A PROGRAM FOR IMPROVING MANAGEMENT AND RESEARCH OF FISHERIES IN THE SOUTHEAST REGION

SOUTHEAST/YAKUTAT MISCELLANEOUS SHELLFISH FISHERIES

Project Bluebook – 2004

Alaska Department of Fish and Game
Division of Commercial Fisheries
Southeast Region

December 2004

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INTRODUCTION

Overview of Southeast Alaska Commercial Fisheries

Several commercially important invertebrate species are found in the Southeast/Yakutat Region, stretching south from Cape Suckling to the Canadian border at Dixon Entrance. Registration Area A, the Southeast Alaska area, extends from Dixon Entrance to Cape Fairweather. Area D, the Yakutat area, extends from Cape Fairweather to Cape Suckling. These species, collectively referred to as "miscellaneous shellfish," include sea cucumbers, sea urchins, geoducks and abalone, and are found primarily in southern waters of Area A. This is especially true of sea urchins, geoducks and abalone, which thrive in subtidal waters exposed to open ocean. Sea cucumbers exist in a broader range of habitats and are found in both exposed and inland waters. Sea cucumbers, sea urchins and geoducks currently support commercial dive fisheries within the region with primary markets in Japan and Asia. These fisheries have developed over the past decade and are considered near fully developed. Abalone stocks are in a recovery phase and commercial harvest is prohibited. Subsistence and personal use harvest of miscellaneous shellfish occurs to an unknown extent.

Southeast dive fisheries are relatively recent entrants into the region's commercial fishing industry. The first commercial landings for abalone occurred in the mid 1960s, and red sea urchins, sea cucumbers, and geoduck clams in the early to mid 1980s. Participation in each fishery was often limited to just one or two divers initially and only recently has expanded to current effort levels

Commercial harvest of abalone (*Haliotis kamschatkana*) began with a boom in effort and landings followed by a rapid decline in stocks. The marked increase in harvests and effort came in the 1978/79 season, when effort increased more than three-fold and harvests jumped to 180,000 lbs from a long-term average of about 6,000 lbs. Harvests peaked at 378,685 lbs in the next season, the first of the seasonal accounting year. This peak exceeded the quota of 250,000 lbs, which the Alaska Board of Fisheries adopted in the spring of 1980, and the fishery was closed by emergency order for the first time. High harvests continued through the 1981/82 season when 371,000 lbs were landed, despite a further reduction in the guideline harvest range (GHR) to a maximum of 125,000 lbs and a season shortened to two months. By the 1984/85 season, it was apparent that the resource was in trouble, when the lower end of the GHR (86,000 lbs) was not reached despite 151 days of fishing. The 1990/91 through 1995/96 seasons opened on October 1, and with the exception of District 13, which is managed separately and closed by emergency order, the length of the season for the rest of southeast Alaska was set prior to the opening to avoid over harvest. By the end of the 1995/96 season only 5,800 lbs were harvested and the season was not reopened in 1996/97.

The sea cucumber (*Parastichopus californicus*) fishery expanded rapidly in the late 1980s and in 1989 the fishery exceeded the ability of the department to manage by the permit system. The department closed the fishery in May 1990 and reopened it in October 1990 following development of the Southeast Alaska Sea Cucumber Commercial Fisheries Management Plan (5 AAC 38.140). This plan seeks to protect subsistence opportunities and provides for sustained

commercial fishing harvests. To protect subsistence opportunities, the cucumber management plan established 18 areas closed to commercial fishing (5 AAC 38.140 (k)). There are also provisions to prevent the use of diving gear in the subsistence (5 AAC 02.020 (1)) and personal use (5 AAC 77.010 (l)(3)) fisheries in those areas. The annual ex-vessel value of the sea cucumber fishery is approximately $2.5 million dollars.

Although interest in sea urchins began with green sea urchins (*Strongylocentrotus droebachiensis*), a red sea urchin (*S. fransiscanus*) fishery has developed in Southeast Alaska as an alternative, due to lack of commercially viable green sea urchin populations. Both green and red sea urchins were harvested sporadically beginning in the mid-1980s. Interest in Alaska product peaked in the mid-1990s in response to success in California and Washington fisheries. The red sea urchin fishery developed rapidly during the 1995-96 fishing season, with a cooperative effort between the Alaska Department of Fish and Game and industry representatives. A major test fishery was conducted during those years, which involved harvest of approximately 3 million pounds of red sea urchins in exchange for funds to begin an annual stock assessment program. Interest in red sea urchins began in the Sitka area, however, now sea urchin harvest is limited to fishing districts 101-104. The increasing geographic range and abundance of sea otters following their reintroduction in Southeast Alaska in the mid 1960s has dramatically reduced the extent of commercially viable populations of red sea urchins on the outer coast. Significant geographic expansion of the red urchin fishery is not anticipated. Poor market conditions have depressed the sea urchin fishery and the annual quota has not been achieved for the past several years. Annual ex-vessel value of this fishery is approximately $1 million.

