

A Case Study of New England Groundfish Fishing Capacity Reduction

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Abstract

The National Marine Fisheries Service (NMFS) has conducted both a vessel buyout and a permit buyout in the limited access Northeast groundfish fishery. These two programs were implemented at different times, and had similar objectives but responded to somewhat different perceived problems. The vessel buyout was implemented at a time when resource conditions were at record lows. In the context of the time, the buyout was viewed as both a form of financial assistance to the fishing industry and as a means of enhancing the effectiveness of Amendments 5 and 7 to the FMP by removing the most active fishery participants. By contrast, the permit buyback was initiated when groundfish stocks were recovering (although, fishing mortality rates on some key stocks were still above required levels) but there was considerable concern about activation of latent effort. It was believed that entry of formerly inactive vessels would thwart gains in recovery and in turn, require further reductions on vessels that had borne the brunt of effort reductions in the groundfish fishery. In this respect, the permit buyout was designed to remove as much potential fishing capacity as possible before latent effort could be activated. The following provides an overview of the parameters of each buyout program and a summary of program results.

Introduction

Groundfish in the Northeast region of the United States are regulated under the Northeast Multispecies Fishery Management Plan (FMP), hereafter referred to as the Multispecies Plan. A total of 15 species are managed under the Multispecies Plan, 11 of which are referred to as “large mesh” and 4 are referred to as “small mesh” species. The large mesh species include Atlantic cod, haddock, yellowtail flounder, pollock, Acadian redfish, white hake, American plaice, witch flounder, windowpane flounder, winter flounder, and Atlantic halibut. Small mesh species include ocean pout, red hake, silver hake, and offshore hake. The primary gear used in the groundfish fishery is the otter trawl, but a substantial number of vessels use gillnet or bottom longline gear.

While both small and large mesh species are regulated under the same FMP, in practice the two species groups managed separately. The groundfish fishery for small mesh species remains an open access fishery while the fishery for large mesh species became limited access in 1994 with implementation of Amendment 5 to the Multispecies Plan. Amendment 5 also implemented a management program for limited access permit holders based on days at sea (DAS) controls, which continues to be the cornerstone of groundfish management in the Northeast region. Under this management regime a limited access groundfish permit represents an access right and a use right limited by the number of allocated DAS. A groundfish permit entitles the vessel to possess any of the 15 species managed under the Multispecies Plan but does not allow retention of any other species for which a specific permit is required. For example, a vessel that wants to retain both groundfish and American lobster must possess a groundfish and a lobster permit in order to do so.

Owners of vessels that participate in the groundfish fishery may, and generally do, hold limited access permits for fisheries managed under different FMP's. These annually renewable permits are assigned to a vessel and are not freely transferable. In this manner, a vessel operating in the Northeast region may be thought of as having a suite of permits that are not individually severable from the vessel unless not renewed by the owner. Vessels may still be bought and sold but the permits must be transferred as a package along with the vessel. For a vessel buyback, this means that removal of the vessel also includes surrendering any attached permits while a permit buyback would entail only the removal of a specific permit.

The National Marine Fisheries Service (NMFS) has conducted both a vessel buyout and a permit buyout in the limited access Northeast groundfish fishery. These two programs were implemented at different times, and had similar objectives but responded to somewhat different perceived problems. The vessel buyout was implemented at a time when resource conditions were at record lows. In the context of the time, the buyout was viewed as both a form of financial assistance to the fishing industry and as a means of enhancing the effectiveness of Amendments 5 and 7 to the FMP by removing the most active fishery participants. By contrast, the permit buyback was initiated when groundfish stocks were recovering (although, fishing mortality rates on some key stocks were still above required levels) but there was considerable concern about activation of latent effort. It was believed that entry of formerly inactive vessels would thwart gains in recovery and in turn, require further reductions on vessels that had borne the brunt of effort reductions in the groundfish fishery. In this respect, the permit buyout was designed to remove as much potential fishing capacity as possible before latent effort could be activated. The following provides an overview of the parameters of each buyout program and a summary of program results.

