California's North Coast Fishing Communities
Historical Perspective and Recent Trends

Crescent City
Fishing Community Profile

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Fishing Community Profile

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EXECUTIVE SUMMARY

Background

National Standard 8 of the Magnuson-Stevens Fishery Conservation and Management Act requires that fishery managers consider the importance of fishery resources to fishing communities, to provide for their sustained participation and to minimize adverse economic impacts on them, consistent with conservation objectives. Similarly, California's Marine Life Management Act mandates the use of socioeconomic as well as biophysical Essential Fishery Information to meet fishery management goals. Information on how individual fisheries and port communities operate is important to meeting these mandates. Yet, such social science information on Northern California port communities has been sparse until recently.

This profile of the Crescent City fishing community describes the history of the area and its fisheries, present-day fishery operations, activities and associated infrastructure. It identifies key regulatory and economic factors highlighted by study participants that interact with and affect the local fishing community. It is intended for use in a range of processes, from local planning and education to state and regional management.

The information presented is based on the collection and integrated analysis of archival and field data to interpret patterns, variability and change within and across fisheries and the fishing community over time. Data sources include:

- Commercial fish landing receipt data for 1981–2007 reconfigured into 34 distinct species/gear combinations;
- Commercial Passenger Fishing Vessel (CPFV) logbook data for 1980–2007;
- An extensive review of the published and gray literature, including fishery status reports and historical fishery statistics (as available); and
- Field observation and interviews and group meetings with about 50 fishery participants and other knowledgeable individuals.

History of the Crescent City Fishing Community

Located 350 miles north of San Francisco and 20 miles south of the Oregon border, Crescent City Harbor is situated near some of the West Coast's most productive fishing grounds for salmon, groundfish, crab and shrimp. People living in this isolated part of the state have long utilized fishery resources for livelihood, sport and subsistence. Once home to the Tolowa and Yurok peoples, Crescent City became a hub for the gold mining, whaling and timber industries in the mid-1800s. The timber and fishing industries grew through the 1900s. In 1950, locals built Citizens Dock to support local fishing activity. In 1964 a devastating tsunami took 11 lives and destroyed most of the town and the docks. Relief funds from that natural disaster promoted the redevelopment of the harbor through the construction of a boat basin, offloading docks, and two large processing plants. By the early 1970s, Crescent City Harbor was a 'state-of-the-art' fishing port, well positioned to support expansion of commercial and recreational fisheries.

By the late 1970s and 1980s, growing concerns about the status of West Coast salmon and groundfish stocks prompted the Pacific Fishery Management Council (PFMC) and the state of California to implement increasingly stringent management measures for the commercial and recreational fisheries. Cumulatively, these measures have discouraged (nontribal) fishing

along much of the North Coast, resulting in substantial reductions in both commercial and recreational fishing activity, and contributing to social and economic impacts in the area.

The Crescent City Fishing Community Today

Crescent City's primary commercial fisheries include the Dungeness crab pot, groundfish and shrimp trawl, groundfish hook-and-line and coonstripe shrimp trap fisheries. The brief whiting trawl season involves a small number of nonresident vessels. Some resident fishermen travel north into Oregon or south (as far as San Francisco) to participate in troll fisheries for Chinook salmon and/or albacore tuna. Of the approximately 100 vessels homeported at Crescent City, 85–90 are described by locals as crabber/trollers, 12 are nearshore fishermen, and five are groundfish/shrimp trawlers. Most fishermen participate in more than one fishery, and more than 75% have participated in the crab fishery.

Local fish receiving and processing capacity consists of six buyers with receiving stations at the harbor and one onsite receiver/processor, Alber Seafoods, Inc. Alber processes some crab and groundfish onsite; however, most of the catch is shipped out of the area for processing as well as distribution. Some buyers and fishermen (through off-the-boat and other direct sales) sell small amounts of crab, groundfish and albacore seasonally. All of the coonstripe shrimp catch is sold through the live market in the San Francisco Bay area.

Following the reduction in recreational salmon fishing opportunities beginning in the early 1990s and the more recent influence of economic factors, participation in ocean recreational fishing at Crescent City has declined. Today, the most avid Crescent City anglers still pursue an annual round of fisheries that includes salmon (when the season is open), albacore in late summer (when it is within range), crab in winter, and rockfish year-round (subject to closure when quotas have been reached). Private boat fishing continues to be the primary recreational fishing mode, although up to two six-passenger charters also operate at the port.

The harbor district and approximately 20 businesses at or near the harbor (and more in the larger region) provide considerable infrastructure, goods and services to support these activities. Harbor infrastructure includes 15 acres of dock, pier and boat slip facilities, two commercial fish processing facilities (one currently in operation), several small receiving stations, an ice plant, a fuel dock, a wastewater treatment plant, an indoor vessel repair facility, retail spaces, a storage yard, launch ramps, and equipment such as a Travelift and hoists.

Commercial Fishing Activity Highlights

Relative to the *long term* (1981–2007), average annual total fishing activity has decreased in *recent years* (2003–2007) in terms of landings (-44%), ex-vessel value (-4%), boats (-57%), trips (-48%) and buyers (-15%).

- The crab fishery, which accounted for an annual average of 43% of landings and 45% of ex-vessel value between 1947 and 1980, has become the dominant fishery at Crescent City, accounting for 64% of landings and 83% of ex-vessel value in recent years.
- Although the groundfish trawl fishery has long been integral to the port, average annual landings and ex-vessel value and numbers of boats, trips and buyers are all 70%–79% lower in recent years relative to the long term.
- Salmon historically played a substantial role at the port, accounting for an annual average of 12% of landings and 31% of ex-vessel value for the period 1947 through 1980, and involving up to 84%

of boats into the early 1980s. However, in recent years the number of boats and trips declined by 78% and 92% relative to the long term, while landings, ex-vessel value and the number of buyers declined by over 40%. This decline was largely underway in the early 1980s, due to the limited entry program and highly restrictive regulations in the Klamath Management Zone (KMZ). Whereas some salmon fishing occurs locally (as regulations permit), local fishermen who choose to participate in the fishery travel to areas with greater fishing opportunities to fish and deliver their catch.

- Landings in the pink shrimp trawl fishery peaked in 1992 at 17.2 million pounds, with an ex-vessel value of $7.8 million. Landings, value, boats, trips and buyers all declined steadily and substantially (by 83%–98%) in recent years relative to the long term due to market, infrastructure and other factors.
- A small hook-and-line fishery for rockfish and lingcod accounted on average for 1%–5% of landings and ex-vessel value during the period 1981–2007, with an average of 23% of boats participating in that fishery.
- The coonstripe shrimp fishery, started by local fishermen in the early 1990s, remains a relatively small fishery in terms of landings, value and fishing effort. Landings peaked in 2000 at just over 81,000 pounds worth $396,600.

Total ex-vessel value (for all fisheries) peaked at $24.7 million in 1988, while landings peaked at 39.3 million pounds in 1992. In both cases, the shrimp trawl fishery accounted for a plurality (38% and 44%, respectively) of the activity. In 2007, 8.2 million pounds worth $12.2 million was landed at the port, with crab accounting for 81% of landings and 52% of value.

The number of boats peaked in 1981, when 1,082 boats made 14,494 deliveries, 53% of which were salmon and 25% of which were crab. Vessel participation was lowest in 2005, when 137 boats made 3,178 deliveries, 3% of which were salmon and 54% of which were crab. In 2007, 157 boats made deliveries, 67% of which were crab.

Of the 20 buyers that received fish at Crescent City in 2007, three accounted for just over 55% of the landed value of the catch, five accounted for 75% and seven accounted for 90%. The 20 buyers include several fishermen who market at least some of their catch directly to retailers and/or consumers.

Average annual prices were lower in recent years relative to the long term in the shrimp trawl (-33%), whiting (-13%), albacore (-21%), crab (-11%) and shrimp pot (-7%) fisheries, but higher in the rockfish hook-and-line (+82%), salmon (+13%), and groundfish trawl (+5%) fisheries.

The number of ‘Crescent City boats’ (i.e., those with a plurality of their ex-vessel revenue at Crescent City) declined from an average of 516 per year from 1981 through 1983 to 82 from 2005 through 2007, while average revenue per boat increased from $37,799 to $141,067. When boats were assigned to their primary fishery (the fishery accounting for the plurality of each vessel’s landed value), this trend was apparent in most fisheries, most notably rockfish, salmon and crab. It is not clear, however, how these increases in revenue per boat compare to costs, which also have increased over time.

Recreational Fishing Activity

Recreational fishery data specific to Crescent City are limited.

- According to the California Department of Fish and Game (CDFG) Recreational Fisheries Survey (CRFS), which provides data on fishing activity at the 'district' level, an annual average of 143,000 angler trips were made in the Redwood District (which comprises Del Norte and Humboldt counties) between 2005 and 2007. About 31% of these trips were from private boats, and 3% from charter boats.
- Data from CDFG's Ocean Salmon Project for the Crescent City area indicate an 86% decline in salmon angler trips (charter and private boats) from 1981 to 2007. Private boat trips accounted for more than 98% of salmon effort both over the long term and in recent years.

Key Factors Affecting Crescent City Harbor Fisheries

Historic events: The 1964 tsunami fundamentally changed the course of history for Crescent City and its fishing community. The devastation evoked national sympathy and catalyzed the community, paving the way for it to obtain federal funding to build a state-of-the-art fishing harbor. In a relatively short time, Crescent City's fishery-support infrastructure was significantly improved and, together with various federal programs, provided one of many incentives at that time for local fishery expansion.

Salmon fishery management: Dramatic reductions in (and at times, closures of) commercial seasons by the PFMC as well as the state's limited entry program, implemented in the early 1980s, led to a sharp decline in the commercial salmon fleet. Effort was displaced into other fisheries such as groundfish and crab. Reduced allocations to nontribal fisheries in the early 1990s led to further reductions in fishing opportunities, this time for the recreational sector, and sharply curtailed the seasonal influx of summer fishermen and the associated economic activity on which many local businesses such as smokehouses, tackle shops, grocers and RV parks depended.

Groundfish fishery management: Increasingly strict federal catch limits since the 1990s, together with the 2003 federal groundfish trawl buyback and the state's implementation of restricted access in the Nearshore Fishery, have limited commercial fishery participation. Of 17 resident groundfish trawlers, 16 participated in the 2003 groundfish trawl buyback. Their removal from the local fleet led to a marked reduction in local fishery activity, including seafood processing and the use of fuel, ice and other support services. Recent time and area closures to protect yelloweye rockfish, coupled with the 2008 salmon closure and the limited (10-day) 2009 salmon season, eliminated many local recreational fishing opportunities, further straining local support businesses and negatively affected the community's sense of well-being.

Economics: Commercial fishery participants and support businesses cited rising operating costs, especially those for gear, vessel maintenance, insurance and fuel, as among the biggest challenges they are facing. At the same time, many commercial fishermen commented on stagnant or declining prices in several fisheries. Increasing costs and less favorable economic conditions also have affected fishery-support businesses, both directly and indirectly. The reduction in fishing opportunities and activity has resulted in reduced demand for goods and services that these businesses provide.

Harbor Infrastructure: As fishing activity has declined over the last 30 years, so has the harbor's revenue base. Insufficient provision for basic maintenance and repair of docks and related infrastructure has led to their disrepair and vulnerability to events such as the 2006 tsunami. These and other costs, particularly for dredging and dredge material disposal, and maintaining and operating the wastewater treatment plant, have become significant.

Local processing of seafood is limited, due in part to the high cost of using the harbor's wastewater treatment plant, which is required for fish processing. This factor contributed to the closure of two local processing facilities, as well as the harbor, in the past decade, and has continued to be an issue for current and prospective processors. The reduction in landings in key fisheries coupled with increasing transportation costs have led to regional consolidation of processing facilities. Finally, Crescent City's small local population, many of whom fish recreationally for their own catch, creates limited demand for local processing and seafood retail.

Current Situation and Outlook

The Crescent City Harbor fishing community has become particularly dependent on the commercial crab fishery, as activity in several other key fisheries has been sharply curtailed. Recreational fisheries now engage perhaps a tenth the number of anglers they did in the 1980s, focusing on groundfish and crab rather than salmon, which is still highly valued but restricted.

The reduction in fishing opportunities and activity have reduced shoreside activity, leading businesses to close, reduce services and/or inventory, or diversify their operations. With limited alternative sources of revenue, harbor infrastructure has deteriorated. In addition, the Marine Life Protection Act process begun in late 2009 in the North Coast Region, and an individual quota program for the federal groundfish trawl fishery, have the potential to fundamentally change local fisheries and the community.

Yet the Crescent City community has a well-established history of adapting to change that may enable it to meet these challenges. Community members have a history of working together to support the harbor and its fisheries. Recently, funds have been secured to begin much-needed dredging of the harbor's main navigation channel, and additional funds to support reconstruction of the inner basin and other improvements are pending. These efforts together with the port's location near rich fishing grounds, its safe and easy access, and the availability of key services create the potential for Crescent City to regain its resilience and vitality as a fishing port.

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Cover photo by C. Pomeroy.

INTRODUCTION

Crescent City Harbor, California's northernmost harbor, historically has been one of the state's most active fishing ports. Located 350 miles north of San Francisco and 20 miles south of the Oregon border (Figure 1), it is situated near some of the West Coast's most productive fishing grounds for groundfish, salmon, crab, and shrimp. People living in this isolated part of the state have long utilized fishery resources for livelihood, sport and subsistence. Community initiative led to the construction of Citizens Dock in 1950 and, following a destructive tsunami in 1964, the development of Crescent City Harbor as a state-of-the-art fishing port by the mid-1970s.

Crescent City fisheries are subject to environmental conditions and events that affect both fishing and fishery-support activities. NOAA's National Weather Service has noted that the area from Eureka north, including Crescent City, is uniquely positioned to experience some of the worst and most dangerous winter storms and summer fog associated with coastal upwelling. These conditions are often an important limiting factor for fishing. Nonetheless, many fishermen consider Crescent City harbor the safest and most accessible on the West Coast north of San Francisco, both because it lacks a bar at the harbor entrance (a notable drawback of Humboldt Bay and Fort Bragg) and affords protection from storms.

Crescent City is Del Norte County's only incorporated city and the county seat. About 30% of the County's approximately 26,000 residents live within the city.[1] A significant portion of the county's 1,070 square miles is owned and managed by state and federal government, and include portions of Redwood National Park, various state parks and the Pelican Bay State Prison, which opened in 1989. According to the Bureau of Economic Analysis, the government sector accounted for 47% of earnings in the county in 2007, three times the proportion for the state as a whole.

This profile of the Crescent City Harbor fishing community provides a brief history of the harbor and its fisheries; a detailed description of present-day fishery operations, activities and associated infrastructure; and discusses some of the key regulatory, economic and

Figure 1. California map locating Crescent City and aerial view of Crescent City Harbor.

other factors highlighted by study participants that interact with and affect the local fishing community.[2]

The information presented is based on archival and field research conducted between July 2007 and March 2009.[3] Fieldwork included observation, informal and formal interviews and group meetings. These activities engaged approximately 50 people, including 20 local commercial and recreational fishermen, 10 fish buyers, owners and/or employees of 10 fishery-support businesses, the harbormaster and staff, as well as other community members who have experience and knowledge of local fisheries. Field data were analyzed together with commercial fishery landings data[4], and information from other primary and secondary sources to interpret patterns, variability and change within and across fisheries and the fishing community over time.

History of the Port and the Surrounding Area

Named after its crescent-shaped beach, Crescent City was settled in the 1850s following the discovery of gold on the Trinity River. Mining along with logging, farming and fishing opportunities soon brought thousands of new settlers to the area, which at that time was inhabited by the native Tolowa and Yurok peoples. Conflicts arose as more settlers arrived and acquired land (often by force from the native people), eventually leading to the Red Cap War in 1856 and the removal of several tribes to the Hoopa Valley Indian Reservation (Norman et al. 2007).

The town of Crescent City was incorporated in 1854, and its natural harbor (the only one between Humboldt Bay, California and Coos Bay, Oregon) became a key port of entry and supply center for settlers. The Crescent City Whaling Company was established in 1855 (Starks 1923) but was short-lived (Bertão 2006). However, offshore whaling operations continued at Crescent City until 1894. In the late 1880s, the Battery Point Lighthouse (located on the mainland) and St. George Reef Lighthouse (located eight miles offshore) were built to help mariners navigate the treacherous coastal waters (Scofield 1954).[5]

Road transportation began with the construction of the county's first plank road in 1858; the Redwood Highway between Eureka and Crescent City opened in 1923 (Pierce 1998). The first local railroad opened in the early 1900s, primarily to transport lumber from nearby Smith River to Crescent City for shipment to the growing San Francisco Bay area and beyond (McEvoy 1986).

As the gold rush slowed in the late 1800s, residents turned to other natural resources in the area, massive redwood forests and abundant fishery resources such as salmon, groundfish and crab. Timber harvesting was the primary industry for many decades, particularly during the post-World War II U.S. housing boom. However, by the 1960s, an estimated 90% of the redwoods were gone (Norman et al. 2007). As logging declined, fisheries became an increasingly important industry in this sparsely populated coastal community.

On March 28, 1964, a 9.2 magnitude earthquake off Alaska caused a tsunami that destroyed much of the town and harbor, badly damaged Citizens Dock, and resulted in 11 deaths. (A 1,000-year storm in December 1964 exacerbated the damage.) However, this disaster enabled the city and the harbor district to acquire state and federal emergency relief and other funds to develop the harbor (RRM Design Group 2006). The boat basin opened in 1968, and the development of associated harbor infrastructure including offloading docks, fish processing and boat-building facilities continued into the 1970s.

Crescent City Harbor Fishing Community Timeline

1800s	Local tribes' first contact with European-Americans
1850	Gold discovered on Trinity River
1854	Crescent City incorporated
1892	Point St. George Lighthouse built
1923	Redwood Highway between Crescent City and Eureka completed
1935	Crescent City Harbor District established
1950	Citizen's Dock built
1964	Tsunami devastates harbor and town
1970	Two processing plants and Del Norte Ice plants open
1973	Inner boat basin completed
1974	Boldt decision
1976	Magnuson-Stevens Fishery Conservation and Management Act (MSA)
1977	Fashion Blacksmith opens at harbor
1979	Klamath Management Zone (KMZ) established
1980	Englund Marine opens
1982	Salmon limited entry
1982-83	El Niño
1985	KMZ commercial salmon fishery closure
1987	Ice plant opens on Citizen's Dock
1991	KMZ recreational salmon fishery closure
1992	Wastewater Treatment Plant (WTP) opens KMZ recreational salmon fishery limited to 14 days Dungeness crab fishery moratorium on entry
1993	Salmon re-allocation to tribes (50%) Coho retention prohibited in commercial fishery
1994	Groundfish limited entry Salmon disaster Coho retention prohibited in KMZ recreational fishery Del Norte Ice ceases operations
1995	Dungeness crab limited entry
1996	Sustainable Fisheries Act (MSA re-authorized)
1998	Harbor district takes over WTP operations from city Marine Life and Nearshore Fishery Management Acts
1999	Marine Life Protection Act (MLPA)
2000	Sea Products ceases operations Federal groundfish disaster Alber Seafoods begins receiving and processing
2001	Eureka Fisheries ceases operations
2002	Nearshore Fisheries Management Plan (FMP) adopted First federal Rockfish Conservation Area (RCA) established
2003	Groundfish trawl buyback Nearshore fishery restricted access
2006	Tsunami Klamath salmon disaster
2008	Statewide salmon disaster and fishery closure Trawl Individual Quota program approved Northern California shrimp trawl grounds closed
2009	Statewide salmon disaster and fishery closure North Coast MLPA process begins

The Expansion of Commercial and Recreational Fisheries

River fisheries for coho (*Oncorhynchus kisutch*) and Chinook salmon (*O. tschawytscha*) began in the mid-1800s while the ocean salmon fishery, which developed in Monterey Bay in the late 1880s, reached the North Coast in the 1920s (Feinberg and Morgan 1980). Information about fisheries at Crescent City in the latter 1800s is scant; however, interest in developing the harbor to support fishing as well as mining and timber is evident. The first wharf reportedly was built in 1855 at Whaler's Island, but was soon destroyed by heavy seas (Scofield 1954). According to Leidersdorf (1975), the U.S. Army Corps of Engineers first considered improving the harbor for navigation in 1867, but did not recommend such development until 1911. Because the harbor was vulnerable to waves and storm surge, the Corps first built a breakwater, completed in 1930, which afforded protection from westerly waves and surge but not from southerly forces. In addition, it caused shoaling, which led the harbor district (established in 1935) to initiate maintenance dredging. Over the next several years, additional breakwaters and barriers were constructed with varying degrees of success in addressing this problem.

