Canada (Pacific)

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INTRODUCTION

Canada borders three oceans and has the world's largest coastline. Approximately seven million Canadians live in coastal communities, where many depend on the coast and the sea to make a living. In 2003 just over 1 million tonnes of fish, with a landed value of approximately $1.53 billion (US$ 2002), were landed in Canada's commercial marine capture fisheries.[1] The Atlantic region accounts for the vast majority of the volume and value of Canada's marine capture fisheries. For example, in 2003, Canada's Pacific marine capture fisheries generated just under 223 000 tonnes of landings and $253.1 million (US$ 2002) in landed value.

The following discussion looks at the management of the marine capture fisheries on Canada's Pacific coast.[2] Canada's Pacific marine capture fisheries can be divided into three main categories, or sectors; commercial fisheries, Aboriginal fisheries for food social and ceremonial purposes, and recreational fisheries.[3]

POLICY FRAMEWORK

In Canada, fisheries management policy objectives are not set forth in legislation; however, many fisheries management policies are outlined in policy documents released by the federal government.[4] For example, on the Pacific coast, the federal government recently released Canada's Policy for Conservation of Wild Pacific Salmon that "…stipulates an overall policy goal for wild salmon, identifies basic principles to guide resource management decision making, and sets out objectives and strategies to achieve the goal" (DFO, 2005a).

At the same time, Canada has a number of initiatives underway to reform and modernize fisheries management. These initiatives emphasize conservation and sustainable use of the fisheries resources, shared stewardship or co-management, increased monitoring and compliance and self-reliant, economically viable fisheries. For the Pacific marine capture fisheries, Canada recently announced a blueprint for reform, with a particular emphasis on the salmon fisheries.[5] The blueprint contains four main themes:

- Sustaining strong salmon populations by setting clear conservation objectives for each fishery based on defined policy principles;

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[1] Fisheries and Oceans Canada National Web Page (www.dfo-mpo.gc.ca) - Statistical Service

[2] For the purposes of this discussion "national" refers to the entire nation of Canada, "regional" refers to the Pacific Region (encompassing British Columbia & the Yukon), as defined by the federal government's Department of Fisheries and Oceans. It is this level that is the main focus of the discussion; however, much of the legislation and policy applies at the national level. "Local" refers to a defined area(s) within the regional level described above.

[3] The Fisheries and Oceans Canada National Web Page (www.dfo-mpo.gc.ca) and the Fisheries and Oceans Canada – Pacific Region Web Page (www.pac.dfo-mpo.gc.ca) are both excellent sites for information on Canada's marine capture fisheries.

[4] Policy documents for Canada's Pacific marine capture fisheries can be found on the Fisheries and Oceans Canada – Pacific Region web site (www.pac.dfo-mpo.gc.ca).

[5] Fisheries and Oceans Canada News Release, April 14, 2005 (www.pac.dfo-mpo.gc.ca).

- Strengthening fisheries management programs that are critical to salmon conservation, such as habitat protection, enforcement and the scientific assessment of stocks;
- Making progress over time on increasing Aboriginal access to economic fisheries; and,
- Improving the economic performance of fisheries so that they reach their full potential, provide certainty to participants, and optimize harvest opportunities.

These themes are consistent with past messages from the federal government on fisheries management reform. However, in its announcement of the blueprint for reform, the federal government clearly advised that the status quo is unsatisfactory and it would consult stakeholders on the blueprint and how to implement it.

Specific objectives for a particular species group or individual fishery, or to address a specific issue or initiative, are generally listed in annual fisheries management plans (FMPs)[6] published prior to the start of each fishing season.[7] These objectives tend to focus on conservation, management, and enforcement initiatives but may also include factors such as international commitments, domestic allocations, enhancement, and stakeholder or sector goals.

One of the more significant "policy" changes over the past fifteen years has been the move to cost sharing arrangements whereby government and stakeholders share the costs associated with managing a particular fishery. Government funding for fisheries management on Canada's Pacific coast appears to have been held constant; however, the costs of fisheries management have increased. Fisheries managers have pursued other sources of funding (e.g. partnerships with other agencies or universities, cost sharing) to address this issue. Cost sharing was introduced on the premise that those citizens who benefit directly from a government service or activity bear a greater responsibility for funding that service or activity than other Canadians.

Cost sharing arrangements on Canada's Pacific coast are generally limited to the commercial fisheries. There is no overarching policy framework that outlines what activities are to be costs shared. As a result, cost sharing arrangements, and the activities that are cost-shared, can vary widely between the fisheries. Depending on the fishery, activities that may be cost shared could include stock assessments and other science-related work, monitoring and enforcement, and government staff time and equipment.

LEGAL FRAMEWORK

The *Constitution Act, 1867*, gives the federal government exclusive jurisdiction over all aspects of fisheries and fish habitat management (i.e., management, enforcement, and monitoring). Through the *Fisheries Act, 1985,* the federal Department of Fisheries and Oceans (DFO) administers all laws relating to fisheries.[8] DFO then makes regulations for carrying out the purposes and provisions of the *Fisheries Act.* For example, the *Fishery (General) Regulations of 1993* apply at the national level and *Pacific Fishery Regulations of 1993* apply at the regional level.[9]

It is important to recognize that, in Canada, fisheries resources are common property owned by the people of Canada. Licences that provide access to fisheries resources are privileges issued at the discretion of the Minister of Fisheries and Oceans. Under Section 7 of the *Fisheries Act*, the Minister of Fisheries and Oceans has absolute

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[6] Also referred to as integrated fisheries management plans (IFMPs).

[7] The FMPs for all of Canada's Pacific marine capture fisheries can be found on the Fisheries and Oceans Canada – Pacific Region web site (www.pac.dfo-mpo.gc.ca).

[8] Though officially named Fisheries and Oceans Canada, the federal department is most often called the Department of Fisheries and Oceans, or simply DFO.

[9] The Fisheries Act and all related regulations can be found at the following website (http://laws.justice.gc.ca/en/F-14/index.html)

BOX 1
Examples of Key Fisheries Regulations on Canada's Pacific Coast

Fishery (General) Regulations apply to commercial, recreational, and aboriginal communal fishing and related activities across the nation. These regulations cover: (1) variation of close times, fishing quotas and size and weight limits of fish, (2) documents and registrations, (3) identification of fishing vessels and fishing gear, (4) observers, (5) assisting persons engaged in the enforcement or administration of the Act, (6) fishing for experimental, scientific, educational or public display purposes, and (7) fishing in waters other than Canadian fisheries waters.

Pacific Fishery Regulations, 1993 contain provisions specific to Pacific Region fisheries. These Regulations apply to commercial fisheries, fishing for Tuna from Canadian vessels on the high seas and the harvesting of marine plants from Canadian fisheries waters outside of the geographical limit of the Province. These Regulations do not apply to recreational fishing, taking fish from an aquaculture site, fishing for marine mammals or fishing from a foreign fishing vessel.

British Columbia Sport Fishing Regulations, 1996 apply to sport fishing in Canadian fisheries waters of the Pacific Ocean and the Province of British Columbia. The Regulations set close times, fishing quotas and size limits for all sport fisheries in B.C. These Regulations do not apply in National Parks. For non-tidal waters (i.e. fresh water), fishers should also refer to Regulations made by the Province of British Columbia under the Wildlife Act.

Aboriginal Communal Fishing Licences Regulations cover the issuance of communal licences to aboriginal organizations. Conditions of licence regulate communal fishing activities.

Marine Mammal Regulations apply to the management and control of fishing for marine mammals and related activities.

Management of Contaminated Fisheries Regulations authorize the Regional Director-General (RDG) to close any area to fishing for a specific species of fish if the RDG has reason to believe that fish in that area are contaminated.

Pacific Fishery Management Area Regulations describe the surfline and divide the Canadian fisheries waters of the Pacific Ocean into Areas and Subareas. The Areas and Subareas are often referenced when describing fishery openings and closures.

Source: Fisheries and Oceans Canada – Pacific Region website (www.pac.dfo-mpo.gc.ca)

discretion in the issuance of licences. In Canada, fisheries resource access is a privilege granted by the Minister, not a property right.

The administration of some federal fisheries laws has, by agreement, been delegated to provincial governments. For example, in the Pacific Region, the Government of Canada has delegated some aspects of non-tidal fisheries management to the Province of British Columbia under several Memoranda of Understanding (Gislason & Associates, 2004). At the local level, in areas where aboriginal land claims have been settled, DFO still retains responsibility but Joint Fisheries Management Committees have been set up to facilitate co-operative planning (Indian and Northern Affairs Canada, 2000).

On Canada's Pacific coast, fisheries management initiatives can also be influenced by other legislation, which includes:[10]

[10] The full text of these pieces of legislation can be searched at the Department of Justice Canada web page (http://laws.justice.gc.ca/en/index.html).

- The Coastal Fisheries Protection Act, 1985, which is the legislative means for controlling foreign fishing vessel access to, and activities in, Canadian fisheries waters (Exclusive Economic Zone - EEZ) and ports. In December 2003, the federal government amended the Coastal Fisheries Protection Regulations to enable Canada to better control and manage the activities of foreign fishing vessels in Canadian waters and ports.
- The Oceans Act, passed in 1996 and came into force in 1997, that outlines Canada's duties and responsibilities in its ocean territories and introduces a new ocean management model which promotes sustainable development of Canada's oceans and their resources. The Act provides the government with some basic authorities and management tools to be used, which include the establishment of Marine Protected Areas, the establishment and enforcement of standards designed to conserve and protect ecosystem health, and the development of integrated coastal zone management plans.
- The federal Species at Risk Act that was passed by the Government of Canada in December 2003 and came into force in June 2004. The goal of the Act is to prevent endangered or threatened wildlife (terrestrial and aquatic) under federal jurisdiction from becoming extinct and to help in the recovery of these species. DFO is the lead agency for aquatic species listed under the Species at Risk Act. Once a species is listed, the Act specifies a defined process for determining recovery and protection actions, which is anticipated to significantly influence fisheries management decisions.

STATUS OF FISHERIES

Over 80 species of finfish, shellfish, and marine plants are harvested in marine capture fisheries on Canada's Pacific coast. The vast majority of species are fully utilized and some form of regular assessment is performed for most target species to determine abundance and appropriate harvest levels. A number of the wild fish stocks are thought to be healthy but there are conservation concerns for some species and/or populations (see Table 1).

While many salmon stocks appear to be healthy, there are some that are considered to be depressed. Changing ocean conditions and poor ocean survival in the 1990s appear to be key factors in these declines; however, overfishing and habitat loss have also been identified as contributing factors. DFO has adopted a precautionary approach to salmon management that has reduced exploitation rates and curtailed mixed stock fisheries (where weak and strong salmon stocks intermingle) to protect weaker runs.[11]

Herring abundance varies by coastal area, a result of geographic variation rather than coastwide abundance, and most stocks appear to be at or above long-term averages. Overall shellfish and invertebrate resources are considered healthy. There are limited financial and staff resources for groundfish stock assessment, and, as a result, stock status remains uncertain for some species. The known stock status of groundfish species varies from healthy (e.g., halibut) through to mixed (e.g., many species) to depressed (e.g., petrale sole, Pacific cod, inshore rockfish). These factors, combined with a decade of low stock recruitment, have led to the introduction of conservative quotas for many groundfish species.

There are conservation concerns over the inshore rockfish species, particularly in the Strait of Georgia. In 2002, DFO announced a rockfish conservation strategy and cut

[11] As outlined in Canada's Policy for Conservation of Wild Pacific Salmon (DFO, 2005a), the application of precaution is consistent with the guidance from A Framework for the Application of Precaution in Science-based Decision Making About Risk (Canada, Privy Council Office 2003) and the Precautionary approach to fisheries, Part I: Guidelines on the precautionary approach to capture fisheries and species introduction (FAO, 1995).

TABLE 1
Canada Pacific - Overall Health of Wild Fish Stocks

Species	Status	Comments
Salmon		
Chinook	Healthy	Continued improvement from late 1990s; most stocks at or above escapement goals
Coho	Mixed	Continued improvement from late 1990s; particularly in Strait of Georgia; interior Fraser River and some North and Central Coast stocks remain weak
Sockeye	Healthy	Increased returns to most major river systems (Nass, Skeena, Barklay Sound and most Fraser River stocks; continued concerns about in-river mortalities in late Fraser run; some South Coast stocks (Sakinaw Lake & Cultus Lake) and Central Coast stocks (Rivers Inlet and Smith Inlet) depressed
Pink	Healthy	Record returns to Fraser River in 2001; localized concerns for some Central Coast and Broughton Archipelago (near the north end of Vancouver Island) stocks
Chum	Mixed	Generally stocks in south are strong, some northern stocks remain depressed
Herring and Other Pelagics		
Herring	Mixed	Abundance varies regionally
Sardine	Healthy	Distribution and abundance highly influenced by climatic conditions; present off Canada's Pacific coast during warm water conditions
Eulachon	Mixed	Fraser River fishery closed in 1998; strong recovery of many stocks since 2001, except Central Coast region
Albacore Tuna	Healthy	Highly migratory species; Canadian catch is small share of total Pacific landings (approximately 3%)
Groundfish		
Halibut	Healthy	Stock status is considered above average, will likely remain so for several years, poor ocean conditions since 1996 indicate the stock size may decrease in the future.
Sablefish	Healthy	Some uncertainty as to current level of recruitment
Pacific Cod	Depressed	Insufficient information for assessment in Queen Charlotte Sound. Biomass increasing in Hecate Strait, currently above management limit reference point
Lingcod	Mixed	Stocks vary by area; Strait of Georgia stocks remain depressed
Hake	Healthy	Outside waters: latest assessment indicates that, primarily due to the decay of the stronger than average 1999 year class, the spawning stock biomass is projected to decline within a precautionary zone by 2006 – 2007.
Inshore Rockfish	Depressed	Conservation concern, particularly in Strait of Georgia
Shelf/Slope Rockfish	Mixed	Lack of timely stock assessment data adds to uncertainty
Flat fish (Dover, Rock, English sole)	Mixed	Generally low recruitment in 1990s due to unfavorable ocean conditions
Shellfish and Invertebrates		
Geoduck clams	Healthy	Need for better biomass and recruitment estimates
Red Urchin	Healthy	Need for improved biological information
Sea Cucumber	Healthy	Lack of biological information for some areas
Abalone	Depressed	Fishery closed in 1990 and remains closed
Dungeness Crab	Healthy	Concerns about fishing effort
Prawns	Healthy	Concerns about fishing effort
Shrimp	Healthy	Concerns about fishing effort
Intertidal Clams	Mixed	Over-harvest of specific beds in Strait of Georgia

Sources: Gislason & Associates, 2004; STAR Panel, 2005; Fargo, 2005.

commercial total allowable catches (TACs) by more than 50 percent, increased at-sea monitoring in the commercial sector, reduced recreational catch limits and introduced a series of rockfish conservation areas to protect spawning biomass.

Canada's Pacific marine capture fisheries can be divided into three main categories, or sectors: commercial fisheries, Aboriginal fisheries for food, social, and ceremonial purposes, and recreational fisheries. By volume, commercial harvests are by far the largest fisheries. Commercial fishing accounts for well over 95 percent of the fish caught in most capture fisheries (James, 2003). However, recreational harvests of certain species can rival commercial landings in some areas of the coast (e.g., inshore rockfish in the southern Strait of Georgia region).[12]

[12] Yamanaka & Lacko, 2001, page 13.

BOX 2
Significant Changes in the Commercial Fisheries

Over the last fifteen years there have been significant changes in the marine capture commercial fisheries on Canada's Pacific coast. Total commercial landings and landed values have declined significantly from their peaks in the late 1980s and early 1990s. Historically, the salmon and herring species groups accounted for the vast majority of the total landed value. Today, salmon and herring together average only 25-30 percent of the total landed value and their positions as the dominant marine capture fisheries have been supplanted by the groundfish and shellfish species groups.

There are currently about 8 400 registered commercial fishermen, less than half the number of a decade ago. This reduction in employment was the result commercial salmon licence retirement programs (buybacks) in the late 1990s and the introduction of single gear and area licensing requirements (see note below) that combined to reduce the size of the salmon fleet by more than 50 percent (Gisalson and Associates, 2004). At the same time fleet rationalization was also occurring in the fisheries that moved to individual quota management. In these fisheries, the more efficient operators acquired quota from less efficient operators (transferable quotas) thereby reducing the number of vessels participating in these fisheries (Gisalson and Associates, 2004).

Landings ('000 tonnes) and Landed Value ($ millions US 2002)

	Salmon		Herring & Pelagics		Groundfish		Shellfish		Total	
Year	*Wt.*	*$*	*Wt.*	*$*	*Wt.*	*$*	*Wt.*	*$*	*Wt.*	*$*
1986	100.2	302.6	16.5	50.4	87.2	42.8	16.7	23.0	220.6	418.8
1990	92.5	298.4	41.6	89.6	142.6	98.4	21.5	45.9	298.2	532.4
1994	82.3	222.0	41.8	81.1	134.8	110.0	28.0	79.4	286.9	492.7
1998	30.3	39.9	33.9	27.3	139.2	93.8	19.3	69.5	222.7	230.5
2002	33.4	36.3	33.0	29.9	112.8	97.4	18.6	68.1	197.7	231.8

Sources: Gislason & Associates, 2004. BC Ministry of Agriculture Food & Fisheries. Fisheries Production Statistics of British Columbia

Commercial Fisheries

Canada's Pacific marine capture commercial fisheries harvest more than 80 different species of finfish, shellfish, and marine plants. There are four main commercial species groups:

- Salmon: There are directed commercial fisheries on five species of salmon (chinook, coho, sockeye, chum, pink).
- Herring and other Pelagics[13]: Aside from herring, pelagic fish commercially harvested on Canada's Pacific coast include eulachon, sardine (pilchard), tuna, and several smelt species.
- Groundfish: Commercial groundfish species include flatfish (flounder, sole, halibut), rockfish, Pacific cod, sablefish, lingcod, pollock, and hake.
- Shellfish and Invertebrates: Commercially harvested species include geoduck clams, shrimp, prawns, Dungeness crabs, red and green urchins, euphausids/krill, sea cucumbers, and scallops as well as several intertidal clam species (littleneck, butter, manila, razor, and varnish).

There are approximately 3 000 active fishing vessels on Canada's Pacific coast and about 8 400 registered commercial fishermen, generating an estimated 3 410 person years of employment (Gislason & Associates, 2004). In 2003, total commercial landings

[13] Pelagic fish is a general term for species of fish that inhabit the water column.

The decline in salmon and herring landed value is the combined result of reduced landings and lower landed prices. Changing environmental conditions in the ocean in the mid-1990s led to lower ocean productivity, lower rates of ocean survival and fewer salmon returns. This prompted fisheries managers to reduce herring harvests and salmon fishing opportunities, and commercial landings fell. For example, annual commercial salmon landings averaged 75 000 tonnes in the early 1990s; however, since 1995, landings have averaged just over 32 700 tonnes on an annual basis.

Note: In 1996, DFO introduced single gear and area licensing requirements in the commercial salmon fishery. Under these licensing requirements, harvesters who wished to fish another area of the coast or gear type had to acquire another licence from a fellow fisherman and "stack" it on their own vessel, thereby removing a vessel from the fishery.

At the same time, there was downward pressure on landed prices for salmon and herring. World salmon prices collapsed due to increased world supply of wild and farmed salmon. In the herring fisheries a weakening Japanese economy and yen currency, combined with changing consumer preferences in Japan, resulted in lower landed prices to commercial fishermen.

In contrast, the shellfish and groundfish have become more important to the marine capture industry. Landed prices for these species have generally risen over this period resulting in more stable revenues. For the shellfish fisheries, geoduck clam landed prices have substantially increased as the fishery moved to individual quota management in 1989 and fishermen were able to develop a new product (live geoduck) and new markets. Prawn prices have risen in the latter half of the 1990s with the development of a new product and market, frozen-at-sea prawns destined for Japan. However, landed prices for Canada's Pacific shrimp have recently fallen and have remained low due to a glut of frozen product on the world markets (Gislason & Associates, 2004).

For the groundfish species the increase in prices can be attributed, in part, to the introduction of individual quota management in the sablefish, halibut, and groundfish trawl fisheries. Individual quota management has enabled the industry to fish over a longer period of time, produce a better quality product, and have access to the higher-value fresh market. Groundfish prices have also increased because of a decline in whitefish landings worldwide, particularly Atlantic cod and some of Canada's Pacific groundfish fisheries have been able to fill this market gap (Gislason & Associates, 2004).

TABLE 2
Largest Commercial Fisheries By Volume in 2003 (Pacific Canada)

	Landings (mt)	Value (2002 US$ million)	Share of Total Landings (%)	Share of Total Landed Value (%)
Hake by Trawl	69 100	9.5	31.0	3.8
Groundfish Trawl	41 900	32.4	18.8	12.8
Salmon	38 400	33.4	17.3	13.2

Note: Data for the commercial salmon fishery excludes commercial aboriginal-only fisheries.

were just under 223 000 tonnes of fish, with a landed (ex-vessel) value of approximately $253.1 million (US 2002).[14]

In recent years the commercial fishing and wild fish processing sectors have together generated an estimated $347 million (US 2002) in gross domestic product (GDP), which translates into about 0.05 percent of national GDP and 0.34 percent of regional (provincial) GDP.[15]

On a volume basis, the largest commercial marine capture fisheries on Canada's Pacific coast are hake by trawl, groundfish trawl and salmon (see Table 2). Salmon,

[14] Landed value is the price paid to commercial fishers for their catch (whole fish).

[15] Gross Domestic Product (GDP) is a measure of the value added by an industry or activity to the economy. It is equal to total revenue from the sale of goods or services produced by the industry less the cost of materials and purchased services consumed in the process of production (BC Ministry of Management Service – BC STATS, 2002). Estimate of commercial fishing and capture fish processing sector GDP from Gislason & Associates, 2004.

halibut, groundfish trawl, crab, geoduck clams, and roe herring are generally the largest commercial fisheries by landed value.

First Nations (Aboriginal, indigenous) participate in the regular commercial fisheries either as individuals, through corporate arrangements, or as part of a band or tribal council.[16] Just over 26 percent of the limited entry commercial fishing licences are held by First Nations interests and 31 percent of all jobs in commercial fishing are held by Aboriginal participants (James, 2003). Approximately 14.2 percent of the average value of all commercial fisheries combined is harvested under authority of Native held licences, including regular commercial licences, excess salmon to spawning requirement (ESSR) fisheries, communal commercial licences, and the Nisga'a fishery (James, 2003).

DFO has also been working to increase First Nations participation in the commercial fisheries through its Aboriginal Fisheries Strategy Allocation Transfer Program. Under the Allocation Transfer Program, commercial fishing licences and/or individual quotas are voluntarily retired (bought out) from the commercial fishery then re-issued to a First Nations band or tribal council as a communal commercial licence. The now re-issued communal commercial licence is fished in the regular commercial fishery under the same rules and regulations as the regular fishing licences. This has increased First Nations participation in the commercial fisheries without adding to existing fishing effort.

Aboriginal Fisheries for Food, Social, and Ceremonial Purposes

On Canada's Pacific coast, First Nations (Aboriginal, indigenous) individuals also harvest fish for food, social, and ceremonial (FSC) purposes. In Canada, First Nations rights to fish for food, social and ceremonial purposes are constitutionally protected in Section 35 of the *Constitution Act* (DFO, 1998). This has been re-affirmed by the courts, as has the necessity and importance of consulting with Aboriginal groups when these fishing rights might be affected. As a result, First Nations fisheries for FSC purposes have priority (after conservation requirements are met) over all other fisheries. Harvest opportunities are developed through consultation with First Nation communities. DFO has noted that the lack of complete and timely information in these fisheries (salmon and non-salmon) is a concern that requires attention (DFO, 2002).

Recreational Fisheries

There is a large and vibrant tidal recreational fishery on Canada's Pacific coast. Salmon, mainly chinook, is the primary target species but other salmon species, rockfish, halibut and other fish, and shellfish are also important. Angling activity may be vessel-based or shore-based. In 2002, a total of 2.1 million angler-days were fished in the tidal waters of Canada's Pacific coast, comprising 1.65 million days of boat-based angling and 0.45 million days of shore-based angling (Gislason & Associates, 2004). Anglers may fish on their own or rely on fishing lodges and charters to enhance their experience. There are approximately 125 fishing lodges and 500 charter operations on Canada's Pacific coast.

