

**STATE OF CALIFORNIA
DEPARTMENT OF FISH AND WILDLIFE**

STD. 399 Addendum

[Amended per DOF Comments]

Proposed Addition of Section 132.8,
Title 14, California Code of Regulations (CCR)
Re: Risk Assessment Mitigation Program: Commercial Dungeness Crab

Economic Impact Statement

The proposed Risk Assessment Mitigation Program (RAMP) program must be implemented per the newly added Fish and Game Code (FGC) Section 8276.1. This regulation is necessary to reduce marine life entanglements in the California commercial Dungeness crab fishery. The marine life species considered for this regulation ("Actionable Species") are Blue Whales, Humpback Whales, and Pacific Leatherback Sea Turtles found in California crab fishing grounds.

This regulation complements other recent regulatory actions (1) to provide additional information on fishery of origin through a gear marking program (Section 122.1, the Standardized Trap Marking Program), and (2) to reduce entanglement and navigational hazards from lost or abandoned gear (Section 132.7, Lost or Abandoned Dungeness Crab Trap Gear Retrieval Program).

The commercial Dungeness crab fishery is governed by FGC sections 8275 *et seq* and implemented by regulations in sections 132.1 through 132.7, Title 14, CCR. These existing statutes and regulations address, among other things, season dates, season opening of the fishery after testing crab meat quality, and a tiered permitting structure and trap limit. Two environmental conditions (testing for human health risk from high levels of domoic acid pursuant to FGC Section 5523, and quality of crab meat pursuant to FGC Section 8276.2) have the potential to drive the economic impact of this fishery every season, based on delays, or time and area closures of the Dungeness crab fishery.

The California Department of Fish and Wildlife (CDFW), in consultation with the Dungeness crab Working Group and other stakeholders, drafted the proposed regulations to include information to assess risk of entanglements, thresholds/ triggers precipitating management action, and the set of management actions that could be taken to mitigate the risk. The proposed RAMP regulations also define Fishing Zones in which management actions may occur – based around subzones of currently commonly accepted management areas of the Northern Management Area (NMA, the California coast north of the Sonoma/Mendocino County line) and Central Management Area (CMA, the California coast south of the Sonoma/Mendocino County line), and a Pacific Leatherback Sea Turtle Foraging Area.

The RAMP regulations propose six management actions in response to changes in measures of entanglement risk. The management actions are proposed to be implemented solely or in combination, depending on the field of risk assessed.

The proposed RAMP regulations could result in economic and fiscal impacts if the implementation of management actions result in reductions in the quantity of Dungeness crab commercially harvested (i.e., ex-vessel value, or the season's crab harvest volume multiplied by the market price - direct expenditure). Management actions that could constrain harvest (temporally and spatially) include:

1. Delay start of the fishing season in 15-day increments
2. Early season closure
3. Depth Constraint
4. Reduction in gear
5. Closure of one or more fishing zone(s)
6. Closure of the entire fishery
7. Use of alternative gear

[Added per DOF comment]

The California RAMP regulations are not expected to affect the ability of California businesses to compete with other states. Even while RAMP has the potential to be more stringent, RAMP also will be much more adaptive in comparison to efforts in Washington and Oregon. Oregon and Washington's focus has been to reduce risk by alerting the fishing fleet to improve "best practices," shorten vertical lines, minimize surface gear and buoys. Oregon is putting increased attention on derelict gear retrieval and Washington has reduced the crab pots limits in the summer fishery. In comparison California is taking a more tailored risk reduction approach by assessing risk monthly based on available data and responding with specific fishery management actions to reduce risk. The RAMP management actions include fishing zones closure, depths restrictions and gear reductions.

Section B, Estimated Costs

The proposed action includes a new bi-weekly reporting requirement to convey the location, depth, and number of traps deployed. Collecting such baseline information will help the Department assess the level of entanglement risk with fishing effort, and need or effectiveness of management actions, such as gear reductions or closures. The Department considered shorter reporting timeframes (less than two weeks) and had concerns about the amount of workload it would create for both Department staff and permit holders. Longer reporting timeframes may not capture important changes in fishing dynamics in a timely manner. Updated information on all fleet activity is necessary to inform entanglement risk and appropriate management response. Requiring reports to be submitted via email or text is consistent with current communication among the fleet and is less burdensome for Department staff. The costs to affected permit holders is anticipated to be minimal in terms of time (less than 1 hour bi-weekly) with no new material costs.

[Added per DOF comments]

B.1. Total statewide dollar costs that businesses may incur to comply with this regulation over its lifetime? **\$6,758,282** over a full year of implementation (based on the Department's judgment of Scenario 2(a) being the most likely outcome, as further discussed below).

a. Initial costs for a small and typical business: **\$616.**

The new reporting requirement is estimated to take 4-6 hours to complete per season. Assuming an hourly wage rate of \$23.17 (for supervisors of fishing workers, Bureau of Labor Statistics, 2019), the annual cost per operator would range from \$93 to \$139 or an average of \$116/year. Additionally, for the mandatory electronic monitoring required by 2023, and based on costs associated with systems currently in pilot phase, the initial cost for setting up electronic monitoring of the depth of trap placements is estimated to cost \$500 per vessel. Resulting in $\$116 + \$500 = \$616$ initial costs for a typical and small business.

b. Annual ongoing costs for a small and typical business: **\$416.**

The ongoing costs for reporting is \$116 per vessel along with \$300 in ongoing costs of electronic monitoring resulting in $\$116 + \$300 = \$416$.

