

Summer Flounder, Scup and Black Sea Bass Advisory Panel

AP member comments provided prior to meeting

June 22, 2018

Brady Lybarger (NJ)

- Research
 - The Council should consider using a research set-aside (RSA) program for summer flounder, scup, and black sea bass. The scallop RSA program works well. Fishermen should be involved in research. Research and commercial harvest should take place on the same trips. Allowing fishermen to sell their catch from RSA trips generates income for fishermen and funding for science.
- Commercial possession limits
 - The regulations for state-specific possession limits be modified to address landings, rather than possession. This would give fishermen more flexibility in where they land their catch. For example, fishermen could unload their limit of one species in one state, while retaining another species on the vessel to land in a different state.

Steven Witthuhn (NY)

- Black sea bass “regions”
 - Regions and the management associated with the regions need to be more clearly defined.
 - Northern region states all have different regulations
 - These differences get anglers upset with the management system
 - Differences within the region make management and recreational catch estimates more difficult and uncertain.
 - Lessons should have been learned from the fluke regional management approach.
 - Consideration should be given to splitting NJ North-South and align those regions with the Northern and Southern regions, respectively.
- Black sea bass management timeframe
 - The regional configurations and management measures need to remain in place and consistent for a number of years (3+) in order to provide some stability and determine if the approach is working and what the impacts on the population might be
- General: when does anecdotal information become fact? If 100’s-1,000’s of anglers and captains are observing the same thing on the water, when will science incorporate this information and not just ignore it?

June 18, 2018

Comments for AP fluke, sea bass, scup meeting June 26, 2018

Council staff:

I wish to thank council for the wise decisions I have seen made thus far in my three years as a member of the AP panel, as it pertains to the region I represent, southern NJ.

1. The allowance for the Delaware Bay to have a lower size limit for fluke has helped the few surviving businesses in that region, though many marinas and related businesses have closed due to lack of fish and strict regulations.

2. The allowance for New Jersey to become its own region for fluke regionalized management allows the state to set regulations consistent with mandated conservation equivalency more appropriate to the temporal shift in the fluke stock. Hopefully the state will act wisely to propose regulations consistent with the stock size parameters along its coast.

3. The reopening of the previously closed sea bass season in federal waters from Sept 21 to Oct 22 will allow the states to set seasons that allow more continued fishing opportunities. This should result in more fishing activity when the season was closed last year for fluke and sea bass during much of Sept and Oct with resultant loss of business to the state and discontinuity of recreational fishing effort. Now with an extended fluke season (Sept 22 vs Sept 5 last year), and sea bass being opened Oct 5, the struggling state recreational fishery related businesses should see an uptick in sales for that time period.

Overall, though, marinas in my area are still far below capacity and fishing effort that I see is no where near what it was in the past. My nonscientific assessment is marina occupancy and fishery activity is down 25-30%. Our bay and ocean striped bass fishery is almost nonexistent. Fluke stocks continue to be at a low level based on my observations and personal catches. Despite the abundance of sea bass, the catch in the Delaware Bay is nonexistent, the near shore catch in small, and only decent abundance is found out 20-30 miles, and even there is not what it once was. We rarely catch scup in southern NJ.

Slot sizes.....I would be in favor of allowing slot size provisions for all three species as this gives management additional opportunity and flexibility in managing these species. Realizing the limited usefulness of slot sizes for sea bass and scup, still it is wise to have this capability for future possibly unforeseen circumstances.

Other sea bass recommendations.....We are very lucky to be in a situation where we have such a robust sea bass stock. I hope we can manage it wisely so as not to be in a situation close to fluke where we are bordering on having an overfished stock. I would make the following comments:

1. I am in favor of making the sea bass regulatory process as close or the same as fluke

management for two reasons. One is that it would reduce management complexity for staff and establish more uniform regulatory frameworks for our stocks. Secondly, and perhaps even more importantly, it would help (to at least some extent) to reduce the frustration the public perceives in our rather complex management processes, when they attempt to understand how our fisheries are managed. In this regard I would favor conservation equivalency with rollover Option 1Bii.

2. I would also recommend mandatory "venting" of sea bass when recreationally fishing in waters over 80 feet deep (the depth I see where barotrauma is significant). Wasteful fishing practices should be greatly discouraged when possible.

3. We are lucky to having sexual dimorphism (ability to distinguish sex by external features) in sea bass. The importance of the females (and subordinate males) makes this an ideal fishery to make it a sex based fishery where only males (obvious blue hump) should be retained. This is particularly important in the spring when the females are loaded with eggs.

4. I would strongly recommend we transition from an MRIP data based system because of the inherent inaccuracy in the system despite repeated modifications. Time and time again this data has proved faulty and is a huge waste of resources and money. Transitioning to an "F" based system like used for striped bass would be huge improvement in terms of reliability, cost, believability, continuity, and stock management.

Research recommendatons:

I have spent a great deal of time studying ocean temperature data (and acidification data) and for sure it has had some effect on stocks particularly in areas like the Gulf of Maine where the effect is magnified. The oceanic (surface and benthic) temperature changes we have seen (and not those worst case scenarios I have seen presented to council) thus far, are relatively minor compared to some of the massive stock shifts we have seen thus far in some of our stocks.

It was quite an interesting read studying the history of the cod stock shifts seen from the late 1800's to the present. Clearly demonstrated are decimation of cods stocks with different DNA makeup, and different migratory patterns of those subunit stocks. It is my belief that we have experienced the same pattern in our fluke stocks.

Our current management scheme has for many years allowed a disproportionate share of the commercial fluke stock to southern states. With commercial fishing effort having shifted beginning in the late 1980's to a winter fishery, exploitation of the stock during its crucial spawning season, could well have decimated the southern portions of the stock causing the fleet to have to fish many hundreds of miles to the north then in previous years. I get the impression that management blames this on the very minor degree of benthic oceanic warming we have seen (whether one blames it on slowing thermohaline circulations or shifting of the cold water pool).

The problem with the loss of the southern portion of the stock is that the recreational fishing industry in those states suffers unfairly, violating the standards of the MSA requiring fair allocation to all parties. These comments are in no way commercial vs recreational in nature, but

instead a suggestion for management to consider the effects of fishing effort on depletion of east-west migratory stocks.

It is possible that this northern shift of the stock has also been a cause of reduced recruitment with a reduced survival rate of newly hatch fluke in more northern and eastern waters. This could be from being spawned in colder or deeper water, or in currents not conducive to good inshore push.

I would suggest research into looking at this scenario.

1. I would look for DNA differences in southern vs northern fluke.

2. I would study egg content of harvested fish to look for prime breeding times (some data is already available for serial spawning of this species) to hopefully curtail fishing activity during this period.

3. I would do a tagging study of fish on the spawning grounds to see how they migrate (i.e. do fluke migrate straight east or more southeast as they move inshore). In this context, I would explore if loss of spawning segments in a north-south axis will be causative for an inshore depletion.

4. I would look at a management scenario where ocean spawning grounds are closed as stock depletion is detected in those waters in a similar way, for example, like certain scallop grounds are closed temporarily as localized depletions occur.

4. On a separate note, I would look at data to see how much fluke loss is contributed to bycatch fisheries for skate, sea bass, scallop, and other fisheries.

5. I would look at the stock benefit of making sea bass a male only recreational fishery.

6. I would look at survival rates of released sea bass and various depths.

Kiley Dancy

From: James Fletcher <unfa34@gmail.com>
Sent: Friday, May 11, 2018 11:02 AM
To: Kiley Dancy; Moore, Christopher; Kellogg, Chris
Subject: 1. RECENT EXPERIENCES IN OCEAN RANCHING: THE CASES OF JAPAN, UNITED STATES AND ICELAND

<http://www.fao.org/docrep/005/Y1805E/y1805e07.htm#TopOfPage>

let us address ocean ranching if the "science" has a problem with stock enhancement. Something needs to be accomplished with Summer Flounders {look at sea scallop production} WHY DO THE COUNCILS ONLY MANAGE FISHERMEN INSTEAD OF THE RESOURCE?

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Kiley Dancy

From: James Fletcher <unfa34@gmail.com>
Sent: Tuesday, May 8, 2018 5:35 PM
To: Kiley Dancy; Moore, Christopher
Subject: Re: June 26 Summer flounder, scup, black sea bass Advisory Panel meeting

Kiley: Could / Would a discussion of an enhancement program to release 20,000,000 one inch summer flounder be within the advisor discussion. At a cost of three to five cents to grow to one to three inches summer flounder it should be worth discussion, in Japan they know how to have white spots or markings to show using spawning methods. Thus we could know the recovery rate.