Currently angling licence sales are relatively stable, at just over 300 000 per year (Gislason & Associates, 2004). This is a decline from the mid-1990s when licence sales were over 400 000 per year. Similarly, angler expenditures[17] peaked in 1994, fell

[16] It should be noted that, for salmon, there are also three types of commercial aboriginal-only fisheries – Pilot Sales Agreements under the Aboriginal Fisheries Strategy, Excess to Salmon Spawning Requirement (ESSR) surpluses, and Nisga'a Treaty entitlements. The total catches in these fisheries averaged about 16 percent of the regular commercial catch of sockeye salmon and about 8 percent of the regular commercial catch of other salmon annually over the 2000 to 2002 period (Gislason & Associates, 2004).

[17] Angler expenditures are made up of expenditures on boats and other equipment, expenditures on lodge and charter fishing packages and direct expenditures on boat fuel and repairs, food and accommodation, transportation, supplies and services (ARA, 1996).

throughout the late 1990s, and have recently rebounded to $350.2 (US 2002) in 2002. Tidal water angling generates approximately $133.7 (US 2002) in GDP (Gislason & Associates, 2004), which is about 0.02 percent of Canada's national GDP and 0.13 percent of regional (provincial) GDP.

MANAGEMENT ACTIVITY

Virtually all exploited species on Canada's Pacific coast are under some form of management regime, with some more rigorous than others. For each species DFO works with stakeholders to develop an Integrated Fisheries Management Plan (IFMP), mainly for the commercial fisheries, that outlines the rules and regulations pertaining to harvesting. These management plans are available on the DFO Pacific Region website (www.pac.dfo-mpo.gc.ca) and are also distributed to commercial harvesters at the time of licence issuance.

In most fisheries managed by DFO, there is an advisory committee comprising representatives from the various sectors of the fishery, the Province of British Columbia, communities and other interested stakeholders. These advisory committees provide advice to DFO on the management of the fishery and a forum for communication between DFO and stakeholder groups. These groups may provide advice to DFO on various aspects of the fishery (e.g., setting catch limits or TACs, fishing times and areas, designated landing ports, catch monitoring, enforcement priorities).

DFO also disseminates information to stakeholders through its websites as well as using regular mail. For some initiatives DFO will also hold public "town hall meetings" to inform and consult with stakeholders and the public. However, it is important to recognize that these consultations and advisory committees are advisory processes only. DFO (ultimately the Minister of Fisheries and Oceans) is responsible for managing fisheries resources and is free to accept or reject the advice provided.

In the commercial fishing sector almost all fisheries have a limited number of licences (limited entry).[18] In the majority of these fisheries, licences are attached to the vessel (vessel-based licensing) and specify the vessel's overall allowable length. All commercial fishermen on licensed fishing vessels must also possess a valid Fisher Registration Card (FRC) issued by DFO on an annual or five-year basis. Input controls, such as limited entry licensing, vessel length and size restrictions, fishing time and area, and gear restrictions, are used in all fisheries to control harvests and/or protect spawning stocks.

Some commercial fisheries are managed using input controls only (e.g., salmon, prawn, crab) resulting in a competitive fishery where harvesters compete with each other in a race to catch the fish. However, over the past 15 years, an increasing number of fleets (e.g., geoduck clam, sablefish, halibut, groundfish trawl) have moved to individual quota (IQ) or individual vessel quota (IVQ) management.[19] Under individual vessel quota management, each licenced vessel is allocated a share of the TAC prior to the start of the season.

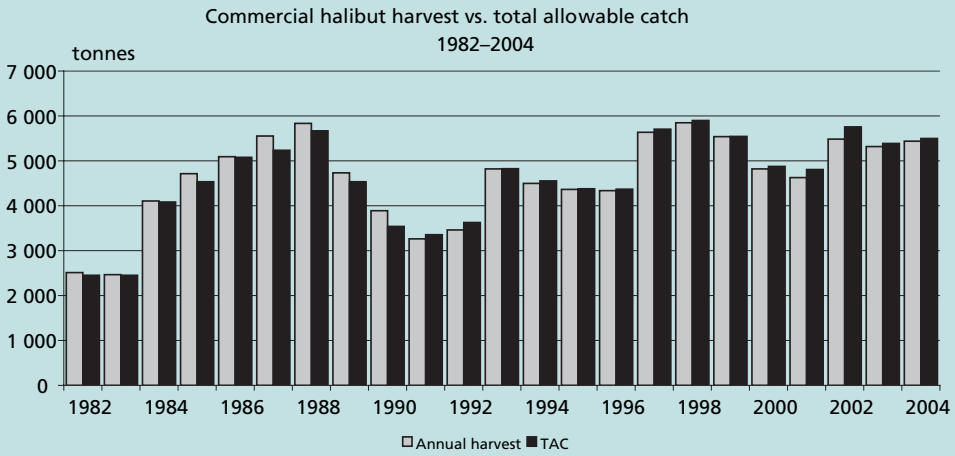
Individual quota (IQ) management has been introduced in a number of fisheries jurisdictions around the world (Kaufmann *et al.,* 1999). The apparent success of IQ management is well documented (Fox *et al,.* 2003; Grafton, 1996, Grafton *et al,.* 2000; Shotton, 2001; Weninger, 1998). On Canada's Pacific coast the benefits have included improved conservation of fish stocks, improved catch monitoring, increased value from better prices and reduced operating and capital costs, greater industry and individual

[18] All limited entry licences are transferable with the exception of herring spawn-on-kelp.

[19] Due to the vessel-based licensing regime is in place in most fisheries, individual quotas (IQs) are referred to as individual vessel quotas (IVQs). Like licences, IVQs are transferable. IVQs can be transferred between licenced fishing vessels (e.g., halibut IVQ can only be transferred between commercial fishing vessels that have halibut licences).

BOX 3

Conservation – Pacific Halibut



Source: Fisheries and Oceans Canada

Prior to individual vessel quota (IVQ) management, Canada's Pacific halibut fleet exceeded the total allowable catch in each year from 1982–1990. Since IVQs were introduced in 1991, the fleet has been below its allowable harvest level in each year. This is due to the fact parameters are built into the IVQ program that give fishermen flexibility and do not force them to try to harvest every single pound of IVQ in a given year (e.g. limited IVQ carryovers to the following year and penalties for exceeding one's IVQ). In addition, catch monitoring improved dramatically with the introduction of IVQs as a dockside monitoring program now validates 100 percent of all halibut landed and provides managers with timely and accurate data.

accountability, industry contribution to management costs and resource stewardship, and safer working conditions (Jones, 2003).

In almost all cases, the move to IQ/IVQ management on Canada's Pacific coast appears to have been driven out of necessity. Within these fisheries commercial licence holders were being increasingly faced with reduced fishing times, poor financial viability, and unsafe working conditions. They started working with DFO fisheries managers to consider IQ/IVQ management as an alternative to the way their fisheries had been traditionally managed. According to Gislason (2004) the move to IQ/IVQ management generally followed four steps:

- an industry vote or expression of support by licence holders in favour of the concept;
- the implementation of IQs, with a non-transferability provision, on a trial or temporary basis;
- a review of the trial program, including a survey or vote of licence holders on satisfaction to date and potential modifications; and
- implementation of the program on a permanent basis and permitting of the transfer of licences and quotas, after a favourable vote by the licence holders.

Jones (2003) provides a fishery-by-fishery description of the events leading up to the implementation of IQ/IVQ management on Canada's Pacific coast.

Today, about two-thirds of the BC landed value derives from fisheries managed under individual quotas (Gislason & Associates, 2004). The only major fisheries not under IQ/IVQ management are the salmon, prawn, crab, and tuna fisheries. DFO and

BOX 4
Safety Matters

Commercial fishing is one of the most dangerous occupations in Pacific Canada (Workers Compensation Board of BC, 2003). Each year accidents happen: several people lose their lives and hundreds of others are injured, some seriously.

On Canada's Pacific coast, when fishermen are asked about the benefits of IVQ management, one would think increased returns from the fishery would top the list. Interestingly fishermen almost always cite improved safety and that they no longer are forced to fish in inclement weather during derby style openings. In a 1992 survey following the introduction of IVQs, commercial halibut licence holders and crew members rated improved safety as the single biggest benefit of the IVQ program (Jones, 2003).

stakeholder groups are currently considering IQ/IVQ management for the lingcod by hook & line, dogfish by hook & line and rockfish by hook & line fisheries.

For First Nations harvests for food social and ceremonial purpose, fisheries are authorized through the issuance of a communal licence (by DFO) to a band or tribal council that in turn designates individual members to fish for the group. While these fisheries have priority access to fisheries resources, DFO and First Nations will discuss consider measures (e.g., time and area closures) to protect species or stocks of concern.

In the recreational sector, there is no licensing requirement for fisheries lodges and charter operations; however, all anglers must possess a tidal water licence. There are no restrictions or limited entry on how many licences can be sold. Recreational fisheries are managed through the use of individual catch limits (daily, possession, and in some cases annual), fishing time and area, and gear restrictions. DFO has been increasingly using time and area closures to protect species or stocks of concern (e.g., rockfish conservation areas).

Most major salmon tidal and non-tidal sport fisheries are monitored using creel surveys. However, according to a DFO discussion document, catch estimates are absent for some recreational fisheries such as shellfish and the available estimates for groundfish and herring are likely unreliable (DFO, 2002).

There is a recognized need to improve catch monitoring and harvest in all three fishing sectors (DFO, 2002). Timely and accurate information on harvest and harvesting practices is necessary for stock assessment purposes and to ensure the conservation and the sustainability of fish resources (DFO, 2002). While some progress has been made, mainly in the commercial groundfish and individual quota fisheries, which involve dockside and at-sea monitoring programs, improvements are needed in all sectors to ensure effective fisheries management.

The federal *Species at Risk* Act, which came into force in June 2004, is anticipated to significantly impact fisheries management activities and decisions. Managers are now legally required to protect fish species listed as endangered or threatened and ensure their recovery. The *Species at Risk Act* specifies a defined process for determining recovery and protection actions once a species is listed.

COSTS AND REVENUES OF FISHERIES MANAGEMENT

The past ten years has seen some dramatic changes in fisheries and fisheries management in Pacific Canada. The costs of fisheries management have increased significantly over this time period, while budgets appear to have remained relatively constant or possibly declined.

The costs of fisheries management have increased due to increased public scrutiny of management decisions and actions requiring more consultation, increased competition

BOX 5
Cost Sharing in the Pacific Halibut Fishery

Prior to the introduction of individual vessel quota (IVQ) management in 1991, commercial halibut licences holders paid approximately $11 (US 2002 $) for their licence and the federal government collected a total of $4 760 (US 2002 $).

Today commercial halibut licence holders pay approximately $0.98 million (US 2002 $) in access fees and another $1.2 million (US 2002 $) to fund the management activities associated with their fishery, which includes: contracted services for dockside catch validation and at-sea monitoring; DFO salaries, benefits and overtime; DFO travel; computer programming; DFO vehicle leases; DFO fishery officer relocations and equipment purchases; science related activities; and, contracted staff.

	Access Fee	Management Levy	Total
1990	$4 760	$0	$4 760
2005	$0.98 M	$1.2 M	$2.18 M

Note: All values in US 2002 $

Source: Jones (2003)

between and within stakeholder groups for access to limited fisheries resources and increasing legal requirements to consult with aboriginal groups. Further, the new national Species at Risk Act requires DFO to undertake additional tasks in order to meet new assessment, actions, and reporting requirements.

At the same time it would appear budgets (government funding) for fisheries management on Canada's Pacific coast have been held constant or may have declined, although this is a difficult question to answer as there have been organizational restructurings and administration changes that make year to year comparisons difficult.[20] Regardless, the Canadian government has embraced fiscal restraint and it would appear that budgets for DFO Pacific region have been affected.

Based on data from the DFO 2004 Southern Salmon Fishery Post-Season Review (DFO, 2004) it would appear that total operational budgets have remained relatively constant, but there has been no new money for operating (e.g., travel) or capital (e.g., vehicles) expenditures budgets. The same report notes that total DFO expenditures on enforcement activities in the Pacific are, in real terms, about the same as they were seven years ago, although a greater proportion is now being spent on salaries.

In an effort to deal with constant budgets, increasing costs and new responsibilities, DFO has re-profiled resources and pursued co-management and cost sharing initiatives with stakeholder groups, mainly the commercial fishing sector, over the past 15 years. These costs sharing initiatives are undertaken to fund specific activities on the premise that those who benefit from the activity should pay for it. The cost sharing initiatives are generally undertaken through joint project agreements that define the roles and responsibilities of DFO and the stakeholder group.

In all commercial fisheries, licence holders pay a licence fee, referred to as an access fee, to the federal government for use of the resource owned by the people of Canada. These access fees go into general federal government revenue, not DFO budgets.

[20] For example, in the late 1990s the Canadian Coast Guard was merged with DFO and took on some fisheries management-related activities. At the same time, in the late 1990s, DFO Pacific Region was significantly re-organized to a more area (local) focus and this had significant budgetary implications.

However, in many commercial fisheries (mainly those that have moved to individual quota management), licence holders also pay some type of levy to fund the fisheries management activities associated with their fishery. These activities can include funding DFO salaries, benefits, and overtime, DFO operating expenditures, stock assessments and science-related activities, and enforcement and monitoring either by DFO or independent third party contractors. The costs to be shared are generally defined in a joint project agreement between DFO and a representative industry association.[21] Levies are usually raised by representative industry associations, either as a flat rate per licence or as a proportion of IVQ holdings or catch.

IMPLEMENTATION OF GLOBAL FISHERIES MANDATES AND INITIATIVES

In 1999, Canada ratified the United Nations Fish Stocks Agreement (UNFSA), which provides a framework for conservation and management on the high seas of straddling fish stocks and highly migratory fish stocks. Under UNFSA, Canada has an obligation to take measures to ensure that vessels flying its flag that fish on the high seas comply with any and all defined conservation and management measures in place. Consistent with UNFSA, in 2001 Canada signed (but has not yet ratified) the Western and Central Pacific Highly Fisheries Convention (WCPFC), which was negotiated to conserve and manage highly migratory fish stocks in the central and western Pacific Ocean (DFO, 2005).

Canada's main fisheries interests in WCPFC relate to the northern albacore tuna stocks. In 2002 Canada and the USA agreed to amend the Canada/United States of America Albacore Tuna Treaty to limit access by their respective fleets to the other's exclusive economic zone (EEZ) to fish albacore tuna. The amendments entered into force June 1, 2004, placing limits on the fishing effort by each country in the other's EEZ (DFO, 2005). For Canadian vessels a separate limited entry licence is now required to authorize fishing albacore tuna in the USA waters. There are currently no domestic licensing requirements for vessels fishing albacore tuna in Canadian fisheries waters or on the high seas; however increasing international obligations may require additional controls (DFO, 2005).

Canada ratified the United Nations Convention on the Law of the Sea (UNCLOS) in 2003. UNCLOS provides the framework for international oceans law, governing many aspects of oceans affairs, from fisheries and navigation to marine pollution and scientific research. However, UNCLOS will be more applicable to the Atlantic coast of Canada where the outer limit of the continental shelf extends beyond the 200 mile limit.

On the Pacific coast, Canada has also taken steps to implement a number of International Plans of Action, specifically capacity management; illegal, unreported, and unregulated (IUU) fishing; shark management; and, seabird bycatch in longline fisheries. However, at this time, a formal National Plan of Action exists only for IUU fishing.

With respect to capacity management, many of the major commercial fisheries on Canada's Pacific coast are managed under transferable individual quota regimes which create the incentive for participants to address fishing capacity issues to improve the economic viability of the fishery, as the less efficient operators are bought out by the more efficient ones, thereby reducing the number of active fishing vessels. In many of the commercial fisheries currently not managed under individual quota management, there are ongoing discussions on moving in that direction (e.g., rockfish by hook & line, dogfish by hook & line, lingcod by hook & line).

DFO has undertaken specific studies of fishing capacity in the Pacific commercial salmon and halibut fisheries, focusing on the number of vessels as the measure of fishing capacity. Interestingly, both fisheries have experienced a reduction in the

[21] In order to enter into a joint project agreement with DFO, industry association must represent at least 66 percent of the licence holders in question.

number of active vessels participating in the fisher, albeit through different means. For the commercial salmon fisheries, in 1996 and 2000, DFO initiated programs (voluntary licence retirement programs, or buybacks, and single gear and area licensing requirements) that reduced fleet size, or capacity, by more than 50 percent). In the commercial halibut fishery, prior to the introduction of individual vessel quotas, there were 433 active fishing vessels. Since 1991 the number of active vessels (capacity) has steadily declined as more efficient operators buy out the less efficient ones. In 2003, there were 225 active halibut vessels.

DFO has taken a number of steps to address IUU fishing, although these actions mainly apply to the Atlantic coast. For example, Canada has closed its ports to vessels from other countries for overfishing quotas, misreporting catches or other Northwest Atlantic Fisheries Organization (NAFO) violations (e.g., in 2002, Canada closed its ports to vessels from the Faroe Islands and Estonia). In December 2003, DFO amended the Coastal Fisheries Protection Regulations to enable Canada to better control and manage the activities of foreign fishing vessels in Canadian waters and ports. The new regulations provide the flexibility to grant or deny access to Canadian ports on a vessel-by-vessel basis, while retaining the ability to deny access to an entire fleet, if necessary. This enables Canada to apply UNFSA enforcement procedures to all UNFSA parties with fleets in the NAFO Regulatory Area.

Canada recently joined the High Seas Task Force – an international, ministerial task force dedicated to the fight against illegal, unreported, and unregulated fishing activities on the high seas in 2004. Canada also tabled its *National Plan of Action to Prevent, Deter, and Eliminate Illegal, Unreported, and Unregulated Fishing* (NPOA-IUU) at the annual meeting of the United Nations Food and Agriculture Organization (FAO) Committee on Fisheries (COFI) in Rome in March 2005. This national action plan outlines ongoing programs and initiatives, as well as existing policies and legislation, which tackle the issue of illegal, unreported, and unregulated fishing.

There are a number of initiatives in Canada's Pacific commercial groundfish fisheries to improve catch data, both retained and released at sea, that benefit all species, including sharks. For example, all commercial groundfish fisheries have mandatory 100 percent dockside monitoring programs that validate all landings. In 1996, DFO introduced 100 percent at-sea observer coverage on all groundfish trawl fishing trips and the Department has advised that it will introduce 100 percent at-sea monitoring in all Pacific commercial hook & line groundfish fisheries starting in 2006. These measures will provide DFO with more accurate information on commercial catches (retained and released) of all species, including sharks and should help improve stock assessments.

Canada has also made significant progress on implementing measures to address seabird bycatch in longline fisheries on the Pacific coast. Since May 1999 DFO has been consulting with stakeholders about the need and intent to move to selective fishing and reduce incidental catches of fish species, marine mammals, and seabirds. A final policy document was released in January 2001 that set out objectives and an implementation framework, as well as specifying a deadline of January 2003 for standards to be developed in consultation with stakeholders.

In cooperation with the commercial halibut fleet, seabird avoidance regulations were introduced on a voluntary basis for the 2001 season. By 2002, mandatory seabird avoidance regulations were in place for the commercial halibut fishery and in 2003 these requirements were extended to all the commercial groundfish longline fisheries on Canada's Pacific coast.

PARTICIPATION IN REGIONAL FISHERY BODIES (RFBS)

On the Pacific coast, Canada is a member of or participates in a number of regional fishery bodies (RFBs). As previously noted, Canadian fishers pursue a significant fishery for northern albacore tuna, a stock covered by the Inter-American Tropical

Tuna Commission (IATTC). The IATTC, established by international convention in 1950, is responsible for the conservation and management of fisheries for tunas and other species taken by tuna-fishing vessels in the eastern Pacific Ocean. Canada is not a member country of the IATTC but is a Cooperating Non Party and actively participates in the process. Canada has signed the most recent amendments to the Convention but has not ratified the convention.

In 1985, after many years of negotiation, Canada and the United States signed the Pacific Salmon Treaty (a new agreement was signed in 1999). The Pacific Salmon Commission is the body formed by the governments of Canada and the United States to implement the Pacific Salmon Treaty. The Commission does not regulate the salmon fisheries but provides regulatory advice and recommendations to the two countries and has responsibility for all salmon originating in the waters of one country which are subject to interception by the other, affect management of the other country's salmon, or affect biologically the stocks of the other country. The Commission develops area fishery plans, although the respective governments have final approval and are responsible for regulatory implementation.

Canada and the United States also have a bilateral agreement for the management of Pacific halibut. The International Pacific Halibut Commission (IPHC), originally called the International Fisheries Commission, was established in 1923 by a Convention between the two governments. Its mandate is research on and management of the stocks of Pacific halibut (*Hippoglossus stenolepis*) within the Convention waters of both nations. Each year the IPHC sets annual harvest limits and makes regulatory recommendations. Each respective government is responsible for managing the fisheries and domestic allocations within its EEZ and has final approval on regulatory implementation.

The North Pacific Anadromous Fish Commission (NPAFC) was created under the Convention for the Conservation of Anadromous Stocks in the North Pacific Ocean, which came into force on February 16, 1993. Canada, Japan, the Republic of Korea, the Russian Federation, and the United States are all Contracting Parties to the Convention.

The objective of the NPAFC is to promote the conservation of anadromous stocks (chum, coho, pink, sockeye, chinook, and cherry salmon, and steelhead trout) in the waters of the North Pacific Ocean and its adjacent seas (north of 33 degrees North Latitude beyond 200-miles zones of the coastal States). The Convention prohibits direct fishing for anadromous fish in this "Convention Area". Since the establishment of the NPAFC, the Parties have cooperated on the exchange of information regarding violation of the provisions of the Convention and on the exchange of enforcement plans and actions. The Parties to the Convention also cooperate in the conduct of scientific research in the Convention Area.

SUMMARY AND CONCLUSIONS

On Canada's Pacific coast, the marine capture fisheries fall into three main categories, or sectors; commercial fisheries, Aboriginal fisheries for food, social, and ceremonial purposes and recreational fisheries. The discussion has focused on marine capture fisheries management on Canada's Pacific coast and looked at the policy framework, the legal framework, the status of the fisheries, the management activity and processes, the costs and revenues of fisheries management, the implementation of global fisheries mandates and initiatives; and, the participation in regional fishery bodies.

In Canada, fisheries management is becoming an increasingly complex task as there is greater public scrutiny, new legal and consultation requirements, and progressively more competition for access to fisheries resources. This is further complicated by the fact government funding and resources are being held constant at a time when fisheries management costs are increasing and DFO is also faced with some new responsibilities.

There have been many positive steps in fisheries management on Canada's Pacific coast (reduced exploitation rates and conservative quotas for species of concern, co-management arrangements, and cost sharing initiatives with commercial participants, movement from traditional input control to output control fisheries management, increased monitoring in some commercial fisheries). However, there is a recognized need for improved catch monitoring in all fishing sectors. A proper accounting of fishing mortalities by all sectors is needed to ensure conservation targets and sustainable use objectives are being met.

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APPENDIX TABLES

Note: Some caution should be used when interpreting these tables as they are a summary only and may not provide the full picture of the fishery in question
"n.a." means not applicable

Current Management of Marine Capture Fisheries in Pacific Canada

Level of Management	% Fisheries Managed	% with Fisheries Management Plan	% with Published Regulations	Trends in the number of Managed Fisheries over ten yrs.
National	n.a.	n.a.	n.a.	n.a.
Regional	100	Almost 100	100	increasing
Local	n.a.	n.a.	n.a.	n.a.

