concentrations

Marine Life Concentrations will be evaluated at the Fishing Zone level (see Figure 1). While additional types of surveys or telemetry monitoring may be developed or approved, and this should not be a considered a comprehensive list of all potentially available data, the following are sources which have been used historically by CDFW and the Working Group and will continue to be considered by CDFW under this Section.



Figure 1. RAMP Fishing Zones. Map showing latitudinal boundaries of each Fishing Zone, as defined in Section 132.8(a)(7). All Fishing Zones extend to 200 nautical miles offshore.

### Aerial Surveys: Line Transect, Reconnaissance

Multiple aerial survey methods are used to inform assessment of marine life entanglement risk. Each method has distinct caveats, and is therefore summarized separately.

### Line Transect

To date, line transects have been used by Working Group Advisors from the National Marine Fisheries Service Southwest Fisheries Science Center. The methodology is based on a wellestablished sampling technique known as distance sampling. All objects of interest (e.g. large whales, leatherback sea turtles, trap buoys) which can be viewed from the plane are counted, as is the location from which the observation is made (e.g. side window, belly window). The angle of each observation is recorded, which is paired with the height of the plane to calculate the distance between the plane and the object. Based on the frequency of sighting a particular object (e.g. Humpback whale) at a given distance, after correcting for group size and sea conditions, the effective strip width is calculated. By summing the effective strip widths, compared to the total area surveyed, the number of observed objects can be used to estimate the total number of objects within the surveyed area. Observations and transect lines are also plotted to assess spatial distribution of the observations and assess overlap (Figures 2-4).

One key assumption of distance sampling is that transect lines proportionally sample available habitat. Surveys are flown along lines perpendicular to the coast or in a zig-zag pattern between two depth contours, to ensure even sampling across all depth ranges.

Due to the importance of being able to detect and accurately measure distances to objects, surveys are only flown during calm sea states and low wind conditions.

The primary targets of these surveys are whales, Leatherback sea turtles, and available forage (bait balls, jelly blooms, etc). If sufficient observers are present, trap gear is also recorded. Due to the speed and altitude at which the plane is flying, buoy configurations or markings which might identify the gear as belonging to a particular fishery cannot always be documented. Therefore, neither the observed or estimated total number of traps should be interpreted as reflecting the total amount of commercial Dungeness crab gear.



Figure 2. Example aerial survey using line transects, focused on leatherback sea turtles.



Figure 3. Example aerial survey plot showing line transects focused on whales, trap gear, and bait balls.



Figure 4. Example aerial survey plot showing zig-zag transect method.

### Reconnaissance

Reconnaissance flights have been used by CDFW, Lighthawk, and the US Coast Guard. Flights may utilize line transects, zig-zag transects, or follow specified depth contours (e.g. flying the 30 fathom contour north to south and the 50 fathom contour south to north). In general, regardless of the transect design, observations are not used to estimate total numbers. Additionally, trap gear abundance and distribution is typically qualitative, rather than the counts recorded during line transect surveys. If flights are conducted during poor weather conditions, observations of large whales may be qualitative as well, and a map showing locations of observed animals may not be produced.

Cascadia Research Group Vessel Surveys [in development]

### Satellite Telemetry

In contrast to large whales, leatherback turtles are rare and cryptic. Due to their low profile, leatherbacks are very difficult to encounter from a ship unless the sea state is unusually calm. Aerial platforms provide a better means for finding leatherbacks but even this method has its limitations because the effective strip half-width is only about 260 meters on each side of the aircraft, therefore, satellite telemetry is a superior means for obtaining information about the presence of leatherback turtles. Furthermore, unlike vessel or aerial survey observations, which provide a snapshot of animal distributions at a given time, satellite telemetry also allows for long-term tracking of individual animals. Within the context of RAMP, satellite telemetry has focused on tracking Pacific Leatherback Sea Turtles. Aerial surveys are used to locate Pacific Leatherback Sea Turtles foraging off central California during the summer and early fall, and small vessels are used to approach and capture the animal to directly attach a transmitter to the carapace (or shell). The transmitter reports the animal's location at specified intervals until the attachment or batteries fail. Movement patterns and current position can be viewed from a web interface (see Figure 5), allowing continuous near real-time assessment of the animal's position and any directional movement patterns (e.g. migration in or out of the foraging grounds).

As the number of concurrently tagged animals increases, there is increased confidence observations are representative of the overall patterns for the population foraging off California during the summer and fall months. Leatherback turtles return to their western Pacific nesting beaches every 3-5 years. Those that do not engage in trans-Pacific movements return to California foraging grounds during the spring and early summer months. Tags that persist until the spring and early summer can provide an indication of when Pacific Leatherback Sea Turtles are likely to return to Dungeness crab fishing grounds.



