INTRODUCTION

This is the first stock assessment of gopher rockfish (*Sebastes carnatus* = "flesh colored"). Gopher rockfish range from Eureka, California, to San Roque, central Baja California (Miller and Lea 1972), but are most common from Mendocino County to Santa Monica Bay, California (Love 1996). During exploratory analyses, we felt it appropriate to assess only the northern California population (north of Point Conception), for there was evidence that fish from southern California are smaller and growth information was not available.

Gopher rockfish is a residential and demersal species, associated with kelp beds or rocky reefs, from the intertidal to about 264 ft (80 m), most commonly between 30 and 120 ft (9-37 m) (Eschmeyer and Herald 1983; Love 1996). One tagging study off central California (Lea et al. 1999) revealed that gopher rockfish exhibit minor patterns of movement (<1.5 nm, 2.8 km) with all fish being recaptured on the same reef system where they were tagged. Another study, conducted by Matthews (1986), reported movements up to 1.2 km (0.65 nm) by gopher rockfish that traveled from a low-relief natural reef to a high-relief artificial reef. The change in substrate type may have been a factor in the movement in the Matthews study.

Gopher rockfish have been a minor component of the commercial and recreational rockfish fishery since at least the late 1960s (CFIS and RecFIN) (Figures 1 a-b). In 1980, an estimated 63 metric tons of gopher rockfish were landed commercially north of Point Conception, with a decrease in landings in the mid-1980s (Figure 2). Landings then began to increase, with a peak in the fishery occurring in 1992 when approximately 74 metric tons were landed. Since then, landings have slightly decreased over time. Lower recent landings in 2003 and 2004 (13 and 15 metric tons, respectively) are in part due to more restrictive federal limits placed on rockfishes. Hook-and-line gears have been the dominant gear type used during the 1969 to 2004 period accounting for 98% of commercial landings.

The recreational gopher rockfish fishery for California ports north of Point Conception peaked during a five-year period in the early 1990s, with 2001 and 2003 also being productive years (Figure 2). Since 1983, anglers caught the greatest proportion of gopher rockfish from private and rental boats (71%), followed next by party and charter boats (27%). However, in more recent years (1997 to 2004) these proportions have changed, with the private and rental boats taking 59% of gopher rockfish in the recreational fishery and 41% by the party and charter boats. Also since 1983, gopher rockfish have ranked 25th in northern California recreational fishery landings, accounting for approximately 1% of the total harvest for all recreationally caught fishes. However, gopher rockfish made up approximately 50% of the estimated take of the shallow nearshore rockfishes and 6% of all nearshore rockfish species combined. Additionally, recent catches have been influenced by size and bag limits.

Starting in the late 1980s (Larson and Wilson-Vandenberg 2001) the premium quality live-fish market developed. Currently, nearly all gopher rockfish are landed in this condition due to a more lucrative high-demand market. As a result of the increasing demand for live-fish the average price per pound has risen steadily from a low of less than $2.00 per pound at the inception of the live-fish market to approximately $6.15 (preliminary) per pound in 2004 (CFIS-CMASTR) (unadjusted for inflation).

Management history:

Gopher rockfish is a federally designated groundfish and part of the *Sebastes* complex, and is managed by the Pacific Fishery Management Council (PFMC). Thus, federal commercial regulations that apply to the *Sebastes* complex apply to gopher rockfish. Additionally, the State of California regulates this species for both the commercial and recreational sectors by means of the State Legislature, the Fish and Game Commission (FGC), and the California Department of Fish and Game (CDFG). Because gopher rockfish are a member of the *Sebastes* complex, the PFMC has actively managed them under the general umbrella of regulatory measures that applied to the *Sebastes* complex until 2000 (PFMC 2002). In 2000, changes in the PFMC's rockfish management structure resulted in the discontinued use of the *Sebastes* complex and minor rockfishes, and were replaced with three species groups: nearshore, shelf, and slope rockfishes (January 4, 2000; 65 FR 221), of which gopher rockfish are included in the nearshore group. Within the nearshore group, they are included in the "shallow nearshore rockfish" component. Additionally, north of 40°10' N. latitude (near Cape Mendocino) gopher rockfish are included in the "other nearshore rockfish" group. However, since gopher rockfish are rarely taken in this area of California they essentially do not contribute to the northern California catch.