Summary information for three largest fisheries (by volume) in Pacific Canada (Year 2003 for commercial fisheries, 2000 or 2002 for all others unless otherwise noted)

Category of Fishery	Fishery	Volume 000's tonnes	Value* mil USD	% of Total Volume Caught**	% of Total Value Caught**	Covered by a Management Plan?	# of Participants	# of Vessels
Industrial	Hake by trawl	69.1	9.5	31.0	3.8	Yes	120 – 160	30-40
	Groundfish trawl	41.9	32.4	18.8	12.8	Yes	160 – 200	40-50
	Salmon	38.4	33.4	17.3	13.2	Yes	3 500 – 3 600	1 700
Aboriginal Food, Social & Ceremonial (FSC)	All species (salmon & herring important)	not available	n.a.	not available	n.a.	n.a.	not available	not available
Recreational	Salmon (Chinook & coho)	1 052 909 pieces***	133.7	not available	not available	Yes	300 000	not available
	Salmon (sockeye, pink & chum)	358 573 pieces***		not available	not available	Yes		
	Rockfish	876,653 pieces ***		not available	not available	Yes		

Notes: The commercial fisheries account for 95 percent of the fish caught in most capture fisheries (James, 2003). Recreational harvests of certain species can rival commercial landings in some areas of the coast (e.g., inshore rockfish in the southern Strait of Georgia region).
* Value in 2002 U.S. Dollars.
** % volume and values are based on totals for each category of fishery.
*** Catch & release data included.

Use of Fishery Management Tools within the three largest fisheries in Pacific Canada

Category of Fishery	Fishery	Restrictions				License/ Limited Entry	Catch Restrictions	Rights-based Regulations	Taxes/ Royalties	Performance Standards
		Spatial	Temporal	Gear	Size					
Industrial	Hake by trawl	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
	Groundfish trawl	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
	Salmon	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes
Aboriginal FSC	All FSC fisheries	Yes	Yes	No	Yes	Yes	No	n.a.	No	No
Recreational	Salmon (Chinook & coho)	Yes	Yes	Yes	Yes	Yes	Yes	n.a.	No	No
	Salmon (sockeye, pink & chum)	Yes	Yes	Yes	Yes	Yes	Yes	n.a.	No	No
	Rockfish	Yes	Yes	Yes	Yes	Yes	Yes	n.a.	No	No

Note: The terms "rights-based" is misleading in as, in Canada, fishing licences are privileges, not property, issues solely at the discretion of the Minister of Fisheries and Oceans. Under Section 35 of the Constitution, First Nations have a right to harvest fish for food, social and ceremonial purposes.

Costs and Funding Sources of Fisheries Management within the three largest fisheries in Pacific Canada

Category of Fishery	Fishery	Do Management Funding Outlays Cover			Are Management Funding Sources From*		
		R&D	Monitoring & Enforcement	Daily Management	License fees in fishery	License fees from other fisheries	Resource rents
Industrial	Hake by trawl	No	No	Yes	No	No	No
	Groundfish trawl	No	No	Yes	No	No	No
	Salmon	Yes	Yes	Yes	No	No	No
Aboriginal Food, Social & Ceremonial	All FSC fisheries	Yes	Yes	Yes	No	No	No
Recreational	Salmon (Chinook & coho)						
	Salmon (sockeye, pink & chum)	Yes	Yes	Yes	No	No	No
	Rockfish						

* Significant management funding sources from "other sources" (i.e. management levies) are recovered through agreements between DFO and a commercial fishing fleet through a representative organization, not through licences fees of participants in the fishery (although this has been used in the past).

Compliance and Enforcement within the three largest fisheries in Pacific Canada

Category of Fishery	Fishery	VMS	On-board observers	Random dockside inspections	Routine inspections at landing sites	At-sea boarding and inspections	Other (please specify)
Industrial	Hake by trawl	No	Yes (partial)	Yes 100% of landings	Yes (100%)	Yes	Hail out / hail in Overflights
	Groundfish trawl	No	Yes (100%)	Yes 100% of landings	Yes (100%)	Yes	Hail out / hail in Overflights
	Salmon	Some	Yes (partial)	Yes	No	Yes	Overflights
Aboriginal Food, Social & Ceremonial	All FSC fisheries	No	No	Yes	Yes (Some)	Yes	n.a.
Recreational	Salmon (Chinook & coho)						
	Salmon (sockeye, pink & chum)	No	No	Yes	No	Yes	Overflights
	Rockfish						

Note: Hail out/hail in: Prior to leaving port fishers are required to "hail out" notifying authorities where they intend to fish, for what species, how much they intend to catch and their anticipated date of return. Prior to leaving the fishing grounds, fishers must "hail in" notifying authorities of their offload port, their estimated time of arrival and provide an estimate of their catch composition.

Capacity Management within the three largest fisheries in Pacific Canada

Category of Fishery	Fishery	Does overfishing exist?	Is fleet capacity measured?	Is CPUE increasing, constant or decreasing?	Have capacity reduction programmes been used?	If used, please specify objectives of capacity reduction programme
Industrial	Hake by trawl	No	No	Increasing	Yes	Overfishing/Profitability/ Minimize impacts
	Groundfish trawl	No	No	Increasing	Yes	Overfishing/Profitability/ Minimize impacts
	Salmon	Some stocks	Yes	Varies by year	Yes	Overfishing/Profitability
Aboriginal FSC	All FSC fisheries	n.a.	n.a.	n.a.	n.a.	n.a.
Recreational	Salmon (Chinook & coho)					
	Salmon (sockeye, pink & chum)	n.a.	n.a.	n.a.	n.a.	n.a.
	Rockfish					

United States of America (Western and Central Pacific Ocean)

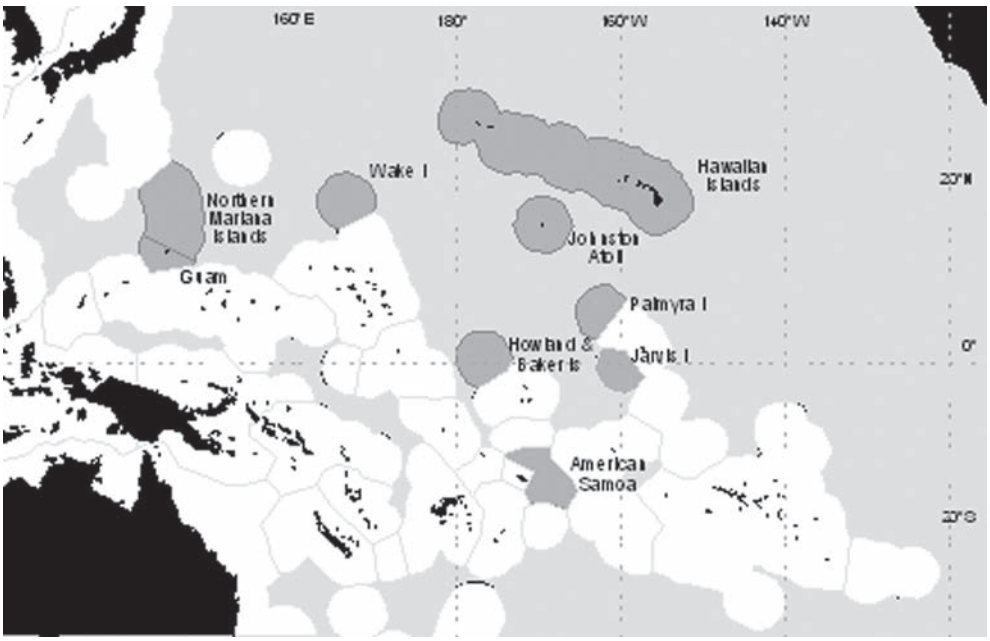
Eric Gilman
Blue Ocean Institute
November 2006

INTRODUCTION

The U.S. Pacific Islands comprise the Territory of American Samoa, Territory of Guam, State of Hawaii, Commonwealth of the Northern Mariana Islands, Jarvis Island, Howland and Baker Islands, Palmyra Island, Kingman Reef, Johnston Island, and Wake Island (Figure 1). The exclusive economic zone (EEZ) areas around these islands constitute an area of over 513 million hectares, representing about half of the total U.S. EEZ.

U.S. purse-seine, pelagic longline and troll fisheries operate on the high seas and within the EEZs of the U.S. and other Pacific Island Countries in the western and central Pacific Ocean, targeting tuna and swordfish. The U.S. islands in the western Pacific have little coastal shelf area and so the greatest volume of commercial fisheries production from within the U.S. EEZ comes from targeting these highly migratory pelagic fishes. Demersal fisheries are of additional economic importance in Hawaii where there are limited fisheries for large snappers that live on the deep outer reef slopes, banks and seamounts. A trap fishery targeting lobsters on reefs and banks of the Northwestern Hawaiian Islands (NWHI) has been closed since 1999 and was of

FIGURE 1
The US Exclusive Economic Zone adjacent to the US Pacific Islands



additional economic importance. The balance of fishery production comes from fishing in the coastal zone, targeting primarily coral reef and inshore pelagic fish. In American Samoa and Guam, landings, transshipment, and processing of tuna catches from distant water fishing nation (DWFN) fleets are extremely important.

A review of the management of U.S. national, regional and local commercial, recreational and subsistence marine capture fisheries in the western and central Pacific Ocean, with a focus on the four largest fisheries by volume and gross value (purse seine, Hawaii-based longline, American Samoa-based longline, and albacore troll fisheries), follows. [1] In addition, examples of successful and unsuccessful approaches to fisheries management are provided.

POLICY FRAMEWORK

In the U.S., policy objectives for national fisheries management are set forth in the Magnuson-Stevens Fishery Conservation and Management Act (MSA) (Public Law 94-265), as amended by the **Sustainable Fisheries Act of 1996** (Public Law 104-297).[2] The MSA focuses on seven main categories of policy objectives:

- **Achieve Optimum Yield**. Each fishery is to achieve optimum yield for the U.S. fishing industry, where the optimum yield from a fishery is defined in the MSA as the amount of fishing that will provide the greatest overall benefit to the nation and is prescribed based on the maximum sustainable yield from the fishery, as reduced by any relevant social, economic or ecological factor.
- **Prevent Overfishing and Rebuild Overfished Stocks**. The MSA places great importance on preventing overfishing, defined as, "a rate of fishing mortality that jeopardizes the capacity of a fishery to produce the maximum sustainable yield on a continuing basis." The MSA requires that overfished stocks be rebuilt as soon as possible, but no longer than ten years, except under unusual, special circumstances related to the biology of the fish or environment in question.
- **Minimize Bycatch**. Defined as fish harvested in a fishery that are not sold or retained for personal use, and includes economic and regulatory discards, the MSA states that conservation and management measures should minimize bycatch, and when bycatch cannot be avoided, minimize bycatch mortality.
- **Protect Essential Fish Habitat**: The MSA requires measures to be taken to identify essential fish habitat, which are waters and substrate necessary for spawning, breeding, feeding, or growth to maturity, and minimize the negative affects of fishing on this habitat.
- **Employ Best Available Science**: Conservation and management decision making must be based on the best available scientific information about biological, ecological, economic and social conditions.
- **Conduct Fishery Research and Monitoring**: The MSA includes policies related to information management, observers and monitoring, development of a Fisheries Strategic Research Plan, and fisheries systems research.
- **Provide for Regional Participation and Implement Administrative Processes**: There is to be regional participation in the management process. The MSA also includes policies related to Advisory Panels for Atlantic Highly Migratory Species Management, identification of allowable fishing gear, consideration of impacts on fishing communities, safety at sea, and reform of fisheries finance programs.

[1] For this review, the term 'nation' refers to the United States of America, 'region' refers to the U.S. possessions in the western and central Pacific Ocean, while 'local' refers to an individual state, commonwealth, territory, or unincorporated island, atoll, or reef, which collectively comprise the U.S. Pacific Islands region.

[2] The texts of the Sustainable Fisheries Act (SFA) and Magnuson-Stevens Fishery Conservation and Management Act (MSA), as amended by the SFA, are available online at www.nmfs.noaa.gov/sfa/.

The MSA covers both commercial and recreational fisheries.[3] The MSA specifically promotes catch and release programs in recreational fishing (MSA section 104-297).

Nationally, eight regional councils established under the MSA, including the Western Pacific Fishery Management Council (WPFMC), develop Fishery Management Plans[4] for federally managed domestic fisheries. Fishery Management Plans must be consistent with the following ten National Standards for fishery conservation and management contained in the MSA (section 301):

> **"National Standard 1**. Conservation and management measures shall prevent overfishing while achieving, on a continuing basis, the optimum yield from each fishery for the United States fishing industry.
>
> **National Standard 2.** Conservation and management measures shall be based upon the best scientific information available.
>
> **National Standard 3.** To the extent practicable, an individual stock of fish shall be managed as a unit throughout its range, and interrelated stocks of fish shall be managed as a unit or in close coordination.
>
> **National Standard 4.** Conservation and management measures shall not discriminate between residents of different States. If it becomes necessary to allocate or assign fishing privileges among various United States fishermen, such allocation shall be (A) fair and equitable to all such fishermen; (B) reasonably calculated to promote conservation; and (C) carried out in such manner that no particular individual, corporation, or other entity acquires an excessive share of such privileges.
>
> **National Standard 5.** Conservation and management measures shall, where practicable, consider efficiency in the utilization of fishery resources; except that no such measure shall have economic allocation as its sole purpose.
>
> **National Standard 6.** Conservation and management measures shall take into account and allow for variations among, and contingencies in, fisheries, fishery resources, and catches.
>
> **National Standard 7.** Conservation and management measures shall, where practicable, minimize costs and avoid unnecessary duplication.
>
> **National Standard 8.** Conservation and management measures shall, consistent with the conservation requirements of this Act (including the prevention of overfishing and rebuilding of overfished stocks), take into account the importance of fishery resources to fishing communities in order to (A) provide for the sustained participation of such communities, and (B) to the extent practicable, minimize adverse economic impacts on such communities.
>
> **National Standard 9.** Conservation and management measures shall, to the extent practicable, (A) minimize bycatch and (B) to the extent bycatch cannot be avoided, minimize the mortality of such bycatch.
>
> **National Standard 10.** Conservation and management measures shall, to the extent practicable, promote the safety of human life at sea."

LEGAL FRAMEWORK

In 1976, the U.S. established jurisdiction over fisheries in federal (national) waters through the MSA, which created eight quasi-federal regional councils to oversee fisheries in their respective areas.[5] This is the principal federal statute governing

[3] The MSA defines the term "commercial fishing" as, "…fishing in which the fish harvested, either in whole or in part, are intended to enter commerce or enter commerce through sale, barter or trade." "Recreational fishing" means, "…fishing for sport or pleasure." The MSA does not define the term "subsistence fishing."

[4] Refer to the Management Activities section for information on Fishery Management Plans.

[5] The eight U.S. regional Fishery Management Councils are the New England, Mid-Atlantic, South Atlantic, Caribbean, Gulf of Mexico, Pacific, North Pacific, and Western Pacific.

U.S. commercial and recreational marine fisheries. Originally enacted as the Fishery Conservation and Management Act, enacted in the midst of ongoing negotiations over the United Nations Convention on the Law of the Sea, the Act extended jurisdiction over fishery resources out to 200 nautical miles (nm) from a baseline (defined in the U.S. to be the mean lower low water line along the coast). National authority over fisheries applies generally seaward from three nm, while local authority generally is within three nm. Under the MSA, the WPFMC makes recommendations for the management of fisheries operating in the EEZ surrounding the U.S. insular possessions and on the high seas in the central and western Pacific Ocean. The main task of the WPFMC is to protect fishery resources while maintaining opportunities for domestic fishing at optimal levels of effort and yield. To accomplish this, the WPFMC monitors the performance of fisheries within its region and prepares, and when needed, modifies Fishery Management Plans (WPFMC, 2003). The National Marine Fisheries Service (NMFS) and the U.S. Coast Guard perform most of the day-to-day activities needed to implement, monitor and enforce the management measures included in Fishery Management Plans.

One U.S. fishery that is generally managed apart from the Fishery Management Plans is the purse seine fishery for tunas in the western and central Pacific, which began in 1976 (Coan *et al.*, 2004). In 1988, the U.S., 15 Pacific Island nations, and one Pacific Island territory[6] entered into the Treaty on Fisheries Between the Governments of Certain Pacific Island States and the Government of the United States of America (South Pacific Regional Tuna Treaty) (FFA, 1994; Coan *et al.*, 2004). The Treaty is implemented in the U.S. through the **South Pacific Tuna Act of 1988**. In addition to management measures established under the South Pacific Tuna Act, there is one management measure established under the MSA in the Pelagics Fishery Management Plan, which is relevant to the purse seine fishery. The measure prohibits vessels longer than 15.24 m (50 feet) in length, including US purse seine vessels, from fishing in the U.S. EEZ within approximately 92.6 km (50 nm) of American Samoa, which is located in the Treaty Area. The Treaty had an initial five-year term, was extended in 1993 for 10 years and most recently was extended in 2003 for another 10 years (Coan et al., 2004). The Treaty provides access by the U.S. purse seine fleet to fishing areas in the EEZs of the Pacific Island parties to the Treaty. The Treaty also places a cap on the number of purse seine vessels (45 U.S. purse seine vessels, five of which are reserved for joint ventures between U.S. and Pacific Island party interests), requires vessels to carry and operate "Vessel Monitoring Systems" (VMS) units (where purse seine vessels must be equipped with a satellite transponder that provides 'real-time' position updates and the track of the vessel movements), identifies closed areas where U.S. purse seine vessels are prohibited from fishing[7], requires 20 percent of trips to be monitored by onboard observers, and requires the fleet to collect information on catches (including bycatch and discards) by set, in vessel logbooks (NMFS, 2006c).

The **High Seas Fishing Compliance Act of 1995** is the U.S. enabling legislation to implement the provisions of the 1993 Agreement to Promote Compliance with International Conservation and Management Measures by Vessels Fishing the High Seas (FAO Compliance Agreement). All U.S. fisheries operating on the high seas, including

[6] Australia, Cook Islands, Federated States of Micronesia, Fiji, Kiribati, Marshall Islands, Nauru, New Zealand, Niue, Palau, Papua New Guinea, Solomon Islands, Tonga, Tuvalu, Vanuatu, Samoa and territory of Tokelau.

[7] Closed Areas established by the South Pacific Regional Tuna Treaty are those in which U.S. purse seine vessels are not allowed to fish (entry is permitted; however, fishing gear must be stowed when in a Closed Area). These areas generally include territorial seas, internal or archipelagic waters, waters in proximity to or used by domestic-based tuna fisheries in the Pacific Island Country, or waters near named offshore banks and reefs. In the Treaty, each of the 16 Pacific Island members has designated a portion of its waters as a Closed Area (NMFS, 2006c).

the U.S. western and central Pacific Ocean purse seine fishery, North and South Pacific albacore troll fisheries, Hawaii-based pelagic longline fisheries and American Samoa-based longline fishery, are subject to the High Seas Fishing Compliance Act and its implementing regulations. The regulations include provisions for the application of five-year non-transferable High Seas Fisheries permits, requirements for vessel identification, requirements for the reporting of catch and effort data, including information on interactions with seabirds and sea turtles, and requirements for compliance with international conservation and management measures.

In 2000 the U.S. enacted the **Shark Finning Prohibition Act of 2000**. The Act prohibits (i) 'finning sharks', defined as taking a shark, removing fins, and returning the remainder of the shark to the sea; (ii) possessing shark fins aboard a fishing vessel without the corresponding carcass; and (iii) landing shark fins without the corresponding carcass. The Act states establishes, "a rebuttal presumption that any shark fins possessed on board a U.S. fishing vessel, or landed from any fishing vessel, were taken, held, or landed in violation [of the Act] if the total wet weight of the shark fins exceeds 5 percent of the total dressed weight of shark carcasses landed or found on board the vessel."

There are also several non-fisheries-specific federal acts of legislation in the U.S. that influence fisheries management:

- **National Environmental Policy Act**: Requires that prior to taking any major or significant action that impacts the human environment, the federal action agency (the law applies only to federal agencies and the programs they fund) must follow a prescribed process to disclose to the public the environmental impacts of the proposed action through preparation of an Environmental Assessment, and if the impacts are significant, through an Environmental Impact Statement. A 'major' federal action includes federal agency regulation or prohibition of activities.
- **Administrative Procedure Act**: Details requirements for prior public notice and opportunity for comment when an agency is proposing or finalizing regulations.
- **Endangered Species Act**: Conserves and protects endangered and threatened species and their ecosystems. Section 7(a)(2) requires federal agencies to ensure that their actions are not likely to jeopardize endangered or threatened species or harm their critical habitat. Either NMFS or the U.S. Fish and Wildlife Service, depending on the species involved, prepares a Biological Opinion analyzing the impact of a proposed action on federally listed endangered and threatened species.
- **Marine Mammal Protection Act**: Manages and conserves marine mammals and marine mammal products. The Act prohibits "takes" of marine mammals, except under specific circumstances, where a take is "to harass, hunt, capture or kill or attempt to harass, hunt, capture or kill." If a fishery is likely to harm marine mammals, any "take" must be specifically authorized and impacts discussed in a document prepared to comply with the National Environmental Policy Act. The Act's goals are to ensure that marine mammal populations do not fall below optimum sustainable population levels, assumed to be between 50 percent and 70 percent of a stock's carrying capacity or historical population size, and are maintained as functioning elements of their ecosystems (Read, 2000). The Act addresses marine mammal bycatch in commercial fisheries, requiring periodic preparation of assessment reports of U.S. marine mammal populations with information on stock structure, abundance, trends, sources and magnitude of anthropogenic mortality, and evaluation of whether this mortality exceeds the Act's threshold levels. A maximum allowable level of anthropogenic mortality is determined for each stock of marine mammals, referred to as the Potential Biological Removal (PBR). The intent is to provide a conservative removal level that allows populations to recover or remain above their optimum sustainable population levels. Furthermore, the Act's Zero

Mortality Rate Goal requires mortality of marine mammals in commercial fisheries be reduced to negligible levels, with an operational goal of reducing bycatch levels to less than 10 percent of PBR. The Act also provides for the categorization of fisheries according to their likelihood of taking marine mammals. Vessels in fisheries categorized as have frequent (Category I) or occasional (Category II) bycatch must obtain authorization for these bycatch levels by registering with NMFS. If anthropogenic mortality levels from bycatch and other human sources of mortality exceed PBR for a marine mammal stock, then a take reduction plan is required. These plans identify regulatory and voluntary measures to reduce mortality and serious injury from anthropogenic sources to below PBR within six months of implementation (Read, 2000).

- **National Marine Sanctuaries Act**: Conserves national sanctuaries and the species that depend upon these marine areas to survive and propagate.
- **National Wildlife Refuge Administration Act**: The U.S. Fish and Wildlife asserts that this Act prohibits fishing activities without a permit within the seaward boundaries of National Wildlife Refuges in the Northwestern Hawaiian Islands, Midway Atoll, Baker Island, Howland Island, Jarvis Island, Johnston Atoll, Kingman Reef, Palmyra Atoll and Rose Atoll (Gilman, 2000).
- **Antiquities Act**: The designation of the Northwestern Hawaiian Islands as a National Monument in 2006 by President George W. Bush establishes the area as a marine protected area and prohibits commercial fishing effective 15 June 2011 (U.S. Office of the President, 2006). Regulations also create caps on the total annual landings of pelagic and bottomfish species (NOAA/FWS, 2006).

There is also local level legislation to manage commercial, recreational and subsistence marine capture fisheries under State, Territorial and Commonwealth jurisdiction. Legislation on fisheries management is in place in American Samoa with rules published at Title 24 of the American Samoa Administrative Code. Guam's legal framework over fisheries is piecemeal; there is no single comprehensive law on fisheries activities. Guam fisheries rules are published at Title 5 GCA Chapter 63. A Guam 1998 law created a system of 11 marine protected areas, which serves as the territories' main framework for managing nearshore fisheries. Hawaii's fisheries legislation is found at Title 13, Department of Land and Natural Resource, Subtitle 4, Fisheries. The Commonwealth of the Northern Mariana Islands' main fisheries legislation is Public Law 2-51.

STATUS OF FISHERIES

U.S. fisheries operating in the western and central Pacific Ocean range from small-scale artisanal methods within the U.S. EEZ to large industrial scale fisheries in international waters. The fish caught in the larger fisheries are marketed worldwide as high quality fresh fish and as canned and dried products. Within the region there is a particularly high demand for high quality fresh fish in addition to the range of products marketed locally in response to the demands from a culturally diverse population. Table 1 summarizes the domestic commercial fisheries of the U.S. Pacific Islands region, while Table 2 summarizes the landings and value of the largest fisheries from this region.

