

## Chapter 3. Management Measures for a Sustainable Market Squid Fishery

### 3.1 Project Objectives

The MLMA sets sustainability as an overall goal for the fishery management system (FGC §7056). Within the definition of sustainability, the MLMA includes not only the maintenance of the fishery populations, but also the fullest possible range of present and long-term benefits (including ecological benefits), and biological diversity (FGC §99.5). The MLMA calls for achieving its primary goal of sustainability by meeting several objectives:

- preventing overfishing;
- rebuilding depressed stocks;
- ensuring conservation;
- promoting habitat protection and restoration.

To this end, fishery management plans (FMPs) must identify measures that will be used for the conservation and management of the fishery (FGC §7082). Among other measures, the MLMA identifies area and time closures, size limits, gear restrictions, and restricted access. The Department plans to meet these requirements and the goals and objectives of the MSFMP using management based on four components: 1) fishery control rules, 2) a restricted access program, 3) ecological considerations, and 4) administrative items. The project will protect the market squid resource and the marine life that depends on squid by minimizing the risk of overfishing, adverse social and economic impacts on the fishing communities whenever possible, and ecological impacts that result from the commercial squid fishery; together this program forms an integral approach to meeting the MLMA guidelines. The final project and the implementing regulations adopted by the Commission at the 27 August 2004 and 3 December 2004 meetings are presented in Table 3-1.

This MSFMP establishes a fisheries management program for market squid and procedures by which the Commission will manage the market squid resource and various fishery components. In addition, it defines the scope of management authority for the Commission when acting under the MSFMP. Management measures implementing the MSFMP, which directly control fishing activities, must be consistent with the goals and objectives of the MLMA and other applicable laws. Also, they must be consistent with federal management requirements in the CPS FMP. These management actions are to be considered repeatedly within the streamlined process that provides for more timely Commission action under certain specific conditions. Procedures in this FMP do not affect the authority of the Director of the Department to take emergency regulatory action under FGC §7710.

#### 3.1.1 Fishery Control Rules

Fishery control rules provide a protocol for managing sustainable levels of market squid fishing that is enforced through the adoption of specific regulatory tools such as seasonal catch limits, gear restrictions, weekend closures, and sustainable levels of egg escapement. The application of the MLMA concept of adaptive management is



particularly relevant to this fishery because information regarding the biology of market squid is limited and no reliable estimate of market squid abundance is available.

### 3.1.2 Restricted Access Program

The MSFMP bases its approach to restricted access upon the MLMA and the Commission's restricted access policy, and establishes a capacity goal (the optimum number of vessels in the fleet that will promote resource sustainability and economic viability of the fishery), initial issuance criteria, and transferability conditions for the commercial market squid fishery.

### 3.1.3 Ecological Considerations

The market squid fishery is part of a larger ecosystem that includes the effects of ecological interactions of the project on non-target species and habitat. In addition, the market squid resource is a significant forage component in the diets of seabirds, marine mammals and fish. Harvest replenishment and general habitat closure areas provide for specific areas where no squid fishing can occur. Harvest Replenishment Areas can provide areas of uninterrupted spawning. General habitat closures are intended to prevent squid fishery interactions in areas that have not been traditionally utilized for commercial squid fishing and where there is the potential for interactions with non-target species such as salmon, seabirds, and marine mammals. Seabird closure areas reduce the potential for interactions between the squid fishery and seabirds that are sensitive to disturbance from lights and noise.

### 3.1.4 Administrative Items

This category contains items that are administrative in nature to the MSFMP, namely the creation of a squid advisory committee.

Table 3-1. Summary of Management Measures as Identified in the Draft MSFMP Adopted by the Commission 27 August 2004 and 3 December 2004.	
<b>FISHERY CONTROL RULES</b>	
<b>Seasonal Statewide Catch Limitation</b>	
	Establish a seasonal catch limitation based on recent average catch and the assumption that squid biomass is above average spawning biomass (currently set at 118,000 tons) to be reviewed in two years (Option A.2).
<b>Weekend Closures</b>	
	Continue closures from noon Friday to noon Sunday from the U.S.-Mexico border to the California-Oregon border (Option D.1)
<b>Monitoring Program</b>	
	Continue existing squid monitoring programs (port sampling and logbooks) (Option E.1).
<b>Live Bait Fishery and Incidental Catch of Market Squid</b>	
	Continue existing regulations that do not require a squid permit when fishing for live bait or incidental take two tons or less (Option F.1).
<b>Gear Restrictions</b>	
	Maintain existing gear options regarding wattage (30,000 watts) (Option G.1)