ALSO WOULD LIKE ADVISORS TO PUSH TOTAL LENGTH RETENTION IN RECREATIONAL DISCUSSION.

THOSE WANTING LARGER FISH CAN USE BARB-LESS HOOKS.

On 5/8/2018 10:33 AM, Kiley Dancy wrote:

Hello Summer Flounder, Scup, and Black Sea Bass Advisory Panel members,
The MAFMC and ASMFC have scheduled a joint Advisory Panel meeting to develop Fishery Performance Reports. Our meeting will be held in person on **Tuesday, June 26, 2018 from approximately 10AM-4:30PM** at the [Hilton Garden Inn BWI](#). We do not yet have sleeping room block information but will send it out as soon as it's available. We will also be sending out background materials and an agenda a few weeks before the meeting.

Please note that although the Council is currently reviewing AP membership applications for our typical re-appointment cycle, this meeting will be with the current group of advisors. New AP member appointments will be finalized in late June but will not be effective until July. Please let us know if you have any questions.

Kiley Dancy
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Kiley Dancy

From: James Fletcher <unfa34@gmail.com>
Sent: Wednesday, May 9, 2018 11:54 AM
To: Kiley Dancy; Moore, Christopher
Subject: Flounder enhancement discussion
Attachments: An_Economic_Review_of_the_Japanese_Flounder_Stock_.pdf

This article is mid 1990's it is time that the council & NMFS begin stock enhancement.

Fishery management has selected for slower growing & smaller fish utilizing regulations, TIME FOR A CHANGE FROM MANAGING FISHERMEN TO MANAGING FISH & FISH GROWTH WITH ENHANCEMENT FOR LARGER FASTER GROWING FISH.

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AN ECONOMIC REVIEW OF THE JAPANESE FLOUNDER STOCK ENHANCEMENT PROJECT IN ISHIKARI BAY, HOKKAIDO

John T. Sproul and Osamu Tominaga

ABSTRACT

The economic viability of a Japanese flounder stock enhancement program initiated in 1983 was investigated in Hokkaido, Japan. Specific costs and benefits of the 20-year venture were calculated through 1989 and estimated for future years. Net present value (NPV) calculations, benefit-cost ratio (B/C) analysis, and corresponding sensitivity analyses were conducted to evaluate the project's net economic returns to Ishikari Bay flounder fishermen. Results suggest the program would generate a NPV over \$2 million with a B/C of 3.15. Sensitivity analysis revealed the highest return on future project investment would come from research on improving fry survival after release. This investigation indicates economic viability need not be sacrificed to accomplish biologically successful stock enhancement programs.

Extensive inshore fishery enhancement programs are one of many approaches undertaken in Japan to help compensate for the decreasing productivity of its distant water fishing fleets. In recent years, high-seas fishing fleets of Japan have experienced severe access restriction in fishing grounds located within Exclusive Economic Zones of foreign nations. In addition, pressure from the international community regarding various high seas fishing methods practiced by Japan, heightens the risk to production from these fishery sectors. As a result, the Ministry of Agriculture, Forestry and Fisheries of Japan reemphasized in its 1990 White Paper that greater consideration be placed on enhancement and utilization of Japanese near and inshore marine fishery resources (JMAFF, 1990). Stock enhancement programs for previously productive Japanese fisheries are consistent with these recommendations. Economic viability of such programs could influence fishery management decisions in Japan, and abroad, whether or not to further pursue similar stock enhancement policies. This paper evaluates the economic viability of a stock enhancement project in Hokkaido, Japan.

In 1981, a Japanese flounder (*Paralichthys olivaceus*) stock enhancement program was initiated by the Hokkaido Prefectural Government along the west coast of the island (Fig. 2). Locally, this species is called "hirame"; its North American common name is "bastard halibut." Ishikari Bay, located on the west coast of central Hokkaido, presently supports a modest hirame fishery. However, in the past Ishikari Bay was among the most productive hirame fishing grounds of the island.

Although the government stocking program involves the entire western coast of Hokkaido, this investigation is limited in scope to only identify project attributable economic returns to the Ishikari Bay hirame commercial fishery. The objective is to estimate net economic landing benefits accruing to this fleet, and to evaluate the economic return to project investment those benefits represent. Results will give an example of quantifying the economic viability of a stock enhancement project.

Net Present Value, Break-Even Analysis, Internal Rate of Return, and B/C ratio values are calculated for the Ishikari Bay stock enhancement program to provide other researchers and policy makers with the opportunity to compare these results with those of their own projects.

BACKGROUND

National Fishery.—From 1978 to 1988 Japanese flatfish landings (halibut, flounder, sole) dropped 73% to equal 85,236 metric tons (MT). This decline is a direct result of reduced access to foreign grounds by Japanese trawlers. In 1988, for the first time in post-war history, non-trawl landings exceeded 50% of Japan's total flatfish catch. Flatfish harvested by gillnets represented 77% of these non-trawl landings and 38% of the national total. Japan's 1988 flatfish imports increased 42% over the previous year equaling 117,185 MT valued at ¥33,042 million (\$258,343,000). The United States, Korea, and Iceland were the main source countries representing 63%, 12%, and 11% of these imports (JETRO, 1989).

Hirame is the most valuable flatfish in Japan. It enjoys high consumer demand among Japanese, especially its live form. Hirame constituted 7,000 MT (8%) of the 1988 total flatfish landings, of which 11% was harvested from Hokkaido. Historically, Ishikari Bay has been the most productive hirame fishing ground in Hokkaido. However, over the past 30 years landings have declined relatively steadily at a 3% annual rate. As a result, the prefectural government targeted the area as a likely candidate for a successful stock enhancement project.

Ishikari Bay Fishery.—Approximately eight fishery cooperatives operate in Ishikari Bay monitoring and controlling its commercial fisheries. In 1988, 2,188 fishing vessels were based out of Ishikari Bay. Approximately 48% (1,054) of these boats were between 1 and 5 gross tons; the main size utilized for hirame fishing. For the same year Ishikari Bay cooperatives recorded total landings of 77,562 MT valued at ¥18.8 billion (≈\$132 million). Of this total tonnage finfish, squid-octopus-crustaceans, shellfish, and seaweeds constituted 83%, 14%, 3%, and >1%, respectively. However, the gross revenue earned by these fishery groups equaled 51%, 45%, 4%, and 0.2%, respectively. Crustaceans receive significantly higher average prices than other marine products from the area. Chum salmon (*Oncorhynchus keta*) and walleye pollock (*Theragra chalcogramma*) represent 5% and 44%, respectively of Ishikari Bay total landings. With the exception of a few species of crab landed in the bay, hirame demands the highest price per kilogram. Because hirame is in strong demand, it has been subject to high fishing pressure, driving down total productivity.

Hirame is primarily harvested by gillnets, small and large set-nets, and bottom long-lines. Within its jurisdiction, each fishery cooperative, in conjunction with local political bodies, is authorized to assign fishing privileges by gear-type, target species, and area. Depending on sea-floor topography, fishing areas are designated into 3 "contours" parallel to shore with perpendicular boundaries delimiting co-op jurisdictions. Typically, in Ishikari Bay these 3 "contour areas" are from shoreline—2,500 m, 2,500 m—5,000 m, and 5,000 m—20,000 m. Into these areas fishermen are allocated. Quotas are not issued. However, various seasonal regulations exist in the area for each fishing method. For example, gillnetting is conducted annually; however set-nets are only permitted from May through December. Hirame landings display strong seasonal peaks during summer and fall.

The number of commercial permits for hirame related operations has remained constant or declined since the stock enhancement project began. This point is later elaborated on with regards to its implication on fishing costs (see Methods).