These improvements, along with many technological developments following World War II, stimulated the expansion of commercial and recreational fisheries at Crescent City. Local citizens sought federal assistance for rebuilding the municipal wharf. When none was forthcoming, they donated materials, money and labor to build Citizens Dock, which was completed in 1950 (Leidersdorf 1975, Powers 2005). Around that time, Scofield (1954) reported on fishing activity at four piers at Crescent City, including Citizens Dock:

A recently constructed municipal pier (Citizens Dock) is the receiving point for about 90% of the fishing boats in the harbor. The three fish piers are equipped with hoists, scales and truck roads. There is a modern fish cannery and a crab processing plant. Most of the boats are salmon trollers and crab boats, but there is some set lining and occasional deliveries by trawlers. The town is chiefly a salmon and crab port, but other species landed are sole, lingcod, rockfish, albacore tuna, smelt, sablefish, shark and halibut.

By the late 1950s, Crescent City had four resident commercial fish companies[6] and a number of fishery-support businesses[7], and was the site of substantial recreational and commercial fishing activity. Fishing vessels were moored in the lee of Whaler's Island, and most of the commercial fish offloading activities occurred at Citizens Dock. Evidence of this activity was used to obtain a $250,000 loan from the state's Division of Small Craft Harbors to expand and improve Citizens Dock (Trice 1960).[8]

California Department of Fish and Game (CDFG) Fish Bulletin data provide a measure of this activity beginning in the late 1940s (Figure 2). During the 1950s and 1960s, commercial fishermen in the area landed primarily crab and salmon The groundfish and shrimp trawl fleets became increasingly active

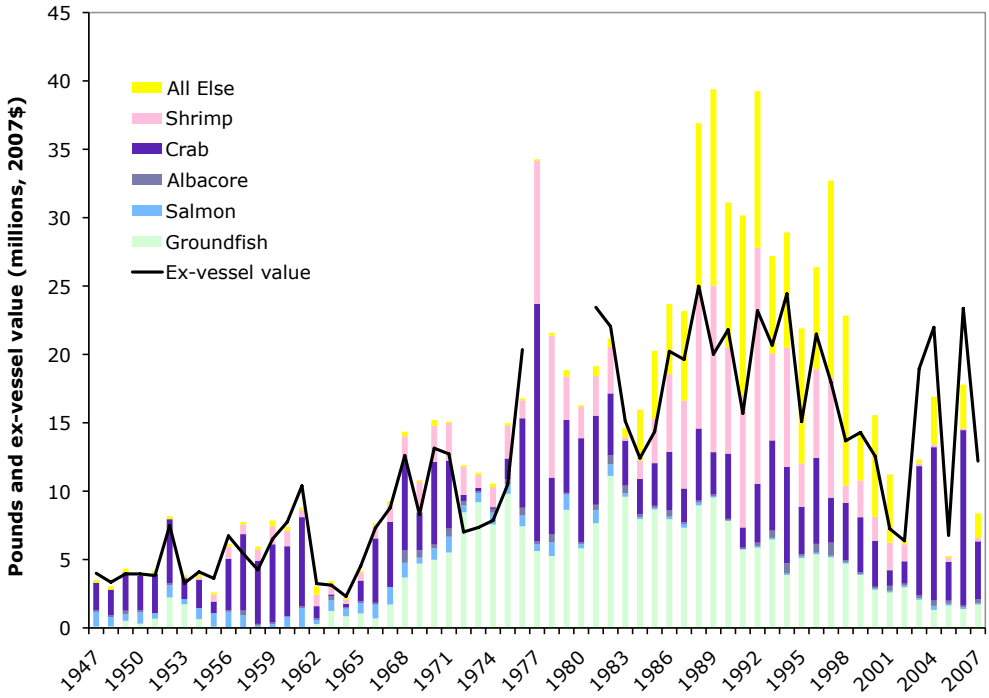

Figure 2. Pounds and ex-vessel value (2007$) of commercial fishery landings at Crescent City, 1947–2007 (CDFG Fish Bulletin Series). Note: Ex-vessel value data for 1977–1980 are not available.

in the late 1960s and early 1970s (due largely to the use of double-rig trawl nets for shrimp), bringing the total landings at Crescent City to more than 10 million pounds worth $12.6 million (2007$) by 1968.

Receiving and processing capacity expanded in the aftermath of the 1964 tsunami with the construction of two large seafood processing plants. When government funds for the project came up $40,000 short, more than 130 individuals and businesses donated money to ensure the project's success (Anon. 1976). In 1970 the Harbor District leased the buildings to Crescent Fisheries and Eureka Fisheries, the latter one of the largest seafood processing companies along the West Coast at the time. Eureka Fisheries' new 16,000 ft^2 processing facility was capable of handling some six million pounds of shrimp, crab, salmon and groundfish annually (Eureka Fisheries 1992). The considerable increase in processing capacity (as well as jobs and income for residents) likely encouraged an increase in the amount of fish landed at the port.

The completion of the inner boat basin provided the first secure berthing space for recreational and commercial fishing vessels, and led to a substantial influx of fishermen into the area, which at that time was economically depressed following the sharp decline in the local timber industry. As of May 1975, the inner harbor's 300 berths were fully occupied by permanent tenants, and there was a substantial slip waiting list (Leidersdorf 1975). The resident commercial fishing fleet consisted of 100 to 120 boats, many of which were new or updated vessels compared to those of the previous decade. In addition to the resident fleet, a growing number of transient vessels used the port. In 1981, there were over 1,000 boats making landings at the port, about ten times the number of resident boats. These boats, many from Eureka and points south or from Oregon, came to access the rich local fishing grounds and to take advantage of the harbor's infrastructure, including fish receiving and processing capacity.

As of the late 1970s, recreational fishing in Crescent City involved some 500 boats in seasonal slips and as many as 100 more on moorings in the harbor's outer basin. At that time the recreational fisheries for groundfish and both coho and Chinook salmon were open most of the year, although most fishing occurred during the summer season (May through August). The recreational fleet included out-of-towners as well as locals. Retirees, school teachers and others would trailer their salmon boats to the harbor and stay for weeks or the entire summer to fish.[9] Many stayed in local RV parks at the harbor and elsewhere in town.

During the 1980s, three receiver/processors (often referred to as 'fish houses') and at least another four buyers were resident at the port. In addition to Crescent Fisheries and Eureka Fisheries, Consolidated Factors/Sea Products received and packed frozen seafood products. Pacific Choice Seafood received and transported seafood to its processing facilities in Eureka. By the end of the decade, there were as many as eight receivers (including processors) operating out of Crescent City, and many more small-scale buyers.

In addition to harbor development, Crescent City's fishing community benefited from various federal programs aimed at encouraging the development of the nation's fisheries. The 1971 reauthorization of the Farm Credit Act enabled commercial fishermen to obtain loans through local Production Credit Associations, which had been making such loans to farmers and ranchers since 1933 (Dewees 1976, NOAA 1999). Additionally, the Capital Construction Fund and Fishing Vessel Obligation Guarantee program (authorized by the Federal Ship Financing Act of 1972) offered low interest or government-backed loans, tax-deferred vessel repair and construction programs, fuel tax relief, gear replacement funds, market expansion programs and technical assistance (NOAA 1999). These opportunities, collectively referred to by one study participant as a "fleet promotion act," helped to substantially increase fleet size and capacity. For Crescent City, as for many other U.S. fishing communities, the 1970s and 1980s were the boom years, as fisheries expanded through industry, technology, and international trade.

The Expansion of Fishery Management

Commercial Fishery Management

Through the late 1970s, Crescent City fisheries were subject to modest management, and landings were driven largely by resource availability and market demand. With the passage of the federal Fishery Conservation and Management Act (later the MSA) in 1976 and the creation of the Pacific Fishery Management Council (PFMC), as well as increased state fishery management, things began to change. By the early 1980s, the fishing community experienced increasing restrictions in the salmon troll and groundfish trawl fisheries.

In the late 1970s, concern for Klamath River fall run Chinook led the newly formed PFMC to begin restricting seasons and areas of catch through the implementation of a Salmon Fishery Management Plan (FMP). In 1979, to better address concerns regarding fishery impacts on Klamath River fall Chinook, the PFMC established the Klamath Management Zone (KMZ; (Pierce 1998). The area extended from Humbug Mountain near Port Orford, Oregon to Horse Mountain, California, encompassing Crescent City fishermen's primary fishing grounds. In 1982, California adopted a statewide limited entry program for commercial trollers. By 1984, the PFMC had shortened the commercial salmon season in the KMZ to approximately two months, much shorter than the five- to six-month seasons in other areas along the coast. In 1985, the commercial season in the KMZ was closed

completely. These actions reflected the PFMC policy of imposing greater restrictions in areas with greater impacts on Klamath fall Chinook (the KMZ) in lieu of lesser restrictions over a larger geographic area.

Beginning in 1992, the PFMC prohibited retention of coho in the commercial salmon fishery south of Cape Falcon, Oregon due to conservation concerns regarding Oregon Coastal Natural coho (PFMC 1992). This led to fishery disaster declarations for California and Oregon fishing communities in 1994 and 1995. Although the KMZ commercial fishery was not nearly as dependent on coho as fisheries further north, the California KMZ was completely closed from 1992 through 1995, largely due to more localized factors that compounded the effects of the coho nonretention policy. In 1993, Klamath fall Chinook was declared overfished (PFMC 1994), and the Department of Interior Solicitor issued an opinion allocating 50% of Klamath-Trinity River salmon to the Yurok and Hoopa tribes. This was significantly higher than the 30% tribal allocation brokered by the Klamath Fishery Management Council in a previous 1987–1991 agreement, and required reduced allocations to nontribal fisheries, including the KMZ commercial fishery (Pierce 1998).[10] As a result, commercial salmon seasons in the California KMZ have at times been only days or weeks in duration, and in some years completely closed (as occurred in 1985). The cumulative effect of these management actions was to discourage (nontribal) salmon fishing along much of the North Coast, resulting in substantial reductions in both commercial and recreational fishing activity at Crescent City, as elsewhere.

In 2006, failure of Klamath fall Chinook to achieve its escapement floor[11] for the third consecutive year triggered a conservation alert and prompted the PFMC to close the commercial fishery in the California KMZ and curtail the season in other areas. Unusually low escapement of Sacramento River fall Chinook in 2008 and 2009 lead to unprecedented closures of California's commercial fishery and dramatically curtailed seasons in Oregon. The 2008–2009 closures have been unprecedented for many salmon-dependent communities, though less so for Crescent City, which has been subject to stringent KMZ regulations for more than two decades.

Fishing opportunities also have been curtailed by state and federal management in the West Coast groundfish fishery. In 1982, the PFMC implemented the federal West Coast Groundfish FMP, and began to manage the commercial fishery with measures such as harvest guidelines, trip landing and trip frequency limits, and gear restrictions. However, it wasn't until 1994 that PFMC implemented a coastwide limited entry program for the trawl and fixed gear (hook-and-line and pot) fisheries, and a small open access fishery for nontrawl fishermen.

In 1992, the PFMC adopted a harvest rate policy for groundfish based on the assumption that West Coast groundfish were similar in productivity to other well-studied groundfish stocks. Over the next eight years, as growing scientific evidence indicated that rockfish (*Sebastes* spp.) had productivity rates much lower than other groundfish species, the PFMC adopted increasingly restrictive management measures for rockfish.[12] However, these measures came too late to reverse the effects of longstanding harvest policies based on inaccurate assumptions, and between 1999 and 2002, eight groundfish stocks were declared overfished.[13] In 2000, a federal disaster was declared in the West Coast groundfish fishery.

To rebuild overfished stocks, optimum yields (OYs) and trip landing limits for healthy stocks typically taken with the species of concern, as well as those overfished species, were

cut further for both limited entry and open access vessels. To afford fishery participants more flexibility and enable them to reduce discards, trip limits were subsequently replaced with cumulative landing limits that gradually expanded in duration (weekly, biweekly, monthly, bimonthly). The PFMC also implemented rockfish conservation areas (RCAs) to reduce the catch of overfished species (PFMC 2008). Implemented in September 2002, the first federal RCA closed continental shelf and slope waters to commercial groundfish fishing from near Cape Mendocino (north of Fort Bragg) north to the Canadian border. The severe decline in harvest opportunities exacerbated the problem of excess harvest capacity, and led to measures such as the industry-funded federal West Coast groundfish trawl buyback program in 2003. Sixteen of Crescent City's 17 resident groundfish trawl vessels participated in the buyback and were removed from the local fleet, leading to further reductions in local fishery activity. In subsequent years, limited entry and open access vessels have been subject to area closures to protect groundfish Essential Fish Habitat (EFH) and required to carry vessel monitoring systems (VMS).[14]

The ocean shrimp fishery has been active at Crescent City since the early 1970s. Over the years, this fishery has been subject to restrictions including finfish excluder devices to minimize groundfish bycatch (2002), area closures to protect groundfish EFH (2006), and VMS (2007). In addition, these vessels are also subject to state regulations including limited entry (for vessels north of Point Conception), a November through March closure (to protect egg-bearing females), and maximum count-per-pound and minimum mesh size (to protect juvenile shrimp; (CDFG 2007). Prior to 2008, shrimp trawling was allowed in state waters 2–3 miles from shore between Point Reyes and False Cape; since then, ocean shrimp trawl grounds in state waters have been closed. Of the 85 pink shrimp permits retired by the 2003 groundfish trawl buyback (which required vessels bought out of the groundfish fishery to retire all of their permits for West Coast fisheries), 31 were held by California vessels, and 12 of these were held by Crescent City-based boats (Federal Register 2003).

Management of the groundfish fishery in state waters (0–3 miles) also has become substantially more restrictive. Motivated by the rapid growth of the live fish fishery (McKee-Lewis 1996), the passage of the Nearshore Fishery Management Act (within the state's Marine Life Management Act, MLMA) in 1998 established a permit program and minimum sizes for 10 commonly caught nearshore species (effective in 1999), and mandated the development of a Nearshore FMP. In 2001, the nearshore rockfish fishery was closed outside 20 fathoms from March through June. Two years later, the state implemented the Nearshore FMP which specified management measures for 19 nearshore species including gear and seasonal restrictions, as well as a restricted access program as a means to achieve the statewide capacity goal of 61 participants (down from 1,128 in 1999). Statewide, the number of permits issued in 2009 (179) was still well above the capacity goal. In the North Coast Region, however, the 22 permits were issued in 2009, and as of mid-2010, 15 permits had been issued – one greater than the capacity goal of 14 for the region.[15]

The Dungeness crab fishery at Crescent City has not experienced the types of dramatic management changes as have occurred in the salmon and groundfish fisheries. In managing the fishery, the state has used a "three S" (sex, size, season) strategy that includes male-only harvest (since 1897), a minimum size limit (since 1911) and a limited season (since 1957). In 1992, the state placed a moratorium on entry; in 1995, a restricted access program

was implemented. The northern crab season usually runs from December 1 through July 15 (with an early season opener off San Francisco starting November 15), but its start has been delayed in some years because of price disputes. In addition, the opening of the season may be delayed to insure that the crabs have completed molting, as occurred in 2005. In 2009, pursuant to SB 1690 (2008), the state convened a Dungeness Crab Task Force in response to concerns about recent increases in participation and gear use. Following the recommendation of the Task Force (California Dungeness Crab Task Force 2010), a bill that would establish a pilot crab pot allocation program to address those concerns (SB 1039, Wiggins) is pending in the State Legislature.

Recreational Fishery Management

Concerns regarding Klamath fall Chinook and coho have influenced management of the recreational salmon fisheries in the Crescent City area. Many of the factors that have constrained the KMZ commercial fishery also have affected the recreational ocean salmon fishery. However, due to its lesser impact on Klamath fall Chinook, the KMZ recreational fishery has generally been less constrained than the KMZ commercial fishery, although more so than the recreational salmon fishery elsewhere in the state.

In 1979, the KMZ recreational season and bag limit were reduced for the first time (PFMC 2005). In 1986, the season was reduced from about nine to five months. Since then, seasons in the California KMZ have generally ranged from one to six months, with several notable exceptions (i.e., the 14-, 0-, and 10-day openings in 1992, 2008, and 2009, respectively), in contrast to other parts of the state, where the recreational season generally extends for six to nine months (PFMC 2009). While the KMZ recreational fishery is much reduced from the peak 1970s and 1980s, it remains an active fishery that attracts both resident and nonresident anglers – at least in those years when recreational opportunity is available.

The recreational rockfish fishery has been increasingly constrained since the late 1990s to address concerns regarding overfished groundfish stocks. Beginning in 1998, sub-limits were added to the overall groundfish bag limit to protect species of concern. For the management area north of Cape Mendocino (including Crescent City), the species of concern were lingcod, canary and (by the early 2000s) yelloweye rockfish. California's longstanding groundfish bag limit of 15 fish was reduced to 10 fish in 2000. By 2009, regulations included a 2-fish sub-limit each for greenling, bocaccio, and cabezon, and prohibited retention of cowcod, canary, yelloweye and bronze-spotted rockfishes. The State began implementing inseason closures in this area in 2000, and added depth-based restrictions as inseason measures in 2004. By 2005, preseason specifications included closures or depth-based restrictions for every month of the year. In 2008, the once year-round season was compressed to four months. In 2008, CDFG considered Yelloweye RCAs in addition to existing depth-based closures, but ultimately did not implement them. Instead, the nearshore recreational groundfish fishery was closed four months early.

THE CRESCENT CITY FISHING COMMUNITY TODAY

The Crescent City Harbor fishing community is comprised of commercial and recreational fishery participants and their families, as well as fishery-support businesses (including the harbor district) that provide goods and services that fishery participants need to operate safely and effectively (Table 1 and Table 2). Local commercial fisheries include a diversity of participants engaged in a range of fisheries and fishery-related activities. Recreational fisheries include private boat operations and a commercial passenger fishing vessel (CPFV, or charter) operation that involve locals and nonlocals alike.

Commercial Fisheries

The primary commercial fisheries at Crescent City include the pot fishery for Dungeness

Table 1. Local support businesses used by Crescent City fishery participants (as of March 2009).

Business Type	Business Name	Estimated Employment
Receivers	Alber Seafood	4–18 FT, 100–120 seasonal
	Caito Fisheries	1 FT, some seasonal
	Carvalho Fisheries	4 FT
	LCZ Unloaders	16–20 FT/PT
	Next Seafood	1 FT, 10–25 seasonal
	Nor-Cal Seafood	
	Pacific Choice Seafood	1FT, 2–4 PT
Processors	Alber Seafood	(see above)
Marine Supply	Englund Marine	4 FT
Marine Repair (mechanical, electrical, or hydraulic)	Crescent City Electric	
	George's Auto Diesel Electric	
	Larry's Equipment & Marine Repair	1 FT
	Mor-Jon, Inc.	10–11 FT, 1 PT
	Northcoast Marine Electronics	1 FT
	Pete's Auto & Marine Repair	2 FT
Marine Refrigeration	Frank's Refrigeration	
Cold Storage	none	-
Ice Facility	Del Norte Ice (Pacific Choice Seafood)	1 FT, 1 PT*
Fuel Dock	C Renner Petroleum	1 PT (dock service)
Bait	Englund Marine	(same as above)
Vessel Repair/ Maintenance	Fashion Blacksmith	10 FT
Commercial Diver	Unknown	
Retail Fish Market	Lucy's Seafood (seasonal)	
Charter Operation	*Golden Bear* Fishing Charters	
	Tally Ho II	1 FT
Port Management	Crescent City Harbor District	4 FT, 3 PT, 2 seasonal
RV Parks	Harbor RV Park	3 PT
	Bayside RV Park	

* Overlaps with Pacific Choice Seafood

Table 2. Out-of-area businesses used by Crescent City fishery participants.

Business Name	Business Type	Location
Monterey Fish Co.	Bait	Watsonville, Salinas
Various	Bait	Los Angeles, Eureka; Reedsport, OR Ilwaco, Westport, WA
David Peterson	Boatwright	Eureka
Harbor Logging	Cable	Brookings, OR
Trilogy	Crab pot materials	Bellingham, WA
Custom Crab Pots	Crab pot materials	Eureka
Fred's Marine	Electronics	Eureka
Chetco Marine	Marine supplies	Chetco, OR
Costco	Miscellaneous supplies	Eureka
	Outboard mechanic	Eureka; Medford and Grants Pass, OR
Cabella's	Sport fishing clothing, gear	Online
Foul Weather Trawl	Trawl nets/gear	Newport, OR
	Various supplies	Redding; Medford, OR
NOAA Weather Service	Weather information	Eureka (online)

crab, and the trawl[16], hook-and-line and trap fisheries for various groundfish species.[17] Other current include the trawl fisheries for pink shrimp (*Pandalus jordani*) and Pacific whiting (*Merluccius productus*), the pot fishery for coonstripe shrimp (*Pandalus danae*), and troll fisheries for Chinook or king salmon and albacore tuna (*Thunnus alalunga)*.

