Excess Harvesting Capacity in U.S. Fisheries
A Report to Congress

Mandated under Section 312(b)(6)

of the

Magnuson-Stevens Fishery Conservation and Management Act

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Executive Summary

As required in §312(b)(6) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA), this report identifies and describes U.S. federally managed fisheries with the most severe examples of excess harvesting capacity, and recommends cost-effective and privately funded measures that could be used to reduce excess harvesting capacity.

This report defines and examines several dimensions of excess harvesting capacity. At a basic level, the National Marine Fisheries Service (NMFS) defines "excess harvesting capacity" to mean "too much" harvesting capacity. The findings are presented for fisheries, which generally refer to fishery management plans (FMPs), and fleets, which generally refer to a combination of vessel/gear type, area, and fishery. Information on the overfishing and overfished status of harvested stocks, as reported in the annual Report to Congress on the status of the U.S. fisheries, is presented to put the excess harvesting capacity estimates in a broader fishery management context.

Findings and Recommendations

As required by Congress, this report identifies 20 fisheries with the most severe examples of excess harvesting capacity. Because the excess harvesting capacity problem raises so many complex issues, the report also provides additional information and develops alternative lists, which highlight different analytical methods, and, in fisheries with sufficient data, different management targets. Although this report studies the problem from many angles, it does not assess all federally managed fisheries. Some federally managed commercial fisheries are excluded from the analysis if data limitations or other issues prevented meaningful quantitative assessments.

When reviewing this report, it is important to understand the limitations of the data and resulting analysis. These limitations and important caveats are discussed in detail in the report. In addition, the estimates are based on 2004 data, and it is important to recognize that biological, economic, and regulatory changes since 2004, some of which could have significant effects on excess harvesting capacity, are not reflected in the results.

The major quantitative and qualitative findings are summarized below.

<u>Major Quantitative Findings</u>

1. Excess capacity (capacity in excess of harvests) and overcapacity (capacity in excess of a management target) rates vary considerably—among regions and fisheries, and even among fleets and stocks within individual fisheries. Therefore, meaningful comparisons of national or even regional excess harvesting capacity rates are not possible.

2. For 12 of the 25 of the assessed fisheries and 18 of 60 of the assessed fleets, excess capacity levels were about 50 percent or more. Overcapacity was more difficult to assess, but in 6 of the 23 fisheries, overcapacity levels exceeded 30 percent.

3. In some fisheries with high rates of excess capacity and overcapacity in 2004, there was overharvest of quotas, overfishing or overfished stocks. However, in other fisheries with high rates of excess capacity and overcapacity, those three undesirable outcomes were prevented by effective management controls on harvesting capacity.

Major Policy Findings

1. Excess capacity and overcapacity rates in and of themselves do not determine if capacity should be reduced, by how much to reduce it, how to reduce capacity, or the urgency for reducing it. Such determinations will be further complicated in the case of (a) multispecies fisheries, (b) rebuilding stocks, (c) stocks subject to environmental fluctuations, (d) fisheries with significant recreational components, and (e) fisheries with significant foreign harvests.

2. Excess harvesting capacity exacerbates certain undesirable management outcomes, including overfishing, poor economic performance, less viable fishing communities, high rates of bycatch, excessive harm to habitats, poor at-sea safety, and a regulatory process that is complicated, contentious and costly.

3. Market-based management, including Limited Access Privilege Programs (LAPPs) and similar programs, has a strong track record for effectively and efficiently reducing excess harvesting capacity. NMFS bases this conclusion on a comparative assessment of the cost-effectiveness, lasting results, and legal and programmatic flexibility of various rationalization programs over nearly two decades.

4. Buybacks may play a helpful role in reducing excess harvesting capacity if they are (a) privately funded and (b) linked with a market-based management program.

5. License limitation programs will not decrease excess harvesting capacity and prevent subsequent increases in excess harvesting capacity unless the rules to obtain and renew a permit and to transfer a permit to a replacement vessel are sufficiently restrictive. However, license limitation programs may form a foundation for subsequent measures, such as LAPPs, that do reduce excess harvesting capacity on a more lasting basis.

6. Conventional harvest restrictions do not provide cost-effective or lasting method of reducing excess harvesting capacity. On the other hand, these harvest restrictions, if implemented in conjunction with a LAPP, can contribute to an effective management regime that meets the objectives of sustainable fisheries.

7. The major policy findings are consistent with the Administration's goal of implementing market-based management programs, such as LAPPs and similar programs, when the Councils and affected industry sectors support them

I. INTRODUCTION

This report to Congress on excess harvesting capacity draws on almost two decades of efforts by NOAA's National Marine Fisheries Service (NMFS) to better understand and effectively address the problems resulting from ineffective controls on the level and use of harvesting capacity. The report fulfills a Congressional mandate in §312(b)(6) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA), in which Congress asked the agency to identify and describe the 20 fisheries with the most severe examples of excess harvesting capacity, recommend measures for reducing such excess harvesting capacity, and identify potential sources of funding for those measures. Therefore, the report has two distinct components. They are: (1) an assessment of excess harvesting capacity and (2) a discussion of the most cost-effective ways to reduce excess harvesting capacity. In conformity with the legislative mandate, NMFS has focused on privately-funded approaches to reduce capacity. Specifically, §312(b)(6) calls for a:

> (6) REPORT-
>
> (A) IN GENERAL.- Subject to the availability of funds, the Secretary shall, within 12 months, after the date of enactment of the Magnuson-Stevens Fishery Conservation and Management Reauthorization Act of 2006 submit to the Congress a report –
>
> (i) identifying and describing the 20 fisheries in United States waters with the most severe examples of excess harvesting capacity in the fisheries, based on value of each fishery and the amount of excess harvesting capacity as determined by the Secretary;
> (ii) recommending measures for reducing such excess harvesting capacity, including the retirement of any latent fishing permits that could contribute to further excess harvesting capacity in those fisheries; and
> (iii) potential sources of funding for those measures.
>
> (B) BASIS FOR RECOMMENDATIONS.- The Secretary shall base the recommendations made with respect to a fishery on-
>
> (i) the most cost effective means of achieving a voluntary reduction in capacity for the fishery using the potential for industry financing; and
> (ii) including measures to prevent the capacity that is being removed from the fishery from moving to other fisheries in the United States, in the waters of a foreign nation, or on the high seas.

NMFS has organized this report to examine several dimensions of excess harvesting capacity. NMFS defines "harvesting capacity" as the capability of one or more specific vessels to catch fish and it measures harvesting capacity in terms of their potential pounds or tons of catch, and not in terms of the number, size or horsepower of those fishing vessels. NMFS uses the following three measures or indicators of excess harvesting capacity:

- **Excess Capacity:** capacity in excess of actual harvests
- **Overcapacity:** capacity in excess of the quotas
- **Overharvest:** harvest in excess of the quotas

The findings, which are for 2004, are presented for 25 fisheries and 60 fleets, where a fishery in most instances refers to the commercial fishing activity governed by a single fishery management plan (FMP) and a fleet is defined by vessel/gear type, area and fishery. Information on the overfishing and overfished status of the harvested stocks, as reported in the annual reports to Congress on the status of the U.S. fisheries, is presented to put the excess harvesting capacity estimates in a broader fishery management context. A stock that is subject to overfishing has a fishing mortality (harvest) rate above the level that provides for the maximum sustainable yield; and a stock that is overfished has a biomass level below a biological threshold specified in its FMP. NMFS interprets "fisheries in United States waters" to mean fisheries that are federally managed. Therefore, with the exception of the Northern shrimp fishery that is managed by the Atlantic States Marine Fisheries Commission, this report excludes fisheries managed by a state or a States Marine Fisheries Commission. The report also excludes the 20 federally managed fisheries for which data limitations or other issues prevented useful quantitative assessments of excess harvesting capacity. In addition, NMFS confined this report to federally managed commercial fisheries, because the concept of "excess harvesting capacity" does not apply in any meaningful way to the recreational sector.

Around 1990, after years of growth, domestic harvests began to level off, and managers and policymakers sought ways to prevent overfishing, in part by bringing about a better balance between harvesting capacity and the harvest levels that will meet the objectives of sustainable fisheries. One response was to introduce tradable individual fishing quotas (IFQs), which, from 1990 to 1995, were implemented in the Atlantic surfclam and ocean quahog fishery, the Atlantic wreckfish fishery, and the Alaska halibut and sablefish fisheries. In the 1990s, community development quotas and fishing cooperatives were also created in certain fisheries, chiefly in Alaska. In 2001, NMFS approved the Pacific Fishery Management Council's limited entry fixed gear permit stacking program in which a vessel is allowed to "stack" up to three sablefish permits on one vessel and harvest the cumulative sablefish limits associated with the stacked permits.

Another response was to remove redundant fishing vessels, or to prevent the entry of additional vessels through buyback and license limitation programs. License limitation programs were introduced in most federally managed fisheries (except in the Caribbean area), and buybacks were implemented in several Northeast, Pacific Coast, and Alaska fisheries. In 1996, with the passage of the Sustainable Fisheries Act amendments to the MSA, Congress formally established a Fishing Capacity Reduction Program in Section 312(b-e), with the intent of encouraging industry-funded buybacks.

In response to the Congressional mandate, the second part of this report addresses measures to reduce excess harvesting capacity and sources of funding for those measures. Although the mandate for this report is included in a provision (MSA §312(b)) that deals with buybacks, NMFS prepared this report to review a wider range of management

responses, including market-based management, other limited access privilege programs (LAPPs) and other harvest-rights based programs, buybacks financed by the fishing industry and, potentially, by other private entities, license limitation programs, and conventional harvest restrictions. The review is based on the agency's broad understanding, gained over the past two decades, of how best to control the level and use of harvesting capacity.

In 1998, NMFS began an analytical program to address a range of issues related to harvesting capacity in marine capture fisheries. In 1999, NMFS initiated a plan to prepare three reports on harvesting capacity in federally managed commercial fisheries. The first report, *Identifying Harvest Capacity and Over-Capacity in Federally Managed Fisheries: A Preliminary Qualitative Report*, was completed in 2001. The second report, *Assessments of Excess Fishing Capacity in Select Federally Managed Commercial Fisheries*, was issued in 2006. The third report, *National Assessment of Excess Harvesting Capacity in Federally Managed Commercial Fisheries*, which was completed in early 2008, includes a report on harvesting capacity, excess capacity, overcapacity, and overharvest in 2004 for each of the six NMFS regions and two separate reports for the Atlantic fisheries for highly migratory species and for the fisheries of the U.S. Caribbean. The National Assessment is provided as Appendix C of this report.

The excess capacity, overcapacity, and overharvest estimates presented in this report were taken from the National Assessment. The definition of "harvesting capacity" used in this report and the methods used to estimate harvesting capacity are presented in Section II. Section III contains: (1) the basic terms of reference and constraints for the estimates in this report; (2) a discussion of the implications of high rates of excess capacity, overcapacity, or overharvest; (3) the estimated excess harvesting capacity rates and ex-vessel values by fishery; (4) excess capacity, overcapacity, and overharvest rankings, by fishery; (5) information on the numbers of stocks that were overharvested, subject to overfishing, or at an overfished level; and (6) the estimated excess capacity by fleet. The definitions and basic terms of reference and constraints for the estimates in this report are critical for understanding the estimates. Measures for reducing excess harvesting capacity and sources of funding for those measures are discussed in Section IV.

II. TERMS AND METHODS

A. AN OUTPUT-BASED DEFINITION OF CAPACITY

Ever since fishery experts at the United Nations Food and Agricultural Organization (FAO) began publishing studies in the early 1990s about the global dimensions of overfishing and overcapacity, many national governments and regional fishery management organizations (RFMOs) have engaged in efforts to assess and address excess harvesting capacity. In most cases, harvesting capacity has been measured in terms of "inputs", such as the numbers and sizes of fishing vessels. Even today, the European Union uses a combination of the size and engine power of a fishing vessel as its measure of a vessel's harvesting capacity. Similarly, the Inter-American Tropical Tuna Commission (IATTC) measures capacity in terms of the hold capacity of the tuna vessels operating in IATTC waters.

However, NMFS has chosen a different, output-based (catch or landings) definition of capacity. There are two reasons why NMFS defines and measures harvesting capacity in terms of the potential harvest of a fishing vessel or fleet of vessels. First, for most fishery management purposes, the potential harvest of a fleet is more important than one or two physical vessel characteristics. Second, for most industries in the United States, capacity is a measure of potential output, and although potential output depends on, among other things, the number and physical characteristics of plants or vessels, capacity is not normally measured in terms of those inputs.

In the instructions to the U.S. Census Bureau's Survey of Plant Capacity Utilization, which is used to estimate capacity for most U.S. industries, capacity is defined as: "The maximum level of production that this establishment could reasonably be expected to attain under normal and realistic operating conditions fully utilizing the machinery and equipment in place." NMFS developed the following definition of harvesting capacity:

> *Harvesting capacity* is the maximum amount of fish that the fishing fleets could have reasonably expected to catch or land during the year under the normal and realistic operating conditions of each vessel, fully utilizing the machinery and equipment in place, and given the technology, the availability and skill of skippers and crew, the abundance of the stocks of fish, some or all fishery regulations, and other relevant constraints.

B. ANALYTICAL METHOD

NMFS selected data envelopment analysis (DEA) as an appropriate analytical tool to estimate harvesting capacity. DEA is a mathematical programming approach that has been used to estimate capacity for a variety of industries. With adequate data, DEA can be used to estimate (1) the potential or technically efficient harvest level for a specific trip and vessel when variable and fixed inputs limit its harvest; (2) the potential or capacity harvest level for a specific trip and vessel when only fixed inputs limit its harvest; and (3) the level of variable input use required to take the capacity harvest level.

Examples of fixed inputs are vessel length, engine horsepower, and gross tonnage. Examples of variable inputs are days at sea, number of sets, and crew size. A detailed discussion of DEA and how it was used to estimate harvesting capacity for each fishery is included in the National Assessment (see Appendix C).

