

Fisheries and Oceans Pêches et Océans Canada Canada

Canadian Stock Assessment Secretariat Research Document 99/31

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Secrétariat canadien pour l'évaluation des stocks Document de recherche 99/31

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The American Lobster, *Homarus americanus*, fishery in the Bay of Fundy (Lobster Fishing Areas 35, 36, and 38)

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Les documents de recherche sont publiés dans la langue officielle utilisée dans le manuscrit envoyé au secrétariat.

ISSN 1480-4883 Ottawa, 1999

ABSTRACT

The status of the lobster fishery in the Bay of Fundy (Lobster Fishing Areas (LFA's) 35, 36, and 38) is reviewed. Estimates of exploitation rate and levels of egg production per recruit (E/R) are presented. Projected impacts of conservation management changes currently in review are evaluated.

Landings have increased dramatically over the past two years and are well above average levels. The mean size of the catch in the upper bay has declined by about 10 mm (due to increased recruitment), but there has been no change in mean size in other areas where catches have been sampled. Because of the large number of pre-recruit lobsters appearing in at-sea samples, landings over 1000 t are expected to continue for several years.

A new analytical approach (length-based cohort analysis, LCA) generated lower estimates of exploitation rate than previous published estimates (based on moult-group comparison techniques). Current LCA estimates of exploitation rate range from 39-70%. A Bay of Fundy-wide exploitation rate was calculated for input into E/R analysis. For 1988-93 (stable landings period prior to recent increase) average exploitation rate was 53% (range 49 - 55%). Several options for doubling egg production per recruit in the Bay of Fundy are presented, using an exploitation rate of 53%, and a more conservative estimate of 70%.

RÉSUMÉ

L'état de la pêche au homard dans la Baie de Fundy (Zone de Pêche au Homard (ZPH's) 35, 36 et 38) est révisé. Des estimations du taux d'exploitation et des niveaux de production d'oeufs par recrue (O/R) sont présentées. Les impacts, résultants des changements dans la gestion de la conservation, sont évalués.

Les débarquements ont augmenté dramatiquement pendant les deux dernières années, et ils sont bien supérieurs aux moyennes. La taille moyenne des prises, dans la partie supérieure de la baie, a baissé de 10 mm environ (à cause de la hausse de recrutement). Cependant aucun changement dans la taille moyenne n'a eu lieu dans les autres zones dont les prises ont été échantillonnées. En raison du grand nombre de homards pré-recrues dans les échantillons prélevés en mer, les débarquements devraient rester supérieurs à 1000 tonnes pendant plusieurs années.

Une nouvelle méthode analytique (analyse par cohortes fondée sur la longueur, <<LCA>>>) a produit à des estimations plus basses des taux d'exploitation, que ceux précédemment publiés (basé sur la technique de comparaison des groupe de mue). Présentement, les estimations des taux d'exploitation issus des <<LCA>>>, varient de 39 à 70 %. Un taux d'exploitation pour l'ensemble la Baie de Fundy a été calculé pour être inclus dans les analyses O/R. Entre 1988-93 (période de débarquements stables avant la hausse récente) le taux d'exploitation moyen était 53 % (variation de 49 à 55 %). Plusieurs options, pour doubler la production d'oeufs par recrue dans la Baie de Fundy sont présentées en utilisant des taux d'exploitation de 53 %, et une estimation plus conservatrice de 70 %.

INTRODUCTION

The Fishery

In the Bay of Fundy, Canada, the American lobster (*Homarus americanus*) is a valued resource shared principally by lobster fishers from three lobster management units referred to as Lobster Fishing Areas or LFA's (Fig. 1). Seasonal landings in the last full season for which data are available (1996/97) were worth \$22.75 million dollars. Lobster fishing began in the Bay of Fundy in the mid 1800's and landings data exist from the 1890's (Williamson, 1992).

The fishery is managed under limited entry, size, and effort controls. There are a total of 319 full time licenses, 39 partnership licenses, and 7 part time licenses in the three LFA's. The number of participants, and trap limits vary among LFA's (Table 1A). With the present fishing season structure, which includes winter fishing off Grand Manan, lobsters are accessible to trap fisheries in various portions of the Bay of Fundy from Oct 15 to July 31 (Table 1B). There is a common 81mm carapace length (CL) minimum size, and a prohibition on landing egg-bearing females across the three LFA's.

During the early part of the fishery, management regimes evolved independently in each management unit (Appendix 1). This situation was not challenged by industry until the late 1970's when improvement in technology (such as hydraulic haulers, bigger and faster boats, loran C, etc.) changed the way that lobster fishing was conducted. Bay of Fundy lobster fishers began to fish in deeper water farther from shore and farther from their home port, thereby exploiting more of the available lobster grounds. Consequently, in 1986, outer boundary lines were established between LFA's (Figure 1, Appendix 1).

Shared boundaries between LFA's 34-38, and U.S. fishing grounds cover considerable distances due to the coastal physiography of the Bay of Fundy. This has resulted in contention over proposed changes in the management system of component LFA's, as well as concern over the impacts of changes in the management regime in Maine coastal waters. While historically the fisheries were restricted close to shore, fishing grounds have expanded both in the upper Bay of Fundy, along the New Brunswick shore, and in LFA 38. A small number of fishers from LFA 38 fish in deeper waters (to 205 m depths) over the winter months at the entrance to the Bay of Fundy (since the late 1970's), targeting the migratory movements of mature lobsters. Extension of fishing grounds off southern Grand Manan is also occurring.

Recent Management Issues

One of the continuing focal points in discussions on lobster management in the Bay of Fundy has been a series of demands, modulated over time, by LFA 36 fishers to extend their lobster fishing season, which is the shortest in the three LFA's (Table 1B). In response to these requests, several biological surveys and scientific assessments have been undertaken (Campbell and Stasko, 1986; Campbell 1986a; Lawton and Robichaud, 1992a; Robichaud and Lawton, 1997). Although the most recent proposal included some compensatory mechanisms (e.g. v-notching) to offset potential increases in exploitation, none of these season change requests has been accepted by DFO management.

From the late-1980's, concerns have been raised by lobster fishermen on potential impacts on their fishery from coastal zone development and activities of other marine resource users, such as salmon aquaculture development (including the use of chemical theraputants to which lobster may be susceptible), dragging impacts from scallop, sea urchin, and groundfish fisheries, and changes in sedimentation related to proposed openings of causeways in the upper Bay of Fundy. These concerns have generated additional areaspecific monitoring studies which have enhanced the regular fisheries monitoring programs.

However, the above issues have been preempted by the major conservation management issue currently being addressed in the Bay of Fundy lobster fishery, and other areas of Atlantic Canada. This issue is the development of additional stock conservation measures in light of the October 1995 review of the Atlantic lobster fishery by the Fisheries Research Conservation Council (FRCC, 1995). In their report, the FRCC concluded that under the current management regimes, lobster fishers generally were "taking too much, and leaving too little". Based on the scientific data available to the Council, they concluded that the current fishery is designed towards high exploitation rates, harvests primarily immature animals, and results in very low levels of egg production (estimated to be as low as 1-2% of what might be expected in an unfished population). While they accepted that lobster stocks have traditionally been quite resilient, they concluded that the risk of recruitment failure is unacceptably high.

Inshore lobster fishers which prosecute the "winter fisheries" (LFA's 33-38) are developing their response to a directive issued by the Minister of Fisheries and Oceans in December 1997, for Atlantic lobster fishers to set in place new management measures which will achieve a doubling in egg production. The timetable to respond to this directive for the winter fisheries is structured by the need to set new management measures in place for the earliest Fall fishery (LFA 35; October 15, 1998).

This lobster assessment reviews the status of the lobster fishery in LFA's 35, 36, and 38 as of the end of the 1997/98 season. Available information on historical catch levels, stock structure, recent trends in catch size composition and catch per unit of effort is summarized. Estimates of exploitation rate and estimated levels of egg production per recruit are presented, and projected impacts of conservation management changes currently in review are evaluated.

ASSESSMENT METHODOLOGY

Biological inputs

At-sea sampling: There are three main methods by which lobster biologists survey catches in lobster fisheries: port sampling, logbook records, and at-sea sampling. Of the three methods, at-sea sampling provides the most detailed information on lobster size-structure in the traps (including sub-legal, berried, and soft-shelled lobsters). As all lobsters retained in each trap haul are measured (carapace length, CL, in mm), biologists are able to convert the numbers caught into estimates of the catch rate of legal-sized animals by weight. An at-sea sampling program has been maintained in the Fall and Spring fisheries in LFA's 35, 36 and 38 since 1978. Emphasis was placed on maintaining an annual series at 4 representative ports. As local fishery issues were addressed (e.g. aquaculture development in Annapolis Basin; Lawton et al., 1995) additional area-specific sampling has been undertaken. For each trap haul made on a given day of sampling, the location, depth, and trap type are recorded. All lobsters retained in the trap are examined to determine size, sex, moult condition, and egg development stage for berried lobsters (criteria described by Robichaud and Campbell, 1991).

Fisher-supplied catch data: A new fishery-monitoring project was started in June 1997 in LFA 35. Participating fishers (3 in 1997) monitored the size structure of their catch at-sea using custom-made calipers sub-divided into 11 size categories, which may be combined to represent molt groups (see Figure 18 for details on size groups).

Research trapping studies: There have been numerous mark-recapture studies conducted in the Bay of Fundy to establish information on lobster movement (reviewed by Lawton and Lavalli, 1995; Robichaud and Lawton, 1997). A number of these studies have been conducted during closed seasons using a chartered lobster fishing boat to standardize trapping operations, and avoid the immediate recapture of lobsters by the commercial fishery. All tagging studies to date in the Bay of Fundy have been undertaken using sphyrion tags (Floy tag type: FTL69), inserted into the dorsal musculature between the abdomen and the carapace, using a hypodermic needle (as described by Campbell and Stasko, 1986).

Diving surveys: While at-sea trap sampling can provide significant information on the location of various segments of the lobster population, trap size-selectivity (e.g. Miller, 1990), behavioural interactions (e.g. Richards et al., 1983), and seasonal movement patterns (e.g. Robichaud and Campbell, 1991) interact to affect the sampled size distribution. From a lobster population perspective, there are two segments of lobster life history which are typically not well represented in trap catches: juvenile (sub-legal) lobsters, and berried females. Additionally, trap samples (whether from the fishery or research trap surveys) do not provide direct absolute estimates of lobster abundance, nor do they identify lobster:habitat relationships, except in the most general sense. Juvenile lobsters tend to occupy shallow subtidal habitats year-round. After their initial recruitment to the benthos they are subject to predation pressure, particularly from fish predators

(Wahle and Steneck, 1992), and remain cryptic (hidden) within shelters (Wahle and Steneck, 1991). Typically, they can only be censused by direct *in-situ* sampling techniques (Lawton and Robichaud, 1992b).

Three different bottom census techniques have been used to investigate lobster population characteristics in various areas of the Bay of Fundy from 1989 onwards. Belt transects (typically consisting of a 150 m weighted line) are deployed perpendicular to the shoreline, the shallowest end placed at approximately 3 m below the mean low water mark, extending out to a maximum depth of 14-20 m. Divers record all lobsters found within 1 m of either side of the line (for a total 300 m² of sea bottom searched). Lobster size and sex, moult stage and egg maturity stage on berried females are recorded on underwater slates. Records of lobsters captured are kept separately for each 25 m segment of the transect (the minimum sampling unit is thus 50 m²); the primary and secondary substrate type, and depth range of each segment is also recorded.

Due to the presence of steep bottom slopes, high currents, or low visibility conditions, certain locations are not amenable to transect sampling. In these locations timed collection dives are made in which experienced DFO diver-biologists explore a general depth range, typically between 5 and 20 m, noting habitat characteristics, and measuring any lobsters encountered on the dive. These dives generate relative abundance estimates (expressed as catch per 60 min. search time) as opposed to absolute abundance estimates (expressed as number of lobsters per unit area) obtained from belt transect dives.

Air-lift suction sampling of small (0.25 m²) quadrats set in juvenile nursery areas has been conducted in the Fundy Isles Region of the Bay of Fundy since 1990 (following techniques described by Wahle and Steneck, 1991) to document annual lobster settlement patterns. However, from 1996, diving-based studies have been reduced in the Bay of Fundy, due to the extension of these sampling techniques to other areas of the Maritimes under a DFO High Priority Research Program on lobsters. Emphasis in the Bay of Fundy has been on maintaining an annual time series on juvenile lobster abundance at a study site in LFA 36 (Beaver Harbour).

Landings and Fishing Effort Analysis

Trends in landings: Lobster landings data is accessed from Oracle database tables created by DFO's Marine Fisheries Division from data compiled by DFO Statistics Branch into the ZIFF (Zonal Interchange File Format) database. The ZIFF database includes lobster landings by Statistical District, (SD), port and date in a series of tables aggregated by year since 1989 (called Identified_catches_YYYY). In order to analyze seasonal trends in the lobster fishery a separate Oracle table (Lobland) has been created which combines data for all years since 1989 for LFA's 34, 35, 36, and 38, incorporating SD's 24 to 81 (Figure 2).

Determination of catch per unit effort is not yet possible as trap numbers are not routinely recorded in the inshore lobster fishery. However, various other effort measures can be derived from the existing data series, such as catch per boat by port, SD or LFA, for various

time periods. These analyses are compromised by certain landing data not being attributable to specific boats, but being aggregated to a port under a single code.

Interviews with lobster fishers: While there have been no Bay of Fundy-wide interview programs, area-specific studies have been conducted in recent years in portions of LFA 35: Annapolis Basin (Lawton et al., 1995), and Chignecto Bay/Minas Basin (1998; Lawton and Robichaud, unpublished). Questions covered the fishing background of the interviewees, and their general perspective on the local fishery including: distribution and extent of fishing effort in each season; expected catch rates; seasonal lobster movements; and, catch composition, including known concentrations of either under-sized or berried lobsters. Fishers were also asked to mark their fishing grounds on base maps of each locality. Subsequent to the interviews, composite maps were produced to derive generalized plots of lobster fishing activity.

Fishing Mortality and Exploitation Rate

Previous assessments of the Bay of Fundy lobster fishery, as was the case with most other lobster fishing areas, used molt group comparison methods to determine fishing mortality and exploitation rate (e.g. Lawton and Robichaud, 1992a). The 1996 Invertebrate Fisheries RAP recommended that a common method of determining Fishing Mortality (F) be used in future assessments. At this time, there were four methods in use the Length Cohort Analysis (Cadrin and Estrella 1996), a length-based method based on work by John Caddy (Caddy 1977), mark recapture methods and Leslie - Delury regression method (Miller and Mohn 1989). The latter two methods are not applicable to all areas but can be useful as a secondary method to verify results. The LCA was chosen as the common method of assessment because it uses all sizes and incorporates more information on growth and time at-size than the previously used length based methods, and has been routinely used in U.S. lobster fisheries assessments (Cadrin and Estrella 1996).

LCA was developed by Jones (Jones 1974; Jones 1981) based on Pope's (Pope 1972) cohort analysis which assumes that abundance at the end of year I can be estimated by the initial abundance (N_i), a half year of natural mortality (M), a mid year catch (C) and natural mortality for the remainder of the year.

 $(N_i e^{-0.5M} - C) e^{-0.5M} = N_{i+1}$

Instantaneous mortality (F) can be estimated from a sequence of cohort abundance over several ages. The equation is arranged from oldest to youngest ages.

 $C_i e^{0.5M} + N_{i+1} e^M = N_i$

Many species cannot be aged so an annual model cannot be applied. Jones (1974) modified the equation to include variable time intervals (Δt)

$$C_i e^{0.5M\Delta t} + N_{i+\Delta t} e^{M\Delta t} = N_i$$

Size distribution of landings was used to estimate the catch for the sequence of time intervals and von Bertalanffy growth parameters were applied to estimate the Δt . Since this method does not follow a single cohort over time, but instead assumes that the size frequency represents the abundance of a cohort over time, the method assumes constant

recruitment. In practice, however, this is not the case and estimates are generally based on the mean of several years. In conditions where the recruitment is trending down or up, as has been the case in the Bay of Fundy where recruitment is presently very high, such values should be used with caution..

The method was further modified by Cadrin and Estrella to include the time of the catch (T_c) . This allows it to be varied from 0.5.

$$C_i e^{T_c M \Delta t} + N_{i+\Delta t} e^{M \Delta t} = N_i$$

They also incorporated a quadratic growth curve derived from molt increment and molt probability at-size to calculate Δt at-size.

The details of the method, sensitivity analysis and sample outputs are in Northeast Fisheries Center Reference Document 96-15 (Cadrin and Estrella 1996)

In the present assessments the method of deriving Δt was modified. Rather than calculating Δt at-size by fitting a quadratic growth curve derived from molt increment and molt probability at-size, Δt was obtained from the output of the Idoine-Rago Egg and Yield per Recruit program (22nd SAW Report). This program simulates the progression of a cohort through its life time. When the program is run with F=0.0 an output file produces a table of mean number of years at-size which can be used as the Δt 's.

E/R Analyses

Female lobsters have a complex reproductive pattern and non-continuous growth which are not easily accommodated by the traditional dynamic pool models (Beverton and Holt 1957) The egg per recruit analysis is based on the size structured egg and yield per recruit model developed by Josef Idoine and Paul Rago (NMFS) and used in the SAW 22 assessment (Anonymous 1996). The model is based on an earlier work by (Fogarty and Idoine 1988).

The model includes size-specific annual molt increments and probabilities, proportion mature and egg bearing, fecundity and weight. The model runs on ¹/₄ year time steps with growth, mortality, and fishing applied in the appropriate quarter. For example natural mortality is applied as hard shell mortality throughout the year and a soft-shell mortality at the time of molt in the fourth quarter. Fishing mortality is assigned to the appropriate quarter through the input parameters giving the proportion of the catch by quarter.

In lobsters, growth is a function of the molt increment and annual probability of molting. Molt increment is input as a distribution of increments at size based on tagging data results. Molt probability is based on observations of animals held in the lab at ambient Bay of Fundy temperatures (S. Waddy, unpublished) and tagging data (Campbell 1983; Pezzack 1990). Immature lobsters molted annually while mature lobsters had intermolt periods of 2 increasing to a maximum, of 4 years at large sizes. Maturity values were based on published and unpublished results using the pleopod method (Aiken and Waddy 1982) and ovary examination.

Maximum size and v-notch protection measures are incorporated into the model with an input parameter to specify the level of compliance by the fishing industry.

A more detailed description of the model is found in the 22nd SAW report and the Res. Doc. for the 1998 assessment of LFA 34 (Pezzack et al. 1999)

RESULTS AND DISCUSSION

Resource Status

General trends in landings: Lobster landings in the Bay of Fundy were first reported in 1892, on an annual basis. Landings peaked in 1895 at 1415 tonnes (t), then subsequently declined, over a 40-year period, to a low of 179 t in 1938 (Figure 3). From 1939 onwards, landings increased to a second peak of 897 t in 1953. In comparison with historical landings, current annual landings in LFA's 35 and 38 represent all time highs, while 1996 landings in LFA 36 are the highest this century (Figure 3).

It is more appropriate to compare contemporary landings in these fisheries on a Fall -Spring season basis, particularly as much of the catch is represented by lobsters which have molted into the first molt-group of the legal size during the previous summer. On a seasonal basis, for the Bay of Fundy as a whole, landings were relatively stable (between 491-897 t) from 1946/47 to 1974/75 (Figure 4). A post-war low of 296 t was reported in 1975/76; however landings rebounded to 545 t the following year, and began the current expansion phase.

For the fishing seasons 1987-88 to 1993-94, total landings from the Bay of Fundy appeared to have stabilized at approximately 1000 t (range 942-1046 t; Figure 4, Table 2). Over the next three years landings increased each year to 1865 t in the 1996-97 season. Total landed value (LFA's 35, 36, and 38) ranged from \$6.5 million to \$9.0 million between the 1988/89 and 1993/94 fishing seasons, then rose progressively to \$22.8 million for the 1996/97 season. Fall 1997 landings, at \$13.6 million were slightly above Fall 1996 value (\$12.9 million).

The landings reporting system changed in 1995 (from collection of sales slip information to self-reporting logbooks), and so reporting differences may confound these recent landings increases. Nonetheless, this recent pattern of overall landings stability, with evidence of further potential increase, matches landings seen in LFA 34 and the US portion of the Gulf of Maine (Maine and Mass.) (Pezzack et al., 1998).

Area-specific trends: On a percentage basis, the contribution of the three LFA's has varied significantly over the last 50 years (Figure 4). LFA 38 represented approximately 50% of the total landings during most of the period, but currently ranks below LFA's 35 and 36 in seasonal landings.

The new capability to access the ZIFF database permits more detailed analysis of landing trends from the 1989/90 season onwards. Still under development, new query tools permit analysis at a variety of levels from SD to port to vessel on a daily, weekly, monthly and seasonal basis. Our initial exploration of these tools revealed several weaknesses in the

current statistical reporting system, and for this reason we include only a few sample analyses.

Of interest is the extent to which the recent surge in landings in LFA's 35 and 36 represent widespread increases. An intermediate level of analysis is to group data by general coastal areas of the Bay of Fundy, and examine the percentage increase in landings in each year relative to the reported landings in 1989/90 (the first full fishing season for which data is available in the ZIFF database).

Thus, for the lower Bay of Fundy landings for the Fundy Isles (SD 51, 52, 53) showed a progressive increase over 1989/90 landings, to >350% increase by 1996/97 (Figure 6). In comparison, landings from Grand Manan (SD 50) did not increase more than 50% over 1989/90 levels in any season, and were only marginally above the 1989/90 season in 1996/97 (see also Table 2).

Landings in the mid-Bay, along the open coastal stretches of SD's 48 and 49 on the New Brunswick shore, and 35 and 38 on the Nova Scotia shore (but including Annapolis Basin, SD 39) did not increase by more than 50% over 1989/90 levels until the 1995/96 season. For Nova Scotia, landings were below 1989/90 levels in 1992/93 and 1993/94. During these seasons a detailed study of the Annapolis Basin fishery was conducted (Lawton et al., 1995) and further at-sea monitoring is now underway. For the last full season (1996/97), landings were up 100% and 226% on the New Brunswick and Nova Scotia sides of the Bay, respectively.

In the Upper Bay of Fundy, reported landings declined initially from 1989/90 levels in both the Chignecto Bay area (SD's 24, 79, 81) and Minas Basin area (SD's 40, 41, and 44). Landings in these areas (which includes fishing prosecuted outside Chignecto Bay and Minas Basin themselves), have since increased substantially, particularly in the Minas Basin area, where landings are now 250% above 1989/90 levels. The landings analysis for the Chignecto Bay area revealed a significant drop in landings for certain ports during the review period which does not compare with local monitoring and interviews with fishers (see issues and uncertainties, below).

This intermediate level of analysis masks some dramatic changes in reported landings, as for example in SD 52 (Passamaquoddy Bay) where reported landings ranged between 1.31 and 2.8 t from 1989/90 until 1995/96 when they rose to 11.06 t and then to 50.11 t in 1996/97. Such dramatic changes at the SD level may be due to reactivation of licenses, shifts in port of landing by specific boats, improved reporting of catches previously not reported on sales slips, mis-reporting of landings, or a combination of these factors.

Another use of the ZIFF database is to document landings by component ports within SD's and/or LFA's to determine their relative contribution to overall landings, both within season, and for the season as a whole. This information is relevant to determining how representative fisheries sampling data may be of the LFA, and designing sampling strategies to improve data input to cohort analyses.

Grand Manan (LFA 38) is useful for documenting this approach as it represents one SD, with only 4 fishing ports, and a stable pattern of landings over the period 1989/90 to 1996/97 (Figure 7; Table 2). Although the maximum increase in total LFA landings was approximately 40% in 1994/95 (over 1989/90), landings reported from North Head were up >80% for the last three seasons in the analysis (Figure 7). This fishery originally represented approximately 10% of LFA 38 landings, but accounted for approximately 20% in 1996/97 (Figure 7). The at-sea sampling program for LFA 38 has targeted this fishery (particularly the segment which fishes in the deep-water entrance to the Bay of Fundy), and Seal Cove. Whereas Seal Cove represented 35% of the landings in 1989/90, it has since dropped to between 20 and 25%.

Seasonal trends in Bay of Fundy lobster landings have been documented previously (e.g. Robichaud and Campbell, 1991), particularly the high contribution of landings in the first few weeks of the Fall season, and last few weeks of the Spring season to total landings. We can now undertake such analyses on a routine basis. Of significance for LFA 38, and for later interpretation of at-sea sampling data, over the fishing seasons 1989/90 to 1996/97 landings in November and June represented 45.4% (1.7% SE), and 15.2% (0.6% SE) of total reported landings in each fishing season.

Issues and uncertainty: Prior to 1998 we had no capability to easily interrogate data on Bay of Fundy lobster landings in order to analyze area- and time-specific trends. Our preliminary exploration of the ZIFF database has yielded some anomalous reports (e.g. outliers in landings per boat for certain ports; reduced catch reports in 1994/95 and 1995/96) which need to be further investigated. An obvious major omission in the available data is the number of trap hauls that contribute to reported landings. With the development of appropriate tools to detect outliers in the data it should be possible to follow trends in catch rates over time, at least in terms of landings per boat per specified time period.

In meetings with Bay of Fundy fishers it has been noted that some of the shifts in effort applied to lobster are related to the relative performance of other fisheries in the Bay of Fundy, as a number of fishing enterprises hold multiple licenses. Access now available to the ZIFF database would allow some comparative analyses to be undertaken, but requires a clear definition of the areas, time periods, and gear sectors that may be interrelated.

Stock Structure

Lobster production characteristics: While a portion of the Bay of Fundy fishery is reliant on lobsters migrating into fishing areas at different times of the year there are, nonetheless, centres of benthic lobster production in the Bay, as evidenced by the presence of juvenile lobsters in the trap fishery, and in benthic biological censuses (e.g. Lawton et al., 1995, Lawton and Robichaud, unpublished data). Examples of these areas are southern Grand Manan (Figures 8 and 9), and the Fundy Isles/S.W. New Brunswick coastal area (Figures 10, 11, and 12). Historically, the fishery in the upper Bay of Fundy was considered to be principally reliant upon seasonal immigration of later benthic stages of lobsters (e.g. Robichaud and Campbell, 1991). However, fisheries monitoring during the 1990's, principally in the Alma area, has documented a dramatic change in trap size-frequency distribution which suggests that local benthic production in the upper Bay has increased (Figures 13 and 14).

Major diving surveys on inshore lobster habitats were conducted in the Fundy Isles Region of the Bay of Fundy between 1989 and 1993. The presence of significant numbers of small juvenile lobsters in shallow water habitats there indicated a lobster nursery area function (*sensu* Lawton and Robichaud, 1992b). Additionally, in certain inshore locations within the Bay of Fundy, for example North Head, St. Martins and Alma, N.B., seasonal aggregations of berried female lobsters have been documented. Information on these inshore lobster spawning areas (*sensu* Lawton and Robichaud, 1992b) has been obtained both by trap sampling (Robichaud and Campbell, 1991; Campbell, 1990), bottom trawl survey (Lawton and Robichaud, unpublished data), and by direct diving observations (Campbell, 1990; Lawton and Robichaud, 1992b; unpublished data).

Lobster movement: Recent results on lobster movement in the Bay of Fundy (Lawton et al. 1995; Robichaud and Lawton (1997) are consistent with those obtained in earlier tagging studies (Campbell 1986b; Campbell and Stasko 1985, 1986) which demonstrate substantial mixing throughout the Bay of Fundy, and along the Maine coast. The total percentages of tag returns in the various tagging studies varied between 13% and 20%.

Fishing effort and catches are not uniformly distributed, spatially or temporally (Pezzack 1987). Thus, to better reflect fishing pattern and seasonality of lobster movement, movement data in recent studies have been analyzed by recapture periods when distinct fisheries in the Bay of Fundy were open, rather than by time at large, *per se*. A total of 3010 lobsters were tagged and released near St. Martins, N.B., in the northeastern part of LFA 36 during July 1992, shortly after the close of the spring season (Robichaud and Lawton, 1997). As of July 31, 1994, 459 lobsters had been recaptured (15.3%). Lobsters migrating into the northeastern portion of LFA 36, in July, did not simply move inshore to reside over summer. A portion of the population actively migrated further up the shore at average rates of 1.4 km/day and appeared in catches of the adjacent LFA 35 fishery, which was still open during the tagging study. In subsequent fall, winter and spring fisheries, from 1992 to 1994, lobsters initially tagged in LFA 36 appeared in the lobster catches from LFA's 34-38, as well as along the north-eastern US coast.

Bay of Fundy lobsters exhibit high dispersal rates. Long term movement rates of 1.2 km/day over a period of 454 days (15 mo.) were reported by Robichaud and Lawton (1997). Distances and rates of movement calculated over a long period of time can be misleading without understanding the dynamics of seasonal migration (Lawton and Lavalli 1995). For example, one of our multiple recaptures shows that after release in July, 1992, one lobster remained a relatively short distance (16 km) from the release site until November 4, 1992, when it was first recaptured. However, when recaptured a second time (on December 28) this lobster had traveled a distance of 152 km in 55 days (2.8 km/day).

Issues and uncertainties: While there are centers of local production (benthic settlement and growth of lobsters), much of the Bay of Fundy lobster fishery has developed over time to capitalize on well marked seasonal and long distance movements of legal-size lobsters

(Robichaud and Campbell 1991; Campbell and Stasko 1986). The Bay of Fundy lobster fishery has been stable over time (compared to some other lobster fishing areas), and in the recent phase of the fishery (from the late 1980's) has shown a sustained high level of landings, and potential for further increase. However, the degree to which the Bay of Fundy is reliant upon adjacent areas for larval production remains unclear. A number of historical studies did not consider the area to be very favorable for local larval production due to relatively cold summer water temperatures, though benthic censuses and other fisheries monitoring from 1989 onwards has verified there to be significant current levels of benthic settlement. There is a need to correlate the recent research findings on benthic settlement in the Bay of Fundy with environmental data on long-term temperature conditions.

The general conclusion from the available scientific studies on the Bay of Fundy lobster fishery is that it should be considered to be a component of a Gulf of Maine lobster metapopulation. The degree to which it represents a source of larval production for adjacent areas (such as the Maine coast), or a sink (receiving the benefits of larval production occurring outside the Bay of Fundy) is not known. There is a need to increase the capability of physical and biological oceanographic models of the Gulf of Maine system to model the Bay of Fundy as an integral component of the system.

Catch size structure

Trends in lobster size distribution: At-sea sampling has been conducted over a 20-year period at four major ports in the Bay of Fundy. Samples are generally available from the first two weeks of the Fall season, and from the last two weeks of the Spring season. As noted earlier, these periods represent the bulk of each season catch (e.g. approx. 60% on Grand Manan). Robichaud and Campbell (1991) summarized the initial sea sampling program design, and reported on catch size composition up to the 1988/89 fishing season. In this assessment document we provide annual size composition data from the 1990/91 season to date (i.e. June 1998 samples for LFA's 36 and 38).

For Seal Cove (LFA 36), annual sampling has indicated a stable size frequency, with mean sizes in the sampled catch ranging from 77 - 85 mm CL (Figures 8 and 9; Figure 19). In Fall sea samples very few berried females have been noted in the traps $(0.8\pm 0.3 \text{ (SE)})$ berried females per 100 trap hauls over a 17 year period). Despite the move to include escape panels in lobster gear, pre-recruit lobsters are still retained in the traps and recent observations (June 1998) show a continued strong representation of prerecruit lobsters.

Fishery samples from Dipper Harbour (LFA 36; Figures 10 and 11) show a broader range of size classes of lobster, both in pre-recruit sizes (<81mm CL), and larger lobsters beyond the first molt group in the legal size range (81-94mm CL). Berried females are represented in the time series (17 years) at a slightly higher level (2.9 ± 0.5 berried lobsters per 100 trap hauls) than in Seal Cove. A progressive increase in pre-recruit presence in the sampled catch is indicated for samples taken in June, such that the latest sample contains the highest number per trap haul (Figures 11, and 19) in the series.

Based on fishery sampling in the 1980's, Robichaud and Campbell (1991) characterized the size frequency of lobsters caught in various specific areas of the Bay of Fundy. They concluded that two fisheries (upper bay fishery in Chignecto Bay and Minas Basin areas; deep-water fishery at the entrance to the Bay of Fundy) were principally reliant on intercepting seasonal migrations of larger, mature lobsters, rather than capitalizing on local annual production of new recruits.

In the time series presented in this assessment, the mean size of lobsters sampled in Alma in the 1990/91 season was 93 and 100 mm CL in Fall and Spring samples. At the start of this series biologists measured between 1.5 and 2 lobsters per trap haul. Through the time period there has been a downward shift in mean size of lobster sampled (to 84 and 88 mm CL in July and October 1997, respectively), and an increase in the catch rate, both of pre-recruits, and the first molt group (Figures 13, 14, and 19). Current at-sea samples in the Alma area may yield 10 lobsters per trap haul. The increase in pre-recruit abundance is seen most clearly in the Spring season samples (Figures 13, 14) where the catch size composition is now similar to that in Seal Cove and Dipper Harbour. Results from the new fisher-supplied catch monitoring are consistent with this data (Figure 18).

In contrast to sea sampling in Dipper Harbour and Seal Cove (which is conducted in November), fishery sampling in October in Alma intercepts berried female lobsters at a substantially higher rate (21.3 ± 3.5) berried lobsters per 100 trap hauls; 19 year series)

The final long-term time series, from North Head (LFA 38), is from a very different fishery which has a number of parallels to the midshore and offshore fisheries in LFA's 34 and 41 (in terms of fishing strategies, soak days, winter fishing period, and lobster size distribution). The average size of lobsters has ranged from 115 to 123 mm CL in Fall sampling, and 127 to 130 mm CL in Spring sampling over the period 1990 to 1998 (Figures 15, 16). Catch rates of berried females in the Fall sampling period are comparable with those seen off Alma (25.7 ± 4.3 berried lobsters per 100 trap hauls; 17 year series).

Based on the occurrence of berried females in the at-sea sampling series from three ports over the period 1978 to 1997, an apparent shift in the average size of berried females has occurred (Table 4, Figure 17). Although sample sizes were 4 to 6 times greater for the period 1978-82 than for more recent time periods, the sample size range is comparable (Table 4). The mean size has decreased by approximately 8 mm, and there are now higher percentages of berried female lobsters in the first two molt groups. These data require further interpretation, particularly in light of recent studies on lobster maturity in the Bay of Fundy (S. Waddy, unpublished), and persistent reports by lobster fishers of smaller berried female lobster in trap catches. For example, two of the fishers in the new monitoring program in LFA 35 recorded berried female lobsters below minimum legal size during June 1997 monitoring.

Fisher-supplied information on catch size structure: Three logbooks were completed by LFA 35 fishers operating in Minas Basin (2 boats), and off Advocate Harbour (1 boat) during June 1997. The size and sex distribution of lobsters, including sub-legal animals and berried females was recorded on 9 to 11 fishing trips. The number of trap hauls sampled on

a given day ranged from 12 to 80, for a total of 1130 trap hauls and 4,051 lobsters measured by the three fishers during the month.

Although not analyzed in detail in this assessment cycle, this fisher-supplied information fills three important gaps in the present fisheries monitoring program:

1. Temporal sampling of catches during periods of the season when catch rates are relatively low, and it is cost-prohibitive to send out scientific observers;

2. Increased spatial coverage that has the potential to allow better interpretation of seasonal movement of lobsters into fishing areas;

3. Participation by fishers in the scientific assessment.

The fishers were unable to continue this level of sampling into the final month of their Spring season, and it would be impractical to expect them to undertake detailed monitoring at the opening of the Fall season. For comparison, science at-sea monitoring in Alma in July 1997 measured 790 lobsters in 167 trap hauls on a single day.

This program is being expanded in June 1998 to include a total of 6 fishers in the Upper Bay of Fundy, who in addition to monitoring their commercial gear, will also be monitoring catches in a research trap designed to intercept juvenile lobsters.

Trends in CPUE: For the Bay of Fundy there is no comprehensive logbook program in place which monitors fishing effort, and long-term trends in CPUE are available only from the at-sea monitoring program, and area-specific interview data. The new monitoring program in LFA 35 has provided some new information on catch rates, and as the program expands will provide an important source of additional information. The available data shows either a stable CPUE (in terms of Kg per trap haul), or general increase over time. Where index fisher logbook programs have been introduced (in other fishing areas) it is clear many factors influence in-season catch rates (e.g. temperature effects, non-linear relationship to abundance etc.).

Issues and uncertainty: Fisheries monitoring data in the Bay of Fundy is limited in area coverage, but contains several long-term series which have identified important shifts in the size distribution of lobsters, particularly in the upper Bay. A series of detailed fisheries monitoring and biological research studies were conducted in the Bay of Fundy in the late 1970's/early 1980's, a level of program activity which could not be maintained throughout the later 1980's/early 1990's. Nonetheless, a number of additional surveys were conducted during this period, in particular diving and research trapping-based studies, which provide a baseline on population size distribution and abundance against which current fisheries information may be indexed.

F and exploitation rate

Length-based cohort analysis (LCA): Application of the LCA approach for LFA 35 to 38 generated substantially lower estimates of F and exploitation rate (A) than were provided in earlier fishery assessments (Lawton and Robichaud, 1992a) and used by the FRCC in their review of the Atlantic lobster fishery (FRCC, 1995). The molt group comparison techniques used in those assessments provided exploitation rate estimates in the range 60-85%. Current estimates of exploitation rate (A) from LCA range from between 39 - 70% for LFA 35, 49-56% for LFA 36, and 54-66% for LFA 38 (Table 3; Figure 21). Using the available size frequency data for the three LFA's, and reported landings, a combined Bay of Fundy LCA was conducted yielding new estimates of exploitation rate in the range of 49-63% over the period 1988 to 1995 (Table 3).

As with all length composition analyses, LCA is sensitive to changes in size structure due to changes in recruitment level, which may bias the estimates of exploitation rate. Thus the increase in exploitation rate in LFA 35 in 1994 and 1995 should be interpreted with some caution (Figure 21). The pattern of fishing mortality and exploitation rate generated by these analyses for the period 1988 to 1993, when landings were more stable for the Bay of Fundy, were used in the calculations of egg per recruit and the impacts of proposed management changes. For the period 1998 to 1993 average exploitation rate for the Bay of Fundy-level analysis was 53%.

Issues and uncertainty: While LCA has been used routinely in US lobster assessments, the current assessment cycle represents its first widespread application in Canadian lobster fisheries. The existing sampling of length composition in most lobster fisheries is limited. For the current assessment it was not possible to break the landings data down much beyond the LFA level, and single samples of length frequency from at-sea samples were used to model Fall and Spring landings data.

However, comparison of the LCA results with those from other F estimation approaches (Leslie analysis, molt group comparison, mark-recapture studies) in other LFA's (Tremblay and Eagles 1998) has indicated some robustness and comparability in the estimates. The lower F and A estimates for the Bay of Fundy are consistent with general results from the first application of the LCA approach in other lobster fishing areas.

Further work needs to be undertaken to determine the appropriate spatial and temporal resolution of catch size structure needed to accurately translate landings to estimates of removals from the fishable stock. The recent ability to access the landings database at a finer scale of resolution will be an important tool in refining fishery-sampling strategies, though uncertainties in landings data quality need to be investigated. Additionally, the requirement to be able to sample catches in a cost-effective manner needs to be addressed. The use of fisher-supplied information, as in the new program in LFA 35, as input into cohort analysis needs to be evaluated.

Egg per Recruit Analyses

Present status: Due to uncertainty in the measurement of exploitation rates, E/R analyses were conducted for a range of exploitation rates. At the present minimum size of 81 mm CL and exploitation rates between 53% and 70%, E/R in the Bay of Fundy ranges from 1.3% to 0.36% of virgin population E/R. In terms of egg numbers, these scenarios yield between 990 and 276 eggs per recruit (Table 5).

Under new management scenarios: Changes in E/R are presented for two exploitation rate scenarios: 53% (based on LCA), and 70% (a high level, based on previous molt group comparison estimates). Incorporation of this high estimate of exploitation rate provides management and industry with an indication of the robustness of some management approaches (in some approaches E/R is doubled under both scenarios). To achieve a doubling of E/R, significant increases in minimum size (adopting this as the sole approach) would be required, beyond 86 mm CL, which by itself provides only an approximate 50% increase at an exploitation rate of 53% (Table 5; Figure 22). Management measures that would include a move to the current US minimum size, 83 mm CL, will require additional measures (e.g. maximum size regulations; v-notching) to achieve the target doubling (Table 5; Figure 22).

These (and other) management scenarios will lead to a loss of catch by certain sectors of the Bay of Fundy fleet, at least on an interim basis, and this will form the basis of significant discussion with industry. Table 6 indicates the catch composition by weight, for specified size ranges of lobsters, observed in the most recent at-sea fishery sampling (Fall 1997/Spring 1998 for LFA's 36 and 38; Spring 1997/Fall 1997 for LFA 35). It is important to note that this analysis is based on the catch sampled on a single day of fishing in each location. With the exception of the North Head fishery, female lobsters greater than 127 mm CL, and 133 mm CL, represented less than 2% by weight. For North Head the percent by weight of females over 127mm CL represented 45% and 2.8% in Spring and Fall samples (Table 6).

Lobsters between 81 and 83 mm CL ranged from not being part of the sampled catches of North Head fishers to a high of approximately 20% by weight for fishers sampled in Seal Cove and Wood Point (Table 6). In other fishing ports this size group of lobsters represented between 10 and 12% of the catch.

Issues and uncertainty: The analyses presented in this assessment are based on a more recent formulation of the E/R model than that used as the basis for the initial recommendations for management change presented by the FRCC (FRCC, 1995). Among the issues and uncertainties are:

1. The reduction in exploitation rates were calculated using the LCA. There will be uncertainty as to the validity of these estimates, and risk associated with the fact that the reduced estimates of fishing mortality lead to greater projected E/R benefits and change the value of the conservation measures.

2. Appropriate time scales and magnitude of credit for specific stock conservation measures (e.g. minimum size, maximum size, and v-notching), both for the Bay of Fundy fishery as a whole, and for specific fleet segments.

CONCLUSIONS

<u>Outlook</u>

The short-term outlook for the Bay of Fundy is for sustained landings well above 1000 t, based on recent landed catch trends and evidence of continued high levels of pre-recruit abundance in the commercial trap sampling program. While landings in LFA 35 and 36 are increasing, landings from LFA 38 appear more stable.

The apparent stability of the Bay of Fundy lobster fishery, recent increase in landings, and recruitment pulse in the Upper Bay need to be better understood in the context of the Gulf of Maine lobster population as a whole before long term projections on landings may be made.

Management Considerations

Consultations have been ongoing with Bay of Fundy lobster fishermen since the release of the FRCC report in October 1995 through direct mail-out of interpretive documents, community-level meetings, discussions at regular Lobster Advisory Committee meetings, and cross-LFA working group meetings. Further consultations are planned for late summer 1998, which will lead to the preparation of a 3 to 4 year conservation harvesting plan which the Minister of Fisheries and Oceans has directed should achieve a doubling of egg production.

Current scenarios, which will achieve this target, include substantial increases in minimum size (when used as a single measure), or a series of measures (e.g. a more modest minimum size increase and a maximum size regulation). As shown in Appendix 1, minimum and maximum size regulations have varied in the fishery, particularly in the 1930's and 40's. The current minimum size has been unchanged since 1951.

Given the size composition of lobsters in the catch, and the existence of particular segments in the fleet which actively target (or routinely intercept) the season movement of mature lobsters, some of the proposed conservation measures, particularly maximum size will have substantial impacts on particular fleet segments.

General issues and uncertainty

Resource management of lobsters in the Gulf of Maine is complicated by structural complexity inherent in the lobster population itself, and that imposed by multiple management jurisdictions (2 Canadian Provinces; Federal inshore and offshore management areas; state and federal jurisdiction in the US portion of the Gulf of Maine).

The relative importance of intrinsic and extrinsic larval production to the Bay of Fundy is not known, but available evidence from oceanographic modeling and benthic studies on movement demonstrates that management of these three LFA's will affect, and be affected by management change in adjacent areas.

The Bay of Fundy lobster fishery appeared to have reached a relatively stable (+/- 50 t) high level harvest of ca. 1000 t from the late 1980's to mid 1990's. Though perhaps modulated by changes in harvest reporting, and possible over-reporting, there appears to be a significant additional recruitment pulse which is challenging previous assumptions that the Bay of Fundy is a marginal area for lobster production due to its cold water regime. Additional research is required to correlate these recent landings trends with environmental conditions, and potential linkage with the wider Gulf of Maine lobster population.

ACKNOWLEDGMENTS

We thank the various Bay of Fundy lobster fishermen who have allowed us to sample their catches since 1978, in particular R. Collins, R. MacDonald, G. Thompson, S. Mawhinney, N. Morse, B. Brown, W. Ingalls, and T. Frost for taking us out over many of these years. We also wish to acknowledge K. Hurley for helping to introduce a fisher monitoring program in LFA 35, and E. Hurley, M. Fraser, and K. Hurley for providing detailed logbook information. Production of this assessment document was assisted by several student interns (on both paid and volunteer arrangements) working with the Gulf of Maine Crustacean Fisheries Section during 1998: I.M. Gutt, A. Spadafora, J. Hunt, S. Chum, and J. Dykens. Reviewed by M.J. Tremblay.

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Table 1. Elements of the lobster fishery management regime in the Bay of Fundy (LFA's 35, 36, and 38). (A) Number of license holders by license category and trap limits per license. (B) Fishing season opening and closing dates.

	License	A licenses	Partnership	B licenses
LFA	details	(full time)	(full time)	(part-time)
35	Number	93	-	4
	Trap limit	300	-	90
36	Number	149	9	2
	Trap limit	300	450	90
38	Number	77	30	1
	Trap limit	375	563	113

(A)

(B)

LFA	Fall season opening date	Fall season closing date	Spring season opening date	Spring season closing date
35	Oct. 15	Dec. 31	April 1	July 31
36	2nd Tues. in Nov.	Jan 14	March 31	June 30
38	2nd Tues. in Nov.	Open through winter	Open through winter	June 30

Table 2. Landings series for the last 10 complete fishing seasons in the Bay of Fundy.

		•								
Season*	87-88	88-89	89-90	90-91	91-92	92-93	93-94	94-95	95-96	96-97
LFA 35	262	270	254	228	254	239	241	311	546	720
LFA 36	340	309	222	271	249	257	274	317	421	642
LFA 38	383	467	466	496	512	471	523	648	600	503
Total	985	1046	942	995	1015	967	1038	1276	1567	1865

Seasonal^{*} Landings (t)

*Fall to subsequent Spring fishery

	35		36		38		Bay of Fund	у
Yr	F	Α	F	Α	F	Α	F	Α
88	0.60	0.45	0.81	0.56	0.91	0.60	0.78	0.54
89	0.50	0.39	0.67	0.49	0.94	0.61	0.68	0.50
90	0.75	0.53	0.77	0.54	0.93	0.60	0.83	0.56
91	0.67	0.49	0.82	0.56	0.77	0.54	0.74	0.52
92	0.50	0.39	0.81	0.56	0.86	0.58	0.73	0.52
93	0.61	0.45	0.66	0.49	1.01	0.64	0.80	0.55
94	1.21	0.70	0.77	0.54	1.08	0.66	1.00	0.63
95	1.20	0.70	0.82	0.56	0.98	0.62	0.97	0.62

Table 3: Cohort F (F) and exploitation rate (A) estimates from length-based cohort analyses for LFA's 35, 36, 38, and all three areas combined (Bay of Fundy) for 1988 to 1995.

Table 4. Frequency distribution information for berried female lobsters sampled during at-sea sampling program in the Bay of Fundy, 1978 - 1997. Frequency distributions presented graphically in Figure 17. Samples are pooled from the ports of North Head, Alma, and Dipper Harbour over 5-year periods.

Variable	1993-97	1988-92	1983-87	1978-82
Number in sample	963	1177	2073	6254
Mean CW (mm)	116.8	116.4	125.0	123.8
Min. CW (mm)	82	83	87	85
Max. CW (mm)	197	185	193	197
% 81-93 mm CW	3.6	1.3	1.0	0.2
% 94-109 mm CW	34.3	30.3	16.1	14.4
% > 109 mm CW	4.4	2.0	8.0	6.4

Manageme measures	ent		E/R as % v current reg	irgin (%) ulations a	V), and % ind at various exp	and % increase (%inc) over arious exploitation rates (A)				
Minimum Size	Maximum Size	V- notch	A = 53%		A = 65%		A = 70%			
			%V	%inc	%V	%inc	%V	%inc		
81	(current reg	ulation)	1.30	0%	0.54	0%	0.36	0%		
81	127		2.83	118%	1.02	89%	0.63	75%		
81		25	1.55	19%	0.68	26%	0.46	28%		
81		50	1.87	44%	0.86	59%	0.61	69%		
81	127	15	3.23	148%	1.25	131%	0.8	122%		
81	127	25	3.51	170%	1.42	163%	0.93	158%		
81	133	15	2.43	87%	0.93	72%	0.6	67%		
81	133	25	2.69	107%	1.08	100%	0.71	97%		
83			1.52	17%	0.66	22%	0.46	28%		
83	127		3.34	157%	1.26	133%	0.81	125%		
83	133		2.42	86%	0.91	69%	0.58	61%		
83		25	1.82	40%	0.83	54%	0.58	61%		
83		50	2.20	69%	1.06	96%	0.77	114%		
83	152	15	1.85	42%	0.79	46%	0.55	53%		
83	152	25	2.05	58%	0.9	67%	0.62	72%		
86			1.93	48%	0.91	69%	0.65	81%		
86	133		3.08	137%	1.67	209%	0.84	133%		
86		15	2.15	65%	1.04	93%	0.75	108%		
86		25	2.31	78%	1.14	111%	0.83	131%		
86		50	2.78	114%	1.46	170%	1.09	203%		
88			2.26	74%	1.13	109%	0.83	131%		

Table 5. Change in E/R under different scenarios of conservation regulation change in terms of minimum and maximum carapace length, and target rates of v-notching.

Table 6. Percent composition by weight of various sizes of lobsters sampled at sea during the fishing season 1997/98. For 81, 82, and 83 mm CL lobsters data is presented as percent by mm class, and for the group 81-83 mm CL. For larger-sized lobsters data is presented as percent by weight for that size and larger (e.g. 127 mm CL females and greater).

	Alr	na	Dipper	Harbour	North H	lead	Scotts	Bay	Seal C	Cove	Victori	a Beach	Wood Point	St. Martins
Size Group	Jul-97	Oct./97	Jun-98	Nov/97	Jun-98	Nov/97	Jul-97	Oct./97	Jun-98	Nov/97	Jul-97	Oct./97	Oct./97	Jun-98
81 mm	2.7	3.2	6.3	2.9	0.0	0.0	3.2	2.0	6.9	8.7	3.2	5.8	6.6	4.8
82 mm	3.7	4.2	4.1	3.6	0.0	0.0	3.4	3.3	7.9	8.5	2.2	7.0	7.6	2.1
83 mm	3.8	4.1	1.8	4.2	0.0	0.0	5.2	3.8	5.0	6.4	2.4	5.1	5.9	1.1
81-83 mm	10.2	11.6	12.7	10.7	0.0	0.0	11.7	9.1	19.8	23.6	7.8	17.9	20.1	8.0
>5" Fem (127 mm)	0.0	0.7	0.9	0.9	45.0	2.8	0.0	0.7	1.6	0.0	0.0	0.0	0.0	0.0
>5" Male (127 mm)	2.9	1.4	1.8	1.6	15.4	37.1	0.0	2.4	0.0	1.7	4.8	1.2	0.0	8.6
	_		-	_	-						_			
>5" M+F (127 mm)	2.9	2.0	2.7	2.5	60.4	40.0	0.0	3.1	1.6	1.7	4.8	1.2	0.0	8.6
					10.1									
>5 1/8" Fem (133 mm)	0.0	0.5	1.8	0.8	12.4	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
>5 1/8" Male (133 mm)	1.0	0.0	0.0	0.8	39.3	32.3	0.0	2.0	0.0	1.7	0.9	1.2	0.0	3.7
,	_							_						-
>5 1/8" M+F (133 mm)	1.0	0.5	1.8	1.6	51.7	33.2	0.0	2.0	0.0	1.7	0.9	1.2	0.0	3.7
					. –									
> 6" Fem (152 mm)	0.0	0.0	1.8	0.0	4.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
> 6" Male (152 mm)	0.0	0.0	0.0	0.0	19.1	21.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
> 6" M+F (152 mm)	0.0	0.0	1.8	0.0	23.8	21.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6 5" Eom (165 mm)	0.0	0.0	1 0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.5 Fem (165 mm)	0.0	0.0	1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6.5" Male (165 mm)	0.0	0.0	0.0	0.0	11.4	8.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6.5" M+F (165 mm)	0.0	0.0	1.8	0.0	11.4	8.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Figure 1. Bay of Fundy LFA's with approximate boundaries. LFA 37 is a buffer zone between LFA's 36 and 38.



Figure 2. Statistical District Boundaries in the Bay of Fundy.



Figure 3. Historical landings from the Bay of Fundy (LFA's 35, 36, and 38). Data presented as annual landings from 1892 to 1996. Notes: Landings data are missing from some LFA's for early years of the fishery. See Williamson (1992) for details.