U.S. Western and Central Pacific Purse Seine Fishery

The U.S. purse seine fishery for tunas in the central-western Pacific began in 1976 (Coan *et al*., 2004). The U.S. fleet has undergone a decreasing trend in the number of vessels since 1995, but individual vessels have had an increase in fish carrying capacity (Coan et al., 2004). The U.S. western Pacific purse-seine fishery predominant retained catch is skipjack tuna (80 percent of retained catch), yellowfin tuna (18 percent of retained catch) and bigeye tuna (2 percent of retained catch). In 2005 the U.S. purse seine fleet made sets predominantly on free-swimming schools of tuna (about 40

TABLE 1
U.S. commercial marine capture fisheries operating in the western and central Pacific Ocean

Location	Pelagic	Bottomfish/Reef-fish	Crustaceans
High seas and EEZs of 17 nations – western and central Pacific	Purse-seine fishery primarily for skipjack tuna		
High seas – North and South Pacific	Troll fishery primarily for albacore tuna		
Hawaii and high seas	Longlining for swordfish and tunas Ika-shibi handlining for yellowfin Palua-ahi handlining for yellowfin and big eye tunas Trolling for tunas and other pelagics Pole-and-line fishing for skipjack (aku) (only 2 vessels)	Deep slope handline fishery for large snappers, jacks and grouper Various inshore fisheries for coral reef associated species	Trap fishery for spiny and slipper lobster (closed in 1999)
American Samoa and high seas	Longlining for tunas Trolling for tunas and other pelagics	Bottomfish handline large snappers, jacks and grouper Various inshore fisheries for coral reef associated species	
Guam	Trolling for tunas and other pelagics Longlining for tunas (1 vessel)	Shallow (100 – 500 ft) handline fishery for reef-dwelling snappers, groupers & jacks plus other inshore fisheries for coral reef associated species Deep-slope (500-700 ft) handline fishery for large snappers, jacks and grouper	
Northern Mariana Islands	Trolling for tunas and other pelagics	Deep slope handline fishery for large snappers, groupers Various inshore fisheries for coral reef associated species	

percent of sets) and on drifting Fish Aggregation Devices (FADs) (about 40 percent of sets), with the remaining 20 percent of sets made on logs (Secretariat of the Pacific Community, 2006). In 2003 the U.S. purse seine fleet delivered 89 percent of its catch to canneries in the Territory of American Samoa, 9 percent was landed in Thailand, and the remaining 2 percent was landed in Papua New Guinea and Colombia (Ito et al., 2004). Western and central Pacific purse seine fisheries predominantly catch 1-2 year-old skipjack (Secretariat of the Pacific Community, 2006). Sets made on FADs catch more small, juvenile fish than unassociated sets (sets made on free-swimming tuna schools) and sets on logs (Secretariat of the Pacific Community, 2006). From 2001-2005, the maximum percent of total skipjack catch discarded by the U.S. western Pacific purse seine fishery due to the size of the fish being too small for canning was 15 percent (Secretariat of the Pacific Community, 2006). In 2003 there was a total of 889 t of fish discarded in the U.S. western and central Pacific Ocean purse seine fishery, which consisted of 746 t of target tuna species (mostly skipjack tuna) that were too small to be marketable, and 143 t primarily of other finfish species, billfish, sharks and rays (Table 2) (Ito *et al.*, 2004).

U.S. Western and Central Pacific Pelagic Longline Fisheries

Pelagic longline fisheries in Hawaii and American Samoa dominate the fishing industries in these locations. The Hawaii-based longline fleet is comprised of two fisheries, one that targets bigeye, yellowfin and albacore tunas, and one that targets swordfish. Both fisheries sell their catches to the fresh fish market through a single public fish auction located in Honolulu. The American Samoa-based longline fleet targets albacore tuna and sells their catch to American Samoa-based canneries. Total fish discards in the Hawaii-based longline fleet was 21 percent in 2003, with blue shark

TABLE 2
Summary statistics for the main U.S. marine capture fisheries operating in the western and central Pacific Ocean (five-year average (1999-2003) and 2005)

Fishery	Landings (tonnes)	Ex-Vessel Value (2003 USD million)	Number of Active Vessels	Discarded Bycatch (tonnes)	Legal Framework
	5-year average 1999-2003 (2005)			2003	
U.S. western and central Pacific purse-seine	126 000 (74 287)	110 (n.a.)	31 (15)	889	South Pacific Tuna Act, High Seas Fishing Compliance Act, Western and Central Pacific Fisheries Commission (no statute yet)
Hawaii pelagic longline	9 800 (n.a.)	43 (n.a.)	111 (125)	2 605 [b]	MSA (WPFMC Pelagics FMP), High Seas Fishing Compliance Act, Western and Central Pacific Fisheries Commission, State of Hawaii laws and regulations
American Samoa pelagic longline	5 045 (n.a.)	7 (n.a.)	47 (37)	605 [c]	MSA (WPFMC Pelagics FMP), High Seas Fishing Compliance Act, Western and Central Pacific Fisheries Commission, Foreign license access agreements – to fish in EEZs of foreign Countries, American Samoa vessel registration law
U.S. North Pacific albacore troll fishery [a]	11 000 (53)	2.3 (n.a)	20 (15)	< 1	High Seas Fishing Compliance Act, MSA (Pacific Council Highly Migratory Species FMP), State of California landing laws
U.S. South Pacific albacore troll fishery	1 800 (700)	3.2 (n.a.)	24 (10)	< 1	High Seas Fishing Compliance Act
Nearshore artisanal troll and handline fisheries[d]	3 137 (n.a.)	11.4 (n.a.)	2 114 (n.a.)	Not known	Local legislation
Hawaii recreational fisheries	8 000 [e] (n.a.)	> 130 [f]	13 600 (n.a.)	Not known	Local legislation

Notes: n.a. = not available for 2005
a The five-year average from 1999-2003 is for the entire U.S. North Pacific albacore troll fishery while the 2005 value is just for U.S. North Pacific albacore troll vessels operating in the Western and Central Pacific Fisheries Commission Statistical Area.
b Estimate based on 98 135 number of discarded fish, 20.6% of total number of caught fish
c Estimate based on 44 701 number of discarded fish, 12.1% of total number of caught fish
d Artisanal troll and handline vessels that operate in the U.S. EEZ adjacent to American Samoa, Northern Mariana Islands, Guam and Hawaii, excluding recreational and subsistence vessels for which information is scarce.
e 2003 estimate for caught pelagic species.
f 1996 estimate of expenditures by the 260,005 Hawaii recreational anglers who conducted 2.5 million fishing trips that year (Maharaj and Carpenter, 1998). The estimate of expenditures is comprised of $96 million for food, lodging, transportation, bait, fuel, and equipment rental; $33 million for fishing equipment; and $949,000 for miscellaneous items (Maharaj and Carpenter, 1998).
Sources: WPRFMC, 2003; Ito et al., 2004; NMFS, 2006d

comprising 67 percent of this total, tunas comprising 18 percent and billfish making up the remaining 5 percent (Ito et al., 2004). The American Samoa-based longline fleet discarded 12 percent of their catch in 2003, with several pelagic fish including oilfish, mahimahi and wahoo comprising 43 percent of this total, tunas comprising 33 percent and sharks making up the remaining 24 percent (Ito *et al.*, 2004).

U.S. Pacific Albacore Troll Fisheries

The U.S. North Pacific albacore troll fishery is comprised of two fleets. One fleet is made up of smaller 'coastal' vessels that conduct multiple temporally short trips each season in the North Pacific off North America, and a second fleet is comprised of larger distant-water vessels that make a few long trips each season. Vessels are based out of California, Oregon and Washington of the west coast of the U.S Fishing grounds for these fleets range by longitude from the coast of North American west to about 170 deg. E, and by latitude from Mexico to Canada. During April – May, U.S. distant-water albacore troll vessels fish in the central Pacific Ocean near the International Date Line. In June and early July the distant-water fleet moves closer to the coast of North America, which is joined by the smaller 'coastal' vessel fleet (Stocker, 2005). Albacore tuna caught with troll gear accounts for about 78 percent of total U.S. North Pacific albacore landings (Stocker, 2005). The albacore caught in the U.S. North Pacific troll fishery are generally 3-4 years of age (Stocker, 2005).

The vessels that participate in the South Pacific U.S. distant-water albacore troll fishery also participate in the U.S. North Pacific fishery. The South Pacific season begins in December and lasts through March. The average number of vessels participating in the fishery from 1999-2003 was 24 (Table 2). Twelve vessels participated in the fishery in the 2001-2002 season, and 14 vessels participated in the 2002-2003 season. The main fishing grounds were between 35-45 deg. S latitude, and 120 deg. W to 180 deg. longitude for the 2002-2003 season (Ito *et al.,* 2004).

Distant Water Fishing Nation Fleets

In American Samoa, Guam, and the Mariana Islands, domestic tuna fisheries are limited, but landings, transshipment, and processing of tuna catches from distant water fishing nation (DWFN) fleets are extremely important. American Samoa has two canneries, which can tuna caught throughout the Pacific, and these are the main source of private sector employment for American Samoa and a significant employer of labor from independent Samoa. Further, re-provisioning of fishing vessels also adds to the revenues generated by tuna processing in this territory. These canneries are likely to close in the near future as a result of the North American Free Trade Agreement (NAFTA). In 2009 NAFTA will eliminate duties on canned tuna into the U.S. from NAFTA signatory countries. This will eliminate American Samoa's current advantage of duty-free access to the U.S. market due to differences in wage levels between American Samoa and the NAFTA Latin American countries. The minimum wage of cannery employees in American Samoa (US$3.20/hr) exceeds minimum wages in Mexico and Ecuador (US$0.70/hr). In Guam, large numbers of DWFN longliners are based and transship their catches. Guam and neighbouring Saipan have also seen the increasing development of airfreighting fresh tuna for the sashimi market in Japan and increasingly to a growing tuna and swordfish market in Europe. The development of air transhipment hubs in Guam and Saipan has also had a positive effect on the development of tuna fisheries in the neighboring Micronesian states of Palau, Federated States of Micronesia and the Marshall Islands, both domestic fisheries and through DWFN vessels home-porting in these islands. Pago Pago, American Samoa and Agana, Guam were ranked first and sixth, respectively, of all major U.S. ports for value of commercial landings in 2002. Honolulu, Hawaii was ranked 12th of U.S. ports in 2002 for value of commercial landings, a decline from recent years due to recent restrictions on the swordfish component of the Hawaii longline fleet.

U.S. Pacific Islands Nearshore Marine Capture Fisheries

Domestic commercial fishing activity in each region of the U.S. Pacific Islands also includes handlining for large snappers and groupers on the outer reef slope, and trolling, handlining and pole-and-line fishing for pelagic fish. The five year average for 1999 – 2003 for pelagic catch of combined Hawaii, Guam, CNMI, and American Samoa troll, handline, and pole-and-line (aku) fisheries was 3 137 tonnes with an ex-vessel value of US$11 483 000 (Table 2) (WPRFMC, 2003).

The trap fishery for spiny and slipper lobsters based in the remote Northwestern Hawaiian Islands was the only lobster fishery of any significance in the U.S. Pacific Islands region. This fishery has been closed since 1999. Harvests of spiny lobsters declined markedly between the 1980s and 1990s, with landing prior to the fishery closure amounting to about 118 tonnes with a value of US$1.2 million in ex-vessel revenue. The 2006 establishment of a National Monument in federal waters surrounding the Northwestern Hawaiian Islands as well as recent Hawaii State prohibitions against fishing in state waters off the Northwestern Hawaiian Islands means that this fishery is unlikely to resume.

Bottomfishing is conducted in Hawaii and the three U.S. territories but is only of major significance in Hawaii, and represents a fraction of total landed value of all

catches. Most bottomfish grounds in American Samoa, Guam, the Northern Mariana Islands and the Main Hawaiian Islands are within the 0-3 nm zone. There are also a wide variety of small-scale inshore fisheries for reef fish and other marine resources in all four island groups, mostly within 3 nm from shore and thus falling under local State or Territorial jurisdiction.

Recreational and Subsistence Fisheries

Although most people of the U.S. Pacific Islands do not need to fish to obtain food, recreational and subsistence fishing is still an extremely popular pastime and is a cultural link with the activities of pre-contact societies. Recreational fisheries in the region are locally managed. There are no requirements for the reporting of recreational catch and effort in American Samoa, Guam, Hawaii and the Northern Mariana Islands.

In Hawaii, the most studied recreational fisheries in the region, one quarter of the population participates in some form of fishing activity at least once per year. Recreational fishing in Hawaii involves not only State residents but also a significant number of the annual 6.6 million tourists who visit the State and want to experience game fishing in the tropical Pacific (WPRFMC, 2003).

Hawaii small boat registrations averaged 14 000 vessels of which about 400 were specified as being commercial for the five year period from 1999–2003 (Table 2). The Hawaii recreational creel survey estimates for 2003 found that there were 8 000 tonnes of pelagic species caught, of which 5 000 tonnes were yellowfin tuna (WPRFMC, 2003). Hawaii recreational boats primarily employ troll gear to target pelagic species. Boat and non-boat based recreational fishers are not required to obtain a state license or file catch reports, and there is no comprehensive creel survey for Hawaii recreational fishers, the result being that accurate estimates of total participants, effort, catch, and catch per unit effort (CPUE) for Hawaii recreational fisheries are not available. In 2001, NOAA Fisheries, in coordination with the Hawaii Division of Aquatic Resources, reinitiated a Marine Recreational Fisheries Statistical Survey following a 20-year gap. Many "recreational" fishermen in Hawaii sell surplus catch to cover trip expenses (Hamilton and Huffman, 1997). These fishermen do not classify themselves as commercial fishermen and may not obtain a State Commercial Marine License despite being required to by Hawaii State law. A 1995-1996 state-wide survey of small boat fishers classified 41 percent of respondents as expense fishers, those who reported that they sold fish only to try to cover expenses, 28 percent were classified as recreational fishers who did not sell any portion of their catch, and the remainder of respondents were full-time or part-time commercial fisheries who fish to generate personal income (Hamilton and Huffman, 1997).

One component of recreational fishing that has gained in popularity is tournament fishing. Most notable is the Hawaiian International Billfish Tournament conducted annually on the Big Island of Hawaii. Tournament fishing for pelagic species is also becoming increasingly important in American Samoa and Guam and accounts for a significant portion of domestic landings.

STATUS OF STOCKS

NMFS and WPRFMC manage 45 stocks and stock complexes in the western and central Pacific Ocean under five Fishery Management Plans: Pelagic Fisheries of the Western Pacific Region; Crustaceans Fisheries of the Western Pacific Region; Precious Coral Fisheries of the Western Pacific Region; Bottomfish and Seamount Groundfish Fisheries of the Western Pacific Region; and Coral Reef Ecosystems of the Western Pacific Region (NMFS, 2006a).

The MSA requires NMFS to report annually on the status of fisheries (Sec. 304(e)(1)). In the Pacific Islands region, of the 12 stocks and stock complexes with a known status in 2005, three were subject to overfishing, one was overfished, and none

TABLE 3
Stocks of the U.S. Pacific Islands region that are subject to overfishing, are overfished, or are approaching an overfished condition, 2005

Stock or Stock Complex	Region	Overfishing	Overfished	Approaching Overfished
Bigeye tuna	Pacific	X		
Yellowfin tuna[a]	Central Western Pacific	X		
Seamount groundfish complex[b]	Hancock Seamount		X	
Bottomfish multispecies complex	Hawaiian archipelago	X		

Notes:
a U.S. vessels from both the U.S. west coast and western Pacific catch yellowfin in the western and central Pacific Ocean (WCPO). Yellowfin tuna is managed under the Pacific Fishery Management Council's West Coast Highly Migratory Species FMP and the WPFMC's Western Pacific Pelagics FMP, however, most yellowfin tuna is caught by the purse seine fleet, which is not managed under either FMP. The determination of overfishing of the WCPO yellowfin stock is based on the August 2005 estimate provided by the Scientific Committee of the Western and Central Pacific Ocean Commission for the Conservation and Management of Highly Migratory Fish Stocks.
b Pelagic armorhead is assessed as the indicator species of a 3-species groundfish complex that includes raftfish and alfonsin.
Source: NMFS, 2006a

were approaching an overfished condition (Table 3) (NMFS, 2006a).[8] However, the status of 71 percent of the stocks and stock complexes managed by WPFMC was 'not known' and 4 percent was 'not defined' (NMFS, 2006a). For pelagic species alone, of the 30 species included in the WPFMC's Pelagics Fishery Management Plan, stock assessments exist for only seven.

Domestic determinations of overfishing of yellowfin and bigeye tuna under the MSA have occurred in the last two years. The Western and Central Pacific Fisheries Commission has yet to adopt reference points for overfishing or formally find that overfishing is occurring for any stocks. There are signs that North Pacific albacore and blue marlin may also reach overexploitation in the future

A seamount bottom trawl fishery in the southern Emperor Seamount chain and Northern Hawaiian Ridge targeting armorhead was conducted by the former Soviet Union starting in 1967 and by Japan in 1969. In 1977 the U.S. included the southernmost seamounts of the Northern Hawaiian Ridge in the U.S. EEZ, which has enabled the U.S. to manage a small portion (approximately 5 percent) of the historic armorhead trawl fishing grounds. Initially the U.S. permitted Japanese vessels to continue to fish for armorhead in the U.S. EEZ with an annual armorhead harvest cap. Then, in 1986, when catch and effort data from the Japanese fishery showed that the armorhead seamount complex was overfished, the WPFMC amended the Bottomfish Fishery Management Plan to institute a six year fishing moratorium on the Hancock Seamount. The moratorium has been renewed every six years and remains in place. Research has shown few signs of recovery by the seamount populations at Southeast Hancock Seamount as well as outside the U.S. EEZ. It is unlikely that Hancock Seamount armorhead stock conditions will improve if grounds outside the U.S. EEZ are not sustainably managed (WPFMC, 2004).

In 2005, NMFS made a determination that overfishing is occurring for the bottomfish complex in the Hawaiian Islands, which occurs in both federal and state waters (WPFMC, 2006). The overfishing condition is a result of excess fishing effort in the main Hawaiian Islands, and the WPFMC had recommended 15 percent or greater reductions in fishing mortality in the main Hawaiian Islands bottomfish complex,

[8] Under the MSA, 'overfishing' is occurring for a stock when the fishing mortality rate is above a prescribed fishing mortality threshold specified in its management plan (for most stocks this threshold is the maximum sustainable yield), i.e., the number of fish being taken by a fishery is too high for that stock. A stock that is 'overfished' has a biomass level that is below a prescribed biological threshold specified in its fishery management plan, i.e., the biomass of a stock is too low. A fishery is 'approaching an overfished condition' when, based on trends in fishing effort, fishery resource size, and other factors, it is estimated that the fishery will become overfished within two years. (NMFS, 2006a,b)

which has been determined to be the requisite level of reduction needed to end overfishing (WPFMC, 2006).

Based on a 2001 assessment of various qualitative indicators of capacity levels of U.S. western and central Pacific Ocean fisheries, the Hawaii-based pelagic charter fishery, Northwestern Hawaiian Islands bottomfish fishery, American Samoa-based bottomfish fishery and Guam-based bottomfish fishery exhibit overcapacity (NMFS, 2001a). Quantitative criteria have not been assessed to confirm the 2001 qualitative assessment. The Northwestern Hawaiian Islands bottomfish fishery will be closed in June 2011 due to the designation of the area as a National Monument in 2006 (NOAA/FWS, 2006).

MANAGEMENT ACTIVITIES

Fishery Management Plans

In the United States, eight regional councils implement the MSA, under federal oversight, by developing Fishery Management Plans (FMPs), which are subject to approval by the Secretary of the Department of Commerce, to ensure sustainable and socially optimal use of the nation's living marine resources in that region. When needed, management measures included in FMPs are implemented through federal regulations published at Title 50, Chapter VI of the Code of Federal Regulations. Council members are appointed by the Secretary of the Department of Commerce and must be individuals who, by reason of their occupational or other experience, scientific expertise, or training, are knowledgeable regarding the conservation and management, or the commercial or recreational harvest, of the fishery resources of the geographical area concerned. The goal for membership on the regional councils is to create a fair and balanced apportionment, based on a rotating or other basis of the active participants in the commercial and recreational fisheries. Decisions are made by majority vote. In the case of the WPFMC, four of the 13 voting Council members are typically heads of local resource agencies (currently from the Hawaii Department of Land and Natural Resources, American Samoa Department of Marine and Wildlife Resources, Commonwealth of the Mariana Islands Department of Land and Natural Resources and Guam Office of the Governor). The other nine voting members are the Administrator of the Pacific Islands Regional Office of NMFS and eight people nominated by the Governors of the four island areas. The eight Governor-nominated members currently include two fishing industry representatives (Hawaii Longline Association and Guam Fishermen's Cooperative Association) and a recreational fishing representative (Recreational Fishing Alliance). No environmental Non Governmental Organizations have held seats on the WPFMC. There are also three non-voting members of the council who may represent other government departments with responsibilities in this area, such as the commander of the responsible Coast Guard district, U.S. Fish and Wildlife Service and U.S. State Department.

Each regional council has various responsibilities. These include: preparing and submitting fishery management plans; creating amendments to each plan (promptly, whenever changes substantially affect the fishery(ies) for which the plan was developed); preparing comments on any application for foreign fishing; conducting public hearings to allow all interested persons an opportunity to be heard in the development of fishery management plans and amendments with respect to the administration and implementation; reviewing and revising on a continuing basis the assessments and specifications made with respect to the optimum yield from, the capacity, and extent to which fish processors will process harvested fish; and determining the total allowable level of foreign fishing within its geographical area of authority.

In addition to Federal review, the public is invited to comment on FMPs. A Federal Register notice states that the FMP or amendment is available and that written information, views or comments of interested persons on the plan or amendment may

be submitted to the Secretary during a 60-day comment period. Next, if rulemaking is required, NMFS publishes a proposed rule and provides another public comment period, and then a final rule is issued. In addition, if NMFS prepares an Environmental Impact Statement (under the National Environmental Policy Act, Section 2), they first prepare a draft document and provide for a public comment period on the draft. NMFS also makes a determination as to whether an Endangered Species Act consultation is needed for the proposed action. Also, NMFS conducts a Regulatory Flexibility Act analysis to examine any economic impacts on small businesses and other small entities and how to mitigate any adverse impacts where possible. This analysis also has a public comment period. Other analytical tasks include regulatory impact review under Executive Order 12866, issuance of fishery impact statements (to assess, specify and describe any social impacts on fishing communities and participants) under MSA, essential fish habitat determination under MSA, and a Coastal Consistency Determination under the Coastal Zone Management Act. Required provisions for FMPs under the MSA are listed in Annex I. These provisions include requirements for including a description of the fishery; identification of the maximum sustainable yield and optimum yield from the fishery, and whether these levels will be met by domestic vessels; identification of essential fish habitat and measures to minimize degrading this habitat; identification of requisite scientific information to implement the plan; inclusion of a fishery impact statement that describes the effects of the plan's management measures on fishermen and fishing communities; definitions of overfished, approaching an overfished condition, and overfishing for the fishery; and a description of a reporting method to assess bycatch and measures to manage bycatch.

The WPFMC is in the process of developing place-based Fishery Ecosystem Plans to replace its species-based plans, and has tentatively approved four archipelagic Fishery Ecosystem Plans for American Samoa, the Marianas (Guam and Northern Mariana Islands), Hawaii, and U.S. Remote Island Areas. A fifth Pacific Pelagic Fishery Ecosystem Plan will supplant the existing Pelagic Fishery Management Plan.

Management Measures for the Hawaii-based Longline Fleet

Several management measures have been recommended by WPFMC, approved by NMFS (acting on behalf of the Secretary of Commerce) for the Hawaii-based pelagic longline tuna and swordfish fisheries.