C. HIGHER AND LOWER ESTIMATES

For each fishery in the National Assessment, two estimates were provided, if data on variable inputs were available. As a matter of convenience, these two estimates are simply referred to as the "higher" and "lower" capacity estimates.

(1) The first and higher estimate, which is the usual measure of capacity output, provides an estimate of what the harvest would have been if all estimated technical inefficiency had been eliminated and if variable inputs had been fully utilized (i.e., used at the level required to attain capacity output). There was technical inefficiency if more could have been produced without increasing inputs.
(2) The second and lower estimate provides an approximation of what the harvest would have been if the variable inputs had been fully utilized but if the estimated technical inefficiency had not been eliminated. Therefore, the lower estimate is based on the actual level of technical efficiency, not the estimated potential level of technical efficiency.

The second and lower estimate is provided to address the concern that the first estimate may overstate the amount of fish a given fleet could have expected to harvest under the normal and realistic operating conditions of each vessel. The reason for this concern is that, with the first and higher estimate, all of the differences in harvest levels among trips of a specific type are attributed to technical inefficiency and differences in the levels of both variable and fixed inputs when, in fact, some of the differences in harvest levels could have been due to unobserved factors, including differences in skill levels among skippers or crews, unobserved differences in fixed inputs, weather conditions, mechanical failures, luck (being at the right place at the right time to catch an unusually large amount of fish), and temporal or spatial differences in fish stocks.

The potential for the first estimate to overstate what the fleet could have harvested under the normal and realistic operating conditions of each vessel is greater when trip-level data are used to estimate harvesting capacity and much of the harvest is accounted for by trips in which only one species is harvested. When capacity is estimated by trip, the peer trips that are used to estimate capacity are defined in terms of both vessel characteristics and the species composition of the catch. For single species trips, all the trips for a given species and for vessels with similar vessel characteristics would be peer trips and the trip with the most catch would be the capacity estimate for all those peer trips. Conversely, if many species are taken on most trips and if the species composition differs by trip, there will be relatively few peer trips to estimate the capacity for each trip, which means that more of these trips will have no or few peers and will be estimated to be at or close to capacity. This may account for the relatively high estimates of excess capacity in some

of the North Pacific fisheries, such as the Alaska halibut, sablefish, and pollock fisheries. The other characteristic of those fisheries and other fisheries with LAPPs that probably contributed to relatively high rates of excess capacity and overcapacity is the additional control the harvest privilege owners have over when and how fish are caught. Some may have decided to use all their harvest privileges (e.g., IFQs) on a small number of large trips while others may have decided to make more but smaller trips. The trip level capacity estimates will tend to reflect the catch per trip from the larger trips; therefore, there will be high estimates of excess capacity if a large part of the total catch was taken with smaller trips. The lack of variable input data for the Alaska Region fisheries limited what could be done to account for such differences in trip types for the fisheries with IFQs or fishing cooperatives.

The higher and lower estimates are not intended to bracket the range of feasible harvesting capacity estimates; they are intended to allow for a more complete assessment of excess capacity and overcapacity by providing a range that accounts for different underlying assumptions about the vessels' ability to increase their harvest. However, given the definition of harvesting capacity stated above, and barring other factors that could result in the first estimate overstating or understating harvesting capacity, actual harvesting capacity would tend to be between the two estimates because the underlying assumptions for the first and second estimates, respectively, are too lenient and too restrictive relative to that definition of harvesting capacity. An estimate of what capacity would have been in 2004 in the absence of management measures that constrained landings per trip, the number of trips, or both in 2004 would have produced larger but more speculative capacity estimates. Similarly, estimates of what capacity would have been, if no stocks had been overfished, would have produced larger but again more speculative estimates of harvesting capacity.

For the fisheries without consistently available variable input data, it was not possible to provide estimates of the technically efficient harvest levels, estimates of the levels of variable input use required to harvest at the capacity level, and the lower estimates that were reported for most fisheries. This makes it more difficult to evaluate whether the harvesting capacity estimates for those fisheries are reasonable approximations of harvesting capacity as defined above. Because only the higher estimates are available for all fisheries, these higher estimates are used in identifying the fisheries with the most severe examples of excess harvesting capacity (see Table 4).

D. OVERCAPACITY

Assessments of overcapacity require commercial harvest quotas or quota proxies, because overcapacity is the difference between estimated harvesting capacity and the commercial harvest quota, which is assumed to be a target harvest level that will achieve the sustainability objectives for a fishery. However, some federally managed fisheries do not have quotas or quota proxies for all commercially important species, and, therefore, this report could not include estimates of overcapacity for those fisheries. However, in the future, the MSA requirement for annual catch limits (ACLs) will insure that quotas are available for all federally managed commercial fisheries.

III. EXCESS HARVESTING CAPACITY IN U.S. FISHERIES

A. ESTIMATES OF CAPACITY

This report summarizes the findings of seven of the eight regional assessments of excess harvesting capacity in federally managed commercial fisheries. NMFS believes it is useful to explain at the outset the following basic terms of reference and constraints for the estimates presented in this report.

1. The capacity estimates address commercial fisheries exclusively, and do not cover the for-hire charter and private angler recreational sectors, even though those sectors can account for much of the total catch of some species in federally managed fisheries.

2. This report estimates harvesting capacity, and does not address processing capacity. To the extent that processing capacity limited catch per trip, the number of trips, or both, it was implicitly accounted for in the estimates of harvesting capacity.

3. The estimates are based exclusively on data for vessels that participated in the fishery in 2004. Therefore, these estimates do not address the latent capacity of vessels that could have fished in 2004 but, for whatever reason, failed to do so. For some fisheries, including latent capacity would have substantially increased the excess capacity and overcapacity rates.

4. The estimates are for harvesting capacity as defined in this report; i.e., they are estimates of what the fleets could have caught in 2004 if they had used the variable inputs (e.g., days at sea, number of sets, and crew size) fully or if they had done that and also eliminated the estimated technical inefficiencies. They are not estimates of what the fishermen would have chosen to catch given the conditions and constraints they faced and their objectives in 2004.

5. Because the estimates use 2004 data, they do not capture changes in resource, environmental, market or regulatory conditions that took place after 2004. Examples of recent changes in regulatory conditions are the LAPP and buyback programs in some Alaska Region fisheries, the LAPP for the Gulf of Mexico red snapper fishery, reductions in days at sea in certain Northeast Region fisheries, and the more restrictive management measures in the Atlantic HMS fisheries.

6. The estimates are for stock conditions in 2004. There was no attempt to estimate excess harvesting capacity for alternative stock conditions. In rebuilding fisheries, estimates for 2004 do not indicate what the excess capacity and overcapacity rates would be after all stock had fully recovered.

7. Many fishing vessels contributed to the catch and, therefore, to the estimates of harvesting capacity, excess capacity and overcapacity for multiple species groups, fleets or fisheries. The species and fleet specific estimates presented in this report are of what catch would have been in 2004 if the catch for a specific type of trip had been greater than it actually was in 2004 but if neither the species composition of each trip nor the number of trips of each type had changed. Therefore, the species and fleet

specific harvesting capacity estimates do not reflect how much of each species group could have been caught in 2004 or how much each fleet could have caught in 2004 if the fishing vessels had changed either the catch composition or the number of trips for one or more types of trips. Under different circumstances, the harvesting capacity estimates could have been quite different. The present assessment was not intended to account for such shifts. This is somewhat less of a problem for the assessment of harvesting capacity by fleet for all species combined; however, because it is common for fishing boats to switch between gear types, the problem is not eliminated.

8. With the exception of the Pacific Coast and Alaska groundfish fisheries, the assessments are in terms of landings, not total harvests. Discards are not included in the estimates. If the commercial quotas were in terms of total harvest and if at-sea discards accounted for a significant part of the total harvest, overcapacity and overharvest could be underestimated.

9. Estimates of overcapacity and overharvest require a commercial quota or a functional equivalent. However, some federally managed fisheries include species that lack such quotas, and therefore overcapacity and overharvest could not be assessed for those species or in aggregate for such a fishery.

10. Except for the Northeast multispecies fishery and the Atlantic sea scallop fishery, the estimates of harvesting capacity are based on the actual number of trips each fishing vessel took in 2004, and not on the number in other years or the potential maximum number of trips each vessel could have taken in 2004 if the number of trips had not been limited by fishery management measures such as harvest quotas.

11. NMFS planned and prepared this report to minimize regional disparities and ensure as much comparability as possible. The analysts used the same terms, definitions, and DEA approach, and based their assessments on 2004 data. In addition, the same three economists worked with regional economists to conduct all the assessments. However, there were differences among the fisheries and sometimes within a single fishery with respect to industry structure, fleet makeup, management approaches, and the availability and quality of data. Such differences inevitably decreased the comparability of the estimates, both among fisheries and within some fisheries.

Of a total of 44 federally managed commercial fisheries, 27 were included in the National Assessment and 17 were excluded (see Table 1). Fisheries were excluded for the following reasons:

(1) adequate data were not available for 2004;
(2) neither a commercial quota nor its proxy was available for 2004;
(3) the biological characteristics of the species made assessments of overcapacity not feasible or not useful;
(4) management authority had been delegated to one or more states, and, therefore, the fishery was not federally managed; and
(5) the fishery did not occur in 2004.

NMFS did not include the U.S. Caribbean fleets and fisheries for two reasons. First, substantial data quality issues for those fisheries and fleets make their estimates very tentative, and, second, the relatively small size and low value of those fisheries would tend to eliminate them from the list of the 20 fisheries with the most severe examples of excess harvesting capacity.

Table 1. Federally Managed Fisheries Included and Not Included in the National Assessment.

Fisheries Included in the National Assessment
Atlantic States Marine Fisheries Commission
• Northern Shrimp Fishery[1]
Caribbean Fishery Management Council
• Spiny Lobster Fishery of Puerto Rico and the U.S. Virgin Islands
• Shallow Water Reeffish Fishery of Puerto Rico and the U.S. Virgin Islands
• Queen Conch Resources of Puerto Rico and the U.S. Virgin Islands
Gulf of Mexico Fishery Management Council
• Reef Fish Resources of the Gulf of Mexico
Mid-Atlantic Fishery Management Council
• Atlantic Surfclam and Ocean Quahog Fisheries
• Atlantic Mackerel, Squid, and Butterfish Fisheries
• Summer Flounder, Scup, and Black Sea Bass Fisheries
• Atlantic Bluefish Fishery
• Tilefish Fishery
New England Fishery Management Council
• Atlantic Sea Scallop Fishery
• Northeast Multispecies Fishery
• Monkfish Fishery
• Atlantic Herring Fishery
• Atlantic Deep Sea Red Crab Fishery
NMFS
• Consolidated Atlantic Highly Migratory Species Fishery
North Pacific Fishery Management Council
• Groundfish Fishery of the Gulf of Alaska
• Groundfish Fishery of the Bering Sea and Aleutian Islands Area
• Bering Sea/Aleutian Islands King and Tanner Crab Fisheries
• Scallop Fishery off Alaska
• Pacific Halibut Fishery (not an FMP fishery)
Pacific Fishery Management Council
• Coastal Pelagic Species Fishery
• Pacific Coast Groundfish Fishery
• U.S. West Coast Fisheries for Highly Migratory Species
South Atlantic Fishery Management Council
• Snapper-Grouper Fishery of the South Atlantic Region
South Atlantic and Gulf of Mexico Fishery Management Councils Joint Efforts
• Coastal Migratory Pelagic Resources of the Gulf of Mexico and South Atlantic Fisheries
Western Pacific Regional Fishery Management Council
• Bottomfish and Seamount Groundfish Fisheries of the Western Pacific Region[2]
• Pelagic Fisheries of the Western Pacific Region[3]

Table 1 Continued.

Fisheries Not Included in the National Assessment

Gulf of Mexico Fishery Management Council

- Red Drum Fishery of the Gulf of Mexico
- Stone Crab Fishery of the Gulf of Mexico
- Shrimp Fishery of the Gulf of Mexico

Mid-Atlantic Fishery Management Council

- Spiny Dogfish Fishery

New England Fishery Management Council

- Small Mesh Multispecies Fishery
- Skate Fishery
- Atlantic Salmon

NMFS

- Federally permitted fisheries beyond the U.S. EEZ (e.g., U.S. tuna vessels in the Western Pacific)

North Pacific Fishery Management Council

- High Seas Salmon Fishery off the Coast of Alaska East of 175 Degrees East Longitude

Pacific Fishery Management Council

- West Coast Salmon Fishery
- Pacific Halibut Fishery (not an FMP fishery)

South Atlantic Fishery Management Council

- Atlantic Coast Red Drum Fishery
- Shrimp Fishery of the South Atlantic Region
- Golden Crab Fishery of the South Atlantic Region
- Dolphin and Wahoo Fishery

South Atlantic and Gulf of Mexico Fishery Management Councils Joint Efforts

- Spiny Lobster Fishery of the Gulf of Mexico and South Atlantic

Western Pacific Regional Fishery Management Council

- Crustaceans Fisheries of the Western Pacific Region

1. At the request of the New England Fishery Management Council, this fishery, which is managed by the Atlantic States Marine Fisheries Commission, was included in the National Assessment; however, it is not a federally managed fishery.
2. This includes only the Hawaii longline fleet, which accounted for about 54 percent of the commercial landings in this fishery in 2004. The American Samoa longline fleet, which accounted for about 28 percent of the landings in this fishery, was not included.
3. This includes only the Northwest Hawaiian Islands bottomfish fleet, which accounts for about 37 percent of the commercial landings in this fishery.