Figure 4. Seasonal landings from the Bay of Fundy (LFA's 35, 36, and 38 combined) from the late 1940's to the 1996/97 fishing season. Data presented as seasonal landings (from the opening of the Fall season in one year to close of the Spring season in the following year; season opening dates presented in Table 1). The percentage contribution of landings from each LFA to the seasonal totals is presented in the lower panel.



Season

Figure 5. Seasonal landings from the Bay of Fundy (LFA's 35, 36, and 38) from the late 1940's to the 1996/97 fishing season. Data presented as seasonal landings (from the opening of the Fall season in one year to close of the Spring season in the following year; season opening dates presented in Table 1).





Figure 6. Landings trends in the Bay of Fundy. Percent increase in landings over 1989/90 season total in subsequent fishing seasons for (A) Lower Bay (Fundy Isles and Grand Manan), (B) Mid Bay (N.B. shore and N.S. shore), and (C) Upper Bay (Chignecto Bay and Minas Basin).



Figure 7. Landings trends for LFA 38 (Grand Manan) by port of landing: North Head (NHead), Seal Cove (SealC), Ingalls Head (IngallsH), and White Head (WhiteHd) for the fishing seasons 1989/90 to 1996/97. (A) Total landings (tonnes), (B) Percent increase in landings over 1989/90 season total in subsequent fishing seasons, (C) Percent contribution to LFA total landings by port.



Figure 8. At-sea sampling size frequencies for fishing seasons 1990/91 to 1993/94 for Seal Cove (LFA 38).





Figure 9. At-sea sampling size frequencies for fishing seasons 1994/95 to 1997/98 for Seal Cove (LFA 38).

Figure 10. At-sea sampling size frequencies for fishing seasons 1990/91 to 1993/94 for Dipper Harbour (LFA 36).



Figure 11. At-sea sampling size frequencies for fishing seasons 1993/94 to 1997/98 for Dipper Harbour (LFA 36).





Figure 12. Size distributions from air-lift suction sampling for juvenile lobster at Beaver Harbour (LFA 36), 1991-97.

Carapace Length (mm)



Figure 13. At-sea sampling size frequencies for fishing seasons 1990/91 to 1993/94 for Alma (LFA 35).



Figure 14. At-sea sampling size frequencies for fishing seasons 1994/95 to 1997/98 for Alma (LFA 35).

Figure 15. At-sea sampling size frequencies for fishing seasons 1990/91 to 1993/94 for North Head (LFA 38).





Figure 16. At-sea sampling size frequencies for fishing seasons 1994/95 to 1997/98 for North Head (LFA 38).

Figure 17. Cumulative frequency distribution of berried female lobsters sampled at-sea in the Bay of Fundy between 1978 and 1997, grouped by 5 year time-period. Sample sizes and sample distribution information in Table 4.



Carapace length (mm)

Figure 18. Fisher-supplied lobster size distribution from at-sea samples in the Minas Basin (2 boats) and off Advocate Harbour (LFA 35), during June 1997. Males (shaded bars), females (white bars), and berried females (black bars) indicated for 11 size categories.

350 300 250 200 Count 150 100 50 0 < 74 mm 75-80 mm 109-115 mm > 136 mm 81-87 mm 116-122 mm 123-129 mm 130-136 mm 88-94 mm 102-108 mm 95-101 mm Lobster Size Categories (CL, mm)

Fisher Monitoring - Minas Basin, June 1997

Fisher Monitoring - Minas Basin, June 1997



Fisher Monitoring - Advocate Harbour, June 1997



Figure 19. Trends in catch per unit of effort observed in at-sea sampling of lobster catches in the Bay of Fundy1978-1998. Number of lobsters per trap haul by molt group.





Figure 20. Trends in catch per unit of effort observed in at-sea sampling of lobster catches in the Bay of Fundy1978-1998. Kg. of lobsters per trap haul.

Figure 21. Summary Plots of F and Exploitation Rate for LFA's 35, 36, and 38, and for the three LFA's combined (Bay of Fundy) from Length-based Cohort Analysis. Note that scales for F and Exploitation Rate plots are different. Data points connected with dotted line; solid line is 2 year moving average.



Figure 22. Percent change in E/R in the Bay of Fundy under different combinations of regulation change. Percent change in E/R is presented for three minimum size scenarios.





Bay of Fundy Change in E/R at Minimum Sizes of 86 and 88 mm



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Appendix 1. Historical review of management policies introduced in the Bay of Fundy lobster fishery (updated from material presented in Robichaud and Lawton, 1997).

Late 1800's: Initial lobster fishing season established for Bay of Fundy. Fishery open May 1 to July 31.

1910: Initial management areas established, called Districts (D) (see Williamson 1992 for details of boundaries). For the most part equivalent to current Lobster Fishing Areas (LFA's), Districts were distinguished only by coastline features. To cross reference between D's and LFA's, approximate LFA's are indicated in brackets after each mention of a District even though LFA's were only created in 1986. Open fishing season established as Jan. 6 to June 15 for D1 (LFA's 36 and 38) and Jan. 15 to June 29 for D2 (LFA 35). A minimum size limit of 4 3/4 in. (120 mm CL) introduced in D1.

1914: Open fishing season for D1 changed to Nov. 15 to June 15.

1918: In February, D1 sub-divided by county lines: Charlotte County, including Grand Manan, became D1 (LFA 38), while St. John County became D2 (LFA 36). The old D2 renamed D3 (LFA 35). Open fishing seasons changed to Nov. 15 to June 15 in D1, and between Nov. 15 and May 31 in D2. Minimum size limit of 9 in. total length (229 mm) introduced in D2. In September, fishing seasons changed again: open from Nov. 15 to June 8 in D1; from Nov. 15 to May 23 in D2. In D3 (LFA 35) open fishing season remained Jan. 15 to June 29. Minimum size limit of 9 in. total length (229 mm) introduced in D3.

1932: Open fishing season in D1 (LFA 38) changed to Nov. 15 to Jan. 15, and from April 25 to June 24.

1934: Fishing season in D1 (LFA 38) changed to be open from Nov. 15 to June 8 and in D2 (LFA 36) from Nov. 15 to Jan 15 and from April 25 to June 24. Minimum size limits of 3 1/2 in. (89 mm) and 3 1/16 in. (78 mm) CL were introduced in D1 and D2, respectively.

1935: During May, D1 was sub-divided: D1a included Grand Manan only (LFA 38), while D1b included Charlotte County. Open fishing season in D1a (LFA 38) changed to be open from Nov. 15 to May 31, and in D1b from Nov. 15 to June 8. During October, a minimum size limit of 3 1/2 in. (89 mm) CL and a maximum size limit of 4 3/4 in. (120 mm) CL was introduced in D1a. Minimum and maximum size limit of 3 1/16 in. (78 mm) CL and 4 3/4 in. (120 mm) CL introduced in D1b. During November, fishing season in D1a was changed to be open from Nov. 15 until the last day of February.

1938: Open fishing season in D1a (LFA 38) changed to Nov. 15 to Dec. 31, and from April 15 to May 31. Minimum and maximum size limit changed to 3 1/4 in. (83 mm CL), and 5 in. (127 mm CL).

1941: Minimum and maximum size limit in D1a changed to 3 1/8 in. (79 mm) CL and 4 3/4 in. (120 mm) CL. Minimum size in D2 and D3 set at 3 1/8 in. (79 mm) CL and maximum size limits removed.

1942: Open fishing season in D1a, D1b and D2 changed to Nov. 15 to Jan. 15 and from April 14 to June 24. Open season in D3 changed to between Jan 15 and June 12. Maximum size limits in D1a and D1b were removed and the minimum size limit in D1b was increased to 3 1/4 in. (83 mm) CL.

1947: Fishing season for D3 (LFA 35) was changed to be open from Jan. 15 to July 20.

1948: D1a and D1b re-combined to form D1 which included Charlotte Co. and Grand Manan. Minimum size limit in D1 and D2 now 3 1/4 in. (83 mm) CL.

1951: Districts 1, 2 and 3 moved to a consistent minimum size limit of 3 3/16 in. (81 mm) CL.

1952: Fishing season in D3 (LFA 35) changed to open from Nov. 1 to Dec. 30 and March 1 to July 20.

1955: Fishing season in D3 (LFA 35) changed to open from Oct. 15 to Dec. 30 and March 1 to July 20.

1956: Fishing seasons in D's 1 and 2 changed to be open from Nov. 15 to June 24.

1962: D1 and D2 were combined into one District called D1.

1968: License limits introduced. Trap limits introduced, based on average number of traps fished in each District prior to 1968. D1 (LFA's 36 and 38) limited to 375 traps; D3 (LFA 35) limited to 300 traps.

1973: Fishing season for D3 (LFA 35) open from Oct. 15 to Dec. 31 and from March 1 to July 31.

1977: Closing date for spring season in D1 (LFA's 36 and 38) changed to third Friday in June, and opening of fall season changed to second Tuesday in November. D1 was divided into D1 (LFA 36) and D2 (LFA 38). Charlotte Co. remained in D1. Trap limits in D1 (LFA 36) reduced from 375 to 300 traps.

1978: Introduction of "Lobster Buy-Back Program" (ran from 1978 to 1981).

1979: End of winter season in D1 (LFA 36). Fishery now open from second Tuesday in Nov. to Jan. 15 and from April 1 to the third Friday in June.

Appendix 1 (cont.)

1980: Change of D1 (LFA 36) and D2 (LFA 38) spring closing date to the fourth Friday in June.

1982: Change of D1 (LFA 36) closing date to June 30.

1986: Establishment of Mid-Bay line and Buffer Zone. Old Districts renamed Lobster Fishing Areas. D1 became LFA 36, D2 became LFA 38 and D3 became LFA 35.

Appendix 2. Outputs from Length Based Cohort Analyses (LCA) for the Bay of Fundy Lobster Fishery, 1988 - 1995.

On the following 8 pages:

Page 1 - LCA for LFA 35, 1988-1991 Page 2 - LCA for LFA 35, 1992-1995

Page 3 - LCA for LFA 36, 1988-1991 Page 4 - LCA for LFA 36, 1992-1995

Page 5 - LCA for LFA 38, 1988-1991 Page 6 - LCA for LFA 38, 1992-1995

Page 7 - LCA for Bay of Fundy (LFA's 35, 36, and 38), 1988-1991 Page 8 - LCA for Bay of Fundy (LFA's 35, 36, and 38), 1992-1995

LFA	3	5 fe	males, 19	88 fish	ing seaso	n					
									(INPUT)		
LENG	TH	н-ва:	SED COHORT	ANALYS	IS		Te	rm in al F =	0.2		
							Natural Mor	tality (m)=	0.147		
			(IN P U T)	(INPUT)				IC =	0.38		
Leng	t h		Catch	Delta-t	Stock	Mean					
(mm)			(numbers)	(у)	Num bers	Num ber	F / Z	Z	F		F*C
131	=	140	469	2 0 5 5	81/						
121	-	130	2203	1.983	3 5 5 0	3628	0.805	0.754	0.607		1337
116	-	120	3596	0.932	7859	4853	0.834	0.888	0.741		2664
111	-	115	4043	0.839	13128	8338	0.767	0.632	0.485		1961
106	-	110	10446	0.726	25486	13007	0.845	0.950	0.803		8389
96		100	12194	0.533	54512	24034	0.75	0.654	0.507		6187
91	-	95	19626	0.486	78717	3 1 1 4 7	0.811	0.777	0.630		12367
86	-	90	25943	0.465	110915	4 2 5 5 3	0.806	0.757	0.610		15817
81	-	85	24806	0.457	144074	56819	0.748	0.584	0.437		10830
7 0 7 0 T o tal	=		113 829			203402	Wtd Ave E -		0 5 7 4		65351
10101			110,020			200,102	A =		0.437		00001
LFA	3	5 fe	males.19	89 fish	ing seaso	o n					
	ľ	[· · ·							(INPUT)		
LENG	TH	н-ва:	SED COHORT	ANALYS	IS		Те	rminalF =	0.2		
							Natural Mor	tality (m)=	0.147		
	-			(1)				Tc =	0.38	┦┤	
leng	l		(INPUI) Catch	Delta-4	Stock	Меал				+	
(m m)	Ϊ		(numbers)	(v)	Numbers	Number	F/Z	z	F		F * C
	=									\square	
131	-	140	938	2.055	1628					$\left \right $	
121	-	130	4690	1.983	7418	7483	0.810	0.774	0.627	+	2940
111		115	8664	0.932	24842	15270	0.791	0.702	0.555		4916
106	-	110	1 3 5 6 8	0.726	41771	22867	0.801	0.740	0.593		8050
101	-	105	17043	0.619	63391	3 1 1 3 7	0.788	0.694	0.547		9329
96	-	100	17052	0.533	86130	38689	0.750	0.588	0.441		7515
86	-	95	25716	0.486	118934	48221	0.784	0.680	0.533		13/14
81	-	85	2 1 9 8 0	0.457	184924	75667	0.664	0.437	0.290		6385
	= =										
Total			138,641			310,158	Wtd.Ave.F =		0.468		64942
							A =		0.574		
	2	E [A	m alaa 10	0 0 fia h							
	3	<u>5 fe</u>	males, 19	<u>90 fish</u>	ing seaso	n					
	3	5 fe	m ales, 19	90 fish	ing seaso	n		minal E -	(INPUT)		
	3 	5 fe н-ва:	m ales, 19 sed соногт	90 fish ANALYS	ing seaso IS	n	Te Natural Mor	rm in al F = tality (m)=	(IN P U T) 0.2 0.147		
	3 T I	<u>5 fe</u> н-ва:	m ales, 19 sed cohort	90 fish ANALYS	ing seaso 18	• n	Te Natural Mor	rm in al F = tality (m)= Tc =	(IN P U T) 0.2 0.147 0.38		
	3 T I	<u>5 fe</u> н-ва:	m ales, 19 SED COHORT (INPUT)	90 fish ANALYS (INPUT)	ing seaso IS	• n	Te Natural Mor	rm in al F = tality (m)= Tc =	(IN P U T) 0.2 0.147 0.38		
LFA LENG	3 T I t h	5 fe н-ва:	males, 19 SED COHORT (INPUT) Catch	90 fish ANALYS (INPUT) Delta-t	ing seaso IS Stock	Mean	Te Natural Mor	rm in al F = tality (m)= Tc =	(IN P U T) 0.2 0.147 0.38		
<u>LFA</u> <u>LENG</u> <u>Leng</u> (mm)	3 T I t h	5 fe	males, 19 SED COHORT (INPUT) Catch (numbers)	90 fish ANALYS (INPUT) Delta-t (V)	ing seaso IS Stock Numbers) n Mean Number	Te Natural Mor F/Z	rm in al F = tality (m)= Tc = Z	(IN P U T) 0.2 0.147 0.38 F		 F * C
<u>LFA</u> <u>LENG</u> (mm) ==== 141	3 T H t h =	5 fe H - B A S = = = 1 5 0	males, 19 SED COHORT (INPUT) Catch (numbers) 115	90 fish ANALYS (INPUT) Delta-t (Y) ====== 2.096	ing seaso IS Stock Numbers 199	n Mean Number	Te Natural Mor F/Z	rm in al F = tality (m)= Tc = Z	(IN P U T) 0.2 0.147 0.38 F		F * C
<u>L F A</u> <u>L E N G</u> <u>L e n g</u> (m m) = = = = 141 131	3 T I t h = -	5 fe H - B A 3 = = = 1 5 0 1 4 0	m ales, 19 SED COHORT (IN PUT) Catch (numbers) 115 115	90 fish ANALYS (INPUT) Delta-t (Y) ==== 2.096 2.095	ing seaso IS Stock Numbers 199 398	9 n Mean Number 573	Te Natural Mor F/Z 0.577	rm in al F = tality (m) = Tc = Z 	(IN P U T) 0.2 0.147 0.38 F 		F * C
L F A L E N G L e n g (m m) = = = = 141 131 121 116	3 T I t h = -	5 fe H - B A = = = 1 5 0 1 4 0 1 3 0	m ales, 19 SED COHORT (INPUT) Catch (numbers) ====================================	90 fish ANALYS (INPUT) Delta-t (Y) ===== 2.096 2.055 1.983 0.202	ing seaso IS Stock Numbers 199 398 1047	0 n Mean Number 573 1284	Te Natural Mor F/Z	rm in al F = tality (m) = Tc = Z 0.347 0.505	(IN P U T) 0.2 0.147 0.38 F 		F*C ::::::::::::::::::::::::::::::::::::
<u>L F A</u> <u>L E N G</u> <u>L e n g</u> (m m) ==== 141 131 121 111	3 T H t h = - - -	5 fe H - B A = = = 1 5 0 1 4 0 1 2 0 1 1 5	m ales, 19 SED COHORT (IN PUT) Catch (numbers) 115 115 460 1043 3011	90 fish ANALYS (INPUT) Delta-t (Y) = = = = = 2.096 2.096 2.055 1.983 0.932 0.932	ing seaso IS Stock Numbers 199 398 1047 2300 5757	M ean Number 573 1284 1425 3036	Te Natural Mor F/Z	rm in al F = tality (m) = T c = Z 	(IN P U T) 0.2 0.147 0.38 F 		F * C 2 3 1 6 5 7 6 4 2 9 8 6
L F A L E N G (m m) = = = = 141 131 121 116 111 106	3 T H = - - - - - -	5 fe H - B A = = = 1 5 0 1 4 0 1 3 0 1 2 0 1 1 5 1 1 0	m ales, 19 SED COHORT (IN PUT) Catch (numbers) ====================================	90 fish ANALYS (INPUT) Delta-t (Y) = = = = = 2.096 2.055 1.983 0.932 0.839 0.726	ing seaso IS Stock Numbers 	M ean Number 573 1284 1425 3036 5657	T e N atural M or F/Z 0.577 0.709 0.833 0.871 0.841	rm in al F = ta lity (m) = T c = 2 	(IN P U T) 0.2 0.147 0.38 F 0.200 0.358 0.732 0.992 0.780		F*C 23 165 764 2986 3443
L F A L E N G (m m) = = = = 141 131 121 116 111 106 101	3 T H = - - - - - - - - -	5 fe H - B A = = = 150 140 130 120 115 110 105	m ales, 19 SED COHORT (IN PUT) Catch (numbers) ====================================	9 0 fish A N A L Y S (IN P U T) D e Ita -t (Y) = = = = = = 2 .0 9 6 2 .0 5 5 1 .9 8 3 0 .9 3 2 0 .8 3 0 .9 3 2 0 .8 3 0 .7 2 6 0 .6 1 9	ingsease IS Stock Numbers 	M ean Number 573 1284 1425 3036 5657 8789	T e N atural M or F/Z 0.577 0.709 0.833 0.871 0.841 0.843	rm in al F = ta lity (m)= T c = 2 	(IN P U T) 0.2 0.147 0.38 F 		F*C 23 165 764 2986 3443 5489
L F A L E N G (m m) = = = 141 131 121 116 111 106 101 96 0	3 T I t h - - - - - - - - - -	5 fe H - B A = = = 1 50 1 40 1 30 1 20 1 15 1 10 1 05 1 00	m ales, 19 SED COHORT (IN PUT) Catch (numbers) 115 115 460 1043 3011 4413 6946 12273 4267	90 fish ANALYS (INPUT) Delta-t (y) ===== 2.096 2.095 5.1.983 0.932 0.839 0.726 0.619 0.533 0.440	ing seasc IS Stock Numbers 	M ean Number 573 1284 1425 3036 5657 8789 13203	T e N a tu ra I M o r F /Z 0.577 0.709 0.833 0.871 0.841 0.843 0.863 0.863	rm in al F = ta lity (m) = T c = 2 0.347 0.505 0.879 1.139 0.927 0.937 1.077 1.077	(IN P U T) 0.2 0.147 0.38 F 		F * C : : : : : : : : : : : : : : : : : : :
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L F A L E N G (m m) = = = 141 131 121 116 111 106 91 86 91 86 91 86 91 E = = = T o tal L E N G L E N G L E N G 131 116 117 116 117 116 117 116 117 116 117 116 117 117	3 T H - - - - - - - - - - - - -	5 fe 	m ales, 19 SED COHORT (IN PUT) Catch (numbers) Catch (numbers) Catch (1043) 3011 4413 6946 12273 18497 18707 18707 18707 18707 18707 18707 18707 18707 18707 18707 16481 SED COHORT (IN PUT) Catch (numbers) 235 1636 1167 5149	90 fish A N A L Y S (IN P U T) D e Ita-t (Y) = = = = = = 2.096 2.055 1.983 0.932 0.839 0.726 0.619 0.533 0.486 0.465 0.465 0.457 = = = = = 1 fish i A N A L Y S (IN P U T) D e Ita-t (Y) = = = = = 2.055 1.983 0.932 0.839	in g Seaso IS Stock Numbers 199 398 1047 2300 5757 11002 19239 33453 54937 78026 99332 	M e a n N u m b e r 5 7 3 1 2 8 4 1 4 2 5 3 0 3 6 5 6 5 7 8 7 8 9 1 3 2 0 3 2 9 8 0 6 3 9 6 2 4 	T e N atural M or F/Z 0.577 0.709 0.833 0.871 0.841 0.843 0.861 0.861 0.861 0.810 0.727 W td. A ve.F = A = Te N atural M or F/Z 0.832 0.740 0.871	rm in al F = ta lity (m) = T c = 2 	(IN P U T) 0.2 0.147 0.38 F 		F * C 2 3 1 65 7 6 4 2 9 8 6 3 4 4 3 5 4 8 9 1 1 4 0 9 1 6 8 3 4 1 1 7 4 2 6 0 4 8
L F A L E N G (m m) = == 141 131 121 116 101 96 91 86 91 86 81 = === T o tal L E N G L E N G L E N G 131 121 116 101 96 91 86 81 = === 131 121 106 91 86 81 = === 106 81 107 106 111 106 106	3 T H - - - - - - - - - - - - -	5 fe 	m ales, 19 SED COHORT (IN PUT) Catch (numbers) Catch (numbers) Catch 115 460 1043 3011 4413 6946 12273 18497 18707 15481 SED COHORT (IN PUT) Catch (numbers) SED COHORT 235 1636 1167 5149 7942	90 fish A N A L Y S (<i>IN P U T</i>) D e Ita-t (<i>Y</i>) = = = = = = 2.096 2.096 2.095 1.983 0.932 0.839 0.726 0.619 0.533 0.486 0.465 0.457 = = = = = 1 fishi A N A L Y S (<i>IN P U T</i>) D e Ita-t (<i>Y</i>) = = = = = 2.055 1.983 0.932 0.839 0.726	ing sease IS Stock Numbers 199 398 1047 2300 5757 11002 19239 33453 54937 78026 99332 0 0 54937 78026 99332 0 15 Stock Numbers 407 2372 3950 9865 19247	M ean Number 573 1284 1425 3036 5657 8789 13203 29806 39624 	T e N a tu ra I M o r F /Z 0.577 0.709 0.833 0.871 0.841 0.843 0.863 0.863 0.861 0.810 0.727 W td.A ve.F = A = Te N a tu ra I M o r F /Z 0.832 0.740 0.8346	rm in al F = ta lity (m) = T c = 2 0.347 0.505 0.879 1.139 0.927 0.937 1.077 1.057 0.775 0.538 	(IN P U T) 0.2 0.147 0.38 F 0.200 0.358 0.732 0.992 0.780 0.930 0.930 0.910 0.628 0.391 0.628 0.391 0.628 0.391 0.516 (IN P U T) 0.2 0.147 0.38 0.730 0.418 0.989 0.810		F*C 23 165 764 2986 3443 5489 11409 16834 11742 6048
L F A L E N G (m m) ==== 1411 131 121 116 101 96 91 86 81 ==== Total L E N G L E N G (m m) ==== 1311 121 116 101 96 81 ==== 1311 121 106 91 86 81 ==== 131 121 106 91 86 81 ==== 107 107 107 106 101 106 106	3 T I - - - - - - - - - - - - -	5 fe 	m ales, 19 SED COHORT (IN PUT) Catch (numbers) Catch (numbers) Catch (10 43 3011 4413 6946 12273 18497 18707 15481 81,061 n ales, 199 SED COHORT (IN PUT) Catch (numbers) SED COHORT 235 1636 1167 5149 7942 9791	90 fish A N A L Y S (<i>IN P U T</i>) D e Ita -t (<i>Y</i>) = = = = = = 2.096 2.096 2.095 1.983 0.932 0.839 0.726 0.619 0.533 0.486 0.465 0.457 = = = = = 1 fish i A N A L Y S (<i>IN P U T</i>) D e Ita -t (<i>Y</i>) = = = = = 2.055 1.983 0.457 = = = = = 0.457 = = = = = 2.055 1.983 0.932 0.839 0.726 0.619 0.726 0.839 0.726 0.839 0.726 0.839 0.726 0.619 0.726 0.839 0.726 0.839 0.726 0.839 0.726 0.619 0.726 0.839 0.726 0.839 0.726 0.839 0.726 0.839 0.726 0.619 0.726 0.839 0.726 0.839 0.726 0.839 0.726 0.726 0.457 0.557 0.726 0.619 0.726 0.	ing sease IS Stock Numbers 199 398 1047 2300 5757 11002 19239 33453 54937 78026 99332 99332 0 15 Stock Numbers 407 2372 3950 9865 19247 31215	M ean Number 573 1284 1425 3036 5657 8789 13203 29806 39624 	T e N atural M or F/Z 0.577 0.709 0.833 0.871 0.841 0.843 0.863 0.861 0.861 0.810 0.727 W td.A ve.F = A = Vtd.A ve.F = A = Vtd.A ve.F = A = Vtd.A ve.F = A = Vtd.A ve.F = A = Vtd.A ve.F = Vtd.A ve.F = A = Vtd.A	rm in al F = ta lity (m) = T c = 2 	(IN P U T) 0.2 0.147 0.38 F 0.200 0.358 0.732 0.992 0.780 0.930 0.930 0.930 0.930 0.930 0.930 0.930 0.9310 0.628 0.3911 0.628 0.3915 0.7516 (IN P U T) 0.2 0.147 0.38 0.38 0.730 0.418 0.989 0.810 0.661		F * C 2 3 1 6 5 7 6 4 2 9 8 6 3 4 4 3 5 4 8 9 1 1 4 0 9 1 6 8 3 4 1 1 7 4 2 6 0 4 8 1 1 7 4 2 6 0 4 8 5 8 9 0 3 F * C 1 1 9 5 4 8 8 5 0 9 0 6 4 3 6 6 4 7 3
L F A L E N G (m m) = == 141 131 121 116 101 96 81 = = = T o tal L E N G L E N G L E N G (m m) = = = 131 121 116 111 106 101 96 101 101 96 101 101 106 101 101 106 101 101	3 T H - - - - - - - - - - - - -	5 fe 	m ales, 19 SED COHORT (IN PUT) Catch (numbers) 115 460 1043 3011 4413 6946 12273 18497 18707 15481 ======= 81.061 n ales, 199 SED COHORT (IN PUT) Catch (numbers) ======= 235 1636 1167 5149 7942 9791 17472 2257	90 fish A N A L Y S (IN P U T) D e Ita -t (Y) = = = = = = 2.096 2.096 2.095 1.983 0.932 0.839 0.726 0.619 0.533 0.486 0.465 0.457 = = = = = 1 fish i A N A L Y S (IN P U T) D e Ita -t (Y) = = = = = 2.055 1.983 0.485 0.457 = = = = = 2.055 1.983 0.485 0.457 = = = = = 2.055 1.983 0.932 0.839 0.726 0.619 0.533 0.485 1.983 0.932 0.839 0.726 0.619 0.533 0.485 0.932 0.839 0.726 0.619 0.533 0.485 0.932 0.955 1.983 0.932 0.839 0.726 0.619 0.533 0.485 0.932 0.839 0.726 0.619 0.533 0.485 0.932 0.955 1.985 1.9	ing sease IS Stock Numbers 	M e a n N u m b e r 5 7 3 1 2 8 4 1 4 2 5 3 0 3 6 5 6 5 7 8 7 8 9 1 3 2 0 3 2 9 8 0 6 3 9 6 2 4 	T e N a tu ra l M o r 	rm in al F = ta lity (m) = T c = 0.347 0.505 0.879 1.139 0.927 0.937 1.077 1.057 0.775 0.538 	(IN P U T) 0.2 0.147 0.38 F 0.200 0.358 0.732 0.992 0.780 0.930 0.927 0.38 0.388 0.388 0.3810 0.9889 0.8350 0.8350 0.8350 0.8350 0.7450 0.8350 0.7450 0.8350 0.74500 0.74500 0.74500 0.74500 0.74500 0.74500 0.74500 0.745000 0.745000 0.745000 0.7450000 0.745000000000000000000000000000000000		F * C 2 3 1 6 5 7 6 4 2 9 8 6 3 4 4 3 5 4 8 9 1 1 4 0 9 1 6 8 3 4 1 1 7 4 2 6 0 4 8
L F A L E N G (m m) = == 141 131 121 116 111 106 91 86 81 = = = T o tal L E N G L E N G (m m) = = = 131 121 106 81 = = = 131 121 106 81 = = = 131 116 101 96 91 86 81 = = = 131 116 106 91 86 81 = = = 131 106 106 91 86 81 = = = 131 106 106 91 86 81 = = = 131 106 106 91 86 81 = = = 131 106 106 91 86 81 = = = 131 106 106 106 106 107 106 106 107 107 106 107 107 106 107 107 106 107 107 106 107 107 107 107 107 107 107 107	3 T H - - - - - - - - - - - - -	5 fe 	m ales, 19 SED COHORT (IN PUT) Catch (numbers) 115 115 460 1043 3011 4413 6946 12273 18497 18707 15481 SED COHORT (IN PUT) Catch (numbers) SED COHORT (18707 15481 235 1636 1167 5149 7942 9791 17472 22573 21400	90 fish A N A L Y S (IN P U T) D elta-t (v) = = = = = = 2.096 2.055 1.983 0.932 0.839 0.726 0.619 0.533 0.486 0.465 0.457 = = = = = = 1 fish i A N A L Y S (IN P U T) D elta-t (v) = = = = = = 2.055 1.983 0.486 0.465 0.465 1.983 0.726 0.619 0.533 0.486 0.465 1.983 0.932 0.839 0.726 0.619 0.533 0.932 0.839 0.726 0.619 0.533 0.486 0.465 1.983 0.932 0.839 0.726 0.619 0.533 0.465 1.983 0.932 0.932 0.932 0.932 0.932 0.932 0.933 0.932 0.933 0.932 0.932 0.933 0.932 0.932 0.933 0.9465 0.4	in g Seasc IS Stock Numbers 199 398 1047 2300 5757 11002 19239 33453 54937 78026 99332 	M ean Number 573 1284 1425 3036 573 1284 1425 3036 5657 8789 13203 29806 39624 	T e N a tu ra l M o r 0.577 0.709 0.833 0.871 0.841 0.843 0.863 0.861 0.861 0.810 0.727 W td.A ve.F = A = T e N a tu ra l M o r F/Z 0.832 0.740 0.832 0.740 0.835 0.850 0.835 0.777	rm in al F = ta lity (m) = T c = 0.347 0.505 0.879 1.139 0.927 0.937 1.077 0.737 1.077 0.775 0.538 rm in al F = ta lity (m) = T c = 2 0.877 0.565 1.136 0.957 0.808 0.982 0.892 0.892 0.892	(IN P U T) 0.2 0.147 0.38 F 0.200 0.358 0.732 0.992 0.780 0.992 0.780 0.992 0.780 0.9910 0.930 0.910 0.628 0.3910 0.628 0.3910 0.628 0.3910 0.628 0.3910 0.61418 0.38 F 		F*C ::::::::::::::::::::::::::::::::::::
L F A L E N G (m m) = == 141 131 121 116 111 106 91 866 81 = = = T o tal L E N G L E N G (m m) = = = 131 121 121 166 111 96 81 121 131 106 91 86 81 131 121 131 106 91 86 81 131 131 106 101 106 91 86 81 131 106 106 107 106 107 107 107 107 107 107 107 107	3 T H - - - - - - - - - - - - -	5 fe 	m ales, 19 SED COHORT (IN PUT) Catch (numbers) 115 115 460 1043 3011 4413 6946 12273 18497 18707 15481 ======= 81,061 nales, 199 SED COHORT (IN PUT) Catch (numbers) ======= 235 1636 1167 5149 7942 9791 17472 22573 21400 14892	90 fish A N A L Y S (IN P U T) D e Ita-t (Y) = = = = = = 2.096 2.055 1.983 0.932 0.839 0.726 0.619 0.533 0.486 0.465 0.457 = = = = = 2.055 1.983 0.486 0.457 = = = = = 2.055 1.983 0.457 = = = = = = 2.055 1.983 0.457 = = = = = = 2.055 1.983 0.457 = = = = = = 2.055 1.983 0.486 0.465 0.457 = = = = = =	ing sease IS Stock Numbers 199 398 1047 2300 5757 11002 199 33453 54937 78026 99332 	M ean N u m b er 573 1284 1425 3036 5657 8789 13203 20323 29806 39624 	T e N a tu ra I M o r F /Z 0.577 0.709 0.833 0.841 0.841 0.843 0.863 0.861 0.863 0.861 0.727 W td. A ve.F = A = X = X = X = X = X = X = X = X	rm in al F = ta lity (m) = T c = 2 0.347 0.505 0.879 1.139 0.927 0.937 1.077 1.057 0.775 0.538 	(IN P U T) 0.2 0.147 0.38 		F*C ::::::::::::::::::::::::::::::::::::
L F A L E N G (m m) = == 1411 131 121 1106 111 106 91 86 81 E F A L E N G L E N G L E N G L E N G 131 116 111 106 91 86 111 116 111 106 91 86 81 121 131 106 91 86 81 131 116 106 91 86 81 131 116 106 91 86 81 131 116 106 91 86 81 131 106 91 86 81 141 106 91 86 81 141 106 91 86 81 141 106 91 86 81 141 106 91 86 81 141 106 91 86 81 141 106 91 86 81 141 106 91 86 81 141 106 91 86 81 141 106 91 86 81 141 106 91 86 81 141 116 117 106 91 86 81 141 116 117 106 91 86 81 141 116 117 116 86 81 117 116 117 116 86 81 117 116 117 116 86 81 117 116 117 116 86 81 117 116 86 81 117 117 116 117 86 81 81 81 86 81 81 81 81 81 81 81 81 81 81	3 T + h - - - - - - - - - - - - -	5 fe 	m ales, 19 SED COHORT (IN PUT) Catch (numbers) 115 115 460 1043 3011 4413 6946 12273 18497 18707 15481 3011 4413 6946 12273 18497 18707 15481 SED COHORT (N PUT) Catch (numbers) SED COHORT 235 1636 1167 5149 7942 9791 17472 22573 21400 14892	90 fish A N A L Y S (IN P U T) D e Ita-t (Y) = = = = = = 2.096 2.096 2.095 1.983 0.932 0.839 0.726 0.6138 0.486 0.465 0.457 = = = = = 1 fish i A N A L Y S (IN P U T) D e Ita-t (Y) D e Ita-t (Y) = = = = = 2.055 1.983 0.485 0.457 = = = = = 2.055 1.983 0.457 = = = = = 2.055 1.983 0.932 0.839 0.726 0.619 0.533 0.486 0.4657 = = = = = =	ing sease IS Stock Numbers 199 398 1047 2300 5757 11002 19239 33453 54937 78026 99332 	M ean Number 573 1284 1425 3036 5657 8789 13203 20323 29806 39624 	T e N a tu ra I M o r F /Z 0.577 0.709 0.833 0.841 0.841 0.843 0.863 0.861 0.863 0.861 0.727 W td. A ve.F = A = F /Z 0.832 0.810 0.740 0.832 0.846 0.832 0.740 0.835 0.835 0.777	rm in al F = ta lity (m) = T c = 2 0.347 0.505 0.879 1.139 0.927 0.937 1.057 0.775 0.775 0.775 0.538 rm in al F = ta lity (m) = T c = 2 0.877 0.565 1.136 0.957 0.808 0.982 0.892 0.659 0.428 	(IN P U T) 0.2 0.147 0.38 F 0.200 0.358 0.732 0.992 0.780 0.930 0.910 0.930 0.910 0.628 0.391 0.516 (IN P U T) 0.2 0.147 0.38 0.730 0.418 0.989 0.810 0.661 0.835 0.745 0.512 0.281 		F*C ::::::::::::::::::::::::::::::::::::