Since the early 1980s a variety of federal regulatory measures have been used to manage the rockfishes, including cumulative trip limits (generally for two-month periods) and seasons for the commercial sector. Over the years these cumulative trip limits have steadily decreased. Starting in 1994 the commercial groundfish fishery sector was divided into two components: limited entry and open access with specific regulations designed for each component. Other regulatory actions for the general rockfish categories have included area closures, gear restrictions, and cumulative bimonthly trip limits set for the four different commercial sectors - limited entry fixed gear, limited entry trawl, open access trawl, and open access non-trawl. Harvest guidelines are also used to regulate the annual harvest for both the recreational and commercial sectors. In 2002, allocation harvest guidelines for the shallow nearshore rockfish group were set for the recreational and commercial sectors south of 40°10' N. lat. at 532 and 124 metric tons, respectively. By contrast, the 2003 recreational and commercial harvest guidelines were set at 433 and 108 metric tons, respectively. In 2004, the harvest guidelines were set at 375 and 97 metric tons for the recreational and commercial sectors, respectively. A timeline of recent regulations can be seen in Table 1.

The state of California has also adopted various regulatory measures to manage the fishery over the years. Notably, regulations affecting the recreational sector include changes in bag limits starting in 2000, area and seasonal closures, depth restrictions, the creation of the Rockfish and Lingcod management areas in 2000, and the creation of the Cowcod Conservation Area (CCA) in 2001. In 1998, the Marine Life Management Act (MLMA) was enacted, which paved the way for the development of the Nearshore Fishery Management Plan (CDFG 2001). More recent regulatory actions included the FGC adopting marine reserves for the Channel Islands (became effective January 1, 2003) which closed areas to fishing, and in 2004 additional regulatory measures were adopted to change bag limits, boat limits, closure of the Cordell Bank, and in the CCA fishing was restricted to depths shoreward of 20 fathoms.

Commercial fishery management was enacted primarily through statues adopted by the state Legislature, until the passage of the MLMA in 1998. The MLMA transferred authority to the FGC to regulate the nearshore finfish fishery, including gopher rockfish (CDFG 2001). State commercial regulations include: license and permit regulations, finfish trap permits, a nearshore fishery permit moratorium (2001), the implementation of a nearshore fishery permit restricted access program (2003), gear restrictions, area and season and time closures, regulations pertaining to Marine Protected Areas and Commercial Management areas, depth restrictions, and a minimum total length size limit of 10 inches (254 mm) in 1999.

BIOLOGICAL PARAMETERS

The largest individual observed was 34.8 cm total length (TL) (Lea et al. 1999). Lea et al. (1999) found the relationship (R^2=0.99, n=537) between TL (mm) and weight (W in grams), sexes combined, to be

$$W = 0.00001299 * TL^{3.077} \quad (1)$$

In this assessment, data were provided in fork length. Using the total length to fork length conversion equation (mm) provided by Echeverria and Lenarz (1984)

$$FL = 0.995TL + 0.768 \quad (2)$$

we used the following length to weight equation

$$W = 0.00001299 * (FL - 0.768/0.995)^{3.077} \quad (3)$$

in this assessment. This relationship can be seen in Figure 3.

Age and growth:

Maximum age estimates of gopher rockfish in northern California range from 24 to 30 years (Bloeser 1999; Lea et al. 1999). Based on a calculated age-length relationship using whole otoliths for aging, a 20 cm (8 in) TL gopher rockfish is approximately 3-4 years, and a 25 cm (10 in) TL fish is approximately 9-10 years (Lea et al. 1999). Even though linear regression tests suggest a significant difference in growth between the sexes, calculated length-at-age by sex suggests this difference to be very small (Lea et al. 1999). We used one growth curve for both sexes in this assessment.

The precise length compositions of gopher rockfish in the wild appear to vary among locations. On a large scale, differences can be seen between northern and southern California (Figure 4). For this reason, we only used northern California for this length-based assessment, due to the lack of information on growth for species in southern California. It can also be seen