Fisheries distribution networks in Japan are relatively complex, and marketing of dead hirame is no exception. However, distribution of live hirame landed at Yoichi on Ishikari Bay, is comparatively straightforward. One large fishery company purchases all live hirame from Yoichi, selling them at wholesale central markets in Toyko, Nagoya, and Osaka where premium prices are offered. Figure

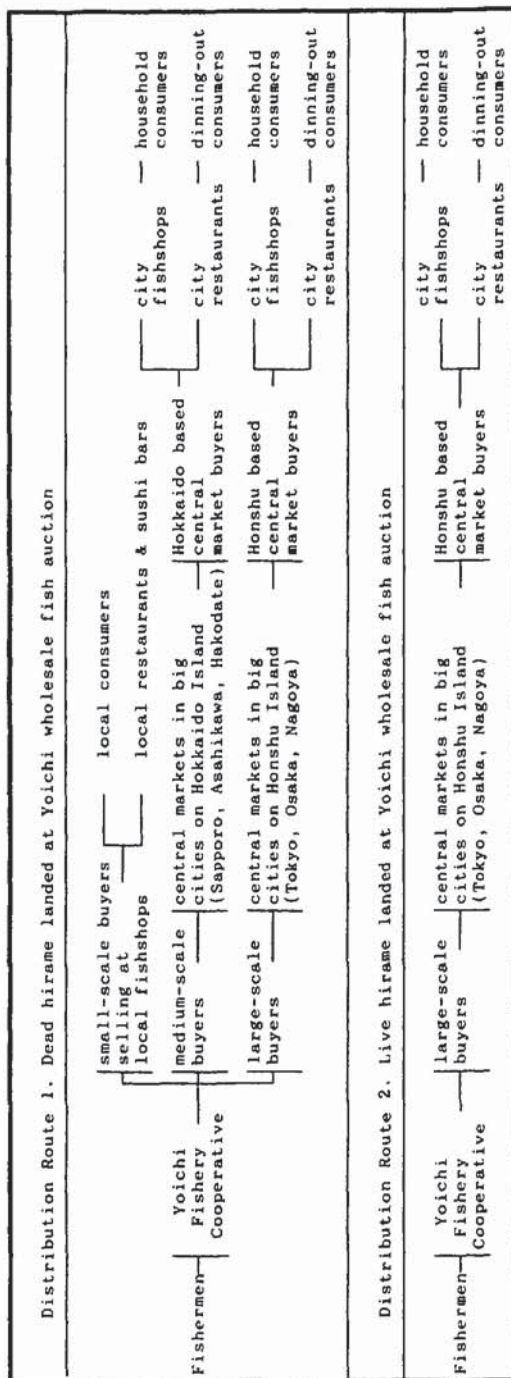


Figure 1. Market distribution routes for Japanese flounder landed at Yoichi wholesale fish auction.

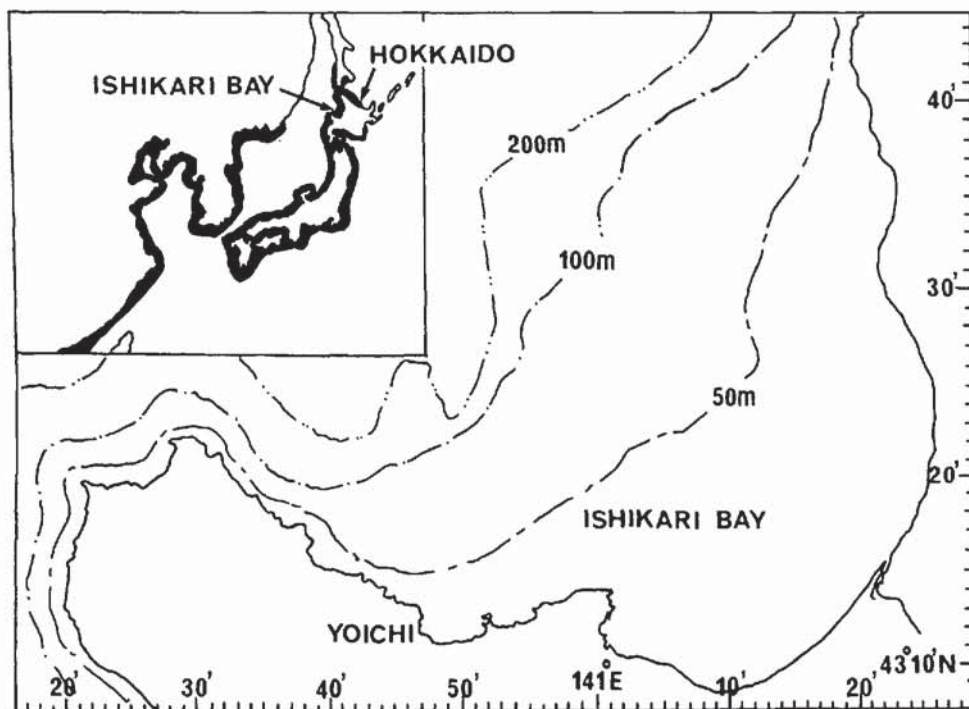


Figure 2. Map of Ishikari Bay in Hokkaido showing contours of depth. Solid area reveals distribution of hirame in and around Japan.

1 provides a schematic of the distribution system of live and dead hirame landed by fishermen of Yoichi Fishery Cooperative.

Hirame Biology.—Hirame are the only species belonging to the genus *Paralichthys* in the northwestern Pacific Ocean. The geographical distribution of this species ranges from the coast of the Soviet island Sakhalin, southward to coastal waters of Japan and Korea and the East China Sea (Fig. 2). Based on tagging experiments, hirame appear to be separated into several stocks, e.g., northern Hokkaido stock, southern Hokkaido stock, northern Pacific stock and the mid-Pacific stock (Mikami and Tamura, 1966; Santoh, 1976; Ishida et al., 1978; Ochiai and Tanaka, 1986).

The spawning period of hirame in Japan varies between regions; from late February to early April in southern areas such as Kyushu, and from June to July in northern regions such as Hokkaido. Fertilized eggs are buoyant in the sea, and during their early stages are distributed in the surface layer. However, as the developmental stages advance, the eggs move to deeper layers and are likely to hatch at depths of approximately 25 m (Yusa, 1990). It takes 40 h to hatch at 20°C or higher, 50 h at 15°C and over 150 h at 10°C. Newly hatched larvae are about 2.4–2.9 mm in total length and the yolk-sack is almost entirely absorbed by the fifth day, when larvae average 3 mm in length. Hirame larvae are pelagic, primarily distributed in subsurface layers between 25 and 50 m in depth (Kuwabara and Suzuki, 1982). The anterodorsal migration of the right eye begins at about 10 mm in length, 25 to 30 days after hatching. When the right eye migrates as far as the edge of the head, larvae are approximately 10–13 mm in length and

begin their benthic dwelling existence (Minami, 1982). At that time they move to inshore waters. Major nursery areas are assumed to occur in estuaries having depths shallower than 10 m. Metamorphosis is usually complete when the animal reaches 17 mm in length (Okiyama, 1967). The number of hirame juveniles fluctuates remarkably from year to year. When hirame length reaches approximately 10 cm, they move offshore.

Adult hirame concentrate and spawn in inshore regions of depths approximating 10–30 m. Female and male hirame begin to mature when roughly reaching 40 cm and 30 cm in total length, respectively. This occurs by their third year of life. The number of eggs laid by laboratory-reared hirame are about 1,000,000 per day (Hiramoto and Kobayashi, 1979). Under experimental conditions, this species has been observed to spawn about 20 times, laying between 10,000,000–36,300,000 eggs during one spawning period in an experimental tank (Takahashi et al., 1980). After spawning, hirame disperse to offshore areas.

Hirame appear to grow very fast during their early development, their growth rate being significantly influenced by water temperature. Hirame distributed in southern Japan grow more rapidly than those in the north. They do not usually eat at temperatures below 10°C. The von Bertalanffy form growth equation of hirame from the Sea of Japan off Niigata Prefecture, central Japan, is presented below in Equation 1 (Kato et al., 1987).

$$\text{Female} \quad Lt = 117.7(1 - e^{-0.1204(t+0.48)}) \quad (1a)$$

$$\text{Male} \quad Lt = 102.1(1 - e^{-0.1252(t+0.52)}) \quad (1b)$$

where L_t is total length (cm) at age t (years). The maximum total length is approximately 1 m.

The length-weight relationship is fitted by using the least square method and generating the following Equation 2.

$$\text{Female} \quad BW = 0.0000118TL^3 \quad (2a)$$

$$\text{Male} \quad BW = 0.0000123TL^3 \quad (2b)$$

where BW is body weight (gram) and TL is total length (mm).

Larvae feed mainly on Copepoda nauplii while adults prey on *Appendiculata* spp. thus displaying prey size-selectivity (Kuwabara and Suzuki, 1982). Five to 10 cm long juveniles prey principally on mysids. Hirame longer than 10 cm mainly feed on fish or macrurura. Adult hirame are piscivorous and eat sardines (*Sardinops melanosticus*), anchovy (*Engraulis japonica*), and sand lance (*Ammodytes personatus*) (Tominaga, unpubl.).