The proposed regulation ~~does not impose~~ may require some businesses, most of which are commercial fishermen operating under a Dungeness crab vessel permit to acquire new electronic monitoring equipment at an estimated \$500 in initial costs. All vessels would incur \$300 in ongoing costs for maintaining electronic monitoring. While some vessels currently have electronic monitoring systems that may comply with the new regulatory requirement, for a conservative estimate of costs we are assuming all vessels will incur both the initial cost for purchasing equipment and the same ongoing cost.

If the fishery conditions are such that no risks are sufficient to trigger a management action, no reduction in harvest capacities would be introduced by RAMP and thus the impact would be \$0 (as described in Scenario 1 in Table 1 below). However, if necessary, RAMP management actions could result in season delays, early closures, and/or a reduction in gear that could reduce the amount of Dungeness crab brought to market. The impacts on the total fishery and supporting businesses from a range of potential reductions in the direct expenditure from the seasonal Dungeness crab harvest is reported.

[Added per DOF comments]

Risk Factors Thresholds

Two main risk factors are central to the RAMP risk assessment determinations: 1) number of confirmed entanglements of Actionable Species and 2) the Marine Life Concentrations of those species. Given the inherent challenges of documenting confirmed entanglements and surveying marine life concentrations, criteria regarding the types of data acceptable to inform those risk factors are to be set in regulation to ensure that valid data is used to inform the risk factors analysis so that any conclusions drawn are reasonably supported and fully transparent.

The proposed trigger levels established in the risk assessment framework were produced through extensive discussions by the California Dungeness Crab Fishing Gear Working Group (WG) based on the best available science and interpretations of the relationship between concentration of whales and sea turtles on the fishing grounds and risk of entanglement (see ISOR).

The ongoing improvement of historical data series on Marine Life Concentrations and Confirmed Entanglements of Actionable Species is one objective of the RAMP program. Since the data collection and verification protocols are just being established for RAMP, precise estimates of the likelihood of the risk factors occurring are not derived as yet.

CDFW is working with NOAA and other research institutions to continue to refine historical data series, and further explore the development of predictive models that would enable likelihood estimations and additional risk factor thresholds that would trigger management actions.

While the collection of consistent historical data series to construct overlapping probability distributions is a goal in progress, provisionally, the CDFW Marine Region scientists' observations of the Dungeness Crab fishery support the view that the less restrictive Scenarios 2 (a) as described below is anticipated to be the most likely to occur in future fishing seasons. The Department anticipates it is likely there will be some combination of a delay and early closure in any given year (hence Scenario 2(a) as the most likely to occur); however given lack of information, that the proposed regulations are implementing previously untested management actions, and changing environmental conditions in any fishing season, it would be speculative to state which management actions are most likely to occur.

In order to fully evaluate the complete range of possible hypothetical RAMP outcomes, given the unknown combination of management actions that may be triggered, five potential scenarios are projected. With the scenario characteristics defined (season start, closure and whether gear must be reduced by 50% or not), historical data on weekly crab landings are drawn upon to estimate the potential loss in harvest that could occur under each scenario.

Range of Hypothetical Scenarios

Scenario 1 considers a season when triggers in the proposed RAMP regulation are never reached, and no management actions are implemented, thus no (\$0) reductions in harvest value to be brought to market. The season would open as usual without delay by Nov 15 in the CMA and Dec. 1 in the NMA, and close June 30 in the CMA and July 15 in the NMA, aside from any potential delay due to domoic acid or meat quality.

Scenario 2 considers a season that is not delayed (opener Nov. 15 for the CMA/ Dec. 1 for NMA) paired with a closure date that is likely due from the increased concentration of Actionable Species that return to California in the spring over the course of their yearly migrations. Entanglement triggers could cause an early closure date of April 1 [Scenario 2(b)] or May 1 [Scenario 2(a)], for a season of 4-5.5 months.

[Added per DOF comments]

The most likely Dungeness Crab season is Scenario 2(a). While it is difficult to predict which scenario will be most likely as the RAMP is implemented due to inadequate data on Actionable Species presence off the California coast on the time scale in which the RAMP will operate,, based on Actionable Species presence and experience during recent fishing seasons, Department staff anticipate Scenario 2(a) (in which there is no season delay from the season start dates for both management conditions with a closure on May 1, to be the most likely to occur. Scenario 2(a) accurately captures the total time limitations on fishing activity that are expected in any given year, even if the exact dates move slightly in either at either the beginning or end of the season, and thus is most likely to represent the anticipated economic impact on the fishery in any given year. In the following economic and fiscal impact Tables 1, 2, 4, 5, 6, and 10 Scenario 2(a) is labeled and highlighted.

Scenario 3 would be a season delay until Dec. 16 due to the continued presence of Actionable Species along the California coast, paired with a closure date of April 1 or May 1, similar to Scenario 2. Entanglement triggers could also cause an early closure date of April 1 [Scenario 3(b)] or May 1 [Scenario 3(a)], for a season of 3.5-4.5 months.

Scenario 4 would be a season delay until Dec. 31, along with an early closure date of April 1 or May 1, and the former date paired with a 50% gear reduction that occurs throughout the season. Entanglement triggers could also cause an early closure date of April 1 [Scenario 4(b)] or May 1 [Scenario 4(a)] and a 50% gear reduction throughout the season until April 1 [Scenario 4(c)].

Scenario 5 would be a full season closure. Delays in the fall, paired with confirmed entanglements, or continued whale presence in the Fishing Grounds could lead to a full season closure.

Table 1 shows the range of potential loss by area in ex-vessel value by scenario. The most likely Scenario2 (a), the second row, is highlighted in each impact table provided in the Addendum to the STD 399.

