Fisheries, Wetlands and Jobs

The Value of Wetlands to America's Fisheries

Presented by

Clean Water Network

Pacific Coast Federation of Fishermen's Associations

Atlantic States Marine Fisheries Commission

Southeast Fisheries Association

East Coast Fisheries Federation

Ocean Trust

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Prepared for the Clean Water Network

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Executive Summary

The nation is engaged in a continuing debate over the future of America's wetlands - salt marshes, the brackish shallows of bays and estuaries, freshwater swamps, seasonal pools, even Alaska's frozen tundra. The discussion should address the role that wetlands play in groundwater replenishment, flood control, the protection of water quality, the conservation of nature and wildlife - and the production of fish.

Fishing pumps $159 billion into the nation's economy and supports nearly two million jobs.

The relationships between wetlands and fish production are essential. They are well understood by fisheries experts and most fishermen. This report, prepared from scientific publications and government documents, describes the links between wetlands function and the health of some of the nation's most valuable fish resources.

The values discussed here are substantial. Three quarters of the nation's fish production depends on marshes and other wetland environments. Fishing contributes *$159 billion* to the country's economy and provides jobs for *nearly two million Americans*.

Three quarters of the nation's fish production depends on estuaries, marshes and other wetland environments.

The U. S. Fish and Wildlife Service estimates that at the birth of our nation wetlands covered 104 million acres of the contiguous states -- an area roughly the size of California. Half of those wetlands are gone. Although our country is largely developed we are still destroying wetlands at a rate of more than 100,000 acres year. In an October 1997 Clean Water Initiative, President Clinton and Vice President Gore vowed to stop the destruction of wetlands in the United States. They directed the agencies under them to prepare a plan for achieving a net *gain* of as many as 100,000 acres of wetlands per year by the year 2005.

If we are to face the question of how we will feed and sustain ourselves in the years ahead, the 1997 Clinton-Gore Clean Water Initiative will prove essential to shaping a national wetlands conservation agenda. Congress must also assume a responsible role by ensuring a strong legislative foundation for the protection of clean water, fisheries-dependent jobs and our remaining wetlands. **This report makes clear the essential role wetlands must play in a sustainable American future.**

Contents

Introduction

This report explains the relationship that fish have with their wetland habitats and the relationship that we have with fish. Both relationships are important to survival - theirs and ours.

Fish, like many humans, may change the location and nature of their habitat as they go through stages of development. The availability of a particular habitat is much more important to the survival of fish, however, than it is to us. For example, many ocean fish spend their youth in shallow-water wetland habitats and can venture into the open sea only when they have become strong swimmers. Scientists believe, and have in many cases clearly demonstrated, that the availability of habitat and the survival of fish are absolutely linked. The disappearance of wetlands, therefore, leads to the decline of the fish that depend upon them.

We sold $8.2 billion of our fish products to foreign trading partners; $6 billion of it produced in the wetlands.

Wetlands are an essential habitat for both salt and freshwater fish. While we may struggle for a politically acceptable definition of wetlands, their nature and function are very clear where fish are concerned. Wetlands cycle nutrients out of mud, sand and water back into bays, lakes and streams, promoting the growth of the smallest organisms in the aquatic food chain. These small creatures are eaten by larger ones and then by fish. Such "primary production" and predation work especially well where the water is sheltered, shallow and rich with nutrients. Therefore, no matter how we may define them, wetlands are vital to fish for food and shelter.

The term "fishery" puts *us* in the picture. It refers to *our* harvest of fish resources, for food or sport, the place of the harvest and even the harvesting method. We talk of an "oyster fishery", a "catch-and-release trout fishery", or the "Columbia River salmon gillnet fishery".

Sports fishermen's $37.8 billion in spending means $109.3 billion in economic output, 1,456,600 jobs and $5.4 billion in state and federal taxes.

Fishing is big business in this country. Our commercial fishermen harvested nearly *ten billion pounds of fish in 1996*. National Marine Fisheries Service scientists estimate that nearly seven billion pounds of these fish depend upon inshore-wetland habitats.

Seventy thousand U.S. fishing boats are the workplace for a quarter million fishermen and fisherwomen. Most of these boats are family businesses, similar to family farms or other small businesses ashore. Each of the onboard jobs supports several workers on land, including those who unload, process and truck fish, and those who fuel, provision and repair the boats.

The U.S. Department of Commerce reports that American spent $41.2 billion on seafood products in 1996, a 6%

increase over 1995. We also sold $8.3 billion worth of fishery products to foreign trading partners, $6 billion of it produced in the wetlands.

And that is just the commercial fishing side of the story. According to a report by Commerce and the Department of the Interior, 36 million anglers spent $24.6 billion on sports fishing in 1991. The Washington, D.C.-based Sports Fishing Institute reported that $24.6 billion in direct purchases by recreational anglers meant a hefty $69.4 billion in economic output, 924,600 jobs and $3.3 billion in state and federal taxes in that year.

The contribution of sport fishing to the nations' economy is increasing. The most recent survey by Commerce and Interior found that recreational anglers spent $37.8 billion in 1996, up 54% since the 1991 survey. This translates to $109.3 billion in total economic output, 1,456,000 jobs and $5.4 billion in state and federal taxes.

As we will see, most of the $159 billion in economic activity and most of this country's *two million fishing-based jobs* rely on fish that in turn rely upon wetlands.

Land of Pollock and the 1% Rule

Alaska, the nation's leader in so many ways, tops the states with the extent of its wetlands - and the rate at which it is destroying them. Development has destroyed more than 50 percent of the historic wetlands surrounding Juneau and Anchorage. Alaska's disregard for wetlands places the state's *three billion dollar a year* fishing industry at risk.

Alaska's disinterest in wetlands protection may seem reasonable considering that half the state, at least 170 million acres, is covered with them. Nearly all these acres are inland wetlands, bogs, muskegs, tundra, swamp and forests essential for wildlife and fish such as salmon. The state has only 345,000 acres of *salt marsh* wetlands. This is where Alaska politics and ocean fish production come into conflict.