B. EXCESS HARVESTING CAPACITY IN FEDERALLY MANAGED COMMERCIAL FISHERIES

MSA §312(b)(6) directs the Secretary of Commerce to identify and describe the 20 federally managed commercial fisheries with the most severe examples of excess harvesting capacity. In responding to this mandate, NMFS provides a list of 20 fisheries in Table 4, but also elected to provide several other tables that examine excess harvesting capacity from different perspectives. The term "excess harvesting capacity" is interpreted in a broad sense, to mean too much harvesting capacity relative to actual harvests, the commercial quotas, or both. Therefore, NMFS uses the rates of excess capacity, overcapacity and overharvest as three measures, or indicators, of excess (i.e., too much) harvesting capacity. These perspectives on excess harvesting capacity are summarized with the following terms:

(1) Excess Harvesting Capacity: the generic term that means too much harvesting capacity

(2) Excess Capacity: capacity in excess of actual harvests

(3) Overcapacity: capacity in excess of the quotas

(4) Overharvest: harvest in excess of the quotas

(5) Excess capacity (EC) rate: the percentage reduction in harvesting capacity that would have eliminated excess capacity in 2004, which is the percent of harvesting capacity that was redundant with respect to the actual commercial harvest in 2004.

(6) Overcapacity (OC) rate: the percentage reduction in harvesting capacity that would have eliminated overcapacity in 2004, which is the percent of harvesting capacity that was redundant with respect to the commercial quota in 2004.

(7) Overharvest (OH) rate: the percentage reduction in commercial harvest that would have eliminated commercial fishery overharvest in 2004.

The following numerical example demonstrates the concepts of excess capacity, overcapacity and overharvest rates. If the harvest was 110 tons, if the commercial quota was 120 tons, and if the capacity estimate was 200 tons, then excess capacity was 90 tons (200 – 110 tons), overcapacity was 80 tons (200 – 120 tons), and overharvest was -10 tons (110 – 120 tons). Therefore, the excess capacity rate was 45 percent because if harvesting capacity had been 45 percent (90/200) less in 2004, and if the fleets had fully utilized their remaining harvesting capacity, both harvesting capacity and the harvest would have been 110 tons and there would have been no excess harvesting capacity in 2004. Similarly, the overcapacity rate was 40 percent, because if harvesting capacity had been 40 percent (80/200) less in 2004, the harvesting capacity would have been equal to the quota of 120 tons and there would have been no overcapacity in 2004. Finally, the overharvest rate was -9 percent because if the harvest had been 9 percent (10/110) greater

in 2004, the harvest would have been 120 tons, the same as the quota, and there would have been neither over nor under harvest.

The overcapacity and overharvest rates, respectively, would be negative if the harvesting capacity estimate and the harvest were less than the commercial quota. In these cases, the overcapacity and overharvest rates, respectively, indicate the percentage increases in harvesting capacity and harvest that would have been required to take the commercial quota or its proxy in 2004.

Each of these three measures of excess harvesting capacity provides different information. A high excess capacity rate indicates that the actual harvest in 2004 could have been taken by much smaller fleets, and therefore, at a lower cost. A smaller fleet could have consisted of fewer vessels, fishing vessels that each had less harvesting capacity, or both. The cost reductions could have included lower operating costs and annual fixed costs as well as reduced costs associated with, for example, bycatch, impacts on habitat, unsafe fishing practices, and fishery management. A high excess capacity rate does not indicate that there was either overcapacity or overharvest. It should be noted that typically there will be some excess capacity in each fishery; therefore, it is important to focus on situations with *high* excess capacity and not just any excess capacity.

A high positive overcapacity rate means that the fleets had the ability to harvest much more than the 2004 commercial quota. Therefore, much smaller fleets could have taken the commercial quota. Although high positive overcapacity rates are commonly accompanied by a high excess capacity rate, a high positive overcapacity rate can occur either without high (or even any) excess capacity or without overharvest. Smaller fleets could have taken the commercial quota and had some of the types of cost reductions mentioned in the previous paragraph. If the actual harvest was less than the commercial quota, the excess capacity rate was greater than the overcapacity rate.

A high positive overharvest rate indicates that the fleets had and used the ability to harvest much more than the commercial quota. This result can occur only if there is overcapacity and the use of that capacity is not adequately controlled. If there was a high positive overharvest rate, much smaller fleets would have had the same types of cost reductions mentioned above. Perhaps more importantly, smaller fleets, better control of the use of their harvesting capacity, or both would have prevented overharvest and the costs associated with overharvest. If the quota was set sufficiently below the overfishing level, a high overharvest rate does not necessarily mean that there was overfishing.

These three measures of excess harvesting capacity are presented in two ways:

(1) by fishery, where a fishery generally refers to a specific FMP, in Tables 2 and 6, and

(2) by fleet, which generally is defined by gear type, area and fishery, in Table 7.

The fisheries are all FMPs except the Pacific halibut fishery in the Alaska Region, which is federally managed but not under an FMP. In addition to the fishery assessments, the estimates are also presented by fleet in Table 7 for two reasons: (1) to focus on the level

of excess harvesting capacity for distinct fleets in a multi-fleet fishery and (2) to help in determining the appropriate measures to reduce excess harvesting capacity. For similar reasons, estimates of excess capacity and overcapacity by species group and fishery are presented in Appendix A.

In addition, to place the issue of excess harvesting capacity in a broader management context, information is provided on the overfishing and overfished status of the harvested stocks in each fishery. If there was not overfishing in 2004, the excess harvesting capacity in 2004 obviously did not contribute to overfishing, but it may have contributed to other undesirable outcomes. For fisheries with high overcapacity rates and overfishing in 2004, the overcapacity no doubt contributed to overfishing, but it was not necessarily the sole or major cause of overfishing. The failure to adequately control the use of the harvesting capacity that existed in 2004 also contributed to the overfishing, as is demonstrated by the fisheries with high excess capacity and overcapacity rates but without overharvest or overfishing in 2004. In some cases, catch or bycatch in other commercial fisheries (including foreign fisheries) or recreational fisheries contributed to or caused the overfishing.

In summary, because there is no single widely accepted criterion for assessing the severity of excess harvesting capacity, this report provides information that can be used to identify the 20 fisheries with the most severe examples of excess harvesting capacity based on one or more of the following: (1) excess capacity by fishery; (2) overcapacity by fishery; (3) overharvest by fishery; (4) ex-vessel values by fishery; (5) the number of stocks that were overharvested, subject to overfishing, or at an overfished level by fishery; and (6) excess capacity by fleet. The list given in Table 4 responds most directly to the Congressional mandate but all the tables provide useful and relevant information. More precisely, Tables 2 through 7, respectively, provide:

- Excess capacity, overcapacity, and overharvest rates and ex-vessel values for 25 fisheries for 2004 (Table 2);
- Rankings of the 25 fisheries in terms of those rates and values (Table 3);
- A list of 20 U.S. fisheries with the most severe examples of excess harvesting capacity based on their higher excess capacity and overcapacity rates, their overharvest rates and their ex-vessel values (Table 4);
- Number of stocks in the 25 fisheries with overharvest in 2004, with overfishing in 2004 and 2006, and with an overfished status in 2004 and 2006 (Table 5);
- Excess capacity and overcapacity rate estimates and the number of stocks that were overharvested, subject to overfishing, or at an overfished level in 2004 (Table 6); and
- Excess capacity rates for 60 fleets for 2004 (Table 7).

Table 2 presents the estimated excess capacity, overcapacity, and overharvest rates and ex-vessel values for 25 fisheries (28 fisheries minus the three excluded Caribbean fisheries), based on 2004 data. For the 25 fisheries, the higher excess capacity rates ranged from 17 percent to 59 percent in 2004. For the 17 fisheries for which the lower estimates could be generated, the lower excess capacity rates ranged from 1 percent to 51 percent in 2004. Of the 25 fisheries, 12 had reasonably high higher rates of excess

capacity (almost 50 percent or more) in 2004. Excluding the Alaska BSAI crab fishery, which had a substantial reduction in the size of its fleet and harvesting capacity after 2004 as the result of a LAPP and buyback, the top 20 fisheries in terms of the higher excess capacity rates are, first, the Northeast northern shrimp fishery, which had a higher excess capacity rate of 59 percent, and 20th the Pacific Coast groundfish fishery, which had a higher excess capacity rate of 26 percent.

For the 17 fisheries with aggregate overcapacity based on the higher capacity estimates, the higher overcapacity rates ranged from 1 percent to 67 percent. For the other 8 fisheries, 6 had undercapacity and 2 had no overcapacity estimates because there were no aggregate quotas in 2004. Therefore, based on the aggregate overcapacity rates alone for the higher capacity estimates, there were no more than 17 fisheries with severe examples of excess harvesting capacity in 2004. If the BSAI crab fishery is removed from the list for the reason noted above and if the fisheries with a higher overcapacity rate of less than 10 percent are eliminated, there would be only 14 fisheries with severe examples of excess harvesting capacity in 2004. Those 14 fisheries included only one fishery that is not on the top 20 list based on the higher excess capacity rates, the Gulf of Mexico reef fish fishery that was ranked 24th in terms of the higher excess capacity rates but 12th in terms of the higher overcapacity rates. If harvest was less than the quota in 2004, the overcapacity rate was less than the excess capacity rate; and for some fisheries the overcapacity rates were substantially less than the excess capacity rates because the harvests were well below the quotas.

The data were adequate to generate the lower capacity estimates for 17 fisheries. For 6 of those 17 fisheries, there was aggregate overcapacity based on the lower capacity estimates and the lower aggregate overcapacity rates ranged from 2 percent to 56 percent. For 10 of the other 11 fisheries, there was undercapacity in 2004; and, for the remaining fishery, overcapacity could not be calculated because there was no aggregate quota in 2004.

Table 2. Excess Harvesting Capacity Assessment and Ex-Vessel Value by Fishery[1], 2004.

Fishery	Value ($ mill.)	Rates of				
		LEC[2]	HEC[3]	LOC[4]	HOC[5]	OH[6]
NE northern shrimp	1.3	24%	59%	-7%	43%	-41%
NE multispecies	98.5	51%	55%	2%	10%	-101%
AK BSAI crab	140.7	-[7]	53%	-	56%	8%
AK Pacific halibut	175.2	-	50%	-	48%	-4%
SW coastal pelagic species	31.5	-	50%	-	-17%	-133%
NE Atl. Herring	15.1	15%	49%	-125%	-37%	-166%
AK GOA groundfish	124.0	-	48%	-	18%	-58%
SE Atl. & GOM coastal migratory pelagics	11.4	15%	48%	-48%	11%	-73%
NE monkfish	30.3	39%	48%	32%	42%	-12%
SW West Coast HMS	33.4	-	47%	-	-	-
NE Atl. sea scallops	321.4	28%	47%	56%	67%	38%
Atl. HMS	43.9	27%	47%	-68%	-22%	-130%
NE summer flounder, scup & black sea bass	43.3	30%	41%	22%	35%	-11%
NE Atl. Bluefish	2.3	22%	37%	-9%	12%	-39%
NE Atl. mackerel, squid & butterfish	56.8	13%	35%	-80%	-33%	-106%
AK BSAI groundfish	500.1	-	32%	-	32%	-1%
NE Atl. surfclam & ocean quahog	58.9	13%	32%	-5%	18%	-20%
NE Atl. Tilefish	5.0	17%	31%	37%	48%	24%
AK GOA scallop	1.5	-	30%	-	8%	-31%
NE Atl. deep sea red crab	5.0	5%	26%	-27%	1%	-34%
NW Pacific Coast groundfish	49.9	-	26%	-	21%	-6%
PI Hawaii based pelagic fisheries	41.4	9%	25%	-	-	-
SE SA snapper-grouper	15.3	13%	21%	-199%	-171%	-244%
SE GOM reef fish	48.2	13%	18%	9%	15%	-4%
PI NWHI bottomfish fishery	0.9	1%	17%	-67%	-40%	-69%

1. The fisheries are listed in order by their HEC rates.
2. LEC lower excess capacity.
3. HEC higher excess capacity.
4. LOC lower overcapacity.
5. HOC higher overcapacity.
6. OH overharvest.
7. A "-" is used when that measure of excess harvesting capacity could not be generated because either variable input data or an aggregate commercial quota (or its proxy) was not available for a specific fishery.

Table 3 presents fishery-specific rankings in terms of the excess capacity, overcapacity, and overharvest rates and ex-vessel values. The ranks are provided for each of these four variables, for each of the three measures of excess harvesting capacity combined with the value of a fishery, and for the aggregate of the three combined measures. The rates are based on the higher harvesting capacity estimates because the lower estimates were available for only 17 of the 25 fisheries. Note that the 25 fisheries are listed in order of their higher excess capacity rates. For each set of rankings that combines an excess harvesting capacity estimate and ex-vessel value, equal weight is assigned to the capacity and value ranks. Similarly, for the rankings in the last column of Table 3, equal weight is assigned to each of the three combination rankings.

The rankings by value and by the higher excess capacity rates differ significantly. For example, the Northeast northern shrimp fishery ranks 1st by the excess capacity rates but 24th by value and the Alaska BSAI groundfish fishery ranks 16th by the excess capacity rates but 1st by value. In addition, the rankings by excess capacity, overcapacity and overharvest rates also differ dramatically.

Table 3. Rankings by Fishery, 2004.

Fishery	Rank by:				Rank by value and:			Aggregate rank
	Value	HEC	HOC	OH	HEC	HOC	OH	
NE northern shrimp	24	1	5	14	13	14	20	16
NE multispecies	6	2	15	18	3	9	11	6
AK BSAI crab	4	3	2	3	1	2	3	1
AK Pacific halibut	3	4	3	5	1	2	4	2
SW coastal pelagic species	15	5	18	21	7	16	18	14
NE Atl. Herring	18	6	21	22	10	20	21	18
AK GOA groundfish	5	7	10	15	4	5	8	5
SE Atl. & GOM coastal migratory pelagics	19	8	14	17	16	16	18	17
NE monkfish	16	9	6	9	13	10	12	12
SW West Coast HMS	14	10	-	-	10	-	-	-
NE Atl. sea scallops	2	11	1	1	5	1	1	2
Atl. HMS	11	12	19	20	8	15	14	13
NE summer flounder, scup & black sea bass	12	13	7	8	13	8	8	9
NE Atl. bluefish	22	14	13	13	20	18	17	19
NE Atl. mackerel, squid & butterfish	8	15	20	19	8	13	13	11
AK BSAI groundfish	1	16	8	4	6	4	2	4
NE Atl. surfclam & ocean quahog	7	17	11	10	10	6	7	6
NE Atl. tilefish	20	18	4	2	21	12	10	15
AK GOA scallop	23	19	16	11	24	20	16	21
NE Atl. deep sea red crab	21	20	17	12	23	19	15	20
NW Pacific Coast groundfish	9	21	9	7	17	6	5	8
PI Hawaii based pelagic	13	22	-	-	19	-	-	-
SE SA snapper-grouper	17	23	23	23	22	22	21	22
SE GOM reef fish	10	24	12	6	18	10	5	10
PI NWHI bottomfish	25	25	22	16	25	23	23	23

1. The fisheries are listed in order by their HEC rates.
2. HEC higher excess capacity.
3. HOC higher overcapacity.
4. OH overharvest.
5. The aggregate rank is based on the previous three ranks.
6. A "-"is used when that measure of excess harvesting capacity could not be generated because an aggregate commercial quota (or its proxy) was not available for a specific fishery.

