

stock. Catches from the Mexican fisheries would also be beneficial. The growth data are based on limited sampling and an updated aging study may improve the assessment.

C. Introduction

1. Description

California scorpionfish (*Scorpaena guttata*), also known locally as sculpin, is a generally benthic species found from central California to the Gulf of California between the inter-tidal and about 170 m (Eschmeyer et al., 1983; Love et al., 1987). It generally inhabits rocky reefs, but in certain areas and seasons it aggregates over sandy or muddy substrate (Frey, 1971; Love et al., 1987). Catch rate analysis and tagging studies show that most, but not all, California scorpionfish migrate to deeper water to spawn during May-September (Love et al., 1987). Tagging data suggest that they return to the same spawning site (Love et al. 1987), but information is not available on non-spawning season site fidelity. California scorpionfish are quite mobile and may not be permanently tied to a particular reef (Love et al. 1987). The species feeds on a wide variety of foods, including crabs, fishes, octopi, isopods and shrimp, but juvenile *Cancer* crabs are the most important prey (Limbaugh, 1955; Love et al., 1987).

2. Important life history characteristics

Love et al. (1987) provide a summary of the biology of California scorpionfish. California scorpionfish spawn from May through August, peaking in July (Love et al. 1987). The species is oviparous, producing floating, gelatinous egg masses in which the eggs are embedded in a single layer (Orton 1955). California scorpionfish utilize the “explosive breeding assemblage” reproductive mode in which fish migrate to, and aggregate at traditional spawning sites for brief periods (Love et al. 1987) and it is believed that spawning takes place just before, and perhaps after dawn, in the water column (Love et al. 1987). These spawning aggregations have been targeted by fishermen. Little is known about California scorpionfish larvae. Few larvae have been taken in ichthyoplankton surveys off southern California (Moser et al. 1993). Larvae are more abundant in surveys conducted off northern Baja California, Mexico (Moser et al. 1993). Few California scorpionfish are mature at 1 year of age, but over 50% are mature by age two and most are mature by age three (Love et al. 1987).

Males and females show different growth rates, with females growing to a larger size than males, and the sexes exhibit different length-weight relationships (Love et al. 1987).

Scorpionfish are very resistant to hooking mortality and have shown survival under extreme conditions. Therefore, for the purpose of this assessment, discard mortality is assumed to be negligible.

Like other species in the genus *Scorpaena*, California scorpionfish produce a toxin in their dorsal, anal, and pelvic spines, which produces intense, painful wounds (Love et al. 1987).

3. Fishery

California scorpionfish comprise a minor part of the Californian sport and commercial fisheries (Love et al., 1987). Some commercial passenger fishing vessels (CPFV) operators reportedly target California scorpionfish spawning aggregations during spring and summer (Love et al. 1987), and also target California scorpionfish in the winter when other species are not available. Historically, California scorpionfish were taken commercially by hook and line and, occasionally, by round haul nets (Daugherty, 1949). More recently, commercial bottom longlines have been used to target spawning aggregations offshore of Long Beach (Love et al. 1987). Since the early 1990s, trawl catch has been a substantial component of the commercial catch. Commercial landings have fluctuated substantially over time, which could, in part, be due to changes in targeting and El Niño events (Love et al. 1987). A high proportion of the catch landed in California during the 1960s and 1970s was taken from Mexican waters. In recent years, most of the catch has come from around the Los Angeles region. In general, the majority of the commercial catch has come from the Los Angeles region, except in the 1960s and 1970s when the majority of the catch came from the San Diego region and Mexican waters.

The CPFV effort has remained relatively constant over a long period (1959-1998; Dotson and Charter, 2003). However, there appears to be a shift in effort towards less utilized species, such as California scorpionfish, over the past decade (Dotson and Charter, 2003).

4. Management (and assessment)

No previous assessments have been carried out for California scorpionfish off southern California. Most previous work has focused on the biology and behavior of scorpionfish or the description and analysis of catch and catch rates (e.g. Love et al, 1987 and references therein).