Hirame are typically day feeders. Based on field experiments, peak feeding activity occurs during the first few hours after sunrise and once or twice in the afternoon (Koshiishi et al., 1982). In the Sea of Japan off Niigata Prefecture, daily consumption by this species increases from early spring to June and then decreases through winter. High and low estimates of daily intake are 4.51% and 1.33% of body weight in June and December, respectively (Nashida and Tominaga, 1987).

Hirame Stock Enhancement Program in Hokkaido. — The Hokkaido hirame stock enhancement program began in 1981 when 10,000 hirame fry were transferred to Hokkaido Mariculture Institute from Miyako Mariculture Station on the north-eastern coast of Honshu island. These fish became parent stock for the culture, spawning, and subsequent release of future hirame fry. Presently, both mariculture facilities produce fry used in the annual stocking program. Late each spring, fry (15–40 mm in total length) are transferred from these mariculture facilities to one of eight grow-out stations located near the final release site. Here, while the

fry attain the desired release size, they are tagged using a variety of methods. By the end of 1989 nearly one million fry had been stocked along the west coast of Hokkaido. Ishikari Bay received the largest number of fish (36%) for any given area. Stocking efforts were intensified in 1986 when the number of released hirame increased two to threefold over previous years (Appendix IA and IB). Ishikari Bay received its first batch of cultured hirame fry in 1983.

Fish are tagged to aid in later identifying their time and place of release. Tagging methods included; fin cuts, latex color dye injections, and anchor tags. Thus far, over 70% of all released fry were tagged using one or more of these methods. In addition, a "natural tag" occurs among cultured fry. It is estimated that over 95% of this project's cultured hirame have distinguishable abnormal white and black pigmentations on the eye-side and underside, respectively. Discoloration is caused by a fatty acid deficiency in the diets of cultured hirame fry. The effect is permanent. Theoretically, if all tags remain until the fish is caught, over 99% of all released fish are "identifiable."

METHODS

Economic Estimation Tools.—The analytical methods used in this study to evaluate project economic returns over a 26 year period are: 1) Net Present Value (NPV); 2) Break-Even or sensitivity analysis (NPV manipulation); 3) Benefit-Cost ratio (B/C); and 4) Internal Rate of Return (IRR). Mathematical equations for each are provided below (Gittinger, 1982). Assumptions are listed in Appendix II.

Net Present Value is the best known and often most appropriate decision criterion when comparing development projects. The method discounts all relevant future costs and benefits, translating them into one value (Equation 3). Independent projects can be ranked on their NPV. The project with the highest NPV can be considered the most economically viable of those contrasted.

Sensitivity analysis was conducted using the Break-Even test. By systematically altering various independent variables influencing annual benefits and costs, NPV eventually equaled zero thus identifying minimum levels of economic acceptance for the variables. Landing prices for live and dead hirame, fry production costs, research operating expenses, and fry survival rate one year after release were among the variables evaluated. Appendix IA and IB lists base conditions from which all sensitivity analysis manipulations were conducted.

The B/C ratio was used to compare the relative size of benefits to costs of this project over time at a specific interest rate or opportunity cost of capital (value i in Equation 4). A B/C ratio greater or equal to 1 indicates a development program with an acceptable return on investment given the opportunity cost of capital. High positive ratio values indicate the relative size of benefits are larger than project costs. However, therein lies its weakness when used in project comparison and therefore caution is necessary. The B/C ratio, when used alone, may inaccurately rank projects because it does not account for the magnitude of net benefits. For example, an extensive project with larger net benefits (high NPV) could have a lower B/C ratio than a smaller project if the latter simply has proportionally fewer costs. Therefore, an evaluation using both NPV and the B/C ratio is encouraged to ensure correct ranking.

Internal Rate of Return sets the discounted net benefits equal to zero by selecting the appropriate interest rate (Equation 5). This investment criterion is used to compare the IRR value to the opportunity cost of capital for the project. Any alternative investment opportunity whose annual yield is less than the determined IRR value may be considered less economically attractive than the project, risk and uncertainty being equal. Since project development is based on various economic concerns such as prudent use of public capital, maximizing total net returns and minimizing relative costs, the use of a combination of project analysis decision criteria is advised.

$$NPV = \sum_{t=1}^{t=n} B_t - C_t / (1 + i)^t \quad (3)$$

$$B/C = \sum_{t=1}^{t=n} B_t \div (1 + i)^t / \sum_{t=1}^{t=n} C_t \div (1 + i)^t \quad (4)$$

IRR: The discount rate i such that the following is satisfied

$$\sum_{t=1}^{t=n} B_t - C_t / (1 + i)^t = 0 \quad (5)$$

Table 1. Hirame culture and growout production costs (Y in 1 × 10³)

Item	Adult rearing and egg collection	Egg to 30 mm fry	Rotifer production	Subtotal	30 mm to release	Total
Personnel	Y2,478	Y1,032	Y413	Y3,923	Y619	Y4,542
Feed	219	310	338	867	341	1,208
Expendables	236	335	40	611	7	618
Fuel	3,200	2,133	0	5,333	1,066	6,399
Electric	321	232	157	710	82	792
Water	4	3	9	16	3	126
Subtotal	6,458	4,045	957	11,466	2,118	13,578
Depreciation				2,189		2,189
Repairs				427		427
Total	Y6,458	Y4,045	Y957	Y14,076	Y2,118	Y16,194

Source: Mariculture Institute of Hokkaido and Yoichi Fishery Cooperative, 1990.

where; B_t = benefit in year t, C_t = cost in year t, t = 1, 2, . . . , n, n = number of years, and i = interest (discount) rate.

Economic Benefits and Costs.—Economic returns evaluated in this analysis are only those derived from harvesting stocked hirame from Ishikari Bay. The inquiry does not investigate economic effects occurring beyond the fishery cooperatives. Economic multipliers were not used to estimate related economic benefits and cost generated throughout the economy as a result of increased hirame production. However, because distribution and marketing infrastructure exists, significant cost increases are unlikely in these sectors yet higher profits are probable due to larger product volume. The absence of these values when calculating total benefits encouraged a conservative estimate of the project's worth.

To estimate annual catch benefits accrued by the Ishikari Bay commercial fishery, the annual stocking rate, annual recapture percentages, landing size and corresponding fish prices were gathered from, or calculated using, government and fishery cooperative records.

Annual economic benefits were estimated using Equation 6:

$$B_t = \sum_{n=1983}^{n \leq t} [(Y_n \cdot S \cdot \%A_t) \cdot S_{At} \cdot \%D_{At}] \cdot P_{ADt} + [(Y_n \cdot S \cdot \%A_t) \cdot S_{At} \cdot \%L_{At}] \cdot P_{ALt} \quad (6)$$

where; B_t = catch benefit (Y) in year "t" of project, t = hirame project return years: 1983, 1984, . . . , 2008 (20 years plus 6 see Appendix II #10 and discussion), n = fry release years: 1983, . . . , 2002 (20 years), A = 0, 1, 2, . . . , 6, age (in years) of stocked hirame (due to fishing pressure, six years is the estimated maximum life span of cultured hirame in Ishikari Bay), Y_n = number of hirame (fry #) stocked in year n, S = fry survival % at one year after release, S_{At} = size of A year old hirame landed in year t, %D_{At} = annual average % of size A year old hirame landed dead in year t, %L_{At} = annual average % of size A year old hirame landed live in year t (%L_{At} + %D_{At} = 100%), %At = annual average % of A year old size hirame landed in year t (Σ %A = 100% see below), P_{ADt} = price of A year old size hirame landed dead in year t, and P_{ALt} = price of A year old size hirame landed live in year t, and when

n = t: %A _t = 0;	Ave. fish size = na.
A = 1: %A _t = 0.319;	Ave. fish size ≈ 0.4 kg.
A = 2: %A _t = 0.345;	Ave. fish size ≈ 0.5 kg.
A = 3: %A _t = 0.211;	Ave. fish size ≈ 0.7 kg.
A = 4: %A _t = 0.075;	Ave. fish size ≈ 1.15 kg.
A = 5: %A _t = 0.034;	Ave. fish size ≈ 2.75 kg.
A = 6: %A _t = 0.020;	Ave. fish size ≈ 4.0+ kg.

