

California Dungeness Crab Fishing Gear Working Group
2017-18 Risk Assessment and Mitigation Program (RAMP) Pilot
Preseason Risk Assessment—Key Highlights and Next Steps
October/November 2017

On October 26 and November 6, 2017, the California Dungeness Crab Fishing Gear Working Group (Working Group) convened to discuss the relative risk of whale entanglements as the 2017-18 California Dungeness crab fishing season approaches. 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.

The following provides key highlights and next steps from the risk assessment process. This summary will be made publicly available via the Working Group's webpage and circulated via the Dungeness Crab Task Force (DCTF) email list and posted to the California Department of Fish and Wildlife (CDFW)'s Dungeness crab webpage.

For more information about the Working Group's efforts and the 2017-18 RAMP pilot, including opportunities to provide feedback and share your expertise, 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, please contact info@cawhalegroup.com.

Key Highlights, RAMP Pilot Preseason 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: season delay, forage/ocean conditions, whale concentrations, and rate of entanglements. *For a more detailed description of the RAF, see page x.* On October 26, 2017, the Working Group began discussing each factor and available information, and on November 6, 2017, the Working Group completed the pre-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.

- **Whale concentrations**

Risk level: Moderate

Guiding question: Are humpback whale concentrations moderate to high when the CA Dungeness crab fishery opens?

Data source: Monterey Bay Whale Watch data and NOAA-SWFSC Marine Turtle Ecology Assessment Program ([here](#))

Jarrod Santora, Associate Researcher at the University of California, Santa Cruz and Working Group advisor, presented a snapshot of seasonal humpback whale distribution information since 2010. This information can serve as an indicator for humpback whales' seasonal migration and anticipated departure from California feeding grounds. As of November 3, 2017, the 7-day composite running average of whale sightings southern Monterey Bay area is between 5 to 20 whales, which is within the moderate concentration range. The most recent aerial survey, conducted in September, indicated that whales were located both nearshore and offshore, and likely foraging on both krill and anchovy.

The Working Group acknowledged the available data for this factor is limited, and moving forward there is a need for both temporal (seasonal) and spatial data to inform the understanding of whale concentrations. The connection of the whale concentrations factor to each of the other factors (season delays, forage/ocean conditions, and entanglements) was discussed, and the group highlighted that improved whale distribution data collected closer to the start of the season would be informative.

Concern was expressed by the Working Group that the available data were limited to Monterey Bay, which may not be representative of whale patterns along the entire California coast. Additionally, weather and ocean conditions can also change rapidly between fall and winter and whales may shift their distribution over the coming weeks. Some members of the Working Group acknowledged the continued need to better understand and factor in the dynamic nature of whale behavior. The Working Group suggested that satellite tagging data be collected to better understand spatial and temporal patterns.

Based on the score of 'moderate risk', the Working Group (operating as an evaluation team) initiated discussions on what information is available and needed to continue to track this factor in the short-term. 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) and take steps to conduct an aerial survey in the Central Management Area between November 15-December 15 (weather dependent). Efforts will also be made to consider relationships between whale concentrations information and forage/ocean conditions data. The commercial fleet and recreational fishing community will be updated about the status of moderate whale concentrations and encouraged to consult best practices. The Working Group will continue to track progress via email, and a conference call may be convened to further track and discuss this factor.

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

Preseason risk level: Low

Guiding question: *Were there more than two humpback whale entanglements reported with California Dungeness crab fishing gear following the end of the 2016-2017 season?*

Data source: *NMFS October 29, 2017 update (see page 6)*

National Marine Fisheries Service (NMFS) confirmed that of the 6 entanglements confirmed after June 30, 2017, none were known to involve CA Dungeness crab fishing gear. The group discussed the value of considering post-season entanglement rates, including how/if this type of information can help to inform an understanding of relative risk prior to the start of the following season. The group expressed interest in gaining a more thorough assessment of possible patterns of post-season entanglements, clearer information on the origin of the entanglements, etc. in an effort to understand if there are any connections between summer/fall entanglements and relative risk for the CA Dungeness crab fishery. The group generally agreed that the gear marking recommendation made in September 2017 ([here](#)) would help to further inform this factor moving forward. Looking beyond the pilot, there was expressed interest to consider information from all entanglements reported in California waters.

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 geographic area or more than 5 entanglements of humpback whales occur in CA Dungeness crab fishing gear cumulatively within the 2017-18 fishing season.