Table 3-1. Summary of Management Measures as Identified in the Draft MSFMP Adopted by the Commission 27 August 2004 and 3 December 2004.	
	Establish gear restrictions which state that each vessel fishing for squid and lighting for squid will utilize shielding that will reduce the light scatter of its fishing operations by shielding the entire filament of each light used to attract squid and orient the illumination directly downward so that the lower edge of the shield will be parallel to the deck of the vessel (Option G.4)
<b>RESTRICTED ACCESS PROGRAM</b>	
<b>Market Squid Fleet Capacity Goal</b>	
	Establish a capacity goal for market squid vessels that produces a moderately productive and specialized fleet (55 vessels, 18 brail vessels and 34 light boats, capacity goal for non-transferable permits is zero) (Option H.3)
<b>Initial Issuance of Permits</b>	
	Transferable Permits: Market Squid Vessel Permit: possession of a current market squid vessel permit (2004-2005) and a minimum of 50 landings in window period January 1, 2000 through March 31, 2003; Brail Permit: Possession of a current market squid vessel permit (2004-2005) and a minimum of 10 landings made with brail gear in window period January 1, 2000 through March 31, 2003; Light Boat Permit: Possession of a current market squid permit (either vessel or light for 2004-2005) and have submitted one light boat log by December 31, 2000. Non-Transferable Permits: Market Squid Vessel Permit: Possession of a current market squid vessel permit (2004-2005), possession of a California commercial fishing license for at least 20 years and a minimum of 33 landings prior to August 27, 2004. Only receipts that demonstrate catch aboard a vessel that does not already qualify for issuance of a transferable permit of any permit class are eligible. Brail Permit: Possession of a current market squid vessel permit (2004-2005), possessed a California commercial fishing license for at least 20 years and made a minimum of 10 landings with brail gear during one fishing season in a window period from January 1, 2000 through March 31, 2003. Only receipts that demonstrate catch aboard a vessel that does not already qualify for issuance of a transferable permit of any permit class are eligible. Light Boat Permit: There is not a non-transferable permit category (Option I.1).
<b>Permit Fees</b>	
	Annual permit fees: Market Squid Vessel Permit – Transferable = \$2,000 Market Squid Vessel Permit – Non-Transferable = \$1,000 Market Squid Brail Permit – Transferable = \$2,000 Market Squid Brail Permit – Non-Transferable = \$1,000 Market Squid Light Boat Permit - Transferable = \$600 (Option J.2)
<b>Market Squid Vessel Permit Transferability</b>	
	Establish full transferability of market squid vessel permits based on comparable capacity (within 10%); establish transferability of market squid vessel permits to a vessel of larger capacity under a “2 for 1” permit retirement; individuals wishing to gain entry into the fishery must secure two permits (Option K.3)
<b>Market Squid Brail Permit Transferability</b>	
	Establish full transferability of market squid brail permits based on comparable capacity (Option L.3)
<b>Market Squid Light Boat Owner’s Permit Transferability</b>	
	Establish full transferability of light boat owner permits with a ‘1 for 1’ permit retirement (Option M.3)
	Upgrade $\geq$ 1 light boat owner permits for one brail permit (Option M.4)(Revised by Commission 22 March 2005).
<b>Transferability Fee</b>	
	Establish a transfer fee of \$500 (Option N.1). Establish a <b>Market Squid Brail Permit Upgrade Fee of \$1,500.</b>
<b>Experimental Market Squid Vessel Permits</b>	
	Establish three non-transferable experimental fishery permits (Option O.2).



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<b>ECOLOGICAL CONSIDERATIONS</b>	
<b>Area and Time Closures to Address Seabird Issues</b>	
	Establish areas closed to squid vessels using attracting lights in all waters of the Gulf of the Farallones National Marine Sanctuary (Option R.9).
<b>ADMINISTRATIVE ITEMS</b>	
<b>Market Squid Advisory Committee</b>	
	Establish one advisory committee for the squid fishery, which includes scientific, environmental and industry representatives (Option S.1).

### 3.2 Fishery Control Rules

#### 3.2.1 Definition of Maximum Sustainable Yield and Optimum Yield

Fishery control rules are the primary mechanism for achieving sustainable use, preventing overfishing, preserving habitat, rebuilding depressed stocks, and recognizing the importance of non-consumptive uses. In addition, control rules must be based on objective, measurable criteria such as population size, productivity, density, or other inputs. Formulas are often used to calculate an allowable catch (fishing mortality); however, control rules do not have to be cast in terms of fishing mortality rates or biomass levels. In general, they help identify key management measures appropriate to the fishery.

The MLMA defines maximum sustainable yield (MSY) as “the highest average yield over time that does not result in a continuing reduction in stock abundance, taking into account fluctuations in abundance and environmental variability” (FGC §96.5).

The MSY model determines catch limits, which most often are expressed as a fixed fishing rate such that a constant fraction of the stock may be harvested each year. It is specific for each species or stock of fish and is calculated from knowledge of abundance, life history, and population dynamics. Environmental factors are also considered since they affect growth, reproduction, and mortality rates. In many cases, providing a range of estimates for MSY may be reasonable since there are different assumptions in the model. In addition, there may be situations where the scientific information is inadequate to directly calculate MSY for a particular species, and a proxy or substitute may be used. For example, recent average catch may be used as a proxy for MSY if a period is chosen when there is no evidence of long-term declining abundance.

The MLMA additionally defines Optimum Yield (OY) to give specific direction for resource managers:

“Optimum yield, with regard to a marine fishery, means the amount of fish taken in a fishery that does all of the following: (a) provides the greatest benefit to the people of California, particularly with respect to food production and recreational opportunities, and takes into account the protection of marine ecosystems; (b) is the maximum sustainable yield of the fishery, reduced by relevant economic, social, or ecological factors; (c) in the case of an overfished fishery, provides for rebuilding to a level consistent with producing maximum sustainable yield in the fishery” (FGC §97).



It is not uncommon that the status of knowledge for a given stock is limited to the catch history and incomplete life history information. This fact is acknowledged by the Legislature in both the MLMA [see FGC §90.1, 7056(g), 7059, 7060, 7072(b), 7073(b) 7081] and in the squid statutes [see FGC §8420(b), 8426(c)]. A precautionary approach to calculating OY in data-moderate or data-poor situations is to multiply MSY, or its proxy, by a fraction. A tenet of this principle is that less aggressive (more restrictive) harvest policies are adopted as uncertainty increases concerning the status of stocks and their response to fishing pressure (Restrepo et al. 1998). And, as mentioned above, an alternative approach is to select a proxy when information needed to calculate MSY is lacking.