Table 1. Potential Dungeness Crab Fishery Ex-Vessel Losses by Area and Scenario (\$2019)

Scenario	Season Opener	Season Closure	Ex-Vessel Loss for NMA & CMA	Ex-Vessel Loss for PLSTFA
1	Nov 15 CMA/ Dec 1 NMA	June 30/ July 15	\$(0)	\$(0)
2(a)	Nov 15/ Dec 1	May 1	\$(3,395,824)	\$(1,933,520)
2(b)	Nov 15/ Dec 1	Apr 1	\$(5,844,192)	\$(3,383,503)
3(a)	Dec 16 Delay	May 1	\$(5,098,157)	\$(3,424,569)
3(b)	Dec 16 Delay	Apr 1	\$(7,718,055)	\$(5,070,407)
4(a)	Dec 31 Delay	May 1	\$(6,058,629)	\$(4,127,163)
4(b)	Dec 31 Delay	Apr 1	\$(9,081,668)	\$(6,023,837)
4(c)	Dec 31 Delay + 50% Gear Reduction (entire season)	Apr 1	\$(35,453,363)	n/a
5	Full closure due to RAMP	-	\$(61,825,058)	n/a

Notes: Pacific Leatherback Sea Turtle Foraging Area (PLSTA) overlaps into both the NMA and CMA. The management actions evaluated here would only impact that sub-area and are shown in a separate column.

Source: CDFW Marine Landings Data System

Using COFHE multipliers developed for the Dungeness crab fishery, the total statewide costs (losses in total economic output) are estimated to range between \$0 to \$119.6 million over the span of scenarios as shown in Table 2. The most likely Scenario2 (a), the second row, is highlighted in each impact table provided in the Addendum to the STD 399.

Table 2. Estimated Season-Long Total Economic Impact by Scenario (\$2019)

Scenario	Direct	Indirect	Induced	Employment	Total Economic Output
1	(\$0)	(\$0)	(\$0)	(0)	(\$0)
2(a)	(\$3,395,824)	(\$636,085)	(\$2,535,085)	(51)	(\$6,566,991)
2(b)	(\$5,844,192)	(\$1,094,699)	(\$4,362,865)	(88)	(\$11,301,751)
3(a)	(\$5,098,157)	(\$954,956)	(\$3,805,927)	(77)	(\$9,859,036)
3(b)	(\$7,718,055)	(\$1,445,700)	(\$5,761,760)	(116)	(\$14,925,506)
4(a)	(\$6,058,629)	(\$1,134,866)	(\$4,522,948)	(91)	(\$11,716,436)
4(b)	(\$9,081,668)	(\$1,701,123)	(\$6,779,737)	(137)	(\$17,562,519)
4(c)	(\$35,453,363)	(\$6,640,911)	(\$26,466,999)	(534)	(\$68,561,238)
5	(\$61,825,058)	(\$11,580,699)	(\$46,154,261)	(932)	(\$119,559,956)

Source: CDFW Marine Landings Data System, COFHE multipliers

Section B, Question 1. Total statewide dollar costs that businesses and individuals may incur to comply with this regulation over its lifetime **\$6,758,282**

[Added per DOF comments]

The new reporting requirement is estimated to take 4-6 hours to complete per season. Assuming an hourly wage rate of \$23.17 (for supervisors of fishing workers, Bureau of Labor Statistics, 2019), the annual cost per operator would range from \$93 - \$139. The reporting costs times the total (450-470) active permit holders would range from \$41,706 - \$65,339 for the minimum total annual costs. The initial cost for setting up electronic monitoring of the depth of trap placements is estimated to cost \$500 per vessel with \$300 in ongoing annual costs. If a closure or a reduction in gear is implemented for a certain location over a limited period of time, the most likely Scenario 2a would result in ex-vessel losses multiplied throughout the economy for total indirect costs of \$6,620,282, which including the ongoing costs of \$191,291 for all commercial Dungeness Crab fishermen yield the total economic impact of \$6,758,282.

Section B, Question 2. If multiple industries are impacted, enter the share of total costs for each industry.

Direct impacts from RAMP management actions would solely impact Dungeness crab fishermen. Impact on the fishermen would then indirectly impact supporting businesses. While there is variation from year to year, Dungeness crab fishermen have been found to spend about 33% of their gross revenue on operating expenses that constitute indirect expenditure flows to operations supporting businesses and to businesses involved in the processing and distribution of the harvest.

If fishermen are to reduce their operating expenditures, the share of impact to businesses that support the fishery operations are estimated to be: Fishing Gear, Hardware and Electronics Retailers (12%); Vessel, Engine, and Gear Maintenance and Repair (10%); Groceries, Ice, Bait, Fuel Purveyors (18%); Moorage to harbors, Accounting and Banking, Insurance, other fixed costs (23%); Crew income shares and taxes (37%).

The share of impact to businesses that are involved in the processing and distribution of the Dungeness crab harvest include: Processors (40%); Wholesaler/ Distributor (45%);

Retailer (7%); Restaurant/ Food Service (2.5%); Grocery/ Retail (2.5%) and Consumers (5.5%).

Section C, Question 3. *What are the total state-wide benefits from this regulation over its lifetime?* \$1,549,697 with the assumption of preventing 50% of the average number of historical entanglements.