Fishing Vessel Buyout

The fishing vessel buyout program was developed and implemented in two phases by the National Oceanic and Atmospheric Administrations Office of Sustainable Development (OSD) beginning with a \$2 million pilot program in June, 1995. The pilot was designed to determine the level of interest in a buyout and to test a variety of implementation protocols such as bidding procedures, vessel scrapping provisions, and eligibility and selection criteria. The pilot buyout program culminated in February, 1996 with the purchase and disposal of 11 vessels having permits in the Northeast multispecies fishery. Based on a favorable review of the pilot buyout program, the OSD initiated a \$23 million expanded buyout program in September 1996 using essentially the same protocols as in the pilot program. By May, 1998 sixty eight additional vessels had been removed from the multispecies fishery through this program.

Vessel Buyout Objectives

The goal of the pilot buyout was "...to demonstrate that a vessel removal program can be successfully designed and implemented and that such a program can be an effective tool in the conservation and management of U.S. fisheries¹ ." Although conservation is mentioned as a

¹ Federal Register, June 22, 1995 (Vol. 60, No. 120, pg. 32504)

goal, the same Federal Register announcement (reiterated in the announcement accompanying the expanded buyout) also stated that the purpose of the buyout was "...to address the needs of those directly affected by the decline of traditional fisheries in the Northeast." Thus, the dual purposes of 1) providing a means for economically disadvantaged groundfish fishermen to exit the fishery, and 2) conserving the resource by permanently removing groundfish vessels and their related permits, were part of the initial design and implementation of both vessel buyout programs.

Design of Vessel Buyouts

An extensive series of public hearings were held in Northeast ports prior to both buyouts to elicit support and ideas for designing the programs. The resulting design of the buyout reflected many of the features and ideas provided by industry members.

To be eligible for the buyout program, a vessel owner had to possess a limited access multispecies permit. In the pilot buyout program, eligibility was limited to a subset of limited access permit categories. In the expanded buyout program, eligibility was opened to all limited access permit categories. Vessel owners were required to demonstrate that (a) at least 65% of their fishing revenue was derived from landings of large mesh groundfish species in three of four years from 1991 to 1994, and (b) that their vessel was capable of fishing under its own power in federal waters.

Bidding was done by a reverse auction, in which each vessel owner was required to prepare a bid or price at which he/she would be willing to render the vessel in an un-fishable condition and would surrender all federal fishing permits. Selection of vessels was based on a hierarchical ranking, from lowest to highest, of the ratio of the bid to the vessel's groundfish revenue. This criterion was selected to provide a means for comparing bids across dissimilar vessels. Selections were made until all budgeted monies were used. Owners of selected vessels were then notified and given an opportunity to reconsider. Mutually accepted bids continued to closure proceedings.

Prior to closure, the vessel owner was required to show that the vessel was being scrapped or sunk or, in the case of the expanded buyout program, committed to some non-fishing use. Vessel owners were required to surrender all federal fishing permits and to pay any costs associated with scrapping or transferring the vessel, including legal or accounting costs and, paying liens, debts, or taxes. The owner had to consider these costs, together with possible income from the sale of vessel equipment (gear, electronics, etc.) in developing the bid amount. Consistent with existing law, vessel owners were not required to surrender their right to reenter the multispecies fishery or enter any other fishery provided they could purchase a vessel with the appropriate permits.

Vessels Removed

Of the original \$27 million budgeted for the two vessel buyouts, \$2 million was set aside to fund a health insurance program for Northeast fishermen. An additional, \$0.6 million was used for administrative expenses of the expanded buyout program, leaving a total of \$24.4 million for the

actual purchase of groundfish vessels. With these funds a total of 79 vessels were removed; 11 from the pilot buyout and 68 from the expanded buyout program. The average bid for retired vessels was \$308,734, but bids ranged from a low of \$50,000 to a high of \$1 million. The average score of the retired vessels was 0.922 which means that, on average, vessel owners thought the value of their vessel was approximately equal to one year of groundfish revenue (1991 to 1994 average revenue).

