

STATE OF CALIFORNIA
FISH AND GAME COMMISSION
INITIAL STATEMENT OF REASONS FOR REGULATORY ACTION
(Pre-publication of Notice Statement)

Add Section 128
Title 14, California Code of Regulations
Re: Commercial Taking of Sea Cucumber

- I. Date of Initial Statement of Reasons: July 11, 2017
- II. Dates and Locations of Scheduled Hearings:
 - (a) Notice Hearing: Date: June 22, 2017
Location: Smith River, CA
 - (b) Discussion Hearing: Date: August 16, 2017
Location: Sacramento, CA
 - (c) Adoption Hearing: Date: October 12, 2017
Location: Atascadero, CA

III. Description of Regulatory Action:

- (a) Statement of Specific Purpose of Regulation Change and Factual Basis for Determining that Regulation Change is Reasonably Necessary:

The proposed addition of Section 128, Title 14, California Code of Regulations (CCR), Commercial Take of Sea Cucumber, is necessary because research and fishery analyses detail concerning trends regarding the warty sea cucumber commercial fishery and indicate that the continued unregulated harvesting of warty sea cucumber during their spawning period poses a significant risk to the sustainability of this fishery.

Current Laws

Current laws for the commercial sea cucumber fishery are found in Fish and Game Code (FGC) sections 8405, 8405.1, 8405.2, and 8405.3. These statutes are permissive with only permits and permitting provisions for the sea cucumber fishery (e.g., gear type, fees, records, renewal, transfer, and number of permits).

The commercial sea cucumber fishery is a limited entry fishery with separate permits for the dive and trawl fisheries, which primarily target warty (*Apostichopus parvimensis*) and giant red (*Apostichopus californicus*) species, respectively. In 2016, 82 dive permits and 16 trawl permits were issued. A trawl

permit can be converted to a dive permit during a transfer, but a dive permit cannot be converted to a trawl permit (Section 8405.2, FGC). Regardless of the permit type, all commercial sea cucumber fishermen are required to fill out a commercial fishing log detailing their daily fishing activities (Subsection 8405.1(c), FGC).

There are currently no seasons, size limits, catch limits, or limits on dive gear usage (e.g., SCUBA and surface supplied air) for the sea cucumber dive fishery. However, under FGC subsection 8405.3(a), the Fish and Game Commission (Commission) has the authority to adopt regulations that are reasonably necessary to protect the sea cucumber resource, to assure a sustainable sea cucumber fishery, or to enhance enforcement activities.

From 2013-2016, the Department of Fish and Wildlife (Department) conducted fishery analyses and collected additional essential fishery information required to inform the development of management measures for the fishery. At the March 2017 meeting of the Commission's Marine Resource Committee, the Department presented its research findings and status of the warty sea cucumber commercial fishery. Based on the analysis and feedback from the fishery in the "2014 CDFW Sea Cucumber Diver Survey: Summary of Key Results" (Attachment 1), the Department recommended a seasonal closure as the initial step for addressing sustainability concerns with the fishery.

The Department developed three seasonal closure options for consideration by the Commission after an evaluation of fishery trends, reproductive patterns of the species, and meetings with commercial sea cucumber divers in March and April of 2017. If adopted, the Department is committed to evaluating the effectiveness of the seasonal closure and working with the fishery and others to develop additional management measures pursuant to goals and objectives of the Marine Life Management Act (Section 7050, et seq., FGC).

Current global demand and almost a complete lack of regulations for the fishery will continue to put the fishery at risk, if no action happens. Sea cucumber fisheries around the world that have shown similar trends have resulted in localized depletion and/or collapse of the fishery due to many of the fisheries developing faster than management can respond (Anderson, 2011). In addition, effective management measures for sea cucumber fisheries have been particularly difficult to develop, as many species are data poor, display late maturity, are long lived, have low rates of recruitment, and exhibit density-dependent reproduction.

Fishery Analyses Key Findings

The first recorded commercial landings of warty sea cucumber occurred in 1980, with landings remaining relatively low until 1990 (Figure 1). From 1990 to 1998,

landings went from 50,000 pounds to over 600,000 pounds as market demand increased. The rapid increase in value from 2005 to 2011 is due to the recent increase in market demand from foreign markets resulting in a dramatic increase in the ex-vessel price paid per pound (Figure 2). Global harvest of sea cucumber has expanded greatly in recent times to meet growing demand in Asia. A study examining the global impacts of this demand found that 81 percent of 37 global fisheries have experienced population declines due to overexploitation and that new sea cucumber fisheries expanded five to six times faster in the 1990's than they did in the 1960's.

1. **Since 2011, landings and ex-vessel value have declined sharply with 2016 landings at a 20-year low and value at an 11-year low (Figure 1). The decline in ex-vessel value has occurred despite the average ex-vessel price per pound increasing (Figure 2).**

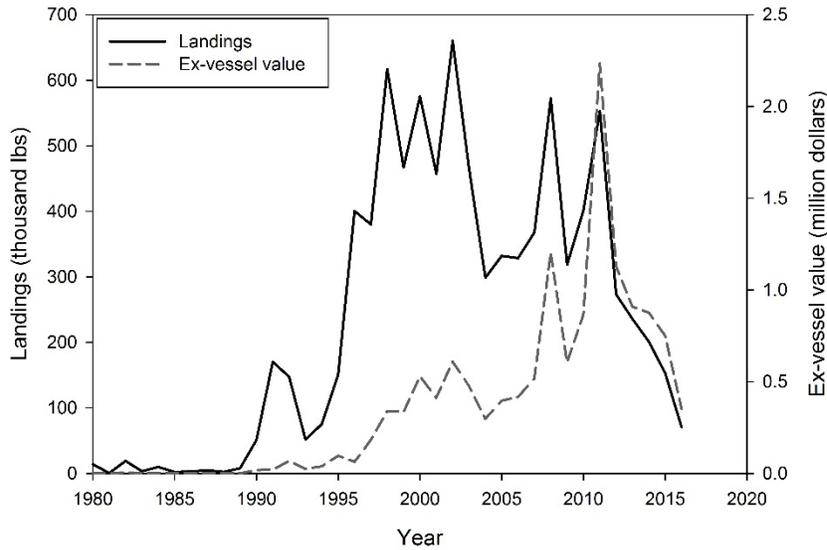


Figure 1. Sea cucumber dive landings and total ex-vessel value from 1980-2016. Data source: CDFW landings data.