### 3.2.2 Proxy for MSY and Precautionary OY

There often is insufficient knowledge to calculate MSY. Restrepo et al. (1998) provide an alternative approach for federal fisheries management, and the State used a variant of the Restrepo approach in the interim regulations for the market squid fishery.

A proxy for MSY is calculated when MSY-related parameters cannot be estimated from available data or when estimated values are deemed unreliable for various reasons (e.g., extremely low precision, insufficient contrast in the data, or inadequate models). The proxy for MSY in data-poor and data-moderate situations in this approach is based on the historical average catch, selecting a period when there is no indication that abundance is declining. A proxy for OY is then determined by reducing the proxy MSY by a percentage that can vary depending on the amount of information available. As uncertainty decreases about the status of stocks and their response to fishing pressure, less precautionary management can be adopted. This approach to risk management reduces the chance of inadvertent overfishing when little is known about the status of a stock.

There are no definitions or standards for measuring the level of data richness for a fishery other than the general guidance provided in Restrepo, et al. (1998) although it is important to remember these guidelines were established for fish that are considered long-lived in comparison with the market squid, which only lives 6 months:

- Data-rich cases: Reliable estimates of MSY-related quantities and current stock size are available. Stock assessments may be sophisticated, and provide a reasonably complete accounting of uncertainty;
- Data-moderate cases: Reliable estimates of MSY-related quantities are either unavailable or of limited use due to peculiar life history, poor data contrast, or high recruitment variability, but reliable estimates of current stock size and all critical life history (e.g., growth) and fishery (e.g., selectivity) parameters are available. Stock assessments may range from simple to sophisticated and uncertainty can be reasonably characterized and quantified;
- Data-poor cases: Reliable estimates of MSY-related quantities are unavailable, as are reliable estimates of either current stock size or certain critical life history or fishery parameters. Stock assessments are minimal, and measurements of uncertainty may be qualitative rather than quantitative.



### 3.2.3 Seasonal Catch Limitation

#### 3.2.3.1 A Proxy for MSY Based on Historical Landings

Due to the lack of adequate data to make a mathematical MSY determination, guidance was taken from NOAA Fisheries (Restrepo et al. 1998). These guidelines propose that in data-poor situations such as the market squid fishery, a proxy may be used for MSY, and that it is reasonable to use recent average catch from a period when there is no qualitative or quantitative evidence of declining abundance.

El Niño events are a recurring phenomenon of the California Current and thus, are a factor in landings when considering MSY. Historic market squid data indicate that low landing periods correspond with El Niño events when availability of squid to the fishery is greatly reduced. In addition, market conditions are volatile and influenced by the international demand and availability of supply from other fisheries. In the period between the last two El Niño events (1993-1994 and 1997-1998) there was a nearly unlimited demand for California market squid in the Republic of China, a situation that kindled rapid development of fishing and expansion of processing for export. The expansion ended with the onset of the 1997-1998 El Niño event during which market squid availability dropped to very low levels and landings declined.

The first fishing season (1999-2000) following the 1997-1998 El Niño event resulted in the highest squid landings on record (Table 3-2). Nearly all of the landings were from the southern California fishery (99.7%); landings reported from the northern fishery were minimal (0.3%). This disparity could not have been predicted given the current understanding of market squid or by utilizing temperature inclusive models. Average landings for the last ten, five, and three years are presented in Table 3-2. These averages can be used as a proxy for MSY.

#### 3.2.3.2 Establishment of a Seasonal Catch Limitation

The Commission has established a statewide seasonal catch limitation based on a multi-year recent average catch (see Table 3-2). This approach assumes that the stock is above the average spawning biomass ( $B_{MSY}$ ) and uses a precautionary multiplier of 1.0. This limitation is currently set at 118,000 tons.

The ability of the market squid fishery to support landings of greater than 100,000 tons in the 1999-2000 season with repeat landings of the same magnitude in the following two seasons suggests that the stock is robust enough to withstand this level of landings. This is likely due to the semiannual lifespan and the presence of several (minimum seven) cohorts throughout the year. Therefore, a multiplier of 1.0 was chosen to be most appropriate for market squid as opposed to more precautionary OY multipliers since traditional assessment methods are normally used for much longer lived fish species.



Table 3.2. Market Squid Landings by Season 1991-1992 through 2002-2003 and Average Landings based on 10, 5, or 3 years using different seasons. Averages are rounded to the nearest thousand. .

