

Figure 17. Total number of fishing licenses sold in Nova Scotia, 1966 - 92.

**NO. OF SPECKLED TROUT PER ANGLER**  
**DATA FOR NOVA SCOTIA 1966 - 1992**

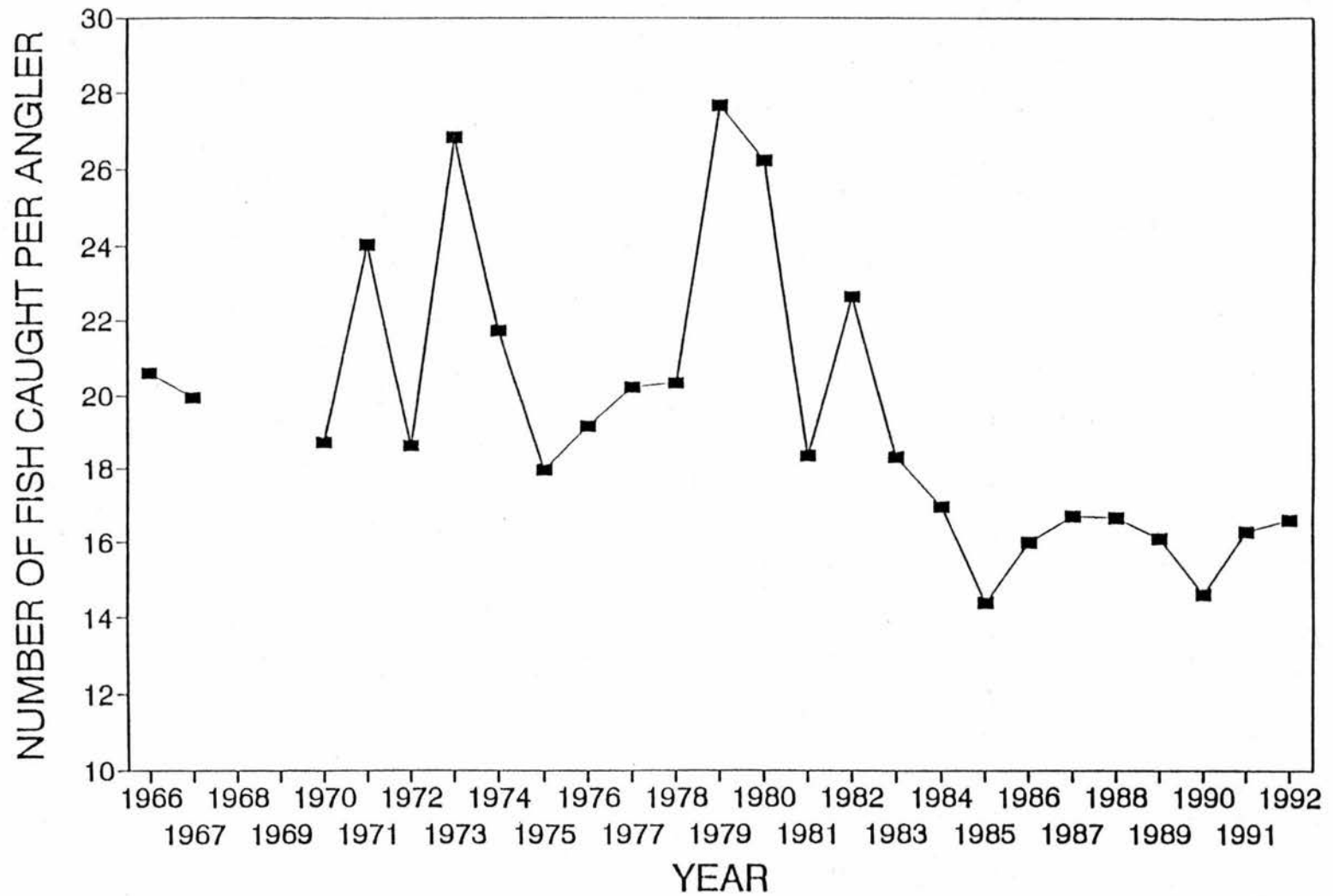


Figure 18. Number of speckled trout caught per licensed angler in Nova Scotia, 1966 - 92.

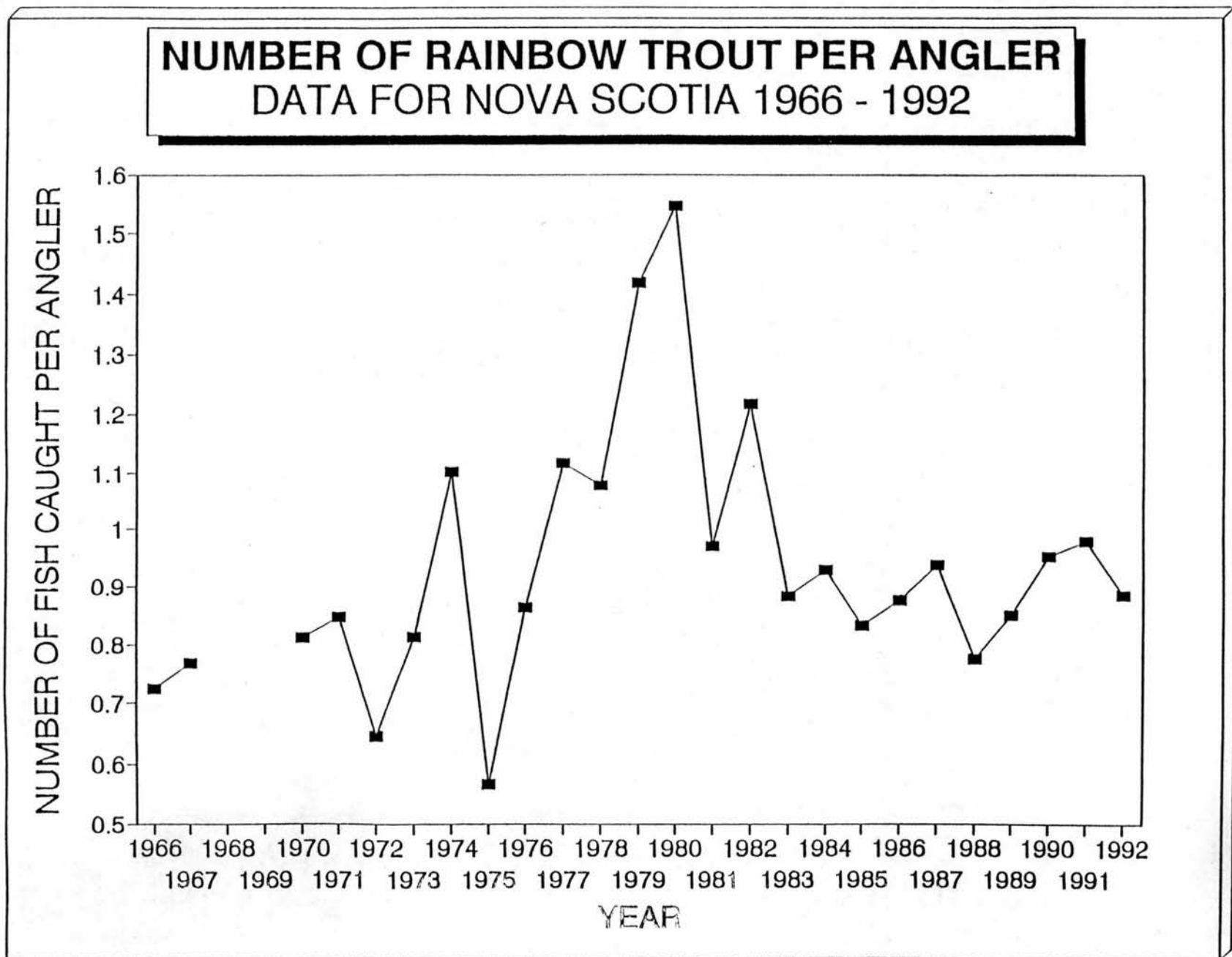


Figure 19. Number of rainbow trout caught per licensed angler in Nova Scotia, 1966 - 92.

## NUMBER OF BROWN TROUT PER ANGLER DATA FOR NOVA SCOTIA 1966 - 1992

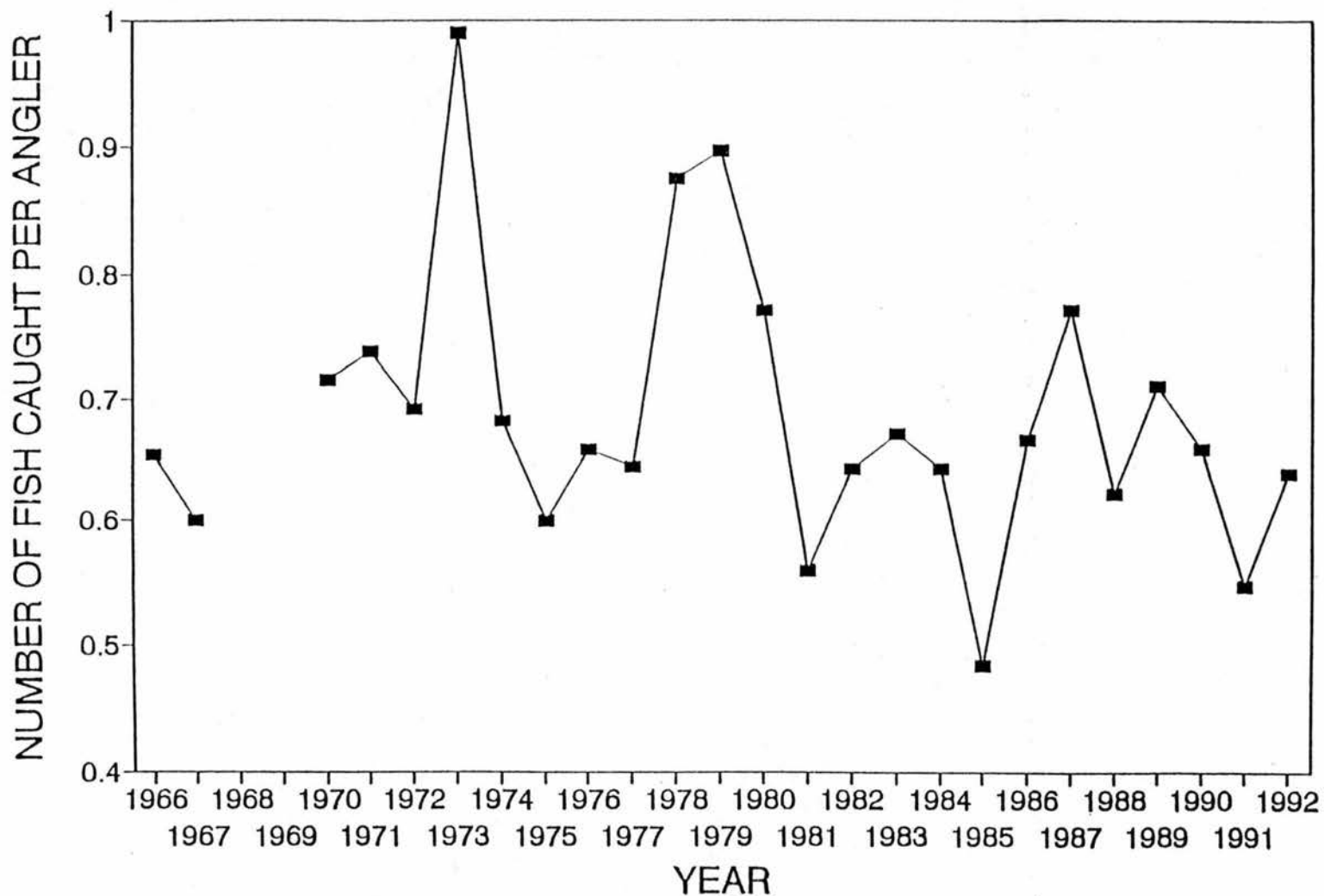


Figure 20. Number of brown trout caught per licensed angler in Nova Scotia, 1966 - 92.

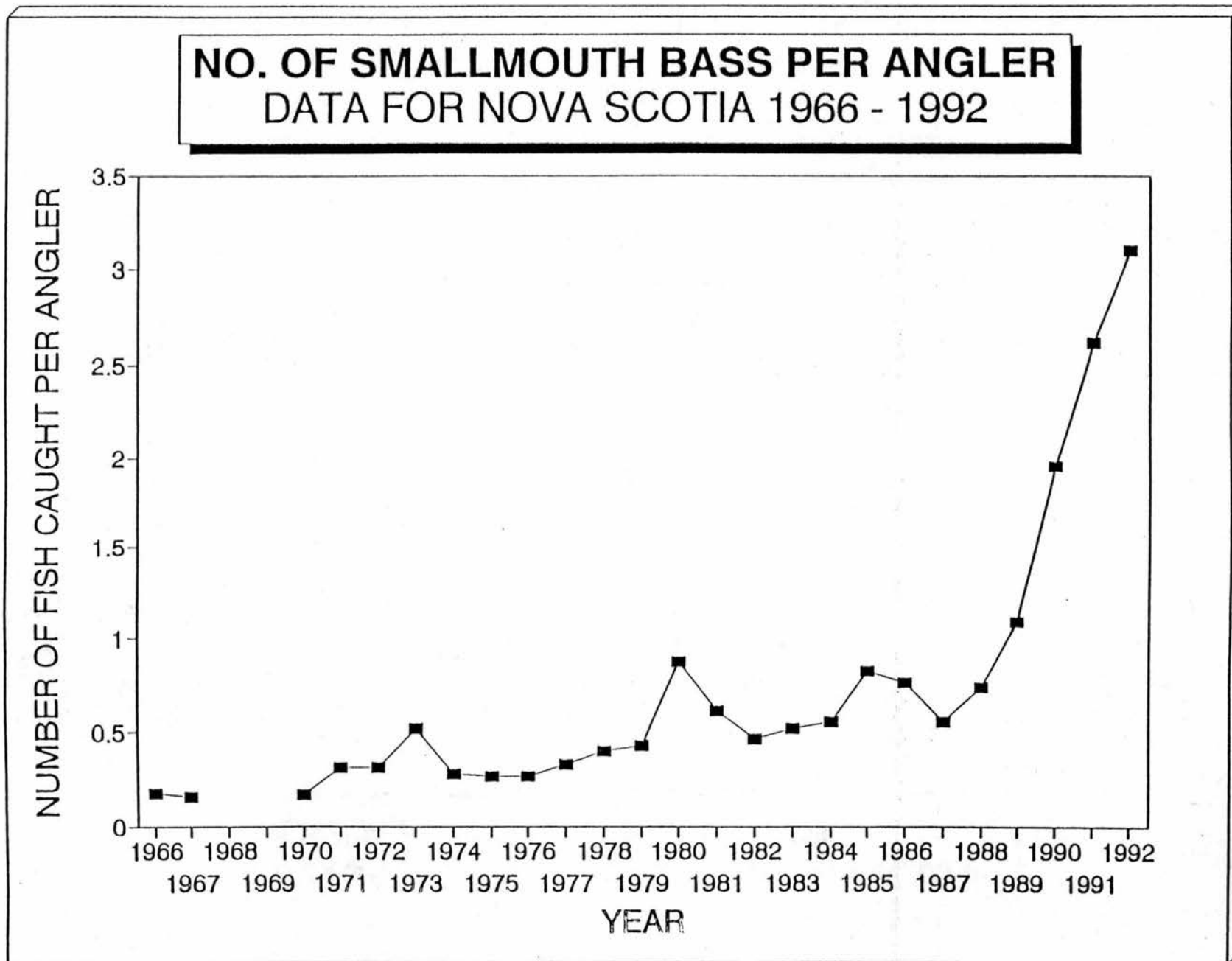


Figure 21. Number of smallmouth bass caught per licensed angler in Nova Scotia, 1966 - 92.

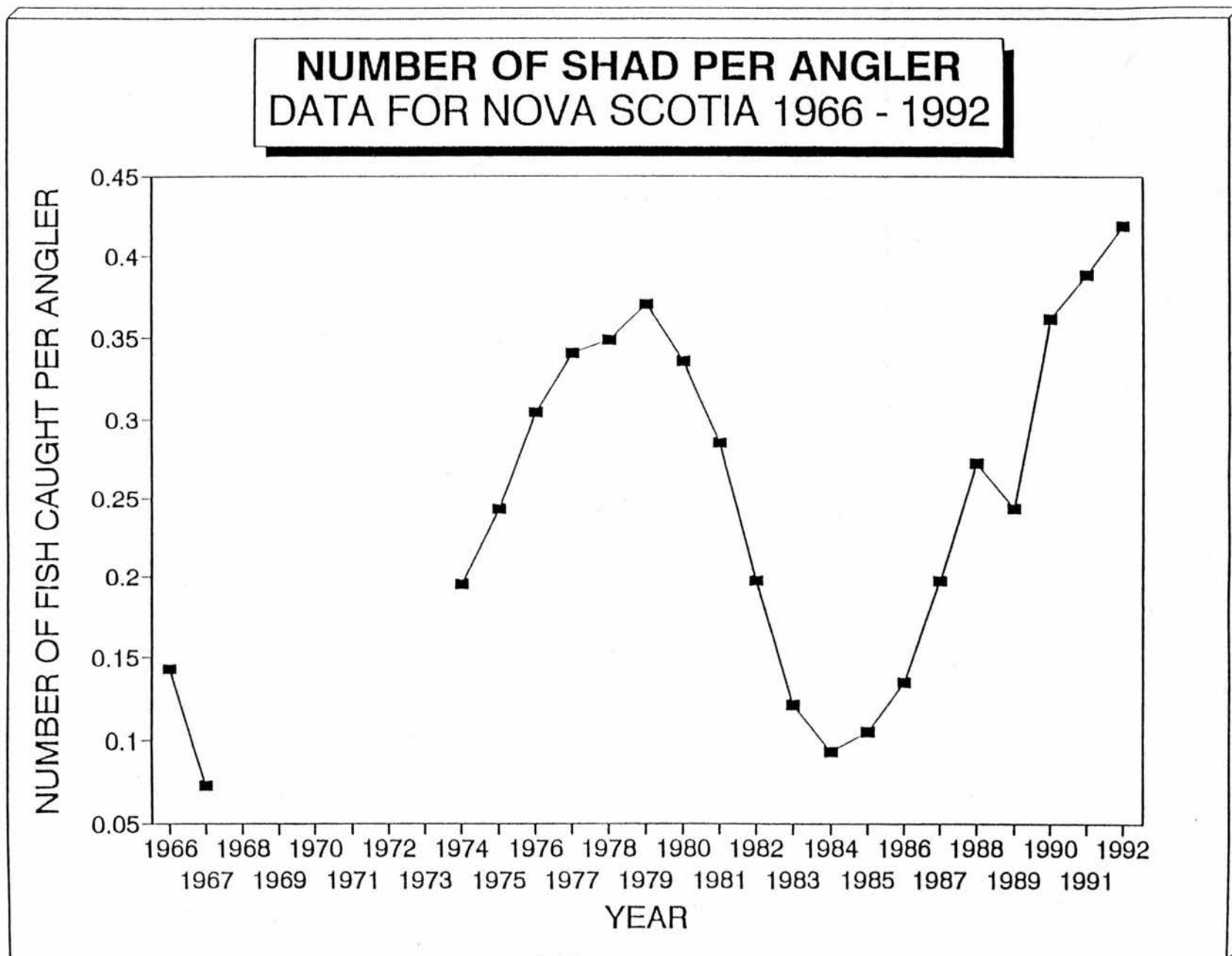


Figure 22. Number of shad caught per licensed angler in Nova Scotia, 1966 - 92.

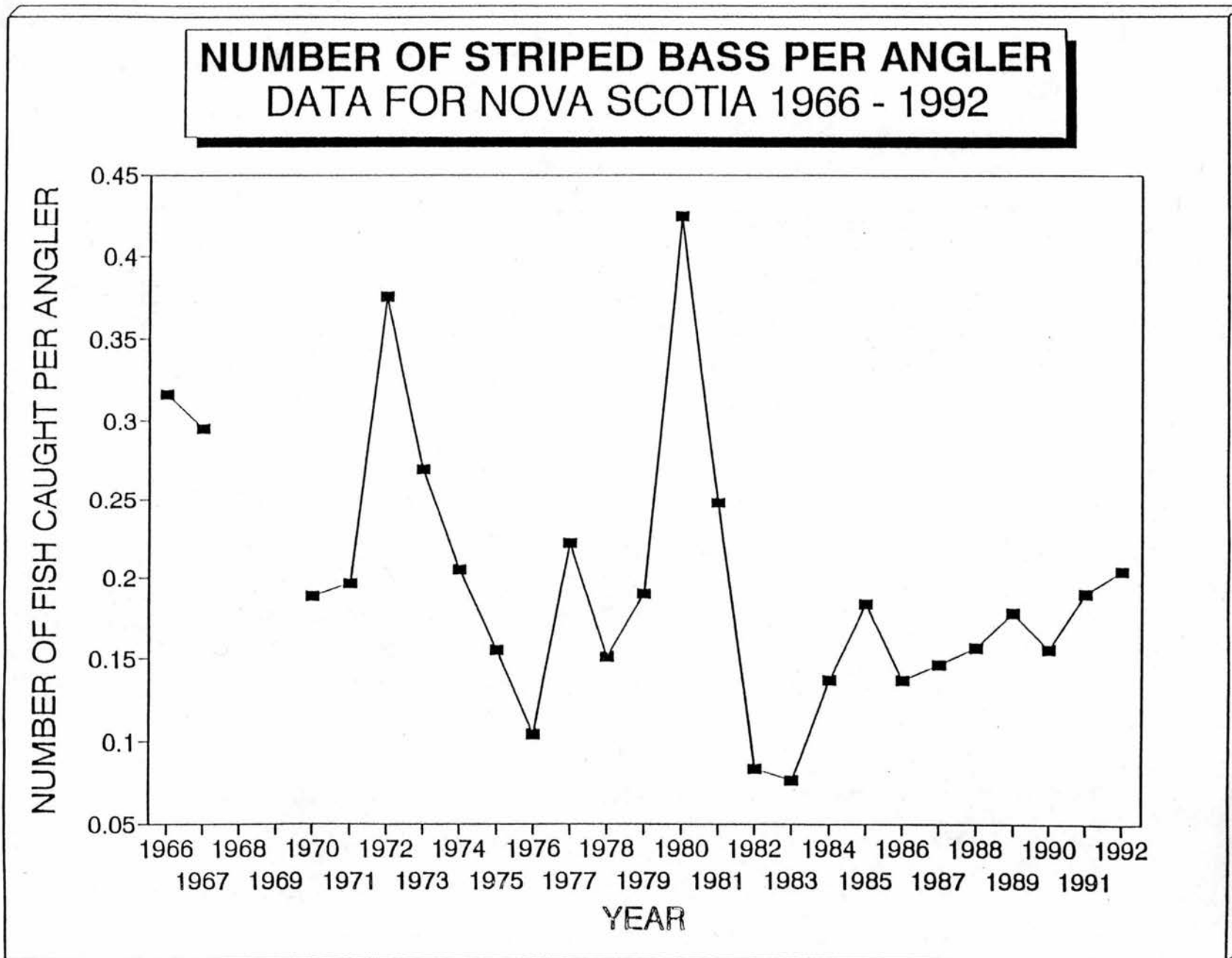


Figure 23. Number of striped bass caught per licensed angler in Nova Scotia, 1966 - 92.

**NUMBER OF YELLOW PERCH PER ANGLER**  
**DATA FOR NOVA SCOTIA 1966 - 1992**

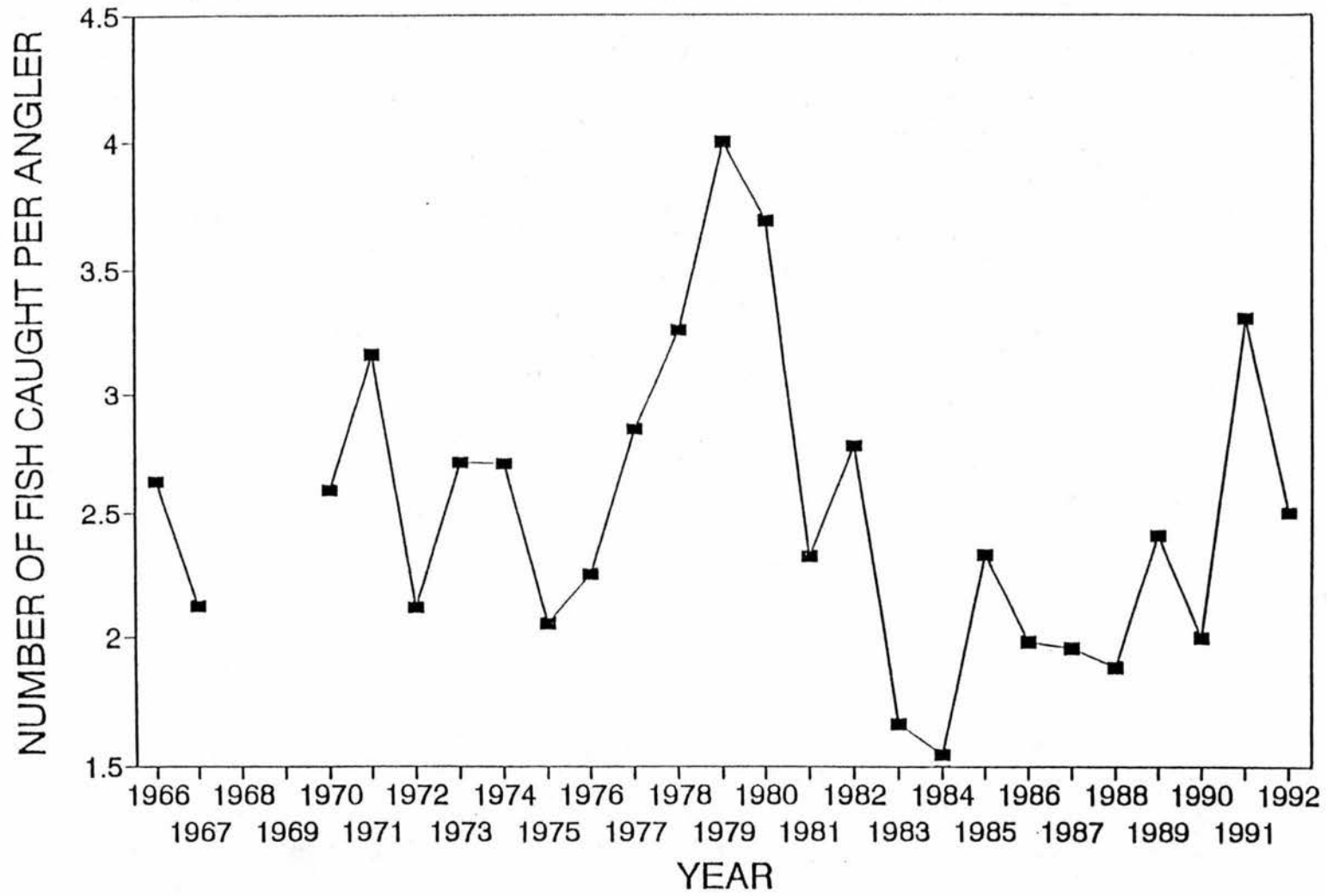


Figure 24. Number of yellow perch caught per licensed angler in Nova Scotia, 1966 - 92.

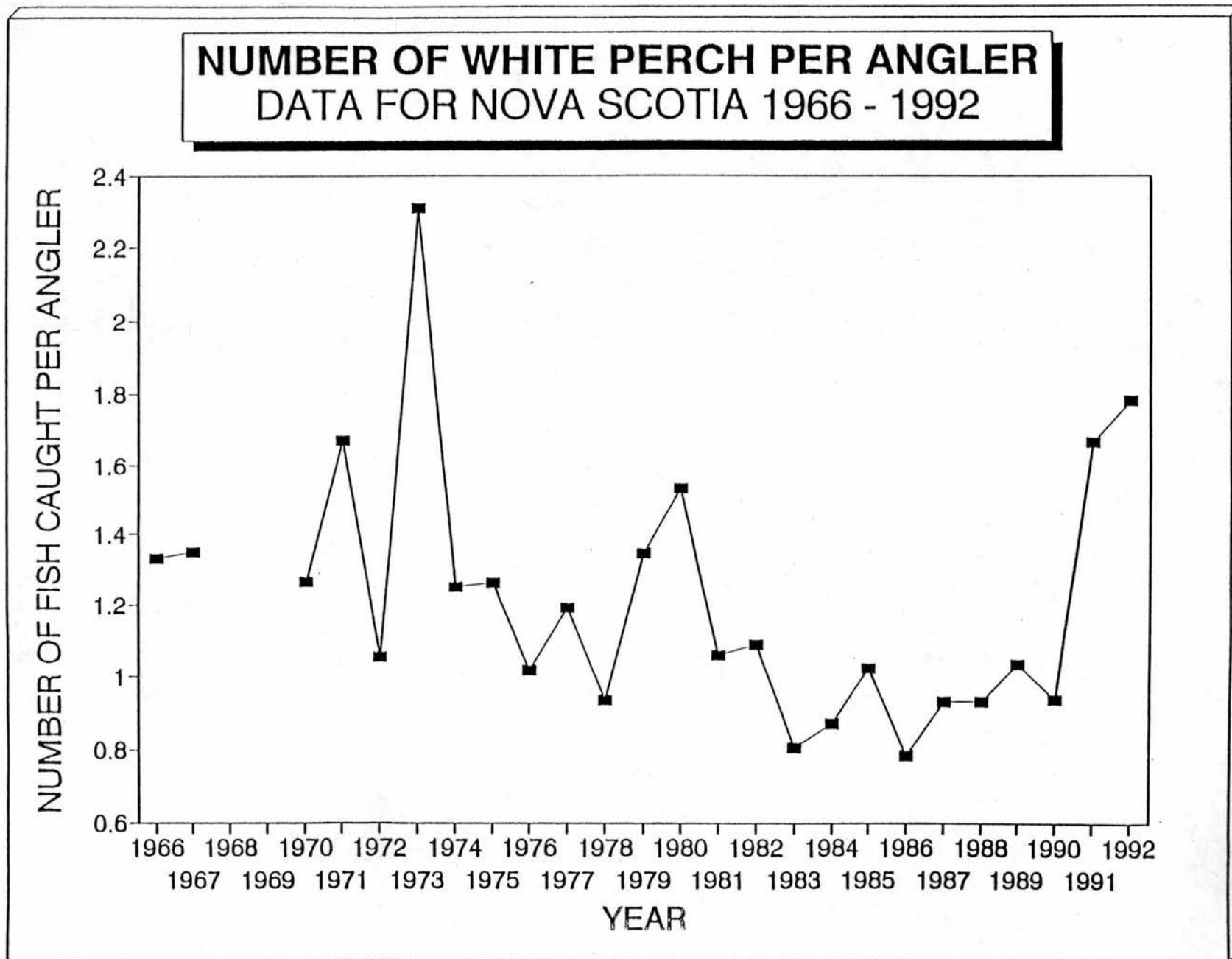


Figure 25. Number of white perch caught per licensed angler in Nova Scotia, 1966 - 92.

## Overview of Stakeholder Recommendations for RFA 1, 2, 3, 5

The following concerns were raised by stakeholders regarding the recreational fisheries in Nova Scotia. Native species such as speckled trout, Atlantic salmon and other fisheries resources have declined as a result of overharvest, habitat degradation, inadequate/fragmented management, inadequate enforcement, lack of conservation oriented angler attitudes, increased public access to the resource, and resource user conflicts. Other concerns included the need to control the introduction of exotic species, lack of education and promotion of angling for non-traditional species, lack of recognition on the part of resource users and governments of the value of the recreational fishery, lack of understanding of the roles and responsibilities of different government agencies, lack of cooperation and coordination between government agencies, and lack of staff and resources assigned to inland recreational fisheries management, enforcement and enhancement. **Stakeholders identified the need for conservation, better management of fisheries resources, better enforcement, implementation of more restrictive harvest control regulations, establishment of "no-kill" zones (catch and release) and sanctuaries, reduced access to the resource in designated areas, improvement in fish habitat/resource databases and the sharing of this information, more applied research, increased and improved stock assessments of all recreational fisheries, development of comprehensive watershed management plans, resolution of jurisdictional issues through the development of agreements or M.O.U.'s, increased involvement of native and non-native community groups in management (co-management), fish habitat restoration/improvement, resource enhancement, provision of advice to stakeholders so that their involvement is focused and effective, improved education and public awareness, establishment of long-term funding mechanisms, development of mechanisms to allocate fiscal resources, development of bio-economic models to assess and evaluate projects as well as the overall strategic development plan.**

An overview of stakeholder recommendations for RFA 1, 2, 3, 5 are outlined in the following section.

- DFO has undertaken a comprehensive approach to Atlantic Salmon Management in Nova Scotia and DFO should continue with these initiatives including the improvement of its stock assessment modeling methodology. Suggestions were advanced by many stakeholders that a multi-species approach is needed in recreational fisheries management.
- NSDOF prepared a Recreational Fisheries Management Plan in 1990 and proposed a series of regulation changes province-wide as a result of extensive consultation with stakeholders. Many aspects of this plan and their proposed regulation changes were summarized in this report which

should be implemented in the context of a multi-species approach to recreational fisheries management in Nova Scotia.

- In view of the priority which should be given to stock management, conservation, natural reproduction, resource limitations and the decline in recreational fisheries resources, more restrictive regulations were recommended by many stakeholders as an important first step in conserving and rebuilding the recreational fishery across the province. Education should be used to change angler attitudes in Nova Scotia from the number of fish captured and killed to improving the angling experience. The fishery resource cannot continue to be perceived as a "meat" fishery by anglers, but rather as an opportunity to enjoy the sport and outdoor experience.
- Attractive educational brochures should be prepared to accompany licenses sold which would emphasize conservation, the biological rationale for regulations, general biology of the different species, gear options, and an outline of research and development projects underway in each RFA.
- Videos should be prepared for television viewing (sport fishing shows) and for use by NSDOF, DFO, ASF Co-ordinators, and stakeholders (watershed groups) on general biology, conservation and recreational fishing of traditional and non-traditional recreational species.
- Enforcement of inland recreational fisheries is currently inadequate. Without major changes and improvement in enforcement efforts, (currently fragmented and constrained by inadequate resources), stakeholders suggested that some anglers would continue to disregard fishing regulations and would overexploit the fishery resource. The stakeholders suggested that a single Inland Recreational Fishery Conservation Unit be established comprised of highly trained select staff from DFO, NSDOF, NSDNR and Native people to enforce fishing regulations, collect catch/effort statistics, carry out watershed surveillance regarding habitat infractions, promote conservation, public awareness and education, and present a highly visible presence in the most significant recreational fishing areas during the fishing season and spawning period (i.e. April - November). Some stakeholders suggested that this Inland Recreational Fishery Conservation Unit could report to a Chief, Recreational Fishery Conservation who would be responsible to the lead government agency (DFO or NSDOF). A working group (DFO, NSDOF, NSDNR, DOE, NSDOE) should study or be assigned the task of examining this option, preparing cost estimates and recommending options to the current system.
- Although the Inland Conservation Officers would work out of different locations they should have sophisticated communications equipment, use distinct vehicles and wear distinctive uniforms for the period of time they are assigned to the Inland Conservation Unit. At the end of each season

they would return to their normal fisheries duties in other sectors of the fishery (DFO) or participate in enforcing wildlife regulations (NSDNR).

- Resources to establish this force could be comprised of modest staff allocations from DFO, DOE, NSDOF, NSDNR, NSDOE in each RFA with an increase in the number of Native Conservation Officers. These arrangements could be achieved as part of the M.O.U.'s signed between the primary government agencies. Modest fiscal resources could also be allocated from within these agencies which should be complemented with agreements with the agriculture, forestry, hydro, and private industry which impact on water resources and fisheries. These fiscal resources could be partially supplemented through allocation of funding from the Canada-Nova Scotia Cooperation Agreement on Recreational Fisheries and long term funding mechanisms initiated as part of the strategic development plan.
- Guidelines for enhancement of the habitats of individual species throughout their life history stages should be established. The Adopt-a-Stream manual should be updated.
- To reduce angler exploitation more "no-kill" zones and sanctuaries should be established in each RFA.
- Access to the resource particularly in isolated areas should be controlled.
- Establishment of better fish habitat and resource databases should be a priority.
- Increased and improved stock assessments on all recreational fish species should be implemented using an index system in each RFA.
- Comprehensive watershed management plans need to be developed.
- More emphasis should be placed on fish habitat improvement, resource enhancement and fisheries regulations which complement the aforementioned initiatives to maximize fish production benefits.
- Plans to develop the recreational fishing industry should be initiated to improve economic benefits from the program. In the beginning, emphasis should be placed on private U-Fish operations, non-traditional species and native species in lakes/rivers where stock assessments or other data identify surpluses to spawning requirements.

- Cooperation and streamlining of all initiatives under the Agreement should be the underlying theme of the strategic development plan.

## Recreational Fishing Area 1

RFA 1 encompasses the counties of Inverness, Victoria, Cape Breton and Richmond in Cape Breton Island. Inverness County occupies the western half of Cape Breton on the coast of the Gulf of St. Lawrence, St. Georges Bay and the Canso Causeway. Victoria County occupies the southeastern section of the Cape Breton Highlands and is bordered on the south by the Bras d'Or Lakes. Cape Breton County is the most easterly of the counties. Richmond County is in the southeast of the island and borders Chedabucto Bay and the Atlantic. The Zone is 10,165 square kilometers in area (1,016,500 ha) or 19.2 % of Nova Scotia, and accounts for about a fifth of the Province's population. The Island is rectangular in shape and is separated from mainland Nova Scotia by the Strait of Canso.

