California Department of Fish and Wildlife Final Assessment of Marine Life Entanglement Risk and Management Recommendation

Date: April 14, 2021

An initial assessment and preliminary recommendation was developed by California Department of Fish and Wildlife (CDFW) Marine Region staff for consideration by the California Dungeness Crab Fishing Gear Working Group (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 Dungeness crab fishery. The initial assessment was shared with the Working Group on April 12, 2021 and finalized at the conclusion of the Working Group meeting on April 13, 2021 based on discussions with the group.

A. Marine life entanglement risk, based on triggers in subsection (c)

Confirmed Entanglements in California Commercial Dungeness Crab Gear:

- During the current Fishing Season: 0
- During the current calendar year: 0

Confirmed Entanglements in Unknown Fishing Gear reported from California:

- During the current Fishing Season: 1 Humpback whale
- During the current calendar year: 1 Humpback whale
- **Fishing Zone 6:** Each confirmed entanglement during a Fishing Seasons triggers management response under RAMP (c)(1)(B)(1).

Marine Life Concentrations Surveys and/or Satellite Telemetry Observations:

- **Fishing Zone 1, 2, 5 and 6:** No current CDFW approved survey data are available for these Zones, which triggers management response under RAMP (c)(2)(B)(1).

B. Scope of risk based on Management Considerations in subsection (d)

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

- No additional information was made available for this risk assessment

Section 132.8(d)(3): Effectiveness of management measures to reduce entanglement risk

- Given the low relative running average sightings of Humpback whales and no observations during CDFW aerial surveys, a Fleet Advisory remains an effective Management Action due to anticipated declining fishing effort in all Fishing Zones.

Section 132.8(d)(4): Total economic impact to the fleet and fishing communities

- A Fleet Advisory is not anticipated to have significant economic impact on the fleet or fishing communities as it allows for continued fishing opportunity.

Section 132.8(d)(5): Data availability within and across Fishing Zones

- CDFW aerial survey data are available for Zones 3 and 4 and additional Monterey Bay Whale Watch (MBWW) data and Cascadia Research data are available for Fishing Zone 4. Point Blue observation data are available for Zones 3, 4 and 6. The Habitat Compression Index and Whale Watch 2.0 habitat predictions are available for all Zones.

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

- Low presence of Humpback whales across all Fishing Zones is consistent with average historical early spring patterns that show few Humpback whale sightings when whales are still migrating from breeding areas off Mexico and Central America. Surveys in late March at these breeding areas indicated lower numbers of Humpback whales than previously observed during mid-winter surveys, indicating some departures. Three sightings of Humpback whales made prior to the last risk assessment are of known animals from Mexico, indicating a few migration arrivals.

- Absence of Blue whales, with no recent sightings.

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

- Season price negotiations delayed actual start of fishing following the December 23, 2020 statewide opener. Most vessels began setting gear on Monday January 11, 2021.

- Based on CDFW landings data, 356 vessels have participated in the fishery as of April 6, 2021. Week 5 had the highest number of potential traps deployed across all Fishing Zones, with an estimated total of 94,675 traps. Fishing Zone 3 had the highest total, followed by Zone 1. Based on the most recent landings data from week 15, vessel participation and landings volume has decreased from the start of the season. The estimated maximum number of traps is currently 39,550 which is a slight decrease from the last risk assessment when 43,725 traps were estimated. Only Zone 3 has a higher-than-average number of traps deployed based on past seasons. Since 2014 (excluding 2016), the average estimated number of traps deployed in Bodega Bay, San Francisco and Half Moon Bay was 22,945, with a range of 11,075 to 28,900. For the current season, there is an estimated 29,525 pots deployed in Zone 3.

- CDFW required bi-weekly trap reporting estimated 34,444 traps fishing in average minimum depths of 11 – 29 fathoms and an average max depth of 24 – 53 fathoms

across all Fishing Zones. *Note: CDFW has not achieved 100% reporting by all active permits.*

Section 132.8(d)(8): Known distribution and abundance of key forage

- Krill abundance (higher offshore in the outer slope) is also anticipated to be closer to average yearly values while anchovy is still considered to be above average, given the historical record.

- Cool ocean temperatures and strong spring upwelling conditions continue from February to March and the Habitat Compression Index (HCI) indicates a current low compression state. It is anticipated that cool conditions with expanded upwelling habitat will continue with no impact of habitat compression that would otherwise result in increased concentrations and aggregations of whales and forage nearshore.

Section 132.8(d)(9): Ocean conditions

- The prediction of ENSO conditions was last updated on April 8, 2021. La Niña conditions persisted in March with an 80% chance of a transition from this condition to ENSO-neutral during May - July 2021.

- The latest outlook of late winter/spring ocean ecosystem conditions shows that ocean conditions have cooled significantly over this past winter and conditions in spring are trending toward cool and productive conditions. It is anticipated that cool conditions will continue, with expanded upwelling habitat and no signs of habitat compression that would otherwise result in increased concentrations and aggregations of whales and forage nearshore.

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

- Impact score calculation under RAMP began on January 1, 2021. The current impact score is 0.38 for Humpback whales and 0 for Blue whales and Pacific Leatherback sea turtles.

Section 132.8(d)(11): Actionable Species migration into or out of Fishing Grounds and across Fishing Zones

- Based on CDFW aerial survey data, Monterey Bay Whale Watch data, Cascadia Research data and Point Blue Conservation Science observation data, significant migration into the Fishing Grounds has yet to occur.

C. Recommended Management Action from options identified in subsection (e)

Fishing Zones 1-6: CDFW Marine Region staff's recommendation is to maintain a state-wide Fleet Advisory based on the lack of recent RAMP approved survey data for Zones 1, 2, 5 and 6 and due to a confirmed entanglement in unknown gear off Ventura, Zone 6. However, the entanglement was reported from an area that is outside the traditional commercial fishing area for Dungeness crab. Based on CDFW landings data and bi-weekly reporting no vessels are

active in the entanglement reporting location, which was last sighted in an area off Ventura, and fewer than three vessels are active in the entirety of Zone 6. Monterey Bay Whale Watch Data and Cascadia Research vessel surveys for Zone 4 and CDFW aerial survey data for Zones 3 and 4 observed few Actionable Species, which serves as a proxy for anticipated observations in Fishing Zones 1, 2, 5 and 6. Although migration is expected to increase into Zone 4 and adjacent Zones based on known historic migration patterns, available data indicate the bulk of the migration has not begun to arrive at this time. In addition, based on favorable (low risk) oceanographic and forage condition data, cool conditions exist, resulting in low compression of available forage, decreasing the likelihood of co-occurrence of trap gear and whales as they begin to arrive to the Fishing Grounds. This is supported by late March sightings of a few Humpback whales foraging in deep water on krill patches. Ocean and forage conditions do not warrant concern, and fleet participation is low across most port complexes when compared to activity levels from previous years (except ports in Zone 3 (Bodega Bay, San Francisco, and Half Moon Bay)), and continuing to decrease from participation levels in the weeks prior to this risk assessment. Given the above, paired with continued low presence of Humpback whales and Blues whales, risk is low across all management considerations at this time.

The RAMP regulations indicate a Fleet Advisory is warranted if the level of risk is elevated and/or anticipated to increase but more restrictive management actions are not necessary at this time. The Director may issue an advisory notice to the Fleet to employ voluntary efforts and/or measures to reduce the risk of entanglements (i.e., fishing best practices) and to avoid triggering additional management actions. As a result, CDFW encourages the fleet to implement fishing best practices (e.g. minimizing knots, line scope) and to immediately remove all gear when an operator no longer intends to fish. Vessels fishing in Zones 4 and 6 should pay particular attention to the location of set gear and foraging whales and minimize entanglement risk by adhering to the Best Practices Guide.

CDFW Marine Region shared the initial assessment and preliminary management recommendation with Working Group representatives and advisors on April 13, 2021. The Fleet Advisory was broadly supported by the Working Group and no opposition to the preliminary recommendation was voiced during the meeting.

CDFW will continue to monitor all available data to inform the next risk assessment (expected to occur on or around May 3, 2021).

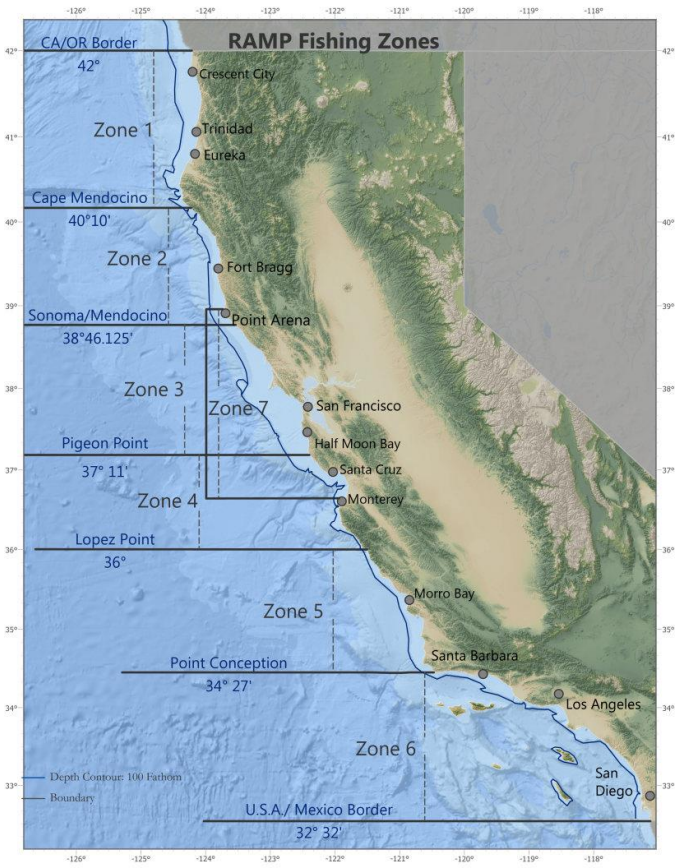

Figure 1. RAMP Fishing Zone boundaries.

California Department of Fish and Wildlife Initial Assessment of Marine Life Entanglement Risk and Preliminary Management Recommendation

Date: April 12, 2021

CDFW will prepare a Final Assessment and Management Recommendation after review of the Working Group Recommendation and any other relevant information.

This assessment and preliminary recommendation have 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 Dungeness crab fishery.

A. Marine life entanglement risk, based on triggers in subsection (c)

Confirmed Entanglements in California Commercial Dungeness Crab Gear:

- During the current Fishing Season: 0
- During the current calendar year: 0

Confirmed Entanglements in Unknown Fishing Gear reported from California:

- During the current Fishing Season: 1 Humpback whale
- During the current calendar year: 1 Humpback whale
- **Fishing Zone 6:** Each confirmed entanglement during a Fishing Seasons triggers management response under RAMP (c)(1)(B)(1).

Marine Life Concentrations Surveys and/or Satellite Telemetry Observations:

- **Fishing Zone 1, 2, 5 and 6:** No current CDFW approved survey data are available for these Zones, which triggers management response under RAMP (c)(2)(B)(1).

B. Scope of risk based on Management Considerations in subsection (d)

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

- No additional information was made available for this risk assessment

Section 132.8(d)(3): Effectiveness of management measures to reduce entanglement risk

- Given the low relative running average sightings of Humpback whales and no

observations during CDFW aerial surveys, a Fleet Advisory remains an effective Management Action due to anticipated declining fishing effort in all Fishing Zones.

Section 132.8(d)(4): Total economic impact to the fleet and fishing communities

- A Fleet Advisory is not anticipated to have significant economic impact on the fleet or fishing communities as it allows for continued fishing opportunity.

Section 132.8(d)(5): Data availability within and across Fishing Zones

- CDFW aerial survey data are available for Zones 3 and 4 and additional Monterey Bay Whale Watch (MBWW) data are available for Fishing Zone 4. Point Blue observation data are available for Zones 3, 4 and 6. The Habitat Compression Index and Whale Watch 2.0 habitat predictions are available for all Zones.