Season	Total landings (short tons)	10-yr Ave. (93-94 to 02-03)	5-yr Ave. (98-99 to 02-03)	3-yr Ave. (00-01 to 02-03)	10-yr Ave. (92-93 to 01-02)	5-yr Ave. (97-98 to 01-02)	3-yr Ave. (99-00 to 01-02)
1991-1992	38,666						
1992-1993	18,793				18,793		
1993-1994	54,452	54,452			54,452		
1994-1995	63,592	63,592			63,592		
1995-1996	93,833	93,833			93,833		
1996-1997	124,309	124,309			124,309		
1997-1998	10,898	10,898			10,898	10,898	
1998-1999	11,699	11,699	11,699		11,699	11,699	
1999-2000	126,772	126,772	126,772		126,772	126,772	126,772
2000-2001	123,411	123,411	123,411	123,411	123,411	123,411	123,411
2001-2002	102,715	102,715	102,715	102,715	102,715	102,715	102,715
2002-2003	46,994	46,994	46,994	46,994			
<b>Average (rounded)</b>	<b>68,000</b>	<b>76,000</b>	<b>82,000</b>	<b>91,000</b>	<b>73,000</b>	<b>75,000</b>	<b>118,000</b>

Setting a seasonal catch limitation will serve to curtail growth of the fishery should market demand allow for such expansion. It is prudent not to allow landings to expand beyond present levels without better methods to assess the status of the resource. Given the number of squid vessels permitted during the moratorium and significant excess capacity in the fleet, dramatic increases in catch could occur in a short time frame unless a safeguard is in place. Catch trends indicate that the market squid resource appears to be quite robust and is able to sustain the recent catch levels.

### 3.2.3.3 The Use of Egg Escapement as a Proxy for MSY

As was mentioned above, because no biomass estimate exists for market squid, it is not possible to define an overfished condition for this species. It is important to recognize that setting an actual MSY for market squid is impractical for the squid fishery because fishery and biological data are inadequate and landings are strongly influenced by market demand rather than effort. However, if a minimum threshold for egg escapement is not realized, it can be considered that an overfished condition may exist, or that catches of squid exceed any specified allowable level. Overfishing is defined as harvests of squid are occurring at times when either the egg escapement threshold is not being met, or that catches are exceeding specified allowable levels and that these catches may not be sustainable.

Consequently, the egg escapement method will also be used as a proxy for MSY/OY. This method of assessing fishery impacts to the squid resource is identified in Amendment 10 of the Federal CPS FMP (PFMC 2002) and brings the state in compliance with federal regulations. The egg escapement method of regulating the fishery relies on the Department to monitor the squid fishery at an appropriate level in



order to collect adequate biological information. The egg escapement model, as a proxy for MSY, is only a temporary measure until an acceptable biomass estimate can be determined for market squid. If a biomass estimate cannot be determined for market squid, agencies will continue to improve and refine the egg escapement method. This process of re-evaluation of the egg escapement model is ongoing through the PFMC CPS Management team.

### **3.2.4 Weekend Closure for Commercial Market Squid Fishery**

The Commission has decided to continue closures beginning noon Friday through noon Sunday from the U.S.-Mexico border to the California-Oregon border. This weekend closure allows for two days of uninterrupted spawning in areas where squid are being harvested. This provides protection to the resource by allowing spawning to occur and egg cases deposited without disturbance from the fishery. This also includes the use of attracting lights on weekends for commercial harvest. Unlike a seasonal quota or closure, this measure spreads the spawning escapement throughout the year, rather than concentrating it during one particular period.

Prohibiting fishing activity on weekends may also help alleviate conflict with other interest groups (e.g., divers, recreational fishermen, commercial passenger fishing vessels, etc.) operating in the same area. For example, the weekend closure has probably reduced the amount of interactions between the fishery and recreational divers wanting to observe squid spawning events.

### **3.2.5 Monitoring Programs**

The Commission has decided to continue the existing squid monitoring programs, including fishery-dependent sampling efforts and ongoing monitoring of catch information, especially those focused on developing management models. The fishery-dependent sampling is essential for real-time monitoring of the market squid fishery through the egg escapement method. The adopted project also maintains the Department's logbook system for squid vessels and light boats. These records provide valuable catch information other than landing data, and are critical to model the market squid population.

These monitoring programs (port sampling and logbooks) are designed to learn more about the fishery and resource and are intended to aid in the development of population models to sustain harvests. This method of assessing fishery impacts to the squid resource is identified in Amendment 10 of the Federal CPS FMP (PFMC 2002) and brings the state in compliance with federal regulations.

### **3.2.6 Live Bait Fishery and Incidental Catch of Market Squid**

The Commission has decided not to require a market squid vessel permit when fishing for live bait or when landing or taking market squid less than two tons in any calendar day. Market squid are an important source of live bait for the California recreational fishing industry. A relatively small volume is taken by the live bait industry using brail,





lampara, or drum seine gear. This fishery is a high value use of squid, supplying bait to recreational fisheries along the West Coast, primarily in southern California. Live bait catch, largely dependent on local availability, is sold by vessels either at sea or at live bait dealerships in several harbors statewide. Since the sale of live bait in California is not documented in a manner similar to that used for the market landings of squid, estimates of tonnage and value are not available.

FGC §8421(b) does not require vessels taking or landing market squid for commercial purposes to have a market squid permit if the catch does not exceed two tons in any calendar day. Because squid frequently school with CPS finfish, mixed landings of market squid and CPS finfish are common. With a seasonal catch limitation in place, once the catch limit is reached, an allowance for incidental catch of market squid from other commercial fisheries is needed. This would prevent the squid being discarded.

### **3.2.7 Gear Restrictions**

The Commission chose to maintain existing lighting restrictions which state that each vessel fishing for squid or lighting for squid will utilize a total of no more than 30,000 watts of light to attract squid at any time. And, as part of those restrictions, each vessel fishing for squid or lighting for squid will reduce the light scatter of its fishing operations by shielding the entire filament of each light used to attract squid and orient the illumination directly downward, or provide for the illumination to be completely below the surface of the water.

In addition, the Commission chose to modify existing shielding regulations to require that the lower edges of the shield be parallel to the deck of the vessel in order to provide the maximum shielding possible to reduce impacts to seabird or coastal communities (Option G.4). Since light shields are currently required, there would not be any significant change in net economic benefits and fishery community economic activities while reducing impacts to seabirds and coastal communities.