Three-quarters of the land in RFA 1 is forested, divided almost equally between softwood, hardwood and mixed wood stands. Flowing or standing water accounts for about 10% of the area.

The region has a complex geological structure but points of significance include the presence of Precambrian uplands of igneous and metamorphic rocks including principally the Northern plateau which contains the Cape Breton Highlands, as well as the soft sedimentary rocks that make up the offshore Sydney coal field and dominate on shore in the region from Sydney to Scaterie Island.

Soils in the northern counties of Inverness and Victoria are mainly shallow, stony humic podzols, but luvisols and loamy podzols occur in the southwest portions of Inverness County. The other counties contain a mix of luvisols and loamy podzols to shallow, stony to deep, loamy podzols. Land drainage throughout RFA 1 varies from excellent (Victoria and Inverness Counties) to moderate (Richmond County, eastern section of Cape Breton County). Numerous peatlands occur in the southern and eastern areas of RFA 1.

Acidity in lake water is not a problem throughout most of RFA 1, with readings remaining above pH 6.0. Lakes in the vicinity of Sydney display the greatest acidity.

### *Land Ownership*

About a third of the area of RFA 1 is owned by the province of Nova Scotia and about ten per cent is owned by the federal government (Cape Breton Highlands National Park, Louisbourg Historic site). Most of the remaining land is classified as small private ownership.

Seven First Nation reserves totaling 62 square kilometers (6,200 ha) occur in RFA 1: Cape Breton County (Caribou Marsh 29, Eskasoni 3 & 3A, Memberton 28b); Victoria County (Wagmatcook 1); Richmond County (Chapel Island 5); and Inverness County (Malagawatch 4, Whycocomah 2).

### ***Population Distribution***

Population of RFA 1 (Cape Breton Island) was 166,116 (1986 census) and was declining slightly. Most of the population is urban (58.5%), reflecting the high population density in Cape Breton County. Outside Cape Breton County, rural dwellers make up from 71.7 to 99.0 % of the population. Unemployment is high, (approx. 25%) throughout much of the area.

The main population centres are : Inverness County (Port Hawkesbury, Cheticamp, Grand Etang, Mabou, Belle-Marche and Margaree); Cape Breton County (Dominion, Glace Bay, Louisbourg, New Waterford, North Sydney, Sydney and Sydney Mines); Richmond County (Arichat, Louisdale, River Bourgeois, and St. Peters); Victoria County (Baddeck, Dingwall, Ingonish and Neils Harbour).

### ***Economic Profile***

Both the primary forestry sector and the primary fishery and fish processing are prime employers in the region. Coal and gypsum are major mineral resources. Tourism is an important part of the economy in most parts of RFA 1. The Cape Breton Highlands National Park and scenery along the Cabot Trail in Inverness and Victoria Counties, as well as the Louisbourg National Historic Site, attract significant tourism and recreational activity.

Within RFA 1, Inverness County has the largest agricultural areas as well as land under crops and pasture, and the largest area of woodland. In RFA 1 as a whole, the majority of farms are for dairy, cattle, hogs and sheep, and miscellaneous specialty items. Ocean fisheries are important, and landed values were \$78.2 million in 1989 or 17.9 % of the Nova Scotia total. Some 4,200 fishermen are active in the fishery (1989), about one-quarter of the Nova Scotia total. Forest production in 1988 accounted for about 2.6% of sawn softwood, 15.5% of sawn hardwood lumber and about 10% of pulpwood production in Nova Scotia.

### ***Industrial Activities Profile***

Manufacturing occupied a relatively small part of the overall economic mix, in 1986 employing approximately 3,600 workers, generating salaries of \$79 million and sales of \$390 million. Most of the labour force in RFA 1 is engaged in community, business and personal services, followed by trades, primary resource industries, and manufacturing.

### *Recreational Activities Profile*

Tourism in the Cape Breton Region netted about \$138.6 million in 1983, representing over a fifth of the Province's tourism revenues. Cape Breton Highlands National Park and the Cabot Trail attract a wide variety of outdoor enthusiasts, including cyclists, kayakers, campers, hikers and backpackers. Abundant Salmon stocks combined with a wealth of unencroached rivers draw many recreational anglers to RFA 1.

The most frequented tourist destinations in RFA 1 are Cape Breton Highlands National Park, Baddeck, Cheticamp, Ingonish, and Louisbourg. Outdoors-oriented businesses operating within the Cape Breton Region include fishing outfitters, and outdoor lodges.

### *Watersheds*

The major rivers and streams in Nova Scotia are outlined in Appendix V. An inventory of existing fishways or fish passage facilities by watershed is summarized in Table 38.

RFA 1 usually receives the highest total precipitation in Nova Scotia and has an abundance of rivers and streams. The Margaree, North and Grand rivers are the most prominent rivers. The distribution of other rivers and streams are listed by county :

Inverness County: Cheticamp, Denys, Mabou, Broad Cove, Skye, Bridgend Brook, Cobb Brook, Trout Brook

Victoria County: Aspy, Baddeck, Barachois, Ingonish, Middle, Indian Brook, Middle Aspy, North Aspy, South Aspy, Clyburn Brook, Peters Brook, Warren Brook

Cape Breton County: Mira, Salmon, Sydney, Aconi Brook, Catalone Brook, Gaspereau Brook, Gerrat Brook, Lorraine Brook, Smelt Brook, S.W. Brook

Richmond County: Inhabitants, Framboise, Tillard, Irish Cove Brook, Marie Joseph Brook, McNabs Creek, Soldiers Cove Brook

### *Lakes*

The following summary of information on lakes for RFA 1 is based on data from the Nova Scotia Recreational Lakes Survey (NSRLS) (compiled by the N.S. Land Use Committee). The NSRLS profiles the recreation potential of approximately 1,200 lakes in Nova Scotia, of which there are over 6,700. Information from this inventory provides a general sense of the abundance and characteristics of lakes situated in RFA 1 relative to the other RFAs. All discussion and statistics presented are within the context of the 1,200 lakes in the NSRLS.

Table 38. Inventory of existing fishways or fish passage facilities by watershed in RFA 1.

Fishway	Watershed	County	Owner	Type	No. of Pools	Head (m)	Latitude	Longitude
Sydney River	Sydney	Cape Breton	Sydney Steel	Denil		2.13	46-05-48	60-14-54
Homeville Road	Black Brook	Cape Breton	DU	Pool & Weir	4	1.52	46-05-24	59-56-48
MacAskill Brook	MacAskill Br.	Cape Breton	Deut of Canada	Borda Pass	5	1.83	46-09-06	59-58-00
Salmon	Mira	Cape Breton	NSDOT	Culvert		.61	45-56-15	60-17-50
Sand Lake Brook	Sand Lake Brook	Cape Breton	Town of Glace Bay	Culvert		.61	46-08-12	59-55-42
McLean Brook	Mira River	Cape Breton	NSDOT	Culvert		.91	45-58-48	60-13-24
Peter's Brook	Baddeck	Victoria	DU	Pool & Weir	3	1.22	46-11-20	60-41-12
Bruce MacDonald Dam	Indian Brook	Victoria	private	Pool & Weir	3	.91	46-07-06	60-56-18
Wreck Beach Pond	Wreck Beach	Victoria	ENV. Canada	Culvert		3.35	46-45-42	60-19-30
Morrison Brook	Middle River	Victoria	NSDOT	Timber Culvert	2	.33	46-14-20	60-56-12
Gillis Pond	Bras d'Or Lakes	Inverness	private	Flap Gate		.61	45-52-09	60-55-54
Unnamed Trib.	Whycocomagh Bay	Inverness	NSDOT	Concrete Box Culvert			45-58-18	61-06-50
Grand R. Falls	Grand	Richmond	DFO	Pool & Weir	23	1.52	45-42-30	60-42-24
Shoal Lake	Lennox Passage	Richmond	DU	Pool & Weir	5	1.52	45-36-48	61-04-30

Within RFA 1 there are 116 lakes with a combined surface area of 12733 ha, representing 10% of the total lake surface area. Total length of shoreline is 420 km, about 8% of the total surveyed shoreline. Fifty of these lakes are headwater lakes. Over 90% of the lakes are accessible by road and 19% have an area for launching boats. Fishing activity on the lakes is high, with 26% of lakes having over 10 anglers at peak hours, and 4% with over 50 anglers. Several lakes located within RFA 1 are larger than 500 ha: Inverness County : L. Ainslie (5735); Cape Breton County: Belfry (552); Richmond County: Loch Lomond (671).

The Bras d'Or Lakes with a surface area of 1100 sq. km. is not a lake in the true sense but rather a large estuarine body of water. The Bras d'Or Lakes are deep (50 - 280m); four major rivers, the Middle, Baddeck, Denys and Skye enter the "Lakes". **The consultants suggest it is the single largest recreational fishery opportunity in Nova Scotia.**

### ***Fish Species Composition***

A variety of recreational fish species occur in RFA 1 among which are : Atlantic salmon, speckled trout, brown trout, rainbow trout, striped bass, smelt, gaspereau, blueback herring, American eel, shad, yellow perch and white perch. In the Bras d'Or Lakes the list of recreational species is somewhat different because of the unique salinity conditions in the lake : spiny dogfish, blueback herring, gaspereau, rainbow trout, Atlantic salmon, brown trout, speckled trout, smelt, American eel, Atlantic cod, Greenland cod, haddock, pollock, hake, striped bass, shad, mackerel, and winter flounder. The georeferenced distribution of recreational fish species in RFA 1 is outlined in Figure 26.

### ***Existing Recreational Fishing Activities***

The major recreational fishing activity in RFA 1 is speckled trout fishing which occurs mainly in the Highland lakes and numerous rivers and streams in Cape Breton Island. Atlantic salmon fishing occurs in summer in the Margaree and North rivers and in the fall in most of the major rivers listed for RFA 1. (Appendix V). The Bras d'Or Lakes provide a variety of fishing experiences in summer ranging from mackerel and groundfish angling to angling for speckled trout, Atlantic salmon, rainbow trout, and brown trout; winter ice-fishing occurs for smelt, with an illegal by-catch of rainbow trout. Figures 27 to 34 summarize sport catches from stub return data in RFA 1 and provide an overview of the number of each species caught annually as well as catch trends in the recreational fishery.

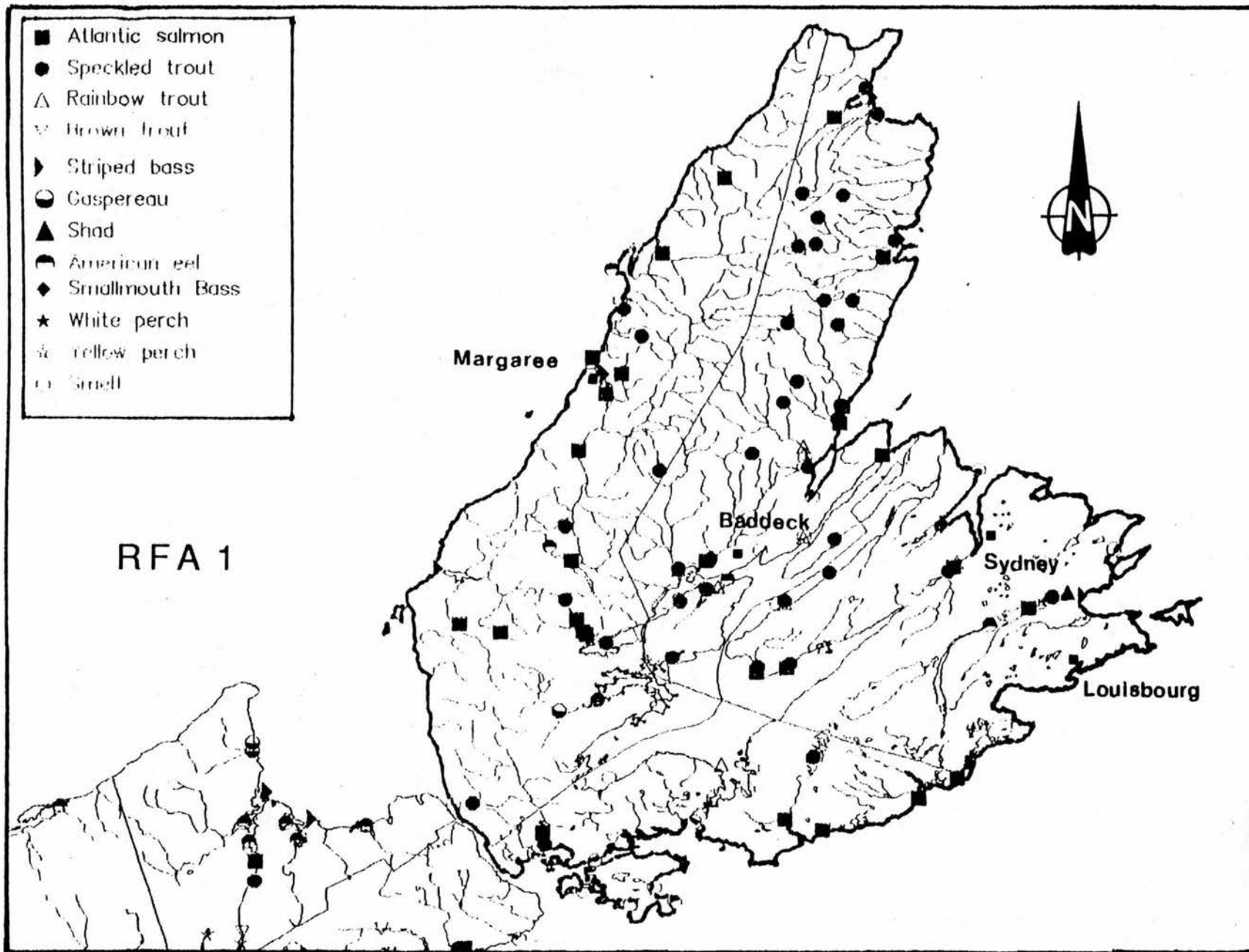


Figure 26. Georeferenced distribution profile of recreational fish species in RFA 1.

NUMBER OF SPECKLED TROUT IN RFA 1  
FROM STUB RETURN DATA 1966 - 1992

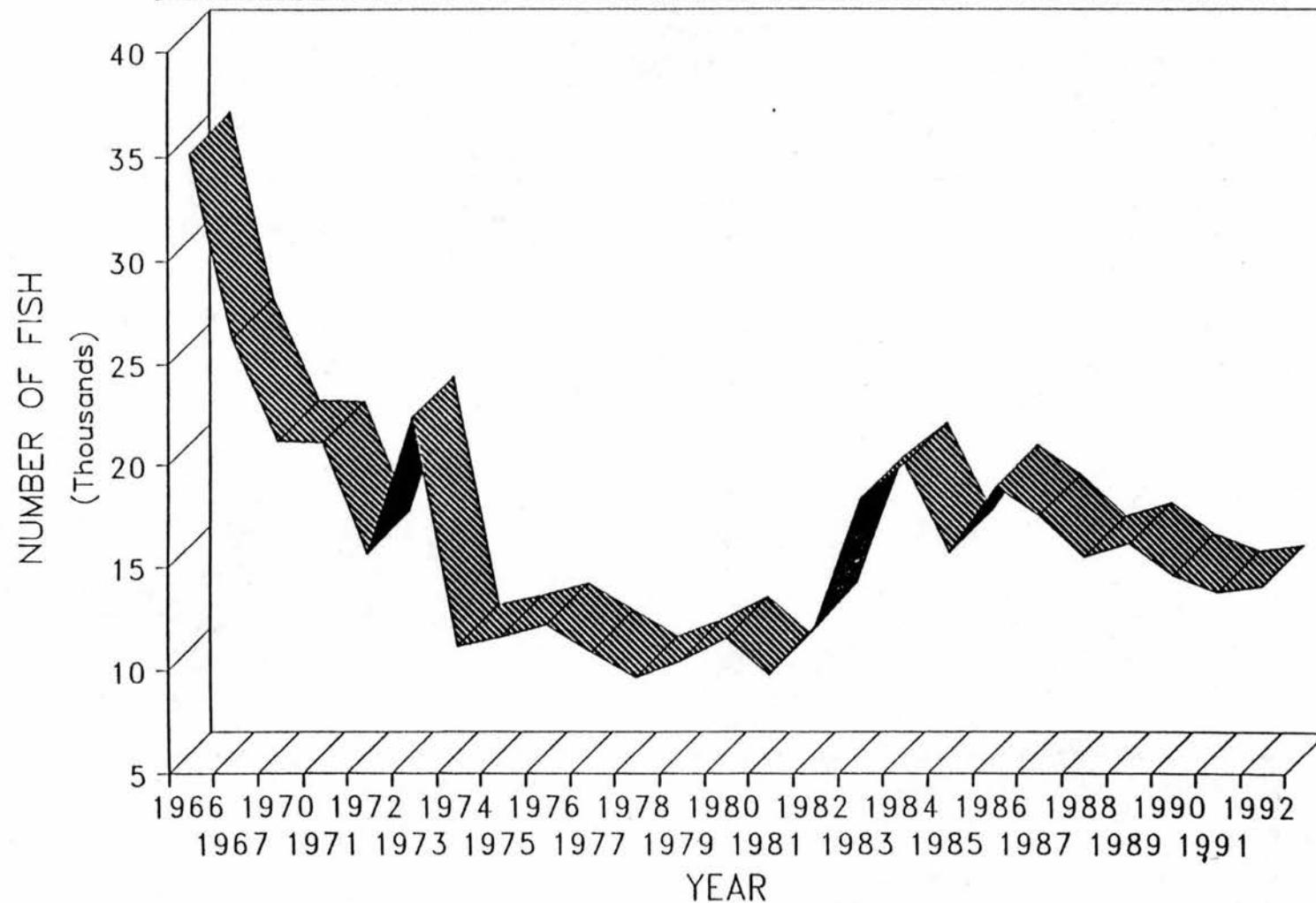


Figure 27. Number of speckled trout caught in RFA 1 from 1966 - 92.

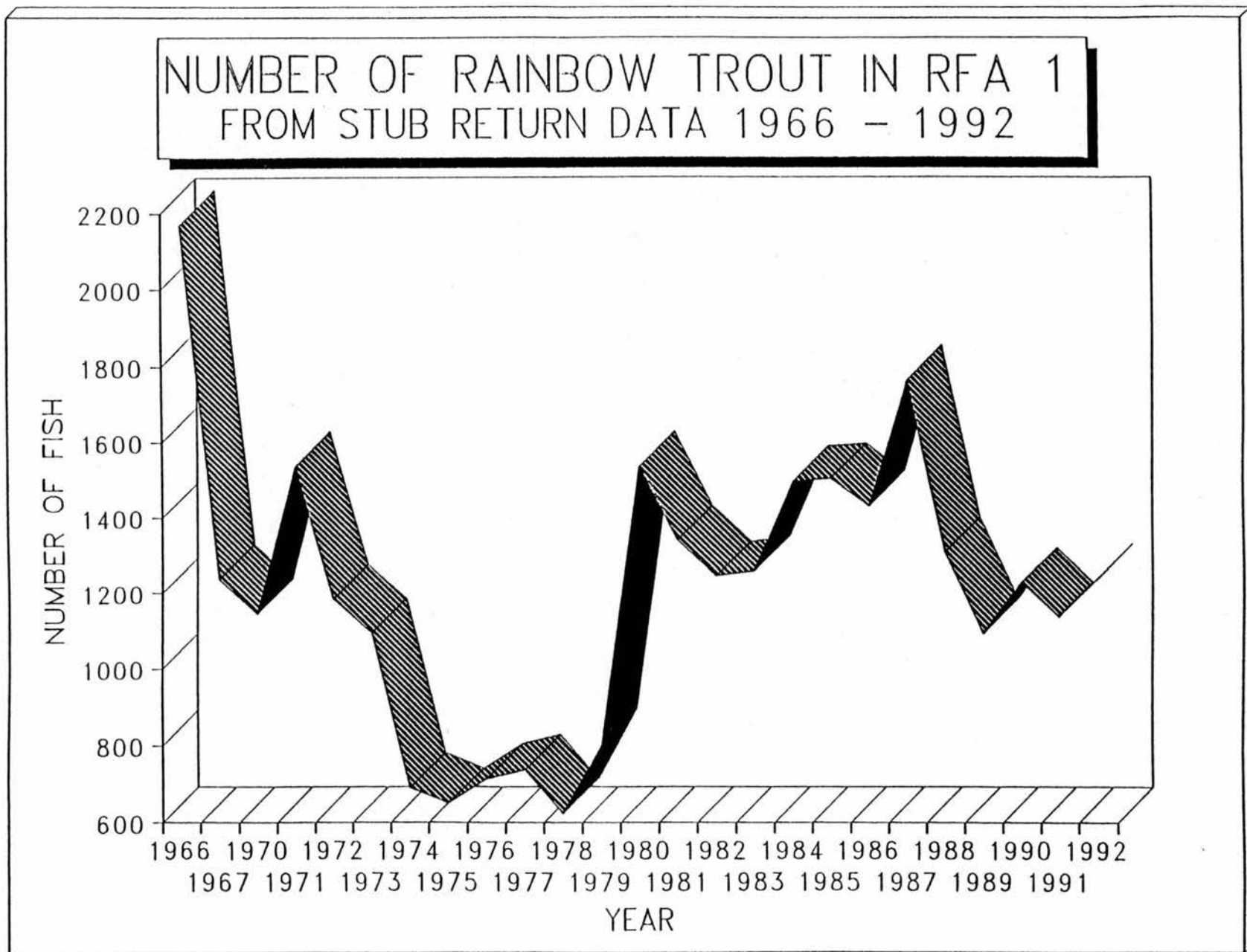


Figure 28. Number of rainbow trout caught in RFA 1 from 1966 - 92.

NUMBER OF BROWN TROUT IN RFA 1  
FROM STUB RETURN DATA 1966 - 1992

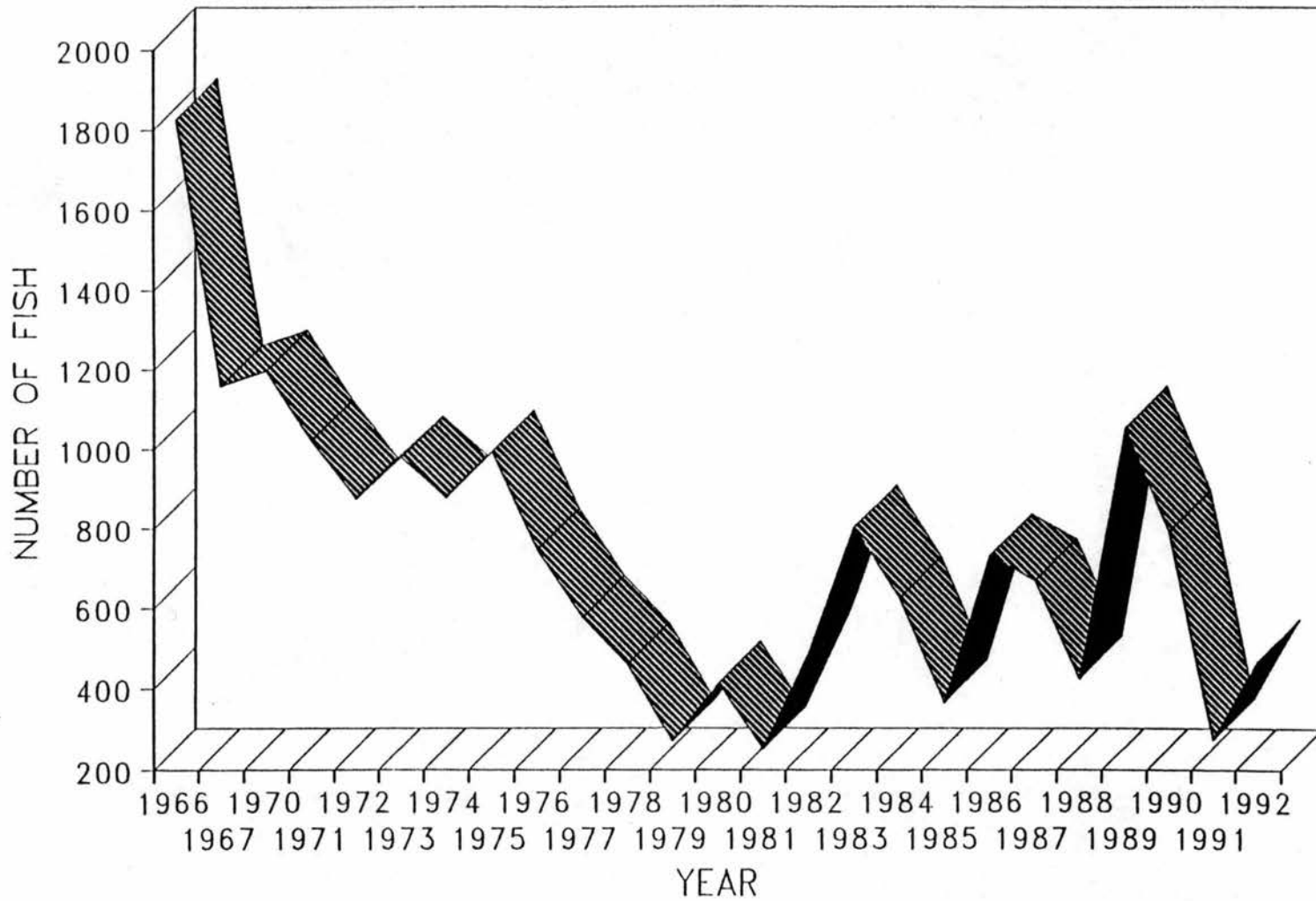


Figure 29. Number of brown trout caught in RFA 1 from 1966 - 92.

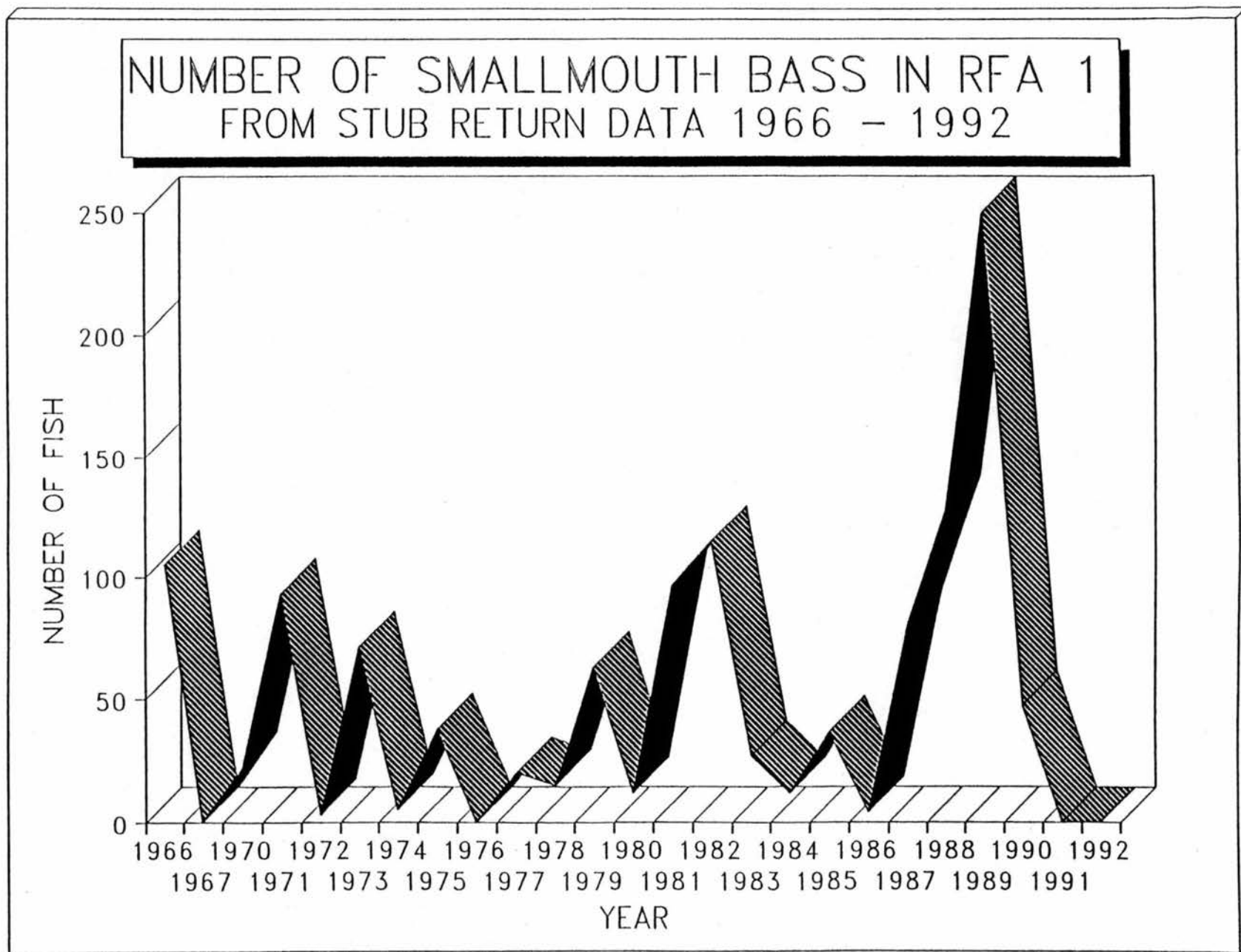


Figure 30. Number of smallmouth bass caught in RFA 1 from 1966 - 92.

NUMBER OF SHAD IN RFA 1  
FROM STUB RETURN DATA 1966 - 1992

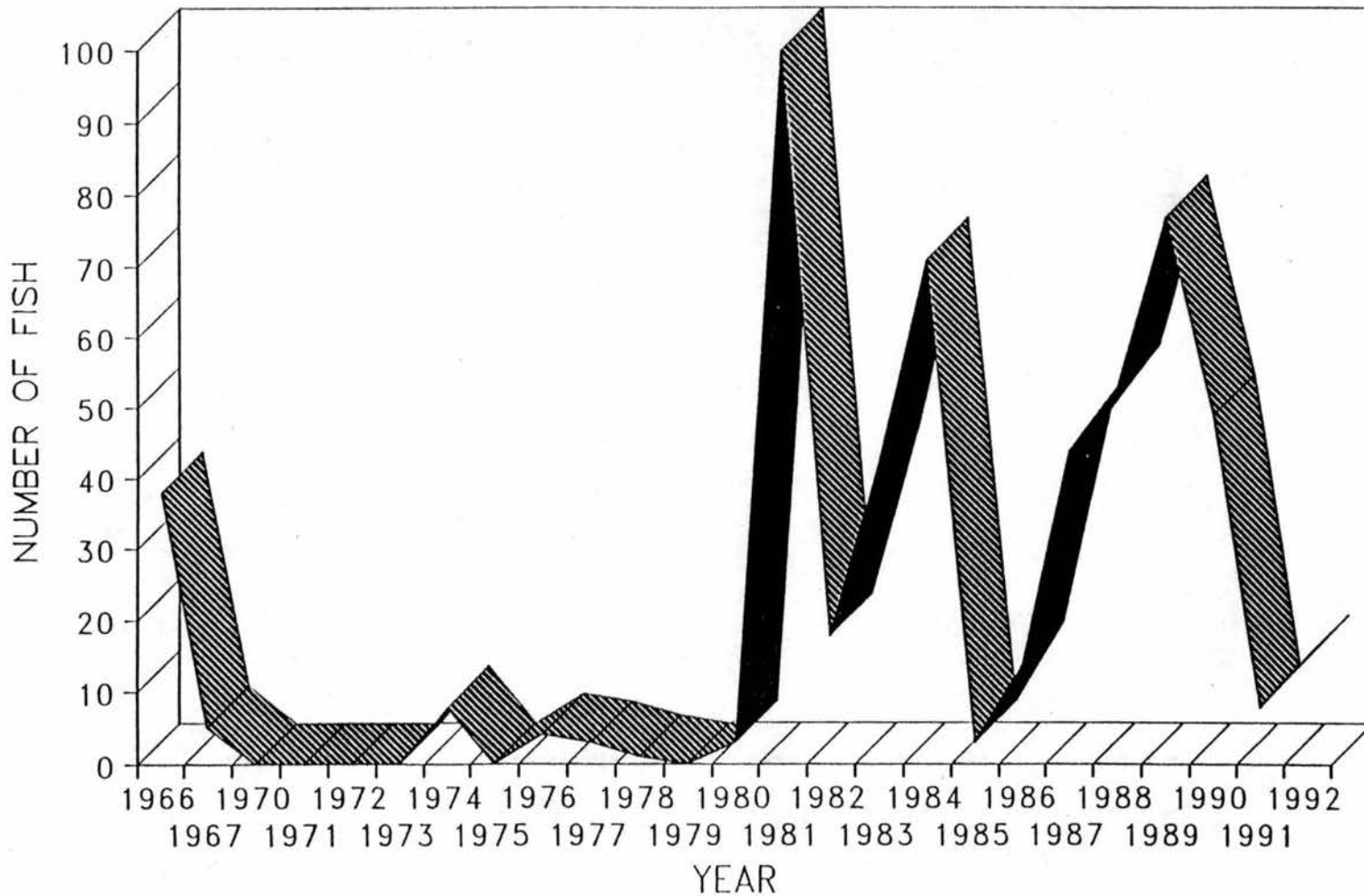


Figure 31. Number of shad caught in RFA 1 from 1966 - 92.

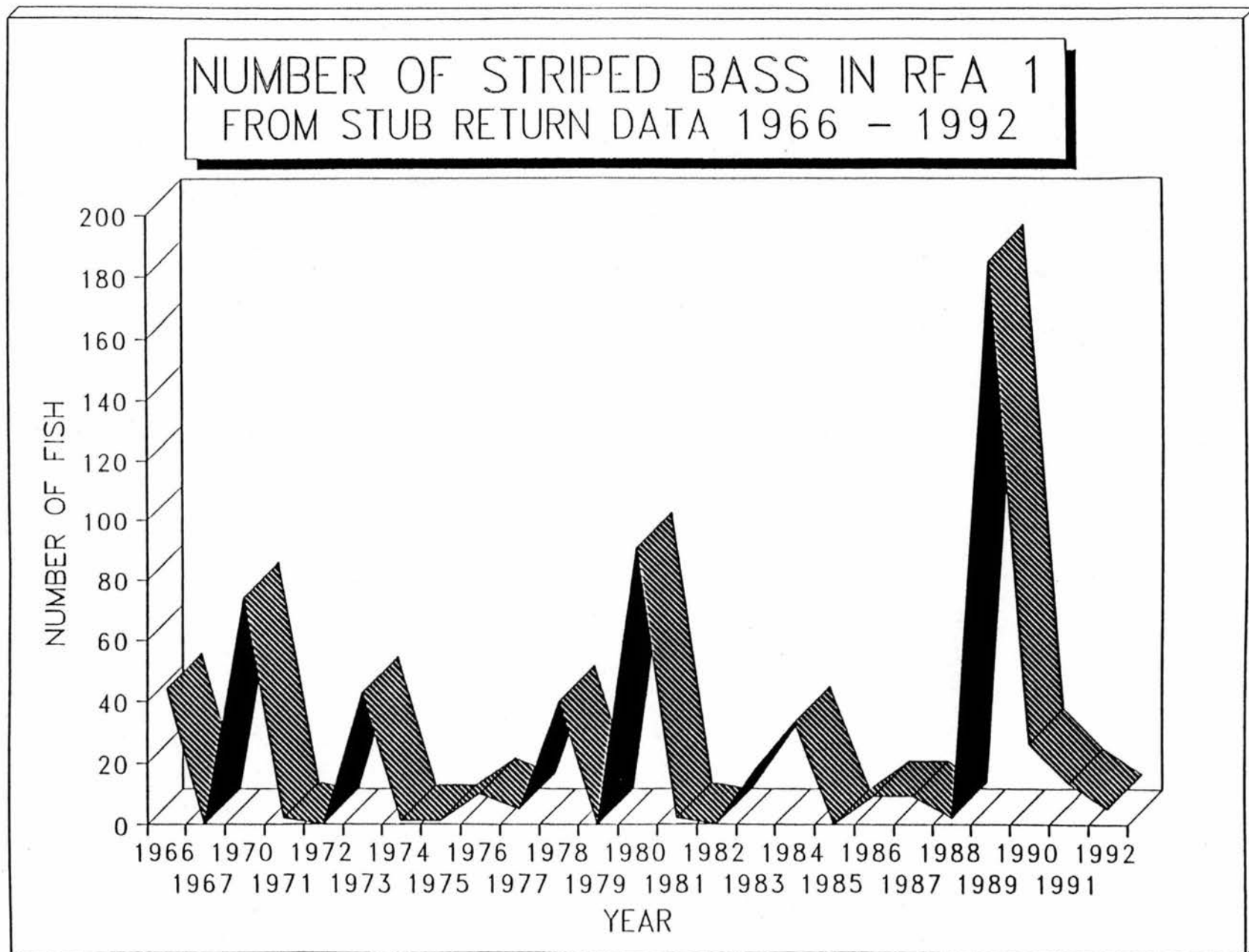


Figure 32. Number of striped bass caught in RFA 1 from 1966 - 92.