Table 4 lists the 20 U.S. fisheries with the most severe examples of excess harvesting capacity based on the aggregate rankings which reflect all three measures of excess harvesting and the ex-vessel value of each fishery. This list, drawn from the information in Table 3, comes closest to meeting the Congressional mandate, which directed that the report identify the 20 U.S. fisheries with the most severe examples of excess harvesting capacity "based on value of each fishery and amount of excess harvesting capacity." However, as this report makes clear, NMFS believes that this approach to identifying the 20 most severe examples of excess harvesting capacity is just one way to make this determination. For example, Tables 5 through 7 provide additional information that may be useful in determining if or how that list of 20 fisheries should be modified. Finally, NMFS was not required to and did not prioritize the fisheries in Table 4. Half of the 20 fisheries listed in Table 4 are in the Northeast and 4 are in Alaska. The Northeast Region northern shrimp fishery was excluded from the list because it is not a federally managed fishery. The four fisheries that were excluded due to their aggregate ranks for 2004 are the Alaska Region Gulf of Alaska scallop fishery, the Pacific Islands Region Hawaii based pelagic and NWHI bottomfish fisheries, and the Southeast Region South Atlantic snapper-grouper fishery.

Table 4. Twenty U.S. Fisheries With The Most Severe Examples of Excess Harvesting Capacity Based on Their Higher Excess Capacity and Overcapacity Rates, Overharvest Rates, and Ex-Vessel Values in 2004.

Northeast Region
NE Multispecies
Atlantic herring
Monkfish
Atlantic sea scallops
Summer flounder, scup, and black sea bass
Atlantic bluefish
Mackerel, squid and butterfish
Surfclam and ocean quahog
Tilefish
Atlantic deep sea red crab
Atlantic HMS
Atlantic tunas, sharks, and billfish
Southeast Region
Atlantic and Gulf of Mexico coastal migratory pelagics
Gulf of Mexico reef fish
Southwest Region
Coastal pelagic species
West Coast highly migratory species
Northwest Region
Pacific Coast groundfish
Alaska Region
Bering Sea and Aleutian Islands crab
Pacific halibut
Gulf of Alaska groundfish
Bering Sea and Aleutian Islands groundfish

Table 5 presents information that places the assessment of excess harvesting capacity in a broader management context by summarizing information on the number of stocks in each of the 25 fisheries with overharvest in 2004, with overfishing in 2004 and 2006, and with an overfished status in 2004 and 2006.

There are a few factors that readers should keep in mind when reviewing this table. First, some fisheries include many species while others are single-species fisheries. Second, in certain cases some stocks subject to overfishing in a specific federally managed commercial fishery also are taken as catch or bycatch either in other commercial fisheries, including foreign fisheries, or in recreational fisheries. In these cases, overfishing can be principally due to the other fisheries and not due to excess harvesting capacity in the specific federally managed commercial fishery that is listed.

For the 25 fisheries, 17 had at least one stock that was overharvested in 2004, subject to overfishing in 2004 or 2006, or at an overfished level in 2004 or 2006; 11 had at least one stock that was overharvested in 2004; 12 and 10 had at least one stock that was subject to overfishing in 2004 and 2006, respectively; 10 had at least one stock that was at an overfished level in 2004 and 2006; and 10 had more than one stock in 2004 or 2006 that was subject to overfishing or was at an overfished level.

Table 5. Number of Stocks That Were Overharvested in 2004, Subject to Overfishing in 2004 and 2006, or at an Overfished Level in 2004 and 2006.

	Number of Stocks With the Following Conditions				
	Overharvested	Overfishing		Overfished	
Fishery[1]	2004	2004	2006	2004	2006
AK BSAI crab	3	0	0	4	2
AK BSAI groundfish	5	0	0	0	0
AK GOA groundfish	2	0	0	0	0
AK GOA scallop	0	0	0	0	0
AK Pacific halibut	0	0	0	0	0
Atl. HMS	3	9	9	7	9
NE Atl. Bluefish	0	0	0	1	0
NE Atl. deep sea red crab	0	0	0	0	0
NE Atl. Herring	0	0	0	0	0
NE Atl. mackerel, squid & butterfish	1	0	0	1	1
NE Atl. Sea scallops	1	1	0	0	0
NE Atl. surfclam & ocean quahog[2]	0	0	0	0	0
NE Atl. Tilefish	1	1	0	1	0
NE monkfish	0	2	2	0	2
NE multispecies	1	8	8	12	13
NE northern shrimp	0	0	0	0	0
NE summer flounder, scup & black sea bass	1	2	2	0	1
NW Pacific Coast groundfish[3]	1	3	1	6	6
PI Hawaii based pelagic fisheries	0	1	2	0	0
PI NWHI bottomfish	0	1	1	1	1
SE Atl. & GOM coastal migratory pelagics	0	0	0	0	0
SE GOM reef fish	2	4	5	5	2
SE SA snapper-grouper[4]	0	10	10	10	3
SW coastal pelagic species	0	0	0	0	0
SW West Coast HMS[5]	0	1	2	0	0

1. These are the 25 fisheries included in this report
2. The Maine mahogany quahog quota is a small part of the total ocean quahog quota.
3. The overharvest assessment for this fishery is for the target species, which accounted for the vast majority of the harvest in 2004, and not for the species that are being rebuilt and can only be taken as incidental catch in this fishery.
4. The overharvest assessment for this fishery is for the three species with explicit commercial quotas (TACs), amounting to only about one-third of the total harvest in this fishery.
5. The overharvest assessment for this fishery is for the two species with harvest guideline levels.

Table 6 combines the higher excess capacity and overcapacity rates with the information on the number of stocks that were overharvested, subject to overfishing, or at an overfished level in 2004. The aggregate overcapacity rate for a fishery indicates the potential for the aggregate commercial quota to have been exceeded; and, if the aggregate quota is not much less than the aggregate overfishing level, it also indicates the potential for the aggregate overfishing level to have been exceeded. However, in a multispecies fishery, it may be of little use with respect to indicating the potential for individual quotas or overfishing levels to have been exceeded. For example, there was undercapacity in the Atlantic HMS and the Atlantic mackerel-squid-butterfish fisheries but there was overharvest of one or more quotas for both fisheries in 2004.

For the 8 fisheries with overcapacity rates greater than 30 percent, only 5 had overharvest for any quota and only 4 had stocks that were subject to overfishing. Conversely, 3 of the 6 fisheries with undercapacity had stocks that were subject to overfishing in 2004. This suggests that care is needed in determining the extent to which a high rate of overcapacity contributed to overfishing in 2004. A small number of multispecies fisheries, such as the Northeast multispecies, Atlantic HMS, South Atlantic snapper-grouper, and Gulf of Mexico reef fish fisheries, accounted for most of the stocks subject to overfishing in 2004 and 2006.

The relationship between high excess capacity rates and the overfished status of stocks is equally tenuous. If a stock is being rebuilt as the result of being overfished, the reductions in quotas or other management actions that were taken to rebuild the stock may have increased excess capacity substantially.

Table 6. Excess Capacity and Overcapacity Rates and the Number of Stocks that Were Overharvested, Subject to Overfishing, or at an Overfished Level by Fishery[1] in 2004.

Fishery	HEC Rate	HOC Rate	Number of Stocks		
			Over-harvest	Over-fishing	Over-fished
NE Atl. sea scallops	47%	67%	1	1	0
AK BSAI crab	53%	56%	3	0	4
AK Pacific halibut	50%	48%	0	0	0
NE Atl. Tilefish	31%	48%	1	1	1
NE northern shrimp	59%	43%	0	0	0
NE monkfish	48%	42%	0	2	0
NE summer flounder, scup & black sea bass	41%	35%	1	2	0
AK BSAI groundfish	32%	32%	5	0	0
NW Pacific Coast groundfish	26%	21%	1	3	6
AK GOA groundfish	48%	18%	2	0	0
NE Atl. Surfclam & ocean quahog	32%	18%	0	0	0
SE GOM reef fish	18%	15%	2	4	5
NE Atl. Bluefish	37%	12%	0	0	1
SE Atl. & GOM coastal migratory pelagics	48%	11%	0	0	0
NE multispecies	55%	10%	1	8	12
AK GOA scallop	30%	8%	0	0	0
NE Atl. deep sea red crab	26%	1%	0	0	0
SW coastal pelagic species	50%	-17%	0	0	0
Atl. HMS	47%	-22%	3	9	7
NE Atl. mackerel, squid & butterfish	35%	-33%	1	0	1
NE Atl. Herring	49%	-37%	0	0	0
PI NWHI bottomfish fishery	17%	-40%	0	1	1
SE SA snapper-grouper	21%	-171%	0	10	10
PI Hawaii based pelagic fisheries	25%	-[2]	0	1	0
SW West Coast HMS	47%	-	0	1	0

1. The fisheries are in the order of their higher overcapacity rates.
2. A "-"indicates that an estimate of overcapacity could not be generated because there was no aggregate quota in 2004.

Up to this point, this report has focused on "fisheries", almost all of which are FMPs. The estimates of excess capacity for each of 60 fleets are presented in Table 7 for two reasons. First, estimates of excess capacity and overcapacity by fishery (e.g. FMP) may obscure the level of excess harvesting capacity for distinct fleets in a multi-fleet fishery. Second, the appropriate measures to reduce excess harvesting capacity can be identified

more readily when estimates are also available by fleet. For the 60 fleets, the higher excess capacity rates ranged from less than 1 percent to 71 percent in 2004.

For the 41 fisheries for which the lower estimates could be generated, the lower excess capacity rates ranged from 1 percent to 65 percent in 2004. Of the 60 fleets, 18 had reasonably high higher rates of excess capacity (almost 50 percent or more) in 2004 and 41 fleets had higher excess capacity rates of at least 25 percent. For most fisheries with multiple fleets, there were significant differences in excess capacity rates among the fleets in a fishery.

The 20 fleets with the highest excess capacity rates (45 – 71 percent) included a wide range of vessel and gear types, and they fish in both very small and very large fisheries (by volume and value). One-half of those 20 fleets were in Northeast fisheries, three each were in Alaska and Southeast fisheries, two were in Southwest fisheries, one each was in the Northwest and Atlantic HMS fisheries, and none was in the Pacific Islands fisheries. Far and away the largest fleet (in terms of volume) exhibiting severe excess harvesting capacity is the Alaska fleet of groundfish trawl catcher-vessels. The very low excess capacity rates for the Alaska trawl catcher-processor fleet may be in part explained by the fact that the estimates for that fleet were based on total catch, and not landed catch.

Table 7. Excess Capacity by Fishery and Fleet in 2004.

Fishery	Gear	Harvest	LEC Rate	HEC Rate	LEC Rank	HEC Rank
AK All	Dredge catcher processor	0.4	-	29%	-	32
AK All	Hook & line catcher processor	329	-	25%	-	41
AK All	Hook & line catcher vessel	119	-	54%	-	10
AK All	Pot catcher processor	11	-	15%	-	49
AK All	Pot catcher vessel	134	-	62%	-	4
AK All	Trawl catcher processor	2,206	-	0%	-	60
AK All	Trawl catcher vessel	2,089	-	50%	-	16
Atl. HMS	Bottom longline	2.8	39%	61%	5	5
Atl. HMS	Handgear	0.8	22%	39%	9	24
Atl. HMS	Other net	0.8	15%	31%	19	30
Atl. HMS	Pelagic longline	10	14%	28%	20	35
Atl. HMS	Trawl	0.1	13%	40%	23	22
NE Atl. Bluefish	Gillnet	1.8	7%	22%	33	43
NE Atl. Herring	Bottom trawl	11	1%	1%	41	59
NE Atl. Herring	Mid-water pair trawl	128	17%	50%	12	15
NE Atl. Herring	Midwater trawl	33	17%	50%	11	14
NE Atl. Herring	Purse seine	43	9%	44%	28	21
NE Atl. mackerel, squid & butterfish	Bottom trawl	143	12%	29%	24	33
NE Atl. mackerel, squid & butterfish	Midwater trawl	52	15%	45%	18	20
NE Atl. sea scallops	General category dredge	2.0	2%	10%	39	54
NE Atl. sea scallops	General category trawl	11	3%	9%	35	56
NE Atl. sea scallops	Limited access dredge	63	29%	49%	7	18
NE Atl. sea scallops	Limited access trawl	2.9	16%	32%	17	28
NE Atl. surfclam & ocean quahog	Dredge (Maine mahogany quahog)	0.1	50%	67%	2	2
NE Atl. surfclam & ocean quahog	Dredge (ocean quahog)	3.8	7%	22%	32	42
NE Atl. surfclam & ocean quahog	Dredge (surfclam)	3.1	17%	38%	14	25
NE Atl. Tilefish	Hook	2.7	17%	31%	13	29
NE Atlantic deep sea red crab	Pot	4.4	5%	26%	34	39
NE multispecies	Bottom trawl	86	49%	52%	3	12
NE multispecies	Gillnet	39	47%	56%	4	8
NE multispecies	Hook	2.6	65%	71%	1	1
NE northern shrimp	Trawl	3.9	24%	59%	8	6
NE summer flounder, scup & black sea bass	Bottom trawl (5.5-6.4 in.)	29	11%	21%	26	44
NE summer flounder, scup & black sea bass	Pots & traps	1.2	37%	55%	6	9

Table 7 Continued.