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

- Low presence of Humpback whales across all Fishing Zones is consistent with average historical early spring patterns that show few Humpback whale sightings when whales are still migrating from breeding areas off Mexico and Central America. Surveys in late March at these breeding areas indicated lower numbers of Humpback whales than previously observed during mid-winter surveys, indicating some departures. Three sightings of Humpback whales made prior to the last risk assessment are of known animals from Mexico, indicating a few migration arrivals.

- Absence of Blue whales, with no recent sightings.

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

- Season price negotiations delayed actual start of fishing following the December 23, 2020 statewide opener. Most vessels began setting gear on Monday January 11, 2021.

- Based on CDFW landings data, 356 vessels have participated in the fishery as of April 6, 2021, making at least one landing. Week 5 had the highest number of potential traps deployed across all Fishing Zones, with an estimated total of 94,675 traps. Fishing Zone 3 had the highest total, followed by Zone 1. Based on the most recent landings data from week 15, vessel participation and landings volume has decreased from the start of the season. The estimated maximum number of traps is currently 39,550 which is another decrease from the last risk assessment when 43,725 traps were estimated. Only Zone 3 has a higher-than-average number of traps deployed based on past seasons. Since 2014 (excluding 2016), the average estimated number of traps deployed in Bodega Bay, San Francisco and Half Moon Bay was 22,945, with a range of 11,075 to 28,900. For the current season, there is an estimated 29,525 pots deployed in Zone 3.

- CDFW required bi-weekly trap reporting estimated 34,444 traps fishing in average minimum depths of 11 – 29 fathoms and in average maximum depths of 24 – 53 fathoms across all Fishing Zones. *Note: CDFW has not achieved 100% reporting by all active permits.*

Section 132.8(d)(8): Known distribution and abundance of key forage

- Krill abundance (higher offshore in the outer slope) is also anticipated to be closer to average yearly values while anchovy is still considered to be above average, given the historical record.

- Cool ocean temperatures and strong spring upwelling conditions continue from February to March and the Habitat Compression Index (HCI) indicates a current low compression state. It is anticipated that cool conditions with expanded upwelling habitat will continue with no impact of habitat compression that would otherwise result in increased concentrations and aggregations of whales and forage nearshore.

Section 132.8(d)(9): Ocean conditions

- The prediction of ENSO conditions was last updated on April 8, 2021. La Niña conditions persisted in March with an 80% chance of a transition from this condition to ENSO-neutral during May - July 2021.

- The latest outlook of late winter/spring ocean ecosystem conditions shows that ocean conditions have cooled significantly over this past winter and conditions in spring are trending toward cool and productive conditions. It is anticipated that cool conditions will continue, with expanded upwelling habitat and no signs of habitat compression that would otherwise result in increased concentrations and aggregations of whales and forage nearshore.

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

- Impact score calculation under RAMP began on January 1, 2021. The current impact score is 0.38 for Humpback whales and 0 for Blue whales and Pacific Leatherback sea turtles.

Section 132.8(d)(11): Actionable Species migration into or out of Fishing Grounds and across Fishing Zones

- Based on CDFW aerial survey data, Monterey Bay Whale Watch data, and Point Blue Conservation Science observation data, significant migration into the Fishing Grounds has yet to occur.

C. Recommended Management Action from options identified in subsection (e)

Fishing Zones 1-6: CDFW Marine Region staff's preliminary recommendation is to maintain a state-wide Fleet Advisory based on the lack of recent RAMP approved survey data for Zones 1, 2, 5 and 6 and due to a confirmed entanglement in unknown gear off Ventura, Zone 6. However, the entanglement was reported from an area that is outside the traditional commercial fishing area for Dungeness crab. Based on CDFW landings data and bi-weekly reporting no vessels are active in the entanglement reporting location, which was last sighted in an area off Ventura. Based on the most recent landings and bi-weekly reports fewer than three vessels are active in Zone 6. Based on the Monterey Bay Whale Watch Data for Zone 4 and

CDFW aerial survey data for Zones 3 and 4, few Actionable Species were observed, which serves as a proxy for anticipated observations in Fishing Zones 1, 2, 5 and 6. Although migration is expected to increase into Zone 4 and adjacent Zones based on known historic migration patterns, available data indicate the bulk of the migration has not begun to arrive at this time. In addition, based on favorable (low risk) oceanographic and forage condition data, cool conditions exist, resulting in low compression of available forage, decreasing the likelihood of co-occurrence of trap gear and whales as they begin to arrive to the Fishing Grounds. This is supported by sightings of a few Humpback whales foraging in deep water on krill patches during late March. Ocean and forage conditions do not warrant concern, and fleet participation is low across most port complexes and decreasing when compared to activity levels from previous years. Given the above, paired with continued low presence of Humpback whales and Blues whales, risk is low across all management considerations at this time.

The RAMP regulations indicate a Fleet Advisory is warranted if the level of risk is elevated and/or anticipated to increase but more restrictive management actions are not necessary at this time. The Director may issue an advisory notice to the Fleet to employ voluntary efforts and/or measures to reduce the risk of entanglements (i.e., fishing best practices) and to avoid triggering additional management actions. As a result, CDFW encourages the fleet to implement fishing best practices (e.g. minimizing knots, line scope) and to immediately remove all gear when an operator no longer intends to fish. Vessels fishing in Zones 4 and 6 should pay particular attention to the location of set gear and foraging whales and minimize entanglement risk by adhering to the Best Practices Guide.

CDFW will continue to monitor all available data to inform the next risk assessment (expected to occur on or around May 3, 2021).

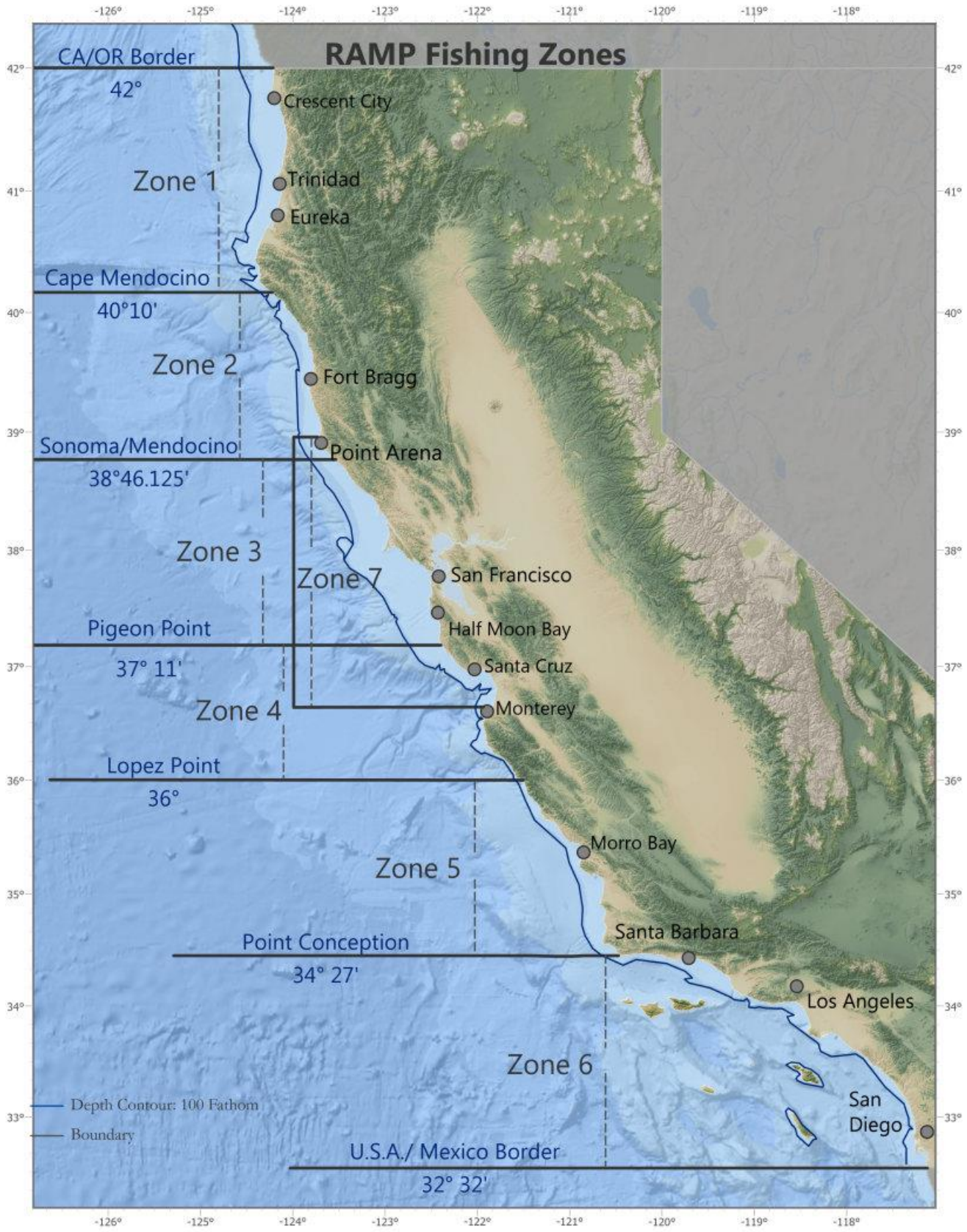

Figure 1. RAMP Fishing Zone boundaries.

2020-21 Risk Assessment Mitigation Program - Available Data

Last updated: April 13, 2021

TRIGGERS REQUIRING MANAGEMENT ACTION

Section 132.8(c)(1): Confirmed Entanglements

Data provided by: Lauren Saez and Dan Lawson, National Marine Fisheries Service (NMFS) and evaluated by the California Department of Fish and Wildlife (CDFW)

Summary of All West Coast Entanglements (by NMFS)

Fishing Zone: *All Zones*

- Humpback whales: 1 confirmed entanglement, unidentified gear (Fishing Zone 6)
- Blue whales: 0 confirmed entanglements
- Leatherback sea turtles: 0 confirmed entanglements

Total entanglements for calendar year 2021: 1 confirmed. *All entanglement reports are subject to further review.*

Supplemental Information:

- On April 3, 2021, a Humpback whale entanglement was reported entangled off Ventura, CA. The reporting party initially reported lines on the back by the dorsal fin and small blue and white buoys on the whale underwater along with a black flag. NOAA could not confirm this observation and only a line is visible in a photo provided near the dorsal fin. As a result, the entanglement was confirmed by NOAA in unidentified gear.

Evaluation of Entanglement Triggers (by CDFW)

Total number of Confirmed Entanglements in California Commercial Dungeness Crab Gear

- During the current Fishing Season: 0
- During the current calendar year: 0

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

- During the current Fishing Season: 1

- During the current calendar year: 1

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

Data provided by: CDFW, Monterey Bay Whale Watch (MBWW) (processed by Karin Forney, NMFS), John Calambokidis (Cascadia Research, SR3, and The Marine Mammal Center)

CDFW Aerial Survey *(Fishing Zones 3 and 4)*

- CDFW staff conducted an aerial survey over Fishing Zones 3 and 4 on April 11, 2021 between Gualala (south of Point Arena) and Point Piños in Monterey Bay. Figure 1 shows the flight path in Fishing Zone 3 and Fishing Zone 4.
- No whales were observed within those fishing zones. Observation conditions south of Half Moon Bay were good, conditions north to Point Arena were marginal in some areas due to wind chop.
- Trap gear was observed throughout the surveyed area.