Equation 7 is constructed to estimate annual expenses for the Ishikari Bay stock enhancement program. It incorporates relevant factors such as fixed and variable operating costs attributed to hirame culturing, grow-out, and release operations as well as research monitoring and operating cost.

$$C_t = (Y_{nz} \cdot C_z) + O_n + H_c \quad (7)$$

where; C_t = project costs in year t, Y_{nz} = # fry stocked in year n at size z (Appendix IB), C_z = production costs for size z fry (Equation 6), O_n = research monitoring and operating costs in year n (Appendix IB), and H_c = net change in annual harvesting costs in year t generated as a result of the enhancement project.

The values for t and n are the same as defined previously, however, unlike Equation 6, in Equation 7 year t always equals year n .

Variable C_z values are generated from the linear production cost function (Equation 8) derived from Hokkaido Mariculture Institute production costs and Yoichi Fishery Cooperative hirame grow-out expenses. Table 1 lists typical annual expenses. All values are in yen.

The net change in annual harvesting costs in year t generated as a result of the enhancement project (H_t) is equal to zero. To date, the Ishikari Bay fishery cooperatives have not issued additional commercial fishing permits as a result of the stocking program. It has been indicated that this practice will continue into the near future and is thus assumed to occur for the project duration (Assumption 6, Appendix II). In addition, fishermen indicated they have not changed their methodology or intensity as a result of the project (Assumption 4, Appendix II). Any changes by management or fishermen affecting fishing effort would have occurred regardless of the existence of the program. Individually, fishermen operate as they did prior to 1983 when the project began. Now, as then, they optimize the effectiveness of their operation. The authors view any technological shift that may occur in the future, such as an introduction of new fishing gear and/or an improved method of gear use or fish handling (thereby shifting fishing costs), would occur regardless of the stocking program.

$$C_z = 14.24 + 1.234 \cdot Z \quad (R^2 = 0.939) \quad (8)$$

where Z = size of hirame fry in mm (see Appendix IB).

Equation 8 generates C_z values for years 1983 through 2002 as listed in Appendix IB.

In Appendix IB, Y_n (actual and estimates) and C_z values are listed for years 1983 through 2002. Operating costs (O_n) are also presented for each year, accounting for 3% annual inflation. This value is based on the 1989 annual inflation rate (OPM, 1990) and estimated annual inflation rate for the coming decade. The average annual price per kg per size class (actual and estimate) for dead and live hirame (P_{AD} and P_{AL} values) are listed. Landing prices for stocked hirame from 1984 through 1989, live and dead form, were based on Yoichi Fishery Cooperative landing records for each size (1–6 year old fish). Landing prices used for future years (1990–2008) were based on averaging prices for each size class and product form from 1984 through 1989. Prices for dead hirame were reduced by 10% before applied to stocked hirame because retailers indicated the price of hirame with abnormal coloration are effected to this decree. No price differences is experienced by discolored live hirame. (Sashimi customers do not see hirame prior to its being freshly served. The taste of pigmented and natural hirame is identical.)

No significant recreational hirame fishery exists in Ishikari Bay and therefore benefits and costs calculated in this study are only those associated with commercial fishing.

RESULTS

Under existing conditions and assumptions, the Ishikari Bay hirame stock enhancement program would generate a NPV of ¥270 million (U.S. \$2 million @ \$1 = ¥130) from its first 20 years of operation. The project exhibits a reasonable B/C value of 3.15. Results under these base conditions, as well as Break-Even analyses, are listed in Table 2. Values are represented in 1990 ¥ and dollars. IRR analysis proved ineffective. Alternating positive and negative annual NPV values occurred, generating multiple solutions and rendering results inconclusive.

Government public investment policy often attempts to incorporate social value to project output. In Japan, high social worth is associated with sustaining domestic inshore fisheries, as suggested in the recommendations from Japan's Ministry of Agriculture, Forestry and Fisheries in its 1990 White Paper. This policy encourages financing such programs even if their return on investment is less than optimum, and possibly even in the extreme cases when NPV is less than zero.

Related to this point, it was viewed that fishing effort would not increase in terms of more fishermen entering this increasingly lucrative fishery because the cooperatives' permit issuing policy would remain stringent. However, if Ishikari Bay cooperatives and local politicians choose to issue additional fishing permits (in the interest of employment objectives, for example) as a result of stock enhancement project returns, the potential for decreasing the total net worth of the project would exist. Total fishery operating costs would increase proportionally

Table 2. Sensitivity analysis results identifying minimum values for selective variables beyond which NPV and B/C become 0 and ≤ 1 , respectively

Analysis run	P_{A0}	P_{A1}	S	i	O_s	C_t	NPV (Y)	NPV (\$)	B/C
Base condition	c	c	c	c	c	c	269,772,872	2,075,176	3.15
Price decrease	NC (100%)	c	c	c	c	c	39,297,325	362,287	1.31
Price decrease	c	NC (100%)	c	c	c	c	104,876,561	806,742	1.84
Price decrease	73.08	73.08	c	c	c	c	0.00	0.00	1.00
Survival level	c	c	15.89%	c	c	c	0.00	0.00	1.00
Interest rate	c	c	c	72.31%	c	c	0.00	0.00	1.00
Cost increase	c	c	c	c	NC (2,232%)	c	0.00	0.00	1.00
Cost increase	c	c	c	c	c	NC (2,723%)	0.00	0.00	1.00

with the number of new entrants. The average catch per unit effort for the fishery as a whole would decrease, thereby increasing harvesting costs per fish.

This is a classic argument between the economical superiority of limited entry vs. open-access fishery policy. Assuming the increased number of fishermen remained, in each successive year fewer available net profits would be divided among more operators. Diminished individual net profitability would result. It becomes clear to see that in an open-access fishery, stock enhancement projects are almost doomed to failure because their net profitability would eventually be eroded away by increasing fishing effort costs generated by new entrants attracted to the fishery. The ability of Ishikari Bay cooperatives to limit fishing effort, in terms of operators, directly influenced this project's positive NPV.

Attempts to identify minimum values sufficient to cause $B/C \leq 1$ and $NPV = 0$ were conducted systematically for each selected variable while holding all other factors constant under base conditions.

The Ishikari Bay hirame stock enhancement project would generate 0 or a negative Net Present Value and $B/C \leq 1$ under the following independent conditions, all else held constant: 1) when prices for live and dead hirame were decreased simultaneously by 78%; 2) when the opportunity cost of capital (i) rose above 72%; and 3) when fry survival one year after release (S) was less than 16%. Independently, prices for live and dead hirame did not constrain project success. Even when each price was independently decreased by 100% (price = 0), revenue received by the other was sufficient to sustain economic viability.

Future hirame price fluctuations would influence project returns the most if occurring across the board. Independently, the economic success of the program is more sensitive to the price of dead hirame than its live form. Although prices for live form are higher, the majority of hirame (70%) are landed dead, thereby heavily influencing annual benefits. Unfortunately, few opportunities remain for fishermen to increase hirame net survival without drastic cost increases. Existing handling methods are extremely conscientious and gear is presently worked twice a day. Environmental factors beyond manipulation, such as ocean water temperatures, have dominant influence on net survival levels.

Some elaboration is in order to better interpret sensitivity results for fry production costs (Cz) and research operating costs (On). In theory, they would require an individual increase of 2,723% and 2,232%, respectively, to generate a NPV equal to zero. On face value, this would suggest they also are non-constraining variables. However, recall that the building costs of Hokkaido Mariculture Institute were not calculated into fry production expenses due to the facility's diverse mandate. Notwithstanding, would a new facility be constructed to solely or primarily service the Ishikari Bay hirame program, incorporation of such construction fees into the fixed costs of fry production could generate a cost increase within the order of magnitude described above. The degree to which this impact would occur is dependent on factors such as facility size, percentage of space committed to hirame production and research, etc. The issue is not purely academic, construction of a new research facility to support Ishikari Bay marine research is being planned. Cost increases associated with hirame field studies or expanded monitoring and deployment procedures could negatively influence project NPV by increasing research costs.

If all else remained constant and the new facility increased project related research cost greater than 2,232% (an increase from \$15,000 to \$355,000 per year plus 3% annual inflation), the project NPV would equal zero. Realistically, it is likely such an increase in research would solve biological, technological, and/or environmental constraints thereby dramatically improving overall project success;

Table 3. Elasticity values for variables manipulated under sensitivity analysis (1% change in variable equals the following NPV percentage change)

Variables	Elasticity
Fry survival after release (S)	1.466
Capital opportunity cost (i)	1.110
Price of dead hirame (P_{ADH})	0.789
Price of live hirame (P_{ALI})	0.579
Fry production cost (C_f)	0.037
Research operating cost (O_n)	0.005

provided research benefits outweighed cost. A prime example is survival of fry after release.