	3	5 fe	males.19	92 fish	ing seaso	o n		(ALMA on	ly sam nle)	
		[, . v							
LENG	T F	- 	SED COHORT	ANALYS	IS		Τe	rm in al F =	0.2	
	Ľ						Natural Mor	tality (m.)=	0.147	
								Tc =	0.38	
			(IN P U T)	(INPUT)						
Lengt	<u>th</u>		Catch	Delta-t	Stock	Mlean				
(mm)			(numbers)	(у)	Num bers	Number	F/Z	Z	F	F * C
= = = =	=	= = =	694		4 4 0 7					
131	-	140	849	2.096	2558	3550	0.619	0 3 8 6	0 2 3 9	203
121	-	130	5092	1 9 8 3	9112	9946	0.013	0.550	0.239	2607
116	-	120	5310	0.932	16044	11032	0.766	0.628	0.481	2556
111	-	115	6652	0.839	25122	16499	0.733	0.550	0.403	2682
106	-	110	11497	0.726	39925	22498	0.777	0.658	0.511	5875
101	-	105	11470	0.619	55600	28608	0.732	0.548	0.401	4598
96	-	100	16974	0.533	77624	34350	0.771	0.641	0.494	8388
91	-	95	22836	0.486	106839	4 3 3 9 5	0.782	0.673	0.526	12017
86	-	90	30671	0.465	145880	56941	0.786	0.686	0.539	16520
81	-	85	27497	0.457	184229	73828	0.717	0.519	0.372	10241
	=									
Total			139,531			300,646	Wtd.Ave.F =		0.471	65688
							A =		0.373	
	3	<u>5 te</u>	males, 19	<u>93 tish</u>	ing seaso	n				
									(INPUT)	
LENG	TH	Н-ВАЗ	SED COHORT	ANALYS	IS		Те	rminalF =	0.2	
							Natural Mor	tality (m)=	0.147	
	\vdash			(1)				Tc =	0.38	
<u> </u>										
Lengi (m)	[n		Catch	Delta-t	Stock	Mean		-	-	
<u>(mm)</u>	-		(numbers)	(y)	Numbers	Number	F / Z	Z	F	F ^ C
141	-	150	100	2 0 9 6	17/					
131	-	140	1560	2.055	1985	1708	0.861	1.060	0,913	1425
121	-	130	3001	1.983	6010	6961	0.746	0.578	0.431	1294
116	-	120	4041	0.932	11150	7472	0.786	0.688	0.541	2186
111	-	<u>11</u> 5	5601	0.839	18484	11785	0.764	0.622	0.475	2662
106	-	110	6723	0.726	27568	16064	0.740	0.566	0.419	2814
101	-	105	7645	0.619	38107	19688	0.725	0.535	0.388	2968
96	-	100	1 0 2 0 8	0.533	5 1 7 3 3	23249	0.749	0.586	0.439	4 4 8 2
91	-	95	14550	0.486	70516	28796	0.775	0.652	0.505	7 3 5 2
86	-	90	25861	0.465	102050	38589	0.820	0.817	0.670	17331
81	-	85	37501	0.457	147615	54861	0.823	0.831	0.684	25634
7070	=	= = =				200 172	W to A y a F -		0 5 9 4	6.9.1.4.0
Total			110,793			209,173	witd.Ave.F =		0.384	00149
	-	F f a		0.4.41.5.5					0.442	
LFA	3	5 Te	males, 19	94 TISN	ing seasc	<u>n</u>				
LENG									(INPUT)	
-	TH	Н-ВА	SED COHORT	ANALYS	IS		T e	rminalF =	(INPUT) 0.2	
	TF	н-ваз	SED COHORT	ANALYS	IS		Te Natural Mor	rm in al F = tality (m)=	(<i>IN P U T)</i> 0.2 0.147	
		н-ва:	SED COHORT	ANALYS	IS		Te Natural Mor	rminalF = tality (m)= Tc =	(IN P U T) 0.2 0.147 0.38	
		H - B A S	SED COHORT (INPUT)	ANALYS (INPUT)	15		Te Natural Mor	rminalF = tality (m)= Tc =	(IN P U T) 0.2 0.147 0.38	
Lengi	T F	Н-ВА \$	SED COHORT (INPUT) Catch	A N A L Y S (IN P U T) D e Ita -t	IS Stock	Mean	Te Natural Mor	rminalF = tality (m)= Tc =	(IN P U T) 0.2 0.147 0.38	
<u>Leng</u> (mm)	T H	H - B A S	SED COHORT (INPUT) Catch (numbers)	A N A L Y S (IN P U T) D e Ita - t (y)	IS Stock Numbers	Mean Number	Te Natural Mor F/Z	rminalF = tality (m)= Tc = Z	(IN PUT) 0.2 0.147 0.38 F	F * C
<u>Leng</u> (mm) ==== 131	T t h =	H - B A S = = = 1 4 0	SED COHORT (INPUT) Catch (numbers) 194	A N A L Y S (IN P U T) D e Ita - t (y) = = = = = =	15 Stock Numbers 	Mean Number	Te Natural Mor F/Z	rm in al F = tality (m)= Tc = Z	(IN P U T) 0.2 0.147 0.38 F	F * C
<u>Leng</u> (mm) = = = = 131 121	T F th = -	 B A 3 = = = <u>1 4 0</u> 1 3 0	SED COHORT (INPUT) Catch (numbers) 194 520	A N A L Y S (IN P U T) D e Ita -t (y) = = = = = 2.055 1.983	IS Stock Numbers 336.026 1.031	Mean Number 1,188	Te Natural Mor F/Z	rm in al F = tality (m)= Tc = Z 	(IN P U T) 0.2 0.147 0.38 F 	F*C ::::::::::::::::::::::::::::::::::::
<u>Leng</u> (mm) ==== 131 121 116	T F t h = -	= = = 1 4 0 1 3 0 1 2 0	SED COHORT (INPUT) Catch (numbers) 194 520 2080	A N A L Y S (IN P U T) D e Ita - t (y) = = = = = 2.055 1.983 0.932	IS Stock Numbers 336.026 1.031 3.373	Mean Number 1.188 1.786	Te Natural Mor F/Z 0.749 0.888	rm in al F = tality (m) = Tc = Z 	(IN P U T) 0.2 0.147 0.38 F 	F * C 2 2 8 2 4 2 3
Lengt (mm) ==== 131 121 116 111	T F t h = - -	= = = 1 4 0 1 3 0 1 2 0 1 1 5	SED COHORT (INPUT) Catch (numbers) 194 520 2080 1560	A N A L Y S (IN P U T) D e ita -t (y) = = = = = = 2.055 1.983 0.932 0.839	Stock Numbers 336.026 1.031 3.373 5.451	Mean Number 1,188 1,786 3,521	Te Natural Mor F/Z 0.749 0.888 0.751	rm in al F = tality (m) = T c = Z 0.585 1.312 0.590	(IN P U T) 0.2 0.147 0.38 F 	F * C 2 2 8 2 4 2 3 6 9 1
Lengt (mm) ==== 131 121 116 111 106	T t h = - - - - - -	= = = 1 4 0 1 3 0 1 2 0 1 1 5 1 1 0	SED COHORT (IN PUT) Catch (numbers) 194 520 2080 1560 2661	A N A L Y S (IN P U T) D e Ita-t (y) = = = = = 2 .0 5 5 1 .9 8 3 0 .9 3 2 0 .8 3 9 0 .7 2 6	IS Stock Numbers 336.026 1.031 3.373 5.451 8.836	M e a n N u m b e r 1,188 1,786 3,521 4,928	Te Natural Mor F/Z 0.749 0.888 0.751 0.786	rm in al F = tality (m) = T c = 2 0.585 1.312 0.590 0.687	(IN P U T) 0.2 0.147 0.38 F 	F * C ::::::::::::::::::::::::::::::::::::
$ \underbrace{L e n g f}_{(m m)} = = = = = = = = = = = = = = = = = $	T t h = - - - - - - -	= = = 1 4 0 1 3 0 1 2 0 1 1 5 1 1 0 1 0 5	SED COHORT (IN PUT) Catch (numbers) 194 520 2080 1560 2661 5322	A N A L Y S (IN P U T) D e Ita-t (Y) = = = = = 2.055 1.983 0.932 0.839 0.726 0.619 0.619	IS Stock Numbers 336.026 1.031 3.373 5.451 8.836 15.187 0.257	M e a n N u m b e r 1,188 1,786 3,521 4,928 6,997	Te Natural Mor F/Z 0.749 0.888 0.751 0.786 0.838	rm in al F = tality (m) = Tc = 2 0.585 1.312 0.590 0.687 0.908	(IN P U T) 0.2 0.147 0.38 F 	F * C :
	T t h - - - - - - - -	= = = 140 130 120 115 110 105	SEDCOHORT (INPUT) Catch (numbers) 194 520 2080 1560 2661 5322 12714	A N A L Y S (IN P U T) D e Ita -t (Y) = = = = = = 2 .055 1 .983 0 .932 0 .839 0 .726 0 .619 0 .533 0 .425	IS Stock Numbers 336.026 1.031 3.373 5.451 8.836 15.187 29.524 67400	M ean N u m b er 1.188 1.786 3.521 4.928 6.997 11.045	T e N atural M or F/Z 0.749 0.888 0.751 0.786 0.838 0.887 0.887	rm in al F = tality (m) = T c = 2 	(IN P U T) 0.2 0.147 0.38 F 	F * C 2 2 8 2 4 2 3 6 9 1 1 4 3 7 4 0 4 8 1 4 6 3 5 5 5 5 5 5 5
Leng1 (mm) ==== 131 121 116 111 106 101 96 91 86	T th - - - - - - - - - - - -	= = = 140 130 120 115 110 105 100 95	SEDCOHORT (INPUT) Catch (numbers) 194 520 2080 1560 2661 5322 12714 34530 55550	A N A L Y S (IN P U T) D e Ita -t (Y) = = = = = = 2.055 1.983 0.932 0.839 0.726 0.619 0.533 0.486	IS Stock Numbers 336.026 1.031 3.373 5.451 8.836 15.187 29.524 67.192 128.64	M e a n N u m b e r 	T e N atural M or F/Z 0.749 0.888 0.751 0.786 0.838 0.887 0.917 0.917	rm in al F = tality (m) = T c = 2 0.585 1.312 0.590 0.687 0.908 1.298 1.298 1.765 1.460	(IN P U T) 0.2 0.147 0.38 F 	F * C 2 2 8 2 4 2 3 6 9 1 1 4 3 7 4 0 4 8 1 4 6 3 5 5 5 8 5 9 7 2 0 4 4
Lengi (mm) ==== 131 121 116 111 106 101 96 91 86 81	T th - - - - - - - - - - - - -		SED COHORT (IN PUT) Catch (numbers) ====== 194 520 2080 1560 2661 5322 12714 34530 55550 69386	A N A L Y S (IN P U T) D e ita - t (Y) = = = = = = 2.055 1.983 0.932 0.839 0.726 0.619 0.533 0.486 0.465	IS Stock Numbers 	M e a n N u m b e r 1,188 1,786 3,521 4,928 6,997 11,045 21,345 42,306 73109	Te Natural Mor F/Z 0.749 0.888 0.751 0.786 0.888 0.887 0.917 0.899 0.899	rm in al F = tality (m) = T c = 2 0.585 1.312 0.590 0.687 0.908 1.298 1.765 1.460 1.095	(IN P U T) 0.2 0.147 0.38 F F 0.438 1.165 0.443 0.540 0.761 1.151 1.618 1.313 0.948	F * C 2 2 8 2 4 2 3 6 9 1 1 4 3 7 4 0 4 8 1 4 6 3 5 5 5 8 5 9 7 2 9 4 1 6 5 7 7 2
<u>Lengi</u> (mm) ==== 1311 116 111 106 101 96 91 86 81	T th - - - - - - - - - - - - -		SED COHORT (IN PUT) Catch (numbers) 194 520 2080 1560 2661 5322 12714 34530 55550 69386	A N A L Y S (IN P U T) D e Ita-t (Y) = = = = = 2.055 1.983 0.932 0.839 0.726 0.619 0.533 0.486 0.465 0.457 = = = =	IS Stock Numbers 336.026 1.031 3.373 5.451 8.836 15.187 29.524 67.192 128.961 209.108	M e a n N u m b e r 1,188 1,786 3,521 4,928 6,997 11,045 21,345 42,306 73,199	Te Natural Mor F/Z 0.749 0.888 0.751 0.786 0.838 0.838 0.838 0.837 0.917 0.917 0.899 0.866	rm in al F = tality (m) = T c = 2 0.585 1.312 0.590 0.687 0.908 1.298 1.298 1.765 1.460 1.095	(IN P U T) 0.2 0.147 0.38 F F 0.438 1.165 0.443 0.540 0.761 1.151 1.618 1.313 0.948	F * C 2 2 8 2 4 2 3 6 9 1 1 4 3 7 4 0 4 8 1 4 6 3 5 5 5 8 5 9 7 2 9 4 1 6 5 7 7 2
Lengi (mm) ==== 131 121 116 111 106 101 96 91 86 81 ==== Total	T th - - - - - - - - - - - - -	= = = 1 4 0 1 3 0 1 2 0 1 1 5 1 1 0 1 0 5 1 0 0 9 5 9 0 8 5 = =	SEDCOHORT (INPUT) Catch (numbers) 194 520 2080 1560 2661 5322 12714 34530 55550 69386 =======	A N A L Y S (IN P U T) D e Ita-t (Y) = = = = = = 2.055 1.983 0.932 0.839 0.726 0.619 0.533 0.485 0.465 0.457 = = = = = =	IS Stock Numbers 336.026 1.031 3.373 5.451 8.836 15.187 29.524 67.192 128.961 209.108	M ean N u m b er 1,188 1,786 3,521 4,928 6,997 11,045 21,345 42,306 73,199 	T e N atural M or F/Z 0.749 0.888 0.751 0.786 0.838 0.887 0.917 0.899 0.866 Wtd.Ave.F =	rm in al F = ta lity (m) = T c = 2 	(IN P U T) 0.2 0.147 0.38 F 0.438 1.165 0.443 0.540 0.761 1.151 1.618 1.313 0.948 1.182	F * C 2 2 8 2 4 2 3 6 9 1 1 4 3 7 4 0 4 8 1 4 6 3 5 5 5 8 5 9 7 2 9 4 1 6 5 7 7 2 ::::::::::::::::: 2 1 8 0 3 3
L e n g 1 (m m) = = = = = 1 3 1 1 2 1 1 1 6 1 1 1 1 1 0 1 0 1 9 0 9 1 8 6 8 1 = = = = T o tal	T t h = - - - - - - - - - - - - -		SEDCOHORT (INPUT) Catch (numbers) 194 520 2080 1560 2661 5322 12714 34530 55550 69386 ======= 184,517	A N A L Y S (IN P U T) D e It a - t (Y) = = = = = = 2 .0 55 1 .9 8 3 0 .9 3 2 0 .8 3 9 0 .7 2 6 0 .6 1 9 0 .5 3 3 0 .4 8 6 0 .4 6 5 0 .4 5 7 = = = = = =	IS Stock Numbers 336.026 1,031 3,373 5,451 8,836 15,187 29,524 67,192 128,961 209,108	M e a n N u m b e r 1,188 1,786 3,521 4,928 6,997 11,045 21,345 42,306 73,199 166,315	T e N atural M or F/Z 0.749 0.888 0.751 0.786 0.838 0.887 0.917 0.917 0.899 0.866 W td.A ye.F = A =	rm in al F = tality (m) = T c = 2 	(IN P U T) 0.2 0.147 0.38 F 0.438 1.165 0.443 0.540 0.761 1.151 1.618 1.313 0.948 1.182 0.693	F * C 2 2 8 2 4 2 3 6 9 1 1 4 3 7 4 0 4 8 1 4 6 3 5 5 5 8 5 9 7 2 9 4 1 6 5 7 7 2 ::::::::::::::::::::::::::::::::::::
Lengi (m m) = === 131 116 111 106 111 106 91 86 81 ==== Total	T		SED COHORT (IN PUT) Catch (numbers) 194 520 2080 1560 2661 5322 12714 34530 55550 69386 ======= 184,517 males 19	A N A L Y S (IN P U T) D e Ita -t (Y) = = = = = = 2.055 1.983 0.932 0.839 0.726 0.619 0.533 0.486 0.465 0.457 = = = = = = 9.5 ficb	IS Stock Numbers 336.026 1.031 3.373 5.451 8.836 15.487 29.524 67.192 128.961 209.108 	M e a n N u m b e r 1,188 1,786 3,521 4,928 6,997 11,045 21,345 42,306 73,199 166,315 0 n	T e N atural M or F/Z 0.749 0.888 0.751 0.786 0.838 0.887 0.917 0.917 0.899 0.866 W td.A ve.F = A =	rm in al F = tality (m)= T c = 2 0.585 1.312 0.590 0.687 0.908 1.298 1.765 1.460 1.095	(IN P U T) 0.2 0.147 0.38 F 	F * C 2 2 8 2 4 2 3 6 9 1 1 4 3 7 4 0 4 8 1 4 6 3 5 5 5 8 5 9 7 2 9 4 1 6 5 7 7 2 ::::::::::::::::::::::::::::::::::::
Lengi (mm) ==== 131 121 110 106 101 90 91 86 81 ===== Total	T	 B A B A B A 	SED COHORT (IN PUT) Catch (numbers) 194 520 2080 1560 2661 5322 12714 34530 55550 69386 ======== 184,517 males, 19	A N A L Y S (IN P U T) D e Ita - t (Y) = = = = = = 2 .0 55 1 .9 83 0 .9 32 0 .8 39 0 .7 26 0 .6 19 0 .5 3 3 0 .4 86 0 .4 65 0 .4 65 9 5 fish	IS Stock Numbers 	M e a n N u m b e r 	Te Natural Mor F/Z 0.749 0.888 0.751 0.786 0.887 0.917 0.899 0.866 Wtd.Ave.F = A =	rm in al F = tality (m)= Tc = 2 0.585 1.312 0.590 0.687 0.908 1.298 1.765 1.460 1.095	(IN P U T) 0.2 0.147 0.38 F F 0.438 1.165 0.443 0.540 0.761 1.151 1.618 1.313 0.948 1.182 0.693 (UN D U T)	F * C 2 2 8 2 4 2 3 6 9 1 1 4 3 7 4 0 4 8 1 4 6 3 5 5 5 8 5 9 7 2 9 4 1 6 5 7 7 2 ::::::::::::::::::::::::::::::::::::
Lengi (mm) ==== 131 121 116 111 106 91 96 91 86 81 ===== Total	T		SED COHORT (IN PUT) Catch (numbers) 194 520 2080 1560 2661 5322 12714 34530 55550 69386 ====== 184,517 males, 19	A N A L Y S (IN P U T) D e Ita-t (Y) = = = = = = 2.055 1.983 0.932 0.839 0.726 0.619 0.533 0.486 0.465 0.457 = = = = = 95 fish	IS Stock Numbers 336.026 1.031 3.373 5.451 8.836 15.187 29.524 67.192 128.961 209.108 	M ean N u m b er 1,188 1,786 3,521 4,928 6,997 11,045 21,345 42,306 73,199 166,315 0 n	Te Natural Mor F/Z 0.749 0.888 0.751 0.786 0.838 0.887 0.917 0.899 0.866 Wtd.Ave.F = A =	rm in al F = tality (m)= Tc = 2 0.585 1.312 0.690 0.687 0.908 1.298 1.765 1.460 1.095	(IN P U T) 0.2 0.147 0.38 0.438 1.165 0.443 0.540 0.761 1.151 1.618 1.313 0.948 1.182 0.693 (IN P U T)	F * C :
Leng1 (mm) ==== 131 121 116 111 106 101 96 91 86 81 ===== Total LFA LENG	T	- - B A S - - B A S	SED COHORT (IN PUT) Catch (numbers) 194 520 2080 1560 2661 5322 12714 34530 55550 69386 ====== 184,517 males, 19	A N A L Y S (IN P U T) D e Ita-t (Y) = = = = = = 2.055 1.983 0.932 0.839 0.726 0.619 0.533 0.4865 0.465 0.457 = = = = = 95 fish A N A L Y S	IS Stock Numbers 336.026 1.031 3.373 5.451 8.836 15.187 29.524 67.192 128.961 209.108 	M ean N u m b er 1.188 1.786 3.521 4.928 6.997 11.045 21.345 42.306 73.199 166.315 0 n	Te Natural Mor F/Z 0.749 0.888 0.751 0.786 0.838 0.887 0.917 0.899 0.866 Wtd.Ave.F = A =	rm in al F = tality (m) = T c = 2 	(IN P U T) 0,2 0,147 0,38 F 0,438 1,165 0,443 0,540 0,761 1,151 1,618 1,313 0,948 1,182 0,693 (IN P U T) 0,2 0,2 0,2 0,447 0,2 0,2 0,47 0,2 0,47 0,2 0,47 0,2 0,47 0,38 0,438 0,540 0,540 0,761 0,540 0,948	F * C 2 2 8 2 4 2 3 6 9 1 1 4 3 7 4 0 4 8 1 4 6 3 5 5 5 8 5 9 7 2 9 4 1 6 5 7 7 2 ::::::::::::::::::::::::::::::::::::
Lengi (m m) ==== 131 116 111 106 101 96 91 86 81 ==== Total LFA	T h th - - - - - - - - - - - - - - - - - -	- - B A S - - B A S	SED COHORT (IN PUT) Catch (numbers) 194 520 2080 1560 2661 5322 12714 34530 55550 69386 ======= 184,517 males, 19 SED COHORT	A N A L Y S (IN P U T) D e Ita -t (Y) = = = = = = 2 .055 1 .983 0 .932 0 .839 0 .726 0 .619 0 .533 0 .485 0 .465 0 .457 = = = = = = 9 5 fish A N A L Y S	IS Stock Numbers 336.026 1,031 3.373 5.451 8,836 15,187 29,524 67,192 128,961 209,108 	M e a n N u m b e r 	Te Natural Mor F/Z 0.749 0.888 0.751 0.786 0.838 0.887 0.917 0.899 0.866 Wtd.Ave.F = A = Te Natural Mor	rm in al F = tality (m) = T c = 2 	(IN P U T) 0.2 0.147 0.38 	F * C 2 2 8 2 4 2 3 6 9 1 1 4 3 7 4 0 4 8 1 4 6 3 5 5 5 8 5 9 7 2 9 4 1 6 5 7 7 2 ::::::::::::::::::::::::::::::::::::
Lengi (m m) = === 131 116 111 106 111 96 91 86 81 ==== Total LFA LENG	T h th - - - - - - - - - - - - -		SED COHORT (IN PUT) Catch (numbers) 194 520 2080 1560 2661 5322 12714 34530 55550 69386 ======= 184,517 males, 19 SED COHORT (IN PUT)	A N A L Y S (IN P U T) D e Ita -t (Y) = = = = = = 2 .0 55 1 .9 83 0 .9 32 0 .8 39 0 .7 26 0 .6 19 0 .5 3 3 0 .4 86 0 .4 65 0 .4 57 = = = = = = 9 5 fish A N A L Y S (IN P U T)	IS Stock Numbers 336.026 1.031 3.373 5.451 8.836 15.187 29.524 67.192 128.961 209.108 	M e a n N u m b e r 	Te Natural Mor F/Z 0.749 0.888 0.751 0.786 0.838 0.887 0.917 0.917 0.899 0.866 Wtd.Ave.F = A =	rm in al F = tality (m) = T c = 2 0.585 1.312 0.590 0.687 0.908 1.298 1.298 1.298 1.298 1.460 1.095 	(IN P U T) 0.2 0.147 0.38 F 	F*C
Leng (mm) ==== 131 121 110 106 101 96 91 86 91 86 81 ===== Total LENG		- - B A S - - B A S	SED COHORT (IN PUT) Catch (numbers) 194 520 2080 1560 2661 5322 12714 34530 55550 69386 ====== 184,517 males, 19 SED COHORT (IN PUT) Catch	A N A L Y S (IN P U T) D e Ita-t (Y) = = = = = 2.055 1.983 0.932 0.839 0.726 0.619 0.533 0.486 0.465 0.457 = = = = = 95 fish A N A L Y S (IN P U T) D e Ita-t	IS Stock Numbers 3 3 6 .0 2 6 1 .0 3 1 3 .3 7 3 5 .4 5 1 8 .8 3 6 1 5 .1 8 7 2 9 .5 2 4 6 7 .1 9 2 1 2 8 .9 6 1 2 0 9 .1 0 8 	M e a n N u m b e r 	Te Natural Mor F/Z 0.749 0.888 0.751 0.786 0.887 0.917 0.899 0.866 Wtd.Ave.F = A =	rm in al F = tality (m) = T c = 2 0.585 1.312 0.590 0.687 0.908 1.298 1.765 1.460 1.095 rm in al F = tality (m) = T c =	(IN P U T) 0.2 0.147 0.38 F F 0.438 1.165 0.443 0.540 0.761 1.151 1.618 1.313 0.948 1.182 0.693 (IN P U T) 0.2 0.147 0.38	F*C 228 2423 691 1437 4048 14635 55859 72941 65772 :::::::::::::::::::::::::::::::::::
Leng1 (mm) ==== 131 121 116 111 106 91 96 91 86 81 ===== Total LENG LENG	T H		SED COHORT (IN PUT) Catch (numbers) 194 520 2080 1560 2661 5322 12714 34530 55550 69386 ======= 184,517 males, 19 SED COHORT (IN PUT) Catch (numbers)	A N A L Y S (IN P U T) D e Ita-t (Y) = = = = = = 2.055 1.983 0.932 0.839 0.726 0.619 0.533 0.486 0.465 0.465 0.457 = = = = = 95 fish A N A L Y S (IN P U T) D e Ita-t (Y)	IS Stock Numbers 336.026 1.031 3.373 5.451 8.336 15.187 29.524 67.192 128.961 209.108 	M ean N u m b er 1,188 1,786 3,521 4,928 6,997 11,045 21,345 42,306 73,199 166,315 0 n M ean N u m b er	T e N atural M or F/Z 0.749 0.888 0.751 0.786 0.838 0.887 0.917 0.899 0.866 W td.A ve.F = A = T e N atural M or	rm in al F = ta lity (m) = T c = 2 	(IN P U T) 0.2 0.147 0.38 F 0.438 1.165 0.443 0.540 0.761 1.151 1.618 1.313 0.948 1.182 0.693 (IN P U T) 0.2 0.147 0.38 	F * C ::::::::::::::::::::::::::::::::::::
Lengi (m m) ==== 131 116 101 96 91 86 81 ===== Total LENG Lengi (m m) =====	T th - - - - - - - - - - - - -	H - B A S = = = 1 4 0 1 3 0 1 2 0 1 1 5 1 1 0 1 0 5 9 0 8 5 = = = 5 fe H - B A S H - B A S	SED COHORT (IN PUT) Catch (numbers) 194 520 2080 1560 2661 5322 12714 34530 55550 69386 ====== 184,517 males, 19 SED COHORT (IN PUT) Catch	A N A L Y S (IN P U T) D e Ita - t (Y) = = = = = = 2 .0 5 5 1 .9 8 3 0 .9 3 2 0 .8 3 9 0 .7 2 6 0 .6 1 9 0 .5 3 3 0 .4 8 6 0 .4 6 5 0 .4 5 7 = = = = = = 9 5 fish A N A L Y S (IN P U T) D e Ita - t (y) = = = = = =	IS Stock Numbers 336.026 1.031 3.373 5.451 8.836 15.187 29.524 67.192 128.961 209.108 	M ean N u m b er 1,188 1,786 3,521 4,928 6,997 11,045 21,345 42,306 73,199 	Te Natural Mor F/Z 0.749 0.888 0.751 0.786 0.838 0.887 0.917 0.917 0.899 0.866 Wtd.Ave.F = A = Te Natural Mor	rm in al F = tality (m) = T c = 2 	(IN P U T) 0,2 0,147 0,38 F 0,438 1,165 0,443 0,540 0,761 1,151 1,618 1,313 0,948 1,182 0,693 (IN P U T) 0,2 0,147 0,38 0,2 0,147 0,38 0,438 0,438 0,2 0,147 0,38 0,438 	F * C 2 2 8 2 4 2 3 6 9 1 1 4 3 7 4 0 4 8 1 4 6 3 5 5 5 8 5 9 7 2 9 4 1 6 5 7 7 2 ::::::::::::::::::::::::::::::::::::
Lengi (m m) = === 131 116 111 106 111 96 91 86 81 ==== Total LENG LENG LENG	T t h - - - - - - - - -	- - B A S - - B A S - - B A S - 1 4 0 1 1 5 1 1 0 1 1 5 1 1 0 1 1 5 1 1 0 9 5 9 0 8 5 5 f e - B A S - - B - - B A S - - - B - - B - - S - - - - - - - - - -	SED COHORT (IN PUT) Catch (numbers) 194 520 2080 1560 2661 5322 12714 34530 55550 69386 ======= 184,517 males, 19 SED COHORT (IN PUT) Catch (numbers) 520	A N A L Y S (IN P U T) D e Ita - t (Y) = = = = = = 2 .0 5 5 1 .9 8 3 0 .9 3 2 0 .8 3 9 0 .7 2 6 0 .6 1 9 0 .5 3 3 0 .4 8 6 0 .4 6 5 0 .4 5 7 = = = = = 9 5 fish A N A L Y S (IN P U T) D e Ita - t (y) = = = = = = 2 .0 9 6	IS Stock Numbers 336.026 1,031 3,373 5,451 8,836 15,187 29,524 67,192 128,961 209,108 	M e a n N u m b e r 	T e N atural M or F/Z 0.749 0.888 0.751 0.751 0.786 0.838 0.887 0.917 0.917 0.899 0.866 W td.A ve.F = A = T e N atural M or	rm in al F = ta iity (m) = T c = 2 0.585 1.312 0.590 0.687 0.908 1.298 1.298 1.765 1.460 1.095 rm in al F = ta lity (m) = T c = 2 Z	(IN P U T) 0.2 0.147 0.38 F 	F*C 228 2423 691 1437 4048 14635 55859 72941 65772 :::::::::::::::::::::::::::::::::::
Lengi (m m) = === 131 121 110 106 91 80 91 80 81 E = = == Total LENG LENG LENG LENG 131 131	T t h 	- - B A S - - - B A S - - - - B A S - - - - - - - - - -	SED COHORT (IN PUT) Catch (numbers) 194 520 2080 1560 2661 5322 12714 34530 55550 69386 ====== 184,517 males, 19 SED COHORT (IN PUT) Catch (numbers) 520 520 520 520	A N A L Y S (IN P U T) D e Ita-t (Y) = = = = = 2.055 1.983 0.932 0.839 0.726 0.619 0.533 0.486 0.465 0.457 = = = = 95 fish A N A L Y S (IN P U T) D e Ita-t (Y) = = = = 2.096 2.055	IS Stock Numbers 3 3 6 .0 2 6 1 .0 3 1 3 .3 7 3 5 .4 5 1 8 .8 3 6 1 5 .1 8 7 2 9 .5 2 4 6 7 .1 9 2 1 2 8 .9 6 1 2 0 9 .1 0 8 	M e a n N u m b e r 1.188 1.786 3.521 4.928 6.997 11.045 21.345 42.306 73.199 166.315 0 n M e a n N u m b e r 2594	Te Natural Mor F/Z 0.749 0.888 0.751 0.786 0.838 0.887 0.917 0.899 0.866 Wtd.Ave.F = A = Te Natural Mor F/Z	rm in al F = ta lity (m) = T c = 2 0.585 1.312 0.590 0.687 0.908 1.298 1.765 1.460 1.095 1.460 1.095 rm in al F = ta lity (m) = T c = 2 2	(IN P U T) 0.2 0.147 0.38 F 0.438 1.165 0.443 0.540 0.761 1.151 1.618 1.313 0.948 0.693 (IN P U T) 0.2 0.38 0.200 0.200	F*C
Leng1 (mm) ==== 131 121 116 111 106 91 86 81 112 11 110 100 91 86 91 86 81 112 11 100 91 86 91 86 81 112 11 100 91 86 81 112 11 100 91 86 81 112 11 100 91 86 81 112 11 100 91 86 81 112 11 100 91 86 81 112 11 100 91 86 81 112 11 100 100 91 86 81 112 11 100 86 81 112 11 11 100 86 81 112 11 100 86 81 112 11 11 100 86 81 112 11 100 81 81 112 11 100 86 81 112 11 100 86 81 111 11 10 86 81 11 10 80 81 11 11 11 11 86 81 11 11 11 11 86 81 11 11 11 11 11 86 81 81 11 11 11 11 86 81 11 11 11 11 11 86 81 11 11 11 11 11 11 86 81 11 11 11 11 11 11 86 81 11 11 11 11 11 11 11 80 11 11 11 11 11 11 11 11 11 11 11 11 11	T H 	- - B A S - - - - B A S - - - - B A S - - - - - - - - - -	SED COHORT (IN PUT) Catch (numbers) 194 520 2080 1560 2661 5322 12714 34530 55550 69386 69386 55550 69386 52550 69386 520 Catch (numbers) 520 520 520 520 520 520 520	A N A L Y S (IN P U T) D e Ita-t (Y) = = = = = = 2.055 1.983 0.932 0.839 0.726 0.619 0.533 0.486 0.465 0.465 0.457 = = = = = 95 fish A N A L Y S (IN P U T) D e Ita-t (Y) = = = = = 2.096 2.055 1.983 0.639 0.726 0.619 0.457 1.983 0.455 0.457 1.983 0.455 0.457 1.983 0.455 0.457 1.983 0.455 0.457 1.983 0.455 0.457 1.983 0.455 0.457 1.983 0.455 0.457 1.983 0.455 0.457 1.983 0.455 0.457 1.983 0.455 0.457 1.983 0.455 0.457 1.983 0.455 0.457 1.983 0.457 1.983 0.457 1.983 0.455 0.457 1.983 0.455 0.457 1.983 0.455 0.457 1.983 0.455 0.457 1.983 0.455 0.457 1.983 0.555 1.983 0.635 1.983 0.635 1.983 0.635 1.983 0.635 1.983 0.635 1.983 0.635 1.983 0.635 1.983 0.635 1.983 0.635 1.983 0.635 1.983 0.635 1.983 0.635 1.983 0.635 1.983 0.6357 1.983 1.9857 1.9857 1.9857 1.983 1.98577 1.98577 1.985777 1.985777777777777777777777777777777777777	IS Stock Numbers 336.026 1.031 3.373 5.451 8.836 15.187 29.524 67.192 128.961 209.108 	M ean N u m b er 1,188 1,786 3,521 4,928 6,997 11,045 21,345 42,306 73,199 166,315 0 n M ean N u m b er 2594 4887 4025	T e N atural M or F/Z 	rm in al F = ta lity (m) = T c = 2 	(IN P U T) 0.2 0.147 0.38 F 0.438 1.165 0.443 0.540 0.761 1.151 1.618 1.313 0.948 1.182 0.693 (IN P U T) 0.2 0.147 0.38 F 	F * C ::::::::::::::::::::::::::::::::::::
Lengi (m m) ==== 131 116 101 96 91 96 91 86 81 ==== Total LENG (m m) ==== 151 131 121 116 116	T - - - - - - - - - - - - - - - - - - -	- - B A S - - - - - B A S - - - - - - - - - -	SED COHORT (IN PUT) Catch (numbers) 194 520 2080 1560 2661 5322 12714 34530 55550 69386 ====== 184,517 males, 19 SED COHORT (IN PUT) Catch (numbers) 520 520 922 2482	A N A L Y S (IN P U T) D e Ita - t (Y) = = = = = = 2 .0 5 5 1 .9 8 3 0 .9 3 2 0 .8 3 9 0 .7 2 6 0 .6 1 9 0 .5 3 3 0 .4 8 6 0 .4 6 5 0 .4 5 7 = = = = = 9 5 fish A N A L Y S (IN P U T) D e Ita - t (Y) = = = = = 2 .0 9 6 2 .0 5 5 1 .9 8 3 0 .9 3 2 0 .8 2 0 1 .9 8 3 0 .9 3 2 0 .8 2 0 1 .9 8 3 0 .9 3 2 0 .9 3 2 0 .8 2 0 1 .9 8 3 0 .9 3 2 0 .8 2 0 1 .9 8 3 0 .9 3 2 0 .9 3 2 0 .8 2 0 1 .9 8 3 0 .9 3 2 0 .8 2 0 1 .9 8 3 0 .9 3 2 0 .8 2 0 1 .9 8 3 0 .9 3 2 0 .8 2 0 1 .9 8 3 0 .9 3 2 0 .8 2 0 1 .9 8 3 0 .9 3 2 0 .9 3 2 0 .8 2 0 1 .9 8 3 0 .9 3 2 0 .8 2 0 0 .9 3 2 0 .9 3 2 0 .8 2 0 0 .9 3 2 0 .9 1 .9 1 .9 1 .9 1 .9 1 .9 1 .9 1 .9	IS Stock Numbers 336.026 1.031 3.373 5.451 8.836 15.187 29.524 67.192 128.961 209.108 	M ean N u m b er 1.188 1.786 3.521 4.928 6.997 11.045 21.345 42.306 73.199 	Te Natural Mor F/Z 	rm in al F = tality (m) = T c = 2 	(IN P U T) 0,2 0,147 0,38 F 0,438 1,165 0,443 0,540 0,761 1,151 1,618 1,313 0,948 0,20 0,147 0,38 0,200 0,189 0,572 0,274	F*C ::::::::::::::::::::::::::::::::::::
Lengi (m m) = === 131 116 111 106 111 96 91 88 81 ==== Total LENG LENG LENG (m m) ==== 151 131 131 116 111	T - - - - - - - - - - - - - - - - - - -		SED COHORT (IN PUT) Catch (numbers) 194 520 2080 1560 2661 5322 12714 34530 55550 69386 ======= 184,517 males, 19 SED COHORT (IN PUT) Catch (numbers) 520 520 520 520 522 2482 2482 2482 2498	A N A L Y S (IN P U T) D e Ita - t (Y) = = = = = = 2 .0 55 1 .9 8 3 0 .9 3 2 0 .8 3 9 0 .7 2 6 0 .6 1 9 0 .5 3 3 0 .4 8 6 0 .4 6 5 0 .4 5 7 = = = = = 9 5 fish A N A L Y S (IN P U T) D e Ita - t (y) = = = = = 2 .0 9 6 2 .0 9 5 1 .9 8 3 0 .9 3 2 0 .8 3 9 0 .7 2 6 1 .9 8 3 0 .9 3 2 0 .8 3 9 0 .7 2 6 1 .9 8 3 0 .9 3 2 0 .8 3 9 0 .7 2 6 1 .9 8 3 0 .9 3 2 0 .8 3 9 0 .7 2 6 1 .9 8 3 0 .9 3 2 0 .8 3 9 0 .7 2 6 0 .6 1 9 0 .7 2 6 0 .7 2	IS Stock Numbers 336.026 1,031 3,373 5,451 8,836 15,187 29,524 67,192 128,961 209,108 	M e a n N u m b e r 	Te Natural Mor F/Z 0.749 0.888 0.751 0.751 0.756 0.838 0.887 0.917 0.899 0.866 Wtd.Ave.F = A = Te Natural Mor F/Z 0.577 0.562 0.718 0.718	rm in al F = tality (m) = T c = 0.585 1.312 0.590 0.687 0.908 1.298 1.765 1.460 1.095 rm in al F = tality (m) = T c = 2 0.347 0.336 0.719 0.521 0.607	(IN P U T) 0.2 0.147 0.38 0.438 1.165 0.438 1.165 0.443 0.540 0.761 1.151 1.618 1.313 0.948 (IN P U T) 0.2 0.147 0.38	F * C 2 2 8 2 4 2 3 6 9 1 1 4 3 7 4 0 4 8 1 4 6 3 5 5 5 8 5 9 7 2 9 4 1 6 5 7 7 2 ::::::::::::::::::::::::::::::::::::
Lengi (m m) ==== 131 121 110 106 91 91 86 91 81 ==== Total LENG LENG LENG LENG 131 131 131 121 116 111	T t h - - - - - - - - -	- - B A S - B A S - B A S - 1 1 0 1 1 3 0 1 1 2 0 1 1 3 0 1 1 0 5 fe - - B A S - - 1 - B A S - 1 - 1 1 0 1 1 1 5 0 1 1 1 0 1 1 1 5 1 1 1 1 1 1 1 1 1 1	SED COHORT (IN PUT) Catch (numbers) 194 520 2080 1560 2661 5322 12714 34530 55550 69386 ======= 184,517 males, 19 SED COHORT (IN PUT) Catch (numbers) 520 520 520 520 520 520 522 2482 2498 4074 820	A N A L Y S (IN P U T) D e Ita-t (Y) = = = = = 2.055 1.983 0.932 0.839 0.726 0.619 0.533 0.486 0.465 0.457 = = = = 95 fish A N A L Y S (IN P U T) D e Ita-t (Y) = = = = 2.096 2.055 1.983 0.932 0.839 0.726 0.619	IS Stock Numbers 3 3 6 .0 2 6 1 .0 3 1 3 .3 7 3 5 .4 5 1 8 .8 3 6 1 5 .1 8 7 2 9 .5 2 4 6 7 .1 9 2 1 2 8 .9 6 1 2 0 9 .1 0 8 	M e a n N u m b e r 1,188 1,786 3,521 4,928 6,997 11,045 21,345 42,306 73,199 166,315 0 n M e a n N u m b e r 2594 4887 4342 6677 8848	Te Natural Mor F/Z 0.749 0.888 0.751 0.786 0.838 0.887 0.917 0.899 0.866 Wtd.Ave.F = A = Te Natural Mor F/Z 0.577 0.562 0.795 0.718 0.758 0.758	rm in al F = ta lity (m) = T c = 0.585 1.312 0.590 0.687 0.908 1.298 1.298 1.298 1.298 1.298 1.460 1.095 1.460 1.095 rm in al F = ta lity (m) = T c = 0.347 0.336 0.719 0.521 0.607	(IN P U T) 0.2 0.147 0.38 F 0.438 1.165 0.438 1.165 0.443 0.540 0.761 1.151 1.618 1.313 0.948 0.693 (IN P U T) 0.2 0.147 0.38 0.200 0.189 0.572 0.374 0.4603 	F*C
Leng (mm) ==== 131 121 116 111 106 91 86 91 86 91 86 91 E=== Total LENG LENG (mm) ==== 151 131 121 116 111 106 111 106 111	T H 		SEDCOHORT (IN PUT) Catch (numbers) 194 520 2080 1560 2661 5322 12714 34530 55550 69386 ====== 184,517 males, 19 SEDCOHORT (IN PUT) Catch (numbers) 520 520 922 2482 2482 4074 8299 23085	A N A L Y S (IN P U T) D e Ita-t (Y) = = = = = = 2.055 1.983 0.932 0.839 0.726 0.619 0.533 0.486 0.465 0.465 0.457 = = = = = 95 fish A N A L Y S (IN P U T) D e Ita-t (Y) = = = = = 2.096 2.055 1.983 0.932 0.839 0.726 0.613 1.983 1.985 1.983 1.985 1.985 1.983 1.985 1.985 1.985 1.985 1.983 1.985 1.985 1.983 1.985 1.	IS Stock Numbers 336.026 1.031 3.373 5.451 8.836 15.187 29.524 67.192 128.961 209.108 	M ean N u m b er 1,188 1,786 3,521 4,928 6,997 11,045 21,345 42,306 73,199 166,315 0 n M ean N u m b er 2594 4887 4342 6677 8848 11974	T e N atural M or F/Z 	rm in al F = ta lity (m) = T c = 2 	(IN P U T) 0,2 0,147 0,38 F 0,438 1,165 0,438 1,165 0,443 0,540 0,761 1,151 1,618 1,313 0,948 0,20 0,189 0,572 0,374 0,460 0,693 1,222	F*C ::::::::::::::::::::::::::::::::::::
Lengi (m m) ==== 131 116 101 96 91 86 81 ==== Total LENG (m m) ==== 151 131 121 131 116 111 106 101 96 91	T H - - - - - - - - - - - - -	- - B A S - B A S - 1 4 0 1 2 0 1 1 5 1 1 0 9 5 9 0 8 5 7 6 9 0 8 5 7 6 9 0 8 5 7 6 9 1 1 0 1 1 0 1 1 1 1 1 1 0 1 1 1 1 1 1 1 1 1 1	SED COHORT (IN PUT) Catch (numbers) 194 520 2080 1560 2661 5322 12714 34530 55550 69386 ===== 184,517 males, 19 SED COHORT (IN PUT) Catch (numbers) 520 520 922 2482 2498 4074 8299 23085 61054	A N A L Y S (IN P U T) D e Ita - t (Y) = = = = = = 2 .0 5 5 1 .9 8 3 0 .9 3 2 0 .8 3 9 0 .7 2 6 0 .6 1 9 0 .5 3 3 0 .4 8 6 0 .4 6 5 0 .4 5 7 = = = = = 9 5 fish A N A L Y S (IN P U T) D e Ita - t (Y) = = = = = 2 .0 9 6 2 .0 5 5 1 .9 8 3 0 .9 3 2 0 .8 3 9 0 .7 2 6 0 .6 1 9 0 .5 3 3 0 .4 8 6	IS Stock Numbers 336.026 1.031 3.373 5.451 8.836 15.187 29.524 67.192 128.961 209.108 	M ean N u m b er 1.188 1.786 3.521 4.928 6.997 11,045 21,345 42.306 73,199 	Te Natural Mor F/Z 0.749 0.888 0.751 0.786 0.838 0.887 0.917 0.899 0.866 Wtd.Ave.F = A = F/Z 0.577 0.562 0.795 0.758 0.825 0.893 0.918	rm in al F = ta lity (m) = T c = 2 	(IN P U T) 0,2 0,147 0,38 F 0,438 1,165 0,443 0,540 0,761 1,151 1,618 1,313 0,948 0,20 0,147 0,38 0,200 0,189 0,572 0,374 0,460 0,693 1,222 1,637	F * C ::::::::::::::::::::::::::::::::::::
Lengi (m m) ==== 131 116 111 106 111 96 91 86 81 ==== Total LENG LENG (m m) ==== 151 131 131 116 111 106 101 96 91 86	T H th - - - - - - - - - - - - -	- - B A S - B A S - B A S - 1 4 0 1 3 0 1 1 5 1 1 0 1 1 5 1 1 0 9 5 9 0 8 5 5 f e - 5 f e - 5 f e - 1 6 0 1 5 0 1 1 1 5 1 1 1 0 1 1 1 5 1 1 1 1 1 1 1 1 1 1	SED COHORT (IN PUT) Catch (numbers) 194 520 2080 1560 2661 5322 12714 34530 55550 69386 ======= 184,517 males, 19 SED COHORT (IN PUT) Catch (numbers) 520 520 922 2482 2482 2482 2482 2482 2498 4074 8299 23085 61054 105108	A N A L Y S (IN P U T) D e Ita - t (Y) = = = = = = 2 .055 1 .9 83 0 .9 32 0 .8 39 0 .7 26 0 .6 19 0 .5 33 0 .4 86 0 .4 65 0 .4 57 = = = = = = 9 5 fish (IN P U T) D e Ita - t (y) = = = = = = 2 .096 2 .055 1 .9 83 0 .9 32 0 .8 39 0 .7 26 0 .6 19 0 .5 33 0 .4 86 0 .4 65 1 .9 83 0 .9 32 0 .8 39 0 .7 26 0 .6 19 0 .5 55 1 .9 83 0 .9 32 0 .8 39 0 .7 26 0 .6 19 0 .5 55 1 .9 83 0 .9 32 0 .8 39 0 .7 26 0 .6 19 0 .5 33 0 .4 86 0 .4 65 0 .4 65 0 .4 5 0 .9 5 1 .9 83 0 .9 32 0 .8 39 0 .7 26 0 .6 19 0 .5 55 1 .9 83 0 .9 32 0 .8 39 0 .7 26 0 .6 19 0 .5 55 1 .9 83 0 .4 86 0 .4 85 0 .4 86 0 .4 65 0 .4 85 0 .4 86 0 .4 65 0 .4 85 0 .4 86 0 .4 65 0 .4 85 0 .4 86 0 .4 85 0 .4 86 0 .4 65 0 .4 85 0 .4 86 0 .4 65 0 .4 85 0 .4 86 0 .4 65 0 .4 85 0 .4 86 0 .4 85 0 .4 86 0 .4 85 0 .4 86 0 .4 85 0 .4 86 0 .4 85 0 .	IS Stock Numbers 336.026 1,031 3,373 5,451 8,836 15,187 29,524 67,192 128,961 209,108 	M e a n N u m b e r 	Te Natural Mor F/Z 0.749 0.888 0.751 0.786 0.838 0.887 0.917 0.899 0.866 Wtd.Ave.F = A = Te Natural Mor F/Z 0.577 0.562 0.795 0.718 0.758 0.758 0.718 0.758 0.893 0.904	rm in al F = tality (m) = T c = 0.585 1.312 0.590 0.687 0.908 1.298 1.765 1.460 1.095 1.460 1.095 rm in al F = tality (m) = T c = 2 0.347 0.336 0.719 0.521 0.607 0.840 1.369	(IN P U T) 0.2 0.147 0.38 	F * C
Leng1 (mm) ==== 131 121 111 106 91 86 91 86 81 Total LENG LENG LENG LENG 131 131 131 121 131 121 136 111 106 111 106 101 86 8 8 8 1	T th - - - - - - - - - - - - -	- - B A S - B A S - B A S - 1 - B A S - 1 1 0 1 1 0 5 fe - - B A S - - 1 - B A S - 1 - 1 1 0 1 1 5 0 1 1 1 0 1 1 1 5 1 1 0 0 1 1 1 5 1 1 0 0 1 1 0 5 1 1 0 0 1 1 5 5 1 1 0 0 1 1 5 5 1 1 0 0 1 1 5 5 1 1 0 0 1 1 5 5 1 1 0 0 1 1 5 1 1 1 0 1 1 1 5 1 1 1 0 1 1 1 5 1 1 1 1 1 1 1 1 1 1	SED COHORT (IN PUT) Catch (numbers) 194 520 2080 1560 2661 5322 12714 34530 55550 69386 ======= 184,517 males, 19 SED COHORT (IN PUT) Catch (numbers) 520 520 520 522 2482 2498 4074 829 23085 61054 105108	A N A L Y S (IN P U T) D e Ita-t (Y) = = = = = = 2 .055 1 .983 0 .932 0 .839 0 .726 0 .619 0 .533 0 .465 0 .465 0 .457 = = = = = 95 fish A N A L Y S (IN P U T) D e Ita-t (Y) = = = = = 2 .096 2 .055 1 .983 0 .932 0 .839 0 .726 0 .619 0 .533 0 .486 0 .619 0 .533 0 .485 0 .465 0 .457 0 .457	IS Stock Numbers 3 3 6 .0 2 6 1 .0 3 1 3 .3 7 3 5 .4 5 1 8 .8 3 6 1 5 .1 8 7 2 9 .5 2 4 6 7 .1 9 2 1 2 8 .9 6 1 2 0 9 .1 0 8 	M e a n N u m b e r 1,188 1,786 3,521 4,928 6,997 11,045 21,345 42,306 73,199 	Te Natural Mor F/Z 0.749 0.888 0.751 0.786 0.838 0.887 0.917 0.917 0.899 0.866 Wtd.Ave.F = A = Te Natural Mor F/Z 0.577 0.562 0.795 0.718 0.825 0.795 0.718 0.825 0.893 0.918	rm in al F = ta lity (m) = T c = 0.585 1.312 0.590 0.687 0.908 1.298 1.765 1.460 1.095 1.460 1.095 rm in al F = ta lity (m) = T c = 0.347 0.336 0.719 0.521 0.607 1.369 1.784 0.1.369 1.784 0.537 0.864	(IN P U T) 0.2 0.147 0.38 0.438 1.165 0.438 1.165 0.443 0.540 0.761 1.151 1.618 1.313 0.948 (IN P U T) 0.200 0.147 0.38	F*C
Lengi (mm) ==== 131 121 106 111 96 91 86 81 ==== Total LENG LENG LENG (mm) ==== 151 131 121 131 121 131 121 131 121 131 13	T 	- - B A S - - - B A S - - - B A S - - - B A S - - - - - B A S - - - - - - - - - -	SED COHORT (IN PUT) Catch (numbers) 194 520 2080 1560 2661 5322 12714 34530 55550 69386 ====== 184,517 males, 19 SED COHORT (IN PUT) Catch (numbers) 520 520 520 520 522 2482 2482 2482 2482 550 520 520 520 520 520 520 52	A N A L Y S (IN P U T) D e Ita-t (Y) = = = = = = 2 .055 1 .983 0 .932 0 .839 0 .726 0 .619 0 .533 0 .486 0 .465 0 .457 = = = = = 9 5 fish A N A L Y S (IN P U T) D e Ita-t (Y) = = = = = 2 .055 1 .983 0 .486 0 .455 1 .983 0 .932 0 .839 0 .726 0 .619 0 .455 1 .983 0 .932 0 .839 0 .726 0 .619 0 .455 1 .983 0 .932 0 .839 0 .726 0 .619 0 .533 0 .486 0 .465 0 .457 = = = = = = 2 .055 1 .983 0 .932 0 .839 0 .726 0 .619 0 .533 0 .486 0 .465 0 .457 = = = = = = = = 2 .055 1 .983 0 .932 0 .839 0 .726 0 .619 0 .533 0 .486 0 .465 0 .457 = = = = = = = = = = = = = = = = = = =	IS Stock Numbers 336.026 1.031 3.373 5.451 8.836 15.187 29.524 67.192 128.961 209.108 	M e a n N u m b e r 1 .1 8 8 1 .7 8 6 3 .5 2 1 4 .9 2 8 6 .9 9 7 1 1 .0 4 5 2 1 .3 4 5 4 2 .3 0 6 7 3 .1 9 9 	T e N atural M or F/Z 	rm in al F = ta lity (m) = T c = 2 	(IN P U T) 0,2 0,147 0,38 	F*C ::::::::::::::::::::::::::::::::::::
Lengi (m m) ==== 131 116 111 106 111 96 91 86 81 ==== Total LENG LENG (m m) ==== 151 131 121 121 116 111 106 101 90 86 81 ==== Total	T th = - - - - - - - - - - - - -	- - B A S - - B A S - - - - - - - - - -	SEDCOHORT (IN PUT) Catch (numbers) 194 520 2080 1560 2661 5322 12714 34530 55550 69386 E====== 184,517 males, 19 SEDCOHORT (IN PUT) Catch (numbers) 520 520 922 2482 4074 8299 23085 61054 105108 90906 E====== 299,471	A N A L Y S (IN P U T) D e Ita-t (Y) = = = = = = 2.055 1.983 0.932 0.839 0.726 0.619 0.533 0.4865 0.465 0.465 0.465 1.983 0.4865 0.455 1.983 0.932 0.839 0.726 0.619 0.555 1.983 0.932 0.4839 0.726 0.619 0.533 0.932 0.839 0.726 0.619 0.533 0.486 0.465 0.465 0.457 = = = = = =	IS Stock Numbers 3 3 6 . 0 2 6 1 . 0 31 3 . 3 7 3 5 . 4 5 1 8 . 8 3 6 1 5 . 1 8 7 2 9 . 5 2 4 6 7 . 1 9 2 1 2 8 . 9 6 1 2 0 9 . 1 0 8 	M e a n N u m b e r 1.188 1.786 3.521 4.928 6.997 11.045 21.345 42.306 73.199 166.315 0 n M e a n N u m b e r 2594 4887 4342 6677 8848 11974 1891 37307 75591 126708 297.820	Te Natural Mor F/Z 	rm in al F = ta lity (m) = T c = 2 	(IN P U T) 0,2 0,147 0,38 	F*C ::::::::::::::::::::::::::::::::::::