The geoduck (*Panopea abrupta*) is the largest clam in the Pacific Northwest, widely distributed from Alaska through Washington State where they are very abundant in Puget Sound. Southeast Alaska is at the extreme northern limit of the geographic range and relatively little is known about the stock structure of geoduck clams in Southeast Alaska. Known geoduck clam beds have a patchy distribution in the central and southern portions of Southeast Alaska, primarily in protected waters near the outside coast. Studies conducted in Washington State, British Columbia and more recently in Southeast Alaska indicate this clam may live to be over 100-years old. Southeast Alaska is the extreme northern limit of the geographic range of this species and recruitment is sporadic or very low seasonally. Sporadic recruitment, low growth rates, and high maximum age make this species susceptible to over harvest.

A troubling problem is the tendency for geoduck clams to bioaccumulate undesirable micro-organisms or compounds. In particular, high levels of paralytic shellfish poisoning (PSP) have been found in geoducks in Southeast Alaska, most strongly associated with the viscera. However, the mantle and necks are the usual body parts consumed and PSP concentrations are lower in these parts. Though this situation permits the sale of processed clams with viscera removed, exvessel value for processed clams is significantly less than that for whole, live product. The Alaska Board of Fisheries adopted regulations during the January 2003 meeting that would allow the department to base management of the geoduck fishery on results of PSP tests conducted prior to harvest. At the request of commercial dive harvesters, during the 2003-04 season, the department managed the fishery based on PSP test results in order to maximize the value of the fishery through shipment of live product.

In order to protect consumers, the state requires that commercially harvested clams be tested by the Alaska Department of Environmental Conservation (ADEC) and certified to be within acceptable levels of PSP prior to release for marketing. In addition, water quality for commercial beds is tested for human pathogenic microorganisms and certified safe by the ADEC.

One of the most notable changes affecting the miscellaneous shellfish fisheries has been the formation of the Southeast Regional Dive Fishery Association (SARDFA) in February 1998. Industry divers in Southeast Alaska recognized the need for a mechanism of funding newly established dive fisheries, funding that the ADF&G was unable to provide. SARDFA was formed by legislative action (CSHB 198) to allow taxation of dive-harvested product, to be used primarily for funding management and research activities of dive fisheries. Prior to the SARDFA formation, funding of these fisheries was obtained through a combination of state general funds, volunteer contributions by industry processors and local municipalities, and test fishing conducted by the state. Currently, geoduck and sea urchin landings are assessed by SARDFA at 7% and sea cucumbers at 5%.

Management of Southeast Alaska Miscellaneous Shellfish Fisheries

Southeast Alaska commercial miscellaneous shellfish fisheries are managed according to management plans set in regulation and approved by the Board of Fisheries. These management plans have in common a number of provisions designed to provide for sustainable fisheries of a group of species for which there is relatively little knowledge about stock productivity, response to harvest and general life history.

Prior to July 1, 1996, entry into Southeast Alaska's dive fisheries was open access, requiring a permit be issued by the CFEC for participation. Historically, most fisheries started off slowly with little effort but interest grew relatively quickly as exvessel value increased, new markets opened, and fishers explored for new ways to expand beyond the more traditional fisheries such as salmon or groundfish. Effort quickly soared to levels that made if difficult for the department to manage each fishery, and individual fisher's proceeds quickly diminished.

In 1996 the Alaska State Legislature established a four-year moratorium on interim-use permits for the Southeast dive fisheries. The legislation, HB 547, was incorporated into statute as AS 16.43.228. The moratorium specified a cap on the total number of interim-use permits in the Southeast Alaska abalone, geoduck, sea cucumber, and sea urchin fisheries. The legislation temporarily halted growth in the number of participants in these fisheries and provides specific eligibility criteria to be used in each fishery. In July 2000, CFEC adopted regulations to limit entry in the sea cucumber, sea urchin and geoduck fisheries, with maximum number of permits of 436, 95 and 104, respectively.