Fry survival one year after release was determined as the single greatest influence on project net worth, followed by the interest rate (Table 3). In contrast, of those variables analyzed, increases in research and production costs negatively influence the project the least. Therefore, increased funding for research on improving fry survival in the wild would provide the greatest return on project "research investment dollar."

CONCLUSION

Results from this study indicate the hirame stock enhancement program of Hokkaido Prefectural Government is economically practical for the Ishikari Bay fishery. These findings are regional in nature, and may or may not be indicative of the project's viability prefecture-wide. Further research on stock enhancement programs are encouraged globally, with emphasis on full-perspective project analysis.

The potential for economically viable stock enhancement programs exists, especially under conditions when access restrictive regulations exist. Their presence as an option should remain clear to resource managers, fishery cooperatives, environmental amelioration groups, and industrial mitigators. Fishery stock enhancement, properly sited and used alone or in conjunction with artificial reefs, marine parks, or other improvement programs, could not only reverse conditions of resource depletion but also provide coastal areas with new options for their resource based economies.

ACKNOWLEDGMENTS

The Hokkaido Central Fisheries Experimental Station at Yoichi (HCFES) is the dominant force contributing to the success and monitoring of the hirame stocking program in Ishikari Bay. Data provided through the HCFES monitoring program made this review possible. Our gratitude is extended to the entire HCFES staff, and the fishermen and managers of Yoichi Fisheries Cooperative. The authors are indebted to K. Nagasawa for helpful suggestions to improve the manuscript. Responsibility for errors and omissions remain our own.

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DATE ACCEPTED: March 26, 1991.

ADDRESSES: (J.T.S.) University of Hokkaido Faculty of Fisheries, Department of Business Economics, 3-1-1 Minato-cho, Hakodate, Japan 041; (O.T.) Hokkaido Central Fisheries Experimental Station, Hananaka-cho, Yoichi, Japan 046.

Appendix IB. Values for variable in Equation 7: Project Cost Function

Year (N)	Fry # released (Ynz)	Fry size (in mm) (z)	Cost of z size fry (C _z)	Research op. cost (O _n)	Total annual cost (C _t)
1983	14,500	118	160	0	2,135,651
1984	300	170	224	0	63,273
1985	4,500	150	199	0	860,774
1986	9,932	154	204	0	1,946,866
1987	39,839	139	186	0	7,137,124
1988	108,995	96	133	0	14,060,249
1989	159,847	125	168	1,977,000	28,903,516
1990	147,210	82	116	2,036,310	19,070,058
1991	100,000	129	174	2,097,399	19,470,764
1992	100,000	129	174	2,160,321	19,533,686
1993	100,000	129	174	2,225,131	19,598,496
1994	100,000	129	174	2,291,885	19,665,250
1995	100,000	129	174	2,360,641	19,734,006
1996	100,000	129	174	2,431,461	19,804,825
1997	100,000	129	174	2,504,404	19,877,769
1998	100,000	129	174	2,579,537	19,952,901
1999	100,000	129	174	2,656,923	20,030,287
2000	100,000	129	174	2,736,630	20,109,995
2001	100,000	129	174	2,818,729	20,192,094
2002	100,000	129	174	2,903,291	20,276,656
2003	100,000	0	0	0	0
2004	100,000	0	0	0	0
2005	100,000	0	0	0	0
2006	100,000	0	0	0	0
2007	100,000	0	0	0	0
2008	100,000	0	0	0	0

Appendix II. Assumptions

1. The migration of artificially stocked hirame into and out of Ishikari Bay from neighboring areas are equal.
2. No stock effect related to stocked hirame increasing population through spawning is taken into account.
3. The prices for both stocked and natural hirame are equal when sold live, but 10% less for stocked hirame landed dead.
4. Fishermen have not changed their operating inputs due to this project.
5. No fish are captured during their stocking year (Y_n).
6. Hirame fishing effort did not increase in the area due to this project (no additional permits were issued by co-ops).
7. Government mariculture facility construction costs are not incorporated into project cost.
8. In future years, fry release size will be within the historical range limits.
9. Positive and negative economic externalities (if any), generated from this project are assumed to cancel out.
10. The project life is 26 years (20 consecutive years of releasing hirame fry into Ishikari Bay plus 6 years to account for life span of final lot of dispatched hirame).
11. The interest rate (opportunity cost of capital) is 8.0%.
12. Hirame size composition is equal for those landed live or dead, however the total quantity of dead vs live differs.
13. Hirame price per kg landed dead is identical for all sizes.

Beaty, Julia

From: Kirby Rootes-Murdy <krootes-murdy@asmfc.org>
Sent: Tuesday, June 26, 2018 6:45 AM
To: Kiley Dancy; Muffley, Brandon; Beaty, Julia; cstarks@asmfc.org
Subject: Fwd: Advisors meeting

Comments from AP member Bill Shillingford who's unable to attend

Kirby Rootes-Murdy
Senior FMP Coordinator
Atlantic States Marine Fisheries Commission
1050 North Highland Street, Suite 200A-N
Arlington, VA 22201-2196
P: 703-842-0740
e: krootes-murdy@asmfc.org
w: www.asmfc.org

----- Forwarded message -----

From: "BUCKTAIL" <bucktail8@aol.com>
Date: Mon, Jun 25, 2018 at 9:11 PM -0400
Subject: Advisors meeting
To: "Kirby Rootes-Murdy" <krootes-murdy@asmfc.org>

I am sorry to tell you I will not be able to attend the advisor's meeting . I have been fighting some kind of Flu for past 3 days and while I am improving I don't think it wise for me to travel down there ,also don't want to pass on whatever I am fighting

Do hope you have a successful meeting
IF I can make a comment...There must be some relief on removing only females and throwing back a very high number that are dying.... There needs to be a slot of like 2 fish between 16-18 and 2 over 18".... The season also needs to be reviewed as Fluke in Southern NJ are arriving very Early April....This year I tagged and released 111 fluke with 44 over 18" up to 25" .pre opening day in NJ. Since opening Day I have caught and tagged 101 with only 11 over 18" and largest at 20" . Fluke only stay in inside waterways 8-10 weeks before moving back out to spawn....The current regulations with current size limits are destroying the population
Delaware fluke fishermen are catching same size fish in same numbers ,10 months a years and last year Delaware boats were in NJ waters in October catching fluke when NJ could not
Thank you for listening and hope you have a productive meeting

Bill Shillingford
bucktail8@aol.com

From: bob pride
To: [Beaty, Julia](#)
Subject: Re: Comments and reminder of other materials for tomorrow's AP meeting
Date: Monday, June 25, 2018 8:11:01 PM

Julia,

I expected to be there tomorrow, but work demands have once again intervened.

I have reviewed the comments and the briefing materials.

My inputs are as follows:

Alt Set 1: Support 1.B.ii

Alt Set 2: Support 2.B

Alt Set 3: 3.B.i does not make sense as it references transit of fish caught in federal waters when federal waters are closed. Huh? I don't understand the local issue as well as people from the area, so I make the following comment: I support relieving enforcement problems and cost burdens on fishermen due to transiting federal waters with catches from state waters.

My support is subject to reasonable safeguards against abuse.

Alt Set 4: Slot limits are challenging for recreational fishermen and tend to compromise trophy fishing. That said, I would support 4.B to allow more flexibility for the Council.

Sincerely,
Bob Pride

,

Beaty, Julia

From: Kirby Rootes-Murdy <krootes-murdy@asmfc.org>
Sent: Tuesday, June 26, 2018 6:46 AM
To: Kiley Dancy; Beaty, Julia; Muffley, Brandon; cstarks@asmfc.org
Subject: Fwd: Comments from CT

Comments from AP member Jack Conway who's unable to attend

Kirby Rootes-Murdy
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----- Forwarded message -----

From: "John Conway" <ctjackc@gmail.com>
Date: Mon, Jun 25, 2018 at 10:23 PM -0400
Subject: Comments from CT
To: "Kirby Rootes-Murdy" <krootes-murdy@asmfc.org>
Cc: "JACK CONWAY" <jack.d.conway.Jr@lmco.com>

Greetings from CT.

Apologies on not being about to make the meeting tomorrow. I've been a bit tied up at work and I could not squeeze a trip in tomorrow.

My answers to discussion questions:

Note - my comments are primarily reflect the views of the private boat based angler in CT, which represent the "lion's share" of angling effort in the CT waters of LIS.

