

California Dungeness Crab Fishing Gear Working Group
2017-18 Risk Assessment and Mitigation Program (RAMP) Pilot
Mid-season Risk Assessment—Key Highlights and Next Steps
March 2018

On March 14, 2018, the California Dungeness Crab Fishing Gear Working Group (Working Group) convened to discuss the relative risk of whale entanglements during the 2017-18 California Dungeness crab fishing season. This assessment was conducted as part of the 2017-18 Risk Assessment and Mitigation Program (RAMP) Pilot, a voluntary program being tested during the upcoming fishing season that is designed to identify and be responsive to elevated entanglement risk in the California Dungeness crab fishery. This mid-season assessment was preceded by a preseason risk assessment that was conducted by the Working Group in October/November 2017 ([see here for more details](#)).

The following provides key highlights and next steps from the mid-season risk assessment process. This summary has been made publicly available via the Working Group's webpage, circulated via the Dungeness Crab Task Force (DCTF) email list, shared with fishing leadership throughout California, and posted to the California Department of Fish and Wildlife (CDFW)'s crab webpage.

For more information about the Working Group's efforts and the 2017-18 RAMP pilot, visit <http://www.opc.ca.gov/whale-entanglement-working-group>. To receive updates on the progress of the RAMP and the Working Group's efforts and/or to provide feedback and share your expertise please contact info@cawhalegroup.com.

Key Highlights, RAMP Pilot Mid-season Risk Assessment

In September 2017, the Working Group finalized a draft risk assessment framework (RAF) that identifies four priority factors that evaluate elevated risk of whale entanglements in Dungeness crab fishing gear: forage/ocean conditions, whale concentrations, fleet dynamics, and rate of entanglements. *For a more detailed description of the RAF, see Figure 1, below.* On March 14, 2018, the Working Group discussed each factor and available information, completed the mid-season RAF, and arrived at a consensus-based score regarding relative preseason entanglement risk. A table summarizing the information shared with the group is available on page 6 of this document.

While each factor was reviewed and discussed individually, efforts were made by the Working Group to consider how factors relate, recognizing that each is inherently connected to one another.

- **Entanglements in CA Dungeness crab fishing gear**

Mid-season risk level: Low

Guiding question: *Were there more than five humpback whale entanglements reported with California Dungeness crab fishing gear during the 2017-18 season thus far?*

Data source: *NMFS March 14, 2018 update (see page 6)*

National Marine Fisheries Service (NMFS) confirmed that of the 3 confirmed and 1 unconfirmed entanglements during the 2017-18 CA Dungeness crab fishing season, 1 humpback whale was known to involve CA Dungeness crab fishing gear. This entanglement is reported to have occurred in December 2017 in nearshore waters in the Pebble Beach/Monterey area. The group discussed the importance of gathering details about the entanglement (e.g., gear set up, gear location/depth, etc.) by both the fisherman whose gear was involved in the entanglement and through forensic review of photos, as available. There was general agreement that greater efforts needed to be made to encourage fishermen involved in entanglement events to share as much information as possible to help better understand the causes of entanglements so they may be addressed. The group discussed the role that fishermen liaisons (e.g., Working Group participants and others) can play in speaking with fishermen directly, the need to revisit the questions that are asked by CDFW and NMFS about the entanglement, and the importance of highlighting that fishermen will not face punitive actions if their gear is involved in an entanglement.

Entanglements will continue to be tracked by NMFS and updates will be shared with the Working Group, CDFW, and the broader fleet. The Working Group will be reconvened if more than one humpback whale is entangled in a specific geographic area or more than 5 entanglements of humpback whales occur in CA Dungeness crab fishing gear cumulatively within the 2017-18 fishing season.

- **Fleet Dynamics, Abundance and Distribution of California Dungeness Crab Fishing Gear**

Risk level: Low for Northern Management Area and Central Management Area

Guiding questions: How has the impact of the Northern delay affected fishing behavior? How will pricing/markets/salmon season/etc. influence the anticipated abundance and distribution of CA Dungeness crab fishing gear this spring?