Most vessels were either scrapped (62) or sunk (7). Scrapping required permanent disassembly while sinking had to be done in an ecologically safe manner. In addition, transfer to a non-fishing use was allowed in the expanded buyout program. A vessel could be transferred to "...a U.S. public entity, a U.S. nonprofit organization, or a foreign national government for research (including fisheries research), education, training, humanitarian, safety, or law enforcement purposes."² Transfers required (1) a provision in the title that the vessel be scrapped once the purpose for which it was transferred had been completed, and (2) a permanent restriction prohibiting that vessel from holding a fishery endorsement. Ten vessels were transferred in accordance with these requirements.

The majority of retired vessels used trawl gear (60). Eighteen vessels reported gillnet gear as the primary gear type and one vessel reported using some combination of otter trawl and gillnet gear. Most vessels were from Massachusetts or Maine (Table 1). Retired vessels averaged 100 gross registered tons (GRT) but ranged from 5 to 198 GRT (Table 2). The average age of the buyout vessels was 21.7 years but newer vessels (6 years of age) and older vessels (69 years) were retired. The main engine horsepower averaged 502 hp but ranged between 160 and 1,125 hp. Overall vessel length averaged 64.9 feet and ranged from 35 to 105 feet.

Permit Buyout

In 2001, \$10 million was appropriated under the Military Construction Appropriations Act for FY2001 (P.L. 106-246) to support a "...voluntary fishing capacity reduction program in the Northeast multispecies fishery that permanently revokes multispecies limited access fishing permits so as to obtain the maximum sustained reduction in fishing capacity at the least cost and in the minimum period time and to prevent the replacement of fishing capacity removed by the program. . . ." Congressional staff guidance indicated that the intent of the program was to reduce the number of "latent" or inactive permits in the fishery. The final notice of permit buyout was announced in December 2001 and culminated in the removal of 245 limited access groundfish permits by March 2002.

Permit Buyout Objectives

Unlike the vessel buyout which had a dual purpose of financial assistance and capacity reduction, the permit buyout was more clearly focused on capacity reduction. The program was enacted to remove capacity which was not being used in the groundfish fishery, but which could potentially be directed at groundfish if stock conditions, or prices, improved. This buyout

² Federal Register, August 28, 1996 (Vol. 61, No. 168 pg. 44300)

differed from the previous buyout in that a vessel did not need to show any evidence of having fished for groundfish. Eligible participants only needed a valid limited access permit and an allocation of multispecies days.

Permit Buyout Design

Like the vessel buyout, the permit buyout was designed through a consultative process. The Industry Advisory Panel of the New England Fishery Management Council and the NMFS collaborated in holding a series of public hearings to solicit input on buyout design and selection criteria. Based on these meetings, a reverse auction approach was used (as in the vessel buyback). Eligible participants were vessels with a limited access groundfish permit. Given the appropriations language and stated Congressional intent, selection criteria were based on capacity output removed per dollar of buyout money expended. The specific selection criterion was based on the permit holder's bid amount divided by capacity output of the vessel, where the daily capacity output was estimated using data envelopment analysis (DEA) and then multiplied by the vessel's allocated days at sea (see Walden and Kirkley, 2000). The resulting ranking factors were sorted in ascending order and awards made until the available buyout funds were exhausted.

Because some of the vessels which submitted bids did not have any fishing history, ranking vessels based on the ratio of capacity to bid price was somewhat problematic. Conversations with industry members revealed that most vessels owners believed horsepower was the most important determinant of capacity. Based on this, vessels which had a fishing history were stratified using a cluster analysis where total landings per day at sea and horsepower were the clustering variables. Capacity per day at sea was then estimated for each vessel in a given cluster, and the average capacity per day estimated for all vessels in each cluster. The appropriate average daily capacity estimate was then assigned to any vessel which submitted a bid and did not have any fishing history. The yearly capacity of vessels was derived by multiplying the average daily capacity times the vessel's days at sea allocation. This value was then used as the denominator in the bid to capacity ranking factor.

Permits Removed

A total of 502 bids were received from 1,732 eligible permit holders. These bids totaled \$99.2 million. A total of 245 permits were able to be purchased with \$9.6 million for an average payment of \$39 thousand.

Most of the surrendered permits were from Massachusetts (160) or Maine (52) but a substantial number were also from Rhode Island (21), New York (20) and New Jersey (20) (Table 3). Although no vessel was purchased, removal of the permits reduced potential effort in the groundfish fishery. The average age of the vessels associated with the removed permits was about 21 years at the time the permit was surrendered. Although the average vessel age in the permit buyout was nearly the same as that in the vessel buyout, the average length, gross tons, and vessel horsepower were all much smaller (Table 4).