- **Limited Entry and Limit on Vessel Length**: Managers have adopted restrictions on the number and length of vessels, to limit the fleet's capacity. In 1991 measures were adopted to make the fishery limited entry, which were amended in 1994 to create a formal limited entry permit program, which capped the number of transferable permits at 164. Also, in 1994, managers adopted a measure that made vessels longer than 30.8 m (101 feet) ineligible for permits.
- **Closed Areas**: In 1992 managers adopted measures to address gear conflicts, creating a closed area to longline vessels around the main Hawaiian Islands (NMFS, 2001d). Another closed area to the Hawaii-based longline fleet was established in 1991 to avoid interactions between the longline vessels and the Hawaiian Monk Seal (*Monachus shauinslandi*), creating a 'protected species zone' within 80.4 km (50 miles) of the Northwestern Hawaiian Islands. Since the creation of this closed area there have been no known longline interactions with monk seals (NMFS, 2001d).
- **Mandatory VMS and Onboard Observer Coverage**: Enforcement of the two longline exclusion zones is accomplished through required use of VMS. The VMS requirement for the Hawaii longline fishery was adopted in December 1994. This was the first requirement for VMS in the U.S. There is currently 100 percent onboard observer coverage of the Hawaii-based pelagic longline swordfish fishery and about 20 percent coverage of the longline tuna fishery. NMFS began to collect observer data for the Hawaii-based longline fleet in 1994.

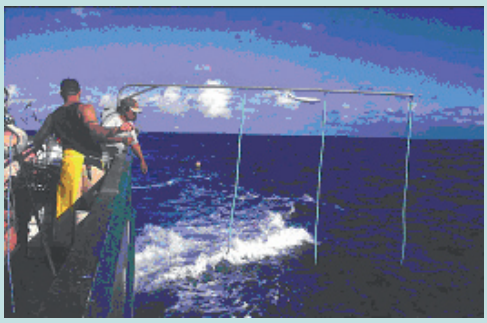
BOX 1

Managing Seabird Bycatch in Hawaii-Based Pelagic Longline Fisheries

The Hawaii-based pelagic longline tuna and swordfish fisheries are faced with strong economic and social incentives to reduce bycatch of sensitive species groups, including seabirds. Through cooperative research, fishery management authorities and the longline industry have identified and adopted the use of effective and commercially viable methods to minimize interactions with seabirds (McNamara *et al.*, 1999; Boggs, 2001; Gilman *et al.*, 2003, 2005, 2006a, 2006b, in Press a).

The Hawaii longline swordfish and tuna fleets are each anticipated to annually take, through injury or mortality, one federally listed endangered Short-tailed Albatross. If more than one Short-tailed Albatross is observed to interact with gear of the Hawaii longline tuna or swordfish fleet in a single year, resource management agencies consult to determine if the fleet should be required to employ additional seabird avoidance measures. The fleet has not had any observed captures of a Short-tailed Albatross since observer coverage began in 1994. Tens of Laysan and Black-footed albatrosses are now annually captured by the fleet, down from thousands before fishery management authorities required the fleet to employ seabird avoidance methods and restricted swordfish fishing effort. Since June 2001 management authorities have required the Hawaii longline tuna and swordfish fisheries to employ a number of measures intended to reduce seabird bycatch, including weighted branch lines, thawed and dyed bait, and offal discards in certain geographical areas, and night setting for the swordfish-targeting component of the Hawaii-based longline fleet.

Between 1999 and 2003, cooperative research was conducted through the collaboration of the Hawaii Longline Association, fishery management authorities, and the Blue Ocean Institute (an environmental organization) to test various strategies (blue-dyed bait, towed buoy, offal discards, streamer line, underwater setting chute, and side setting) to reduce seabird bycatch in longline gear (see photos below). From these experiments it was determined that several seabird bycatch avoidance methods are capable of nearly eliminating bird captures in longline fisheries when effectively employed. These experiments focused on identifying the most effective seabird bycatch abatement methods that are also economically viable and practical. Fishery management authorities amended regulations on measures for the Hawaii longline fleet to reduce seabird bycatch based on these research results (NMFS, 2005). The research experiments on techniques to reduce seabird bycatch in the Hawaii longline fisheries provide an example of how research can be designed to collect information on economic viability, practicality, and enforceability (Gilman et al., In Press b). Analyzing differences in alternative seabird avoidance methods' effect on bait retention, hook setting rates, and target fish catch-per-unit-of-effort (CPUE); operational benefits and costs; time and money to adopt and employ; and enforceability is of high interest to industry, fishery management authorities, and other stakeholders. The Hawaii Longline Association became an active participant in addressing seabird bycatch problems by instituting and participating in research and commercial demonstrations and supporting adoption of regulations based on best available science before restrictions and possible closures were imposed on the fleet. By being directly involved in the development and testing of seabird avoidance methods, Hawaii longline fishers developed a sense of ownership for these tools and now support their required use.



PHOTOS BY NIGEL BROTHERS

Cooperative research being conducted on an underwater setting chute (left) and side setting with a bird curtain (right) to reduce seabird bycatch in the Hawaii-based pelagic longline fisheries.

- **Seabird and Sea Turtle Avoidance Measures**: Measures to manage interactions between the Hawaii-based longline fleet and seabirds were adopted in June 2001 and have been subsequently amended to account for the results of new research on the efficacy and commercial viability of seabird avoidance methods (Gilman et al., 2005). The success of these management measures is described in Box 1. Measures to reduce interactions with sea turtles were adopted in May 2004. The Hawaii-based longline swordfish fishery was closed for over two years and is now subject to strict management measures, including prescribed use of 10 degree offset 18/0 circle hooks and fish bait (vessels had previously used narrower 9/0 J hooks with squid bait), restricted annual effort, annual limits on loggerhead and leatherback turtle captures, and 100 percent onboard observer coverage, due to turtle interactions (NMFS, 2004b). Since these measures have been adopted, there have been significant reductions in sea turtle and shark capture rates and reduced proportion of deeply hooked turtles, which may increase post release survival prospects, without comprising target species catches (Gilman *et al.*, 2006b).
- **Restrictions on Shark Finning:** The Shark Finning Prohibition Act of 2000 prohibits the practice of retaining shark fins and discarding the associated carcass in U.S. fisheries.

Management Measures for the American Samoa-based Longline Fleet

Until very recently, a unique feature of the American Samoa longline fishery has been a bimodal longline fleet, split between large (> 15 m) conventional monohull longline vessels and small outboard motor-powered locally built aluminium *alia* catamarans < 12 m in length, from which longline gear is set and hauled manually. The fishery began based on *alia* catamarans, but the recent expansion was a result of the entry of large conventional longline vessels into the fishery. Management authorities instituted measures to ensure the productivity of the *alia* pioneer fleet in the face of entry from larger monohull vessels. The first of these was the development of 50 nautical mile area closures to all pelagic fishing vessels > 15 m around the American Samoa islands (Tutuila and Manu'a Islands and Rose Atoll), which minimized competition between the two fleet segments and allocated nearshore areas to the less mobile *alias* (WPFMC, 2005). The second was a limited entry program, which caps vessel numbers, but allows for the upgrade of vessels from *alia* to larger monohulls by American Samoa fishermen (WPFMC, 2005). As of 2006, there are only two active *alia* vessels in American Samoa, due in part to rising fuel costs and low tuna catch rates close to port.[9] No regulatory measures are currently in place to avoid and minimize interactions between the American Samoa-based longline fleet and sea turtles, but the fleet is required to employ management measures for the handling and release of caught turtles to improve the turtles' post release survival prospects.

Management Measures for the U.S. Western and Central Pacific Ocean Purse Seine Fishery

The Pacific Islands Forum Fisheries Agency (FFA), based in Honiara, Solomon Islands, serves as the Treaty Administrator for Pacific Island parties to the South Pacific Tuna Treaty. U.S. regulations implementing the South Pacific Tuna Act of 1988 are found at 50 CFR Subpart D. The regulations include vessel license requirements, reporting requirements, vessel and gear identification, compliance with closed areas, and compliance with onboard observer coverage.

[9] Personal communication, Ray Tulafono, Director, American Samoa Department of Marine and Wildlife Resources, March 2006.

BOX 2

Learning from Missteps to Sustainably Manage Sea Cucumber Fisheries in the Northern Mariana Islands

Sea cucumbers are collected primarily from the tropical Indo-Pacific region to supply the demand for dried beche-de mer or trepang, imported primarily by Hong Kong, Singapore, and Taiwan. Sea cucumber fisheries are typically short-lived pulse fisheries. The biology of sea cucumbers makes them highly susceptible to overfishing, resulting in long-term recruitment failure (Trianni, 2003). In the U.S. Commonwealth of the Northern Mariana Islands, commercial sea cucumber fisheries were permitted by the local Department of Natural Resources, Division of Fish and Wildlife to occur in 1995 and 1996 on the islands of Rota and Saipan with limited collection on Tinian (Trianni and Bryan, 2004). Managers did not obtain pre-harvest population estimates of the target species (surf redfish, *Actinopyga mauritiana* with an incidental take of black teatfish, *Holothuria whitmaei*), but instead managed the fisheries based on data collected on catch and effort to determine if overfishing was occurring. Analysis of these catch-effort statistics revealed that 78 - 90 percent of the initial population sizes were taken, prompting managers to close the fishery in January 1998 (Trianni, 2003). Based on this experience, managers now obtain pre-harvest sea cucumber population estimates to enable the establishment of sustainable quotas for Tinian Island in order to prevent repeating population depletion when the cucumber fishery resumes.

Management Measures for the U.S. Distant Water North and South Pacific Troll Fisheries

The U.S. North Pacific albacore troll fishery is managed under a West Coast Highly Migratory Species Fishery Management Plan and associated regulations. The U.S. South Pacific albacore troll fishery, because fishing generally does not occur within the U.S. EEZ, is not managed under a MSA Fishery Management Plan. Vessels participating in both fisheries are issued a license under the High Seas Fishery Compliance Act to authorize fishing on the high seas. Regulations under this Act require licensed vessels to maintain and file logbooks for their fishing on the high seas (NMFS, 2004d).

Management Measures for Small-Scale Nearshore Artisanal, Recreational, and Subsistence Fisheries

American Samoa

A commercial fishing license is required to commercially fish in American Samoa waters. Regulations ban the use of SCUBA-assisted fishing, in response to an increase in nighttime artisanal coral reef spear fishing (Turgeon *et al.*, 2002). Regulations also prohibit the use of explosives, poisons, and electrical devices to take fish or shellfish in American Samoa waters. Regulations create restrictions on the design of hand nets, cast or throw nets, gill nets, seines or surround nets, and fish traps. A permit is required to use a fish weir, to use a trap for commercial purposes, to collect ornamental shells for commercial purposes, and for the commercial harvest of coral. Regulations restrict the collection of coral, mangrove crabs, slipper and spiny lobsters, and giant clams and prohibit the taking of sea turtles and marine mammals. There are four marine protected areas in American Samoa. American Samoa fishing regulations prohibit all commercial fishing, the collection of certain marine fauna, including all invertebrates, and prohibit the use of spear guns, fishing nets, fishing poles, handlines, trawls and bang sticks within the Fagatele Bay National Marine Sanctuary, located on the main island of Tutuila. Fishing is also prohibited in the federally-managed Rose

Atoll National Wildlife Sanctuary (Turgeon et al., 2002). Rose Atoll is located 160 km from the nearest population center in the Manua Islands of American Samoa.

Guam

In Guam, a 1998 law established 11 territorial Marine Protected Areas, five of which are no-take reserves. The five no-take preserves comprise about 12 percent of Guam's coastline (Turgeon et al., 2002). There are rules creating a permit requirement to collect coral; no permits have been issued since 1982. The same title also regulates fishing net mesh sizes used in coastal waters and identifies illegal chemicals and explosives. Regulations create size restrictions and seasons for certain aquatic fauna (title 16 GCA) (Turgeon *et al.*, 2002).

Hawaii

Commercial fishers in the State of Hawaii are required to obtain a commercial license and report catch, however underreporting is common and the quality and quantity of the data collected has varied over the years (Moffitt *et al*., 2006). There are no requirements for licenses or reporting by recreational and subsistence fishers, resulting in large uncertainty in local catch statistics (Moffitt *et al*., 2004). Creel surveys in the main Hawaiian Islands indicate that the recreational catch exceeds the reported commercial catch, and recreational fishers likely take a higher diversity of species with a wider array of gear types than does the commercial sector (Turgeon *et al.*, 2002). Regulations create several restrictions and requirements including: size limits for certain species, numerous gear restrictions (e.g., prohibits the use of drift gill nets, explosives, electro-fishing devices, poisons, and intoxicants in local waters), a requirement for a commercial marine license for any sale of captured fish, a license requirement for commercial collection of fish to be used as live bait using a small mesh net, a requirement for vessel registration for bottomfish fishing, a permit requirement to use a small mesh net to collect aquarium fish, and a per-person non-commercial bag limit for certain bottomfish species. A recent law prohibits the capture of female spiny lobsters, Kona crabs, and Samoan crabs. Insufficient resources for enforcement and nominal fines for violations of fishery regulations results in a prevalent lack of compliance with regulations (Turgeon *et al.,* 2002). A law adopted in 2000 bans the practice of shark finning from within state waters or the landing of shark fins regardless of where the sharks were caught. Various types of protected areas have been established in Hawaii, including Marine Life Conservation Districts, Fisheries Management Areas and the Northwestern Hawaiian Islands State Marine Refuge. No-take areas account for only 0.3 percent of state waters. Recreational and marine tourism activities are permitted in theses no-take areas (Turgeon *et al.*, 2002). A law passed in 1998 established the West Hawaii Regional Fishery Management Area, under which 35 percent of the western Hawaii Island coastline has been designated as Fish Replenishment Areas. Within these areas fish feeding by commercial tour operators is restricted, there are restrictions on non-selective fishing methods, and there is augmented enforcement of prohibitions on aquarium fish collection in areas where these restrictions are in place (Turgeon *et al*., 2002).

Northern Mariana Islands

Commonwealth of the Northern Mariana Islands regulations include prohibitions on the use of explosives, poisons, electric shocking devices, collecting live coral, using gillnets, using fish weirs, and using SCUBA or hookah when fishing. A license is required to fish with a net. Regulations restrict the design of throw nets, scoop nets, surround nets and set nets. A lack of institutional and financial capacity hampers enforcement of these fishery regulations (Turgeon *et al*., 2002). There are several no-take reserves in the Commonwealth of the Northern Mariana Islands, with a total area

BOX 3

Sea Turtle and Marine Mammal Bycatch in the U.S. Western and Central Pacific Ocean Purse Seine Seine Fishery

Onboard observer data collection protocols did not accurately document bycatch interactions until 2003 (NMFS, 2006c). In 2003 five turtles (one hawksbill, one green, and three unidentified species) were observed caught in 698 observed sets out of a total of 3 204 sets, and no turtles were observed caught in 2004 in 801 observed sets out of a total of 2 656 sets (NMFS, 2006c). Observer data held by the Secretariat of the Pacific Community identify 104 sea turtles captures in 27 644 observed sets by purse seine vessels (of all nations) operating in the western and central Pacific Ocean from 1994 to 2004 (Molony, 2005). However, these data are based on low rates of observer coverage and suffer from deficiencies in the design of observer data collection protocols for most of the period (Molony, 2005; NMFS, 2006c).

Observer data show that only 40 sets of a total of 6 058 observed sets made by U.S. purse seine vessels in the western and central Pacific Ocean from 1997-2002 were associated with a live whale, however the observer data collection protocols are not well defined for determining what constitutes a set associated with a live whale, the observers did not identify the whales to the species level, and it is unclear how many of the whales were caught and died as a result of the interaction with the fishing gear (NMFS, 2006c). Molony (2005) reports that in the 27 644 observed purse seine sets (by vessels of all nations) in the western and central Pacific Ocean between 1994 and 2004, a total of 687 marine mammals in 137 sets were reported by observers as captured. It is unclear if the observer coverage was temporally or spatially representative for the fleet in these two years.

of about 9.6 km^2 (Turgeon *et al.*, 2002). The Commonwealth of the Northern Mariana Islands has eight marine protected areas, of which four (three off of Saipan, one off of Rota) are established as no-take areas for all marine resources under local public laws. There are three areas where collection of topshell gastropods (trochus) is prohibited, and two areas where the collection of sea cucumbers is prohibited. A 1998 public law created a ten-year moratorium on the collection of sea cucumbers and seaweeds (Turgeon *et al.*, 2002). Regulations create a size limit for lobsters, prohibit the taking of lobsters carrying eggs, and prohibit collection by methods other than by hand. It is illegal to export marine aquarium fish, a permit is required to collect aquarium fish for personal use, and there are restrictions on collection methods.

Monitoring Activities

U.S. purse seine fishing in the western and central Pacific Ocean is monitored by NMFS in collaboration with FFA using logbook data collected under the South Pacific Tuna Treaty, cannery landings receipts, direct sampling of landings at the primary landing port in Pago Pago, American Samoa, USA, where 89 percent of landings were made in 2003 (Coan *et al.*, 2004), and from onboard observer data. The South Pacific Tuna Treaty has a target onboard observer coverage rate of 20 percent, to be administered by FFA (NMFS, 2006c). 25.2 percent of sets were observed from 1997-2004 (NMFS, 2006c). Mandatory logbooks contain details on set-level fishing effort, catches by species, fishing location and other data (Ito et al., 2004). Box 3 describes the state of knowledge of sea turtle and cetacean interactions in the U.S. purse seine fishery.

The NMFS Pacific Islands Regional Office and Pacific Islands Fisheries Science Center monitor U.S. Hawaii and American Samoa-based longline fisheries using onboard observer coverage; mandatory logbooks; federal, state and territorial port

BOX 4
Seabird and Sea Turtle Bycatch in the American Samoa-based Longline Fishery

As onboard observer coverage of the American Samoa-based longline fleet was only recently initiated, there is insufficient information to assess the existence of problematic bycatch in this fishery. Fishery management authorities have not instituted precautionary measures to reduce bycatch with sensitive species groups. While it is unlikely that the American Samoa-based longline fleet has a serious seabird bycatch problem (Gilman, 2006), records of sea turtle interactions exist in the logbook data: from 1992-1999 logbook data identify the capture of six sea turtles (NMFS, 2001d). However, logbook data are known to be an unreliable source of information on bycatch, particularly of protected species. Existing observer coverage to date of six trips (138 sets of 400 322 hooks) from 21 April to 23 August 2006 identified the capture of two green sea turtles. This exceeds the annual incidental take level of one hardshelled turtle under the Endangered Species Act, triggering a federal government consultation process, in part, to determine what conservation and management measures need to be instituted.

BOX 5
Cetacean Interactions in the Hawaii and American Samoa-based Longline Fisheries

Interactions with cetaceans in the Hawaii and American Samoa-based longline fisheries cause large economic problems (e.g., from loss and damage of caught fish and gear), and can result in ecological problems (e.g. infrequent entanglement and hooking of cetaceans) (Gilman et al., In Press c). It is unclear if cetacean interactions in these fisheries are causing population-level effects or if measures to manage cetacean interactions are needed and feasible (Gilman *et al*., In Press c). The Hawaii-based and American Samoa-based longline fisheries are listed as Category I (annual mortality and serious injury of a marine mammal stock is > to 50 percent of the PBR level) and III (annual mortality and serious injury in a given fishery is < one percent of the PBR level) fisheries, respectively, under the Marine Mammal Protection Act (NMFS, 2006b).

sampling; and reports of fish landed and sold to wholesale fish dealers. Currently there is 100 percent observer coverage of the Hawaii-based longline swordfish fleet, about 20 percent coverage of the Hawaii-based longline tuna fleet, and 10 percent coverage of the American Samoa-based longline fleet. NMFS is in the process of determining a target observer coverage rate for the American Samoa-based longline fleet in order to obtain necessary data to analyze effects of the fishery on endangered sea turtles.[10] Observer coverage of this fleet began only recently in April 2006. Logbooks contain information on fishing effort, time and geographical location of fishing, details of fishing gear, and the number of fish and protected species (seabirds, sea turtles, marine mammals) caught. Box 4 summarizes what is known about bycatch of seabirds and sea turtles in the American Samoa-based longline fishery, and Box 5 summarizes observations of cetacean interactions in the Hawaii and American Samoa-based longline fisheries.

The NMFS Southwest Region monitors U.S. distant-water North and South Pacific albacore troll vessels using mandatory and voluntary logbooks, cannery receipts and

[10] Personal communication, Alvin Katekaru, U.S. National Marine Fisheries Service, Pacific Islands Regional Office, 16 October 2006.

landing records, port sampling, and in the North Pacific fishery there has been occasional onboard observers (Ito *et al*., 2004; NMFS, 2004d). Logbooks provide daily effort and catch data, geographical location, and sea surface temperature. Port samplers and onboard observers collect length frequency and other biological data (Ito *et al.*, 2004). Observer data indicate that there is minimal discarded bycatch in the North Pacific U.S. albacore troll fishery, with occasional albacore discards of undersized or damaged fish, and occasionally due to spoilage from refrigeration problems (Childers, 2005).

Optimum yield, which is identified as a U.S. fisheries management policy in MSA National Standard 1, is defined for individual fisheries in Fishery Management Plans. Despite the MSA's intent of having optimum yield be an overarching policy objective, due to the complexities of determining optimum yield for straddling and migratory stocks, optimum yield is defined in such a way that it is very flexible and non-confining in the U.S. western and central Pacific region. In the case of the WPFMC's Pelagics Fishery Management Plan, optimum yield is expressed in a qualitatively and vague manner; consequently it is difficult to assess whether optimum yield is being achieved for the fisheries managed under this plan.

COSTS AND REVENUES OF FISHERIES MANAGEMENT

The staff and operational (equipment, travel, supplies, overhead) costs for national fisheries management in the U.S. western and central Pacific Ocean by the National Marine Fisheries Service (Pacific Islands Regional Office and Pacific Islands Fisheries Science Center) and WPFMC for MSA-managed fisheries (excludes management costs for the purse seine and distant water troll fisheries) was US$37.3 million in 2003 (NMFS/WPRFMC, 2004). This amount excludes costs for temporary and contract employees, including onboard observers, who are hired through a contract with a private company. The two National Marine Fisheries Service offices based in Honolulu receive most of their operational funding from government base salary and expense funds, Congressional appropriations, and grants from other various Government agency grant programs. The WPRFMC receives annual base operating funds from Congressional appropriations through the National Oceanic and Atmospheric Administration, and funds are also provided directly from the National Oceanic and Atmospheric Administration to support work on pressing issues (NMFS/WPRFMC, 2004). The national fishery management authorities do not recover costs for management from licenses or resource rents.

A large portion of funding for operating costs for local fishery management agencies (American Samoa Department of Marine and Wildlife Resources, Guam Division of Aquatic and Wildlife Resources, Hawaii Division of Aquatic Resources, Northern Mariana Islands Division of Fish and Wildlife) is provided by the U.S. Fish and Wildlife Service under the Federal Aid in Sport Fish Restoration Act. of 1950, as amended in 1984. This Act provides for funding from revenues collected from the manufacturers of fishing rods, reels, creels, lures, flies and artificial baits. There is an excise tax on these items, which is paid to the U.S. Treasury. The program is a cost-reimbursement program, where the state covers the full amount of an approved project then applies for reimbursement through Federal Aid for up to 75 percent of the project expenses. The state must provide at least 25 percent of the project costs from a non-federal source. Appropriate State agencies are the only entities eligible to receive grant funds. Each State's share is based 60 percent on its licensed fishers and 40 percent on its land and water area. No State may receive more than five percent or less than one percent of each year's total apportionment. Guam, American Samoa, and the Northern Mariana Islands each receive one-third of one percent.

Estimates are available of gross and net revenues, costs and impacts on the economy of the Hawaii-based pelagic longline fisheries (Hamilton and Huffman, 1997). Cost data have not been collected since a study conducted in 1994-1995. Costs per trip using 1993 data result in an average profit to the vessel owner of US$1 186 per trip or about US$1.3 million per year for the entire fleet on average and after taxes, which is about 2.3 percent of gross sales. Total wages and profit for the estimated 616 participants in the 1993 fishery amount to US$15.7 million, or about one-third of the gross revenue. Indirect economic impacts account for an additional estimated 89 jobs for a total estimated 705 jobs (Hamilton and Huffman, 1997). Similar information on costs and revenues are not available for other U.S. marine capture fisheries of the central and western Pacific Ocean.