Data source: Fishermen's reported observations, March 14, 2018

Fishermen on the Working Group who have been fishing from Central Oregon south to Monterey Bay provided an overview of the California Dungeness crab fishing season to date. When reflecting that fishing opened on time in the Central Management Area (south of the Mendocino/Sonoma County border), it was noted that the first week of the Central Management Area opener was strong in terms of product quality and price. Within the first few weeks of the season, however, the amount of product available became more limited and price held relatively consistent until the north opened. Fishermen reported that there were a number of challenges that were faced related to the Northern Management Area (Mendocino/Sonoma County border north to the CA/OR border) opener, including a quality delay that impacted pricing, a delayed opener in Central Oregon which created a glut of product in the market, and the 30-day fair start that fishermen who had fished the central opener were required to abide by. Some fishermen reflected on whether it would have been more beneficial if the north had opened on January 15 and not waited to open (due to price) until early February.

Fishermen shared their forecast for how the spring fishery may shape up and highlighted a number of considerations that may inform relative risk to whales over the coming weeks. Currently, fishing seems to be slowing down in the north, and fishermen on the call anticipated that there would be a switch around April 1 when a number of boats will start to fish shrimp, groundfish, and salmon instead of Dungeness crab. Fishing in the central and more southern range of the fishery has been winding down since January/February, however due to an anticipated limited salmon season, there may be fishermen who will deploy crab gear back out into the water to make ends meet through to June/July.

The group discussed the trade-offs and considerations that fishermen weigh when deciding to continue fishing Dungeness crab during the spring/summer months, which has a direct relationship with the concentration/distribution of gear in the water during a time of year where humpback whales are at their peak concentrations. Three factors were highlighted: the economic cost of running the boat vs. the amount of product that is being harvested and the price per pound; the economic considerations of moving to another fishery that might be more profitable than Dungeness crab; and the increased risk of having crab gear impacted/cut by other fisheries (e.g., salmon trolling). The group agreed that all of these factors are important to understand, track, and discuss. Gaining better and more real-time information to understand the movement of the fleet throughout the season continued to be highlighted as a priority, and one of the collaborative research projects the group is involved in could help to address this information need in the longer-term ([click here](#) for more information).

Moving forward, the Working Group will continue fine-tuning the fishing dynamics factor so it considers and combines a number of elements that can influence gear distribution and concentrations (e.g., delays (domoic acid, quality, market, other pricing and markets, availability and quality of product, other available fisheries to move to, etc.). Additionally, there is interest to consider this factor on a spatial scale, considering the unique qualities and characteristics of fishing dynamics in the northern, central, and southern geographic areas of the California Dungeness crab fishery. Additional discussions are needed to define these areas in detail.

The distribution and concentration of fishing gear, and how the price of crab, availability of product, and the 2018 salmon season (or fishermen from other fisheries may transition to in April/May) will continue to be tracked by CDFW and updates will be shared with the Working Group and the broader fleet. CDFW will continue to be in direct communication with the fishing representatives on the Working Group to gain an on-the-water picture of the general distribution of the fleet. Additionally, planned spring aerial surveys (see 'whale concentrations' factor below) will also provide information on the distribution of the fleet in a portion of the Central Management Area.

- **Forage/ocean conditions**

Risk level: Low

Guiding question: *Are there indications of anomalous forage/ocean conditions occurring during the 2017-18 fishing season?*

Data source:

http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/enso_advisory/ensodisc.shtml

Additional information: *Dr. Jarrod Santora's presentation [here](#)*

Jarrold Santora, Associate Researcher at the University of California, Santa Cruz and Working Group advisor, provided data on the current distribution and abundance of krill and anchovy, which are key forage species for humpback whales. He reported that in January, upwelling was still "average" and sea surface temperatures were warm. Since February, however, ocean conditions have switched quite drastically and strong upwelling winds and cold water indicate that a very good krill year is anticipated for this spring and summer, particularly around the shelf and canyon areas. This would indicate that humpback whales, as well as blue whales, will likely be found in high concentrations off canyons.