NUMBER OF YELLOW PERCH IN RFA 1  
FROM STUB RETURN DATA 1966 - 1992

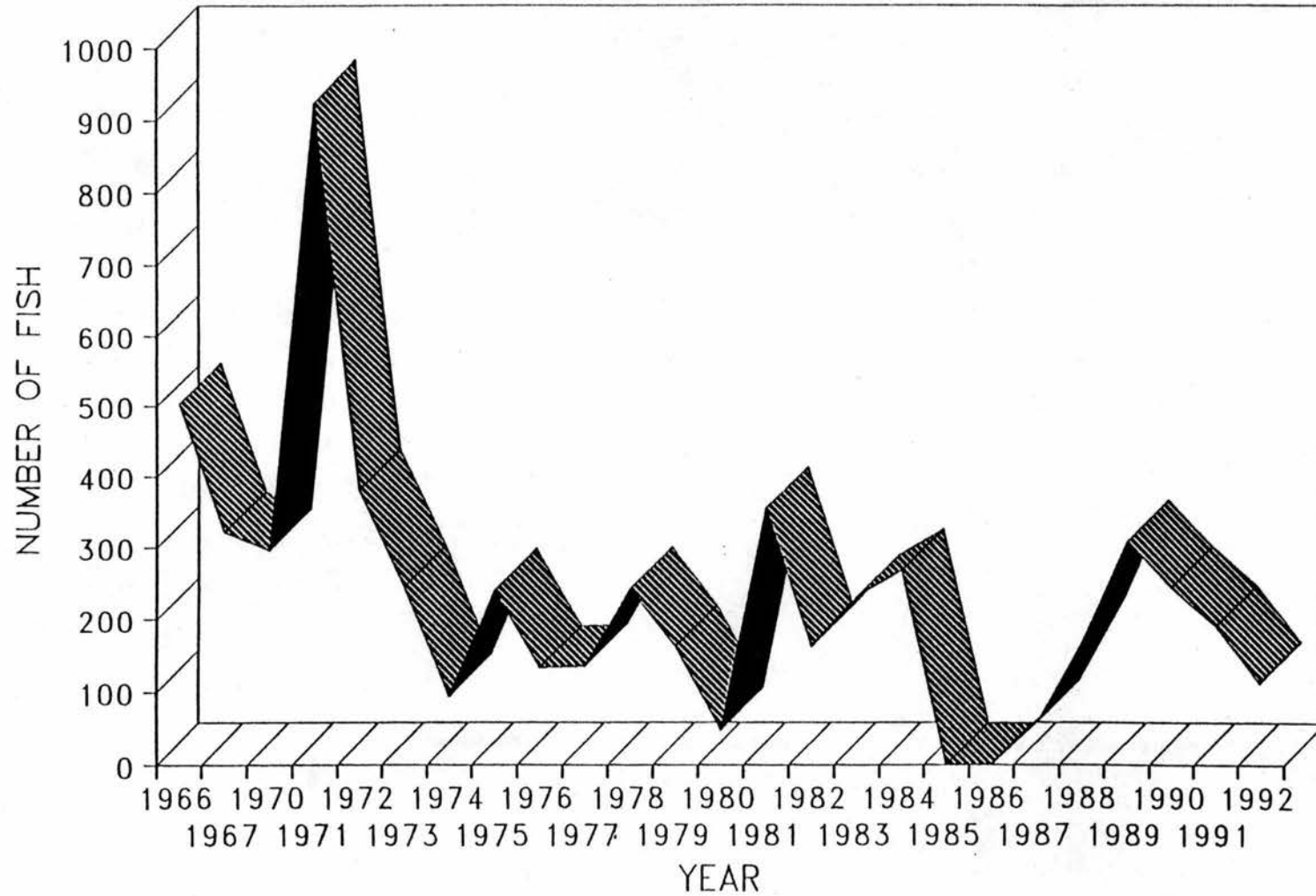


Figure 33. Number of yellow perch caught in RFA 1 from 1966 - 92.

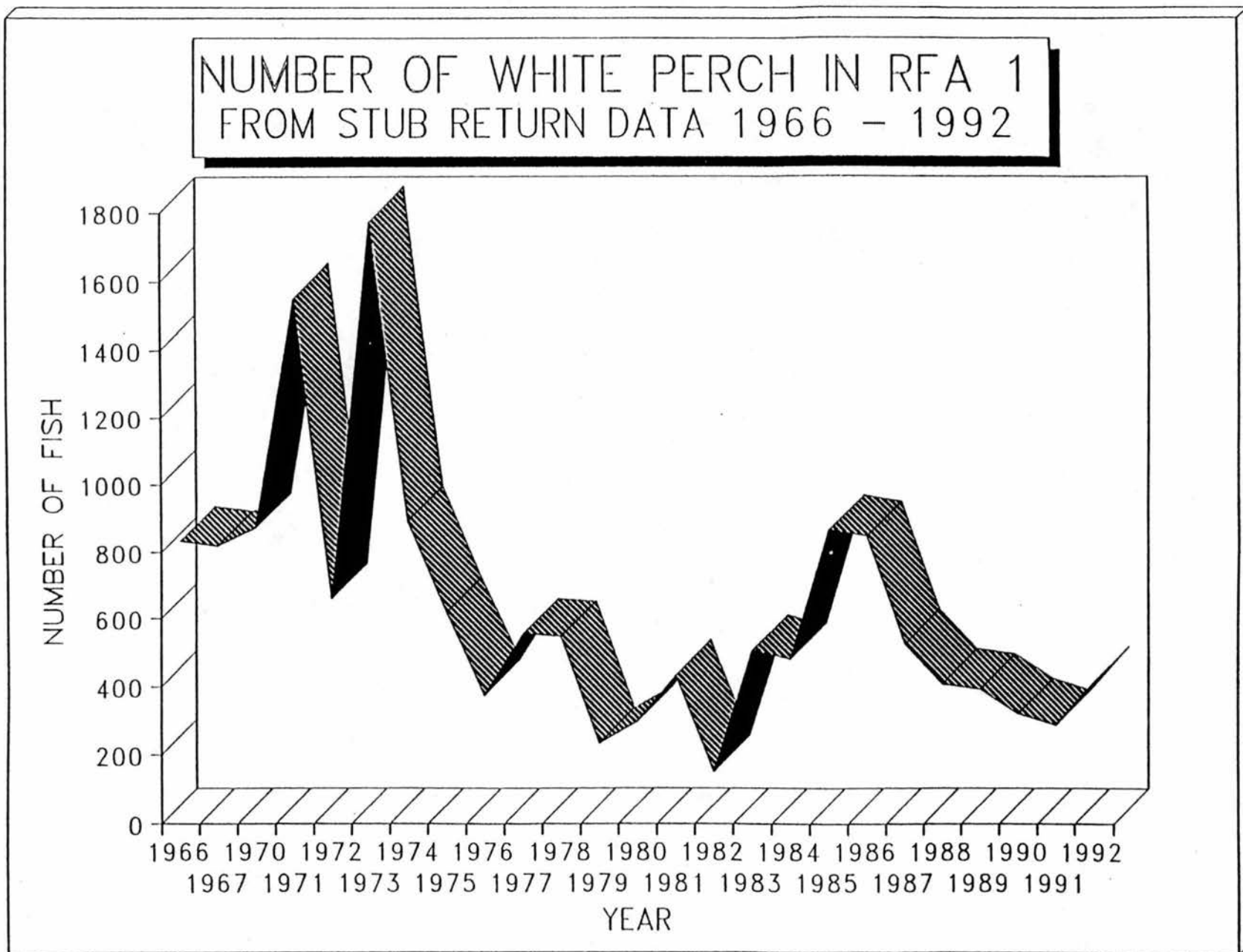


Figure 34. Number of white perch caught in RFA 1 from 1966 - 92.

### ***Recreational Fisheries Stakeholders***

The major stakeholders in RFA 1 are : Margaree Salmon Association, Margaree Watershed Council, Cape Breton Anglers Association, Cape Breton Sport Fishery Advisory Committee, Trout Unlimited, Nova Scotia Salmon Association, Nova Scotia Wildlife Federation, New Waterford Fish and Game Association, North Sydney Wildlife Association, Highland Sportsmans Club and First Nations at Caribou Marsh, Eskasoni, Memberton, Wagmatcook, Chapel Island, Malagawatch and Whycomoh.

### ***Resource User Conflicts***

Conflicts exist with recreational and commercial gillnets or traps set to capture smelt, gaspereau and American eels. These operations negatively impact predominantly on Atlantic salmon and sea-run speckled trout but also on naturalized brown trout populations in Braec Brook and River Tom. Some stakeholders in RFA 1 identified the presence of draggers in the Bras d'Or Lakes as a potential threat to several recreational species. Conflicts still exist between sport fishermen (fly fishing vs. lure fishing), trout fishermen vs. salmon fishermen and native vs. non-native fishermen. Since native peoples have the legislative right to a food fishery after spawning requirements are met (Section 35 of the 1982 Constitution Act), these rights are now recognized by recreational fishermen. However, in some cases the actual or perceived overfishing by native fishermen is a conflict in the view of some anglers which must be resolved by governments. With regard to native rights, discussions should focus on the displacement of fishing effort in return for economic development opportunities in the recreational fishery; however, should this scenario be chosen by native fishermen, this would not mean the relinquishment of their fishing rights.

The overharvest of recreational species by some anglers particularly speckled trout, was a problem identified by many stakeholders. Poaching was also an issue of concern raised by stakeholders. With regard to these latter problems, stakeholders suggested that improving enforcement efforts should be a priority.

### ***Recreational Fisheries Economic Impact***

The economic impact of the recreational fisheries in RFA 1 is discussed in another section of this report.

### ***New Recreational Fishing Opportunities***

A number of new recreational fishing opportunities exist in RFA 1 which are summarized below :

- Development of an attractive recreational fishery in the Bras d'Or Lakes. It is suggested that rehabilitation of self-sustained sea-run speckled trout, and Atlantic salmon populations in the small watersheds that enter the Bras d'Or Lakes take precedence. Secondly, a put-grow-take fishery (sea ranching) based on stocking triploid rainbows or the existing local domestic spring

spawning rainbow strain would likely be required to provide biodiversity and a sufficient abundance of sport fish to support an attractive recreational fishery. Thirdly, although studies would be required prior to implementation, establishment of self-sustained populations of brown trout and rainbow trout, (using suitable genetic strains) in streams where they currently exist could be examined to promote biodiversity and reduce stocking costs. Species interactions should be examined so that significant damage would not occur to endemic species. In summary, it is difficult to envision that an attractive sport fishery throughout the year (spring, summer, fall, winter) could be developed based on self-sustained endemic salmonid populations alone.

- Development of a black salmon fishery (spring) in the Margaree River has potential because of the surplus of fall spawners and the low return rate of repeat spawners (4 - 10% survival).
- Preparation of a comprehensive plan to develop sea-run speckled trout populations in RFA 1 is needed. Sea-run speckled trout would provide excellent sport fishing opportunities in the numerous streams in Cape Breton.
- Rehabilitation of resident speckled trout in the Highland Lakes, in other lakes and streams in Cape Breton would provide for vastly improved sport fishing opportunities.
- Rehabilitation of Atlantic salmon stocks would provide expanded sport fishing opportunities in many rivers where stocks have declined.
- Development of designated lakes close to communities for put-take fisheries in summer and for winter ice-fishing would provide new opportunities and reduce exploitation of wild speckled trout stocks.
- Designate a few isolated lakes for development of artificial fisheries for summer and for winter ice-fishing so that a wilderness angling experience could be simulated to create new angling opportunities.
- Encourage private enterprise in put-take fisheries, U-Fish ponds, derbies where stocking would be paid for by the businesspersons or watershed groups; catch and release tactics could be implemented as part of the format for some derbies during summer festivals to educate anglers regarding conservation principles.
- Winter ice-fishing for smelt would be attractive at several locations; tournaments could be promoted.

- Limited potential exists at a few locations for striped bass fishing (e.g. Forshu, North Aspy, Dingwall, Bras d'Or Lakes).
- Good potential exists for sport fishing for gaspereau in a number of rivers (e.g. SW Margaree River); promotion and education is needed (e.g. tournament).
- White perch and brown trout offer some potential for expanded sport fishing in selected areas of Cape Breton.
- Development of landlocked salmon stocks in a few lakes would provide new angling experiences and opportunities.
- Rainbow trout offers excellent potential for expanded sport fishing particularly if the Bras d'Or Lakes are developed.

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### Specific Recommendations for RFA 1 (Not necessarily in order of priority)

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MAJOR CONCERNS : Fish Habitat Protection and Improvement; Enforcement; Overexploitation of stocks; Economic Development, Watershed Specific Management, Public Involvement, Rehabilitation of Speckled Trout; Access to the resource has increased and negatively impacted on the fisheries resource.

The consultants suggest a number of specific recommendations for RFA 1 for consideration :

- The potential for expansion of the recreational fishery in the Bras d'Or Lakes is one of the best recreational fisheries opportunities in Nova Scotia. It should be the highest priority in RFA 1. A detailed plan is needed to identify the infrastructure requirements, industry development requirements, applied research requirements, evaluation mechanisms and the costs and benefits of this project. The direct involvement of Native and Non-Native groups in the planning and implementation of this project is essential.

Various species including sea-run speckled trout, Atlantic salmon, brown trout, several strains of rainbow trout including steelhead trout and other species have been discussed to develop a recreational fishery in the Bras d'Or Lakes. Although the most desirable approach would be to proceed using self-sustained stocks of endemic species, several questions need to be addressed in preparing a comprehensive development strategy for the Bras d'Or Lakes. There are advantages and disadvantages to each salmonid species identified, little is known about productivity in the "Lakes" hence, it is difficult to provide in-depth recommendations. However, since biodiversity or

restoration of different salmonid species would provide angling benefits to watersheds entering the Bras d'Or Lakes as well as in the Lakes themselves a multi-species approach should be examined.

**Atlantic salmon** : this resource is available in several watersheds entering the Bras d'Or Lakes. Although salmon would migrate out of the Bras d'Or Lakes and therefore only be available for short periods for angling purposes in the Bras d'Or Lakes, restoration of this resource would provide angling opportunities in designated streams as well as by trolling in the "Lakes" (legislation required). Some options include :

- Stock designated streams with appropriate genetic stocks of salmon to "kick-start" self sustained populations. Implement salmon kelt reconditioning on a large scale in cage nets for use in Native food fisheries but also for release in the Bras d'Or Lakes for recreational fishing (trolling).
- A strategic development plan for Atlantic salmon in the Bras d'Or Lakes and its watersheds should be prepared and a pilot project should be initiated as soon as possible using experts familiar with Atlantic salmon kelt reconditioning.

**Sea-run Speckled Trout** : this resource should be enhanced through the implementation of restrictive management regulations and appropriate resource enhancement techniques including stocking progeny from wild broodstock in designated streams to establish self-sustained populations for recreational fisheries in these streams and also in the Bras d'Or Lakes. A development strategy needs to be prepared.

**Rainbow trout** : the most suitable genetic strain of rainbow trout for use in the Bras d'Or Lakes should be examined. Some of the issues that need to be addressed include :

- Identify streams where rainbow trout would be stocked (i.e. those which have rainbow trout now).
- What bio-economic impact would these introductions have on endemic stocks of Atlantic salmon and speckled trout in these and other watersheds entering the Bras d'Or Lakes?
- What proportion of the Bras d'Or Lakes fishery could be self-sustained?
- What rainbow strain should be used; should triploids be considered?
- What numbers would have to be stocked on an annual basis (catchable size) to create an attractive fishery and what would the costs be?
- Would a recreational fishery in the Bras d'Or Lakes be more attractive if several species were available to anglers?
- What evaluation mechanisms are needed for the project?
- What user-pay mechanisms or other fiscal support in addition to the Recreational Fishery Development Program would be available to offset costs of the program?
- Should a Watershed Specific Management Board be established to develop the Bras d'Or Lakes fishery where user pay mechanisms could be implemented to offset stocking costs?

- What hatchery infrastructure is available to collect, spawn and stock juvenile salmonids for the program? If specific strains (e.g. steelhead) of rainbow have to be imported into Nova Scotia where could these be quarantined close to the Bras d'Or Lakes.
- What "grow-out" facilities/infrastructure would be needed to provide the target numbers of catchable size rainbow trout annually.
- Native involvement in the Bras d'Or Lakes program is important and the fishery should be developed in consultation with Native people.
- Regardless of the salmonid species utilized, these would spawn (excluding triploids) in the freshwater tributaries to the lake and since these collective watersheds are small, presumably, self-sustained production would also be small relative to the numbers of fish needed to create an attractive sport fishery in the Bras d'Or Lakes. What impact would these spawners have on native species? Would the positive benefits outweigh any negative impacts from such a development initiative?

To summarize, it is suggested that rehabilitation of self-sustained sea-run speckled trout, and Atlantic salmon populations in the small watersheds that enter the Bras d'Or Lakes take precedence. Secondly, a put-grow-take fishery (sea ranching) based on stocking triploid rainbows or the existing local domestic spring spawning rainbow strain would likely be required to provide biodiversity and a sufficient abundance of sport fish to support an attractive recreational fishery. Thirdly, although studies would be required prior to implementation, establishment of self-sustained populations of brown trout and rainbow trout, (using suitable genetic strains) in streams where they currently exist could be examined to promote biodiversity and reduce stocking costs. Species interactions should be studied thoroughly so that significant damage would not occur to endemic species.

- A comprehensive recreational fishery development strategy should be prepared for the Bras d'Or Lakes including species/genetic strain selection, development options/scenarios, benefit : cost considerations, funding, Native and other stakeholder involvement, and government/private hatchery and grow-out infrastructure requirements among other issues that need to be addressed. Planning for this initiative should begin as soon as possible.
- As part of the proposed **Experimental Lakes Program**, it is recommended that the **Highland Lakes** of RFA 1 be targeted for speckled trout stock assessment, experimental management regimes, applied research (e.g. limnology, growth, and productivity studies), and rehabilitation of trophy speckled trout fisheries. This project should be planned and implemented with direct involvement from the Native and Non-Native community groups.
  - The Highland Lakes should be divided into management units.

- A comprehensive management plan for these lakes should be developed under the ELP.
  - Mechanisms to control access to designated lakes should be explored as part of this plan.
  - Consultations with all stakeholders to obtain their support and involvement regarding the program should be carried out in 1993. The forestry industry should be involved in these consultations.
  - A hatchery should be identified which could be used to collect/hold wild broodstock, and rear speckled trout (and possibly landlocked salmon for some lakes) to "kick-start" the program.
  - The plan should be initiated in 1994 with the closure of a cluster of lakes, controlling access to other lakes, implementation of more restrictive angling regulations, initiation of applied research studies and stock assessments.
- RFA 1 has at least two major rivers, (Margaree and North) where early and late run Atlantic salmon provide important recreational and economic benefits for five months from June - October each year. An intensive effort should be continued to implement management, enhancement and harvesting scenarios to maintain the genetic integrity of these unique stocks of Atlantic salmon. In other major rivers of RFA 1 Atlantic salmon stocks should be managed and enhanced to optimize recreational and economic benefits occurring from the Atlantic salmon resource. These initiatives should be undertaken with the direct involvement of Native and Non-Native groups in the planning and implementation of effective strategies.
    - Watershed Specific Management should be initiated in the Margaree River.
    - A Recreational Fishery Development Strategy should be implemented in the Margaree watershed where a multi-species approach should be taken.
    - Wild stock management, research and resource enhancement initiatives in North, Middle, Mira, Grand and other Cape Breton rivers for Atlantic salmon should be expanded. These initiatives should be evaluated.
- Development and expansion of sea-run speckled trout stocks in many rivers and streams of RFA 1 should begin as soon as possible. Priorities should be established in consultation with stakeholders. A comprehensive development strategy should be prepared for sea-run speckled trout in RFA1.
- New recreational fishing opportunities can be created in various large lakes, smaller lakes and streams of RFA 1 such as the introduction of landlocked salmon, the development of winter ice-fishing for smelts and salmonids in the Bras d'Or Lakes, and salmonids in other lakes, and the development of community fishing derbies in designated fishing areas in collaboration with all stakeholders. New recreational fishing opportunities for RFA 1 are described in detail in this report.

- Overexploitation of recreational fisheries resources is occurring because of increased access (logging roads) to the Highland lakes and other remote areas. More enforcement is recommended. Options to improve enforcement efforts should be examined including the involvement of Native peoples and the streamlining of enforcement by establishing a combined Inland Recreational Fishery Conservation Unit for RFA 1. A federal/provincial working group should be established to study and recommend improvements to enforcement activities.
- Fish habitat protection and enforcement of existing legislation and guidelines needs to be strengthened. Consultations should be initiated with forestry, agriculture and private industries to encourage compliance and cooperation.
- Fish habitat restoration and improvement should be emphasized in all rivers and streams in RFA 1 particularly where siltation, low river discharges or pollution problems are being aggravated by the lack of Integrated Resource Management. A detailed study of changes in water discharge in RFA 1 rivers is needed. The forestry, agriculture and other industries in RFA 1 should be represented on ZMAC/RFAC and encouraged to participate in the restoration and conservation of fish habitat and fisheries resources.
- Recreational fishing activities should also focus on the excellent potential which exists in the tidal and marine waters surrounding Cape Breton. These waters provide excellent fishing for sharks, mackerel, dogfish, groundfish, striped bass, salmonids and in some areas giant bluefin tuna. Promotion of these opportunities will take some of the fishing pressure off freshwater species while creating expanded recreational fishing opportunities in RFA 1.
- Many streams in Cape Breton require pool restoration to improve angling.
- Satellite rearing could be implemented at several locations to rebuild speckled trout stocks; semi-natural rearing could be examined for trout or salmon at different locations.
- It is suggested that recreational gill nets for gaspereau and smelt could be removed to improve these stocks and eliminate the by-catch of salmon and sea-run speckled trout. A comprehensive management plan should be developed for smelt in Nova Scotia.
- Beaver management should be encouraged in several streams where damage is occurring.
- Put-take fisheries could be established as described for RFA 1 to reduce exploitation of wild trout stocks, provide angling opportunities and as a vehicle to educate anglers on conservation ethics (e.g. McIntyre, Horton's, Hector lakes may be feasible sites but should be examined).

- The impact on the fisheries resource of small hydro-electric plants proposed for Cape Breton should be studied if plans to implement these projects proceed.
- A black salmon fishery on the Margaree River should be examined because of the surplus of fall run spawners and the low return rate of repeat spawners.
- The feasibility of establishing buffer zones at the mouths of streams entering the Bras d'Or Lakes to protect sea-run speckled trout taken as a by-catch in winter ice-fisheries should be examined.

## Recreational Fishing Area 2

RFA 2 encompasses the counties of Cumberland, Pictou and Antigonish Counties and the part of Colchester County north of Highway # 104. It contains the northern section of mainland Nova Scotia situated between the Bay of Fundy and the Northumberland Strait, and extending from the Nova Scotia/New Brunswick border to the Strait of Canso on the southeast. The region encompasses approximately 10,000 square kilometres (1,000,000 hectares), or twenty per cent of Nova Scotia, and contains one-sixth of the Province's population.

Cumberland County, the largest of the four counties, lies in the upper half of the northern arm of Nova Scotia, and is bordered by Northumberland Strait on the north, Chignecto Bay and the New Brunswick border on the west, and the outer portions of Minas Basin and Minas Channel and Colchester County on the south, and the Pictou County line on the east. The northwestern part of Colchester County falls within RFA 2, and borders on Cumberland County and the Northumberland Strait on the north and west, inner Minas Basin, Cobequid Bay and Highway #104 on the south, and Pictou County on the east. Pictou and Antigonish Counties occupy the northeasterly part of RFA 2 between Cape Breton and a boundary slightly east of Truro. Antigonish County is the most easterly of the counties in RFA 2.

RFA 2 overlaps two of Nova Scotia's tourism districts: the entire Northumberland Shore Region and the northern portion (between Amherst and Truro) of the Fundy Shore Region.

The Northern Region is underlain principally by rocks of the Carboniferous Lowlands and Avalon Uplands. The predominating Carboniferous Lowlands exhibit a landscape of rolling plains or alternating ridges and valleys. The rocks are soft shales, limestones and sandstones and there are deposits of coal, salt and gypsum. Few lakes are in Carboniferous Lowlands, but many of Nova Scotia's mature lakes are found there. A narrow band of Avalon Uplands landscape extends inland along the Minas shore from Cape Chignecto to the county line separating Colchester and Pictou Counties. Plateaus, gorges and valleys containing glacial outwash deposits characterize this uplands region. Its rich fertile well drained soil supports extensive stands of hardwood.

The land cover in RFA 2 is dominated by softwoods (37.1%), but there is also an abundance of hardwoods (20.3%). One fifth of the land is unforested, most occurring along the coastal area of the Northumberland Strait.

Generally, waters in RFA 2 maintain pH levels above 6.5.

### ***Land Ownership***

Five First Nations reserves occur in RFA 2, totaling 8.7 square kilometers (875 ha): Pictou County (Merigomish Harbour 31, Fishers Grant 24 & 24G, Boat Harbour West 37); Antigonish County (Pomquet & Afton 23); and Cumberland County (Franklin Manor 22). Most land in RFA 2 is privately owned. However, there are significant tracts of crown land in Pictou and Cumberland Counties and tracts of commercially owned lands in Cumberland and Colchester Counties.

### ***Population Distribution***

The population of RFA 2 was approximately 123,200 (1986 census) and is increasing slightly. The population is mostly rural (55.3%). Pictou County is the most densely populated county (17.9 people/km<sup>2</sup>) in this region, followed by Antigonish (12.8), Colchester (12.0) and Cumberland (8.1). The largest centres in RFA 2 are Amherst, New Glasgow, Stellarton, and Antigonish. Other major populated areas in RFA 2 are: Pictou County (Pictou, Trenton, and Westville); Antigonish County (Lower West River, Monastery); Colchester County (Bass River, Great Village, Debert); and Cumberland County (Pugwash, Springhill, Oxford, Joggins, Parrsboro).

### ***Economic Profile***

Non-resource based manufacturing is the most important component of the Northern Region's economy, accounting for about 50% of its value. Forestry-related industries (30%), followed by agriculture (10%) are the next strongest segments of the economy. The Northern Region generates about 28% of Nova Scotia's pulpwood and about 30% of its sawn lumber. Most of the large farms (60%) produce dairy products, cattle, hogs or sheep. As well, Nova Scotia's sizable blueberry industry is based in RFA 2. Other notable economic resources include coal from the Pictou Coalfields, and the lobster fishery.

### ***Industrial Activities Profile***

Pictou County possesses the second most profitable manufacturing sector in the Province, with forestry being the mainstay of its economy. In 1986 approximately 5,000 people worked in the manufacturing sector in RFA 2 producing goods valued at \$840 million, 18% of the provincial total.

Most of the labour force in RFA 2 is engaged in community, business, and personal services (28%), followed by non-resource manufacturing (18%), trades (17.5%), and primary resource manufacturing (10%).

### *Recreational Activities Profile*

Tourism in RFA 2 generated over \$110 million in 1983, representing one-fifth of Nova Scotia's tourism revenues. Visitors to RFA 2 were most apt to stay in Pictou, New Glasgow, Antigonish and Amherst.

### *Watersheds*

The major rivers and streams in Nova Scotia are outlined in Appendix V. An inventory of existing fishways and fish passage facilities by watershed and a list of known obstructions by watershed are summarized in Tables 39 and 40.

RFA 2 has an abundance of rivers and streams with excellent water quality which are listed below by county :

Antigonish Co.: Afton, Pomquet, South, Tracadie, West, Black, James, Pinevale

Pictou Co.: Barneys, East, West, French, River John, Sutherlands, Middle, Mill Brook

Colchester Co.: Waugh, Bass, Economy, Portapique, Salmon, North, Chiganois, Debert, Folly, Great Village, Harrington, Little Bass, Stewiacke

Cumberland Co.: Pugwash, River Philip, Shinimicas, Wallace, Maccan, Tidnish, Apple, Diligent, Nappan, Hebert, Indian Brook

### *Lakes*

The following summary of information on lakes for RFA 2 is based on data from the Nova Scotia Recreational Lakes Survey (NSRLS). The NSRLS profiles the recreation potential of approximately 1,200 lakes in Nova Scotia, of which there are over 6,700. Information from this inventory provides a general sense of the abundance and characteristics of lakes situated in RFA 2 relative to the other RFAs. All discussion and statistics presented are within the context of the 1,200 lakes in the NSRLS.

RFA 2 has few lakes compared to the rest of the Province; within RFA 2 there are 88 lakes with a combined surface area of 3954 ha, representing 3% of the total lake surface area. Of these lakes, 49 were headwater lakes. Total length of lake shoreline is 269 km, about 5% of the total surveyed shoreline. Over 85% of the lakes are accessible by road and 32% have an area for launching boats. Fishing activity on the lakes is high, with 29% of the lakes having over 10 anglers at peak hours; none have over 50 anglers at peak hours.

Table 39. Inventory of existing fishways and other fish passage facilities by watershed in RFA 2.

Fishway	Watershed	County	Owner	Type	No. of Pools	Head (m)	Latitude	Longitude
Missaquash	Missaquash	Cumberland	DU	Steep Pass		2.44	45-53-48	64-13-50
Lower Maccan Meadow	Maccan	Cumberland	DU	Pool & Weir	5	1.22	45-45-18	64-16-52
Nappan Tide Gates	Nappan	Cumberland	NS Agriculture	Tide Gates		1.22	45-46-20	64-14-30
Nappan	Nappan	Cumberland	Town of Amherst	Pool & Weir	21	6.71	45-48-30	64-09-48
John Lusby Marsh	LaPlanche	Cumberland	NS Agriculture	Aboiteau			45-49-48	64-15-24
Trueman's	LaPlanche	Cumberland	DU	Pool & Weir	8	2.44	45-51-57	64-02-10
Amherst Marsh	LaPlanche	Cumberland	DU	Denil		2.13	45-51-12	64-11-05
Chignecto	St. George	Cumberland	NS L&F	Pool & Weir	6	2.13	45-43-15	64-14-14
Stanley Brook	Maccan	Cumberland	NSDOT	Culvert			45-44-45	64-05-17
Stewarts Brook	Maccan	Cumberland	NSDOT	Culvert			45-43-55	64-03-55
North Locharber	East St. Mary's	Antigonish	NSDOT	Culvert			45-27-25	62-00-42

Table 40. List of known obstructions on streams in RFA 2. (not in order of priority)

River	Location and Type of Obstruction	Fish Passage Alternatives
East (Pictou)	Hopewell - partially obstructed by natural falls	Blasting
West (Pictou)	Pictou Harbour - Causeway Natural Falls (6m)	Fishway Improvements Fishway
South	Fishways (2)	Fishway Improvements
Barney's	West Branch - Dam	Fishway
Sutherlands	I Parks' Falls (7m) MacPhersons' Grist Mill Dam(2.4m) Greenvale Falls (8m) II Parks' Falls	Fish Passage Studies and Design are Required
Waugh	"The Falls"	Trapping and Trucking
Middle (Pictou)	Pictou Harbour Causeway CNR Causeway	Fishway Improvements Fishway Downstream Passage
Shinimicas	Angus Mill Brook Dam	Fish Passage Studies and Design are Required
River Phillip	Several locations - Natural falls	Fish Passage Studies and Design are Required
Wallace	East Branch - Natural Falls	Fish Passage Studies and Design are Required
French (Colchester)	Natural Falls	Fish Passage Studies and Design are Required
French (Pictou)	East Branch - Dam	Fish Passage Studies and Design are Required
Rights	Clydesdale Dam	Fish Passage Studies and Design are Required
Pomquet	Several locations - Natural Falls	Fish Passage Studies and Design are Required
Afton	Barrier Beach - River Mouth	Fish Passage Studies and Design are Required
Doctor's Brook	Barrier Beach - River Mouth	Fish Passage Studies and Design are Required
Tracadie	Several Dams, Natural Falls	Fish Passage Studies and Design are Required
Monestary Brook	Dam (4m), several Natural Falls	Fish Passage Studies and Design are Required
Tidnish River	Mosely's Dam (2m)	Fishway Design/Modification is Required

Only one lake (ha) located in RFA 2 is larger than 500 ha: Pictou County: West River (621).

### ***Fish Species Composition***

The recreational fish species found in RFA 2 are : Atlantic salmon, speckled trout, brown trout, rainbow trout, striped bass, smelt, gaspereau, American eel, shad, yellow perch, smallmouth bass and white perch. The georeferenced distribution of recreational species in RFA 2 is shown in Figure 35.

### ***Existing Recreational Fishing Activities***

The major recreational fishing activity in RFA 2 is speckled trout which are angled mainly in the streams and some lakes; speckled trout stocks appear to be in serious trouble in RFA 2 (Figure 36). Atlantic salmon are angled in the fall in most of the rivers of this zone although salmon stocks in the Inner Fundy rivers have sharply declined. Species such as gaspereau, eel, yellow perch, white perch, striped bass, and smallmouth bass represent a small proportion of the sport catch (Figures 39, 41 - 43). Brown trout and rainbow trout are popular while shad have shown increased catch levels (Figures 37, 38, 40). The number of each species angled in RFA 2 is summarized in Figures 36 to 43.

### ***Recreational Fisheries Stakeholders***

The major stakeholders in RFA 2 are : Cobequid Salmon Association, Cumberland County River Enhancement Association, Hunting and Fishing Guides of Nova Scotia, Pictou County Rivers Association, West Pictou Wildlife Association, Nova Scotia Salmon Association and Nova Scotia Wildlife Federation. Five First Nation reserves are located in RFA 2 : Merigomish Harbour, Fishers Grant, Boat Harbour West, Pomquet/Afton and Franklin Manor.

### ***Resource User Conflicts***

Conflicts occur with recreational and commercial gillnets or traps set in estuaries or rivers to capture smelt, gaspereau and American eels. They have purportedly been responsible for declines in sea-run speckled trout in several rivers in RFA 2, notably West River (Antigonish) and no doubt other anadromous stocks of salmon and brown trout as well. Conflicts still exist between sport fishermen (fly fishing vs. lure fishing), trout fishermen vs. salmon fishermen and native vs. non-native fishermen. Since native peoples have the legislative right to a food fishery after spawning requirements are met (Section 35 of the 1982 Constitution Act), these rights are now recognized by recreational fishermen. However, in some cases the actual or perceived overfishing by native fishermen is a conflict in the view of some anglers which must be resolved by governments. With regard to native rights, discussions should focus on the displacement of fishing effort in return for economic development opportunities in the recreational fishery; however, should this scenario be chosen by native fishermen, this would not mean the relinquishment of their fishing rights.

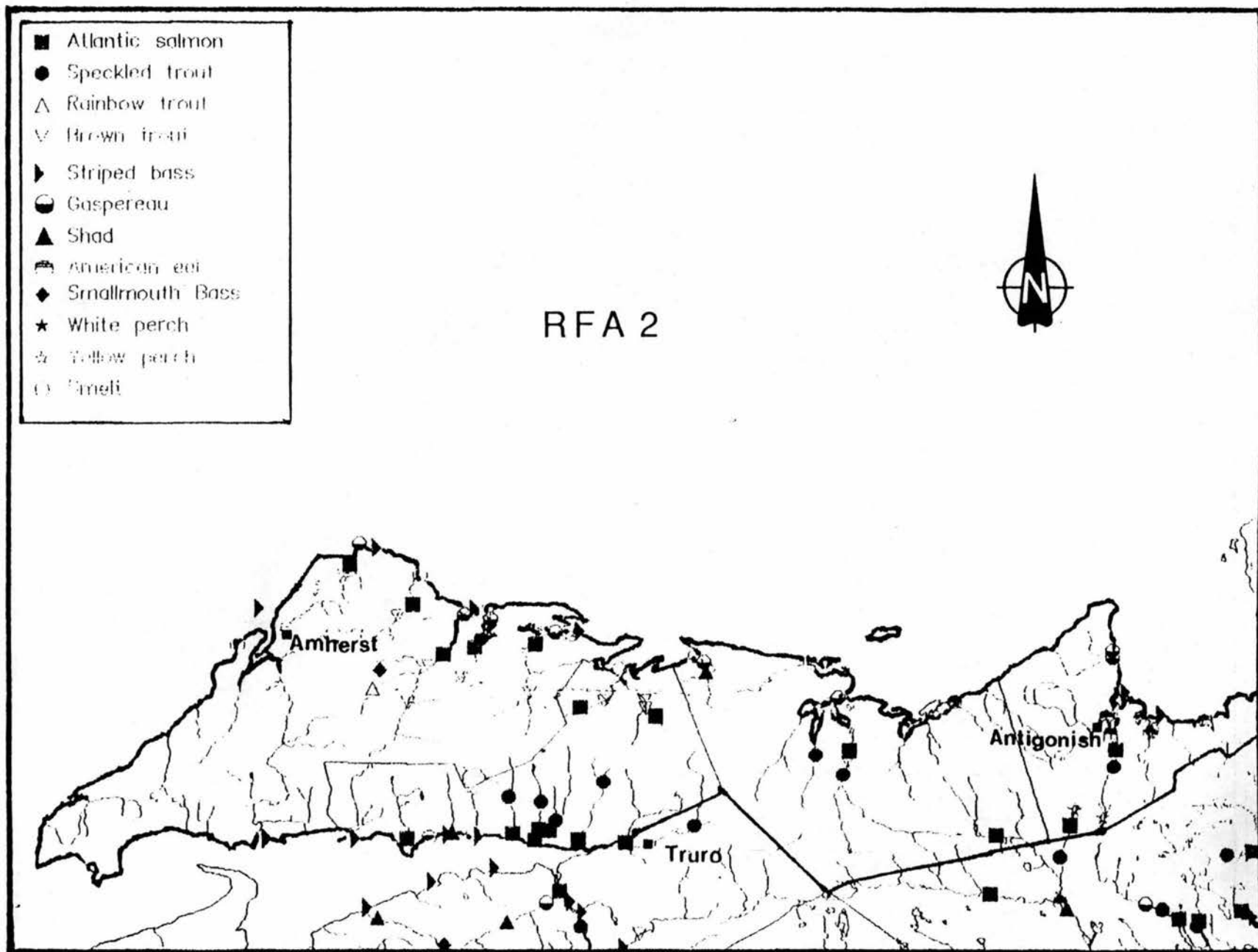


Figure 35. Georeferenced distribution profile of recreational fish species in RFA 2.