Fishery	Gear	Harvest	LEC Rate	HEC Rate	LEC Rank	HEC Rank
NW Pacific Coast groundfish	Hook & line	6	-	45%	-	19
NW Pacific Coast groundfish	Other Gear	0.8	-	28%	-	36
NW Pacific Coast groundfish	Pot	1.8	-	38%	-	26
NW Pacific Coast groundfish	Trawl	243	-	31%	-	31
NW Pacific Coast groundfish	Trawl catcher processor	162	-	10%	-	55
NW Pacific Coast groundfish	Trawl mothership	101	-	15%	-	51
PI NWHI bottomfish	Handline	0.4	3%	19%	36	47
PI Hawaii-based pelagics	Longline	18	9%	25%	30	40
SE Atl. coastal migratory pelagics	Gillnet	1.0	3%	35%	37	27
SE Atl. coastal migratory pelagics	Other	0.9	8%	59%	31	7
SE Atl. coastal migratory pelagics	Troll	1.8	16%	53%	16	11
SE Atl. coastal migratory pelagics	Vertical line	2.3	14%	39%	21	23
SE GOM coastal migratory pelagics	Troll	0.9	22%	62%	10	3
SE GOM coastal migratory pelagics	Vertical Line	1.7	17%	28%	23	46
SE GOM reef fish	Longline	8	9%	12%	29	52
SE GOM reef fish	Trap	1.0	10%	15%	27	50
SE GOM reef fish	Vertical line	11	13%	20%	22	46
SE SA snapper-grouper	Diving	0.2	1%	2%	40	58
SE SA snapper-grouper	Longline	0.5	11%	16%	25	48
SE SA snapper-grouper	Vertical Line	2.4	3%	5%	38	57
SW coastal pelagic species	Purse sine	309	-	50%	-	17
SW West Coast HMS	Drift Gillnet	0.7	-	12%	-	53
SW West Coast HMS	Gillnet	0.4	-	27%	-	37
SW West Coast HMS	Hook & line	3.9	-	27%	-	38
SW West Coast HMS	Seine	2.0	-	21%	-	45
SW West Coast HMS	Troll	30	-	51%	-	13

1. Harvest is in millions of pounds live weight except for (a) Atlantic HMS harvests, which are in dressed weight, (b) scallops, which are in meat weight, and (c) surfclam and ocean quahog, which are in millions of bushels.
2. LEC and HEC refer to the lower and higher excess capacity rates and ranks.
3. The NE Atlantic surfclam and ocean quahog fleets are defined by gear and stocks because clams from only one of three stocks were landed in any given trip and, to a great extent, different fleets of vessels targeted each of the three stocks. The Maine mahogany quahog quota is just a very small part of the total ocean quahog quota.
4. A "-"is used when that measure of excess harvesting capacity could not be generated because variable input data were not available for a specific fleet.

With all the estimates viewed together, a better and more nuanced overall picture emerges of the extent of excess harvesting capacity in federally managed commercial fisheries in 2004. By extension, if it is determined that 50 percent is a reasonable threshold at which excess capacity and overcapacity rates call for management action to more effectively control the level and/or use of harvesting capacity, this report suggests that excess capacity rates in 12 fisheries and 18 fleets warrant such action. Using the same 50 percent threshold, the aggregate overcapacity rates in just 4 fisheries warrant such action. If, however, a 25 percent threshold is used, such action would be called for in 22 of the 25 fisheries and for 41 of 60 fleets based on their higher excess capacity rates and in 9 fisheries based on their higher overcapacity rates.

To place the capacity estimates in a more meaningful context, this report also provides management information on the fish stocks, in particular, whether they are subject to overfishing, overfished, or overharvested. In addition, in response to the Congressional mandate, the estimates include data on the ex-vessel value of the fisheries. If we combine all this information, this report supports the conclusion that a federally managed fishery may be assumed to have significant excess harvesting capacity if it has a relatively high excess capacity and/or overcapacity rate, a relatively high ex-vessel value, and exhibits the management problems (overfishing, overfished, and overharvests) listed in Tables 5 and 6.

Finally, NMFS stresses that this report gives various estimates of excess harvesting capacity, but does not address capacity targets or objectives. Although the excess capacity and overcapacity estimates are potentially useful for some management purposes, they do not, in and of themselves, indicate *if* capacity should be reduced, *by how much* to reduce it, *how* to reduce it, or the *urgency* for reducing it. Fortunately, as explained in Section IV, there are effective methods for reducing harvesting capacity that do not require such determination.

IV. MEASURES TO REDUCE EXCESS HARVESTING CAPACITY

A. THE FUNDAMENTAL PROBLEM

Congress mandated that this report identify measures for reducing excess harvesting capacity in the 20 fisheries "with the most severe examples of excess harvesting capacity," and identify potential sources of funding for those measures. Excess harvesting capacity and, when it occurs, overfishing are just two of the often co-occurring undesirable outcomes of a common management problem that prevent the attainment of the objectives of sustainable fisheries. The other undesirable outcomes include high levels of bycatch, adverse impacts on habitat, substandard vessel safety, lower product quality, poor economic performance, less viable fishing communities, non-compliance with regulations, and a fishery management regime that is unnecessarily complex, unstable, burdensome, contentious, intrusive, and costly.

The common underlying management problem is that, in the absence of well-defined use rights or secure harvest privileges, the race for fish typically is used to allocate the allowable catch among competing fishermen, and the race for fish provides incentives for individual fishermen to increase harvesting capacity and to take other actions that prevent the attainment of the objectives of sustainable fisheries. The severity of the undesirable results of this problem can be increased by inadequate information, monitoring, and enforcement, which, in part, can be due to the underlying problem. Basically, without well defined use rights, such as those that can be established with limited access privilege programs (LAPPs) as authorized and described in the MSA, the interests of individual fishermen are not aligned with the objective of sustainable fisheries and fishermen do not have sufficient incentives to support investments in the conservation and management of fishery resources.

B. TWO SPECIAL PROBLEMS: THE MOVEMENT OF CAPACITY AND LATENT CAPACITY

Congress also mandated that recommendations made in this report with respect to a fishery include "measures to prevent the capacity that is being removed from the fishery from moving to other fisheries in the United States, in the waters of a foreign nation, or on the high seas." Buybacks implemented under MSA §312(b-e) are already required to include such measures. However, enforcing the prohibition on the redeployment of bought-out vessels to other fisheries has imposed considerable costs on U.S. Government agencies (i.e., USCG and NMFS). On the other hand, such anti-redeployment measures are not required and have not been used in the other approaches for reducing excess harvesting capacity discussed in this report, i.e., limited access privileges, license limitation, and harvest restrictions. Measures to prevent the movement of capacity to other fisheries in these latter programs may or may not be justified when both their benefits and costs are carefully considered. To vessel owners, the costs include: (1) benefits foregone by not being able either to use the vessel in another fishery or to sell it to someone who would and (2) the cost of decommissioning or scrapping a vessel if that cost is paid by the vessel owners. The benefit of the prohibition is the protection it

provides to other fisheries by preventing the fishing vessels that are removed from one fishery from entering other fisheries. However, if there are not effective measures for managing harvesting capacity in those fisheries, harvesting capacity will tend to increase despite this redeployment prohibitions. Therefore, little protection and benefit would be provided. Conversely, if effective measures are in place in the other fisheries, the protection provided by this prohibition is not needed. Therefore, NMFS recommends that a prohibition on fishing vessel redeployment not be added to the other approaches (other than MSA §312(b-e) buybacks) for reducing excess harvesting capacity until it is clear that such measures make sense when both their benefits and costs are carefully considered.

Finally, some latent capacity exists in most federally managed fisheries, and can be addressed through several means, including license limitation and exclusive quota programs, including LAPPs. With respect to capacity reduction programs, buybacks should be accompanied by license limitation and other measures that will prevent the activation of latent permits after the buyback. In LAPPs, the market for harvest shares can remove excess harvesting capacity associated with active vessels, as well as that associated with the latent capacity of permitted but inactive vessels. Additional comments are offered on how to address latent permits in the following discussions of LAPPs and buybacks.

C. CRITERIA FOR RECOMMENDATIONS

In light of the Administration's analysis of the causes of excess harvesting capacity and its fishery management priorities, NMFS has identified the following criteria for evaluating options for reducing excess harvesting capacity:

(1) Legal feasibility and proven effectiveness: Proposed programs must not be prohibited by the MSA and should have a proven track record.

(2) Self-financing and cost-effective: The members of the fishing industry or other private parties who benefit from the program should bear some or all of the cost of capacity reduction and the additional management costs associated with the program and the program should be cost-effective.

(3) Permanent effect: Programs should promote permanent reductions in excess harvesting capacity. A management system that adjusts capacity levels automatically to changes in commercial quotas, and market and environmental conditions is particularly desirable.

(4) Flexibility: Given the diversity of U.S. marine fisheries, effective reform programs must be adaptable to the unique needs of individual fisheries.

These criteria will be used to evaluate the available options for reducing excess harvesting capacity. In light of the excess capacity, overcapacity, and overharvest assessments and the information on the status of the subject stocks presented in this report, NMFS generally recommends that the highest priority should be assigned to

capacity-reducing programs in fisheries that have excess harvesting capacity that contributes significantly to the current and future challenges of preventing/ending overfishing and rebuilding overfished stocks.

Finally, in response to the charge to identify sources of funding, this report focuses on potential private sources of funding for certain generic options for decreasing excess harvesting capacity. This report does not offer any estimates of fishery-specific, regional, or aggregate national funding needs for capacity reduction programs.

Based on the estimates and priorities provided in this report, NMFS strongly urges the Councils and the relevant industry sectors to initiate or accelerate efforts to identify feasible solutions that address the fundamental management problems in these fisheries, end overfishing, and recover overfished stocks within mandated schedules, and pave the way for cost-effective and permanent measures that will eliminate or substantially reduce excess harvesting capacity.

The MSA currently authorizes two privately funded capacity-reducing options: (1) market-based management and (2) industry-funded buyback programs, referred to in the MSA as Fishing Capacity Reduction Programs. These two approaches and a third option (buybacks funded by other entities) are discussed below. Finally, we provide a brief review of two other approaches for improving the management of the level and use of harvesting capacity: license limitation programs and conventional harvest restrictions.

D. MEASURES TO REDUCE CAPACITY

(1) Market-Based Management (Limited Access Privilege and Similar Programs)

For several years, the Administration has assigned a high priority to wider use of market-based management, and has announced its intent to double the number of LAPPs by 2010. This objective was stated explicitly in the 2004 U.S. Ocean Action Plan. In its 2005 proposal to reauthorize the MSA, the Administration recommended "dedicated access privileges"—including individual fishing quotas (IFQs), fishing cooperatives, community quotas, and area-based quota programs—as a vehicle for promoting market-based and more rational management. With the enactment of the Magnuson-Stevens Fishery Conservation and Management Reauthorization Act of 2006, an entire section, §303A, is devoted to LAPPs. Notably, Congress explicitly linked LAPPs and overcapacity in §303A(c)(1)(B), which directs that a LAPP shall "if established in a fishery that is determined by the Secretary or the Council to have over-capacity, contribute to reducing capacity."

A LAPP is a generic concept that includes individual fishing quotas (IFQs), regional fishery associations, and community quotas. However, other programs, such as fishing cooperatives and sector allocations, have similar characteristics, and may be referred to as LAPP-like programs. The MSA defines a "limited access privilege" as a Federal permit

to harvest a quantity of fish expressed by a unit or units representing a portion of the total allowable catch of the fishery that may be received or held for exclusive use by a person.

Fundamentally, LAPPs are a market-based management approach, in which harvest privileges are assigned exclusively to individuals or groups, and may be transferred to others. Transferability allows harvest privilege holders who want to leave a fishery to be compensated, and enables purchasers to consolidate their use of harvest privileges on fewer and/or more efficient fishing vessels. Thus, the transferability rules are critical in determining the extent and speed with which a LAPP will reduce harvesting capacity. In this regard, §303A(c)(6) stipulates that, when a Council creates a LAPP, it must "establish a policy and criteria for the transferability of limited access privileges (through sale or lease), that is consistent with the policies adopted by the Council for the fishery."

LAPPs tend to eliminate or substantially decrease the perverse incentives to maintain or increase capacity when there is already excess harvesting capacity. Holders of specified harvest privileges will naturally use these privileges more wisely and with a longer-term view. When these privileges are transferable, fishermen who hold them will seek to maximize their value and, therefore, have an added incentive to maintain healthy resources. With transferable harvest privileges, excess harvesting capacity will be reduced over time by the market for harvest privileges. Compared to a "top-down" regulatory approach, the market mechanism can be more effective and efficient means of addressing excess harvesting capacity.

IFQs have a generally positive record of reducing harvesting capacity, even in fisheries with substantial amounts of latent capacity associated with permitted but inactive vessels. IFQs have been established in several federally managed fisheries on the East Coast and Alaska starting in 1990. As examples, the Atlantic surfclam/ocean quahog, Alaska halibut and sablefish, and BSAI crab IFQ programs have all significantly reduced the numbers of fishing vessels in those fisheries.

However, this report also shows that, in some IFQ programs, such as the Northeast surfclam and Alaska halibut and sablefish programs, there is still some excess capacity and overcapacity. There are three reasons why some excess capacity and overcapacity can continue in LAPP-managed fisheries:

First, a LAPP may include regulatory constraints on transfers that slow down or impede the removal of excess harvesting capacity. The Alaska halibut and sablefish IFQ program is a good example of a LAPP with design elements that restrict the sale of harvest shares to maintain a certain industry structure. In this IFQ program, although the number of share holders has declined significantly since the program's inception in 1995, there remains some excess capacity. In the surfclam and ocean quahog program, virtually all the shares are controlled by processors, who presumably have somewhat less incentive to promote efficiency in the harvesting sector.