Prior to the adoption of the Pacific Coast Groundfish Fishery Management Plan (FMP) in 1982, California scorpionfish (*Scorpaena guttata*) was managed through a regulatory process that included the California Department of Fish and Game (CDFG) along with either the California State Legislature or the Fish and Game Commission (FGC) depending on the sector (recreation or commercial) and fishery. With implementation of the Pacific Coast Groundfish FMP, California scorpionfish came under the management authority of the Pacific Fishery Management Council (PFMC), being incorporated, along with all genera and species of the family Scorpaenidae, into a federal rockfish classification and managed as part of “Remaining Rockfish” under the larger heading of “Other Rockfish” (PFMC 2004; PFMC 2002, Tables 31-39). California scorpionfish continued to be managed through federal regulations for “Remaining Rockfish” from 1983-1996, although the larger heading “Other Rockfish” was discontinued in 1992 and replaced with “*Sebastes* complex” (PFMC 2002, Tables 40-47; March 1, 1999, 64 FR 9936).

Under the Pacific Coast Groundfish FMP, groundfish species and species groups were managed using estimates of Allowable Biological Catch (ABC) (early documentation refers to Maximum Sustainable Yield, but now referenced as ABC). The ABCs provided by the PFMC’s Groundfish Management Team (GMT) in the 1980’s were based on an analysis of commercial landings from the 1960’s and 1970’s. For this analysis, most of the rockfishes were lumped into one large group. This analysis indicated that the landings for rockfish in the Monterey-Conception area were at or near ABC levels (PFMC 1993). In the 1990’s, as bocaccio and other rockfish were assessed, the ABCs associated with these species were removed from this larger “*Sebastes* complex” group. Starting in 1992, some of the rockfish species and species groups began to be

managed using harvest guidelines (in addition to ABCs) followed in 1999 by the use of Optimum Yields (OY).

To keep landings within these adopted harvest targets, the Pacific Coast Groundfish FMP provided the Council with a variety of management tools including area closures, season closures, gear restrictions, and, for the commercial sector, cumulative limits (generally for two-month periods). With the implementation of a federal groundfish restricted access program in 1994, allocations of total catch and cumulative limits began to be specifically set for open access (including most of California's commercial fisheries that target California scorpionfish in Southern California) and limited entry fisheries (PFMC 2002; 2004).

During most of this time frame, management also centered on the commercial groundfish sector primarily because harvest from the recreational sector was considerably smaller than that from the commercial sector. This approach began to change in the later 1990's as commercial landings decreased and recreational harvest became a greater proportion of the available harvest. For the "*Sebastes* complex", an estimate of the recreational harvest began to be included in the ABC tables starting in 1997 (PFMC 2002, Tables 48).

Also beginning in 1997, the "Remaining Rockfish" group was separated into two groups: "Other Rockfish" which contained those species, like California scorpionfish, with no quantifiable assessment (and whose OY was calculated as 0.5 of the ABC); and "Remaining Rockfish" which contained species that had been assessed with less rigorous methods than a stock assessment (and whose OY was calculated as 0.75 of the ABC) (PFMC 2002, Tables 48-53; March 1, 1999, 64 FR 9935-9936). Therefore, beginning in 1997, California scorpionfish was managed as part of the *Sebastes* complex-south, "Other Rockfish" category. (*Sebastes* complex-south included the Eureka, Monterey, and Conception areas while *Sebastes* complex-north included the Vancouver and Columbia areas.)

The PFMC's rockfish management structure changed significantly in 2000 with the replacement of the *Sebastes* complex –north and –south areas with Minor Rockfish North (now covering the Vancouver, Columbia, and Eureka areas) and Minor Rockfish South (now Monterey and Conception areas only). The OY for these two groups (which continued to be calculated as 0.50 of the ABC) was further divided (between north and south of 40°10' N. Lat.) into nearshore, shelf, and slope rockfish categories with allocations set for Limited Entry and Open Access fisheries within each of these three categories (January 4, 2000, 65 FR 221; PFMC 2002, Tables 54-55). Species were parceled into these new categories depending on primary catch depths and geographical distribution. Because of its depth range and southern distribution, California scorpionfish was included within the Minor Rockfish South, "Other Rockfish" ABC and managed under the south of 40°10' N. Lat. nearshore rockfish OY and trip limits (PFMC 2002, Table 29).