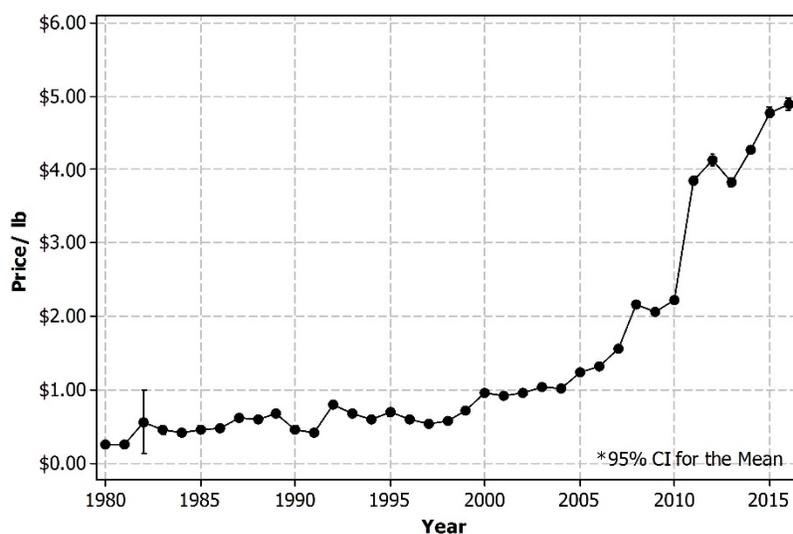


Figure 2. Average price per pound paid for sea cucumber harvested by the commercial dive fishery from 1980-2016. Lines extending from the averages indicate 95% confidence intervals of the average. Data source: CDFW landings data.

In 2011, the total ex-vessel value for the commercial fishery reached a record high of \$2.2 million and landings reached approximately 553,000 pounds. While the average price per pound continued to increase to a record high in 2016 (Figure 2), both annual ex-vessel value and landings have declined continuously since 2011, with 2016 ex-vessel value reaching an 11-year low of approximately \$353,000 and landings reaching a 20-year low of approximately 66,000 pounds (Figure 1). The Department is aware that landings data are influenced by sea cucumbers being landed in both an eviscerated (cut) and whole (un-cut) state; however, the Department has found that declines in landings cannot be fully explained by changes in processing practices alone.

According to the 2014 Sea Cucumber Diver Survey (Attachment 1), a majority of individuals believed that the change in processing occurred sometime between 2008 and 2010. Looking at the period from 2008 to 2010 as the most relatable to current processing practices, a continued declining trend from this earlier period until now can be assumed. In addition, the total ex-vessel value has also reached an 11-year low in 2016, suggesting that regardless of landing condition (cut vs. un-cut) the fishery is generating increasingly less ex-vessel value. Considering that demand for sea cucumber is on the rise, as evidenced by the average price/lb continually increasing (Figure 2), it is concerning that landings are trending down as this is a classic example of market demand exceeding the ability of the resource to sustain itself. Sea cucumber and other fisheries that have collapsed in the past typically show similar trends in increasing value and decreasing catch.

2. Dive catch per unit effort has declined sharply over the history of the fishery (Figure 3).

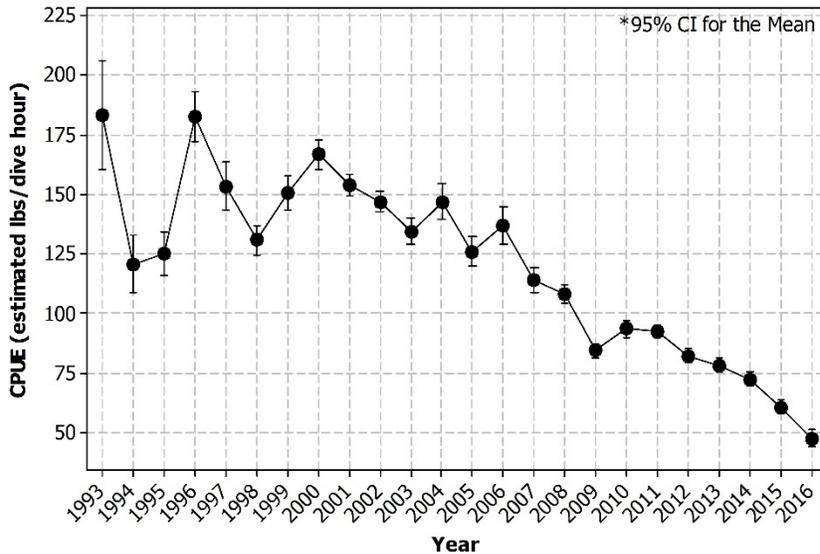


Figure 3. Average catch per unit effort (CPUE) for the commercial dive fishery from 1993-2016. Lines extending from the averages indicate 95% confidence intervals of the average. Data source: CDFW landings data.