Second, the full reduction in harvesting capacity will not happen instantaneously. It will take fishermen time to decide how to respond to LAPPs and more time to carry out those

decisions. The size and speed of the reduction will depend on a variety of factors, including the transferability rules. For example, if the harvest privileges can be sold but not leased, fishermen who want to hold the privileges as an investment would have an incentive to remain in the fishery and use their annual privileges.

Third, participants in LAPPs may choose, for various reasons, to sacrifice some economic efficiency and retain a modest surplus of harvesting capacity. In other words, the industry's optimum level of harvesting capacity may include some excess capacity and overcapacity. One reason is that it is not practical to change the size and physical characteristics of a fleet each time conditions change. Another reason is that fishermen have multiple objectives and, in order to have a fishing vessel that is safer, more comfortable, and more versatile, a fisherman may choose to have a larger fishing vessel than typically is necessary for most fishing trips. In part because the capacity of a vessel cannot be tailored to the conditions of each fishery in which it is used, this would be particularly true for vessels that are used in multiple fisheries. As a result, the industry's "optimal" level of capacity may include some excess capacity and overcapacity in some years but very little in other years.

In summary, the estimates included in this report suggest that some excess capacity and overcapacity typically will remain even in well-managed fisheries. Over the long term, however, an effective LAPP will eliminate the race for fish and move the level of capacity in the right direction. Thus, excess capacity or overcapacity may persist in some LAPPs, but in a manageable range. Just as important, a LAPP can reduce the severity of other often co-occurring undesirable outcomes.

In addition to LAPPs, fishing (harvest) cooperatives have been created in several West Coast and Alaskan fisheries, starting in 1997. In the Bering Sea Pollock cooperatives, for example, capacity was removed by means of a buyback and further reduced by consolidation after implementation of the cooperative arrangements authorized by the 1998 American Fisheries Act. Harvest cooperatives, which reduced harvesting capacity, have also been implemented in the Pacific whiting and Alaska scallop fisheries by the fishing industry with the use of contracts.

Although it is explicitly not a LAPP as defined by MSA §303A, the Western Alaska community development quota (CDQ) program has also enabled participants in the BSAI groundfish fishery to consolidate fishing operations on fewer and more efficient fishing vessels. However, community quota programs, as opposed to CDQs, are LAPPs according to MSA §303A. NMFS believes that these community quota programs also have the potential to encourage reductions in harvesting capacity.

Sector allocation programs may or may not be treated as LAPPs under MSA §303A, but in many respects they resemble fishing cooperatives, and may also serve as vehicles for the reduction of harvesting capacity. Two sector allocation programs have been implemented in recent years in the Northeast multispecies fishery, but do not yet have a well-established record of capacity reduction. As of January 2008, 17 new sector allocation programs have been proposed to the New England Fishery Management

Council. Obviously, the potential of these sector allocations to reduce harvesting capacity will depend on the specifics of the program and specifically whether they address the underlying management problem.

In conclusion, a market-based system is an appropriate, legally available and effective management program to prevent and reduce excess harvesting capacity. In current U.S. fisheries, market-based management encompasses a broad range of exclusive and tradable share programs, including LAPPs (as defined by MSA §303A) and LAPP-like programs, such as fishing cooperatives, and sector allocation programs.

Congress also required that that the recommended methods for reducing excess harvesting capacity be based on "the most cost effective means of achieving a voluntary reduction in capacity for the fishery using the potential for industry financing." LAPPs are by and large industry funded because the additional management, enforcement, and data collection and analysis costs are recoverable, either by means of a fee of up to 3 percent of the ex-vessel value or through an auction of harvest privileges. In these programs, the industry effectively and voluntarily pays for capacity reduction when they buy harvest privileges and consolidate the number and type of vessels that will use the privileges. According to recent NMFS estimates, the government's share of the costs of developing and implementing these programs is reasonable, especially in view of the broad range of expected benefits from these programs. This suggests that they are cost-effective from the government's perspective. Similarly, industry support for LAPPs suggests they are cost-effective from the industry's perspective too.

All these LAPPs and similar programs meet the criteria proposed by NMFS: (1) cost-effective and industry funding through cost recovery and through the sale and lease of harvest privileges; (2) legal availability through MSA §303A and other laws, all with a mostly positive track record going back to 1990 (3) permanence, in part due to automatic adjustment to changing conditions, and (4) flexibility of design.

A list of 13 existing IFQs, fishing cooperatives, community quotas, and sector allocation programs and data on their economic importance are provided in Table 8 on the following page. Note that this list includes a variety of LAPP and LAPP-like programs that have been implemented in practically all the NMFS regions (except the Southwest and Pacific Islands). These existing LAPPs and similar programs have an aggregate ex-vessel value of more than $730 million, about 18 percent of the total ex-vessel revenues for all U.S. commercial fisheries, including both federally and non federally managed fisheries, in the last several years.

Table 8. Existing LAPP and LAPP-like Programs: (IFQs, Community Quotas, Fishing Cooperatives, and Sector Allocation Programs, 2007)

Program	First Year	Ex-Vessel Value ($M)
Surfclam/ocean quahog IFQ	1990	49.0
South Atlantic wreckfish IFQ	1992	0.3
Western Alaska CDQ	1992	68.0
AK halibut/sablefish IFQ	1995	237.0
Pacific whiting cooperative	1997	21.8
Bering Sea pollock cooperatives	1998	266.0
Pacific sablefish permit stacking	2001	6.4
AK scallop cooperative	2001	1.0
Georges Bank hook sector	2004	0.6
AK Crab rationalization (IFQ & coop)	2005	65.0
Georges Bank fixed gear sector	2006	0.9
GOM red snapper IFQ	2007	9.0
Central GOA rockfish pilot sector	2007	8.5

Table 9 lists IFQs and fishing cooperative programs that NMFS anticipates have a good chance of approval in the next few years. This list does not include the proposed Northeast groundfish sector allocations because it is not yet clear how the New England Fishery Management Council will react to those proposals. According to this projection, by 2010, federally managed fisheries organized as IFQs, cooperatives, community quotas, and sector allocations will account for an aggregate ex-vessel value of almost $900 million, or between 20 and 25 percent of the total ex-vessel value of all U.S. commercial fisheries, including federally managed and non-federally managed fisheries. In other words, within a few years, about one-fourth (by value) of all U.S. commercial fisheries will have completed the transition from open/limited access to some form of market-based LAPP or LAPP-like management. Although there is obviously a wide and growing variety of LAPPs and LAPP-like programs, the large majority of market-based management programs are IFQs and fishing cooperatives.

NMFS roughly estimates that the government's costs of developing and initially implementing these new LAPPs and LAPP-like programs may range from about $5 to $15 million annually over the next six fiscal years. In other words, public costs associated with the transition to LAPP management may amount to roughly 3 to 10 percent of the total ex-vessel value of the new LAPP fisheries.

Table 9. Anticipated LAPP and LAPP-like Programs (2008–2010)

Program	First Year	Ex-Vessel Value ($M)
Mid-Atlantic tilefish IFQ	2008	3.0
BS Non-pollock groundfish coops	2008	52.0
NE Atl. scallops IFQ (General Category)	2009	18.0
GOM grouper (IFQ?)	2010	26.0
SA snapper-grouper (IFQ?)	2010	11.5
West Coast groundfish trawl IFQ	2010	51.0

The effectiveness of LAPPs as measures that will reduce excess harvesting capacity depends in large part on the rules governing the sale and lease of harvest privileges. Essentially, the more liberal the rules on transfers, the more quickly and effectively the program will adjust capacity levels to prevailing conditions and, therefore, eliminate/prevent excess harvesting capacity.

(2) Industry-Funded Buybacks

The second option for reducing excess harvesting capacity is to remove fishing vessels and reduce capacity directly by means of a buyback of fishing vessels or permits. Capacity reduction programs by means of buybacks are addressed in MSA §312(b-e). Buybacks are authorized under other laws, such as the Interjurisdictional Fisheries Act for disaster assistance. Fishery-specific buybacks have also been authorized by other laws, such as the 1998 American Fisheries Act provisions on buybacks of certain Bering Sea pollock catcher-processor vessels. In addition, other funds appropriated by Congress for disaster assistance have often been used for capacity reduction. Publicly and privately funded buybacks have been implemented in numerous East and West Coast and Alaska groundfish and crab fisheries in the last 13 years, and, in each case, one objective was the reduction of capacity.

Table 10 provides an overview of publicly and industry-funded vessel and permit buyback programs between 1995 and 2007, where a buyback through a Federal government loan that is repaid by the fishing industry is considered an industry-funded buyback. This table excludes three buybacks associated with Northwest Pacific salmon disasters in 1994, 1995, and 1998, because the Pacific salmon fishery has been excluded from this report. Table 10 shows that, in the last 13 years (1995-2007), a total of almost $60 million was appropriated for a series of East and West Coast and Alaska buybacks, whose aggregate buyback amounts totaled almost $340 million. In addition, it should be noted that the Federal Credit Reform Act requires subsidy costs to be budgeted for each buyback loan. Generally, these costs are about 1 percent of the total loan amount. The early East Coast buybacks tended to be publicly funded and the later West Coast and Alaska programs were financed largely, although not entirely, by industry.

Table 10. Publicly and Fishing Industry-Funded Buybacks in U.S. Marine Fisheries, 1995–2007 ($ millions)

Program	Year	Buyback Amount	Appropriation
Northeast Multispecies	1995	$ 1.89	$ 1.89
Northeast Multispecies	1996	$22.50	$22.50
Northeast Multispecies	2002	$10.00	$10.00
BSAI Pollock	1998	$90.00	$15.00
Pacific Coast Groundfish	2003	$45.70	$10.00
BSAI Crab	2004	$97.40	N/A
AK BSAI Groundfish Freezer Longliners	2007	$35.00	N/A
TOTALS		$337.49	$59.39

The anticipated buybacks listed in Table 11 are estimated by NMFS to total another $220 million, with the result that the value of completed and anticipated buybacks will amount to more than $550 million. Most of this total will be in the form of federal loans that post-buyback fishermen (fishermen remaining in the fishery after the buyback program) will pay off with assessments on their post-buyback landings. Thus, the fishing industry has been and is expected to continue to be the major source of funding with this approach to capacity reduction.

Table 11. Anticipated Buybacks ($ millions)

Program	Buyback Amount
Northeast multispecies	$45
New England lobster	$50
SE Alaska purse seine salmon	$50
GOM reef fish	$35
AK non-pollock groundfish	$40
TOTAL	$220

Based on the U.S. experience with buybacks, this approach to capacity reduction has certain advantages. Buybacks may be crafted to suit the needs of specific fisheries and are therefore flexible. They provide immediate relief and can target fisheries that exhibit a dire need. Under MSA §312(b-e), the affected industry develops a business plan, and fees paid by industry must be approved through a referendum. Buybacks may also be used to facilitate a transition to more effective management measures, including IFQs and cooperatives.

Although buybacks may be principally industry-funded, like LAPPs, they require some government resources in their planning and implementation. NMFS needs to review, approve, and administer the buyback, ensure that adequate and timely payments are made

on buyback loans, and may need to adjust the payment rate. If problems develop, NMFS has the legal flexibility to adjust the assessment rate up to 5 percent of the ex-vessel value. In addition, buybacks require some follow-up actions by two agencies. NMFS and the United States Coast Guard must ensure that fishing vessels removed from a fishery through a buyback are not redeployed in other fisheries anywhere in the world. Based on experience to date with vessel buybacks, NMFS has determined that mandatory scrapping is probably the most cost-effective means of meeting that requirement.

On the other hand, the major problems with buybacks are that: (1) they do not, by themselves, provide a permanent solution, and (2) if there is substantial latent capacity, they are more costly or less effective in reducing excess harvesting capacity. This approach fails to provide a permanent solution because it does not address the common underlying management problem and, therefore, it neither eliminates the incentive fishermen have to increase harvesting capacity nor provides a mechanism that responds automatically to changes in commercial quotas and both market and environmental conditions. One solution to this shortcoming is to implement both an industry-funded buyback and a LAPP or a LAPP-like program in the same fishery, as part of a capacity reduction program. For example, a LAPP and an industry-funded buyback were used together in Alaska crab fisheries; a LAPP-like program and a buyback that was partly paid for by the fishing industry were used in the Bering Sea/Aleutian Islands pollock fishery; and the industry-funded buyback in the Pacific Coast groundfish fishery in 2003 is expected to facilitate the implementation of a LAPP in that fishery.

(3) Buyouts Financed by Other Private Organizations

A third and more novel approach to private financing of capacity reduction is a buyout of vessels and/or permits by other private entities, such as a conservation organization. In this approach, vessel owners agree to sell their fishing vessels or permits, and a private entity agrees to buy and retire those fishing vessels or permits. We have no experience with this type of program, but, in theory, a conservation organization, a recreational association, or a firm in a non-related field could be interested in such an approach.

In a recent example in central California, The Nature Conservancy (TNC) funded a "conservation banking" scheme in Morro Bay, Monterey, Moss Landing, and Half Moon Bay. TNC purchased seven federal groundfish trawl permits in 2006, leasing one permit back to a local fisherman, and, in the following year, concluded a Conservation Fishing Agreement with local fishermen. It should be noted that this program is in its infancy, and, thus far, is arguably not a capacity reduction initiative. In fact, THC may substitute hook and line permits for the trawl permits in an effort to promote the wider use of an alternative harvesting technology. Therefore, the major objectives of this program are reduced bycatch and habitat protection, rather than capacity reduction.

Using the four criteria for assessing the effectiveness of capacity reduction programs, NMFS is unable to draw firm conclusions because of the paucity of evidence. In principle, it may be said that buybacks funded by entities unrelated to the fishing industry offer one key advantage: instead of relying exclusively on fishing industry funding, this approach utilizes the financial resources of the conservation community and, potentially,

other private organizations that benefit from capacity reductions programs. Although this type of buyback is not explicitly addressed in the MSA, §303A(c)(D) states that harvest privileges in LAPPs may be acquired by:

> "A United States citizen, a corporation, partnership, or other entity established under the laws of the United States or any State, or a permanent resident alien that meets the eligibility and participation requirements of the program."

