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Chesapeake Bay Status of Stocks Report 1989-1990

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Chesapeake Bay
Status of Stocks Report

1989-1990

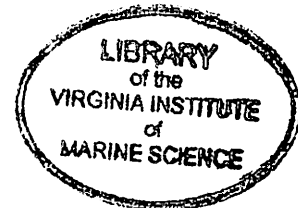
Chesapeake Bay Stock Assessment Committee

Virginia and Maryland Juvenile Finfish Data

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Cooperative Agreement No. NA89EA-D-FM063
Status of Stocks Logistics Support Project

STATUS OF STOCKS KNOWLEDGE

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This is the fourth in a series of documents prepared for the Chesapeake Bay Stock Assessment Committee (CBSAC) under the aegis of Status of Stock Knowledge. The first was a report prepared by the Status of Stocks Knowledge Work Group of CBSAC (Austin and Furman, 1987), which:

1. identified important finfish and shellfish stocks in the Chesapeake Bay,
2. identified information needs for stock assessment, and
3. summarized the current status of information relative to identified needs and identified information gaps.

The basis for the report was a matrix of important species and needed information, and a bibliography, by species citing those references that are documented in the matrix.

This report was followed by a Status of Stocks Report (Austin, Furman and Scoles 1988), which was initially to have been an annual status of Chesapeake Bay stocks, much as the Northeast Fisheries Center's (NMFS)

annual Status of Fishery Resources off the Northeastern United States Report which provides an annual assessment of the stocks, including landings, recruitment and other relevant biological information. This report was superceded however, by a document prepared by the Maryland DNR and Virginia MRC entitled, Chesapeake Bay Fisheries: Status, Trend, Priorities and Data Needs (September, 1989).

While CBSAC looked favorably on the Status of Stocks report, it decided to support the joint Maryland-Virginia funded Chesapeake Bay Fisheries document in lieu of the CBSAC funded Status of Stocks report. CBSAC was reorganized in 1989 and the Status Stocks Knowledge Work Group ceased to exist. A third year of work was funded however, to continue work on the juvenile finfish indicies.

A report, Chesapeake Bay Status of Stocks Report, 1988-1989: Virginia Juvenile Finfish Trawl Data was produced (Austin and Bonzek 1990). This report was a tabulation of the Virginia trawl data expressed as CPUE (catch per minute of tow) for all species collected throughout the period of the survey (1954-1989). The data were presented both as actual CPUE and as log transformed CPUE.

The purpose of the fourth year, and current study was to provide:

1. an annual updated graphic presentation of commercial landings in the two states,
2. tabular juvenile index data, and

3. selection of the best "juvenile index" for each species, and its graphic presentation with the landings data (much as the NMFS Status of Fisheries Resources).

These are the basis for this report.

Commercial Landings

The original source of the commercial landings is the Chesapeake Bay Program Data Center. Because of annual end-of-the-year updates to the data by Maryland and Virginia's resource management agencies, and slow submission of data from the states to NMFS, then to the data center, it has been necessary to get the annual updates directly from MdDNR and VMRC.

Juvenile Indices

Maryland

100 ft Beach Seine:

The Maryland Juvenile index is derived from three summer month (July-September) 100 ft beach seine surveys in the Maryland tributaries to the Bay. The Primary objective is to provide a relative annual measure of juvenile striped bass recruitment in Maryland (Cosden and Schaefer 1989). Species taken in addition to striped bass are enumerated. The juvenile index is calculated as the average catch for the three summer months each year. This survey has been conducted annually since 1954. Because of the

summer-only, and shallow beach locations of the survey, some species, such as summer flounder and croaker are not collected consistently. Consequently, the index for such species is discontinuous, and compared to the Virginia trawl index, is not useful. Other species, such as mummichog, menhaden and bluefish, lend themselves well to the gear and provide a better index than the Virginia trawl index.

Fish of all sizes are reported in the index. This is not a problem however, as generally only the smaller, young-of-the-year are collected in the seine.

The data are available from the Maryland DNR in Annapolis.

Virginia

30 ft Trawl:

Virginia's index is computed from year-round monthly trawl surveys in the Virginia tributaries of the Bay (James, York, Rappahannock). The data presented in Part I are a three-rivers combined index. Because recruitment for different species occurs at different times of the year, the Virginia indices are not all computed the same way. Some species are represented every month; others by seasonal summer peaks, or by seasonal winter peaks which span two calendar years. We believe a simple calendar year index would have been misleading for some species, particularly those whose young-of-the-year first appear in the late fall (e.g. croaker) and continue on into spring of the following calendar year. The data are reported here both as the index and as log transforms as it has been shown that biological

abundance numbers exhibit a negative binomial distribution (Colvocoresses and Austin 1987).

Using several references and discussions with VIMS ichthyologists a "cut-off" length was determined for young-of-the-year for each of the major species (Table 1). Fish greater than this length were characterized as yearling, or 0⁺. In most cases, only young of the year and yearling fish were taken in the trawl surveys as older/larger fish either are not resident in the Bay, or avoid the trawl. In some instances, for example white perch and summer flounder, older larger fish are taken, but these are generally in such small numbers as not to exceed 10 % of the reported yearling fish.

In order to determine the "index-of-choice" for each species we ran regression analyses of the transform of the young-of-the-year against the yearling abundance. Regressions were run with a calendar year, biological year, peak two month period, and all months with a log value >0.03 index. The results are presented in Table 2. For those species (notably the sciaenids) with a relatively higher R², and with greater significant of regression (p), that relationship was used to define the index. For those with no apparent relationship, a calendar year index was used. Some species appear sporadically, or not at all in the survey. In these instances no index is computed.

Transformed index data were used to develop the best fit, the actual CPUE data were used in the plots.

The VIMS trawl survey has been in continuous operation since 1955. It would be risky however, to attempt a 35 year retrospective examination or time series analysis as there have been modifications to the methods. In many of the earlier years (1955-1965), months are missing, and during the period 1973-1979 cruises were run on a quarterly basis. Cruises are run up the mainstem of the rivers except during 1973-1979 when a stratified random sampling was employed. Since 1972 a 1/4" mesh cod end liner has been employed. For these reasons, it has been only since 1972 that the juvenile index for the graphics has been computed.

100 ft Beach Seine:

The juvenile index for striped bass is derived from the summer young of the year seine survey targeted specifically at striped bass. The particulars of the methods are described in Colvocoresses and Austin (1987). This is the "official" Virginia striped bass young-of-the-year index.

Alosa Push Net:

Young-of-the-year alosines (American shad, river herring and alewives) are collected in a pushnet described by Loesch and Kriete (1984). Juvenile alosines run to the sea and do not return until they are mature. Consequently, no young of the year vs yearling analyses were performed.