Alaska's disregard for wetlands places the state's three billion dollar a year seafood industry and 55,000 jobs at risk.

Alaska's political leadership advocates a "one percent rule". The rule asks that Alaska not be held to the same wetlands protection standard as the Lower 48 states, until the state has eliminated one percent of its historic wetlands. Alaska's one percent wetlands exemption was adopted by the Bush Administration in November, 1992. Alaska's population has tripled since 1950. Most of this growth adjoins coastal waters. Most of the development pressure on Alaska's wetlands is, therefore, on its coastal wetlands.

Simple arithmetic clearly demonstrates the problem. Alaska's 345,000 acres of coastal wetlands represent only *two-tenths of one percent* of the state's total. The "one percent rule" would allow the destruction of *five times* the total area of Alaska's coastal wetlands.

Fishing is serious business in Alaska. The state's Department of Commerce and Economic Development reports that more than one in ten Alaskans makes his living from the fisheries. In addition, ships and workers from many other states and nations make seasonal journeys to Alaska to participate in the harvest. Included in this work force are the crews of nearly 18,000 vessels which land *six billion pounds of seafood* a year, 60 percent of the nation's total, plus workers at more than 400 fish handling and processing plants.

While Alaskans debate the future of their coastal ecosystems, evidence linking wetlands to the production of the state's most valuable fish grows. The results of research by state and federal fisheries agencies shows that Alaska's salmon, steelhead, herring, sole, and flounder are all strongly dependent on wetland habitats.

According to a 1991 study by the National Marine Fisheries Service, 76 percent of Alaska's seafood harvest came from inshore and wetlands dependent species in that year. While more recent numbers are not available, the importance of this relationship remains clear.

Alaska's fastest growing ocean fishery is for walleye pollock, a member of the cod family. According to the National Marine Fisheries Service (NMFS) two and a half *billion* pounds of Alaska pollock was landed in 1996, a catch worth a quarter of a billion dollars.

Scientists from the government's Auke Bay Laboratory near Juneau regularly survey the region's shallow waters. Young pollock and ocean perch, another economically vital species, are consistently found in the shallow waters around Juneau and other coastal population centers. These shallow water habitats will be degraded unless their value to Alaska's fisheries is recognized in the wetlands regulatory process.

The Clinton Administration announced its policy on wetlands in August, 1993. In *Protecting America's Wetlands: A Fair, Flexible, and Effective Approach*, the White House declared, "Because of the significant adverse environmental consequences that it would allow, the Alaska 1% rule will be withdrawn."

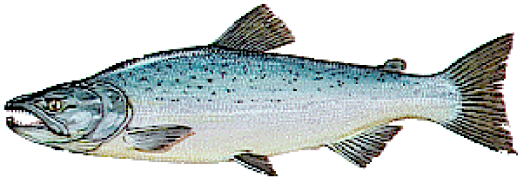
The Administration has not yet withdrawn the one percent rule, which leaves Alaska's wetlands fish habitat, her $3 billion a year fisheries resource, 55,000 local jobs and the jobs of thousands more Americans at risk.

Restoring the King

Redwood Creek nestles in the coastal rain forest of northwestern California halfway between Humboldt Bay and the Oregon border. The stream was once famous for its fishing. Redwood Creek yielded chinook salmon - also known as *kings* because of their great size -weighing up to 65 pounds, in addition to coho salmon and steelhead.

All three salmon runs have now declined dramatically. The chinooks - the kings - have been hit the hardest. Their numbers have plummeted 80 percent since the late 1960s.

The land around Redwood Creek has been acquired by the government for the Redwood National Park. National Park Service scientists began to study Redwood Creek more than 20 years ago to learn what could be done to return the kings to the stream. These studies soon determined that the disappearance of salmon from Redwood Creek was linked to the loss of wetlands from the stream's lower reaches.



King salmon – *Oncorynchus tshawytscha*

Studies link the salmon decline to the loss of wetlands.

Floods swept through lower Redwood Creek in the winter of 1965, closing the Redwood Highway and damaging the streamside village of Orick. Congress reacted swiftly, authorizing the Corps of Engineers to straighten and levee Redwood Creek in order to speed its flow directly into the Pacific Ocean.

Before the Corps' 1968 channelization project, lower Redwood Creek spread into side channels and backwaters. It was in these wetland areas, Park Service biologists concluded, that young chinook salmon lingered on their migration to the sea. This was where the fish had fed and gained the strength to survive in the open ocean.

The Park Service settled on a plan more than fifteen years ago to improve Redwood Creek's fish habitat. The Service estimated it will take at least $2 million to modify the now 30-year-old flood control project to restore some of the lost wetland rearing areas. Fishery experts agree this is the only way to return the kings to the stream.

In stark contrast to the speed with which the Corps of Engineers' levee project was funded, the Park Service's request for funds to restore Redwood Creek's wetlands has moved at a snail's pace. In terms of the National Park system's nationwide priorities, it seems the return of the king to Redwood Creek must wait.

There are hundreds of streams like Redwood Creek up and down the Pacific Coast where habitat for young salmon must be pieced back together if salmon are to continue to contribute to the nation's economy. Nearly $100 million was spent to repair these battered streams in California alone over the past