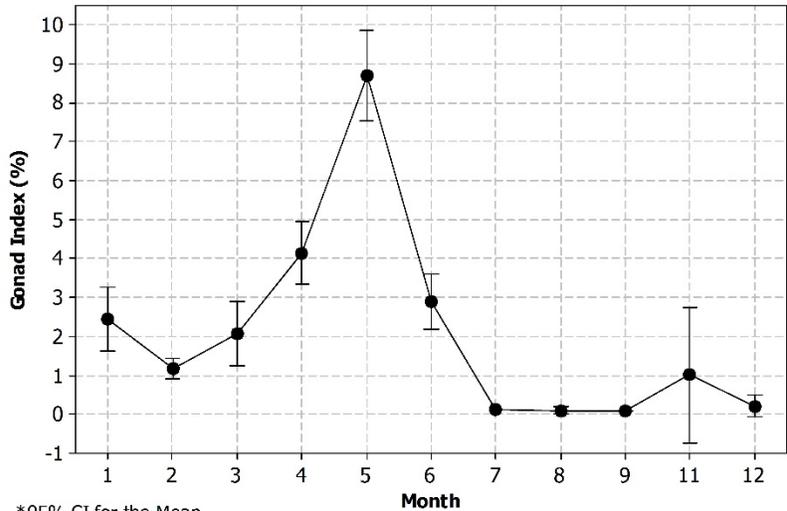
Catch per unit effort (CPUE) data from commercial dive log data from 1993 to 2016 indicates that the amount of sea cucumber harvested per dive hour is also on a downward trend, with average CPUE for 2016 reaching a record low of 47 pounds per dive hour (Figure 3). As with landings, declines in CPUE are not fully explained by changes in processing practices as evidenced by CPUE declining by 51 percent since 2009, the estimated year that most divers believe that a majority of the fishery was landing product in a cut state. Considering these fishery trends, the Department is concerned with the sustainability of the fishery.

Department Research Findings

Warty sea cucumbers are broadcast spawners with fertilization occurring externally in the water column, requiring individuals to be in close proximity to each other for successful reproduction. The sexes are separate and occur in approximate ratios of 1:1. The reproductive cycle of warty sea cucumber was first described in 1983 for individuals collected off Santa Catalina Island (Muscat, 1983). Research over the course of three years (1980-1982) found that individuals reached peak maturation during the months of March-April with peak spawning occurring during the months of May-June. Department research

findings on reproductive cycle of the species are consistent with previous findings. The similar findings of these two studies conducted over 30 years apart provide evidence that warty sea cucumber exhibit consistent seasonal spawning behavior during spring and early summer periods.

1. The reproductive condition of warty sea cucumbers increases in early spring with spawning occurring from late spring into summer (Figure 4).



*95% CI for the Mean

Figure 4. Reproductive condition represented by Gonadosomatic Index (GSI) (%) (Gonad Index) of warty sea cucumber by month from 2013-2016. (GSI= (gonad weight/ total body weight) x 100) Data source: CDFW data.

Department research findings from 2013-2016 on 1,462 individuals collected from the northern Channel Islands demonstrate that warty sea cucumber ovaries and testes begin maturing in January with gonads continuing to develop through February and March, and reaching peak maturation in April-May as measured using Gonadosomatic index (GSI) analysis (Figure 4). GSI is used to determine the degree of sexual maturity by comparing the proportion of each individual’s gonad mass relative to its total body mass. Although it appears that some spawning may begin as early as April, most spawning occurs from May-July, as shown by the decreasing average GSI values from May to July (Figure 4).

2. Increased densities from March to July indicate formation of spawning aggregations (Figure 5).

Department dive surveys inside and outside marine protected areas (MPAs) at the northern Channel Islands were conducted simultaneously with the reproductive research. The MPAs chosen for this study do not allow the take of warty sea cucumber and represent populations that are in as close to natural

state as possible. The research revealed that warty sea cucumber densities are considerably lower in fished sites when compared to the MPA sites and that densities inside MPAs build to peak levels during maturation and spawning periods in March-July (Figure 5). This build-up of densities is related to individuals aggregating for spawning. Since warty sea cucumber are broadcast spawners, reproductive success is dependent upon individuals of the opposite sex being in close proximity to increase the chances of successful fertilization. Once spawning activities begin to dwindle in July and August, the densities of warty sea cucumber begin to decline, with annual lows in density observed in MPAs during October and November (Figure 5, Table 1).

The seasonal aggregation behavior displayed by warty sea cucumber results in the resource being the most available to dive harvest during sensitive reproductive periods. For this research, MPAs provided an invaluable tool for determining the seasonality of spawning aggregations as densities outside MPAs did not display measurable seasonal differences in density.

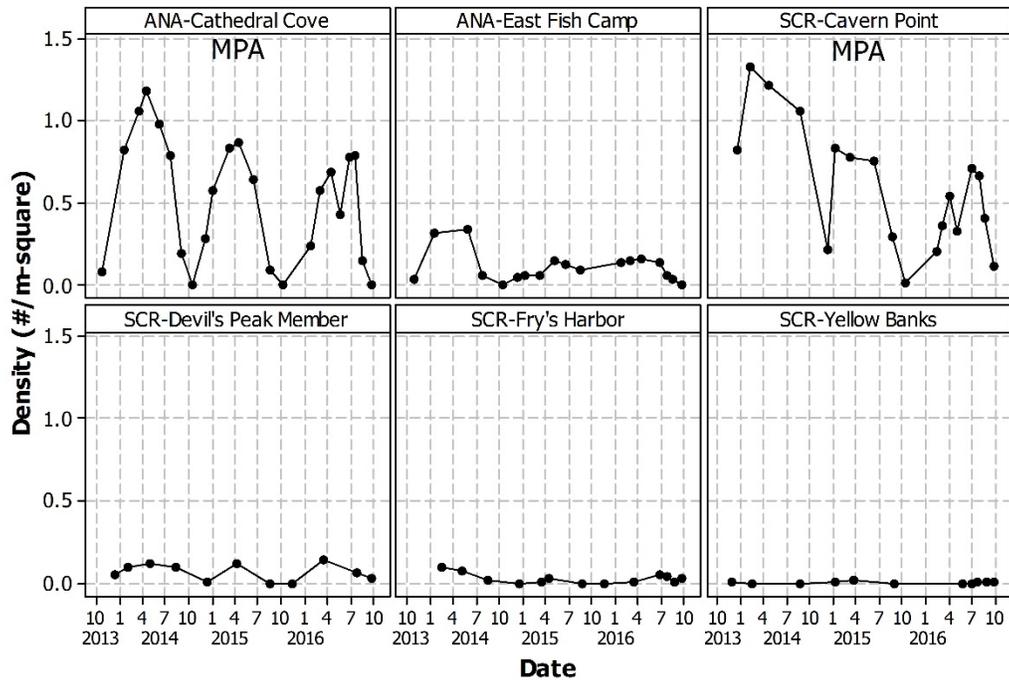


Figure 5. Seasonal densities of warty sea cucumber (number per square meter) measured inside and outside of Marine Protected Areas (MPA) at Anacapa (ANA) and Santa Cruz Islands (SCR) from 2013-2016. Each panel represents a different site with the site name in the panel heading. Data source: CDFW data.