In as much as there are numerous potential combinations of monthly young of the year or yearling data to derive an index, it should be remembered that, with the exception of the striped bass and alosines, these indices are

"ours" and are not "official". Other methods of calculating indices are currently under investigation by various researchers in an attempt to find the best method for each species. Indeed, there may not even be an official index for each species, but different indices may be appropriate as the need dictates.

We expect, during 1990-1991 to examine the VIMS juvenile striped bass survey (July-September) and develop a Virginia index for silversides, bluefish and mummichogs. Further, the relationships between young-of-the-year, yearling and commercial landings will be examined.

Table 1
List of Species and Corresponding Sizes at Age 1

Species	Cut-off Length	Citation
American shad	27 mm	Loesch, Pers. Comm.
Alewife	27 mm	Loesch, Pers. Comm.
Atlantic menhaden	115 mm	June and Nicholson, 1964
Bay anchovy	55 mm	Jaingang Liu, Pers. Comm.
Striped anchovy	90 mm	Stevenson 1958
White perch	90 mm	Colvocoresses, Pers. Comm.
Striped Bass	100 mm	Kline 1990
Spot	105 mm	Chao and Musick 1977
Atlantic croaker	100 mm	Chao and Musick 1977
Weakfish	105 mm	Scoles, Pers. Comm.
Red drum	275 mm	Mercer 1984
Black drum	250 mm	Hildebrand and Schroeder 1928
Summer flounder	190 mm	Wyanski, Pers. Comm.
Bluefish	200 mm	Austin 1974
Channel catfish	190 mm	Troutman 1957
White catfish	100 mm	Lanier 1971
Brown bullhead	150 mm	Troutman 1957
Yellow bullhead	130 mm	Troutman 1957
Atlantic silverside	100 mm	Austin 1974
Mummichog	80 mm	Austin 1974
Blue crab	100 mm	Van Engel, Pers. Comm.

Table 2
 Regression Analyses of Trawl Survey Young of the Year
 Against Yearling CPUE
 for Virginia Tributaries

<u>Species</u>	<u>Combination</u>	<u>R²</u>	<u>p</u>
Menhaden	13-32-C	.398	.078
	13-43-Q	.289	.092
	13-43-C	.290	.203
White perch	43-43-L	.326	.017
	43-43-Q	.372	.038
	43-43-C	.377	.095
Striped bass	43-43-C	.470	.036
	13-43-C	.447	.046
	43-13-C	.441	.049
Weakfish	43-13-C	.832	.000
	43-43-C	.828	.000
	43-43-Q	.823	.000
Croaker	13-13-C	.156	.515
	13-32-C	.125	.616
	13-43-C	.125	.615
Spot	31-13-C	.389	.084
	13-43-C	.388	.086
	13-13-C	.329	.146
Summer Flounder	13-13-C	.461	.040
	13-32-C	.436	.053
	43-13-C	.398	.078
Blue crab	43-43-C	.189	.231
	43-43-Q	.173	.264
	13-43-Q	.173	.392

Legend

Combinations:

First Pair: Young of the Year, Second Pair: Yearling (1⁺)
 13-Calendar Year
 21-Biological Year
 31-Index >0.03
 43-Greatest two months
 L-Linear, C-Cubic, Q-Quadratic

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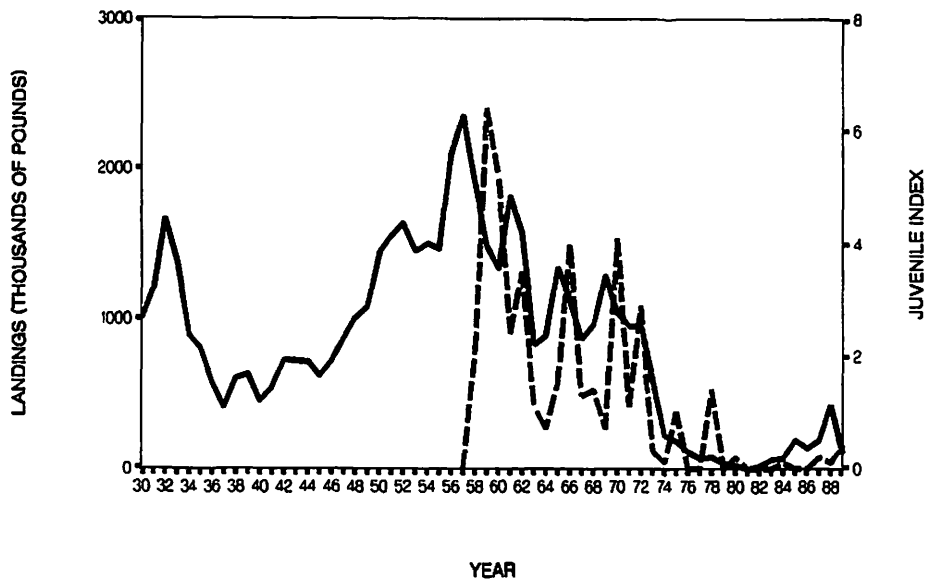
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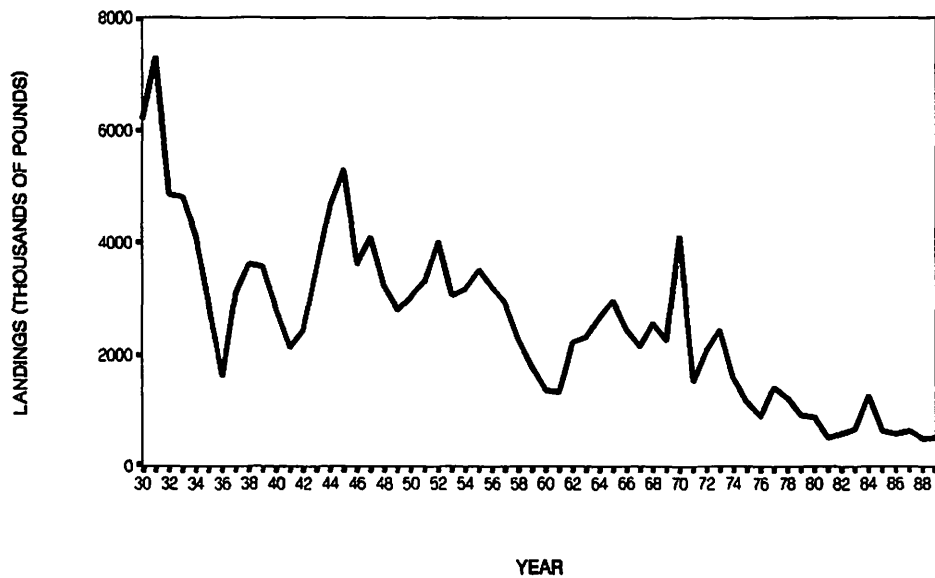
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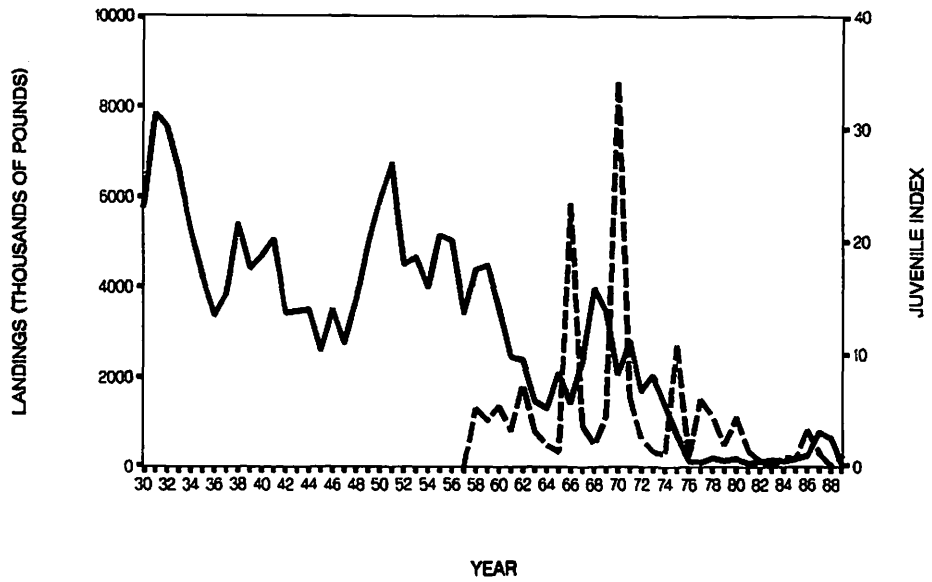
MARYLAND AMERICAN SHAD COMMERCIAL LANDINGS and JUVENILE INDEX