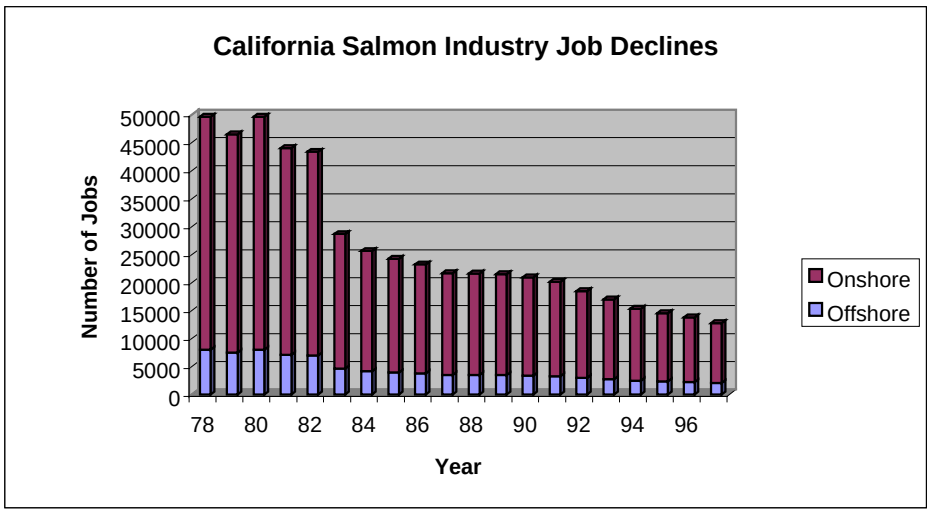
20 years. Much of this money was raised by the state's commercial salmon fishermen through a tax on their own landings, even though both fish and work have declined steadily since 1978.

The fishermen are fighting for their lives. The industry had gained a major victory in 1992 when it persuaded Congress to restore a significant amount of water from the vast federal Central Valley Project back into key California rivers for salmon restoration. The future seemed brighter still with the provisions for salmon habitat in the Clinton Administration's Northwest Forest Plan.

The rationale supporting these efforts is strong. After analyzing the state's salmon problem the California Legislature concluded that rebuilding salmon runs to twice the depressed 1980s levels would provide economic benefits of $150 million a year. Full implementation of the doubling effort over several years would yield *$6 billion* in net profits to the state, $1 billion of which would go to small businesses. In addition, it was found that the salmon restoration objective, which Congress incorporated into the 1992 Central Valley Project reform, would create 8,000 new jobs.

The bright promise of the Central Valley Project Improvement Act and the Northwest Forest Plan seem to be slipping away, however. The Act is under fire from today's agribusiness-friendly Congress and the Administration has shrunk from implementing the streamflow reallocation. The Forest Plan's salmon watershed restoration initiative, which provided a husky $70 million in 1994, has since withered under congressional parsimony.

Even if the money for restoration becomes available, this should not become the excuse for destroying wetlands further. In a 1992 report to Congress, the National Research Council's Committee on Restoration of Aquatic Ecosystems cautioned, "[M]any [restoration] projects fall short of the goal of returning ecosystems to the predisturbance condition, and there is indeed considerable controversy over whether or not wetlands can actually be restored [at all]." As Redwood Creek demonstrates so poignantly, it is a whole lot easier to protect a wetland than it is to put one back together.

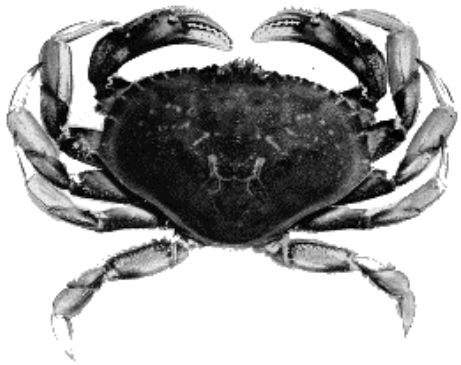


Source – *Pacific Coast Federation of Fishermen's Associations*

Dungeness Crab

Dungeness crab are near the top of life's blessings. Sweet and succulent, Dungeness crab meat, like fresh ocean-caught king salmon, is one of the nation's finest seafoods.

When northern California's rivers swell with late rains and snow-melt, the strength of their outflow forces incoming tides to the bottom of bays and estuaries. These bottom tides, or gravitational currents, carry the crab larvae from the ocean through the Golden Gate and deposit them among the wetlands of the upper San Francisco Bay system.



Dungeness crab – *Cancer magister*

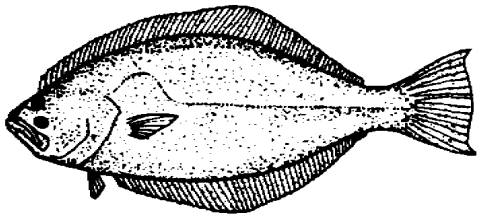
These springtime travelers look more like tiny shrimp at this *megalops* stage. The wetlands nourish the young crabs which grow, molt (shed their shells) and grow some more until they reach adulthood in the Bay a year or so later. To be precise, not all Dungeness crabs rear in the Bay. Some appear never to leave their nearshore ocean spawning grounds. Those that do rear along the edges of San Francisco Bay's sheltering wetlands grow more quickly and doubtless survive at a higher rate, contributing more to the fishery.

Young Dungeness crabs do not appear to use areas of the estuary where salinities are less than about one-third that of seawater. To the extent young crabs depend on wetlands, and they certainly appear to, they require areas bordering salty, rather than fresh or brackish, water. You cannot, therefore, mitigate the destruction of Dungeness crab-sustaining wetlands at sites that are less than one-third seawater.

California fishers landed 12.3 million pounds of Dungeness crab in 1996, up 35% from 1995 and worth over $16 million dockside. A healthy Dungeness crab fishery provides some relief to those fishermen who have traditionally depended on salmon for a living.

California's Halibut

Westerners have a hearty appreciation for their seafood, including halibut. While Pacific halibut from Alaska is excellent, fresh California halibut is especially prized. These flavorful fish, which grow to more than 50 pounds, range from northern Washington to Baja California. Much of the California halibut catch now occurs, however, inside the Southern California Bight, the nearshore waters between Point Arguello and Mexico.



California Halibut - *Paralichthys californicus*

Like many of California's fisheries the halibut industry was launched from San Francisco. Italian-born fishermen began towing a bottom net for halibut, a *paranzella*, between two lanteen-rigged sailboats during the 1880s. The fishery soon grew north to Bodega Bay and Eureka and south to Santa Barbara, Los Angeles and San Diego. By 1920 California halibut landings had swelled to nearly five million pounds a year.