During the pre-season risk assessment in October/November 2017, Jarrod reported that anchovy populations were indicating a positive trend, which could bring humpbacks closer inshore, putting them at increased risk of entanglements. With the strongest upwelling occurring since 2013, Jarrod updated the group that it is unlikely that there will be a strong anchovy signal this spring. However, being mindful that ocean conditions have been highly variable in recent years, there have been some reports that have come in that anchovies are present which could bring whale farther inshore, and this will require continued monitoring. Fishermen are requested to share what they are seeing on the water related to anchovy schools with Jarrod (jsantora@ucsc.edu).

The group discussed the connections between the relative krill abundance in central California to the abundance of krill in Baja or British Columbia and Alaska. This could be particularly important to anticipate the behavior of migrating whales that do not have the spatial loyalty that humpbacks do, such as blue whales, which will move into areas where krill is most readily available. At this time, there is limited information available on krill populations off Baja, however there could be an opportunity to review and synthesize krill data along the entire West Coast of the United States to improve our understanding of blue whale distributions. To date, this type of data synthesis has not been conducted.

Forage/ocean conditions will continue to be tracked into the spring months by Jarrod, including an anticipated rockfish/krill survey in late April/early May. Updates will be shared with the Working Group and the broader fleet.

- **Whale concentrations**

Mid-season risk level: Low

Guiding question: *Are humpback whale concentrations moderate to high as of March 14, 2018?*

Data source: *Monterey Bay Whale Watch data ([here](#))*

Karin Forney, Research Biologist with the Southwest Fisheries Science Center and Working Group advisor, presented a snapshot of seasonal humpback whale distribution information since 2012. This

information can serve as an indicator for humpback whales' seasonal migration and anticipated departure from California feeding grounds. As of March 14, 2018, the 7-day composite running average of whale sightings in the southern Monterey Bay area is below 5 whales, which is within the low concentration range. Current reports from breeding grounds in Mexico and Central America indicate that the humpback whale migration north is not yet in full swing, and whales are expected to start arriving in greater numbers in April/May. Based on the information shared regarding anticipated spring forage/ocean conditions, humpback whale distribution is expected to be concentrated offshore around the canyon areas. There also may be lower numbers of humpback whales feeding inshore following the anchovy.

The agencies and whale researchers will continue to compile and analyze available data on whale concentrations (Monterey Bay Whale Watch, the Applied California Current Ecosystem Studies (ACCESS) and Oceanic Society). Additionally, 1-2 aerial surveys are planned for the Central Management Area in April/May/June (weather dependent). Efforts will also continue to understand relationships between whale concentrations and forage/ocean conditions. The commercial fleet and recreational fishing community will be updated about the status of whale concentrations and encouraged to consult best practices under conditions of low entanglement risk.

Next Steps

As outlined above, the Working Group will continue to work with agencies and researchers to evaluate, and be responsive to, relative risk of entanglements throughout the 2017-18 fishing season. Unless there are additional indications of elevated risk identified in the near-term, the group is scheduled to reconvene in June/July to conduct a postseason risk assessment. This will involve reviewing the same four factors identified above, some of which will have more information available to help inform discussions.