1. What factors influenced your catch of summer flounder, scup and black sea bass in recent years:

Summer Flounder - in general, summer flounder fishing in the CT waters of LIS has been somewhat "off" during recent years. Typically there has been a a bit of an early run (May/June) which ends quickly. A decade ago, the best fishing was in early August and peaked in late August. Fluke fishing ends earlier and there is a lack of good fishing before August. Obviously, recreational boats from CT will venture to NY and RI waters for better summer flounder fishing, landings from these vessels can confuse the reality of summer flounder fishing in CT waters.

Bottom line - the fishery in the CT waters of LIS is definitely not as good as it used to be, an early run and and an early ending.

Scup - a great success story for CT. I have a joke that CT is "a Scup State". Decades ago scup were primary targeted by minority communities that liked small pan fish. With e rebuilt fishery that offers large fish that fight good and poor

summer flounder and striped bass fishing, scup fill the void left by other species. In addition, they are now universally targeted by the recreational fishing community in CT. I have experienced some spotty fishing in certain areas that used to be great but overall no complaints. Somewhat uniquely, bluefish were almost absent in LIS last fall and scup again helped keep anglers on the water. They also allow anglers to fish for a good tasting fish in September and October which used to be dominated by tautog fishing. Scup are incredibly important to the recreational fishing community in CT. A long open season and reasonable bag limit are important.

Black Sea Bass - another incredibly important species for CT. LIS has a robust black sea bass population and recreational fishery that did not exist 20 years ago. They fill the slack for the decline in the striped bass fishery. There used to be a fleet of recreational boats (for hire and not for hire) everyday for striped bass. That effort has switched to black sea bass.

2. Issues or concerns:

In general, the Council does not solicit enough feedback from the private boat angler. The for hire fleet tends to dominate conversations but the majority of landings are from private boats. Private boats dwarf the economic impact of the for hire fleet. The council needs to rethink how it runs meetings and how they solicit input from the public. A switch to electronic meetings and a consideration of running meetings in early evenings is warranted. (No offense against the for hire sector.)

3. Research Recommendations:

Focus on understanding black sea bass population dynamics and if there are discrete populations of black sea bass.

4. Recommendations for 2019 regulations:

For CT, having the longest possible open season for black sea bass (and a May opening) is really important. Interestingly, Central and Western LIS have a great spring run of black sea bass and very poor fishing for them in the fall when Southern LI and RI have a robust fishery. Scup need to be managed in a similar fashion (long open season) and a September/October season for scup is also critical. CT and NY are very much linked in the summer flounder fishery since many CT boats will fish NY waters early in the season for the "spring run" of summer flounder. Early opening is important for this fishery as well.

Thanks- Jack

Kiley Dancy

From: Fishthewizard <fishthewizard@aol.com>
Sent: Monday, July 9, 2018 1:52 PM
To: Kiley Dancy
Subject: BSB AP Comments

- With black sea bass so abundant, the yearly quota should be increased. There are many age classes present proving an over abundance of fish to sustain a greater harvest.
- If the RSA program is used to fund studies, black sea bass quota awarded should benefit only that fishery, not other species.

Joan Berko

Kiley Dancy

From: Monty Hawkins <capt.montyhawkins@gmail.com>
Sent: Tuesday, July 3, 2018 7:33 AM
To: Luisi, Michael; Angel Willey -Dnr-; Moore, Christopher; Didden, Jason; Coakley, Jessica; Beaty, Julia; Kiley Dancy
Cc: Odell, Jay; peter.auster@uconn.edu; Hare, Jon
Subject: BSB Spawning Production..

Greetings All,

I've written about BSB spawning & age at maturity several times of late. I truly believe Nature's Plan for dealing with calamity can be utilized to great effect — offers the most simple restoration strategy; a strategy we employed until MRFSS mislead regulation into overly stringent regulation.. What I experienced owing our own pre-regulatory actions & bolstered strongly by early regulation was, primarily, a result of "all hands on deck" for spawning.

It's NOT overcrowding that triggers a shift to older maturity - it's the SIZE of males on a reef..

Well, I do hope you'll read & consider these thoughts I have offered for so long.

Cheers

Monty

From Fish Report 7/2/18..

On the East Coast we have a 10 fish limit on mahi. I'd be thrilled if we caught 10 for the boat while sea bassing..

Used to call them dolphin or dorado, but folks would get all wound up with "dolphin" on a menu. (Oh! We switched to dolphin free tuna and now they want to serve Flipper to us?!) Word usage transition must be very nearly complete if folks such as myself use "mahii" instead of dolphin.

In the Pacific, there are no limits. Even the staunchest conservation groups are A-OK with that because they grow so fast and begin spawning [at 3 to 4](#) months of age.

Oceana is about as protectionist as they come in the marine world; this from Oceana's website: "*Though the common dolphinfish is heavily fished by recreational and commercial fishers, its high productivity and young age at maturity have so far protected it from overfishing. Populations are stable and are able to support the heavy fishing. Currently, scientists consider the common dolphinfish to be a species of least concern*"

This is EXACTLY why I'm trying so hard to get management's attention on black sea bass's varying 'age at maturity.'

In sea bass, 'age at maturity' is malleable. We can change it via size limit regulation as evidenced by the size of blue 'knothead' spawning males -- I witnessed when ALL sea bass in the ocean appeared to be in the spawning class. All scientific works prior to 2000 have sea bass spawning at age zero/age one. (After you correct for mis-aging. It was once thought that a 9 inch sea bass was 3, even 5, years old. We know today that's solidly age one.)

As management began sea bass still spawned in their first months of life or certainly by age one. But after the size limit hit 12 inches that youthful spawning, as evidenced by abundance/absence of less than 9 inch males, was replaced by populations where males matured at age 3 or better.

Instead of all our throwbacks being spawners, now it's just our keepers.. Spawning success from hot oil? Not so good.

Sea bass were far more prolific off DelMarVa when the entire marine population was in the spawning class.

Recent issues with survey equipment have created 'experiments' off Maryland's coast where large areas of habitat had virtually all sea bass driven out. As these areas recolonized, sea bass again reverted to age one spawning...

(I wrote about this at length in my 6/22/18 report if you'd care to dig deeper..)

There was a time when I fully believed our sea bass off DelMarVa were at "Habitat Capacity" - that we just couldn't hold many more UNLESS WE BUILT MORE HABITAT.

That was in the early 2000s. Every reef built in the 1990s & into the early 2000s was swiftly colonized by sea bass capable of spawning.

We even had 1/2 day boats occasionally catching boat limits at 25 fish per-person when the 12 inch and 25 bag limit first

started in 2002.

But sea bass were already maturing later. As soon as all reefs, even the hardest hit--pounded daily by 1/2 days boats; as soon as even those reefs were populated by 12 inch sea bass -- by 2003 the little guys ceased to be. They would not transition to male until 11.5 inches or better. Because they also grow fast, relative to their max size, these just-maturing fish become legal soon after.

Where once reefs/wrecks with amazingly heavy pressure STILL had a strong spawning contribution to make, suddenly the entire inshore spawning population (or darn near all of it) was being removed..

We're experiencing a spike in spawning production now; where it was All Hands On Deck for spawning as the MD Wind Energy Area recolonized. Hopefully the African Queen Reef will follow suite as it seems the Navy is not returning with the Sheila Bordelon this year.. (Knocking wood..)

An amazing tool. Incredibly powerful. Management can FORCE sea bass to spawn young.

But because to do so requires LOWERING our size limit to match the commercial limit of 11 inches, getting NOAA et al to even consider it has been impossible.

After all, they have to keep a sharp eye out for Overfishing. Maybe this year's catch estimates will show kayaks outfishing all commercial trawl.

In an estimate system where shore fishers commonly have the largest average sized sea bass catches, any illusion of catch is quickly assigned the title, "Science."

Would that population biology & ecology might take catch estimate's place....

Regards,
Monty

Here from Fish Report 6/22/18 — So my theory on "size limit's influence on age at maturity in sea bass" will be nigh impossible. Where my other assertions are well supported in science except my beef with catch estimates.. My argument to compare Private Boat against the more well-known & measured Party/Charter landings hasn't gained an inch. I can get 100 regulators laughing out load by comparing Private Boat's insane estimates against Party/Charter, but they'll take not not one step toward using such comparison to truth the data. MRIP estimates are, after all, supported by brilliant statisticians **who do not fish**, yet the numbers are implausible beyond belief----and about to become many times worse under NOAA's impending "Recalibration." Bayesian Stops are REQUIRED. Currently an estimate stating Shore Fishers from one state, in one two month period, catching more fish than ALL COMMERCIAL EFFORT causes no discomfort to regulators. I've detailed many such exaggerated claims over the years.. So far as NOAA's concerned, there is no height recreational fishers cannot achieve where over-harvest of quota is concerned.