### **3.3 Restricted Access Program (Limited Entry Program)**

Restricted access programs are designed to match fishing effort with the sustainability of the resource and to address economic issues associated with excess harvest capacity in open access fisheries. In a fishery such as the market squid commercial fishery, the main objective of a restricted access program would be to assure the greatest economic viability from the harvest of market squid.

Prior to the 1998-1999 season, the squid fishery was an open access fishery. In 1996, new demand and markets for squid attracted many fishing vessels from other states. This influx of fishing vessels and increased competition has resulted in conflict and territorial disputes between "local" and out-of-state fishermen.

A restricted access program for the squid fishery should serve to balance the need to provide a viable economic harvest with the need to protect the squid resource. Access into the market squid fishery may be restricted by issuing only a certain number of



permits (limited entry). In the absence of a biomass estimate for market squid, a limited entry program, in conjunction with a seasonal catch limit, monitoring the fishery through the egg escapement method and weekend closures should collectively provide for a sustainable squid resource and fishery.

### **3.3.1 Summary of Commission Restricted Access Policy and the Market Squid Fishery**

California's fisheries are to be protected, conserved, and managed for the public benefit, which may include food production, commerce and trade, subsistence, cultural values, recreational opportunities, maintenance of viable ecosystems, and scientific research. None of these purposes need be mutually exclusive and, ideally, as many of these purposes should be encouraged as possible, consistent with resource conservation.

If harvest and other human-caused factors affecting the sustainability of the squid fishery are not managed, fishery resources may be less than optimally productive or, in the worst case, may suffer serious declines. Restricting access to a fishery has become one of many standard fishery management tools used by public agencies in carrying out their conservation and management responsibilities for publicly held fishery resources. It is the policy of the Commission to design restricted access programs to enhance the State's ability to manage its commercial fishery resources. Restricted access programs should: 1) contribute to sustainable fisheries management by providing a means to match the level of effort in a fishery to the health of the fishery resource and by giving fishery participants a greater stake in maintaining sustainability; 2) provide a mechanism for funding fishery management, research, monitoring, and law enforcement activities; 3) provide long-term social and economic benefits to the State and fishery participants; and 4) broaden opportunities for the commercial fishing industry to share management responsibility with the Department.

More specifically, the Commission's purposes for restricting access or entry to a fishery are described as: 1) promote sustainable fisheries; 2) provide for an orderly fishery; 3) promote conservation among fishery participants; and 4) maintain the long-term economic viability of fisheries. Restricted access programs may be instituted in order to carry out one or more of these purposes in a given fishery.

Because a primary purpose of restricted access programs is to match the level of effort in a fishery to the health of the fishery resource, each restricted access program that is not based on individual transferable quotas shall identify a fishery capacity goal intended to promote resource sustainability and economic viability of the fishery. Fishery capacity goals can be expressed as some factor or combination of factors that fairly represents the fishing capacity of the fleet. These factors may include the number of permitted fishery participants, number of permitted boats, net tonnage of the permitted fleet, amount of gear used in the fishery, and cumulative hold capacity. Fishery capacity goals should be based on such biological and economic factors as what is known about the size and distribution of the target species, historic fleet size or harvest capacity, and distribution of harvest within the current fleet. Conflicts with other



fisheries or ocean interest groups and economic conditions (current and future) within the fishery may also be factored in to such determinations. Depending on the fishery, the fishery capacity goal may be expressed as a single number or as a range.

### **Rationale for Implementation of a Limited Entry Program for the Market Squid Fishery**

Vessels currently participating in the market squid fishery are capable of harvesting more squid than is available under current or likely future biomass conditions. Fisheries characterized by excess harvesting capacity are described as overcapitalized in terms of the number of vessels and the amount of gear and equipment devoted to harvesting. As fisheries become overcapitalized, harvesting costs increase while catches remain the same. This situation represents an economically inefficient use of society's productive resources, and causes several problems for managers and the fishing industry when abundance and demand decline, and catches are reduced. As harvesting capacity in fisheries increases, problems arising from the need for more restrictive management measures and resolution of allocation issues become more acute. No relief from these problems will occur if harvesting capacity continues to rise. Taking action to reduce excess capacity before a resource reaches depleted status is a proactive management strategy that may thwart or alleviate potential problems with resource allocation in the future.

### **Scope of the Market Squid Limited Entry Program**

Vessels landing less than two tons of squid on a per trip basis will not be required to possess a limited entry permit. Additionally, landing of squid beyond the jurisdiction of the state of California will not be affected by any limited entry requirements. Recreational fishing for squid will not require a limited entry permit, nor does fishing for squid for use as live bait.

### **3.3.2 Capacity Goal**

Evaluating the capacity of the current market squid fishery can be used to provide a basis for establishing a restricted access program that matches the level of effort in a fishery to the health of the fishery resource. The goal of such a program is to maintain a sustainable squid resource and provide for a fishery that is diverse, stable, and profitable. With the establishment of the moratorium in 1998, many vessels applied for permits that were not previously active in the squid fishery. These purchases led to a situation where excessive and currently unutilized capacity has been present among permitted vessels of the fleet. During peak landing periods, the number of active vessels was still significantly below the number of currently permitted vessels.