3. The fishery primarily harvests warty sea cucumber during peak aggregation (March –June) and spawning months (May–July) (Figure 6).

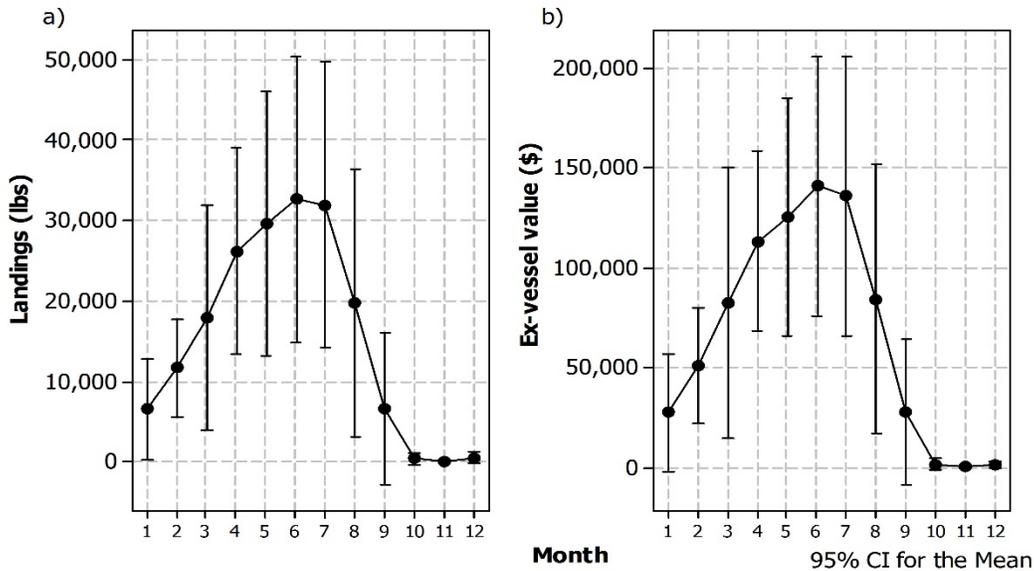


Figure 6. a) Average annual commercial landings by month from 2012-2016 and b) Average total ex-vessel value by month from 2012-2016. Lines extending from the averages indicate 95% confidence intervals of the average. Data source: CDFW landings data.

From 2012-2016, the months of March-July accounted for approximately 75 percent of the total dive landings, with the fishery peaking in both landings (Figure 6a) and ex-vessel value (Figure 6b) in June. Reasons for this peak in value and landings in June can mostly be attributed to the high CPUE that spawning aggregations provide divers. The practice of harvesting before and during peak spawning times results in the take of individuals before they have a chance to spawn, reducing productivity. Continued unregulated harvesting during the spawning season poses a significant risk to the sustainability of this fishery.

Proposed Regulation

Add Section 128, Title 14, CCR; Commercial Taking of Sea Cucumber

This regulatory proposal would add new Section 128, Title 14, CCR, for the commercial take of sea cucumber. This proposed new section will establish a closed season for commercial take of warty sea cucumber, prohibit the possession of warty sea cucumbers during the closed season, and clarify logbook requirements for commercial sea cucumber dive activities. It is necessary for the Commission to adopt new regulations to protect the sea cucumber resource and to assure a sustainable sea cucumber fishery.

Add subsection 128(a), Closed Season for Commercial Take of Warty Sea Cucumber

The proposed regulation establishes a closed season for the commercial take of warty sea cucumber during significant portions of the spawning season. This is a critical first step towards improving management of this fishery and resource.

Three seasonal closure options are provided for Commission consideration:

- April 1 to June 30; or
- March 1 to June 14; or
- January 1 to June 14.

The three options protect important aspects of the spawning period (March-July) and strike a balance between the needs of the resource and maintaining the fishery it supports. Each option includes critical aspects of the reproductive stages of aggregation, maturation, and spawning while providing fishing opportunities either before and/or near the end of the reproductive season.

To aid the decision-making process, the reproductive and fishery importance of each month is described in Table 1a, the biological and fishery pros and cons for each option are provided below, and results from a May 2017 "Commercial Sea Cucumber Diver Survey Results for Three Seasonal Closure Options" (Attachment 2) indicate similar levels of preference for options 1 and 3. Most divers ranked them as either their most or least preferred options (Attachment 2, Figure 1). This suggests that two groups exist in the fishery, those that want a shorter closure and those that want a longer closure. However, there is strong agreement between the two groups on option 2, as all respondents ranked it as either their first or second preferred option. No respondents listed option 2 as their least preferred option.