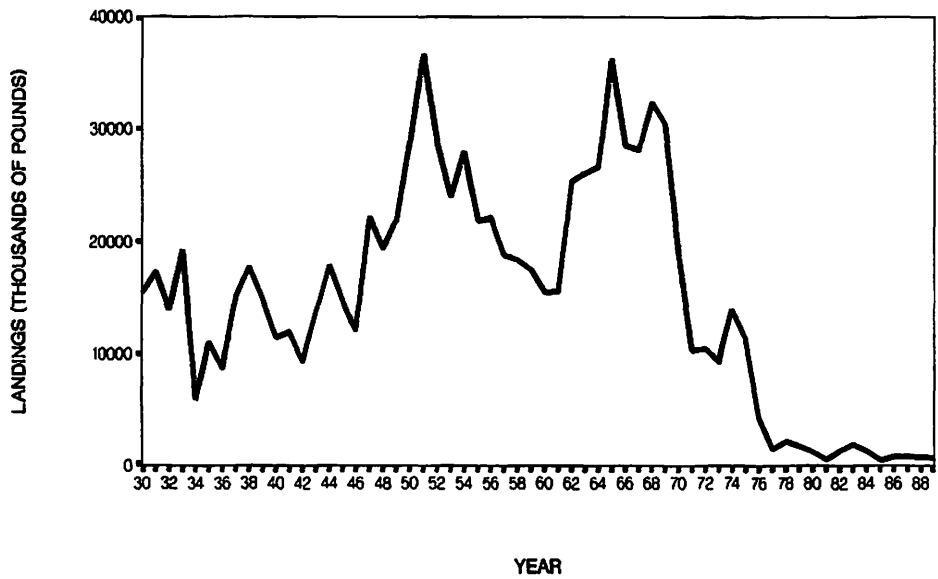
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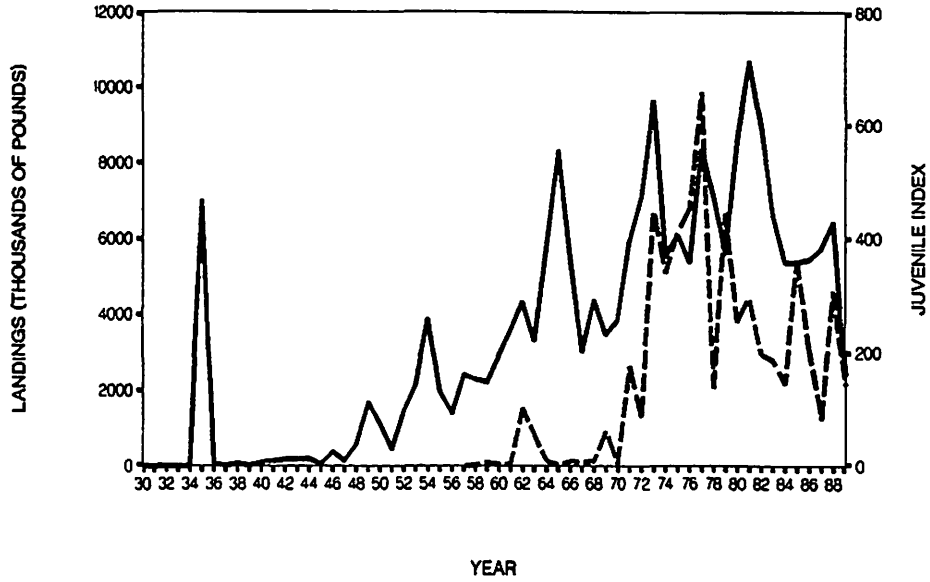
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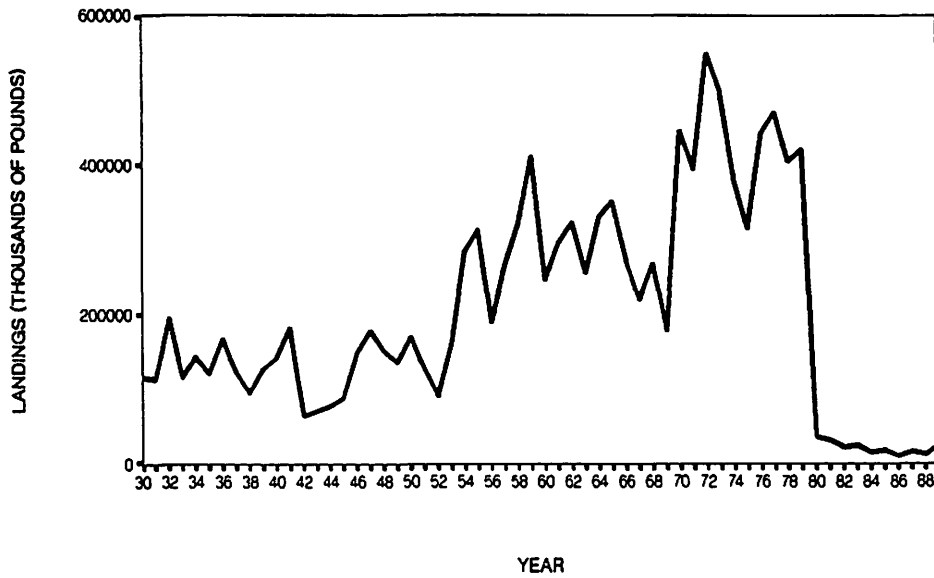
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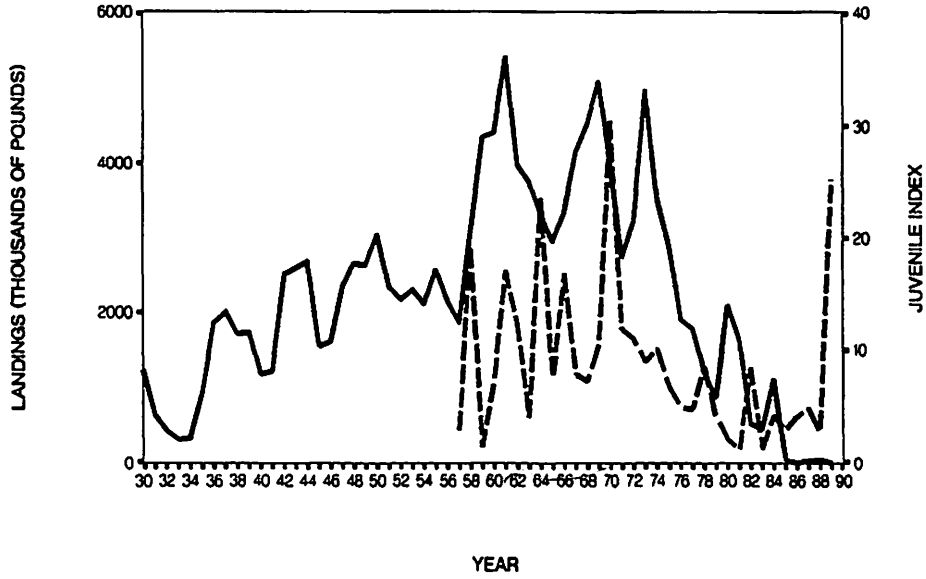