Commercial catches of halibut have declined from nearly 5 million pounds to just over one half million pounds a year since 1920.

Declining numbers of halibut and resulting protective regulations have taken their toll on the halibut fishery. Commercial catches have declined in recent decades to just over a half million pounds a year. In 1994, commercial fishermen took 510 thousand pounds of halibut worth an estimated $1.3 million. The fish continues to be a popular target for sports fishermen. The loss of wetlands to development along California's coast has contributed significantly to the decline in halibut.

Like many ocean fish, mature halibut broadcast their eggs in shallow waters where they become part of the planktonic mix, to be tossed about by winds and currents. Researchers have begun to pinpoint when and where larval halibut settle out along the coast to begin their growth needed to survive to harvestable size. The new information makes clear the importance of wetlands to this fishery.

Researchers from the State University system's Southern California Ocean Studies Consortium have captured young halibut in a variety of open water and protected areas along the Bight during the 1980s. The samples from these surveys makes clear the high preference of young halibut for protected shallow water areas such as those provided by salt marshes. The loss of these wetlands - 90 percent of the bays and estuaries in southern California have been severely altered or destroyed by human activities - is clearly implicated in the decline of California halibut in recent decades.

The small fraction of historic wetlands that remains along the southern California coast will have to be protected vigorously if California halibut are to continue to grace the tables of our nation.

Gulf Shrimp

Shrimpers from the Northwest to New England land about a third of a billion pounds of shrimp a year. At $1.50 to two dollars a pound dockside, the nation's annual shrimp harvest puts a half billion dollars in the pockets of U.S. fishermen. The nation's most productive shrimp fishery is the Gulf of Mexico where fishermen from Texas, Louisiana, Mississippi, Alabama and Florida harvested 438 million pounds of brown, white and pink shrimp in 1995 and 1996 combined, worth over $838 million.

Nowhere in the nation is the link between wetland habitat and fish production more obvious than in the Gulf, where National Marine Fisheries Service scientists estimate that *98 percent of the harvest* comes from inshore, wetlands dependent fish and shellfish. Gulf shrimp clearly head the list of the region's wetland dependent species.

The mature shrimp spawn in the Gulf's offshore waters. Fertile eggs soon hatch into free-swimming larvae, and the larvae quickly pass through a series of molts. During the postlarvae stage the shrimp enter the estuaries along the coast to become bottom feeders.

In the estuaries the juvenile shrimp feed at the marsh-water or mangrove-water interface or in submerged seagrass beds. These areas offer a concentrated food supply of detritus, algae and microfauna and some protection from predators. Both the growth and survival of the young shrimp are largely dependent on local salinity and temperature regimes.

In its shrimp management plan the federal Gulf of Mexico Fishery Management Council notes that, "The weakest link in the life cycle chain is the estuarine phase of growth." Man-caused factors implicated by the Council in the decline of Gulf shrimp habitat were "bulkheading that removes critical marsh-water and mangrove-water interfaces" together with "alterations in freshwater discharge that create unfavorable salinity regimes."

Wetlands are the mainstay of the Gulf Coast's $7.9 billion sportfishing economy.

The Everglades of south Florida, Marjory Stoneman Douglas' *River of Grass*, have for centuries fed freshwater through the mangroves into the warm tides of the Gulf and Florida Bay. The seagrass beds of this region are critical habitat for pink shrimp. The diversion of Everglades freshwater to urban development and as a result of drainage programs has driven up salinities in the receiving bays, destroying the seagrass shrimp nurseries. By 1990, 10,000 acres of Florida Bay seagrass beds had been lost completely while another 50,000 acres was in serious decline. Recent research shows that while lost seagrass acreage has recovered in some areas, other areas have continued to decline, indicating an overall net loss that has yet to be fully quantified.

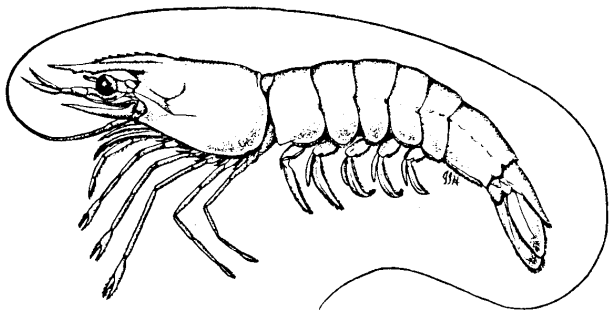
Because the wetlands-shrimp production relationship is so strong it illustrates an important matter in the debate over wetlands: the boundaries of

wetlands are not always simple to define. Freshwater from the heart of the Everglades' huge wetlands system moderates the salinity of Florida Bay more than 50 miles downstream. Moderate salinities are needed for healthy seagrass beds. Agriculture and urban development rob the Everglades of much of this water, and the water that returns is often polluted. As seagrass beds die off due to salinity fluctuations and nutrient pollution, the sediment held by their roots is suspended, blocking out the sunlight needed by the remaining plants – a downward spiral.

Florida Bay's seagrass beds are prime pink shrimp habitat. The Everglades, the Florida Bay seagrasses and the Gulf's offshore shrimping grounds are, in this way, an interdependent ecosystem – all parts of which need protection.

Many of the 14,000 jobs in more than a thousand Gulf Coast fish processing plants are sustained by the shrimp fishery. And commercial fishing represents only a part of the economic engine fueled by these tasty invertebrates. Shrimp are prime prey for the area's gamefish and, therefore, popular as bait with the region's anglers.

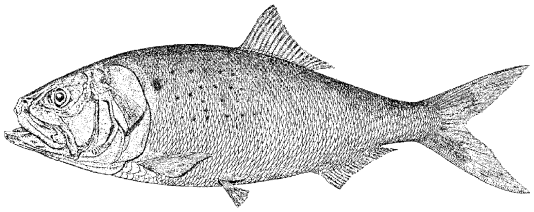
According to the Census Bureau, Gulf state sport anglers brought $7.9 billion to the region's economy in 1996. Florida anglers led the way, with nearly $3.3 billion dollars in total expenditures. Anglers in Texas ($2.9 billion), Louisiana ($824 million), and Alabama ($835 million) also provided a significant boost to the regional economy.