IMPLEMENTATION OF GLOBAL FISHERIES MANDATES AND INITIATIVES

The High Seas Fishing Compliance Act is the U.S. enabling legislation to implement the provisions of the 1993 Agreement to Promote Compliance with International Conservation and Management Measures by Vessels Fishing the High Seas (FAO Compliance Agreement). The U.S. has fully implemented the FAO Compliance Agreement since 1996. The High Seas Fishing Compliance Act applies to any person subject to the jurisdiction of the U.S. when fishing on the high seas, and has a scope of liability that includes fishing without a permit, fishing in contravention of conservation measures or permit conditions, obstructing justice, or possessing or trading any living marine resources taken in violation of the Act. The U.S. is not a party to the 1982 United Nations Convention on the Law of the Sea (UNCLOS), but regards its provisions relating to the conservation and management of living marine resources as reflecting customary international law (U.S. Department of State, No Date). The U.S. ratified the 1995 Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 Relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks (UN Fish Stocks Agreement), which entered into force on 11 December 2001.

The U.S. also implements many non-binding international instruments, including the FAO Code of Conduct for Responsible Fisheries and the UN General Assembly Resolution 46/215, which created a moratorium on the use of large-scale high seas driftnets. The U.S. has also adopted National Plans of Action (U.S. Department of State, No Date; NMFS, 2001b, 2001c, 2004a) to implement the Food and Agriculture Organization of the United Nation's International Plans of Action on the (i) Management of Fishing Capacity; (ii) to Prevent, Counteract and Eliminate Illegal, Unregistered and Unregulated Fishing; (iii) Conservation and Management of Sharks; and (iv) Reducing Incidental Catch of Seabirds in Longline Fisheries.

PARTICIPATION IN REGIONAL FISHERY BODIES

The U.S. is party to many international agreements that have established Regional Fishery Bodies (RFBs) and is a member of many of these RFBs. Table 4 summarizes the U.S. membership of RFBs with jurisdiction over western and central Pacific Ocean fisheries, as well a number of other organizations with an interest in the region's fisheries.

SUMMARY AND CONCLUSIONS

The U.S. is a world leader in adopting the rebuilding provisions of the Sustainable Fisheries Act of 1996, however, the sustainable management of highly migratory species will require successful international initiatives. Fishery management authorities and fishing industries of the western and central Pacific Ocean are presented with a substantial, relatively recent, challenge to (i) reduce the exploitation of Pacific bigeye

TABLE 4
Summary of the mandate and area of competence of Regional Fishery Bodies with an interest in western and central Pacific Ocean fisheries, U.S. membership status and any U.S. enabling legislation and regulations.

Organization	Convention Area or Area of Interest	Mandate/Mission	U.S. Membership and Implementation
Asia-Pacific Economic Cooperation (APEC)	Asia-Pacific Region	Encourage a smooth flow of trade and investment between nations in the Asia-Pacific region. A Fisheries Working Group, formed in 1991, promotes the conservation and sustainable use of fisheries resources.	The U.S. is a member.
Pacific Islands Forum Fisheries Agency (FFA)	South Pacific region. There is no precise definition of this area by line of longitude and latitude. It coincides mainly with FAO Statistical Areas 71 and 81. Established by the 1979 South Pacific Forum Fisheries Agency Convention.	Conservation and optimum utilization of the species covered by the Convention; the promotion of regional cooperation and coordination in respect of fisheries policies; securing of maximum benefits from the living resources of the region for their peoples and for the region as a whole and in particular the developing countries; and facilitating the collection, analysis, evaluation and dissemination of relevant statistical scientific and economic information about the resources covered by the Convention. Assists Members to conserve and manage their tuna stocks, for example, in its early days by advising emerging Pacific Island countries in establishing their EEZs.	The U.S. is not a member.
Secretariat of the Pacific Community (SPC)	Western and central Pacific Ocean	The Oceanic Fisheries Program of SPC gathers fishery statistics and conducts research, including stock assessments for major Western Pacific tuna stocks, and advises members.	The three U.S. Pacific territories (American Samoa, Guam and the Northern Mariana Islands) have member status separate from U.S. membership.
Western and Central Pacific Fisheries Commission (WCPFC)	Western and Central Pacific Ocean (Article 3 of the Convention provides a precise delimitation of the Convention Area). Established by the 2000 Convention on the Conservation and Management of the Highly Migratory Fish Stocks of the Western and Central Pacific Ocean.	To ensure, through effective management, the long-term conservation and sustainable use of highly migratory fish stocks in the western and central Pacific Ocean in accordance with UNCLOS and the UN Fish Stocks Agreement.	The U.S. is a Cooperating Non-Member, and as such has the same obligations as Members. The U.S. signed the Treaty and Congress has ratified the Treaty, but the instrument has not yet been deposited. U.S. enabling legislation is pending.

and yellowfin tuna populations to reverse overfishing conditions; (ii) sustainably manage other highly migratory species to provide optimum yield; (iii) assess and mitigate problematic bycatch of seabirds, sea turtles, cetaceans and sharks in longline and purse seine fisheries; and (iv) minimize bycatch and discards of juvenile target and other fish species in the purse seine fishery. It also remains a challenge to (v) sustainably manage nearshore marine capture fisheries in the face of growing populations and innovation of more efficient and damaging fishing methods.

The global overexploitation of fisheries witnessed over the past 50 years and the widespread inability of regional and national management authorities to implement measures to reverse these trends (Millennium Ecosystem Assessment, 2005; Safina et al., 2005) warrants caution in making projections for the ability of future fisheries management in the western and central Pacific Ocean to prevent highly migratory target species from becoming overfished and remedy problematic bycatch. Given the ability to learn from the missteps of fishery management authorities and fishing industries from other regions, we can be cautiously optimistic that marine capture fisheries of the western and central Pacific will be sustainably managed for the long term benefit of the fishing and seafood industries, fishing communities, and seafood consumers. In addition to this political will to address overexploitation, there is an urgent need for an increase in research on stock assessments to allow managers to identify the status of all exploited stocks.

Long-term observer coverage is needed for the U.S. purse seine fishery operating in the western and central Pacific Ocean to accurately assess the existence of any bycatch problems because abundance of bycatch species complexes in different areas of the tropical Pacific may exhibit high inter annual and seasonal variability (Gilman, 2006). Observer data would also ideally be collected to be evenly distributed by areas and seasons to assess whether or not there is problematic bycatch (Gilman, 2006). Fishery management authorities need to conduct a more comprehensive assessment of interactions with sea turtles and cetaceans to determine the need to institute measures to reduce bycatch. An assessment is also needed to determine the need for reducing the bycatch and discards of juvenile target and other fish species in western and central Pacific Ocean purse seine fisheries (Ito et al., 2004; Secretariat of the Pacific Community, 2006). Once a large enough sample size is collected, analysis of observer data for the American Samoa-based longline fishery will determine the need to institute measures to reduce interactions with sea turtles and possibly other problematic bycatch. The approach taken to manage bycatch of seabirds and sea turtles in the Hawaii-based longline fishery, where cooperative research identified effective and commercially viable solutions, is a model for addressing problematic bycatch.

Overfishing of nearshore marine resources is prevalent near population centers of the U.S. Pacific Islands (Turgeon et al., 2002). Improving data collection programs, local legal and management frameworks, monitoring, and enforcement of existing rules governing commercial, recreational and subsistence fisheries in nearshore waters is a priority. The management of land-based point and non-point sources of pollution (e.g., sewage discharge, runoff from unpaved roads), which adversely affect coastal ecosystems, is also a priority. The recent move towards ecosystem-based management approaches may contribute to improving the management and conservation of coastal ecosystems in the U.S. western and central Pacific Ocean.

The move by the WPFMC towards an ecosystem-based approach to fisheries management promises to bring many benefits to coastal and marine ecosystems, the fishing industry and seafood consumers. However, the current dearth of information on the health of most managed stocks as well as the lack of information on nearshore commercial, recreational and subsistence fisheries makes ecosystem-based management in this region a challenge. Furthermore, ecosystem-based management frameworks for coastal and marine ecosystems need to be as integrated as are the interconnected ecosystems and human forces. The WPFMC's focus on only one activity, fishing, that affects coastal and marine ecosystems, is counter to the principle of ecosystem-based management. For instance, if the WPFMC's management framework does not consider the effects of land-based activities on coastal ecosystems, it will be unable to adequately manage and conserve fishery resources. An integrated, ecosystem-based management approach manages all interrelated elements (natural resources, environmental processes, human activities, socioeconomic factors, and political factors) that affect an area under a single unifying approach, through the collaboration of all management authorities and stakeholders, to conserve biodiversity and protect ecological integrity, and to sustain the provision of valued services and products indefinitely. An underlying principle of ecosystem-based management is that ecosystem functioning, anthropogenic forces, and the sustainability of human societies are interconnected and should be holistically managed through the collaboration of all groups (Gilman, 2002).

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ANNEX I.

REQUIRED PROVISIONS FOR FISHERY MANAGEMENT PLANS UNDER SECTION 303 OF THE MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT

Any fishery management plan which is prepared by one of the eight regional Fishery Management Councils, or by the Secretary of the Department of Commerce, with respect to any fishery, shall:

- Contain a description of the fishery, including, but not limited to, the number of vessels involved, the type and quantity of fishing gear used, the species of fish involved and their location, the cost likely to be incurred in management, actual and potential revenues from the fishery, any recreational interest in the fishery, and the nature and extent of foreign fishing and Indian treaty fishing rights, if any;
- Assess and specify the present and probable future condition of, and the maximum sustainable yield and optimum yield from, the fishery, and include a summary of the information utilized in making such specification;
- Assess and specify (i) the capacity and the extent to which fishing vessels of the United States, on an annual basis, will harvest the optimum yield; (ii) the portion of the optimum yield which, on an annual basis, will not be harvested by fishing vessels of the United States and can be made available for foreign fishing; and (iii) the capacity and extent to which United States fish processors, on an annual basis, will process that portion of such optimum yield that will be harvested by fishing vessels of the United States;
- Specify the pertinent data which shall be submitted to the Secretary with respect to commercial, recreational, and charter fishing in the fishery, including, but not limited to, information regarding the type and quantity of fishing gear used, catch by species in numbers of fish or weight thereof, areas in which fishing was engaged in, time of fishing, number of hauls, and the estimated processing capacity of, and the actual processing capacity utilized by United States fish processors;
- Consider and provide for temporary adjustments, after consultation with the Coast Guard and persons utilizing the fishery, regarding access to the fishery for vessels otherwise prevented from harvesting because of weather or other ocean conditions affecting the safe conduct of the fishery;
- Describe and identify essential fish habitat for the fishery based on the guidelines established, minimize to the extent practicable adverse effects on such habitat caused by fishing, and identify other actions to encourage the conservation and enhancement of such habitat;
- Assess and specify the nature and extent of scientific data which is needed for effective implementation of the plan;
- Include a fishery impact statement for the plan or amendment which will assess, specify, and describe the likely effects of the conservation and management measures recommended on (i) the participants in the fisheries and fishing communities affected by the plan or amendment; and (ii) participants in the fisheries conducted in adjacent areas under the authority of another Council, after consultation with that Council;
- Specify objective and measurable criteria for identifying when the fishery to which the plan applies is overfished (with an analysis of how the criteria were determined and the relationship of the criteria to the reproductive potential of stocks of fish in that fishery) and, in the case of a fishery which the Council or the Secretary has determined is approaching an overfished condition or is overfished, contain conservation and management measures to prevent overfishing or end overfishing and rebuild the fishery;

- Establish a standardized reporting methodology to assess the amount and type of bycatch occurring in the fishery and include conservation and management measures, to the extent practicable, in the following priority: minimize bycatch, minimize the mortality of bycatch which cannot be avoided;
- Assess the type and amount of fish caught and released alive during recreational fishing under catch and release fishery management programs and the mortality of such fish, and include conservation and management measures that, to the extent practicable, minimize mortality and ensure the extended survival of such fish;
- Include a description of the commercial, recreational, and charter fishing sectors which participate in the fishery and, to the extent practicable, quantify trends in landings of the managed fishery resource by the commercial, recreational, and charter fishing sectors; and
- To the extent that rebuilding plans or other conservation and management measures which reduce the overall harvest in a fishery are necessary, allocate any harvest restrictions or recovery benefits fairly and equitably among the commercial, recreational, and charter fishing sectors in the fishery.

APPENDIX TABLES

Current Management of Marine Capture Fisheries in the U.S. Western and Central Pacific Ocean

Level of Management	% Fisheries Managed	% with Fisheries Management Plan	% with Published Regulations	Trends in the number of Managed Fisheries over ten yrs. (increasing/ decreasing/unchanged)
National/Regional	100	62.5	100	Unchanged
Local				
American Samoa	20	0	40	Unchanged
Guam	25	0	25	Unchanged
Hawaii	20	0	20	Unchanged
N. Mariana Is.	50	0	50	Unchanged

Summary information for three largest fisheries (by volume) in the U.S. Western and Central Pacific Ocean (Five-year average 1999-2003)

Category of Fishery	Fishery	Volume tonnes	Value* mil USD	% of Total Volume Caught**	% of Total Value Caught**	Covered by a Management Plan? (Yes/No)	# of Participants	# of Vessels
Industrial	1 Purse seine	126 000	110	81.9	66.5	No	n.a.	31
	2 Hawaii-based longline	9 800	43	6.4	26.0	Yes	485	111
	3 American Samoa-based longline	5 045	7	3.3	4.2	Yes	185	47
Artisanal	1 Pelagic (troll and handline)	3 137	11.4	72.7	n.a.	No	n.a.	2 114
	2 Bottomfish	381	2.7	8.8	n.a.	Yes***	n.a.	452
	3 Reef	295	n.a.	6.8	n.a.	No	n.a.	n.a.
Recreational	1 Pelagic (troll and handline)	> 8 000	n.a.	n.a.	n.a.	No	n.a.	> 13 600
	2 Bottomfish	n.a.	n.a.	n.a.	n.a.	No	n.a.	n.a.
	3 Reef	n.a.	n.a.	n.a.	n.a.	No	n.a.	n.a.

Notes: n.a. = not available
* Value in 2003 U.S. Dollars.
** % values are based on totals for each category of fishery.
*** Commercial bottomfish fisheries in federal waters (seaward of 3 nm) are covered under a WPFMC fishery management plan. Commercial bottomfish fisheries are under a management plan in federal waters and in the State of Hawaii, but not in Guam, American Samoa or the Commonwealth of the Northern Mariana Islands.

Use of Fishery Management Tools within the three largest fisheries in the U.S. Western and Central Pacific Ocean

Category of Fishery	Fishery	Restrictions				License/ Limited Entry	Catch Restrictions	Rights-based Regulations	Taxes/ Royalties	Performance Standards
		Spatial	Temporal	Gear	Size					
Industrial	1 Purse seine	Yes	No	No	No	Yes	No	Yes	No	No
	2 Hawaii-based longline	Yes	No	Yes	No	Yes	No	No	No	No
	3 American Samoa-based longline	Yes	No	No	No	Yes	No	No	No	No
Artisanal	1 Pelagic (troll and handline)	Yes	No	Yes	Yes	No	Yes	No	No	No
	2 Bottomfish	Yes	No	No	No	Yes	No	No	No	No
	3 Reef	Yes	No	Yes	Yes	No	Yes	No	No	No
Recreational	1 Pelagic (troll and handline)	Yes	No	Yes	No	No	Yes	No	No	No
	2 Bottomfish	Yes	No	Yes	No	No	Yes	No	No	No
	3 Reef	Yes	No	Yes	Yes	No	Yes	No	No	No

Costs and Funding Sources of Fisheries Management within the three largest fisheries in the U.S. Western and Central Pacific Ocean

Category of Fishery	Fishery	Do Management Funding Outlays Cover			Are Management Funding Sources From		
		R&D	Monitoring & Enforcement	Daily Management	License fees in fishery	License fees from other fisheries	Resource rents
Industrial	1 Purse seine	Yes	Yes	Yes	No	No	No
	2 Hawaii-based longline	Yes	Yes	Yes	No	No	No
	3 American Samoa-based longline	Yes	Yes	Yes	No	No	No
Artisanal	1 Pelagic (troll and handline)	No	Yes	Yes	No	No	No
	2 Bottomfish	No	Yes	Yes	No	No	No
	3 Reef	No	Yes	Yes	No	No	No
Recreational	1 Pelagic (troll and handline)	No	Yes	Yes	No	No	No
	2 Bottomfish	No	Yes	Yes	No	No	No
	3 Reef	No	Yes	Yes	No	No	No

Compliance and Enforcement within the three largest fisheries in the U.S. Western and Central Pacific Ocean

Category of Fishery	Fishery	VMS	On-board observers	Random dockside inspections	Routine inspections at landing sites	At-sea boarding and inspections	Other (please specify)
Industrial	1 Purse seine	Yes	Yes	Yes	Yes	No	
	2 Hawaii-based longline	Yes	Yes	Yes	Yes	No	Aerial surveillance
	3 American Samoa-based longline	No	Yes	Yes	Yes	No	
Artisanal	1 Pelagic (troll and handline)	No	No	Yes	Yes	No	
	2 Bottomfish	No	No	Yes	Yes	No	
	3 Reef	No	No	No	No	No	
Recreational	1 Pelagic (troll and handline)	No	No	No	No	No	
	2 Bottomfish	No	No	No	No	No	
	3 Reef	No	No	No	No	No	

Capacity Management within the three largest fisheries in the U.S. Western and Central Pacific Ocean

Category of Fishery	Fishery	Does overfishing exist?	Is fleet capacity measured?	Is CPUE increasing, constant or decreasing?	Have capacity reduction programmes been used?	If used, please specify objectives of capacity reduction programme
Industrial	1 Purse seine	Yes	Yes	Variable	No	
	2 Hawaii-based longline	Yes	Yes	Variable	No	
	3 American Samoa-based longline	Yes	Yes	Variable	No	
Artisanal	1 Pelagic (troll and handline)	Yes	Yes	Constant	No	
	2 Bottomfish	Yes	Yes	Decreasing	No	
	3 Reef	n.a.	No	n.a.	No	
Recreational	1 Pelagic (troll and handline)	Yes	No	n.a.	No	
	2 Bottomfish	Yes	No	n.a.	No	
	3 Reef	n.a.	No	n.a.	No	

United States of America (Pacific Coast)

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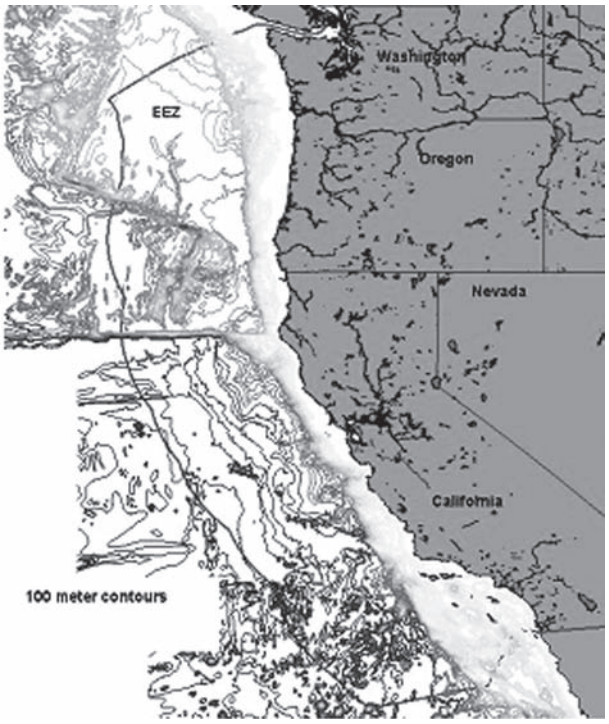
INTRODUCTION

This review is structured to address marine capture fisheries in the United States of America (US) by treating the national level affairs that are common to all regions of the country, then the regional (Pacific Coast) affairs, followed by the local level, represented by the individual Pacific Coast states. In some areas of the US, but not the Pacific Coast, there is even a finer level of treatment, as counties and municipalities may be involved in management of fisheries within their jurisdictions. This review covers the national policies and legislation that provide the basis for federal actions in fisheries, but focuses on the Pacific Coast Region of the United States. This Region (see figure) is comprised of the coastal states of Washington, Oregon, and California and their bordering inland states.

The US EEZ is the largest in the world, encompassing 1.7 times the area of the United States and territorial landmass. The EEZ is located 3–200 nautical miles (n.mi.) seaward of the 48 contiguous states, Alaska, Hawaii, and US-affiliated islands except 9-200 n.mi. off Texas, the Florida Gulf Coast, and Puerto Rico. The EEZ has at least eight Large Marine Ecosystems (NE & SE continental shelf, Caribbean Sea, Gulf of Mexico, California Current, Insular Pacific Hawaiian, Gulf of Alaska, and Eastern Bering Sea). Fisheries developed in the United States as each area was settled, whether the original aboriginal peoples or the post Columbian arrivals. Inshore marine fisheries are managed by states, or regional Marine Fisheries Commissions, which usually coordinate state actions, and even municipalities or counties in some areas. Fisheries in the EEZ beyond state jurisdiction (three nautical miles in most states) are the responsibility of the federal system, whose primary institutions are the eight Fishery Management Councils and the National Marine Fisheries Service (NMFS) of the National Oceanic and Atmospheric Administration (NOAA) in the Department of Commerce. Information about this management system is available at http://www.nmfs.noaa.gov/sfa/sfweb/index.htm.



THE US PACIFIC COAST AND EEZ. CREDIT: USGS

The major Pacific Coast landed species are Pacific salmon, coastal pelagic fishes, groundfish, Pacific halibut, and nearshore resources. There is underutilization of some species and also low abundance of others. Most stocks, including all five salmon species, are fully or over utilized. Depressed

OCEANSART.US

Many types of West Coast fish are sold at the famous Pike Street Market in Seattle

salmon production is partly due to generally unfavorable ocean conditions off the Pacific Coast since the late 1970's and other factors such as habitat degradation. Some stocks are depleted. NMFS has listed 26 Pacific Coast salmon populations as endangered or threatened under the Endangered Species Act. Salmon recovery will take many years and requires the cooperative efforts of federal, state, local, tribal, and private entities. Coastal pelagic fishes typically fluctuate widely in abundance, and most stocks are low in abundance relative to historical levels and are fully utilized. The Pacific sardine population has been increasing after decades of low abundance. Jack mackerel and northern anchovy are underutilized.

The groundfish fishery harvests a vast array of bottom-dwelling species from Washington to California. Some are overexploited, some have experienced periods of low recruitment, and some are underutilized. Pacific whiting dominates the commercial groundfish catch. Rockfishes and lingcod also support popular recreational fisheries. Certain stocks, such as Pacific Ocean perch, need to be rebuilt following overutilization and a period of poor recruitment. Shortbelly rockfish is underutilized because of a lack of market. Many rockfish species live a long time (in some cases up to 80 years or more) and may take many years to mature and reproduce, making stock recovery even more challenging. NMFS works in partnership with the industry, universities, and state, local, and tribal agencies to collect basic scientific data about the species. Also, there are observers on fishing vessels, transmitting real-time data electronically to NMFS.

Pacific Coast shellfish resources are diverse and important. Shrimp, crab, clam, and abalone fisheries are relatively small in tonnage, but contribute substantially to fisheries value due to the high prices they command. Most shellfish species are fully utilized. Recreational fisheries are important, especially in southern California. A wide variety of species is taken, and the recreational catch of some greatly exceeds the commercial catch. Many are nearshore resources. Gamefishes such as albacore, billfishes, rockfish, and salmon are highly prized. Recreational crabbing, clam digging, and abalone diving activities are also significant. While the economic value of recreational fisheries is clearly important, the catch is also significant. In most inland US fisheries and even in several marine fisheries, recreational anglers harvest as much or more fish than commercial fishermen.