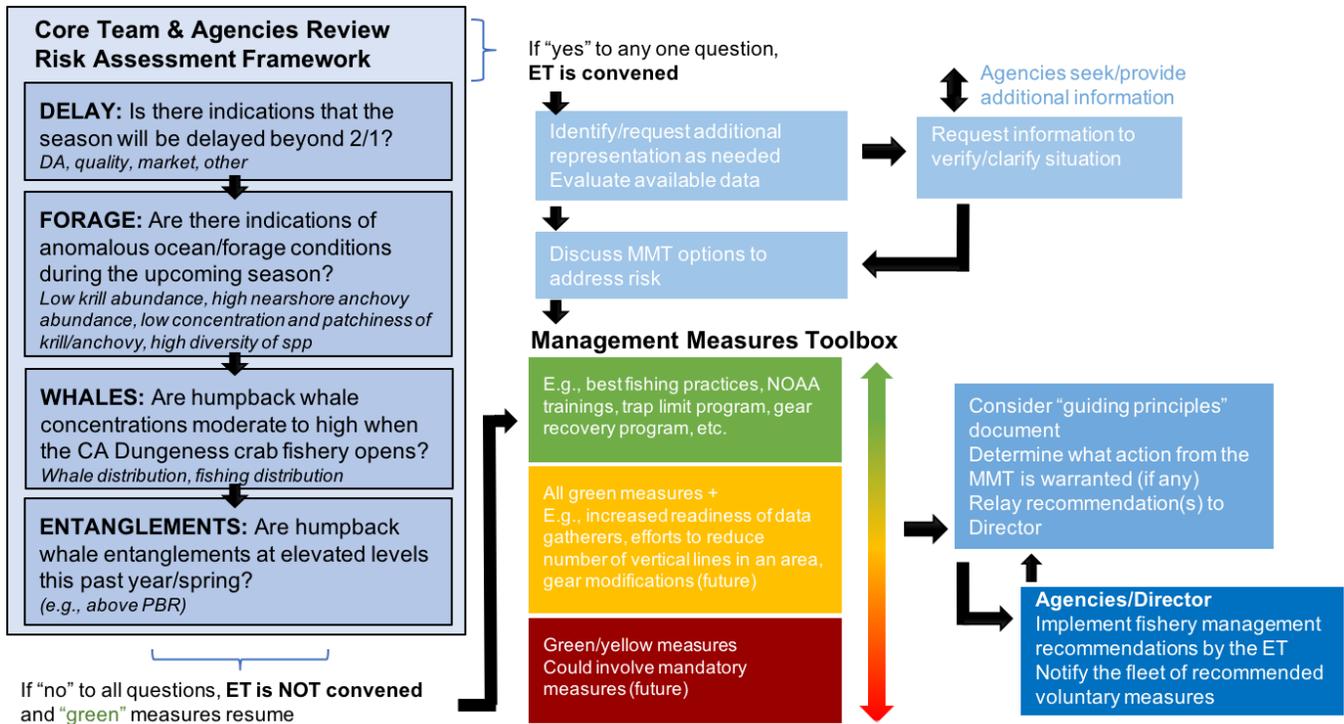
The draft RAMP is in its beginning stages of development. This voluntary pilot provides an opportunity to test out the draft RAMP's structure and function, explore aspects of the RAMP that could benefit from legislative support, and to learn what may need to be further adjusted and refined, including the program's working assumptions and guiding principles.

During the RAMP pilot, commercial and recreational fishermen and others involved in the California Dungeness crab fishing industry are invited to review the draft RAMP approach and provide feedback on all aspects of the program. Ideas on how to improve the Working Group's approach to assessing risk, considerations for possible management measures, and suggestions related to new technologies are welcomed and encouraged. Additionally, the Working Group is planning to hold a select number of meetings in 2018 at port locations in an effort to share information and address questions.

Information learned during the 2017-18 pilot phase will be shared with CDFW, NMFS, the California Ocean Protection Council, the Fish and Game Commission, Joint Committee on Fisheries and Aquaculture, and California Dungeness Crab Task Force in summer/fall 2018.

This update will be shared via the [DCTF email list](#), the [Working Group webpage](#), and [CDFW's crab webpage](#). The Working Group welcomes your feedback and insights about the Working Group's efforts and the 2017-18 RAMP pilot. Please visit <http://www.opc.ca.gov/whale-entanglement-working-group> or contact the Working Group at info@cawhalegroup.com.

Figure 1. Risk Assessment Framework Factors and Questions and Process to Consider Possible Management Measures (voluntary for 2017-18 RAMP Pilot)



CT: Core Team; ET: Evaluation Team; RAF: Risk Assessment Framework; MMT: Management Measures Toolbox

Note: for the purposes of the 2017-18 RAMP Pilot, the Working Group will serve as both the core team and evaluation team.