с г а	3	<u>6 fe</u>	<u>m ales, 1</u>	<u>988 fish</u>	ing seas	on				
									(INPUT)	
LENG	TI	<u>н-ва</u>	<u>ѕер соно</u>	RTANALYS	5 I S		Те	rm in al F =	0.2	
							Naturai Mor	$T_{c} = \frac{T_{c}}{T_{c}}$	0.147	
			(INPUT)	(INPUT)						
Leng	<u>th</u>		Catch	Delta-t	Stock	Mean	E /2		-	
(mm) ====	=		<u>(numbers)</u> =======	(y)	Numbers	Number	F / Z	<u>Z</u>	F	F ^ C
131	-	140	482	2.055	837					
121	-	130	4055	1.983	5650	5157	0.843	0.933	0.786	3189
110	-	120	4352	0.932	11064	7225	0.804	0.749	0.602	2621
106		110	4253	0.726	23878	14598	0.665	0.438	0.291	1239
101	-	105	9557	0.619	36044	17754	0.785	0.685	0.538	5144
96	-	100	17395	0.533	56907	23583	0.834	0.885	0.738	12831
86	-	95	47378	0.486	109804	37550	0.896	1.409	1.262	59776
81	-	85	41295	0.457	218002	84931	0.768	0.633	0.486	20078
7070	=									
Total	-		178,951			263,241	Wtd.Ave.F =		0.786	140695
	_	0 (-			•		A =	1	0.544	
LFA	3	<u>6 1 e</u>	m ales, 1	<u>989 fisn</u>	ing seas	on				
	<u> </u>						_	<u>.</u> .	(INPUT)	
LENG		н-ва	SED COHO	RIANALY	515		le Natural Mor	<u>rm in al F =</u> tality (m)-	0.2	
								Tc =	0.38	
			(INPUT)	(INPUT)						
Leng (mm)	<u>th</u>		Catch	Delta-t	Stock	Mean	E /7	7	F	E * C
====	=			========			F / 2			
141	-	160	964	4.216	1673					
131	-	140	1446	2.055	3885	5210	0.654	0.425	0.278	402
116	1	130	3339	1.983	8931	11605	0.662	0.435	0.288	961
111	1	115	2393	0.839	18670	13539	0.546	0.324	0.177	4 2 3
106	-	110	6714	0.726	27766	16204	0.738	0.561	0.414	2782
101	-	105	10572	0.619	4 1 3 5 4	20516	0.778	0.662	0.515	5447
90	-	100	16286	0.533	61506	26301	0.808	0.766	0.619	10084
86	-	90	4 4 2 5 0	0.465	153347	56464	0.842	0.931	0.784	34678
81	-	85	30920	0.457	195727	77962	0.730	0.544	0.397	12263
= = = = =	= =	= = =								
Iotal			154,528			275,443	wtd.Ave.F = A =		0.641	99083
	2	6 fo	males 1	000 fieh	ina case	0 n				
	- -	0 10	in arcs, r	3 3 8 113 1	ing seus	<u>v II</u>				
LENG	 ; T	Н-ВА	SED СОНО	RTANALYS	S I S		Те	rm in al F =	(IN P U T) 0.2	
LENG	TI	Н-ВА	SED COHO	RTANALYS	S I S		Te Natural Mor	rm in al F = tality (m)=	(IN P U T) 0.2 0.147	
LENG		Н-ВА	SED COHO		S 1S		Te Natural Mor	rminalF = tality (m)= Tc =	(IN P U T) 0.2 0.147 0.38	
<u>LENG</u> Leng	T I	H - B A	SED COHO (INPUT) Catch	RTANALYS (INPUT) Delta-t	SIS Stock	Mean	Te Natural Mor	rm in al F = tality (m)= Tc=	(IN PUT) 0.2 0.147 0.38	
LENG Leng (mm)	t h	H - B A	SED COHO (INPUT) Catch (numbers)	R T A N A L Y S (<i>IN P U T</i>) D e Ita - t (y)	SIS Stock Numbers	Mean Number	Te Natural Mor F/Z	rminalF = tality(m)= Tc = Z	(IN P U T) 0.2 0.147 0.38	F * C
LENG Leng (mm) ===1	t h	H - B A	SED COHO (INPUT) Catch (numbers)	R T A N A L Y S (IN P U T) D e Ita-t (y)	SIS Stock Numbers	Mean Number	Te Natural Mor F/Z	rm in al F = ta lity (m)= Tc = Z	(IN PUT) 0.2 0.147 0.38 F	F * C
LENG Leng (mm) ==== 151 141	th -	H - B A	SED COHO (INPUT) Catch (numbers) 964 482	R T A N A L Y S (IN P U T) D e Ita-t (Y) = = = = = = = = = = = = = = = = = = =	SIS Stock Numbers 1673 2810	Mean Number	Te Natural Mor F/Z	rm in al F = tality (m)= Tc = Z	(IN P U T) 0.2 0.147 0.38 F	F*C
L E N G L e n g (m m) = = = = 151 141 131	th - -	H - B A = = = 1 6 0 1 5 0 1 4 0	SED COHO (INPUT) Catch (numbers) 964 482 2470	RTANALYS (INPUT) Delta-t (y) ===== 2.119 2.096 2.055	SIS Stock Numbers 1673 2819 6584	Mean Number 	Te Natural Mor F/Z	rm in al F = tality (m) = Tc = Z 0.254 0.428	(IN P U T) 0.2 0.147 0.38 F 	F*C ::::::::::::::::::::::::::::::::::::
L E N G L e n g (m m) = = = = 151 141 131 121 121	t h - - -	H - B A = = = 1 6 0 1 5 0 1 4 0 1 3 0	SED COHO (INPUT) Catch (numbers) 964 482 2470 3615	RTANALYS (INPUT) Delta-t (y) ===== 2.119 2.096 2.055 1.983	SIS Stock Numbers 1673 2819 6584 12850	Mean Number 4516 8805 18035	Te Natural Mor F/Z 0.421 0.656 0.577	rm in al F = tality (m) = Tc = Z 0.254 0.428 0.347	(IN P U T) 0.2 0.147 0.38 F 0.107 0.281 0.200	F*C ::::::::::::::::::::::::::::::::::::
L E N G L e n g (m m) = = = = 151 141 131 121 116 111	t h - - - - -	H - B A = = = 1 6 0 1 5 0 1 4 0 1 3 0 1 2 0	SED COHO (INPUT) Catch (numbers) 964 482 2470 3615 4097	RTANALYS (INPUT) Delta-t 2.119 2.096 2.055 1.983 0.932	SIS Stock Numbers 1673 2819 6584 12850 19052 22221	M e a n N u m b e r 4 5 1 6 8 8 0 5 1 8 0 3 5 1 4 3 2 4 2 0 5 5 4	Te Natural Mor F/Z 0.421 0.656 0.577 0.661 0.782	rm in al F = tality (m) = T c = Z 	(IN P U T) 0.2 0.147 0.38 	F*C
L E N G (m m) ==== 151 141 131 121 116 111 1106	t h - - - - - - - - - - - - - - - -	H - B A = = = 1 6 0 1 5 0 1 4 0 1 2 0 1 1 5 1 1 0	SED COHO (INPUT) Catch (numbers) 964 482 2470 3615 4097 10847 10847	RTANALYS (INPUT) Delta-t (y) ===== 2.119 2.096 2.055 1.983 0.932 0.839 0.726	SIS Stock Numbers 1673 2819 6584 12850 19052 32921 47989	M e a n N u m b e r 4 5 1 6 8 8 0 5 1 8 0 3 5 1 4 3 2 4 2 0 5 5 4 2 8 3 1 0	Te Natural Mor F/Z 0.421 0.656 0.577 0.661 0.782 0.724	rm in al F = tality (m) = T c = 2 0.254 0.428 0.347 0.433 0.675 0.532	(IN P U T) 0.2 0.147 0.38 F 0.107 0.281 0.200 0.286 0.528 0.385	F * C :::::::: 5 1 6 9 3 7 2 5 1 1 7 2 5 7 2 5 4 2 0 2
LENC (m m) ==== 151 141 131 121 116 111 116 111 106 101	th 	= = = 160 150 140 130 120 115 110 105	SED COHO (INPUT) Catch (numbers) 964 482 2470 3615 4097 10847 10907 12412	R T A N A L Y S (IN P U T) D e Ita - t (Y) = = = = = = = = = = = = = = = = = = =	SIS Stock Numbers 1673 2819 6584 12850 19052 32921 47989 65408	M e a n N u m b e r 4 5 1 6 8 8 0 5 1 8 0 3 5 1 4 3 2 4 2 0 5 5 4 2 8 3 1 0 3 4 0 5 7	Te Natural Mor F/Z 0.421 0.656 0.577 0.661 0.782 0.724 0.713	rm in al F = tality (m) = T c = 2 0.254 0.428 0.347 0.433 0.675 0.532 0.511	(IN P U T) 0.2 0.147 0.38 F 	F * C
L E N C L e n g (m m) = = = 1511 1411 1311 121 1161 1111 106 101 96	th 	H - B A = = = 1 6 0 1 5 0 1 4 0 1 3 0 1 2 0 1 1 5 1 1 0 1 0 5 1 0 0	SED COHO (INPUT) Catch (numbers) 964 482 2470 3615 4097 10847 10907 12412 23559	RTANALYS (INPUT) Delta-t (y) = = = = = = = 2.119 2.096 2.055 1.983 0.932 0.839 0.726 0.619 0.533 0.533	S to c k N um b ers 1673 2819 6584 12850 19052 32921 47989 65408 95015	M e a n N u m b e r 4 5 1 6 8 8 0 5 1 8 0 3 5 1 4 3 2 4 2 0 5 5 4 2 8 3 1 0 3 4 0 5 7 4 1 1 4 7	Te Natural Mor F/Z 0.421 0.656 0.577 0.661 0.782 0.724 0.713 0.796	rm in al F = tality (m) = T c = 2 0.254 0.428 0.347 0.433 0.675 0.532 0.511 0.720	(IN P U T) 0.2 0.147 0.38 F 0.107 0.281 0.200 0.286 0.528 0.385 0.385 0.364	F * C : : : : : : : : : : : : : : : : : : :
L E N G (m m) (m m) (m 1 151 131 121 116 111 106 101 96 91 86	th 	H - B A = = = 1 6 0 1 5 0 1 4 0 1 2 0 1 1 5 1 1 0 1 0 5 1 0 0 9 5	SED COHO (INPUT) Catch (numbers) 964 482 2470 3615 4097 10847 10907 12412 23559 70067 79287	RTANALYS (INPUT) Delta-t (y) = = = = = = 2.119 2.096 2.096 2.096 2.096 2.095 1.983 0.932 0.839 0.726 0.619 0.533 0.486	S to c k N u m b e r s 1 6 7 3 2 8 1 9 6 5 8 4 1 2 8 5 0 1 9 0 5 2 3 2 9 2 1 4 7 9 8 9 6 5 4 0 8 9 5 0 1 5 1 7 4 0 5 0 2 6 7 7 4 5	M e a n N u m b e r 	Te N atural M or F/Z 	rm in al F = ta lity (m) = T c = 2 	(IN P U T) 0.2 0.147 0.38 F 	F * C : :::::::::::::::::::::::::::::::::::
L E N G (m m) ==== 151 141 121 116 111 101 101 96 91 866 81	th 	H - B A = = = 1 6 0 1 5 0 1 4 0 1 2 0 1 1 5 1 1 0 1 0 5 1 0 0 9 5 9 0 8 5	SED COHO (INPUT) Catch (numbers) 964 482 2470 3615 4097 10847 10907 12412 23559 70067 79287 76634	R T A N A L Y S (IN P U T) D e Ita - t (y) = = = = = = = 2 .1 19 2 .0 96 2 .0 55 1 .9 83 0 .9 32 0 .8 39 0 .7 26 0 .6 19 0 .5 33 0 .4 86 0 .4 65 0 .4 57	S to c k N u m b e rs 1 6 7 3 2 8 1 9 6 5 8 4 1 2 8 5 0 1 9 0 5 2 3 2 9 2 1 4 7 9 8 9 6 5 4 0 8 9 5 0 1 5 1 7 4 0 5 0 2 6 7 7 4 5 3 6 4 9 7 5	M e a n N u m b e r 	Te N atural M or F/Z 0.421 0.656 0.577 0.661 0.782 0.724 0.724 0.724 0.796 0.887 0.887 0.846 0.788	rm in al F = ta lity (m) = T c = 2 	(IN P U T) 0.2 0.147 0.38 	F * C 5 1 6 9 3 7 2 5 1 1 7 2 5 7 2 5 4 2 0 2 4 5 2 4 1 3 4 8 8 8 0 4 7 6 6 4 1 3 8 4 1 9 1 6
L E N G (m m) = == 1511 1411 131 121 1116 1111 1066 1011 966 911 866 811 = = =	th 	H - B A 1 6 0 1 5 0 1 4 0 1 3 0 1 4 0 1 2 0 1 1 5 1 1 0 1 0 5 1 1 0 1 0 5 1 0 0 9 5 9 0 8 5 = = =	SED COHO (INPUT) Catch (numbers) 964 482 2470 3615 4097 10847 10907 12412 23559 70067 79287 76634	R T A N A L Y S (IN P U T) D e Ita -t (y) = = = = = = 2 .1 19 2 .0 96 2 .0 55 1 .9 83 0 .9 32 0 .8 39 0 .7 26 0 .6 19 0 .5 33 0 .4 86 0 .4 65 0 .4 57 = = = = = =	S to c k N u m b e rs 1 6 7 3 2 8 1 9 6 5 8 4 1 2 8 5 0 1 9 0 5 2 3 2 9 2 1 4 7 9 8 9 6 5 4 0 8 9 5 0 1 5 1 7 4 0 5 0 2 6 7 7 4 5 3 6 4 9 7 5	M e a n N u m b e r 	Te N atural M or F/Z 0.421 0.656 0.577 0.661 0.782 0.724 0.724 0.713 0.796 0.887 0.846 0.788	rm in al F = ta lity (m) = T c = 2 0.254 0.428 0.347 0.433 0.675 0.532 0.511 0.720 1.296 0.956 0.694	(IN P U T) 0.2 0.147 0.38 F 	F * C 5 1 6 9 3 7 2 5 1 1 7 2 5 7 2 5 4 2 0 2 4 5 2 4 1 3 4 88 8 0 4 7 6 6 4 1 3 8 4 1 9 1 6 ::::::::::::::::::::::::::::::::::::
L E N G (m m) = = = 1511 1411 131 121 1166 1111 1066 911 860 811 = = = T o tal	th - - - - - - - - - - - - - - - - - -	H - B A 160 150 140 130 140 120 115 110 105 100 95 90 85 = = =	SEDCOHO (INPUT) Catch (numbers) 964 482 2470 3615 4097 10847 10907 12412 23559 70067 79287 76634	R T A N A L Y S (IN P U T) D e Ita -t (y) = = = = = = 2 .1 19 2 .0 96 2 .0 55 1 .9 83 0 .9 32 0 .8 39 0 .7 26 0 .6 19 0 .5 33 0 .4 86 0 .4 65 0 .4 57 = = = = =	S to c k N um b ers 1 6 7 3 2 8 19 6 5 8 4 1 2 8 5 0 1 9 0 5 2 3 2 9 2 1 4 7 9 8 9 6 5 4 0 8 9 5 0 1 5 1 7 4 0 5 0 2 6 7 7 4 5 3 6 4 9 7 5	M e a n N u m b e r 	Te N atural M or F/Z 0.421 0.656 0.577 0.661 0.724 0.713 0.724 0.713 0.796 0.887 0.887 0.887 0.846 0.788	rm in al F = ta lity (m) = T c = 2 0.254 0.428 0.347 0.433 0.675 0.532 0.511 0.720 1.296 0.956 0.694	(IN P U T) 0.2 0.147 0.38 F 	F*C 51 693 725 1172 5725 4202 4524 13488 80476 64138 41916 ::::::::::::::::::::::::::::::::::::
L E N G (m m) = = = 151 141 131 121 116 111 106 111 96 91 86 81 = = = T o tal	T th - - - - - - - - - - - - -	H - B A 16 0 15 0 14 0 13 0 14 0 14 0 13 0 14 0 14 0 15 5 11 0 10 5 10 0 9 5 9 0 8 5 = = = = = = = = =	SED COHO (IN PUT) Catch (numbers) 964 482 2470 3615 4097 10847 10907 12412 23559 70067 79287 76634 ======= 295,341	R T A N A L Y S (IN P U T) D e Ita - t (y) = = = = = = 2 . 1 19 2 . 0 9 6 2 . 0 55 1 . 9 8 3 0 . 9 3 2 0 . 8 3 9 0 . 7 2 6 0 . 6 1 9 0 . 5 3 3 0 . 4 8 6 0 . 4 5 7 = = = = = =	S IS S to c k N um b e rs 1 6 7 3 2 8 19 6 5 8 4 1 2 8 5 0 1 9 0 5 2 3 2 9 2 1 4 7 9 8 9 6 5 4 0 8 9 5 0 1 5 1 7 4 0 5 0 2 6 7 7 4 5 3 6 4 9 7 5 	M e a n N u m b e r 	Te Natural Mor F/Z 0.421 0.656 0.577 0.661 0.724 0.713 0.724 0.713 0.796 0.887 0.887 0.846 0.788 Wtd.Aye.F = A =	rm in al F = tality (m) = T c = 2 0.254 0.428 0.347 0.433 0.675 0.532 0.511 0.720 1.296 0.956 0.694	(IN P U T) 0.2 0.147 0.38 F 	F * C 5 1 6 9 3 7 2 5 1 1 7 2 5 7 2 5 4 2 0 2 4 5 2 4 1 3 4 8 8 8 0 4 7 6 6 4 1 3 8 4 1 9 1 6 :::::::::::: 2 1 7 1 0 9
L E N G (m m) = = = = 151 141 121 116 101 96 91 86 81 = = = = T o tal L F A	T th - - - - - - - - - - - - -	H - B A = = = 1 6 0 1 5 0 1 4 0 1 3 0 1 4 0 1 1 5 1 1 0 1 0 5 1 1 0 1 0 5 1 0 0 9 5 9 0 8 5 = = = 6 f e	SEDCOHO (INPUT) Catch (numbers) 964 482 2470 3615 4097 10847 10907 12412 23559 70067 79287 76634 ====== 295,341 males, 1	R T A N A L Y S (IN P U T) D e Ita - t (y) = = = = = = 2 . 1 1 9 2 . 0 9 6 2 . 0 5 5 1 . 9 8 3 0 . 9 3 2 0 . 8 3 9 0 . 7 2 6 0 . 6 1 9 0 . 5 3 3 0 . 4 8 6 0 . 4 6 5 0 . 4 5 7 = = = = = = 9 9 1 fish	S IS S to c k N um b ers 1 6 7 3 2 8 19 6 5 8 4 1 2 8 5 0 1 9 0 5 2 3 2 9 2 1 4 7 9 8 9 6 5 4 0 8 9 5 0 1 5 1 7 4 0 5 0 2 6 7 7 4 5 3 6 4 9 7 5 	M e a n N u m b e r 	Te N atural M or F/Z 0.421 0.656 0.577 0.661 0.724 0.713 0.724 0.713 0.796 0.887 0.887 0.846 0.788 0.788 0.788	rm in al F = tality (m) = T c = 2 0.254 0.428 0.347 0.433 0.675 0.532 0.511 0.720 1.296 0.956 0.694	(IN P U T) 0.2 0.147 0.38 F 0.107 0.281 0.200 0.286 0.528 0.385 0.364 0.528 0.3647 0.735 0.521 (UD D U T)	F * C 5 1 6 9 3 7 2 5 1 1 7 2 5 7 2 5 4 2 0 2 4 5 2 4 1 3 4 8 8 8 0 4 7 6 6 4 1 3 8 4 1 9 1 6 ::::::::::: 2 1 7 1 0 9
$L = N G$ $\frac{L e n g}{(m m)}$ $\frac{1}{2} = = =$ 151 141 131 116 101 96 91 86 81 $= = = =$ $T o tal$ $L F A$ $L F A$	th = - - - - - - - - - - - - - - - - - -	H - B A = = = 1 1 6 0 1 5 0 1 4 0 1 2 0 1 1 0 1 2 0 1 1 0 1 0 5 1 0 0 9 5 9 0 8 5 = = = 6 f e H - B A	SEDCOHO (INPUT) Catch (numbers) 964 482 2470 3615 4097 10847 10907 12412 23559 70067 79287 7663 295,341 males, 1 SEDCOHO	R T A N A L Y S (IN P U T) D e Ita -t (y) = = = = = 2 .119 2 .096 2 .055 1 .983 0 .932 0 .839 0 .726 0 .619 0 .533 0 .486 0 .465 0 .457 = = = = = 991 fish	S IS S to ck N um b ers 1 6 7 3 2 8 19 6 5 8 4 1 2 8 5 0 1 9 0 5 2 3 2 9 2 1 4 7 9 8 9 6 5 4 0 8 9 5 0 1 5 1 7 4 0 5 0 2 6 7 7 4 5 3 6 4 9 7 5 	M e a n N u m b e r 	Te Natural Mor F/Z 0.421 0.656 0.577 0.661 0.782 0.724 0.713 0.796 0.887 0.846 0.788 Wtd.Ave.F = A =	rm in al F = tality (m) = T c = 2 0.254 0.428 0.347 0.433 0.675 0.532 0.511 0.720 1.296 0.956 0.694	(IN P U T) 0.2 0.147 0.38 F 0.107 0.281 0.200 0.286 0.528 0.385 0.364 0.573 1.149 0.809 0.547 0.735 0.521 (IN P U T)	F*C ::::::::::::::::::::::::::::::::::::
$L = N G$ $\frac{L e n g}{(m m)}$ $\frac{r}{r} = = =$ 1511 1411 116 1011 966 911 866 811 $r = = =$ $T o tal$ $L F A$ $L E N G$	th 	H - B A = = = 1 6 0 1 5 0 1 4 0 1 2 0 1 1 5 1 1 0 1 0 5 1 0 0 9 5 9 0 8 5 = = 6 f e H - B A	SED COHO (IN PUT) Catch (numbers) 964 482 2470 3615 4097 10847 10907 12412 23559 70067 79287 76634 295,341 males, 1 SED COHO	R T A N A L Y S (IN P U T) D e Ita - t (Y) = = = = = = 2 . 1 9 2 . 0 96 2 . 0 55 1 . 9 83 0 . 9 32 0 . 8 39 0 . 7 2 6 0 . 6 19 0 . 5 33 0 . 4 8 6 0 . 4 6 5 0 . 4 5 7 = = = = = = 9 9 1 fish R T A N A L Y S	SIS Stock Numbers 1673 2819 6584 12850 19052 32921 47989 65408 95015 174050 267745 364975 	M e a n N u m b e r 	Te N atural M or F/Z 0.421 0.656 0.577 0.661 0.724 0.713 0.796 0.887 0.886 0.788 0.846 0.788 0.846 0.788 Wtd.Ave.F = A =	rm in al F = tality (m) = Tc = 2 0.254 0.428 0.347 0.433 0.675 0.532 0.511 0.720 1.296 0.956 0.956 0.694 0.956 0.694	(IN P U T) 0.2 0.147 0.38 F 	F*C
L = N G $(m m)$ $= = =$ 151 141 121 116 101 96 91 86 81 $= = =$ $T o ta1$ $L F A$ $L E N G$	th = - - - - - - - - - - - - - - - - - -	H - B A = = = 1 6 0 1 5 0 1 4 0 1 2 0 1 1 5 1 1 0 1 0 5 1 0 0 9 5 9 0 8 5 = = 6 fe H - B A	SED COHO (IN PUT) Catch (numbers) 964 482 2470 3615 4097 10847 10907 12412 23559 70067 79287 76634 ====== 295,341 males, 1 SED COHO	R T A N A L Y S (IN P U T) D e Ita - t (Y) = = = = = = = 2 .1 9 2 .0 96 2 .0 55 1 .9 83 0 .9 32 0 .8 39 0 .7 26 0 .6 19 0 .5 3 3 0 .4 86 0 .4 65 0 .4 57 = = = = = = = 9 9 1 fish R T A N A L Y S	S IS S to c k N um b e rs 1 6 7 3 2 8 19 6 5 8 4 1 2 8 5 0 1 9 0 5 2 3 2 9 2 1 4 7 9 8 9 6 5 4 0 8 9 5 0 1 5 1 7 4 0 5 0 2 6 7 7 4 5 3 6 4 9 7 5 	M e a n N u m b e r 4 5 1 6 8 8 0 5 1 8 0 3 5 1 4 3 2 4 2 0 5 5 4 2 8 3 1 0 3 4 0 5 7 4 1 1 4 7 6 1 0 0 4 9 8 0 1 5 1 4 0 1 0 8 	Te N atural M or F/Z 0.421 0.656 0.577 0.661 0.782 0.724 0.713 0.796 0.887 0.8846 0.788 Wtd.Ave.F = A =	rm in al F = tality (m) = Tc = 2 0.254 0.428 0.347 0.433 0.675 0.532 0.511 0.720 1.296 0.956 0.956 0.694 	(IN P U T) 0.2 0.147 0.38 F 	F*C
L E N G (m m) = = = = 1511 1411 1211 116 101 96 911 86 811 = = = T o tal L F A L E N G	th 	H - B A = = = 1 6 0 1 5 0 1 4 0 1 3 0 1 4 0 1 3 0 1 4 0 1 3 0 1 4 0 1 3 0 1 4 0 1 5 0 1 4 0 1 5 0 1 1 5 1 0 0 9 0 8 5 = = 6 f e H - B A	SED COHO (IN PUT) Catch (numbers) Catch (numbers) Catch 482 2470 3615 4097 10847 10907 10847 10907 12412 23559 70067 79287 76634 EEEEEEE 295,341 males,1 SED COHO (IN PUT) Catch	R T A N A L Y S (IN P U T) D e Ita - t (Y) = = = = = = = = = 2 .1 9 2 .0 96 2 .0 55 1 .9 83 0 .9 32 0 .8 39 0 .7 26 0 .6 19 0 .5 3 3 0 .4 85 0 .4 57 = = = = = = = 9 9 1 fish R T A N A L Y S (IN P U T) D e Ita - t	SIS Stock Numbers 1673 2819 6584 12850 19052 32921 47989 65408 95015 174050 267745 364975 	M e a n N u m b e r 4 5 1 6 8 8 0 5 1 8 0 3 5 1 4 3 2 4 2 0 5 5 4 2 8 3 1 0 3 4 0 5 7 4 1 1 4 7 6 1 0 0 4 9 8 0 1 5 1 4 0 1 0 8 4 6 8 , 8 7 6 O n	Te Natural Mor F/Z 	rm in al F = ta lity (m) = T c = 2 0.254 0.428 0.347 0.428 0.347 0.675 0.632 0.532 0.511 0.720 1.296 0.956 0.694 rm in al F = ta lity (m) = T c =	(IN P U T) 0.2 0.147 0.38 F 	F*C
L E N G (m m) = = = = 1511 141 121 116 101 96 91 86 81 = = = T o tal L F A L E N G L E N G	th 	H - B A = = = 1 6 0 1 5 0 1 4 0 1 2 0 1 1 5 1 1 0 1 1 0 1 1 0 1 1 0 1 0 0 9 5 9 0 8 5 = = 6 fe H - B A	SED COHO (IN PUT) Catch (numbers) SED COHO 3615 4097 10847 10907 12412 23559 70067 79287 76634 SED COHO SED COHO (IN PUT) Catch (numbers)	R T A N A L Y S (IN P U T) D e Ita-t (Y) = = = = = = = 2 .1 9 2 .0 96 2 .0 55 1 .9 83 0 .9 32 0 .8 39 0 .7 26 0 .6 19 0 .5 3 3 0 .4 85 0 .4 57 = = = = = 9 9 1 fish R T A N A L Y S (IN P U T) D e Ita-t (Y)	S IS S to c k N um b ers 1 6 7 3 2 8 19 6 5 8 4 1 2 8 50 1 9 0 5 2 3 2 9 2 1 4 7 9 8 9 6 5 4 0 8 9 5 0 1 5 1 7 4 0 5 0 2 6 7 7 4 5 3 6 4 9 7 5 	M e a n N u m b e r 	Te Natural Mor F/Z 	rm in al F = ta lity (m) = T c = 2 0.254 0.428 0.347 0.428 0.347 0.433 0.675 0.532 0.551 1.296 0.956 0.956 0.694 rm in al F = ta lity (m) = T c = Z	(IN P U T) 0.2 0.147 0.38 F 	F*C ::::::::::::::::::::::::::::::::::::
$L = N G$ $\frac{L e n g}{(m m)}$ $\frac{e = = =}{1511}$ 141 131 116 101 101 96 91 86 81 $\frac{e = = =}{1000}$ T o t al $L = N G$ $\frac{L e n g}{(m m)}$	th 	H - B A = = = = 1 6 0 1 5 0 1 4 0 1 3 0 1 4 0 1 2 0 1 1 5 1 1 0 1 0 5 1 0 0 9 5 9 0 0 8 5 = = = 6 f e H - B A = = =	SED COHO (IN PUT) Catch (numbers) SED COHO 3615 4097 10847 10907 12412 23559 70067 79287 76634 SED COHO SED COHO (IN PUT) Catch (numbers)	R T A N A L Y S (IN P U T) D e Ita - t (y) = = = = = = = = = = = = = = = = = = =	S IS S to c k N um b ers 1 6 7 3 2 8 1 9 6 5 8 4 1 2 8 5 0 1 9 0 5 2 3 2 9 2 1 4 7 9 8 9 6 5 4 0 8 9 5 0 1 5 1 7 4 0 5 0 2 6 7 7 4 5 3 6 4 9 7 5 	M e a n N u m b e r 	Te N atural M or F/Z 	rm in al F = ta lity (m) = T c = 2 0.254 0.428 0.347 0.433 0.675 0.532 0.511 0.720 1.296 0.956 0.956 0.694 rm in al F = ta lity (m) = T c = 2 	(IN P U T) 0.2 0.147 0.38 F 0.107 0.281 0.200 0.286 0.528 0.385 0.364 0.573 1.149 0.809 0.547 0.735 0.521 (IN P U T) 0.2 0.147 0.38 0.735 0.521 0.147 0.38 0.521 0.147 0.38 	F * C F * C
$L \in N \in Q$ $\frac{L \in n \in Q}{(m \in M)}$ $1 + 2 + 2 + 2 + 2 + 2 + 2 + 2 + 2 + 2 + $	th 	H - B A = = = 1 6 0 1 5 0 1 4 0 1 3 0 1 4 0 1 3 0 1 4 0 1 1 5 1 1 0 1 0 5 1 0 0 9 5 9 0 8 5 = = = 6 f e H - B A = = = 1 5 0 1 4 0 1 5 0 1 1 5 1 0 0 9 5 9 0 8 5 = = = 1 6 0 1 5 0 1 4 0 1 5 0 1 1 5 1 0 0 9 5 9 0 8 5 = = = 1 6 0 1 5 0 1 4 0 1 5 0 1 1 5 1 0 0 9 5 9 0 8 5 = = = 1 6 0 1 5 0 1 4 0 1 5 0 1 1 5 1 0 0 8 5 = = = 1 6 0 1 5 0 1 1 5 1 0 0 8 5 = = = 1 6 0 1 5 0 1 0 5 1 0 0 8 5 = = = 1 6 0 1 7 0 1 0 5 1 0 0 1 0 0 1 0 5 1 0 0 1 0 0 0 1 0 0 1 0 0 0	SED COHO (IN PUT) Catch (numbers) 964 482 2470 3615 4097 10847 10907 12412 23559 70067 79287 76634 ======= 295,341 males, 1 SED COHO (IN PUT) Catch (numbers) 766	R T A N A L Y S (IN P U T) D e Ita - t 2.1 19 2.0 96 2.0 96 2.0 55 1.9 83 0.9 32 0.8 39 0.7 26 0.6 19 0.5 33 0.4 86 0.4 65 0.4 57 ======== 9 9 1 fish R T A N A L Y S (IN P U T) D e Ita - t (y)	S IS S to c k N u m b e rs 1 6 7 3 2 8 1 9 6 5 8 4 1 2 8 5 0 1 9 0 5 2 3 2 9 2 1 4 7 9 8 9 6 5 4 0 8 9 5 0 1 5 1 7 4 0 5 0 2 6 7 7 4 5 3 6 4 9 7 5 	M e a n N u m b e r 	Te N atural M or F/Z 0.421 0.656 0.577 0.661 0.782 0.724 0.724 0.724 0.713 0.796 0.887 0.887 0.887 0.887 0.887 0.786 0.786 0.786 0.786 0.786 0.786 0.786 0.787 0.787 0.786 0.777 0.786 0.777 0.796 0.787 0.796 0.787 0.787 0.787 0.787 0.787 0.787 0.787 0.787 0.787 0.787 0.777 0.787 0.777 0.782 0.7782 0.777 0.782 0.777 0.782 0.7782 0.7782 0.7782 0.7782 0.777 0.787 0.787 0.787 0.787 0.787 0.777 0.787 0.787 0.787 0.787 0.787 0.787 0.787 0.787 0.787 0.787 0.787 0.777 0.787 0.787 0.787 0.787 0.787 0.787 0.777 0.787 0.777 0.782 0.777 0.782 0.7782 0.7782 0.7782 0.7782 0.7782 0.777 0.787 0.787 0.787 0.787 0.787 0.787 0.787 0.787 0.777 0.787 0.777 0.787 0.777 0.787 0.777 0.787 0.777 0.787 0.777 0.787 0.777 0.787 0.777 0.787 0.777 0.787 0.777 0.787 0.777 0.787 0.777 0.787 0.777 0.787 0.777 0.777 0.777 0.777 0.777 0.777 0.777 0.777 0.777 0.777 0.777 0.777 0.777 0.777 0.777 0.777 0.777 0.7777 0.7777 0.7777 0.77777 0.77777777	rm in al F = ta lity (m) = T c = 2 0.254 0.428 0.347 0.433 0.675 0.532 0.511 0.720 1.296 0.956 0.694 rm in al F = ta lity (m) = T c = 2 	(IN P U T) 0.2 0.147 0.38 	F*C
$L = N G$ $\frac{L e n g}{(m m)}$ $\frac{1 = = =}{1511}$ 1411 1211 116 1011 960 911 860 811 $= = = =$ $T o tal$ $L E N G$ $L E N G$ $L e n g$ $(m m)$ $= = = =$ 1411 131	th 	H - B A = = = 1 6 0 1 5 0 1 4 0 1 3 0 1 4 0 1 2 0 1 1 5 1 1 0 1 0 0 9 5 9 0 8 5 = = = 6 f e H - B A = = = 1 5 0 1 4 0 1 5 0 1 5 0 1 4 0 1 5 0 1 1 5 1 1 0 1 5 5 1 1 0 1 5 5 1 0 0 9 5 9 0 8 5 = = = 1 5 0 1 5 0 1 5 0 1 5 0 1 5 0 1 1 0 1 5 0 1 5 0 1 1 5 1 1 0 1 5 0 1 5 0 1 1 5 1 1 0 1 5 0 1 1 5 1 1 0 8 5 = = = 1 5 0 1 5 0 1 5 0 1 5 0 1 1 0 1 5 0 1 1 0 1 1 5 1 1 0 1 5 1 1 0 1 5 1 1 0 1 5 1 1 0 1 1 5 1 1 0 1 1 5 1 1 0 1 1 5 1 1 1 0 1 1 1 5 1 1 1 0 1 1 1 5 1 1 1 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	SED COHO (IN PUT) Catch (numbers) 964 482 2470 3615 4097 10847 10907 12412 23559 70067 79287 76634 ======== 295,341 males,1 SED COHO (IN PUT) Catch (numbers) ======= 766 2114 2880	R T A N A L Y S (IN P U T) D e Ita -t (y) = = = = = = = 2 .119 2 .096 2 .055 1 .983 0 .932 0 .839 0 .726 0 .619 0 .533 0 .486 0 .465 0 .457 = = = = = = 9 9 1 fish R T A N A L Y S (IN P U T) D e Ita -t (y) = = = = = = 2 .096 2 .09	SIS Stock Numbers 1673 2819 6584 12850 19052 32921 47989 65408 95015 174050 267745 364975 	M e a n N u m b e r 	Te N atural M or F/Z 0.421 0.656 0.577 0.661 0.724 0.724 0.724 0.724 0.746 0.887 0.887 0.846 0.786 0.887 0.846 0.786 Exercise A = Te N atural M or F/Z 	rm in al F = ta iity (m) = T c = 0.254 0.428 0.347 0.433 0.675 0.532 0.511 0.720 1.296 0.956 0.694 ta lity (m) = T c = z 0.575 0.539	(IN P U T) 0.2 0.147 0.38 F 	F*C 5 1 6 93 7 25 1 172 5 25 1 25 4 202 4 524 1 3488 8 0476 6 4138 4 1916 : :::::::::::: 2 17109 F*C : ::::::::::::: 2 17509
L E N G (m m) = = = = 151 141 121 141 121 116 101 96 91 866 81 = = = = T o tal L E N G L E N G L E N G L E N G	th 	H - B A = = = 1 6 0 1 5 0 1 4 0 1 3 0 1 4 0 1 2 0 1 1 5 1 1 0 1 0 0 9 5 9 0 8 5 = = = 6 fe H - B A = = = 1 5 0 1 4 0 1 2 0 1 2 0	SED COHO (IN PUT) Catch (numbers) 964 482 2470 3615 4097 10847 10907 12412 23559 70067 79287 76634 ======= 295,341 males,1 SED COHO (IN PUT) Catch (numbers) 764 2114 2880 3943	R T A N A L Y S (IN P U T) D e Ita -t (y) = = = = = = = 2 .119 2 .096 2 .055 1 .983 0 .932 0 .726 0 .619 0 .533 0 .486 0 .465 0 .457 = = = = = = 9 9 1 fish R T A N A L Y S (IN P U T) D e Ita -t (y) = = = = = = 2 .096 2 .093 2 .095 2 .093 2 .093 2 .093 2 .093 2 .095 2 .093 2 .093 2 .093 2 .095 2 .095 2 .093 2 .093 2 .095 2 .095 2 .093 2 .093 2 .095 2 .095 2 .093 2 .095 2 .09	S IS S to c k N u m b e rs 1 6 7 3 2 8 1 9 6 5 8 4 1 2 8 5 0 1 9 0 5 2 3 2 9 2 1 4 7 9 8 9 6 5 4 0 8 9 5 0 1 5 1 7 4 0 5 0 2 6 7 7 4 5 3 6 4 9 7 5 	M e a n N u m b e r 	Te N atural M or F/Z 	rm in al F = ta iity (m) = T c = 0.254 0.428 0.347 0.433 0.675 0.532 0.511 0.720 1.296 0.956 0.694 	(IN P U T) 0.2 0.147 0.38 F 	F*C
$L = N G$ $\frac{L e n g}{(m m)}$ $\frac{1 = = =}{151}$ 141 131 116 101 96 91 86 81 $\frac{1}{2} = = =$ $T o tal$ $L F A$ $L E N G$ $\frac{L e n g}{(m m)}$ $\frac{1}{2} = = =$ 141 131 1216 111 1216	th 	H - B A = = = 1 160 150 140 120 115 100 95 90 85 = = = 6 f e H - B A 	SED C O H O (IN P U T) C atch (n u m bers) 964 482 2470 3615 4097 10847 10907 12412 23559 70067 79287 76634 = 295,341 m ales, 1 SED C O H O (IN P U T) C atch (n u m bers) 766 2114 2880 3943 3263	R T A N A L Y S (IN P U T) D e Ita - t (Y) = = = = = = = 2 . 1 9 2 . 0 96 2 . 0 55 1 . 9 8 3 0 . 9 3 2 0 . 8 3 9 0 . 7 2 6 0 . 6 1 9 0 . 5 3 3 0 . 4 8 6 0 . 4 6 5 0 . 4 5 7 = = = = = = 9 9 1 fish R T A N A L Y S (IN P U T) D e Ita - t (Y) = = = = = = 2 . 0 9 6 2 . 0 5 5 1 . 9 8 3 0 . 9 3 2 0 . 4 5 7 = = = = = = 9 9 1 fish R T A N A L Y S (IN P U T) D e Ita - t (Y) = = = = = = 2 . 0 9 6 2 . 0 5 5 1 . 9 8 3 0 . 9 3 2 0 . 8 3 9 0 . 5 3 0 . 9 3 2 0 . 8 3 0 . 9 3 2 0 . 8 3 9 0 . 5 3 0 . 9 3 2 0 . 8 3 0 . 9 3 0 . 9 3 0 . 9 3 0 . 9 3 2 0 . 8 3 0 . 9 3 0	S IS S to c k N u m b e rs 1673 2819 6584 12850 19052 32921 47989 65408 95015 174050 267745 364975 	M e a n N u m b e r 	Te Natural Mor F/Z 	rm in al F = ta lity (m) = T c = 0.254 0.428 0.347 0.433 0.675 0.532 0.511 0.720 1.296 0.956 0.694 0.956 0.694 rm in al F = ta lity (m) = T c = 20.575 0.389 0.533 0.384 0.384	(IN P U T) 0.2 0.147 0.38 F 0.107 0.281 0.200 0.286 0.528 0.385 0.385 0.364 0.528 0.364 0.521 0.521 (IN P U T) 0.2 0.147 0.38 0.521 (IN P U T) 0.2 0.147 0.38 0.521 0.52 0.521 0.521 0.52 0.521 0.525 0.521 0.525 0.521 0.525	F*C
$L = N G$ $\frac{L = n g}{(m m)}$ $\frac{= = =}{1511}$ 1411 116 1111 106 101 96 911 86 811 $= = = =$ $T o ta1$ $B = = =$ $L = N G$ $L = N G$ $L = N G$ $L = n g$ $(m m)$ $= = =$ 1411 131 121 1166 1111 106 101	th 	H -B A = = = 1 160 150 140 120 115 105 105 105 105 100 90 85 = = = 6 fe H -B A = = = 150 140 130 140 130 140 130 140 130 115 110 105 105 105 105 105 10	SED C O H O (IN P U T) C atch (n u m bers) 964 482 2470 3615 4097 10847 10907 12412 23559 70067 79287 76634 ======= 295,341 m ales, 1 SED C O H O (IN P U T) C atch (n u m bers) 766 2114 2880 3943 3263 9518	R T A N A L Y S (IN P U T) D e Ita - t (Y) = = = = = = = 2 .1 9 2 .0 96 2 .0 55 1 .9 83 0 .9 32 0 .8 39 0 .7 2 6 0 .6 19 0 .5 3 3 0 .4 86 0 .4 65 0 .4 57 = = = = = = 9 9 1 fish R T A N A L Y S (IN P U T) D e Ita - t (y) = = = 2.0 9 6 2 .0 55 1 .9 83 0 .9 32 0 .4 57 = = = = = = 9 9 1 fish 0 .1 55 1 .9 83 0 .9 32 0 .8 39 0 .7 2 6 0 .6 19 0 .5 33 0 .9 32 0 .8 39 0 .7 2 6 0 .6 19 0 .5 33 0 .9 32 0 .8 39 0 .7 2 6 0 .6 19 0 .5 33 0 .9 32 0 .8 39 0 .7 2 6 0 .6 19 0 .5 33 0 .9 32 0 .8 39 0 .7 2 6 0 .6 19 0 .5 33 0 .9 32 0 .8 39 0 .7 2 6 0 .6 19 0 .5 33 0 .9 32 0 .8 39 0 .7 2 6 0 .6 19 0 .5 3 0 .9 32 0 .8 39 0 .7 2 6 0 .6 19 0 .5 3 0 .9 32 0 .8 39 0 .7 2 6 0 .6 19 0 .5 3 0 .9 32 0 .8 39 0 .7 2 6 0 .6 19 0 .5 3 0 .9 32 0 .8 39 0 .7 2 6 0 .6 19 0 .5 3 0 .9 32 0 .8 39 0 .7 2 6 0 .6 19 0 .5 5 1 .9 83 0 .9 32 0 .8 39 0 .7 2 6 0 .6 19 0 .5 5 1 .9 83 0 .9 32 0 .8 39 0 .7 2 6 0 .8 39 0 .7 2 6 0 .8 19 0 .8 39 0 .7 2 6 0 .8 19 0 .8 39 0 .7 2 6 0 .8 19 0 .8 19	SIS Stock Numbers 1673 2819 6584 12850 19052 32921 47989 65408 95015 174050 267745 364975 	M e a n N u m b e r 4 5 1 6 8 8 0 5 1 8 0 3 5 1 4 3 2 4 2 0 5 5 4 2 8 3 1 0 3 4 0 5 7 4 1 1 4 7 6 1 0 0 4 9 8 0 1 5 1 4 0 1 0 8 	Te Natural Mor 0.421 0.656 0.577 0.661 0.724 0.713 0.796 0.887 0.846 0.788 Wtd.Ave.F = A = Te Natural Mor F/Z 	rm in al F = tality (m) = T c = 0.254 0.428 0.347 0.433 0.675 0.532 0.511 0.720 1.296 0.956 0.956 0.694 	(IN P U T) 0.2 0.147 0.38 0.147 0.38 0.38 0.286 0.528 0.385 0.385 0.364 0.573 1.149 0.809 0.547 0.521 (IN P U T) 0.2 0.147 0.38 0.521 0.521 0.521 0.521 0.521 0.521 0.521 0.523 0.521 0.521 0.521 0.523 0.521 0.523 0.521 0.521 0.521 0.523 0.523 0.523 0.521 0.523 0.521 0.2 0.147 0.38 0.5247 0.521 0.2 0.147 0.38 0.537 0.539 0.537 0.537 0.537 0.539 0.537 0.539 0.537 0.539 0.5539 0.555555555 0.55555555555555555555555	F*C : : : : : : : :
$L = N G$ $\frac{L = n g}{(m m)}$ $\frac{= = =}{1511}$ 1411 116 101 96 911 86 811 $= = =$ $T o tal$ $L = N G$ $L = N G$ $\frac{L = n g}{(m m)}$ $\frac{= = =}{1411}$ 131 121 116 1111 106 101 96	th 	H - B A = = = = 1 6 0 1 5 0 1 4 0 1 3 0 1 4 0 1 3 0 1 1 5 1 1 0 1 0 5 1 0 0 9 0 8 5 = = = 6 f e H - B A = = = 1 5 0 1 4 0 1 3 0 1 2 0 1 4 0 1 3 0 1 2 0 1 4 0 1 3 0 1 2 0 1 4 0 1 0 5 1 1 0 1 2 0 1 1 5 1 1 0 1 2 0 1 1 5 1 1 0 1 2 0 1 2 0 1 1 5 1 1 0 1 0 5 1 0 0 1 0 0 1 0 0 0 1	SED COHO (INPUT) Catch (numbers) Catch (numbers) Catch (numbers) Catch 10907 10847 10907 12412 23559 70067 79287 76634 Catch (INPUT) Catch (numbers) (numbers) (numbers) (numbers) (numbers) (numbers) (numbers) (numbers) (numbers) (numbe	R T A N A L Y S (IN P U T) D e Ita-t (Y) = = = = = = = = 2 .1 9 2 .0 9 6 2 .0 5 5 1 .9 8 3 0 .9 3 2 0 .8 3 9 0 .7 2 6 0 .6 1 9 0 .5 3 3 0 .4 8 5 0 .4 5 7 = = = = = = = 9 9 1 fish R T A N A L Y S (IN P U T) D e Ita-t (Y) = = = = = = 2 .0 9 6 2 .0 5 5 1 .9 8 3 0 .9 3 2 0 .8 3 9 0 .7 2 6 0 .6 1 9 0 .5 3 3	S IS S to c k N um b ers 1 6 7 3 2 8 19 6 5 8 4 1 2 8 5 0 1 9 0 5 2 3 2 9 2 1 4 7 9 8 9 6 5 4 0 8 9 5 0 1 5 1 7 4 0 5 0 2 6 7 7 4 5 3 6 4 9 7 5 	M e a n N u m b e r 	Te Natural Mor F/Z 	rm in al F = ta lity (m) = T c = 2 0.254 0.428 0.347 0.428 0.347 0.433 0.675 0.532 0.551 1.296 0.956 0.956 0.694 rm in al F = ta lity (m) = T c = 2 0.575 0.389 0.533 0.384 0.676	(IN P U T) 0.2 0.147 0.38 F 0.107 0.281 0.200 0.288 0.385 0.364 0.528 0.364 0.573 1.149 0.809 0.547 0.735 0.521 (IN P U T) 0.2 0.147 0.38 0.127 0.38 0.521 0.127 0.38 0.521 0.22 0.385 0.386 0.237 0.539 0.639 0.639 0.529	F * C :
L E N G (m m) = == = 1511 141 131 116 101 96 91 E E N G 86 81 = = = T o tal L F A L E N G L E N G (m m) = = = 141 131 116 101 96 91 131 121 131 141 131 141 101 96 91 131 141 131 116 101 96 91 131 141 101 96 91 131 141 131 141 131 141 131 141 14	th 	H - B A = = = 1 6 0 1 5 0 1 4 0 1 3 0 1 4 0 1 3 0 1 1 5 1 1 0 1 1 5 1 0 0 9 5 9 0 8 5 = = 6 fe H - B A = = = 1 5 0 1 4 0 1 2 0 1 4 0 1 3 0 1 2 0 1 4 0 1 3 0 1 2 0 1 1 5 1 1 0 1 0 0 9 5 9 0 8 5 = = = = 5 0 1 4 0 1 2 0 1 1 0 8 5 = = = = 5 0 1 4 0 1 2 0 1 1 0 1 0 0 1 1 0 1 0	SEDCOHO (INPUT) Catch (numbers) SEDCOHO 3615 4097 10847 10907 12412 23559 70067 79287 76634 SEDCOHO Males, 1 SEDCOHO (INPUT) Catch (numbers) SEDCOHO (1NPUT) Catch (numbers) SET 295,341	R T A N A L Y S (IN P U T) D e Ita - t (y) = = = = = = = = 2 .1 19 2 .0 96 2 .0 55 1 .9 83 0 .9 32 0 .8 39 0 .7 26 0 .4 57 = = = = = = 9 9 1 fish R T A N A L Y S (IN P U T) D e Ita - t (y) = = = = = = 2 .0 96 2 .0 55 1 .9 83 0 .9 32 0 .4 86 (x) 4 86	SIS Stock Numbers 1673 2819 6584 12850 19052 32921 47989 65408 95015 174050 26745 364975 	M ean N u m b er 	Te N atural M or F/Z 	rm in al F = ta lity (m) = T c = 2 0.254 0.428 0.347 0.433 0.675 0.532 0.511 0.720 1.296 0.956 0.694 rm in al F = ta lity (m) = T c = 2 0.575 0.389 0.538 0.384 0.686 0.676 1.367	(IN P U T) 0.2 0.147 0.38 F 	F * C :
L E N G (m m) = = = = 1511 1411 116 1111 106 1011 966 811 = = = T o tal L F A L E N G L E N G (m m) = = = = 1411 1211 116 1011 916 866 911 866 911 866 911 866 911 866 911 866 911 866 911 866 911 866 911 866 911 866 911 866 911 916 917 918 918 918 918 918 918 918 918	T t - -	H - B A = = = 1 6 0 1 5 0 1 4 0 1 3 0 1 4 0 1 3 0 1 1 5 1 1 0 1 0 5 1 0 0 9 0 8 5 = = 6 f e H - B A = = 1 5 0 1 4 0 1 3 0 1 2 0 1 3 0 1 2 0 1 1 5 1 1 0 1 3 0 1 2 0 1 3 0 1 0 5 1 0 0 5 1 0 0 8 5 = = 1 5 0 1 0 0 8 5 = = 1 5 0 1 0 0 8 5 = = 1 5 0 1 1 0 1 0 5 1 0 0 1 2 0 1 1 0 1 0 5 1 0 0 1 2 0 1 1 0 1 0 0 8 5 = = 1 1 0 1 0 0	SED COHO (IN PUT) Catch (numbers) SED COHO 3615 4097 10847 10907 12412 23559 70067 79287 76634 SED COHO (IN PUT) Catch (numbers) SED COHO (IN PUT) Catch (numbers) 5451 16686 57351 68660 62901	R T A N A L Y S (IN P U T) D e Ita -t (Y) = = = = = = = 2 .1 19 2 .0 9 6 2 .0 55 1 .9 83 0 .9 32 0 .8 39 0 .7 2 6 0 .6 19 0 .5 33 0 .4 86 0 .4 57 = = = = = = 9 9 1 fish R T A N A L Y S (IN P U T) D e Ita -t (Y) = = = = = = 2 .0 9 6 2 .0 5 5 1 .9 83 0 .9 32 0 .4 86 0 .6 19 0 .5 33 0 .9 32 0 .9 32 0 .4 85 0 .6 19 0 .5 5 1 .9 83 0 .9 32 0 .8 39 0 .7 26 0 .6 19 0 .5 33 0 .4 86 0 .4 65 0 .4 57 = = = = = = 2 .0 9 6 2 .0 55 1 .9 83 0 .9 32 0 .8 39 0 .7 26 0 .6 19 0 .5 33 0 .4 86 0 .4 65 0 .4 57 = = = = = = 2 .0 9 6 2 .0 55 1 .9 83 0 .9 32 0 .8 39 0 .7 26 0 .6 19 0 .5 33 0 .4 86 0 .4 65 0 .4 57 = = = = = = 2 .0 9 6 0 .5 33 0 .4 86 0 .4 65 0 .4 57 = = = = = = 2 .0 9 6 0 .5 33 0 .4 86 0 .4 65 0 .4 57 = = = = = = 2 .0 9 6 0 .5 33 0 .4 86 0 .4 65 0 .4 57 = = = = = = 2 .0 9 6 0 .5 33 0 .4 86 0 .4 65 0 .4 57 = = = = = = 2 .0 9 6 0 .5 33 0 .4 86 0 .4 65 0 .4 57 = = = = = = 2 .0 9 6 0 .5 33 0 .4 86 0 .4 65 0 .4 57 = = = = = = 2 .0 9 6 0 .5 33 0 .4 86 0 .4 65 0 .4 57 = = = = = = 2 .0 9 6 0 .5 33 0 .4 86 0 .4 65 0 .4 65 0 .4 57 = = = = = 2 .0 9 6 0 .5 33 0 .4 86 0 .4 65 0 .4 65	S IS S to c k N um b ers 1 6 7 3 2 8 1 9 6 5 8 4 1 2 8 5 0 1 9 0 5 2 3 2 9 2 1 4 7 9 8 9 6 5 4 0 8 9 5 0 1 5 1 7 4 0 5 0 2 6 7 7 4 5 3 6 4 9 7 5 	M e a n N u m b e r 	Te N atural M or F/Z 0.421 0.656 0.577 0.661 0.724 0.724 0.724 0.724 0.724 0.724 0.796 0.887 0.887 0.846 0.788 W td.A ve.F = A = Te N atural M or F/Z 0.724 0.724 0.788 0.788 0.788 0.788 0.788 0.724 0.788 0.788 0.724 0.724 0.724 0.788 0.778 0.724 0.788 0.788 0.724 0.724 0.788 0.788 0.788 0.724 0.724 0.788 0.788 0.788 0.788 0.724 0.788 0.788 0.788 0.724 0.788 0.788 0.788 0.788 0.724 0.7888 0.788 0.78857 0.77780 0.7888 0.78857 0.77700 0.78800 0.78857 0.77700000000000000000000000000000000	rm in al F = ta iity (m) = T c = 2 0.254 0.428 0.347 0.433 0.675 0.532 0.511 0.720 1.296 0.956 0.694 rm in al F = ta iity (m) = T c = 2 0.575 0.389 0.533 0.384 0.676 0.676 1.367	(IN P U T) 0.2 0.147 0.38 	F*C : : : : : : : :
$L \in N \in Q$ $\frac{L \in n \in Q}{(m \in m)}$ $\frac{1}{1} = \frac{1}{1} $	T t - <t< td=""><td>H - B A = = = 1 6 0 1 5 0 1 4 0 1 3 0 1 1 5 1 1 0 1 0 5 1 0 0 9 5 9 0 8 5 = = = 6 f e H - B A - - - - - - - - - - - - -</td><td>SED COHO (IN PUT) Catch (numbers) </td><td>R T A N A L Y S (IN P U T) D e Ita -t (Y) = = = = = = = = = = = = = = = = = = =</td><td>S IS S to c k N um b ers 1673 2819 6584 12850 19052 32921 47989 65408 95015 174050 267745 364975 364975 S to c k N um b ers 1330 4169 8797 14243 19533 31646 50654 71977 136239 216352 295818</td><td>M e a n N u m b e r </td><td>Te N atural M or F/Z 0.421 0.656 0.577 0.661 0.782 0.724 0.724 0.724 0.724 0.738 0.887 0.887 0.887 0.887 0.887 0.886 0.788 E W td.A ve.F = A = Te N atural M or F/Z 0.724 0.724 0.788 0.788 0.788 0.788 0.788 0.724 0.724 0.724 0.724 0.788 0.724 0.724 0.788 0.724 0.724 0.724 0.788 0.788 0.724 0.724 0.724 0.788 0.724 0.724 0.788 0.724 0.724 0.788 0.724 0.788 0.724 0.724 0.788 0.788 0.724 0.724 0.788 0.788 0.724 0.724 0.788 0.788 0.788 0.724 0.724 0.788 0.788 0.788 0.788 0.724 0.788 0.788 0.788 0.724 0.788 0.788 0.788 0.788 0.778 0.724 0.788 0.778 0.788 0.788 0.788 0.788 0.788 0.788 0.788 0.788 0.788 0.788 0.788 0.788 0.798 0.788 0.799 0.788 0.799 0.788 0.799 0.788 0.799 0.788 0.799 0.799 0.779 0.787 0.783 0.783 0.7890 0.7890 0.787 0.7900 0.787 0.783 0.78900 0.78700 0.78700 0.78700 0.787000 0.7870000000000</td><td>rm in al F = ta iity (m) = T c = 2 0.254 0.428 0.347 0.433 0.675 0.532 0.511 0.720 1.296 0.956 0.694 rm in al F = ta iity (m) = T c = 2 0.575 0.389 0.533 0.384 0.6686 0.676 1.367 1.028 0.701</td><td>(IN P U T) 0.2 0.147 0.38 </td><td>F*C ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** * </td></t<>	H - B A = = = 1 6 0 1 5 0 1 4 0 1 3 0 1 1 5 1 1 0 1 0 5 1 0 0 9 5 9 0 8 5 = = = 6 f e H - B A - - - - - - - - - - - - -	SED COHO (IN PUT) Catch (numbers) 	R T A N A L Y S (IN P U T) D e Ita -t (Y) = = = = = = = = = = = = = = = = = = =	S IS S to c k N um b ers 1673 2819 6584 12850 19052 32921 47989 65408 95015 174050 267745 364975 364975 S to c k N um b ers 1330 4169 8797 14243 19533 31646 50654 71977 136239 216352 295818	M e a n N u m b e r 	Te N atural M or F/Z 0.421 0.656 0.577 0.661 0.782 0.724 0.724 0.724 0.724 0.738 0.887 0.887 0.887 0.887 0.887 0.886 0.788 E W td.A ve.F = A = Te N atural M or F/Z 0.724 0.724 0.788 0.788 0.788 0.788 0.788 0.724 0.724 0.724 0.724 0.788 0.724 0.724 0.788 0.724 0.724 0.724 0.788 0.788 0.724 0.724 0.724 0.788 0.724 0.724 0.788 0.724 0.724 0.788 0.724 0.788 0.724 0.724 0.788 0.788 0.724 0.724 0.788 0.788 0.724 0.724 0.788 0.788 0.788 0.724 0.724 0.788 0.788 0.788 0.788 0.724 0.788 0.788 0.788 0.724 0.788 0.788 0.788 0.788 0.778 0.724 0.788 0.778 0.788 0.788 0.788 0.788 0.788 0.788 0.788 0.788 0.788 0.788 0.788 0.788 0.798 0.788 0.799 0.788 0.799 0.788 0.799 0.788 0.799 0.788 0.799 0.799 0.779 0.787 0.783 0.783 0.7890 0.7890 0.787 0.7900 0.787 0.783 0.78900 0.78700 0.78700 0.78700 0.787000 0.7870000000000	rm in al F = ta iity (m) = T c = 2 0.254 0.428 0.347 0.433 0.675 0.532 0.511 0.720 1.296 0.956 0.694 rm in al F = ta iity (m) = T c = 2 0.575 0.389 0.533 0.384 0.6686 0.676 1.367 1.028 0.701	(IN P U T) 0.2 0.147 0.38 	F*C ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** *
$L \in N \in Q$ $\frac{L \in n \in Q}{(m \in m)}$ $\frac{1}{1} = \frac{1}{1} $	T - - - - - - - - - - - - -	H - B A = = = 1 6 0 1 5 0 1 4 0 1 3 0 1 1 5 1 0 0 9 5 9 0 8 5 = = = 6 f e H - B A - H - B A - 1 5 0 1 4 0 1 0 5 1 0 0 1 2 0 1 3 0 1 2 0 1 3 0 1 2 0 1 3 0 1 2 0 1 5 0 1 5 0 1 0 5 1 0 0 9 5 9 0 8 5 = = = - - - - - - - - - - - - -	SED COHO (IN PUT) Catch (numbers) 964 482 2470 3615 4097 10847 10907 12412 23559 70067 79287 76634 ======= 295,341 males,1 SED COHO (IN PUT) Catch (numbers) 766 2114 2880 3943 39518 15451 166866 57351 68660 62801 ====== 243,435	R T A N A L Y S (IN P U T) D e Ita - t 2.1 1 9 2.0 9 6 2.0 5 5 1.9 8 3 0.9 3 2 0.8 3 9 0.7 2 6 0.4 5 7 = = = = = = = = = = = = = = = = = = =	S IS S to c k N u m b e r s 1 6 7 3 2 8 1 9 6 5 8 4 1 2 8 5 0 1 9 0 5 2 3 2 9 2 1 4 7 9 8 9 6 5 4 0 8 9 5 0 1 5 1 7 4 0 5 0 2 6 7 7 4 5 3 6 4 9 7 5 	M e a n N u m b e r 	Te N a tu ral M o r 0.4 21 0.6 56 0.5 7 7 0.6 61 0.7 82 0.7 24 0.7 24 0.7 24 0.7 96 0.8 87 0.8 87 0.8 87 0.8 87 0.8 87 0.8 87 0.7 96 0.8 87 0.7 96 0.7 96 0.7 88 W td. A ve. F = A = Te N a tu ral M o r F /Z 0.7 24 0.7 24 0.7 86 0.7 88 0.7 88 0.7 24 0.7 88 0.7 24 0.7 24 0.7 24 0.7 86 0.7 24 0.7 24 0.7 24 0.7 24 0.7 24 0.7 24 0.7 24 0.7 24 0.7 24 0.7 85 0.7 24 0.7 24 0.7 85 0.7 24 0.7 24 0.7 85 0.7 24 0.7 83 0.8 82 0.8 57 0.7 90 W td. A ve. F	rm in al F = ta iity (m) = T c = 2 0.254 0.428 0.347 0.433 0.675 0.532 0.511 0.720 1.296 0.956 0.694 rm in al F = ta iity (m) = T c = 2 0.575 0.389 0.533 0.384 0.676 0.389 0.533 0.384 0.676 0.384 0.384 0.676 0.676	(IN P U T) 0.2 0.147 0.38 	F*C *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ** ** *** *** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** *