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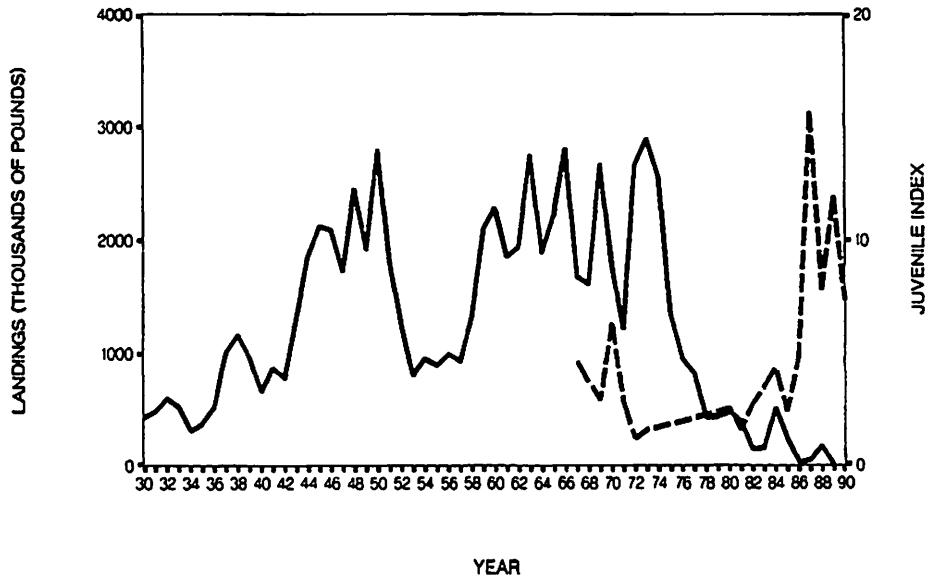
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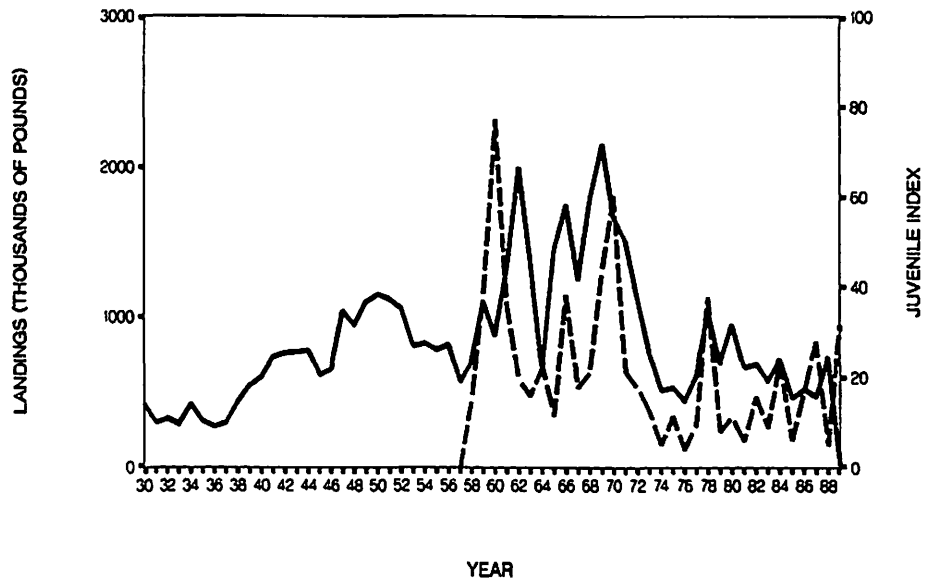
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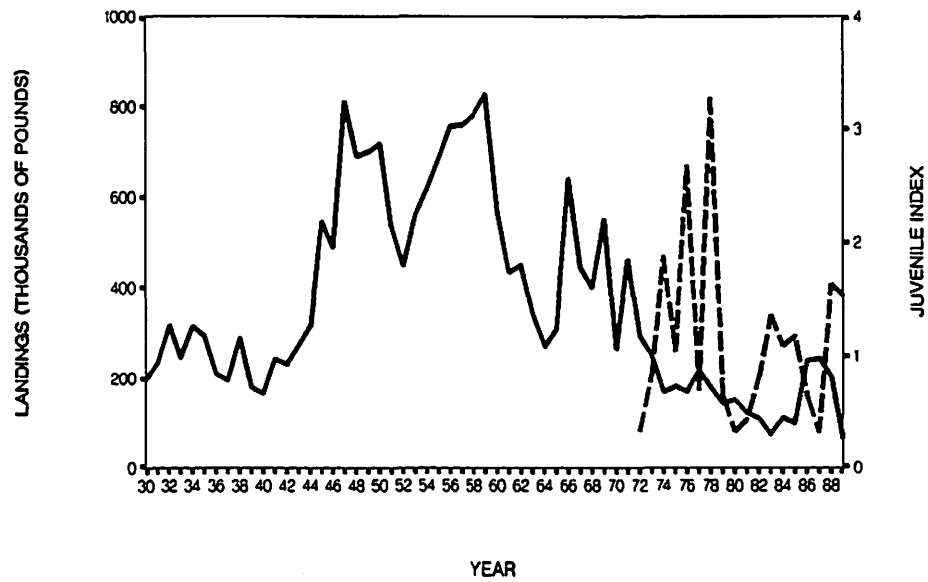
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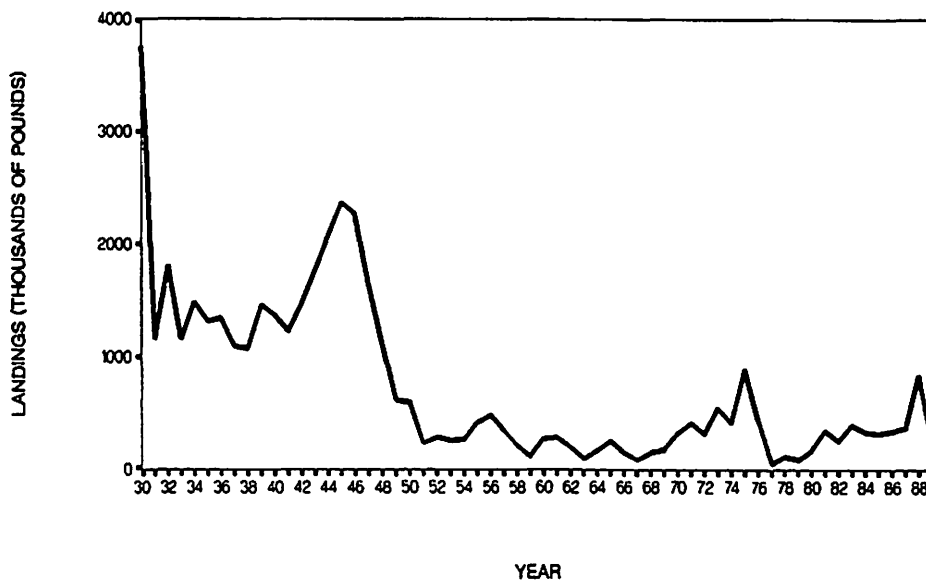