Figure 5. Fastlock GPS positions for tagged leatherback sea turtle from October 6 to December 2, 2019.

### Monterey Bay Whale Watch

Sightings on commercial whale watching trips and research surveys by Nancy Black are reported on a publicly available website:

<u>http://www.montereybaywhalewatch.com/slstcurr.htm</u>. Karin Forney (National Marine Fisheries Service Southwest Fisheries Science Center) compiles new postings into a database which contains reported sightings from 2003 to present. Given the restrictions in place due to COVID-19, and the suspension of commercial whale watching trips, sightings from researchonly trips conducted by the same organization were standardized to the same half-day effort unit used previously to ensure the data were comparable.

One type of plot (see Figure 6) shows a time series of daily sightings (blue bars), standardized to half-day trips. The figure includes the 7-day running average (red line) to make it easier to discern patterns. Green lines are added on November 15<sup>th</sup> of each year (the typical start date of the commercial Dungeness crab season), and x-axis tick marks are at one-month intervals. Plots are prepared for each large whale species (humpback, blue, and gray). Plots may be re-scaled to include only more recent data to make it easier to identify trends (see Figure 7).



Monterey Bay Whale Watch: Humpback whales per 1/2-day trip (Nov 15, 2014 - May 3, 2020)

Figure 6. Example plot of Monterey Bay Whale Watch data for humpback whales, expanded time series.



Monterey Bay Whale Watch: Humpback whales per 1/2-day trip

Figure 7. Example plot of Monterey Bay Whale Watch data for humpback whales, shorter time series.

Another type of plot (Figure 8) presents bi-monthly  $(1^{st} - 15^{th}, 15^{th})$  end of the month) averages of sightings from 2003 to present. The boxplots are formatted according to standard statistical practice; the horizontal black line is the average number of whales, the blue box shows the 24<sup>th</sup> - 75<sup>th</sup> percentiles (i.e. half of all past averages fall within the box), and outliers are shown as black dots. Average values for more recent years may be overlaid on top of the boxplots to show them in historical context. Plots are prepared separately for each large whale species.



Figure 8. Historical boxplots and recent bi-monthly averages for MBWW data.

Point Blue Conservation Science Whale Observations and Mapping Tool In the Gulf of the Farallones (north-central CA), whale observations are made by trained biologists from <u>Point Blue Conservation Science</u> stationed on the Farallon Islands. In Monterey Bay (central CA), whale observations are made by trained naturalists and researchers from <u>Monterey Bay Whale Watch</u> and <u>Marine Life Studies</u>. In the Channel Islands (southern CA), whale observations are made by the <u>Channel Islands Naturalist Corp</u>, a joint program between Channel Islands National Park and Channel Islands National Marine Sanctuary that represents the sanctuary and park on board local whale watch vessels.

In all cases, whale sightings are entered using a mobile application that records the whale species and count, time and GPS location of the observation. The record is stored in the mobile device until there is access to a phone network. Once the observation is transmitted, it takes about two hours for Point Blue Conservation Science to harvest the data and update the map (<u>https://geo3.pointblue.org/whale-map/index.php</u>). Once on the mapping tool, observations can be filtered and summarized by location, species and time period.

Data compilations typically include a map displaying recent sightings for key whale species (humpback whales and blue whales), over either the last 7 day or 30 day period (Figure 9). Each white dot represents a single report, which may include sightings of multiple individuals. In the online data portal, clicking on one of these dots will display additional information (e.g. observation date and number of individuals by species).



Figure 9. Screenshot of the Point Blue Conservation Science Data Portal, showing Humpback Whale observations for Monterey Bay.

Sightings from all three areas can be used as a proxy for humpback whale migration trends and distribution patterns (e.g. onshore/offshore). The systematic nature of the counts for the Farallon and Channel Islands means observations can also be used to assess trends in abundance and distribution. In Monterey Bay, the same individual may be counted multiple times by different whale watch companies, or the same company on multiple days.

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

### CDFW Databases: Landing Receipts and Permitting Information

All commercial fishing activity must be documented on a landing receipt, which must be submitted electronically through Pacific States Marine Fisheries Commission's E-Tix platform within 3 business days. Data is transferred twice per day to CDFW's Marine Landings Data System, where it is available to CDFW staff for extraction and analysis.

Error-checking procedures are implemented throughout the fishing season, however there may be delays between identification and correction of errors. All landings data is preliminary until official publication of the annual CDFW commercial landing report the following year.