	3	<u>6 fe</u>	<u>m ales, 1</u>	992 fish	ing seas	on				
									(INPUT)	
LENG		<u>н-ва</u>	<u>SED COHO</u>	RTANALYS	5 I S		Te Natural Mor	<u>rm in al F =</u> tality (m.)–	0.2	
								T c =	0.38	
			(INPUT)	(INPUT)						
Leng (mm)	th		(numbers)	Delta-t (v)	Numbers	<u>Number</u>	F/Z	Z	F	F * C
= = = =	=	= = =								
131	-	140	482	2.055	837	E 4 E 7	0.042	0.022	0.7.0.6	2480
116	-	120	4352	0.932	11064	7225	0.843	0.933	0.602	2621
111	-	115	4735	0.839	17479	1 1 4 2 6	0.738	0.561	0.414	1962
106	-	110	4253	0.726	23878	14598	0.665	0.438	0.291	1239
96	-	100	17395	0.533	56907	23583	0.834	0.885	0.738	1 2 8 3 1
91	-	95	47378	0.486	109804	37550	0.896	1.409	1.262	59776
86	-	90	45449	0.465	164222	61016	0.835	0.892	0.745	33853
= = = =	=	= = =		========						
Total			178,951			263,241	Wtd.Ave.F =		0.786	140695
	_	<u> </u>					A =	1	0.544	
LFA	3	<u>6 te</u>	<u>m ales, 1</u>	993 tish	ing seas	on				
	 - ·				2 1 9		-	rm in al 5	(INPUT)	
LENG				NI ANALIS			Natural Mor	tality (m.)=	0.2	
								Tc=	0.38	
Lerr	+ h		(INPUT)	(INPUT)	6 to o k	Maar				
(m m)	Ľ		(numbers)		Numbers	<u>Numbe</u> r	F /Z	z	F	<u>F*C</u>
	=	= = =								
151	-	160	964	2.096	1673	12120	0 4 4 9	0.266	0 1 1 0	172
121	-	130	3339	1.983	10294	13949	0.620	0.200	0.239	799
116	-	120	3839	0.932	15850	11678	0.691	0.476	0.329	1 2 6 2
111	-	115	2393	0.839	20438	14935	0.522	0.307	0.160	383
101	-	105	10572	0.619	43509	21791	0.722	0.632	0.382	5129
96	-	100	16286	0.533	63837	27497	0.801	0.739	0.592	9646
91	-	95	33804	0.486	103300	38501	0.857	1.025	0.878	29680
81	-	8 5	30920	0.457	198594	79230	0.726	0.537	0.390	12067
7070	=									
Total	-		154,528			294,947	Wtd.Ave.F =		0.619	95659
	2	6 60	malas 1	004 fich	ing soos	<u> </u>	A -		0.402	
	<u> </u>	0 10	<u>in ales, i</u>	334 1131	ing seas	0 11				
LENG	 ; T	Н-ВА	SED СОНО	RTANALYS	S I S		Те	rm in al F =	(IN P U T) 0.2	
LENG	т I	Н-ВА	SED COHO	RTANALYS	S I S		Te Natural Mor	rm in al F = tality (m)=	(IN PUT) 0.2 0.147	
LENG	і Т I	н-ва	SED COHO		5 IS		Te Natural Mor	rm in alF = tality (m)= Tc =	(IN P U T) 0.2 0.147 0.38	
LENG Leng	T I	H - B A	SED COHO (INPUT) Catch	RTANALYS (INPUT) Delta-t	SIS Stock	Mean	Te Natural Mor	rm in al F = tality (m)= Tc=	(IN P U T) 0.2 0.147 0.38	
LENG Leng (mm)	t h	H - B A	SED COHO (INPUT) Catch (numbers)	R T A N A L Y S (<i>IN P U T</i>) D e Ita - t (y)	SIS Stock Numbers	Mean Number	Te Natural Mor F/Z	rminalF = tality(m)= Tc = Z	(IN P U T) 0.2 0.147 0.38	F * C
<u>LENG</u> Leng (mm) = = = = = = = = = = = = = = = = = = =	th -	H - B A	SED COHO (INPUT) Catch (numbers) 964.316	R T A N A L Y S (IN P U T) D e Ita-t (Y) = = = = = 2.119	SIS Stock Numbers 1673	Mean Number	Te Natural Mor F/Z	rm in al F = tality (m) = T c = Z	(IN P U T) 0.2 0.147 0.38 F	F * C
<u>L E N G</u> <u>L e n g</u> (m m) = = = = 151 141	th -	H - B A = = = 1 6 0 1 5 0	SED COHO (IN PUT) Catch (numbers) 964.316 482.158	R T A N A L Y S (IN P U T) D e Ita-t (Y) = = = = = 2.119 2.096	SIS Stock Numbers 1673 2819	Mean Number 4516	T e N atural M o r F /Z	rminalF = tality (m)= Tc = Z 	(IN P U T) 0.2 0.147 0.38 F 	F * C ::::::::::::::::::::::::::::::::::::
L E N G L e n g (m m) = = = = 151 141 131 121	th - - -	H - B A = = = 1 6 0 1 5 0 1 4 0	SED COHO (IN PUT) Catch (numbers) 964.316 482.158 2470.071 3614.867	RTANALYS (INPUT) Delta-t (y) ====== 2.119 2.096 2.055 1.083	SIS Stock Numbers 1673 2819 6584 12850	Mean Number 4516 8805 18035	T e N atural M o r F /Z 0 .4 2 1 0 .6 5 6 0 5 7 7	rminalF = tality (m) = Tc = Z 0.254 0.428 0.347	(IN P U T) 0.2 0.147 0.38 F 	F * C ::::::::::::::::::::::::::::::::::::
<u>L E N G</u> (m m) = = = = = 151 141 131 121 116	t h = - - - -	H - B A = = = 1 6 0 1 5 0 1 4 0 1 3 0 1 2 0	SED COHO (INPUT) Catch (numbers) 964.316 482.158 2470.071 3614.867 4097.025	(IN P U T) D e Ita - t (y) = = = = = = 2.119 2.096 2.055 1.983 0.932	SIS Stock Numbers 1673 2819 6584 12850 19052	M e a n N u m b e r 4 5 1 6 8 8 0 5 1 8 0 3 5 1 4 3 2 4	T e N atural M o r F /Z 0 . 4 2 1 0 . 6 5 7 7 0 . 6 6 1	rminal F = tality (m) = Tc = Z 0.254 0.428 0.347 0.433	(IN P U T) 0.2 0.147 0.38 F 	F * C : : : : : : : : : : : : : : : : : : :
<u>L E N G</u> <u>L e n g</u> (m m) = = = = = 1511 1411 131 121 116 111 106	th - - - - - -	H - B A = = = 1 6 0 1 5 0 1 4 0 1 3 0 1 2 0 1 1 5	SED COHO (INPUT) Catch (numbers) 964.316 482.158 2470.071 3614.867 4097.025	RTANALYS (INPUT) Delta-t (y) = = = = = = = 2.119 2.096 2.096 2.055 1.983 0.932 0.839	SIS Stock Numbers 1673 2819 6584 12850 19052 32921 522	M e a n N u m b e r 	T e N a tu ra I M o r F /Z 0.421 0.656 0.577 0.661 0.782	rminal F = tality (m) = Tc = Z 0.254 0.428 0.347 0.433 0.675	(IN P U T) 0.2 0.147 0.38 F 	F*C
<u>L E N G</u> <u>L e n g</u> (m m) = = = = 1511 1411 1311 121 116 1111 106 101	th 	H - B A = = = 1 6 0 1 5 0 1 4 0 1 3 0 1 2 0 1 1 5 1 1 0 1 0 5	SED COHO (IN PUT) Catch (n umbers) 964.316 482.158 2470.071 3614.867 4097.025 10847.235 10906.517 12412.273	R T A N A L Y S (IN P U T) D e Ita - t (Y) = = = = = = = 2.119 2.096 2.055 1.983 0.932 0.839 0.726 0.619	SIS Stock Numbers 1673 2819 6584 12850 19052 32921 47989 65408	M ean N u m b er 	T e N a tu ra I M o r F /Z 0 .4 2 1 0 .6 5 6 0 .5 7 7 0 .6 6 1 0 .7 8 2 0 .7 2 4 0 .7 2 4	rm in al F = tality (m) = Tc = 2 	(IN P U T) 0.2 0.147 0.38 F 	F * C : : : : : : : : : : : : : : : : : : :
LENG (mm) ==== 151 141 131 121 116 111 106 101 96	th 	H - B A = = = 1 6 0 1 5 0 1 4 0 1 3 0 1 2 0 1 1 5 1 1 0 1 0 5 1 0 0	SED COHO (IN PUT) Catch (numbers) 964.316 482.158 2470.071 3614.867 4097.025 10847.235 10906.517 12412.273 23558.552	R T A N A L Y S (IN P U T) D e ita - t (y) = = = = = = = 2 .1 19 2 .0 9 6 2 .0 5 5 1 .9 8 3 0 .9 3 2 0 .8 3 9 0 .7 2 6 0 .6 19 0 .5 3 3	S to c k N u m b e rs 1 6 7 3 2 8 1 9 6 5 8 4 1 2 8 5 0 1 9 0 5 2 3 2 9 2 1 4 7 9 8 9 6 5 4 0 8 9 5 0 1 5	M e a n N u m b e r 	T e N atural M or F/Z 	rm in al F = tality (m) = Tc = 2 	(IN P U T) 0.2 0.147 0.38 F 	F * C 5 1 6 9 3 7 2 5 1 1 7 2 5 7 2 5 4 2 0 2 4 5 2 4 1 3 4 8 8
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L E N C (m m) ==== 151 141 131 121 116 101 106 101 96 91 86 81	T T T T T T T T	H - B A = = = 1 6 0 1 5 0 1 4 0 1 2 0 1 1 5 1 1 0 1 0 5 1 0 0 9 5 9 0 8 5	SED COHO (IN PUT) Catch (numbers) ===== 964.316 482.158 2470.071 3614.867 4097.025 10847.235 10906.517 12412.273 23558.552 70067.034 79287.315 76634.131	R T A N A L Y S (IN P U T) D e Ita-t (y) = = = = = = = 2.119 2.096 2.096 2.055 1.983 0.932 0.839 0.726 0.619 0.533 0.486 0.465 0.465	S to c k N u m b e r s 1 6 7 3 2 8 1 9 6 5 8 4 1 2 8 5 0 1 9 0 5 2 3 2 9 2 1 4 7 9 8 9 6 5 4 0 8 9 5 0 1 5 1 7 4 0 5 0 2 6 7 7 4 5 3 6 4 9 7 5	M e a n N u m b e r 	Te Natural Mor F/Z 	rm in al F = tality (m) = Tc = 2 0.254 0.428 0.347 0.433 0.675 0.532 0.511 0.720 1.296 0.956 0.694	(IN P U T) 0.2 0.147 0.38 F 	F * C 5 1 6 9 3 7 2 5 1 1 7 2 5 7 2 5 4 2 0 2 4 5 2 4 1 3 4 88 8 0 4 7 6 6 4 1 3 8 4 1 9 1 6
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L E N G L e n g (m m) = = = 1511 141 131 116 111 106 111 96 91 86 81 = = = T o tal	th - - - - - - - - - - - - - - - - - - -	H - B A = = = 160 150 140 130 140 120 115 110 105 100 95 90 85 = = =	SED COHO (IN PUT) Catch (numbers) 964.316 482.158 2470.071 3614.867 4097.025 10847.235 10906.517 12412.273 23558.552 70067.034 79287.315 76634.131 ======= 295.341	R T A N A L Y S (IN P U T) D e Ita-t (y) = = = = = = = = = = = = = = = = = = =	S to c k N u m b ers 1 6 7 3 2 8 1 9 6 5 8 4 1 2 8 5 0 1 9 0 5 2 3 2 9 2 1 4 7 9 8 9 6 5 4 0 8 9 5 0 1 5 1 7 4 0 5 0 2 6 7 7 4 5 3 6 4 9 7 5	M e a n N u m b e r 	Te Natural Mor F/Z 0.421 0.656 0.577 0.661 0.782 0.724 0.724 0.713 0.796 0.887 0.887 0.846 0.788 0.846	rm in al F = tality (m) = Tc = 2 	(IN P U T) 0.2 0.147 0.38 F 	F*C 51 693 725 1172 5725 4202 4524 13488 80476 64138 41916 117109
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$L = N G$ $\frac{L e n g}{(m m)}$ $\frac{1}{2} = \frac{1}{1511}$ $\frac{1}{1111}$ $\frac{1}{1211}$ $\frac{1}{116}$ $\frac{1}{1111}$ $\frac{1}{216}$ $\frac{1}{1111}$ $\frac{1}{216}$ $\frac{1}{21$	th 	H - B A = = = 160 150 140 130 140 120 115 110 100 95 90 85 = = = 6 fe	SED COHO (IN PUT) Catch (numbers) 964.316 482.158 2470.071 3614.867 4097.025 10847.235 10906.517 12412.273 23558.552 70067.034 79287.315 76634.131 ======= 295.341 males, 1	R T A N A L Y S (IN P U T) D e Ita - t (y) = = = = = = = = = = = = = = = = = = =	S IS S to c k N u m b e rs 1 6 7 3 2 8 1 9 6 5 8 4 1 2 8 5 0 1 9 0 5 2 3 2 9 2 1 4 7 9 8 9 6 5 4 0 8 9 5 0 1 5 1 7 4 0 5 0 2 6 7 7 4 5 3 6 4 9 7 5 	M e a n N u m b e r 	T e N atural M o r F/Z 0.421 0.656 0.577 0.661 0.782 0.724 0.724 0.713 0.796 0.887 0.846 0.887 0.846 0.788 0.846 0.788 	rm in al F = tality (m) = Tc = 2 0.254 0.428 0.347 0.433 0.675 0.532 0.511 0.720 1.296 0.956 0.694	(IN P U T) 0.2 0.147 0.38 F 0.107 0.281 0.200 0.286 0.528 0.385 0.365 0.365 1.149 0.809 0.547 0.735 0.521 (IN P II T)	F * C : : : : : : : : : : : : : : : : : : :
$L = N G$ $\frac{L e n g}{(m m)}$ $\frac{1}{2} = \frac{1}{1511}$ $\frac{1}{1211}$ $\frac{1}{116}$ $\frac{1}{1111}$ $\frac{1}{106}$ $\frac{1}{1111}$ $\frac{1}{96}$ $\frac{91}{911}$ $\frac{96}{811}$ $\frac{91}{2}$ $\frac{1}{2} = \frac{1}{2}$ $\frac{1}{2} E R G$ $\frac{1}{2} E R G$	th 	H - B A = = = 160 150 140 130 140 120 115 110 100 95 90 85 = = = 6 fe H - B A	SED COHO (IN PUT) Catch (numbers) 964.316 482.158 2470.071 3614.867 4097.025 10847.235 10906.517 12412.273 23558.552 70067.034 79287.315 76634.131 ====== 295.341 males, 1 SED COHO	R T A N A L Y S (IN P U T) D e Ita - t (Y) = = = = = = 2 .119 2 .096 2 .055 1 .983 0 .932 0 .839 0 .726 0 .619 0 .533 0 .486 0 .465 0 .457 = = = = = 9 9 5 fish R T A N A L Y S	S IS S to c k N u m b e rs 1 6 7 3 2 8 19 6 5 8 4 1 2 8 5 0 1 9 0 5 2 3 2 9 2 1 4 7 9 8 9 6 5 4 0 8 9 5 0 1 5 1 7 4 0 5 0 2 6 7 7 4 5 3 6 4 9 7 5 	M e a n N u m b e r 	T e N atural M or F/Z 0.421 0.656 0.577 0.661 0.782 0.724 0.724 0.713 0.796 0.887 0.887 0.846 0.788 0.788 0.788 0.788 0.788	rm in al F = tality (m) = Tc = 2 0.254 0.428 0.347 0.433 0.675 0.532 0.511 0.720 1.296 0.956 0.694	(IN P U T) 0.2 0.147 0.38 F 0.107 0.281 0.200 0.286 0.528 0.385 0.364 0.528 0.385 0.36573 1.149 0.809 0.547 0.735 0.521 (IN P U T) 0.2	F*C 5 1 6 93 7 25 1 172 5 25 4 202 4 524 1 3488 8 0476 6 4138 4 1916 1 17109
L E N G L e n g (m m) = == = 1511 141 1211 116 1011 96 911 866 81 = = = = T o tal L F A	th = - - - - - - - - - - - - - - - - - -	H - B A = = = 160 150 140 130 140 120 140 120 140 120 100 95 90 85 = = = 6 fe H - B A	SED COHO (IN PUT) Catch (numbers) 964.316 482.158 2470.071 3614.867 4097.025 10847.235 10906.517 12412.273 23558.552 70067.034 79287.315 76634.131 ====== 295.341 males, 1 SED COHO	R T A N A L Y S (IN P U T) D e Ita - t (y) = = = = = = = = = = = = = = = = = = =	S IS S to c k N u m b e rs 1 6 7 3 2 8 19 6 5 8 4 1 2 8 5 0 1 9 0 5 2 3 2 9 2 1 4 7 9 8 9 6 5 4 0 8 9 5 0 1 5 1 7 4 0 5 0 2 6 7 7 4 5 3 6 4 9 7 5 	M e a n N u m b e r 	T e N atural M o r F/Z 0.421 0.656 0.577 0.661 0.724 0.724 0.724 0.713 0.796 0.887 0.887 0.846 0.788 0.887 0.846 0.788 	rm in al F = tality (m) = Tc = 2 0.254 0.428 0.347 0.433 0.675 0.532 0.511 0.720 1.296 0.956 0.694 0.956 0.694 	(IN P U T) 0.2 0.147 0.38 F 	F*C 51 693 725 1172 525 4202 4524 13488 80476 64138 41916 ::::::::::::::::::::::::::::::::::::
$L = N G$ $\frac{L e n g}{(m m)}$ $\frac{151}{1211}$ $\frac{141}{1161}$ $\frac{116}{1011}$ $\frac{96}{911}$ $\frac{96}{861}$ $\frac{81}{1011}$ $\frac{1}{100}$	th - - - - - - - - - - - - -	H - B A = = = 160 150 140 130 140 120 140 120 140 120 100 95 90 85 = = 6 fe H - B A	SED COHO (IN PUT) Catch (n u m bers) ====== 964.316 482.158 2470.071 3614.867 4097.025 10906.517 12412.273 23558.552 70067.034 79287.315 76634.131 ====== 295.341 m ales, 1 SED COHO (IN PUT)	R T A N A L Y S (IN P U T) D e Ita -t (Y) = = = = = = = 2 .119 2 .096 2 .055 1 .983 0 .932 0 .839 0 .726 0 .613 0 .486 0 .465 0 .465 0 .457 = = = = = = 9 9 5 fish R T A N A L Y S (IN P U T)	S IS S to c k N u m b e rs 1 6 7 3 2 8 19 6 5 8 4 1 2 8 5 0 1 9 0 5 2 3 2 9 2 1 4 7 9 8 9 6 5 4 0 8 9 5 0 1 5 1 7 4 0 5 0 2 6 7 7 4 5 3 6 4 9 7 5 	M e a n N u m b e r 	T e N atural M or F/Z 0.421 0.656 0.577 0.661 0.724 0.713 0.713 0.796 0.887 0.887 0.887 0.846 0.788 W td. A ve.F = A =	rm in al F = tality (m) = T c = 2 0.254 0.428 0.347 0.433 0.675 0.532 0.511 0.720 1.296 0.956 0.694 0.956 0.694 	(IN P U T) 0.2 0.147 0.38 F 	F*C 51 693 725 1172 5725 4202 4524 13488 80476 64138 41916 ::::::::::::::::::::::::::::::::::::
L E N G (m m) = == = 151 141 121 116 101 96 91 86 81 = = = T o tal L F A L E N G L E N G	th 	H - B A = = = 1 6 0 1 5 0 1 4 0 1 2 0 1 2 0 1 1 0 1 2 0 1 1 0 1 0 5 1 0 0 9 5 9 0 8 5 = = 6 f e H - B A	SED COHO (IN PUT) Catch (numbers) ====== 964.316 482.158 2470.071 3614.867 4097.025 10847.235 10906.517 12412.273 23558.552 70067.034 79287.315 76634.131 ====== 295.341 males, 1 SED COHO (IN PUT) Catch	R T A N A L Y S (IN P U T) D e Ita - t (Y) = = = = = = 2 .119 2 .096 2 .055 1 .983 0 .932 0 .839 0 .726 0 .619 0 .533 0 .486 0 .465 0 .457 = = = = = 9 9 5 fish R T A N A L Y S (IN P U T) D e Ita - t	S IS S to c k N u m b e rs 1 6 7 3 2 8 19 6 5 8 4 1 2 8 5 0 1 9 0 5 2 3 2 9 2 1 4 7 9 8 9 6 5 4 0 8 9 5 0 1 5 1 7 4 0 5 0 2 6 7 7 4 5 3 6 4 9 7 5 	M e a n N u m b e r 	T e N atural M o r 0.421 0.656 0.577 0.661 0.724 0.713 0.796 0.887 0.887 0.846 0.788 W td. A ve.F = A =	rm in al F = tality (m) = T c = 2 0.254 0.428 0.347 0.433 0.675 0.532 0.511 0.720 1.296 0.956 0.694 0.694 0.694 rm in al F = tality (m) = T c =	(IN P U T) 0.2 0.147 0.38 F 	F*C 51 693 725 1172 5725 4202 4524 13488 80476 64138 41916 ::::::::::::::::::::::::::::::::::::
L E N G (m m) = == = 151 141 121 116 101 96 91 86 81 = = = T o tal L E N G L E N G L E N G	th 	H - B A = = = 160 150 140 150 120 110 105 100 95 900 85 = = 6 fe H - B A	SED COHO (IN PUT) Catch (numbers) Second 964.316 482.158 2470.071 3614.867 4097.025 10847.235 10906.517 12412.273 23558.552 70067.034 79287.315 76634.131 SED COHO (IN PUT) Catch (numbers)	R T A N A L Y S (IN P U T) D e Ita - t (Y) = = = = = = = 2.119 2.096 2.096 2.095 1.983 0.932 0.839 0.726 0.619 0.533 0.486 0.465 0.457 = = = = = = = = = = = = = = = = = = =	SIS Stock Numbers 1673 2819 6584 12850 19052 32921 47989 65408 95015 174050 267745 364975 	M e a n N u m b e r 	T e N atural M o r 	rm in al F = tality (m) = T c = 2 0.254 0.428 0.347 0.433 0.675 0.532 0.511 0.720 1.296 0.956 0.694 0.694 0.694 rm in al F = tality (m) = T c =	(IN P U T) 0.2 0.147 0.38 F 	F*C
L E N G (m m) = == = 1511 141 1211 116 101 96 911 86 811 = = = T o tal L F A L E N G L E N G L E N G	th 	H - B A = = = 160 150 150 140 150 140 120 115 100 90 85 = = = 6 fe H - B A = = = 150	SED COHO (IN PUT) Catch (n um bers) ===== 964.316 482.158 2470.071 3614.867 4097.025 10847.235 10906.517 12412.273 23558.552 70067.034 79287.315 76634.131 ===== 295.341 m ales, 1 SED COHO (IN PUT) Catch (n um bers) ===== 766	R T A N A L Y S (IN P U T) D e Ita - t (y) = = = = = = = 2.119 2.096 2.055 1.983 0.932 0.839 0.726 0.619 0.533 0.486 0.465 0.457 = = = = = = 995 fish R T A N A L Y S (IN P U T) D e Ita - t (y) = = = = = = 2.096	S IS S to c k N um b ers 1673 2819 6584 12850 19052 32921 47989 65408 95015 174050 267745 364975 	M e a n N u m b e r 4 5 1 6 8 8 0 5 1 8 0 3 5 1 4 3 2 4 2 0 5 5 4 2 8 3 1 0 3 4 0 5 7 4 1 1 4 7 6 1 0 0 4 9 8 0 1 5 1 4 0 1 0 8 4 6 8 .8 7 6 O N M e a n N u m b e r	T e N atural M o r F/Z 0.421 0.656 0.577 0.661 0.724 0.713 0.796 0.827 0.846 0.788 W td.A ve.F = A = Te N atural M o r	rm in al F = tality (m) = T c = 2 0.254 0.428 0.347 0.433 0.675 0.532 0.511 0.720 1.296 0.956 0.694 0.956 0.694 rm in al F = tality (m) = T c = 2	(IN P U T) 0.2 0.147 0.38 F 	F*C
L = N G $= = =$ 1511 1411 1211 101 96 911 86 811 $= = =$ $T o ta1$ $L = N G$ $L = N G$ $U = 1411$ 131	th 	H - B A = = = 1 6 0 1 5 0 1 4 0 1 3 0 1 4 0 1 3 0 1 4 0 1 3 0 1 1 5 1 1 0 1 0 5 1 0 0 9 5 9 0 0 8 5 = = 6 fe H - B A = = 1 5 0 1 4 0 1 5 0 1 4 0 1 5 0 1 5 0 1 4 0 1 5 0 1 4 0 1 5 0 1 5 0 1 4 0 1 5 0 1 4 0 1 5 0 1 4 0 1 5 0 1 1 5 1 1 0 9 0 8 5 = = 1 5 0 1 5 0 1 4 0 1 5 0 1 1 5 1 0 0 9 5 9 0 8 5 = = 1 5 6 6 fe 1 6 6 fe 1 1 0 1 1 1 1 1	SED COHO (IN PUT) Catch (n um bers) 964.316 482.158 2470.071 3614.867 4097.025 10847.235 10906.517 12412.273 23558.552 70067.034 79287.315 76634.131 ====== 295.341 m ales, 1 SED COHO (IN PUT) Catch (n um bers) 766	R T A N A L Y S (IN P U T) D e Ita - t (Y) = = = = = = = = = = = = = = = = = = =	S IS S to c k N um b ers 1673 2819 6584 12850 19052 32921 47989 65408 95015 174050 267745 364975 	M e a n N u m b e r 	T e N a tu ra I M o r F /Z 	rm in al F = tality (m) = T c = 2 0.254 0.428 0.347 0.433 0.675 0.532 0.511 0.720 1.296 0.956 0.694 0.956 0.694 rm in al F = tality (m) = T c = 2 0.575	(IN P U T) 0.2 0.147 0.38 F 0.107 0.281 0.200 0.286 0.528 0.364 0.573 1.149 0.809 0.547 0.735 0.521 (IN P U T) 0.2 0.147 0.38 0.107 0.286 0.364 0.573 1.149 0.809 0.547 0.735 0.521 0.147 0.38 0.107 0.286 0.385 0.364 0.573 1.149 0.809 0.547 0.147 0.385 0.364 0.547 0.521 0.147 0.286 0.385 0.364 0.573 1.149 0.547 0.521 0.521 0.127 0.521 0.521 0.521 0.147 0.287 0.547 0.521 0.528 0.547 0.521 0.528 0.521 0.528 0.521 0.528 0.521 0.528 0.521 0.528 0.521 0.521 0.521 0.521 0.521 0.521 0.521 	F*C 51 693 725 1172 5725 4202 4524 13488 80476 64138 41916 ::::::::::::::::::::::::::::::::::::
L E N G (m m) = = = = 1511 1411 1211 101 96 911 86 811 = = = T o tal L F A L E N G L E N G (m m) = = = 1411 131 121 131 121 121 121	th 	H - B A = = = 160 150 140 130 140 130 115 110 105 100 95 900 85 = = = 6 fe H - B A = = 150 140 120 115 100 95 900 85 = = 140 100 100 100 100 100 100 100	SED COHO (IN PUT) Catch (n um bers) 2470.071 3614.867 4097.025 10847.235 10906.517 12412.273 23558.552 70067.034 79287.315 76634.131 ====== 295.341 males, 1 (IN PUT) Catch (n um bers) ===== 766 2114 2880	R T A N A L Y S (IN P U T) D e Ita-t (Y) = = = = = = = = = = = = = = = = = = =	S IS S to c k N um b ers 1 6 7 3 2 8 19 6 5 8 4 1 2 8 50 1 9 0 5 2 3 2 9 2 1 4 7 9 8 9 6 5 4 0 8 9 5 0 1 5 1 7 4 0 5 0 2 6 7 4 5 3 6 4 9 7 5 	M e a n N u m b e r 	Te Natural Mor F/Z 0.421 0.656 0.577 0.661 0.782 0.724 0.724 0.796 0.887 0.887 0.887 0.886 0.796 0.887 0.796 0.788 Wtd.Ave.F = A = Te Natural Mor F/Z 	rm in al F = tality (m) = T c = 2 0.254 0.428 0.347 0.428 0.347 0.433 0.675 0.532 0.5511 0.720 1.296 0.956 0.694 rm in al F = tality (m) = T c = 2 0.575 0.389 0.622	(IN P U T) 0.2 0.147 0.38 F 0.107 0.281 0.200 0.286 0.528 0.385 0.364 0.573 1.149 0.809 0.547 0.735 0.521 (IN P U T) 0.22 0.147 0.38 0.142 0.38 0.428 0.428 	F*C ::::::::::::::::::::::::::::::::::::
L E N G (m m) ==== 1511 1411 1211 116 101 96 911 866 811 ==== T o tal L F A L E N G L E N G L E N G (m m) ==== 1411 1311 1211 1316 1111 1316 1317 1	th 	H - B A = = = 160 150 140 150 140 120 115 100 90 85 = = 6 fe H - B A = = 150 140 120 110 120 110 120 110 120 110 120	SED COHO (IN PUT) Catch (n um bers) 964.316 482.158 2470.071 3614.867 4097.025 10847.235 10906.517 12412.273 23558.552 70067.034 79287.315 76634.131 ====== 295.341 males, 1 SED COHO (IN PUT) Catch (n um bers) ===== 766 2114 2880 3943 3263	R T A N A L Y S (IN P U T) D e Ita-t (Y) = = = = = = = = = = 2.119 2.096 2.055 1.983 0.32 0.839 0.726 0.619 0.533 0.486 0.457 = = = = = = = = = = = = = = = = = = =	S IS S to c k N um b ers 1673 2819 6584 12850 19052 32921 47989 65408 95015 174050 26745 364975 	M e a n N u m b e r 	Te Natural Mor F/Z 	rm in al F = tality (m) = T c = 2 0.254 0.428 0.347 0.433 0.675 0.532 0.511 0.720 1.296 0.956 0.694 rm in al F = tality (m) = T c = 2 0.575 0.389 0.633 0.384	(IN P U T) 0.2 0.147 0.38 F 0.107 0.281 0.200 0.286 0.528 0.385 0.364 0.528 0.364 0.573 1.149 0.809 0.547 0.735 0.521 (IN P U T) 0.2 0.147 0.38 0.428 0.38 0.428 	F*C ::::::::::::::::::::::::::::::::::::
L E N G (m m) ==== 1511 1411 116 1111 106 101 96 91 866 81 ==== T o tal L F A L E N G L E N G L E N G 1311	th 	H - B A = = = 160 150 140 150 140 130 115 110 90 85 = = 6 fe H - B A = = 150 140 120 140 130 120 140 130 120 140 130 120 115 110 100 120 115 110 100 120 115 100 120 115 100 100 100 100 100 100 10	SEDCOHO (IN PUT) Catch (n umbers) 964.316 482.158 2470.071 3614.867 4097.025 10847.235 10847.235 10906.517 12412.273 23558.552 70067.034 79287.315 76634.131 ===== 295.341 males, 1 SEDCOHO (IN PUT) Catch (n umbers) ===== 766 2114 2880 3943 3263 9518	R T A N A L Y S (IN P U T) D e Ita - t (y) = = = = = = = = = = = = = = = = = = =	S IS S to c k N um b ers 1673 2819 6584 12850 19052 32921 47989 65408 95015 174050 26745 364975 	M ean N u m b er 	Te Natural Mor F/Z 	rm in al F = tality (m) = T c = 0.254 0.428 0.347 0.433 0.675 0.532 0.511 0.720 1.296 0.956 0.694 rm in al F = tality (m) = T c = 2 0.575 0.389 0.533 0.384 0.686	(IN P U T) 0.2 0.147 0.38 F 	F * C : :::::::::::::::::::::::::::::::::::
L E N G (m m) ==== 1511 1411 116 1111 106 1011 96 91 866 81 ==== T o tal L F A L E N G L E N G L E N G 1311 1211 1211 1216 1311 1216 1311 1216 1317	th 	H - B A = = = 1 6 0 1 5 0 1 4 0 1 3 0 1 1 5 1 1 0 1 0 5 1 0 0 9 5 9 0 8 5 = = 6 fe H - B A = = 1 5 0 1 4 0 1 3 0 1 2 0 1 0 5 1 1 0 1 0 5 1 0 0 1 0 0 1 0 5 1 0 0 1 0 0	SED COHO (IN PUT) Catch (n um bers) 964.316 482.158 2470.071 3614.867 4097.025 10847.235 10906.517 12412.273 23558.552 70067.034 79287.315 76634.131 ====== 295.341 males, 1 SED COHO (IN PUT) Catch n um bers) ===== 766 2114 2880 3943 3263 9518 15451 16685	R T A N A L Y S (IN P U T) D e Ita - t (Y) = = = = = = = = = = = = = = = = = = =	S IS S to c k N um b ers 1 6 7 3 2 8 1 9 6 5 8 4 1 2 8 5 0 1 9 0 5 2 3 2 9 2 1 4 7 9 8 9 6 5 4 0 8 9 5 0 1 5 1 7 4 0 5 0 2 6 7 7 4 5 3 6 4 9 7 5 	M e a n N u m b e r 	Te Natural Mor F/Z 	rm in al F = tality (m) = T c = 0.254 0.428 0.347 0.433 0.675 0.532 0.511 0.720 1.296 0.956 0.694 	(IN P U T) 0.2 0.147 0.38 F 	F * C : : : : : : : : : :
$L \in N \in Q$ $L = n = q$ (m m) $= = = = = = = = = = = = = = = = = = = $	th 	H - B A = = = 1 6 0 1 5 0 1 4 0 1 3 0 1 4 0 1 3 0 1 1 5 1 1 0 9 0 8 5 = = = 6 f e H - B A - H - B A - 1 5 0 1 2 0 1 3 0 1 2 0 1 3 0 1 2 0 1 1 5 1 1 0 1 3 0 1 2 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1	SEDCOHO (IN P U T) Catch (n u m b ers) 2 470.071 3614.867 4097.025 10847.235 10906.517 12412.273 23558.552 70067.034 79287.315 76634.131 = = = = = = = = = = = = = = = = = = =	R T A N A L Y S (IN P U T) D e Ita - t (y) = = = = = = = 2 . 1 1 9 2 . 0 9 6 2 . 0 5 5 1 . 98 3 0 . 9 3 2 0 . 8 3 9 0 . 7 2 6 0 . 4 8 6 P 9 5 fish R T A N A L Y S (IN P U T) D e Ita - t (y) = = = = = = = 2 . 0 9 6 0 . 4 8 6 0 . 5 1 0 .	S IS S to c k N um b ers 1673 2819 6584 12850 19052 32921 47989 65408 95015 174050 267745 364975 	M e a n N u m b e r 	Te Natural Mor F/Z 0.421 0.656 0.577 0.661 0.724 0.724 0.724 0.724 0.724 0.746 0.887 0.887 0.887 0.846 0.788 Wtd.Ave.F = A = Te Natural Mor F/Z 	rm in al F = tality (m) = T c = 0.254 0.428 0.347 0.433 0.675 0.532 0.511 0.720 1.296 0.956 0.694 rm in al F = tality (m) = T c = 2 0.575 0.389 0.533 0.384 0.676	(IN P U T) 0.2 0.147 0.38 	F*C ::::::::::::::::::::::::::::::::::::
L E N G (m m) = = = = 1511 141 131 141 131 116 101 96 91 86 81 = = = T o tal L E N G L E N G L E N G 141 116 101 106 106	th 	H - B A = = = 1 6 0 1 5 0 1 4 0 1 3 0 1 4 0 1 1 5 1 1 0 1 0 5 1 0 0 9 5 9 0 8 5 = = = 6 f e H - B A - H - B A - - - - - - - - - - - - -	SEDCOHO (IN P U T) Catch (n u m b ers) = = = = = = = = = = = = = = = = = = =	R T A N A L Y S (IN P U T) D e ita -t (y) = = = = = = = 2 .1 19 2 .0 96 2 .0 55 1 .98 3 0 .93 2 0 .8 39 0 .7 26 0 .6 19 0 .5 3 3 0 .48 6 0 .46 5 0 .457 = = = = = = = 9 9 5 fish R T A N A L Y S (IN P U T) D e ita -t (y) = = = = = = = 2 .0 96 2 .0 55 1 .98 3 0 .93 2 0 .8 39 0 .7 26 0 .6 19 0 .7 26 0 .6 19 0 .7 26 0 .8 32 0 .8 32 0 .9 32 0 .8 32 0 .8 32 0 .8 32 0 .8 32 0 .9 5 1 .9 83 0 .9 32 0 .8 48 0 .4 86 0 .4 65 0 .4 65	S IS S to c k N u m b e r s 1 6 7 3 2 8 1 9 6 5 8 4 1 2 8 5 0 1 9 0 5 2 3 2 9 2 1 4 7 9 8 9 6 5 4 0 8 9 5 0 1 5 1 7 4 0 5 0 2 6 7 7 4 5 3 6 4 9 7 5 	M e a n N u m b e r 	T e N atural M or F/Z 0.421 0.656 0.577 0.661 0.782 0.724 0.724 0.724 0.738 0.887 0.887 0.887 0.846 0.788 Wtd.Ave.F = A = Te N atural M or F/Z 0.724 0.724 0.788 0.788 0.788 0.788 0.788 0.724 0.724 0.622 0.724 0.617 0.783 0.892 0.857	rm in al F = tality (m) = T c = 0.254 0.428 0.347 0.433 0.675 0.532 0.511 0.720 1.296 0.956 0.694 	(IN P U T) 0.2 0.147 0.38 	F*C ::::::::::::::::::::::::::::::::::::
L E N G L e n g (m m) = == = 1511 1411 1211 116 1011 966 81 = = = = T o tal L E N G L E N G L E N G L E N G 1211 1211 1311 1311 1311 1316 1011 966 911 866 81 = = = =	th 	H - B A = = = 1 6 0 1 5 0 1 4 0 1 3 0 1 4 0 1 1 5 1 1 0 1 0 5 1 0 0 9 5 9 0 8 5 = = = 6 f e H - B A - - - - - - - - - - - - -	SEDCOHO (IN PUT) Catch (n umbers) 964.316 482.158 2470.071 3614.867 4097.025 10906.517 12412.273 23558.552 70067.034 79287.315 76634.131 ====== 295.341 males, 1 SEDCOHO (IN PUT) Catch (n umbers) === 766 2114 2880 3943 3263 9518 15451 168660 57351 68660 62801	R T A N A L Y S (IN P U T) D e ita - t (Y) = = = = = = = = = = = = = = = = = = =	S IS S to c k N u m b e rs 1 6 7 3 2 8 1 9 6 5 8 4 1 2 8 5 0 1 9 0 5 2 3 2 9 2 1 4 7 9 8 9 6 5 4 0 8 9 5 0 1 5 1 7 4 0 5 0 2 6 7 7 4 5 3 6 4 9 7 5 5 5 5 5 5 5 5 5 5 5 5 5 5	M e a n N u m b e r 	T e N atural M o r F/Z 0.421 0.656 0.577 0.661 0.724 0.724 0.724 0.724 0.738 0.887 0.887 0.846 0.786 0.887 0.846 0.788 W td.A ve.F = A = T e N atural M or F/Z 0.724 0.724 0.782 0.782 0.783 0.892 0.857 0.790	rm in al F = tality (m) = T c = 0.254 0.428 0.347 0.433 0.675 0.532 0.511 0.720 1.296 0.956 0.694 tality (m) = T c = 2 0.575 0.389 0.533 0.384 0.675 0.389 0.533 0.384 0.675 0.389	(IN P U T) 0.2 0.147 0.38 F 	F*C ::::::::::::::::::::::::::::::::::::
L E N G (m m) = == = 151 141 121 141 116 101 96 91 86 81 = = = = 141 121 121 106 101 96 81 121 121 121 121 121 106 81 101 96 91 121 121 121 106 101 106 81 101 96 81 121 121 121 121 121 121 121	T - - - - - - - - - - - - -	H - B A = = = 1 6 0 1 5 0 1 4 0 1 3 0 1 4 0 1 1 5 1 1 0 1 0 5 1 0 0 9 5 9 0 8 5 = = = H - B A = = = 1 5 0 1 4 0 1 2 0 1 5 1 0 0 1 5 1 0 0 9 5 9 0 8 5 = = =	S E D C O H O (<i>IN P U T</i>) C atch (n u m b ers) 964.316 482.158 2470.071 3614.867 4097.025 10847.235 10906.517 12412.273 23558.552 70067.034 79287.315 76634.131 ====== 295.341 m a les, 1 S E D C O H O (<i>IN P U T</i>) C atch (n u m b ers) ===== 766 2114 2880 3943 3263 9518 15451 16686 57351 68660 62801 ====== 243.435	R T A N A L Y S (IN P U T) D e Ita - t (y) = = = = = = = 2 .1 1 9 2 .0 9 6 2 .0 5 5 1 .9 8 3 0 .9 3 2 0 .8 3 9 0 .7 2 6 0 .6 1 9 0 .5 3 3 0 .4 8 6 0 .4 6 5 1 .9 8 3 0 .4 5 7 = = = = = = = 2 .0 9 6 2 .0 5 5 1 .9 8 3 0 .4 8 6 0 .4 8 6 0 .4 6 5 0 .4 8 5 0 .4 5 7 = = = = = = =	S IS S to c k N u m b e rs 1 6 7 3 2 8 1 9 6 5 8 4 1 2 8 5 0 1 9 0 5 2 3 2 9 2 1 4 7 9 8 9 6 5 4 0 8 9 5 0 1 5 1 7 4 0 5 0 2 6 7 7 4 5 3 6 4 9 7 5 	M e a n N u m b e r 	Te Natural Mor F/Z 0.421 0.656 0.577 0.661 0.724 0.724 0.724 0.724 0.726 0.887 0.846 0.796 0.887 0.846 0.796 0.887 0.846 0.796 0.887 0.846 0.788 Wtd.Ave.F = Control Control Control F/Z 0.724 0.724 0.782 0.782 0.783 0.724 0.617 0.783 0.892 0.857 0.790 Wtd.Ave.F =	rm in al F = tality (m) = T c = 0.254 0.428 0.347 0.433 0.675 0.532 0.511 0.720 1.296 0.956 0.956 0.956 0.694 rm in al F = tality (m) = T c = 0.575 0.533 0.675 0.694 rm in al F = tality (m) = tality (m) = T c = 0.575 0.389 0.533 0.384 0.686 0.786 0.676 1.367 1.028 0.701 	(IN P U T) 0.2 0.147 0.38 F 	F*C ::::::::::::::::::::::::::::::::::::

LFA	3	8 fe	males, 19	<u>988 fis</u> h	ning seaso	n				
									(INPUT)	
LENG		н-ва	SED COHOR	IANALY	\$ 15	Na	tural Mort	<u>m in al F =</u> ality (m)=	0.2	
-			(14) 5 (1 7)	(11) 5 (1 7)				Tc =	0.38	
Leng	th		(INPUT) Catch	Delta-t	Stock	Mean				
(mm)			(numbers)	(у)	Num bers	Num ber	F/Z	Z	F	F * C
161	-	170	5 4	2.343	9 3					
151	-	160	107	2.331	253	360	0.669	0.445	0.298	3 2
131	-	150	2080	2.306	3449	1045	0.709	0.506	0.359	1 3 4
121	-	130	7080	2.181	1 2 7 5 1	15110	0.761	0.616	0.469	3 3 1 8
116	-	120	7239	0.932	2 2 2 4 8	15368	0.762	0.618	0.471	3410
106	-	110	8924	0.726	4 4 2 8 9	26625	0.695	0.482	0.335	2991
101	-	105	11557	0.619	60470	31456	0.714	0.514	0.367	4246
91	-	95	61632	0.533	164570	59043	0.829	1.191	1.044	64334
86	-	90	115693	0.465	294959	99970	0.887	1.304	1.157	133889
81	- =	85	126468	0.457	4 4 5 2 0 3	161747	0.842	0.929	0.782	98884
Total			375,211			475,870	W td.Ave	.F =	0.890	333915
	_	0 ()			• • • • • • • • •		A =		0.589	
	3	<u>8 1 e</u>	m ales, 1	<u>a a a fisr</u>	ning seaso	n				
LENG	T	Н-ВА	SED COHOR		SIS		Ter	minalF =	(IN P 0 I)	
						Na	tural Mort	ality (m)=	0.147	
	-		(INPUT)	(IN PUT)				Tc =	0.38	
Leng	th		Catch	Delta-t	Stock	Mean				
(mm) =	-	=	(numbers)	(y)	Num bers	Number	F / Z	Z	F	F * C
151	-	160	295	2.331	511					
141	-	150	562	2.306	1356	1928	0.665	0.438	0.291	164
121	-	140	2168 5732	2.260	4351	16240	0.706	0.533	0.386	2023
116	-	120	4 3 2 3	0.932	18856	14028	0.677	0.455	0.308	1 3 3 2
111	-	115	4925	0.839	26492	18445	0.645	0.414	0.267	1315
101	-	105	9591	0.619	50264	26152	0.714	0.514	0.367	3517
96	-	100	21521	0.533	76536	32324	0.819	0.813	0.666	1 4 3 2 9
86	-	95	5 8 9 5 9 1 0 0 2 2 9	0.486	255764	86712	0.890	1.335	1.188	115854
8 1	-	85	109037	0.457	385402	140144	0.841	0.925	0.778	84835
= = = = T o t a l			324401			413 504	WtdAye	F -	0 9 1 4	296507
						,	A =		0.599	
LFA	3	<u>8 fe n</u>	n a le s , 1 9	<u>90 fish</u>	ing seaso	<u>n</u>				
	3	8 fen	n ales, 19	90 fish	ing seaso	n			(IN P U T)	
L F A	3 	<u>8 fen</u> н-ва:	n <mark>ales, 19</mark> sed cohor	90 fish TANALY	ing seaso sis	n Na	Ter tural Mort	minalF = ality (m)=	(IN P U T) 0.2 0.147	
	3 T	<u>8 fen</u> н - в А	<mark>n ales, 19</mark> sed соног	90 fish TANALY	ing seaso sis	n Na	Ter tural Mort	minalF = ality (m)= Tc =	(INPUT) 0.2 0.147 0.38	
	3 T T th	<u>8 fen</u> н-ва	n ales, 19 SED COHOR (INPUT) Catch	90 fish T A N A L Y (IN P U T) D e Ita - t	ing seaso SIS Stock	n Na Nean	Ter tural Mort	m in alF = ality (m)= Tc=	(IN P U T) 0.2 0.147 0.38	
L F A L E N G L e n g (m m)	3 T t h	<u>8 fen</u> н-ва	nales, 19 SEDCOHOR (INPUT) Catch (numbers)	90 fish T A N A L Y (IN P U T) D e Ita -t (y)	ing seaso SIS Stock Numbers	n <u>Na</u> Mean Number	Ter tural Mort F/Z	m in al F = ality (m)= T c = Z	(IN P U T) 0.2 0.147 0.38 F	F * C
L F A L E N G L e n g (m m) = = = = 151	3 T t h =	8 fe n	n ales, 19 SED COHOR (INPUT) Catch (numbers)	90 fish T A N A L Y (IN P U T) D e Ita - t (y) = = = = = 2.331	ing seaso SIS Stock Numbers 186	n Na Mean Number	Ter tural Mort F/Z	m in al F = a lity (m)= T c = Z	(IN P U T) 0.2 0.147 0.38 F	F * C
L F A L E N G L e n q (m m) ==== 151 141	3 T 1 t h = -	8 fe n H - B A : = = = 1 6 0 1 5 0	n ales, 19 SED COHOR (INPUT) Catch (numbers) ====== 107 375	90 fish T A N A L Y (<i>IN P U T</i>) D e Ita - t (y) = = = = = 2.331 2.306	ing seaso SIS Stock Numbers 186 687	n Na Mean Number 861	<u>Ter</u> tural Mort F/Z 0.748	m in al F = a lity (m)= T c = Z 	(IN P U T) 0.2 0.147 0.38 F 	F * C ::::::::::::::::::::::::::::::::::::
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<u>L F A</u> <u>L E N G</u> <u>L E N G</u> (m m) = = = = 151 141 131 121 116	3 T t h = - - - - - - -	8 fe n H - B A = = = 1 6 0 1 5 0 1 4 0 1 3 0 1 2 0	n ales, 19 SED COHOR (INPUT) Catch (numbers) ===== 107 375 3470 6864 5541	9 0 fish T A N A L Y (IN P U T) D e Ita -t (Y) = = = = = = 2.3 3 1 2.3 0 6 2.2 6 0 2.1 8 1 0.9 3 2	ing seaso SIS SIS 186 687 4895 14499 22465	n Na Number 861 5019 18637 16497	Ter tural Mort F/Z 0.748 0.825 0.715 0.696	m in al F = a lity (m) = T c = 2 0.583 0.838 0.515 0.483	(IN P U T) 0.2 0.147 0.38 F 	F * C 1 6 3 2 3 9 9 2 5 2 8 1 8 6 1
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L F A L E N G (m m) = = = 1511 141 131 141 131 141 131 106 101 96 91 86 81 = = = T o tal L E N G (m m) = = = = 151 141 106 101 96 91 151 106 101 106 101 96 90 151 106 101 106 101 106 101 106 101 106 101 106 101 106 106	3 th - - - - - - - - - - - - -	8 fen H - B A = = = 1 6 0 1 5 0 1 4 0 1 2 0 1 1 5 1 1 0 1 2 0 1 1 5 1 0 0 9 5 9 0 8 fen H - B A H - B A H - B A 1 5 1 1 0 1 2 0 1 5 1 1 0 1 2 0 8 fe n 1 5 1 1 0 1 1 0 1 5 1 1 0 1 1	n a le s , 1 9 SED C O H O R (IN P U T) Catch (n u m b e rs) 107 375 3470 6864 5541 5027 14896 15802 28028 102441 129965 129965 129965 129965 129965 SED C O H O R (IN P U T) Catch (n u m b e rs) SED C O H O R (IN P U T) Catch (n u m b e rs) 311 1518 2681 6979 5888 9411 9760 16310 35566	9 0 fish T A N A L Y (IN P U T) D e Ita-t (y) = = = = = = 2 .3 3 1 2 .3 0 6 2 .2 6 0 2 .1 8 1 0 .9 3 2 0 .8 3 9 0 4 0 .7 2 6 4 2 0 .6 1 8 7 8 0 .5 3 3 5 0 .4 8 6 1 6 0 .4 6 5 2 7 0 .4 5 7 2 1 = = = = = = 9 1 fish V (IN P U T) D e Ita-t (y) = = = = = 2 .3 3 1 2 .3 0 6 2 .2 6 0 2 .1 8 1 0 .4 5 7 2 1 = = = = = = = = 9 1 fish U U U U U U U U U U U U U	ing seaso SIS SIS SIS 186 687 4895 14499 22465 30683 49653 70740 105386 218454 365475 524210 	n N a N a N u m b e r 8 6 1 5 0 1 9 1 8 6 3 7 1 6 4 9 7 2 1 7 0 2 2 7 7 1 9 3 5 9 4 6 4 5 0 2 6 7 2 2 9 4 1 2 8 1 5 5 1 9 5 7 1 1 5 6 7 .5 6 7 N a N u m b e r 2 8 9 9 9 1 1 0 2 8 7 2 1 8 6 1 3 2 4 4 3 3 8 4 0 5 4 9 0 6 2	Ter tural Mort F/Z 0.748 0.825 0.715 0.696 0.612 0.785 0.749 0.906 0.809 0.906 0.872 0.819 Wtd.Ave A= Ter tural Mort 0.781 0.667 0.675 0.679 0.743 0.831	m in a 1 F = a lity (m)= T c = 2 	(IN P U T) 0.2 0.147 0.38 F 0.436 0.691 0.368 0.336 0.232 0.537 0.440 0.622 1.417 1.000 0.664 0.597 (IN P U T) 0.2 0.147 0.38 0.597 (IN P U T) 0.2 0.147 0.38 	F*C
L F A L E N G (m m) = = = = 1511 1411 1161 1011 966 911 866 811 = = = = T o tal L E N G (m m) = = = 151 1311 1211 1161 1311 1211 1365 1375	3 T T T T T T T T T T T T T	8 fen H - B A = = = 1 6 0 1 5 0 1 4 0 1 5 0 1 2 0 1 1 0 1 2 0 1 1 0 1 0 0 9 5 9 0 8 fen H - B A - - - - - - - - - - - - -	n a le s, 1 9 SED C O H O R (IN P U T) C atch (n u m b e rs) 107 375 3470 6864 5541 5027 14896 15802 28028 102441 129965 ====== 440,699 n a le s, 1 9 SED C O H O R (IN P U T) C atch (n u m b e rs) ====== 440,699 n a le s, 1 9 SED C O H O R (IN P U T) C atch (n u m b e rs) ====== 311 1518 2681 6979 5888 9411 9760 16310 35566 65608	9 0 fish T A N A L Y (IN P U T) D e Ita-t (y) = = = = = = 2 .3 3 1 2 .3 0 6 2 .2 6 0 2 .1 8 1 0 .9 3 2 0 .8 3 9 0 4 0 .7 2 6 4 2 0 .6 1 8 7 8 0 .5 3 3 5 0 .4 8 6 1 6 0 .4 6 5 2 7 0 .4 5 7 2 1 = = = = = = 9 1 fish C I Fish C	ing seaso SIS SIS SIS 186 687 4895 14499 22465 30683 49653 70740 105386 218454 365475 524210 	n N a N a N u m b e r 8 6 1 5 0 1 9 1 8 6 3 7 1 6 4 9 7 2 1 7 0 2 2 7 7 1 9 3 5 9 4 6 4 5 0 2 6 7 2 2 9 4 1 2 8 1 5 5 1 9 5 7 1 1 5 6 7 .5 6 7 N a N u m b e r 2 8 9 9 9 1 1 0 2 2 8 7 2 1 8 9 6 5 2 5 8 6 1 3 2 4 4 3 3 8 4 0 5 4 9 0 6 2 7 1 7 5 0	Ter tural Mort F/Z 0.748 0.825 0.715 0.696 0.696 0.612 0.749 0.906 0.872 0.906 0.872 0.906 0.872 0.906 0.872 0.906 0.872 0.749 0.906 0.872 0.749 0.906 0.6672 0.781 0.667 0.675 0.679 0.712 0.6743 0.831 0.862 0.831 0.862 0.831 0.862 0.862 0.854 0.743 0.831 0.862 0.862 0.854 0.743 0.831 0.862 0.854 0.854 0.743 0.855 0.755 0.755 0.755 0.755 0.749 0.906 0.872 0.872 0.872 0.872 0.875 0.872 0.785 0.785 0.742 0.672 0.7743 0.831 0.862 0.831 0.862 0.831 0.862 0.8743 0.8545 0.8555 0.8555 0.85555 0.85555 0.85555 0.855555 0.855555 0.85555555 0.8555555555555555555555555555555555555	m in a 1 F = a lity (m) = T c = 2 	(IN P U T) 0.2 0.147 0.38 F 0.436 0.691 0.368 0.336 0.232 0.537 0.440 0.622 1.417 1.000 0.664 0.597 (IN P U T) 0.2 0.147 0.38 0.597 (IN P U T) 0.2 0.147 0.38 	F*C
L F A L E N G (m m) = = = = 1511 1411 1161 1011 966 911 866 811 = = = = T o tal L E N G L E N G (m m) = = = 15 1411 1016 1011 1016 1011 106 1011 106 1011 106 1011 106 101 106 101 106 101 106 101 106 101 106 101 106 101 106 101 106 101 106 101 106 101 106 101 106 101 106 101 106 101 106 101 106 101 106 107 106 107 106 107 107 107 107 107 107 107 107	3 t h - - - - - - - - - - - - -	8 fen H -B A = = = 1 6 0 1 5 0 1 4 0 1 3 0 1 2 0 1 1 5 1 1 0 1 0 0 9 5 9 0 8 5 = = = 8 fen H -B A - - - - - - - - - - - - -	n a le s, 1 9 SED C O H O R (IN P U T) C atch (n u m b e rs) 107 375 3470 6864 5541 5027 14896 15802 28028 102441 129965 ====== 440,699 n a le s, 1 9 SED C O H O R (IN P U T) C atch (n u m b e rs) ====== 440,699 n a le s, 1 9 SED C O H O R (IN P U T) C atch (n u m b e rs) ====== 311 1518 2681 9760 16310 35566 65608 105344 116777	9 0 fish T A N A L Y (IN P U T) D e Ita-t (y) = = = = = = 2 .3 0 6 2 .2 6 0 2 .2 6 0 2 .1 8 1 0 .9 3 2 0 .8 3 9 0 4 0 .7 2 6 4 2 0 .6 1 8 7 8 0 .5 3 3 5 0 .4 8 6 1 6 0 .4 6 5 2 7 0 .4 5 7 2 1 = = = = = = 9 1 fish T A N A L Y (IN P U T) D e Ita-t (y) = = = = = 2 .3 3 1 2 .3 0 6 2 .2 6 0 2 .1 8 1 0 .9 3 2 0 .8 3 9 0 .7 2 6 0 .2 1 8 1 0 .9 3 2 0 .8 3 9 0 .7 2 6 0 .6 1 9 0 .5 3 3 0 .4 8 6 0 .4 8 5 0 .4 8 5 0 .4 8 5 0 .4 5 7	ing seaso SIS SIS SIS 186 687 4895 14499 22465 30683 49653 70740 105386 218454 365475 524210 	n N a N a N u m b e r 8 6 1 5 0 1 9 1 8 6 3 7 1 6 4 9 7 2 1 7 0 2 2 7 7 1 9 3 5 9 4 6 4 5 0 2 6 7 2 2 9 4 1 2 8 1 5 5 1 9 5 7 1 1 5 6 7 .5 6 7 N N u m b e r 2 8 9 9 9 1 1 0 2 2 8 7 2 1 8 9 6 5 2 5 8 6 1 3 2 4 4 3 3 8 4 0 5 4 9 0 6 2 7 1 7 5 0 1 1 2 3 6 1 6 9 9 8	Ter tural Mort F/Z 0.748 0.825 0.715 0.696 0.696 0.612 0.749 0.906 0.872 0.906 0.872 0.906 0.872 0.906 0.874 0.906 0.874 0.906 0.872 0.749 0.906 0.872 0.749 0.906 0.872 0.749 0.906 0.872 0.749 0.906 0.872 0.749 0.906 0.872 0.749 0.906 0.872 0.749 0.906 0.872 0.749 0.906 0.872 0.749 0.906 0.872 0.872 0.819 0.906 0.872 0.872 0.831 0.667 0.672 0.743 0.831 0.862 0.743 0.824	m in al F = a lity (m) = T c = 2 	(IN P U T) 0.2 0.147 0.38 F 0.436 0.691 0.368 0.336 0.232 0.537 0.440 0.622 1.417 1.000 0.664 1.417 1.000 0.664 0.597 (IN P U T) 0.2 0.147 0.38 0.597 (IN P U T) 0.38 0.597 (IN P U T) 0.38 (IN P U T) (IN P U	F*C
L F A L E N G (m m); = = = = 151 141 121 141 121 141 106 91 86 81 L F A L E N G 0 151 111 106 91 86 81 L F A L E N G 86 81 151 111 121 106 91 86 81 151 101 96 81 151 101 96 81 151 101 96 81 151 101 96 81 151 101 96 81 151 101 96 81 151 101 96 81 151 101 96 81 151 101 96 81 151 101 96 81 151 101 96 81 151 101 96 81 151 101 106 91 86 81 151 101 156 101 106 91 156 101 106 91 86 81 157 101 106 91 157 101 106 91 157 101 106 91 157 101 106 91 157 101 106 91 157 101 106 91 157 101 106 91 157 101 106 91 157 101 106 91 106 81 101 106 81 101 106 80 101 101 106 91 106 80 101 101 106 80 101 101 106 80 101 101 106 80 101 101 106 80 101 101 106 80 101 101 106 80 101 101 106 80 101 101 106 80 101 101 106 80 101 101 106 101 106 101 106 101 106 101 106 80 106 80 106 80 106 80 80 80 80 80 80 80 80 80 80	3 T - - - - - - - - - - - - -	8 fen H -B A = = = 1 6 0 1 5 0 1 4 0 1 3 0 1 2 0 1 4 0 1 3 0 9 5 9 0 8 5 = = = 8 fen H -B A - - - - - - - - - - - - -	n a le s, 1 9 SED C O H O R (IN P U T) C atch (n u m b ers) 107 375 3470 6864 5541 5027 14896 15802 28028 102441 128182 129965 ======= 440,699 n a le s, 1 9 SED C O H O R (IN P U T) C atch (n u m b ers) 311 1518 2681 6979 5888 9411 9760 16376 65608 105344 116777 =======	90 fish T A N A L Y (IN P U T) D e Ita-t (y) = = = = = 2.3 3 1 2.3 0 6 2.2 6 0 2.1 8 1 0.9 3 2 0.6 3 8 0 4 0.7 2 6 4 2 0.6 1 8 7 8 0.5 3 5 0.4 8 6 1 6 0.4 6 5 2 7 0.4 5 7 2 1 = = = = = = 91 fish (IN P U T) D e Ita-t (y) = = = = = = 2.3 3 1 2.3 0 0.8 3 9 0.7 2 6 0.4 3 1 0.4 5 3 0.4 5 7 = = = = = = = 2.4 10 0.5 3 3 0.4 8 1.5 10 0.4 5 7 = = = = = = 2.5 3 1 2.3 0 0.4 5 7 = = = = = = 2.5 3 1 2.5 0 0.4 5 7 = = = = = = 2.5 3 1 2.5 0 0.4 5 7 = = = = = = = 2.5 3 1 2.5 0 0.4 5 7 = = = = = = = 2.5 3 1 2.5 0 0.4 5 7 = = = = = = = 2.5 3 1 0.4 5 7 = = = = = = = 2.5 3 1 0.4 5 7 = = = = = = = = 2.5 3 1 0.4 5 7 = = = = = = = = 2.5 3 3 0.4 8 6 0.4 8 6 0.4 8 7 0.4 5 7 = = = = = = = = 2.5 3 3 0.4 8 7 0.4 5 7 = = = = = = = = = 2.5 3 3 0.4 8 7 0.4 5 7 = = = = = = = = = 2.5 3 3 0.4 8 7 0.4 5 7 = = = = = = = = = 2.5 3 3 0.4 8 7 0.4 5 7 = = = = = = = = = 2.5 3 3 0.4 8 7 0.4 5 7 = = = = = = = = = 2.5 3 0.4 5 7 = = = = = = = = = 2.5 3 0.4 5 7 = = = = = = = = = = 2.5 3 0.4 8 7 0.4 5 7 = = = = = = = = = = 2.5 3 0.4 8 7 0.4 8 7 0.5 3 0.4 8 7 0.5 3 0.5 8 8 0.5 9 0.5 3 0.5 8 0.5 8 0	ing seaso SIS SIS Stock Numbers 186 687 4895 14499 22465 30683 49653 70740 105386 218454 365475 524210 	n N a N a N u m b e r 	Ter tural Mort F/Z 0.748 0.825 0.715 0.696 0.696 0.612 0.749 0.809 0.906 0.872 0.819 0.906 0.872 0.819 	m in a 1 F = a lity (m) = T c = Z 0.583 0.838 0.515 0.483 0.379 0.684 0.587 0.769 1.564 1.147 0.811 F = m in a 1 F = a lity (m) = T c = C 0.671 0.452 0.457 0.511 0.441 0.452 0.457 0.511 0.4452 0.457 0.511 0.448 0.572 0.872 1.061 1.085 0.834	(IN P U T) 0.2 0.147 0.38 F 0.436 0.691 0.368 0.232 0.537 0.440 0.622 1.417 1.000 0.664 0.908 0.597 (IN P U T) 0.2 0.147 0.38 0.597 (IN P U T) 0.2 0.147 0.38 (IN P U T) 0.2 0.147 0.38 (IN P U T) 0.2 0.147 0.38 (IN P U T) 0.38 (IN P U T) (IN P U T) 0.38 (IN P U T) (IN P U T) (F*C 163 2399 2528 1861 1165 8005 6947 1145159 128210 86306 128210 86306 128210 86306 1145159 128210 86306 128210 86306 128210 86306 1218210 86306 128210 86306 128210 86306 128210 86306 128210 86306 128210 86306 128210 86306 128210 8787 12828 3425 2936 6927 25783 59992 98766 80218 11129