Therefore, a private party may be able to purchase fishing permits and vessels, depending on the specific eligibility and participation requirements of the fishery. For example, such a buyback program would not be possible under a LAPP that either includes a use-or-lose provision or prevents a private entity, such as a conservation organization, from buying and holding harvest privileges. Potentially, private entities could purchase harvest privileges in LAPPs, and conservation organizations have demanded the right to own shares. The feasibility of this approach will depend on the willingness of the Councils to approve programs in which non-fishing industry entities can participate in license limitation, LAPP and LAPP-like management programs.

Finally, this approach has the same two disadvantages of buybacks funded by the fishing industry, which are: (1) the failure to eliminate or substantially reduce the perverse incentives to increase or maintain harvesting capacity and (2) the latent capacity problem.

(4) License Limitation

The most common approach for managing harvesting capacity in a fishery is to implement measures that restrict the number and size of vessels that can participate in a fishery. This approach is referred to as license limitation or limited entry, and has been used in various forms in the large majority of federally managed commercial fisheries. The first step is to require a license or permit as a condition for participating in a fishery. Participants may then have to meet certain past and current requirements to obtain and renew a permit. However, unless the rules to obtain and renew a permit, to upgrade a fishing vessel, and to transfer a permit to a replacement vessel are sufficiently restrictive, there will be no lasting reduction in capacity. The basic problem with license limitation is its failure to address the common underlying management problem.

However, license limitation programs may pave the way for subsequent measures, such as LAPPs, that do achieve capacity reduction on a more lasting basis. This was the case for the industry-implemented cooperatives in the Pacific whiting and Alaska scallop fisheries. In both instances, restrictive license limitation programs made possible the adoption of cooperatives. In addition, a buyback would be even less effective in the absence of a somewhat restrictive license limitation program. It should be noted that a moratorium on new entrants is a prerequisite for an industry-funded buyback under MSA §312(b-e). Using the four criteria for assessing capacity reduction programs, we may conclude that license limitation programs (1) are available under the MSA and have been implemented in various forms in the vast majority of federally managed fisheries; (2) although not industry-funded, they can be relatively inexpensive, but tend to distort investment decisions and therefore are not cost-effective from the industry's standpoint;

and (3) they can be highly flexible; but (4) typically, they lead to at best temporary rather than permanent reductions of capacity, because the rules are not sufficiently restrictive and because the perverse incentives are not removed. NMFS believes that the major long-term benefit of these programs is that they may be precursors to more effective and lasting measures.

Finally, NMFS acknowledges that, if a LAPP is not feasible for a specific fishery, license limitation may be the most effective means for dealing with excess harvesting capacity. This could be the case, for example, in a fishery in which the adoption of a LAPP would involve prohibitively high costs of developing, monitoring, and enforcement of the LAPP. Fisheries for long-lived, low biomass, hard to identify and rare event species, such as some of the Pacific Coast rockfish species, may be examples of fisheries for which adequate monitoring and enforcement of the harvest privileges would be prohibitively expensive.

(5) Conventional Harvest Restrictions

The fifth generic option for addressing excess harvesting capacity does not directly reduce capacity, but limits the ability of each vessel in the fishery to harvest fish. Much of current marine fisheries management falls in this category, including measures that limit where, when, and with what gear a fishing vessel can be used. Area, seasonal, and gear restrictions increase costs and reduce revenues, and, therefore, may have the cumulative effect of forcing some vessels out of the fishery. These measures are used for a variety of reasons, including the reduction of bycatch, the conservation of essential fish habitat, and the protection of endangered and threatened species.

If we apply the four criteria for assessing capacity reduction programs to this category of measures, we conclude that: (1) these management actions are certainly provided for in law, and have been used to control both the level and use of capacity; (2) because there are so many types of harvest restrictions, these measures are highly flexible; and (3) the costs of implementing and enforcing harvest restrictions are not recoverable, but the effect of these regulations is to increase the industry's operating costs and reduce their revenues; but (4) these measures do not provide a permanent solution to the problem of excess harvesting capacity, unless they are made progressively more restrictive. This approach does not provide a permanent solution to the problem because these measures do not address the underlying management problem and do not respond automatically to changes in commercial quotas and both market and environmental conditions. In summary, harvest restrictions do not provide cost-effective or lasting solutions to excess harvesting capacity. On the other hand, conventional harvest restrictions, if implemented in conjunction with a LAPP, can contribute to an effective management regime that meets the objectives of sustainable fisheries.

V. CONCLUSIONS

A. Scope and Objectives of the Report

This report examines several dimensions of excess harvesting capacity. NMFS defines "harvesting capacity" as the capability of one or more specific vessels to catch fish and it measures harvesting capacity in terms of their potential pounds or tons of catch, and not in terms of the number, size or horsepower of those fishing vessels. NMFS interprets the term "excess harvesting capacity" to mean "too much" harvesting capacity and uses the following three measures or indicators of excess harvesting capacity:

- **Excess Capacity:** capacity in excess of actual harvests
- **Overcapacity:** capacity in excess of the quotas
- **Overharvest:** harvests in excess of the quotas

The findings are presented for 25 fisheries and 60 fleets, where a fishery generally refers to the commercial fishing activity governed by a single fishery management plan (FMP) and a fleet generally is defined by vessel/gear type, area and fishery. Information on the overfishing and overfished status of the harvested stocks, as reported in the annual reports to Congress on the status of the U.S. fisheries, is presented to put the excess harvesting capacity estimates in a broader fishery management context. Adequate data were available to generate both lower and higher estimates of the excess capacity and overcapacity rates for 17 of the 25 fisheries and for 41 of the 60 fleets. For the other 8 fisheries and 19 fleets, only the higher estimates could be generated. The higher and lower estimates provide a range that accounts for different underlying assumptions about the ability to increase the harvest of a specific set of vessels.

This report also reviews five generic programs for reducing harvesting capacity: (1) limited access privilege programs (LAPPs) and LAPP-like programs, (2) industry-funded buyback programs, (3) buybacks funded by other private entities, (4) license limitation programs, and (5) conventional harvest restrictions. These generic programs are evaluated according to four criteria:

- Is it self-financing and cost-effective?
- Is it available under current law, or at least consistent with law, and have a good track record?
- Does the program provide a permanent solution to excess harvesting capacity?
- Does the program offer sufficient flexibility of design and implementation?

B. Quantitative Estimates of Capacity: Major Findings

The information presented in the report can be used to identify the 20 fisheries with the most severe examples of excess harvesting capacity based on one or more of the following: (1) excess capacity rates by fishery; (2) overcapacity rates; (3) overharvest rates; (4) ex-vessel values; (5) the number of stocks that were overharvested, subject to overfishing, or at an overfished level; and (6) excess capacity rates by fleet. Of these

perspectives, the list of 20 fisheries in Table 4, which is based on the first four items, corresponds most closely to the Congressional mandate.

Excess capacity and overcapacity rates vary considerably – among regions and fisheries, and among fleets and stocks within individual fisheries. Overall, the higher excess capacity and overcapacity rates for 2004 were reasonably high in approximately one-third to one-half of the fisheries and fleets.

- For 12 out of 25 fisheries and 18 of 60 fleets, the higher excess capacity rate was approximately 50 percent or more in 2004.

- For 8 out of 23 fisheries, the higher overcapacity rate exceeded 30 percent in 2004. Overcapacity and overharvest could be calculated for only 23 of the 25 fisheries because aggregate commercial quotas or their proxies were not available for the other two fisheries.

High rates of excess capacity, overcapacity, or overharvest in 2004 were accompanied by stocks that were subject to overfishing (i.e., catch exceeded the overfishing levels) in only some federally managed commercial fisheries. In other fisheries with high rates of excess capacity and overcapacity, effective management of the use of harvesting capacity or other factors prevented overfishing.

- 17 of the 25 fisheries had at least one stock that was overharvested, subject to overfishing, or at an overfished level.
- Of these 17 fisheries, the higher excess capacity rate exceeded 45 percent for 7 fisheries and the higher overcapacity rate exceeded 30 percent for 8 fisheries.
- Of the other 8 fisheries, the higher excess capacity rate exceeded 45 percent for 5 fisheries and the higher overcapacity rate exceeded 30 percent for 3 fisheries.

Given all the relevant MSA mandates, the most meaningful measure of the severity of excess harvesting capacity would combine information on (1) the value of the landings, (2) the rates of excess capacity, overcapacity, and overharvest, and (3) the number of stocks that are subject to overfishing and/or are overfished.

C. Management Recommendations

General policy

1. The capacity estimates should be used with caution. The excess capacity and overcapacity rates do not indicate if capacity should be reduced, and, if so, by how much to reduce it, how to reduce capacity, or the urgency for reducing it. These determinations will be more difficult for (1) multispecies fisheries, (2) rebuilding stocks, (3) stocks subject to sharp environmental fluctuations, (4) stocks with significant recreational catch, and (5) international stocks with significant foreign harvests. However, with an effective LAPP in place, the need for such determinations is substantially reduced, if not eliminated.

2. The MSA emphasizes the need to focus on the most critical undesirable outcomes—stocks that are subject to overfishing (i.e., actual harvest exceeds the overfishing level) or are overfished (i.e., in need of being rebuilt) because virtually all of the objectives of sustainable fisheries depend on ending and preventing overfishing, and rebuilding overfished stocks. The most critical linkage connects excess harvesting capacity and overfishing.

3. Except in cases when other fisheries or incidental catches are responsible for overfishing, excess harvesting capacity must, by definition, exist in fisheries in which there is overfishing.

4. Given all the biological, economic, and social objectives of fisheries management, it is difficult, if not impossible, to determine an optimum level of harvesting capacity. The information in this report indicates that zero excess capacity and overcapacity are not desirable goals. NMFS does not propose quantitative capacity targets or ceilings in fishery management plans.

5. Although excess harvesting capacity is not the root cause of the other often co-occurring undesirable outcomes, high levels of excess harvesting capacity can increase the severity of those outcomes.

6. The eight Regional Fishery Management Councils provide an appropriate public forum to determine management priorities and the applicability of different methods of reducing capacity in the fisheries under their jurisdiction.

Limited access privilege programs (LAPPs)

1. Excess harvesting capacity and overfishing are just two of several often co-occurring undesirable outcomes of a common underlying management problem. The other undesirable outcomes include high levels of bycatch, adverse impacts on habitat, substandard vessel safety, lower product quality, poor economic performance, less viable fishing communities, and non-compliance with regulations.

2. The basic underlying problem is that, in the absence of well-defined harvest privileges, the race for fish typically is used to allocate the allowable catch among competing fishermen, and the race for fish provides incentives for individual fishermen to increase harvesting capacity and to take other actions that prevent the attainment of the objectives of sustainable fisheries. LAPPs can address the underlying management problem and, therefore, substantially reduce the severity of many of the often co-occurring undesirable outcomes.

3. NMFS and the Regional Fishery Management Councils have made significant progress since 1990 in developing and implementing a wide variety of LAPPs and LAPP-like programs. The flexible provisions of MSA §303A should encourage continued progress in this area. NMFS estimates that, in a few years, there will be LAPP and LAPP-like management programs in the large majority of regions. Although this report

shows that fisheries with LAPPs continue to exhibit some excess capacity and overcapacity, the weight of evidence indicates that harvesting capacity has been reduced in these fisheries and that the severity of other undesirable outcomes has been reduced.

4. With respect to preventing the capacity that is removed from one fishery from moving to other fisheries, an issue identified in MSA §312(b)(6)(B)(ii), NMFS does not believe that all capacity reduction programs should include a mandatory prohibition on the redeployment of vessels to other fisheries. Such a prohibition exists specifically for MSA §312(b-e) buybacks, but NMFS does not recommend applying such a ban to LAPPs. Restrictive provisions of this nature require a careful assessment of all the public and private costs and benefits on a case-by-case basis by the Regional Councils and NMFS.

Buybacks

1. Buyback programs have advantages and disadvantages. They can be used to target a capacity problem and produce an immediate and significant reduction in harvesting capacity. However, buybacks do not, by themselves, address the fundamental and underlying problem of economic incentives and, therefore, at best can result in only temporary reductions in excess harvesting capacity. Therefore, NMFS does not view stand-alone buybacks as an effective measure to prevent or eliminate excess harvesting capacity.

2. At the same time, recent experience, especially in Alaska, suggests that buybacks may be useful if they are part of a larger capacity reduction program that either includes a LAPP or leads to a LAPP.

License limitation and harvest restrictions

1. Unless the rules to obtain and renew a permit, to upgrade a fishing vessel, and to transfer a permit to a replacement vessel are sufficiently restrictive, a license limitation program will not reduce capacity or capacity will tend to increase after any initial reduction. However, such a program can lead to a LAPP or LAPP-like program that will address the underlying management problem.

2. Conventional harvest restrictions, which have been used to control both the level and use of harvesting capacity and to meet other management objectives, are often more effective in a management regime that includes a LAPP.

Future NMFS Actions

1. In domestic fisheries, NMFS will continue to conduct economic analyses of LAPPs and the other options for reducing capacity, and will urge the Councils to determine for each fishery what, if any, type of LAPP and LAPP-like program is appropriate for reducing excess harvesting capacity and decreasing the severity of other undesirable outcomes of the current management regime.

2. Internationally, NMFS will urge foreign governments and Regional Fishery Management Organizations, in which it participates, to study excess harvesting capacity in international fisheries, seriously consider measures to improve the management of the level and use of harvesting capacity in those fisheries, and promote the use of well defined and enforced harvest privileges, where it is feasible and appropriate.

Appendix A

Excess Capacity and Overcapacity by Fishery and Species Group in 2004.