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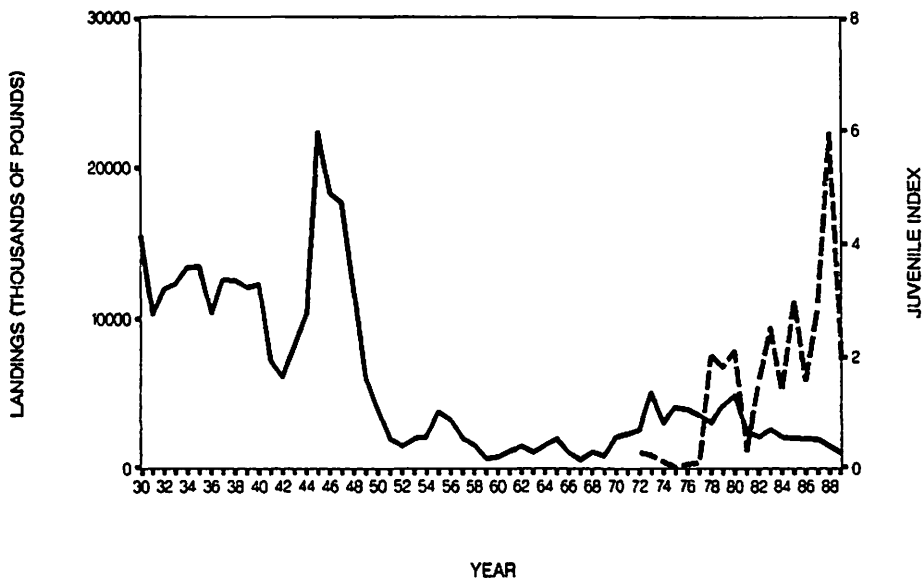
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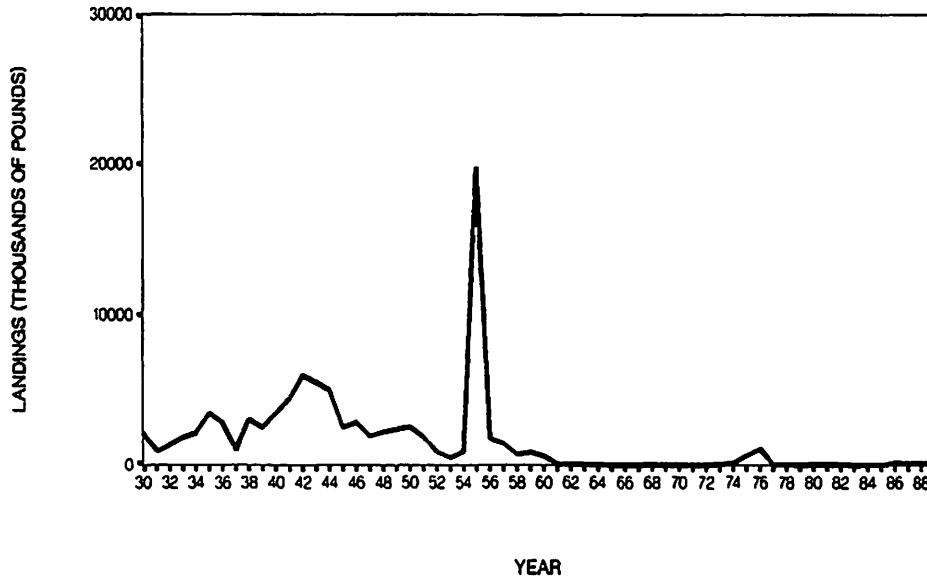
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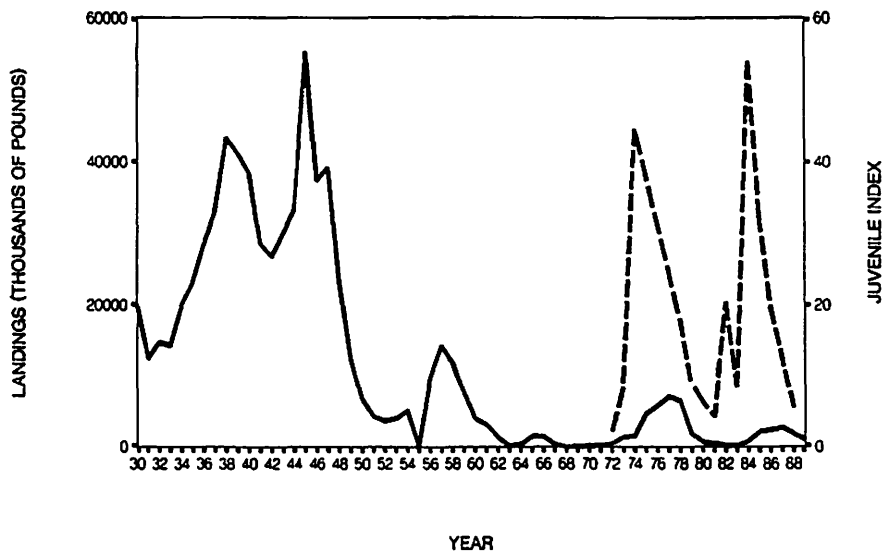
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MARYLAND CROAKER COMMERCIAL LANDINGS