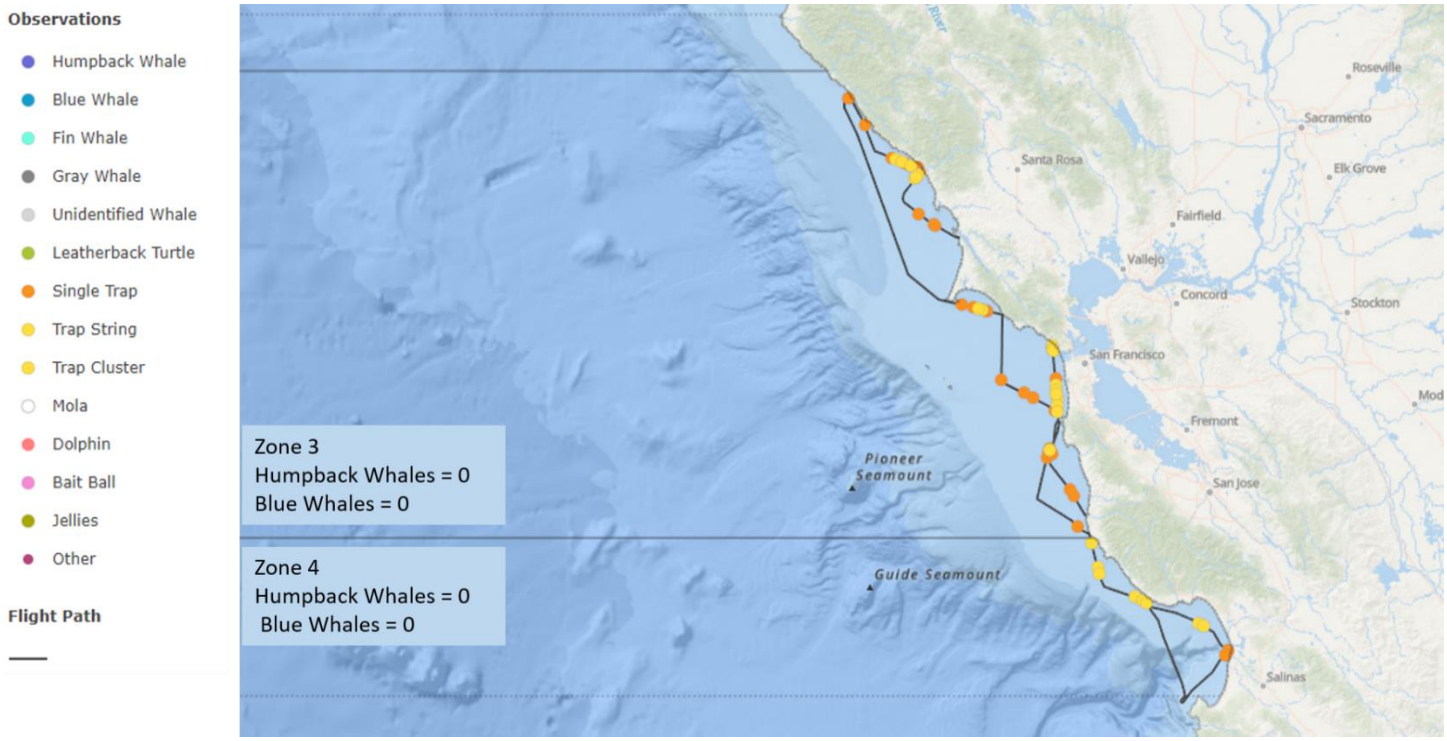

Figure 1. Observations made over flight path conducted during CDFW aerial survey in Fishing Zones 3 on April 11, 2021.

Monterey Bay Whale Watch *(Fishing Zone 4)*

- Monterey Bay Whale Watch (MBWW) was able to conduct trips on 12 of the last 14 days, with a maximum of 10 Humpback whales observed within a single trip on April 5, 2021.

Both the 14-day and 7-day average number of Humpback whales-per-half-day-trip are 1.4 animals (Figure 2).

- No Blue whales have been observed by MBWW since December 24, when a single whale was seen (Figure 3).

Cascadia Research, SR3, and The Marine Mammal Center *(Fishing Zone 4)*

- A vessel-based survey was completed on April 12, 2021 in Monterey Bay. Weather was challenging offshore, but the vessel covered both the 70-m and 200-m contours. Two Humpback whales were observed and confirmed to be the same single animal later in the survey. The animal transited 8-9 miles during the survey period.

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

- Economic analysis currently available is reflected in the landings data. See management consideration (d)(7) for available information on fishing activity to date during the 2020-21 fishing season.

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

Data provided by: Monterey Bay Whale Watch (processed by Karin Forney, NMFS)

Monterey Bay Whale Watch *(Fishing Zone 4)*

- The average of 1.4 whales-per-half-day-trip represents a decrease from 2 weeks ago and is lower than average historical patterns (Figure 2). Based on historical patterns, it is expected that Humpback whale numbers will continue to increase during the coming weeks.
- The absence of Blue whales is consistent with their historical seasonal migration patterns (Figure 3).

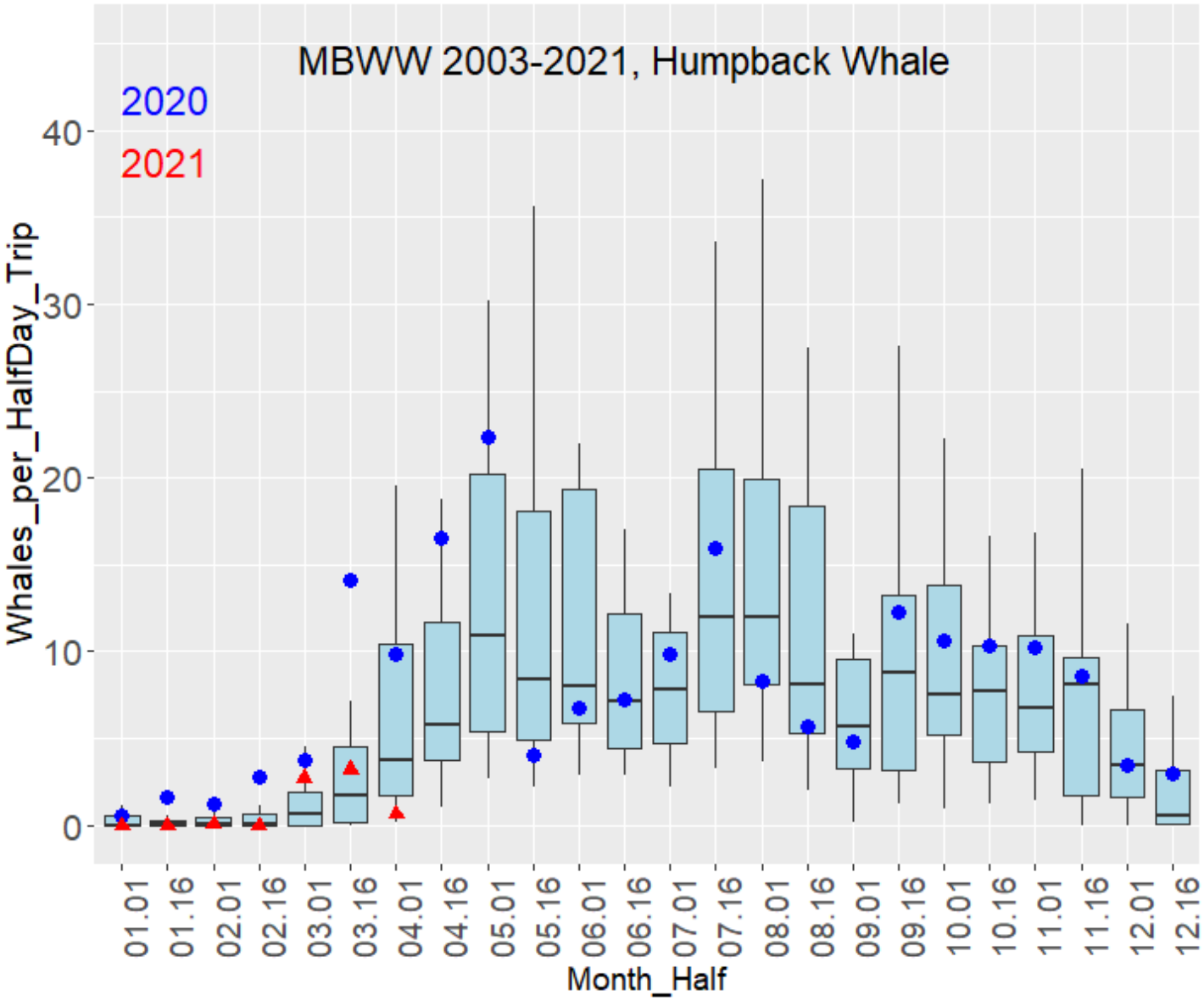

Figure 2. Historical Monterey Bay Whale Watch data for 2003-2021, summarizing the average and variation in the number of Humpback whales per half-day trip on a semi-monthly basis (1st- 15th, 16th- end of month). This boxplot follows standard statistical practice in that the black horizontal line is the 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) are provided for reference, placing recent whale numbers in a historical context.

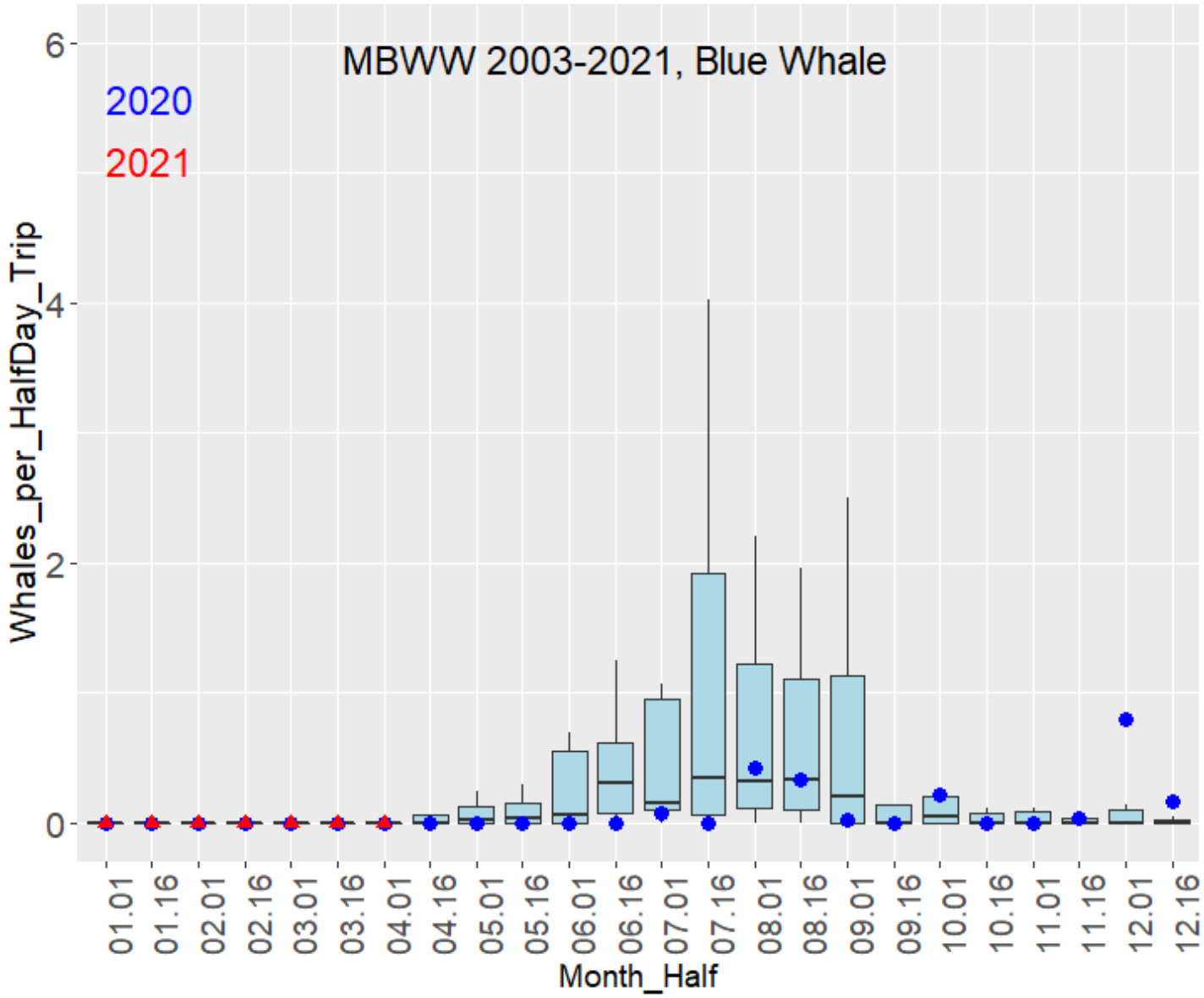

Figure 3. Historical Monterey Bay Whale Watch data for 2003-2021, summarizing the average and variation in the number of Blue whales per half-day trip on a semi-monthly basis (1st- 15th, 16th- end of month). This boxplot follows standard statistical practice in that the black horizontal line is the average 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) are provided for reference, placing recent whale numbers in a historical context.