White Shrimp – *Penaeus setiferus*

Menhaden: A Little Pogy in All of Us

Until the recent boom in Alaska pollock, menhaden - "pogy" to fishermen - made up an impressive one-third of our nation's industrial catch. Because we don't eat menhaden, or we don't *know* that we do, the fish attracts little interest outside a few southern coastal towns where malodorous menhaden plants exude the "smell of money".



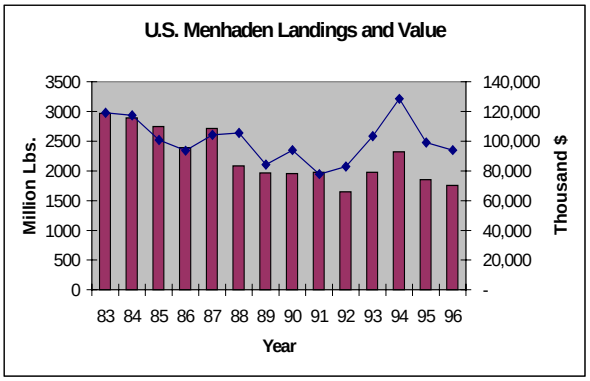
Atlantic menhaden - *Clupea harengus*

The menhaden fishery began in New England. Colonists used the fish for fertilizer and for bait. Rhode Islanders began pressing lamp oil from menhaden about 1800. Beginning in the 1930s the bulk of the fishery shifted to the South, where it now involves two species, Atlantic and Gulf menhaden.

Menhaden are cooked and pressed into meal, oil and "solubles". Mixed into poultry feeds, the meal and oil are vital for improving growth rates and food efficiency. The solubles are blended with soybean meal for cattle and swine feed. Menhaden oil is mixed with other fats in cooking oil, shortening and margarine, marine lubricants, plasticizers, alkyd resins, oil for paint and even lipstick. As author Earl Conrad wryly notes in *Gulf Stream North*, pogy "reaches everybody's plate by the back door."

Increasingly mechanized, the fishery employs over 100 boats, 1,400 fishermen and a like number of plant workers. The 1.8 billion pound 1996 menhaden harvest brought fishermen $94 million and guaranteed products essential to the South's poultry producers and many other industries.

Menhaden absolutely need wetlands to exist. Tragically, their coastal nurseries are under siege. Researchers estimate that Louisiana's coastal marshes, critical habitat for menhaden, are being lost to a combination of natural and development forces at an average rate of *more than 30,000 acres a year*. In recent years, an alarming new threat has emerged – a mysterious micro-organism, the dinoflagellate *Pfiesteria piscicida* - the "cell from hell" - has caused large kills of menhaden and other fish, and has even been associated with human illness. Researchers believe that this organism may have always been present in estuaries in a dormant or non-toxic state. The concern now is that nutrient pollution of rivers and estuaries from agriculture, livestock and urban development may have caused the broad scale emergence of the deadly form.



Source – *National Marine Fisheries Service*

Trout Fishing Michigan's Wetlands

Fishing is big business in Michigan. Angling contributed $3 billion to the state's economy in 1996 and generated nearly $300 million in taxes. Michigan owes some of its best fishing to wetlands that would be stripped of federal protection under an ongoing series of proposed policy changes to Section 404 of the Clean Water Act, which provides specific provisions for protecting wetlands. These proposals are similar in one critical respect, they soften regulations by ignoring good science. Fortunately to date these proposals have not been accepted. A look at Michigan's Pere Marquette River will explain how wetlands serve freshwater ecosystems, and how proposed changes to Federal wetlands protection regulations in 1995 threatened these resources.

In hundreds of streams in the Midwest and Rocky Mountain regions, wetlands support the trout that are so valuable for sports fishing.

The Pere Marquette River rises from two large wetland complexes, the Oxford swamp and the Widewaters. Along its 80 mile trip to Lake Michigan, the river takes on water from a number of smaller wetlands. At some points the entire river must work its way through a mixture of swamps, floating bogs and marshes.

The water chemistry of the Pere Marquette rarely varies. The river never freezes and it rarely gets above 60 degrees in the summer. The wetlands release the water they store up in winter and spring gently throughout the year. In short, the Pere Marquette is prime trout water and it attracts fishermen by the thousands from all over the country.

Government's 1995 proposals for changing the way wetlands are defined would turn a blind eye to what makes the Pere Marquette, and hundreds of other wetland-origin trout streams in the Midwest and Rocky Mountain regions of the nation, so valuable. Although the

Brown trout – *Salmo trutta*

Pere Marquette's wetlands have saturated soils, the water seldom is at or above the surface, a requirement for "wetlands" definition under the proposed 1995 criteria. Over-the-bank flooding has never exceeded three days – and never during the proposed assessment period, the height of the early summer growing season - typically the driest period of the year. In sum, one of the finest trout rivers in Michigan would fail to meet the tests for Federal wetlands protection under the proposed 1995 changes to the Clean Water Act.

As the nation considers how to cope with the damage from Midwest's devastating 1993 and 1995 floods, we should keep in mind an essential function of wetlands. They soak up water like giant sponges when it might otherwise race away in a flood, and they release that water slowly, benefiting man and beast. That is the way the Pere Marquette works, and that is the way

some of the land which the Missouri River and other Midwest streams took back in 1993, and again in 1995, may be made to work once more.

As of 1997, the House of Representatives is considering a bill to streamline wetlands regulation while providing better protection of these valuable resources. This bill is a start in the right direction, but does not provide the protection that wetlands need. We can only hope that saner policies prevail.