The Commission has adopted a capacity goal for market squid vessels that produces a moderately productive and specialized fleet of 55 market squid vessel permits, 18 market squid brail permits, and 34 light boat permits. A capacity goal of 55 market squid vessels instead of the 52 originally proposed was adopted to include the addition of three experimental non-transferable fishery permits (Option O.2). The adopted program sets the capacity goal for light vessels at 52 light boats. The adopted project



supports a brail fleet capacity goal of 18 vessels as part of the total light boat capacity goal of 52 vessels.

### **3.3.3 Initial Issuance of Market Squid Fleet Permits**

Establishing limited entry qualifying criteria is a first step in reducing fleet size from the 165 squid vessels and 40 light boats currently permitted to achieve the selected capacity goal. A capacity goal is a target value that may be disruptive if implemented immediately. Providing initial qualifying criteria, implementing provisions for permit transferability, and encouraging additional attrition are mechanisms to help reduce the number of vessels in order to achieve the capacity goal in a less disruptive manner. Senate Bill 364 (1997) served as an initial notice of intent that a restricted access program was to be considered for the market squid fishery. This legislation established a squid fishery permit system; the system issued vessel-owner permits, and permit renewal required possession of a permit the previous season (moratorium). This moratorium of squid permits further served to alert squid fishermen of the potential for a restricted access program.

The Commission's policy to determine qualification for an initial permit has three elements. First, the policy for all restricted access fisheries assumes that initiating a restricted access program will not increase the recent level of fishing effort. Second, initial issuance of permits will only be to the current owners of qualifying vessels. Third, in order to meet the needs of a particular fishery, it may be desirable to modify the approach of giving permits only to current owners of qualifying vessels.

FGC §8101 permits any licensed fisherman to participate during the initial year of a limited entry program regardless of the prescribed conditions for entry if the fisherman presents to the Department satisfactory evidence that he or she has been licensed as a California commercial fisherman for at least 20 years and has participated in the specific fishery. Further, the fisherman must demonstrate qualifying participation in the fishery through landings or other appropriate criteria determined by the Commission.

Developing light boat initial issuance criteria based on historical participation is particularly problematic given that light boat participation was not formally documented prior to the logbook program. When the permit program was initiated, light boats could possess either a market squid vessel permit or a squid light boat owner's permit to use attracting lights. A number of currently active light boats hold market squid vessel permits rather than light boat owner permits based on the design of the permit structure during the 1998-2004 moratorium period. Beginning in 2000, the Department has operated a market squid logbook program, which documents light boat activity, and used these submitted logbooks as documented participation in the squid fishery.

The Commission adopted a limited entry program for the California market squid fishery following the Commission's own established guidelines and policies for restricted access commercial fisheries. Limited entry was widely supported by most members of the SRSC, the SFAC, and other squid fishing industry and conservation groups, with some processors and fishermen initially in opposition. During the adoption process, a



group of both fishermen and processors got together and decided which elements to support as a group, which the Commission adopted.

Five major permit categories were adopted for initial issuance criteria: 1) transferable market squid vessel owner permits, 2) non-transferable market squid vessel owner permits, 3) transferable market squid brail permits, 4) non-transferable market squid brail permits, and 5) market squid light boat owner permits. Initial issuance of these permits was set under the following criteria:

Transferable Permits:

- Market Squid Vessel Permit: possession of a current market squid vessel permit (2004-2005) and a minimum of 50 landings in window period 1 January 2000 through 31 March 2003;
- Brail Permit: Possession of a current market squid vessel permit (2004-2005) and a minimum of 10 landings made with brail gear in window period 1 January 2000 through 31 March 2003;
- Light Boat Permit: Possession of a current market squid permit (either vessel or light for 2004-2005) and have submitted one light boat log by 31 December 2000.

Non-Transferable Permits:

- Market Squid Vessel Permit: possession of a current market squid vessel permit (2004-2005), possessed a California commercial fishing license for at least 20 years and made a minimum of 33 squid landings at any time prior to August 27, 2004;
- Brail Permit: Possession of a current market squid vessel permit (2004-2005), possessed a California commercial fishing license for at least 20 years and made a minimum of 10 landings with brail gear during one fishing season in a window period from 1 January 2000 through 31 March 2003. Only receipts that demonstrate catch aboard a vessel that does not already qualify for issuance of a transferable permit of any permit class are eligible.

The adopted option (Option I.1) for initial issuance establishes a fleet, (Table 3-3), that is in proximity with the adopted capacity goal for the market squid fishery (Option H.3). Further, the adopted transferability options (Options K.3, L.3, and M.4) provide a mechanism to achieve the adopted capacity goal.

Table 3-3. Summary of adopted project initial issuance limited entry criteria. Source: CDFG Landing Receipts.		
Permit Type	Initial issuance criteria	Anticipated number of qualifiers
Market squid vessel permit (transferable)	Possession of a valid 2004-2005 market squid permit; 50 market squid landings between 1 January 2000, and 31 March 2003.	68