My thoughts on sea bass spawning production, however, cut against all teachings in fisheries science.

Where today science holds "big old fecund females," or "BOFF" as the best way to bolster egg production and therefore a population's spawning production is increased, my experience with sea bass populations shows BOFF to be wholly ineffective.

In fact, I believe BOFF-type thinking has curtailed production so badly that DelMarVa's nearshore reef spawning production has been nearly lost.

Indeed, today's sea bass population is mostly comprised of large females--larger than scientists once believed even existed prior to 2000--yet spawning production is minimized despite the greatest female population of sea bass since fishing began.

For years & years I've been trying to convince management of size limit's affect on black sea bass production: how ALL sea bass found at sea prior to 2002 were once spawners, but when the size limit increased to 12 inches their age at maturity--(or ability to participate)--shifted from age zero/age one to age three or better.

This spawning participation is, I believe, evidenced by the blue hump on a male sea bass; the nuchal hump. We call them knotheads..

When I was told in 1992 that: "All sea bass have spawned by 9 inches (age 1) and some twice," it was a true statement. Since 2002 it has been false. Except in one instance..

It's not crowding. Sea bass were astoundingly crowded in the late 1990s/early 2000s, but they still matured young as, so far as we knew then, they always had.

When a lot of age 3 fish started populating reefs however, younger fish ceased showing the nuchal hump -- almost completely. When the size limit was 11 inches and smaller, all the sea bass we threw back were spawners. Some for *another* year too.

When the size limit went to 12 inches (and then 12.5) almost none of our throwbacks were spawners. They grow 3 inches that 3rd summer. A 12 inch male thrown back in May will be legal come mid-June.

Seeing larger fish around a reef stops the biological urge to spawn at age one dead in its tracks.

Inshore grounds where fishing pressure is heaviest continue their downward sea bass population spiral, except on new reef. The greater fishing pressure is, the greater size limit impacts production. Used to be our heavily pressured inshore reefs contributed importantly to spawning production -- more so, I believe, than even distant & lightly fished reefs populated by jumbos. Pre-2002 size limits 11 inches & below forced ALL sea bass into the spawning population. Now we take sea bass JUST as they begin spawning.

Timing is everything.. Just as cbass are joining the spawning stock today--just as they are about to have their first spawn -- they also become legal.

Spawning population ain't much good in a fry pan.

Interesting..

Experiments with sea bass aquaculture

from: http://www.unh.edu/news/news_releases/2006/april/kw_060411bass.html

Berlinsky's team found that females were more likely to change sex when no males were present in the tank. Additionally, the fish were more likely to turn into males when kept in crowded tanks.

Did I mention they change sex? This a development that assures reproductive success on even far-flung isolated reef communities. It's at the core of my argument.

I believe we can purposely trigger age one fish to become males and start spawning simply by lowering the size limit a bit.

Well, we've recently completed an (unplanned!) experiment on this idea of shifting age at maturity.

In the spring of 2016 we had our worst 'spring run' of sea bass ever.

Ever.

We also had the utter evacuation of at least 500 square miles of seabed -- sea bass & flounder had completely left the area affected by sub-bottom profiler surveys in the MD Wind Energy Area by the summer of 2015. (see a video I had made in Jan 2016 with video from 2004 & the last day of August,

2015 <https://www.youtube.com/watch?v=46ahNqo8geE>)

After the surveys ceased in late summer 2015, recolonization for spawning's purpose began in 2016. I predicted a return to sub-9 inch male spawning colors owing there were no males staking their claim to prime habitats.

I also predicted an increase in spawning production.

It wasn't just the wind area. Though especially there, we also saw small males on many reefs/wrecks outside 15 fathoms owing, I believe, to suitable habitat unoccupied by age 3 or better males.

This recent spawning population of age 1 & age 2 sea bass propelled us to today's better fishing.

2016's enlivened spawning production became 'age one' on January 1st, 2017. They were fully in the spawning class that summer. We had the most 'knothead' sea bass off here in a very long time.

In 2015 I was still writing how we'd only see less than a dozen under-9 inch male sea bass a year - hadn't since 2002. In 2016 it was fairly commonplace to see small males again offshore a bit in some areas. Small, age one males were a frequent occurrence in 20 fathoms, some places 15 fathoms too. Perhaps the greatest reason this is so important is because every teeny, tiny bit of anything sticking above the seabed is colonized by some little guy and his girls. Increasing the percentage of the population in the spawning class makes for great reproduction.

Now age 2, they're making for a lot of throwback action. Soon the fastest growers will be legal.

Age 1 - 112.92g - 0.25 lbs - 5.5 to 9.1 inches.

Age 2 - 243.19g - 0.54 lbs - 8.7 to 12.2 inches. (our size limit 12.5 inches)

Age 3 - 395.48g - 0.871 lbs - 10.6 to 16.1 inches.

Age 4 - 604.69g - 1.33 lbs - 13.4 to 20.5 inches.

Age 5 - 861.95g - 1.90 lbs - 16.5 to 22.0 inches.

They can live to 12, perhaps older, but growth slows as it must..

In 2018 we are NOT seeing under 9 inch males -- just age 2 and above.

Those surveys about drove me mad. Guvmint said of survey noise: "They're as quiet as a ships propeller" ..couldn't do a thing to reef fish.

But fish fled the noise - left entirely after a couple years.

As in so many things in nature: From Catastrophe, Abundance.

If I cannot get science to pay attention this time, there may never be another.

We'll be drawn into MRIP's trap soon. Always able to find "overfishing" - MRIP even has 2016's MD Shore anglers loading up on 1.3 pound AVERAGE SIZED sea bass, and far more than Party/Charter caught that same year. We'll have a 15 inch size limit and some short season like up north -- all to "Prevent Overfishing."

A fishery that survived true overfishing's darkest days of even distant water fleets of factory trawl pummeling US fish populations; our recreational sea bass fishery may not survive management's ignorance.

Would that it might.

I absolutely believe a full suite of management options, including Ecology & Population Biology, can send sea bass populations above even those that must have existed during industrial fishing's earliest days.

It'll never happen so long as managers find regulatory comfort in recreational catch data that couldn't possibly be true.

Regards,
Monty

Capt. Monty Hawkins
Partyboat Morning Star
Ocean City, MD
mhawkins@morningstarfishing.com

Sent from my iPhone

Kiley Dancy

From: Monty Hawkins <capt.montyhawkins@gmail.com>
Sent: Monday, July 9, 2018 4:00 PM
To: Luisi, Michael; Angel Willey -Dnr-; Hare, Jon; john.manderson@noaa.gov; Odell, Jay; peter.auster@uconn.edu; Kelly, Moira; Moore, Christopher; Coakley, Jessica; Beaty, Julia; Didden, Jason; Kiley Dancy; Steve Doctor -Dnr-
Subject: Re: Prepare..

And, for anyone VAUGLY aware of the MD sea bass fishery - That MD Shore outcaught All MD Party/Charter in 2016 by 141,000 pounds might cause question.

Absolute BALONEY!

We've found One Guy who claims to have caught a keeper.. Yet MRIP claims Shore-Caught BSB AVERAGE 1.4 POUNDS!!!!!!

I can not believe this horrible infection in fisheries science has been allowed to fester to where it will kill the patient.

You're soooo much further from the truth than you were last night.

I hope my business survives this idiocy.

Regards

Monty

Sent from my iPhone

> On Jul 9, 2018, at 3:28 PM, Monty Hawkins <capt.montyhawkins@gmail.com> wrote:

>

> So now we have "recalibration" I hear.

> And do.

> One would think a 'calibration' might be accomplished with a known value & a recalibration undertaken as the known value became firmer.

> Instead - the dumbest statistical garbage ever Fed a system of regulation will have now become far worse than ever before.

> Unbelievable..

> Absolutely unbelievable.

> Yes - You will be FORCED to ingest NY wave 6 Party/Charter bsb 2016 and 17 as approx 30k lbs of landings — but the ghost fleet of Private Boats NY PROFESSIONAL SKIPPERS NEVER SEE caught over THREE MILLION!!

> What a complete failing.

> Unbelievable..

> This deserves to be made a fool.

> And shall.

> Regards,

> Monty

>

> Sent from my iPhone