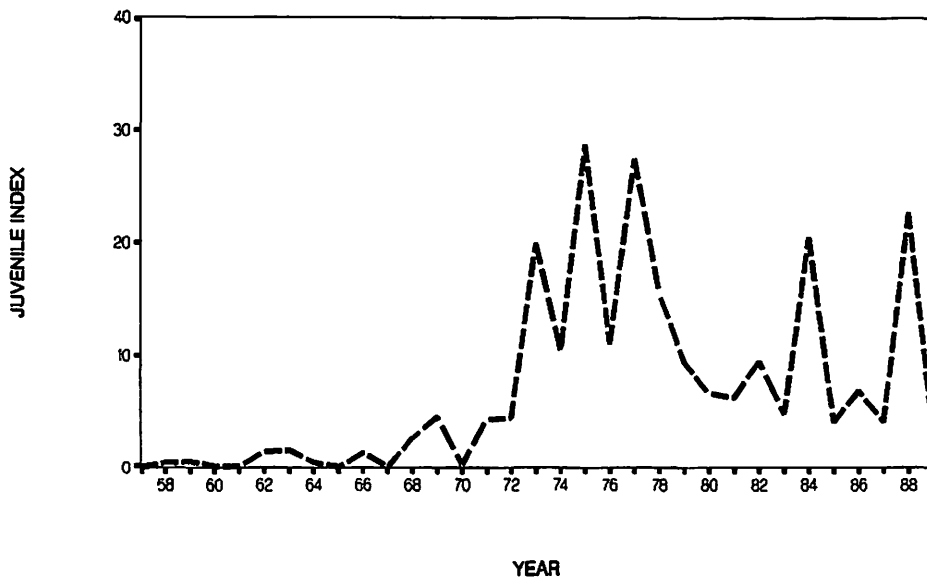


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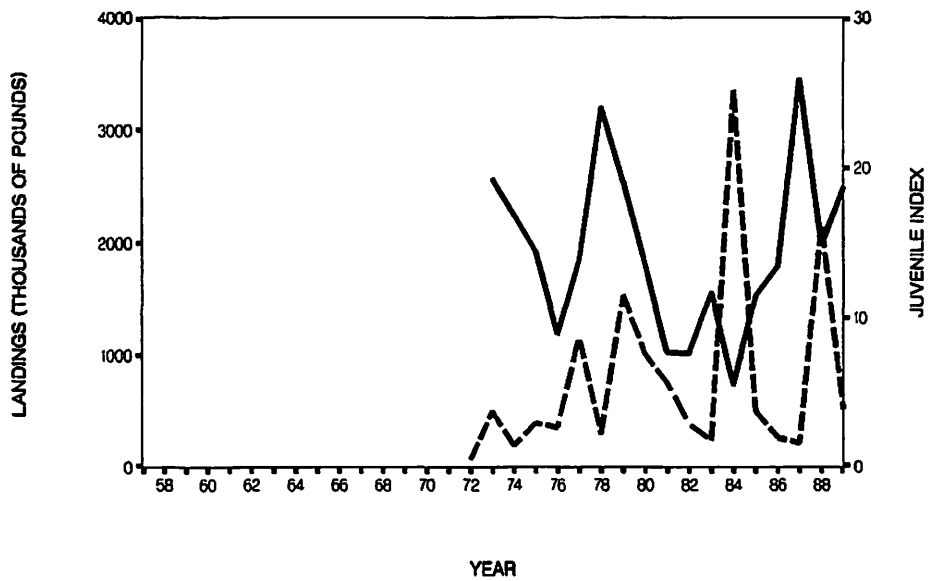