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

Data provided by: California Department of Fish and Wildlife; Accessed from CDFW's Marine Landings Data System (MLDS) on April 9, 2021, Automatic Licensing Data System (ALDS) on April 7, 2021, Bi-Weekly Reporting Database on April 9, 2021, and PowerBI landings report Database on April 5, 2021. Solar Logger Pilot Project provided by Kathi George (The Marine Mammal Center).

Marine Landings Data System *(All Fishing Zones)*

- The commercial Dungeness crab fishery opened statewide on December 23, 2020. Due to ongoing price negotiations, most vessels did not begin fishing until January 11, 2021.
- As of April 6, 2021, there have been 3,085 daily vessel landings of Dungeness crab with a total volume of 3,415,414 pounds and with a total Ex-Vessel Value of $17,353,385. Average unit price for these landings was $5.73 (excluding receipts with unit price of $0 reported). A total of 356 vessels have made at least one landing during the 2020-21 season.
- Volume of landings (pounds) each week by CDFW Fishing Zones (aggregated CDFW Fishing Blocks used to report catch location) are shown in Figure 4 with 15 complete weeks of landings to summarize from the start date of December 23, 2020 to April 6, 2021. The highest volume originated from Fishing Zone 3.
- Of the 356 vessels, 355 could be tied to a Dungeness crab vessel permit and are organized in the trap tiers as follows and represent a total of 117,125 traps:
    - Tier 1: 45 vessels
    - Tier 2: 44 vessels
    - Tier 3: 43 vessels
    - Tier 4: 39 vessels
    - Tier 5: 36 vessels
    - Tier 6: 97 vessels
    - Tier 7: 51 vessels
- The maximum potential traps, represented by the number of vessels that made at least one landing each week and the overall traps in their vessel permit tier, is summarized each week by CDFW Fishing Zones (Figure 5). Week 5 shows the highest number of aggregated maximum potential traps, estimated at a total of 94,675 traps deployed. Fishing Zone 3 shows the highest proportion of total maximum potential traps, followed by Zone 1. By Week 15, the total maximum potential trap numbers decreased to an estimated 39,550 traps.
- For the past 3 weeks (Weeks 13-15), average weekly price per pound by port complex range between $5.41 and $9.50 each week (Figure 6). There is a demarcation in average price between the two management areas for this time period, with higher average price at the central ports ($6.98-$9.50) and lower average price at the northern ports ($5.41-$6.47).

- Two figures of graphs showing number of vessels (Figure 7) and the maximum potential trap number they represent (Figure 8) between the years of 2014 and 2021 are being provided to compare with the current low Dungeness crab season (2021 panel). This information is being summarized by port complex over five bi-weekly periods between March 1 and April 30. Data are current as of April 5, 2021 and will be populated as the current season progresses.
- The two time periods of March 1-14 and March 15-28 in 2021 indicate higher overall maximum trap numbers in relation to the past season average between 2014 and 2020 (removing 2016 data) for those ports within Fishing Zone 3, while this number remains below average for those ports within Fishing Zones 1, 2, 4 and 5. Data is still incomplete for March 29-April 11 period.

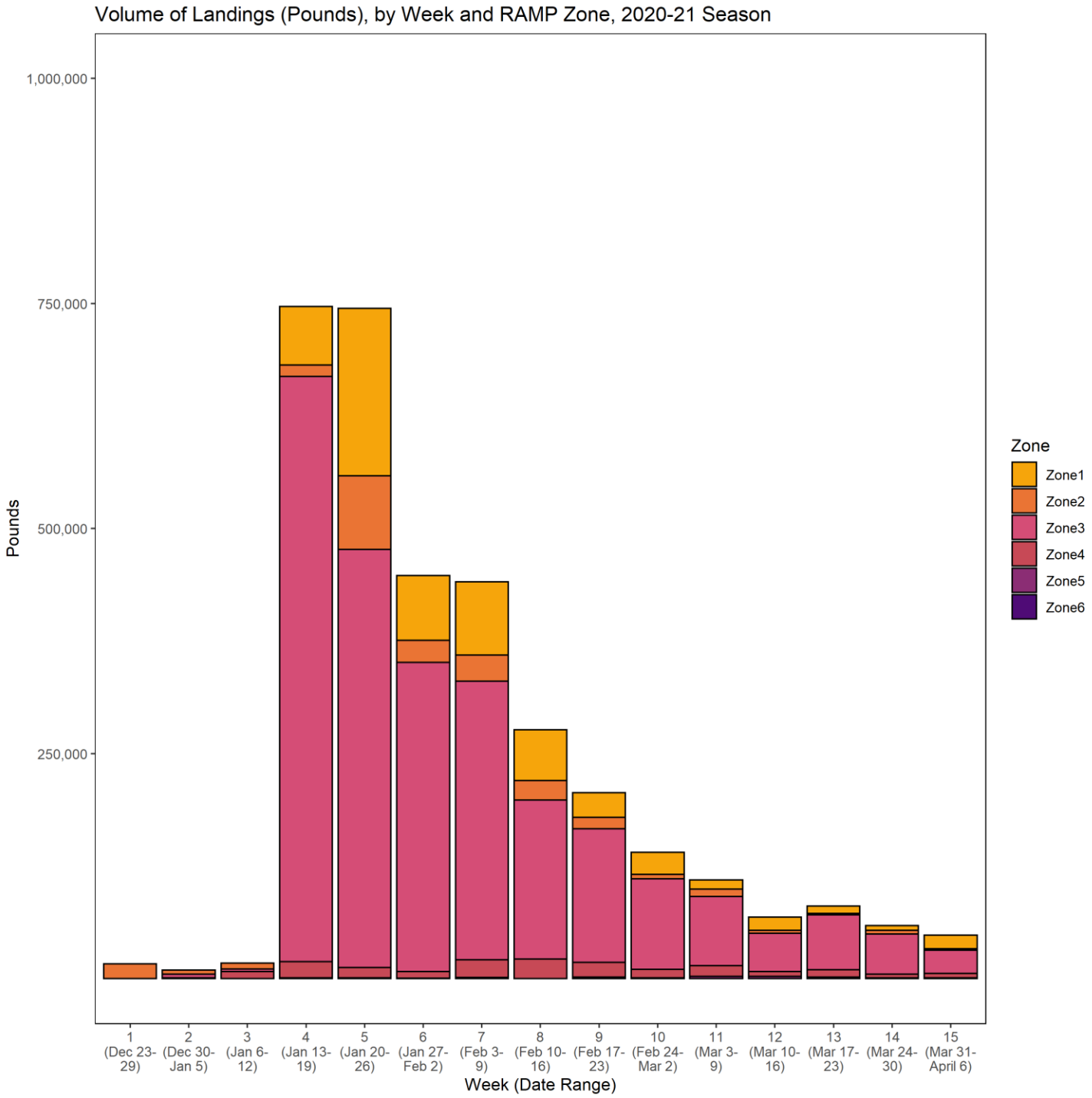

Figure 4. Dungeness crab landings (pounds) by week and Fishing Zone. Accessed from CDFW's MLDS on April 9, 2021. All data are preliminary and subject to change.

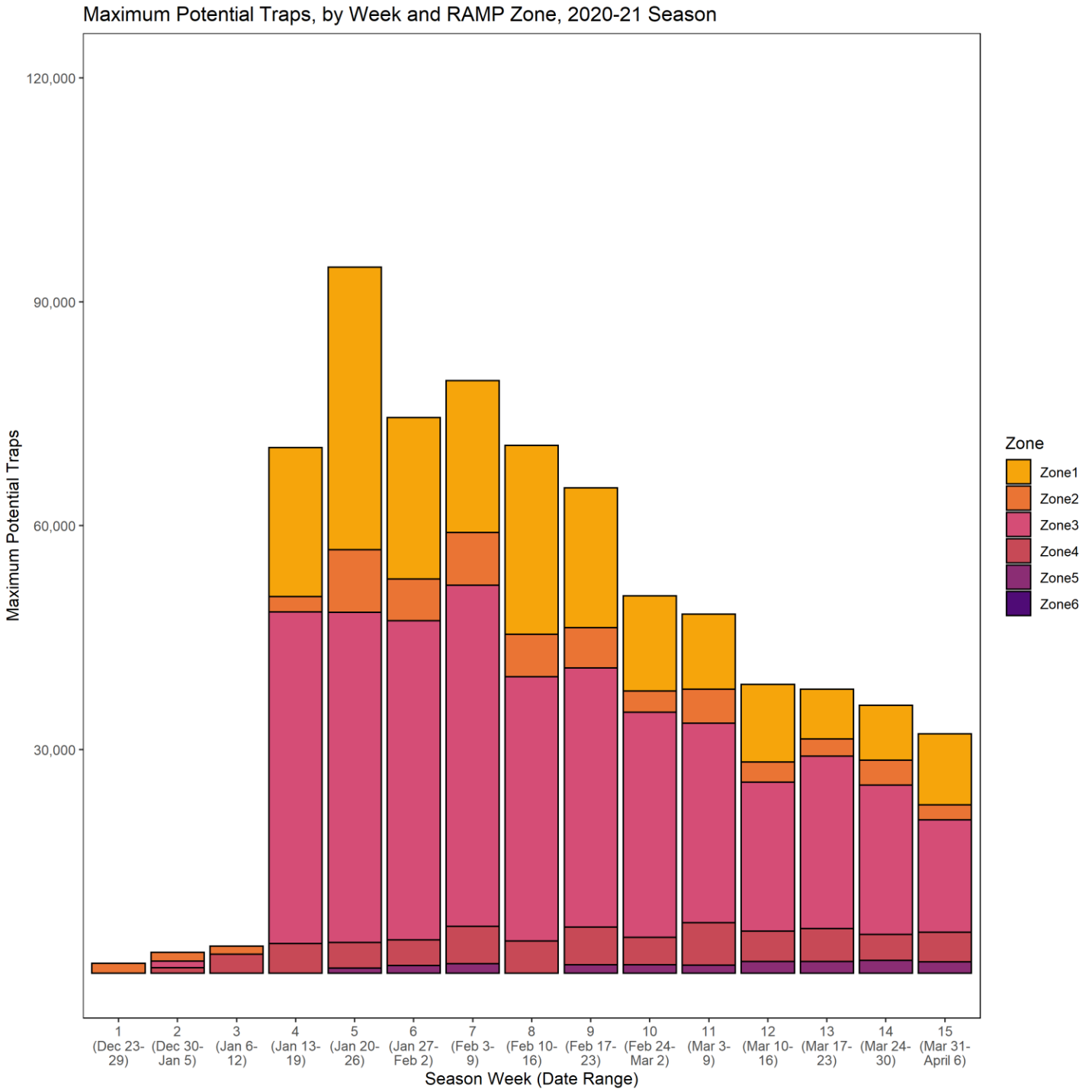

Figure 5. Maximum potential traps by week and Fishing Zone, based on landings data and Dungeness crab vessel permit tier information. Accessed from CDFW's MLDS on April 9,2021 and CDFW's ALDS on April 7, 2021. All data are preliminary and subject to change.