Sea Cucumbers

The sea cucumber fishery is managed according to the Southeast Alaska Sea Cucumber Commercial Fisheries Management Plan (5 AAC 38.140). The plan provides for an October 1

opening date with weekly fishing periods of seven daylight hours on Mondays, plus an additional four daylight hours on Tuesdays through March. There are also provisions for limiting the numbers of divers per vessel to two, providing fishing period trip limits of 2,000 pounds per person, and limiting gear to scuba, surface-supplied systems, or snorkels. The department must conduct a biomass assessment within the preceding two years of opening an area for commercial harvest. Annual commercial fishery guideline harvest levels are approximately 5% of the total sea cucumber biomass taken on a three-year rotational basis (i.e. 15% on a three-year basis). Rotational fisheries have the advantage of lowering overall departmental assessment survey and management costs.

Sea Urchins

In 1996, the department, in cooperation with the sea urchin fishing industry, developed interim regulations and a management plan for a commercial fishery in Southeast Alaska beginning with the 1996/97 season. The regulations were adopted by the Commissioner of the Alaska Department of Fish and Game, under the authority of 5 AAC 39.210 for High Impact Emerging Fisheries and became effective in December, 1996. The Alaska Board of Fisheries formally adopted the red sea urchin management plan during their regular meeting in January 1997. The core elements were:

Annual guideline harvest levels are 6% of the biomass estimate, which is the lower bound of the 90% confidence interval for biomass. Fisheries will only be opened where biomass surveys have been conducted in the previous three years.

Harvest opportunities are to be distributed to each week of every month that the fishery is open. The fishery is to be managed to span approximately four months, subject to needs for conservation, law enforcement, reducing waste, and promoting fishery development. Size limits and trip limits may be imposed if needed to slow the pace of the fishery.

Processing vessels must carry observers, and vessels transporting unprocessed product out of Registration Area A must first obtain a transport permit.

In addition to fish ticket requirements, processors must submit records of the roe recovery within 30 days of landing.

Since the management plan became effective in December 1996, no major regulatory changes have been made to the red urchin fishery.

Geoducks

The objective of geoduck fishery management is to allow only a very low exploitation rate because the species is long-lived and recruitment is sporadic and low. A management plan was adopted by the Board of Fisheries in January 2000, which specifies a fishing season of October 1 through September 30. The department generally decides the starting date of the fishery after consultation with SARDFA. To avoid the summer spawning and recovery period and to minimize PSP toxin levels, harvest usually occurs in late fall through early spring. Other key

elements of the management plan are a mandatory stock assessment survey within 12 years preceding a fishery opening, biomass thresholds of 30% of original biomass and limitations to use of dive gear only while using manually-operated water jet devices.

In response to industry requests to increase likelihood of shipment of live product, and thus value of the fishery, the Board of Fisheries adopted regulations allowing the department to manage the geoduck fishery based on pre-season and in-season results of PSP tests conducted by the DEC. SARDFA, ADEC and the department have worked together to develop sampling protocols for PSP testing that will allow certification of geoduck harvest areas prior to harvest. Consequently, the department now manages the fishery by delaying opening dates of individual areas until certified by ADEC for PSP. If areas do not pass testing, they will be opened for harvest of product bound for processed markets. The 2004-05 season will be the second in which the fishery will be managed based on results of PSP testing.

FUNDING NEEDS

General fund support for dive fisheries management and stock assessment in Southeast Alaska has remained stable while the fisheries have expanded substantially in recent years. It has been the policy of ADF&G Southeast Region to not conduct new fisheries without identifying funding sources prior. This policy was established to prevent re-allocating staff time from already developed fisheries. The creation of SARDFA has mitigated budgetary needs, however assessments generated are fishery-specific and shortfalls occur annually. This is especially true for sea urchin and geoduck fisheries, where value of product is low due to current market conditions. Federal funding in the form of Nearshore Marine Research grants has been relied upon for the past four years to maintain basic functions of conducting biomass surveys and funding seasonal staff time. This funding source becomes more limited each year with growing statewide requests to fund other projects and cannot be relied upon as a long-term solution to growing needs of additional staff and development of research projects needed to answer questions about basic life history to manage these fisheries adequately.

PROPOSED PROJECTS

This document contains a list of projects proposed for increased funding. The projects described are either not conducted due to a lack of funding or are currently operated at levels insufficient to meet management objectives. All costs are expressed in thousands of dollars.

Table 1. Summary of proposed projects and estimated costs (thousands of dollars).