Most of these fisheries are seasonal as a function of resource availability, regulations that define when, where and how each fishery is allowed to operate, the availability of buyers, and market demand (Table 3). However, it should be noted that the actual temporal distribution of activity is often more compressed, variable and complex than suggested by the table. For instance, the availability of albacore varies widely from one year to the next. The salmon fishery in California's KMZ was completely closed in 2006, 2008 and 2009, and open only briefly in 2007. The Dungeness crab fishery is concentrated in the winter months due to peak holiday demand. Groundfish seasons tend to be defined in two-month increments (reflecting the use of bimonthly vessel cumulative landing limits), vary by species and fishery sector, and are sometimes subject to inseason closure to prevent OYs of selected species from being exceeded.

About 100 commercial fishing vessels are homeported at Crescent City. Commercial fishery participants described the makeup of the resident fleet as including five trawlers, 12 nearshore fishing operations, and about 85 to 90 crabber/trollers. While most local fishermen focus on a particular fishery, most participate in one or more additional fisheries during the year. The fleet includes both full-time and part-time fishermen. Full-time skippers depend on fishing for their livelihood and fish year-round, as resource availability, weather and regulations permit. Part-time skippers fish part of the year, often focusing on a single fishery, and may pursue other activities as part of their livelihood.

Table 3. Seasonality of selected commercial fisheries at Crescent City Harbor.

	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEP	OCT	NOV	DEC
Albacore tuna							■	■	■			
Coonstripe shrimp					■	■	■	■	■	■		
Dungeness crab	■	■	■	■	■	■	■					■
Groundfish	■	■	■	■	■	■	■	■	■	■	■	■
Pacific whiting				■	■							
Pink shrimp				■	■	■	■	■	■	■		
Salmon									■			

Vessels are characterized as either 'big boats' (55 feet long or larger) or 'small boats' (less than 55 feet). Big boats include trawlers and larger crabber/trollers. These vessels tend to be 'trip-boats', equipped with comfort and safety features that enable them to venture as far south as the San Francisco Bay area (particularly for the mid-November Dungeness crab opener), north into Oregon and Washington, and further offshore for a few days to several weeks to follow the fish. Small boats tend to fish for some combination of crab, groundfish, coonstripe shrimp, and perhaps salmon. These vessels usually work as 'day-boats', leaving port early in the morning to fish nearby, then returning to Crescent City the same day to unload their catch. Larger boats may carry two to four crew (including the skipper); smaller operations may carry one to three crew.

In addition to resident vessels, many transient vessels also use the harbor. For example, of the 157 boats that landed at Crescent City in 2007, an estimated 37 (about 24%) were nonresident vessels from Oregon and Washington as well as other California ports. According to study participants and other sources, historically, more than half of the vessels that landed fish commercially at Crescent City were nonresident. A small number of nonlocal groundfish trawlers still do deliver their catch, obtain services or reprovision at the port. All of the vessels that deliver whiting at Crescent City are nonresident.

Crescent City Harbor Seafood Receiving, Processing and Marketing

Presently, local fish receiving and processing capacity consists of six buyers with receiving stations at the harbor and one onsite receiver/processor, Alber Seafoods, Inc. Some buyers receive fish on behalf of other entities based elsewhere along the West Coast as well as their own business. The chain of custody generally follows from fishing vessel to receiver, with most of the catch transported out of Crescent City for processing and distribution (Figure 3). Some businesses are vertically integrated and function in multiple roles (e.g., receiver, processor, wholesaler).

In 2007, about half of the 20 entities that received fish at Crescent City (including fishermen who sold their own and in some cases others' catch) were based in the area. One of the seven fish businesses that operate receiving stations on Citizens Dock is locally owned. The other receivers, as well as outside buyers for whom they serve as agents, are based as far north as Ilwaco, Washington and as far south as Los Angeles, California. There is also a seasonal crab market near the boat basin.

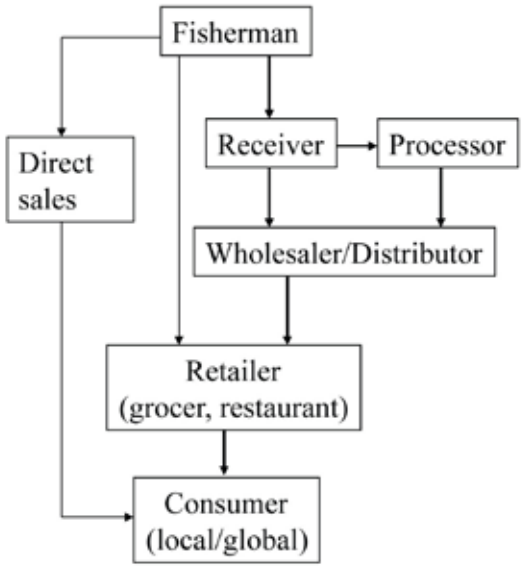

Figure 3. Pathways of seafood landed at Crescent City Harbor. Note: Thicker arrows indicate most common pathways.

Product forms vary within and across fisheries (Table 4). Most whiting, groundfish and crab is processed on a relatively large scale locally. Live crab, coonstripe shrimp and rockfish have become more common over the past decade, largely due to growing demand in the San Francisco Bay area. Small amounts of groundfish and crab are processed on a small scale (e.g., as groundfish fillets) in the Crescent City area for local and regional distribution. One local buyer sells to the public during crab season (winter), and a handful of albacore trollers sell directly to consumers (through off-the-boat sales) during the late summer and fall.

Ocean Recreational Fishing

Decades ago, "salmon was king," and for study participants, it still is. In addition, anglers target albacore, groundfish (i.e., rockfish and lingcod, *Ophiodon elongates*), and Dungeness crab. Private boat fishing has long been the dominant mode of ocean recreational fishing here. For a period of 4 to 5 years in the late 1990s, Crescent City had no charter operations. Then in 2000, the *Tally Ho II* began operations. Although equipped to carry up to 14 fishing passengers or 20 whale watching passengers, it currently operates primarily as a 'six-pack', carrying no more than six fishing passengers reportedly because of the limited availability of crew. The operator describes his clientele as 15% local (within Del Norte County) and 85% nonlocal, coming primarily from inland communities throughout California, Arizona and outside the US.[18]

As with commercial fisheries, the seasonality of Crescent City's recreational fisheries (Table 5) is defined by resource availability, weather and regulations, and is often more compressed and variable than indicated in the table. For instance, the availability of albacore varies widely from year to year. The salmon fishery in California's KMZ is open only for a subset of days in some months in order to extend the length of the season; it was completely closed in 2008 and open for only 10 days in 2009. The groundfish fishery, which was open year-round through the early 2000s, has not opened until May in recent years and has also been

Table 4. Product forms, processing location and destination of seafood landed at Crescent City Harbor.

Fishery	Product forms	Processing location	Markets
Coonstripe shrimp	Live	n/a	San Francisco Bay area
Dungeness crab	Cooked whole & sectioned, picked and canned, live	Crescent City, Eureka, Other West Coast	Local to nationwide
Groundfish	Whole, filet, live	Crescent City, Eureka, Fort Bragg, Other West Coast	Local to overseas
Pink shrimp	Picked and canned	Eureka	State to nationwide
Salmon	Whole, filet, steak	Eureka, Fort Bragg, Other West Coast	Local to nationwide
Pacific whiting	Filet, head/gut, surimi	Crescent City (little), Other West Coast	Overseas

Table 5. Seasonality of major recreational fisheries at Crescent City Harbor.

	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEP	OCT	NOV	DEC
Albacore												
Crab												
Groundfish												
Salmon												

subject to late-season closure to prevent OYs of selected species from being exceeded.

Harbor Infrastructure and Fishery-Support Businesses

Crescent City's commercial and recreational fishery participants depend on infrastructure, including docks, equipment, various facilities, and goods and services provided by the harbor district and other local and regional fishery-support businesses. Harbor-owned infrastructure consists of 15 acres of dock, pier and boat slip facilities, as well as buildings, parking and storage areas, launch ramps (one with trailer parking), and equipment such as a Travelift and hoists (Table 6). Buildings include two commercial fish processing facilities (one currently in operation), several small receiving stations, an ice plant, a fuel dock, a wastewater treatment plant, an indoor vessel repair facility, retail spaces, a storage yard and the harbor office. Two RV parks (with 129 and 137 spaces, respectively), five food service establishments and several other businesses lease space from the harbor. A Coast Guard base for the Cutter *Dorado*), a Sheriff's Marine Patrol station, and a former aquaculture facility also are located on Whalers Island. In all, approximately 20 businesses at or near the harbor provide goods and services that directly support commercial and recreational fishing activities (see Table 1).

Although specific needs vary by fishery and fishing operation, the businesses most commonly used by commercial fishermen at the harbor include receivers/processors, and marine repair and supply services, as well as restaurants and grocery stores located in town. A vessel fabrication and repair facility (Fashion Blacksmith) primarily services out-of-town commercial vessels, but also works on local vessels and fabricates equipment such as fish and boat hoists. Although recreational fishermen do not use facilities related to fish receiving and processing or large vessel construction and repair, they use the marine supply store, mechanical and electronic services, RV parks, and local restaurants and groceries.

When it was built in the early 1970s, the inner boat basin had 308 slips for vessels ranging in length from 30 to 70 feet. By 2006, the

Table 6. Crescent City Harbor user groups, infrastructure and services.

User groups	Harbor-owned infrastructure	Harbor services	Resident business types
Commercial fishing Recreational fishing (charter, private boat and shore-based) Resident businesses & organizations Community residents Tourists	Docks/slips Inner Basin (~230) Outer Basin (variable) Launch ramps (2) Parking Offloading Infrastructure - Docks (4) - Hoists (6 receiving, - 1 public) - Receiving stations (7) - Receiving/processing buildings (2) Other Infrastructure - Fish cleaning station - Work dock - Transient dock - Boatyard - Wastewater treatment plant	Bilge pump-out station Oil recycling station Bathrooms/showers Dredging of harbor channel and berthing Visitor berthing Fuel, water, ice Dock power Waste disposal and recycling Dry storage	Fish buyers (7) Fish processor (1) Electronics services (2) Marine supplies (1) Bait/tackle shop (1) Fuel dock (1) Ice Plant (1) Commercial divers (4) Boatyard (1) Restaurants (5) RV parks (2)

number of slips dropped to 228 because of deferred maintenance (RRM Design Group 2006), and decreased further following damage from the tsunami in November of that year. The outer boat basin contains docks that are installed seasonally, and can provide berthing for up to 500 smaller boats. These slips are used primarily by recreational fishermen during the summer. Occupancy of both inner and outer basin berthing has declined in recent years with the reduction in fishing opportunities. Occupancy of the inner basin's 228 slips averaged 68% between 1999 and 2003, down from full occupancy in prior years (RRM Design Group 2006). Outer basin slip occupancy declined from about 500 in 1980, to 250 in 1999, and to about 50 in 2008.

Although Crescent City has considerable infrastructure and fishery-support businesses, some fishermen obtain goods and services at other ports, usually in connection with fishing near those ports. For example, some reported purchasing bait in Eureka or Westport, Washington (see Table 2). Some larger operations haul out (for maintenance) at ports in Oregon and Washington. Fishermen reported traveling to Eureka for supplies, vessel maintenance and repair; some also reported obtaining crab and trawl gear in Eureka, Newport, Oregon and Bellingham, Washington.

Fishing Organizations and Events

Two commercial fishing associations are active at Crescent City. The Fishermen's Marketing Association (FMA), based in McKinleyville, California, was established in 1952 by a group of Eureka-based groundfish trawl fishermen to address marketing issues with fish buyers, and in later years, management issues. In the late 1980s, the organization expanded to include

shrimp trawlers and groundfish trawlers from other areas. With the 2003 groundfish trawl buyback retiring a large portion of the Crescent City trawl fleet, the FMA has a somewhat diminished presence locally.

The locally-based Del Norte Fishermen's Marketing Association, established in the early 1970s, primarily represents crabber/trollers, and has focused on market orders for salmon and crab and legal issues in the crab fishery. The organization also has sponsored two fish fries a year, through which it raises funds and educates the public. The association's membership has ebbed and flowed in connection with issues and conditions in the fisheries. As one local fisherman noted, "when salmon was big," the organization was very active, with about 95% of local crabbers and trollers as members. They funded the organization with self-imposed assessments on their catch. Following the establishment of the KMZ and the drop in local salmon fishing activity, however, the organization became inactive. More recently, the organization has become active again, supported by annual membership fees rather than catch-based assessments to address issues including management of the crab fishery and the state's Marine Life Protection Act (MLPA) process, began in the North Coast region in late 2009.

At one time, Crescent City also had a Commercial Fishermen's Wives Association, which sponsored an annual Labor Day Seafood Festival (1983–1993) with the local Sea Grant Extension Program However, as many wives and partners entered the workforce, the Fishermen's Wives Association has become inactive.

Although there are a number of recreational fishing organizations in the state, some of which cover the North Coast, none of these is active at Crescent City.

COMMERCIAL FISHERY ACTIVITY AT CRESCENT CITY HARBOR

The information in this section is based on customized summaries of Pacific Fisheries Information Network (PacFIN) landings receipt data, augmented by sources that provide earlier and/or longer-term data, as well as data from fieldwork conducted in 2007 and 2008. In the discussion that follows, the 'long term' is the period from 1981 through 2007, whereas 'recent years' pertains to the period from 2003 through 2007, unless otherwise noted.[19] The purpose of focusing on these two time periods is to demonstrate how recent activity compares to longer-term historical levels. While the long-term trends described in this section begin in 1981, it should be noted that some local fisheries (e.g., groundfish, salmon, crab) were established well before that year (see Figure 2).[20]

We use five measures of fishing activity derived from the landings receipts data for the most common local fisheries, define as species-gear combinations (e.g., salmon troll, groundfish trawl), and for all fisheries combined. Landings are reported as 'round weight' (in pounds), which reflects the total weight of the fish caught. (For species like salmon, which are gutted at sea, landed weights are converted to round weights to provide comparability with other species.) Ex-vessel value represents the amount paid to fishermen at the first point of sale (usually to a dockside buyer or receiver). Prices are calculated as the total ex-vessel value divided by total pounds landed, and therefore represent an average, rather than the (potentially wide) range of prices paid over the year. Both ex-vessel value and price (US$) are adjusted for inflation using 2007 values as a base. Boat counts represent individual (resident and nonresident) fishing operations, though not necessarily individual fishermen, as some fishermen may own and/or operate multiple boats. Buyer counts are based on the number of unique buyer IDs in the landings data, and include fishermen who land their own catch (e.g., for off-the-boat sales, delivery to restaurants) as well as fishermen and fish buyers who purchase fish from fishermen delivering their catch at the docks. The number of trips provides a count of the number of deliveries each boat makes at the port.[21] Data are reported by calendar year. To insure confidentiality, data are not reported for some fisheries and/or years if fewer than three vessels and/or buyers participated in that year or fishery.

Fishing activity at Crescent City Harbor varied considerably over the period 1981–2007. Annual landings were 14.6–23.4 million pounds during the period 1981–1987, increased to 21.1–39.3 million pounds during the period 1988–1998, then declined to 5.3–17.8 million pounds during the period 1999–2007 (Figure 4). Annual ex-vessel value was $12.2–$23.1 million between 1981 and 1987, $13.6–$24.8 million between 1988 and 1998, and $6.4–$23.4 million between 1999 and 2007. Whereas the increase in revenue between the first two periods was modest, the decline between the second and third periods was notable, with record low revenues (less than $7.2 million) experienced in three recent years (2001, 2002, 2005; Figure 5).

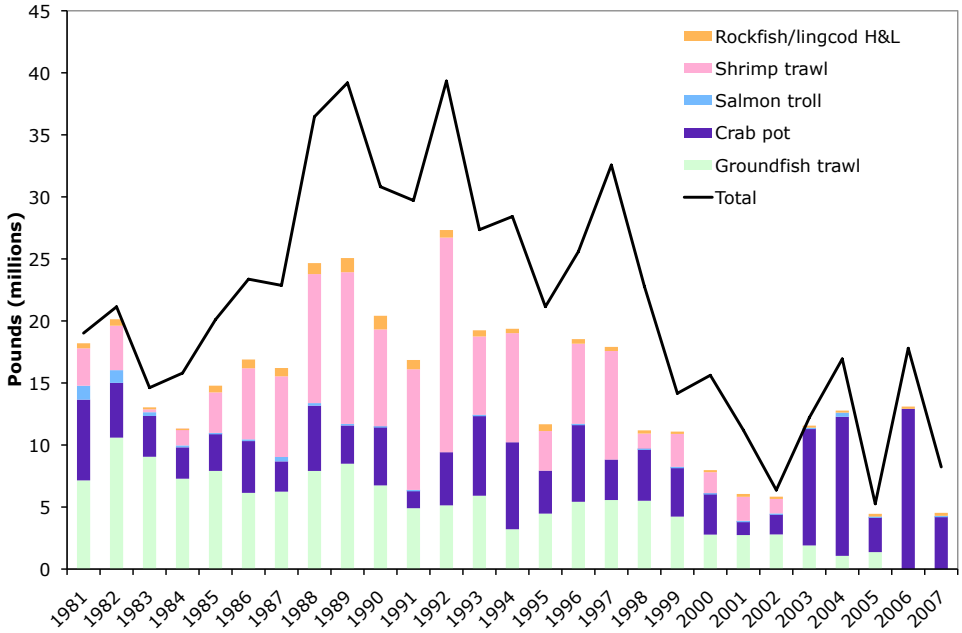

Figure 4. Commercial fishery landings (pounds) at Crescent City for selected fisheries and overall, 1981–2007. Note: Activity cannot be reported for years when more than zero and fewer than three boats or buyers participated in the groundfish trawl (2006–2007), salmon troll (1992, 1995, 1997) and shrimp trawl (2003–2005, 2007) fisheries.

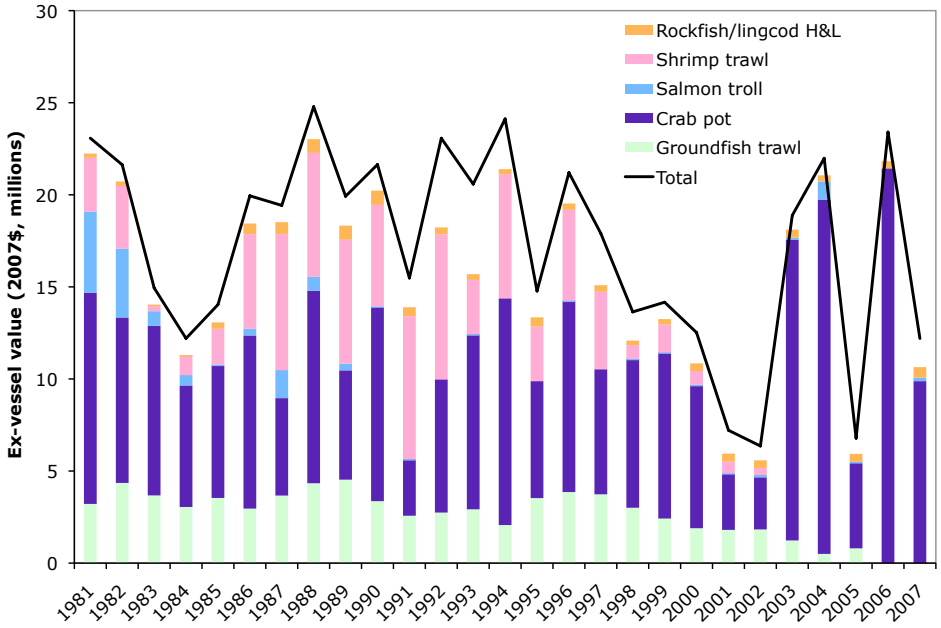

Figure 5. Ex-vessel value (2007$) of commercial fishery landings at Crescent City for selected fisheries and overall, 1981–2007. Note: Activity cannot be reported for years when more than zero and fewer than three boats or buyers participated in the groundfish trawl (2006–2007), salmon troll (1992, 1995, 1997) and shrimp trawl (2003–2005, 2007) fisheries.