Table 1 a) Warty sea cucumber reproductive cycle (Department research 2013-2016), average landings, and ex-vessel value of the dive fishery by month (monthly averages calculated using 2012-2016 Department landings data). b) Description of the three proposed seasonal closure options including the months that would be open or closed under each option.

a)

	January	February	March	April	May	June	July	August	September	October	November	December
Reproductive Importance	<i>Low</i> -gonads developing -aggregations begin building and can range between 25-100% of peak density	<i>Low</i> -gonads developing -aggregations building to 50-100% of peak density	<i>Moderate</i> -gonads developing -aggregations nearing maturation -aggregations building to 75-100% of peak density	<i>High</i> -peak gonad maturation -some spawning -peak aggregations 75-100% of peak density	<i>Critical</i> -peak gonad maturation -peak spawning -peak aggregations 75-100% of peak density	<i>Critical</i> -peak gonad maturation with some reduction due to spawning -peak spawning -peak aggregations 75-100% of peak densities	<i>Moderate</i> -gonads reduced after spawning -spawning lessens generally start to decline but can still be between 75-100% of peak density	<i>Low</i> -gonads extremely reduced or absent -spawning likely completed declining but can still be between 50-100% of peak density	<i>Low</i> -gonads reduced or absent -spawning completed -aggregations declining to 0-25% of peak density	<i>Low</i> -gonads reduced or absent -spawning completed -aggregations near 0% of peak density	<i>Low</i> -gonads reduced or absent -spawning completed -aggregations near 0% of peak density	<i>Low</i> -gonads developing -aggregations begin building to 0-25% of peak density
Average Percentage of Annual Landings	3.4	6.8	9.7	14.2	16.1	17.6	17.3	11.1	2.9	0.3	0.2	0.3
Average Annual Ex-Vessel Value	\$27,691	\$52,219	\$83,069	\$114,821	\$127,765	\$142,993	\$137,761	\$90,575	\$23,265	\$3,705	\$837	\$1,612
Average number of participants	11	22	26	29	29	31	27	20	11	4	2	3
Importance to Fishery Based on Ex-Vessel Value (rank 1-12)	8	7	6	4	3	1	2	5	9	10	12	11

b)

	<i>Seasonal Closure Options</i>											
Options	January	February	March	April	May	June	July	August	September	October	November	December
1. (April 1 - June 30)	Open		Closed			Open						
2. (March 1 - June 14)	Open		Closed				Open					
3. (January 1 - June 14)	Closed					Open						

Option 1: From April 1-June 30 (3 months)

Pros:

Biological:

- Protects the formation of aggregations and gonad development in April.
- Protects the two most critical months for peak maturity and spawning (May and June).

Fishery:

- Allows for harvest during July, August, and March, which are the second, fifth, and sixth most valuable months for the fishery, respectively.
- Allows for harvest from January through March prior to peak spawning periods and July after most spawning has occurred.
- Provides the most fishing opportunity of all three options.

Cons:

Biological:

- Individuals that are developing gonads and forming aggregations in March would be available for harvest.
- If levels of fishing in March increase due to effort shift, then densities may be reduced to levels that would impact successful fertilization during April-June, potentially reducing much of the benefits of protection during this period.

Fishery:

- The fourth, third, and first most valuable months to fishery value would not be open to harvesting (April-June); however, it is expected that a portion of individuals that were historically harvested during these months would be available for harvest once the fishery opens on July 1.

Option 2: March 1-June 14 (3.5 months)

Pros:

Biological:

- Protects a majority of the months when aggregations form and peak in density (March-June).
- Protects key periods for gonad development (March-May).
- Protects approximately 75 percent of the peak spawning months (May-June).
- Anticipated that most individuals will have spawned before the fishery would re-open on June 15.

Fishery:

- Allow for harvest during two weeks of June, which is historically the most valuable month and all of July and August, which are the second and fifth most valuable months to the fishery, respectively.
- Allows for fishing opportunity in January and February prior to spawning aggregations fully developing and it is expected that CPUE will be enhanced once the fishery re-opens on June 15.

Cons:

Biological:

- Two weeks of June, one of the two most critical spawning months would be open to harvesting, likely resulting in the harvest of some individuals before they spawn.

Fishery:

- Two weeks of historically the most significant landing month (June) would not be open to harvesting. Similar level of impacts to the fishery as option 1, but results in 15 fewer fishing days with the tradeoff of closing March for opening two weeks in June.

Option 3: From January 1-June 14 (5.5 months)

Pros:

Biological:

- Like option 2, protects a majority of aggregation formation (March-June) and approximately 75 percent of peak spawning periods (May-June).

- Some added benefit by including January and February when densities generally start to increase and gonad development commences.

Fishery:

- Likely to result in the highest CPUE of the three options once the fishery re-opens as aggregations are completely protected prior to the season opening.
- Like option 2, allows for harvest during two weeks of June, the most valuable month and all of July and August, which are the second and fifth most valuable months to the fishery, respectively.

Cons:

Biological:

- Like option 2, two weeks of June, one of the two most critical spawning months would be open to harvesting, likely resulting in the harvest of some individuals before they spawn.

Fishery:

- Largest impact to the fishery of the three options, with the greatest impacts to divers who only have sea cucumber permits (17 individuals). The other 65 divers have sea urchin permits and can dive for urchin during the sea cucumber closure.
- Expect to result in the “race to fish” once the fishery re-opens due to low sea cucumber availability from September to December, essentially creating a two and one-half to three-month fishing season.

Add subsection 128(b), Prohibiting Possession of Warty Sea Cucumber for Commercial Purposes during the Closed Season

The proposed regulation would prohibit the possession of warty sea cucumber aboard any commercial fishing vessel as well as the landing of warty sea cucumber during the proposed closed season. Since the commercial take of warty sea cucumber during the proposed closed season (subsection 128(a)) is prohibited, the regulation would also require any incidentally caught warty sea cucumber to be immediately returned to the water. The proposed subsection 128(b) is designed to prevent the take, possession, and/or landing of warty sea cucumber by any sea cucumber permit holder during the closed season proposed in subsection 128(a). While warty sea cucumber is almost exclusively taken by divers, minor incidental catch of the species also occurs in the trawl fishery. As such, the proposed regulation would clarify that the possession or landing of warty sea cucumber aboard any commercial fishing vessel during the

closed season, regardless of the method of take, is prohibited and any incidental catch must be immediately returned to the water.