Impacts of Fishing Capacity Reduction and Lessons Learned

Measures of Capacity Reduction

The combined vessel and permit buyouts removed a total of 324 permits or 18.7% of the groundfish vessels that would have existed without either buyout (Table 5). Assuming no buyout, estimated capacity output based on DAS allocations in fishing year 2001 would have been 409.4 million pounds. The combined capacity output for all vessels and permits removed was 79.4 million pounds. That is, capacity output for the remaining vessels (330 million pounds) is almost 20% lower today than it would have been if the buyouts had occurred.

Lessons Learned

The explicit objective of the vessel buyout was to remove the most active harvest capacity as possible given available funds. However, at the time the vessel buyout was implemented, the analytical models to develop a capacity-based selection criterion had not been developed. These models were developed later and a post-hoc assessment of the vessel buyout clearly demonstrated that the actual capacity removal was lower than what could have been removed had a capacity-based selection criterion been available (Walden, et al., 2003). For the same cost, a capacity-based selection criterion would have removed 1.5% more capacity than was actually removed.

Prior to the permit buyout, the U. S. General Accounting Office (GAO) [an investigative arm of the U.S. Congress], conducted a review of the vessel buyback. In its report the GAO made a number of recommendations including prohibiting buyback participants from entering any fishery with excess capacity, placing restrictions on latent effort, minimizing incentives to increase capacity, and developing performance measures to evaluate buyback program with respect to capacity and conservation of fish stocks (GAO, 2000). These recommendations, and the finding that selection criteria should be capacity-based, provided the rationale for the ranking criterion used in the latent permit buyout.

Within the limits of the capacity estimates and the reverse auction bidding process, the capacity-weighted ranking removed as much potential capacity output as possible given available funding. However, as the permit buyout was designed to target inactive permits, an empirical estimate of capacity output for all vessels was not possible because DEA can only be applied for active vessels. Our solution to this problem was to estimate capacity output for all active vessels within each horsepower cluster. The mean value of each cluster was then assigned to inactive vessels within horsepower clusters. After the buyout, comments from vessel owners indicated that assigning a latent permit the average daily capacity for a cluster was considered unfair, because in many instances the capacity assigned was higher than that for an active boat. As such, given equal bids, a vessel assigned the mean capacity output would be selected before any other vessel in the same horsepower cluster whose capacity output was below the mean.

Working within the DEA framework, this perceived inequity could be resolved by assigning

inactive permits the minimum capacity output within a cluster, a solution some vessel owners considered more equitable. The other possibility would be to investigate alternative procedures for measuring capacity output. The stochastic production frontier might be one possibility as the parameter estimates could be used to construct a unique capacity output for every vessel. Both active and inactive vessels would need to be ranked using stochastic frontier capacity output estimates to assure consistent treatment of all potential bidders.

Epilogue

On December 28, 2001, the U.S. District Court for the District of Columbia (Court) rendered a decision on Conservation Law Foundation, et al. V. Evans (Case No. 001134, D.D.C, December 28, 2001) that required the NMFS to develop remedial measures to bring the Multispecies Plan into compliance with applicable law. This ruling initiated a process that culminated in a Settlement Agreement that was eventually accepted by the Court (May 23, 2002). One element of the Settlement Agreement was the establishment of a freeze baseline for DAS allocations, and a 20% reduction in allocations from that baseline. The initial lawsuit was filed while the New England Fishery Management Council was still in the midst of developing Amendment 13 to the Multispecies Plan. The measures included in the Settlement Agreement are due to be replaced by implementation of Amendment 13 on May 1, 2004. Of note is that under Amendment 13 allocations would be more than halved from fishing year 2001 levels (about 135,000) to nearly 67,000 DAS. Since our measure of capacity output includes DAS allocations, the reduction in capacity output due to a single management decision will be approximately 55% (i.e. a reduction from the estimated 2001 capacity output of 330 million to 147 million pounds). The clear message is that opportunities to achieve capacity reduction exist within the framework of the Multispecies Plan without having to resort to buyouts. This is not to say that the buyouts should not have occurred or that they were of little or no benefit.