Average annual landings in recent years (12.1 million pounds) were 44% lower compared to the long-term average (21.4 million pounds; Table 7). At the same time, the total ex-vessel value of the landings was only 4% lower in recent years ($16.7 million) than the long-term average ($17.3 million). This discrepancy is due primarily to the growth of the crab fishery (with higher ex-vessel prices compared to trawl-caught groundfish). The emergence of lower volume, higher price-per-pound live fish fisheries for rockfish and coonstripe shrimp, and the increase in sablefish activity and prices, together with declines in the higher-volume, lower-price groundfish and shrimp trawl fisheries have contributed to this differential outcome.

The recent average number of vessels (154, resident and nonresident combined) with landings at Crescent City is 57% less than the long-term average of 363 boats (Table 7). This change is due largely to the curtailment of the salmon fishery in the mid-1980s, but also to attrition following implementation of limited entry programs in several fisheries, and the reduction in local processing capacity in recent years. The number of boats declined sharply from 1,082 (mostly salmon trollers) in 1981 to 320 in 1985, then ranged between 312 and 503 through 1994 before declining further to fewer than 170 since 2001 (Figure 6). Of the 1,082 boats that made commercial fishery landings at Crescent City in 1981, 911 (84%) landed salmon and 246 (23%) landed crab. Since 1990, however, the proportion landing salmon has declined to 0%–29%, while the proportion landing crab has increased to 57%–89%.

The number of trips in Crescent City dropped sharply from a high of nearly 15,000 in 1982 (a majority of which were salmon) to fewer than 3,800 since 1998 (Figure 7). Annual effort in recent years averaged 3,044 trips, 48% lower than the long-term annual average of 5,882. The only fishery for which effort has been higher in recent years than the long term is the relatively new coonstripe shrimp fishery, which has a small number of participants and a limited (five-month) season. In the early 1980s, the salmon fishery accounted for 53% of all trips into Crescent City. As salmon fishing declined, crab trips accounted for a variable but increasing proportion of trips, peaking at 80% in 2006, and averaging 68% for the short term. The rockfish and lingcod hook–and-line fishery accounted for 22% of trips over the long term and 19% over the short term. All other fisheries accounted for 8% or less of trips over the long term, and 3% or less in the short term.

The number of fish buyers at Crescent City has varied considerably over the last 27 years, both within and among fisheries. Overall, the number of buyers was 34–45 during the period 1981–1983, decreased to 19–28 during

Table 7. Long-term and recent annual average, percent difference, and highs and lows in selected measures for commercial fisheries at Crescent City, 1981–2007.

All Fisheries	Long-term average 1981–2007	Recent average 2003–2007	Percent difference	High year(s) (amount)	Low year(s) (amount)
Landings (lbs)	21,411,639	12,087,253	-44	1992 (39,336,658)	2005 (5,260,636)
Ex-vessel value ($)	17,255,298	16,651,100	-4	1988 (24,786,105)	2002 (6,358,568)
Boats	363	154	-57	1981 (1,082)	2005 (137)
Buyers	41	35	-15	1998 (65)	2007 (20)
Trips	5,882	3,044	-48	1982 (14,943)	2005 (2,128)
Price ($/lb)	0.89	1.39	+55	2003 (1.55)	1989 (0.51)

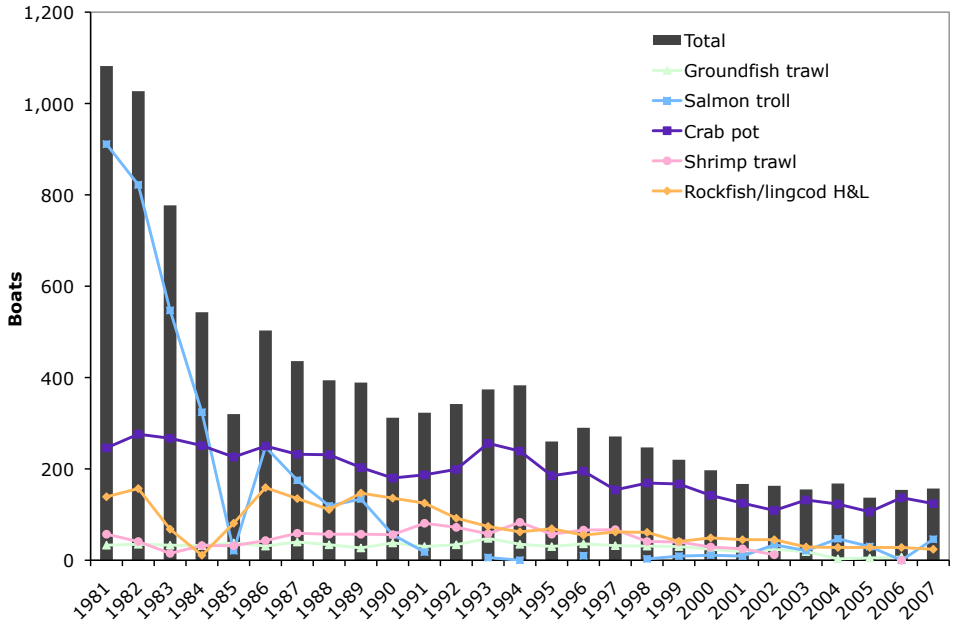

Figure 6. Number of boats with commercial fishery landings at Crescent City for selected fisheries and overall, 1981–2007. Note: Activity cannot be reported for years when more than zero and fewer than three boats or buyers participated in the groundfish trawl (2006–2007), salmon troll (1992, 1995, 1997) and shrimp trawl (2003–2005, 2007) fisheries.

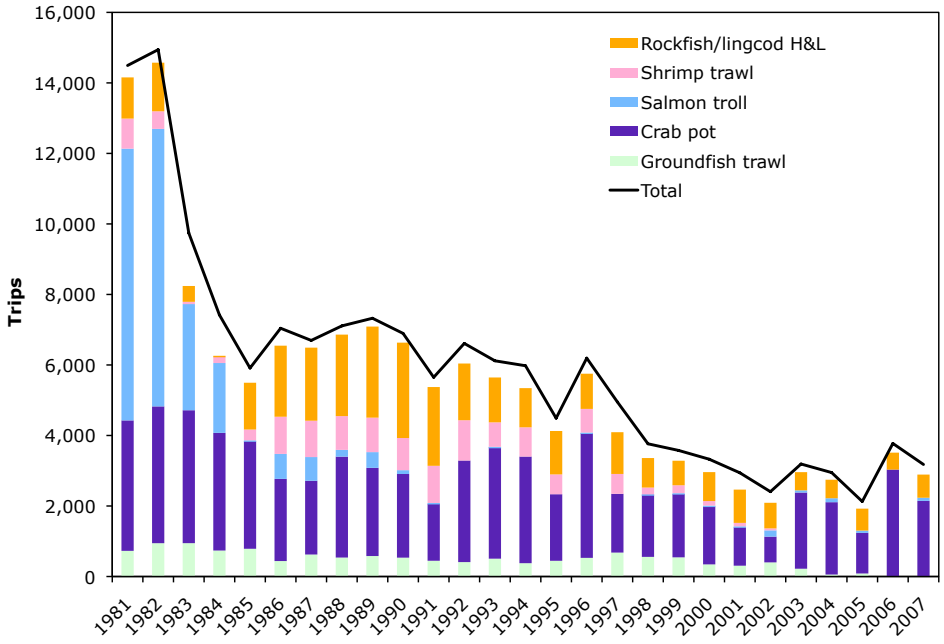

Figure 7. Number of trips by fishing vessels landing at Crescent City for selected fisheries and overall, 1981–2007. Note: Activity cannot be reported for years when more than zero and fewer than three boats or buyers participated in the groundfish trawl (2006–2007), salmon troll (1992, 1995, 1997) and shrimp trawl (2003–2005, 2007) fisheries.

the period 1984–1991, increased to 30–50 during the period 1992–2004, and decreased again to 20–27 during the period 2005–2007. Participants noted that despite an increase in the number of buyers, the actual number of 'fish houses' – large volume fish buyers that process and/or distribute the catch – has declined in the region.

Of the 23 buyers that received commercially caught seafood at Crescent City in 2005, about 75% were predominantly engaged in fish receiving (and perhaps processing, wholesale activities and distribution). The remaining receivers were fishermen who sell their own (and perhaps others') catch directly to restaurants and other retailers and/or consumers. Of the 20 buyers that received fish at Crescent City in 2007, three accounted for slightly more than 55% of the landed value of the catch, five accounted for 75% and seven accounted for 90%. Eleven (just over half) of those receivers relied entirely on Crescent City for their California receipts, and 14 relied on Crescent City for more than 50% of their California receipts.

The average ex-vessel price for all fisheries combined is 55% greater in the recent term ($1.39 per pound) compared to the long term ($0.89 per pound). However, the trends vary among fisheries. Recent-term prices are lower than long-term prices in the shrimp trawl (-33%), whiting (-13%), albacore (-21%), crab (-11%) and shrimp pot (-7%) fisheries. In contrast, recent-term prices are greater in the rockfish hook-and-line (+82%), salmon (+13%), and groundfish trawl (+5%) fisheries.

The distribution of ex-vessel value among vessels and buyers provide insights into the extent to which consolidation of fishing activity has occurred. Over the past decade (1998–2007), the number of boats delivering fish to Crescent City decreased from 247 to 157, while the proportion of boats accounting for 90% of landed value at the port increased slightly from 42%–46% prior to 2003 to 45%–54% thereafter. Over the same period, the number of buyers decreased from 50 to 20, while the proportion of buyers accounting for 90% of the landed value increased from 16% to 35%. While vessel and buyer concentration remain a feature of Crescent City fisheries, both have lessened since 1998. The reduction in buyer concentration has been more dramatic and is likely related to the closure of two major processors at the port around 2000.

Activity Within Commercial Fisheries

Crescent City has supported a diversity of fisheries over time. Crab, salmon, and groundfish trawl have historically been the mainstay of Crescent City's commercial fisheries, together accounting for an average of 91% of the ex-vessel value of landings per year over the long term (1981–2007) and 97% in recent years (2003–2007). This section examines fishery activity based on landings data for these fisheries and for two others highlighted in our meetings with community members: the shrimp trawl and rockfish/lingcod hook-and-line and pot fisheries. Albacore troll, coonstripe shrimp pot and Pacific whiting trawl fisheries have played a role as well, and are discussed briefly.

The Dungeness Crab Pot Fishery

Dungeness crab has ranked first among the port's commercial fisheries on most measures over the long term and in recent years. According to study participants, some of the best crab grounds are within a few miles of the harbor and, although the abundance of crab is cyclical, these grounds have been extremely productive. Historically, the crab was cooked and canned, but today crab is sold either cooked and frozen (whole or in sections), or live.

Between 1981 and 2002, landings varied widely between 1.1 million pounds (worth $3.0 million) and 7.0 million pounds (worth $12.3 million)

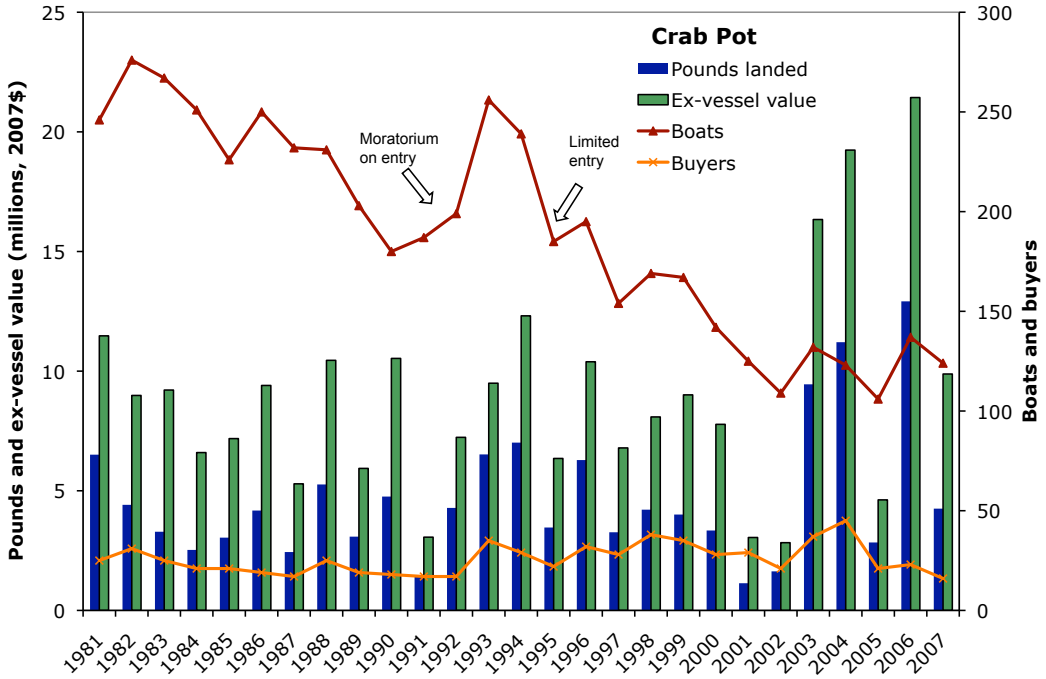

Figure 8. Landings, ex-vessel value (2007$), and number of boats and buyers for the commercial Dungeness crab fishery at Crescent City, 1981–2007.

Table 8. Long-term and recent annual average, percent difference, and highs and lows in selected measures for commercial crab pot fishery at Crescent City, 1981–2007.

Crab pot	Long-term average 1981–2007	Recent average 2003–2007	Percent difference	High year(s) (amount)	Low year(s) (amount)
Landings (lbs)	4,449,260	8,133,587	+83	2006 (12,916,602)	2001 (1,135,811)
Ex-vessel value ($)	8,625,771	14,301,909	+66	2006 (21,434,629)	2002 (2,830,656)
Boats	189	124	-34	1982 (276)	2005 (106)
Buyers	26	34	+34	2004 (45)	2007 (16)
Trips	2,416	2,108	-13	1982 (3,880)	2002 (730)
Price ($/lb)	2.04	1.81	-11	1983 (2.80)	1993 (1.46)

(Figure 8, Table 8). The record low activity experienced in 2001 and 2002 (1.1–1.6 million pounds, $2.8–$3.0 million) was followed by three extraordinary years (2003, 2004, 2006) in which landings and value ranged between 9.4 and 12.9 million pounds and $16.3 and $21.4 million, respectively.[22]

The numbers of boats and buyers participating in the crab fishery also have fluctuated, although not in synchrony with landings. Average annual vessel participation in recent years was 124 boats, 34% lower than the long-term average of 189 boats. Participation peaked at 246–276 boats during the period 1981–1984 and 256 boats in 1993. However, the general trend has been a marked decline

from more than 245 boats in the early 1980s to 109–137 boats since 2001. The average number of buyers (including fishermen selling their own catch) was 34 in recent years, a 34% increase from the long-term average of 26. The number of buyers increased from 6–11 for the period 1981–1997 to 11–19 for the period 1998–2005, then declined to 11–12 for the period 2006–2007.

The number of crab trips at Crescent City averaged 2,108 in recent years, 13% lower than the long-term average of 2,416 trips. Trips peaked at more than 3,500 in 1981–1983 and 1996, and were at their lowest (730–1,981 trips) in 2001 and 2002 (the years of record low landings). During years of record high landings (2003, 2004, 2006), the number of trips ranged from 2,052 to 3,033, a rather "ordinary" level of effort. This apparent lack of synchrony between landings and trips may reflect, to a large extent, the marked increase in the number of traps used.

Local ex-vessel prices for crab averaged $1.81 in recent years, an 11% decline from the long-term average of $2.04. This change is somewhat unexpected, given the growth in the live market, which can offer prices twice those for cooked crab. However, larger landings in 2003, 2004 and 2006, especially early in the season when most of the product is directed to the lower-priced cooked and frozen sectioned crab market, may have kept average prices low in recent years. Prices have varied considerably nonetheless, from a low of $1.46 per pound (1993) to a high of $2.80 per pound (1983). The crab fishery has played an increasingly central role for the Crescent City commercial fishing community as a result of several factors, most notably reduced opportunities in other fisheries and availability of and access to the resource. The proportion of fishing activity at Crescent City involving crab has been much higher in recent years relative to the long term. Crab boats as a proportion of total boats landing at Crescent City has increased from 52% to 81%. The contribution of crab trips have increased from 41% to 69%, of landings from 22% to 67%, and of ex-vessel value from 52% to 86% of those totals.

The Groundfish Trawl Fishery

Annual landings of groundfish declined steadily from 6.1–10.6 million pounds during the period 1981–1990 to 2.8–5.9 million pounds during the period 1991–2000, and to 1.1–2.8 million pounds during the period 2001–2007 (Figure 9, Table 9). Landings have averaged 1.4 million pounds in recent years, a 73% decline from the long-term average of 5.1 million pounds. The ex-vessel value of groundfish landings declined by 70%, from a long-term average of $2.7 million to $821,000 in recent years. Landed value fell from $3.0–$4.5 million during the period 1981–1990, to $1.9–$3.9 million during the period 1991–2000, and to $500K–$1.8 million during the period 2001–2007.

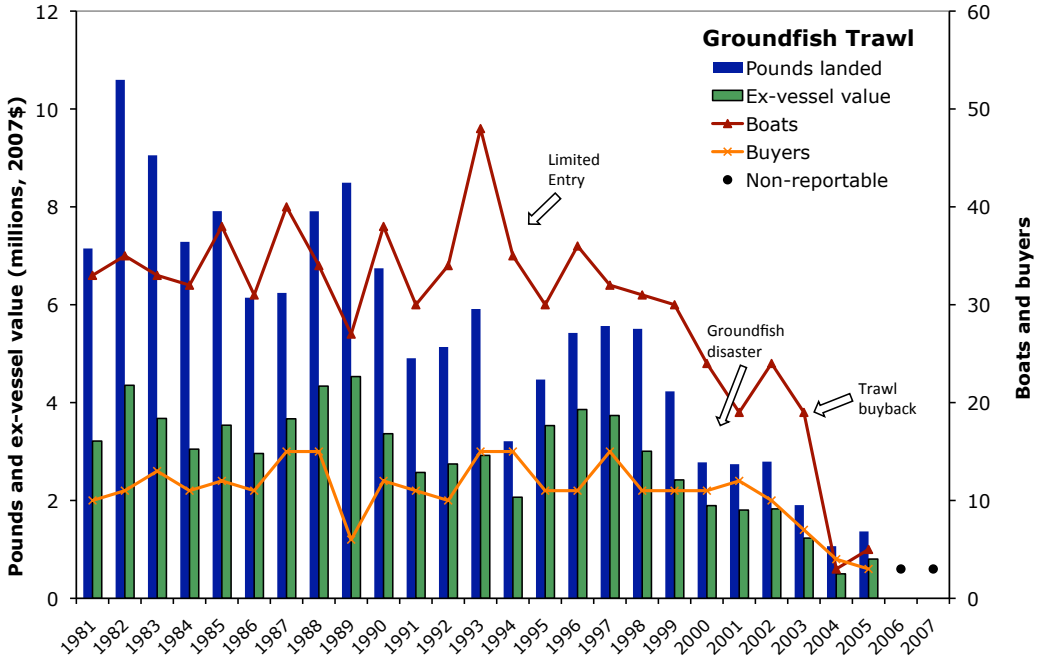

Figure 9. Landings, ex-vessel value (2007$), and number of boats and buyers for the commercial groundfish trawl fishery at Crescent City, 1981–2007. Note: Activity cannot be reported for 2006 and 2007, when more than zero but fewer than three boats or buyers participated in the fishery.

Table 9. Long-term and recent annual average, percent difference, and highs and lows in selected measures for commercial groundfish trawl fishery at Crescent City, 1981–2007. Note: Data for 2006 and 2007, years when fewer than three boats or buyers participated in the fishery, are included in averages but excluded from highs and lows.