Project	Estimated First-Year Cost	Estimated Annual Continuing Cost	Duration
A. Miscellaneous Shellfish Biometric Support	$45.0	$45.0	Long Term
B. Effort Distribution in Cucumber and Geoduck Fisheries	$21.0	$7.0	Long Term
C.1. Geoduck Aging	$50.0	$50.0	2 Years
C.2. Geoduck Recruitment Studies	$42.0	$42.0	Long Term
C.3. Geoduck Control Areas	$8.5	$8.5	Long Term
C.4. Geoduck Assessments	$35.0	$35.0	Long Term
D. Threshold Limits	$15.0	$0.0	2 months
E. Sea Cucumber Survey Modification	$35.0	$35.0	3 Years
F. Abalone Stock Assessment	$15.0	$15.0	2 Years

Project A. Miscellaneous Shellfish Biometric Support

Location: Southeast Alaska.

Primary Objective: To improve the region's miscellaneous shellfish stock assessment program through increased biometric support.

Description: Additional biometric support is needed for the miscellaneous shellfish program in Southeast Alaska. Currently one Biometrician position is funded to provide support for all shellfish fisheries in the Southeast and Yakutat areas. Due to a traditional shellfish management program that requires intense data analysis, nearly all of this position's time is committed to those fisheries. A backlog of stock assessment modeling, analyses, and reporting has accumulated within the miscellaneous shellfish projects. We are requesting funds for 6 months of Biometrician II time in order to improve management and assessment of the miscellaneous shellfish fisheries. The remaining 6 months of the position could be shared with the traditional Shellfish Project.

There are numerous biometric improvements that need to be made to improve the region's miscellaneous shellfish stock assessment program. The original management plans were designed with a conservative harvest rate approach because of the lack of data and information about these stocks. This approach has the benefit of a relatively low level of data analysis during early stages of data collection, but sacrifices possible benefits to fishery stakeholders if too conservative. Over the past 10 years data has accumulated and analysis that could refine our management approach has been neglected. For example, analysis of a building sea cucumber dataset could determine the effects of exploitation at the current harvest rate, or if current sampling design must be modified to make such determinations. The red sea urchin dataset is another example where biometric analysis is needed. Modeling of data from an on-going study of urchin growth rates would help determine if currently used harvest rates are sustainable. In general, all miscellaneous shellfish projects need biometric review to help determine if the current stock assessment approach is adequate and capable of providing the information necessary to properly manage these fisheries.

Duration: A long-term stable funding source is desired.

Estimated Annual Cost: $45.0.

Project B. Effort Distribution in Sea Cucumber and Geoduck Fisheries

Location: Southeast Alaska

Primary Objective: Determine distribution and concentration points of commercial harvest effort during sea cucumber and geoduck fisheries.

Description: The question of localized depletion has been raised frequently among participants in the sea cucumber and geoduck fisheries. There is little information about specific locations where harvest occurs. It is presumed that the most productive areas offering protection from weather attract a high level of effort. Spatial dynamics of effort allocation may be a significant component in the assessment of a population. A careful analysis of fishery effort may identify population centers with concurrent CPUE analysis (though CPUE can probably best be used only as an index of abundance). A specific GIS component should be added to address the spatial allocation of harvest effort and populations. This component could map assessment survey data and overlay fishery data (logbooks would be needed with additional cost and enforcement requirements, to obtain data for the fishery component). Additionally, aerial surveys of fleet distribution would help identify areas of concentration.

Duration: Multi-year, ongoing, with initial year to plot historical data and subsequent years requiring less time to update fishery and survey data.

Estimated Cost: $21.0 (first year); $7.0 annually.

Project C.1. Geoduck Aging

Location: Southeast Alaska

Primary Objective: To obtain an age frequency for geoduck clam stocks in Southeast Alaska.

Description: An extensive aging program in Southeast Alaska, with broad geographic coverage, is needed to assess growth and mortality parameters and to reconstruct an historical time series of year-class strength. Biometric involvement is needed to structure and define modeling requirements. After these requirements have been estimated, collection and aging of geoduck clams should be completed as soon as possible. Aging requires the collection of shells (probably during the fishery but also, possibly through contracts and Department surveys) and technician training with validation of aging techniques. The Juneau aging lab has completed approximately 500 geoduck ages collected from a variety of locations in 1998. This preliminary data needs to be expanded.

Duration: Two years.

Estimated Annual Cost: $50.0 (5mm FWTIV, $25.0; collection of samples through contract, $25.0).

Project C.2 Geoduck Recruitment Studies

Location: Southeast Alaska

Primary Objective: An extensive recruitment program examining the dynamics of harvested geoduck populations.

Description: Surveys conducted by the Department should be expanded to vigorously survey beds currently in recovery and those beds nearing their threshold levels. Additionally, geographic differences in recruitment (and recovery) should be examined, as this could be a major consideration in the identification of metapopulations and the boundaries of management units.