The potential impact that the buyouts had in infusing the fishery management dialogue with discussions related to capacity is not known. The buyouts may have been instrumental in instilling a growing awareness that latent capacity threatened not only resource recovery but the competitive position of vessel owners. The vessel buyout played a role in prompting the Council's Interspecies Committee (which eventually became the Capacity Committee) to address the topic of capacity. These deliberations, as well as the series of public hearings that accompanied the buyout allowed discussions of capacity to be vetted in public. The manner or degree to which either buyout program contributed toward furthering the realization that capacity reduction was a necessary component of groundfish management is speculative but may well have been pivotal in fostering this dialogue.

In a more tangible sense, the buyouts meant that the DAS reduction necessary to achieve a given conservation objective under Amendment 13 would not have to be quite as large. To see this, consider the fact that baseline DAS allocations in Amendment 13 would be based on past use (1996-2001). The target DAS reduction for year one of Amendment 13 was determined to be 40% from this baseline. Had the buyout vessels and permits not been removed, the initial baseline would have been increased by approximately 7 thousand days and DAS would have to be reduced by 46% to achieve the same target. To put this difference into context, for a vessel

with a 50 DAS baseline removing the buyout vessels translates into a savings of 3 fishing days to that vessel.

The impetus for further buyouts seems to be waning as the New England Fishery Management Council is moving toward more market based vehicles for rationalizing effort in the groundfish fishery. These provisions include both leasing and transfers of DAS among limited access vessels. Amendment 13 also includes a provision that allows the formation of groups of vessel owners to receive group output quotas or “sector allocations” which would be managed by these sectors. Viewed in retrospect, the buyout programs removed nearly 20% of potential capacity output, but their more valuable contribution was probably as a catalyst to the management of fishing capacity in the New England groundfish fishery.

References

General Accounting Office, 2000. *Entry of Fishermen Limits Benefits of Buyback Programs*. GAO/RCED-00-120. United States General Accounting Office, Washington, D.C., 2000

Walden, John B. and James E. Kirkley. 2000. *Modeling Technical Efficiency and Capacity in Fisheries by Data Envelopment Analysis Using the General Algebraic Modeling System (GAMS): A Workbook*. NOAA Technical Memorandum NMFS-NE-160. Research Communications Unit, Northeast Fisheries Science Center, Woods Hole, Massachusetts.

Walden, John B., James E. Kirkley, and Andrew W. Kitts. 2003. A Limited Economic Assessment of the Northeast Groundfish Fishery Buyout Program. *Land Economics*. 79 (3): 426-439.

Table 1. Number of Vessels Retired by the State and City/Region of Residence of the Vessel Owner.

State	Vessels	City/region	Vessels
Massachusetts	55	New Bedford	19
Maine	19	Gloucester	11
Rhode Island	1	Cape Cod	11
New Hampshire	3	Portland	8
New York	1	Other	30

Table 2. Characteristics of Retired Vessels

Vessel characteristic	Average	Minimum	Maximum
Gross registered tons	100	5	198
Age when retired (years)	21.7	6	69
Propulsion engine horse power	502	160	1,125
Vessel length (feet)	64.9	35	105

Table 3. Number of Permits Retired by State of Residence of Permittee.

State	Permits
Maine	52
New Hampshire	8
Massachusetts	108
Rhode Island	21
Connecticut	7
New York	20
New Jersey	20
Maryland	2
Virginia	1
North Carolina	3
Other	3

Table 4. Characteristics of Vessels with Retired Permits

Vessel characteristic	Average	Minimum	Maximum
Gross registered tons	23	1	197
Age when retired (years)	21.3	2	94
Propulsion engine horse power	324	8	2,100
Vessel length (feet)	39	18	102

Table 5. 2001 Estimated Capacity Output (100,000 lb units) for Limited Access Vessels

Vessel group	Number of Vessels	Capacity Output	Percent of Total Capacity Output
Bought out vessels	79	245	6.0%
Bought out permits	245	549	13.4%
Vessels not bought out	1,413	3,300	80.6%
Total	1,737	4,094	100.0%