[Added per DOF comments]

Entanglements Baseline and Assumptions used

Reported reductions in 2019 confirmed entanglements (NOAA, 2020, West Coast Large Whale Entanglement Response Program) may suggest that limited 2019 Dungeness crab fishery closures have contributed to reduced numbers of whale entanglements. However, forecasting the relative success of RAMP management actions at reducing bycatch is still unknown. Given that the RAMP program has not been enacted, a cautious approach to projecting the possible benefits was taken. We derived a range of for the monetary value per whale that was used to calculate the dollar value of saving 50% (25 whales saved), 75% (38 whales saved), or 100% (50 whales saved) of the five-year average number of west coast whale entanglements (refer to Table 13 of the SRIA). It must be noted that the benefits calculations incorporated the entanglement history for all species of whales: Humpback, Blue, Grey, and other or unidentified whales. While the proposed RAMP program focuses on the three Actionable Species, the program could contribute to reduced entanglement for all listed and non-listed whales which would benefit the whale-watching industry, provide ecosystem benefits and enhance non-use value benefits.

Reduced Marine Life Entanglements

The benefits of the proposed regulatory RAMP program are mitigation of the risk of marine life entanglements with commercial Dungeness crab gear. While there are a number of approaches to valuing environmental goods, this estimate of the benefits of marine life entanglement avoidance focuses more narrowly on the monetized market-traded direct uses, such as expenditures in the whale-watching industry, supplemented with monetized travel costs research. Whale-watching and the associated travel costs are considered non-consumptive direct use values. Whale-watching is an industry that draws value from an abundance of whales that will attract more whale-watchers. Whale-watchers derive value from the sighting of whales and in theory the ticket price along with the travel costs of getting to the shore equal the “price” of seeing whales. Therefore, for the purposes of this analysis, the value of the whale-watching industry is evaluated as a proxy for the value of an abundance of whales. The number of whales off the California coast at risk of entanglement in Dungeness crab gear is the other key factor in assigning a value for an individual whale.

A literature survey¹ of the economic contribution of the whale watching industry in California yielded an estimated \$44,614,500 to \$59,902,500 in direct expenditures annually. The multipliers for whale-watching tourism expand the initial direct expenditure to a range of \$127,819,900 to \$171,720,500 in total economic value for the whale-watching industry, which supports 79 jobs per \$1 million in direct expenditures.

¹ Erich Hoyt and E.C.M. Parsons (2014); Knowles, T., Campbell, R. (2011); Linwood Pendleton, (2006).

The next steps taken to arrive at the monetary value of an individual whale are shown below.

Total Economic Value of Whale-Watching Tourism

[Range = \$127,894,900 to \$171,720,050]

The travel cost research that traces the additional real costs of travel (e.g. gas and time) to estimate the consumer surplus of whale-watching beyond the direct ticket costs was also surveyed. Consumer surplus is the benefit that consumers reap, beyond what is paid for the experience.

Travel Cost as a Measure of Consumer Surplus

[Average total = \$52,400,00]

The average total travel costs value is added to the total economic impact of direct expenditures in the state. That sum was then divided by the number of whales of the species traveling in the water depths and areas that could be most likely vulnerable to entanglement with Dungeness crab gear lines. This provides a measure of the total economic value of the whale watching industry and travel cost consumer surplus per whale potentially protected by the RAMP.

$$(\$127,894,900 + \$52,400,00)/2,442 \text{ whales} = \$52,400 \text{ per whale}$$

$$(\$171,720,050 + \$52,400,00)/2,442 \text{ whales} = \$70,348 \text{ per whale}$$

For the purposes of this analysis, CDFW evaluated the benefits from a 50%, 75% and 100% reduction in whale entanglements in commercial Dungeness crab gear shown in Table 3.

Table 3. Value of Reduced Whale Entanglements (\$2019)

Range	\$ Value per whale	50% saved	75% saved	100% saved
low-end	\$52,400	\$1,323,100	\$1,984,650	\$2,646,200
high-end	\$70,348	\$1,776,295	\$2,664,442	\$3,552,590
Average in the range	\$61,374	\$1,549,697	\$2,324,546	\$3,099,395

Sources: CDFW Analysis; with data from: NOAA Whale Entanglement Reports 2015-2019; Jay Barlow and Karin A. Forney. 2007; Erich Hoyt and E.C.M. Parsons (2014); Knowles, T., Campbell, R. (2011); Linwood Pendleton, (2006).

Section D. Alternatives to the Regulation, Question 2. Summarize the total statewide costs and benefits from this regulation and each alternative considered.

Regulation Benefit: Ranges from **\$1.3M to \$3.5M**; most likely benefit as would occur under Scenario 2(a) = 50% of potential entanglements are avoided = \$1.5M (highlighted in Table 3 above).

Based on a most likely fishing Scenario 2(a), and in order to avoid overestimating the benefit, for the purposes of completing this economic analysis a 50% reduction in entanglements is the most likely outcome from implementation of fishing Scenario 2(a). However, while the Department fully anticipates this regulation will reduce whale entanglements in the fishery, it is difficult to predict the actual scale at which that will occur in any given season. Other Scenarios would likely lead to increased reduction in

entanglements (for example, a full closure in Scenario 5 would lead to a 100% reduction in entanglements).

Regulation Cost: Reporting costs range from \$41,706 to \$65,339 + Potential Output loss range from \$0 to 119,559,956 = a range of \$41,706 to \$119,601,662. The most likely total statewide costs as would occur under Scenario 2(a) = Total reporting and monitoring costs average \$53,522 + \$138,000 + Potential Output loss \$6,556,991 = \$6,758,282 or about \$6.8M.