- **Season delay**

Risk level: Low

Guiding question: *Are there indications the CA Dungeness crab fishing season will be delayed beyond February 1, 2018?*

Data source: <https://www.cdph.ca.gov/Programs/CEH/DFDCS/CDPH%20Document%20Library/FDB/FoodSafetyProgram/DomoicAcid/CrabDA17-18.pdf>

CDFW presented recent domoic acid test results (via the California Department of Public Health's (CDPH) website [here](#)) and confirmed there will be no delay in the Central Management Area (south of the Mendocino/Sonoma county line) as a result of elevated levels of domoic acid. While the area is slated to open on November 15, 2017, price negotiations may delay the opener, however there are no indications this delay would extend beyond the end of November. Domoic acid levels were elevated at some

northern sites (George's Reef, Eel River, and Usal), and it was unknown if elevated levels of domoic acid will persist beyond the traditional Northern Management Area opener of December 1. Additional sampling will be conducted in these northern areas, as two consecutive clean tests are required before CDPH will recommend opening an area. CDFW is also working with the fleet to perform crab quality testing. Should the Northern Management Area be delayed due to quality, the delay would occur in 15-day increments from December 1 and could not extend beyond January 15 unless domoic acid remains an ongoing issue (the health advisory in place for the start of the recreational season on November 4 splits the two northern management area fishing districts). It is unclear at this time whether any delay in the north could lead to increased fishing effort in the south since crabs appear to be more abundant in northern waters.

The Working Group discussed the potential consequences of a season delay, including a traveling fleet that could lead to effort shifts and increased concentration of gear in smaller areas. Gaining better and more real-time information to understand the movement of the fleet at the start of the season was deemed a priority, and it was highlighted that 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).

The status of delays, related to domoic acid, quality, and price negotiations, will continue to be tracked by CDFW and updates will be shared with the Working Group and the broader fleet. CDFW will be in direct communication with the fishing representatives on the Working Group within the first 8-10 days of the start of the season to gain an on-the-water picture of the general distribution of the fleet. Additionally, an aerial survey (coordinated by the Working Group) is scheduled between November 15-December 1 (weather dependent), which will also provide information on the distribution of the fleet in a portion of the Central Management Area. The Working Group will be convened if there are any indications of delays beyond February 1.

- **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: http://www.opc.ca.gov/webmaster/media_library/2016/08/

[Whales_SantoraForageReport_Pres_May2017.pdf](#) - presentation given by Jarrod Santora during the May 2017 Working Group meeting

Jarrod 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 atmospheric and oceanic models indicate a La Niña year is ahead, which typically supports a good krill year. This would lower the risk of humpback entanglements in Spring 2018. Anchovy populations are indicating a positive trend, which could bring humpbacks closer inshore, putting them at increased risk of entanglements. While additional monitoring is required into February/March, this mix of both forage species being present moving into the spring months could lead humpback whales to focus on both krill and anchovy.

The Working Group discussed the recent trends of juvenile humpback whales remaining in the Central Coast area over the winter months and not following traditional migration patterns. Additional information on these "resident" humpbacks will be important to consider as the group re-assesses risk in Spring 2018, and beyond.

Forage/ocean conditions will continue to be tracked by Jarrod and updates will be shared with the Working Group and the broader fleet. Fishermen are requested to share what they are seeing on the

water at the start of the season related to anchovy schools with Jarrod (jsantora@ucsc.edu). The Working Group will reassess this factor in February/March 2018 to help understand relative entanglement risk during the spring and summer.

Recommendation of an Additional Factor: Fleet Dynamics

During the November 6, 2017 discussion, the Working Group discussed the value of considering fleet dynamics as an additional priority factor. While information on fleet dynamics had been identified as a factor for a mid-season (Feb/Mar) risk assessment, this factor was identified to be important during the preseason assessment. This would help to evaluate potential/anticipated effort shift and gear concentrations in relation to season delays and crab abundance, and inform connections between anticipated fishing effort and whale concentrations. It was suggested that a survey of the number of traps and/or truck loads of traps coming into local ports would provide information on the relative concentration of gear in an area. This type of information would enable a more thorough assessment of the risk entanglements in the upcoming season by taking into account fishermen's business strategies.

Specific objective criteria and guiding questions require additional discussion. The Working Group will continue to discuss the value of this proposed factor and hone in on the guiding question, objective criteria, and data sources that are needed for an assessment.