CDFW typically summarizes data at the weekly level (starting with the first day the season was open). In light of the delays between the landing date and data availability, and to avoid presenting incomplete data, summaries do not include information from partial weeks. This means data from up to two weeks prior to data extraction will be withheld.

For the purpose of spatial analyses regarding deployed gear and harvest, CDFW staff have identified the CDFW fishing blocks comprising each Fishing Zone shown (see Figure 10). Fishing block maps are available at <a href="https://wildlife.ca.gov/Fishing/Commercial/Landing-Resources">https://wildlife.ca.gov/Fishing/Commercial/Landing-Resources</a>.

Assessing the amount of deployed trap gear (i.e. vertical lines), and changes over time, is a key component of determining entanglement risk. Prior to the 2020-21 fishing season, there were no mandatory reporting requirements allowing CDFW to directly determine this value. As an interim approach, permitting information from CDFW's Automatic License Data System (which provides the trap allotment for each permitted Dungeness crab vessel) was paired with MLDS data (which provides the activity for a given vessel). By summing the trap allotments for all vessels making a landing during the specified time period, the number of deployed traps can be estimated.

There are several limitations of this approach. Overestimation may occur if a vessel does not utilize their full trap allocation. Underestimation may occur if a vessel has traps deployed but does not make a landing during that time period or if a vessel number was incorrectly reported on a landing receipt (preventing assignment of the vessel's trap allocation). Incorrectly reported catch locations (blocks) will also generate discrepancies. However, this type of analysis will continue to be generated for comparison with information gathered from new mandatory reporting requirements.



Figure 10. Map showing assignment of CDFW Fishing Blocks to RAMP Fishing Zones.

## Mandatory Bi-Weekly Reporting

Section 132.8(g)(1) requires all vessels participating in the California commercial Dungeness crab fishery to submit electronic reports on or before the first and 16<sup>th</sup> day of each month. The reports include the Dungeness crab vessel permit number, current Fishing Zone, depth range, and number of traps deployed at the time of reporting. CDFW staff review and compile these reports to produce summary tables, charts, and figures.

## California Coast Crab Association Port Surveys

In early March 2020, the California Coast Crab Association began conducting biweekly port surveys of active commercial Dungeness crab vessels and deployed trap gear to generate real-

time estimates of fishing activity and inform the Fishing Dynamics factor. Information is collected by contacting a statewide network of Port Liaisons. The number of vessels actively crabbing in each port (Brookings, Crescent City, Trinidad, Eureka, Shelter Cove, Fort Bragg, Bodega Bay, San Francisco, Half Moon Bay, Santa Cruz, Moss Landing, Monterey, Avila, and Morro Bay) is collected, as well as the number of crab pots deployed by each crabbing vessel. Port Liaisons verify data with individual Captains and vessel owners.

Actively fishing vessels and Port Liaisons are queried regarding anticipated crabbing activity for the upcoming 15-30 day period.

Data is summarized in a chart showing the number of active vessels and number of actively fished traps reported by port, totals north and south of Gualala Point (i.e. Northern Management Area and Central Management Area), and statewide totals. Both current (i.e. on day surveyed) and future estimates are presented.

### Electronic Monitoring

Section 132.8(g)(2)(A) requires all vessels operating under a depth constraint or using Alternative Gear must have an operational electronic monitoring system. Section 132.8(g)(2)(B) expands the electronic monitoring requirement to all vessels participating in the commercial Dungeness crab fishery beginning with the 2023-24 season. While specific devices or manufacturers are not identified, the system must meet requirements for ping rate, data collection, and data retention.

### Solar Loggers

Through a grant from the Ocean Protection Council, electronic monitoring devices have been installed on multiple commercial fishing and whale watch vessels. These solar-powered instruments, known as "solar loggers", automatically collect positional information every few seconds. Data is then uploaded via cellphone networks to Pelagic Data Systems, which aggregates data to produce a variety of map-based summaries.

Review of solar logger data by fishery participants has informed development of filters which enable specific portions of each vessel track to be classified as either transiting or fishing activity (see Figure 11), and to distinguish between fishing for Dungeness crab or other species.



Figure 11. Example map showing transiting and fishing activity for vessels based in Half Moon Bay.

Vessel position information is presented in two main forms: track lines or cumulative time within specified cells. The cumulative time analyses allow assessment of overlap between fishing effort (i.e. time spent fishing for Dungeness crab; see Figure 12) and large whale presence (inferred by the total time spent in the area by whale watch vessels).



Figure 12. Example map showing estimated fishing effort (in hours) for vessels based in Half Moon Bay.

Section 132.8(d)(8): Forage distribution and abundance [in development]

Section 132.8(d)(9): Ocean conditions [in development]