NEW Table 4. Regulation Total Statewide Benefits and Costs (\$2019)

Scenario (see Table 1 above)	Regulation Benefit:	Regulation Cost:
Most Likely Scenario 2(a)	\$1.5M	\$6.8M
Full range of potential Scenarios	\$1.3 to \$3.5M	\$41.7K to \$119.6M

CDFW implementation and enforcement costs totaling \$509,129 annually are reported in the Fiscal Impact Statement section, B. Fiscal Effect on State Government.

Through consultation with the Working Group and other stakeholders, a number of alternative management strategies were considered for inclusion in the RAMP regulations that were not ultimately selected. There were challenges to precisely monetize the costs and benefits of each, so the rationale for rejecting the strategies and relative costs and anticipated benefits of each are discussed below.

Include Other Fisheries

CDFW considered whether to expand the scope of this rulemaking to include other commercial and recreational fishing sectors that pose an entanglement risk to marine life. Senate Bill 1309, which grants CDFW authority to implement this program, is only applicable to commercial Dungeness crab and did not contemplate other fishery sectors. While including other fisheries could provide the benefit of reduced marine life entanglement, the economic impact of the management actions on the additional fisheries would result in much higher economic impacts than would occur under the RAMP program as proposed.

Include Other Actionable Species

In considering which Actionable Species to include within the RAMP, CDFW examined confirmed entanglements in California commercial Dungeness crab fishing gear. Although Grey Whales have been entangled in California commercial Dungeness crab fishing gear, they were not included as part of this rulemaking because the Eastern North Pacific population, once listed as endangered under the Endangered Species Act (ESA), has successfully recovered and was delisted in 1994. All Actionable Species are still listed under the ESA, indicating the populations are at a higher risk and may be more impacted on a population scale by entanglements. Additionally, the proposed RAMP regulations are intended inform CDFW draft Conservation Plan which will be part of CDFW's application for an Incidental Take Permit (ITP) under Section 10 of the federal Endangered Species Act. Furthermore, work done by the Working Group in developing the pilot risk assessment program did not include grey whales. Other species of whales and sea turtles have not been observed entangled in commercial California Dungeness crab gear. Including a broader list of actionable Species would potentially

lead to more closures of the fishery and thus the economic impacts could be much higher than the RAMP program as proposed. Any measures implemented to reduce the risk of entanglement will provide similar protections for other marine life not specifically included in this rulemaking.

Higher Entanglement Triggers

In developing triggers for entanglements, CDFW considered guidance from NOAA and other applicable federal laws governing species of concern (Marine Mammal Protection Act (MMPA) and Endangered Species Act (ESA)). Because this rulemaking will form an integral part of the Department's application for an Incidental Take Permit (ITP), triggers must be set at a level that are not likely to cause jeopardy to the identified species. Setting higher triggers could result in a jeopardy determination by NOAA and preclude CDFW from receiving an ITP. A jeopardy determination by NOAA could also lead to a full closure of the fishery, which would entail similar economic impacts as Scenario 5.

Additional Data Sources to Inform Marine Life Concentrations

In collaboration with the Working Group and its advisors, CDFW evaluated several data sources to determine their suitability for assessing marine life concentrations in California waters. While many data sources showed promise, CDFW determined they were not appropriate for inclusion in this rulemaking due to limited spatiotemporal scope, lack of standardized data collection methodologies, lags between data collection and availability for management, and/or lack of a direct connection between information and entanglement risk. Use of additional data sources, if deemed appropriate, could provide a clearer picture of risk of entanglement and possibly reduce the need for season closures, reducing economic impacts to the fishery. However, relying on data sources that are not suitable due to limited scope and applicability could also result in underestimation of the entanglement risk, which would potentially lead to increased entanglements that could result in a closure of the fishery.

Incorporating Predictive/ Forecasting Models

In collaboration with the Working Group and NOAA scientists, CDFW has explored the use of various predictive models to predict species distribution and associated entanglement risk in specified times and/or areas. Better modeling data, could provide a clearer picture of risk of entanglement and possibly reduce the need for season closures, reducing economic impacts to the fishery. However, these models are still under development and were not available for consideration at the time of this rulemaking. Once model development and testing has been completed, CDFW will consider their inclusion through a future rulemaking.

Additional Management Actions

Static Season Structure

The season structure in the proposed regulations, including potential delays and/or closures, was developed to allow for adaptive in-season management based on demonstrated entanglement risk. CDFW discussed whether to utilize a more static approach where allowable fishing periods were defined prior to the season opening, with no in-season adjustments made. Performance of the fishery relative to entanglement risk would then be assessed at the end of the season, and any changes deemed necessary applied to the following season.

While a static management approach would provide certainty to the fleet, it could result in a fishing season that is unnecessarily restrictive and punitive, which would have negative economic consequences without necessarily reducing entanglement risk. Conversely, the absence of in-season management measures may not provide the necessary protections for species of concern by allowing fishery operations that result in excessive entanglements to continue. Given that this fishery is highly influenced by changing environmental conditions, CDFW determined in-season management provided a balanced approach between providing for economic stability of coastal communities and environmental protections.

Confirming Gear Reduction

Requiring individuals to double tag their buoys (use two tags instead of one) during the 50% gear reduction management action was an option discussed to confirm gear reduction compliance, since fisherman would need to take half of their 500-tag allotment and affix them to a maximum of 250 buoys. While it could confirm that fisherman had reduced the amount of gear in the water, it would dramatically increase enforcement costs for CDFW since the current requirement is for them to keep the 250 unused tags in a location on their vessel, which can quickly be verified versus checking hundreds of unique buoys

In view of information currently possessed, no reasonable alternative considered would be more effective in carrying out the purpose for which the regulation is proposed, would be as effective and less burdensome to affected private persons than the proposed regulation, or would be more cost effective to affected private persons and equally effective in implementing the statutory policy or other provision of law.