LFA	3	8 fe	males, 19	992 fist	ing seaso	n					
	L								(INPUT)		
LENG		н-ва	SED COHOR	IANALY	\$ 15	Na	ler tural Mort	ality (m)=	0.2		
								Tc=	0.38		
leng	t h		(INPUT) Catch	(INPUT) Delta-t	Stock	Mean					
(mm)	Ĺ		(numbers)	(y)	Numbers	Number	F/Z	z	F		F * C
= = = =	=	= = =	618	2 3 4 7	1073					::	
151	-	170	61	4.675	2 2 1 1	7 3 3 2	0.053	0.155	0.008		0
141	-	150	767	2.306	3976	6787	0.435	0.260	0.113		87
121	-	140	2537	2.260	18194	12982	0.571	0.342	0.195		496
116	-	120	5012	0.932	26145	19995	0.630	0.398	0.251		1256
111	-	115	10048	0.839	40106	26626	0.720	0.524	0.377		3791
100	-	105	16184	0.726	82734	42898	0.745	0.576	0.429		6106
96	-	100	3 3 9 4 8	0.533	124458	52901	0.814	0.789	0.642		21785
91	-	95	85137	0.486	221159	78665	0.880	1.229	1.082		92143
81	-	90 85	138478 138194	0.465	547052	203527	0.878	0.826	0.679		93834
	=	= = =								. ::	
Total	-		451,814			644,782	Wtd.Ave	.F =	0.826	_	373245
	3	8 fo	males 10	03 fiek	ing saaso	n			0.002		
	Ť				ing seaso						
LEN G	т	H - B A	SED COHOR	TANALY	SIS		Ter	minalF =	0.2		
	+					Na	tural Mort	ality (m)=	0.147	++	
	1		(INPUT)	(INPUT)					0.38		
Leng	t h		Catch	Delta-t	Stock	Mean					
(mm)	-		(numbers)	(у)	Num bers	Num ber	F/Z	z	F	\vdash	F * C
151	=	160	323	2.331	560					::	
141		150	848	2.306	1750	2330	0.712	0.511	0.364		308
131	-	140	4 4 0 5	2.260	7437	8724	0.775	0.652	0.505	\vdash	2224
116	-	130	4472	2.181	24169	23065	0.569	0.341	0.194		2250
111	-	115	3944	0.839	3 1 4 7 5	2 2 8 7 0	0.540	0.319	0.172		680
106	-	110	8798	0.726	4 4 1 8 5	26608	0.692	0.478	0.331		2909
96	-	105	26126	0.619	88032	30498	0.636	0.404	0.257		2014
91	-	95	69089	0.486	165545	57302	0.891	1.353	1.206		83301
86	-	90	1 1 9 4 6 6	0.465	299875	101116	0.889	1.328	1.181		141147
7070	-	85	159733	0.457	484587	169926	0.865	1.087	0.940	- I	150151
Total	_		411,328			496,743	Witd.Ave	.F =	0.983		404432
							A _		0 0 0 0		
	-						A =		0.020		
LFA	3	8 fe	males, 19	994 fish	ning seaso	n	A =		0.020		
	3 	8 fe	<mark>m ales, 1</mark> 9 sed сонов	994 fish	ning seaso	n	Ter	minal F =	0.020 (INPUT) 0.2		
	3 T	8 fe н-ва	<mark>m ales, 1</mark> 9 sed соног	994 fish TANALY	ning seaso sis	n N a	Ter tural Mort	m in al F = ality (m)=	(IN P U T) 0.2 0.147		
	3 T	<u>8 fe</u> н-ва	males, 19 SED COHOR	994 fish	ning seaso sis	n Na	Ter tural Mort	m in al F = ality (m)= T c =	(IN P U T) 0.2 0.147 0.38		
	3 T I	<u>8 fe</u> н-ва	males, 19 SED СОНО R (IN P U T) Catch	994 fish TANALY (INPUT) Delta-t	ning seaso SIS Stock	n Na Mean	Ter tural Mort	m in alF = ality (m)= Tc=	(IN P U T) 0.2 0.1 4 7 0.3 8		
LFA LENG Leng (mm)	3 T t h	8 fe н-ва	males, 19 SED COHOR (INPUT) Catch (numbers)	994 fish TANALY (INPUT) Delta-t (y)	n ing seaso SIS Stock Numbers	n Na Mean Number	Ter tural Mort F/Z	minalF = ality (m)= Tc = Z	(IN P U T) 0.2 0.147 0.38		F * C
L F A L E N G L e n g (m m) = = = 15 1	3 T t h	8 fe	males, 19 SEDCOHOR (INPUT) Catch (numbers)	994 fish TANALY (INPUT) Delta-t (Y) ======	sis Stock Numbers	N Na Mean Number	Ter tural Mort F/Z	m in al F = a lity (m)= T c = Z	(IN P U T) 0.2 0.147 0.38		F * C
L F A L E N G (m m) = = = = 151 141	3 T t h = -	<mark>8 fe</mark> H - В А = = = 1 6 0 1 5 0	m ales, 19 SED COHOR (INPUT) Catch (numbers) 323 1208	994 fish TANALY (<i>INPUT</i>) Delta-t (y) ==== 2.331 2.306	sis <u>Stock</u> <u>Stock</u> <u>Stock</u> <u>Stock</u> <u>Stock</u> <u>Stock</u> <u>Stock</u> <u>Stock</u>	n Na Mean Number 	Ter tural Mort F/Z	m in a F = a lity (m) = T c = Z 0.600	(IN P U T) 0.2 0.147 0.38		F * C
L F A L E N G (m m) ==== 151 141 131	3 T t h = - -	8 fe H - B A = = = 1 6 0 1 5 0 1 4 0	m ales, 19 SED COHOR (INPUT) Catch (numbers) 1208 3839	9 9 4 fish T A N A L Y (<i>IN P U T</i>) D e Ita - t (y) = = = = = = 2 .3 3 1 2 .3 0 6 2 .2 6 0	sis <u>Stock</u> <u>Numbers</u> <u>560</u> 2160 7367	n Na Mean Number 	Ter tural Mort 	m in al F = ality (m)= T c = Z 	(IN P U T) 0.2 0.147 0.38 F 0.453 0.413		F*C 547 1584
L F A L E N G (m m) = = = = 151 141 131 121 116	3 T I t h = - - - -	8 fe 	m ales, 19 SED COHOR (INPUT) (INPUT) Catch (numbers) 323 3839 7029 4978	9 9 4 fish T A N A L Y (IN P U T) D e lta - t (Y) = = = = = 2.3 3 1 2.3 0 6 2.2 6 0 2.1 8 1 0 9 3 2	sis <u>Stock</u> <u>Numbers</u> <u>560</u> 2160 7367 <u>18092</u> 2592	n N a <u>M e a n</u> <u>N u m b e r</u> <u>2667</u> 9305 25138 19881	Ter tural Mort 0.755 0.737 0.655 0.630	m in al F = ality (m) = T c = Z 0.600 0.560 0.427 0.307	(IN P U T) 0.2 0.147 0.38 F 0.453 0.413 0.280 0.250		F * C 5 4 7 1 5 8 4 1 9 6 6 1 2 4 6
L F A L E N G (m m) = = = = = 151 141 131 121 116 111	3 T t t - - - - -	8 fe H - B A = = = 1 6 0 1 5 0 1 4 0 1 3 0 1 2 0 1 1 5	m ales, 19 SED COHOR (INPUT) (INPUT) Catch (numbers) 323 1208 3839 7029 4978 6541	9 9 4 fish T A N A L Y (IN P U T) D e lta - t (y) = = = = = 2.331 2.306 2.260 2.181 0.932 0.839	sis <u>stock</u> <u>Numbers</u> <u>560</u> 2160 7367 <u>18092</u> 25992 36259	N a N a N u m b e r 2 6 6 7 9 3 0 5 2 5 1 3 8 1 9 8 8 1 2 5 3 4 5	F /Z 0.755 0.737 0.655 0.630 0.637	m in al F = ality (m)= T c = Z 0.600 0.560 0.427 0.397 0.405	(IN P U T) 0.2 0.147 0.38 F 0.453 0.413 0.280 0.250 0.258		F * C 5 4 7 1 5 8 4 1 9 6 6 1 2 4 6 1 6 8 8
L F A L E N G (m m) = = = = 1511 1411 1311 1211 1111 106	3 T t h = - - - - - - -	8 fe H - B A = = = 1 6 0 1 5 0 1 4 0 1 3 0 1 2 0 1 1 5 1 1 0 4 0 - 1 4 0	m a les, 19 SED COHOR (INPUT) Catch (numbers) 323 1208 3839 7029 4978 6541 15210	9 9 4 fish T A N A L Y (IN P U T) D e lta - t (y) = = = = = 2.331 2.306 2.260 2.181 0.932 0.839 0.726	s is s to c k N um b ers 5 6 0 2 1 6 0 2 3 6 7 1 8 0 9 2 2 5 9 9 2 3 6 2 5 9 5 6 1 8 4	N a M e a n N u m b e r 2 6 6 7 9 3 0 5 2 5 1 3 8 1 9 8 8 1 2 5 3 4 5 3 2 0 8 1	F /Z 0.755 0.737 0.655 0.630 0.637 0.763	m in al F = a lity (m)= T c = Z 0.600 0.560 0.427 0.397 0.405 0.621	(IN P U T) 0.2 0.147 0.38 0.453 0.413 0.280 0.250 0.258 0.474		F * C 5 4 7 1 5 8 4 1 9 6 6 1 2 4 6 1 6 8 8 7 2 1 1
L F A L E N G (m m) = = = = 1511 1411 1211 1211 1211 106 101 96	3 T t t - - - - - - - - - - - - - - - - -	8 fe 	m a les, 19 SED COHOR (INPUT) Catch (numbers) 323 1208 3839 7029 4978 6541 15210 19414 72822	9 9 4 fish T A N A L Y (IN P U T) D e lta - t (y) = = = = 2.331 2.306 2.260 2.181 0.932 0.839 0.726 0.6133	S IS S to c k N um b ers 5 6 0 2 1 6 0 2 3 6 2 3 6 2 5 9 5 6 1 8 4 8 1 6 3 1 1 6 3 3 1 5	N a M e a n N u m b e r 2 6 6 7 9 3 0 5 2 5 1 3 8 1 9 8 8 1 2 5 3 4 5 3 2 0 8 1 4 1 0 4 1 6 0 2 8 8	F /Z 0.755 0.737 0.655 0.630 0.637 0.763 0.763 0.763	m in al F = a lity (m)= T c = Z 0.600 0.560 0.427 0.405 0.621 0.621 0.620 1.355	(IN P U T) 0.2 0.1 4 7 0.38 0.4 13 0.2 80 0.2 50 0.2 58 0.4 7 4 0.4 7 3 1.2 0 8		F * C 5 4 7 1 5 8 4 1 9 6 6 1 2 4 6 1 6 8 8 7 2 1 1 9 1 8 3 8 7 9 6 1
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L F A L E N G (m m) = = = = 1511 1411 131 116 101 96 911 86 81 = = = T o tal L F A L E N G L E N G L E N G 151 1411 116 111 121 131 121 131 121 131 121 131 13	3 T t t - - - - - - - - - - - - -	<pre>8 fe 1 - B A 1 - B A 1 - B A 1 - B A 1 - B A 1 - B A B A B A B A B A B A B A B A B A B A B A B A B A B A </pre>	m a les, 19 SED COHOR (IN PUT) Catch (numbers) 233 1208 3839 7029 4978 6541 15210 19414 72822 162781 248603 285810 285810 285810 3285810 5210 19414 72822 162781 248603 285810 5210 19414 7282 162781 248603 285810 5210 19414 7282 162781 248603 285810 5210 19414 7282 162781 248603 285810 5210 8285 810 8285 8386 8486 8386 8366 8386 8886 8886 8866 8866 8866 8866 8866 8866 8866 8866 8866 8866 8876 8776 8776 87776 87777 877777 87777777777	9 9 4 fish T A N A L Y (IN P U T) D e Ita -t (Y) = = = = = = 2 .3 3 1 2 .3 0 6 2 .2 6 0 2 .1 8 1 0 .9 3 2 0 .8 3 9 0 .7 2 6 0 .6 1 9 0 .5 3 3 0 .4 8 6 0 .4 6 5 0 .4 6 5 0 .4 6 5 0 .4 5 7 = = = = = 9 9 5 fish T A N A L Y (IN P U T) D e Ita -t (Y) = = = = = 2 .3 3 1 2 .3 0 6 2 .2 6 0 2 .1 8 1 0 .9 3 2 0 .8 3 9	s is s to c k N u m b e rs 5 6 0 2 1 6 0 7 3 6 7 1 8 0 9 2 3 6 2 5 9 5 6 1 8 4 8 1 6 3 1 1 6 3 3 1 5 3 4 2 6 7 5 6 2 2 0 8 1 9 5 8 5 3 1 	n N a M e a n N u m b e r 2 6 6 7 9 3 0 5 2 5 1 3 8 1 9 8 8 1 2 5 3 4 5 3 2 0 8 1 4 1 0 4 1 6 0 2 8 8 1 1 2 7 8 7 2 0 9 5 4 3 3 4 4 9 0 	Ter tural Mort 0.755 0.737 0.655 0.763 0.763 0.763 0.763 0.763 0.892 0.908 0.890 0.849 0.849 Wtd.Ave A = Constant Mort F/Z 0.741 0.673 0.680 0.641	m in al F = a lity (m) = T c = 2 	(IN P U T) 0.38 (IN P U T) 0.2 0.147 0.38 		F*C 547 1584 1966 1246 1688 7211 9183 87961 234935 294944 237125 ::::::::::::::::::::::::::::::::::::
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L F A L E N G (m m) = = = = 1511 1311 1211 1061 1011 966 911 1061 1011 966 811 = = = T otal L E N G L E N G L E N G L E N G 1311 1316 1311 1316 1311 1316 1311 1316 1311 1316 1311 1316 1311 1316 1311 1316 1311 1316 1311 1316 1317 1316 1317	3 t h - - - - - - - - - - - - -	<pre>8 fe 1 - B A = = = 1 6 0 1 5 0 1 4 0 1 3 0 1 1 5 1 0 0 9 5 9 0 8 5 = = = 8 fe 1 - B A 1 - B A 1 - B A 1 - B A 1 - B A 1 - B A </pre>	m a les, 19 SED COHOR (IN PUT) Catch (numbers) 323 323 323 323 323 323 323 32	9 9 4 f is f T A N A L Y D e Ita - t (<i>IN P U T</i>) D e Ita - t (<i>Y</i>) = = = 2 .3 0 6 2.2 6 0 2 .1 8 1 0.9 3 2 0.8 3 9 0 .7 2 6 0.6 19 0.4 6 5 0 .4 6 5 0.4 5 7 = = = = = 9 9 5 f is f T A N A L Y	s is s to c k N u m b e rs 5 6 0 2 1 6 0 7 3 6 7 1 8 0 9 2 3 6 2 5 9 5 6 1 8 4 8 1 6 3 1 1 6 3 3 1 5 3 4 2 6 7 5 6 2 2 0 8 1 9 5 8 5 3 1 n in g s e a s o s is s to c k N u m b e rs 8 4 0 2 9 98 8 0 0 1 2 1 0 2 0 3 0 5 2 9 4 0 8 5 0 5 4 0 0 4 7 1 7 4 4 1 4 2 0 4	N N N N N N N N N N N N N N	Ter tural Mort 0.755 0.737 0.655 0.737 0.655 0.763 0.763 0.763 0.763 0.892 0.908 0.892 0.908 0.899 Wtd.Ave A= Wtd.Ave A= Constant 0.741 0.680 0.641 0.584 0.624 0.624	m in al F = a lity (m) = T c = C 0.600 0.560 0.427 0.397 0.405 0.621 0.620 1.355 1.590 1.333 0.977 F = T c = C C 0.567 0.450 0.459 0.450 0.557 0.459	(IN P U T) 0.2 0.147 0.38 F 0.453 0.413 0.280 0.250 0.250 0.258 0.474 0.474 0.473 1.208 1.443 0.473 1.208 1.443 0.473 1.208 1.443 0.654 (IN P U T) 0.2 0.147 0.38 0.453 0.250 0.255 0.258 0.474 0.325 0.206 0.206 0.244 0.321 0.754		F*C 547 1584 1966 1246 1688 7211 9183 87961 234935 294944 237125 ::::::::::::::::::::::::::::::::::::
L F A L E N G (m m) = = = = 1511 1311 1216 1111 1066 1011 966 816 816 817 = = = T o tal L F A L E N G L E N G L E N G 1511 1411 1216 1511 1411 1216 1511 1411 1216 1511 1411 1216 1511 1411 1216 1511 1516 1011 966 911 1411 1016 101 101 1016 101 101 1016 1017 1016 1017 1016 1017 1016 1017 1016 1017 1016 1017 1016 1017 1016 1017 1016 1017 1016 1017 1016 1017 1016 1017 1017 1016 1017 1016 1017 1016 1017 1016 1017 1016 1017 1016 1017 1016 1017	3 T t t - - - - - - - - - - - - -	<pre>8 fe 1 -B A = = = 1 6 0 1 5 0 1 4 0 1 3 0 1 4 0 1 3 0 1 1 5 1 0 0 9 5 9 0 8 5 = = = 8 fe H -B A - 1 6 0 1 5 0 1 4 0 1 5 0 1 4 0 1 3 0 1 2 0 1 1 5 1 0 0 9 5 </pre>	m a les, 19 SED COHOR (IN PUT) Catch (numbers) ====== 323 1208 3839 7029 4978 6541 15210 19414 72822 162781 248603 285810 ======= 828.557 m a les, 19 SED COHOR (IN PUT) Catch (numbers) ===== 484 1598 3369 8448 6024 8210 12170 3529 98901	9 9 4 fish T A N A L Y (IN P U T) D e Ita - t (Y) = = = = = = 2 .3 3 1 2 .3 0 6 2 .2 6 0 2 .1 8 1 0 .9 3 2 0 .8 3 9 0 .7 2 6 0 .6 1 9 0 .5 3 3 0 .4 8 6 9 9 5 fish T A N A L Y (IN P U T) D e Ita - t (Y) = = = = = 2 .3 3 1 2 .3 0 6 2 .2 6 0 2 .1 8 1 0 .9 3 2 0 .4 8 5 (IN P U T) D e Ita - t (Y) = = = = = 2 .3 3 1 2 .3 0 6 2 .2 6 0 2 .1 8 1 0 .9 3 2 0 .8 3 9 0 .7 2 6 0 .6 1 9 0 .5 3 3 0 .4 8 6 (IN P U T) (IN P U T) D e Ita - t 0 .9 3 2 0 .8 3 9 0 .7 2 6 0 .6 1 9 0 .5 3 3 0 .4 8 6	s is s to c k N u m b e rs 5 6 0 2 1 6 0 7 3 6 7 1 8 0 9 2 3 6 2 5 9 5 6 1 8 4 8 1 6 3 1 1 6 3 3 1 5 3 4 2 6 7 5 6 2 2 0 8 1 9 5 8 5 3 1 	N N a N a N u m b e r 2 6 6 7 9 3 0 5 2 5 1 3 8 1 9 8 8 1 2 5 3 4 5 3 2 0 8 1 4 1 0 4 1 6 0 2 8 8 1 1 2 7 8 7 2 0 9 5 4 3 3 4 4 4 9 0 	Terr tural Mort 0.755 0.737 0.655 0.737 0.6337 0.763 0.763 0.763 0.892 0.908 0.892 0.908 0.892 0.908 0.849 Wtd.Ave A= Wtd.Ave A= 0.741 0.673 0.680 0.684 0.684 0.741 0.624 0.624 0.630 0.631	m in al F = a lity (m) = T c = C 0.600 0.560 0.427 0.397 0.405 0.621 1.355 1.590 1.333 0.977 m in al F = a lity (m) = T c = C 0.450 0.450 0.450 0.450 0.459 0.450 0.459 0.459 0.450 0.459 0.567 0.459 0.567 0.577 0.577 0.577 0.577 0.577 0.577 0.577 0.577 0.577 0.577 0.577 0.577 0.577 0.577 0.577 0.5777 0.5777 0.5777 0.5777 0.5777 0.57777 0.57777 0.5777777 0.5777777777777777777777777777777777777	(IN P U T) 0.2 0.147 0.38 F 0.453 0.413 0.280 0.250 0.258 0.474 1.208 1.443 0.250 0.258 0.474 1.208 1.443 1.208 1.443 0.654 (IN P U T) 0.2 0.147 0.38 0.474 0.330 0.654 F 0.420 0.303 0.312 0.263 0.206 0.303 0.303 0.303 0.206 0.206 0.206 0.206 0.206 0.206 0.303 0.303 0.206		F*C 547 1584 1966 1246 1688 7211 9183 87961 234935 294944 237125
L F A L E N G (m m) = = = = 151 131 121 131 121 131 121 131 121 101 96 91 86 81 = = = T o tal L E N G L E N G L E N G (m m) = = = 151 141 111 126 101 96 91 80 81 = = = 100 101 96 81 = = = 100 101 96 81 = = = 100 101 96 81 = = = 100 101 96 81 = = = 100 101 100 101 96 81 = = = 100 101 100 101 96 81 = = = 100 101 100 100 100 100 100 10	3 t h - - - - - - - - - - - - -	<pre>8 fe = = = 1 - B A = = = 1 6 0 1 5 0 1 4 0 1 3 0 1 1 5 1 0 0 9 0 8 5 = = = 8 fe - - - - - - - - -</pre>	m a les, 19 SED COHOR (IN PUT) Catch (numbers) ====== 323 3839 7029 4978 6541 15210 19414 72822 162781 248603 285810 ====== 828,557 m a les, 19 SED COHOR (IN PUT) Catch (numbers) ===== 484 1598 3369 8848 6096 6024 8210 12170 3629 98901 162279 162279	9 9 4 fish T A N A L Y (IN P U T) D e Ita - t (Y) = = = = = = 2 .3 3 1 2 .3 0 6 2 .2 6 0 2 .1 8 1 0 .9 3 2 0 .8 3 9 0 .7 2 6 0 .6 1 9 0 .5 3 3 0 .4 8 6 0 .4 5 7 = = = = = = 9 9 5 fisf T A N A L Y (IN P U T) D e Ita - t (Y) = = = = = = 2 .3 3 1 2 .3 0 6 2 .2 6 0 2 .1 8 1 0 .9 3 2 0 .8 3 9 0 .7 2 6 0 .4 5 7 = = = = = = 9 9 5 fisf 2 .3 3 1 2 .3 0 6 2 .2 6 0 2 .1 8 1 0 .9 3 2 0 .8 3 9 0 .7 2 6 0 .6 1 9 0 .5 3 3 0 .4 8 6 0 .4 6 5 0 .4 5 7 = = = = = = 9 9 5 fisf	s is s to c k N u m b e rs 5 60 2 160 7 3 67 1 80 92 2 59 92 3 62 59 5 61 84 8 16 3 1 1 6 3 3 15 3 4 2 6 7 5 6 2 20 81 9 5 8 5 3 1 	n N a N a N u m b e r 2 6 6 7 9 3 0 5 2 5 1 3 8 1 9 8 8 1 2 5 3 4 5 3 2 0 8 1 4 1 0 4 1 6 0 2 8 8 1 1 2 7 8 7 2 0 9 5 4 3 3 4 4 4 9 0 8 8 2 .5 6 7 N a M e a n N u m b e r 	Ter tural Mort 0.755 0.737 0.655 0.737 0.6337 0.763 0.763 0.763 0.763 0.892 0.908 0.892 0.908 0.849 Wtd.Ave A = 0.741 0.673 0.6741 0.673 0.684 0.637 0.741 0.673 0.684 0.637 0.637 0.638 0.639 0.637 0.741 0.638 0.638 0.638 0.638 0.638 0.639 0.637 0.637 0.637 0.637 0.637 0.637 0.637 0.638 0.638 0.638 0.638 0.638	m in al F = a lity (m) = T c = C C C C C C C C C C C C C	(IN P U T) 0.2 0.147 0.38 F 0.453 0.413 0.280 0.250 0.258 0.474 1.208 1.443 1.208 1.443 1.208 1.443 0.654 0.654 0.654 0.38 0.654 0.38 0.38 0.250 0.258 0.474 0.3250 0.258 0.474 0.330 0.453 0.206 0.258 0.474 0.3250 0.258 0.474 0.3250 0.258 0.474 0.3250 0.258 0.474 0.3250 0.258 0.474 0.3250 0.258 0.474 0.330 0.654 0.303 0.303 0.206 0.266 0.4554 0.4554 0.4200 0.254 0.254 0.258 0.258 0.474 0.250 0.258 0.258 0.258 0.258 0.258 0.258 0.258 0.258 0.258 0.258 0.258 0.258 0.258 0.258 0.258 0.258 0.258 		F*C 547 1584 1966 1246 1688 7211 9183 87961 234935 294944 237125 34935 294944 237125 37961 234935 294944 237125 37961 234935 294944 237125 37061 234935 294944 237125 37061 234935 294944 237125 37061 234935 294944 237125 37061 234935 294944 237125 37061 234935 294944 237125 37061 234935 294944 237125 37061 234935 294944 237125 37061 234945 294944 237125 37061 234935 294944 237125 37125 37961 234935 294944 237125 37961 234935 294944 237125 37961 234935 294944 237125 37961 234935 294944 237125 37961 234935 294944 237125 37960 1021 27460 1601 12242 2005 3908 266785 128579 192125 2053 3908 266785 128579 192125 26785 128579 192125 26795 128579 1285779 1285779 12857575 1285775757 128575757575757575757575757575757575
L F A L E N G (m m) = = = = 151 131 121 131 121 131 121 131 121 106 111 96 91 86 81 = = = I o tal L E N G L E N G L E N G (m m) = = = 151 141 151 161 101 96 81 = = = 100 101 96 81 = = = 100 101 96 81 = = = 100 101 96 81 = = = 100 101 96 81 = = = 100 101 100 101 96 81 = = = 100 101 100 101 96 81 = = = 100 101 100 100 100 100 100 10	3 t h - - - - - - - - - - - - -	<pre>8 fe = = = 1 6 0 1 5 0 1 4 0 1 3 0 1 4 0 1 3 0 1 1 5 1 1 0 9 5 1 0 0 9 5 9 0 8 5 = = = 8 fe H - B A = = = 1 6 0 1 5 0 1 4 0 1 5 0 1 4 0 1 5 0 1 4 0 1 5 0 1 4 0 1 0 5 1 0 0 9 0 5 9 0 0 5 5 9 0 0 5 5 9 0 0 5 5 5 9 0 0 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5</pre>	m a les, 19 SED COHOR (IN PUT) Catch (numbers) ======= 323 3839 7029 4978 6541 15210 19414 72822 162781 248603 285810 ====== 828.557 m a les, 19 SED COHOR (IN PUT) Catch (numbers) ===== 484 598 3369 828.597 Males, 19 Catch (numbers) ===== 484 1598 3369 8210 12170 3598 162616 162616	9 9 4 f i s f T A N A L Y D e i t a - t (IN P U T) D e i t a - t (U) = = = 2 .3 0 1 2 .2 6 0 2 .2 3 0 1 2 .2 6 0 2 .1 8 1 0.9 3 2 0.8 3 9 0 .7 2 6 0 .4 5 7 = = = = 9 5 f i s f T A N A L Y D e i t a - t (IN P U T) D e i t a - t (IN P U T) D e i t a - t (IN P U T) D e i t a - t (IN P U T) D e i t a - t (IN Q U T) D e i t a - t (IN P U T) D e i t a - t (IN Q U T) D i t a - t (IN Q U T) D i t a - t (IN Q U T) D i t a - t (IN Q U T) 0 </td <td>s is s to c k N u m b e rs 5 60 2 160 7 3 67 1 80 92 2 59 92 3 6 2 5 9 5 6 1 84 8 1 6 3 1 1 6 3 3 1 5 3 4 2 6 7 5 6 2 2 0 81 9 5 8 5 3 1 </td> <td>n N a N a N u m b e r 2 6 6 7 9 3 0 5 2 5 1 3 8 1 9 8 8 1 2 5 3 4 5 3 2 0 8 1 4 1 0 4 1 6 0 2 8 8 1 1 2 7 8 7 2 0 9 5 4 3 3 4 4 4 9 0 8 8 2 .5 6 7 N a M e a n N u m b e r </td> <td>Ter tural Mort 0.755 0.737 0.655 0.737 0.6330 0.763 0.763 0.763 0.763 0.892 0.908 0.890 0.849 Wtd.Ave A = 0.741 0.673 0.741 0.673 0.641 0.680 0.681 0.683 0.684 0.673 0.741 0.673 0.683 0.684 0.633 0.633 0.633 0.633 0.633 0.633 0.834 0.834 0.834 </td> <td>m in al F = a lity (m) = T c = 2 </td> <td>(IN P U T) 0.2 0.147 0.38 </td> <td></td> <td>F*C 547 1584 1966 1246 1688 7211 9183 87961 234935 294944 237125 37969 F*C F*C F*C 672 1021 2760 1601 1242 2005 3908 26785 128579 192125 119678</td>	s is s to c k N u m b e rs 5 60 2 160 7 3 67 1 80 92 2 59 92 3 6 2 5 9 5 6 1 84 8 1 6 3 1 1 6 3 3 1 5 3 4 2 6 7 5 6 2 2 0 81 9 5 8 5 3 1 	n N a N a N u m b e r 2 6 6 7 9 3 0 5 2 5 1 3 8 1 9 8 8 1 2 5 3 4 5 3 2 0 8 1 4 1 0 4 1 6 0 2 8 8 1 1 2 7 8 7 2 0 9 5 4 3 3 4 4 4 9 0 8 8 2 .5 6 7 N a M e a n N u m b e r 	Ter tural Mort 0.755 0.737 0.655 0.737 0.6330 0.763 0.763 0.763 0.763 0.892 0.908 0.890 0.849 Wtd.Ave A = 0.741 0.673 0.741 0.673 0.641 0.680 0.681 0.683 0.684 0.673 0.741 0.673 0.683 0.684 0.633 0.633 0.633 0.633 0.633 0.633 0.834 0.834 0.834	m in al F = a lity (m) = T c = 2 	(IN P U T) 0.2 0.147 0.38 		F*C 547 1584 1966 1246 1688 7211 9183 87961 234935 294944 237125 37969 F*C F*C F*C 672 1021 2760 1601 1242 2005 3908 26785 128579 192125 119678
L F A L E N G L e n g (m m) = = = = 1511 1211 1311 1216 1111 966 911 866 811 = = = T o tal L E N G L E N G L E N G L e n g (m m) = = = 1511 1411 1161 1111 126 1011 966 811 = = = T o tal L e n g (m m) = = = 1511 1411 1161 1011 966 811 = = = T o tal 1011 101 1	3 t h - - - - - - - - - - - - -	<pre>8 fe = = = 1 6 0 1 5 0 1 4 0 1 2 0 1 1 5 1 0 0 9 5 9 0 8 5 = = = 8 fe - - - - - - - - -</pre>	m a les, 19 SED COHOR (IN PUT) Catch (numbers) = = = = = = = = = = = = = = = = = = =	9 9 4 fish T A N A L Y (IN P U T) D e Ita - t (Y) = = = = = = 2 .3 3 1 2 .3 0 6 2 .2 6 0 2 .1 8 1 0 .9 3 2 0 .8 3 9 0 .7 2 6 0 .6 1 9 0 .5 3 3 0 .4 8 5 0 .4 5 7 = = = = = = 9 9 5 fish T A N A L Y (IN P U T) D e Ita - t (Y) = = = = = = 2 .3 3 1 2 .3 0 6 2 .2 6 0 0 .4 5 7 = = = = = = 9 9 5 fish C A N A L Y (IN P U T) D e Ita - t (Y) = = = = = = 2 .3 3 1 2 .3 0 6 2 .2 6 0 0 .1 8 1 0 .9 3 2 0 .8 3 9 0 .7 2 6 0 .6 1 9 0 .5 3 3 0 .4 8 6 0 .4 6 5 0 .4 5 7 = = = = = = = 2 .3 3 1 2 .3 0 6 2 .2 6 0 0 .6 1 9 0 .5 3 3 0 .4 8 6 0 .4 6 5 0 .4 5 7 = = = = = = = 2 .3 3 1 2 .3 0 6 2 .2 6 0 0 .6 1 9 0 .5 3 3 0 .4 8 6 0 .4 6 5 0 .4 5 7 = = = = = = = 2 .3 3 1 2 .3 0 6 2 .2 6 0 0 .6 1 9 0 .5 3 3 0 .4 8 6 0 .4 6 5 0 .4 5 7 = = = = = = = = 2 .3 3 1 2 .3 0 6 2 .2 6 0 2 .1 8 1 0 .9 3 2 0 .8 3 9 0 .7 2 6 0 .6 1 9 0 .5 3 3 0 .4 8 6 0 .4 6 5 0 .4 5 7 = = = = = = = 2 .3 3 1 2 .3 0 6 2 .2 6 0 0 .6 1 9 0 .5 3 8 0 .4 8 6 0 .4 6 5 0 .4 5 7 = = = = = = = 2 .3 1 2 .3 0 6 2 .2 6 0 .4 6 5 0 .4 5 7 = = = = = = 2 .3 1 2 .3 0 6 2 .2 6 0 .4 6 5 0 .4 5 7 = = = = = = 2 .3 1 2 .3 0 6 2 .2 6 0 .4 6 5 0 .4 5 7 = = = = = = 2 .3 1 2 .3 0 6 .4 6 5 0 .4 5 7 .4 8 6 0 .4 6 5 0 .4 5 7 .4 8 6 0 .4 6 5 0 .4 5 7 .4 8 6 0 .4 6 5 0 .4 5 7 .4 8 7 .4 8 6 0 .4 6 5 0 .4 5 7 .4 8 7 .4	s is s to c k N u m b e rs 5 60 2 160 7 3 67 1 80 92 2 59 92 3 62 59 5 61 84 8 16 3 1 1 6 3 3 15 3 4 2 6 7 5 6 2 20 81 9 5 8 5 3 1 	n N a N a N u m b e r 2 6 6 7 9 3 0 5 2 5 1 3 8 1 9 8 8 1 2 5 3 4 5 3 2 0 8 1 4 1 0 4 1 6 0 2 8 8 1 1 2 7 8 7 2 0 9 5 4 3 3 4 4 4 9 0 8 8 2 .5 6 7 N a M e a n N u m b e r 	Ter tural Mort 0.755 0.737 0.655 0.737 0.6337 0.763 0.763 0.763 0.763 0.892 0.908 0.892 0.908 0.849 Wtd.Ave A = Constant 0.741 0.673 0.641 0.584 0.680 0.641 0.683 0.683 0.684 0.684 0.741 0.673 0.684 0.684 0.635 0.637 0.637 0.637 0.6384 0.6384 0.637 0.637 0.637 0.637 0.641 0.6384 0.837 0.834 0.834	m in al F = ality (m) = T c = 2 	(IN P U T) 0.2 0.147 0.38 F 0.453 0.413 0.280 0.258 0.413 0.280 0.258 0.474 1.208 1.443 1.208 1.443 1.208 1.443 1.208 1.443 0.654 1.060 0.654 0.654 0.38 0.420 0.38 0.258 0.474 1.208 1.443 0.280 0.258 0.474 0.258 0.474 0.258 0.474 0.258 0.474 0.258 0.474 0.258 0.474 0.258 0.474 0.258 0.474 0.258 0.474 0.258 0.474 0.258 0.474 0.303 0.2654 0.38 0.38 0.38 0.258 0.258 0.258 0.258 0.258 0.258 0.258 0.258 0.258 0.258 0.258 1.208 1.208 1.208 1.208 1.208 1.208 1.208 1.208 		F * C 5 4 7 1 5 8 4 1 9 6 6 1 2 4 6 1 6 8 8 7 2 1 1 9 1 8 3 8 7 9 6 1 2 3 4 9 3 5 2 9 4 9 4 4 2 3 7 1 2 5 ::::::::::::::::::::::::::::::::::::