Duration: Multi-year, ongoing. Long-term funding is desired.

Estimated Annual Cost: $42.0.

Project C.3. Geoduck Control Areas

Location: Southeast Alaska

Primary Objective: Observation of unharvested areas for comparison to harvested areas and separate effects caused by exploitation and environmental variability.

Description: Control areas that have never been opened to commercial harvest should be established and vigorously monitored. This practice is followed for sea cucumbers and sea urchins and would be valuable information for geoduck populations.

Duration: Multi-year, ongoing.

Estimated Cost: $8.5.

Project C.4. Geoduck Assessments

Location: Southeast Alaska

Primary Objective: Conduct stock assessment surveys with more frequency.

Description: Fishery assessment surveys should be conducted as frequently as possible. Current regulation specifies a maximum interval of 12 years between surveys. This interval was established primarily to reduce survey costs. A greater frequency of surveys is desirable to verify stock levels have not fallen below threshold levels. In addition, monitoring density and biomass changes within areas would allow tracking trends in multiple locations. Biometric support is needed to effectively analyze this data and is not included in the cost estimate below.

Duration: A long-term stable funding source is desired. Current general funds allow for assessment surveys of only originally surveyed areas. No funds are currently available to survey beyond initial surveys, which are currently funded with Federal Nearshore Marine Research grant.

Estimated Cost: $35.0.

Project D. Thresholds Limits

Location: Southeast Alaskan red sea urchin and sea cucumber stocks

Primary Objective: To establish a threshold limit for red sea urchins and sea cucumbers.

Description: Threshold limits do not exist for red sea urchins or sea cucumbers in Southeast Alaska. Threshold limits define a level below which fishing would be prohibited in an area. For geoducks this is set at a relative level of 30% of the original biomass though a limit threshold could be defined as an absolute measure such as a mean density or biomass per linear meter of shoreline. Spawning success of these species is probably controlled by population size, density, and the direction and velocity of currents. A threshold would prohibit harvest from populations in jeopardy of falling below levels necessary for successful reproduction. Without a threshold limit, spawning success of populations may be compromised.

Densities and biomass estimates are determined on a Subdistrict level, however this may not be the appropriate spatial scale over which to consider threshold limits. The spatial scale needs to be evaluated and considered for threshold limits.

Red sea urchins are exploited to varying degrees among Subdistricts in Southeast Alaska. In areas where marketable product is abundant, the GHL is achieved, however GHLs remain unharvested in areas of less desirable product. Analysis of these differing exploitation rates coupled with a review of population response to harvest, may lend insight to what an appropriate threshold limit might be. For both sea urchins and sea cucumbers a review of literature would be necessary to compare prior study in this area to Alaska's fisheries.

Duration: Two months of biometric support.

Estimated Annual Cost: $15.0.

Project E. Sea Cucumber Survey Modification

Location: All sea cucumber fisheries in Southeast Alaska

Primary Objective: To evaluate and improve sea cucumber survey methods.

Description: Current sea cucumber survey method involves resurveying areas prior to opening to commercial harvest. This method involves resurveying permanent transect locations every survey. Although this provides a reasonably precise estimate of biomass during the year of survey, it may not provide meaningful data capable of making statistically valid determinations of trends in average density or weight. A possible alternative is to use index transects positioned at locations known to support cucumbers, and plot additional randomly positioned transects to estimate biomass. The main function of index transects would be to identify changes in average density or weight. These additional transects would be in different locations (different random placement) each survey. Another option would be to place additional transects based on actual

areas fished but this would require logbook information, something the Department has not had good success in obtaining from industry.

An additional 10 randomly placed transects should be surveyed per area, which will add approximately an additional half day of survey time per area. Each year approximately 15 areas are surveyed; therefore at least 8 additional days of survey time would be required.

Duration: 3 Years; after three surveys we will evaluate the methods to be used for sea cucumber surveys with considerations as to whether these changes should become permanent, or additional methods are added or substituted.

Estimated Annual Cost: $35.0.

Project F. Abalone Stock Assessment Method

Location: Selected abalone stocks in Southeast Alaska

Primary Objective: Evaluate methods for determining abalone densities in Southeast Alaska with 'an eye' toward estimating stocks.

Description: The department currently has no population estimates of abalone stocks in Southeast, but we believe that they remain at low levels. The department currently has no system in place to objectively determine if stocks are increasing or continuing to decrease, other than subjective observations. At a minimum, several days of survey time per year could be used to evaluate abalone survey methods.

Duration: 2 Years; annual surveys of approximately 3 days each year.

Estimated Annual Cost: $15.0.

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