Section D. Alternatives to the Regulation, Question 3. *Briefly discuss any quantification issues that are relevant to a comparison of estimated costs and benefits for this regulation or alternatives.*

Calculating a dollar value for a resource such as a whale or sea turtle, which is not commercially harvested, and thus does not have a recognized ex-vessel dollar value and is not recreationally harvested with known angler expenditures per day, requires the use of other valuation methods. These methods may be used singularly or in combination in the exercise of assigning a monetary value to the preservation of whales, turtles, and other marine life threatened by Dungeness crab gear.

Figure 1 below summarizes some commonly utilized methods to assess the value of non-market traded environmental goods.

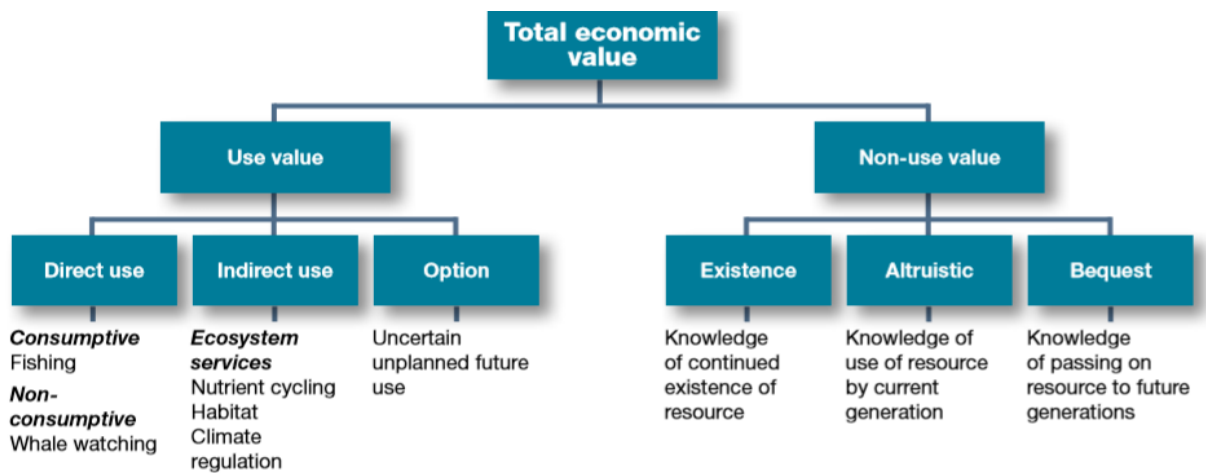


Figure 1. Total Economic Value Framework, conceptual. Source: Tinch & Mathieu, 2011. This image describes “Use” and “Non-Use” values that make up total economic value. Under “Use,” are consumptive (e.g., fishing), non-consumptive (e.g., whale watching), ecosystem services, and options for future use. Under “Non-Use,” “Existence,” “Altruistic” and “Bequest” show knowledge of continued existence of resource, knowledge of resource by current generation, and knowledge of passing on resource to future generations.

While any anticipated ecosystem services benefits, aesthetic benefits and other non-use values are difficult to monetize, it is worth recognizing that especially for rare and charismatic wildlife, non-use values are likely to be quite substantial for residents in and out of California. Many people value and express a willingness to pay to protect whales, even if they do not expect to ever see them. This type of value, “existence value” is on the right-side of Figure 1 above, along with “altruistic” and “bequest” values. These non-use values could be very important - but given that they would require more extensive and careful surveying of public sentiments than time permitted, this analysis concentrated on the less-disputable expenditure research.

Fiscal Impact Statement

A. Fiscal Effect on Local Government

Answer 6. Other. Explain Estimated local governments fiscal impact (\$664).

Fishery and Associated Tax Revenue Impacts

This regulation does not affect any local entity or program. No reimbursement is required by this act pursuant to Section 6 of Article XIII B of the California Constitution. The underlying basis for the state and local, and business tax projections is that the Dungeness crab fishermen and associated businesses utilize goods and services of other industry sectors when conducting their fishing: boat fuel, food, bait, ice, insurance, rental storage, and other various operational needs. In purchasing these goods and services from other industry sectors, local taxes are paid on the transactions. As expenditures originating with the Dungeness crab fishery ripple through the economy there is an additive effect on the economy; these are the culmination of the direct, indirect, and induced effects and are captured in the multiplier coefficients.

The impact on business tax revenue is projected for the estimated loss in ex-vessel value by Scenario in Table 4. The most likely Scenario2 (a), the second row, is highlighted in each impact table provided in the Addendum to the STD 399. The local government business tax impact alone is \$(500).

Table 5. Projected by Scenario: Business Tax Revenue (\$2019)

Scenario	Direct	Indirect	Induced	Total Effect
1	(\$0)	(\$0)	(\$0)	(\$0)
2(a)	(\$229,741)	(\$2,959)	(\$10,088)	(\$28,590)
2(b)	(\$395,383)	(\$5,093)	(\$17,361)	(\$49,203)
3(a)	(\$344,911)	(\$4,443)	(\$15,145)	(\$42,922)
3(b)	(\$522,157)	(\$6,726)	(\$22,927)	(\$64,979)
4(a)	(\$409,890)	(\$5,280)	(\$17,998)	(\$51,008)
4(b)	(\$614,411)	(\$7,914)	(\$26,978)	(\$76,459)
4(c)	(\$2,398,562)	(\$30,896)	(\$105,318)	(\$298,484)
5	(\$4,182,713)	(\$53,878)	(\$183,659)	(\$520,509)

Source: CDFW Marine Landings Data System, COFHE multipliers

State and Local Tax

The impact on the combined state and local tax revenue is projected for each defined scenario based on the COFHE multipliers for the Dungeness crab fishery in Table 5. The most likely Scenario2 (a), the second row, is highlighted in each impact table provided in the Addendum to the STD 399. The local government sales tax impact alone is \$(164).