Wetlands Sustain Sport Fishing Industries in the Midwest and Rocky Mountain States

Economic Contribution of Sports Fishing in 1996				
State	**Angler Expenditures**	**Economic Output**	**Jobs**	**State & Federal Taxes**
Colorado	$634,447,000	$1,310,164,000	20,156	$72,976,545
Idaho	279,950,000	505,805,000	9,715	34,511,236
Illinois	1,568,471,000	3,665,731,000	48,731	243,879,185
Michigan	1,506,228,000	2,879,908,000	43,605	185,567,289
Minnesota	1,874,835,000	3,834,321,000	61,735	282,205,184
Montana	243,501,000	464,571,000	8,997	13,849,043
Ohio	836,192,000	1,771,676,000	28,063	101,292,606
Wisconsin	1,072,570,000	2,211,733,000	38,196	139,658,535
U.S. Total	**$37.8 billion**	**$109.3 billion**	**1,456,245**	**$5.39 billion**

Dollars and Sense on the Big Muddy

Throughout time Missouri River fish danced to the seasons. Bass, catfish, sturgeon and freshwater drum all thrived as the "Big Muddy" swelled across its floodplain, gathered up organic decay and nutrient-rich silts, gorged underground aquifers and saturated its wetlands. These flooded backwaters, teeming with young fish, then drained slowly, relentlessly back to the main river, feeding its life web with water, salts and silt.

For more than a century now men have worked to herd the Missouri between levees, drain its wetlands, and strip its riparian forests for farmland. Ninety percent of the Missouri's historic bottomlands have been obliterated. The river's commercial fish harvests have plummeted 80 percent in the past 50 years. Rather than support a potentially lucrative caviar fishery, the pallid sturgeon has been listed as "endangered" under the federal Endangered Species Act.

When the Missouri and Mississippi rivers overwhelmed their flood control works in 1993 the nation's taxpayers got a cleanup bill for $16 billion. When these rivers turned right around and did the same thing two years later, it seemed like it was time to rethink the way we were spending money.

Freshwater Drum – *Aplodinotus arunniens*

In 1997 the U.S. Fish and Wildlife Service proposed that 45,000 acres of historic Missouri River floodplain be rejoined to the river by expanding the existing 14,000-acre Big Muddy National Fish and Wildlife Refuge. The lands will be acquired from willing sellers weary of battling the river. The refuge expansion idea looks like a winner from at least two standpoints: Missouri's own fishing and the health of the larger Mississippi River ecosystem.

The Flood of '93 cost taxpayers nearly $16 billion in disaster recovery payments, much of which was lost in 1995 when floods again dismantled levees.

Missouri is a fishing state. Spending by anglers gave the state a $700 million shot in the arm in 1996. The Big Muddy National Fish and Wildlife Refuge expansion will increase the river's fish production and thereby expand both angling and commercial fishing opportunities. Reconnecting the river's historic wetlands will also increase the recruitment of silt into the river and improve nutrient cycling, delivering benefits all the way downstream to the Gulf of Mexico.

American taxpayers are eyeing their bills a lot more closely these days. The benefits of the Big Muddy wetlands restoration will go far beyond Missouri and, unlike the flood control works they replaced, they will endure.

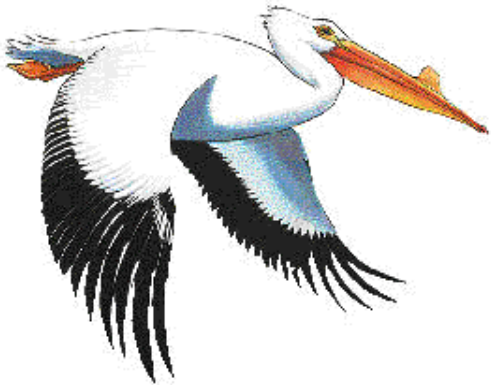
Trouble in Paradise

Louisiana's vehicle license plate proclaims that the state is the "Sportsman's Paradise". The numbers would certainly suggest so. The state is blessed with 42 percent of the nation's coastal wetlands. These include the central Gulf of Mexico area known as the "Fertile Crescent", some of the most productive fisheries habitat in the world. Louisiana leads the lower 48 states in total fisheries production and in the production of shrimp, blue crabs and oysters. Louisiana sports anglers spent $824 million in 1996. The state's commercial fisheries brought in $267 million that year.

Louisiana is losing her coastal wetlands, however, at the rate of 35 square miles a year. That rate has more than doubled since the late 1940s, when work on the Mississippi River flood control projects accelerated. The project levees cut the river from its bottomland sediment supply, and it was those very sediments that helped build the river's Delta wetlands over the ages.

As Louisiana's wetlands go, so goes southwestern Mississippi. The two states share the region's wetlands blessings - and the tragedy of their loss. The region has campaigned successfully for federal recognition of the problem. Congress passed the Coastal Wetlands Planning, Protection and Restoration Act - the "Breaux Act" - in 1990. The act calls for the implementation of specific projects to improve the delivery of river-borne sediments into the threatened coastal wetland areas. The main projects called for in the act have proven controversial, however, and progress since 1990 has been limited to minor measures.

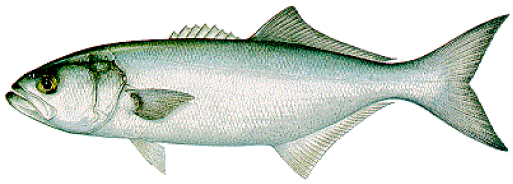
Noting the then-incipient shrinkage of Louisiana's coastal wetlands back in 1928, one researcher urged "a broad program of conservation along new and intelligent lines", concluding that wetlands loss "should be considered a state and national problem … to the end that the state and nation may enjoy a more balanced diet, more healthful recreation, and enduring prosperity." Those words ring every bit as true today as they did 70 years ago. Time is running out for Louisiana's coastal wetlands and her enormously valuable wetlands-dependent fisheries. We can only pray that the region's political leadership will grasp those "new and intelligent lines" before Paradise is lost.