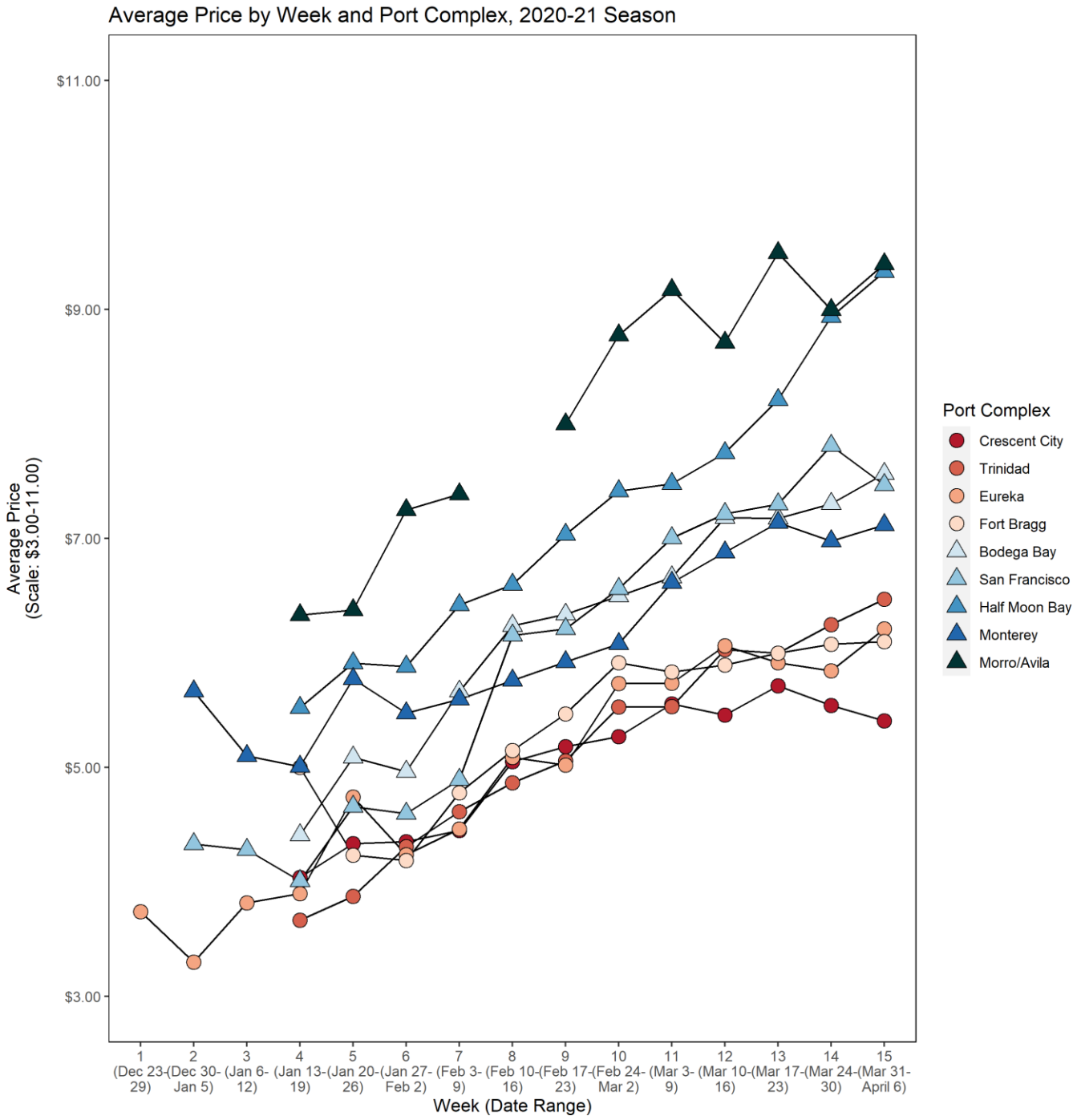

Figure 6. Average price per pound by week and port complex (removing receipts that reported $0 unit price). Northern management area ports are designated by circles while central management area ports are designated by triangles. Accessed from CDFW's MLDS on April 9, 2021. All data are preliminary and subject to change.

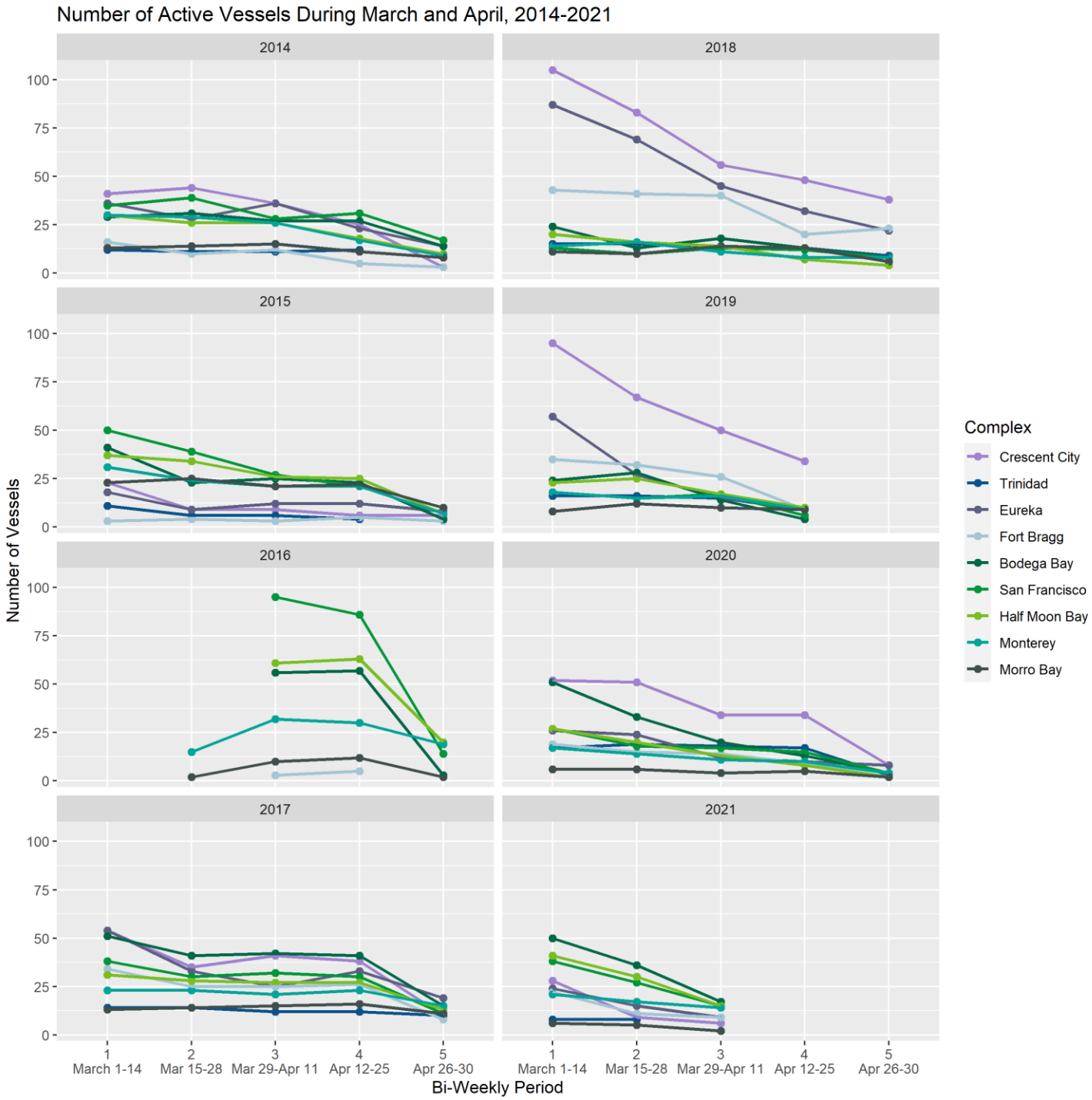

Figure 7. Panels showing number of active Dungeness crab vessels each year between 2014 to 2021 by port complex over each bi-weekly period between March 1 and April 30. Accessed from CDFW's custom PowerBi report with last data refresh on April 5, 2021. All data are preliminary and subject to change.

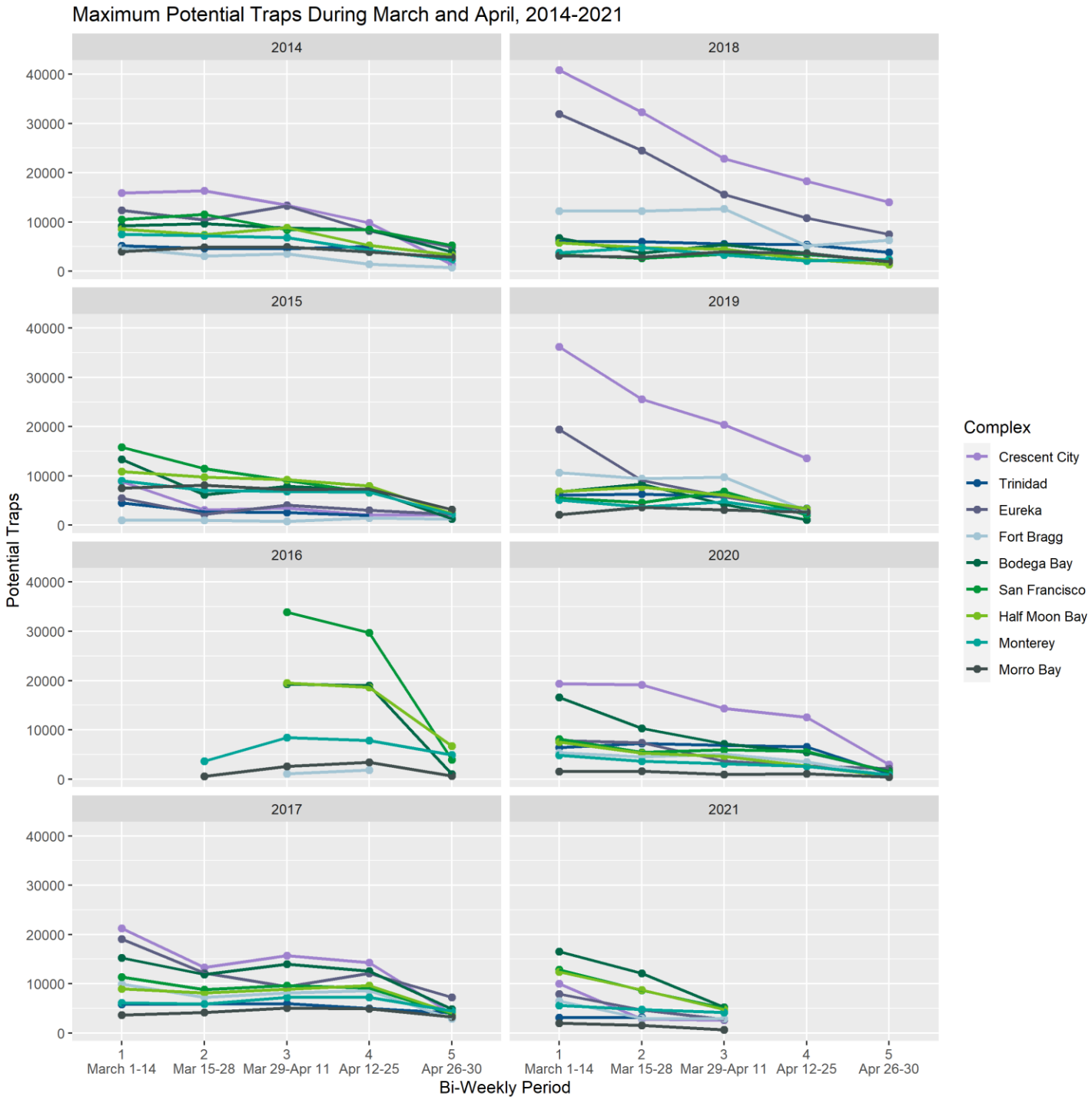

Figure 8. Panels showing number of maximum potential traps based on active Dungeness crab vessels each year between 2014 to 2021 by port complex over each bi-weekly period between March 1 and April 30. Accessed from CDFW's custom PowerBi report with last data refresh on April 5, 2021. All data are preliminary and subject to change.