Вау	0	fFu	ndy fem a	les, 19	88 fishin	g season				
-			-						(INPUT)	
LENO	S T I	н-ваз	SED COHORI	ANALYS	IS		Те	rm in al F =	0.2	
							Natural Mor	tality (m)= Tc-	0.147	
			(IN P U T)	(INPUT)				10-	0.30	
Leng	t h		Catch	Delta-t	Stock	Mean				
(mm) 	-		<u>(numbers)</u>	(y)	<u>Numbers</u>	Number	F / Z	Z	F	F * C
161	-	170	54	2.343	93					
151	-	160	107	2.331	2 5 3	360	0.669	0.445	0.298	3 2
141	-	150	3/5	2.306	781	1045	0.709	0.506	0.359	134
121	-	130	13338	2.181	2 1 3 0 7	23400	0.795	0.717	0.570	7603
116	-	120	15186	0.932	40433	26803	0.794	0.714	0.567	8604
111	-	115	14//4	0.839	61223	40928	0.711	0.508	0.361	5333
101	-	105	31616	0.619	134282	67631	0.761	0.614	0.441	14780
96	-	100	57597	0.533	204576	86375	0.819	0.814	0.667	38407
91	-	95	128636	0.486	351908	127186	0.873	1.158	1.011	130102
81	-	8 5	192569	0.457	805925	302899	0.812	0.783	0.922	1 2 2 4 2 7
7070	=	= = =								
Tota	4		667,992			938,056	Wtd.Ave.F =		0.767	512167
D		4 F			00 fichin		A =		0.535	
вау	0		nay tema	i i e s , i 9	89 TISNIN	<u>g season</u>				
	<u> </u>	 . B ^ 4					т	rm in al E	(IN PUT)	
	Ľ						<u>Natural M</u> or	<u>tality (m)</u> =	0.2	
	_	<u> </u>	(IN D)	/ · · · · · · · · · · · · · · · · · · ·				Tc =	0.38	
Leng	th	<u> </u>	(INPUT) Catch	(INPUT) Deltart	Stock	Maan				
<u>(m</u> m)	ľ		(numbers)	(y)	<u>Num</u> bers	Num ber	F / Z	z	F	F*C
	=	= = =								
151 141	-	160	1259	2.331	2184	6521	0 3 7 0	0 2 3 3	0.086	1 0
131	-	140	4553	2.260	10330	14099	0.687	0.470	0.323	1470
121	-	130	1 3 7 6 2	2.181	29779	38691	0.708	0.503	0.356	4895
116	-	120	13313	0.932	48177	34585	0.724	0.532	0.385	5125
106	-	110	27341	0.839	107752	62324	0.893	0.478	0.331	11995
101	-	105	37205	0.619	156527	78703	0.763	0.620	0.473	17588
96	-	100	54859	0.533	225815	98157	0.792	0.706	0.559	30660
86	-	95	118478	0.486	562820	205568	0.856	0.966	0.871	137820
8 1	-	8 5	161937	0.457	768073	294666	0.789	0.697	0.550	88994
	= =									
			617 570			1 0 1 7 5 3 0			0 6 6 0	407114
Tota	-		0 1 1 10 1 0			1,017,556			0 4 8 3	
Tota Bay		fFu	ndv 35 fe	males	1990 fis	hing seas			0.483	
т _{о ta} Вау	/ 0	fFu	ndy 35 fe	m ales	, 1990 fis	hing seas			0.633 0.483	
Bay LENG	' 0	f Fu	ndy 35 fe	males ANALYS	, 1990 fis	hing seas	S O N T e	rm in al F =	0.635 0.483 (IN P U T) 0.2	
Bay	' 0	f Fu н-ваз	ndy 35 fe	males Analys	, 1990 fis	hing seas	SON Natural Mor	rm in al F = tality (m)=	0.839 0.483 (IN P U T) 0.2 0.147	
Bay LENC	0 3 T I	<u>f Fu</u> н-ваз	ndy 35 fe	males ANALYS	, 1990 fis	hing seas	SON Te Natural Mor	rminalF = tality (m)= Tc =	(IN P U T) 0.2 0.147 0.38	
<u>Bay</u> LEN(7 0 5 T 1 t h	fFu H-BAS	ndy 35 fe SED COHORT (INPUT) Catch	ANALYS (INPUT) Delta-t	, 1990 fis 15 Stock	hing seas	A = S O N Te Natural Mor	rm in al F = tality (m)= Tc =	0.83 0.483 (IN P U T) 0.2 0.147 0.38	
<u>Bay</u> LEN(Leng (mm)	2 0 3 T 1 4 1	f Fu	Indy 35 fe SED COHORT (INPUT) Catch (numbers)	ANALYS (INPUT) Delta-t (y)	, 1990 fis IS Stock Numbers	hingseas Mingseas Mean Number	A = S O N Te Natural Mor F/Z	rm in al F = tality (m)= Tc = Z	0.333 0.483 (IN P U T) 0.2 0.147 0.38	F*C
<u>Bay</u> <u>LEN(</u> <u>Leng</u> (<u>mm</u>) = = = 5 1	7 0 3 T 1 t h	f F u H - B A S	Indy 35 fe SED COHORT (INPUT) Catch (numbers)	<u>ANALYS</u> (INPUT) Delta-t (y) ======	. 1990 fis 	hing seas	A = S O N Te N atural M or F /Z	rm in al F = ta lity (m) = Tc = Z	0.335 0.483 (IN P U T) 0.2 0.147 0.38	F * C
<u>Bay</u> <u>LEN(</u> <u>Leng</u> (<u>mm</u>) = = = = 151 141	2 0 5 T 1 5 T 1 	f F u H - B A S = = = 1 6 0 1 5 0	<u>n d y 3 5 fe</u> SED COHORT (INPUT) Catch (numbers) ====== 1071 972	m a le s A N A L Y S (IN P U T) D e Ita-t (y) = = = = = = 2.3 3 1 2.3 0 6	, 1990 fis 	hingseas Mean Number 6012	A = S O N Te N atural M or F/Z 0.524	rm.in.a.l.F = ta.lity (m.)= T.c.= Z	0.335 0.483 (IN P U T) 0.2 0.147 0.38 F 	F * C
Tota Bay LEN((mm) ==== 151 141 131	2 0 3 T 1 3 T 1 4	f F u H - B A S = = = 1 6 0 1 5 0 1 4 0	Indy 35 fe SED COHORT (INPUT) Catch (numbers) ====================================	m a le s A N A L Y S (IN P U T) D e lta - t (y) = = = = = = 2 .3 3 1 2 .3 0 6 2 .2 6 0	, 1990 fis SIS Numbers 1859 3715 12048	Mean Number <u>6012</u> 15501	A = S O N Te N atural M or F/Z 0.524 0.727	rm in al F = tality (m) = Tc = Z 	0.335 0.483 (IN P U T) 0.2 0.147 0.38 F 	F*C
<u>B a y</u> <u>L E N (</u> <u>L E N (</u> <u>L E N (</u> <u>L e n g</u> (m m) <u>= = = = = = = = = = = = = = = = = = = </u>	2 0 3 T 1 4	f F u H - B A S = = = 1 6 0 1 5 0 1 4 0 1 3 0 1 2 0	Indy 35 fe SED COHORT Catch (INPUT) Catch (numbers) ====================================	m a le s A N A L Y S (IN P U T) D e lta -t (Y) = = = = = 2 .3 3 1 2 .3 0 6 2 .2 6 0 2 .1 8 1 0 9 3 2	, 1990 fis SIS Stock Numbers 1859 3715 12048 28958 4463	M ean Number 	A = S O N Te N atural M or F/Z 0.524 0.727 0.647 0.689	rm in al F = tality (m) = T c = Z 0.309 0.638 0.416 0.473	0.335 0.483 (IN P U T) 0.2 0.147 0.38 F 	F * C 157 2365 2946 3478
B a y B a y L E N (<u>L</u> e n g (m m) = == = = 151 141 131 116 111	th - - - - - - -	f F u H - B A S = = = 1 6 0 1 5 0 1 4 0 1 3 0 1 2 0 1 1 5	n d y 3 5 fe SED C O H O R 1 (IN P U T) C atch (numbers) = = = = = = = 1071 972 6055 10938 10682 18885	m a le s A N A L Y S (IN P U T) D e lta - t (Y) = = = = = = 2.3 3 1 2.3 0 6 2.2 6 0 2.1 8 1 0.9 3 2 0.8 3 9	, 1990 fis Stock Numbers 1859 3715 12048 28958 44463 70091	M ean Number 	A = A = S O N Te N atural M or F/Z 0.524 0.727 0.647 0.689 0.737	rm in al F = ta lity (m) = T c = 2 	0.335 0.483 (IN P U T) 0.2 0.147 0.38 F 	F * C : 157 2365 2946 3478 7776
Tota Bay LENC (mm) ==== 151 141 131 121 116 111	2 0 3 T 1 5 T 1 th - - - - - - - - - - - - -	f F u H - B A S = = = 1 6 0 1 5 0 1 4 0 1 2 0 1 1 5 1 1 0 1 1 5 1 1 0	Indy 35 fe N dy 35 fe SED COHORT (INPUT) Catch (numbers) ====================================	m a les A N A L Y S (IN P U T) D e lta-t (y) = = = = 2.3 3 1 2.3 0 6 2.2 6 0 2.1 8 1 0.9 3 2 0.8 3 9 0.7 2 6	, 1990 fis Stock Numbers 1859 3715 12048 28958 44463 70091 109457 427	M ean Number 6012 15501 40621 32808 45869 62246	A = A = S O N Te N atural M or F/Z 0.524 0.727 0.647 0.689 0.737 0.768	rm in al F = tality (m) = Tc = 2 	0.335 0.483 (IN P U T) 0.2 0.147 0.38 F 	F * C : :::::::::::::::::::::::::::::::::::
Tota Bay LENC (mm) ==== 151 141 131 121 116 111 106 101 96	2 0 3 T 1 4	f F u H - B A \$ = = = 160 150 140 130 120 115 110 105	INDUT) Catch (INPUT) Catch (numbers) 1071 972 6055 10938 10682 18885 30215 35160 63860	m a les A N A L YS (IN P U T) Delta-t (y) = = = = = 2.331 2.306 2.260 2.181 0.932 0.839 0.726 0.619 0.533	. 1990 fis Stock Numbers 1859 3715 12048 28958 44463 70091 109457 156277 234817	M ean Number 6.012 15501 4.0621 3.2808 45869 6.2246 7.9318 9.870	A = A = A = A = A = A = A = A =	rm in al F = ta lity (m) = T c = 2 	0.483 (IN P U T) 0.2 0.147 0.38 F 0.162 0.391 0.269 0.326 0.412 0.485 0.443 0.639	F * C : :::::::::::::::::::::::::::::::::::
Tota Bay LEN((mm) ==== 151 131 121 121 111 106 101 906 91	7 0 3 T 3 T 4 - 5 - - -	f F u H - B A S H - B A S S H - B A S S H - B A S S H - B A S S S S S S S S S S	Indy 35 fe ndy 35 fe SED COHORT (INPUT) Catch (numbers) ====== 1071 972 6055 10938 10682 18885 30215 35160 63860 191004	m a les A N A L Y S (IN P U T) Delta-t (y) = = = = = 2.3 0 6 2.2 6 0 2.1 8 1 0.9 3 2 0.8 3 9 0.7 2 6 0.6 1 9 0.5 3 3 0.4 8 6	. 1990 fis Stock Numbers 185 185 185 1859 3715 12048 28958 44463 70091 109457 156277 234817 448475	M e a n N u m b e r 	A = S O N T e N a tural M o r F /Z 0.524 0.727 0.647 0.689 0.737 0.761 0.751 0.813 0.894	rm in al F = ta lity (m) = T c = 2 0.309 0.638 0.416 0.473 0.659 0.632 0.590 0.786 1.386	0.483 (IN P U T) 0.2 0.147 0.38 F 0.162 0.391 0.269 0.326 0.412 0.485 0.443 0.639 1.239	F * C 15 7 2 3 6 5 2 9 4 6 3 4 7 8 7 7 7 6 1 4 6 6 7 1 5 5 8 6 4 0 8 3 4 2 3 6 7 3 8
Image: Tota Bay Leng Leng (mm) ==== 151 141 121 111 106 101 96 91 86	7 0 3 T 3 T 4 - - -	f F u H - B A S = = = 1 6 0 1 5 0 1 1 0 1 2 0 1 1 0 1 2 0 1 1 0 0 1 1 1 0 1 1 0 0 1 1 0 0 1 1 1 0 1 1 1 0 1 1 1 1 1 1 1 1 1 1	INDUT INDUT Catch (INPUT) Catch (NUMBERS) Catch (NUMBERS) Catch 1071 972 6055 10938 10682 18885 35160 63860 19104 226177	m a les A N A L Y S (IN P U T) Delta-t (y) = = = = = = 2.3 3 1 2.306 2.260 2.181 0.932 0.839 0.726 0.619 0.533 0.486 0.465	, 1990 fis Stock Numbers 	M ean N u m b er 6 0 1 2 1 5 5 0 1 4 0 6 2 1 3 2 8 0 8 4 5 8 6 9 6 2 2 4 6 7 9 3 1 8 9 9 8 7 0 1 5 4 1 0 6 2 5 6 4 7 3 2 5 6 4 7 3	A = A = A = A = A = A = A = A =	rm in a F = ta lity (m) = T c = 0.309 0.638 0.416 0.473 0.659 0.632 0.590 0.786 1.386 1.029 0.029	0.483 0.483 (IN P U T) 0.2 0.147 0.38 F 0.381 0.382 0.381 0.382 0.443 0.639 0.289 0.389 0.289 0.326 0.443 0.639 0.289 0.839 0.838 0.443 0.639 0.885 0.885 0.885 0.895 0.885 0.885 0.885 0.895 0.885 0.885 0.885 0.895 0.885 0.885 0.885 0.895 0.885 0.885 0.885 0.895 0.885 0.885 0.885 0.885 0.895 0.885 0.885 0.885 0.895 0.885 0.885 0.885 0.885 0.895 0.88	F * C : : : : : : : : : : : : : : : : : : :
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B a y L E N (L E N ((m m) L E N ((m m) L E N (L E N (f F u H - B A S H - B A S H - B A S H - B A S H - B A S	n d y 3 5 fe n d y 3 5 fe SED C O H O R T (IN P U T) Catch (numbers) = = = = = = = = = = = = = = = = = = =	m a le s A N A L Y S (<i>IN P U T</i>) D e Ita - t (y) E = E = E 2 .3 3 1 2 .3 0 6 2 .2 6 0 2 .1 8 1 0 .9 3 2 0 .8 3 9 0 .7 2 6 0 .6 1 9 0 .5 3 3 0 .4 8 6 0 .4 6 5 0 .4 5 7 E = E = E = E I E S , 1 9	, 1990 fis Stock Numbers 1859 3715 12048 28958 44463 70091 109457 156277 234817 448475 712354 989702 	M ean N um ber 6012 15501 40621 32808 45869 62246 79318 99870 154106 256473 375967 1.168.793 g season	A = A = A = A = A = A = A = A =	rm in al F = ta lity (m) = T c = 2 0.309 0.538 0.416 0.473 0.559 0.632 0.590 0.786 1.386 1.386 1.029 0.738	0.3 3 3 0.4 8 3 (IN P U T) 0.2 0.1 4 7 0.3 8 F 0.1 6 2 0.3 9 1 0.2 6 9 0.3 2 6 0.4 1 2 0.4 8 5 0.4 4 3 0.6 3 9 1.2 3 9 1.2 3 9 0.8 8 2 0.5 9 1 	F * C : :::::::::::::::::::::::::::::::::::
B a y B a y L E N (L E N ((m m) L E N (m m) L E N (m m) L E N (m m) m m)	Image: Constraint of the second sec	f F u H - B A S H - B A S S H - B H H H H H H H H H H	Indy 35 fe ndy 35 fe SED COHORT (INPUT) Catch (numbers) ====== 10711 972 6055 10938 10682 18885 30215 35160 63860 191004 226177 222080 ====== 817.102 ndy fem 2	m a le s (IN P UT) D e lta-t (IN P UT) D e lta-t (IN P UT) D e lta-t 2.331 2.306 2.306 2.260 2.181 0.932 0.619 0.533 0.486 0.4657 = = = = = = = = = Iles, 19 19	. 1990 fis Stock Numbers 185 3715 12048 28958 44463 7091 109457 156277 234817 448475 712354 98702 	h in g s e a s h in g s e a s <u>N u m b e r</u> 	A = A = A = A = A = A = A = A =	rm in al F = tality (m) = T c = 2 	0.483 (IN P U T) 0.2 0.147 0.38 0.162 0.391 0.269 0.326 0.443 0.639 1.239 0.882 0.551 (IN P U T)	F * C :
Tota Bay LENC LENC [mm] ==== 151 141 121 141 106 101 96 91 86 91 86 91 86 91 86 91 80 91 81 92 83 94 95 96 91 92 94 95 91 92 94 94 95 94 95 94 95 96 97 98 94 95 96 97 96 97 96 97	0 3 1 1 1 1 2 1 2 1 2 1 2 1 2 1 2 1 2 2 2 2 2 2 2 2 2 2 2 2 3 1	f F u H - B A S E = = = 1 6 0 1 5 0 1 4 0 1 3 0 1 2 0 1 4 0 1 3 0 1 2 0 1 4 0 1 3 0 1 2 0 1 1 0 1 1 0 5 9 0 9 5 9 0 8 5 5 = = = 4 6 F u H - B A S	I N d y 3 5 fe N d y 3 5 fe S E D C O H O R T (IN P U T) C atch (n u m b ers) 1071 972 6055 10938 10682 18885 30215 35160 63860 191004 226177 222080 191004 226177 222080 ===================================	m a le s A N A L Y S (IN P U T) D e Ita - t (Y) = = = = = 2.3 0 6 2.2 6 0 2.1 8 1 0.9 3 2 0.6 3 9 0.7 2 6 0.6 1 9 0.4 8 6 0.4 8 5 0.4 5 7 = = = = = = Ie s , 1 9 A N A L Y S	. 1990 fis Stock Numbers 1859 3715 12048 28958 44463 70091 109457 156277 234817 448475 712354 989702 	M e a n N u m b e r 6012 15501 40621 32808 45869 62246 79318 962246 79378 0154106 256473 375967 1.168.793 g season	A = A = A = A = A = A = A = A =	rm in a 1 F = ta lity (m) = T c = 	0.483 (IN P U T) 0.2 0.147 0.38 F 0.162 0.391 0.269 0.326 0.412 0.485 0.443 0.639 1.239 0.882 0.551 (IN P U T) 0.2	F * C :
B a y L E N (L E N (m) = = = = 1 511 1 41 1 11 1 121 1 11 1 121 1 11 1 10 6 1 01 9 6 8 1 = = = = T o ta B a y L E N (1 5 1 5 	Image: Constraint of the second sec	f F u H - B A S = = = 1 6 0 1 5 0 1 4 0 1 2 0 1 4 0 1 2 0 1 4 0 1 2 0 1 4 0 1 2 0 1 1 0 5 1 1 0 0 9 5 5 9 0 8 5 5 = = 5 6 F u H - B A S 1 H U 1 U U U U U U U U	IN D Y 35 FE N D Y 35 FE SED C O H O R T (IN P U T) C atch (n u m b ers) ====== 1071 972 6055 10938 10682 18885 30215 35160 63860 191004 226177 222080 ====== 817,102 N D FE M 2 SED C O H O R T	m a le s A N A L Y S (IN P U T) Delta-t (y) = = = = = 2.3 0 6 2.2 6 0 2.1 8 1 0.9 3 2 0.8 3 9 0.7 2 6 0.6 1 9 0.5 3 3 0.4 8 6 0.4 6 5 0.4 5 7	. 1990 fis Stock Numbers 185 185 185 185 12048 28958 44463 70091 109457 156277 234817 448475 712354 989702 	M e a n N u m b e r 6 0 1 2 1 5 5 0 1 4 0 6 2 1 3 2 8 0 8 4 5 8 6 9 6 2 2 4 6 7 9 3 1 8 9 9 8 7 0 1 5 4 1 0 6 2 5 6 4 7 3 3 7 5 9 6 7 1 . 1 6 8 . 7 9 3 g season	A = A = A = A = A = A = A = A =	rm in al F = ta lity (m) = T c = C C C C C C C C C C C C C C C C C C C	0.483 (IN P U T) 0.2 0.147 0.38 F 0.162 0.391 0.269 0.326 0.412 0.485 0.443 0.639 1.239 0.882 0.551 (IN P U T) 0.2 0.147 0.38 0.38 0.551 (IN P U T) 0.2 0.38 0.551 0.38 0.551 0.38 0.551 0.38 0.551 0.38 0.551 0.38 0.38 0.551 0.38 0.38 0.551 0.38 0.38 0.38 0.551 0.38 0.38 0.551 0.38 0.38 0.38 0.551 0.38 0.38 0.38 0.38 0.551 0.38 0.38 0.38 0.38 0.551 0.38 0.38 0.38 0.551 0.38 0.38 0.38 0.38 0.551 0.38 0.38 0.38 0.38 0.38 0.38 0.551 0.38 0.38 0.38 0.38 0.38 0.38 0.38 0.551 0.38 0.38 0.38 0.38 0.38 0.38 0.551 0.38 0.3	F * C : : : : : : : : : : : : : : : : : : :
B a y B a y L E N ((m m) = = = = 1511 1411 1211 1116 1011 966 911 866 811 = = = = T o ta B a y L E N (011) 867 807 807 807 807 807 807 807 80	· • · ·	f F u H - B A S = = = 1 6 0 1 5 0 1 4 0 1 5 0 1 2 0 1 1 0 1 2 0 1 1 0 1 2 0 1 1 0 1 2 0 1 1 0 1 2 0 1 3 0 1 2 0 1 1 0 1 9 5 9 0 8 5 = = = f F u H - B A S	I N d y 3 5 fe SED C O H O R T (IN P U T) C atch (n u m b ers) = = = = = = = 1071 972 6055 10938 10682 1885 30215 35160 63860 19104 226177 222080 = = = = = = 817,102 N d y fe m a SED C O H O R T (IN P U T)	Image: A mage and the second state of the second state	. 1990 fis Stock Numbers 185 3715 12048 28958 44463 70091 109457 156277 234817 448475 712354 989702 	h in g s e a s h in g s e a s M e a n N u m b e r 	A = A = A = A = A = A = A = A =	rm in a F = ta lity (m) = T c = 0.309 0.638 0.416 0.473 0.659 0.632 0.590 0.786 1.386 1.029 0.738 1.029 0.738 ta lity (m) = T c =	0.3 3 3 0.4 8 3 (IN P U T) 0.2 0.1 4 7 0.3 8 	F * C F * C 15 7 2 3 6 5 2 9 4 6 3 4 7 8 7 7 7 6 1 4 6 6 7 3 8 1 9 9 4 6 0 1 3 1 1 8 1 1 ::::::::::::::::::::::::::::::::::::
Tota Bay Leng (mm) ==== 151 141 111 116 101 96 91 100 86 81 ==== Tota Bay Leng Leng	· · · ·	f F u H - B A S = = = 1 6 0 1 5 0 1 4 0 1 5 0 1 2 0 1 2 0 1 1 0 1 2 0 1 1 0 1 2 0 1 1 0 1 0 0 9 5 9 0 8 5 = = f F u H - B A S	Indy 35 fe SED COHORT (INPUT) Catch (numbers) Catch (numbers) Catch (numbers) Catch 1071 972 6055 10938 10682 18885 35160 63860 19104 226177 222080 EED COHORT 817,102 Indy fem 2 SED COHORT (INPUT) Catch	Image: A mage and the second state of the second state	. 1990 fis Stock Numbers 185 3715 12048 28958 44463 70091 109457 156277 234817 448475 712354 989702 91 fis h in 185 Stock	h in g s e a s h in g s e a s M e a n N u m b e r 	A = A = A = A = A = A = A = A =	rm in a F = ta lity (m) = T c = 2 0.309 0.638 0.416 0.473 0.659 0.632 0.590 0.786 1.386 1.029 0.738 - 	0.3 3 3 0.4 8 3 (IN P U T) 0.2 0.1 4 7 0.3 8 	F * C : : : : : : : : : : : : : : : : : : :
B a y L E N ((m m) = = = = 151 141 116 101 106 101 906 901 866 81 = = = = T o ta B a y L E N (0 101 0 101 106 101 106 101 106 101 106 101 106 101 106 101 106 101 106 101 106 101 106 101 106 101 106 101 106 106	/ 0 3 T 1 - - -	f F u H -B A H -B A I 0 1 1 5 0 1 10 1 20 1 1 1 0 0 9 5 9 9 0 8 S = =	IN DY 35 FE SED COHORT (IN PUT) Catch (numbers) Catch (numbers) 1071 972 6055 1073 1072 6055 1073 1074 2260 1938 10682 18885 35160 63860 19104 226177 222080 EED COHORT 017 222080 EED COHORT (IN PUT) Catch (numbers) EED COTO	Image: A mage and the second state of the second state	. 1990 fis Stock Numbers 185 185 185 185 185 12048 2858 44463 70091 109457 156277 234817 44875 712354 989702 91 fishin 315 315 315 315 315 315 315 315	h in g s e a s h in g s e a s M e a n N u m b e r 	A = A = A = A = A = A = A = A =	rm in a F = ta lity (m) = T c = 2 0.309 0.538 0.416 0.473 0.559 0.632 0.590 0.786 1.386 1.029 0.738 rm in a F = ta lity (m) = T c = 2	0.3 3 3 0.4 8 3 (IN P U T) 0.2 0.1 4 7 0.3 8 	F*C
Tota Bay LEN((mm) ==== 151 141 116 101 106 101 86 81 ==== Tota Bay LEN(LEN(101 106 106	/ 0 3 T 1 - - -	f F u H - B A S H - B A S 1 00 1 50 1 40 1 50 1 40 1 50 1 40 1 50 1 100 1 20 1 100 1 20 1 100 1 20 1 30 1 5 1 100 9 5 9 90 0 6 5 5 9 1 - B A S 1 - B A S 1 - 1 40 1 - 1 30 1 - 1 - 1 30 1 - 1	IN D Y 35 FE SED COHORT (IN PUT) Catch (numbers) 1071 972 6055 10938 10682 18885 35160 63860 191004 226177 222080 E====== 817.102 N d y fem 2 SED COHORT (IN PUT) Catch (numbers) E======311	m a le s A N A L Y S (IN P U T) D e lta-t (y) = = = = = 2 .3 0 6 2 .2 3 0 6 2 .2 6 0 2 .1 8 1 0 .9 3 2 0 .8 3 9 0 .7 2 6 0 .6 1 9 0 .4 8 6 0 .4 6 5 0 .4 5 7 = = = = = = Ile s , 1 9 (IN P UT) D e lta-t (Y) = = = = = 2 .3 3 1	. 1990 fis Stock Numbers 18 18 18 18 18 18 18 18 12048 28958 44463 70091 109457 156277 234817 448475 712354 989702 	h in g s e a s h in g s e a s M e an N u m b e r 	A = A = A = A = A = A = A = A =	rm in a F = ta ity (m) = T c = 2 0.309 0.538 0.416 0.473 0.559 0.632 0.690 0.738 1.386 1.029 0.738 1.386 1.029 0.738 	0.3 3 3 0.4 8 3 (IN P U T) 0.2 0.1 4 7 0.3 8 	F*C
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Tota Bay Leng (mm) ==== 151 141 131 121 141 106 101 96 91 86 81 === Tota Bay LENC Leng (mm) ==== 151 141 116 101 106 106	/ 0 - -	f F u H - B A S H - B A S B A S H - B A S B B A S B A S B A S B B B B B B B B B B	Indy 35 fe ndy 35 fe SED COHORT (INPUT) Catch (numbers) 1071 972 6055 10938 10682 18885 30215 35160 63860 19104 226177 222080 19104 226177 222080 19104 226177 222080 19104 226177 22284 5029 1495 311 2284 5029 1495	Image: A mage and the second state of the second state	. 1990 fis Stock Numbers 185 3715 12048 28958 44463 70091 109457 156277 234817 448475 712354 98702 	M e a n N u m b e r 6.012 15501 4.0621 3.2808 45869 6.2246 79318 99870 154106 256473 3.75967 1.168.793 g season M e a n N u m b e r 3.615 1.3596 3.6827	A = A = A = A = A = A = A = A =	rm in al F = tality (m) = T c = 0.309 0.638 0.416 0.473 0.659 0.632 0.590 0.786 1.386 1.386 1.029 0.738 rm in al F = tality (m) = T c = 0.779 0.517 0.59	0.483 (IN P U T) 0.2 0.147 0.38 	F*C ::::::::::::::::::::::::::::::::::::
B a y L E N (L E N (m) E = = = 1 511 1 41 1 11 1 121 1 16 1 11 1 16 1 11 1 16 1 11 1 16 1 11 1 41 1 21 1 11 1 11 1 51 1 41 1 121 1 11 1	· • · ·	f F u H - B A S E = = 1 1 6 0 1 5 0 1 4 0 1 3 0 1 2 0 1 1 0 1 2 0 1 4 0 1 3 0 1 2 0 1 1 0 1 3 0 1 2 0 1 4 0 1 3 0 1 4 0 1 5 0 1 4 0 1 3 0 1 4 0 1 5 0 1 4 0 1 5 0 1 4 0 1 5 0 1 1 0 5 1 0 0 5 9 0 8 5 5 E E E E E E E E E E E E E E E E E E E E E E E E E E E E E E E E E E E	Indy 35 fe ndy 35 fe SED COHORT (INPUT) Catch (numbers) 1071 972 6055 10938 10682 18885 30215 35160 63860 191004 226177 222080 ===================================	m a le s (IN P U T) D e Ita -t (UN P U T) 0 (0 3 2) (UN P U T) 0 (0 3 2) (UN P U T) 0 (0 4 6 5) (UN P U T) 0 (0 4 5) (UN P U T) 0 (0 1 4 5) (UN P U T) 0 (0 1 4 5) (UN P U T) 0 (0 1 4 5) (UN P U T) 0 (0 1 4 5) (UN P U T) 0 (0 1 4 5) (UN P U T) 0 (0 1 4 5) (UN P U T) 0 (0 1 4 5) (UN P U T) 0 (0 1 4 5) (UN P U T) 0 (0 1 4 5) (UN P U T) 0 (0 1 4 5) (UN P U T) 0 (0 1 4 5) (UN P U T) 0 (0 1 4 5) (UN P U T) 0 (0 1 4 5) (UN P U T) 0 (0 1 4 5) (UN P U T) 0 (0 1 4 5) (UN P U T) 0 (0 1 4 5) (UN P U T) 0 (0 1 4 5) (UN P U T) 0 (0 1 4 5) (UN P U T) 0 (0 1 4 5) (UN P U T) <	. 1990 fis Stock Numbers 1859 3715 12048 28958 44463 70091 109457 156277 234817 448475 712354 989702 	M e a n N u m b e r 6 0 1 2 1 5 5 0 1 4 0 6 2 1 3 2 8 0 8 4 5 8 6 9 6 2 2 4 6 7 9 3 1 8 9 9 8 7 0 1 5 4 1 0 6 2 5 6 4 7 3 3 7 5 9 6 7 1 , 1 6 8 .7 9 3 g s e a s o n M e a n N u m b e r 3 6 1 5 1 3 5 9 6 3 6 8 2 7 3 1 2 5 8	A = A = A = A = A = A = A = A =	rm in al F = ta lity (m) = T c = C = C = C = C = C = C = C = C	0.483 (IN P U T) 0.2 0.147 0.38 F 0.162 0.391 0.269 0.326 0.412 0.391 0.269 0.326 0.443 0.639 1.239 0.882 0.551 (IN P U T) 0.2 0.147 0.38 0.551 0.632 0.370 0.352	F*C ::::::::::::::::::::::::::::::::::::
B a y L E N (L E N (m) E = = = 1 511 1 411 1 111 1 106 1 011 9 6 9 1 1 511 1 6 1 011 9 6 8 1 1 511 1 411 1 106 1 011 1 201 1 511 1 411 1 106 1 111 1 116 1 116 	· • · ·	f F u = = = = = 1 6 0 1 5 0 1 4 0 1 2 0 1 1 5 0 1 4 0 1 2 0 1 1 5 0 1 4 0 1 2 0 1 1 0 5 1 1 0 5 1 1 0 6 5 5 7 7 6 7 7 7 7 8 7 1 1 0 1 1 1 1 1 1 1 1 1 1	IN D Y 35 fe SED COHORT (IN PUT) Catch (numbers) Catch (numbers) 1071 972 6055 10938 10682 18885 30215 35160 63860 19904 226177 222080 EBED COHORT 817,102 N d y fem 2 SED COHORT (IN PUT) Catch (N W D T) Catch 11495 2284 5029 11495 10999 17823 000000000000000000000000000000000000	m a le s (IN P U T) D e lta -t (U) U = = 2.3 0 6 2.2 6 0 2.3 0 6 2.2 6 0 2.1 8 1 0.9 3 2 0.6 3 9 0.7 2 6 0.6 1 9 0.5 3 3 0.4 8 6 0.4 6 5 0.4 6 5 0.4 5 7 = = Ile s, 1 9 (IN P U T) D e lta -t 0.3 3 0 0.4 8 0 0.4 8 0 0.4 8 0 0.4 8 0 0.4 8 0 0.4 8 0 0.4 8 0 0.4 8 0 0.4 8 0 0.4 8 0 0.7 2 0 0.7 2 0 0.7 2 0 0.7 2 0 0.7 2 0 0.7 2 0 0.7 2 0 0.8 3 0 0.8 3 0 0.8 3 0	. 1 9 9 0 fis Stock Numbers 185 3715 12048 28958 44463 70091 109457 156277 234817 448475 712354 989702 	M ean N u m b er 6 0 1 2 1 5 5 0 1 4 0 6 2 1 3 2 8 0 8 4 5 8 6 9 6 2 2 4 6 7 9 3 1 8 9 9 8 7 0 1 5 4 1 0 6 2 5 6 4 7 3 3 7 5 9 6 7 1 . 1 6 8 . 7 9 3 g season M ean N u m b er 3 6 1 5 1 3 5 9 6 3 6 8 2 7 3 1 2 5 8 4 4 1 1 3 	A = A = A = A = A = A = A = A =	rm in al F = ta lity (m) = T c = C = 0.309 0.638 0.416 0.473 0.659 0.632 0.590 0.786 1.386 1.029 0.738 	0.483 (IN P U T) 0.2 0.147 0.38 	F*C
B a y B a y L E N ((m m) ==== 1511 141 1211 106 101 96 911 86 81 ==== T o ta B a y L E N ((m m) ==== 151 141 121 106 101 121 116 101 106 101 106 101 106 101	0 3 1 - -	<pre>f F u = = = 1 6 0 1 5 0 1 4 0 1 3 0 1 2 0 1 1 5 1 1 0 1 0 5 1 0 0 9 5 9 0 8 5 = = = f F u H - B A S = = = 1 6 0 1 5 0 1 5 0 1 4 0 1 3 0 1 2 0 1 1 5 1 1 0 1 2 0 1 1 5 1 1 0 </pre>	INDUT INDUT SEDCOHORT (INPUT) Catch (numbers) Catch (numbers) 1071 972 6055 10938 10682 18885 30215 35160 63860 19104 226177 222080 EEDCOHORT 817,102 INDUT Catch (numbers) EEDCOHORT (INPUT) Catch (numbers) 2284 5029 11495 10999 17823 2720 41555 4155 4155 4155 4155 4155 4	Image: A n A L Y S (IN P U T) Delta-t (y) = = = = = = 2.306 2.260 2.306 2.260 2.360 2.260 0.330 0.486 0.465 0.465 0.457 = = = = = (IN P U T) Delta-t (y) = = = = = 2.331 (y) = = = = = 2.306 2.260 2.181 (y) = = = = = 2.336 2.260 2.181 0.932 0.839 0.726	. 1 9 9 0 fis . 1 9 9 0 fis . 1 8 50 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	h in g s e a s h in g s e a s M e a n N u m b e r 	A = A = A = A = A = A = A = A =	rm in a F = ta lity (m) = T c = 0.309 0.638 0.416 0.473 0.658 0.473 0.6590 0.786 1.386 1.386 1.029 0.786 1.386 1.029 0.7786 ta lity (m) = T c = 2 0.779 0.517 0.459 0.499 0.651 0.608	0.632 0.322 0.147 0.269 0.326 0.326 0.326 0.326 0.412 0.326 0.412 0.326 0.412 0.443 0.639 1.239 0.882 0.591 	F*C 157 2365 2946 3478 7776 15586 40834 236738 199460 131181 ::::::::::::::::::::::::::::::::::::
B a y B a y E E N ((m m) = = = = 151 141 111 106 101 96 91 101 96 91 E a y E	0 3 1 -	f F u = = = = 1 0 1 5 1 1 0 1 2 1 1 0 1 2 1 1 0 1 5 1 1 0 9 5 9 0 8 5 = 1 1 0 1 5 1 1 0 1 5 1 1 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	IN D Y 3 5 FE N D Y 3 5 FE SED C O H O R T (IN P U T) C atch (n u m b ers) 1071 972 6055 10938 10682 1885 30215 35160 63860 191004 226177 222080 191004 226177 222080 191004 226177 222080 191004 226177 222080 10938 5ED C O H O R T (IN P U T) C atch (n u m b ers) 311 2284 5029 11495 10999 17823 27220 415522 69724	Image: A n A L Y S (IN P U T) Delta-t (y) = = = = = 2.306 2.260 2.306 2.260 2.181 0.932 0.639 0.726 0.619 0.533 0.486 0.4657 = = = = 2.301 (IN P U T) Delta-t (y) = = = = 2.331 2.306 2.260 2.336 2.336 2.331 0.6339 0.726	. 1 9 9 0 fis Stock Numbers 	h in g s e a s h in g s e a s M e a n N u m b e r 	A = A = A = A = A = A = A = A =	rm in a F = ta lity (m) = T c = 0.309 0.638 0.416 0.473 0.659 0.632 0.590 0.786 1.386 1.029 0.738 1.029 0.738 rm in a F = ta lity (m) = T c = 0.779 0.517 0.459 0.459 0.4551 0.688 0.838	0.632 0.462 0.269 0.326 0.326 0.326 0.326 0.326 0.412 0.269 0.326 0.412 0.269 0.326 0.443 0.639 1.239 0.882 0.591 0.882 0.551 (<i>IN P U T</i>) 0.20 0.551 (<i>IN P U T</i>) 0.20 0.370 0.312 0.352 0.352 0.352 0.404 0.5691	F*C
B a y L E N ((m m) = = = = 151 141 111 106 101 96 91 86 81 = = = = T o ta B a y L E N (L E N (101 121 131 116 101 121 131 121 131 116 101 101 106 101 101 106 107 106 107 106 107 107 106 107 107 107 107 107 107 107 107	• • • •	f F u = = = 1 0 1 5 1 1 0 1 2 1 1 0 1 2 1 1 0 1 2 1 1 0 9 5 9 0 8 5 = = = 1 f F u u H - B A S - - - 1 1 1 1 0 1 3 0 1 2 0 1 3 0 1 1 0 1 3 0 1 1 1 0 1 1 0 1 1 0 1 0 1 0 1 1 0 1 0 1 0 0 1 0 0 0 0 0 0 0 <td>IN D Y 35 FE (IN P U T) C atch (IN P U T) C atch (n u m b ers) 1071 972 6055 10938 10682 18885 35160 63860 19104 226177 222080 5407 222080 5417,102 N d y fe m 2 (IN P U T) C atch (n u m b ers) 551 351 60 63860 19104 226177 222080 5177 222080 5177 222080 5177 222080 5177 222080 5177 222080 5177 222080 5177 517</td> <td>Image: A n A L Y S (IN P U T) Delta-t (y) = = = = 3 3 1 2 .3 0 6 2 .2 6 0 2 .3 0 6 2 .3 0 6 2 .3 0 6 2 .3 0 6 2 .3 0 6 2 .4 8 1 0 .9 3 2 0 .6 1 9 0 .4 6 5 0 .4 6 5 0 .4 6 5 0 .4 6 5 0 .4 6 5 0 .4 5 7</td> <td>. 1990 fis . 1990 fis . 18 . 28 . 18 . 19 . 3715 . 12048 . 28958 . 44463 . 70091 . 109457 . 156277 . 234817 . 448475 . 712354 . 989702 </td> <td>h in g s e a s h in g s e a s M e a n N u m b e r </td> <td>A = A = A = A = A = A = A = A =</td> <td>rm in a F = ta lity (m) = T c = 0.309 0.5309 0.632 0.6416 0.473 0.659 0.632 0.590 0.786 1.386 1.029 0.738 1.029 0.738 T c = rm in a F = ta lity (m) = T c = 0.779 0.517 0.459 0.551 0.607 0.688 0.838 1.127</td> <td>0.6 3 2 0.4 8 3 (IN P U T) 0.2 0.1 4 7 0.3 8 </td> <td>F*C </td>	IN D Y 35 FE (IN P U T) C atch (IN P U T) C atch (n u m b ers) 1071 972 6055 10938 10682 18885 35160 63860 19104 226177 222080 5407 222080 5417,102 N d y fe m 2 (IN P U T) C atch (n u m b ers) 551 351 60 63860 19104 226177 222080 5177 222080 5177 222080 5177 222080 5177 222080 5177 222080 5177 222080 5177 517	Image: A n A L Y S (IN P U T) Delta-t (y) = = = = 3 3 1 2 .3 0 6 2 .2 6 0 2 .3 0 6 2 .3 0 6 2 .3 0 6 2 .3 0 6 2 .3 0 6 2 .4 8 1 0 .9 3 2 0 .6 1 9 0 .4 6 5 0 .4 6 5 0 .4 6 5 0 .4 6 5 0 .4 6 5 0 .4 5 7	. 1990 fis . 1990 fis . 18 . 28 . 18 . 19 . 3715 . 12048 . 28958 . 44463 . 70091 . 109457 . 156277 . 234817 . 448475 . 712354 . 989702 	h in g s e a s h in g s e a s M e a n N u m b e r 	A = A = A = A = A = A = A = A =	rm in a F = ta lity (m) = T c = 0.309 0.5309 0.632 0.6416 0.473 0.659 0.632 0.590 0.786 1.386 1.029 0.738 1.029 0.738 T c = rm in a F = ta lity (m) = T c = 0.779 0.517 0.459 0.551 0.607 0.688 0.838 1.127	0.6 3 2 0.4 8 3 (IN P U T) 0.2 0.1 4 7 0.3 8 	F*C
B a y L E N ((m m) = = = = 151 141 116 101 96 91 86 B a y L E N (101 96 91 86 81 = = = 151 141 106 101 96 91 141 116 101 116 101 116 101 106 106	0 3 T - -	<pre>f F u H -B A S = = = 160 150 140 130 120 10 5 110 105 110 105 110 105 = = = H -B A S = = = 160 150 140 150 120 115 110 105 140 130 120 115 110 105 140 130 120 115 110 105 140 130 120 115 110 105 140 130 120 115 110 105 140 130 120 115 110 105 140 130 120 115 110 105 100 120 115 110 105 100 120 115 110 105 100 120 115 110 105 100 120 115 110 105 100 120 115 110 105 100 120 115 110 105 100 120 115 110 105 100 120 115 110 105 100 120 115 110 105 100 120 115 110 105 100 120 115 110 105 100 120 115 110 105 100 120 115 110 105 100 120 115 110 105 100 120 115 110 105 100 120 115 110 105 100 120 115 110 105 100 120 115 110 105 100 120 115 100 120 115 110 105 100 120 115 110 105 100 120 115 110 105 100 120 115 110 105 100 120 115 110 105 100 120 115 100 100</pre>	In d y 3 5 fe n d y 3 5 fe SED C O H O R T (IN P U T) C atch (num bers) = = = = = = = 1071 972 6055 10938 10682 18885 30215 35160 63860 191004 226177 222080 = = = = = = 817.102 In d y fe m 2 SED C O H O R T (IN P U T) C atch (num bers) = = = = = = 817.102 In d y fe m 2 311 2284 5029 11495 10999 17823 27220 41552 69724 145532 195405 194471	Image: A n A L Y S (IN P U T) Delta-t (Y) = = = = 2.331 2.306 2.260 2.181 0.932 0.619 0.533 0.465 0.465 0.465 0.465 0.465 0.1457 = = = = = = = (IN P U T) Delta-t (Y) = = = = = 2.331 2.306 2.260 2.331 2.306 2.260 2.331 2.306 2.260 2.331 2.306 2.260 2.331 2.306 2.331 2.306 2.331 2.306 2.331 2.331 2.331 2.331 2.331 2.331 2.331 2.480 0.533 </td <td>. 1990 fis Stock Numbers 3715 12048 28958 44463 7091 109457 156277 234817 448475 712354 98702 91 fis hin 15 Stock Numbers 539 3354 10382 27291 42885 67192 10311 155943 2404954 637275</td> <td>M ean N u m b er 6 0 1 2 1 5 5 0 1 4 0 6 2 1 3 2 8 0 8 4 5 8 6 9 6 2 2 4 6 7 9 3 1 8 9 9 8 7 0 1 5 4 1 0 6 2 5 6 4 7 3 3 7 5 9 6 7 1 , 1 6 8 , 7 9 3 G S e a S O N M ean N u m b er 3 6 1 5 1 3 5 9 6 3 6 8 2 7 3 1 2 5 8 4 4 1 1 3 5 9 1 7 9 7 6 7 3 7 1 0 0 8 9 2 1 4 8 4 5 3 2 3 1 4 0 1 3 3 5 6 0 1 3 6 1 5 1 3 5 9 6 3 6 2 7 3 1 2 5 8 4 4 1 1 3 5 9 1 7 9 7 6 7 3 7 1 0 0 8 9 2 1 4 8 4 5 3 2 3 1 4 0 1 3 3 5 6 0 1 3 6 5 1 3 5 6 0 1 3 6 1 5 1 3 5 9 6 3 6 1 5 1 3 5 9 6 3 6 2 7 3 1 2 5 8 4 4 1 1 3 5 9 1 7 9 7 6 7 3 7 1 0 0 8 9 2 1 4 8 4 5 3 2 3 1 4 0 1 3 3 5 6 0 1 3 6 5 1 3 5 6 0 1 1 5 1 3 5 9 6 3 6 1 5 1 3 5 9 6 3 6 2 7 1 0 0 8 9 2 1 4 8 4 5 3 2 3 1 4 0 1 3 3 5 6 0 1 3 6 1 5 1 3 5 9 6 3 6 1 5 1 3 5 9 6 3 6 1 5 1 3 5 9 6 3 6 2 7 1 0 0 8 9 2 1 4 8 4 5 3 2 3 1 4 0 1 3 3 5 6 0 1 1 5 1 5 1 5 1 5 1 5 1 5 1 5 1</td> <td>A = A = A = A = A = A = A = A =</td> <td>rm in a 1 F = ta lity (m)= T c = </td> <td>0.635 0.483 (IN P U T) 0.2 0.147 0.38 0.162 0.391 0.269 0.326 0.443 0.639 1.239 0.822 0.551 0.802 0.551 0.326 0.443 0.639 1.239 0.822 0.551 0.370 0.370 0.352 0.404 0.460 0.541 0.980 0.844 0.691 0.980 0.844 0.551</td> <td>F*C </td>	. 1990 fis Stock Numbers 3715 12048 28958 44463 7091 109457 156277 234817 448475 712354 98702 91 fis hin 15 Stock Numbers 539 3354 10382 27291 42885 67192 10311 155943 2404954 637275	M ean N u m b er 6 0 1 2 1 5 5 0 1 4 0 6 2 1 3 2 8 0 8 4 5 8 6 9 6 2 2 4 6 7 9 3 1 8 9 9 8 7 0 1 5 4 1 0 6 2 5 6 4 7 3 3 7 5 9 6 7 1 , 1 6 8 , 7 9 3 G S e a S O N M ean N u m b er 3 6 1 5 1 3 5 9 6 3 6 8 2 7 3 1 2 5 8 4 4 1 1 3 5 9 1 7 9 7 6 7 3 7 1 0 0 8 9 2 1 4 8 4 5 3 2 3 1 4 0 1 3 3 5 6 0 1 3 6 1 5 1 3 5 9 6 3 6 2 7 3 1 2 5 8 4 4 1 1 3 5 9 1 7 9 7 6 7 3 7 1 0 0 8 9 2 1 4 8 4 5 3 2 3 1 4 0 1 3 3 5 6 0 1 3 6 5 1 3 5 6 0 1 3 6 1 5 1 3 5 9 6 3 6 1 5 1 3 5 9 6 3 6 2 7 3 1 2 5 8 4 4 1 1 3 5 9 1 7 9 7 6 7 3 7 1 0 0 8 9 2 1 4 8 4 5 3 2 3 1 4 0 1 3 3 5 6 0 1 3 6 5 1 3 5 6 0 1 1 5 1 3 5 9 6 3 6 1 5 1 3 5 9 6 3 6 2 7 1 0 0 8 9 2 1 4 8 4 5 3 2 3 1 4 0 1 3 3 5 6 0 1 3 6 1 5 1 3 5 9 6 3 6 1 5 1 3 5 9 6 3 6 1 5 1 3 5 9 6 3 6 2 7 1 0 0 8 9 2 1 4 8 4 5 3 2 3 1 4 0 1 3 3 5 6 0 1 1 5 1 5 1 5 1 5 1 5 1 5 1 5 1	A = A = A = A = A = A = A = A =	rm in a 1 F = ta lity (m)= T c = 	0.635 0.483 (IN P U T) 0.2 0.147 0.38 0.162 0.391 0.269 0.326 0.443 0.639 1.239 0.822 0.551 0.802 0.551 0.326 0.443 0.639 1.239 0.822 0.551 0.370 0.370 0.352 0.404 0.460 0.541 0.980 0.844 0.691 0.980 0.844 0.551	F*C
Tota Bay LEN((mm) = = = = 151 141 116 101 96 91 86 81 = = = Tota Bay LEN(Leng (mm) = = = 151 141 106 101 96 91 86 91 86 81 121 141 116 101 106 106	0 3 T - -	f F u H -B A H -B A 1 0 1 5 1 1 0 1 2 1 1 0 1 2 0 1 1 0 0 5 9 0 8 5 = = = -	In d y 3 5 fe n d y 3 5 fe SED C O H O R T (IN P U T) C atch (n u m b ers) = = = = = = 10711 972 6055 10938 10682 18885 30215 35160 63860 191004 226177 222080 = = = = = = 817.102 n d y fe m 2 SED C O H O R T (IN P U T) C atch (n u m b ers) = = = = = = 817.102 n d y fe m 2 311 2284 5029 11495 10999 17823 27220 41552 69724 145522 195405 194471 = = = = = =	Im a les (IN P UT) Delta-t Delta-t (y) = = = = = 2.331 2.306 2.260 2.181 0.932 0.932 0.619 0.4839 0.726 0.457 = = = = = Ies, 19 0.457 = = = = = = = = (IN P UT) Delta-t (y) = = = = = = = = = = = (IN P U T) Delta-t (y) = = = = = = 2.331 2.306 2.260 0.832 0.312 0.832 0.832 0.833 0.486 0.4619 0.533 0.486 0.4657 = = = =	. 1 9 9 0 fis Stock Numbers 18 3715 12048 28958 44463 7091 109457 156277 234817 448475 712354 98702 91 fishin 15 Stock Numbers 539 3354 10382 27291 42885 67192 103111 155943 2407499 407854 96792 10575 1	M ean N u m ber 6.012 15501 40621 32808 45869 62246 79318 99670 154106 256473 375967 1.168,793 g season M ean N u m ber 3615 13596 3615 13596 3615 13596 3627 31258 44113 59179 76737 100892 148453 231401 335602 	A = A = A = A = A = A = A = A =	rm in al F = ta lity (m) = T c = 	0.635 0.483 (IN P U T) 0.2 0.147 0.38 	F*C ::::::::::::::::::::::::::::::::::::