Core Factors	Mid-season Risk Assessment	Objective Criteria to Indicate Elevated Risk	Guiding Questions	Mid-season Information Used to Inform Assessment	Comments/Notes	Next Steps
Entanglements in CA Dungeness crab fishing gear	Low	Any season/offseason where 5+ humpback whale entanglements occurred within the CA Dungeness crab fishery, or there were months of 2+ entanglements reported with CA Dungeness crab gear after the season ended.	Were there more than 5 humpback whale entanglements reported with CA Dungeness crab gear during the 2017-18 season thus far?	Current entanglement data, 2017-18 season from NMFS: In 2018, there have been three whale entanglements reported to NMFS: 2 in February and 1 in March 1) February: Gray whale, confirmed, only line only, Dana Point, CA 2) February: Unidentified whale, unconfirmed, gear type unknown, northern California 3) March: Gray whale, confirmed, gillnet, Malibu, CA During the 2017-18 fishing season, there has been 1 humpback whale, confirmed, entangled with California Dungeness Crab commercial gear in December 2017 in Monterey, CA. After speaking with the gear owner, we found out the gear was set near Monterey.	National Marine Fisheries Service (NMFS) confirmed that of the 3 confirmed and 1 unconfirmed entanglements during the 2017-18 CA Dungeness crab fishing season, 1 humpback whale was known to involve CA Dungeness crab fishing gear. This entanglement is reported to have occurred in December 2017 in nearshore waters in the Pebble Beach/Monterey area, however limited information about the the entanglement (e.g., gear set up, gear location/depth, etc.) is available.	Entanglements will continue to be tracked by NMFS and updates will be shared with the Working Group, CDFW, and the broader fleet. The Working Group will be reconvened if more than one humpback whale is entangled in a specific geographic area or more than 5 entanglements of humpback whales occur in CA Dungeness crab fishing gear cumulatively within the 2017-18 fishing season.
Fleet dynamics	Low	To consider a number of factors throughout the season that would influence/inform the concentration and/or distribution of CA Dungeness crab fishing gear. Factors include: Delays: Any delay (domoic acid, quality, market, etc.) that causes the season to start beyond February 1 in either management area. Other fisheries: Availability of other fisheries to transition to during the Spring months (e.g., salmon, shrimp, groundfish, etc.) Location of crab & location/concentration of gear	How has the impact of the Northern delay affected fishing behavior? How will pricing/markets affect the spring fishery? Are we expecting CA Dungeness crab fishermen to switch to other fisheries (e.g., salmon, shrimp, groundfish, black cod) this spring (i.e., by/around April 1)?	Fishermen on the Working Group who have been fishing from Central Oregon south to Monterey Bay provided an overview of the California Dungeness crab fishing season to date. The Central Management Area opener was strong in terms of product quality and price. Within the first few weeks of the season, however, the amount of product available became more limited and price held relatively consistent until the north opened. The Northern Management Area opener was affected by a quality delay that impacted pricing, a delayed opener in Central Oregon which created a glut of product in the market, and the 30-day fair start that fishermen who had fished the central opener were required to abide by. Looking ahead to spring, the fishermen on the call anticipated that there would be a switch around April 1 when a number of boats will start to fish shrimp, groundfish, and salmon instead of Dungeness crab. Fishing in the central and more southern range of the fishery has been winding down since January/February, however due to an anticipated limited salmon season, there may be fishermen who will deploy crab gear back out into the water to make ends meet through to June/July.	Moving forward, the Working Group will continue fine-tuning the fishing dynamics factor so it considers and combines a number of elements that can influence gear distribution and concentrations (e.g., delays (domoic acid, quality, market, other pricing and markets, availability and quality of product, other available fisheries to move to, etc.). Additionally, there is interest to consider this factor on a spatial scale, considering the unique qualities and characteristics of fishing dynamics in the northern, central, and southern geographic areas of the California Dungeness crab fishery. Additional discussions are needed to define these areas in detail.	The distribution and concentration of fishing gear, and how the price of crab, availability of product, and the 2018 salmon season (or fishermen from other fisheries may transition to in April/May) will continue to be tracked by CDFW and updates will be shared with the Working Group and the broader fleet. CDFW will continue to be in direct communication with the fishing representatives on the Working Group to gain an on-the-water picture of the general distribution of the fleet. Additionally, planned spring aerial surveys (see 'whale concentrations' factor below) will also provide information on the distribution of the fleet in a portion of the Central Management Area.