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

- CDFW has received bi-weekly reports since the first reporting period of January 1, 2021 through the most recent reporting period of April 1, 2021. Although total reports for each period may not reflect all permitted vessels participating in the fishery, summaries are being provided for the following periods: March 1, 2021 (Table 1), and March 16, 2021 (Table 2), and April 1, 2021 (Table 3).
- For the April 1 reporting period, covers fishery participation from March 16-31, about 34,444 traps are estimated to be deployed statewide with just over half of these located within Fishing Zone 3. Between March 1 and April 1, just under 11,700 traps have been removed from Fishing Zone 3.

Table 1. Summary of information provided for the March 1, 2021 bi-weekly reporting period by Fishing Zone (1-6). Accessed from CDFW's Bi-Weekly Reporting database on April 9, 2021. NR-C refers to data withheld due to confidentiality and all data are preliminary and subject to change.

Fishing Zone	Permits Reporting	Average Trap Number	Total Traps	Average Min. Depth (fathoms)	Average Max. Depth (fathoms)	Max. Reported Depth (fathoms)	Final Report	Number of Lost Traps
Zone 1	52	270	14,047	12	26	65	9	14
Zone 2	18	225	4,052	13	31	75	3	1
Zone 3	116	265	30,747	19	42	100	10	51
Zone 4	10	185	1,851	24	43	65	0	0
Zone 5	5	123	617	32	53	60	0	0
Zone 6	NR-C	NR-C	NR-C	NR-C	NR-C	NR-C	NR-C	NR-C
Totals	201		51,314				22	66

Table 2. Summary of information provided for the March 16, 2021 bi-weekly reporting period by Fishing Zone (1-6). Accessed from CDFW's Bi-Weekly Reporting database on April 9, 2021. NR-C refers to data withheld due to confidentiality and all data are preliminary and subject to change.

Fishing Zone	Permits Reporting	Average Trap Number	Total Traps	Average Min. Depth (fathoms)	Average Max. Depth (fathoms)	Max. Reported Depth (fathoms)	Final Report	Number of Lost Traps
Zone 1	40	261	10,425	10	23	65	12	29
Zone 2	18	203	3,650	16	33	75	2	5
Zone 3	111	256	28,377	20	42	80	15	78
Zone 4	11	190	2,093	21	39	60	1	2
Zone 5	6	150	900	28	50	55	0	0
Zone 6	NR-C	NR-C	NR-C	NR-C	NR-C	NR-C	NR-C	NR-C
Totals	186		45,445				30	114

Table 3. Summary of information provided for the April 1, 2021 bi-weekly reporting period by Fishing Zone (1-6). Accessed from CDFW's Bi-Weekly Reporting database on April 9, 2021. NR-C refers to data withheld due to confidentiality and all data are preliminary and subject to change.

Fishing Zone	Permits Reporting	Average Trap Number	Total Traps	Average Min. Depth (fathoms)	Average Max. Depth (fathoms)	Max. Reported Depth (fathoms)	Final Report	Number of Lost Traps
Zone 1	36	264	9,494	11	24	65	7	10
Zone 2	16	207	3,304	15	32	75	2	0
Zone 3	96	196	18,845	17	36	80	23	91
Zone 4	8	186	1,486	21	39	60	0	0
Zone 5	6	219	1,315	29	53	60	1	2
Zone 6	NR-C	NR-C	NR-C	NR-C	NR-C	NR-C	NR-C	NR-C
Totals	162		34,444				33	103

Solar Loggers (Fishing Zones 1, 3, and 5)

- The vessel track data provided by the solar logger pilot project is shown for the March 29 - April 7, 2021 period. The following maps show vessel activity in 1) entire coast of California and Fishing Zone 1 (Figure 9) and 2) Fishing Zones 3 and 5 (Figure 10). From vessel participation in the project (and not necessarily representative of the entire fishery), Fishing Zone 3 showed the most activity. Several vessels participating in the pilot are fishing outside of California this season. A summary of cumulative fishing trips every one to two weeks since January 1, 2021 is provided in Table 4.

Table 4. Summary of individual fishing trips based on data provided by the solar logger project (and not necessarily representative of the entire fishery) between different time periods since January 1, 2021 until April 7, 2021.

Date Ranges	Fishing Trips
March 29 – April 7, 2021	28
March 10-28, 2021	81
March 1-9, 2021	50
February 10-28, 2021	78
February 1-9, 2021	50
January 16-31, 2021	81
January 1-15, 2021	58

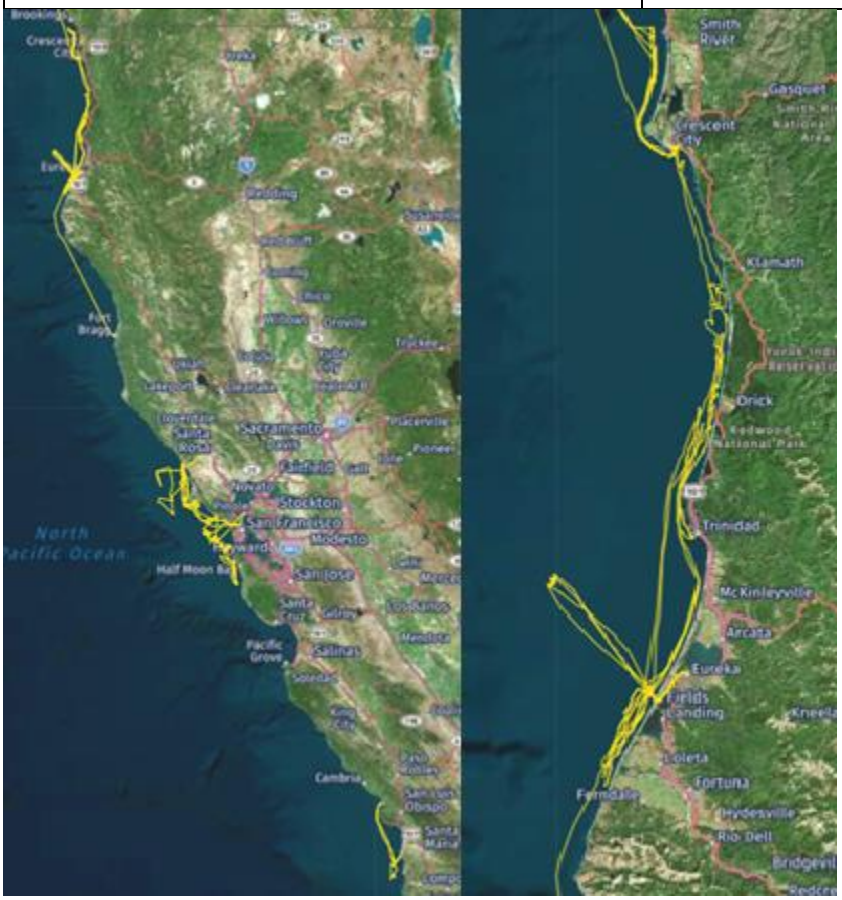

Figure 9. Fishing trips from March 29 – April 7, 2021. The map on the left represents the entire coast where vessels may be participating. The map on the right focuses on fishing activity in Fishing Zone 1.

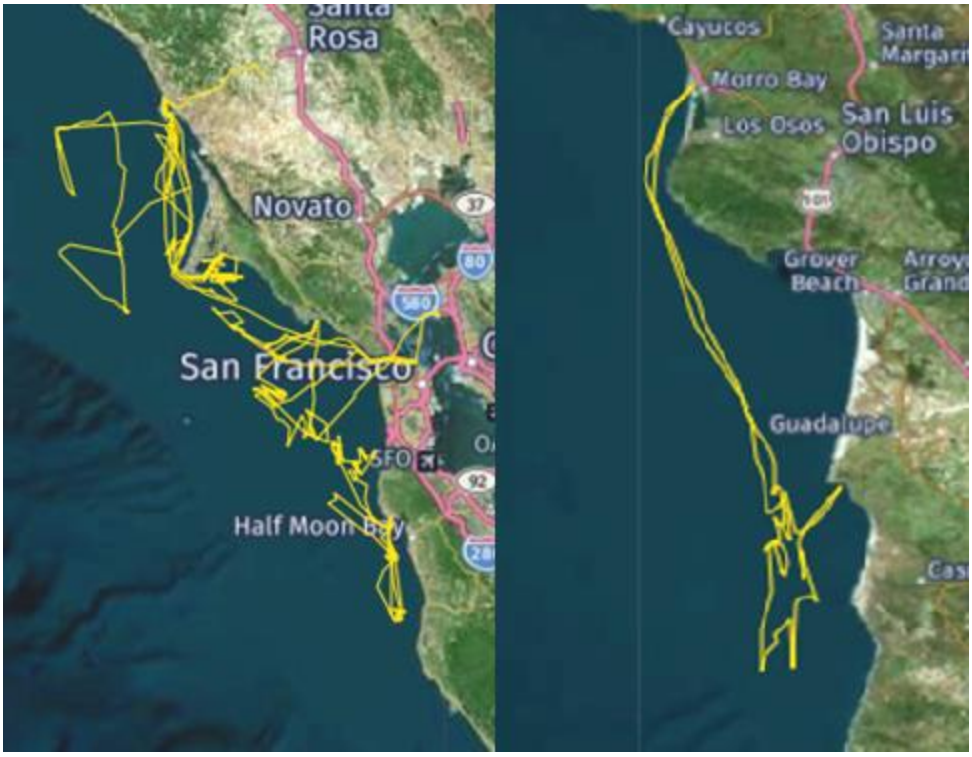

Figure 10. Fishing trips from March 29 – April 7, 2021. The map on the left shows fishing activity in Fishing Zone 3 while the map on the right shows fishing activity in Fishing Zone 5.

Section 132.8(d)(8): Known distribution and abundance of key forage

Data provided by: Jarrod Santora and Isaac Schroeder (NMFS SWFSC and UC Santa Cruz)
https://www.integratedecosystemassessment.noaa.gov/regions/california-current/cc-projects-whale-entanglement

Forage Indices (*All Fishing Zones*)

- Krill abundance (higher offshore in the outer slope) is also anticipated to be closer to average while anchovy is still considered to be above average, given the historical record.

Section 132.8(d)(9): Ocean conditions

ENSO prediction accessed from NOAA's Climate Prediction Center website *on April 8, 2021, Data provided by: Jarrod Santora and Isaac Schroeder (NMFS SWFSC and UC Santa Cruz)*

El Nino/Southern Oscillation (ENSO) Alert System Status (*All Fishing Zones*)

- The prediction of ENSO conditions was last updated on April 8, 2021. La Niña conditions persisted in March with an 80% chance of a transition from this condition to ENSO-neutral during May - July 2021.

Habitat Compression Index (*All Fishing Zones*)

- Cool ocean temperatures and strong spring upwelling conditions continue from February to March and the Habitat Compression Index (HCI) indicates a current low compression state (Figure 11). It is anticipated that cool conditions with expanded upwelling habitat will continue with no impact of habitat compression that would otherwise result in increased concentrations and aggregations of whales and forage nearshore.
- The HCI for March 2021 indicates no risk of a high compression state (Figure 12) and this is in stark contrast to the HCI values in March for the past 7 years between 2014 and 2020 (Figure 13). A low compression state for March has not been observed since 2013, the year just prior to the emergence of the large marine heatwave. This HCI information applies to all CDFW Fishing Zones.