Along with the above changes, a North/South management line at 40°10' N. Lat. was established in 2000 with separate management specifications adopted for the areas north and south of 40°10' N. Lat. and with the southern area divided into two separate management areas at Point Lopez, 36°00' N. Lat. This was followed in 2001 with the implementation of two distinct rockfish and lingcod management areas south of 40°10' N. Lat. (along with separate management specifications): the northern rockfish and lingcod management area between 40°10' N. Lat. and Point Conception (34°27' N. Lat.); and the southern rockfish and lingcod management area between Point Conception and the U.S.-Mexico border. These were later revised starting in 2004 with the northern rockfish and lingcod management area redefined as ocean waters from the

Oregon – California border (42°00' N. Lat.) to 40°10' N. Lat., the central rockfish and lingcod management area defined as ocean waters from 40°10' N. Lat. to Point Conception, and the southern rockfish and management area continuing to be defined as ocean waters from Point Conception to the U.S.-Mexico border.

Cowcod Conservation Areas (CCAs) also were established in 2001 to reduce fishing effort for cowcod rockfish (PFMC 2002, Table 29). These areas were closed to all recreational and commercial fishing for groundfish except for recreational and commercial fishing for minor nearshore rockfish² (including California scorpionfish) within waters less than 20 fathoms. In addition, Rockfish Conservation Areas (RCAs) were established in 2003 to allow for the closure of specific area and depth ranges along the West Coast for the purpose of reducing fishing effort for shelf and slope rockfish. The California Rockfish Conservation Area (CRCA) was defined as those ocean waters south 40°10' N. Lat. to the U.S.-Mexico border with different depth zones specified for the areas north and south of Pt. Reyes (37°59'44''N. Lat.).

During the late 1990's and early 2000's, major changes also occurred in the way that California managed its nearshore fishery. The Marine Life Management Act (MLMA), which was passed in 1998 by the California Legislature and enacted in 1999, required that the FGC adopt an FMP for nearshore finfish. It also gave authority to the FGC to regulate commercial and recreational nearshore fisheries through FMPs and provided broad authority to adopt regulations for the nearshore fishery during the time prior to adoption of the nearshore finfish FMP. Within this legislation, the Legislature also included commercial size limits for nine nearshore species including California scorpionfish (10-inch minimum size) and a requirement that commercial fishermen landing these nine nearshore species possess a nearshore permit.

Following adoption of the Nearshore FMP and accompanying regulations by the FGC in fall of 2002, the FGC adopted regulations in November 2002 which established of a set of marine reserves around the Channel Islands in Southern California (which became effective April 2003) and adopted a nearshore restricted access program in December 2002 (which included the establishment of a Deeper Nearshore Permit) to be effective starting in the 2003 fishing year.

Although the Nearshore FMP provided for the management of the nearshore rockfish and California scorpionfish, management authority for these species continued to reside with the Council. Even so, for the 2003 and subsequent fishery seasons, the State provided recommendations to the Council specific to the nearshore species that followed the directives set out in the Nearshore FMP. These recommendations, which the Council incorporated into the 2003 management specifications, included a recalculated OY for Minor Rockfish South - Nearshore, division of the Minor Rockfish South - Nearshore into three groups (shallow nearshore rockfish; deeper nearshore rockfish; and California scorpionfish), and specific harvest targets and recreational and commercial allocations for each of these groups. This was followed in 2004 with the adoption of specific management measures for each of the three management areas: the California-Oregon border to 40°10' N. Lat.; 40°10' N. Lat. to Point Conception (34 ° 27' N. Lat.); and Point Conception to the U.S.-Mexico border.

Also, since the enactment of the MLMA, the Council and State in a coordinated effort developed and adopted various management specifications in 1999-2004 to keep harvest within the harvest targets, including seasonal and area closures (e.g. the CCAs; a closure of Cordell Banks to specific fishing), depth restrictions, minimum size limits, and bag limits to regulate the

² This exception also included the two state managed groundfish species, cabezon and kelp greenling.

recreational fishery and license and permit regulations, finfish trap permits, gear restrictions, seasonal and area closures (e.g. the RCAs and CCAs; a closure of Cordell Banks to specific fishing), depth restrictions, trip limits, and minimum size limits to regulate the commercial fishery.