NUMBER OF SPECKLED TROUT IN RFA 2  
FROM STUB RETURN DATA 1966 - 1992

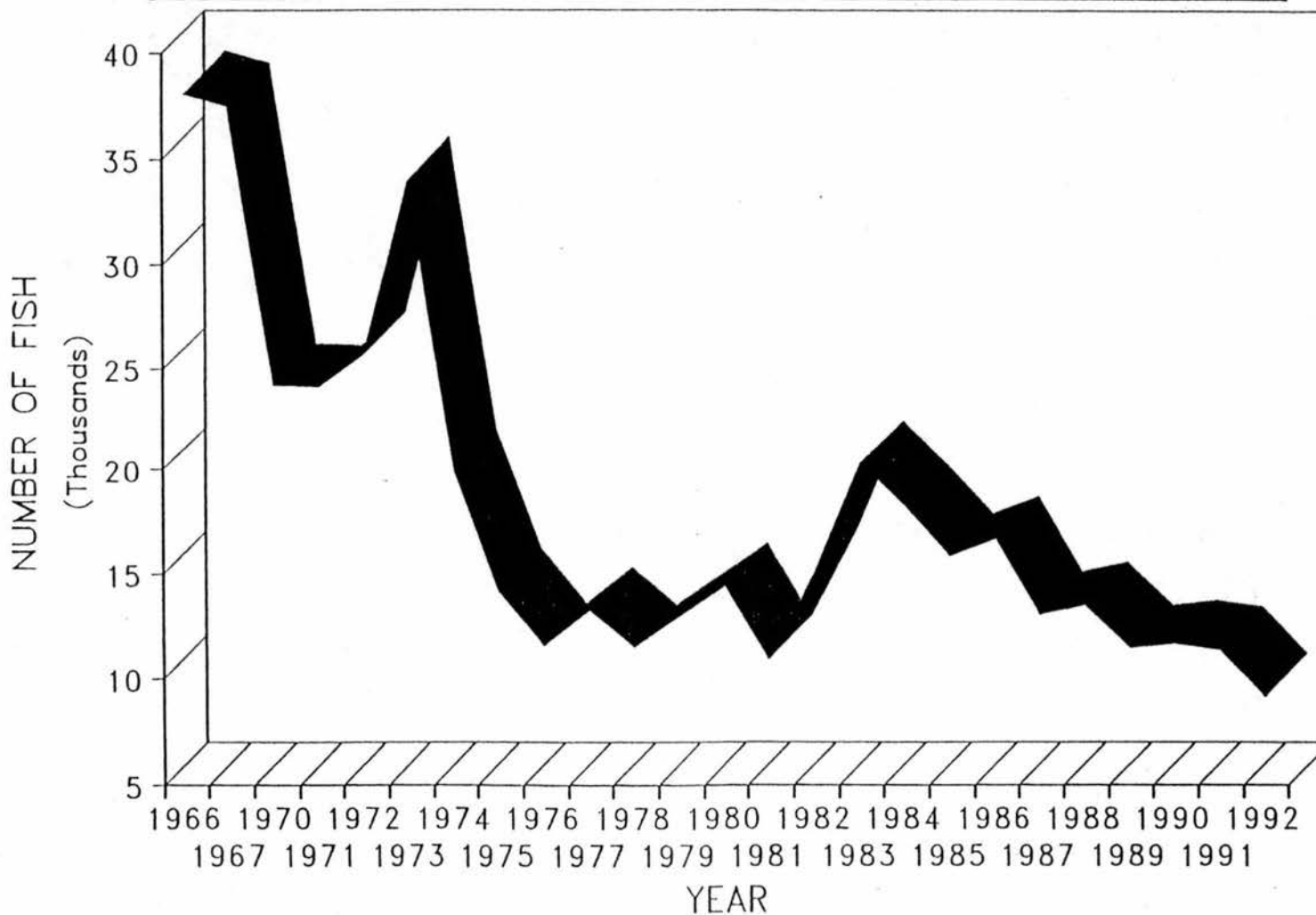


Figure 36. Number of speckled trout caught in RFA 2 from 1966 - 92.

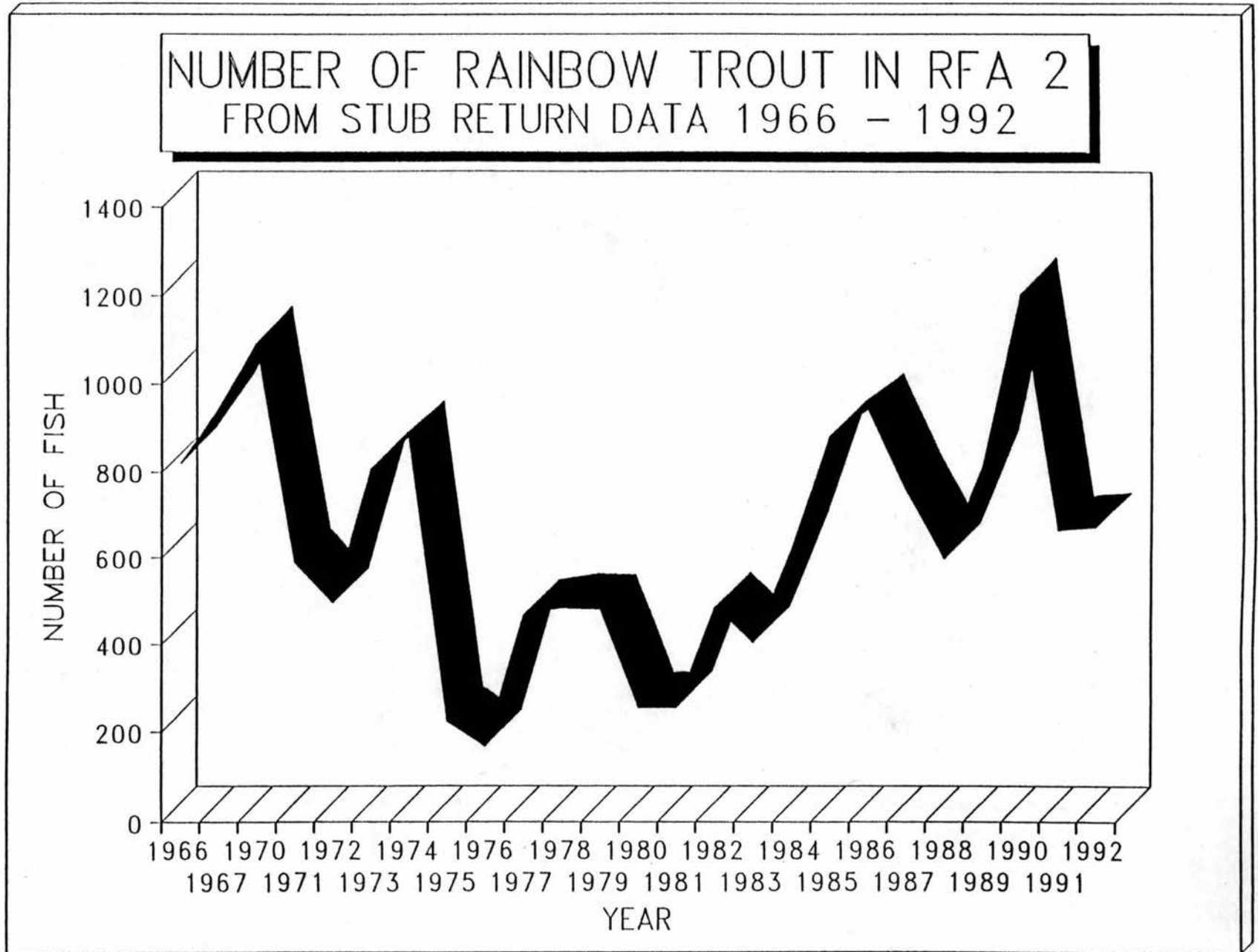


Figure 37. Number of rainbow trout caught in RFA 2 from 1966 - 92.

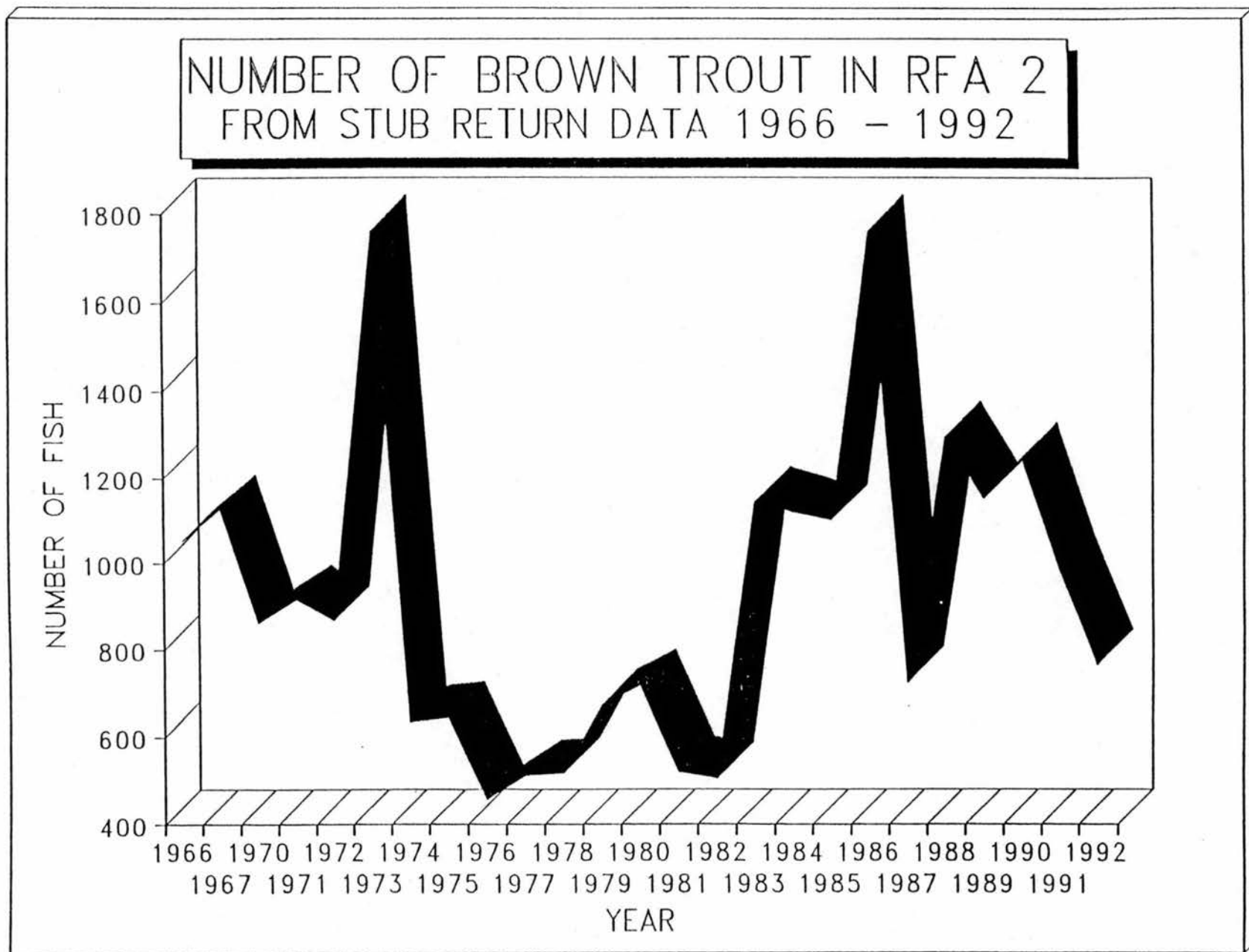


Figure 38. Number of brown trout caught in RFA 2 from 1966 - 92.

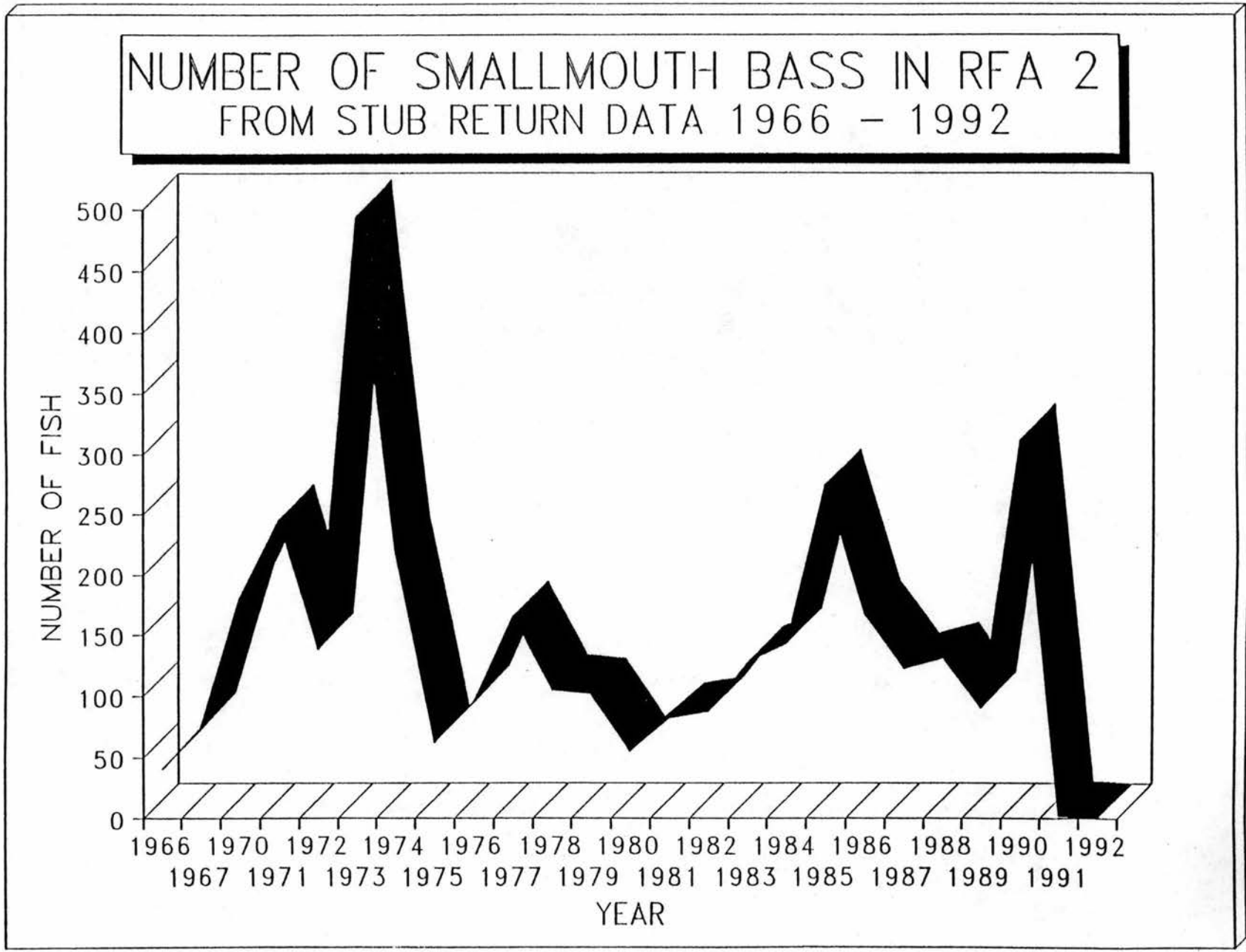


Figure 39. Number of smallmouth bass caught in RFA 2 from 1966 - 92.

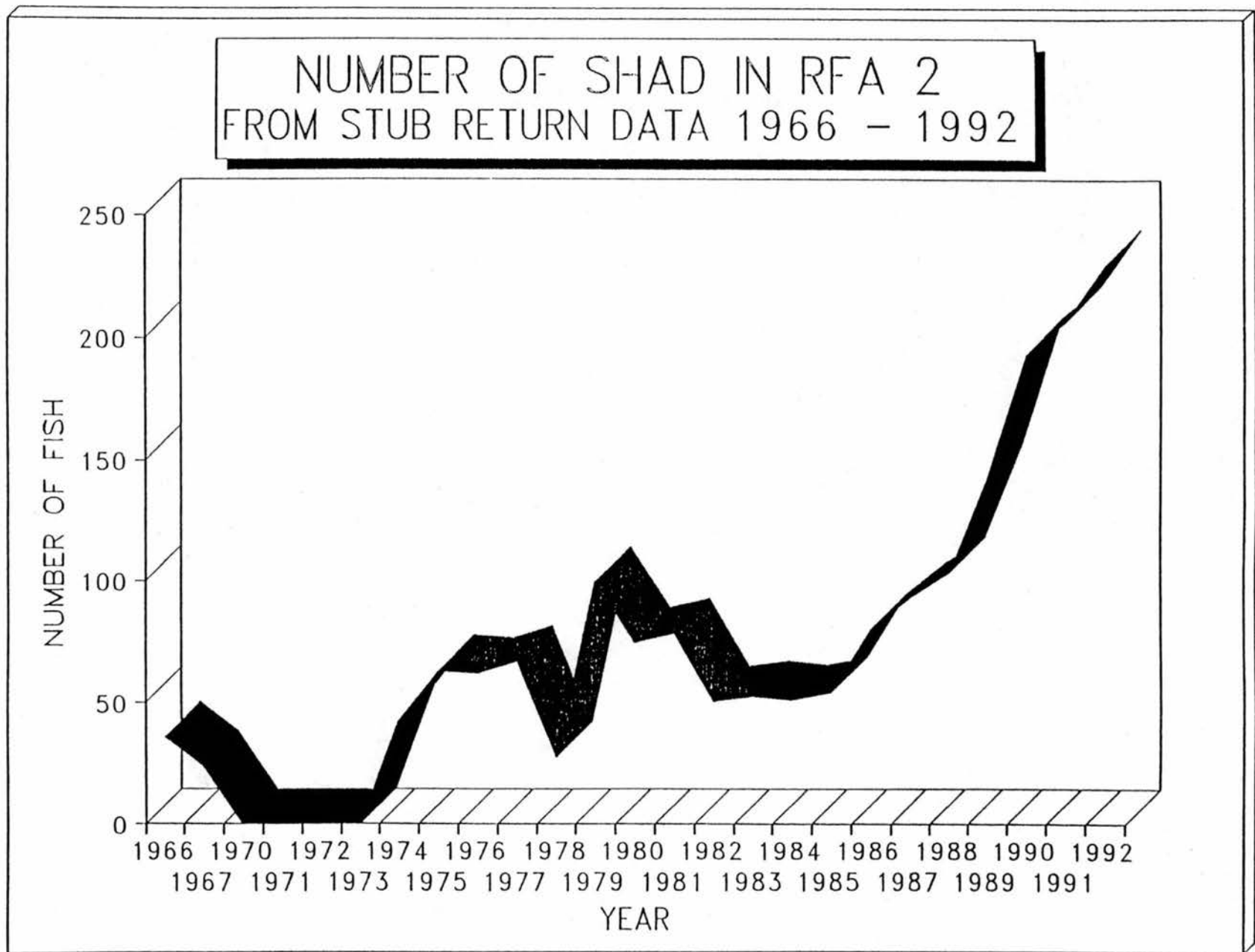


Figure 40. Number of shad caught in RFA 2 from 1966 - 92.

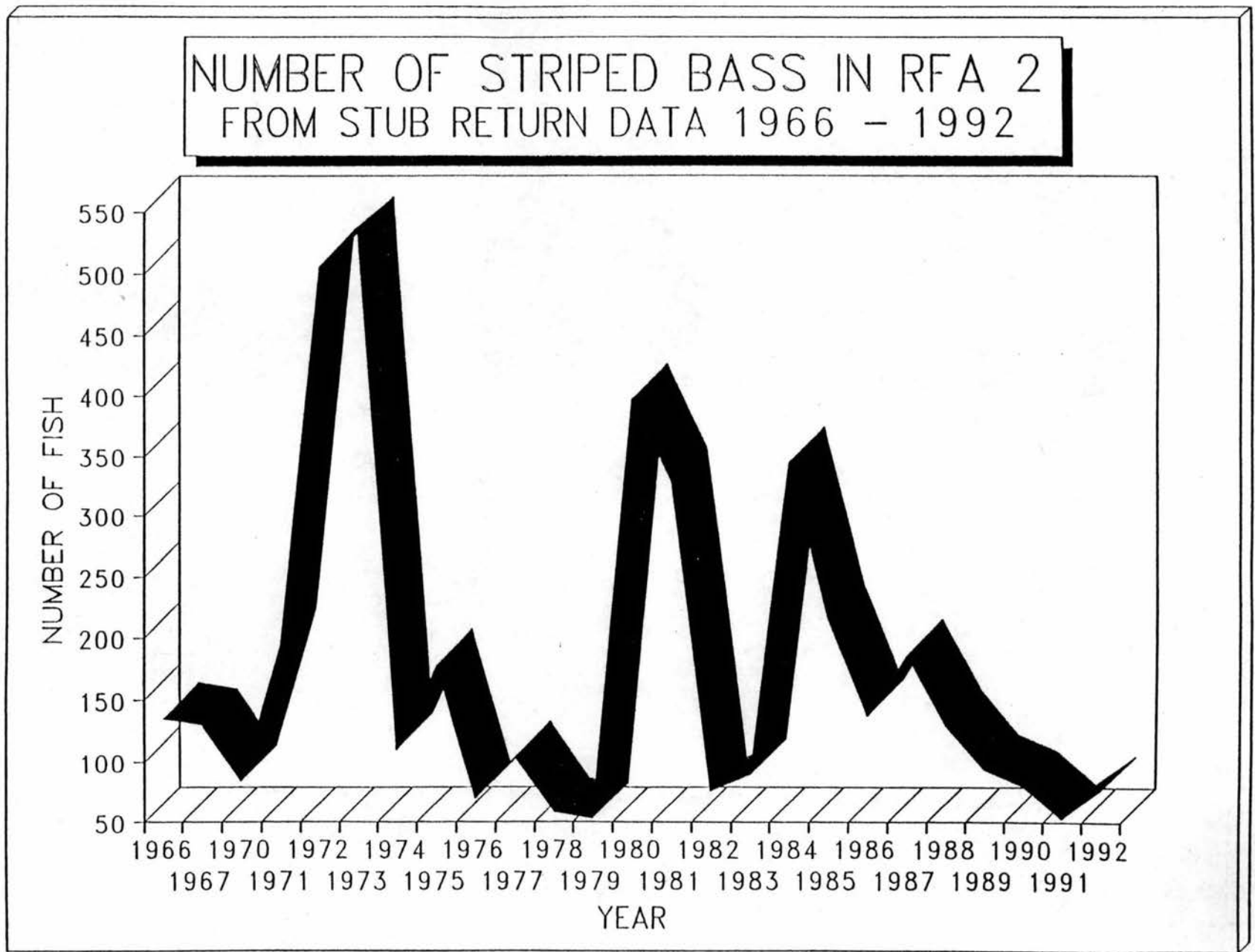


Figure 41. Number of striped bass caught in RFA 2 from 1966 - 92.

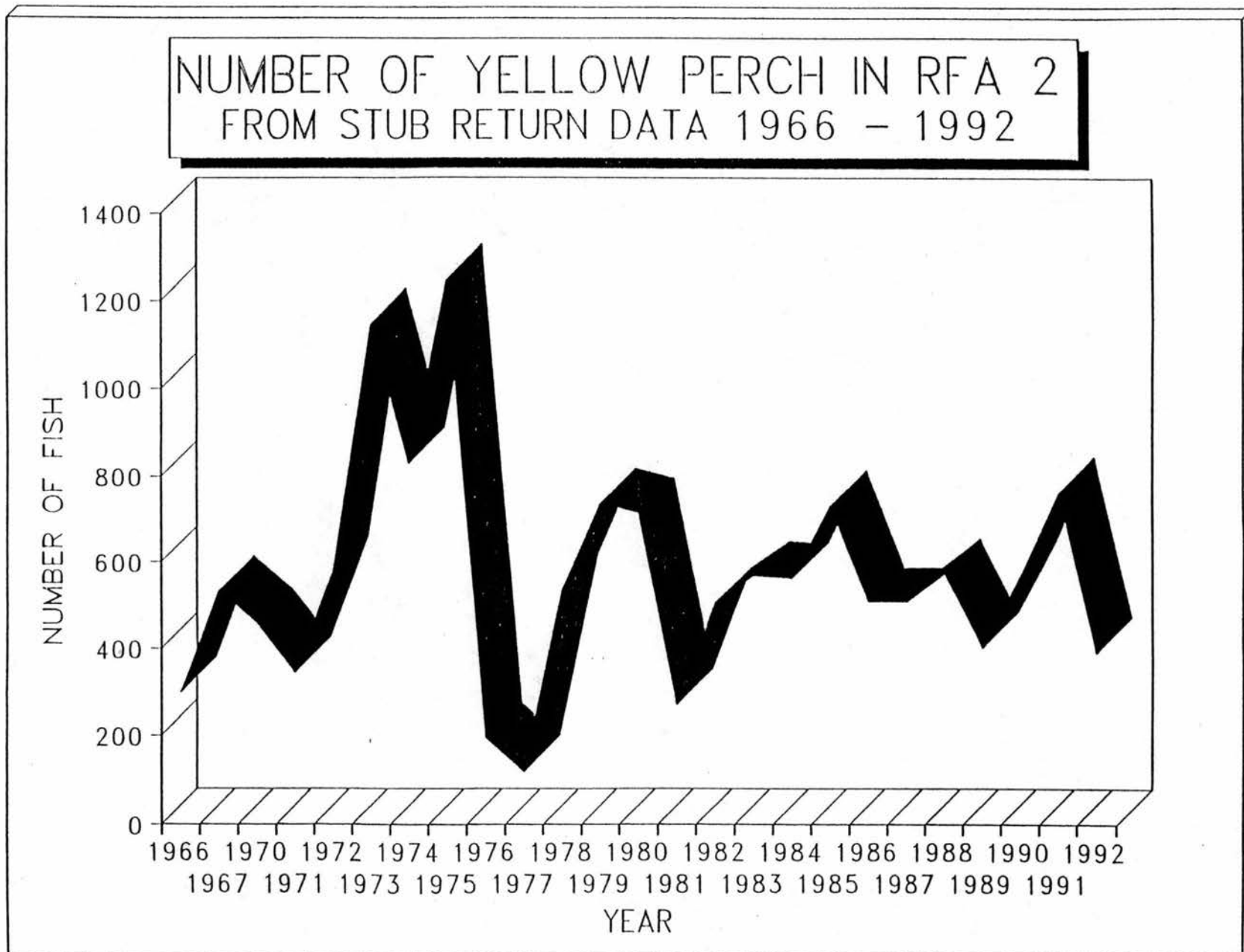


Figure 42. Number of yellow perch caught in RFA 2 from 1966 - 92.

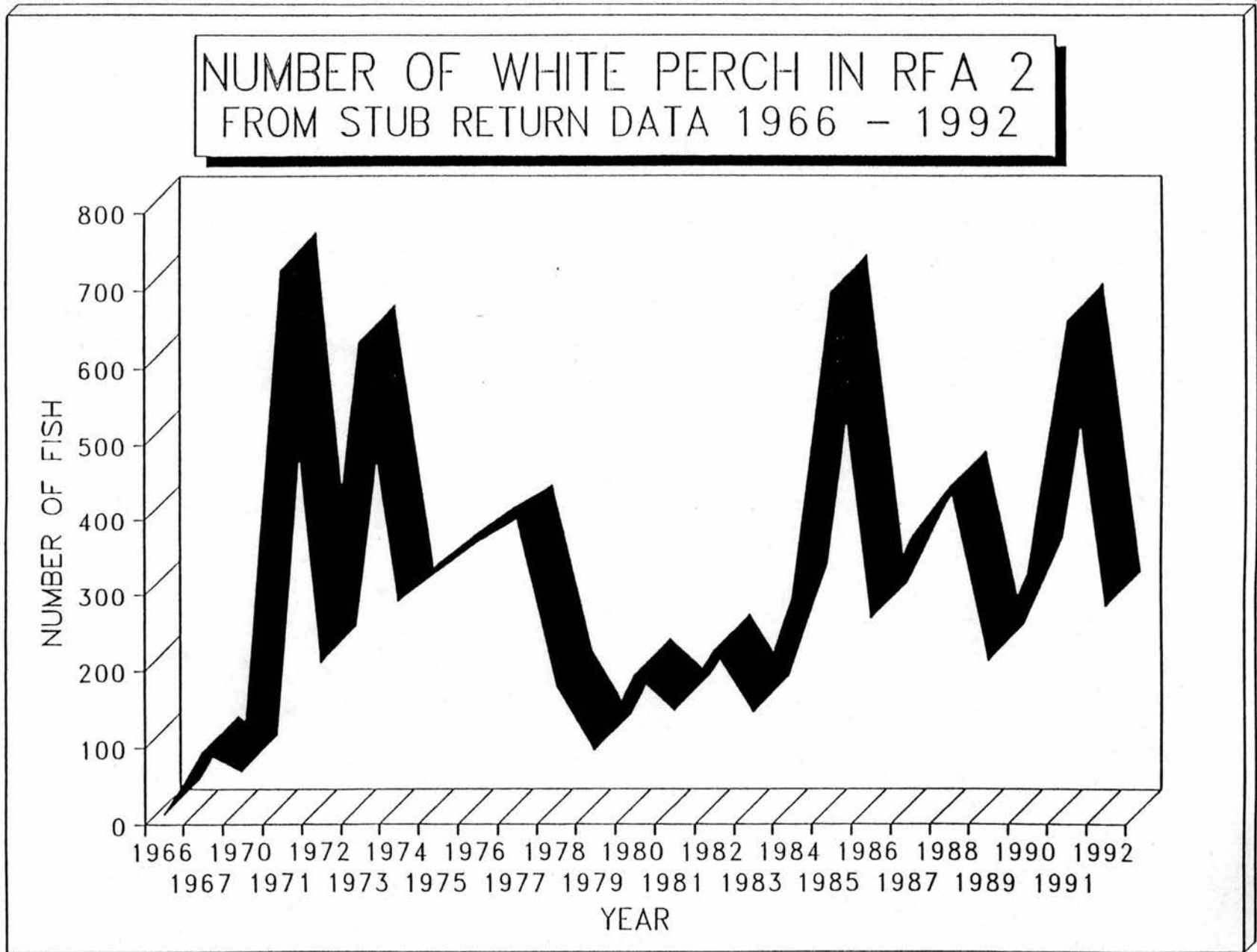


Figure 43. Number of white perch caught in RFA 2 from 1966 - 92.

The overharvest of recreational species by some anglers particularly speckled trout, was a problem identified by many stakeholders. Poaching was also an issue of concern raised by stakeholders. With regard to these latter problems, stakeholders suggested that improved enforcement efforts were needed.

### *Recreational Fisheries Economic Impact*

The economic impact of the recreational fisheries in RFA 2 is discussed in another section of this report.

### *New Recreational Fishing Opportunities*

- Although there are fewer lakes in RFA 2, water quality in most areas is excellent for speckled trout, Atlantic salmon and other salmonids. Priority should be placed on rehabilitating resident and sea-run speckled trout populations in cooperation with native and non-native community groups. A variety of fish habitat improvement and resource enhancement techniques are available for this purpose including the stocking of progeny from wild broodstock.
- Development of shad, brown trout and striped bass sport fisheries have potential both along the Northumberland Strait and Fundy rivers.
- Atlantic salmon stocks should be rehabilitated where spawning requirements are not being met. Introduction of a catch and release sport fishery for black salmon in rivers where spawning requirements are met and surpluses are identified would have potential.
- Preparation of a comprehensive development strategy for sea-run speckled trout populations in RFA 2 is needed since stocks are low and they provide excellent sport fishing opportunities.
- Potential exists for winter ice-fishing for smelts in certain areas and should be encouraged where stocks permit; tournaments would provide economic benefits.
- Designate specific lakes close to communities for put-take fisheries (derbies, tournaments) as part of summer festivals or winter carnivals. These initiatives would take pressure off wild stocks and create opportunities explained elsewhere in this report; catch and release tactics could be implemented as part of the format for some derbies.
- Designate a few isolated lakes for the implementation of artificial fisheries for summer and for winter ice-fishing so that a wilderness angling experience could be simulated. Encourage private

enterprise to undertake such initiatives where stocking would be paid for by businesspersons or watershed groups.

- Sport fisheries for gaspereau, yellow perch, white perch, and American eels should be promoted.
- Establishment of an early-run salmon stock on River Philip should be examined since it would provide excellent sport fishing.

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### **Specific Recommendations for RFA 2** (Not necessarily in order of priority)

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MAJOR CONCERNS : Fiscal Resources; Fish Habitat Protection and Improvement; Control the introduction of Exotic Species; Public Involvement in Management; Lack of Integrated Resource Planning and Management; Enforcement of fishing regulations and environmental issues, Watershed Specific Management.

A variety of endemic and naturalized salmonids inhabit the streams and lakes in RFA 2. The consultants suggest a number of specific recommendations for consideration in RFA 2 :

- Fish habitat protection and enforcement of existing legislation and guidelines need to be strengthened. Current enforcement efforts are fragmented and inadequate - a combined Inland Recreational Fishery Conservation Unit should be established in RFA 2. A working group (NSDOF, DFO, NSDNR, DOE, NSDOE) should examine options to improve enforcement efforts and support.
- Fish habitat restoration and improvement should be a priority in RFA 2. Water quality is generally excellent; however, habitat degradation caused by siltation, channelization, low summer discharges, deforestation, agricultural land-use practices, beaver activity, fish passage problems and urban development brought about by the lack of Integrated Resource Management should be addressed. Direct involvement by Native and Non-Native groups in the planning and implementation of applied research, fish habitat improvement and resource enhancement initiatives is recommended. The forestry, agriculture and other industries in RFA 2 should be represented on ZMAC/RFAC and encouraged to participate in the restoration and conservation of fish habitat and fisheries resources.

- Applied research is required to identify the cause of the collapse of the Inner Bay of Fundy Atlantic salmon stocks and to study environmental impacts and approaches to rehabilitating the fisheries resource and its habitat. Applied research should also include studies on stock enhancement techniques, ways to increase biomass through stream/lake fertilization and implement stock assessments of speckled trout, salmon, brown trout, and striped bass.
- A comprehensive development strategy for sea-run speckled trout populations in RFA 2 should be prepared since stocks are low and improved stock status would provide excellent sport fishing opportunities.
- Speckled trout stocks in RFA 2 need to be rehabilitated through implementation of the comprehensive recreational fisheries management strategies proposed by DFO and NSDOF and the resource enhancement strategies proposed in this report.
- The status of Atlantic salmon stocks in the Upper Northumberland Strait rivers should be assessed; a comprehensive development strategy should be prepared for River Philip to determine whether the early-run component of the salmon run can be re-established.
- Under the proposed Experimental Lakes Program, several "index" lakes in RFA 2 should be examined to determine speckled trout stock abundance, the need for lake habitat improvement and the development of new recreational fisheries opportunities.
- Development of winter ice-fishing for smelts and salmonids (put and take) as part of community fishing derbies is recommended in designated areas with appropriate planning and in collaboration with stakeholders (See New Fishing Opportunities).
- A detailed study of changes in water discharge is needed in RFA 2.
- Criteria should be established and a management plan developed to control the introduction of exotic species to new areas in RFA 2 to minimize negative impacts on speckled trout or Atlantic salmon.
- Although conservation and effective management of the recreational fisheries should be the first priority in RFA 2, stock enhancement is also essential because of low stock levels. Stakeholders suggested that where trout streams have been over-exploited, they should be closed to fishing, stocked with local wild genetic strains of speckled trout and allowed time to recover. As an

alternative to closure, sections could be managed for hook and release using fly fishing techniques. Consultation with stakeholders is needed before major changes are implemented.

- Comprehensive watershed plans should be prepared in RFA 2 with fiscal resources provided to watershed groups from the Recreational Fisheries Development Program.
- Forest cutting plans should be reviewed, monitored and enforced; greenbelts should be established along watercourses in forested areas as well as through agricultural land. Selective cutting could be carried out near streams with support from the forestry industry if costs are higher.
- Resource user conflicts, for example, using gaspereau nets in West River (Antigonish), Barneys River, French River, South River, Pictou Harbour have purportedly destroyed sea-run speckled trout stocks. Resource conflicts with gaspereau, smelt and eel nets should be managed in consultation with stakeholders in the recreational fishery and adequate enforcement should be available if netting is permitted. A comprehensive management plan for smelt is needed in RFA 2 as well as for the whole province.
- Smallmouth bass introductions should be carefully planned and implemented following public consultations. Most stakeholders did not favor SMB introductions unless it could be demonstrated that no negative impacts would occur to endemic species.
- Although the proposed NSDOF regulations for 1993 are more restrictive, some stakeholders felt the regulations should go further i.e. the season should not start in mid-April but later, and should end September 1 not September 30 i.e. shorter season. The use of "no-kill" zones or hook and release for part of the fishing season may accomplish the same goals.
- New recreational fishing opportunities identified for RFA 2 should be reviewed and implemented with appropriate study where identified.
- U-Fish (put-take) operations could be encouraged for speckled trout to reduce fishing pressure on wild stocks and educate the public on conservation.
- Economic development should include development of U-Fish operations, guiding and outfitting sectors. Participants at the specific consultations felt that having qualified guides available was an asset, however, they should not be forced on sport fishermen from N.B. or P.E.I.. Guiding of non-Canadian anglers was suggested as an economic opportunity; however, whether this should be mandatory or volunteer should be studied before being implemented.