Table 3-3. Summary of adopted project initial issuance limited entry criteria. Source: CDFG Landing Receipts.		
Permit Type	Initial issuance criteria	Anticipated number of qualifiers
Market squid brail permit (transferable)	Possession of a valid 2004-2005 market squid vessel permit; a minimum of 10 landings made with brail gear in window period 1 January 2000 and 31 March 2003.	5 (11 qualify less 6 that also qualify for vessel permit)
Market squid light boat owner's permit (transferable)	Possession of a 2004-2005 market squid permit (either vessel or light); submission of one light boat log by 31 December 2000.	45 (57 qualify less 8 that qualify for a vessel permit and 11 that qualify for a brail permit)
Market squid vessel permit (non-transferable)	A 20-year CA commercial fishermen possessing a valid 2004-2005 market squid permit; a minimum of 33 landings prior to 27 August 2004	12-25
Market squid brail permit (non-transferable)	Possession of a 2004-2005 market squid vessel permit; possession of a California commercial fishing license for at least 20 years; made a minimum of 10 landings with brail gear during one fishing season in a window period from 1 January 2000 and 31 March 2003. Only receipts that demonstrate catch aboard a vessel that does not already qualify for issuance of a transferable permit of any permit class are eligible.	5

### 3.3.4 Permit Fees

The adopted project requires that an appropriate annual fee for market squid vessel, market squid brail, and light boat owner's permits be established to: 1) cover the cost of squid research and management programs, and 2) provide adequate monitoring and implementation of a limited entry program. Revenue is also generated from taxes levied on squid landings (\$3.80 per ton) this source of funding is variable and dependent entirely on the success of the fishery year-to-year. Any permit fee established needs to be reevaluated periodically.

The Commission adopted the following annual permit fees:  
 Market Squid Vessel Permit – Transferable = \$2,000  
 Market Squid Vessel Permit – Non-Transferable = \$1,000  
 Market Squid Brail Permit – Transferable = \$2,000  
 Market Squid Brail Permit – Non-Transferable = \$1,000  
 Market Squid Light Boat Permit - Transferable = \$600

Limited entry guidelines require an appropriate fee to implement a limited entry program, while also providing funds for management and research. The current baseline costs for maintaining existing Department programs that deal directly with



market squid research, monitoring, enforcement, and license sales exceeds \$964,000 annually (see Section 1, Chapter 5). Under the Commission's adopted program for initial issue of permits, the number of permits issued would be 111 transferable (68 vessel, 13 brail, 38 light boat). Assuming a minimum of 17 20-year nontransferable permits issued, there would be 135 permits initially issued (Table 3-4).

The Commission has adopted the following transfer criteria:

- Establish full transferability of market squid vessel permits based on comparable capacity (within 10%).
- Establish transferability of market squid vessel permits to a vessel of larger capacity (greater than 10%) under a "2 for 1" permit retirement – this option will allow vessel owners to increase their vessel capacity by transferring their permit to a replacement boat and surrendering one additional permit. Permit holders wishing to increase their current capacity by more than 10% must acquire another market squid vessel permit and surrender it to the Department for retirement.
- Once the Capacity Goal has been achieved, individuals wishing to gain entry into the fishery must secure two permits: one permit must be surrendered to the Department for retirement and one permit would be issued to a vessel of comparable capacity. Market squid light boat owner permits cannot be used to secure a market squid vessel permit.



Table 3-4. Range of fees for transferable and non-transferable market squid vessel, brail and light boat owner permits. The current baseline costs for maintaining existing Department programs that deal directly with market squid research, monitoring, enforcement, and license sales exceeds \$964,000 annually (see MSFMP Section 1, Chapter 5).			
Permit type	Initial issuance	Permit Fee	Total
Market squid transferable permits			
Vessel	68	\$2,000	\$136,000
Brail	5	\$2,000	\$10,000
Light	45	\$600	\$27,000
Market squid non-transferable permits			
Vessel	12-25	\$1,000	\$12,000-25,000
Brail	5	\$1,000	\$5,000
Totals	135		\$178,000
Program fees offset by fees (%):		Full Implementation (\$964,000)	18.5%
		Current Monitoring Only (\$533,000)	33.4%

For market squid vessel permits, the adopted project establishes transferability of these permits to a vessel of comparable capacity, within 10%. This gives the permit holder some flexibility when another vessel is required, because it is often difficult to find exact matches in capacity and provides fishermen who wish to retire the opportunity to sell their boat and/or permit to new participants. Additionally, the adopted project allows upgrades via transfer to vessels of larger capacity under specified conditions. Using a “2 for 1” permit retirement system, those in the fleet wishing to increase their catching capacity may do so while simultaneously generating a net loss in overall capacity of the fleet, which will aid in achieving the capacity goal.

### 3.3.6. Transferability of Market Squid Brail Permits

For market squid brail permits, the Commission adopted full transferability of these permits (Option L.3) based on comparable capacity (within 10%). Given they are a minor component of the fleet and the number of currently active brail vessels is less than the suggested capacity goal, there is little concern regarding overcapitalization at this time.

### 3.3.7 Transferability of Market Squid Light Boat Owner’s Permits





The Commission has decided to establish full transferability of light boat owner's permits. This would be allowed only if the initial number of permits issued is equal to or less than the capacity goal.

On 22 March 2005, the Commission sent notice of a change in the original proposed language for upgrading a light boat owner's permit to a transferable brail permit. The original language stated that a light boat permit holder may exchange 2 light boat owner permits for one market squid brail permit. The change reflects the Fish and Game Commission's decision to allow the holder of a Transferable Market Squid Light Boat Permit to upgrade that Permit to a Transferable Market Squid Brail Permit, without the surrender of any additional permits (one-for-one upgrade).

### **3.3.8 Permit Transfer Fees**

The Commission chose to set the permit transfer fee at \$500. The adopted project establishes an appropriate fee to transfer market squid vessel, market squid brail, and light boat owner's permits to assist with transfer administrative costs. The permit upgrade fee from a transferable light boat permit to a transferable brail permit, with the surrender of the light boat permit, is \$1500.