White Pelican – *Pelecanus erythrohynchos*

Leapin' Bluefish

The scientific name for bluefish, *Pomatomus saltatrix*, salutes the fish's impressive energy. While the first name attempts to describe the dark, scar-like line on the gill cover ("cover-cut"), *saltatrix* exclaims "somersaulter" - leaper. The ubiquitous blue bites hard and fights valiantly, making him a favorite of saltwater anglers from the South Atlantic coast to New England. Unfortunately, blues are in decline and deteriorating shoreline conditions may be the reason.



Bluefish - *Pomatomus saltatrix*

Adult bluefish move around the ocean a lot. They winter off the coast of Florida and head north in the spring. A major bluefish spawn occurs in early spring just landward of the Gulf Stream between Florida and southern North Carolina. A second summer spawn takes place off the mid-Atlantic. Larvae from the spring spawn head north with the currents, around Cape Hatteras to the offshore waters of the mid-Atlantic Bight. As the waters nearer the shore warm in late spring, juvenile blues move into bays and estuaries to feed on wetlands invertebrates such as opossum shrimp, amphipods and small wetlands fish like silversides and killifish.

Bluefish are famous for feeding frenzies in which they attack schools of baitfish and tear their prey savagely to bits. The scraps attract gulls, which blue seeking fishermen eagerly track for a chance to join the fray.

United States anglers caught *93 million pounds* of bluefish in 1983. By 1993, the catch plummeted to 20.6 million pounds. "We have strong reason to believe the population is declining" State of Connecticut fisheries research supervisor Victor Crecco told the press that year.

The evidence behind Crecco's assertion continues to mount. Bluefish catches have continued to decline, falling to just over 15 million pounds in 1996. While heavy fishing pressure certainly shares some responsibility, researchers believe that the destruction of inshore habitat, including the pollution of bays and estuaries, is strongly implicated in the blues' decline.

Despite these hard times, blue fever remains strong. Over 60% of bluefish caught in 1996 were taken from party or private vessels, an important source of employment for coastal communities on the eastern seaboard.

Stripers on the Chesapeake

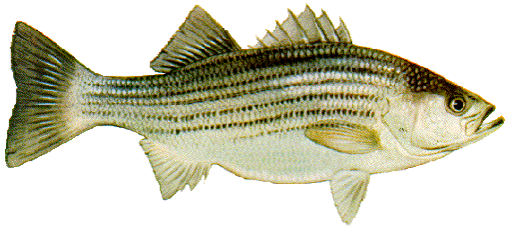
There are three primary striped bass populations along the Atlantic coast: Hudson River, Chesapeake Bay and the Roanoke River. For generations these bass sustained major commercial and recreational fisheries. The popularity of stripers with anglers often drove sport annual catches beyond those of the commercial fishermen. The commercial striped bass harvest peaked in 1973 at about 14 million pounds, then began a precipitous decline.

The State of Maryland places a value of $678 billion on Chesapeake Bay's resources. Much of this is dependent upon wetlands.

Following years of particularly poor survival of striped bass, the result of poor water quality and severe fishing pressure, Congress passed the Striped Bass Conservation Law in 1984. This legislation directed the Departments of Commerce and Interior to assist the interstate Atlantic States Marine Fisheries Commission to moderate fishing pressure in order to restore striper populations to healthy levels.

Fishing pressure is not the only problem. Water pollution has been especially hard on the Chesapeake Bay stripers. During July of the years 1984 through 1987 there was simply *no* suitable habitat remaining for striped bass in the north central part of the bay. The bay receives about 19 million pounds of phosphorus and 188 million pounds of nitrogen a year from urban and agricultural wastes according to U.S. Environmental Protection Agency estimates. These nutrients stimulate the growth of algae near the water surface, blocking sunlight needed by the bay's underwater seagrasses – critical rearing areas for juvenile stripers. When the mats of algae die they consume the oxygen needed by seagrass and stripers alike. By the late 1980's, *half* the bay's seagrass beds had been lost in this way.

The magnitude of the nutrient problem prompted the inclusion of a specific commitment in the 1987 Chesapeake Bay Agreement to reduce by 40 percent the amount of nitrogen and phosphorus entering the bay by the year 2000. A 1990 review of the Chesapeake Bay nutrient problem conducted by the U.S. Environmental Protection Agency concluded that, although progress had been made toward the 40 percent reduction goals, further substantial reductions in phosphorous loadings were necessary. Further, the review concluded that wetlands within the Bay's 64,000 square mile watershed must be protected vigorously for their nutrient trapping and removal capabilities.



Striped bass - *Morone saxitalis*

At the time of this writing, significant reductions in nitrogen and phosphorus load have been achieved and steady progress is being made towards

year 2000 goals. The tangible result of these efforts is a 70% increase in seagrass acreage from the low point of 10 years ago. While the net loss of estuarine wetlands has been slowed, the loss of freshwater wetlands in Bay watersheds is accelerating – a cause for concern and continued vigilance.

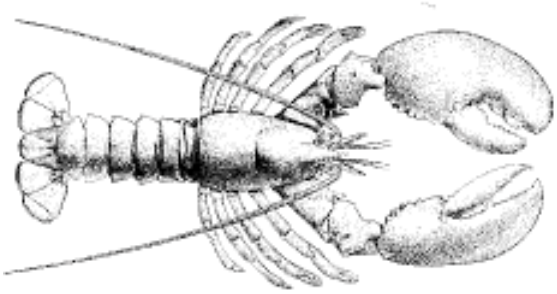
The confirmed presence of the toxic micro-organism *Pfiesteria piscicida* after a fish kill on Maryland's Pocomoke River last summer reinforces that this is no time to rest on recent successes. Many fishers and conservationists blame the watershed's large number of chicken farms for sending slugs of nitrogen into the Pocomoke, especially during the unusually heavy rains of 1996. They see the outbreak of this organism and the fish kill as a result of that pollution. Quoted by the press when the story broke, Mike Hirshfield, vice president for Chesapeake Bay Foundation, the region's largest environmental group, said, "As if we needed another reason to worry about animal waste nutrients, this was a real kick in the teeth."