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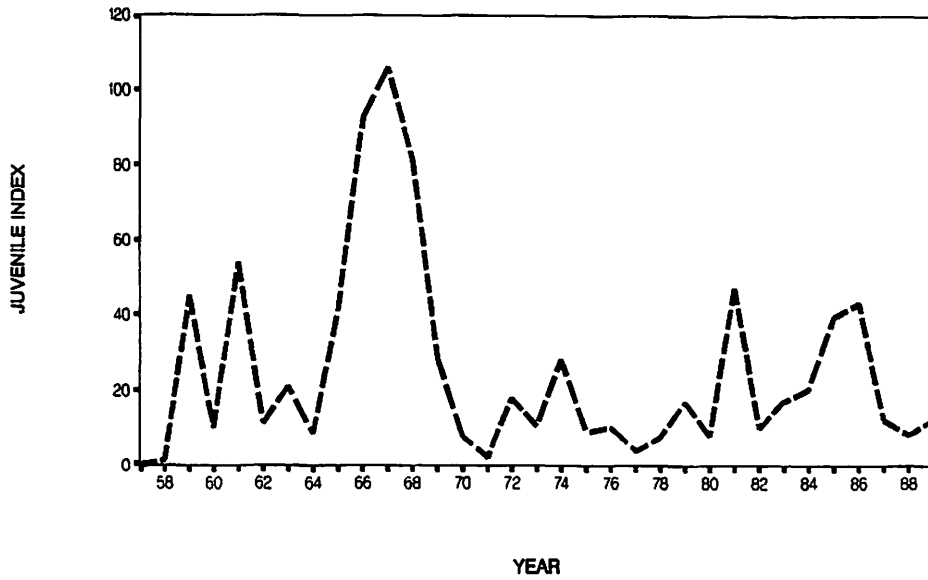
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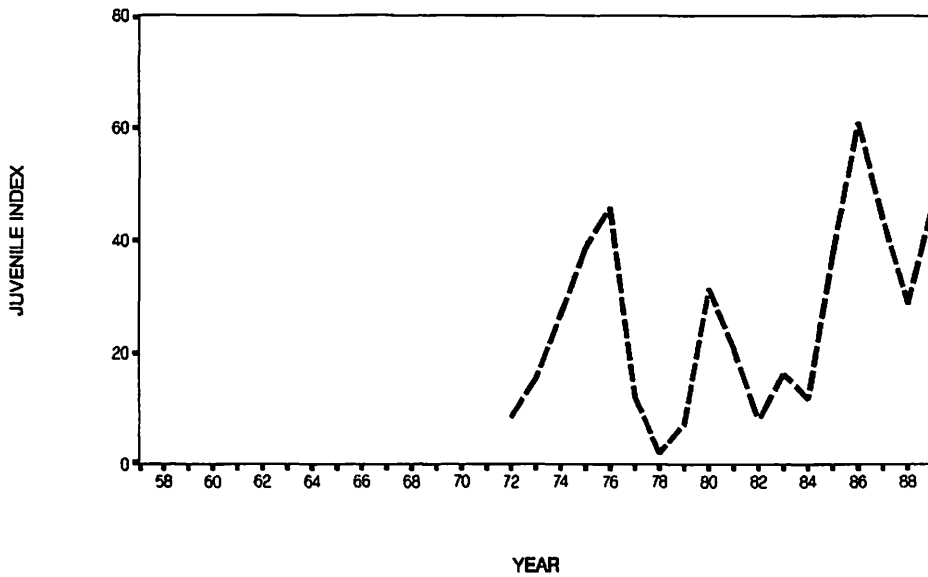
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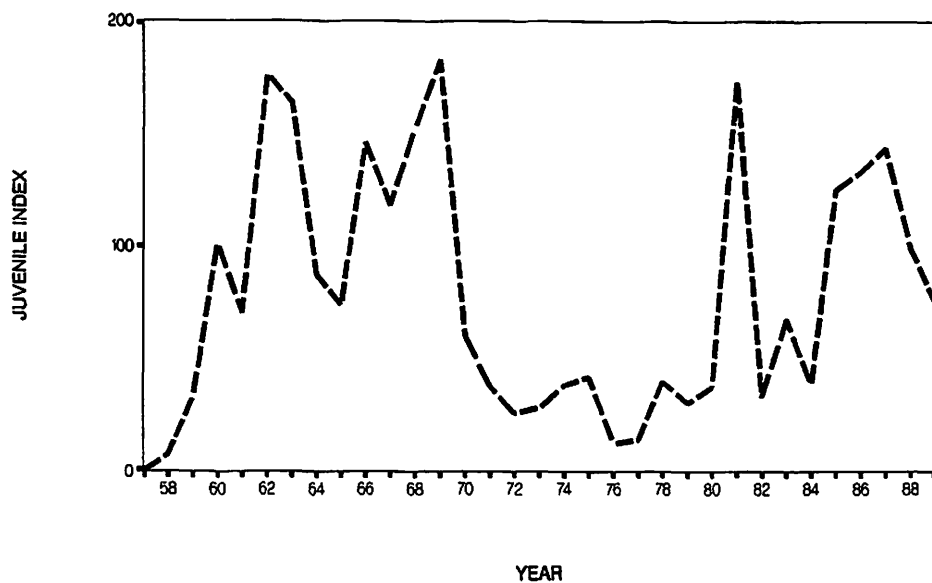
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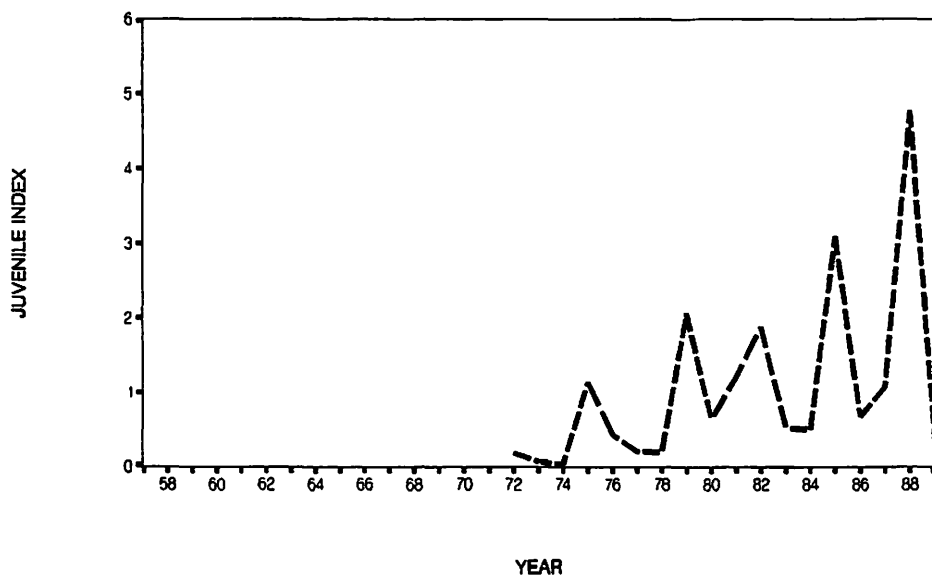
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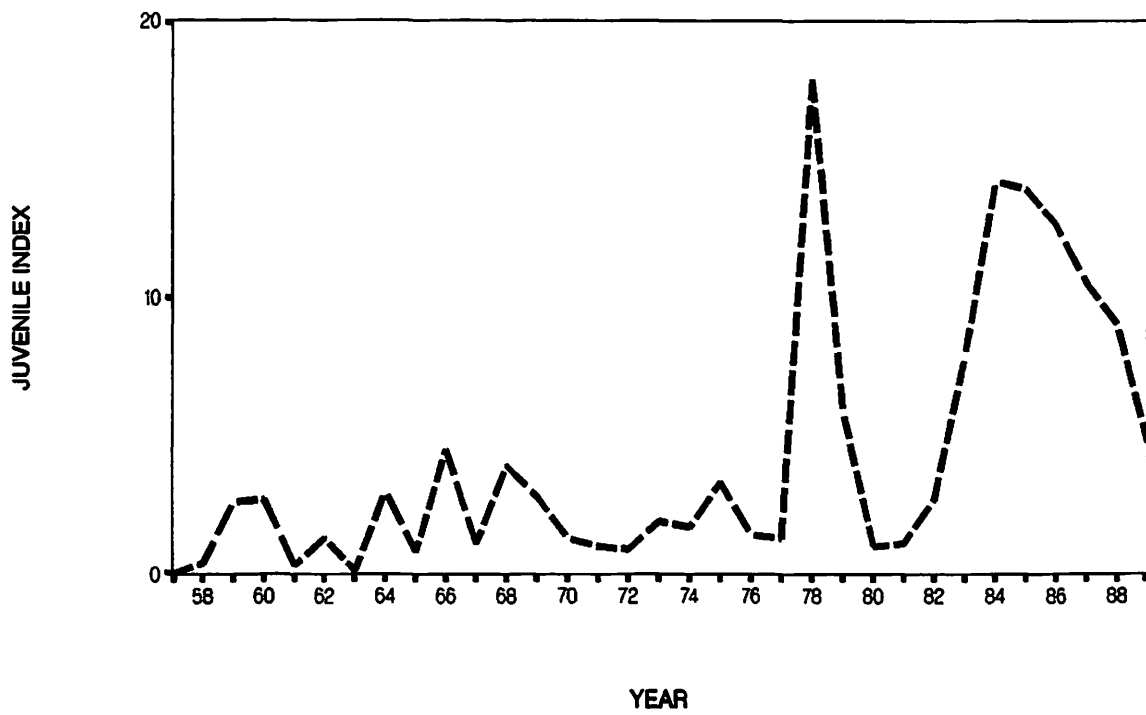