Next Steps

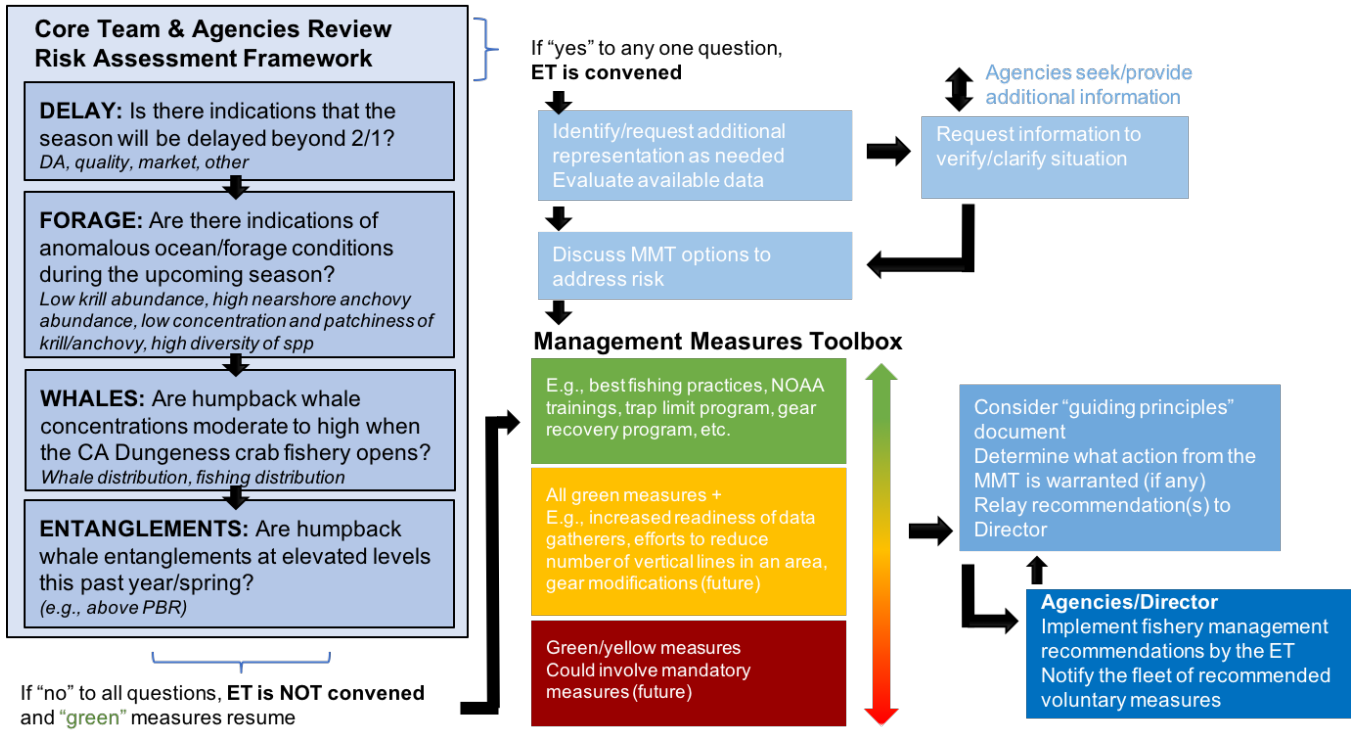
As outlined above, the Working Group will continue to work with agencies and researchers to evaluate, and be responsive to, relative risk of entanglements throughout the 2017-18 fishing season. Unless there are additional indications of elevated risk identified in the near-term, the group is scheduled to reconvene in February/March to conduct a mid-season 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. The 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 adjusted and fine-tuned, 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.