Despite these concerns, the recovery of the Chesapeake's estuarine habitats has supported a remarkable comeback for striped bass, to the point that the stock was declared restored as of 1995. A modest commercial harvest of stripers has been reopened, and the fishery is being monitored closely to assure that it is kept as sustainable levels.

The return of the stripers demonstrates that wetlands protection will generate positive results. Even in its most impaired condition Chesapeake Bay yielded 100 million pounds of seafood a year. In a 1989 assessment by the Maryland Department of Economic and Employment Development, the estimated value of the natural resources related goods, services and amenities provided by the bay stood at *$678 billion*. While more recent figures are not available, it can be presumed that this figure will grow substantially when the benefits of ongoing wetlands protection and restoration efforts are fully realized.

Lobsters: Home for Homarus

The American lobster, *Homarus americanus*, plays an important role in the culture and heritage of New England. This fishery is also important to the regional economy. Each year, the fishers of Massachusetts, Maine and Connecticut harvest this succulent delicacy by the millions. Yearly catches in this decade have averaged better than



American lobster – *Homarus americanus*

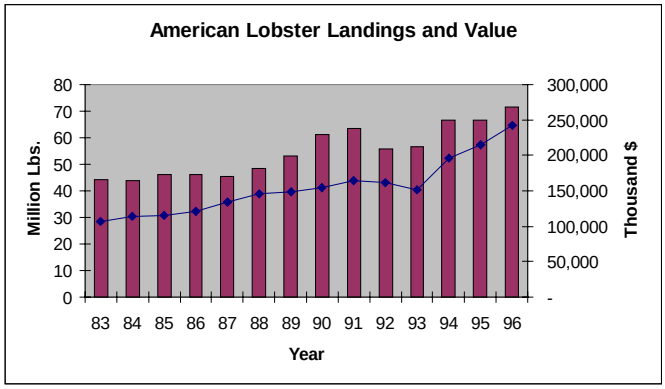
60 million pounds. In 1996, New England fishers landed 71.6 million pounds of lobster, worth nearly $242 million dollars.

The lobster is not usually thought of as a wetlands-dependent animal. And that, according to New England researchers, is an oversight that could undermine the region's valuable lobster fishery. Inshore areas that have shallow water, lowered salinities, varying temperatures and increased turbidity may be precisely what are needed to speed young lobsters on their way to becoming "keepers".

Recent research shows that juvenile lobsters inhabit inshore areas including cobble, eelgrass and salt marsh peat reefs in relatively high densities. There is strong evidence that years of abundant freshwater flow from wetland areas into these inshore habitats are followed nine years later - the period it takes juvenile lobsters to grow to legal size - by good lobster harvests.

Better survival of juveniles to harvestable size, "recruitment" to fisheries managers, is essential if lobster fishing is to be sustained. The fishery is currently taking a relatively high percentage of the adult lobsters, the breeding population needed to sustain future harvests.

The connection between wetland functions and lobster production is coming under closer scrutiny. Pending the scientists' final verdict, lobstermen and their friends will do well to continue their support for wetland conservation efforts.



Source – *National Marine Fisheries Service*

Conclusions

From hundreds of fishing communities across the land and thousands of coastal and river fish habitats, the evidence mounts steadily that most of this country's $159 billion dollar fisheries economy - and the two million jobs that go with it - depend on wetlands.

Where wetlands have been destroyed, fisheries have declined. Some heroic efforts, like those of California's salmon fishermen, are being made to restore wetland and fish resources. In relatively undisturbed areas like Alaska the wetlands-fisheries connection appears to be inadequately appreciated. In the New England lobster fishery the importance of wetlands, always a fact, is only now becoming clear.

The fishermen of this country are literally fighting for their lives. Those with organizing skills and some remaining resources are leading - even winning - conservation battles, as in the case of the recent reform of California's federal Central Valley Project. In too many cases, however, fishermen's pleas for wetlands protection have been lost in the nation's race to develop coasts, estuaries and rivers for agricultural, energy, recreational and urban projects.

America's fisheries are sustainable, but only if the habitat they need is identified and protected. It accomplishes little to shut down threatened fisheries, like those for Atlantic coast striped bass, unless the rebuilding process tackles habitat problems as well.

Absolutely essential to three-quarters of America's fishery production, wetlands are complex and often - as in the case of the Everglades - extensive ecosystems. Wetlands are complex systems that cycle water, air, soil, nutrients and energy into the waters and life that surround them. It is not surprising that the National Research Council questions whether we can create or restore wetlands ecosystems. The prudent course, clearly, is to protect our remaining wetlands. The alarming outbreak of *Phiesteria* in the estuaries of the Atlantic and now the Gulf coasts drives home the point that taking our wetlands for granted threatens our economic, cultural and physical health.

The current Congressional deliberations concerning the wetland protection provisions of the Clean Water Act, coming just as we must determine the future of flood control in the nation's heartland, provide an important opportunity to weigh the values that wetlands bestow on this country. We must consider how to sustain those values for the generations to come.

About This Report

This report was originally prepared by William M. Kier in 1994 for the Campaign to Save California Wetlands and was funded by a grant from the David and Lucille Packard Foundation. It has now been updated with the assistance of Eric G. Doyle. Mr. Kier is a certified fisheries scientist with more than 35 years of professional experience in the protection and management of freshwater, estuarine and marine sport and food fish resources. His early work in the field included life history studies of the fishes of the San Francisco Bay-Delta Estuary. He became assistant chief of the California Department of Fish and Game's environmental protection branch, the state's assistant Resources Secretary and the principal fisheries advisor and director of research for California's State Senate. The consulting firm he leads specializes in fisheries management analysis and restoration planning.

Eric Doyle has a B.S. in marine biology, and a Masters degree from the School of Marine Affairs - University of Washington, specializing in the economic and policy implications of natural resource management issues. Mr. Doyle has worked extensively with the National Marine Fisheries Service on Endangered Species Act listings of salmon and steelhead in the Pacific Northwest and California.

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