NATIONAL POLICY FRAMEWORK

Concern for the sustainability of fish resources was evident as early as 1871, when Congress wrote that "... the most valuable food fishes of the coast and the lakes of the United States are rapidly diminishing in number, to the public injury, and so as materially to affect the interests of trade and commerce...." However, it was not until 1976, with the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA), that the federal government began actively managing fisheries from 3 to 200 miles off the coast for most species and beyond 200 miles for anadromous species such as salmon. Prior to the MFCMA, the federal fisheries role mostly consisted of

research, exploratory fishing, gear development, financial assistance, voluntary seafood inspection programs, and participation in international agreements and treaties. The legislation has been revised every few years to strengthen or add new provisions (such as protecting Essential Fish Habitat) and to improve administrative processes. In some cases there have been amendments to incorporate international fisheries protocols, either by name or in substance. However, the basic tenets have not changed.

In recent years, NOAA's vision for increasing the Nation's wealth includes maintaining fishery resources over time to provide Americans with both commercial and recreational fishing opportunities and a safe supply of high quality seafood. This vision incorporates both biological and economic sustainability: stock levels maintained at biologically healthy levels; optimal harvest of fish over time, using the least-cost levels of capital, labor, and other resources; and equitable allocation of the harvest between user groups (NOAA, 1996).

In partnership with the regional fishery management councils, NMFS is working to prevent overfishing and restore overfished stocks. The NMFS objectives are to reduce fishing intensity, monitor the fisheries, and implement measures to reduce bycatch and protect essential fish habitat. NMFS is establishing marine protected areas and individual fishing quotas, reducing fishing capacity, and implementing ecosystem-based fishery management. Recent initiatives include streamlining regulatory operations, implementing the recommendations of independent review bodies, and expanding research (NOAA, 2004a).

The MSFCMA is the primary fisheries law in the US. It mandates strong action to conserve and manage fishery resources that contribute to the food supply, economy, and health of the Nation. Its provisions require NMFS to use the best scientific information available, end overfishing, rebuild all overfished stocks, and conserve essential fish habitat through research and consultations on federal and state actions which may adversely affect such habitat. The MSFCMA and related documents are available at http://www.nmfs.noaa.gov/sfa/index.htm.

The ten national standards in the Act provide the roadmap for United States marine fisheries actions. Any FMP prepared, and any regulation promulgated to implement any such plan:

- Shall prevent overfishing while achieving optimum sustained yield from each fishery.
- Shall be based upon the best scientific information available.
- Shall manage, to the extent practicable, an individual stock of fish as a unit throughout its range, and interrelated stocks of fish as a unit or in close coordination.
- Shall not discriminate between residents of different States. If it becomes necessary to allocate or assign fishing privileges among United States fishermen, such allocation shall be fair and equitable to all, reasonably calculated to promote conservation, and no particular individual, corporation, or other entity may acquire an excessive share of privileges.
- Shall, where practicable, consider efficiency in the use of fishery resources; except that no measure shall have economic allocation as its sole purpose.
- Shall take into account and allow for variations among, and contingencies in, fisheries, fishery resources, and catches.
- Shall, where practicable, minimize costs and avoid unnecessary duplication.
- Shall take into account the importance of fishery resources to fishing communities in order to provide for the sustained participation of such communities, and minimize adverse economic impacts on such communities.
- Shall, to the extent practicable, minimize bycatch and to the extent bycatch cannot be avoided, minimize the mortality of such bycatch
- Shall, to the extent practicable, promote the safety of human life at sea.

BOX 1
Sustainable Fisheries Act

The passage of the Sustainable Fisheries Act in 1996, reauthorizing the MSFCMA, brought a major change to management of US living marine resources. It strengthened authority to address human impacts on the marine environment in recognition of the need to prioritize essential fish habitat, bycatch reduction, fishing communities and fishing vessel safety and it contained stringent requirements to rebuild overfished fisheries and prevent overfishing.

The SFA greatly improved the mechanisms available for managing fisheries resources and established a standardized process for rebuilding stocks. From 1997 to 2003, overfishing has been corrected a total of 31 times, and stocks have been rebuilt above their biomass thresholds a total of 30 times. The success stories outweigh the backsliding on about half as many stocks and include many valuable commercial or recreational species such as Atlantic redfish, Georges Bank winter flounder, Atlantic swordfish, sandbar shark, blacktip shark, Pacific sardine, Pacific (chub) mackerel, several Pacific salmon stocks, summer flounder, and South Atlantic yellowtail snapper.

The MSFCMA interacts with other important federal and state laws such as the Marine Mammal Protection Act, the Endangered Species Act, the Coastal Zone Management Act, and the National Marine Sanctuaries Act.

Major revisions to the MSFCMA were passed in 1982 and 1996 after extensive hearings and negotiations. The general trend has been towards more effective legislation to ensure the rebuilding and sustainability of fisheries. Further modifications are in preparation. These changes are generally improvements, updates to reflect changed technologies and circumstances and clarifications rather than changes to the fundamental system of management.

LEGAL FRAMEWORK

Under the MSFMCA, eight Regional Fishery Management Councils are charged with preparing Fishery Management Plans (FMPs), using the best scientific information available, for the fisheries needing management within their areas of authority. After the Councils prepare FMPs that cover domestic and foreign fishing efforts, the FMPs are submitted to the Secretary of Commerce (Secretary) for approval and implementation. The Department, through NMFS agents and the United States Coast Guard, is responsible for enforcing the law and regulations. Enforcement is done at sea using USCG vessels and USCG and NMFS personnel, and onshore using NMFS enforcement agents. Agreements with 21 coastal states and three United States territories make available over 2 000 state resource officers. In addition to patrol services, automated surveillance is provided through the use of satellite-based vessel monitoring systems, which currently monitor over 2 200 vessels. These systems provide for reporting catch, identifying vessels, reporting a ship's position, routine communications and communicating emergencies. The NMFS budget for Enforcement in Fiscal Year 2005 was about $70 million. This does not include grants to states and funds of the USCG.

The Secretary is empowered to prepare FMPs in the Atlantic and Gulf of Mexico for highly migratory species. Where no FMP exists, Preliminary Fishery Management Plans (PMPs), which only cover foreign fishing efforts, are prepared by the Secretary for each fishery for which a foreign nation requests a permit. The Secretary is also empowered to produce an FMP for any fishery that a Council has not duly produced. In this latter case, the Secretary's FMP covers domestic and foreign fishing.

The MSFCMA requires the eight Fishery Management Councils to establish scientific and statistical committees, an industry advisory panel, other advisory panels if appropriate, and the involvement of the public, including the fishing industry, and to develop Fishery Management Plans (FMPs). The Department of Commerce (NOAA/NMFS) has a defined time period in which to accept or reject the proposed FMP and attendant regulations proposed by the Council.

NMFS and the Councils have developed and implemented 46 Fishery Management Plans to manage domestic fishery stocks, under the authority of the MSFCMA. Of these, two are Secretarial FMPs developed by NMFS for Atlantic highly migratory species. Another nine Plans are under development. The Plans and links to further information are available through http://www.nmfs.noaa.gov/sfa/domes_fish/FMPS.htm.

All Council-prepared FMPs must be reviewed for approval by the Secretary of Commerce and then implemented by NMFS through federal regulations. The FMPs are amended by the Councils and the amendments are submitted for approval under the same Secretarial review process as new FMPs. Most of the FMPs have been amended since initial implementation.

Inshore fisheries within states or tribal lands are managed by the states or tribes amid conflicting pressures for allocations among the recreational and commercial interests as well as concerns from environmental groups. In many areas, there are also concerns over water quality and thus there is constant monitoring of contaminants in the various species. There is also an important impact from invasive species that have taken over certain ecological niches and caused damage, or changes, to fisheries of all types.

Coordination among Pacific Coast states on inshore fisheries and among the state and federal managers (NMFS and the Councils) is facilitated by the Pacific States Marine Fisheries Commission. Similar federally chartered interstate commissions exist in other regions. The legal basis is the Interjurisdictional Fisheries Act of 1986 (16 *U.S.C.* 4101-4107; Pub. L. 99-659, as amended[1], which establishes Regional State Fisheries Commissions to coordinate state management of their fisheries. Congress appropriates funding for a major share of the budget of the commissions and this is reflected in the NMFS budget. Each Pacific Coast state has established a fisheries commission within the state to manage its fisheries under a broad mandate. Various legislation, and/or rules, and/or public referenda votes within the three coastal states establish the foundation for regulations. The legislation, rules and further information are available at the following web sites:

- California: http://www.leginfo.ca.gov/cgi-bin/calawquery?codesection=fgc&codebody=&hits=20
- Oregon: http://www.dfw.state.or.us/OARs/OARs.html (Rules of the Fisheries Commission)
- Washington: http://wdfw.wa.gov/com/comintro.htm

This complex system of management is driven by the concept of the United States being a sum of its 50 states. The individual states treasure their rights to manage their own affairs and to turn over responsibilities only when it is clearly for the common good. The MSFCMA recognizes this with the explicit statement "(a) IN GENERAL.-- (1) Except as provided in subsection (b), nothing in this Act shall be construed as extending or diminishing the jurisdiction or authority of any State within its boundaries. (SEC. 306. STATE JURISDICTION 16 U.S.C. 1856 97-453, 98-623). Within state waters (out to 3 miles on the Pacific Coast), the states are the primary managers unless some over arching federal law comes into play, such as the Endangered Species Act or the Marine Mammal Protection Act. There is an advantage to this

[1] Available: http://www4.law.cornell.edu/uscode/html/uscode16/usc_sup_01_16_10_61.html.

system in that rules can be tailored for cultural differences among the states as well as to the differences within the species groups and their habitats. A major disadvantage is that a species that migrates closely along the shore could have differing quotas and size limits (or none) among the different states it traverses. One state could take all available fish before they reached their spawning area in another state. This is a good example of where an Interstate Fisheries Commission is necessary to coordinate management among the states.

STATUS OF FISHERIES IN THE COUNTRY

National Fisheries

United States fisheries are pursued on all coasts in coastal waters and in the US exclusive economic zone (EEZ), as well as in many rivers and lakes throughout the country. The catch combined with aquaculture production makes the United States the fourth ranked fishing nation with 4 percent of the landings in 2002. In 2003, finfish accounted for 87 percent of US landings but only 45 percent of the value (NOAA, 2004b).

In the United States as a whole, fisheries are less than one percent of the economic activity, but in many coastal areas, fisheries constitute a major, or even the principal economic base. Even in major cities such as Boston, Seattle, and San Diego, it is easy to see from a quick tour of the waterfront the major impact that fishing has on the local economy. In some cases, one can see what appears to be endless marinas filled with expensive sport fishing boats and in others there are wharfs upon wharfs of small and large commercial fishing craft ranging from a few meters long to over 100. In many coastal cities, such as New Bedford, Kodiak, and Brownsville, one can quickly grasp that the local economy revolves around the fishing industry.

The commercial fishing industry contributes about $31.5 billion (2003) in value added to the US GDP. According to the FAO, it was the fourth largest in the world in 2002. Recreational fisheries contributed an additional $12 billion. Aquaculture production grew from $45 million worth of products in 1974 to about $866 million in 2002 (NOAA, 2004).

There are 36 000 (2002) fishers and related fishing workers (BLS, 2004). The secondary sector employs 67 472 (2002) working in 935 plants and 2 446 wholesaler firms (NOAA, 2004).

United States fisheries use virtually all types of fishing gears and many vessels are able to change quickly among two or more types of gear, such as scallop dredges to bottom trawls to pots. The predominant methodologies are trawling and purse seining, but many other types are important as well. Some vessels are able to freeze catches at sea, but catches are mostly landed fresh, at, or close to, the homeport of the vessel. Electronic navigational and fish finding equipment are generally widely used aboard the larger vessels.

Commercial fisheries landings since 1950 are shown in the graphic below. Landings reached a peak of 4.8 million metric tons (10.5 billion pounds) in 1993 and 1994 and

TABLE 1
Basic Data

US Land and Water Area	Land: 9 631 418 sq. km // *water:* 469 495 sq km
US EEZ area (to 200 miles)	3.36 million sq. nm = 11.5 million sq. km
Length of coastline	19 924 km
Population (2005)	US: 295 184 // World: 6 410 524 000
GDP (2004)	US$ $11 815 billion
Per Capita GDP (2003)	US$ 37 898
Agriculture (Farms) GDP (2003)	US$ 84.8 billion, 0.8 % of total US GDP
Forestry, Fishing, & Hunting GDP (2003)	Combined US$ 29.1 billion, 0.3 % of US GDP

Sources: BEA, 2004; BEA, 2005; CIA, 2004; CRS, 1997; DOC, 2004a; DOC 2004b.

TABLE 2
Fisheries Supply

(2003)	Production	Imports	Exports	Food supply	Per capita sup.*
		mt in live weight – except mollusks			*kg/year*
Fish for direct human consumption	3 420 000	4 390 000	2 450 000	5 360 000	26.8
Fish for animal feed and other purposes	900 000	310 000	620 000	590 000	4.2
TOTAL	**4 320 000**	**4 700 000**	**3 070 000**	**5 950 000**	**31.0**

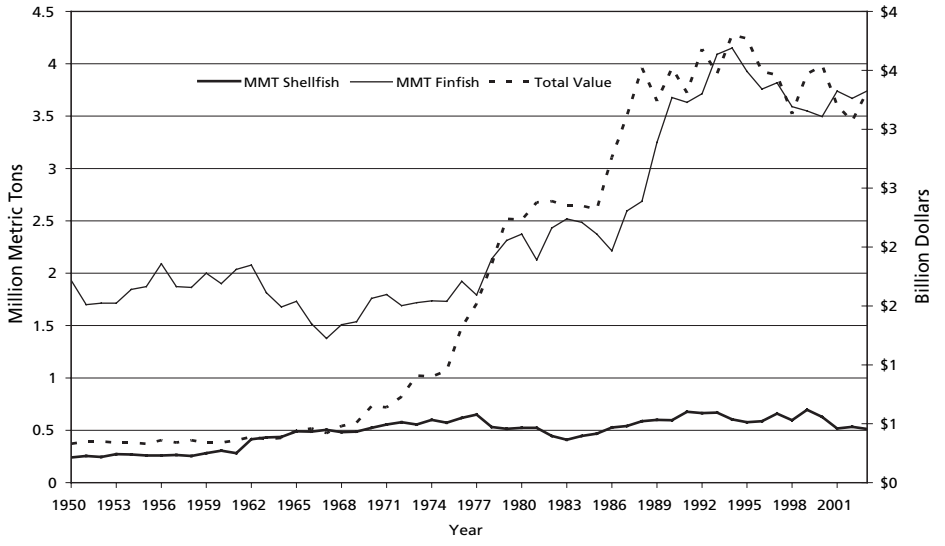
* Per capita supply excludes exports, is live weight, and includes military abroad
Source: NOAA, 2004b

TABLE 3
Major US Domestic Species Landed in 2003

		Ranked by Quantity and Value (Numbers in millions)			
Rank	Species	Metric Tons	Rank	Species	Dollars
1	Pollock	1 532	1	Crabs	484
2	Menhaden	727	2	Shrimp	424
3	Salmon	306	3	Lobsters	308
4	Cod	269	4	Flatfish	267
5	Flatfish	202	5	Scallops	229
6	Hakes	155	6	Pollock	209
7	Crabs	154	7	Salmon	201
8	Shrimp	143	8	Cod	187
9	Herring (sea)	130	9	Clams	163
10	Sardines	73	10	Oysters	103

Source: NOAA, 2004b

FIGURE 1
Fisheries Value and Volume



a value of $3.8 billion. In recent years, the values of finfish and shellfish landings have been close to equal (not shown). Alaska Pollock ranked first in landings in 2003, but 6th in value[2].

Estimated employment

In the primary sector, the number of vessels greater than 5 net tonnes with commercial fishing documents is about 36 150 (2005) (Sutherland, 2005a). In an internal NMFS

[2] NOAA. 2004b.

TABLE 4
US Nation-Wide Marine Recreational Fisheries (2003)[1]

Number of Anglers: 13 000 000	Number of Angler Trips: 82 000 000
Metric Tons Harvested: 122 454	Number of Fish Harvested: 207 228 000
Number of Fish Released: 248 314 000	

[1]Fisheries of the US, 2003. NOAA/NMFS. Available: http://www.st.nmfs.gov/st1/fus/fus03/index.html. October 2004.

analysis of commercial fishing craft that were licensed and actively fished during 2004, there were about 19 350 vessels and 17 300 boats. In aggregate, the 19 350 vessels exceeded 1 100 000 gross registered tonnes. However, in some states, the statistics on fishing craft, especially boats, may be incomplete, making this a minimum estimate (Sutherland, 2005b). There are no complete published data on employment in the primary sector.

In the secondary sector, there are about 67 500 (2002) people working in 935 plants and 2 446 wholesalers.[3]

Pacific Coast Fisheries

The **commercial** fisheries on the Pacific Coast are important economically. The groundfish component is the most valuable, but several species have been overfished. These include Pacific Whiting and several of the rockfishes. The rockfishes are long-lived and slow to reach reproductive age. The rockfish species in trouble are often found in association with healthy stocks of other species, making rebuilding difficult due to bycatch issues. There has been a buyout program for the Whiting fishery jointly financed by a government appropriation and industry participants who stand to benefit from a smaller fleet. The coastal states and the federal government share management responsibilities.

Artisanal Marine Fisheries in the three Pacific Coast states show up in landings records for species that are normally taken with small boats, during diving, or by working on the shore. These species include various clams and oysters, abalone, mussels, octopus, spiny lobsters, sea urchins, cockles and shad. By volume the three most important are urchins, clams, and sea cucumbers. By value, they are clams, oysters and urchins. Some of the "commercial" fisheries include catches by similar independent fishers and boats, and some of the "artisanal" catches are caught by larger vessels. Primary management of this sector is mostly by the coastal states. For this report we use the FAO Glossary definition that artisanal fisheries are: "traditional fisheries involving fishing households (as opposed to commercial companies), using relatively small amount of capital and energy, relatively small fishing vessels (if any), making short fishing trips, close to shore, mainly for local consumption. In practice, definition varies between countries, e.g. from gleaning or a one-man canoe in poor developing countries, to more than 20-m. trawlers, seiners, or longliners in developed ones. Artisanal fisheries can be subsistence or commercial fisheries, providing for local consumption or export. They are sometimes referred to as small-scale fisheries".

Recreational fishing is also an important contributor to the economy, with about 1 500 000 marine anglers participating in the fishery on the Pacific Coast. They fish from shore, from small craft, and from several hundred passenger fishing vessels. Their catches are often significant or even the primary harvest from some marine stocks. Primary management of this sector is by the coastal states.

Pacific Coast NMFS Enforcement data (includes Hawaii and US Pacific Islands) show no clear trends that would indicate any change in compliance with MSFCMA regulations over the last decade. Variability in violation (cases opened) statistics is

[3] Fisheries of the US, 2003. NOAA/NMFS. Available: http://www.st.nmfs.gov/st1/fus/fus03/index.html. October 2004.

TABLE 5
Landings in the three largest fisheries on the Pacific Coast by sub-sector

Fishery	Landings (mt)	% of class Landings	% of class Value
Industrial/large-scale/commercial			
Fishery 1: Pacific Whiting	140 326	14	4
Fishery 2: Pacific Sardines	71 624	7	2
Fishery 3: Squid	40 020	4	6
Artisanal/Small-scale/lifestyle/ subsistence/indigenous/customary fisheries			
Fishery 1: Sea Urchins	5 276	65	15
Fishery 2: Clams	1 397	17	64
Fishery 3: Sea Cucumbers	8 101	7	2
Recreational marine fisheries[1]			
Fishery 1: Flatfishes (Halibuts and many others)	11 271	48	N/A
Fishery 2: (Salmon –Mostly chinook and coho)	4 689	20	N/A
Fishery 3: (Rockfish- *Sebastes* of many species	1 689	7	N/A

Notes: N/A = not available
1. Includes non-consumptive use such as catch and release fishing, ecotourism, and diving in terms of the amount of recreational fish harvested.

high, probably due to changes in staffing patterns in each area from year to year and the number of new regulations that enter into force in any given year. Relative to the number of participants in the fisheries, the number of new cases (129-390 per year) is low.

The principal Pacific Coast marine commercial, artisanal, and recreational capture fisheries by volume are shown in the following table.

MANAGEMENT ACTIVITY

Management within the EEZ is the responsibility of the federal government (NMFS) and the eight regional Fishery Management Councils, established by the MSFCMA. NMFS is part of the National Oceanic and Atmospheric Administration (NOAA) within the Department of Commerce. NMFS is often referred to as NOAA Fisheries, and more recently, NOAA Fisheries Service. NMFS provides scientific and technical services and programs in support of fisheries management and conservation. NMFS employs about 2 500 people across the country in six regional offices and science centers and at its headquarters in Silver Spring, Maryland. There are over 20 laboratories plus other facilities, particularly near fishing centers.

NMFS coordinates and approves fishery management plans, implements and enforces regulations, and conducts other fisheries conservation and service programs. To ensure productive fisheries in the future, NMFS will implement a number of strategies to ensure that ecosystem approaches to management are applied in the conservation and management of federal, state, and international fisheries; that the public promotes stewardship of marine fisheries; and that fish stocks are maintained at productive levels to support sustainable fisheries and ecosystems. Strategies include:

- Implement fully a regulatory quality improvement program
- Strengthen coordination of marine fisheries management and conservation
- Increase opportunities for industry to improve economic performance
- Issue guidance for ecosystem approaches to management
- Increase public understanding of the NMFS stewardship role
- Manage to recover all overfished stocks under effective rebuilding plans.

The eight Councils develop federal fishing plans and regulations through a process involving technical teams, independent scientific committees, constituent advisory panels, enforcement officials, lawyers, management agencies, and the public. Council members are nominated by state governors in each region and appointed by the

Secretary of Commerce. On each council are each state's director of marine fisheries; a person knowledgeable of fisheries or marine conservation from each state; and some at-large members from any of the states in the region. Councils have Scientific and Statistical Committees (of scientists and other technical persons) and Advisory Panels (of people knowledgeable in fisheries or conservation). The plans and their concomitant regulations are submitted to NMFS for approval and implementation[4].

Inland fisheries are managed by the individual states with some technical and coordinating support from Interior Department agencies, particularly the US Geological Service and the Fish and Wildlife Service.

Nearshore fisheries, within the 0-3 nm (in most states) territorial sea, are managed by coastal states and three interstate marine fisheries commissions. State agencies manage fishery resources within state waters, developing and enforcing programs, policies, and conservation regulations. NMFS assists on major problems or when there is a cross-jurisdictional issue. The interstate commissions are used by the states as an instrument for joint action, focusing on issues that affect multiple states. The commissions coordinate data collection, research, and responses to fisheries issues. Membership in the commissions includes the states of the region, government and industry leaders, and representatives of the fishing sectors[5].

At the federal level, and similarly among the states, the formal fisheries management process requires extensive advice from those being managed, from other agencies and people with varying interests. Once an FMP and its implementing regulations are put into place (and even before), aggrieved parties can bring their complaint to the court system. Agency managers and Councils work to resolve disputes before this happens, but there is considerable involvement of the judiciary in US fisheries management.

The US fishing fleet is diverse in terms of sizes and gear types, varying significantly among fisheries as well as among geographic areas, even within a multi-state region. Even individual fleets are quite diverse, and each fishery has unique biological, economic, and sociological characteristics that make broad-based policy impractical. For example, see US commercial fishing photos at http://www.oceansart.us. On the other hand, regulation on a fishery-by-fishery basis is not practical or effective. Vessels are extremely mobile and often able to change gear types readily. In addition, it is usually difficult to remove vessels from fishing, once a vessel is built and equipped for fishing as few alternative uses exist for it. This provides incentive for vessels to transfer effort from one fishery or geographic location to another, rather than leave fishing altogether, when regulations become binding. When vessels shift effort to open-access fisheries or to those regulated with traditional command and- control methods, the new vessels may impose stock and/or crowding externalities on existing vessels. When controlled access systems are in place, these externalities are taken into account when fishermen decide whether or not to enter a new fishery. Fishermen would only shift effort to another fishery if it were worth the cost of purchasing the right to harvest in that fishery. Thus, management systems that take into account the potential transfer of effort, and provide the correct incentives and signals for entry and exit of vessels and fishermen, are important for ensuring that effort reductions in one fishery do not exacerbate conditions in other fisheries (NOAA, 1996). Several important US fisheries

[4] Copies of the fisheries legislation and related documents, including guidelines, can be found at http://www.nmfs.noaa.gov/sfa/index.htm. Links to the Councils are at http://www.nmfs.noaa.gov/partnerships.htm. The NMFS organization chart is at http://www.nmfs.noaa.gov/org_chart.htm. The US Coast Guard (http://www.uscg.mil/uscg.shtm) works with NMFS on at-sea enforcement.