Вау	0	<u>f F u</u>	ndy fem a	les, 19	92 fishin	g season					
	Ļ						Te		(INPUT)		
LENG		н-ваз	SED COHORI	ANALYS	15		Natural Mor	<u>rm in al F =</u> tality (m)=	0.2		
								Tc=	0.38		
Lena	l th		(INPUT) Catch	(INPUT) Delta-t	Stock	Mean					
(mm)	ľ.		(numbers)	(y)	Numbers	Num ber	F/Z	Z	F		F*C
= = = =	=	= = =	618	= = = = = = = = = = = = = = = = = = = =	1072						
151	-	170	61	4.675	2 2 1 1	7 3 3 2	0.053	0.155	0.008		0
141	-	150	1452	2.306	4755	7 4 2 7	0.571	0.342	0.195		284
121	-	140	14980	2.260	11017	<u>16287</u> 41531	0.618	0.385	0.238		<u>919</u> 5403
116	-	120	14674	0.932	52274	37400	0.727	0.539	0.392		5758
111	-	115	21435	0.839	81599	53677	0.731	0.546	0.399		8560
100	-	105	37211	0.726	173030	88462	0.746	0.568	0.432		15652
96	-	100	68317	0.533	257529	110085	0.808	0.768	0.621		42396
91	-	95	155351	0.486	436235	158875	0.869	1.125	0.978	+	151906
81	-	85	206986	0.465	947488	361492	0.855	0.720	0.864		1 1 8 5 1 7
	=									:	
Total	-		770,297			1,202,292	Wtd.Ave.F =		0.711		547986
Bay	<u> </u>	f E	ndy fom a	106 19	0.2 fichin	a	A -		0.303		
Бау	ľ	<u> </u>	nuy rem a	1165, 13	33 113 11 11	y season					
LENG	ТН	 Н-ВА \$	SED COHORT		IS		Те	rminalF =	0.2		
	Ľ						Natural Mor	tality (m)=	0.147		
	-							Тс =	0.38	┩─┼─	
Leng	t h		<u>(INFUI)</u> Catch	<u>Delta-t</u>	<u>S</u> tock	Mean					
(m m)			(numbers)	(y)	Num bers	Number	F /Z	Z	F	Γ	F * C
151	-	160	1 2 8 7	2 3 3 1						++:	
141	-	1 5 0	948	2.306	4 2 1 3	7017	0.479	0.282	0.135		128
131	-	140	7411	2.260	1 4 2 8 1	18077	0.736	0.557	0.410		3038
121	-	130	10813	2.181	31893	46251	0.614	0.381	0.234		2528
111		115	1 1 9 3 8	0.839	70772	49886	0.619	0.386	0.239		2857
106	-	110	22236	0.726	101905	60520	0.714	0.514	0.367		8170
101	-	105	26055	0.619	138579	72247	0.710	0.508	0.361		9396
91	-	95	1 1 7 4 4 3	0.486	3 3 9 8 9 2	124848	0.865	1.088	0.941		1 1 0 4 7 7
86	-	90	189578	0.465	558521	197630	0.867	1.106	0.959		181853
7070	-	85	228153	0.457	831404	304285	0.836	0.897	0.750	<u> </u>	171069
Total	Ē.		682,649			1,005,504	Wtd.Ave.F =		0.771		526500
_							A =		0.538		
Вау	•	fFu	ndy fem a	les, 19	94 fishin	g season	A =		0.538		
Вау	0	f F u	ndy fem a	iles, 19	94 fishin	g season	A =	rm in al E –	(IN P U T)		
Вау _{LENG}	0 	<u>fFu</u> н-ва:	ndyfema sedсоногі	ILES, 19	94 fishin	g season	A = Te Natural Mor	<u>rm in al F =</u> tality (m)=	(IN P U T) 0.2 0.147		
B a y ∟ E N G	о т н	<u>f F u</u> н - в а з	ndyfema sedсоновт	Ales, 19	94 fishin	g season	A = Te Natural Mor	rm in al F = tality (m)= Tc =	(IN P U T) 0.2 0.147 0.38		
B a y		fFu H-BAS	ndyfema sedcohori (INPUT)	Ales, 19 FANALYS (INPUT)	94 fishin	g season	A = Te Natural Mor	rm in alF = tality (m)= Tc =	(IN P U T) 0.2 0.147 0.38		
Bay LENG Leng (mm)	0 T F	<u>f F u</u> н - в а з	ndyfema SEDCOHORT (INPUT) Catch (numbers)	Ales, 19 ANALYS (INPUT) Delta-t (y)	94 fishin SIS Stock Numbers	g season Mean Number	A = Te Natural Mor F/Z	rm in al F = tality (m)= Tc = Z	(IN P U T) 0.2 0.147 0.38		F * C
<u>Bay</u> <u>LENG</u> <u>Leng</u> (mm) ====	0 T I t h	f F u H - B A S	ndyfema SEDCOHORI (INPUT) (NUMbers)	(IN P U T) Delta-t (y)	94 fishin IS Stock Numbers	g season Mean Number	A = Te Natural Mor F/Z	rm in a F = tality (m)= T c = Z	(IN P U T) 0.2 0.147 0.38		F * C
<u>Bay</u> <u>LENG</u> (mm) === 151 141	0 T H t h = -	f F u H - B A S = = = 1 6 0 1 5 0	ndyfema SEDCOHORI (INPUT) (INPUT) (numbers) 1287 1690	(IN P U T) D e Ita-t (2.331 2.336	9 4 fishin 11S Stock Numbers 2233.248 5.057	g season Mean Number	A = <u>Te</u> <u>Natural Mor</u> F/Z 0.599	rm in al F = tality (m)= Tc = Z	0.538 (IN P U T) 0.2 0.147 0.38 F 		F * C
<u>B a y</u> <u>L E N G</u> <u>L e n g</u> (m m) = = = = 151 141 131	0 T H t h = - -	f F u H - B A S = = = 1 6 0 1 5 0 1 4 0	ndyfema SEDCOHORT (INPUT) Catch (numbers) 1287 1690 6503	A I E S , 1 9 A N A L Y S (IN P U T) D e Ita - t (y) = = = = = 2 .3 3 1 2 .3 0 2 .2 6 0	9 4 fishin 15 5 tock Numbers 2 2 3 3 . 2 4 8 5 .0 5 7 1 4 . 4 2 7	g season Mean Number 7,711 19,509	A = T e N a tu ra I M o r F /Z 0.599 0.694	rm in a F = ta lity (m) = T c = Z 0.366 0.480	(IN P U T) 0.2 0.147 0.38 F 0.219 0.333		F * C ::::::::::::::::::::::::::::::::::::
<u>B a y</u> <u>L E N G</u> (m m) = = = 151 141 131 121	0 T I t h = - - -	f F u H - B A S = = = 1 6 0 1 5 0 1 4 0 1 3 0	ndyfema SEDCOHORT (INPUT) Catch (numbers) 1287 1690 6503 11164	(IN P U T) D e Ita - t (y) D e 2 2 6 0 2 . 1 8 1 0 2 2 2 0 2 2 1 0 2 2 2 0 2 2 1 0 2 2 2 0 2 2 2 2	9 4 fishin 15 5 tock N u m b ers 2 2 3 3 2 4 8 5 .0 5 7 1 4 .4 2 7 3 2 .4 9 1 4 .0 4 2 0	g season Mean Number 7.711 19.509 46.937	A = Te N atural Mor F /Z 0.599 0.694 0.618 0.675	rm in al F = tality (m)= T c = Z 0.366 0.480 0.385	(IN P U T) 0.2 0.147 0.38 F 0.219 0.333 0.238		F * C ::::::::::::::::::::::::::::::::::::
<u>B a y</u> <u>L E N G</u> (m m) = = = = 151 141 131 121 121 116 111	0 T t h - - - - - - - - - -	f F u H - B A S = = = 1 6 0 1 5 0 1 4 0 1 2 0 1 1 2 0	ndyfema SEDCOHORT (INPUT) Catch (numbers) 1287 1690 6503 11164 11155 18948	(IN P U T) D e Ita-t (y) = = = = 2.331 2.306 2.260 2.181 0.932 0.83904	9 4 fishin 11S Stock Numbers 2233.248 5.057 14.427 32.491 49.013 75.304	g season <u>Mean</u> <u>Number</u> 7,711 <u>19,509</u> <u>46,937</u> <u>36,509</u> <u>49,953</u>	A = T e N a tu ra I M o r F /Z 0.599 0.694 0.618 0.675 0.721	rm in al F = tality (m) = T c = Z 0.366 0.480 0.385 0.453 0.526	(IN P U T) 0.2 0.147 0.38 F 		F * C : : : : : : : : : : : : : : : : : : :
B a y L E N G (m m) = == 1511 1411 1311 1211 116 1111 106	0 T I t h = - - - - - - - - - - - -	f F u H - B A S = = = 1 6 0 1 5 0 1 4 0 1 3 0 1 2 0 1 1 5 1 1 0	n d y fe m a SED C O H O R T (IN P U T) C atch (n um b ers) 1287 1690 6503 11164 11155 18948 28777	A N A L Y S (IN P U T) D e Ita-t (y) = = = = = 2.331 2.306 2.260 2.181 0.932 0.83904 0.72642	9 4 fishin IS Stock Numbers 2233.248 5.057 14.427 32.491 49.013 75.304 113.760	g season <u>Mean</u> <u>Number</u> 7,711 19,509 46,937 36,509 49,953 65,837	A = Te N atural Mor F /Z 0.599 0.694 0.618 0.675 0.721 0.728	rm in al F = tality (m) = T c = Z 0.366 0.480 0.385 0.453 0.526 0.584	(IN P U T) 0.2 0.147 0.38 F 0.219 0.333 0.238 0.306 0.379 0.437		F * C 3 7 0 2 1 6 8 2 6 5 6 3 4 0 8 7 1 8 8 1 2 5 7 8
<u>B</u> a y <u>L</u> E N G (m m) ==== 151 141 131 121 116 111 106 101 966	0 T I th = - - - - - - -	f F u H - B A S = = = 1 6 0 1 5 0 1 4 0 1 3 0 1 2 0 1 1 5 1 1 0 1 0 5	n d y fe m a SED COHORI (INPUT) Catch (numbers) 1287 1690 6503 1164 11155 18948 28777 37148	A N A L Y S (IN P U T) D e Ita-t (Y) = = = = = 2.331 2.306 2.260 2.181 0.932 0.83904 0.72642 0.61878	9 4 fishin IS Stock Numbers 2233.248 5.057 14.427 32.491 49.013 75.304 113.760 163.047 28.047	g season Mean Number 7,711 19,509 46,937 36,509 49,953 65,837 65,837 82,581	A = T e N a tural M or F /Z 0.599 0.694 0.618 0.675 0.721 0.724 0.754 0.754	rm in al F = tality (m)= T c = Z 0.366 0.480 0.385 0.453 0.526 0.584 0.597 442	(IN P U T) 0.2 0.147 0.38 F 0.219 0.333 0.238 0.306 0.379 0.437 0.450 0.0 e e		F * C 3 7 0 2 1 6 8 2 6 5 6 3 4 0 8 7 1 8 8 1 2 5 7 8 1 6 7 1 1 1 0 5 2 2
<u>Leng</u> (mm) ==== 151 141 121 121 116 111 106 101 96 91	0 T I t t - - - - - - - - - - - - - - - - -	f F u H -B A S H -B A A	n d y fe m a SED C O H O R 1 Catch (IN P U T) Catch (n u m bers) 1287 1690 6503 11164 11155 18948 28777 37148 109094 267378	A N A L Y S (IN P U T) D e Ita - t (Y) = = = = = = 2.331 2.306 2.260 0.2181 0.932 0.83904 0.72642 0.61878 0.5335 0.48616	9 4 fishin Stock Numbers 2 2 3 3 . 2 4 8 5 . 0 5 7 1 4 . 4 2 7 3 2 . 4 9 1 4 9 . 0 1 3 7 5 . 3 0 4 1 1 3 . 7 6 0 1 6 3 . 0 4 7 2 8 8 . 7 4 3 5 8 4 . 8 7 1	g season Mean Number 7,711 19,509 46,937 36,509 49,953 65,837 82,581 112,936 195,584	A = T e N a tu ra I M o r F /Z 0.599 0.694 0.618 0.675 0.721 0.724 0.754 0.754 0.868 0.903	rm in al F = tality (m) = T c = 2 0.366 0.480 0.385 0.453 0.526 0.526 0.584 0.597 1.113 1.514	(IN P U T) 0.2 0.147 0.38 F 		F * C 2 1 6 8 2 6 5 6 3 4 0 8 7 1 8 8 1 2 5 7 8 1 6 7 1 1 1 0 5 3 8 3 3 6 5 5 2 5
B a y L E N G L E N G (m m) ==== 1511 1411 1211 116 1011 96 911 866	0 T I - - - - - - - - - - - - -	f F u H -B A A H -B	n d y fe m a	A N A L Y S (IN P U T) D e Ita-t (Y) = = = = = = 2.331 2.306 2.260 2.181 0.932 0.83904 0.72642 0.61878 0.5335 0.48616 0.46527	9 4 fishin Stock Numbers 2 2 3 3 .248 5 .057 1 4 .427 3 2 .491 4 9 .013 7 5 .304 1 1 3 .760 1 6 3 .047 2 8 8 .743 5 8 4 .871 1 .019 .809	g season Mean Number 7,711 19,509 46,937 36,509 49,953 65,837 82,581 112,936 19,55,84 350,323	A = T e N a tu ra l M o r F /Z 0.599 0.694 0.618 0.675 0.721 0.721 0.754 0.754 0.868 0.903 0.882	rm in a 1 F = tality (m) = T c = 2 	0.538 (IN P U T) 0.2 0.147 0.38 		F * C ::::::::::::::::::::::::::::::::::::
B a y L E N G (m m) ==== 1511 1411 1211 116 1111 106 101 96 911 86 81	0 T 1 - - - - - - - - - - - - -	F F u H - B A S H - B A S H - B A S H - B A S H - B A S H - B A S H - B H - B H H H - B H H H H H H H H H H	n d y fe m a	A N A L Y S (IN P U T) D e Ita - t (Y) = = = = = = 2 .3 0 f 2 .2 6 0 2 .1 8 1 0 .9 3 2 0 .8 3 9 0 4 0 .7 2 6 4 2 0 .6 1 8 7 8 0 .5 3 3 5 0 .4 8 6 1 6 0 .4 6 5 2 7 0 .4 5 7 2 1	9 4 fishin Stock Numbers 2 2 3 3 . 2 48 5	g season Mean Number 7,711 19,509 46,937 36,509 49,953 65,837 82,581 112,936 195,584 350,323 558,280	A = T e N a tu ra l M o r F/Z 0.599 0.694 0.618 0.721 0.721 0.724 0.868 0.903 0.882 0.840	rm in a 1 F = ta lity (m) = T c = 2 0.3 6 6 0.4 8 0 0.3 8 5 0.4 5 3 0.5 2 6 0.5 8 4 0.5 9 7 1.1 1 3 1.5 1 4 1.2 4 2 0.9 2 1	0.538 (IN P U T) 0.2 0.147 0.38 		F * C 3 7 0 2 1 6 8 2 6 5 6 3 4 0 8 7 1 8 8 1 2 5 7 8 1 6 7 1 1 1 0 5 3 8 3 3 6 5 5 2 5 4 1 9 6 8 9 3 3 4 0 2 1
B a y L E N G (m m) = == 1511 1411 1311 1211 101 96 911 86 811 = = = = T o tal	0 T I th - - - - - - - - - - - - -	f F u H -B A S I 6 0 I I 5 0 I I I 1 0 I	n d y fe m a	A I e s , 1 9 (IN P U T) D e Ita - t (Y) = = = = = = = 2 .3 0 6 2 .2 6 0 2 .1 8 1 0 .9 3 2 0 .8 3 9 0 4 0 .7 2 6 4 2 0 .6 1 8 7 8 0 .5 3 3 5 0 .4 8 6 1 6 0 .4 6 5 2 7 0 .4 5 7 2 1 = = = = = =	9 4 fishin Stock Numbers 2 2 3 3 .248 5 .057 1 4 .427 3 2 .491 4 9 .013 7 5 .304 1 1 3 .760 1 6 3 .047 2 8 8 .743 5 8 4 .871 1 .019 .809 1 .533 .706	g season Mean Number 7,711 19,509 46,937 36,509 49,953 65,837 82,581 112,936 195,584 350,323 558,280 	A = T e N a tu ra I M o r F /Z 0.599 0.694 0.618 0.675 0.721 0.748 0.754 0.868 0.903 0.882 0.8840 W td A ve F =	rm in al F = tality (m)= T c = 2 0.366 0.480 0.385 0.453 0.526 0.526 0.597 1.113 1.514 1.242 0.921	0.538 (IN P U T) 0.2 0.147 0.38 		F * C 3 7 0 2 1 6 8 2 6 5 6 3 4 0 8 7 1 8 1 6 7 1 1 1 0 5 3 8 3 3 6 5 5 2 5 4 1 9 6 8 9 3 3 4 0 2 1 ::::::::::::::::::::::::::::::::::::
B a y L E N G (m m) = = = = 1511 1411 1311 116 1011 106 911 86 811 = = = = T ot al	0 T I - - - - - - - - - - - - -	f F u H - B A S H - B A S H - B H A S H - B H H - B H H H - H H H H H H H H H H	n d y fe m a	A Ies, 19 (IN P U T) D elta-t (Y) = = = = = 2.3 0 6 2.2 6 0 2.1 8 1 0.9 3 2 0.8 3 9 0 4 0.7 2 6 4 2 0.6 1 8 7 8 0.5 3 3 5 0.4 8 6 5 2 7 0.4 5 7 2 1 = = = = = =	9 4 fis hin Stock Numbers 2 2 3 3 . 2 4 8 5 . 0 5 7 1 4 . 4 2 7 3 2 . 4 9 1 4 9 . 0 1 3 7 5 . 3 0 4 1 1 3 . 7 6 0 1 6 3 . 0 4 7 2 8 8 . 7 4 3 5 8 4 . 8 7 1 1 . 0 1 9 . 8 0 9 1 . 5 3 3 . 7 0 6	g season M ean N u m ber 7,711 19,509 46,937 36,509 49,953 65,837 82,581 112,936 195,584 350,323 558,280 	A = N a tu ra I M o r 0.599 0.694 0.618 0.721 0.748 0.754 0.868 0.903 0.882 0.840 W td .A ve F = A =	rm in a l F = ta lity (m) = T c = 2 0.366 0.480 0.385 0.453 0.526 0.526 0.597 1.113 1.514 1.242 0.921	0.538 (IN P U T) 0.2 0.147 0.38 		F * C ::::::::::::::::::::::::::::::::::::
B a y L E N G (m m) = = = = 151 141 121 131 121 131 106 101 111 106 91 866 81 = = = = T o tal B a y	0 T I th - - - - - - - - - - - - -	f F u H - B A S H - B A S S S H - B A S S S S S S S S S S	n d y fe m a	Ies, 19 A N A L Y S (IN P U T) Delta-t (Y) = = = = 2.306 2.260 2.181 0.932 0.83904 0.72642 0.61878 0.48616 0.46527 0.45721 = = = = = ales, 19	9 4 fishin Stock Numbers 2 2 3 3 . 2 4 8 5 . 0 5 7 1 4 . 4 2 7 3 2 . 4 9 1 4 9 . 0 1 3 7 5 . 3 0 4 1 1 3 . 7 6 0 1 6 3 . 0 4 7 2 8 8 . 7 4 3 5 8 4 . 8 7 1 1 . 0 1 9 . 8 0 9 1 . 5 3 3 . 7 0 6 9 5 fishin	g season Mean Number 7,711 19,509 46,937 36,509 49,953 65,837 82,581 112,936 195,584 350,323 558,280 1,526,159 g season	A = N a tu ra I M o r 0.599 0.694 0.618 0.721 0.748 0.754 0.868 0.903 0.882 0.840 W td.A ve F = A =	rm in a l F = ta lity (m)= T c = 2 0.366 0.480 0.385 0.453 0.526 0.526 0.597 1.113 1.514 1.242 0.921	0.538 (IN P U T) 0.2 0.147 0.38 F 0.219 0.333 0.238 0.306 0.379 0.437 0.450 0.966 1.367 1.095 0.774 		F * C 3 7 0 2 1 6 8 2 6 5 6 3 4 0 8 7 1 8 8 1 6 5 7 8 1 6 7 1 1 1 0 5 3 8 3 3 6 5 5 2 5 4 1 9 6 8 9 3 3 4 0 2 1 ::::::::::::::::::::::::::::::::::::
B a y L E N G (m m) = = = 151 141 141 121 141 121 106 91 86 91 86 91 86 91 86 91 86 91 86 91 86 91 86 91 87 70 tal	0 T H - - - - - - - - - - - - - - - - - - -	F F u H - B A S H - B A S S S H - B A S S S S S S S S S S	n d y fe m a	A N A L Y S (IN P U T) D e Ita - t (Y) = = = = = 2 .3 0 6 2 .3 0 6 2 .3 0 6 2 .3 0 6 2 .3 0 6 2 .3 0 4 0 .7 2 6 4 2 0 .6 1 8 7 8 0 .5 3 3 5 0 .4 8 6 1 6 0 .4 5 7 2 1 = = = = = =	9 4 fishin Stock Numbers 2233.248 5.057 14.427 32.491 49.013 75.304 113.760 163.047 288.743 584.871 1.019.809 1.533.706 	g season Mean Number 7,711 19,509 46,937 36,509 49,953 65,837 82,581 112,936 195,584 350,323 558,280 1,526,159 g season	A = T e N a tu ra I M o r F /Z 0.599 0.694 0.618 0.675 0.721 0.748 0.754 0.868 0.903 0.882 0.840 W td.A ve.F = A =	rm in a F = ta ity (m)= T c = Z 0.366 0.480 0.385 0.463 0.526 0.584 0.597 1.113 1.514 1.242 0.921	0.538 (IN P U T) 0.2 0.147 0.38 0.338 0.306 0.379 0.437 0.450 0.966 1.367 1.095 0.774 0.621 0.621		F * C ::::::::::::::::::::::::::::::::::::
B a y L E N G (m m) = == (m m) = == 151 141 121 141 121 116 101 96 91 86 91 86 91 86 91 B a y L E N G	0 T - - - - - - - - - - - - -	f F u H - B A S E = = 1 6 0 1 5 0 1 4 0 1 5 0 1 4 0 1 2 0 1 1 0 5 1 1 0 0 9 5 9 0 8 5 = = = F u H - B A S	n d y fe m a SED COHORI (INPUT) Catch (numbers) 1287 1690 6503 1164 11155 18948 28777 37148 267378 383441 431830 ========= 1.308,415 n d y fe m a SED COHORI	A N A L Y S (IN P U T) D e Ita - t (Y) = = = = = = 2 .3 3 6 2 .2 6 0 2 .1 8 1 0 .9 3 2 0 .8 3 9 0 4 0 .7 2 6 4 2 0 .6 1 8 7 8 0 .4 6 5 2 7 0 .4 6 5 2 7 0 .4 6 5 2 7 1 = = = = = = 1 le s , 1 9 A N A L Y S	9 4 fis h in Stock Numbers 2233.248 5,057 14.427 32.491 49,013 75.304 113.760 163.047 288.743 584.871 1.019.809 1.533.706 	g season Mean Number 7,711 19,509 46,937 36,509 49,953 65,837 82,581 112,936 195,584 350,323 558,280 1,526,159 g season	Te N atural Mor F /Z 0.599 0.618 0.675 0.721 0.754 0.862 0.842 0.842 0.842 0.840	rm in a F = ta lity (m)= T c = Z 0.366 0.480 0.385 0.453 0.526 0.597 1.113 1.514 1.242 0.921	(IN P U T) 0.2 0.147 0.38 		F * C ::::::::::::::::::::::::::::::::::::
B a y L E N G (m m) = == (m m) = == 1511 141 121 141 121 16 101 96 81 1 = = = T o tal B a y L E N G	0 T - - - - - - - - - - - - -	f F u H - B A S H - B A S	n d y fe m a SED COHORI (INPUT) Catch (numbers) 1287 1690 6503 1164 11155 18948 28777 37148 109094 267378 383441 431830 ======== 1,308,415 n d y fe m a SED COHORI	Ies, 19 A N A L Y S (IN P U T) Delta-t (Y) = = = = = 2.306 2.260 2.306 2.260 0.83904 0.72642 0.61878 0.5335 0.46527 0.45721 = = = = = Ies, 19 A N A L Y S	9 4 fis hin Stock Numbers 2 2 3 3 . 2 4 8 5 . 0 5 7 1 4 . 4 2 7 3 2 . 4 9 1 4 9 . 0 1 3 7 5 . 3 0 4 1 1 3 . 7 6 0 1 6 3 . 0 4 7 2 8 8 . 7 4 3 5 8 4 . 8 7 1 1 . 0 1 9 . 8 0 9 1 . 5 3 3 . 7 0 6 9 5 fis hin 15	g season Mean Number 7,711 19,509 46,937 36,509 46,937 36,509 49,953 65,837 82,581 112,936 195,584 350,823 558,280 1,526,159 g season	A = T e N a tu ra M o r F /Z 0.599 0.694 0.618 0.675 0.721 0.748 0.754 0.868 0.903 0.882 0.882 0.840 W td .A ve .F = A = N a tu ra M o r	rm in al F = tality (m)= T c = Z 0.366 0.480 0.385 0.453 0.526 0.584 0.597 1.113 1.514 1.242 0.921 	(IN P U T) 0.2 0.147 0.38 		F * C 3 7 0 2 1 6 8 2 6 5 6 3 4 0 8 7 1 8 8 1 2 5 7 8 1 6 7 11 1 0 5 3 8 3 3 6 5 5 2 5 4 1 9 6 8 9 3 3 4 0 2 1 :::::::::::: 2 6 9 6 9 6
B a y L E N G (m m) = === 1511 1411 1311 116 101 966 91 866 811 = = == T o tal B a y L E N G	0 T 1 = - - - - - - - - - - - - - - - - - -	f F u H - B A S H - B A S	n d y fe m a SED COHORI Catch (NPUT) Catch (numbers) 1287 1690 6503 1164 11155 18948 28777 37148 109094 267378 383441 431830 ======== 1,308,415 n d y fe m a SED COHORI (INPUT) (INPUT)	Ies, 19 A N A L Y S (IN P U T) Delta-t (Y) = = = = = 2.306 2.306 2.306 2.306 2.306 2.260 0.932 0.83904 0.72642 0.61878 0.48516 0.45270 0.45721 = = = = = Ies, 19 A N A L Y S (IN P U T) Detta-t	9 4 fishin Stock Numbers 2 2 3 3 . 2 4 8 5 . 0 5 7 1 4 . 4 2 7 3 2 . 4 9 1 4 9 . 0 1 3 7 5 . 3 0 4 1 1 3 . 7 6 0 1 6 3 . 0 4 7 2 8 8 . 7 4 3 5 8 4 . 8 7 1 1 . 0 1 9 . 8 0 9 1 . 5 3 3 . 7 0 6 9 5 fishin 18	g season Mean Number 7,711 19,509 46,937 36,509 49,953 65837 82,581 112,936 195,584 350,323 558,280 1,526,159 g season g season	Te N atural Mor F/Z 0.599 0.694 0.618 0.675 0.721 0.754 0.868 0.903 0.882 0.840 Wtd.Ave.F = A A Te Natural Mor	rm in al F = ta lity (m) = T c = Z 0.366 0.480 0.385 0.453 0.526 0.584 0.597 1.113 1.514 1.242 0.921 rm in al F = ta lity (m) = T c =	0.538 (IN P U T) 0.2 0.147 0.38 		F * C 2 1 6 8 2 6 5 6 3 4 0 8 7 1 8 8 1 2 5 7 8 1 6 7 1 1 1 0 5 3 8 3 3 6 5 5 2 5 4 1 9 6 8 9 3 3 4 0 2 1 ::::::::::::::::::::::::::::::::::::
B a y L E N G (m m) ==== 1511 1411 1311 1411 116 1011 96 91 ==== T o tal B a y L E N G L E N G	T I T	f F u H - B A S E = = = 1 6 0 1 5 0 1 4 0 1 5 0 1 2 0 1 1 0 1 2 0 1 1 0 1 2 0 1 1 0 1 2 0 1 1 0 1 3 0 1 2 0 1 1 0 1 3 0 1 2 0 1 1 0 1 5 0 1 4 0 1 3 0 1 2 0 1 1 0 1 5 0 1 4 0 1 5 0 1 1 0 1 5 0 1 1 0 1 0 5 9 0 8 5 = = F u H - B A S H - B A S	n d y fe m a SED COHORI (INPUT) Catch (numbers) Catch (numbers) Catch 1287 1690 6503 11164 11155 18948 28777 37148 109094 267378 383441 431830 ======= 1,308,415 n d y fe m a (INPUT) Catch (numbers)	Ies, 19 A N A L Y S (IN P U T) Delta-t (Y) = = = = = 2.306 2.260 2.181 0.932 0.83904 0.72642 0.61878 0.48616 0.46527 0.45721 = = = = = Ies, 19 (IN P U T) Delta-t (IN P U T) Delta-t (IN P U T) Delta-t	9 4 fishin Stock Numbers 2 2 3 3 . 2 4 8 5 . 0 5 7 1 4 . 4 2 7 3 2 . 4 9 1 4 9 . 0 1 3 7 5 . 3 0 4 1 1 3 . 7 6 0 1 6 3 . 0 4 7 2 8 8 . 7 4 3 5 8 4 . 8 7 1 1 . 0 1 9 . 8 0 9 1 . 5 3 3 . 7 0 6 9 5 fishin 9 5 fishin Stock Numbers	g season Mean Number 7,711 19,509 46,937 36,509 49,953 65,837 82,581 112,936 19,5,584 350,323 558,280 1,526,159 g season Mean Number	Te Natural Mor F/Z 0.599 0.694 0.618 0.675 0.721 0.7548 0.7548 0.868 0.903 0.882 0.840 Wtd.Ave.F = A = Te Natural Mor	rm in a 1 F = tality (m) = T c = 0.3 6 6 0.4 8 0 0.3 8 5 0.4 5 3 0.5 2 6 0.5 8 4 0.5 8 4 0.5 9 7 1.1 1 3 1.5 1 4 1.2 4 2 0.9 2 1 rm in a 1 F = tality (m) = T c =	0.538 (IN P U T) 0.2 0.147 0.38 0.333 0.238 0.333 0.238 0.306 0.379 0.437 0.450 0.966 1.367 1.095 0.774 0.970 0.621 (IN P U T) 0.2 0.147 0.38		F * C ::::::::::::::::::::::::::::::::::::
B a y L E N G (m m) = = = 1511 1411 1311 1411 116 1011 96 911 86 81 = = = = T o tal B a y L E N G L E N G	0 T I - - - - - - - - - - - - -	f F u H - B A S H - B - B A S H - B	n d y fe m a SED COHORI (INPUT) Catch (numbers) 1287 1687 1277 12777 12777 1277 1277 1277 1277	Ies, 19 A N A L Y S (IN P U T) Delta-t (Y) = = = = = 2.306 2.260 2.181 0.932 0.83904 0.72642 0.61878 0.45721 = = = = = = 1es, 19 N 48616 0.46527 0.45721 = = = = = = Ies, 19 (IN P U T) Delta-t (Y) = = = = = =	9 4 fishin Stock Numbers 2 2 3 3 .2 4 8 5 .0 5 7 1 4 .4 2 7 3 2 .4 9 1 4 9 .0 1 3 7 5 .3 0 4 1 1 3 .7 6 0 1 6 3 .0 4 7 2 8 8 .7 4 3 5 8 4 .8 7 1 1 .0 1 9 .8 0 9 1 .5 3 3 .7 0 6 9 5 fishin 1 5 Stock Numbers	g season Mean Number 7,711 19,509 46,937 36,509 49,953 65,837 82,581 112,936 195,584 350,323 558,280 1,526,159 g season g season Mean Number	Te Natural Mor F/Z 0.599 0.694 0.618 0.721 0.724 0.868 0.903 0.882 0.840 Wtd.Ave.F = A = Te Natural Mor	rm in a 1 F = ta lity (m) = T c = 0.3 6 6 0.4 8 0 0.3 8 5 0.4 5 3 0.5 2 6 0.5 8 4 0.5 9 7 1.1 13 1.5 1 4 1.2 4 2 0.9 2 1 rm in a 1 F = ta lity (m) = T c = Z	0.538 (IN P U T) 0.2 0.147 0.38 		F * C ::::::::::::::::::::::::::::::::::::
B a y L E N G (m m) = == 1511 141 131 141 131 141 131 141 131 141 131 141 106 101 96 91 86 81 = == T o tal B a y L E N G L E N G (m m) = == 151 141 155 155 155 155 155 155	0 T I - - - - - - - - - - - - -	f F u H - B A S E = = = 1 6 0 1 5 0 1 4 0 1 5 0 1 4 0 1 2 0 1 1 0 1 0 5 9 0 8 5 E = = f F u H - B A S H - B A S B A S H - B A S B A S B A S B A S B B B B B B B B B B	n d y fe m a SED C O H O R 1 (IN P U T) C atch (n um bers) 1287 1697 6503 11164 11155 18948 28777 37148 109094 267378 383441 431830 ======= 1.308.415 n d y fe m a (IN P U T) C atch (n um bers) ======= 1004	Ies, 19 A N A L Y S (IN P U T) Delta-t (Y) = = = = = 2.3 0 f 2.2 6 0 2.1 8 1 0.9 3 2 0.8 3 9 0 4 0.7 2 6 4 2 0.6 1 8 7 8 0.4 5 6 1 8 0.4 4 5 2 7 0.4 5 7 2 1 = = = = = ales, 19 (IN P U T) Delta-t (Y) = = = = 2.3 31	9 4 fishin Stock Numbers 2 2 3 3 .2 48 5 2 2 3 3 .2 48 5 2 2 3 3 .2 48 5 2 3 3 .2 49 1 4 .4 27 3 2 .4 91 4 9.0 1 3 7 5 .3 0 4 1 1 3 .7 60 1 6 3 .0 47 2 8 8 .7 4 3 5 8 4 .8 7 1 1 .0 19 .8 09 1 .5 3 3 .7 0 6 9 5 fishin 18 Stock Numbers 	g season Mean Number 7,711 19,509 46,937 36,509 49,953 65,837 82,581 112,936 195,584 350,323 558,280 1,526,159 g season Mean Number 	A = T e N a tu ra I M o r F/Z 0.599 0.694 0.694 0.618 0.721 0.748 0.754 0.868 0.903 0.882 0.840 W td .A ve.F = A = T e N atural Mor F/Z	rm in a 1 F = ta lity (m) = T c = 2 	0.538 (IN P U T) 0.2 0.147 0.38 		F * C ::::::::::::::::::::::::::::::::::::
B a y L E N G (m m) = = = = 151 141 141 141 121 141 106 91 96 91 866 81 = = = = T o tal B a y L E N G L E N G L E N G 151 141 1141 116 116 111 116 111 116 116 111 116 116 111 116 116 111 116 116 111 116 116 111 116 116 111 116	0 T - - - - - - - - - - - - -	f F u H -B A S 1 6 0 1 S 1 5 0 1 4 O 1 1 5 0 1 1 0 1 1 0 1 0 5 1 0 9 0 8 5 = = = + H - B A S + + -	n d y fe m a SED C O H O R 1 (IN P U T) C atch (n um bers) C atch 1287 1690 6503 11164 11155 18948 28777 37148 109094 267378 383441 431830 E D C O H O R 1 (IN P U T) C atch (n um bers) E E D C O H O R 1 (IN P U T) C atch (n um bers) E E E E C O H O R 1 (IN P U T) C atch (n um bers) E E E E C O H O R 1 (IN P U T) C atch (n um bers) E E E E C O H O R 1 (IN P U T) C atch (n um bers) E E E E C O H O R 1 (IN P U T) C atch (N U M C T) (N U M C T) C atch (N U M C T) (N	Ies, 19 A N A L Y S (IN P U T) Delta-t (Y) = = = = = 2.306 2.260 2.181 0.932 0.83904 0.72642 0.61878 0.5335 0.48616 0.45721 = = = = = ales, 19 (IN P UT) Delta-t (Y) = = = = = 2.331 2.330 2.306 2.331 2.306 2.301 2.301 2.301 2.60	9 4 fishin Stock Numbers 2 2 3 3 . 2 4 8 5	g s e a s o n M e a n N u m b e r 7 ,711 19,509 46,937 36,509 49,953 65,837 82,581 112,936 195,584 350,323 558,280 1 ,526,159 g s e a s o n g s e a s o n n n u m b e r 1 ,52,61,59 g s e a s o n n n u m b e r 	A = N a tu ra I M o r 0.599 0.694 0.618 0.721 0.748 0.754 0.868 0.903 0.882 0.840 Wtd.Ave.F = A = Te N a tu ra I M o r 0.724 0.724	rm in a 1 F = ta lity (m) = T c = 2 0.3 6 6 0.4 8 0 0.3 8 5 0.4 5 3 0.5 2 6 0.5 2 6 0.5 8 4 0.5 9 7 1.1 1 3 1.5 1 4 1.2 4 2 0.9 2 1 	0.338 (IN P U T) 0.2 0.147 0.38 		F * C ::::::::::::::::::::::::::::::::::::
B a y L E N G (m m) = == 151 141 121 141 121 106 91 86 81 151 121 121 121 121 121 121 12	0 T H - - - - - - - - - - - - -	f F u H - B A S = = = 1 6 0 1 5 0 1 4 0 1 2 0 1 1 0 1 2 0 1 1 0 1 2 0 1 1 0 1 2 0 1 1 0 1 2 0 1 3 0 1 2 0 1 3 0 5 9 0 8 5 = = = f F u H - B A S H - B A S B A S H - B A S B A B A B A B B A B B A B A B A B A B A B A B B A B B B B B B B B B B	n d y fe m a SED C O H O R 1 (IN P U T) C atch (n um bers) = = = = = = = = 1287 6503 11164 11155 18948 28748 28748 109094 267378 383441 431830 = = = = = = = 1,308,415 n d y fe m a SED C O H O R 1 (IN P U T) C atch (n um bers) = = = = = = = 1004 2885 5483 12651	I e s , 1 9 (IN P U T) D e lta - t (IN P U T) D e lta - t (Y) = = = = = = 2 .3 0 6 2 .2 6 0 2 .1 8 1 0 .9 3 2 0 .8 3 9 0 4 0 .7 2 6 4 2 0 .6 1 8 7 8 0 .4 8 6 1 6 0 .4 6 5 2 7 0 .4 5 7 2 1 = = = = = = 1 e s , 1 9 (IN P U T) D e lta - t (Y) = = = = = = 2 .3 3 1 2 .3 0 6 2 .2 6 0 2 .1 8 1	9 4 fishin Stock Numbers 2 2 3 3 . 2 4 8 5	g season Mean Number 7,711 19,509 46,937 36,509 49,953 65,837 82,581 112,936 195,584 350,323 658,280 1,526,159 g season g season Mean Number 7481 20372 47673	A = N a tu ra I M o r F /Z 0.599 0.694 0.618 0.721 0.748 0.754 0.822 0.840 Wtd.Ave.Fe A = Te N a tu ra I M or F /Z 0.724 0.724	rm in a F = ta lity (m) = T c = 2 0.366 0.480 0.385 0.453 0.526 0.584 0.597 1.113 1.514 1.242 0.921 	0.3 3 8 (IN P U T) 0.2 0.1 4 7 0.3 8 0.2 19 0.3 3 3 0.2 3 8 0.3 0 6 0.3 7 9 0.4 3 7 0.4 5 0 0.9 6 6 1.3 6 7 1.0 9 5 0.7 7 4 		F * C ::::::::::::::::::::::::::::::::::::
B a y L E N G (m m) = == (m m) = == 1511 141 121 141 121 116 101 96 91 86 91 86 91 86 91 L E N G L E N G L E N G L E N G 1511 121 116 111 116 111 116 111 117 116 111 117 116 111 117 116 111 117 116 111 117 116 111 117 116 111 117 116 111 117 116 111 117 117	O T H - - - - - - - - - - - - -	f F u H - B A S E = = = 1 6 0 1 5 0 1 4 0 1 5 0 1 2 0 1 1 0 1 2 0 1 1 0 1 2 0 1 1 0 9 5 9 0 8 5 E = = F F u H - B A S E = = H - B A S E = = E = 1 6 0 1 5 0 1 4 0 1 5 0 1 2 0 1 1 0 1 5 0 1 4 0 1 3 0 1 2 0 1 1 0 9 5 9 0 8 5 E = = E = 1 6 0 1 5 0 1 4 0 1 3 0 9 5 9 0 8 5 E = = E = 1 6 0 1 5 0 1 1 0 0 1 2 0 1 1 0 1 1 0 1 1 0 5 E = = E = 1 6 0 1 5 0 1 1 0 1 0 1 1 2 0 1 1 1 0 1 1 2 0 1 1 1 5 1 1 1 0 1 1 1 0 1 1 5 1 1 1 0 1 1 5 1 1 1 0 1 1 5 1 1 1 1 5 1 1 1 5 1 1 1 5 1 1 1 1 5 1 1 1 1 5 1 1 1 1 5 1 1 1 1 5 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	n d y fe m a SED COHORI (INPUT) Catch (numbers) 1287 1690 6503 1164 11155 18948 28777 37148 109094 267378 383441 431830 1.308.415 n d y fe m a SED COHORI (INPUT) Catch (numbers) 12651 1202 1004 2855 5483 12651 12522 14765	Ies, 19 A N A L Y S (IN P U T) De Ita-t (Y) = = = = = 2.306 2.2306 2.306 2.260 0.83904 0.72642 0.61878 0.5335 0.46527 0.45721 = = = = = Ies, 19 (IN P U T) De Ita-t (Y) = = = = = (IN P U T) De Ita-t (Y) = = = = = 2.306 2.260 2.181 0.932	9 4 fishin Stock Numbers 2 2 3 3 . 2 4 8 5 . 0 5 7 1 4 . 4 2 7 3 2 . 4 9 1 4 9 . 0 1 3 7 5 . 3 0 4 1 6 3 . 0 4 7 2 8 8 . 7 4 3 5 8 4 . 8 7 1 1 . 0 1 9 . 8 0 9 1 . 5 3 3 . 7 0 6 	g s e a s o n M e a n N u m b e r 7,711 19,509 46,937 36,509 49,953 65,837 82,581 112,936 195,584 350,323 558,280 1,526,159 g s e a s o n g s e a s o n g s e a s o n n u m b e r 	Te N atural Mor F /Z 0.599 0.618 0.675 0.721 0.748 0.754 0.868 0.903 0.840 Wtd.Ave.F = A = Xtd.Ave.F =	rm in al F = tality (m)= T c = 2 0.366 0.480 0.385 0.453 0.526 0.584 0.597 1.113 1.514 1.242 0.921 rm in al F = tality (m)= T c = 2 0.533 0.416 0.473	0.338 (IN P U T) 0.2 0.147 0.38 0.219 0.333 0.238 0.306 0.306 0.379 0.437 0.450 0.966 1.367 1.095 0.774 0.970 0.621 (IN P U T) 0.20.147 0.386 0.386 0.269 0.265 0.326		F*C ::::::::::::::::::::::::::::::::::::
B a y L E N G (m m) = == (m m) = == 1511 141 121 141 121 16 101 96 81 = = = T o tal B a y L E N G L E N G (m m) = = = 1511 106 106	O T I I I I I I I I I I I I I	f F u H -B A H -B A I 0 1 5 I 10 1 2 I 1 0 1 2 I 1 0 1 2 I 1 0 9 5 I 0 0 8 5 I I 0 0 8 5 I I I 0 1 1 0 H -B A S I I 0 1 1 0 1 1 0 1 <td>n d y fe m a SED C O H O R 1 Catch (IN P U T) Catch (n u m b ers) 1287 1690 6503 1164 11155 18948 28777 37148 109094 267378 383441 431830 ======== 1,308,415 n d y fe m a SED C O H O R 1 (IN P U T) Catch (n u m b ers) ======= 1004 2885 5483 12522 11786 21803</td> <td>Ies, 19 A N A L Y S (IN P U T) Delta-t (Y) = = = = = 2.3 06 2.2 3 06 2.3 06 2.3 06 2.3 06 2.2 6 0 0.4 8 3 9 0 4 0.7 2 6 4 2 0.6 1 8 7 8 0.4 8 5 16 0.4 5 7 2 1 = = = = = </td> <td>9 4 fishin Stock Numbers 2 2 3 3 . 2 48 5 . 0 5 7 1 4 . 4 2 7 3 2 . 4 9 1 4 9 . 0 1 3 7 5 . 3 0 4 1 6 3 . 0 4 7 2 8 8 . 7 4 3 5 8 4 . 8 7 1 1 . 0 1 9 . 8 0 9 1 . 5 3 3 . 7 0 6 </td> <td>g season Mean Number 7,711 19,509 46,937 36,509 49,953 65,837 82,581 112,936 195,584 350,323 558,280 1,526,159 g season g season Number 7481 20372 47673 38376 50306 60306 60336</td> <td>Te Natural Mor 6.599 0.694 0.618 0.675 0.721 0.754 0.754 0.868 0.903 0.882 0.840 Wtd.Ave.F = A = Te Natural Mor F/Z</td> <td>rm in al F = tality (m) = T c = 2 </td> <td>(IN P U T) 0.2 0.147 0.38 </td> <td></td> <td>F * C ::::::::::::::::::::::::::::::::::::</td>	n d y fe m a SED C O H O R 1 Catch (IN P U T) Catch (n u m b ers) 1287 1690 6503 1164 11155 18948 28777 37148 109094 267378 383441 431830 ======== 1,308,415 n d y fe m a SED C O H O R 1 (IN P U T) Catch (n u m b ers) ======= 1004 2885 5483 12522 11786 21803	Ies, 19 A N A L Y S (IN P U T) Delta-t (Y) = = = = = 2.3 06 2.2 3 06 2.3 06 2.3 06 2.3 06 2.2 6 0 0.4 8 3 9 0 4 0.7 2 6 4 2 0.6 1 8 7 8 0.4 8 5 16 0.4 5 7 2 1 = = = = =	9 4 fishin Stock Numbers 2 2 3 3 . 2 48 5 . 0 5 7 1 4 . 4 2 7 3 2 . 4 9 1 4 9 . 0 1 3 7 5 . 3 0 4 1 6 3 . 0 4 7 2 8 8 . 7 4 3 5 8 4 . 8 7 1 1 . 0 1 9 . 8 0 9 1 . 5 3 3 . 7 0 6 	g season Mean Number 7,711 19,509 46,937 36,509 49,953 65,837 82,581 112,936 195,584 350,323 558,280 1,526,159 g season g season Number 7481 20372 47673 38376 50306 60306 60336	Te Natural Mor 6.599 0.694 0.618 0.675 0.721 0.754 0.754 0.868 0.903 0.882 0.840 Wtd.Ave.F = A = Te Natural Mor F/Z	rm in al F = tality (m) = T c = 2 	(IN P U T) 0.2 0.147 0.38 		F * C ::::::::::::::::::::::::::::::::::::
<u>L e n g</u> (m m) ==== (m m) ==== 1511 141 121 111 106 101 96 91 96 91 96 91 86 81 ==== Total <u>B a y</u> <u>L E N G</u> <u>L E N G</u> <u>L E N G</u>	O T - - - - - - - - - - - - -	f F u H -B A S I 1 0 1 S I 1 0 1 Z O I 1 0 1 Z O 1 I O I Z O I I O O S	n d y fe m a SED C O H O R 1 Catch (IN P U T) Catch (n u m bers) 1287 1690 6503 11164 11155 18948 28777 37148 109094 267378 383441 431830 ======= 1,308,415 n d y fe m a (IN P U T) Catch (n u m bers) ======= 1004 2885 5483 1252 1004 2885 5483 1252 1004 2885 5483 1252 1786 28920	Ies, 19 A N A L Y S (IN P U T) Delta-t (Y) = = = = = 2.3 06 2.3 06 2.3 06 2.3 06 2.3 06 2.3 06 2.3 06 2.3 06 2.3 06 2.3 06 2.2 60 0.61878 0.53350 0.48616 0.45721 = = = = 11es, 19 Y A N A L Y S (IN P U T) Delta-t Y (IN P U T) Delta-t (Y) = = = = 2.3 06 2.2 60 2.181 0.932 0.839 0.726 0.619	9 4 fishin Stock Numbers 2 2 3 3 . 2 4 8 5 . 0 5 7 1 4 . 4 2 7 3 2 . 4 9 1 4 9 . 0 1 3 7 5 . 3 0 4 1 1 3 . 7 6 0 1 6 3 . 0 4 7 2 8 8 . 7 4 3 5 8 4 . 8 7 1 1 . 0 1 9 . 8 0 9 1 . 5 3 3 . 7 0 6 9 5 fishin 9 5 fishin 1 5 Stock Numbers 1 7 4 2 5 7 2 7 1 4 2 0 4 3 8 6 3 5 2 0 2 6 7 1 2 0 7 1 0 1 9 . 8 1 4 8 2 8	g season Mean Number 7,711 19,509 46,937 36,509 49,953 65,837 82,581 112,936 19,5584 350,323 558,280 1,526,159 g season Mean Number 7481 20372 47673 38376 50306 60731 74629	Te Natural Mor 0.599 0.694 0.618 0.618 0.721 0.754 0.753 0.754 0.868 0.903 0.882 0.8640 Wtd.Ave.F = A = Te Natural Mor F/Z 0.724 0.647 0.644 0.689 0.614 0.724 0.724 0.724 0.724 0.724 0.724 0.724 0.724 0.724 0.724 0.724 0.724 0.709 0.7109 0.7109 0.7109 0.7109 0.766	rm in a 1 F = tality (m) = T c = 0.3 6 6 0.4 8 0 0.3 8 5 0.4 5 3 0.5 2 6 0.5 8 4 0.5 8 4 0.5 9 7 1.1 1 3 1.5 1 4 1.2 4 2 0.9 2 1 	0.538 (IN P U T) 0.2 0.147 0.38 0.333 0.238 0.306 0.379 0.437 0.450 0.966 1.367 1.095 0.774 0.970 0.621 (IN P U T) 0.2 0.147 0.38 0.3 0.2 0.437 0.437 0.4450 0.966 1.367 1.095 0.774 0.38 0.2 0.2 0.147 0.38 0.2 0.2 0.2 0.2 0.2 0.38 0.2 0.2 0.38 0.2 0.2 0.2 0.3 0.2 0.2 0.2 0.2 0.3 0.2 0.3 0.2 0.3 0.2 0.3 0.2 0.3 0.2 0.3 0.2 0.3 0.2 0.2 0.3 0.2 0.2 0.2 0.2 0.3 0.2 0.2 0.2 0.3 0.2 0.3 0.2 0.2 0.2 0.2 0.3 0.2 0.3 0.2 0.2 0.2 0.3 0.2 0.2 0.2 0.3 0.2 0.3 0.2 0.2 0.2 0.2 0.2 0.3 0.2 0.3 0.2 0.2 0.2 0.2 0.3 0.2 0.2 0.2 0.3 0.2 0.3 0.2 0.2 0.2 0.3 0.2 0.2 0.2 0.3 0.2 0.3 0.2 0.3 0.2 0.3 0.2 0.2 0.3 0.2 0.2 0.3 0.2 0.3 0.2 0.2 0.3 0.2 0.3 0.2 0.2 0.3 0.2 0.3 0.2 0.2 0.3 0.2 0.3 0.2 0.2 0.3 0.2 0.2 0.3 0.2 0.2 0.2 0.3 0.2 0.2 0.2 0.3 0.2 0.2 0.2 0.2 0.3 0.2 0.2 0.2 0.2 0.3 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2		F * C ::::::::::::::::::::::::::::::::::::
B a y L E N G (m m) = == 1511 1411 1311 1411 106 1011 96 8 B a y L E N G B a y L E N G L E N G 1511 1111 106 1011 96 96 96 97 96 96 97 96 97 97 97 97 97 97 97 97 97 97	O T t - - - - - - - - - - - - -	f F u H -B A S I 0 1 5 0 1 1 0 1 2 0 1 1 0 1 2 0 1 1 0 1 2 0 1 1 0 5 1 1 0 9 0 8 5 = = = +	n d y fe m a SED C O H O R 1 (IN P U T) C atch (n u m bers) 1287 1697 6503 11164 11155 18948 28777 37148 109094 267378 383441 431830 ======= 1,308,415 n d y fe m a SED C O H O R 1 (IN P U T) C atch (n u m bers) ======= 1,308,415 n d y fe m a 261 21265 5483 12651 12522 11786 21803 35920 75301 21790	Ies, 19 A N A L Y S (IN P U T) Delta-t (Y) = = = = = 2.3 0 6 2.3 0 6 2.3 0 6 2.3 0 6 2.3 0 6 2.3 0 6 2.3 0 6 2.3 0 6 2.3 0 6 2.3 0 6 2.1 8 1 0.7 2 6 4 2 0.6 1 8 7 8 0.4 8 6 1 6 0.4 6 5 2 7 0.4 5 7 2 1 = = = = = 2.3 3 1 = = = = = 2.3 3 1 (IN P U T) D e Ita-t (Y) = = = = = 2.3 3 1 2.3 3 1 2.3 3 1 2.3 3 1 2.3 3 1 2.3 3 0 2.2 6 0 2.1 8 1 0.9 3 2 0.8 3 9 0.7 2 6 0.6 1 9 0.5 3 3 0.4 9	9 4 fishin Stock Numbers 2 2 3 3 . 2 4 8 5 . 0 5 7 1 4 . 4 2 7 3 2 . 4 9 1 4 9 . 0 1 3 7 5 . 3 0 4 1 1 3. 7 6 0 1 6 3 . 0 4 7 2 8 8 . 7 4 3 5 8 4 . 8 7 1 1 . 0 1 9 . 8 0 9 1 . 5 3 3 . 7 0 6 9 5 fishin 9 5 fishin 1 7 4 2 5 7 2 7 1 4 2 0 4 3 3 8 6 3 5 2 0 2 6 7 1 2 0 7 1 0 1 9 3 8 1 4 8 2 8 2 3 8 5 4 8	g season Mean Number 7,711 19,509 46,937 36,509 49,953 65,837 82,581 112,936 195,584 195,584 3558,280 195,584 195,	Te Natural Mor F/Z 0.599 0.694 0.694 0.618 0.721 0.754 0.754 0.868 0.903 0.882 0.840 Wtd.Ave.F = A = Ytd.Ave.F = A = Constant of the state of	rm in a 1 F = ta lity (m) = T c = 0.3 6 6 0.4 8 0 0.3 8 5 0.4 5 3 0.5 2 6 0.5 8 4 0.5 9 7 1.1 1 3 1.5 1 4 1.2 4 2 0.9 2 1 rm in a 1 F = ta lity (m) = T c = 0.5 3 3 0.4 1 6 0.4 1 2 0.4 7 3 0.3 8 1 0.5 0 6 0.6 2 8 0.9 1 5	0.538 (IN P U T) 0.2 0.147 0.38 0.333 0.238 0.333 0.238 0.306 0.379 0.437 0.450 0.966 1.367 1.095 0.774 0.970 0.621 (IN P U T) 0.2 0.147 0.38 0.386 0.265 0.326 0.326 0.359 0.481 0.768 1.369 0.481 0.768 0.778 0.778 0.778 0.778 0.778 0.788 0.778 0.7888 0.78888 0.7888 0.7888 0.7888 0.7888 0.7888 0.7888 0.78888 0.7888 0.78888 0.78888 0.78888 0.78888 0.78888 0.78888 0.78888 0.78888 0.78888 0.78888 0.78888 0.78888 0.78888 0.78888 0.78888 0.78888 0.78888 0.78888 0.788888 0.788888 0.7888888 0.7888888888888888888888888888888888888		F * C ::::::::::::::::::::::::::::::::::::
B a y L E N G (m m) = == 1511 1411 116 1111 106 101 96 81 L E N G L E N G L E N G L E N G 1511 1411 106 1011 96 1011 96 101 106 101 106 101 106 101 106 107 107 107 107 107 107 107 107	O T	f F u H -B A S I 0 1 5 0 1 1 0 1 2 0 1 1 0 1 2 0 1 1 0 1 2 0 1 1 0 5 9 0 8 5 = = = H - B A S H - B A S I 1 5 0 1 H - B A S S I I 1 5 0 1 I 1 1 1 1 1 1 I 1 1 0 1 1 0 1 I 1 0 1 0 1 0 1 I 0 0	n d y fe m a SED C O H O R 1 (IN P U T) C atch (n u m bers) C atch (n u m bers) C atch (n u m bers) C atch (1287 6503 1164 1155 18948 28777 37148 109094 267378 383441 431830 C atch (N U T) C atch (N U T) C atch (n u m bers) C atch (1004 2885 5483 12651 1252 1004 2885 5483 12651 1252 1004 2885 5483 12651 1252 1004 2885 5483 12651 1252 1004 2885 5483 12651 1252 1004 2885 5483 12651 1252 1004 2885 5483 12651 1252 1004 2885 5483 12651 1252 17306 336048 1217306 121770 1217306 121770 121770 121770 121770 1217706 121770 1217706 1217706 121770 1217706 121770 1217706 1217706 121770 1217706 1217706 121770 1217706 121770 121770 1217706 121770 1217706 121770 1217706 121770 1217706 121770 1217706 1217706 121770 1217706 121770706 1217706 1217706 1217706 121770706 12177070707 12177070707 12177070707070707 121770	$\begin{array}{c} \textbf{Iess, 19} \\ \textbf{Iess, 19} \\ \textbf{Interpretation} \\ Interpret$	9 4 fishin Stock Numbers 2 2 3 3 .2 48 5 .0 57 1 4 .4 2 7 3 2 .4 9 1 4 .9 .0 1 3 7 5 .3 0 4 1 1 3 .7 6 0 1 6 3 .0 47 2 8 8 .7 4 3 5 8 4 .8 7 1 1 .0 1 9 .8 0 9 1 .5 3 3 .7 0 6 9 5 fishin 9 5 fishin 1 5 Stock Numbers 1 7 4 2 5 7 2 7 1 4 2 0 4 3 3 8 6 3 5 2 0 2 6 7 1 2 0 7 1 0 1 9 38 1 4 8 8 28 2 3 8 5 4 8 4 7 9 5 0 8 8 5 8 3 4 7	g s e a s o n M e a n N u m b e r 7 , 7 1 1 1 9, 5 0 9 4 6, 9 3 7 3 6 6, 8 0 7 4 9, 9 5 3 6 5, 8 3 7 8 2, 5 8 1 1 1 2, 9 3 6 1 9 5, 5 8 4 3 5 0, 3 2 3 5 5 8, 2 8 0 1 , 5 2 6, 1 5 9 g s e a s o n g s e a s o n 1 , 5 2 6, 1 5 9 1 , 5 6, 1 5 9 1 , 7 4 8 19 1 , 6 10 9 11 1 , 2 9 1 0 9 7 1 1 , 6 19 1 1 1 , 6 0 9 11 1 , 7 4 9 1 9 7 1 1 , 6 19 1 1 1 , 8 19 1 1 1 , 6 19 1 1 1 , 6 19 1 1 1 , 6 19 1 1 1 , 6 19 1 1 1 , 6 19	A = N a tu ra I M o r F/Z 0.599 0.618 0.675 0.721 0.748 0.754 0.754 0.754 0.868 0.903 0.882 0.840 W td .A ve.F = A = Y td .A ve.F =	rm in a 1 F = ta lity (m) = T c = 0.3 6 6 0.4 8 0 0.3 8 5 0.4 5 3 0.5 2 6 0.5 8 4 0.5 9 7 1.1 1 3 1.5 1 4 1.2 4 2 0.9 2 1 rm in a 1 F = ta lity (m) = T c = 2 0.5 3 3 0.4 1 6 0.4 1 2 0.4 7 3 0.3 8 1 0.5 0 6 0.6 2 8 0.9 1 5 1.4 9 7 1.3 0 1	(IN P U T) 0.2 0.147 0.38 		F * C ::::::::::::::::::::::::::::::::::::
B a y L E N G (m m) = = = 151 141 121 141 121 16 96 91 86 81 = = = T o tal B a y L E N G L E N G L E N G 131 141 166 91 866 81 121 141 166 91 866 81 121 131 166 81 121 166 81 101 166 81 101 166 81 101 106 81 101 106 81 101 106 81 101 106 81 105 111 115 111 115 111 115 85 85 85 85 85 85 85 85 85 8	O T	F U H - B A H - B A I 16 0 1 50 140 1 20 115 1 105 100 990 85 B E E F H - B A I 150 1 1 1200 1 1 1200 1 1 105 1 1 100 1 9 9 0 8 5 1	n d y fe m a SED C O H O R 1 (IN P U T) C a tch (n u m b ers) C a tch (1 2877 37148 109094 267378 383441 431830 C a tch (N P U T) C a tch (n u m b ers) C a tch (n u m b ers) C a tch (n u m b ers) C a tch (1 0 4 2 8 8 5 5 4 8 3 1 2 6 5 1 1 2 5 2 2 1 1 7 8 6 2 1 8 0 3 6 0 4 8 3 1 6 3 2 4 C a tch (1 0 4 2 8 8 5 5 4 8 3 C a tch (1 0 4 C 1 7 3 0 C 2 4 C 1 7 3 C 2 4 C 2 4	$\begin{array}{c} \textbf{Ies, 19} \\ \textbf{Ies, 19} \\ \textbf{Ies, 19} \\ \textbf{Interpretation} \\ $	9 4 fishin 9 4 fishin Stock Numbers 2 2 3 3 . 2 48 5	g s e a s o n M e a n N u m b e r 7,711 19,509 46,937 36,509 49,953 65,837 82,581 112,936 195,584 350,323 558,280 1 ,526,159 g s e a s o n 1 ,526,159 g s e a s o n 1 ,526,159 g s e a s o n 1 ,52,6,159 g s e a s o n 1 ,52,37 1 ,52,37 1 ,52,37 1 ,52,37 1 ,52,57 1 ,52,57 1 ,52,6,159 1 ,52,57 1 ,57 1 ,52,57 1 ,52,57 1 ,57 1 ,52,57 1 ,57 1 ,57 1 ,52,57 1 ,57 1 ,52,57 1 ,57 1 ,52,57 1 ,57 1 ,57 1 ,57 1 ,57 1 ,57 1 ,57 1 ,57 1 ,57 1 ,74 4 ,61 1 ,59 5 ,57 1 ,57	A = N a tu ra I M o r 0.599 0.6194 0.618 0.721 0.748 0.759 0.748 0.748 0.759 0.748 0.748 0.868 0.903 0.882 0.840 W td.A ve.F = A = X tu ra I M o r X tu ra I M	rm in a 1 F = ta lity (m) = T c = 2 0.3 6 6 0.4 8 0 0.3 8 5 0.4 5 3 0.5 2 6 0.5 2 6 0.5 9 7 1.1 1 3 1.5 1 4 1.2 4 2 0.9 2 1 	0.338 (IN P U T) 0.2 0.147 0.38		F * C ::::::::::::::::::::::::::::::::::::
B a y L E N G L E N G (m m) = == 151 141 121 141 121 106 91 86 81 = == 151 T o tal B a y L E N G L E N G L E N G L E N G 0 131 11 11 106 91 86 81 121 131 121 131 121 16 91 86 81 121 131 121 131 121 106 91 86 81 121 131 121 131 121 106 91 86 81 135 135 135 135 135 135 135 13	O T I I I I I I I I I I I I I I I I I I	F U ■	n d y fe m a SED C O H O R T C atch (IN P U T) C atch (n um bers) 1287 1690 6503 11164 11155 18948 28777 37148 109094 267378 383441 431830 ====================================	e s, 19 $(IN P U T)$ $D e ta - t$ (Y) $= = = = = = = = = = = = = = = = = = =$	9 4 fishin Stock Numbers 2 2 3 3 . 2 4 8 5	g s e a s o n N u m b e r 7 ,711 1 9,509 4 6,937 3 6,509 4 9,953 6 5,837 8 2,581 1 12,936 1 95,584 3 50,323 5 58,280 1 15,584 3 50,323 5 58,280 1 1,526,159 g s e a s o n g s e a s o n 7 481 2 0 3 72 4 7 6 73 3 8 3 76 5 0 3 0 6 6 0 7 3 1 7 4 6 29 9 8 0 9 11 2 9 10 9 7 4 6 15 9 5 1 3 11 2 6 1	Te Natural Mor F/Z 0.599 0.618 0.675 0.721 0.748 0.754 0.868 0.903 0.864 0.903 0.840 Wtd.Ave.F = A = 0 0.724 0.647 0.647 0.644 0.644 0.644 0.644 0.642 0.614 0.709 0.766 0.839 0.614 0.709 0.823	rm in a 1 F = ta lity (m) = T c = 2 0.3 6 6 0.4 8 0 0.3 8 5 0.4 5 3 0.5 2 6 0.5 8 4 0.5 9 7 1.1 1 3 1.5 1 4 1.2 4 2 0.9 2 1 	0.338 (IN P U T) 0.2 0.147 0.38 		F * C ::::::::::::::::::::::::::::::::::::