- Stakeholders felt that the jurisdictional issue of inland fisheries management should be resolved by developing an M.O.U. as soon as possible.
- Stakeholder cooperation and collaboration is needed in watershed management. Objectives for each watershed should be established to meet the needs of natives and all user groups.
- Improvements are required regarding fish habitat, fisheries resource, economic and catch effort databases (e.g. surveys, log book).
- The impact on the fisheries resource of small hydro-electric plants proposed for RFA 2 should be studied if plans to implement these projects proceed.
- Recreational fishing activities should also focus on the excellent potential which exists in the tidal and marine waters of RFA 2. These waters provide excellent fishing for mackerel, dogfish, groundfish, striped bass, gaspereau, salmonids and in St. George's Bay, the giant bluefin tuna and sharks. This approach will take some of the fishing pressure off freshwater species while creating expanded recreational fishing opportunities in RFA 2.

## Recreational Fishing Area 3

RFA 3 encompasses the counties of Lunenburg, Halifax and Guysborough counties. The coastal boundary extends from the Antigonish/Guysborough County line at the Canso Causeway, along Canso Strait and Chedabucto Bay and southwesterly along the Atlantic Coast to the Lunenburg/Queens County line. The northern boundaries of the counties run approximately along the centre line of the Nova Scotia. The Zone is 12,838 square kilometres in area, or 24.2 % of Nova Scotia, and accounts for about 40% of the Province's population.

Guysborough County is the most easterly division and extends from the Canso Causeway to Ecum Secum on the Atlantic Coast. Halifax County is located centrally in RFA 3 and includes lands extending approximately to Hubbards on St. Margarets Bay. Lunenburg County is the most southerly division of RFA 3, and reaches to the Queen's County line at East Port Medway.

Roughly seventy per cent of the land area in RFA 3 is forested by predominantly softwood (58%); hardwood and mixed wood stands are about equally abundant (23% and 20% respectively).

Flowing or standing water accounts for about 10% of the area of RFA 3.

Much of the region is underlain by bedrock of several major formations. A zone of granites occurs mainly between Halifax and Mahone Bay and inland occupying about half of Lunenburg County, as well as inland along the Eastern Shore and in the Canso area. Sedimentary rocks of the Meguma group, including Greywacke, quartzites, slate, schists and gneiss of the Goldenville formation, and the slates, schists and migmatite of the Halifax formation cover the remainder of Lunenburg and Halifax Counties and about half of Guysborough County to the Town of Guysborough at the head of Chedabucto Bay. The northern part of Guysborough County along the Pictou County boundary consists of sedimentary rocks, of which the Horton Group consisting of sandstone, conglomerate and shale is a major formation.

Soils over most of the area are shallow, stony Podzols, but deep, loamy Podzols occur over a large part of Lunenburg County. RFA 3 is moderately well drained, with the exception of the southwestern section of Guysborough County which contains an abundance of peatlands.

The acidity of the region's lakes and rivers is variable. Low pH readings occur in eastern Lunenburg County (pH < 4.7), western Halifax County (pH < 5.0) and in the vicinity of Sheet Harbour (pH < 5.4). Remaining areas maintain pH's > 5.4.

There are seven First Nation reserves in RFA 3 occupying 8.6 square kilometres (860 ha). These occur in Halifax County (Sheet Harbour 36, Cole Harbour 30, Shubenacadie 13, St. Croix 34) and Lunenburg County (Pennal 19, New Ross 20, Gold River 21).

About a third of the land in RFA 3 is owned by the province of Nova Scotia, about two-thirds of the land is under small private ownership and the remainder is owned by pulp and paper and lumber companies.

### *Population Distribution*

The population of RFA 3 was 366,773 (1986 census, 1991 data for Lunenburg county) and was increasing slightly, mainly through increases in Halifax County. Most of the population is urban (69.5%), reflecting the high population density in Halifax County and the urban centres of Halifax, Dartmouth, Bedford and Lower Sackville. In contrast, about three-quarters of the population in Lunenburg and Guysborough Counties reside in rural areas. Overall, about 30% of the population of RFA 3 live outside urban centres and 0.5% live on farms.

The main population centres in RFA 3 are Halifax-Dartmouth, Lower Sackville and Bedford. Other population centres include: Halifax County (Beaverbank, Hatchet Lake, Herring Cove, Lake Echo, Middle Musquodoboit, Musquodoboit Harbour, North Preston, Porters Lake, Prospect Bay, Sheet Harbour, Springfield Lake, Upper Sackville, Upper Tantallon, Waverley and West Chezzetcook); Lunenburg County (Bridgewater and Lunenburg, as well as smaller centres at Blockhouse, Chester Basin, Dayspring, Hubbards, Martin's Point, and New Germany); and Guysborough County (Canso and Mulgrave and a smaller population centre at Guysborough).

### *Economic Profile*

Non-resource based manufacturing sustains the economy of the Eastern Region. However, the region's overall bias to non-resource based manufacturing is due to the strong non-resource based manufacturing sector in Halifax County. Outside of Halifax County forestry contributes most to the economy, followed by non-resource based manufacturing, and fisheries. The Eastern Region generates about 28% of Nova Scotia's pulpwood and about 20% of its sawn lumber. The fisheries yielded a landed value of \$128 million, representing about one-quarter of the Province's total.

### ***Industrial Activities Profile***

Halifax County supports the most profitable manufacturing sector in the Province. In 1988 the manufacturing sector in RFA 3 employed approximately 18,000 people with wages totaling \$209 million and produced goods valued at \$2,379 million, over half of the provincial total. Most of the labour force in RFA 3 is engaged in community, business, and personal services (33%), followed by trades (17%), public administration & defense (15%) and manufacturing (9%).

### ***Recreational Activities Profile***

Tourism in RFA 3 generated about \$166.8 million in 1983, representing over a quarter of the Province's tourism revenues. In descending order, the most attractive tourist sites in RFA 3 are Halifax - Dartmouth, Bridgewater - Lunenburg, Port Hawkesbury, and Hubbards - Chester. Outdoors-oriented businesses operating within RFA 3 include fishing outfitters, outdoor lodges, and canoe/kayak outfitters.

RFA 3 falls within the three tourism districts: Eastern Shore (Canso Causeway to Halifax-Dartmouth); Halifax-Dartmouth; and South Shore.

### ***Watersheds***

RFA 3 has an abundance of lakes, rivers and streams. The major rivers and streams in Nova Scotia are outlined in Appendix V. An inventory of existing fishways and other fish passage facilities by watershed and a list of known obstructions by watershed are summarized in Tables 41 and 42. The St. Mary's, Musquodoboit and LaHave rivers are the most prominent. The distribution of other rivers is shown by county :

Guysborough County: Ecum Secum, Indian Harbour, Issacs Harbour, Liscomb, New Harbour, Salmon, County Hbr., Spanish Ship Bay Brook, Gaspereau Brook, Gegogan Brook

Halifax County: Moser, Tangier, East and West (Sheet Harbour), Taylor Bay Brook, Port Dufferin, Quoddy, Halfway Brook, Little West, Ship Hbr., Little Salmon (Dartmouth), Ingram, Salmon (Jeddore), Porters Lake Brook

Lunenburg County: East, Gold, Middle, Petite, Mushamush, Martins

Table 41. Inventory of existing fishways and other fish passage facilities by watershed in RFA 3.

Fishway	Watershed	County	Owner	Type	No. of Pools	Head (m)	Latitude	Longitude
Conrod Lake	Chezetcook	Halifax	NSDOE	Pool & Weir	5	1.83	44-45-48	63-14-30
Barrie Dam	East River	Halifax	DFO	Vertical Slot	9	2.74	44-56-12	62-30-12
Ruth Falls (Diversion Dam)	East River	Halifax	DFO	Pool & Weir	14	4.88	44-57-18	62-30-06
Ruth Falls	East River	Halifax	DFO	Louvers		6.10	44-57-18	62-30-06
Ten Mile Lake (D/S)	East River	Halifax	NSPC	D/S By-Pass	1	3.35	45-07-36	62-42-00
Ten Mile Lake	East River	Halifax	NSPC	Drawdown Agreement		3.66	45-07-36	62-42-00
Malay Falls	East River	Halifax	DFO	By-Pass Flume	1	12.19	44-59-18	62-29-06
Marshall Falls	East River	Halifax	NSPC	3' High Weir with stilling basin	1	2.36	45-00-06	62-29-12
Fall River	Lake Thomas	Halifax	NSPC	Barrier Screens			44-48-30	63-36-30
Lake Major	Little Salmon	Halifax	City of Dartmouth	Pool & Weir	7	2.44	45-42-48	63-28-12
Long Lake	McIntosh Run	Halifax	NS Lands & Forests	Drawdown	3	1.22	45-36-53	63-37-30
Long Lake	Moose	Halifax	Kidston Camp	Pool & Weir	3	1.22	44-59-18	62-57-19
Dollar Lake	Musquodobolt	Halifax	NS Agriculture	Pool & Weir	1	.61	44-55-42	63-19-17
Lay Lake Marsh	Musquodobolt	Halifax	DU	Pool & Weir	3	1.22	44-55-00	63-12-12
Beaver Lake	Musquodobolt	Halifax	NS Agriculture	Pool & Weir	6	2.13	44-57-24	63-12-48
Chaswood Meadow	Musquodobolt	Halifax	DU	Pool & Weir	4	1.22	45-00-48	63-13-05
Shaw Bridge	Musquodobolt	Halifax	NS Agriculture	Pool & Weir	9	3.05	44-59-00	63-07-12
Grand Lake	Musquodobolt	Halifax	NS Agriculture	Pool & Weir	1	.61	44-54-12	63-10-00
Box Mill Brook	Shubenacadie	Halifax	Ashburn Golf Club	Drawdown Agreement		3.30	44-48-48	63-39-05
East Loon Lake	St. Mary's	Halifax	East Loon Lake Association	Pool & Weir	7	2.44	45-15-47	62-42-18
River Lake	Tangler	Halifax	NSDOE	Pool & Weir	4	1.83	44-55-00	62-44-24
River Lake (Auxiliary Spillway)	Tangler	Halifax	NSDOE	Pool & Weir	3	1.22	44-55-00	62-44-24
River Lake (D/S)	Tangler	Halifax	NSDOE	D/S By-Pass	2	.61	44-55-00	62-44-24
Lower or Mill Dam	West River	Halifax	NSDOE	Stop-log Weir		varies	44-55-42	62-32-54
Springfield Lake	Beaver	Halifax	NSDOT	Culvert	2	.91	44-48-48	63-44-48
Bannery Lake	Shubenacadie	Halifax	Hfx. Co. Ind. Comm.	Pool & Weir	7	2.44		
Portobello	Shubenacadie	Halifax						
North End Lake Charles	Shubenacadie	Halifax						
Grand Lake Wellington	Shubenacadie	Halifax						
Hesler Falls	Sackville	Halifax	DFO	Pool & Weir	12	4.27	44-46-28	63-42-46
Liscomb	Liscomb	Guysborough	DFO	Pool & Weir	16	9.75	45-02-12	62-06-36
Sherbrooke Lake	St. Mary's	Guysborough	NS Gov't. Serv.	Pool & Weir	5	1.83	45-08-39	61-58-36
Sherbrooke Lake (D/S)	St. Mary's	Guysborough	NS Gov't. Serv.	D/S By-Pass		3.05	45-08-05	61-58-48
Sherbrooke Lake	St. Mary's	Guysborough	NS Tourism	D/S By-Pass at upper dam	1	3.05	45-08-05	61-58-36
Upper Indian Harbour Lakes	Upper Indian Harbour Lakes	Guysborough	St. Mary's Fish & Game	Pool & Weir	1	.46	45-10-19	61-57-18
Fraser Brook	East St. Mary's	Guysborough	NSDOT	Culverts			45-22-26	62-07-12
Indian Lake	Gold	Lunenburg	private	Pool & Weir	2	.91	44-46-42	64-24-24
Rhodenzer Lake	Lalave	Lunenburg	private	Pool & Weir	2	.91	45-23-18	64-29-18
Morgan Falls	Lalave	Lunenburg	DFO	Vertical Slot	22	6.40	44-32-06	64-42-54
Indian Falls	Lalave	Lunenburg	DFO	Vertical Slot	18	5.18	44-35-30	64-36-14
Crousetown Mill	Petite Riviere	Lunenburg	private	Runaround	8	2.13	44-15-36	64-29-00
Sarty's	Petite Riviere	Lunenburg	DU	Pool & Weir	6	1.83	44-19-24	64-39-50
Highway 103	Middle	Lunenburg	NSDOT	Culvert	2	.91	44-35-12	64-17-25

Table 42. List of known obstructions on streams in RFA 3 (not in order of priority).

River	Location and Type of Obstruction	Fish Passage Alternatives
Liscomb	Little Liscomb Falls Small partial natural barrier above No.7 Highway Bridge	Blasting; Fishway
Tangier	Timber dam at River Lake	Breach; Fishway
Salmon (Port Dufferin)	Small partial natural barriers	Blasting
East (Sheet Harbour) <sup>1</sup>	Ruth Falls Dam Gaspereau Falls Malay Falls Dam Marshall Falls Dam Partial natural barrier-Twelve Mile Stream Antidam-Fifteen Mile Stream	Trapping and Trucking Selected Blasting and Fishways
West (Sheet Harbour)	Beaver Dam Natural Barrier	Breach; Fishway Blasting
Clam Harbour	Small dam; natural barrier	Fish passage studies and design required
St. Francis	Natural Falls	Fish passage studies and design required
Sackville	Natural Falls (Hefler's Mill)	Blasting; Fishway
Little Salmon (Dartmouth)	Dam; Minor stream obstructions	Fishway; In-Stream Work
East (Chester)	Timber Lake Dam	Fish passage studies and design required
Mushamush	Timber Dams (2)	Fish passage studies and design required
Musquodoboit	Minor Stream Obstructions	Fish passage studies and design required

<sup>1</sup> If East River (Sheet Harbour) is selected as a sea-ranching site, no major improvements to fish passage would be required.

## *Lakes*

The following summary of information on lakes for RFA 3 is based on data from the Nova Scotia Recreational Lakes Survey (NSRLS). The NSRLS profiles the recreation potential of approximately 1,200 lakes in Nova Scotia, of which there are over 6,700. Information from this inventory gives a general sense of the abundance and characteristics of lakes situated in RFA 3 relative to the other RFAs. All discussion and statistics presented are within the context of the 1,200 lakes in the NSRLS.

RFA 3 is particularly endowed with lakes; within RFA 3 there are 547 lakes with a combined surface area of 45864 ha, representing 36% of the total lake surface area. Total length of shoreline is 2,185 km, which is over 40% of the total surveyed shoreline. Of these lakes, 177 were headwater lakes. Over 80% of the lakes are accessible by road and 39% have an area for launching boats. Fishing activity on the lakes is high, with 29% of lakes having over 10 anglers at peak hours, and 7% with over 50 anglers at peak hours.

Lakes (ha) located within RFA 3 larger than 500 ha include :

Halifax County: Porters (1651), Charlotte (1485), Governor (651), Scraggy (644), Shubenacadie (1841), Tangier (785).

Lunenburg County: Sherbrooke L. (1660), Big Mushamush (1088.7), Minamkeak (780).

## *Fish Species Composition*

The recreational species present in RFA 3 are Atlantic salmon, speckled trout, smallmouth bass, yellow perch, gaspereau, blueback herring, shad, brown trout, American eel, striped bass, white perch and smelt. The georeferenced distribution of these species is outlined in Figure 44.

## *Existing Recreational Fisheries Activity*

Recreational fisheries in RFA 3 include Atlantic salmon which have mainly early run characteristics in the St. Mary's, East (Sheet Harbour), Musquodoboit, Gold and LaHave rivers. Angling for speckled trout comprises the major fishery found in most of the streams and lakes throughout RFA 3 not impacted by acid rain. Speckled trout catches in RFA 3, although higher than in other RFAs have declined dramatically since the 1960's and the current sport catch is only a small fraction of its former level (Figure 45). Shad catches appear to have improved slightly (Figure 49) and it is becoming a popular sport fish in rivers such as the LaHave and Musquodoboit. Sea-run speckled trout are popular on the Eastern Shore in rivers such as Ecum Secum, Moser and the St. Mary's. Smallmouth bass catches have increased dramatically according to the data (Figure 48) in response to their spread in RFA 3 and their increasing popularity as a sport fish. Sport catches of yellow perch and white perch are modest,

possibly reflecting their increased abundance in many lakes in RFA 3 (Figure 51 - 52). Recreational catches of striped bass are not large but have increased and they are popular in selected rivers in Guysborough County and in some other rivers such as the LaHave (Figure 50). Gaspereau are abundant throughout the rivers of RFA 3 but this resource is not well utilized as a sport fish. Brown trout angling is restricted to a few rivers in Guysborough County where it is popular. Sport catches of brown trout and rainbow trout are not large (Figure 46 - 47). Smelt provide a popular angling opportunity during the winter months in several river estuaries where ice-fishing tournaments are undertaken, notably on the LaHave River. Sport catches of rainbow trout have fluctuated annually according to the data. The angling catch of these species from stub return data is shown in Figure 45 to 52.

### ***Recreational Fishery Stakeholders***

The major stakeholders in RFA 3 are : St. Mary's River Association, Nova Scotia Salmon Association, Nova Scotia Wildlife Federation, Musquodoboit River Association, Sackville River Association, LaHave Salmon Association, Salmon River Association, Gold River Salmon Association, Lunenburg Rod and Gun Club, Lunenburg County Wildlife Association, and Eastern Shore Wildlife Association. There are seven First Nation reserves in RFA 3 : Sheet Harbour, Cole Harbour, Shubenacadie 13, St. Croix 34, Pennal 19, New Ross 20 and Gold River 21.

### ***Resource User Conflicts***

Resource user conflicts in RFA 3 are similar to those previously described for RFA 2.

### ***Recreational Fisheries Economic Impact***

The economic impact of the recreational fisheries in RFA 3 is outlined in another section of this report.

### ***New Recreational Fishing Opportunities***

A number of new recreational fishing opportunities exist in RFA 3 which are summarized below :

- Resident speckled trout stocks have declined in RFA 3 in response to a number of factors yet excellent potential exists to rehabilitate the resource. A comprehensive development strategy needs to be prepared for resident speckled trout including the closure of specific lakes, establishment of "no-kill" zones and other strategies identified in this report. Sea-run and resident speckled trout rehabilitation should be a priority in RFA 3.
- Sea-run speckled trout offer excellent sport fishing potential in certain watersheds along the Eastern Shore. A comprehensive development strategy should be prepared to enhance sea-run speckled trout in RFA 3 as well as other areas of the province.

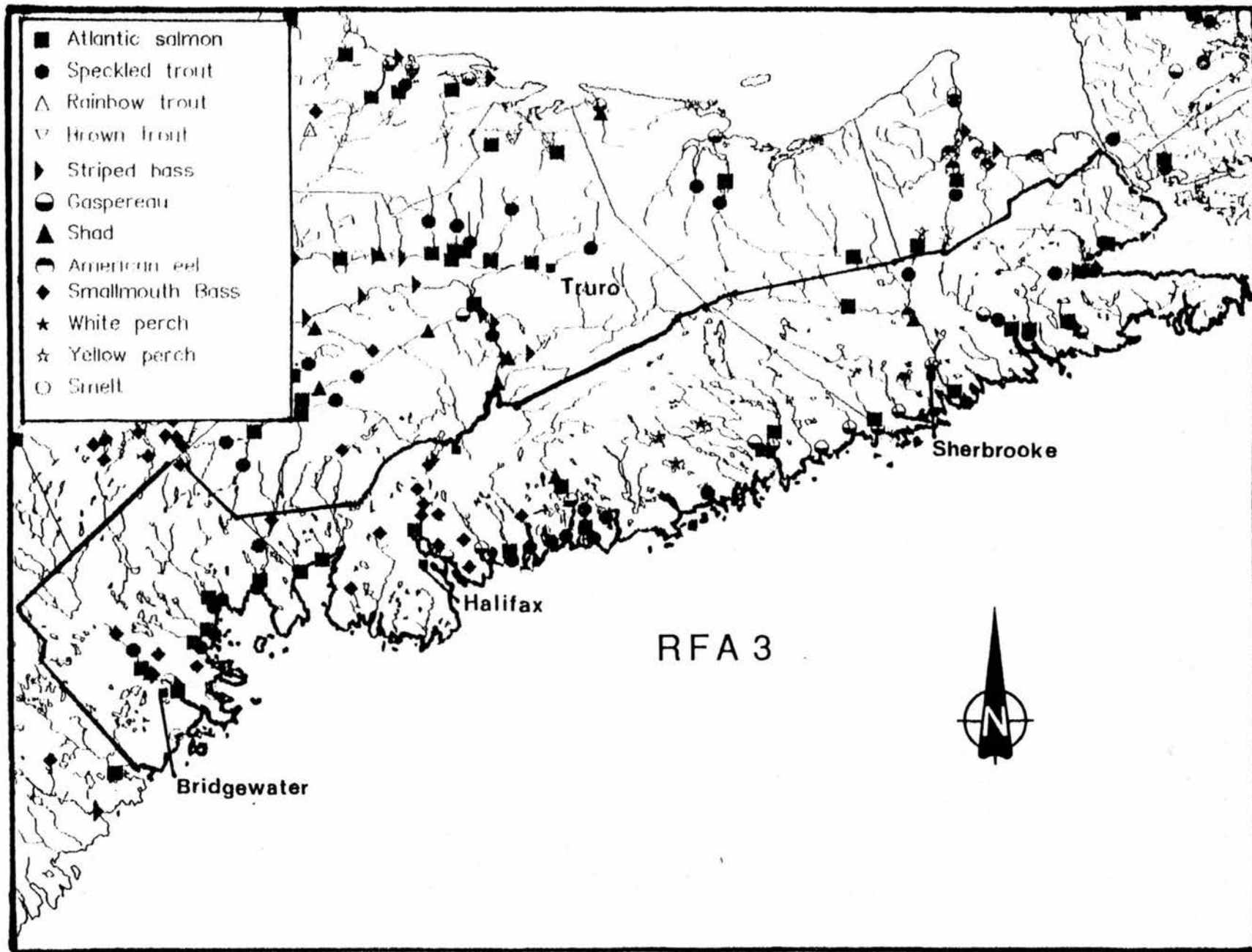


Figure 14. Generalized distribution profile of various fish species RFA 3



NUMBER OF SPECKLED TROUT IN RFA 3  
FROM STUB RETURN DATA 1966 - 1992

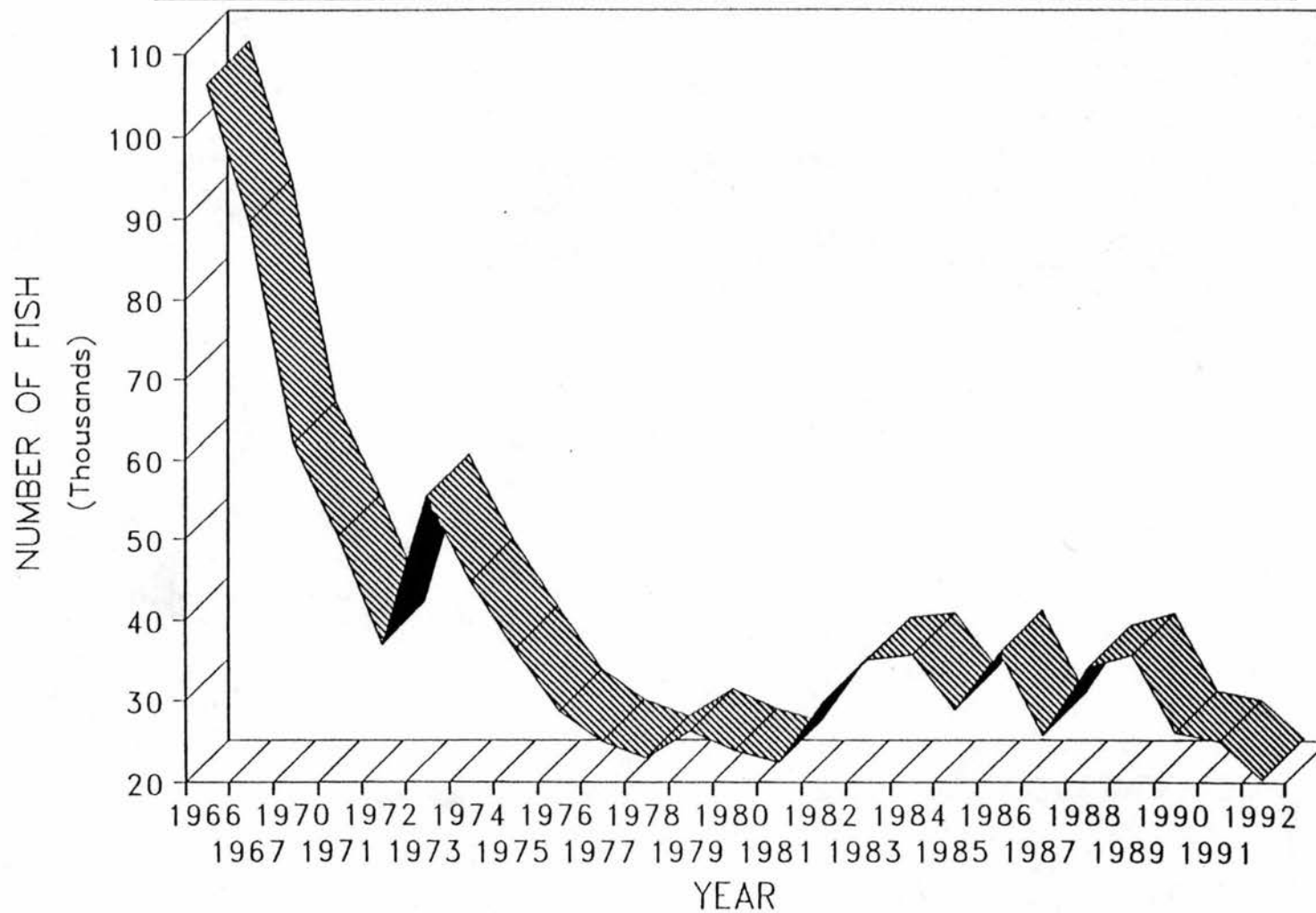


Figure 45. Number of speckled trout caught in RFA 3 from 1966 - 92.

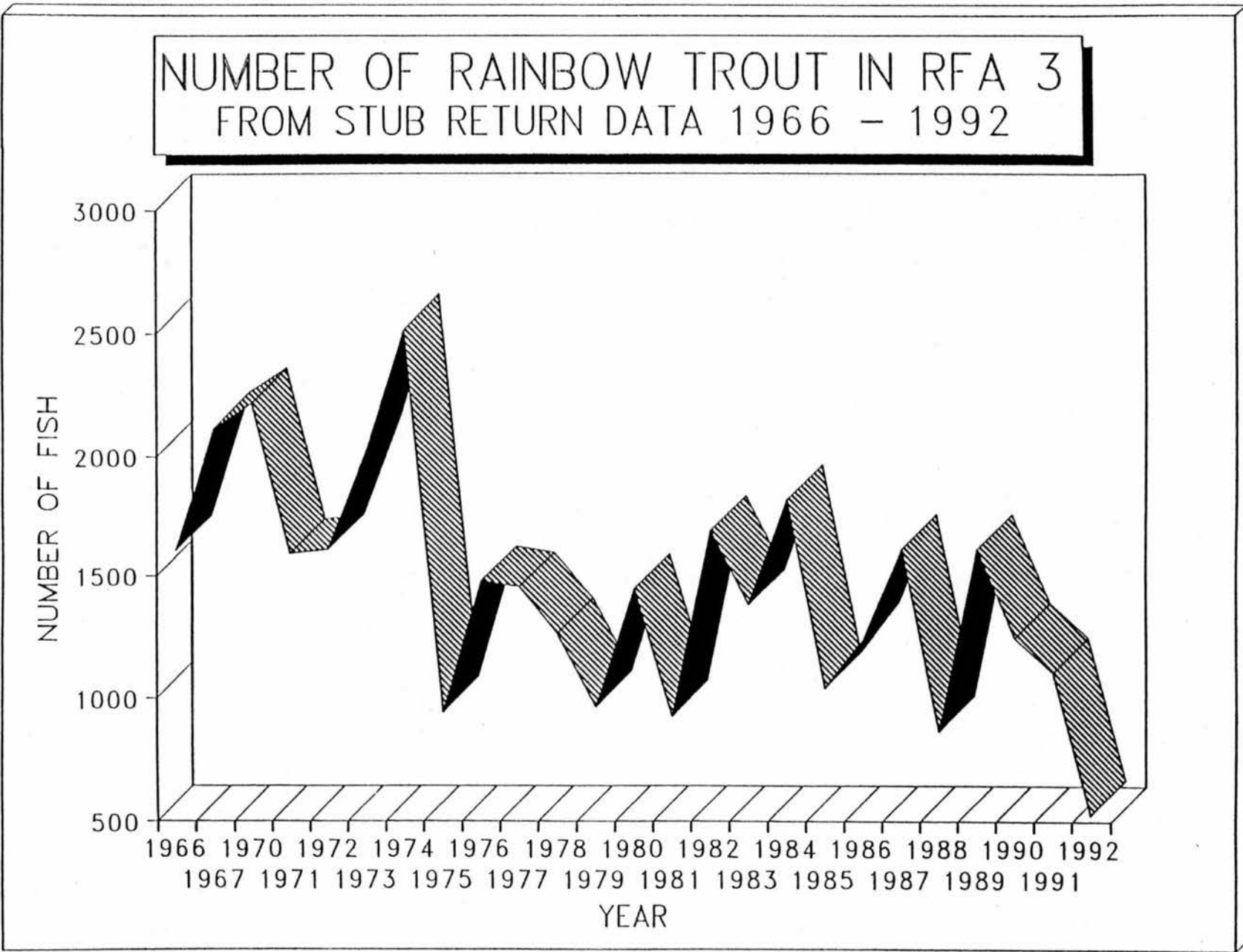


Figure 46. Number of rainbow trout caught in RFA 3 from 1966 - 92.

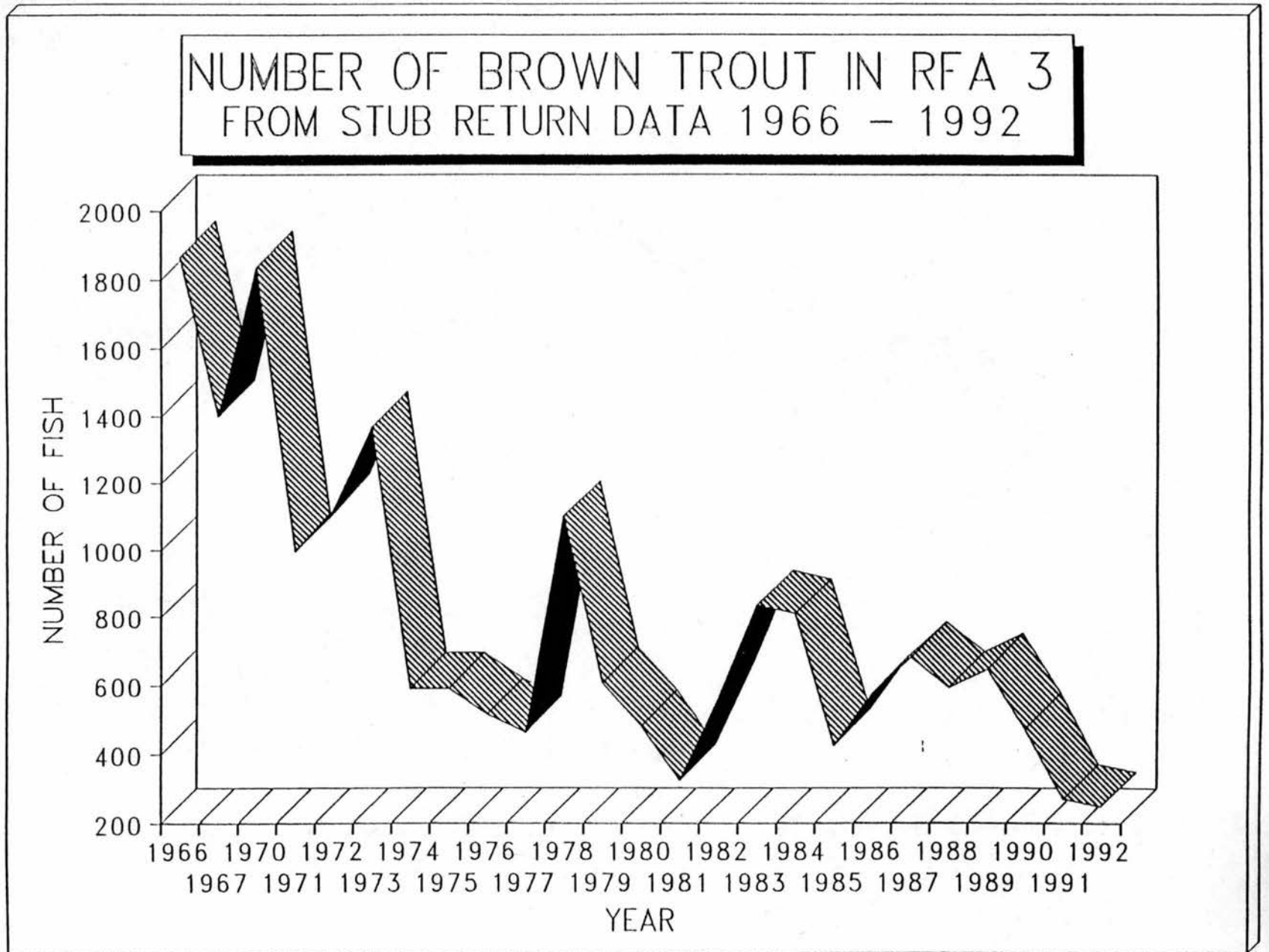


Figure 47. Number of brown trout caught in RFA 3 from 1966 - 92.

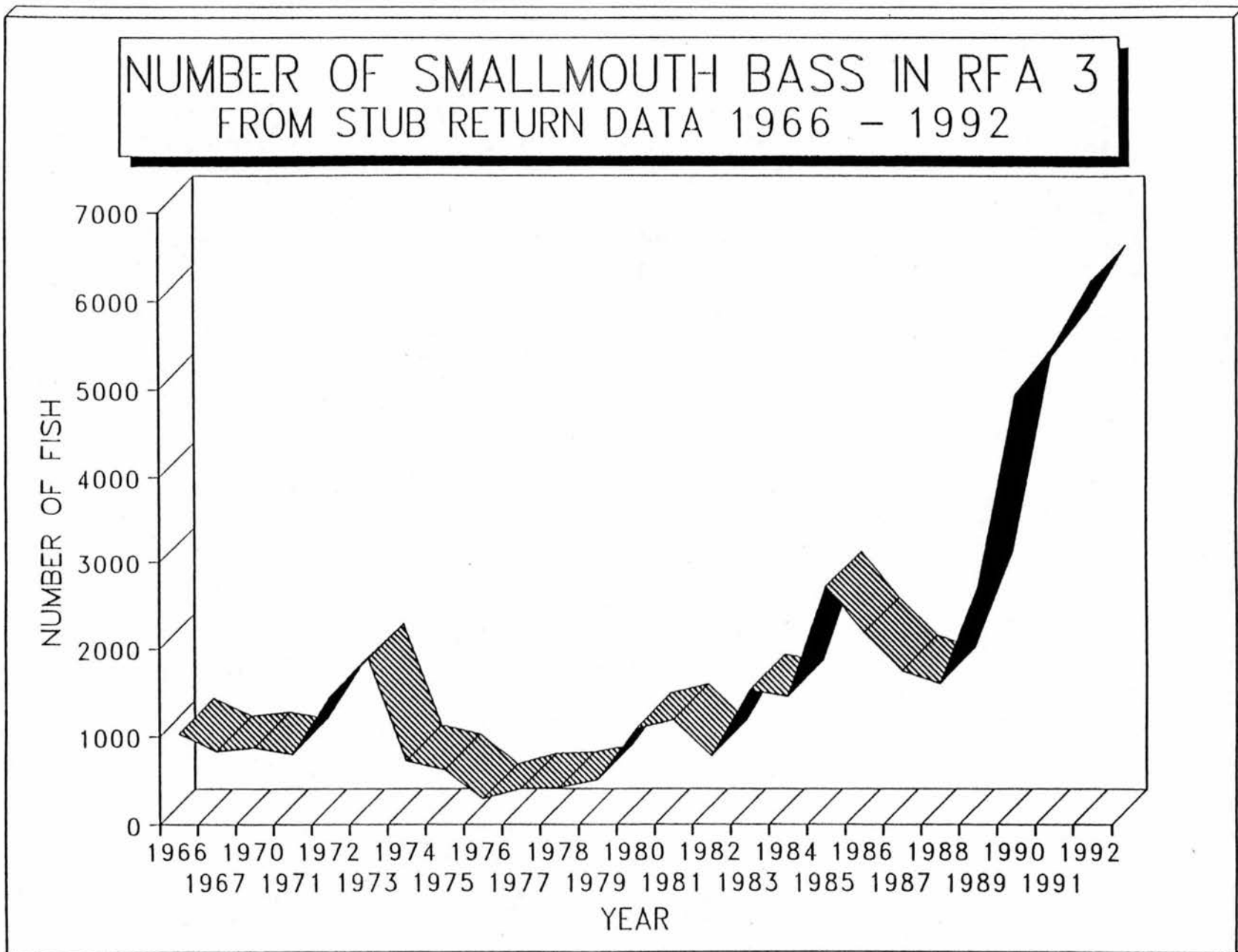


Figure 48. Number of smallmouth bass caught in RFA 3 from 1966 - 92.