[5] Links to the Commissions are at http://www.nmfs.noaa.gov/partnerships.htm. The Pacific States Marine Fisheries Commission is at http://www.psmfc.org/ . State agencies with primary fisheries responsibilities for the three Pacific Coastal states are: California Department of Fish and Game. Available: http://www.dfg.ca.gov/; Oregon Department of Fish and Wildlife. http://www.dfw.state.or.us/; Washington Department of Fish and Wildlife. http://wdfw.wa.gov/com/comintro.htm

are managed through systems that limit effort, and the few buyout programs that have been implemented, including that for Pacific Coast groundfish, have sought to prevent removed vessels from adding stress to other fully capitalized fisheries.

Commercial and recreational fishing are very closely related even though they are often considered to be mutually exclusive. Both sectors are often in competition for the same species, they each are working on a renewable resource, and the support services such as piers, equipment, ice, fuel, and bait may be provided by the same firms. Both sectors have immense political influence such that regulatory actions that would reduce catches, add an economic burden, or allocate resources between the two groups can often quickly become very contentious. As for other fishery sectors, management techniques include closed seasons and areas, size and quantity limits, and restrictions on the number of licenses.

The scale and scope of NMFS research varies. Some major research initiatives focus on the needs of the fishing industry and are performed jointly with industry, such as studies of harvesting methods and development of more effective fishing gear to reduce wasteful bycatch.

Since the 1970s, virtually all fisheries in all waters of any significance have been managed. Even long before then, many important fisheries were regulated in various ways, such as with gear restrictions and size limits and protection of spawners. The first regulations arose locally, such as at a salmon weir, then at the state level, such as with size limits on clams, and then internationally through treaties, such as the International North Pacific Halibut Commission. Regulations have been aimed to accomplish conservation or allocation objectives, or both. The MSFCMA brought management to nearly all fisheries in the US EEZ. Under it, US marine fisheries must be managed for optimum yield based on the best scientific information available. Managers are to prevent overfishing, identify and rebuild overfished stocks, ensure conservation, facilitate long-term protection of essential fish habitat, reduce bycatch, increase stock assessments, and are to realize the full long-term potential of the resources. The law stresses that reliable data is essential to effective conservation, management, and scientific understanding. Better assessments can provide more accurate abundance estimates and forecasts, reducing uncertainty in setting quotas, and lowering the costs of following the precautionary approach. Better assessments also invoke more confidence from the fishing industry, encouraging better compliance with regulations. Research in bycatch, essential fish habitat, life history, and ecosystems holds the promise for progressing from reactive management towards adaptive management, allowing maximum catches with reduced risks for the fisheries (NOAA, 1998).

For most of US stocks there is at least basic information on landed catch and the size frequency of the catch. However, for over a third there is no fishery-independent or fishery-dependent index of abundance, making it extremely difficult to conduct a meaningful assessment. Other factors, such as the need to prioritize the stocks to be assessed, result in most stocks lacking assessments sufficient to evaluate their biomass. On the other hand, although there are relatively few stocks with comprehensive input data, over 100 stocks are routinely assessed using state-of-the-art age or size structured models, some of which may also incorporate spatial and oceanographic effects. With a few exceptions, all of the high-valued, high-volume, or high-profile species are routinely assessed, while most of the unassessed species contribute little or nothing to total landings. Overall, the two most important needs for augmentation are research vessel surveys designed to produce fishery-independent indices of abundance and to collect related information on spatial and temporal distributions, associated species, habitat, and oceanographic variables; and observer programs that provide information on species composition, amounts of each species kept and discarded, and fishing effort. The major fishery research goals and objectives are provided in the NMFS Research Strategic Plan available at http://www.st.nmfs.gov/st2/strategic_plan.html.

Because federal fishery managers are legally required to rebuild stocks and to prevent overfishing, detailed records are kept and reported to Congress. At the state level, similar requirements exist. At the end of 2003, 60 federally-managed stocks were overfished and 232 were not. A net gain of 13 stocks that are fully rebuilt has been made. The number of stocks for which harvest rates are unknown or for which overfishing thresholds are not defined decreased from 658 in 2002 to 617 in 2003. Most of these stocks do not have significant harvests, and are not assessed as a matter of priorities for research funds, particularly if their assessment is difficult and there is no evidence they are in jeopardy. Rebuilding programs are in place or under development for virtually all overfished stocks, and have largely resulted in the gains. Among the 267 major stocks, 40 are overfished, 147 are not, and for the remaining 80, the overfishing status is not known or is not defined. Among the 642 minor stocks, 20 are overfished, 85 are not, and for the remaining 537, the overfishing status is not known or is not defined. A "major" stock is a stock that has 200 000 pounds (91 000 kg.) or more of landings in 2001 (NOAA, 2003).

There are eight stocks overfished (all are groundfish) on the Pacific Coast – lingcod, Pacific ocean perch, bocaccio, canary rockfish, darkblotched rockfish, widow rockfish, cowcod and yelloweye rockfish. Because many of these stocks are long-lived and slow to reproduce, they cannot support aggressive harvest rates. Similarly, once these stocks are overfished, they are slow to rebuild. Rebuilding plans for overfished Pacific Coast groundfish species of canary rockfish, darkblotched rockfish, lingcod, and Pacific Ocean perch were approved in January, 2004. Additionally, NMFS announced in April, 2004 that Pacific whiting will no longer be considered overfished. The remaining stocks are being managed under interim rebuilding measures or default rebuilding policies while species-specific plans are formalized. Reductions in the harvest and bycatch have enabled these stocks to begin rebuilding. For example, the most recent lingcod assessment shows a recent increase in spawning biomass.

Many traditional management tools are used by federal managers, including time and area closure, gear restrictions, size and bycatch restrictions, and total catches. More

BOX 2
Pacific Fisheries Management Council

The Pacific Fisheries Management Council manages over 80 species through the **Pacific Coast Groundfish Plan**. The Council moved quickly when presented with revised science on May 13, 2002, that showed three overfished species— yelloweye, bocaccio and canary rockfish— were reproducing more slowly than thought. The next month, the Council adopted expansive continental shelf closures to protect these species and is developing rebuilding plans for them. The Council also implemented a number of measures to ensure groundfish are harvested sustainably and bycatch is minimized. These include depth-based closures, gear restrictions, quotas and trip limits, an observer program, and an electronic vessel monitoring system. The fisheries will also benefit from a groundfish capacity reduction program passed by Congress and developed in partnership with the fishing industry.

The Pacific Coast **coastal pelagic species** fishery (sardines, anchovies, mackerel, and market squid) are generally viewed as healthy and well-managed, and management takes a precautionary and ecosystem-based approach. None of the species are overfished, and the fishery is stable. Recent fisheries for Pacific sardine have expanded off Oregon and Washington due to an increase in coastwide abundance, but the harvest has been below a conservatively-set guideline. The Council created an ecosystem-based harvest rule that recognizes the close relationship of sardine abundance to oceanic and climate variability and the value of sardines as forage for other fish, sea birds, and marine mammals.

recently, closed areas have been implemented on very large scales to protect fragile habitat and small populations of rare species that could be destroyed as bycatch in regular fisheries. In the Pacific Groundfish Fishery (over 80 species), there has recently been a buyout of some capacity through a $46 million federal (22 percent) – participant (78 percent) program. There have also been a few programs in other regions as well over the last two decades.

Nearshore fishery resources are coastal and estuarine species under the control of coastal states and their local governments for which NMFS does not have direct responsibility. Many of these species provide the basis for locally important commercial and recreational fisheries. They vary widely in species diversity and abundance. Many are highly prized gamefish. Others are small fishes used for bait, food, and industrial products. Those of greatest interest include invertebrate species like crabs, shrimps, abalones, clams, scallops, and oysters. Because it is difficult to assess the condition of many of the Nation's nearshore resources, a high percentage are of unknown status. No firm estimates exist for long term potential yield. Because the composition of nearshore resources is diverse and management is spread out among the many coastal states and other local authorities, a comprehensive treatment of them has not been attempted.

Traditional techniques are usually employed in nearshore resource conservation. These include size limits, catch limits, method restrictions, and area and time closures. Nearly all fisheries are covered by licensing requirements and these often prohibit non-residents from participating in the fisheries or require them to pay higher license fees. Usually, sales and landings must be reported to local conservation agencies and to taxing authorities.

Significant progress has been made nationwide in recent years. During 2003, four stocks were declared fully rebuilt – Georges Bank winter flounder in the Northeast, Atlantic blacktip shark, and South Atlantic and Gulf of Mexico stocks of yellowtail snapper. There are now 31 stocks for which overfishing has been stopped, while 14 have been newly listed as overfished, representing a net gain of 17 stocks not overfished.

The condition of the fish stocks upon which the US industry depends appears to be steadily improving. The number of overfished stocks varies from region to region but is decreasing. Because of the lengthy times they need to mature and reproduce, some of the long-lived species will require rebuilding schedules up to decades. Of 909 fish stocks included in the 2004 report to Congress, 565 have unknown or undefined status relative to acceptable target stock abundance and harvest rate. However, these stocks represent less than 1 percent of all US fishery landings by weight. Of the major stocks, representing 99 percent of landings, 39 were overfished, 122 are not, and 94 have unknown or undefined status (NOAA, 2004a).

A recent study of a number of federally managed fisheries reports that 55 percent of the assessed fisheries have some measurable over-capacity, 29 percent do not, and information is lacking for the remaining 16 percent. In some regions, vessels and fishing permits are being bought and retired as part of a federal buyback program (NOAA, 2003).

The outlook for the Nation's living marine resources depends in good part on the management actions that are being taken at present. The decline in the abundance of many stocks in all US regions during the past few decades was primarily the result of overfishing (sometimes compounded by environmental changes). The strengthened management measures, designed to reduce overfishing and begin rebuilding, that are being implemented should result in an acceleration in the rate of improvement of stock status and fishery utilization levels. Their success depends on how effectively they can be implemented over the foreseeable future. Short-term losses in yield are expected as an immediate cost of rebuilding overfished stocks. However, judging from the remarkable ability of many stocks to recover from overfishing, the outlook is very

positive over the long term, and should result in the potential for higher sustainable yields with reduced risk to the resources (NOAA, 1999).

Inland fisheries will likely remain about the same, with the majority of production being harvested by the recreational sector. As water quality continues to improve, fisheries production will find easy access to dinner tables, no matter how it is caught. Strong movements to remove dams or provide improved fish access around dams and to consider fish needs in water flow management is strengthening some anadromous fish populations in all areas of the country, including the Pacific Coast (such as for salmon).

Many fisheries have allocation disputes, including those between commercial and recreational fishermen, between various subsets of the commercial harvesting sector, and between them and environmental interests. Solutions used to ensure the health of fishery resources while resolving allocation issues typically include imposition of increasingly strict and complex regulations.

COSTS AND REVENUES OF FISHERIES MANAGEMENT

Budgets for NMFS have risen over the last ten years at the National level. Breakdown by fishery and by state are not available because costs are generally not apportioned at that level. Funds at the State level for in-state management are derived from license fees and from state appropriations. In addition, some funds in the NMFS budget, and from other federal sources, augment state budgets. The following budgets include all NMFS operations except research vessel acquisition and operation. US Coast Guard enforcement costs are not included (also not apportioned by fishery or activity).

TABLE 6
NMFS Appropriations

1992	$220 million
1995	$280 million
2000	$530 million
2005	$824 million

These costs reflect increased research demanded by precautionary approaches to management, increased attorney staff to deal with legal complexities and litigation, increased enforcement, including observers and satellite-based position monitoring, new programs to assess and protect fisheries habitat, and increased involvement of stakeholders in development of fisheries management regimes.

IMPLEMENTATION OF GLOBAL FISHERIES MANDATES AND INITIATIVES

The United States has not formally acceded to the UNCLOS but has generally been working within its scope. Discussions about accession are continuing between the Congress and the Executive Branch. Other global fisheries issues of interest to the United States include various international fisheries management agreements and initiatives (such as the FAO International Plans of Action for Seabirds, Sharks, Capacity and IUU Fishing and the UN Fish Stocks Agreement). The United States has taken a positive stance on them during bilateral and multilateral discussions during which information is traded on the status of implementation of these instruments, ways are discussed to encourage their implementation by other countries.

In addition, NMFS has built the precepts of these initiatives into its program structure. For example, NMFS intends to implement a prohibition on the importation of toothfish harvested by vessels identified on the CCAMLR IUU vessel list in a future rulemaking. It also has formally published the National Plan of Action for Reducing the Incidental Catch of Seabirds in Longline Fisheries and the The National Plan of Action for the Management of Fishing Capacity. The Shark Finning Prohibition Act of 2000 was passed as an amendment to the MSFCMA. The Act prohibits any person under U.S. jurisdiction from (i) engaging in the finning of sharks; (ii) possessing shark fins aboard a fishing vessel without the corresponding carcass; and (iii) landing shark fins without the corresponding carcass. The Act also requires the National Marine Fisheries Service to promulgate regulations to implement the prohibitions of the Act,

initiate discussion with other nations to develop international agreements on shark finning and data collection, provide congress with annual reports describing efforts to carry out the Act, and establish research programs[6]. The 2004 report of the status of international fishing agreements has a wealth of information about US international activities[7].

PARTICIPATION IN REGIONAL FISHERY BODIES (RFBS)

The United States works with its primary bordering countries of Mexico and Canada to jointly manage shared stocks and to allocate them among the fishers of each nation. On the Pacific Coast, the primary shared resources are halibut, implemented by the Northern Pacific Halibut Act of 1982 and salmon, implemented by Pacific Salmon Treaty Act of 1985.

Implementation of agreements can be done several ways. There can be the the simple incorporation of elements into existing plans and programs, or as a formal agreement that is passed into law as a self standing treaty as the halibut and salmon Acts, or as an amendment to the MSFCMA or other law.

The MSFCMA reaches beyond the EEZ in also providing for fishery management authority over continental shelf resources and anadromous species, except when they are found within a foreign nation's territorial sea or fishery conservation zone (or equivalent), to the extent that such sea or zone is recognized by the United States.

Under the MSFCMA, the Secretary of State, in cooperation with the Secretary of Commerce, negotiates Governing International Fishery Agreements (GIFAs) with foreign nations requesting to fish within the US EEZ. After a GIFA is signed, it is transmitted by the President to the Congress for ratification.

As US fishing capacity grew following passage of the MSFCMA, foreign participation in directed fisheries, as well as in foreign joint ventures in which US vessels delivered US harvested fish to permitted foreign vessels in the EEZ diminished until, in 1991, foreign vessels no longer were permitted to conduct directed fishing in the EEZ. This marked the achievement of one of the objectives of the MSFCMA, that is, the development of the US fishing industry to take what were in 1976 underutilized species, and the displacement of directed foreign fishing effort in the EEZ. Although there has been very little foreign fishing allowed since 1991, NMFS maintains foreign fishing regulations should there be a future situation in which allowing limited foreign fishing in an underutilized fishery would be of advantage to the United States.

Regional and local fisheries authorities advise the national government on the creation and operation of international agreements and may engage in cooperative activities under them.

SUMMARY AND CONCLUSIONS

Fisheries management in the United States is not a new concept. It has been practiced since the first fishers noticed that stocks could be damaged if too many fish were removed. While the ability to remove large quantities from the high seas throughout the range of fish stocks is a more recent phenomenon, the ability to remove too many clams from a bay or salmon from a river has existed for centuries. Society has been adept at responding to challenges, whether to massive factory fleets, or new fish detection and capture devices that remove any haven a fish might have had. Technologies do not only favor the fisher. Regulators have developed sophisticated fish survey equipment, computer models of fish populations and their ever-changing environments, and even

[6] More information about these three programs is at http://www.nmfs.noaa.gov/sfa/domes_fish/index.htm.

[7] Available at http://www.nmfs.noaa.gov/sfa/international/InternationalAgreements/04InternationalAgreements.pdf.

enforcement devices such as vessel monitoring systems that track ships (and even some fish) throughout the oceans.

The resources have demonstrated their ability to bounce back from difficult times if the will of society contributes wise stewardship and the environment cooperates. A robust collection of people, whether fishers, consumers, or environmentalists, in fact, everyone interested in the husbandry of the fish stocks, will ensure their availability for generations to come. In the United States, the legislation demands that decisions be based on scientific knowledge and that the resource users and the general citizenry be involved in management decisions. There have been times when this seemingly complex system has been justifiably called into question, but, in general, it is working and procedural problems are being resolved. In a government based on personal freedoms and responsibilities, and on the rights of the constituent states that are collectively the United States, the federal government is a coordinating mechanism until stronger action is needed, as has happened with some fisheries. This concept underlies fisheries management and most other sectors in the United States.

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- NMFS: Southwest Science Center: http://swfsc.nmfs.noaa.gov
- NMFS: Southwest Region: http://swr.nmfs.noaa.gov/
- NMFS: Northwest Region http://www.nwr.noaa.gov/
- NMFS: Northwest Science Center: http://www.nwfsc.noaa.gov/
- Pacific Fisheries Management Council: http://www.pcouncil.org/

State Fishery Responsibilities
- PSMFC: http://www.psmfc.org/
- Washington: http://wdfw.wa.gov/
- Oregon: http://www.dfw.state.or.us/
- California: http://www.dfg.ca.gov/

Statistics on Fisheries
- Federal Commercial: http://www.st.nmfs.gov/st1/commercial/index.html
- Federal Recreational: http://www.st.nmfs.gov/st1/recreational/index.html
- Pacific Coast States Commercial: http://www.psmfc.org/pacfin/
- Pacific Coast States Recreational: http://www.recfin.org/

Background on US Fisheries
- FAO USA Fisheries Profile: http://www.fao.org/fi/fcp/en/USA/profile.htm

Price Deflator from: National Income and Product Accounts Table. Table 1.2.4. Price Indexes for Gross Domestic Product by Major Type of Product available at http://www.bea.gov/bea/dn/nipaweb/index.asp

Pacific Coast Map from USGS Coastal and Marine Geology Program at http://coastalmap.marine.usgs.gov/ArcIMS/Website/usa/westcoast/pacificcoast/viewer.htm

Pike Street Market Photo from OceansArt.US (http://www.OceansArt.us)

APPENDIX TABLES

Current Management of Marine Capture Fisheries in Pacific Coast of US (WOC)

Level of Management	% Fisheries Managed (ByVolume)	% with Fisheries Management Plan (By Volume)	% with Published Regulations (By Volume)	Trends in the number of Managed Fisheries over ten yrs. (increasing/decreasing/unchanged)
National -USA	>95%	>95%	>95%	(increasing)
Regional – Pacific Coast	>95%	>95%	>95%	(increasing)
Local – within states	>95%	>95%	>95%	(increasing)

Summary information for three largest fisheries (by volume) in Pacific Coast of US (WOC) Year 2003 & 2002 (Recreational)

Category of Fishery	Fishery	Volume mil tonnes	Value* mil US$	% of Total Volume Caught**	% of Total Value Caught**	Covered by a Management Plan?	# of Participants	# of Vessels
Industrial	1 Pacific Whiting	140	17	31	4	Yes	1 400	275
	2 Pacific Sardines	72	7	16	2	Yes	1 240	248
	3 Squid	12	47	10	6	Yes	1 420	284
Artisanal	1 Sea Urchins	5	8	65	15	Yes	356	N/A
	2 Clams	1	36	17	64	Yes	N/A	N/A
	3 Sea cucumbers	8	1	7	2	Yes	190	N/A
Recreational	1 Flatfishes (Halibuts and many others)	11	N/A	48	N/A	Yes	2 500 000	Thousands of small craft & <1000 passenger fishing vessels
	2 Salmon –Mostly chinook and coho	5	N/A	20	N/A	Yes	2 500 000	
	3 Rockfish- Sebastes species	2	N/A	7	N/A	Yes	2 500 000	

* Value in 2002 U.S. Dollars.
** % values are based on totals for each category of fishery.
N/A = not available

Use of Fishery Management Tools within the three largest fisheries in the Pacific US

Category of Fishery	Fishery	Restrictions				License/ Limited Entry	Catch Restrictions	Rights-based Regulations	Taxes/ Royalties	Performance Standards
		Spatial	Temporal	Gear	Size					
Industrial	1 Pacific Whiting	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No
	2 Pacific Sardines	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No
	3 Squid	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No
Artisanal	1 Sea Urchins	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No
	2 Clams	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No
	3 Sea cucumbers	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No
Recreational	1 Flatfishes (Halibuts and many others)	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No
	2 Salmon –Mostly chinook and coho	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No
	3 Rockfish- Sebastes species	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No

Costs and Funding Sources of Fisheries Management within the three largest Pacific US fisheries

Category of Fishery	Fishery	Do Management Funding Outlays Cover			Are Management Funding Sources From		
		R&D	Monitoring & Enforcement	Daily Management	License fees in fishery	License fees from other fisheries	Resource rents
Industrial	1 Pacific Whiting	Yes	Yes	Yes	Some	No	No
	2 Pacific Sardines	Yes	Yes	Yes	Some	No	No
	3 Squid	Yes	Yes	Yes	Some	No	No
Artisanal	1 Sea Urchins	Yes	Yes	Yes	Some	No	No
	2 Clams	Yes	Yes	Yes	Some	No	No
	3 Sea cucumbers	Yes	Yes	Yes	Some	No	No
Recreational	1 Flatfishes (Halibuts and many others)	Yes	Yes	Yes	Some	No	No
	2 Salmon –Mostly chinook and coho	Yes	Yes	Yes	Some	No	No
	3 Rockfish- Sebastes species	Yes	Yes	Yes	Some	No	No

Compliance and Enforcement within the three largest fisheries in Pacific US

Category of Fishery	Fishery	VMS	On-board observers	Random dockside inspections	Routine inspections at landing sites	At-sea boarding and inspections	Other (please specify)
Industrial	1 Pacific Whiting	Yes	Yes	Yes	Yes	Yes	
	2 Pacific Sardines	No	No	Yes	Yes	Yes	
	3 Squid	Yes	Yes	Yes	Yes	Yes	
Artisanal	1 Sea Urchins	No	No	Yes	Yes	Yes	
	2 Clams	No	No	Yes	Yes	Yes	
	3 Sea cucumbers	No	No	Yes	Yes	Yes	
Recreational	1 Flatfishes (Halibuts and many others)	No	No	Yes	Yes	Yes	
	2 Salmon –Mostly chinook and coho	No	No	Yes	Yes	Yes	
	3 Rockfish- Sebastes species	No	No	Yes	Yes	Yes	

Capacity Management within the three largest fisheries in Pacific US

Category of Fishery	Fishery	Does overfishing exist?	Is fleet capacity measured?	Is CPUE increasing, constant or decreasing?	Have capacity reduction programmes been used?	If used, please specify objectives of capacity reduction programme
Industrial	1 Pacific Whiting	Yes	Yes	increasing	Yes	Efficiency/conservation
	2 Pacific Sardines	No	Yes	variable	No	
	3 Squid	Yes	Yes	increasing	Yes	Efficiency/conservation
Artisanal	1 Sea Urchins	No	Yes	N/A	No	
	2 Clams	No	Yes	N/A	No	
	3 Sea cucumbers	No	Yes	N/A	No	
Recreational	1 Flatfishes (Halibuts and many others)	No	Yes	variable	No	
	2 Salmon –Mostly chinook and coho	No	Yes	variable	No	
	3 Rockfish- Sebastes species	No	Yes	variable	No	

N/A = not available