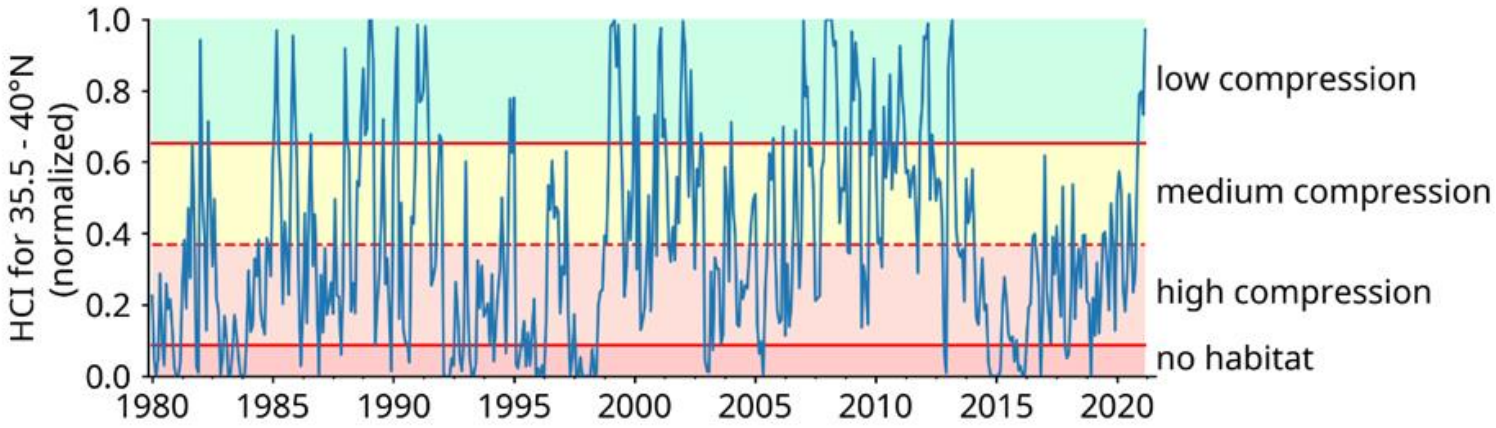

Figure 11. Habitat Compression Index time-series in central-northern California, from January 1980-March 2021, indicating a current low compression state. Source: J. Santora (NOAA/UCSC) and I. Schroeder (UCSC).

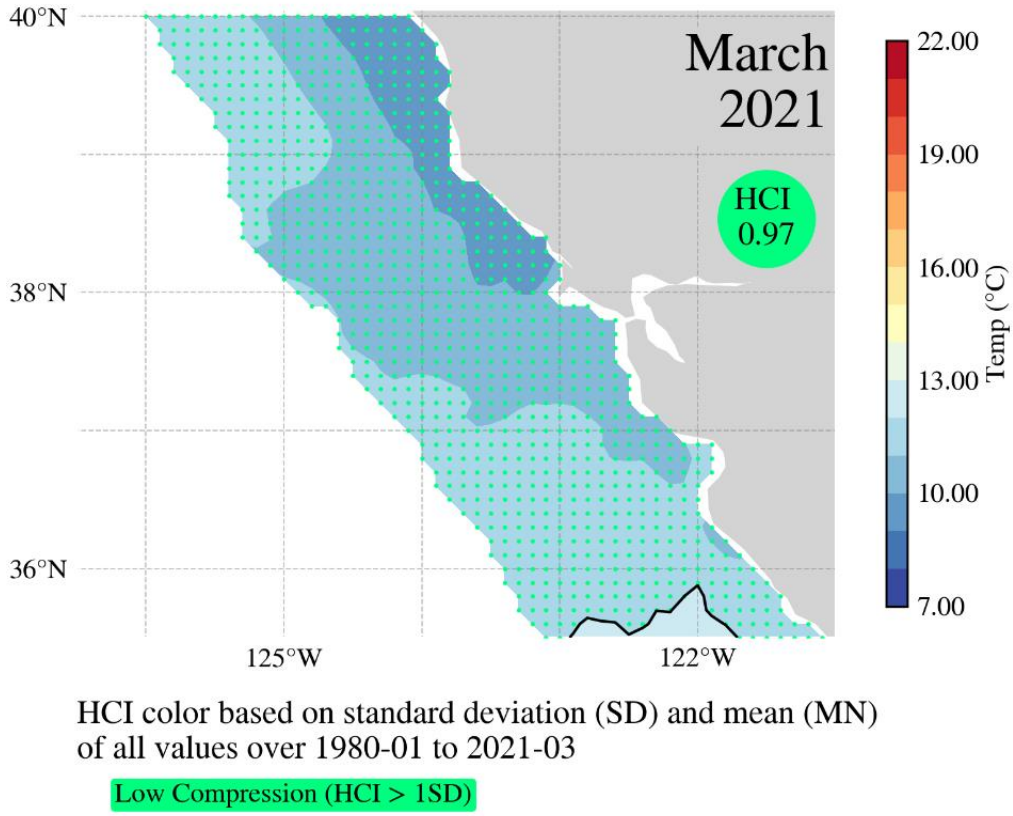

Figure 12. Map of March 2021 seas surface temperature and location of Habitat compression Index (HCI) boundary (black thin line) with and HIC value indicating low compression for the month. Source: https://oceanview.pfeg.noaa.gov/hci/

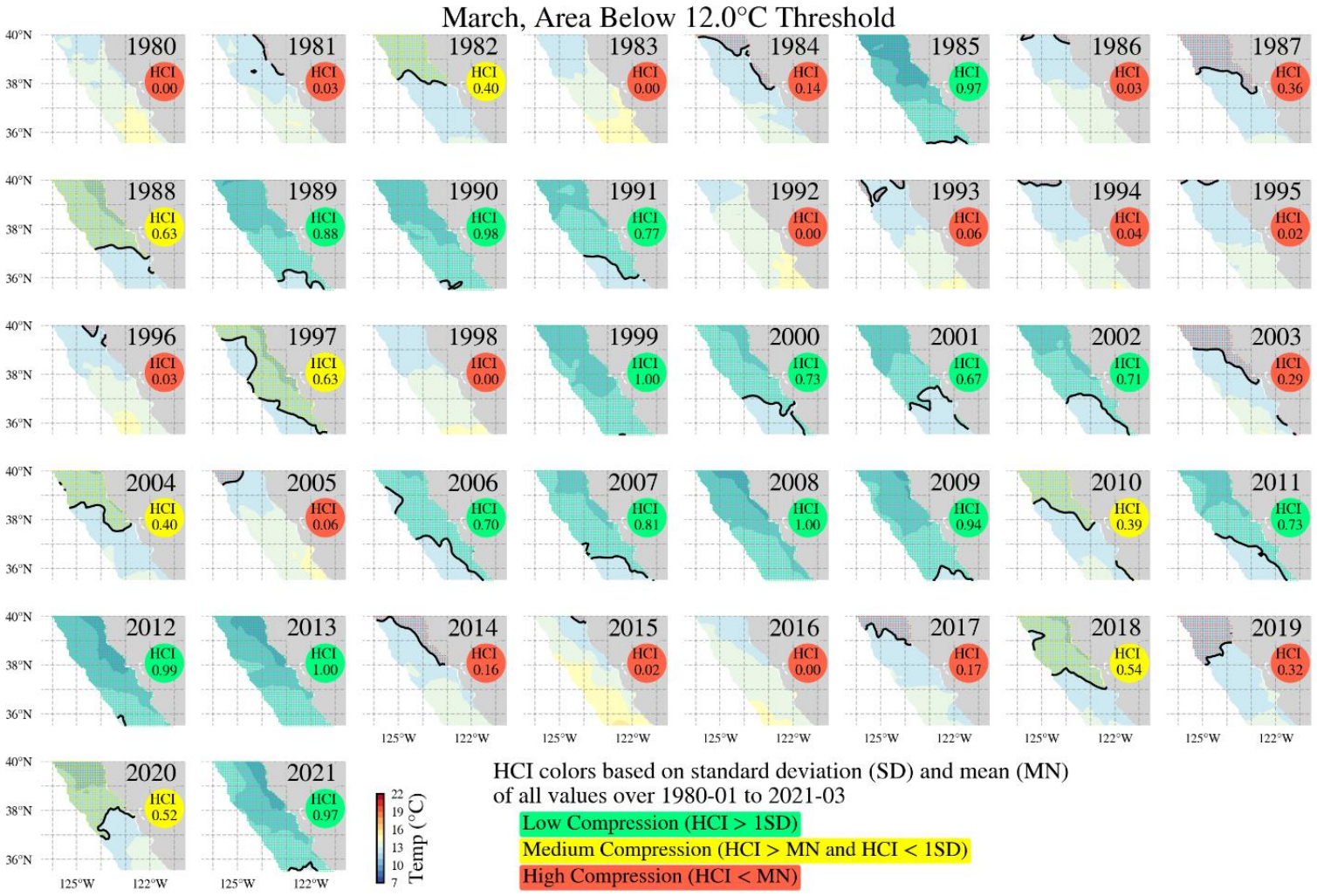

Figure 13. Maps of historical March sea surface temperature and location of Habitat Compression Index (HCI) boundary (black thin line) between 1980 and 2021 and resulting HCI values for each time period. Source: https://oceanview.pfeg.noaa.gov/hci/

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

Data provided by: California Department of Fish and Wildlife

- 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. As described in Section 132.8(c)(1) above, one confirmed entanglement of a Humpback whale in unidentified gear has been reported for the current calendar year. Therefore, the Impact Score Calculation for Humpback whales is 0.38 and 0 for both Blue whales and Pacific Leatherback sea turtles.

Section 132.8(d)(11): Actionable Species migration into or out of Fishing Grounds and across Fishing Zones

Data provided by: John Calambokidis (Cascadia Research, SR3, and The Marine Mammal Center), Briana Abrahms (University of Washington), Cascadia Research, SR3, The Marine Mammal Center, Kathi George (The Marine Mammal Center), Karen Grimmer (Monterey Bay National Marine Sanctuary) and Jaime Jahncke (Point Blue Conservation Science)

Cascadia Research, SR3, and The Marine Mammal Center *(Fishing Zone 4)*

- Only one Humpback whale was observed on vessel-based survey in Monterey Bay on April 12, 2021.
- Recent surveys in Nicaragua observed five Humpback whales, indicating some whales remain on the Central American breeding grounds.

WhaleWatch 2.0 *(All Fishing Zones)*

- WhaleWatch habitat predictions for April 10, 2021 indicate that probability of Blue whale presence is low in Fishing Zones 1-5 and high in Fishing Zone 6.

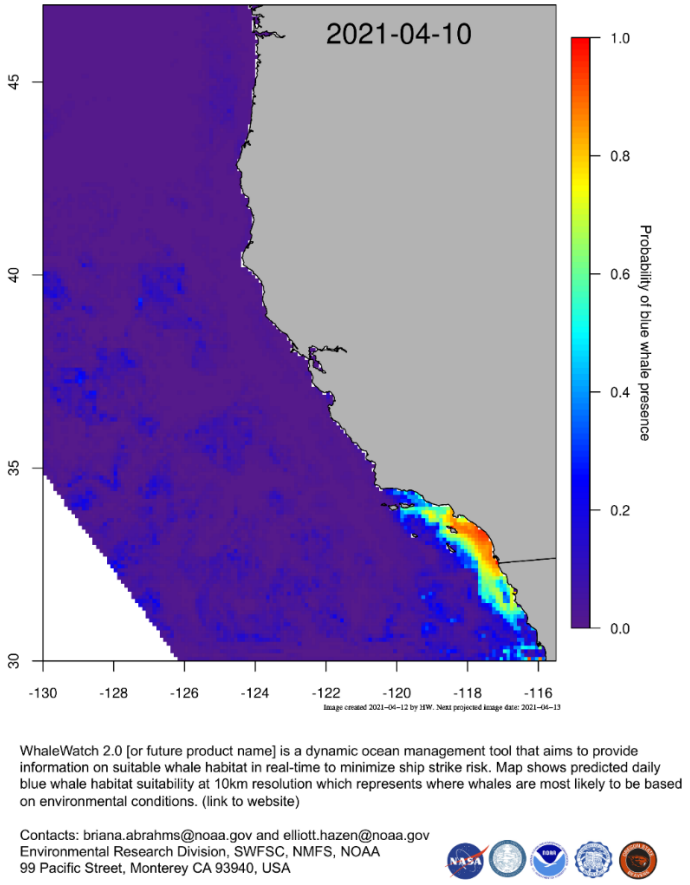

Figure 14. WhaleWatch 2.0 map for April 10, 2021. View a current map.

Cascadia Research, SR3, The Marine Mammal Center *(Fishing Zones 3 and 4)*

- Three Humpback whales identified in recent vessel-based surveys in Fishing Zones 3 and 4 conducted on March 27-28, 2021 were known animals from Mexico.
- Recent surveys in north Costa Rica (where high sightings of humpback whales were seen in January and February) revealed few whales suggesting migration north is underway from there.