NUMBER OF SHAD IN RFA 3  
FROM STUB RETURN DATA 1966 - 1992

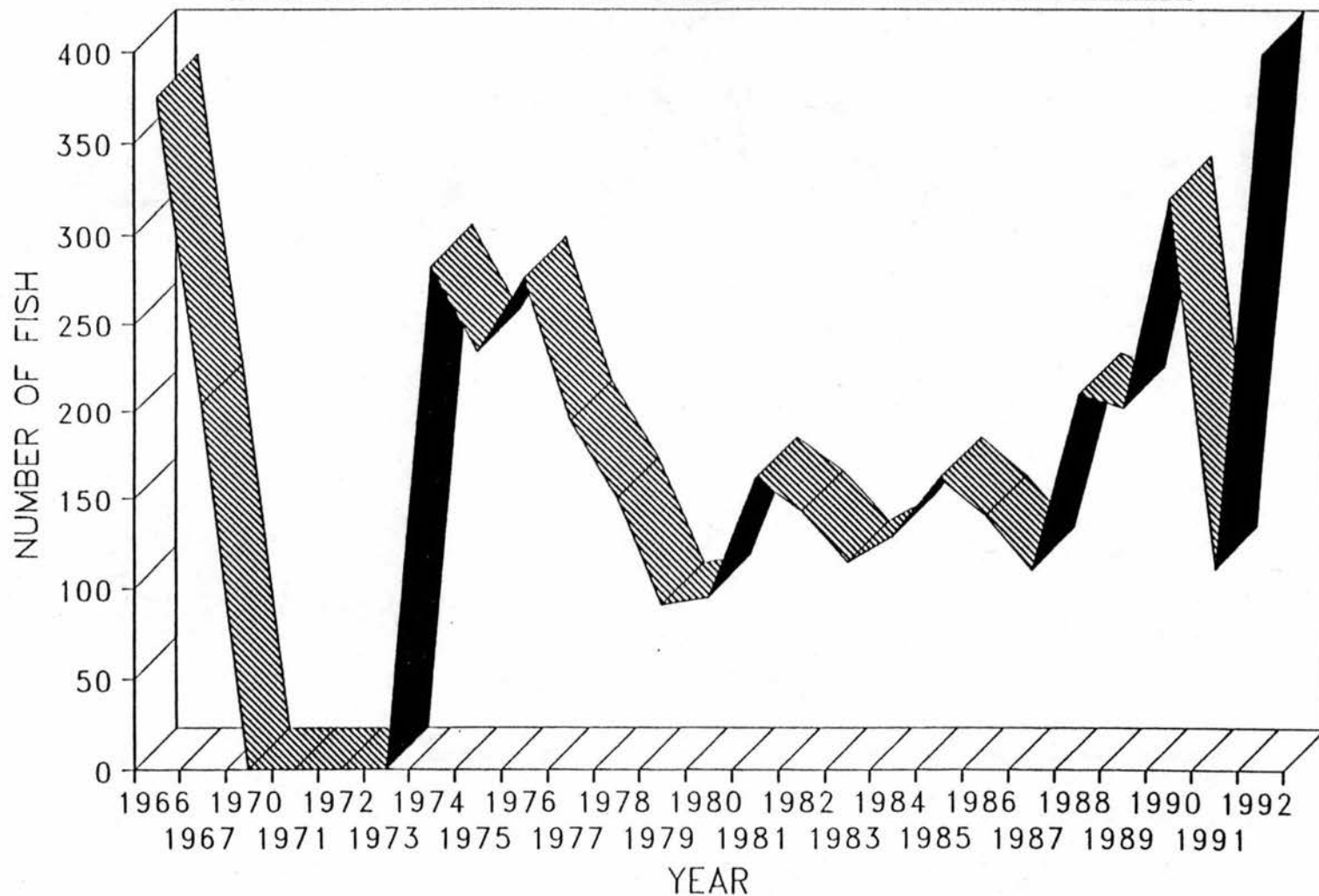


Figure 49. Number of shad caught in RFA 3 from 1966 - 92.

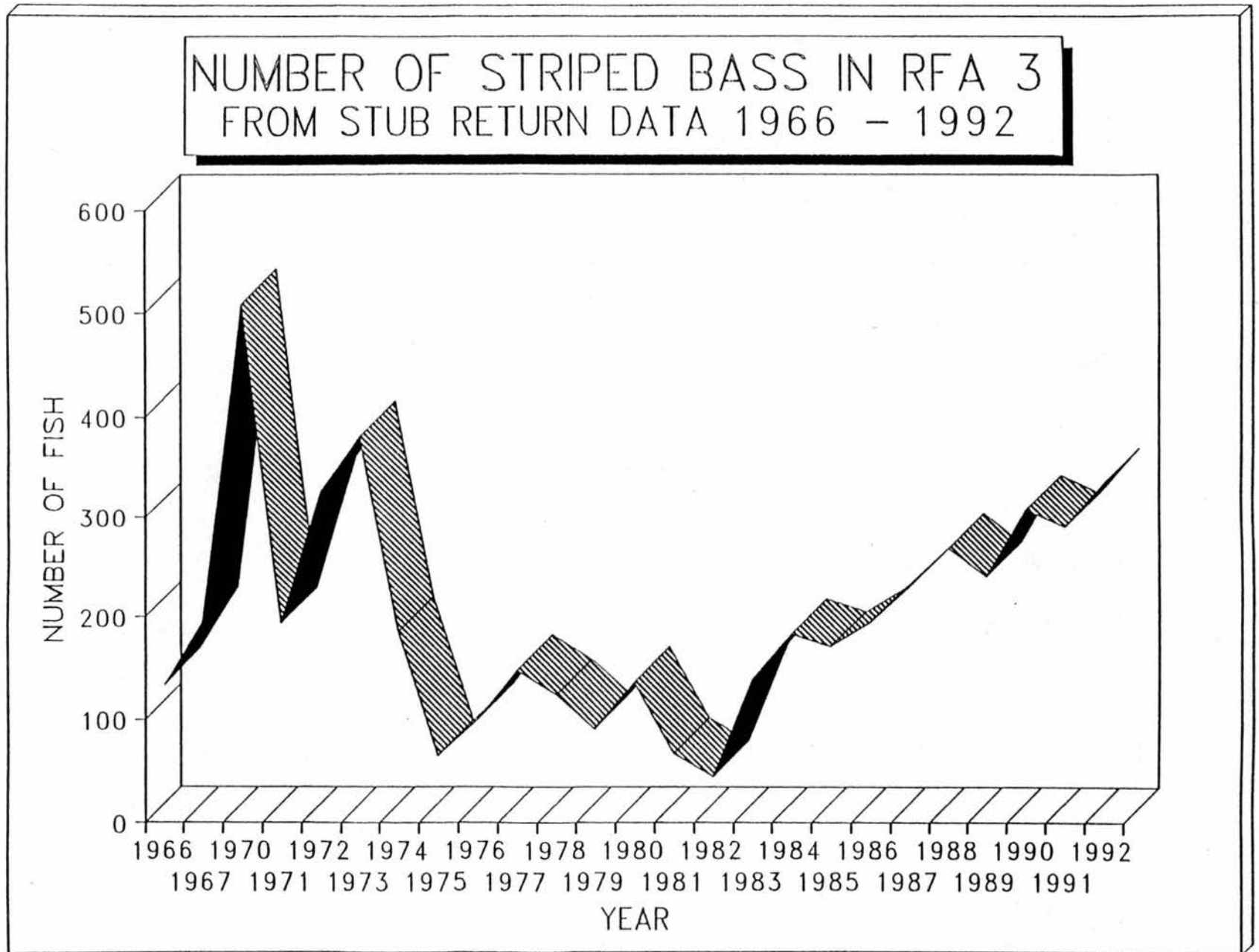


Figure 50. Number of striped bass caught in RFA 3 from 1966 - 92.

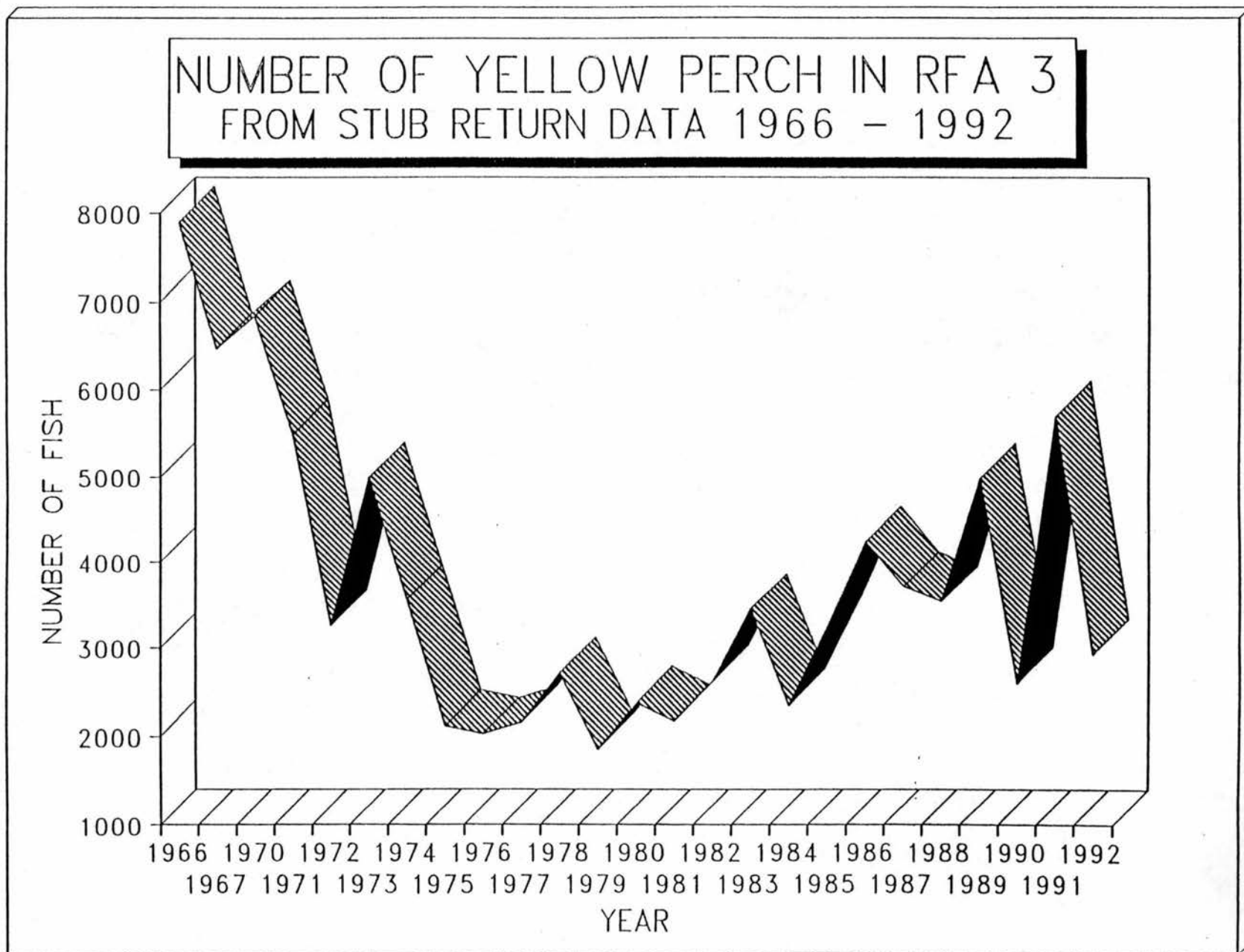


Figure 51. Number of yellow perch caught in RFA 3 from 1966 - 92.

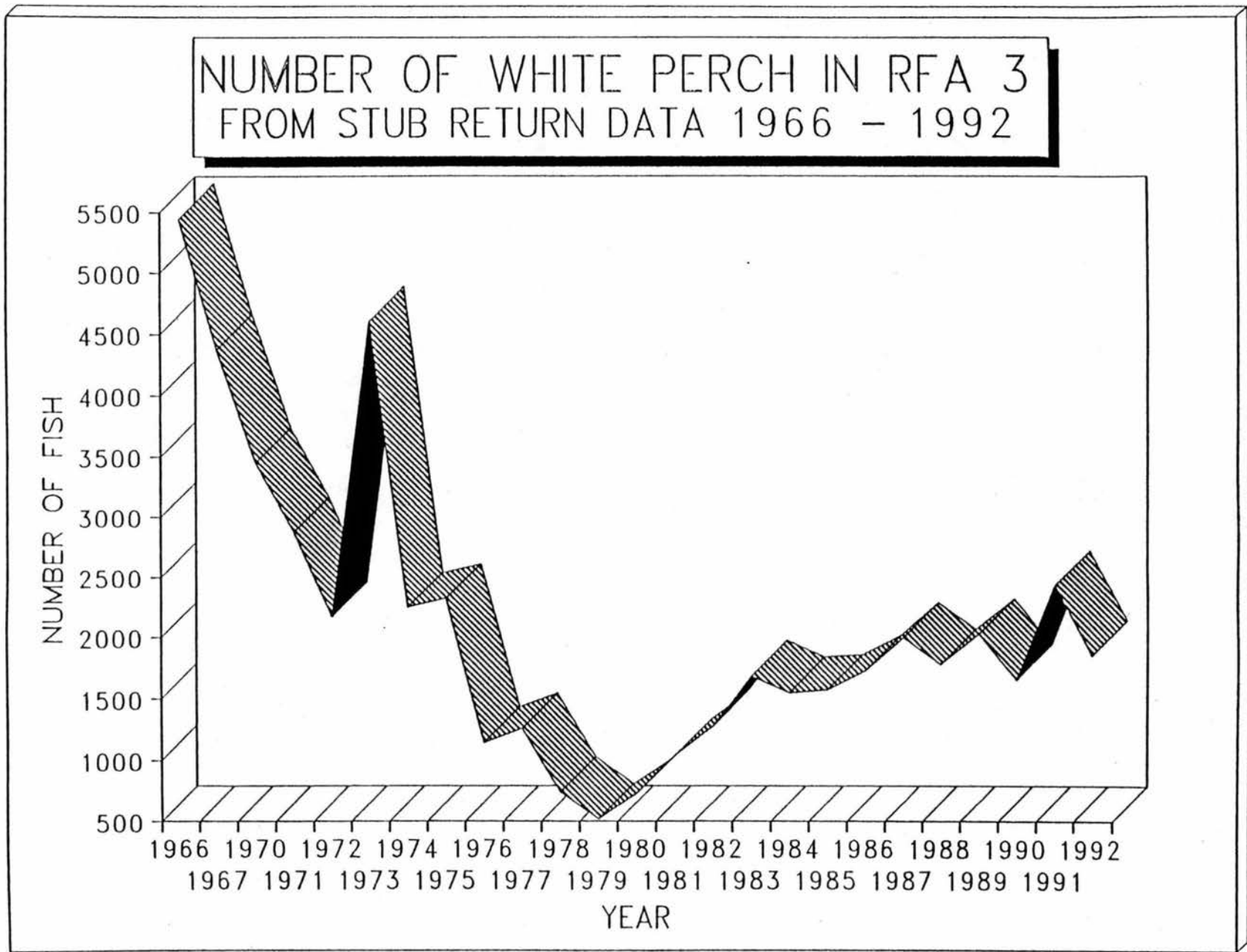


Figure 52. Number of white perch caught in RFA 3 from 1966 - 92.

- Excellent potential exists for smallmouth bass sport fisheries in RFA 3; these should be promoted.
- Sport fishing for yellow perch, white perch, gaspereau and possibly shad should be promoted where stocks permit. Yellow perch has an excellent taste, is a combative sport fish and can be angled in summer or winter.
- Winter ice-fisheries for yellow perch, white perch and smelt could be initiated at a number of locations.
- Winter ice-fisheries for salmonids in designated lakes which could be stocked for this purpose would also provide excellent potential.
- Landlocked salmon in Grand Lake should be rehabilitated to create an expanded fishing opportunity; other lakes may also have potential for landlocked salmon.
- Atlantic salmon stocks should be enhanced to improve angling for this highly popular sport fish. Consideration should be given to initiating a sea ranching project in RFA 3 (e.g. East R., (Sheet Harbour); Sackville R.).
- As recommended for RFA 1 and 2, put-take, U-Fish ponds, or artificial fisheries associated with community summer festivals, derbies, winter carnivals, etc. should be developed to reduce exploitation of wild trout stocks, create new angling opportunities including a simulation of wilderness angling and for the other objectives described in this report. Wherever possible, private enterprise (or watershed groups) should be encouraged to participate so that stocking costs could be minimized.

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### **Specific Recommendations for RFA 3** (not necessarily in order of priority)

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MAJOR CONCERNS : Fish Habitat Protection and Improvement; Hydroelectric Development; Acidic Precipitation; Loss of Fisheries Resources; Flow Control, Public Involvement.

Parts of RFA 3 are impacted by acidic precipitation; fish passage problems (upstream and downstream) exist on several rivers due to hydro-electric development, storage reservoirs, incorrect culvert

installations, natural obstructions, etc. and the baseflows in many rivers in summer are critically low. Since most of the watersheds are fed by surface run-off this results in less water available in the lakes and streams of RFA 3; this problem is compounded by forestry practices, hydro-electric development and other water management needs by industry and urbanization. The waters of RFA 3 are generally less productive than in RFA 1 or 2 and warmer water temperatures occur in summer which may be a limiting factor to the production of endemic speckled trout and possibly also Atlantic salmon in certain watersheds. The consultants recognize the need for the collection of accurate biological, chemical and physical data on these watersheds, more applied research on flow control, acid mitigation, species interaction and stream and lake productivity in RFA 3 and throughout Nova Scotia. Endemic species such as speckled trout and Atlantic salmon are still the predominant recreational species in most watersheds in RFA 3; however, with the aforementioned problems, some naturalized species such as brown trout and smallmouth bass have become important recreational species in some watersheds. The consultants suggest a number of specific recommendations for consideration in RFA 3 :

- Detailed recreational fisheries watershed management plans are required for the watersheds in RFA 3 including the Guysborough, Salmon, Cole Harbour, New Harbour, Isaac's Harbour, County Harbour, Liscomb, Ecum Secum, Moser, Quoddy, East/West (Sheet Harbour), Tangier, Ship Harbour, Musquodoboit, Sackville, Ingram, East (Chester), Middle, Gold, and Martin's rivers before proceeding with recreational fisheries development initiatives; biological/technical advice is required to assist in formulating these plans;
- Implement the proposed NSDOF regulations for recreational fisheries management proposed for 1993;
- NSDOF has established criteria for the introduction of exotic or naturalized species (e.g. smallmouth bass, brown trout, rainbow trout) to new areas so as not to negatively impact on speckled trout or Atlantic salmon; these should be implemented. Stakeholders in RFA 3 are sensitive to this problem and do not want SMB introduced into "trout" waters;
- With declining speckled trout and Atlantic salmon stocks in RFA 3 it is suggested that effective resource and habitat enhancement strategies, combined with effective new management regimes and adequate enforcement is needed to rebuild these endemic species;
- Several management options are suggested :
  - (i) RFA/Zonal Specific Management (See section on Recreational Fisheries Management);

- (ii) Experimental Lakes Program (alternating lake closures or lake sanctuaries; hook and release in fly fishing zones; stocking local wild speckled trout strains to "kick start" rehabilitation of wild populations; control access to designated lakes);
  - (iii) Watershed Specific Management (larger lakes, rivers with unique characteristics and significant recreational fisheries potential (e.g. St. Mary's, Musquodoboit, LaHave);
  - (iv) Integrated Resource Management should be implemented in cooperation with appropriate industries;
  - (v) Native and Non-Native involvement should be encouraged;
  - (vi) Establishment of more sanctuaries and No-Kill zones; sanctuaries should be established on the major rivers and designated lakes (LaHave, St. Mary's). Sanctuaries such as the Liscomb Game Sanctuary should be utilized to rebuild trout stocks; other lakes on Scott land could be designated for sanctuaries, and opened later for trophy fishing using controlled angling mechanisms.
  - (vii) The pilot River Specific Management project on the St. Mary's River should be continued. This project is an example where the local community group is directly involved in the planning and collection of scientific data on the salmon stocks, improvement and protection of fish habitat, and in the management of the river and its resources. The challenge over the next few years for this pilot project will be to work closely with various government agencies : (i) to continue to collect scientific data; (ii) to improve and protect fish habitat; (iii) to identify and evaluate options regarding water discharge on the West Branch; (iv) to enhance the recreational fisheries resources including Atlantic salmon, speckled trout and other species; (v) to formulate and implement effective recreational fisheries management regimes; (vi) to identify how enforcement efforts can be improved as a model for other streams; (vii) to identify options to maximize socio-economic benefits from the recreational fishery to the community and Nova Scotia; and (viii) to examine long term funding mechanisms which will help finance the RSM project to ensure it will continue (e.g. ZEC's in Quebec);
- Other approaches to expanding the recreational fisheries resource are available and Native and Non-Native community groups should be directly involved with Government in the planning and implementation of recreational fisheries development projects in RFA 3 and throughout the Province;
  - Fish habitat improvement or restoration should be a high priority in RFA 3 and is the cornerstone to rehabilitating the overall fisheries resource and in the restoration of speckled trout and salmon stocks in specific watersheds in RFA 3; in cases where industries (e.g. forestry) are working near

watercourses or lakes, performance bonds could be an approach to protecting sensitive aquatic ecosystems;

- In streams where water quality is good the installation of in-stream devices such as digger logs, wing deflectors, bank stabilization, and pool restoration could be carried out by Native and Non-Native community groups which should improve summer and overwintering fish habitat, stream productivity and holding areas for salmonids;
- Community groups should work with forest industries to implement selective cutting near streams, establish streamside greenbelts and improve fish habitat;
- Cottage developments near rivers and around lakes in Nova Scotia is becoming an environmental problem. More attention should be focused on these developments to ensure fish habitat and water quality are not degraded and greenbelts or buffer zones are established to protect aquatic ecosystems and the fisheries resource; this applies to all RFAs.;
- Mitigation of acidic precipitation in watersheds where pH is within 0.4 units of acceptable levels should be examined from a biological and cost-benefit perspective. The consultants have developed a bio-economic model to examine different habitat and resource enhancement strategies to help fishery managers make decisions on individual projects. Usually acid mitigation projects have a negative benefit:cost ratio and fiscal resources should normally be targeted at projects where water quality is acceptable; however, for societal reasons smaller liming projects could be funded where acidic waters are a limiting factor. Utilization of put-take fisheries, derbies and hatchery stocking are compensatory approaches to this problem if liming costs are prohibitive;
- Upstream and downstream fish passage problems continue to exist on some rivers. For example, a detailed study is needed on East River (Sheet Harbour) where several hydro-electric dams obstruct fish passage. This problem is compounded in this watershed by the impact of acidic precipitation. In general, benefit-cost analyses should be undertaken to evaluate where the provision of fish passage facilities would be acceptable. For example, East River (Sheet Harbour) could be considered as a sea ranching project to compensate for fish habitat loss, provide a native food fishery and take fishing pressure off wild salmon stocks in other rivers in RFA 3 if the cost of fish passage was prohibitive;
- Hatchery stocking has had a major impact in restoring speckled trout and Atlantic salmon stocks in RFA 3. These efforts should continue emphasizing wild broodstocks wherever possible. Many

success stories by DFO and NSDOF can be listed, among which are the LaHave and Liscomb rivers. There is a need in some instances to upgrade hatchery facilities and satellite (field) infrastructure to meet increased demands to rehabilitate salmonid stocks in watersheds where fish habitat is in good condition or where it has been improved. This investment is required to "kick-start" wild population, provide food fisheries, compensate for loss of fish habitat, expand the fisheries resource, protect unique genetic strains of recreational species and improve the efficiency of hatchery operations. With the high demand for recreational fisheries, maintenance stocking, urban recreational stocking and colonization of lakes or rivers where self-sustained wild populations will become established are needed;

- The consultants recommend that other cost-effective resource conservation and enhancement techniques also be employed where appropriate since hatcheries by themselves cannot sustain the recreational fishery. These include :
  - (a) Effective management regimes such as catch and release, seasons, bag and size limitations as outlined by DFO and NSDOF in their respective management plans;
  - (b) Improved enforcement with DFO, NSDOF, NSDNR and Native and Non-Native involvement (e.g. volunteer efforts through River Watch, Report-a-Poacher - 1-800 numbers, river wardens, etc.) will assist Conservation Officers in their task. Governments may also need to examine the feasibility of allocating more resources to the enforcement of Inland waters. A unified Inland Recreational Fisheries Conservation Unit is recommended;
  - (c) Streamside Satellite rearing tanks;
  - (d) Semi-Natural rearing ponds;
  - (e) Semi-Natural lake rearing cages;
  - (f) Broodstock transfers;
  - (g) Broodstock reconditioning;
  - (h) Stream Sanctuaries and "No-Kill" zones;
  - (i) Streamside Incubation Boxes.
  
- Selection of wild strains of speckled trout, sea-run trout and Atlantic salmon are needed to provide those most suitable for rehabilitating specific streams or lakes. It may be possible to develop more acid tolerant broodstock strains. Broodstock genetics must remain a high priority when stock enhancement initiatives are undertaken. The preparation of a comprehensive stocking policy using the experience and knowledge from other jurisdictions should be a high priority to reduce program costs, improve the survival of stocked salmonids and improve the efficiency of available space in Federal and Provincial hatcheries;

- Stock assessments of recreational species are required in many of the watersheds; more research is needed to develop cost-effective techniques and models to provide stock assessments for individual rivers or lakes. Index rivers or lakes representative of rivers or lakes with similar characteristics should be identified; creel census, fishway counts, electrofishing and other methods should be implemented to improve catch and effort statistics and information needed for stock assessments;
- Pilot research on acid mitigation being conducted by DFO (Timber Lake -East River, Chester) should be continued to provide bio-economic data on techniques to mitigate the effects of acidic precipitation in appropriate lakes and streams;
- Flow control or regulation is required on a number of watersheds in RFA 3. A detailed study is needed to determine the utility of constructing low head water storage areas to regulate flows in rivers affected by low baseflows in summer. The consultants recommend that a pilot study be carried out on Gold River to determine the bio-economics of this technique in rehabilitating the recreational fisheries resource; other examples where water regulation is needed in RFA 3 are : LaHave (Sherbrooke Lake, Big LaHave Lake), St. Mary's River, etc.;
- As the demand for recreational fishing expands, the challenge for fishery managers is to control demand and increase the supply of recreational fisheries resources without doing irreparable damage to native fish species in the RFA/Zone. The consultants suggest several options :
  - To meet the demand for recreational fisheries in urban areas, urban recreational stocking programs (put and take) should be continued or expanded. Consideration might be given to encouraging the use of private Fish-Out or U-Fish operations for this sector of the recreational fishery.
  - Community fishing derbies as part of summer festivals or winter carnivals are popular in Nova Scotia and stocking either from government hatcheries or in some cases from private operations is needed for these events which could take some pressure off wild stocks. This is particularly important for local anglers, but could also generate economic benefits from tourists.
  - Recreational fisheries should target other species such as smallmouth bass, shad, gaspereau, white perch, yellow perch, chain pickerel, striped bass, landlocked salmon, brown trout, rainbow trout and winter ice-fishing for white perch, yellow perch, put-take salmonids and smelt. These resources should be utilized to their full potential. Management plans proposed

by DFO and NSDOF should be implemented so that overexploitation of these species does not occur in RFA 3;

- Opportunities to create recreational fisheries in lakes suitable for landlocked salmon should be developed; for example, landlocked salmon stocks in Grand Lake should be rehabilitated;
- One sea-ranching project should be implemented for Atlantic salmon in RFA 3 (e.g. East River (Sheet Harbour); Sackville River, etc.);
- The impact on the fisheries resource of small hydro-electric plants proposed for RFA 3 should be studied if plans to implement these projects proceed.
- Recreational fishing activities should also focus on the excellent potential which exists in the tidal and marine waters of RFA 3. These waters provide excellent potential for mackerel, dogfish, groundfish, and big game species such as sharks. This approach will take some fishing pressure off freshwater and anadromous species while creating expanded recreational fishing;

## Recreational Fishing Area 5

RFA 5 encompasses the counties of Annapolis, Kings, Hants and that portion of Colchester County south of Highway #104. It contains the northern half of central Nova Scotia from Truro to Digby. The region encompasses approximately 13,000 square kilometers (1,300,000 hectares), or a fifth of Nova Scotia. One hundred and thirty eight thousand (138,000) people or a sixth of the Province's population reside in RFA 5. The southern boundaries of the counties in RFA 5 occur along the midline of the province. Annapolis County, the most westerly county in RFA 5, extends east from Digby to Middleton on the east and borders the Bay of Fundy. Kings County borders Annapolis County on the west and the western shore of the Minas Basin on the east. Hants County extends to the south and east of Kings County to include the watersheds of the Avon, St. Croix and Shubenacadie rivers. Bordering on the south shore of the Minas Basin, Hants County extends east to Highway # 104 where it meets Colchester County and south to boundaries with Halifax and Lunenburg Counties. Only the southern portion of Colchester County -- the section below Highway # 104 -- falls within RFA 5. The Stewiacke River watershed is contained by this section.

The geology of the Valley Region is diverse, ranging from the soft sedimentary rocks and mineral deposits such as gypsum in the Windsor area to basalt rock faces of North Mountain along the Fundy Coast. The landward extent of Annapolis and Kings Counties are predominantly ancient granites of the same formation found characteristically west of Halifax. In these counties, the North Mountain basalts predominate in a band running from Digby Neck to Cape Split. Between the two major formations there are occurrences of the Blomidon sedimentary formations of red sandstone, conglomerate, siltstone and shale, and the grewackes, quartzites, slates, schists and gneisses of the Meguma group.

Hants County and the southern portion of Colchester County contain a variety of sedimentary bedrock formations of the Windsor, Horton and Pictou groups, but southern portions of Hants County include granites, and both counties overlap regions having occurrences of Meguma group rocks of both the Halifax and Goldenville formations (slates, schists, greywacke, gneiss).

The portion of RFA 5 west of the Avon River generally has many more lakes and rivers than to the east. The western section shows strong effects of glaciation: soils are thin, metamorphic rock and granite are exposed, while the eastern section of RFA 5 is composed of soft sedimentary rock covered thickly with glacial till; there are few lakes, but many mature rivers.

Land cover in RFA 5 is dominated by softwoods (32%) and mixed woods (26%). One quarter of the region is land that is non-forested or occupied by water and flowage.

Soil drainage is fair to moderately good throughout most of Hants County and the southern portion of Annapolis County; the remaining areas are well drained. Peatlands are prevalent in the south of Annapolis County.

Acid waters appear to be confined to the southwestern section of Annapolis County (pH < 5.0), the southern extremes of Hants County and parts of Kings County.

### *Land Ownership Distribution*

The majority of land in RFA 5 is under small private ownership. The proportion of land under commercial ownership is significant in Annapolis County (25%), and Hants County (15%). Large tracts of crown land occur in Annapolis and Kings Counties. Within the Valley Region, there are four First Nation reserves occupying a total of 17.6 square kilometers (1764 ha): Kings County (Horton 35, Cambridge 32); Hants County (Shubenacadie 14); and Colchester County (Millbrook 27, 27A, 27B, 27C) .

### *Population Distribution*

The population of RFA 5 is approximately 138,200 (1986 census) and is increasing. The population is mostly rural (67%), a situation that appears to be stable. The most densely populated county is Kings (24.4 /km<sup>2</sup>) followed by Colchester (13.0), Hants (12.0) and Annapolis (7.4). The main population centres in RFA 5 are Truro, Kentville, Annapolis Royal, Middleton, and Windsor. Smaller centres in RFA 5 include: Annapolis County (Bridgetown, Lawrencetown); Kings County (Berwick, New Minas, Wolfville, New Ross, Aylesford); Hants County (Hantsport, Three Mile Plains); and Colchester County (Stewiacke, Bible Hill).

### *Economic Profile*

Resource-based manufacturing accounts for about 60% of the Valley Region's economy of which agriculture followed by forestry are the most important contributors. The Counties of Hants, Kings and Annapolis are the most lucrative farming regions in Nova Scotia. Farms tend to produce cattle, hogs and sheep (33%), fruit & vegetables (20%), and dairy products (19%). The Valley Region generates about 24% of Nova Scotia's pulpwood and about 26% of its sawn lumber. Mining of limestone, gypsum shale, clay and sand occurs in RFA 5.

### ***Industrial Activities Profile***

Manufacturing contributes moderately to the overall economy of the Valley Region. In 1986 the manufacturing sector employed approximately 4,000 people and produced goods valued at \$600 million, 14% of the provincial total. Most of the labour force in RFA 5 is engaged in community, business, and personal services (26%), followed by trades (15%), public administration & defense (13%) and manufacturing (12%).

### ***Recreational Activities Profile***

Tourism in the Valley Region generated about \$95 million in 1983, representing a sixth of the Province's tourism revenues. In descending order, the most attractive tourist sites in RFA 5 are Kentville, New Minas, Wolfville, Truro, Annapolis Royal, and Middleton. Kejimkujik National Park in Annapolis County attracts many outdoor enthusiasts. Sport fishing derbies are held in Middleton (Shad) and Black River (Smallmouth bass). Outdoor-based businesses operating within the Valley Region include fishing outfitters, lodges, and canoe outfitters.

RFA 5 overlaps two tourism districts: the Fundy Shore Region below Highway # 104 and the portion of the Annapolis Valley Region east of Digby.

### ***Watersheds***

The major rivers and streams in Nova Scotia are outlined in Appendix V. An inventory of existing fishways and other fish passage facilities by watershed and a list of known obstructions by watershed are summarized in Tables 43 and 44. RFA 5 has an abundance of rivers, lakes and streams throughout. The major rivers are the Annapolis, Gaspereau, Shubenacadie, Salmon and Stewiacke. Other smaller rivers and streams are listed by county :

Annapolis Co.: Nictaux, Bear, Lequille, Round Hill, Paradise Brook, Armstrong Brook, Black River Brook, Burbridge Brook, Fales Brook, Messenger Brook, McEwens Brook, Morton Brook, Oak Hollow Brook, Parker Brook, Slokum Brook, Walker Brook, Wiswall Brook, Worchester Brook

Kings County: Cornwallis, Canning

Hants County : Avon, Kennetcook, Herbert, St. Croix, Indian Brook

Table 43. Inventory of existing fishways and other fish passage facilities by watershed in RFA 5.

Fishway	Watershed	County	Owner	Type	No. of Pools	Head (m)	Latitude	Longitude
Annapolis Causeway	Annapolis	Annapolis	NSTPC	Stoplogged	Tidal		44-45-10	65-30-48
Annapolis Causeway	Annapolis	Annapolis	NSPC	Pool & Weir	Tidal		44-45-10	65-30-48
West Moose River	Moose	Annapolis	Clementsport Legion	Operating Agr.		1.52	44-39-30	65-35-36
Walker Brook	Annapolis	Annapolis	NSDOT	Baffle Culvert	53	3.35	44-49-20	65-17-48
Messenger Brook	Annapolis	Annapolis	NSDOT	Baffle Culvert	32	1.22	44-48-46	65-19-11
Button Brook	Annapolis	Annapolis	NSDOT	Baffle Culvert		1.22	44-50-04	65-16-04
Evans Brook	Annapolis	Annapolis	NSDOT	Concrete Culvert			45-44-45	64-05-17
Rowe Hatchery	Annapolis	Kings	private	Pool & Weir	5	1.52	44-57-50	64-48-00
Rockland Brook	Annapolis	Kings	DU	Pool & Weir	4	1.22	45-01-24	64-44-00
Lumsden Dam	Black River	Kings	NSPC	D/S Fishway		21.95	45-01-48	64-23-48
Hollow Bridge	Black River	Kings	NSPC	D/S Fishway		45.11	44-59-00	64-22-50
Hell's Gate	Black River	Kings	NSPC	D/S Fishway		21.34	45-01-45	64-24-09
Forest Home	Black River	Kings	NSPC	D/S Control Gate		varies	44-56-12	64-31-07
Tupper Brook	Cornwallis	Kings	Scotia Gold	Pool & Weir	2	.91	45-04-08	64-34-30
Seven Bridges Estate (Lower Structure)	Cornwallis	Kings	private	Pool & Weir	2	.91	45-04-42	64-33-12
Seven Bridges Estate (Upper Structure)	Cornwallis	Kings	private	Pool & Weir	2	.91	45-04-42	64-33-12
Webster's Dam	Cornwallis	Kings	private	Pool & Weir Drawdown Agr.	3	.91 to 3.05	45-02-42	64-37-42
Aylesford Lake	Gaspereau	Kings	NSPC	Pool & Weir	2	.76	44-57-42	64-39-18
North Gaspereau Runaround	Gaspereau	Kings	NSPC	Runaround		1.83	44-58-18	64-37-00
White Rock	Gaspereau	Kings	NSPC	Pool & Weir	65	19.81	45-04-48	64-22-50
White Rock (D/S)	Gaspereau	Kings	NSPC	D/S Bypass	1	19.81	45-04-48	64-22-50
Trout River By-Pass	Gaspereau	Kings	NSPC	Downstream Passage	1	.61	44-56-12	64-30-15
Lane's Mill	Gaspereau	Kings	NSPC	D/S By-Pas	1	1.37	44-59-24	64-37-05
Lane's Mill	Gaspereau	Kings	NSPC	Pool & Weir	15	4.57	44-59-24	64-32-05
Habitant Creek	Habitant	Kings	NS Agriculture	Gates			45-08-56	64-24-30

continued on next page

Table 43. Inventory of existing fishways and other fish passage facilities by watershed in RFA 5 (con't.)