A summary of the above regulations for 1999-2004, as they relate to California scorpionfish, is supplied in Table C4.1 and a regulation timeline for 1990-2004 is provided in Figure C4.1. In addition, OYs and harvest targets for the Minor Rockfish South - Nearshore and California scorpionfish for 1999-2006 are provided in Table C4.2.

Table C4.1. Summary of Federal and California Regulations for California Scorpionfish for the Area South of Point Conception (34° 27' N. lat.) from 1999-2004.

Recreational	
1999	Fishing open January – December at all depths.
2000	10” minimum size limit. January-February closure for rockfishes including California scorpionfish.
2001	January – February, November - December fishing in waters < 20 fathoms; March-October fishing open at all depths.
2002	January – February, November – December closure for rockfishes including California scorpionfish; March-June fishing open at all depths; July – October fishing in waters <20 fathoms.
2003	Bag limit changed from 10 fish to 5 fish. January – February fishing only in waters < 20 fathoms; March – June fishing open at all depths; July – August fishing in waters < 20 fathoms; September - November fishing in waters < 30 fathoms; December closure for rockfishes including California scorpionfish.
2004	January – February, May - October closure for rockfishes including California scorpionfish; March – April, November – December open in waters < 60 fathoms.
Commercial	
1999	10” minimum size limit with exemption for fish taken in trawl nets and landed dead. Fishermen landing California scorpionfish required to possess a Nearshore Permit. <i>Sebastes</i> Complex -South (which includes California scorpionfish) open January – December. Limits under <i>Sebastes</i> Complex –South provided in Federal Register (FR) for all open access gear (revised at 64 FR 54786, October 8, 1999). A limit of 300 pounds of groundfish per trip also set for open access exempted trawl gear engaged in fishing for pink shrimp, spot and ridgeback prawns, California halibut, and sea cucumbers; all limits and closures adopted for open access gear also apply and are counted toward the groundfish limit (PFMC 2002).
2000	For area south of 36° N. Lat., closed January – February; in area between 40° N. Lat. and 36° N. Lat., closed March – April. Limits under Minor Rockfish South – Nearshore provided in Table 5 for all open access gear (revised at 65 FR 66655, November 7, 2000) (also provided in PFMC 2002, Table 29.d). A limit of 300 pounds of groundfish per trip also set for open access exempted trawl gear engaged in fishing for spot and ridgeback prawns, California halibut, and sea cucumbers; all limits and closures adopted for open access gear (Table 29.d) also apply

	and are counted toward the groundfish limit; more specific limits set for exempted trawl gear engaged in fishing for pink shrimp (PFMC 2002).
2001	<p>For area south of 34° 27', January – February fishing in waters < 20 fathoms; March – December open at all depths.</p> <p>Limits under Minor Rockfish South – Nearshore provided in Table 5 for all open access gear (revised at 66 FR 54721, October 5, 2001) (also provided in PFMC 2002, Table 29.h).</p> <p>A limit of 300 pounds of groundfish per trip also set for open access exempted trawl gear engaged in fishing for spot and ridgeback prawns, California halibut, and sea cucumbers; all limits and closures adopted for open access gear (Table 29.h) also apply and are counted toward the groundfish limit; more specific limits set for exempted trawl gear engaged in fishing for pink shrimp (PFMC 2002).</p>
2002	<p>For area south of 34° 27', closed January – February; March – June open at all depths; July – August open in waters < 20 fathoms; closed September – December.</p> <p>Limits under Minor Rockfish South – Nearshore provided in Table 5 for all open access gear (revised at 67 FR 70018, November 20, 2002).</p> <p>A limit of 300 pounds of groundfish per trip also set for open access exempted trawl gear engaged in fishing for spot and ridgeback prawns, California halibut, and sea cucumbers; all limits and closures adopted for open access gear (Table 5) also apply and are counted toward the groundfish limit; more specific limits set for exempted trawl gear engaged in fishing for pink shrimp (revised at 67 FR 10490, March 7, 2002).</p>
2003	<p>For California scorpionfish, closed January – April, September – December; open at all depths May – August.</p> <p>Limits under Minor Rockfish South – Nearshore, California scorpionfish provided in Table 5 (South) for all open access gears (revised at 68 FR 40187, July 7, 2003).</p> <p>Trip limits and RCAs for groundfish retained in the pink shrimp, ridgeback prawns, California halibut, and sea cucumber fisheries also provided in Table 5 (South).</p> <p>Fishermen using open access exempted trawl gear and taking nearshore species covered by the Nearshore Permit (including California scorpionfish) now required to have a Nearshore Fishery Bycatch Permit and now limited to 50 pounds per day of these select nearshore species. All limits and closures adopted for open access gear in Table (5) also apply.</p>
2004	<p>For California scorpionfish, closed January – February; open at all depths March – December.</p> <p>Limits under Minor Rockfish South – Nearshore, California scorpionfish provided in Table 5 (South) for all open access gears (revised at 69 FR 58916, October 6, 2004).</p> <p>Trip limits and RCAs for groundfish retained in the pink shrimp, ridgeback prawns, California halibut, and sea cucumber fisheries also provided in Table 5 (South).</p> <p>Fishermen taking nearshore species covered by the Nearshore Permit (including California scorpionfish) under the Nearshore Fishery Bycatch Permit limited to 50 pounds per day of these select nearshore species. All limits and closures adopted for open access gear in Table (5) also apply.</p>