### **3.3.9 Experimental Market Squid Vessel Permits**

The Commission has established 3 experimental market squid vessel non-transferable permits. This allows the Commission to issue 3 non-transferable market squid vessel permits to any individual for placement on any vessel for purposes of developing a squid fishery in areas previously not utilized for squid production. Individuals issued permits pursuant to this section would be required to adhere to all commercial squid fishing regulations in CCR Title 14 §149, and all terms and conditions for permits defined in CCR Title 14 §149.1, excepting initial issuance criteria defined in CCR Title 14 §149.1(c). These permits count towards the capacity goal.

## **3.4 Ecological Considerations**

As part of the 1997 Legislation enacted to protect the market squid resource, the Department was directed to determine where there are areas, if any, that should be declared harvest replenishment areas for market squid where the taking of squid would not be permitted. Harvest replenishment areas for market squid would serve to:

- protect spawning habitat,
- function as forage reserves,
- offer protection against bycatch and fishery interactions, and
- provide areas of uninterrupted spawning for market squid.

In October 2002, the Commission designated 12 new MPAs at the northern Channel Islands (three of which replace existing reserves at Anacapa, Santa Barbara and San Miguel islands). These areas include known commercial squid fishing sites at Santa Barbara, Anacapa, Santa Cruz, and Santa Rosa islands. In addition to the closures at the Northern Channel Islands, commercial fishermen are not allowed to fish in state-



designated ecological reserves using roundhaul nets. Several existing reserves are known to be market squid spawning sites (e.g., Carmel Bay Ecological Reserve, Point Lobos Ecological Reserve, northeast side of Santa Catalina Island and Santa Monica Bay); all serve as harvest replenishment areas for market squid. Also, based on the large geographic range (Baja California north to Alaska) of market squid, there is an abundance of areas where squid are not fished. The MPAs and ecological reserves meet all of the goals of a harvest replenishment area. Marine protected areas have multiple uses, including 1) providing a buffer for species against the effects of environmental fluctuations and management uncertainties, 2) protecting specific areas or species from overexploitation, or 3) reducing user conflict.

The market squid resource is also important to the recreational fishery. Further, market squid is a significant component in the diets of numerous seabirds, marine mammals, and fish. The MPAs and ecological reserves will function as forage reserves for the many species that consume market squid.

Several seabird species are the focus of squid fishery interactions with seabirds, including: the federally and State-listed endangered and fully protected California brown pelican (*Pelecanus occidentalis californicus*), State-listed threatened Xantus's murrelet (*Synthliboramphus hypoleucus*), and Department species of special concern (SSC) ashy storm-petrel (*Oceanodroma homochroa*).

In total, there are 14 seabird species that breed on Santa Barbara, Anacapa and San Miguel islands (including one endangered species, one threatened species and five SSC) while 12 seabird species breed at the Farallon Islands (including four SSC) (Table 3-5). In addition to these nesting species, there are numerous other species associated with State waters that forage near these islands.

Table 3-5 Seabird species that breed (indicated by an X) in the Channel Islands and the Farallon Islands									
	ANA	SBI	SMI	SRI	SCR	CAT	SCL	SNI	Farallon Is.
<b>Diurnal Species</b>									
California Brown Pelican*	X	X	R		R		R	R	
Double-Crested Cormorant**	X	X	X					X	X
Brandt's Cormorant	X	X	X	X	X		X	X	X
Pelagic Cormorant	X	X	X	X	X				X
Western Gull	X	X	X	X	X	X	X	X	X
Pigeon Guillemot	X	X	X	X	X				X
Tufted Puffin**			X						X
Western Snowy Plover †,**			----x	X					
Black Oystercatcher	X	X	X	X	X		X	X	X
Common Murre									X
<b>Nocturnal Species</b>									
Ashy Storm-Petrel**	P	X	X		X	X	X		X
Black Storm-Petrel**		X	X			X	X		
Leach's Storm-Petrel		X	X						X
Xantus's Murrelet**, ***	X	X	X		X	X	X		
Rhinoceros Auklet**			X						X
Cassin's Auklet	X	X	X		X				X

\*Federally and State listed as endangered, † Federally listed as threatened, \*\* Department Species of Special Concern (SSC), ----x = not seen since 1991



\*\*\* State listed as threatened

P= probable nesting, R= Roost site

ANA=Anacapa, SBI= Santa Barbara, SMI= San Miguel, SRI= Santa Rosa,

SCR= Santa Cruz, CAT= Santa Catalina, SCL= San Clemente, SNI= San Nicolas

### **3.4.1 Area and Time Closures to Address Seabird Issues**

The Commission established an area closure to squid fishing with the use of attracting lights in the Gulf of the Farallones National Marine Sanctuary with boundaries defined as of 27 August 2004. This would protect not only the seabirds that breed and rear on the Farallon Islands, but also protect a large forage area (3,250 km<sup>2</sup>) in the waters surrounding the islands from light disturbance and interactions with squid vessels. Under this option, noise associated with squid fishing activities has the potential to cause disturbances to seabirds.

### **3.5 Administrative Items**

#### **3.5.1 Advisory Committee for Squid Fishery**

The Commission in its adoption of §53.02 to Title 14, CCR established that the Director may create an advisory committee to assist the Department with development and review of fishery assessments, management options and proposals, and Plan amendments. This squid fishery advisory committee shall be comprised of industry, science, and environmental community members. The committee will assist the Department by providing recommendations regarding the effectiveness of adopted squid management.