Groundfish trawl	Long-term average 1981–2007	Recent average 2003–2007	Percent difference	High year(s) (amount)	Low year(s) (amount)
Landings (lbs)	5,076,900	1,375,267	-73	1982 (10,595,055)	2004 (1,065,626)
Ex-vessel value ($)	2,710,460	821,198	-70	1989 (4,531,671)	2004 (500,702)
Boats	28	8	-75	1993 (48)	2004 (3)
Buyers	7	2	-71	1987 (15)	2005 (3)
Trips	478	102	-79	1983 (946)	2004 (56)
Price ($/lb)	0.56	0.59	+5	1995 (0.79)	1983 (0.41)

The number of trawlers landing groundfish at Crescent City averaged eight boats in recent years, a 75%, decline from the long-term average of 28 boats. From 1981 through 1999, the number of boats ranged from 27 to 40 (except for the peak of 48 in 1993). Participation declined to 19–24 boats during the 2000–2003 period (as regulations became more restrictive to protect overfished stocks), then fell sharply to 3–7 boats during the 2004–2007 period (following the trawl buyback). The number of groundfish buyers in Crescent City averaged 2 in recent years, a 71% decline from the long-term average of 7 buyers. The

number of buyers peaked at 10–13 from 1981 through 1986 and 1993 through 1994, and was 5–9 throughout the rest of the pre-2003 period. Since 2003, however, the number of buyers has fallen to 1–4.

An average of 102 groundfish trips were taken in Crescent City in recent years, a 79% decline from the long-term average of 478 trips (see Table 9). During the period 1981–1985, 728–946 trips were made per year; over the next 14 years (1986–1999), trips stayed within the 409–679 range. Effort declined to 221–401 trips during the period 2000–2003, then declined even further to 56–90 trips between 2004 and 2007 (after the trawl buyback).

The annual price of trawl-caught groundfish averaged $0.59 per pound (for all species combined) in recent years, a modest 5% increase over the long-term average of $0.56. The fishery targets a mix of species, with some species commanding a higher dockside price per pound than others. Changes in the species composition of landings, due to changing markets, abundance and limits on the catch of individual species, affect average ex-vessel prices.

Groundfish trawl activity at Crescent City has declined not only in absolute terms, but also as a proportion of total activity at the port. The proportion of vessels at Crescent City consisting of groundfish trawlers averaged 8% over the long term, relative to 5% in recent years. Over these same periods, the groundfish contribution to total trips declined from 8% to 3%, the contribution to landings declined from 24% to 11%, and the contribution to landed value declined from 16% to 5%.

The Salmon Troll Fishery

The commercial salmon troll fishery has historically played a vital role in the Crescent City fishing community (see Figure 2). However, dramatic changes occurred in Crescent City's salmon fishery during the period 1981–2007 (Figure 10, Table 10). Average annual landings in recent years (89,000 pounds) are 40% lower than the long-term average of 149,000 pounds. These averages reflect a precipitous decline that occurred largely in the 1980s. Since 1990, landings have been consistently and very low, with the notable exception of 2004, when landings reached 337,000 pounds. The 2004 spike is due to an unusual abundance of Chinook salmon off the Southern Oregon coast; California fishermen fished nearby in waters off Oregon and delivered their catch at Crescent City.[23] Fishing was not allowed in the KMZ in 1985, 1992–1995 and again in 2006. Minimal landings occurring in those years, and were due to a small number of trollers who fished in other areas but landed their catch at Crescent City.

Ex-vessel values follow a pattern similar to landings, with average landed value in recent years ($270,000) 49% lower than the long-term average of $524,000. Landed value ranged between $3.7 million and $4.4 million in 1981 and 1982, then fell to $57,000 in 1985; through the rest of the 1980s, ex-vessel value ranged from $364,000 to $1.5 million. Since 1990, ex-vessel values have been consistently very low (well below $200,000 per year), with the notable exception of 2004, when the value was $980,000.

The average annual number of boats in the fishery declined by 78% from a long-term average of 134 boats to an average of 29 boats in recent years (Tab. Participation declined from 911 boats in 1981 to 21 boats in 1985 (closure of the California KMZ in 1985 limited salmon participation to vessels fishing outside the KMZ that were willing to travel to Crescent City to land those fish). Participation rebounded to 248 boats in 1986 (when the KMZ reopened), then continued its downward trajectory to 18 boats by 1991. Participation

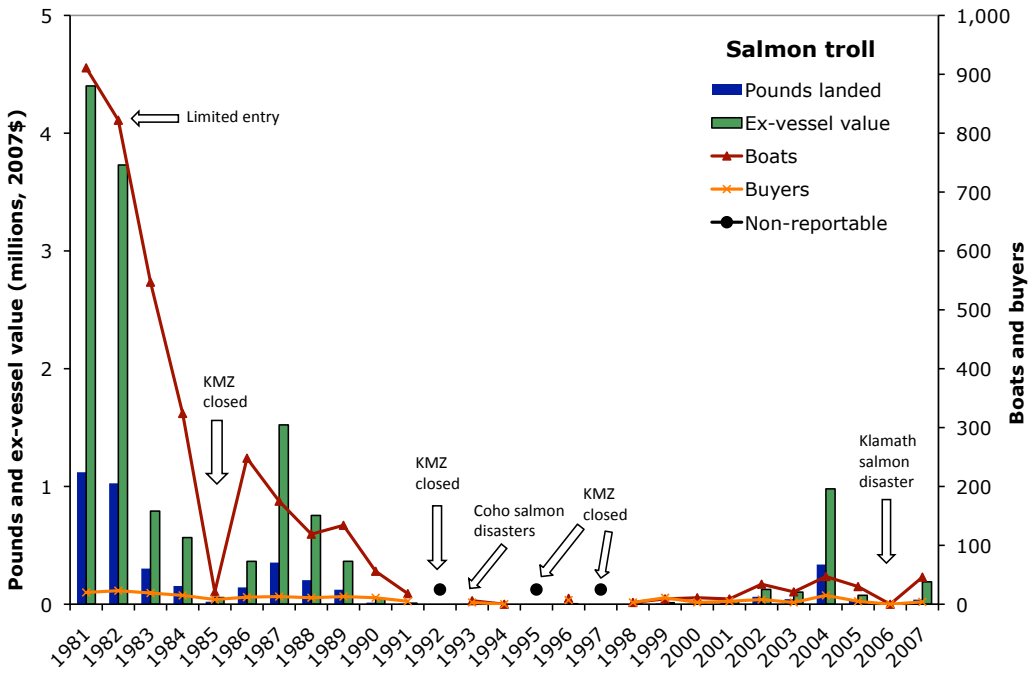

Figure 10. Landings, ex-vessel value (2007$), and number of boats and buyers for the commercial salmon troll fishery at Crescent City, 1981–2007. Note: Activity cannot be reported for 1992, 1995 and 1997, when more than zero but fewer than three boats or buyers participated in the fishery.

Table 10. Long-term and recent annual average, percent difference, and highs and (nonzero) lows in selected measures for commercial salmon troll fishery at Crescent City, 1981–2007. Note: No landings occurred in 1994 and 2006. Data for 1992, 1995 and 1997, when fewer than three boats or buyers participated in the fishery, are included in averages but excluded from highs and lows.

Salmon troll	Long-term average 1981–2007	Recent average 2003–2007	Percent difference	High year(s) (amount)	Low year(s) (amount)
Landings (lbs)	148,643	89,499	-40	1981 (1,120,731)	1998 (753)
Ex-vessel value ($)	524,265	269,718	-49	1981 (4,401,181)	1998 (1,685)
Boats	134	29	-78	1981 (911)	1998 (3)
Buyers	7	4	-43	1982 (23)	1993, 1998, 2000, 2003 (3)
Trips	866	66	-92	1982 (7,871)	1993, 1998 (6)
Price ($/lb)	2.83	3.21	+13	2007 (4.89)	1983 (1.20)

declined further to 0–11 boats during the period 1992–2001, then increased to 21–47 vessels during the period 2002–2007 (except for 2006, when the KMZ was closed again). The number of salmon buyers averaged four in recent years, 43% lower than the long-term average of seven. The number of buyers was 19–23 between 1981 and 1983, fell to 9–14 from 1984 through 1990, and declined further to 0–10 thereafter. Several fishermen who sell their own catch are included in these counts.

The annual number of salmon trips averaged 66 in recent years, a 92% decline from the long-term average of 866 trips. Fishing effort, which exceeded 7,800 trips in 1981 and 1982, declined precipitously to 26 trips in 1985 (when the California KMZ was closed). Effort rebounded to 708 trips in 1986, when the KMZ reopened, then continued its downward trajectory to 21 trips by 1991. Since 1992, effort has ranged from 0 to 178 trips per year, exceeding 100 in only two years (2002 and 2004).

Annual ex-vessel prices for salmon averaged $3.21 per pound in recent years, a modest 13% increase compared to the long-term average of $2.83 per pound. From 1981 through 1993, prices varied from $2.51 to $4.31. From 1995 through 2004, prices shifted downward to $1.58–$2.91 per pound. After the fishery closure in 2006, prices peaked at $4.89 in 2007.

Salmon troll activity at Crescent City has declined not only in absolute terms, but also as a proportion of total activity at the port. The proportion of vessels that participated in the fishery averaged 37% over the long term, and 19% in recent years. Over these same periods, the salmon contribution to total trips declined from 15% to 2%, the contribution to landings remained unchanged at 1%, and the contribution to landed value declined slightly from 3% to 2%.

The Ocean (Pink) Shrimp Trawl Fishery

The shrimp trawl fishery, managed by the state with some federal oversight,[24] started along the North Coast in the 1950s, and expanded in the 1970s largely due to technological changes in fishing (i.e., double-rig trawl nets) and processing (i.e., shrimp peeling machines) (Frimodig et al. 2009). Although the shrimp trawl fishery has played a lesser role at Crescent City in recent years, historically it accounted for substantial landings, value and participation, and provided part of the incentive for the construction of a wastewater treatment facility at the harbor. Since 2008, ocean shrimp trawl grounds in state waters have been closed between Point Reyes and False Cape (located south of Eureka). Crescent City shrimp fishermen reported fishing south of Cape Mendocino (delivering to Crescent City, Eureka or Fort Bragg) many years in the past, as the resource was often more abundant and accessible than in federal waters off Crescent City.

Shrimp landings exceeded three million pounds in 1981 and 1982, declined abruptly as the resource became scarce during the 1982–83 El Niño, then expanded steadily to 6.5 million pounds in 1987 (Figure 11, Table 11). Landings peaked between 1988 and 1992, ranging from 7.8 million to 17.3 million pounds. Landings declined to 1.2–8.8 million pounds between 1993 and 2002, then declined more abruptly to 0–350,000 pounds between 2003 and 2007. Annual landings averaged 172,000 pounds in recent years, 96% lower than the long-term average of 4.6 million pounds. Ex-vessel value followed a similar pattern, peaking at $5.5–$7.9 million between 1987 and 1992 and reaching lows of $0–$172,000 during the period 2003–2007. Annual landed value averaged $78,700 in recent years, 97% lower than the long-term average of $3.1 million.

The number of boats participating in the fishery dropped sharply from 57 in 1981 to 15 in 1983 (due to the scarcity of shrimp during the El Niño event), then peaked at 83 in 1994 (likely in anticipation of a state moratorium on entry into the fishery). Since then, the number of boats has declined, reaching lows of 0–7 boats since 2003. Annual participation averaged three boats in recent years, 93% less than the long-term average of 41 boats.

From 1981 to 1982, 10–12 buyers of trawl-caught shrimp operated in Crescent City. The numbers of buyers fell to 4–9 from 1983 to 2001. Since 2002, however, the number of buyers has averaged one, 83% lower than the

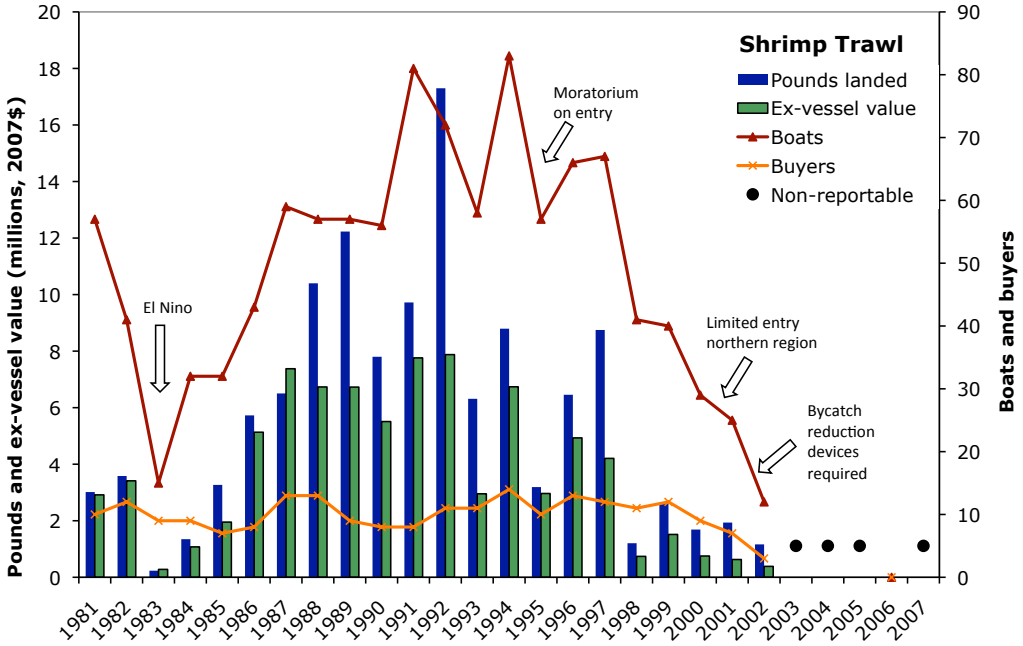

Figure 11. Landings, ex-vessel value (2007$), and number of boats and buyers for the commercial shrimp trawl fishery at Crescent City, 1981–2007. Note: Activity cannot be reported for 2003–2007, when more than zero but fewer than three boats or buyers participated in the fishery.

Table 11. Long-term and recent annual average, percent difference, and highs and (nonzero) lows in selected measures for commercial ocean shrimp trawl fishery at Crescent City, 1981–2007. Note: No landings occurred in 2006. Data for 2003–2007, when fewer than three boats or buyers participated in the fishery, are included in averages but excluded from highs and lows.

Shrimp trawl	Long-term average 1981–2007	Recent average 2003–2007	Percent difference	High year(s) (amount)	Low year(s) (amount)
Landings (lbs)	4,597,480	172,034	-96	1992 (17,298,714)	1983 (232,806)
Ex-vessel value ($)	3,072,551	78,660	-97	1992 (7,877,070)	1983 (279,299)
Boats	41	3	-93	1994 (83)	2002 (12)
Buyers	6	1	-83	1994 (14)	2002 (3)
Trips	485	8	-98	1992 (1,143)	2002 (56)
Price ($/lb)	0.66	0.44	-33	1983 (1.2)	2001 (0.32)

long-term average of six buyers. This is due in part to receiving and processing issues at the port despite reports from fishermen and others of increases in the resources and improved markets for the product.

The number of shrimp trawl trips dropped from 853 in 1981 to 64 in 1983. Effort subsequently increased to 912–1,143 trips between 1986 and 1992, then declined dramatically to 0–17 trips during the period 2003–2007. Annual shrimp trawl effort averaged eight trips in recent years, 98% lower than the long-term average of 485 trips.

Prices for trawl-caught shrimp have ranged widely, increasing from $0.97 per pound in 1981 to a peak of $1.20 per pound in 1983 (when shrimp were scarce). Since then, prices have generally cycled downward, reaching lows of $0.32–$0.49 during the period 2000–2007. Prices averaged $0.44 per pound in recent years, 33% lower than the long-term average of $0.66.

The shrimp trawl fishery accounted for about 11% of boats, 8% of trips, 22% of landings and 18% of landed value at Crescent City over the long term. The fishery's contribution to Crescent City activity has declined dramatically in recent years to 2% of boats, less than 1% of trips, and 1% of landings and landed value.

The Rockfish and Lingcod Hook-and-Line Fishery

Commercial fishing for rockfish and lingcod using hook-and-line and bottom longline gear has occurred at Crescent City for decades. Traditionally, the fishery produced whole fish and filets for retail and food service. Since the late 1990s the fishery also has served the live fish market, which emerged about a decade earlier in the southern part of the state.

Landings increased from 407,000 pounds in 1981 to a peak of 1.1 million pounds in 1989–1990 (Figure 12, Table 12). This upward trend was interrupted in 1983–1984 by the 1982–1983 El Niño and extreme weather in 1984 that made fishing particularly difficult (CDFG 1984, 1985). Landings declined to 164,000–258,000 pounds during the period 1999–2007. The ex-vessel value of landings followed a similar pattern between 1981 and 1990, although the increase in value from 1985 to 1990 was not as dramatic as the increase in landings. After 1990, however, instead of declining as landings did, ex-vessel values varied from $249,000 to $572,000 without apparent trend.

Annual landings averaged 194,000 pounds in recent years, a 55% decline compared to the long-term average of 429,000 pounds. The ex-vessel value of landings increased by 6%, from a long-term average of $410,000 to $436,000 in recent years.

The trend in the number of rockfish hook-and-line fishery participants at Crescent City bears some similarity to the trend in landings. Participation averaged 27 boats in recent years, 64% lower than the long-term average of 76 boats. Prior to 1989, vessel participation varied widely, ranging between highs of 135–159 in 1981, 1982, 1986 and 1987 and a low of 11 boats in 1984. According to local fishermen, many displaced salmon fishermen entered the fishery in 1985 and 1986 when harvest opportunities in the KMZ were severely constrained. Participation reached 147 boats in 1989 and declined steadily thereafter to 41–49 during the period 1999–2002. From 2003 onward, participation declined again to fewer than 30 boats following the implementation of restricted access in the state's nearshore fishery.

The number of buyers in this fishery averaged 8 in recent years, a 43% decline from the long-term average of 14. Between 8 and 28 buyers partipcated during the period 1981–2004, then declined to 5–7 thereafter, due to fewer boats

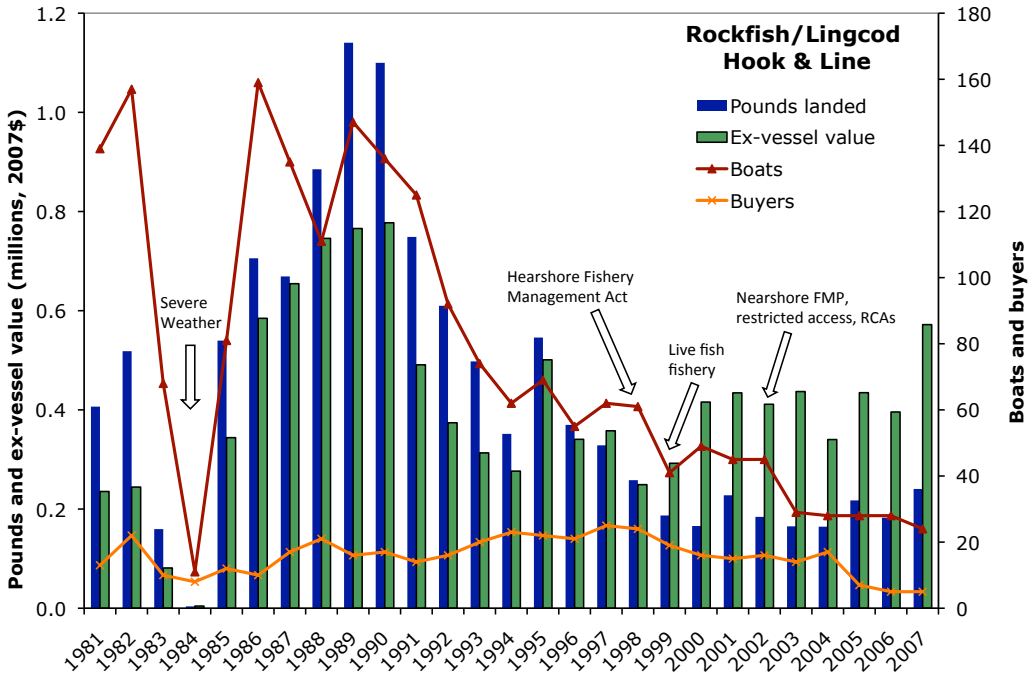

Figure 12. Landings, ex-vessel value (2007$), and number of boats and buyers for the commercial rockfish and lingcod hook-and-line fishery at Crescent City, 1981–2007.

Table 12. Long-term and recent annual average, percent difference, and highs and lows in selected measures for commercial rockfish/lingcod hook-and-line fishery at Crescent City, 1981–2007.

Rockfish/Lingcod hook-and-line	Long-term average 1981–2007	Recent average 2003–2007	Percent difference	High year(s) (amount)	Low year(s) (amount)
Landings (lbs)	428,620	193,984	-55	1989 (1,140,393)	1984 (3,668)
Ex-vessel value ($)	410,125	435,883	+6	1990 (777,303)	1984 (4,391)
Boats	76	27	-64	1986 (159)	1984 (11)
Buyers	14	8	-43	1997 (25)	2006 (5)
Trips	1,204	560	-53	1990 (2,705)	1984 (27)
Price ($/lb)	1.24	2.25	+82	2003 (2.65)	1982 (0.47)

and lower landings. Most of the buyers are now local fishermen who sell their own and in some cases others' catch both locally and to San Francisco Bay area markets.