Solar Loggers *(Fishing Zone 4)*

- Track lines from whale watching vessels participating in the solar logger pilot project (Figure 14) indicate more widespread effort across Monterey Bay during 37 trips conducted between March 29 - April 7, 2021. A summary of cumulative whale watching trips every one and two weeks since January 1, 2021 is provided in Table 5.

Table 5. Summary of whale watching trips based on data provided by the solar logger project between different time periods from January 1, 2021 until April 7, 2021.

Time Periods	Whale Watching Trips
March 29 – April 7, 2021	37
March 10-28, 2021	46
March 1-9, 2021	21
February 10-28, 2021	38
February 1-9, 2021	15
January 16-31, 2021	19
January 1-15, 2021	28

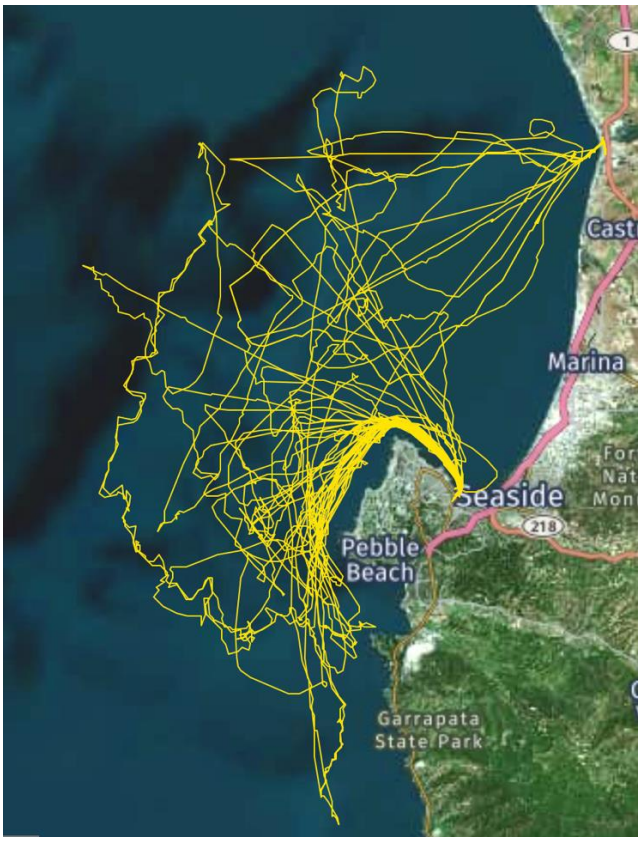

Figure 15. Track lines for 37 whale watch trips in Monterey Bay from March 29 – April 7, 2021. Sightings, numbers and species are not reflected on this map.

Point Blue Conservation Science Data Portal *(Fishing Zones 3, 4 and 6)*

- The Greater Farallones National Marine Sanctuary (through the Spotter/Whale Alert app) has observed ten Humpback whales in Fishing Zone 3 from April 1 to 9, 2021 (Figure 15). No Blue whales have been observed. Observations were recorded by trained observers on the Farallon Islands.
- Monterey Bay National Marine Sanctuary has observed 27 Humpback whales from March 10 to April 9, 2021, with ten in the past seven days in Fishing Zone 4 (Figure 16). No Blue whales have been sighted during the past month. Observations were reported from trained naturalists aboard Monterey Bay Whale Watch and a newly trained naturalist aboard Secret Harbors Charter.
- Channel Islands National Marine Sanctuary observed 29 Humpback whales from April 1 to 9, 2021, and no Blue whales in Fishing Zone 6 (Figure 17). These observations are conducted by trained naturalists from the Channel Islands National Marine Sanctuary and National Park Service.

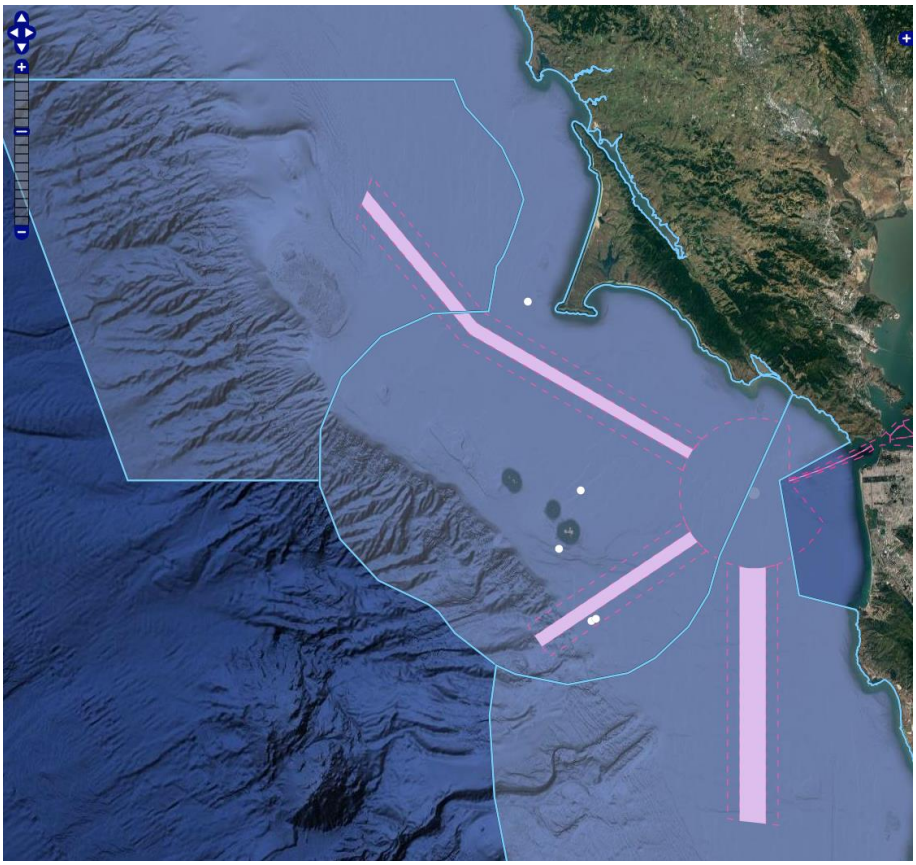

Figure 16. Location of 10 Humpback whale sightings in Fishing Zone 3 from April 1-9, 2021. Reporting locations are represented by white circles. A given report may or may not represent multiple individuals.

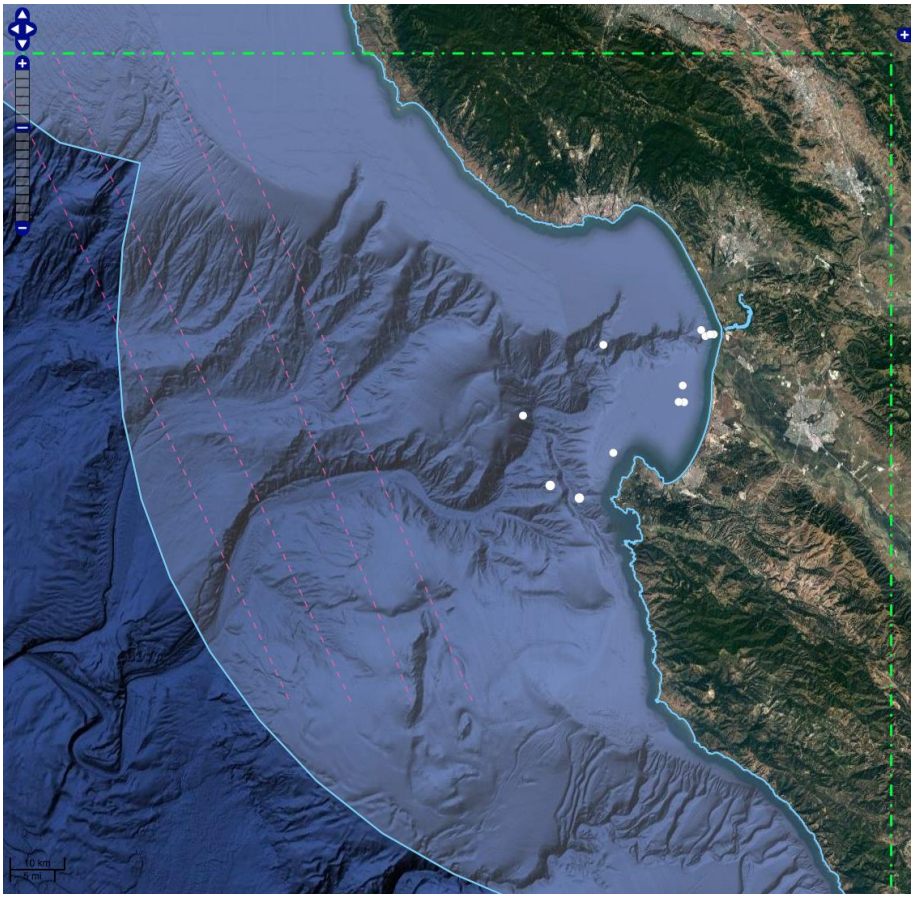

Figure 17. Location of 27 Humpback whale sightings in Fishing Zone 4 from March 10 to April 9, 2021. Reporting locations are represented by white circles. A given report may or may not represent multiple individuals.

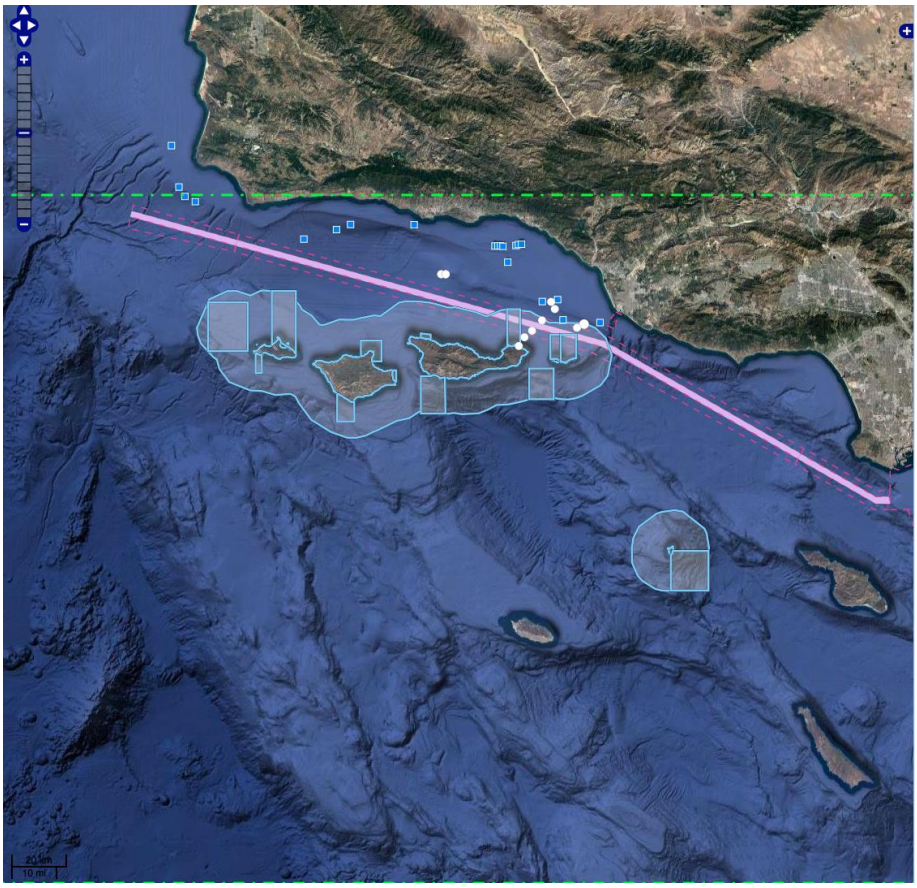

Figure 18. Location of 29 Humpback whale sightings in Fishing Zone 6 from April 1-9, 2021. Reporting locations are represented by white circles. A given report may or may not represent multiple individuals.