Table 6. Projected by Scenario: State and Local Tax (\$2019)

Scenario	Direct	Indirect	Induced	Total Effect
1	(\$0)	(\$0)	(\$0)	(\$0)
2(a)	(\$113,543)	(\$739)	(\$6,086)	(\$9,369)
2(b)	(\$195,407)	(\$1,273)	(\$10,475)	(\$16,124)
3(a)	(\$170,463)	(\$1,110)	(\$9,137)	(\$14,065)
3(b)	(\$258,062)	(\$1,681)	(\$13,833)	(\$21,293)
4(a)	(\$202,577)	(\$1,319)	(\$10,859)	(\$16,715)
4(b)	(\$303,656)	(\$1,978)	(\$16,277)	(\$25,055)
4(c)	(\$1,185,422)	(\$7,720)	(\$63,543)	(\$97,813)
5	(\$2,067,189)	(\$13,463)	(\$110,810)	(\$170,570)

Source: CDFW Marine Landings Data System, COFHE multipliers

B. Fiscal Effect on State Government

1. Additional expenditures in the current State Fiscal Year. The California Department of Fish and Wildlife (CDFW) is projected to spend roughly \$95,000 in regulation development (including preparation of the SRIA) and outreach in the year preceding the promulgation of the proposed regulations in 2020.

A. Absorb these additional costs within existing budgets and resources. No Budget Change Proposals (BCPs) are proposed to date.

Additional Ongoing CDFW Expenditures

Thereafter additional expenditures and revenue losses are foreseen for CDFW for the first year of implementation and in the following two+ years.

Existing Whale Safe Program Costs

In response to increasing numbers of whale entanglements since 2015, a FY2018-2019 Budget Change Proposal (3600-016-BCP-2018-GB) included the request for \$500,000 to create two new PYs to initiate a program that would evaluate entanglement risk in real-time, and coordinate as needed with the Dungeness crab fleet, NMFS, NGOs and others on the appropriate response options. The request was approved for FY2019 and two Marine Region staff were hired to form the Whale Safe Fisheries project. Responsibilities include coordination of the Dungeness Crab Fishing Gear Working Group as well as implementation of the RAMP pursuant to FGC Section 8276.1.

Projected RAMP Implementation Costs

Implementation of the proposed RAMP regulations will trigger additional program costs to the existing Whale Safe Program and other CDFW programs. It is anticipated that this funding will remain in place during FY2020-21 to continue supporting the PY's assigned to the Whale Safe Fisheries project. A breakdown of anticipated staff costs are displayed in Table 6.

Responsibilities include:

- Conducting aerial surveys commencing October 1 until the season opens statewide to provide information on the number and distribution of whales remaining in Dungeness crab Fishing Grounds as they migrate south to their winter breeding grounds. Based on historical migratory patterns, species expected to depart California waters in late fall, so the surveys would trail off at that point, and resume in the spring (as noted above).
- Performing risk assessment starting November 1 so that a first evaluation may be completed in time to inform the risk level of a traditional season opener on November 15 as well as any necessary management action based on that evaluation.
- Continuing risk assessments at the minimum monthly frequency throughout the season. Additional work and coordination amongst the possibility of domoic acid or meat quality concerns means that the season could open in any month within the Fishing Season. The requirement to evaluate risk only lasts through July 15 or as long as the season is open because evaluation of risk is not critical when the fishery is closed; without fishing gear in the water the risk of entanglement is only from lost or abandoned gear, which are not addressed through this program. However, the Director may choose to perform a risk analysis at any time.
- Convening the Working Group to conduct the risk assessment, evaluate next steps, and if warranted, propose recommendations for Director's management actions.
- Management actions set in motion require notification to the affected fishermen, and the public pursuant to the notification section in the regulations.

[Added per DOF comments]

Additionally, the state of California is anticipated to experience a reduction in business taxes of \$(28,090) and sales taxes of \$(9,205) summing to **\$(37,295)**.

Table 7. Estimated Staffing Costs for FY2020-2021 for Implementation of RAMP Regulations

Classification	PY	Benefits ¹	Monthly Salary ²	Annual	% Time	Projected
Env. Prog. Mgr I	0.20	\$6,673	\$12,655	\$231,933	20%	\$46,387
Env. Sci (Range B)	1.00	\$2,765	\$5,244	\$96,103	100%	\$96,103
Env. Sci (Range B)	0.20	\$2,765	\$5,244	\$96,103	20%	\$19,221
Sr. Env. Sci (Spec)	1.00	\$4,033	\$7,648	\$140,164	100%	\$140,164
Sr. Env. Sci (Sup)	0.10	\$5,423	\$10,395	\$190,520	10%	\$19,052
Sum	2.5				<i>subtotal</i>	\$320,927
		Overhead ³	24.32%			\$78,049
					Total	\$398,976

¹ Staff Benefit rate FY 2018-2019 is 52.734% (Dept. Budget Memo dated 9/18/2018)

² Staff Payscales (CalHR 01/08/2020)

³ Staff Overhead rate FY 2019-2020 is 24.32% Non-federal (Dept. Budget Memo 6/26/2019)

Aerial Surveys

CDFW will support and work closely with NOAA staff to build staff capacity and training tools to support aerial survey work for RAMP. Annual costs will include aircraft time, pilot and additional observer costs (Table 7).