Annual effort averaged 560 trips in recent years, a 53% decline from the long term average of 1,204. The trend in trips is similar to the trend in vessel participation. In 1981 and 1982, the number of trips exceeded 1,000, then dropped sharply to a low of 27 in 1984. Effort subsequently increased to a high of 2,705 trips in 1990, gradually declining to 480–657 trips during the 2003-2007 period.

Average annual prices ranged from $0.47 to $1.20 per pound between 1981 and 1998, increased to $1.56 in 1999 and peaked at $1.91–$2.65 between 2000 and 2007. The increase in prices in the late 1990s coincided with the expansion of the live fish fishery. Prices in recent years averaged $2.25 per pound, 82% higher than the long-term average of $1.24.

Whereas this fishery has accounted for an average of only 2%–3% of total landings and ex-vessel value in Crescent City (over the long term and in recent years), it has accounted for a considerable proportion of fishing effort. The proportion of vessels at Crescent City that participate in this fishery averaged 21% over the long term, relative to 18% in recent years. Over these same periods, the contribution of this fishery to total trips also declined from 21% to 18%, while the proportion of buyers participating in the fishery declined from 42% to 31%.

The Coonstripe Shrimp Trap/Pot Fishery

California's commercial trap fishery for coonstripe shrimp (*Pandalus danae*) is relatively new, started in 1992 by a small group of Crescent City fishermen. The lack of landings prior to 1992, and the low number of participants between 1992 and 1995 and again in 2007 limit the discussion here (Figure 13, Table 13).[25] Landings rose through the late 1990s, peaking at just over 81,000 pounds in 2000, then generally declined to a reportable low of 35,411 pounds in 2006. Annual landings averaged 45,343 pounds in recent years, similar to the long-term (1992–2007) average of 45,999 pounds.

Annual ex-vessel value averaged $181,692 in recent years, a 9% decline from the long- term (1992–2007) average of $199,623. Ex-vessel value more than doubled from $181,000 in 1996 to a high of $396,598 in 2000, then declined to $143,530 by 2006 .

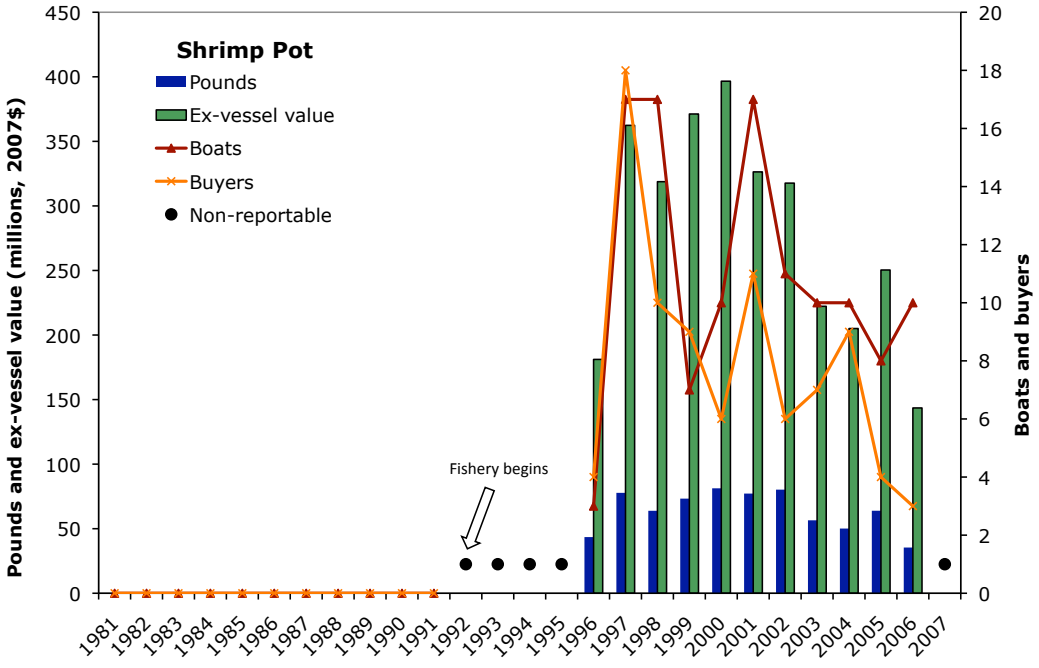

Figure 13. Landings, ex-vessel value (2007$), and number of boats and buyers for the commercial coonstripe shrimp pot fishery at Crescent City, 1981–2007. Note: No landings occurred between 1981 and 1991. Activity cannot be reported for 1992–1995 and 2007, when more than zero but fewer than three boats or buyers participated in the fishery.

Table 13. Long-term and recent annual average, percent difference, and highs and (nonzero) lows in selected measures for commercial coonstripe shrimp pot fishery at Crescent City, 1992–2007. Notes: No landings occurred between 1981 and 1991. Data for 1992–1995 and 2007, when fewer than three boats or buyers participated in the fishery, are included in averages but excluded from highs and lows.

Coonstripe Shrimp pot	Long-term average 1992–2007	Recent average 2003–2007	Percent difference	High year(s) (amount)	Low year(s) (amount)
Landings (lbs)	45,999	45,343	-1	2000 (81,278)	1996 (43,502)
Ex-vessel value ($)	199,623	181,692	-9	2000 (396,598)	2006 (143,530)
Boats	8	9	+12	1997, 1998, 2001 (17)	1996 (3)
Buyers	4	3	-25	1997 (17)	2006 (3)
Trips	96	90	-6	1997 (242)	1996 (45)
Price ($/lb)	4.36	4.04	-7	1999 (5.06)	2005 (3.92)

The number of boats participating in the fishery has been quite variable, increasing from 3 in 1996 to 17 in 1997 (as well as 1998 and 2001). In all other reportable years, 8–11 boats participated in the fishery. Annual participation averaged nine boats in recent years, 12% higher than the long-term average of eight boats.

The number of buyers quadrupled from four in 1996 to 17 in 1997, then declined to three by 2006. Buyer participation in the fishery averaged three in recent years.

The number of trips increased from 45 in 1996 to a high of 242 in 1997, then varied but generally declined to 86 trips by 2006. The average number of trips in recent years was 90, a 6% decline from the long-term average of 96.

Coonstripe shrimp is one of the higher priced (and lower volume) fisheries at Crescent City. Prices ranged from $3.92 to $5.06 per pound between 1996 and 2006. The average price in recent years was $4.00 per pound, a 7% decline from the long-term average of $4.36.

The Albacore Troll Fishery

Albacore tuna is a highly migratory species whose distribution varies widely. Oceanic conditions such as warm water currents (particularly El Niño events) and availability of prey affect their migration. Albacore can range within 10 to 50 miles of the coast or further offshore and from south to well north of Crescent City. With the closure of the last large California cannery in 2001, most fishery participants market their catch through direct sales or deliver to one of the few remaining canneries in Oregon or Washington. As a result, participation and production at Crescent City can vary widely from year to year.

Average annual landings of troll-caught albacore in recent years and over the long term have been about the same, at 237,548 and 227,318 pounds respectively. Ex-vessel value averaged $205,065 and $237,388 over the same periods (Figure 14, Table 14). The apparent stability in these average estimates masks the high degree of inter-annual variability in the fishery. Years of peak landings (1982, 1994, 1996 and 1997) have largely coincided with El Niño events. In the remaining (reportable) years, landings and value ranged widely, from 24,051 to 306,734 pounds and from $28,863 to $539,836.
The number of boats with albacore troll landings at Crescent City averaged 20 in recent years, down 23% compared to the long-term

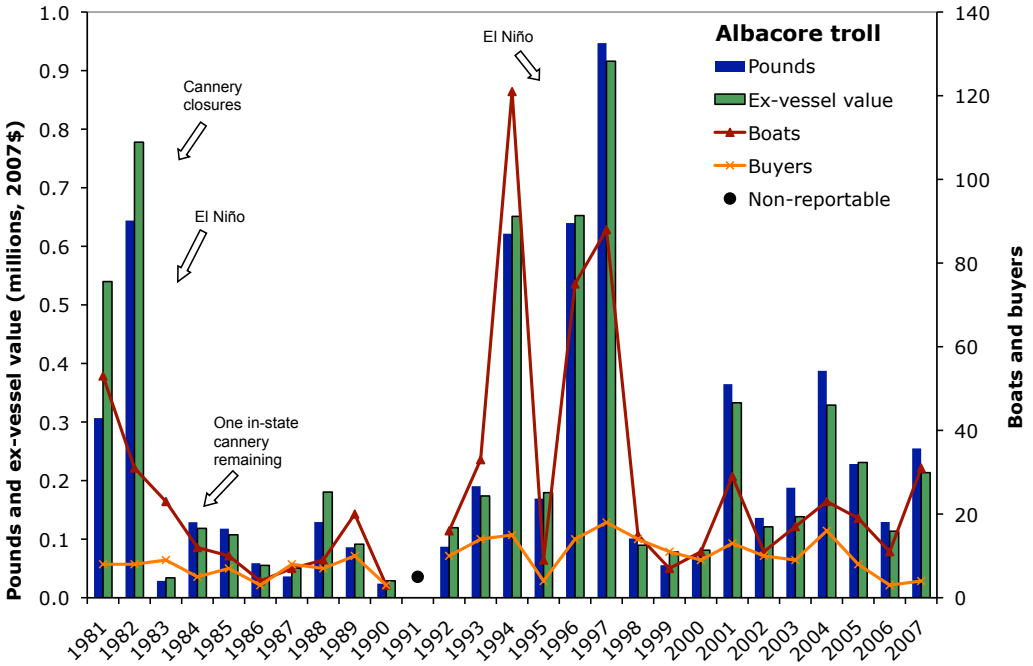

Figure 14. Landings, ex-vessel value (2007$), and number of boats and buyers for the commercial albacore troll fishery at Crescent City, 1981–2007. Note: Activity cannot be reported for 1991, when more than zero but fewer than three boats or buyers participated in the fishery.

Table 14. Long-term and recent annual average, percent difference, and highs and lows in selected measures for commercial albacore troll fishery at Crescent City, 1981–2007. Note: Years when fewer than three boats or buyers participated are included in averages, but excluded from highs and lows.

Albacore troll	Long-term average 1981–2007	Recent average 2003–2007	Percent difference	High year(s) (amount)	Low year(s) (amount)
Landings (lbs)	227,318	237,548	+5	1997 (946,945)	1990 (24,051)
Ex-vessel value ($)	237,388	205,065	-14	1997 (916,055)	1990 (28,863)
Boats	26	20	-23	1994 (121)	1990 (3)
Buyers	9	9	+0	1997 (18)	1986, 1990 (3)
Trips	58	41	-29	1994 (271)	1990 (3)
Price ($/lb)	1.10	0.86	-21	1981 (1.76)	2003 (0.74)

average of 26 boats (Table 14). The number of trips averaged 41 in recent years, a 29% reduction from the long-term average of 58 trips. Peak years of boat activity included 1994 (121 boats) and 1996–1997 (75–88 boats), with 3–53 boats participating in other years. The number of trips peaked in 1994 (271 trips), 1997 (237 trips) and 1996 (142 trips), with 3–74 trips occurring in other years (Table 14).

An average of nine buyers participated in the albacore fishery in recent years and over the long term (Table 14). The number of buyers was highest (14–18) in 1993, 1994 and from

1996 through 1998, and included both low- and high-landing periods. These numbers included an estimated six fishermen who sell at least some of their catch directly to the public in late summer and early fall as a strategy for dealing with the scarcity of canneries and stagnant prices.

Annual ex-vessel prices for albacore landed at Crescent City averaged $0.86 per pound in recent years, a 21% reduction from the long-term average of $1.07 (Table 14). Recent term prices have been generally been lower and more stable ($0.74–$1.01 per pound) than prices in previous years ($0.89–$1.76 per pound).

On average, 13% of boats delivering to Crescent City in recent years have been albacore boats, an increase from the long-term average of 7%. However, in terms of other measures of fishing activity, albacore has accounted for an average of only 1%–2% of total trips, landings and ex-vessel value in Crescent City (both over the long term and in recent years).

The Pacific Whiting (Hake) Trawl Fishery

The whiting trawl fishery is the largest fishery by volume on the U.S. West Coast. However, only a small portion of the annual harvest is taken in California, as the stock has a limited window of availability (due to its northward migration in late spring) and whiting processors are largely concentrated in Oregon.[26] The fishery has been among Crescent City's top two by volume, accounting for 14% and 26%, of landings in recent years and over the long term, respectively. However, whiting has accounted for only 2% and 1% of ex-vessel value over those same periods and currently involves no resident vessels. Nonetheless, it supports receivers and other businesses during an otherwise slow period at the port.

Because of the small number of participants, data on the fishery can only be reported for seven individual years: 1985, 1990, 1993 and 1997 when reportable landings occurred, and 1981, 2002 and 2005 when no landings were made. Landings averaged 6.3 million pounds over the long term and 2.1 million pounds in recent years; ex-vessel value averaged $407,496 and $97,816 over the same periods. Among the four reportable years with positive landings, landings peaked in 1997 at 13 million pounds and value peaked in 1990 at $859,000.

Except for 1997 when eight boats (3% of all boats that landed at the port) participated, five or fewer boats participated in the fishery at Crescent City. Similarly, three or fewer buyers received whiting locally.

The number of whiting trips at Crescent City averaged 59 over the long term, dropping 75% to an average of 15 per year in recent years. These trips account on average for well under 1% of trips at Crescent City in most years, although they accounted for 2% of all trips in 1997. Ex-vessel prices for whiting have consistently been the lowest for all fisheries at Crescent City, at $0.15–$0.16 per pound in 1982 and 1983 and less than $0.12 per pound in all subsequent years. Price per pound averaged $0.07 in recent years, a 13% reduction compared to the long-term average of $0.08.

Commercial Fishery Combinations

Commercial fishery participants move among fisheries, ports and fishing areas in response to changes in resource availability, regulations, weather and other factors. Reflecting the highly constraining nature of regulations in recent years, one fisherman noted, "You follow the seasons, the regulations, not so much the fish." Examination of fishery combinations provides insight into the changing nature of individual operations as well as the community.

For purposes of identifying trends in fishery participation, it would be reasonable to focus on boats that are resident (homeported) at Crescent City. However, although recent data on resident vessels were collected as part of the fieldwork for this project, similar data for earlier years are not readily available. Thus, in lieu of focusing on resident vessels, we focused on those boats that earned a plurality (i.e., the greatest proportion) of their annual ex-vessel revenues from landings at Crescent City (hereafter referred to as 'Crescent City vessels'). While there may be some coincidence between port of residence and the port accounting for plurality of revenue, one is not necessarily a good proxy for the other. We identified 32 one-, two-, three- and four-way fishery combinations common to these Crescent City vessels during three periods: 1981–1983, 1993–1995 and 2005–2007 (Figure 15, Table 15). In Figure 15, the numbers in each box indicate the average number of vessels per year that participated exclusively in that fishery in each period. For example, an annual average of 207 boats participated only in the salmon troll fishery during the first period (1981–1983), none participated only in this fishery during the second period (1993–1995), and an average of fewer than three participated during the most recent period (2005–2007). The numbers on the lines connecting two boxes indicate the average number of vessels that participated exclusively in the fisheries denoted by those two boxes. For example, the line connecting

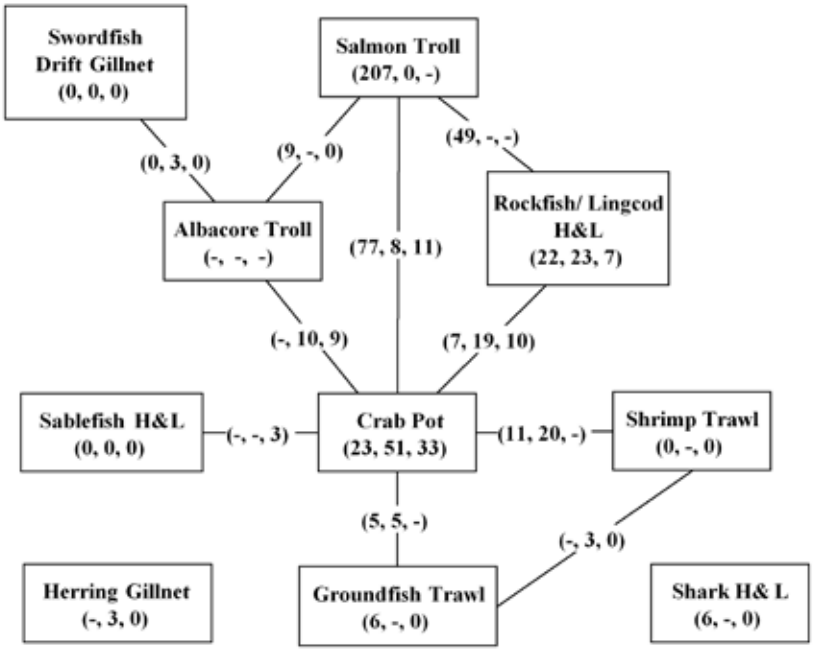

Figure 15. Major one- and two-way fishery combinations utilized by Crescent City boats based on three-year averages for 1981–1983, 1993–1995 and 2005–2007. Note: "-" indicates fishery combinations involving only one or two boats, and cannot be reported because of confidentiality rules.

Table 15. Major three- and four-way fishery combinations utilized by Crescent City boats in each of three periods. Note: "-" indicates fishery combinations involving only one or two boats, and cannot be reported because of confidentiality rules.

Fishery Combination	1981–1983 Average	1993–1995 Average	2005–2007 Average
Salmon Troll - Crab Pot - Albacore Troll	21	3	9
Salmon Troll - Crab Pot - Rockfish Hook-and-Line	30	4	0
Groundfish Trawl - Crab Pot - Salmon Troll	6	0	0
Groundfish Trawl - Crab Pot- Shrimp Trawl	5	12	-
Albacore Troll - Crab Pot - Shrimp Trawl	5	5	0
Albacore Troll - Crab Pot - Rockfish Hook-and-Line	3	9	-
Albacore Troll - Crab Pot - Groundfish Trawl	-	3	0
Albacore Troll - Shrimp Trawl - Rockfish Hook-and-line	-	3	-
Rockfish Hook-and-line - Sablefish Hook-and-Line - Crab Pot	0	4	-
Rockfish Hook-and-line - Crab Pot - Shrimp Pot	0	0	3
Swordfish Drift Gillnet - Shark Gillnet – Albacore Troll	0	3	0
Salmon Troll - Crab Pot - Albacore Troll - Rockfish Hook-and-Line	-	3	-

the salmon troll and crab pot boxes indicates that an annual average of 77 vessels participated in both the salmon and crab fisheries (only) during the period 1981–1983, 8 did for the period 1993–1995, and 11 did for the period 2005–2007.

Several fishery combinations pursued in the early 1980s no longer occur at all (or sufficiently to report). Among the most notable changes are the reductions in salmon troll-only, groundfish trawl-only, rockfish/lingcod hook-and-line/pot-only, salmon troll combination, and groundfish trawl combination vessels. The numbers of operations that fish for crab only or in combination with other fisheries have not necessarily increased in absolute terms, but have assumed greater prominence following declines in other fisheries. One new combination is that of crab pot together with rockfish/lingcod hook-and-line and shrimp pot, two smaller fisheries directed toward the live market. Study participants discussed several of these fishery combinations, often highlighting one of three fisheries as their main fishery and two others they depend (or depended) on to fill out their annual round. They also noted shifts within and across fisheries such as the following:

> *As the groundfish fishery became more regulated and trip limits onerous,… the fleet started to shift into other things such as crab… and shrimp came back, too, so you had a diverse mix then. Also the larger salmon vessels moved into groundfish and crab. So there was a lot of effort just 'sloshing around' among fisheries.*

Some Crescent City commercial fishery participants also move among ports to follow the fish, avoid dangerous weather and access fishery support businesses not available locally. For example, groundfish trawl fishermen reported traveling as far south as San Francisco and as far north as Washington. When targeting shrimp, trawlers also range widely, from Westport, Washington to Ft. Bragg – seeking harvest opportunities in areas and times that are not closed by regulation. Those who fish for albacore start the late summer season fishing far offshore of Newport, Oregon, where they deliver their catch, then follow the fish as they move south toward Crescent City in September and San Francisco by October or November. Most salmon fishermen

travel due to the much more limited fishery openings locally, working especially off San Francisco or Coos Bay, Oregon. During crab season, most fishermen stay in the area to fish, although some local fishermen participate in the southern crab season opener off San Francisco. Coonstripe shrimp and rockfish hook-and-line fishing are focused locally. Because the catch is perishable and the time and fuel costs associated with transiting by sea is considerable, those who travel to fish usually deliver to a port near the fishing grounds either to a buyer who operates at Crescent City or to a different buyer.