Add subsection 128(c), Commercial Dive Fishing Logbook Requirement

The proposed regulation would clarify the recordkeeping requirements already laid out in FGC Section 8405.1 by referring to Section 120.7, Title 14, CCR, which specifies the Commercial Dive Fishing logbook form (DFG 120.7), incorporated by reference. The proposed regulation is needed to provide clear rules for recordkeeping under a sea cucumber dive permit and improve regulatory enforcement.

FGC subsection 8405.1(c) requires all sea cucumber permit holders to complete and submit an accurate record of their fishing activities on forms provided by the Department. Currently, each sea cucumber permit is specific to a method of take (i.e., trawl permit or dive permit). Section 176, Title 14, CCR, specifically describes the Department logbook form that commercial trawlers must use to record their trawl fishing activity. However, a similar regulation identifying a specific Department logbook form does not currently exist for divers taking sea cucumbers for commercial purposes. Each commercial sea cucumber dive permit holder currently fills out a daily dive record using the Department's Commercial Dive Fishing Log, but use of the form is not explicitly referenced in Title 14.

Benefits of the Proposed Regulation

It is the policy of this State to ensure the conservation, sustainable use, and, where feasible, restoration of California's marine living resources for the benefit of all the citizens of the State. The objectives of this policy include, but are not limited to, conserving the health and diversity of marine ecosystems and marine living resources; allowing and encouraging only those activities and uses of living marine resources that are sustainable; and recognizing the importance to the economy and the culture of California of sustainable sport and commercial fisheries.

Over time, a seasonal closure will have a positive impact on population growth of the resource and benefit the fishery.

- (b) Authority and Reference Sections from Fish and Game Code for Regulation:

Authority: Section 8405.3, Fish and Game Code.

Reference: Sections 8026, 8405.1, 8405.3 and 8500, Fish and Game Code.

- (c) Specific Technology or Equipment Required by Regulatory Change: None.
- (d) Identification of Reports or Documents Supporting Regulation Change:
1. Attachment 1: 2014 CDFW Sea Cucumber Diver Survey: Summary of Key Results.
 2. Attachment 2: Commercial Sea Cucumber Diver Survey Results for Three Seasonal Closure Options, May 25, 2017.
 3. Anderson, S.C., Flemming, J.M., Watson, R., Lotze, H.K. 2011. Serial exploitation of global sea cucumber fisheries. *Fish and Fisheries*. 12, 317–339.
 4. Caddy, J.F., Defeo, O. 2003. Enhancing or restoring the productivity of natural populations of shellfish and other marine invertebrate resources. *FAO Fisheries Technical Paper*. No. 448. Rome, FAO. 159p.
 5. Chavez, E.A., Salgado-Rogel, MA. DE Lourdes, Palleiro-Nayar, J. 2011. Stock assessment of the warty sea cucumber fishery (*Parastichopus parvimensis*) of NW Baja California. *California Cooperative Oceanic Fisheries Investigations*. Vol. 52. 136-147p.
 6. Muscat, A.M. 1983. Population dynamics and the effect on the infauna of the deposit feeding holothurian (*Parastichopus parvimensis*) (Clark). PhD Dissertation. University of Southern California, Los Angeles.
 7. Purcell, S.W., Lovatelli, A. (eds), Vasconcellos, M.(eds), Yimin, Y. (eds). 2010. Managing sea cucumber fisheries with an ecosystem approach. *FAO Fisheries and Aquaculture Technical Paper*. No. 520. Rome, FAO. 157p.
 8. Rogers-Bennett, L., Ono, D.S. 2001. Sea cucumbers. *California living marine resources: A status report*. California Department of Fish and Game. 131–134 p.
 9. Schroeter, S.C., Reed, D.C., Kushner, D.J., Estes, J.A., Ono, D.S., 2001. The use of marine reserves in evaluating the dive fishery for the warty sea cucumber (*Parastichopus parvimensis*) in California, U.S.A. *Canadian Journal of Fisheries and Aquatic Sciences*. 58, 1773–1781.
 10. Toral-Granda, V., Lovatelli, A., Vasconcellos, M. (eds). 2008. Sea cucumbers. A global review of fisheries and trade. *FAO Fisheries and Aquaculture Technical Paper*. No. 516. Rome, FAO. 317p.

- (e) Public Discussions of Proposed Regulations Prior to Notice Publication:
1. March 16, 2017, Los Alamitos, California. The Department presented and discussed the status of the California sea cucumber dive fishery at an outreach meeting to commercial sea cucumber fishermen.
 2. March 23, 2017, San Clemente, California. The Department briefed the Marine Resources Committee on the status of the commercial sea cucumber dive fishery and discussed potential sea cucumber regulation changes.
 3. April 28, 2017, Oxnard, California. The Department presented sea cucumber dive permit holders in the Santa Barbara/Ventura area with the information regarding the trend of the fishery; the permit holders were given opportunity to voice their opinions concerning potential management measures.

IV. Description of Reasonable Alternatives to Regulatory Action:

(a) Alternatives to Regulation Change:

Total Allowable Catch (TAC): A cap on overall harvest was considered and rejected. This alternative is not deemed viable at this time because historical landings data is used as the basis for determining a sustainable TAC, but such data is not available. Without precise landing data, the Department cannot effectively determine a sustainable quota.

(b) No Change Alternative:

Under the no change alternative, the commercial take of warty sea cucumber during the spawning season will continue to occur without any restriction on take. Research and fishery analyses detail concerning trends regarding the warty sea cucumber commercial fishery and indicate that the continued unregulated harvesting of warty sea cucumber during their spawning period poses a significant risk to the sustainability of this fishery. The intent of the proposed action is the improved management of the warty sea cucumber resource and fishery and a step towards the long-term sustainability of the resource and viability of the commercial fishery in accordance with the goals and objectives of the Marine Life Management Act and provisions of FGC subsection 8405.3(a).