Fishery	Species Group	Catch	LEC Rate	HEC Rate	LOC Rate	HOC Rate	OH Rate
AK BSAI Crab	Golden king crab	2.8	-	55%	-	58%	6%
AK BSAI Crab	Red king crab	7.2	-	47%	-	47%	0%
AK BSAI Crab	Snow crab	10.9	-	56%	-	61%	13%
AK BSAI groundfish	Atka mackerel	61	-	0%	-	-4%	-4%
AK BSAI groundfish	Pacific cod	212	-	44%	-	43%	-2%
AK BSAI groundfish	Pollock	1,482	-	34%	-	33%	-1%
AK BSAI groundfish	Sablefish	2.0	-	37%	-	-85%	-193%
AK BSAI groundfish	Alaska plaice	7.9	-	1%	-	-25%	-27%
AK BSAI groundfish	Arrowtooth flounder	18.2	-	9%	-	20%	12%
AK BSAI groundfish	Flathead sole	17.4	-	3%	-	0%	-4%
AK BSAI groundfish	Greenland turbot	2.2	-	15%	-	-24%	-46%
AK BSAI groundfish	Rock sole	49	-	2%	-	9%	7%
AK BSAI groundfish	Yellowfin sole	76	-	2%	-	-3%	-5%
AK BSAI groundfish	Other flatfish	5.0	-	5%	-	7%	2%
AK BSAI groundfish	Northern rockfish	4.7	-	0%	-	-7%	-7%
AK BSAI groundfish	Pacific Ocean perch	11.9	-	0%	-	-5%	-5%
AK BSAI groundfish	Rougheye rockfish	0.21	-	2%	-	7%	5%
AK BSAI groundfish	Shortraker rockfish	0.24	-	7%	-	-102%	-117%
AK BSAI groundfish	Other rockfish	0.32	-	8%	-	-130%	-151%
AK BSAI groundfish	Other species	29.3	-	22%	-	33%	14%
AK BSAI groundfish	Squid	1.01	-	2%	-	-5%	-7%

Fishery	Species Group	Catch	LEC Rate	HEC Rate	LOC Rate	HOC Rate	OH Rate
AK BSAI halibut	Pacific halibut	5.4	-	47%	-	41%	-12%
AK GOA groundfish	Atka mackerel	0.82	-	1%	-	27%	27%
AK GOA groundfish	Pacific cod	43.1	-	53%	-	48%	-11%
AK GOA groundfish	Pollock	63	-	55%	-	49%	-13%
AK GOA groundfish	Sablefish	15.6	-	50%	-	47%	-6%
AK GOA groundfish	Arrowtooth flounder	15.3	-	26%	-	-84%	-148%
AK GOA groundfish	Deep-water flatfish	0.68	-	31%	-	-512%	-790%
AK GOA groundfish	Flathead sole	2.4	-	30%	-	-219%	-354%
AK GOA groundfish	Rex sole	1.5	-	11%	-	-669%	-764%
AK GOA groundfish	Shallow-water flatfish	3.1	-	50%	-	-238%	-570%
AK GOA groundfish	Demersal shelf rockfish	0.26	-	13%	-	-50%	-73%
AK GOA groundfish	Northern rockfish	4.8	-	8%	-	7%	-1%
AK GOA groundfish	Pacific ocean perch	11.6	-	13%	-	0%	-15%
AK GOA groundfish	Pelagic shelf rockfish	2.7	-	11%	-	-48%	-67%
AK GOA groundfish	Shortraker/Rougheye rockfish	1.00	-	26%	-	2%	-32%
AK GOA groundfish	Thornyhead rockfish	0.82	-	35%	-	-55%	-137%
AK GOA groundfish	Other rockfish	0.89	-	0%	-	25%	24%
AK GOA groundfish	Other species	4.5	-	36%	-	-185%	-346%
AK GOA halibut	Pacific halibut	30.2	-	51%	-	50%	-2%
AK GOA Scallop	Scallop	0.19	-	30%	-	8%	-31%

Fishery	Species Group	Catch	LEC Rate	HEC Rate	LOC Rate	HOC Rate	OH Rate
Atl HMS	Albacore Tuna	137	10%	18%	-396%	-351%	-454%
Atl HMS	Blue Sharks	0.1	2%	2%	-268419%	-268419%	-272900%
Atl HMS	Large Coastal Sharks GOM	1,075	49%	69%	77%	86%	56%
Atl HMS	Large Coastal Sharks N. Atl	121	20%	41%	62%	72%	52%
Atl HMS	Large Coastal Sharks S/ Atl	695	19%	48%	29%	54%	12%
Atl HMS	Other Pelagic Sharks	146	9%	17%	-203%	-178%	-234%
Atl HMS	Porbeagle Sharks	2.6	0%	0%	-3450%	-3450%	-3450%
Atl HMS	Small Coastal Sharks GOM	55	17%	29%	-226%	-181%	-294%
Atl HMS	Small Coastal Sharks S. Atl	163	20%	41%	-10%	20%	-36%
Atl HMS	Swordfish	2,089	14%	24%	-194%	-156%	-240%
NE Atl Bluefish	Atl Bluefish	7.6	22%	37%	-9%	12%	-39%
NE Atl herring	Atl herring	207	15%	49%	-125%	-37%	-166%
NE Atl scallops	Atl scallops	64	28%	47%	56%	67%	38%
NE Atl tilefish	Atl tilefish	2.6	17%	31%	37%	48%	24%
NE Atl. mackerel, squid & butterfish	Butterfish	1.2	4%	11%	-962%	-883%	-1002%
NE Atl. mackerel, squid & butterfish	Illex Squid	58	16%	38%	23%	43%	8%
NE Atl. mackerel, squid & butterfish	Loligo Squid	34.1	10%	22%	1%	14%	-10%
NE Atl. mackerel, squid & butterfish	Mackerel	118	12%	38%	-146%	-74%	-179%

Fishery	Species Group	Catch	LEC Rate	HEC Rate	LOC Rate	HOC Rate	OH Rate
NE Atl. surfclam & ocean quahog	Maine Mahogany Quahog	0.1	50%	67%	49%	66%	-4%
NE Atl. surfclam & ocean quahog	Ocean Quahog	3.8	7%	22%	-21%	-1%	-30%
NE Atl. surfclam & ocean quahog	Surfclam	3.1	17%	38%	10%	33%	-9%
NE Atlantic deep sea red crab	Atlantic deep sea red crab	4.4	5%	26%	-27%	1%	-34%
NE Monkfish	Monkfish	47	39%	48%	32%	42%	-12%
NE Multispecies	American Plaice	3.8	41%	44%	-27%	-22%	-116%
NE Multispecies	Cod (GB)	7.7	55%	59%	62%	65%	15%
NE Multispecies	Cod (GOM)	8.4	61%	66%	60%	65%	-2%
NE Multispecies	Haddock (GB)	15.8	55%	59%	-51%	-36%	-232%
NE Multispecies	Haddock (GOM)	2.3	52%	56%	-129%	-110%	-373%
NE Multispecies	Pollock	11.2	40%	42%	-25%	-21%	-109%
NE Multispecies	Redfish	0.9	34%	35%	-171%	-164%	-309%
NE Multispecies	White Hake	7.7	37%	38%	31%	32%	-10%
NE Multispecies	Windowpane Flounder	0.2	73%	74%	-226%	-215%	-1104%
NE Multispecies	Winter Flounder (GB)	6.5	50%	56%	49%	55%	-2%
NE Multispecies	Winter Flounder (GOM)	1.1	61%	63%	-166%	-152%	-590%
NE Multispecies	Winter Flounder (SNE)	3.2	73%	76%	46%	52%	-96%
NE Multispecies	Witch Flounder	6.4	46%	48%	4%	8%	-77%
NE Multispecies	Yellowtail Flounder (GB)	13.7	44%	47%	3%	9%	-73%
NE Multispecies	Yellowtail Flounder (GOM)	1.8	59%	61%	56%	58%	-6%
NE Multispecies	Yellowtail Flounder (SNE)	0.4	79%	79%	10%	11%	-321%
NE Northern shrimp	Shrimp	3.9	24%	59%	-7%	43%	-41%

Fishery	Species Group	Catch	LEC Rate	HEC Rate	LOC Rate	HOC Rate	OH Rate
NE Summer flounder, scup & black sea bass	Black Sea Bass	3.1	28%	41%	12%	28%	-22%
NE Summer flounder, scup & black sea bass	Scup	9.3	26%	31%	2%	9%	-32%
NE Summer flounder, scup & black sea bass	Summer Flounder	17.2	32%	45%	34%	47%	3%
NW Pacific Coast groundfish	Arrow-tooth Flounder	3.9	-	47%	-	22%	-47%
NW Pacific Coast groundfish	Dover Sole	7.3	-	13%	-	12%	-1%
NW Pacific Coast groundfish	English Sole	1.2	-	32%	-	-80%	-162%
NW Pacific Coast groundfish	Petrale Sole	1.9	-	8%	-	-32%	-44%
NW Pacific Coast groundfish	Other Flatfish	2.1	-	46%	-	29%	-32%
NW Pacific Coast groundfish	Pacific Cod	1.1	-	8%	-	-166%	-189%
NW Pacific Coast groundfish	Pacific Whiting	210	-	23%	-	21%	-4%
NW Pacific Coast groundfish	Sable-fish	7.2	-	59%	-	60%	3%
NW Pacific Coast groundfish	Thorny-head Rockfish	0.9	-	22%	-	-5%	-35%
PI Hawaii based pelagic fisheries	Bigeye Tuna	10.0	9%	25%	7%	23%	-2%
PI Hawaii based pelagic fisheries	Swordfish	0.37	7%	22%	-	-	-
PI Hawaii based pelagic fisheries	Yellowfin Tuna	1.28	8%	24%	-	-	-
PI NWHI bottomfish fishery	Bottomfish	0.27	1%	17%	-67%	-40%	-69%
SE GOM coastal migratory pelagics	King Mackerel (GOM)	1.9	23%	40%	-33%	-4%	-72%
SE GOM coastal migratory pelagics	Spanish Mackerel (GOM)	1.2	5%	10%	-326%	-304%	-349%

Fishery	Species Group	Catch	LEC Rate	HEC Rate	LOC Rate	HOC Rate	OH Rate
SE Atl coastal migratory pelagics	King Mackerel (SA)	2.7	18%	55%	-14%	37%	-39%
SE Atl coastal migratory pelagics	Spanish Mackerel (SA)	3.5	10%	53%	1%	49%	-10%
SE GOM Reef Fish	Deep Water Groupers	1.45	1%	2%	18%	19%	17%
SE GOM Reef Fish	Red Grouper (part of SW grouper)	5.9	15%	21%	10%	17%	-6%
SE GOM Reef Fish	Red Snapper	4.6	13%	20%	13%	20%	-1%
SE GOM Reef Fish	Shallow Water Groupers	9.3	14%	20%	4%	11%	-11%
SE GOM Reef Fish	Tilefish	0.63	12%	14%	31%	32%	22%
SE South Atl. snapper-grouper	Golden Tilefish	0.27	20%	28%	-231%	-199%	-314%
SE South Atl. snapper-grouper	Greater Amberjack	0.36	11%	22%	-201%	-164%	-237%
SE South Atl. snapper-grouper	Snowy Grouper	0.17	4%	5%	-133%	-130%	-143%
SW Coastal pelagic species	Jack Mackerel	1,160	-	23%	-	-1950%	-2572%
SW Coastal pelagic species	Market Squid	40,088	-	64%	-	4%	-167%
SW Coastal pelagic species	Northern Anchovy	7,019	-	32%	-	-443%	-698%
SW Coastal pelagic species	Pacific Mackerel	3,708	-	35%	-	-111%	-223%
SW Coastal pelagic species	Pacific Sardine	89,339	-	41%	-	19%	-37%
SW West Coast HMS	Albacore	14,540	-	50%	-	-	-
SW West Coast HMS	Bigeye Thresher Shark	5.3	-	6%	-	-	-
SW West Coast HMS	Bigeye Tuna	22.2	-	0%	-	-	-
SW West Coast HMS	Blue Shark	0.8	-	0%	-	-	-
SW West Coast HMS	Bluefin Tuna	10.1	-	0%	-	-	-
SW West Coast HMS	Common Thresher	116	-	22%	-	-129%	-193%
SW West Coast HMS	Dorado	1.2	-	1%	-	-	-

Fishery	Species Group	Catch	LEC Rate	HEC Rate	LOC Rate	HOC Rate	OH Rate
SW West Coast HMS	Mako Shark	55	-	20%	-	-117%	-171%
SW West Coast HMS	Pelagic Thresher Shark	1.6	-	0%	-	-	-
SW West Coast HMS	Skipjack Tuna	307	-	20%	-	-	-
SW West Coast HMS	Swordfish	1,255	-	10%	-	-	-
SW West Coast HMS	Unspecified Tuna	9.3	-	0%	-	-	-
SW West Coast HMS	Yellowfin Tuna	488	-	25%	-	-	-

1. LEC lower excess capacity.
2. HEC higher excess capacity.
3. LOC lower overcapacity.
4. HOC higher overcapacity.
5. OH overharvest.
6. The assessment for the NW Region Pacific groundfish fishery is for the target species, which accounted for the vast majority of the harvest in 2004, and not for the species that are being rebuilt and can only be taken as incidental catch in this fishery.
7. The Maine mahogany quahog quota is just a very small part of the total ocean quahog quota.
8. The assessment for SE Region Atlantic snapper-grouper fishery is for the three species with explicit commercial quotas (TACs) and, therefore, it includes only about one-third of the total harvest in this fishery.
9. A "-" is used when that measure of excess harvesting capacity could not be generated because either variable input data was not available for that fishery or a commercial quota (or its proxy) was not available for a specific species or species group.
10. Catch is in million pounds live weight with the following exceptions: (a) Atlantic HMS catch is in metric tons dressed weight for sharks and round weight for tunas and swordfish, (b) scallop catch is in meat weight, (c) Alaska and Northwest Region catch is in thousand metric tons, (d) surfclam and ocean quahog catch is in million bushels, and (e) Southwest Region catch is in metric tons. With the exception of the Alaska and Northwest Region groundfish fisheries, catch is in terms of landed catch and not total catch. For those two fisheries, the catch estimates are of total catch including landed and discarded catch. The estimates of discarded catch are provided by at-sea observer programs.

Appendix B

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A. Report to Congress:

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