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	Preseason Risk Assessment	Guiding Question	Objective Criteria to Indicate Elevated Risk	Preseason Information Used to Inform Assessment	Comments/Notes	Next Steps
Concentrations of whales	Med	Are whale concentrations moderate to high when then fishery opens?	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	A snapshot of seasonal humpback whale distribution information provided an indicator for humpback whales' seasonal departure from California feeding grounds. As of November 3, 2017, the 7-day composite running average of whale sightings in the Monterey Bay area is between 5 to 20 whales, which is within the moderate concentration range. The most recent aerial survey, conducted in September, indicated that whales were located both nearshore and offshore, and likely foraging on both krill and anchovy. Monterey Bay Whale Watch data: http://www.montereybaywhalewatch.com/slstcurr.htm Worked up Monterey Bay Whale Watch data and NOAA-SWFSC Marine Turtle Ecology Assessment Program data: http://bit.ly/PreseasonWhaleData	Available data for this factor is limited, and moving forward there is a need for both temporal (seasonal) and spatial data to inform the understanding of whale concentrations. Improved whale distribution data collected closer to the start of the season would be informative, and an improved understanding of the connections between whale concentrations and the other factors (above). Concern that the available data were limited to Monterey Bay, which may not be representative of whale patterns along the entire California coast. Satellite tagging data would help to better understand spatial and temporal patterns.	Based on the score of 'moderate risk', the Working Group (operating as an evaluation team) initiated discussions on what information is available and needed to continue to track this factor in the short-term. - 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) and take steps to conduct an aerial survey in the Southern Management Area between November 15-December 15 (weather dependent). - Efforts will also be made to consider relationships between whale concentrations information and forage/ocean conditions data. - The commercial fleet and recreational fishing community will be updated about the status of moderate whale concentrations and encouraged to consult best practices
Entanglements in CA Dungeness crab fishing gear	Low	Were there more than 2 humpback whale entanglements reported with CA Dungeness crab gear following the end of the 2016-17 season?	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.	NMFS report, as of 10/10/2017: 2017- CA/OR/WA: 34 whale entanglements reported 2017- CA only report location: 29 whale entanglements reported (21 confirmed) 2017- CA only, Humpbacks: 11 reported (10 confirmed) 2017- CA only, Humpbacks, after 6/30/17 end of Dcrab season: 6 reported (6 confirmed) -> -0 confirmed in CA Dungeness crab fishery -1 confirmed in Sablefish/Coonstrip shrimp gear reported in Crescent City in July -1 confirmed in WA Dungeness crab tribal gear reported in San Diego in September -4 Unknown entanglements, line only- report locations: 1 San Diego in July , 2 in Monterey (August, October), 1 in Huntington Beach in September	Interest in gaining a better understanding of the connections between patterns of unknown entanglements during the summer/fall and relative risk for the Dungeness crab fishery. Importance of knowing more about the origin of entanglements, particularly those occurring close to the start of the CA Dungeness crab season. Gear marking recommendation could help with this.	Entanglements will continue to be tracked by NMFS and updates will be shared with the Working Group and the broader fleet. The Working Group will be convened if more than one humpback whale is entangled in a geographic area or more than 5 entanglements of humpback whales occur in CA Dungeness crab fishing gear cumulatively within the 2017-18 fishing season.
Season delay	Low	Are there indications that the season will be delayed beyond February 1, 2018?	Any delay (domoic acid, quality, market, etc.) that causes the season to start beyond February 1 in either management area.	CDFW confirmed there will be no delay in the CentralManagement Area (south of the Mendocino/Sonoma county line) as a result of elevated levels of domoic acid. While the area is slated to open on November 15, 2017, price negotiations may delay the opener, however there are no indications this delay would extend beyond the end of November. Domoic acid levels are elevated at some northern sites (George's Reef, Eel River, and Usal), and it was unknown if elevated levels of domoic acid will persist beyond the traditional Northern Management Area opener of December 1. Additional sampling will be conducted in these northern areas. CDFW is also working with the fleet to to perform crab quality testing and first round of testing took place on November 6. DA CDPH's website: https://www.cdph.ca.gov/Programs/CEH/DFDCS/CDPH%20Document%20Library/FDB/FoodSafetyProgram/DomoicAcid/CrabDA17-18.pdf Biotxin Monitoring Page: https://www.cdph.ca.gov/Programs/CEH/DRSEM/Pages/EMB/Shellfish/Marine-Biotxin-Monitoring-Program.aspx Additional reports: https://www.cdph.ca.gov/Programs/CEH/DRSEM/Pages/EMB/Shellfish/Marine-Biotxin-Monitoring-Reports.aspx	Discussed the potential consequences of a season delay, possible effort shifts and increased concentration of gear in smaller areas. Real-time information to understand the movement of the fleet at the start of the season is needed in the longer-term.	The status of delays, related to domoic acid, quality, and price negotiations, will continue to be tracked by CDFW and updates will be shared with the Working Group and the broader fleet. CDFW will be in direct communication with the fishing representatives on the Working Group with the first 8-10 days of the start of the season to gain an on-the-water picture of the general distribution of the fleet. Additionally, an aerial survey (coordinated by the Working Group) is scheduled between November 15-December 1 (weather dependent), which will also provide information on the distribution of the fleet in a portion of the Southern Management Area. The Working Group will be convened if there are any indications of delays beyond February 1.
Forage/ocean conditions	Low	Are there indications of anomalous ocean/forage conditions occurring during the 2017-18 fishing season?	Low krill, high anchovy abundance and density; El Nino; or high diversity of species, especially if there is a delay in the season.	Atmospheric and oceanic models indicate a La Niña year is ahead, which typically supports a good krill year. This would lower the risk of humpback entanglements in Spring 2018. Anchovy populations are indicating a positive trend, which could bring humpbacks closer inshore, putting them at increased risk of entanglements. While additional monitoring is required into February/March, this mix of both forage species being present moving into the spring months could lead humpback whales to focus on both krill and anchovy. Most recent ENSO forecast for winter 2017-18 (October 12): http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/enso_advisory/ensodisc.shtml	Discussed the recent trends of juvenile humpback whales remaining in the Central Coast area over the winter months and not following traditional migration patterns. Additional information on these potential "resident" humpbacks will be important to consider as the group re-assesses risk in Spring 2018.	Forage/ocean conditions will continue to be tracked by Jarrod and updates will be shared with the Working Group and the broader fleet. Fishermen are requested to share what they are seeing on the water at the start of the season related to anchovy schools with Jarrod (jsantora@ucsc.edu). The Working Group will reassess this factor in February/March 2018 to help understand relative entanglement risk during the spring and summer.