Revenue Per Boat

Trends in aggregate revenues do not necessarily correlate with how individual vessels may be faring in terms of revenue. To illustrate this point, we estimated average annual revenue per boat for Crescent City boats (defined as boats that earned a plurality of their ex-vessel revenues from landings at Crescent City). The number of Crescent City boats was 353–540 (average=475) between 1981 and 1984, declined to 102–301 (average=201) between 1985 and 2002, then declined further to 88–122 (average=110) thereafter. Over these same periods, revenue per boat increased from $32,100–$41,300 (average=$37,600) to $73,100–$121,200 (average=$88,500) to $77,400–$216,200 (average=$161,400); (Figure 16). The increase in average annual revenue per vessel between 1985 and 2002 can be traced to the marked reduction in the number of small-revenue salmon trollers in the early 1980s. The more recent revenue increase (since 2003) is largely due to unusually high crab landings during that period.

To better understand how vessel revenue is affected by an individual's participation in particular fisheries, we assigned each Crescent City boat to its 'principal fishery', that is, the fishery from which the boat derived the plurality of its annual revenue. For vessels associated with each principal fishery, we then estimated average annual revenue per boat (based on their landings in all fisheries at all West Coast ports). Estimates for three-year periods over the last three decades indicate a decline in the number of Crescent

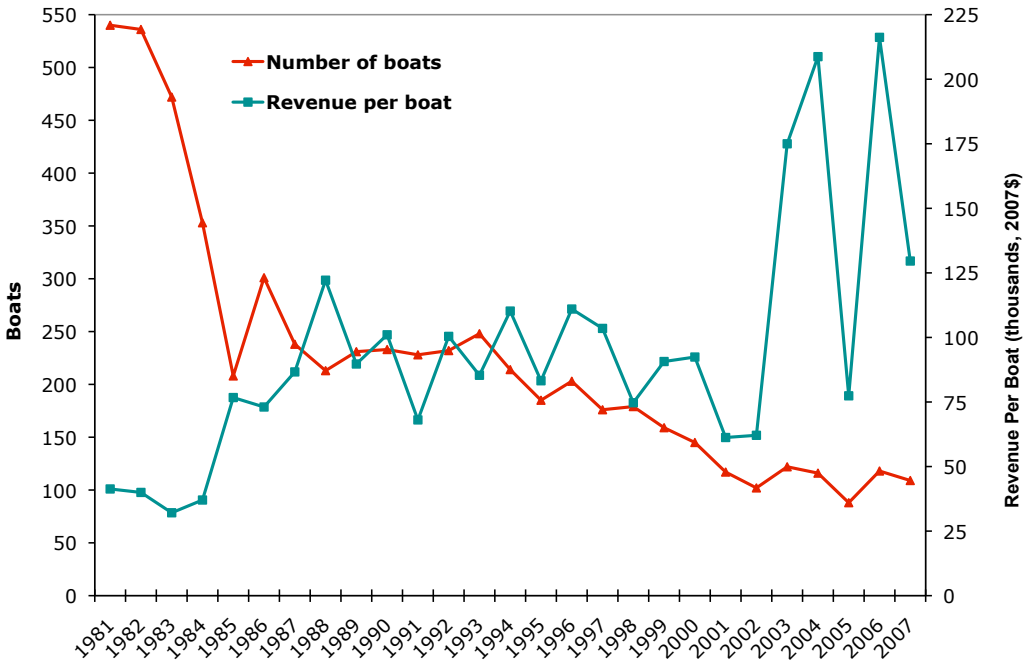

Figure 16. Number of boats that earned a plurality of their revenue from landings at Crescent City, and average annual (total West Coast) revenue per boat, 1981–2007.

City boats and an increase in revenue per boat (Table 16). This trend is evident in the crab, salmon, rockfish/lingcod, and groundfish trawl fisheries. Revenue per boat varies considerably among fisheries, and is higher for crabbers and groundfish trawlers than for salmon and rockfish boats, which tend to be smaller and have less capacity. Whether these patterns are indicative of future trends is uncertain, given the high degree of variability experienced in these fisheries and in other fisheries included in the revenue estimates. It is also unclear whether increases in revenue per boat have kept pace with increasing costs.[27]

Table 16. Average annual number of Crescent City boats and average annual revenue per boat (2007$), by major fishery and overall, 1981–1983, 1993–1995 and 2005–2007. Note: From 2005 through 2007, at least three unique boats participated in the groundfish trawl fishery, however fewer than three participated in the shrimp trawl fishery.

	Average Number of Boats			Average Annual Revenue Per Boat (All Ports, All Fisheries)		
Major Fishery	**1981–1983**	**1993–1995**	**2005–2007**	**1981–1983**	**1993–1995**	**2005–2007**
Crab pot	127	127	82	$ 71,258	$ 64,939	$147,229
Salmon troll	293	3	3	$ 6,845	$ 46,929	$ 54,193
Rockfish/lingcod hook-and-line	36	33	13	$ 4,057	$ 9,140	$ 32,818
Shrimp trawl	11	19	-	$270,946	$247,187	-
Groundfish trawl	16	12	2	$263,364	$285,841	$298,943
Albacore troll	7	3	3	$ 94,927	$ 64,242	$ 98,105
All Boats	516	216	105	$ 37,799	$ 92,930	$141,067

RECREATIONAL FISHERY ACTIVITY AT CRESCENT CITY HARBOR

Historically, Crescent City harbor supported extensive ocean recreational fisheries, with a particular focus on salmon. According to study participants, both coho and Chinook salmon fishing were significant from the 1960s into the early 1990s. According to a 1991 survey of ocean salmon sport fishermen in the KMZ, 86% (337 of 388 respondents) self-reported as seasonal visitors, 13% as local residents, and 1% as short-term tourists (Waldvogel 1992). Approximately 67% of respondents stayed at local RV parks, 13% stayed at local campgrounds, and 4% stayed at local motels. Most (68%) used the harbor's berthing facilities for their boats, while 17% used launch ramps to launch their boats daily. These study results suggest the presence of an active recreational fishery at the harbor with a high proportion of nonresident anglers contributing to local economic activity. Although port-specific data are limited, these use patterns clearly changed following the sharp reduction in recreational salmon fishing opportunities soon after the 1991 survey was completed.

Groundfish, especially rockfish and lingcod, is the other major species group targeted by marine anglers at Crescent City. Study participants reported that this fishery is secondary to salmon, but that it still affords an opportunity to get out on the water and fish. Many local anglers also participate in recreational fisheries for crab in the winter. Fewer fishermen participate in the recreational albacore fishery in the late summer and early fall, and then only if the resource is within about 10 miles of the coast. Although specific estimates of recreational groundfish effort are not readily available, regulations have undoubtedly contributed to a decline in groundfish catch and effort over the past decade.[28]

Recreational Fishing Effort

Recreational fishery information specific to Crescent City is limited. Port-specific estimates of effort and harvest estimates are available from CPFV logbooks but cannot be fully reported for Crescent City, due to confidentiality requirements. Salmon effort and harvest estimates for the area are available from CDFG's Ocean Salmon Project (OSP). Effort and harvest estimates (all species) are available from CDFG's California Recreational Fisheries Survey (CRFS), but only at the 'district' level.[29] Information about other aspects of local recreational fishing activity provided here is based on fieldwork conducted in 2007 and 2008.

According to the CRFS, an annual average of 143,000 angler trips[30] were made in the Redwood District (which comprises Del Norte and Humboldt counties, excluding Shelter Cove) during the period 2005–2007. About 31% of these trips were from private boats, 34% from manmade structures, 32% from beaches and banks, and 3% from charter boats. The dominance of private relative to charter boats at the district level is also characteristic of the Crescent City recreational fishery. According to the OSP, recreational salmon effort in the Crescent City area declined from 14,000–52,100 angler trips between 1981 and 1991 to 3,300–15,400 trips between 1992 and 2002. Effort declined further to 1,500–3,200

trips during the period 2003–2007. The average annual number of salmon trips in the recent term is 86% less in the private boat fishery and 84% less in the CPFV fishery compared to the long term (Table 17).

The dominance of private boat relative to charter boat activity indicated by the CRFS Redwood District estimates is also apparent from OSP. According to OSP, the proportion of recreational salmon effort in the Crescent City area coming from charter boats was 1%–5% during the period 1981–1994 and has declined to less than 1% most subsequent years.

Table 17. Long-term and recent annual average, percent difference, and highs and (nonzero) lows in the number of recreational ocean salmon trips at Crescent City, 1981–2007 (PFMC 1997, 2009).

Mode	Long-term average 1981–2007	Recent average 2003–2007	Percent difference	High year(s) (amount)	Low year(s) (amount)
Private boat	16,000	2,300	-86	1987 (50,600)	2006 (1,500)
CPFV	600	100	-84	1985 (1,600)	1992, 1995, 2000, 2004 (100)
All boat	16,400	2,300	-86	1987 (52,100)	2006 (1,500)

KEY FACTORS AFFECTING CRESCENT CITY FISHERIES

Crescent City's fisheries and fishing community have experienced considerable social and economic change over the past 30 years. Regulatory, market and environmental factors have influenced individuals and communities, sometimes gradually and at other times more abruptly, as with the devastating 1964 tsunami. These factors do not operate in isolation; rather, they often interact in complex ways. As one study participant summarized:

> *When I arrived [in 1964], there was no boat basin. The biggest boat was 52 feet. The biggest impact was with the boats from the East Coast in the 1970s. With the [Farm] Credit Act, fishing was viewed as farming. I saw it as an opportunity, but it wasn't. Single riggers (trawlers) ... were replaced by double riggers with two nets. They got more sophisticated and more educated [and] depleted the resource. You didn't need more than a license to get in. It was great back then. Then they needed to move toward a permit.*

Community members highlighted several factors that have shaped local fisheries, infrastructure and the community as a whole (Table 18). Some of these factors originated locally, while others are regional, national or even international in nature. Moreover, these forces do not operate in isolation. Rather, they interact in complex and cumulative ways, posing both challenges and opportunities to the viability and resilience of the community. The discussion that follows focuses on those factors highlighted by study participants as having most influenced local fisheries, infrastructure, and the community as a whole.

A Watershed Event, Expansion and Contraction

The 1964 tsunami fundamentally changed the course of history for Crescent City and its fishing community. The devastation evoked national sympathy and catalyzed the community, paving the way for it to obtain federal funding to build a more extensive harbor. In a relatively short time, Crescent City's fishery-support infrastructure was significantly improved, and provided one among many incentives at that time for local fishery expansion. According to one study participant:

> *Before the boat basin, fishing boats had to anchor out (in the outer harbor), and fishermen rowed out to them every morning to go fishing or work on the boat. With the new boat basin, their life became a lot more convenient; the fish plants gave them a better place to sell their catch; and the haul-out facility made it easier to repair (or build) their boats. All of this made it easier and more lucrative to be a fisherman in Crescent City, and contributed to an atmosphere where investing in a fishing boat was 'the thing to do'. Even some local loggers and real estate brokers were buying boats in the late 1970s. I don't know of any other port on the West Coast where so much public investment in commercial fishing occurred in such a short time.*

The 1970s into the late 1980s were 'boom years' for Crescent City, as they were for many other fishing communities along the West Coast. Expanding markets and incentive programs such as the Capital Construction Fund and Fishing Vessel Obligation Guarantee Program fueled the expansion not only of

Table 18. Key factors and their effects as identified by Crescent City fishing community members and augmented by other sources.

Factor/Event	Effect on Fisheries and Community
Environmental	
1964 Tsunami	Massive destruction and loss of 11 lives Fishery activity temporarily suspended Community action to obtain funding for rebuilding Vastly improved fishing infrastructure
1982–1983 El Niño	Decreased abundance of shrimp Effort shifts to groundfish and crab
2006 Tsunami	Substantial damage to aging slips and other infrastructure Acquisition of external funding to rebuild
Regulatory	
1976 MSA and incentive programs	Increased fishing and receiving capacity Increased catch of many species Expanded and enhanced harbor infrastructure Increased social and economic activity Enhanced sense of opportunity and well-being
Limited entry programs Salmon (1982) Groundfish (1994) Shrimp trawl (1994) Whiting trawl (1994) Crab (1995) Nearshore (2002)	Pre-implementation spikes in participation Decreased participation in some fisheries (e.g., salmon) Effort shifts among fisheries For those qualifying: transferable asset, increased security For those not qualifying: loss of flexibility, real and/or and perceived economic loss
Salmon management (Commercial: 1982–present, Ocean recreational: 1991–present) KMZ and statewide limits/closures Coho limits/prohibitions Reallocation among sectors	Effort shift to other areas and/or fisheries Exit from fishery Decreased fishing and offloading Reduced use of fishery-support businesses Reduced revenue and employment Economic and psychological stress Loss of community Change of identity
Groundfish management Quotas, cumulative trip limits (1994–present) Groundfish disaster (2000) Federal trawl buyback (2003) Rockfish conservation areas (2002–present)	Decreased fishing and offloading Effort shifts among species groups, areas and fisheries (esp. crab) Reduced receiving and local processing Reduced use of fishery-support businesses Reduced revenue and employment Increased costs to harbor (abandoned vessels) Change of identity
Shrimp trawl management Bycatch reduction devices (2002) Closure of northern state trawl grounds (2008)	Increased catch efficiency/reduced waste Effort shifts among species groups, areas and fisheries
Marine Life Protection Act process (late 2009–present)	Concern and mistrust Increased uncertainty about access to resource Reluctance to invest in fishing, receiving and other support businesses
Economic	
Increased costs Insurance/Workman's Comp Fuel prices (summer 2008)	Reduced use of goods and services Increased uncertainty Decreased quality of life Concerns about viability, future
Market Challenges Market shifts Stagnant/declining prices	Effort shifts Increased uncertainty
Macroeconomic conditions Recent downturn	Reduced use of goods and services Reduced revenue and employment

fishing, receiving and processing capacity, but also the businesses that supported them. However, this era of expansion gave way to contraction as growing concerns over the health of many commercially and recreationally important species prompted increasingly stringent regulation in several fisheries.

Changing Fisheries, Changing Community

The ocean salmon fishery was the first of many to be restricted amid growing concern about the health of fish stocks, in this case Klamath River fall Chinook. With the implementation of limited entry for the troll fishery, reductions in season length especially in the KMZ, the increased harvest allocation to the Tribes (Pierce 1998), and recent statewide closures of the fishery, commercial salmon fishing at Crescent City has gone from a central feature of the port to almost nonexistent today.

The situation in the recreational fishery is similar. As of the late 1970s when harbor enhancements were completed, recreational salmon fishing involved some 500 boats in seasonal slips and as many as 100 more on moorings in the harbor's outer basin. The recreational fleet included out-of-towners as well as locals. Retirees, school teachers and others would trailer their salmon boats to the harbor and stay for weeks or the entire summer to fish. Some even bought commercial licenses to be able to land more fish and offset their expenses. Many stayed at local RV parks at the harbor or elsewhere in town. A distinctive culture associated with this fishery grew over time, as participants returned year after year and built strong social networks in the community.

After the implementation of limited entry in 1982, which made commercial fishing untenable for many part time fishermen, activity dropped. Subsequent sharp reductions in the length of the KMZ commercial salmon season led to economic and social losses (PFMC 1985). Some fishing community members remarked that for Crescent City the salmon disaster occurred not in 2006 or 2008 as noted in statewide news, but rather in 1985 when the KMZ was first closed for the season.

In response to the changes of the early 1980s, those who remained in the fishery shifted their effort south or north of the KMZ, where the salmon fishing season remained open considerably longer. Others shifted their effort to other fisheries such as groundfish, shrimp or crab. Many others left fishing altogether. This loss of fishing activity led to reduced demand for goods and services and reduced revenues for fishery-support businesses including gear supply stores, fuel and ice providers, RV parks and motels that housed visiting fishermen and their families, and others. In addition, it signaled a change in community relationships and identity that had been largely shaped by the bustling summer salmon season.

A major change occurred in the recreational fishery in 1992, when the season in the California KMZ was cut from more than four months to 14 days. According to study participants, the 14-day season was a disaster for fishery participants and the community. At that time, an estimated 400–600 sport fishing boats participated in the local summer salmon fishery, many of them coming from out of town and staying for a month or more to fish daily. According to one participant who then ran a local fishery-support business (which soon closed for lack of business), the number of summer recreational fishery participants dropped by about 50% in response to the closure. From 1993 to 2007, the season ranged from 1.5 to 4 months, a notable improvement over 1992 but much shorter than the 4- to 9-month seasons that prevailed prior to 1992.

While Crescent City is subject to similar regulations as other KMZ ports such as

Eureka and Trinidad, the decline in its salmon fishery has been disproportionate relative to the KMZ as a whole. For instance, during the period 1981–1983, Crescent City accounted for an average of 34% of total salmon effort (angler days) and 30% of salmon landed in the KMZ commercial fishery; by 2005–2007 its contribution to total effort and landings dropped to 7% and 11% respectively (PFMC 1997, 2009). Crescent City's contribution to effort and landings in the KMZ recreational fishery fell from 20% and 19% respectively during the period 1981–1983 to 7% and 5%, respectively, by the period 2005–2007.

As the fishing community was acclimating to new rules in the ocean salmon fishery, other events induced further change in the system. The 1982–1983 El Niño had a dramatic effect on many California fisheries including salmon, groundfish and shrimp (CDFG 1984, 1985). Many Crescent City fishery participants observed major ecosystem shifts such as changes in the distribution of certain rockfishes, decreases in the size of salmon, and the scarcity of pink shrimp after several strong years (Pearcy and Schoener 1987, Woodbury 1999). In response to these ecological changes, fishermen shifted their effort to other more readily available species. Many shrimp fishermen modified their trawlers and began to target groundfish and/or shifted to crabbing. As one participant noted:

> *Virtually the entire West Coast shrimp fleet shifted in to the groundfish trawl fishery. Before 1982–83, there was a shrimp fleet and a groundfish fleet… when shrimp nearly disappeared due to the El Niño, the two fleets became indistinguishable.*

Contractions in commercial fishing activity, particularly with respect to the high-volume groundfish and shrimp fisheries, have impacted local receiving and processing infrastructure as well as the harvesting sector. For example, Castle Rock Seafood, a local processor since the mid 1970s that was bought out by a fishermen's cooperative beginning in 1995, ceased operations in 1997. Consolidated Factors/Sea Products closed in 2000, and in 2001 one of the largest processors on the West Coast, Eureka Fisheries, ceased operations.[31] Although these business closures cannot be directly linked to reductions in fishing activity, it stands to reason that reduced poundage going across the docks and into these facilities (paying for machinery, receiving and processing labor, wastewater treatment, and product distribution) had a substantial negative impact on the viability of those businesses.

Economic Factors and Impacts

For commercial and charter fishing operations, costs include fixed items such as vessels, gear and equipment (for navigation, safety and maintaining the quality of the catch), slip fees, permit fees, insurance and general vessel maintenance. They also include variable (operating) costs such as fuel, ice and other provisions, as well as crew. For recreational fishery participants, fixed costs include most of these items (except, for example, crew), although they tend to be considerably lower. Fish buyers and processors, support businesses and the harbor likewise have fixed and variable costs including facilities, equipment, labor (and associated costs such as workers' compensation insurance), supplies, and maintenance, repair and services needed to keep their operations functioning safely and effectively.

Commercial Fisheries

Commercial fishery participants and support business operators cited rising operating costs, especially those for gear, vessel maintenance, insurance and fuel, as among the biggest challenges they are facing. One trawl fishery participant reported (in May 2008), "We're on really tight margins, especially fuel. It used to

be about 7% of gross, now it's 26%...but the fish price is just the same." Another participant commented, "Fuel has gone from $0.85 a gallon to $4.05 a gallon, and the price of fish is not keeping up. The high fuel cost means you really can't scratch [go looking for fish]. The cost used to be time; now you go into the red. You don't take the risks." According to the Pacific States Marine Fisheries Commission's (PSMFC) annual West Coast Marine Fuel Price Survey, average pretax fuel prices at Northern California ports increased more than three-fold from $1.00 per gallon in December 1999 to $3.19 in December 2007, and about 21% between January and December 2007 (PSMFC 2000, 2008).