Fishway	Watershed	County	Owner	Type	No. of Pools	Head (m)	Latitude	Longitude
Sheffied Mills	Habitant	Kings	DU	Pool & Weir	4	1.22	45-09-06	64-28-48
North Br. Marsh	Habitant	Kings	DU	Pool & Weir	5	1.22	45-09-12	64-28-12
Armstrong Meadow	LaHave	Kings	DU	Pool & Weir	3	1.22	44-45-50	64-43-48
C. Randbrook	Cornwallis	Kings	NSDOT	Double Box Timber			45-03-44	64-46-32
Sharpe Brook	Cornwallis	Kings	NSDOT	Baffle Culvert		.46	45-03-36	64-38-12
Dodge Brook	Cornwallis	Kings	NSDOT	Baffle Culvert	2	1.83	45-03-12	64-31-12
Avon	Avon	Hants	NS Agriculture	Tide Gates	Tidal		44-59-49	64-08-54
Zwicker Lake	Avon	Hants	NSPC	Pool & Weir	6	2.44	44-48-50	64-14-10
Three Mile Brook	Cogmagum	Hants	DU	Pool & Weir	3	1.22	45-08-30	64-01-35
Akins Meadow	Halfway	Hants	DU	Pool & Weir	2	.91	45-02-00	64-10-51
King Meadow	Shubenacadie	Hants	DU	Pool & Weir	3	.91	45-08-30	63-31-42
Davidson Meadow	Bass River	Colchester	DU	Pool & Weir	4	1.22	45-25-20	63-45-28
MacElmon's Pond	Chiganois	Colchester	DU	Pool & Weir	5	1.83	45-23-24	63-25-48
Great Village	Great Village	Colchester	NS Agriculture	Pool & Weir	6		44-23-42	63-36-18
St. Andrews	St. Andrews	Colchester	DU	Verical Slot	3	1.22	45-04-45	63-22-36
Davis Lake	South Stewiacke	Colchester	DU	Pool & Weir	4	1.22	45-08-30	63-09-30

Table 44. List of known obstructions on streams in RFA 5 (not in order of priority).

River	Location and Type of Obstruction	Fish Passage Alternatives
Annapolis	Annapolis Causeway; Pilot Tidal Power Project	Fish passage studies and design required
Bear	Several Hydroelectric Dams (NSPC); Natural Falls	
Lequille	Several Hydroelectric Dams (NSPC)	
Bloody Creek	Hydroelectric Dam (NSPC); Natural Falls	
Paradise	Hydroelectric Dams (NSPC)	
Nictaux	Several Hydroelectric Dams (NSPC); Natural Falls	
Fales	Randall Lake Dam (NSPC)	
South Annapolis	Hydroelectric Dam (NSPC)	
Gaspereau	Lanes Mills Dam (NSPC) Several Hydroelectric Dams (NSPC)	Fishway Improvements (Downstream fish passage)
Chiganois	Aboiteau Fishway; Natural Falls (15m)	Fishway Improvements (Fish Passage Study Required)
Debert	Timber Dam (4m) (Headwaters)	Breach; Fishway (Fish Passage Study Required)
Diligent	Natural Falls (9m) (West Branch)	Blasting; Fishway (Fish Passage Study Required)
Five Islands	Natural falls (5m) (East Branch)	Blasting; Fishway (Fish Passage Study Required)
Harrington	Timber Dams; Stream Debris	Breach (Fish Passage Study Required)
Avon	Several Hydroelectric Dams; Windsor Causeway	Flap Gates - Causeway (Fish Passage Study Required)
St. Croix	Several Hydroelectric Dams	Fish Passage Study Required
Folly	Natural Falls (6m)	Blasting; Fishway (Fish Passage Study Required)
North (Colchester)	Natural Falls (29m) (Headwaters)	Fish Passage Study and Design Required
Economy	Natural Falls (21m) (Headwaters)	Fish Passage Study and Design Required
Portapique	Natural Falls (Headwaters)	Fish Passage Study and Design Required
Greville	Natural Falls (12m)	Fish Passage Study and Design Required
Parrsboro	Concrete/Timber Dam (Scott Paper)	Fishway (Fish Passage Study and Design Required)
Great Village	Natural Falls (5m) (Londonderry)	Blasting; Fishway (Fish Passage Study and Design Required)
Moose, Bass	Several Natural Falls	Fish Passage Study and Design Required
Hebert, Naupon, LaPlanche	Dams	Fish Passage Study and Design Required

## **Lakes**

The following summary of information on lakes for RFA 5 is based on data from the Nova Scotia Recreational Lakes Survey (NSRLS). The NSRLS profiles the recreation potential of approximately 1,200 lakes in Nova Scotia, of which there are over 6,700. Information from this inventory gives a general sense of the abundance and characteristics of lakes situated in RFA 5 relative to the other RFAs. All discussion and statistics presented are within the context of the 1,200 lakes in the NSRLS.

Within RFA 5 there are 172 lakes with a combined surface area of 267830 ha, representing 13% of the total lake surface area. Total length of lake shoreline is 876 km, about 16% of the total surveyed shoreline. Of these lakes, 70 are headwater lakes. Over 70% of the lakes are accessible by road and 74% have an area for launching boats. Fishing activity on the lakes is moderately high, with 28% of lakes having over 10 anglers at peak hours, and none with over 50 anglers during peak hours.

Lakes (ha) located within RFA 5 larger than 500 ha include :

Annapolis County: Big Molly (507), Kejimkujik (1288).

Kings County: Aylesford (532), Black River (667), Gaspereau (1280).

Hants County: Five Mile (505), Panuke (1639)

## ***Fish Species Composition***

The predominant recreational species in RFA 5 are speckled trout, Atlantic salmon, smallmouth bass, striped bass, shad, and gaspereau. Other recreational species found in RFA 5 include brown trout, rainbow trout, yellow perch, white perch, American eel and smelt. The georeferenced distribution of these species is shown in Figure 53.

## ***Existing Recreational Fishing Activity***

Although speckled trout are still the predominant species in sport catches in RFA 5 (Figure 54), angling catches are less than 25% of those in the mid-1960's. A number of factors probably account for this (e.g. overexploitation, acid precipitation, habitat degradation and adverse species interactions), and speckled trout stocks in RFA 5 appear to have suffered severe damage. Smallmouth bass catches have increased dramatically in the last six years according to the data (Figure 57), as have shad catches (Figure 58), possibly reflecting the increased popularity of these sport fish. Brown trout, rainbow trout, and Atlantic salmon, although popular sport fish, do not comprise a large part of the recreational fishery in RFA 5 (Figures 55 and 56). Salmon stocks in the Stewiacke River have been in severe decline for unknown reasons. Similar to RFA 3, yellow perch and white perch make up a good proportion of the

sport catch in RFA 5 (Figures 60 and 61). Striped bass is an excellent sport fish, however, sport catches have declined dramatically from the mid-1960's (Figure 59).

Smallmouth bass are angled in the larger lakes and rivers in RFA 5. Shad and striped bass are popular in the Annapolis, Gaspereau and Shubenacadie rivers. Brown trout are popular in the Cornwallis River. Atlantic salmon are angled in the Annapolis, Gaspereau, Stewiacke, Shubenacadie and several other rivers; both early and late runs of salmon are present in the rivers of RFA 5. Gaspereau are found in most rivers of RFA 5; however, the resource is poorly utilized as a sport fish. The angling catch represented from stub return data for each species in RFA 5 is shown in Figures 54 to 61.

### ***Recreational Fisheries Stakeholders***

The major stakeholders in RFA 5 are : Canadian Association of Smallmouth Bass Anglers, Nova Scotia Wildlife Federation, Annapolis River Management Group, Kings County Wildlife Association, Nova Scotia Salmon Association, Clean Annapolis River Project and Cobequid Salmon Association. There are four First Nation reserves in RFA 5 : Horton 35, Cambridge 32, Shubenacadie 14 and Mill 27, 27A, 27B, 27C.

### ***Resource User Conflicts***

Conflicts occur with commercial gillnets or traps set to capture gaspereau or American eels. Conflicts also occur regarding the setting of gillnets for shad, particularly in the estuary of the Stewiacke River where nets purportedly capture striped bass, salmon and sea-run speckled trout as a by-catch. Conflicts still exist between sport fishermen (fly fishing vs. lure fishing), trout fishermen vs. salmon fishermen, trout fishermen vs. smallmouth bass fishermen and native vs. non-native fishermen. Since native peoples have the legislative right to a food fishery after spawning requirements are met (Section 35 of the 1982 Constitution Act), these rights are now recognized by recreational fishermen. However, in some cases the actual or perceived overfishing by native fishermen is a conflict in the view of some anglers which must be resolved by governments. With regard to native rights, discussions should focus on the displacement of fishing effort in return for economic development opportunities in the recreational fishery; however, should this scenario be chosen by native fishermen, this would not mean the relinquishment of their fishing rights.

The overharvest of recreational species by some anglers particularly speckled trout, was a problem identified by many stakeholders. Poaching was also an issue of concern raised by stakeholders. With regard to these latter problems, stakeholders suggested that improved enforcement efforts were needed.

### ***Recreational Fisheries Economic Impact***

The economic impact of the recreational fisheries in RFA 5 is discussed in another section of this report.

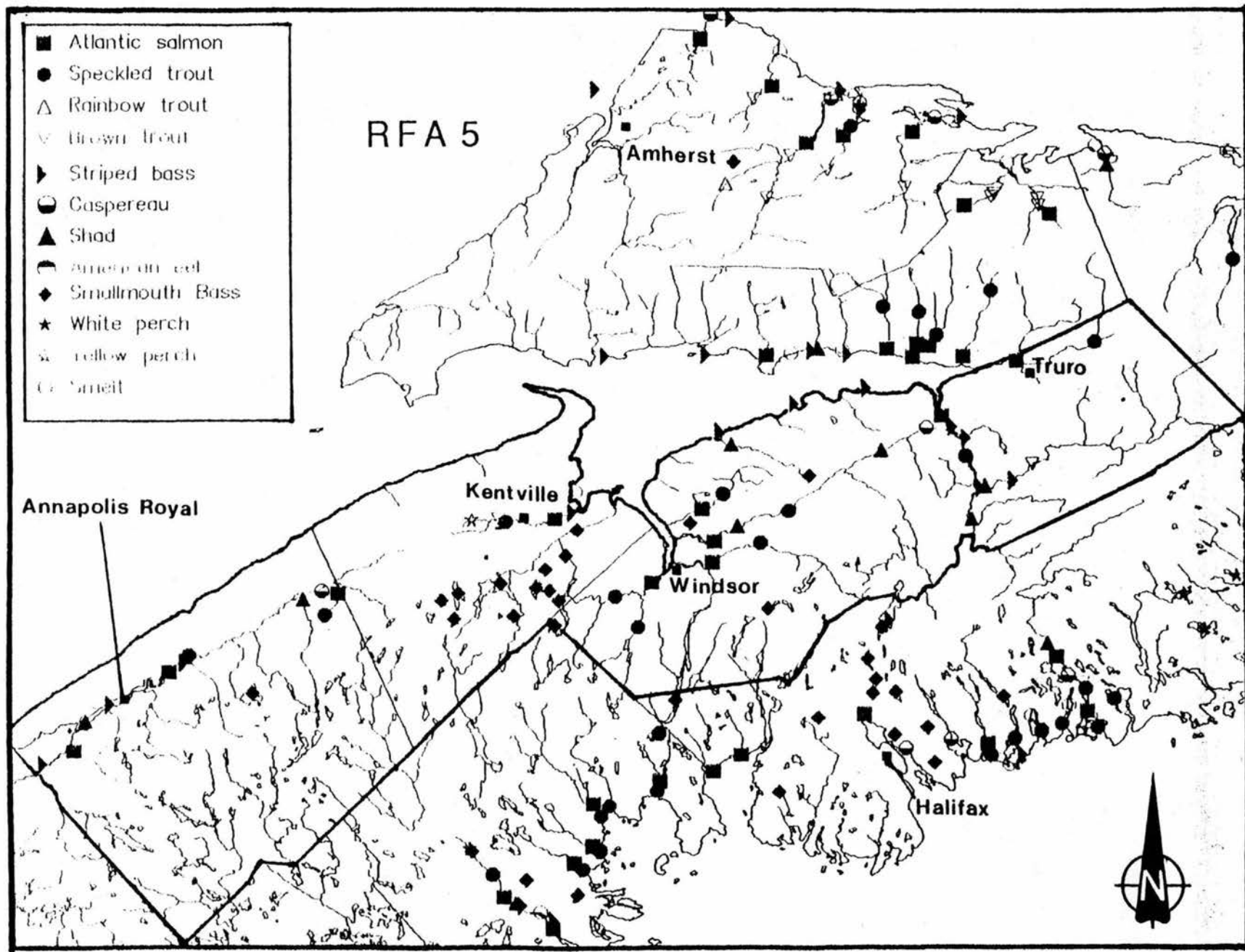


Figure 53. Georeferenced distribution profile of recreational fish species in RFA 5.

NUMBER OF SPECKLED TROUT IN RFA 5  
FROM STUB RETURN DATA 1966 - 1992

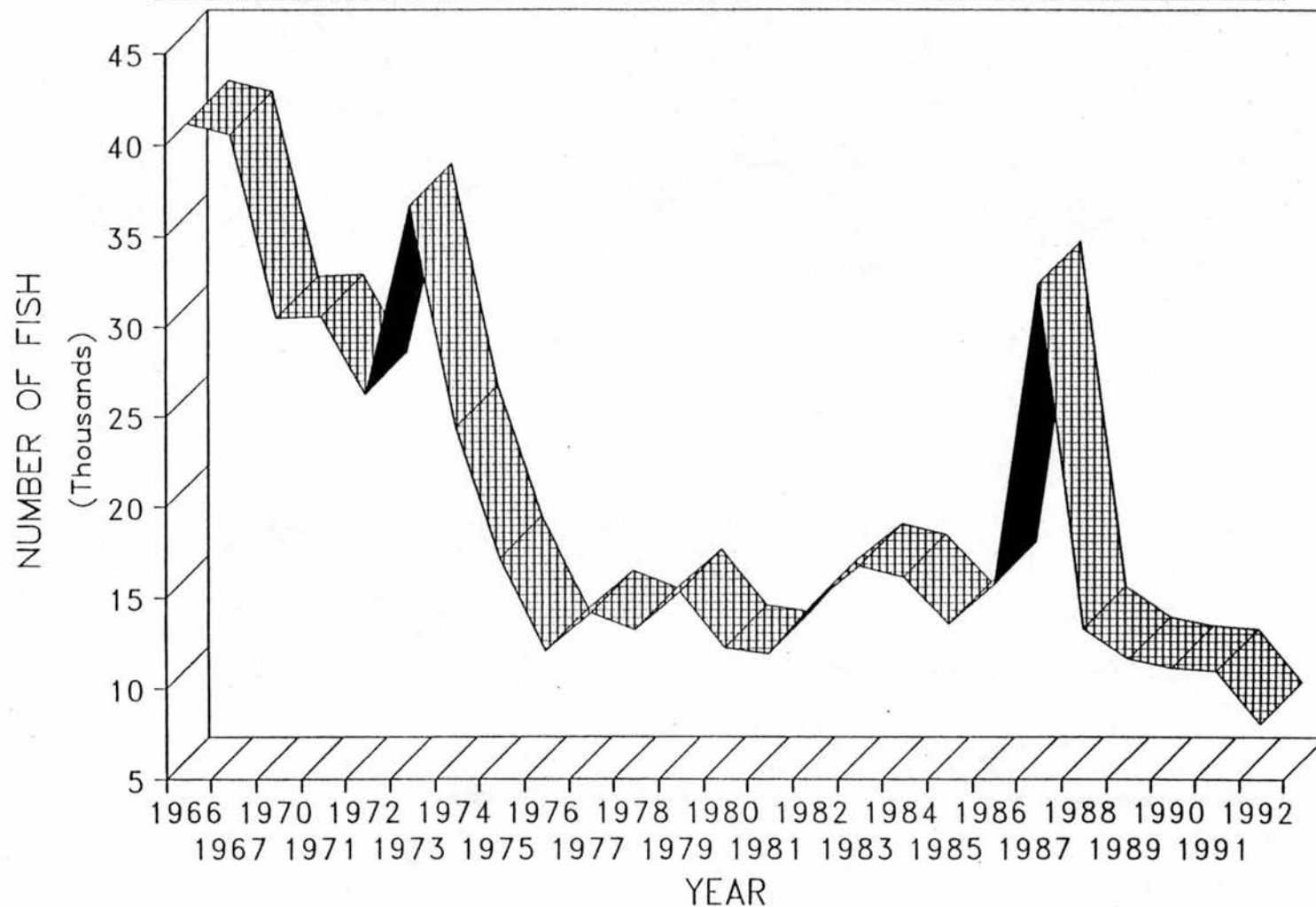


Figure 54. Number of speckled trout caught in RFA 5 from 1966 - 92.

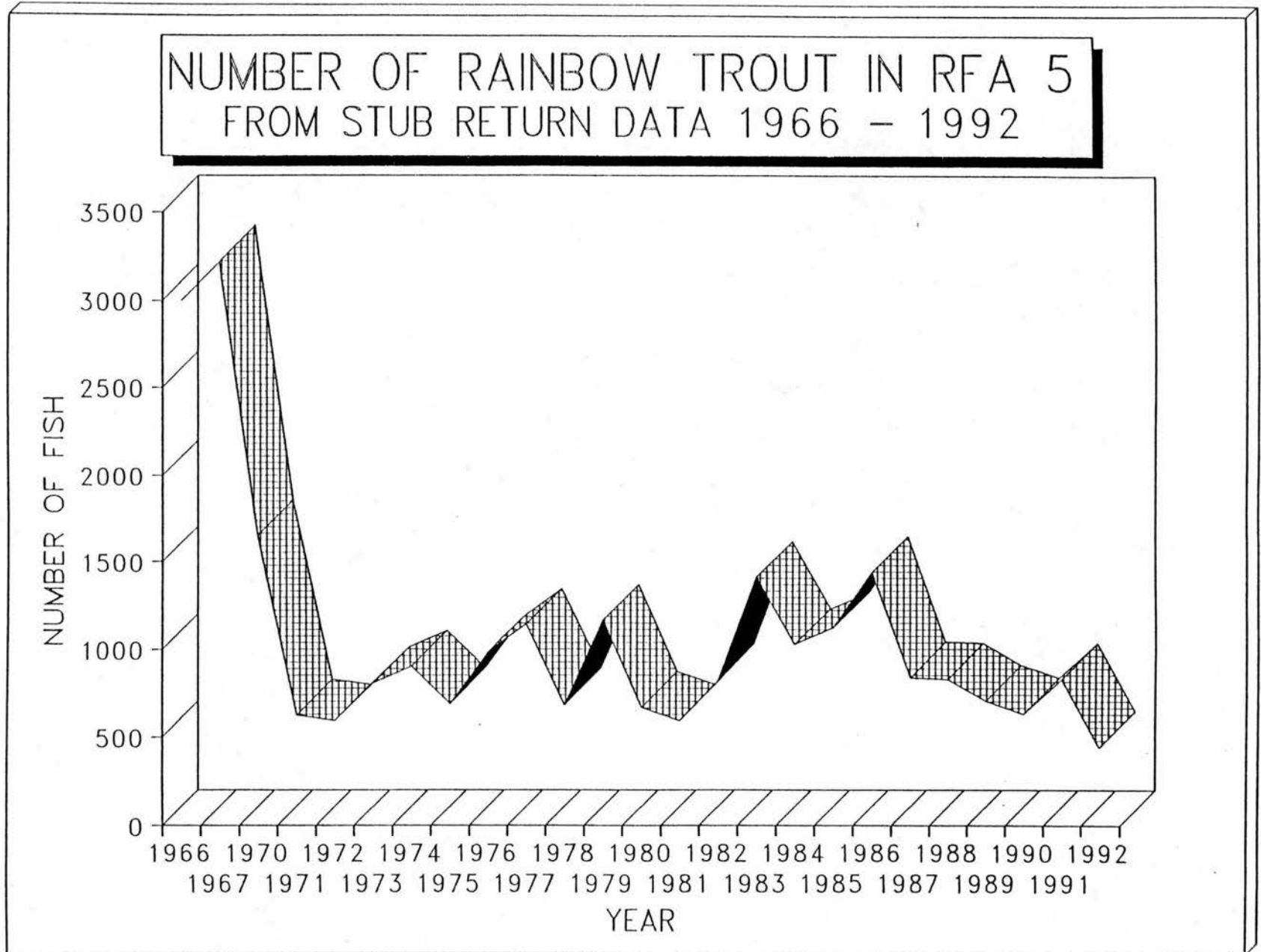


Figure 55. Number of rainbow trout caught in RFA 5 from 1966 - 92.

NUMBER OF BROWN TROUT IN RFA 5  
FROM STUB RETURN DATA 1966 - 1992

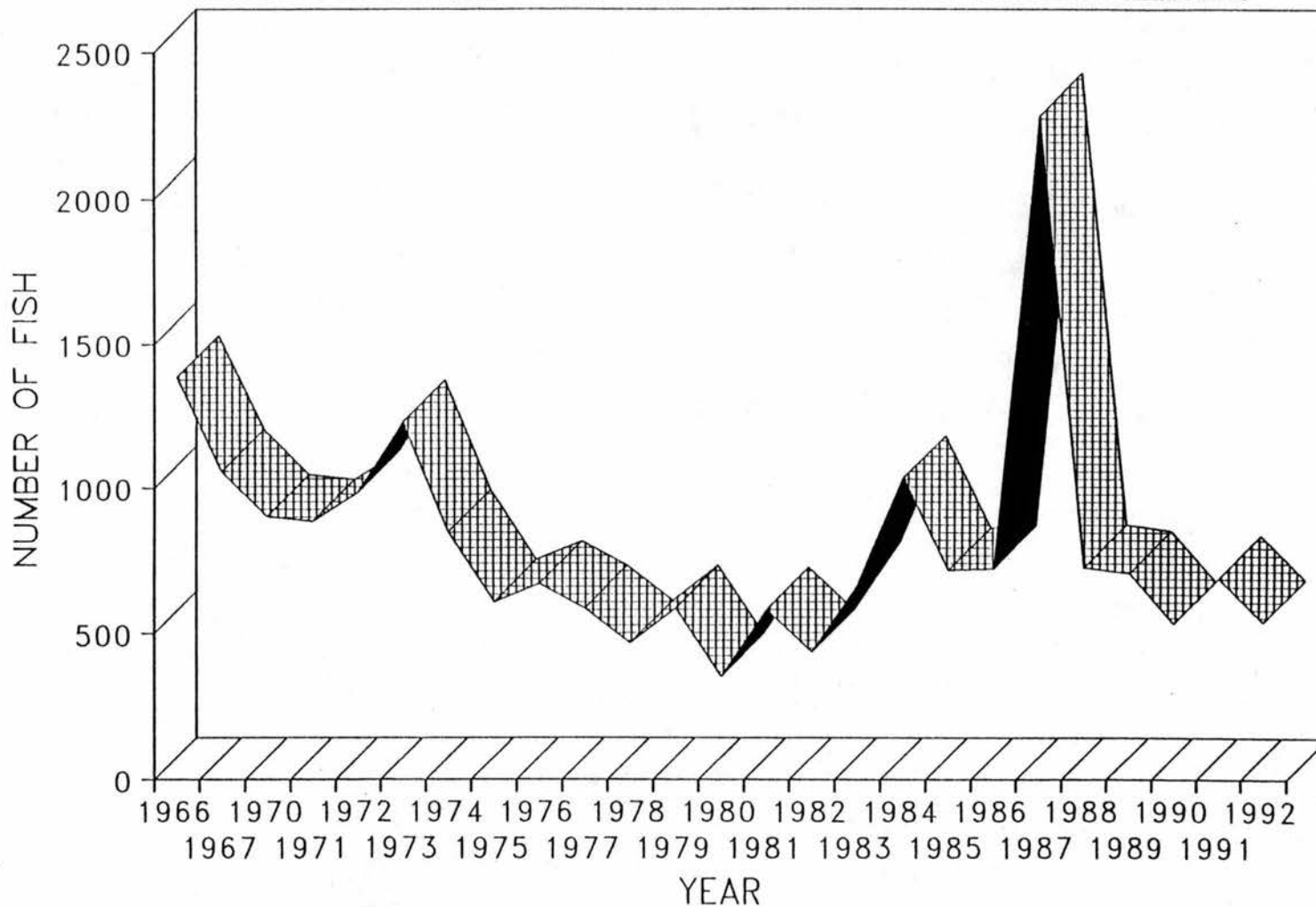


Figure 56. Number of brown trout caught in RFA 5 from 1966 - 92.

# NUMBER OF SMALLMOUTH BASS IN RFA 5 FROM STUB RETURN DATA 1966 - 1992

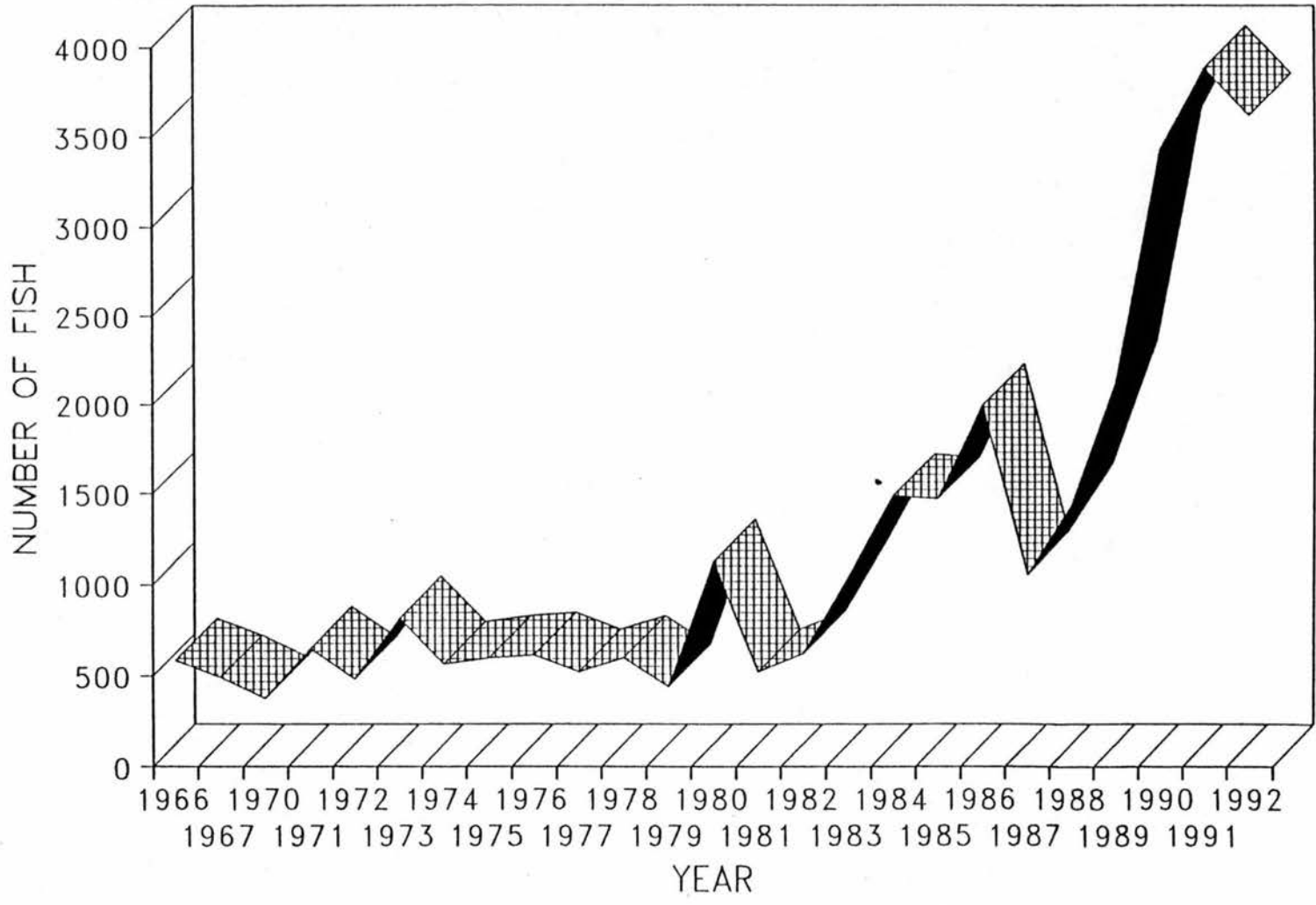


Figure 57. Number of smallmouth bass caught in RFA 5 from 1966 - 92.

NUMBER OF SHAD IN RFA 5  
FROM STUB RETURN DATA 1966 - 1992

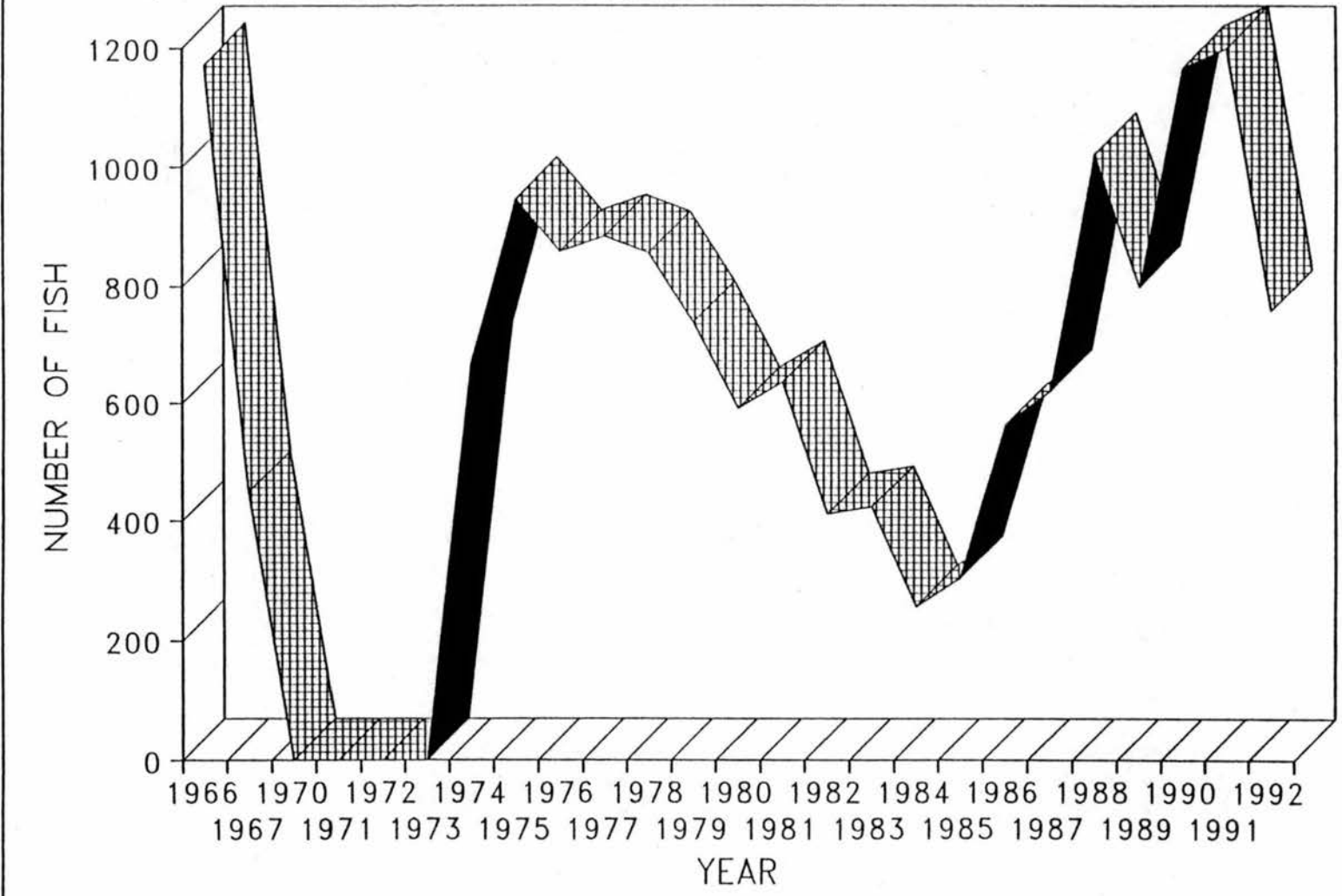


Figure 58. Number of shad caught in RFA 5 from 1966 - 92.

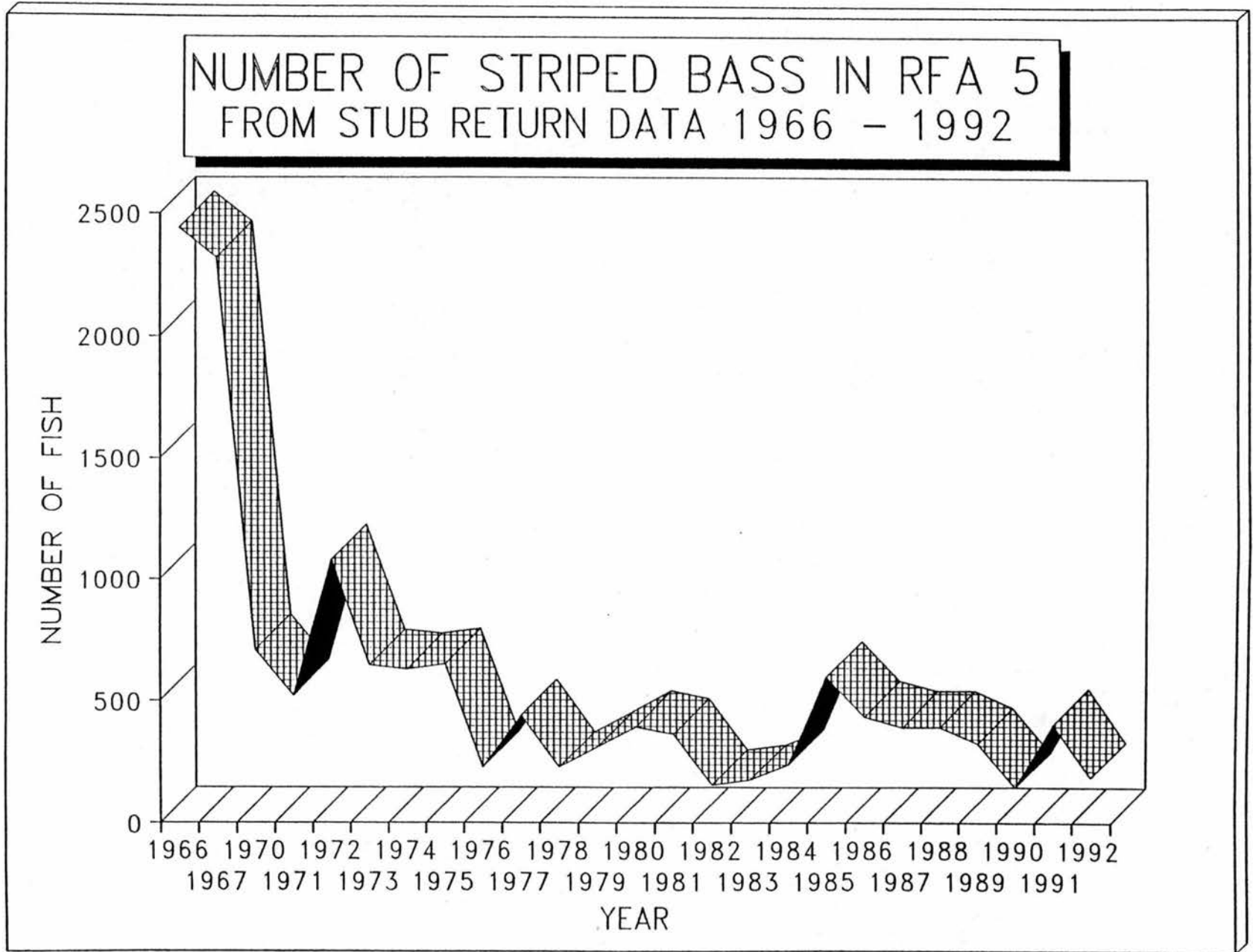


Figure 59. Number of striped bass caught in RFA 5 from 1966 - 92.