Forage/ocean conditions	Low	Low krill, high anchovy abundance and density; El Nino; or high diversity of species, especially if there is a delay in the season.	Are there indications of anomalous ocean/forage conditions occurring during the 2017-18 fishing season?	Jarrold Santora, Associate Researcher at the University of California, Santa Cruz and Working Group advisor, provided data on the current distribution and abundance of krill and anchovy, which are key forage species for humpback whales. He reported that in January, upwelling was still "average" and sea surface temperatures were warm. Since February, however, ocean conditions have switched quite drastically and strong upwelling winds and cold water indicate that a very good krill year is anticipated for this spring and summer, particularly around the shelf and canyon areas. This would indicate that humpback whales, as well as blue whales, will likely be found in high concentrations off canyons. Most recent ENSO Alert System forecast: http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/enso_advisory/ensodisc.shtml Jarrod Santora presentation: http://bit.ly/MidSeasonForageData	During the pre-season risk assessment in October/November 2017, Jarrod reported that anchovy populations were indicating a positive trend, which could bring humpbacks closer inshore, putting them at increased risk of entanglements. With the strongest upwelling occurring since 2013, Jarrod updated the group that it is unlikely that there will be a strong anchovy signal this spring. However, being mindful that ocean conditions have been highly variable in recent years, there have been some reports that have come in that anchovies are present which could bring whale farther inshore, and this will require continued monitoring. Fishermen are requested to share what they are seeing on the water related to anchovy schools with Jarrod (jsantora@ucsc.edu).	Forage/ocean conditions will continue to be tracked into the spring months by Jarrod, including an anticipated rockfish/krill survey in late April/early May. Updates will be shared with the Working Group and the broader fleet.
Concentrations of whales	Low	The following criteria have been developed when considering relative risk of entanglements for season humpback whale migration patterns: High: running average >20 whales present Moderate: running average 5-20 whales present Low: running average <5 whales present Averages considered over sustained period of 1 week	Are whale concentrations moderate to high as of March 14? Are whale concentrations expected to be high in the near future (i.e., days)?	Karin Forney, Research Biologist with the Southwest Fisheries Science Center and Working Group advisor, presented a snapshot of seasonal humpback whale distribution information since 2012. This information can serve as an indicator for humpback whales' seasonal migration and anticipated departure from California feeding grounds. As of March 14, 2018, the 7-day composite running average of whale sightings in the southern Monterey Bay area is below 5 whales, which is within the low concentration range. Monterey Bay Whale Watch data: http://www.montereybaywhalewatch.com/slstcurr.htm Worked up Monterey Bay Whale Watch data: http://bit.ly/MidseasonWhaleData	Current reports from breeding grounds in Mexico and Central America indicate that the humpback whale migration north is not yet in full swing, and whales are expected to start arriving in greater numbers in April/May. Based on the information shared regarding anticipated spring forage/ocean conditions, humpback whale distribution is expected to be concentrated offshore around the canyon areas. There also may be lower numbers of humpback whales feeding inshore following the anchovy.	The agencies and whale researchers will continue to compile and analyze available data on whale concentrations (Monterey Bay Whale Watch, the Applied California Current Ecosystem Studies (ACCESS) and Oceanic Society). Additionally, 1-2 aerial surveys are planned for the Central Management Area in April/May/June (weather dependent). Efforts will also continue to understand relationships between whale concentrations and forage/ocean conditions. The commercial fleet and recreational fishing community will be updated about the status of whale concentrations and encouraged to consult best practices under conditions of low entanglement risk.