At the same time, many commercial fishermen commented on stagnant or declining prices in several fisheries. Our analysis comparing average annual prices for the recent term and the long term suggests this is indeed the case for the shrimp trawl (-33%), albacore (-21%), whiting (-13%), crab (-11%) and shrimp pot (-7%) fisheries. In the shrimp and whiting trawl fisheries, market competition was cited as a cause of the decline. Study participants cited, for example, competition with Canadian shrimp beginning in the early 1990s. The drop in crab prices may be attributed to the substantial growth in crab production with the majority of landings still being purchased for the lower price cooked (rather than live) crab market.

At the same time, prices have increased for some fisheries, including rockfish hook-and-line (+82%), salmon (+13%), and groundfish trawl (+5%).[32] The price increase for rockfish is likely due to the growth in markets and distribution channels for live product in the San Francisco Bay area. Salmon troll prices have increased in years following a long period of decline, which has been attributed to the growing supply and popularity of farmed salmon in both domestic and international markets (Sylvia et al. 1998). Recent price increases may be attributed to the development of localized niche markets for wild (versus farmed) salmon.

Fish buyers and processors raised similar concerns about rising costs, including those for utilities (power and sewer) and labor-related costs (such as workers' compensation insurance), especially compared to nearby Oregon ports where state and local laws differ. Several discussed the problems posed by the harbor's wastewater treatment plant, noting the ongoing issues with its operation and high costs, and its effects on harbor operations and opportunities for seafood processing at Crescent City.

Increasing costs and less favorable economic conditions also have affected fishery-support businesses, both directly and indirectly. The reduction in fishing opportunities and activity has resulted in reduced demand for goods and services that these businesses provide. A key fishery-support business, Englund Marine, has experienced reduced demand for salmon and groundfish gear and increased demand for crab gear, as well as a general shift toward more recreational (salt and freshwater) business:

> *We used to sell primarily commercial salmon troll gear. We used to have a big bait freezer, but no longer. In the early 1990s, we started selling more sport gear….In earlier days it was probably 60/40 commercial to recreational (inventory). Now it's more like 70% recreational inventory. We've completely restructured the store in the last year to adapt to the changes.*

As local fisheries expanded in the 1980s, a shaved ice plant was built on Citizens Dock to supplement local block ice production to meet the growing demand from shrimp and groundfish trawlers. Both plants operated

from 1987 until 1994, when the block ice plant closed. Since then, only the Citizens Dock plant, operated by Pacific Choice Seafood since 2003, has provided ice for sale to the public. However, the groundfish trawl buyback has affected the ice plant, which has reduced its staff and operations following a sharp reduction in demand: "The ice house was a two-person job. I'd work 10 pm to sunrise, and the other guy would take over. Now it's open 8 to 6 and there are hardly any customers.…We're lucky to sell 50 tons in a month." The remaining trawlers and other fishery participants need ice for their fishing operations, and are concerned about the plant's long-term viability.

Shifting demand and markets for seafood also have influenced Crescent City fisheries, especially those for pink shrimp, live fish, coonstripe shrimp, and crab. Technological changes in the 1960s and 1970s afforded economies of scale in the pink shrimp fishery, increased production and expanded access to markets. After recovering from the 1982–1983 El Niño, the fishery grew again until the early 1990s when prices dropped due to competition from Canadian shrimp. In response, Crescent City fishermen report that they shifted effort to the groundfish and crab fisheries. According to one participant:

> *Dragging picked up in the late 1990s because the shrimp market went down. In years where shrimp were abundant and the price was good, draggers would shrimp. When the shrimp market went down, they switched over to dragging. You could lease a trawl permit if you didn't have one.*

Even as the price for pink shrimp declined, demand for live seafood – including rockfish and other groundfish species, coonstripe shrimp and crab – grew. Some study participants suggested that the arrival of Vietnamese refugees in the late 1970s and 1980s, followed by more general growth in the San Francisco Bay area Asian population, was a driving force behind the emergence of the live rockfish fishery. The live fish fishery, which had begun in Southern California in the late 1980s, had spread north and into the Crescent City area by 1999. Hook-and-line fishermen who had been supplying the local and regional filet fish market found they could earn several times more per pound for live rockfish. In the early years of the live fish fishery at Crescent City, Bay area buyers would travel to Crescent City to buy the fish off the boats. A small group of Crescent City fishermen worked together through a cooperative to market their catch, although the group disbanded after about a year. At present, two resident buyers handle some of the catch, and a few local fishermen transport their catch to Bay area wholesalers, restaurants and markets. Although the coonstripe shrimp fishery involves a different group of local fishermen, that group similarly took advantage of the growing Bay area demand for live seafood.

The market for live crab has grown as well. Historically, the fishery was directed primarily toward the production of whole and sectioned cooked crab for institutional food service and other similar high volume uses. In the early 2000s, however, the demand for fresh, live crab increased. Although the majority of crab landed at Crescent City still is processed, study participants report that the live market has put some upward pressure on ex-vessel prices and accommodated production after the first month of the season, when 80% of the northern California catch is typically landed (Leet et al. 2001). (The ex-vessel price for live crab is about twice that for processed crab; although demand is smaller, it lasts well into the season.)

Finally, the local demand for seafood at Crescent City has influenced and been affected by local fisheries. Some locally caught seafood has been sold via off-the-boat and other direct sales by fishermen, a local vendor (Lucy's Seafood) during crab season and, through the 1990s until it closed, by Eureka Fisheries at the harbor. However, local demand for fresh commercially caught seafood has been limited because of Crescent City's small population, isolation from larger urban centers (and "limited foot traffic," as one participant noted), and the tendency of many residents to catch their own seafood.

Recreational Fisheries

Recreational fishery participants highlighted the general economic downturn for its dampening effect on Crescent City's recreational fisheries over the past several years. They also cited rapidly rising fuel prices at the time of the study, noting that they and other recreational fishermen were "carpooling," with two or more anglers fishing from one boat to share fuel costs. In addition, Crescent City Harbor increasingly competes with the port of Brookings, Oregon, where fewer restrictions, lower fuel prices and the absence of sales tax reportedly have attracted some anglers who used to fish out of Crescent City.

Among fishery-support businesses oriented toward recreational fisheries, several have faced challenges as fishing opportunities have changed. One former business owner discussed the impacts of the Klamath-driven recreational salmon fishery cutbacks of the early 1990s. In the late 1980s, the recreational ocean fishery was very active. Local recreational fishery support businesses were thriving, with record gear sales and other activity: "The launch ramp between Fashion Blacksmith and the harbor was backed up. Folks came from Redding, Anderson, Cotton, Fresno...They'd spend the winter in Yuma and the summer in Crescent City." When the fishery was sharply curtailed in 1991, however, "Recreational fishermen left in droves. The harbor had a plan to build 500 more slips…It was a blow to the entire community." Over the next few years, as recreational fishing activity at the harbor continued to decline, many local fishery-support businesses closed or shifted their focus to be less dependent on recreational fishing activity. However, in recent years some businesses have begun to carry more recreational gear to make up for a decline in commercial activity.

The recent economic downturn coupled with declining local fishing opportunities is evident as well. For example, one of the local RV parks has experienced a shift from primarily seasonal (summer) recreational fishing enthusiasts to year-round nonfishing residents. According to the owner:

> *Fishing was great up until the late 1980s. We were full with recreational fishing folks. It's really the last three to four years that we began taking in other users. The regulars [who came for the fishing season] would fight over spaces….The fishermen are running late this year [2008, with the statewide salmon closure]. Usually, they're here by mid May. I've received 30 reservations for the summer; not many of them are fishermen.*

The Harbor District

As fishing activity has declined over the last 30 years, so has the harbor's revenue base. Revenue sources include income from slip rentals and related services, fees for offloading commercially-caught fish and ice and fuel sales, and rent from other concessions (RRM Design Group 2006). In addition, the harbor district receives County property taxes (although these have been appropriated in part by the state in recent years) and various loans and grants from federal and state government agencies. At the same time, operating costs have become significant, particularly with respect to dredging the harbor channels and removing tailings, and maintaining and operating the wastewater treatment plant, which is required for fish processing. In addition, according to Harbormaster Richard Young, historically the harbor district made little or no provision for basic maintenance and repair of the docks or their replacement. As a result, these costs have grown. Harbor facilities also need to be brought up to code to meet Americans with Disabilities Act and other requirements, which add to their cost (RRM Design Group 2006, Madar 2009a).

Dredging

As with most California harbors, access into and out of Crescent City Harbor depends on maintenance dredging of its navigable channels and boat basins. The biggest obstacle to dredging the harbor has been adequate funding, for both the removal of dredged materials (spoils or tailings) and their disposal. The estimated cost to dredge the federal channel and the inner boat basin is $2–$3 million. Like most other harbors in California, Crescent City Harbor depends on Congressional appropriations to allocate funds to the Army Corps of Engineers for the work.

Over the past decade, the harbor has been dredged irregularly, once in 2000 and again in 2009 after conditions became critical. Portions of the federal navigation channel had depths as shallow as two feet, where they are supposed to be at least 15 feet deep (Madar 2009b). As a result, most vessels had to wait for high tide to enter or leave the harbor, creating safety issues as well as economic costs.

A second obstacle has been securing a site for the disposal of dredged materials. For many years, Crescent City Harbor had access to an offshore disposal site. Following the closure of that site, the tailings were dried at its 5.3-acre dewatering site, then transported to the Del Norte County landfill. With the dewatering ponds full and the landfill closed to new materials, finding a cost-effective disposal site has posed a significant challenge. Recently, however, about three acres of Del Norte Solid Waste Management Authority excavation areas have been suggested as a possible dredge materials disposal site (Madar 2009c).

The November 2006 tsunami exacerbated shoaling and damaged the inner boat basin, especially G- and H-docks, where 35 slips were lost (Ma 2008). Although the initial assessment estimated repair costs at about $5 million, subsequent investigations have estimated that as much as $25.4 million may be needed to repair the tsunami damage and bring the inner boat basin up to code (Ma 2008). State and federal funds may be available for up to 75% of the cost, with local (harbor, city and/or county) funds required for the remainder. In June 2009, the harbor received a $5 million Community Development Block Grant for the match (Madar 2009a).[33]

Wastewater Treatment Plant

In 1992, Crescent City was awarded a federal grant to build a wastewater treatment plant, with the goal of accommodating up to five processing plants or 800,000 gallons of water per day. When the plant went online in 1993, three fish processing plants used it to pretreat waste from their operations, especially those for shrimp and groundfish. Due to a design

flaw, the plant produced strong odors that resulted in complaints from nearby business owners and residents. Eventually the problem was fixed. However, the cost of operating the plant became so great that in 1997, the City Council threatened to shut it down until a financial solution could be found. In 1998, the harbor district took possession of the plant, and resumed operations. By 2001, however, all three processors had gone out of business, due in part to high operating costs, including those associated with the wastewater treatment plant. Currently the one resident processor uses the wastewater treatment plant only during the height of the crab season (two to three months in the winter) and whiting season (two weeks in late spring). Operating costs continue to be extremely high, totaling an estimated $110,000 per year (RRM Design Group 2006, Durkee 2008). These high costs and other issues associated with the plant have limited seafood processing and, according to some study participants, deterred other processors from establishing operations in the area.

Taken together, these factors have put a substantial financial strain on the harbor, particularly since its revenue has declined in recent years. The harbor district operated under a deficit beginning in fiscal year (FY) 1995–1996 (RRM Design Group 2006). The district relied on property taxes to cover this deficit, however these funds were insufficient, and the harbor district had significant debt until FY 2006–2007, when it showed a net profit of about $230,000 (Crescent City Harbor District 2008). In 2008, the harbor district imposed additional fees on fish processors, raised mooring rates, and increased service charges and rents to reflect actual costs and match market rates (Young 2008). For FY 2008–2009, harbor staff projected a deficit of $60,000, and expected cash reserves to cover the shortfall (Crescent City Harbor District 2008).

CURRENT SITUATION AND OUTLOOK

Crescent City Harbor's fishing community faces critical challenges as it continues to adjust to regulatory, economic and environmental change. Once highly engaged in a diversity of commercial and recreational fisheries, the fishing community has become particularly dependent on the commercial crab fishery, which is vulnerable to fluctuations in resource availability and, to a lesser extent, markets. Salmon troll and groundfish and shrimp trawl activity at the port have been sharply curtailed. Recreational fisheries, once highly dependent on salmon, now engage perhaps a tenth the number of anglers they did in the 1980s. Other sport fisheries for crab and groundfish continue, but have not filled the void left by salmon.

The reduction in fishing opportunities and activity have, in turn, reduced shoreside activity and associated revenues, which have been felt by fishery support businesses and the harbor itself. Moreover, because activity at the port is now highly concentrated during the winter crab season rather than spread throughout the year, many businesses, from fish buyers and processors to marine supply stores, have had trouble maintaining a consistent labor force and income flow. These same circumstances make it difficult for fishing operations to retain crew and maintain their vessels. Several businesses have closed or reduced services and/or inventory, while others have adapted by diversifying their operations. With limited alternative sources of revenue, harbor infrastructure including docks and other shoreside facilities, once considered state-of-the-art, have deteriorated.

Current issues for the fishing community include the implementation of marine protected areas (MPAs) through the state's ongoing MLPA process (in which several community members are actively engaged), and an individual quota program (IQ) for the federal groundfish trawl fishery. Both of these have the potential to fundamentally change local fisheries and the community. Study participants expressed concerns about the MLPA process and its potential outcomes, especially reduced access to marine resources and increased safety risks. They noted that expectations about future MPAs have already created substantial unease in the community, and have affected choices related to investment in new boats, shoreside facilities and equipment. In addition, considerable uncertainty exists regarding the trawl IQ program, which is "intended to increase economic efficiency within the fishery and reduce the incidental catch of overfished groundfish species" (PFMC and NMFS 2010). However, some fishery participants are concerned that limited initial quota allocations for nontarget species will substantially reduce their fishing activity, with negative economic impacts on their operations and the community.

Taken together, these circumstances may undermine the viability and well-being of the Crescent City fishing community and the harbor. The situation is exacerbated by its isolation from larger population centers, and limited alternatives for local employment and community livelihood.

At the same time, the Crescent City community has a well-established history of adapting to change that may enable it to meet challenges in a constructive way. Community members have long worked together to support the harbor and its fisheries, as occurred with the building of Citizens Dock and its reconstruction following the 1964 tsunami. Recently, funds have been secured to begin much-needed dredging of the harbor's main navigation channel, and additional funds to support reconstruction of the inner basin and other improvements are pending. These efforts together with the port's location near rich fishing grounds, its safe and easy access, and the availability of key services (e.g., fuel, ice, haul-out, refuge) create the potential for Crescent City to regain its resilience and vitality as a fishing port.

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ENDNOTES

[1] http://www.crescentcity.org, accessed 6/1/09.

[2] Shore-based ocean, inland and river fisheries, clam digging and other collecting activities - both tribal and nontribal - are also integral to the community and the region, but are beyond the scope of this report.

[3] See Appendix C for methodological detail.

[4] Data sources include the Pacific Fisheries Information Network (PacFIN) database, the California Recreational Fisheries Survey (CRFS) and Commercial Passenger Fishing Vessel (CPFV) logbooks.

[5] The Battery Point Lighthouse was deactivated in 1965 and re-activated in 1982; the St. George Reef Lighthouse was deactivated in 1975, and reactivated in 2002 (National Park Service 2009a, b).

[6] According to Trice (1960), the fish companies at that time included California Shellfish Company, Paladini Fish Company, Tom Lazio Fish Company, and West Coast Crab Company. Hallmark Fisheries and Meredith Seafood also operated at Crescent City around that time.

[7] See Appendix B for a glossary with definitions of this and other key terms used throughout this report.

[8] http://www.dbw.ca.gov/PDF/Legis_Districts/Senate/SenDist04.pdf, accessed 6/11/10.

[9] There was a fine line between the recreational and commercial fleets at this time, as many summer salmon anglers would purchase a commercial license to enable them to catch more fish and/or sell some of their catch to offset expenses.

[10] The tribal allocation was upheld in Parravano v. Babbitt, 70 F.3d 539 (9th Cir. 1995), cert. denied, 518 US. 1016 (1996).

[11] The 'spawner escapement floor' is the minimum number of fish that are required to arrive at a natal stream or river to spawn, as identified in a management process.

[12] See Ralston (2002) for a discussion of the biology of West Coast groundfish and how growing understanding of that biology affected PFMC management.

[13] Pacific ocean perch, bocaccio and lingcod were declared overfished in 1999, canary rockfish and cowcod in 2000, darkblotched and widow rockfish in 2001, and yelloweye rockfish in 2002. Lingcod was declared rebuilt in 2005.

[14] Vessel monitoring systems are electronic transmitters placed on fishing vessels that transmit information about a vessel's position to enforcement agencies via satellite to determine, for example, whether a vessel is in a closed area (http://www.pcouncil.org/groundfish/gfvms.html, accessed 12/7/09).

[15] http://www.dfg.ca.gov/licensing/pdffiles/cf_items_10yr.pdf, 4/30/10, accessed 6/4/10; http://www.dfg.ca.gov/licensing/commfishbus/nearshoreprovisions.html, accessed 6/4/10.

[16] Although the trawl fishery for whiting is managed under the Groundfish FMP, it is a distinct fishery in many respects, and is discussed separately.

[17] See Leet et al. 2001 and Starr et al. 2002 for descriptions of these fisheries and gear types.

[18] A second charter, *Golden Bear* Fishing Charters, also operates out of Crescent City; however, information was not available during fieldwork for this project.

[19] The 1981 start date for this analysis is based on the availability the Pacific States Marine Fisheries Commission's (PSMFC) PacFIN database, which integrates Washington, Oregon and California commercial fishery landings data to provide a consistent coast-wide electronic record of landings from 1981 forward. The PacFIN data for California are based on the C-MASTER data provided by CDFG to the PSMFC.

[20] Throughout we abbreviate the names of these fisheries as follows: albacore for albacore troll, coonstripe shrimp for coonstripe shrimp pot, crab for crab pot, groundfish trawl for nonwhiting groundfish trawl, rockfish for rockfish/lingcod hook-and-line/pot, sablefish for sablefish hook-and-line/pot, salmon for salmon troll, and whiting for whiting trawl.

[21] Because multiple species may be caught during a fishing trip, trips are measured by assigning each delivery to the fishery accounting for the greatest (i.e., plurality of) ex-vessel value associated with that delivery. In some cases, fishing for particular combinations of species and/or using multiple gear types on a single trip is prohibited.

[22] Note that crab season straddles the calendar year (December through July), and most landings occur within the first one to two months of the season (Hankin et al. 2001). As a result, activity reported for a given year may not correspond to that of a season, *per se*. We analyzed the data by calendar year for consistency with analyses for other fisheries, most of which have seasons that lie within the calendar year.

[23] In 2005, to prevent a recurrence of this situation, the state of Oregon prohibited fishermen from delivering fish caught off the Oregon coast to buyers in California without an Oregon receiver's license.

[24] Because groundfish are taken as bycatch in the fishery, the shrimp trawl fishery is subject to federal groundfish regulations as well (Frimodig et al. 2009).

[25] Because the fishery did not begin until 1992, the averages reported are only for the 17-year period (1992-2007).

[26] The U.S. whiting fishery mostly occurs off Oregon and Washington and is conducted by fishermen in the shore-based, mothership, tribal, and catcher-processor sectors (Helser et al. 2008).

[27] This is an area for further economic research. Many fishery participants alluded to much higher operating costs; however, we were unable to collect detailed expenditure data to demonstrate this.

[28] Port-specific catch and effort estimates for the albacore and crab fisheries are not available.

[29] Initiated by the state in 2004, the CRFS provides comprehensive estimates of effort and catch for all recreational fishing modes and species. (Modes are the locations/facilities anglers fish from, and include: "manmade" structures, beaches and banks, CPFVs or charter boats, and private boats.)

[30] An 'angler trip' is defined as one angler spending part or all of one or more days fishing before returning to the location where the trip began. An 'angler day' is defined as one person's fishing on a given day. For example, two anglers each fishing for three days counts as six angler days.

[31] Pacific Choice Seafood, based in Portland Oregon, currently leases the former Eureka Fisheries facilities in Crescent City.

[32] Differential prices among groundfish (including rockfish) species can mask changes in the make-up and profitability of the fishery.

[33] As part of the grant application process, in early 2009, the harbor collected information from commercial fishermen and support businesses to demonstrate that at least 144 jobs are dependent on the inner boat basin (Madar 2009a).