(c) Consideration of Alternatives:

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.

(d) Description of Reasonable Alternatives That Would Lessen Adverse Impact on Small Business:

The proposed action will affect a relatively small number of jobs (17-21) engaged in commercial take of warty sea cucumber as a sole source of income. However, these individuals may sustain their income through the harvest of warty sea cucumbers in the remaining portion of the season. No other reasonable alternative was identified that would lessen the impact on small business while providing the same level of protection to the warty sea cucumber resource.

V. Mitigation Measures Required by Regulatory Action:

The proposed regulatory action will have no negative impact on the environment; therefore, no mitigation measures are needed.

VI. Impact of Regulatory Action:

The potential for significant statewide adverse economic impacts that might result from the proposed regulatory action has been assessed, and the following initial determinations relative to the required statutory categories have been made:

(a) Significant Statewide Adverse Economic Impact Directly Affecting Businesses, Including the Ability of California Businesses to Compete with Businesses in Other States:

The proposed action will not have a significant statewide adverse economic impact directly affecting business, including the ability of California businesses to compete with businesses in other states because harvest quantities by California permittees are not anticipated to fall and a commercial warty sea cucumber fishery only exists in the State of California and there are no like products that currently compete as substitutes for warty sea cucumber. While no other state has a commercial fishery that poses competition, Mexico does have a warty sea cucumber fishery. However, Mexico's fishery has been exhibiting similar signs of decline. In light of the fact that other sea cucumber stocks in the world have been overharvested, it is critical to maintain a sustainable sea cucumber fishery in California.

(b) Impact on the Creation or Elimination of Jobs Within the State, the Creation of New Businesses or the Elimination of Existing Businesses, or the Expansion of Businesses in California; Benefits of the Regulation to

the Health and Welfare of California Residents, Worker Safety, and the State's Environment:

The Commission anticipates limited short-term negative impacts from a curtailed season length on the creation or elimination of jobs within the State, with the potential for the direct, indirect, and induced loss of 17 to 21 jobs that are directly or indirectly linked to the warty sea cucumber fishery statewide.

The proposed action is not anticipated to exert significant impact on the creation of new businesses, the elimination of existing businesses, or the expansion of businesses in California because the proposed action will not constitute a substantial year-round drop in fishery activity.

The Commission anticipates generalized benefits to the health and welfare of California residents through the improved reporting and better monitoring of the fishery.

No impacts to worker safety are anticipated.

The State's environment should benefit by the improved management of the warty sea cucumber resource with the goal of creating a more sustainable sea cucumber dive fishery, which would benefit existing businesses in the long term.

(c) Cost Impacts on a Representative Private Person or Business:

The agency is not aware of any cost impacts that a representative private person or business would necessarily incur in reasonable compliance with the proposed action. The annual income from sea cucumber harvesting is not likely to change for individuals since the regulation only changes the season dates. The proposal does not impose additional compliance costs such as gear, fees, etc. The individuals comprising the sea cucumber fishery support the changes in order to sustain the fishery for future years.

(d) Costs or Savings to State Agencies or Costs/Savings in Federal Funding to the State: None.

(e) Nondiscretionary Costs/Savings to Local Agencies: None.

(f) Programs Mandated on Local Agencies or School Districts: None.

(g) Costs Imposed on Any Local Agency or School District that is Required to be Reimbursed Under Part 7 (commencing with Section 17500) of Division 4, Government Code: None.

(h) Effect on Housing Costs: None.

VII. Economic Impact Assessment:

Reported commercial landings of warty sea cucumber have shown a five-year declining trend since ex-vessel value peaked in 2011, with 2016 landings at a 20-year low (see Figure 1). Dive logbook data also indicate a continuous decline in CPUE over this period, which translates to declining profit margins for fishermen (see Figure 3). Outreach in the fishery community showed the strongest support for a seasonal closure to begin to address the long-term sustainability of the warty sea cucumber fishery.

The three proposed seasonal closure periods include all or part of the key spawning period that spans from March through June. Estimates for the annual economic impacts of each option are shown in Table 2. These values show the difference between the historical average annual values and the projected outcome for the proposed scenarios in which three to five and one-half months of historical catch is forgone. As such, this static comparison tends to overstate the probable impacts because fishermen’s behavior is likely to adjust to the new season length. Effort is likely to shift to the remaining open months and the ex-vessel value may exceed the historical average for those months. Additionally, many warty sea cucumber fishermen will pursue income in other active fisheries during the proposed seasonal closure.

Table 2. Impacts on Ex-Vessel Value, Jobs, Wages, and Total Economic Output

Options	Ex-Vessel Value	Jobs	Wages	Total Economic Output
1. (April-June)	-\$385,579	-17	-\$202,859	-\$641,898
2. (March-June 14)	-\$397,151	-17	-\$208,947	-\$661,163
3. (January-June 14) *proposed by divers	-\$477,061	-21	-\$250,989	-\$794,194

- Option 1, a closure during peak spawning from April - June results in the lowest loss in ex-vessel value and total economic output (Table 2). These three months historically have had the highest landings and value, averaging \$ 213,966 in ex-vessel value per month. Despite that, the April – June three-month closure is the shortest time and sums to the lowest aggregate impact on the fishery economy including associated businesses.
- Option 2, March – June 14, constitutes a three and one-half month closure,

which adds a small amount to the aggregate economic impact, whereas the average ex-vessel value over this period is historically less, at \$188,904 per month (Table 3).

- Option 3, January – June 14, is a closure of five and one-half months but spans several months with historically low landings. While the total economic impact is the highest of the options, the historical ex-vessel value per month is the lowest, at \$144,399 per month from January – June 14.

Table 3. Adverse Economic Impact Per Month By Proposed Option.