Table 8. Estimated Staffing Costs for FY2020-2021 for Aerial Surveys

Item	Description	Unit	Quantity	Rate	Projected Cost
Aircraft contract	Airtime	hour	100	\$650	\$65,000
Pilot Expenses	Travel, tie-down etc.	person-days	10	\$350	\$3,500
Observer Travel	Travel, data collection	person-days	30	\$200	\$6,000
Observer Cost	Day rate	person-days	30	\$400	\$12,000
Supply Purchases	Data recording	variable	1	\$5,000	\$5,000
				Total	\$91,500

Source: Marine Region information

Enforcement costs

In addition to Whale Safe Program costs with implementation of the RAMP regulations, CDFW would incur patrol costs for law enforcement of management actions implemented by the Director (Table 8). This involves CDFW resources including large patrol vessels, crews, aircraft patrol, lieutenants and wildlife officers. These patrol costs are estimated separately as they would only be needed for management actions put into place once the Dungeness crab fishery is already open, the frequency of which those actions are required is unknown for purposes of this analysis.

Table 9. Law Enforcement Patrol Costs Per Management Action Implemented (2 day aerial patrols, 3 day large vessel patrols)

F & G Classification	Activity	Benefits¹	Monthly Salary²	Hourly Rate	Patrol Unit (hours)	Projected
Captain	Supervision	\$5,768	\$9,463	\$92.49	4	\$370
Lieutenant Supervisor	Supervision	\$5,031	\$8,254	\$80.68	16	\$1,291
<i>Large Patrol</i>	<i>Vessel</i>			\$202	24	\$4,848
Lieutenant Specialist	Patrol	\$4,543	\$7,452	\$72.84	24	\$1,748
Warden	Patrol	\$3,781	\$6,202	\$60.62	24	\$1,455
Warden	Patrol	\$3,781	\$6,202	\$60.62	24	\$1,455
<i>Aircraft Patrol</i>				\$116	16	\$1,856
Warden Pilot	Patrol	\$5,070	\$8,317	\$81.29	16	\$1,301
Warden	Patrol	\$3,781	\$6,202	\$60.62	16	\$970
					<i>subtotal</i>	\$14,924
		Overhead ³	24.32%			\$3,629
F&G= Fish and Game				Total		\$18,553

¹ Peace Officer Staff Benefit rate FY 2018-2019 is 60.960% (Dept. Budget Memo dated 9/18/2018)

² Staff Payscales (CalHR 01/08/2020)

³ Staff Overhead rate FY 2019-2020 is 24.32% Non-federal (Dept. Budget Memo 6/26/2019)

There are many unknown variables associated with patrols and enforcement costs. In general, the estimates provided above for a two-day aerial patrol, and a three-day large vessel patrol would capture the time spent in enforcement of a single management action, particularly actions taken after the season is already underway to ensure that no further take of Dungeness crab is occurring. These patrols would be utilized for enforcement of management actions 2-5 described as part of the regulatory proposal, including management area closures, 50% reduction in gear, depth or area restrictions, and full closure.

It is particularly difficult to estimate enforcement costs for management action 6 (alternative gear) because of several unknowns, including the types of gears CDFW will certify through its process listed in the last subsection of the proposed regulations. After the certification process is implemented and requests are received and approved, CDFW law enforcement will have a better sense of the gear approved, how it operates, whether additional training or equipment is needed, and if there are variations in what may be needed to ensure compliance.

4. Other. Explain CDFW Landings Fee Revenue Losses

The CDFW anticipates losses in Dungeness Crab Landings Fee revenue depending on the RAMP management actions taken. Pursuant to FGC Section 8051, the landing fee for Dungeness crab is \$0.0333 per pound. The impact on CDFW landings fee revenue is projected with the estimated losses in ex-vessel value per case scenario (Table 9). CDFW could expect to lose between zero dollars for Scenario 1 to a maximum of

\$2,057,628 for Scenario 5 per fiscal year of full implementation (FY 2020/21). The anticipated revenue loss is also projected for the subsequent two fiscal years, 2021/22 and 2022/23. The most likely Scenario2 (a), the second row, is highlighted in each impact table provided in the Addendum to the STD 399.

Table 10. Projected CDFW Landings Fee Revenue Impact by Scenario (\$2019)

Scenario	Ex-Vessel Loss	Landings Fee Loss FY1	Landings Fee Loss FY2	Landings Fee Loss FY3
1	(\$0)	(\$0)	(\$0)	(\$0)
2(a)	(\$3,395,824)	(\$113,081)	(\$113,081)	(\$113,081)
2(b)	(\$5,844,192)	(\$194,612)	(\$194,612)	(\$194,612)
3(a)	(\$5,098,157)	(\$169,769)	(\$169,769)	(\$169,769)
3(b)	(\$7,718,055)	(\$257,011)	(\$257,011)	(\$257,011)
4(a)	(\$6,058,629)	(\$201,752)	(\$201,752)	(\$201,752)
4(b)	(\$9,081,668)	(\$302,420)	(\$302,420)	(\$302,420)
4(c)	(\$35,453,363)	(\$1,180,597)	(\$1,180,597)	(\$1,180,597)
5	(\$61,825,058)	(\$2,058,774)	(\$2,057,628)	(\$2,057,628)

Source: CDFW Marine Landings Data System

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