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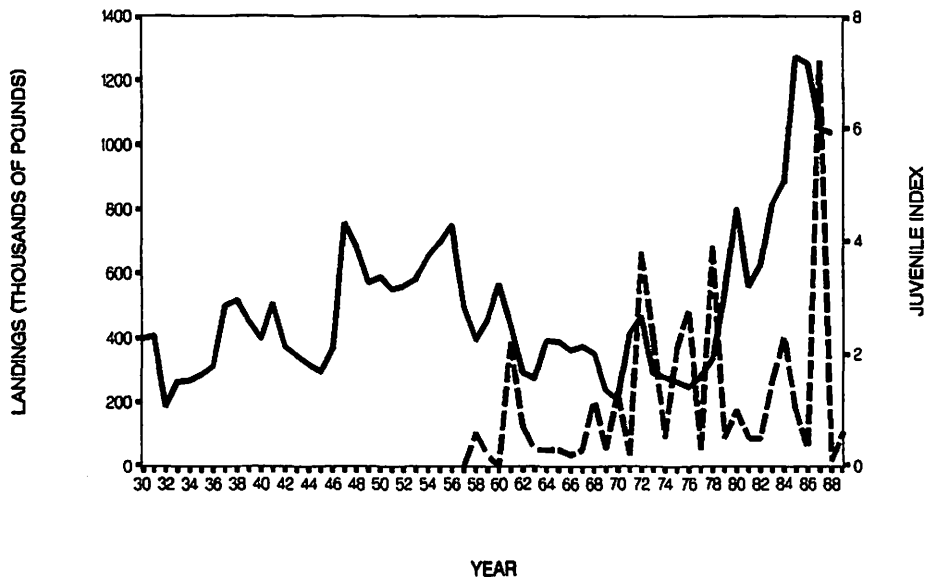
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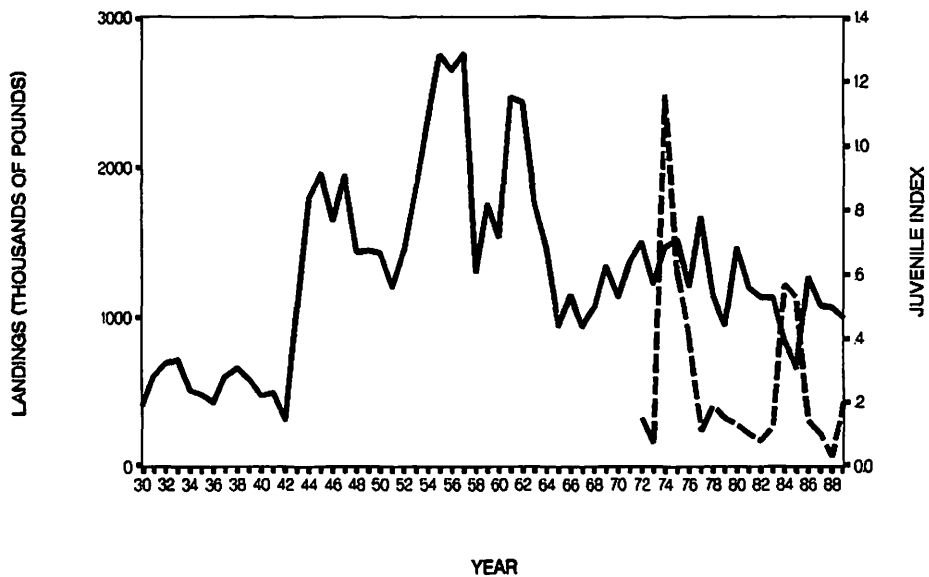
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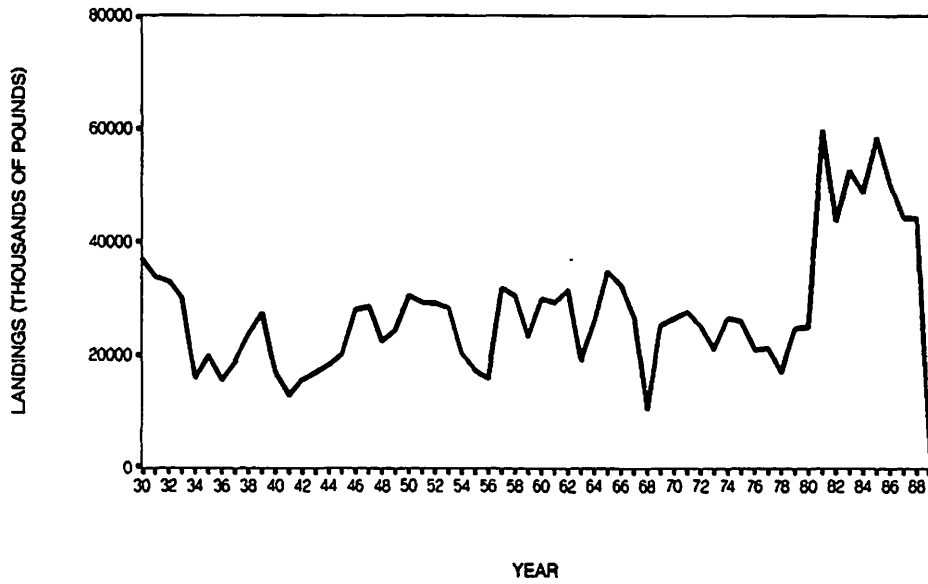
MARYLAND CATFISH COMMERCIAL LANDINGS and JUVENILE INDEX



VIRGINIA CATFISH COMMERCIAL LANDINGS and JUVENILE INDEX



MARYLAND BLUE CRABS COMMERCIAL LANDINGS



VIRGINIA BLUE CRABS COMMERCIAL LANDINGS and JUVENILE INDEX