Options	Months Closed	Adverse Impact/Month Closed
1. (April-June)	3.0	-\$213,966
2. (March-June 14)	3.5	-\$188,904
3. (January-June 14) *proposed by divers	5.5	-\$144,399

The socio-economic multipliers used to derive these estimates are specific to the warty sea cucumber fishery with linkages to an array of associated business activities. Warty sea cucumber fishing is somewhat similar to red sea urchin diving in which the typical operation involves a mid-size fishing vessel, air compression apparatus with hookah lines or scuba equipment, with one or two divers and one crew member. The first stage of warty sea cucumber processing (cutting) is increasingly onboard, while the boiling and drying is on land in facilities in the same county or some other location within the State. The final product is virtually all exported to Asia. The multiplier effect of traded goods once exported outside of the State economy limits the extent of value and income generation within the State. As products leave a region, the market, transportation, and handling costs are also “leaked” outside of the regional economy.

- (a) Effects of the Regulation on the Creation or Elimination of Jobs Within the State:

The Commission anticipates limited short-term negative impacts from a curtailed season length on the creation or elimination of jobs within the State, with the potential for the total loss of 17 to 21 jobs statewide.

- (b) Effects of the Regulation on the Creation of New Businesses or the Elimination of Existing Businesses Within the State:

The proposed action is not anticipated to exert significant impact on the creation of new businesses or the elimination of existing businesses because the regulatory action will limit warty sea cucumber harvest over a few months and the total annual harvest could nearly match the historical averages in the remaining open months. Moreover, if harvest during spawning is not curtailed, the long-term economic viability of the warty sea cucumber fishery may be lost which would adversely impact the associated businesses that support the commercial dive fishery for warty sea cucumber.

(c) Effects of the Regulation on the Expansion of Businesses Currently Doing Business Within the State:

The proposed regulations are not anticipated to result in the expansion of businesses currently doing business in the State because the proposed seasonal closure is not expected change the volume of economic activity. Clarification of the logbook requirement is administrative in nature and will not impact the volume of fishing activity or the purchasing of fish.

(d) Benefits of the Regulation to the Health and Welfare of California Residents:

The Department anticipates generalized benefits to the health and welfare of California residents through the improved reporting and better monitoring of the fishery.

(e) Benefits of the Regulation to Worker Safety:

The proposed regulations represent a neutral effect, offering neither benefits nor detriment to worker safety in the State.

(f) Benefits of the Regulation to the State's Environment:

The Commission anticipates benefits to the State's environment. It is the policy of this State to ensure "the conservation, sustainable use, and, where feasible, restoration of California's marine living resources for the benefit of all the citizens of the State" (FGC subsection 7050(b)).

Over time, a seasonal closure will have a positive impact on population growth of the resource and benefit the fishery. However, positive impacts may not be measurable for five or more years. Recent findings reported by the National Parks Kelp Forest Monitoring Program demonstrate that warty sea cucumber densities take at least 10 years to recover to pre-fishing levels once areas become fully protected from take by MPAs (D. Kushner, pers. communication). Considering these findings and that fishing will still be allowed outside of the closed season, it can be expected

that warty cucumbers in fished areas may take a considerable amount of time to reach the densities needed to increase the overall productivity of the resource. MPAs will provide an invaluable tool moving forward to assess the degree to which a seasonal closure or other management measures are promoting population growth in fished areas. MPAs allow comparison between fished and non-fished areas to tease out the differences between potential effects of fishing and/or changes in environmental conditions.

Informative Digest/Policy Statement Overview

The proposed addition of new regulations in Section 128, Title 14, California Code of Regulations (CCR), will create a seasonal closure that would prohibit all commercial take of warty sea cucumber during a significant portion of the spawning season and prohibit the possession aboard commercial vessels and landings of warty sea cucumbers during the closed season.

Current laws governing commercial harvest of sea cucumber in California are permissive with only permits and permitting provisions for the sea cucumber fishery (Fish and Game Code (FGC) Section 8405, et seq.). There are no seasons, size limits, catch limits or limits on dive gear usage (e.g. SCUBA and surface supplied air) when commercially fishing for sea cucumber by diving or trawling.

Under FGC subsection 8405.3(a), the California Fish and Game Commission (Commission) has the authority to adopt regulations that are reasonably necessary to protect the sea cucumber resource, to assure a sustainable sea cucumber fishery, or to enhance enforcement activities. Consistent with the policy and criteria outlined in FGC subsection 8405.3(a), the Department of Fish and Wildlife (Department) recommends that the Commission add Section 128, Title 14, CCR, to establish a closed season for warty sea cucumber. The proposed regulations would promote a sustainable warty sea cucumber fishery through the protection of the spawning population.

Three seasonal closure options are provided for the Commission's consideration,

- April 1 to June 30; or
- March 1 to June 14; or
- January 1 to June 14.

The proposed regulations would also clarify the existing recordkeeping obligations for commercial sea cucumber dive activities (FGC subsection 8405.1(c)) by referencing Section 120.7, Title 14, CCR, which incorporates the Department's Commercial Dive Fishing Log form (DFG 120.7) by reference. A similar regulation currently exists for recordkeeping of commercial trawling activities for sea cucumber in Section 176, Title 14, CCR.

Benefits of the Regulations

The proposed closed season for the commercial warty sea cucumber fishery would protect warty sea cucumber spawning aggregations from overexploitation and promote the long-term sustainability of the fishery resource. The recordkeeping requirements would provide clarification and improve compliance with and enforcement of the regulations.

Consistency and Compatibility with Existing Regulations

The proposed regulations are consistent with sections 120, 120.7, 123, 189 and 632, Title 14, CCR. Commission staff has searched the CCR and found no other regulations that address the commercial take of sea cucumber and therefore finds that the proposed regulations are neither inconsistent nor incompatible with existing State regulations. The Legislature has delegated authority to the Commission to adopt regulations necessary to protect the sea cucumber resource and to assure a sustainable sea cucumber fishery (FGC subsection 8405.3(a)). No other State agency has the authority to regulate the commercial take of warty sea cucumber.