Table C4.2. ABCs, OYS, and Harvest Targets in Metric Tons for Nearshore Minor Rockfish South and California Scorpionfish for 1999-2006.
 Table 2. ABCs, OYS, and Harvest Targets in Metric Tons for Nearshore Minor Rockfish South and California Scorpionfish for 1999-2006.

Species Group	1999			
	ABC	OY	Recreational ¹	Commercial ¹
<i>Sebastes</i> complex - south ²	4,731	2,705	-----	1,396
Other Rockfish	3,603	-----	-----	-----

Species Group	2000				2001				2002			
	ABC	OY	Recreational ¹	Commercial ¹	ABC	OY	Rec. ¹	Comm. ¹	ABC	OY	Rec. ¹	Comm. ¹
Minor Rockfish South ³	3,457	1,899	571	1,328	3,556	2,040	950	1,090	3,506	2,015	732	1,283
Other Rockfish	2,702	-----	-----	-----	2,702	-----	-----	-----	2,652	-----	-----	-----
Nearshore		680	379	301		662	550	112		662	532	130

Species Group	2003				2004				2005/2006			
	ABC	OY	Recreational ¹	Commercial ¹	ABC	OY ⁴	Rec. ¹	Comm. ¹	ABC	OY ⁴	Rec. ¹	Comm. ¹
Minor Rockfish South ³	3,506	1,894	493	1,401	3,412	1,968	435	1,390	3,412	1,968	443	1,390
Other Rockfish	2,652	-----	-----	-----	2,558	-----	-----	-----	2,558	-----	-----	-----
Nearshore ^{4,5,6}		541	433	108		615	375	97		615	383	97
Shallow Nearshore		104.8	66	38.8		104.8	66	38.8		-----	-----	-----
Deeper Nearshore ⁶		351.1	303.1	48		282.3	245.1	37.2		-----	-----	-----
California Scorpionfish		84.9	63.9	21		84.9	63.9	21		-----	-----	-----

Note:

1. Unbolded recreational values are either recreational estimates or harvest targets; unbolded commercial values are harvest targets while bolded values are OYs.
2. *Sebastes* complex -south covers the Eureka, Monterey, and Conception areas.
3. Minor Rockfish South covers only the Monterey and Conception areas with the boundary between Minor Rockfish North and Minor Rockfish South at 40° 30' N. lat.
4. The Nearshore Minor Rockfish South OY of 615 mt for 2004-2006 is currently under review.
5. The Nearshore Minor Rockfish South northern boundary is 40°10' N. lat.
6. Starting in 2004, Nearshore and Deeper Nearshore Rockfish OYs and harvest targets do not include black rockfish.

Figure C4.1. Commercial and recreational regulations for CA Scorpionfish, 1990-2004.