NUMBER OF YELLOW PERCH IN RFA 5  
FROM STUB RETURN DATA 1966 - 1992

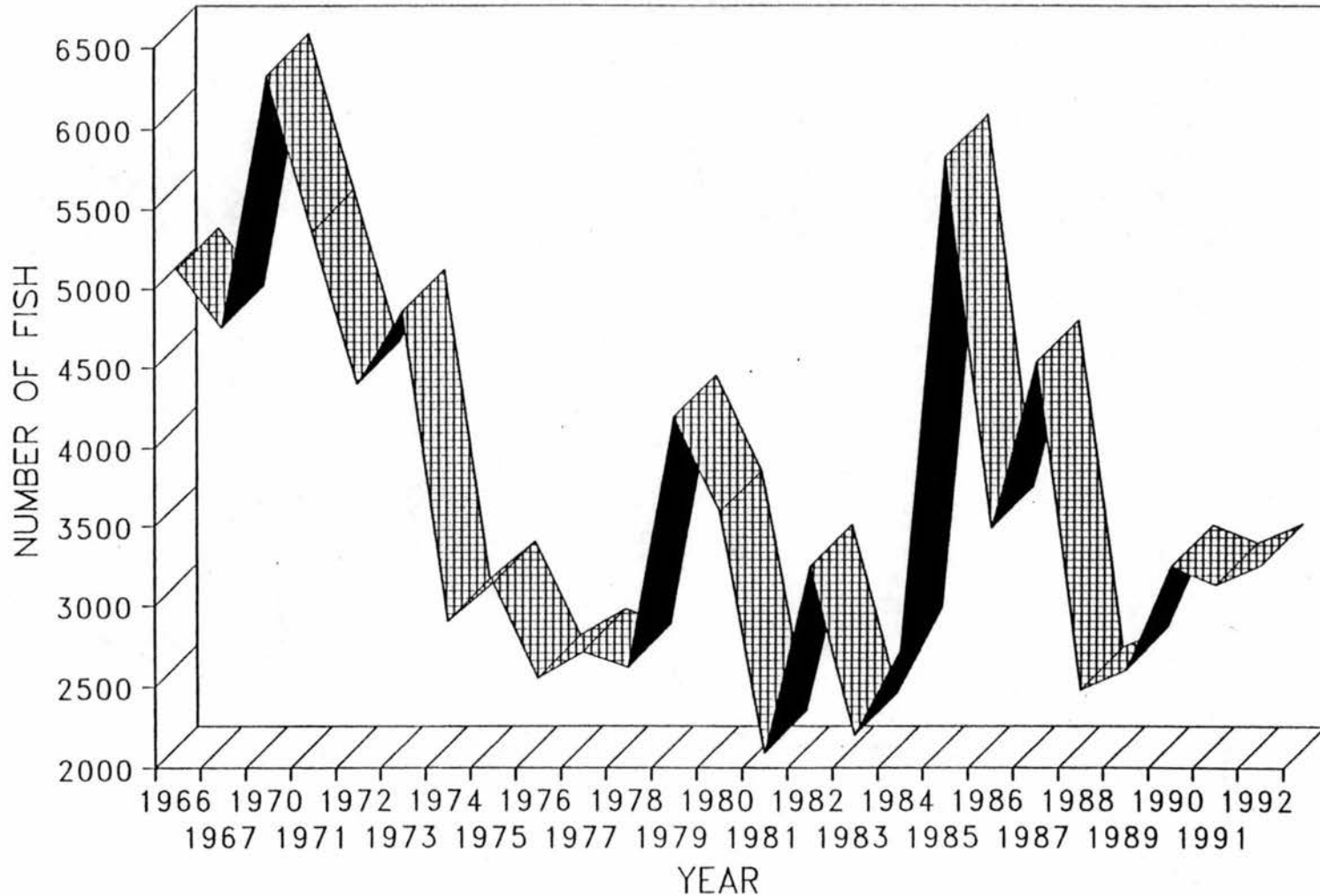


Figure 60. Number of yellow perch caught in RFA 5 from 1966 - 92.

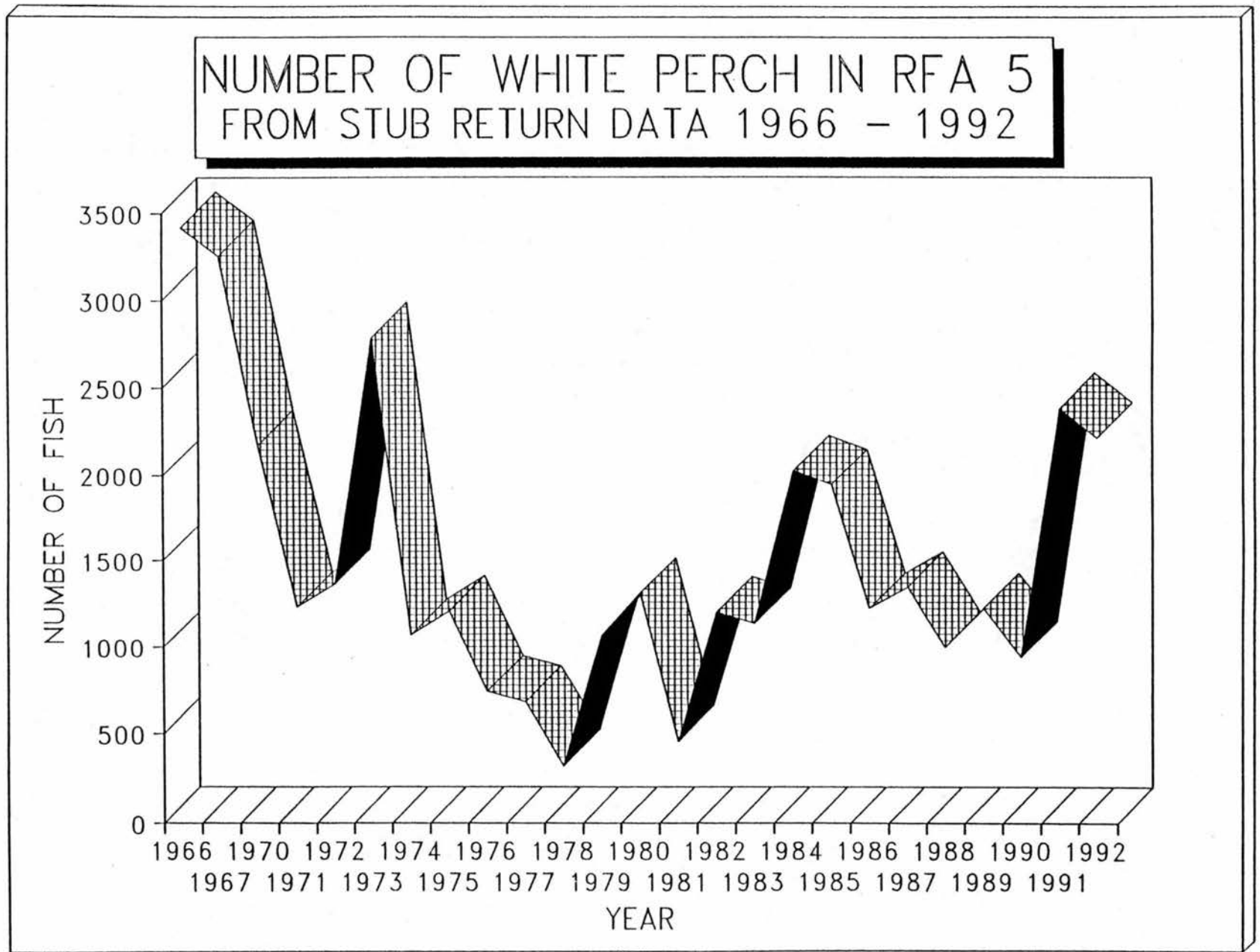


Figure 61. Number of white perch caught in RFA 5 from 1966 - 92.

### *New Recreational Fishing Opportunities*

- Where water quality is suitable priority should be given to rehabilitating sea-run and resident speckled trout and Atlantic salmon populations in RFA 5 since these species will provide excellent angling opportunities. A comprehensive plan to develop the speckled trout resource in RFA 5 is needed.
- Development of shad sport fisheries would provide excellent sport fishing including the organization of tournaments; catch and release tactics might be attractive for conservation minded anglers.
- Promotion of smallmouth bass sport fisheries have excellent potential in RFA 5 including the organization of tournaments; catch and release tactics for SMB would be attractive for most anglers involved in tournaments and derbies.
- Striped bass sport fisheries also have potential in rivers such as the Annapolis, Gaspereau, Stewiacke, and Shubenacadie where stocks permit.
- Development and promotion of yellow perch and white perch fisheries have excellent potential for both summer and winter ice-fisheries. Tournaments/derbies for these species would be attractive.
- The designation of specific lakes close to communities or isolated lakes for artificial fisheries (put-take) as part of summer festivals or winter carnivals would be attractive. These initiatives as in other RFAs should encourage private businesspersons or watershed groups to participate to reduce stocking costs. These initiatives could be used to simulate wilderness fishing, reduce exploitation of wild trout stocks and create opportunities as explained elsewhere in this report. Catch and release tactics could be implemented as part of the format for some of these projects.
- Promote sport fishing opportunities for gaspereau.
- A sea ranching project for Atlantic salmon could be considered for RFA 5 (e.g. tributary to the Annapolis River).

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## Specific Recommendations for RFA 5 (Not in order of priority)

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MAJOR CONCERNS :Fish Habitat Protection and Improvement; Jurisdictional Issues in Fisheries Management; Rehabilitate endemic species and introduce exotic species where they are compatible with endemic species; Hydroelectric Development.

RFA 5 has an abundance of rivers, lakes and streams throughout the RFA/Zone. The major watersheds are the Annapolis, Gaspereau, Shubenacadie, Salmon, and Stewiacke, all of which have populations of speckled trout and Atlantic salmon. Other recreational species which are well represented in these watersheds are shad, striped bass, gaspereau, smallmouth bass, smelt, white perch, yellow perch and in some cases brown trout and rainbow trout. Smaller rivers include the Nictaux, Cornwallis, Canning, Avon, Kennetcook, Herbert and St. Croix. Approximately 172 lakes with a combined surface area of 268,000 hectares provide recreational fishing 70% of which are accessible by road and have boat launching areas. The largest lakes are : Big Molly, Kejimkujik, Aylesford, Black, Gaspereau, Five Mile and Panuke.

The major habitat problems in RFA 5 are the result of siltation, hydro-electric development, and pollution point sources particularly in the Annapolis River. Parts of RFA 5 are impacted by acidic precipitation. Low summer flows in some rivers are compounded by agriculture and forestry practices, hydro-electric development and other water management needs by industry and urbanization.

The consultants have suggested a number of specific recommendations for consideration in RFA 5 :

- Detailed watershed management plans are required for the Gaspereau, Shubenacadie, Salmon, Cornwallis and smaller watersheds in RFA 5 before proceeding with recreational fisheries development initiatives;
- Criteria should be established and a management plan developed for the introduction of exotic species to new areas in RFA 5 so as not to negatively impact on speckled trout or Atlantic salmon (See Draft NSDOF Policy in Appendix VII.);
- Species such as smallmouth bass, shad, striped bass should be managed so as not to be over-exploited;

- Declining speckled trout and salmon stocks in RFA 5 suggest that effective resource and habitat enhancement strategies, combined with effective management and adequate enforcement will be needed to rebuild these stocks;
- Declines in the Inner Bay of Fundy salmon stocks are a concern and further detailed studies are recommended;
- Several management options are suggested for RFA 5:
  - (i) RFA/Zonal Specific Management;
  - (ii) Experimental Lakes Program;
  - (iii) River/Lake Specific Management (larger lakes, rivers with unique characteristics and significant recreational fisheries potential e.g. Annapolis, Stewiacke);
  - (iv) Integrated Resource Management;
  - (v) Native and Non-native Involvement;
  - (vi) Sanctuaries and No-Kill Zones, among others.
- Other approaches to expanding the recreational fisheries resource are available and Native and Non-Native community groups should be directly involved with governments in the planning and implementation of recreational fisheries development projects in RFA 5;
- Fish habitat improvement or restoration is the cornerstone to rehabilitating the overall fisheries resource and in the restoration of recreational fish stocks in specific watersheds in RFA 5;
- In streams where water quality is good the installation of in-stream devices such as digger logs, wing deflectors, bank stabilization, pool restoration carried out by Native and Non-Native community groups should improve fish habitat and stream productivity;
- Watershed groups should work with the agriculture and forest industries to reduce siltation, establish streamside greenbelts and improve fish habitat;
- Mitigation of acidic precipitation in watersheds where pH is within 0.4 units of acceptable levels should be examined from a biological and cost-benefit perspective. The consultants have developed a bio-economic model to examine different habitat and resource enhancement strategies to help fishery managers make decisions on individual projects;

- Upstream and downstream fish passage problems continue to exist on some rivers. For example, a detailed study is needed on the Nictaux River at Martyn's Dam and at the Annapolis Tidal Power Station. In general, a cost-benefit analyses should be undertaken to evaluate where the provision of fish passage facilities would be acceptable;
- Pollution point sources on the Annapolis River should be examined and the Annapolis - Cornwallis Pollution Task Force should be supported in its efforts to control pollution in the Annapolis River;
- Hatchery stocking has had an impact in restoring speckled trout and Atlantic salmon stocks in RFA 5. These efforts should continue emphasizing wild broodstocks wherever possible. There is a need to upgrade hatchery facilities and satellite (field) infrastructure to meet increased demands to rehabilitate salmonid stocks in watersheds where fish habitat is in good condition or where it has been improved. This investment is required to expand the fisheries resource, protect unique genetic strains of recreational species and improve the efficiency of hatchery operations. With the high demand for recreational fisheries, maintenance stocking, urban recreational stocking and stocking to colonize lakes or rivers where self-sustained wild populations would become established are needed;
- If Atlantic salmon stocks cannot be successfully rehabilitated in the Annapolis River, consideration should be given to a sea ranching project on a tributary of the Annapolis River.
- Rainbow trout stocking in Rumsey Lake should be continued as a put-take fishery.
- The consultants recommend that other cost-effective resource conservation and enhancement techniques also be employed since hatcheries by themselves cannot sustain the recreational fishery. These techniques include :
  - (a) Effective management regimes such as catch and release, seasons, bag and size limitations;
  - (b) Improved enforcement with Native and Non-Native involvement (e.g. Native and Non-Native River Guardians/Wardens; River Watch Programs, etc.). Governments may also need to examine the feasibility of allocating more resources to the enforcement of Inland waters if the overall economic value of the inland recreational fishery is considered;
  - (c) Streamside Satellite rearing tanks;
  - (d) Semi-Natural rearing ponds;
  - (e) Semi-Natural lake rearing cages;
  - (f) Broodstock transfers;
  - (g) Broodstock reconditioning;

(h) Stream Sanctuaries and "No-Kill" zones;

(i) Streamside Incubation Boxes.

- Applied research into wild strains of speckled trout, sea-run trout and Atlantic salmon are needed to identify those most suitable for hatchery broodstock. Broodstock genetics must remain a high priority when stock enhancement initiatives are undertaken;
- Stock assessments for recreational species are required in many of the watersheds and more research is needed to develop cost-effective techniques and models to provide stock assessments for individual rivers or lakes. Identification of index rivers or lakes for groups of rivers or lakes with similar characteristics should be examined for stock assessment and fishery management purposes;
- Assessment of smallmouth bass, shad and striped bass stocks is needed in RFA 5;
- Flow control or regulation should be examined on a number of watersheds where water management needs may be adversely impacting on river discharges;
- As demand in the recreational fishery expands in RFA 5, the challenge is to control demand and increase the supply of recreational fisheries resources without doing irreparable damage to native fish species in the RFA/Zone. The consultants suggest several options :
  - To meet the demand for recreational fisheries in urban areas, urban recreational stocking programs (put and take) should be continued or expanded. Consideration might also be given to encouraging the use of private Fish-Out or U-Fish operations for this sector of the recreational fishery.
  - Community fishing derbies as part of summer festivals or winter carnivals are popular in Nova Scotia and stocking either from government hatcheries or in some cases from private operations are needed for these events which could take some pressure off wild stocks. This is particularly important for local anglers, but could also generate economic benefits from tourists.
  - Recreational fisheries in RFA 5 target smallmouth bass, shad, striped bass, brown trout, and rainbow trout. These resources must be utilized to their full potential. Management plans such as those proposed by DFO and NSDOF need to be implemented so that over-exploitation of these species does not occur in RFA 5.

- Some potential recreational species such as gaspereau, white perch, and yellow perch are presently underutilized in RFA 5; these should be promoted;
- The impact on the fisheries resource of small hydro-electric plants proposed for RFA 5 should be studied if plans to implement these projects proceed.
- Recreational fishing activities should also focus on the potential which exists in the tidal and marine waters of RFA 5. These waters provide excellent potential for mackerel, dogfish, and groundfish, as well as the anadromous species mentioned above. This approach will take some fishing pressure off freshwater and anadromous species while creating expanded recreational fishing.

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## RECOMMENDATIONS

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Based on literature review and specific consultations with stakeholders and government experts the consultants prepared specific recommendations for each RFA. **All recommendations of the consultants in this report entail the development of strong partnerships between the federal and provincial governments, and all stakeholders in the recreational fisheries.**

From the studies carried out by the consultants the following recommendations are made regarding the Recreational Fisheries Development Plan for the Freshwater and Anadromous Fish Species of Nova Scotia - Inland .

- The governing principles for recreational fisheries management in Nova Scotia should be conservation, sustainable development, resource limitations, natural reproduction, research and development, and socio-economic development.
- New recreational fisheries initiatives will require new funding.
- The recreational fisheries are currently under-valued and lack recognition; a change in attitudes and values on the part of legislators, fishery managers, native peoples, anglers, industry and the general public is needed regarding the industry.
- The recreational fisheries in RFA 1, 2, 3 and 5 have an economic impact of \$125 million; it creates 3,314 person years of employment.
- The fisheries resource and aquatic ecosystems in the province are severely damaged in some areas and need to be improved.
- New recreational fisheries management strategies need to be implemented to control the demand for various fishing experiences.
- Fish habitat improvement, conservation measures, improved enforcement capabilities and resource enhancement strategies are required to rebuild the fisheries resource.

- Integrated Resource Planning and management initiatives should be implemented by all industries and government agencies impacting on water quality, fish habitat and fisheries resources.
- More native and public participation is needed in the planning and implementation of fisheries initiatives.
- Stakeholders must recognize that some form of "user pay" mechanisms are needed to offset the increased cost of managing the recreational fisheries.
- Long term funding mechanisms need to be implemented by community or watershed groups to sustain the recreational fisheries development program.
- Without jeopardizing the ability of every citizen to fish or the principle of open access, it must be recognized that different angling experiences will require mechanisms to limit the demand and access for fishing.
- Enforcement and protection of the fisheries resource needs to be improved including how this function should be carried out (i.e. Inland Recreational Fisheries Conservation Unit, more public and native involvement, use of different approaches to address poaching and other issues, etc.).
- New experimental management regimes are needed to control fishing demand and to obtain more accurate data to manage the recreational fisheries.
- Limited fiscal resources should be invested in the best opportunities identified to develop the recreational fisheries.
- Strong partnerships, communication, cooperation and streamlining infrastructure must replace fragmentation, confrontation, confusion, duplication of effort and inaction.
- New working agreements and arrangements between fisheries agencies, other government agencies, industry and recreational fisheries stakeholders are needed.
- Development scenarios/options regarding stock enhancement, artificially supported fisheries, stock management/conservation, harvest controls, environmental protection, research and enforcement, all have fiscal and/or social costs and more emphasis should be placed on bio-

economic modeling, evaluation, public involvement, education and user pay mechanisms to select and implement the most cost-effective approaches to recreational fisheries management.

- The Department of Fisheries and Oceans has the legislative power to manage both the inland and marine fisheries in Nova Scotia. However, problems have been identified by stakeholders and the roles and responsibilities of the two primary agencies (DFO and NSDOF) should be clarified as follows : (i) that a formal agreement between DFO and NSDOF be developed outlining their respective roles and responsibilities in recreational fisheries management; (ii) that a joint or cooperative approach to recreational fisheries management be adopted based on a multi-species approach to watershed management; (iii) that joint management objectives be developed; (iv) that cooperative applied research, stock assessments, and resource and habitat initiatives be undertaken; (v) that joint education and communications initiatives be undertaken; (vi) that joint enforcement initiatives be implemented; (vii) that both DFO and NSDOF delegate more responsibility and encourage increased native and public involvement in the planning, management and implementation of new recreational fisheries initiatives; and (viii) that both governments work towards streamlining various components of recreational fisheries management.
- Through interagency cooperation (e.g. DFO, NSDOF, ACOA, NSDNR, NSDOE, DOE, ISTC, Tourism, Forestry, Agriculture, Transportation, Health, Municipalities) and increased native and community involvement, recreational fisheries management will be strengthened.
- Establishment of the following components in the Recreational Fisheries Development Program to be undertaken cooperatively by DFO and NSDOF will ensure that the goals and objectives for the program will succeed :
  - Recreational Fisheries Information System (RFIS)
  - Native Fisheries Involvement Program (NFIP)
  - Community Fisheries Involvement Program (CFIP)
  - Education and Public Awareness Program (EPAP)
  - Experimental Lakes Program (ELP)
  - Fisheries Assessment Program (FAP)
  - Resource Development Program (RDP)
  - Applied Research Program (ARP)
  - Industry Development Program (IDP)
- Utilization of bio-economic modeling similar to models identified in this report will assist fishery managers in making decisions on the most cost-effective projects to implement.

- A new recreational fisheries information system using georeferenced data should be adopted by DFO and NSDOF so that all information required by fishery managers and stakeholders is easily accessible in standardized formats to make wise decisions on recreational fisheries management.
- Management of Atlantic salmon should continue as currently practiced recognizing the primacy of conservation. However, stock levels in many rivers are below target spawning requirements and new options suggested by the consultants should be examined to reduce the harvest of individual stocks, increase stakeholder involvement in managing watersheds, improve protection of stocks and establish self-sustained stocks in a shorter time frame. For example :
  - establish "no-kill" zones or "hook and release" zones in critical holding pools/river sections;
  - establish conservation sanctuaries in more salmon rivers;
  - under new management options, establish controlled angling (# rods/day/pool) for part of the season in these sanctuaries where a "draw" system would be used to select anglers (+ user pay) who would enjoy a quality fishing experience in a pristine stream; - a detailed outline of how this would work was developed for a pilot project on the Margaree River;
  - establish a sea-ranching project in each RFA or SFA which would provide excellent angling and reduce angling pressure on wild stocks in other rivers in each RFA. This could entail reconstruction/restoration of pools for holding salmon and angling. Although these target rivers would be "artificially" maintained, the river habitat, access to pools (signs, walking trails, outfitting lodges, cabins, camp sites, etc.) could be made natural in appearance and very attractive to both resident and non-resident anglers. Open access would be assured since the resource would be maintained by stocking; user pay mechanisms could be examined where the overall project would be managed by a watershed group and anglers would buy a "stamp" to fish.
- Development of stock assessment initiatives is needed where more public involvement is encouraged; this will permit government staff to allocate more time to applied research or other species.
- Stocking policies should be examined where focused initiatives would be carried out for shorter time periods (e.g. five years) to "kick-start" self-sustained production. Other stocking strategies such as those related to sea ranching, mitigation of acidic precipitation or hydro development would be of longer duration. Involvement of watershed groups in these latter stocking strategies with "user pay" mechanisms could help offset stocking costs.

- Applied research and management of recreational species is described in detail in this report and should be expanded in the following areas (not in order of priority):
  - Research and various experimental management options including the concept of a common property resource with various means of structural access or controlling the demand for fishing to provide different angling experiences.
  - An Experimental Lakes Program should be initiated. Limnological research in selected areas should be a high priority.
  - Stock assessment techniques should be developed to (a) improve the assessment of individual stock components and (b) to encourage public participation in assessing fish populations. Both low tech and high tech methodologies should be developed for appropriate use in different watersheds.
  - Lake and stream stock assessments of fish communities is required across the province. Priority watersheds should be studied initially with index watersheds established in each RFA or Salmon Management Area.
  - More emphasis should be placed on short term research (i.e. research needed to answer specific questions posed by fishery managers); longer term research should be carried out by government scientists and research biologists, economists and engineers.
  - Higher priority should be given to cost-effective cooperative research between governments, university/college researchers, consultants, native communities and conservation groups, particularly on issues requiring short-term studies and answers.
  - A high priority should be given to research and enhancement of sea-run speckled trout for "world class" recreational fishing. A high priority should be given to research and enhancement of speckled trout in lakes and streams.
  - Research is required on aspects of fish habitat improvement.
  - Research on water discharge patterns and flow control techniques should be a priority.
  - Research and enhancement associated with developing a recreational fishery in the Bras d'Or Lakes should be a high priority.
  - Development research on winter recreational fisheries and put-grow-take fisheries should be implemented.
  - More research is required on the techniques and feasibility of rehabilitating acidified lakes and streams where pH levels are close to acceptable levels for recreational fish species.
  - Research on stream and lake productivity is needed.
  - Research on stream and lake fertilization (e.g. lakes >150 hectares) is needed.
  - Studies on overwintering habitat for salmonids should be a high priority.
  - Interspecific competition between salmonids, other anadromous species and smallmouth bass should be studied.

- The potential of estuaries to produce salmonids and other recreational species should be studied.
- Research is needed on the socio-economics of recreational fisheries including bio-economic modeling.
- A comprehensive management plan should be prepared to develop and manage sea-run speckled trout populations in Nova Scotia.
- Management of speckled trout and other freshwater species should continue as proposed in the 1990 NSDOF management plan. In addition to the initiatives contained in this plan the consultants suggested a number of options for consideration to rebuild and expand the freshwater recreational fisheries in Nova Scotia :
  - Establish a multi-species approach to managing and developing the recreational fisheries resource and fish habitat in each watershed;
  - Improve communication and cooperation between Federal (DFO) and Provincial (NSDOF) agencies in the planning and implementation of recreational fisheries initiatives;
  - Strengthen the infrastructure of both the Federal and Provincial agencies in terms of staff, fiscal resources and facilities required to implement the strategic plan;
  - Biological and technical advice and fiscal resources are required to support Native and Community groups (Watershed Groups) in initiating recreational fisheries projects;
  - Establish a Native Fisheries Involvement Program (NFIP), Community Fisheries Involvement Program (CFIP), Experimental Lakes Program (ELP), Fisheries Assessment Program (FAP), Resource Development Program (RDP) and a Recreational Fisheries Information System (RFIS) which will standardize and improve the collection, storage, analysis and sharing of databases between government agencies and all stakeholders;
  - Improve government agencies capability to provide the quantity, quality and genetic composition of hatchery reared salmonids with an emphasis on wild broodstocks from local stocks;
  - Streamline existing consultative mechanisms (ZMAC, RFAC) and management zones (RFAs, Federal/Provincial, and SFAs). A Federal/Provincial working group should be established to discuss consolidation and streamlining these management mechanisms as discussed under Program Delivery;
  - Streamline enforcement activities by combining the resources and staff from the respective government agencies (DFO, NSDOF, NSDNR, DOE, NSDOE), and Natives to form an Inland Conservation Unit. Community Groups could assist through volunteer mechanisms and education (Report a poacher, river watch, 1-800 numbers, and hiring river wardens where

watershed (river/lake) specific management is introduced. Consideration should be given to a ticketing system and suspension of fishing privileges as appropriate; details are provided in this study.

- Establish "no-kill" or "catch and release" zones in designated streams and lakes in each RFA;
- Establish sanctuaries in designated streams and lakes in each RFA;
- Under the Experimental Lakes Program described in this report implement the closure of clusters of lakes on a rational basis (e.g. Highland Lakes) in each RFA;
- Control the access to designated lakes by controlling access on private logging roads;
- Develop a comprehensive stocking policy. For example, the policies should emphasize wild broodstock and endemic speckled trout; naturalized species such as brown trout and rainbow trout would receive lower priority for designated streams and lakes; landlocked salmon should be stocked in lakes where they currently exist (e.g. Grand Lake) and in other lakes where potential exists without impacting on other species. Put-and-take urban or community stocking would be another aspect of the policy where private interests (economic development) and isolated lakes would be considered for urban stocking, fishing derbies/tournaments and winter ice-fishing;
- Implement fish habitat improvements in streams and lakes in cooperation with watershed groups;
- Implement applied research on a number of issues/techniques discussed in this report in cooperation with watershed groups;
- Implement stock assessments, resource and habitat data collection initiatives in cooperation with watershed groups;
- Projects identified in class "A" and class "B" waters should be given preference because of more suitable water quality;
- Wild speckled trout stocks should be managed in class "A" waters using techniques such as fish habitat improvement, more restrictive harvests (daily bag limits e.g. 5 trout/day, slot limits, etc.), "no kill" zones, and sanctuaries where no harvest is permitted. This approach could be used by closing clusters of lakes on a 3 - 4 year cycle to rehabilitate stocks and provide for trophy fishing in designated lakes (e.g. Highland Lakes);
- Enhanced wild speckled trout stocks should be rehabilitated through the techniques identified for "pure wild" trout stocks but using wild broodstock from that stream or lake or a local wild strain and implementing other techniques in combination with those discussed for "pure wild" such as semi-natural rearing, satellite rearing or streamside incubation boxes. Community involvement would be essential for both "pure wild" and "enhanced wild" trout projects. These techniques should be used to "kick-start" rehabilitation of these populations which would then be managed as "pure wild" trout stocks;

- Since stocking costs are high the consultants suggest that the stocking of progeny of "enhanced hybrid" and "enhanced hatchery" be reviewed by NSDOF experts in the context of other approaches to "kick-start" trout rehabilitation in class "A" and "B" waters;
  - Urban or Community Recreational stocking should remain a priority since it will provide angling opportunities to educate anglers regarding conservation (bag limits), stimulate interest (derbies), take pressure off wild trout stocks and create opportunities for recreational fishing during the shoulder tourist season and winter ice fishing in designated lakes. Private enterprise could be considered under this category for economic development i.e. U-Fish Ponds or intensive stocking of isolated fisheries in a pristine environment for economic development objectives. Consideration could be given to stocking rainbow trout in selected projects to increase biodiversity and provide a variety of angling experiences under this category. These fisheries would additionally provide recreation for the disabled, the elderly and novice angler;
  - Consideration should be given to shorter seasons for designated lakes/streams i.e. later season openings such as May 15 and earlier closures such as September 1 where watershed groups wish to adopt this approach; catch and release could be applied in lieu of closures for these time periods (i.e. April 1 - May 15; September 1 - 30);
  - Consideration should be given to catch and release of all speckled trout greater than 25 cm in length in designated lakes/streams where watershed management groups concur;
  - Consideration should be given to the draft policies on fishing derbies, tournaments, and the introductions policy for smallmouth bass prepared by the NSDOF.
- New or improved management regimes identified in this report should be adopted where appropriate. These include :
    - Watershed Specific Management;
    - RFA Specific Management;
    - Experimental Lakes Program;
    - Delegation of more responsibility to community and conservation groups;
    - Native involvement and participation;
    - Establishment of more "no-kill" zones (catch and release) and sanctuaries;
    - Implementation of various means of structured access or controlling the demand for fishing to provide different angling experiences;
    - Rotating closures of clusters of lakes;
    - Creation of winter recreational fisheries;
    - Reducing pressure on wild stocks through the creation of put-take artificial fisheries, sea-ranching, fishing derbies and tournaments;
    - Utilization and promotion of non-traditional recreational species.

- New fish habitat protection regulations are needed and enforcement of existing regulations should be improved.
- Fish habitat improvements regarding improvements to streams, siltation, fish passage, acidic mitigation, water regulation, etc. should be a high priority. For an increasing number of fisheries in Nova Scotia, protecting and maintaining present habitats will be insufficient to sustain on-going fisheries. Therefore, expansion of fish habitat and fish habitat improvement should be a high priority. Guidelines for enhancement of the habitats of individual species throughout their life history stages should be developed e.g enhancing brook trout spawning habitat in lakes, increasing overwintering habitats for Atlantic salmon in rivers, stabilizing stream banks to reduce instream siltation, reducing siltation from forestry and agricultural practices etc.. The Adopt-a-Stream manual should be revised to address various techniques to improve fish habitat in Nova Scotia and as a resource document for community involvement. Funds should be provided to revise the manual and implement a workshop with community groups. The major freshwater habitat problems that account for much of the habitat degradation in Nova Scotia are related to siltation, acid rain toxicity and fish passage problems. These problems and fish habitat improvement techniques are described in detail in the consultants' report.
- Various resource enhancement techniques described in this report to rehabilitate the fisheries resources should be implemented after watershed plans have been prepared. These include hatchery stocking, satellite rearing, semi-natural pond rearing, semi-natural lake/pond cage rearing, broodstock transfers, salmonid broodstock reconditioning, stream sanctuaries, "no-kill" zones, streamside incubation boxes.
- Hatchery infrastructure should be modernized and strengthened to make it more responsive to stocking needs and more cost-effective.
- Comprehensive watershed plans should be prepared by watershed groups before implementing recreational fisheries initiatives.
- Stakeholder involvement and collaboration should be expanded and implemented including participating in rehabilitating the fisheries resource, harvesting the resource, involvement in policy formulation to establish sound resource management strategies and to foster stewardship. Thirty different projects are suggested by the consultants where native and non-native groups could participate in rehabilitating the fisheries resource and developing the industry. These activities

would create employment and income opportunities associated with the recreational fishery. The effective participation of native and non-native groups in habitat and resource protection, conservation and enhancement is inextricably linked to the long-term preservation and expansion of the recreational fishery.

- Education and public awareness is a key element in the program and should be a high priority. The EPAP undertaken by the Sport Fishery Enhancement Program through ASF is a positive initiative. More education and cooperative projects undertaken with various industries and resource users are needed. Education and communication strategies are needed to foster public awareness of the importance of all wildlife species and the need for Integrated Resource Management. The consultants recommend that :
  - the public, anglers, industry and legislators be educated regarding the value of the recreational fishery so that a better understanding is fostered of the need to protect healthy aquatic ecosystems and the fisheries resource;
  - all stakeholders be educated on the need for conservation and the limitations of the fisheries resource;
  - all stakeholders be educated to change angler attitudes towards overharvest, the need to utilize other species (e.g. smallmouth bass, yellow perch, white perch, gaspereau, shad, striped bass, brown trout, etc.) and reduce their catch of declining stocks of speckled trout and salmon;
  - fish habitat and resource enhancement initiatives be implemented to foster involvement, understanding, ownership and respect for the conservation of fisheries resources;
  - fact sheets, brochures, posters, TV videos, radio advertisements, seminars and other communications (communication plan) be prepared and distributed to target groups such as schools, the public, all stakeholders, industry, tourism, the judiciary and legislators on topics such as : conservation, under-utilized species, resource conflicts (species, hydro development, forestry and agricultural practices, industries and municipalities re. pollution, sewage treatment), applied research, enforcement efforts, fishing regulations, enhancement projects, new fishing opportunities, sport fishing techniques (e.g. fly fishing, trolling, and angling techniques for shad, striped bass, gaspereau, smallmouth bass, yellow perch, white perch) and winter fishing;
  - cooperative projects be undertaken with industry and other government agencies to promote Integrated Resource Management and an understanding of the recreational and economic value of the recreational fishery;
  - training be provided to industry to develop conservation minded, viable recreational fishing enterprises.

- Applied research priorities and stock assessments are examined in this study and should be implemented in collaboration with stakeholders wherever possible.
- New recreational fishing opportunities for Atlantic salmon, sea-run and resident speckled trout, landlocked salmon, smallmouth bass, shad, yellow perch, white perch, rainbow trout, brown trout, gaspereau, smelt and striped bass have been described in this report. The largest recreational fishing opportunity in Nova Scotia is the Bras d'Or Lakes. These opportunities relate to expanded sport fisheries in summer, winter ice-fisheries, and artificial fisheries such as derbies, tournaments and U-Fish operations.
- More coordination is needed in the promotion of the recreational fisheries between Tourism, DFO and NSDOF.
- The consultants recommend the following regarding Program Delivery :
  - The roles and responsibilities of Federal and Provincial government agencies regarding recreational fisheries management and environmental issues should be clarified.
  - Stakeholders across the province expressed the view that a formal agreement between DFO which currently has the legislative mandate to manage both the inland and saltwater recreational fishery and NSDOF be prepared and implemented regarding the sharing of this responsibility. The consultants suggest that both levels of government are currently involved and that a task force should be established to examine this issue and develop a formal agreement which would explain their respective roles and responsibilities under a "new cooperative deal" in recreational fisheries management. Native issues should be addressed as part of this package.
  - Governments should delegate more responsibility to stakeholders while maintaining the overriding responsibility for recreational fisheries management.
  - Integrated Resource Planning (IRP) and Management is weak in the province and program delivery infrastructure should reflect the need for IRP in its advisory mechanism.
  - Assistance for more detailed watershed planning, collection of accurate biological data, assessing fish stocks, technical advice, implementing stream enhancement projects and evaluating progress in projects should be provided to community/conservation groups, and funding should be allocated for this purpose.
  - The consultants recommended one organizational option for program delivery, among several which could be adopted, to address the needs of all stakeholders and governments in

implementing the recreational fisheries strategic development plan for the Canada-Nova Scotia Cooperation Agreement on Recreational Fisheries.

- Existing consultative mechanisms (RFAC, ZMAC) should be streamlined. Recreational Fishing Areas (RFAs) designated by DFO and NSDOF are different and should be streamlined. A Federal/Provincial working group should be established to examine these issues in the context of multi-species recreational fisheries management.
- It is suggested that a Recreational Fisheries Development Office (RFDO) be created with adequate resources to carry out various components of the program regarding operational functions, provision of assistance to watershed groups or project proponents and implement a communications plan. This RFDO could be divided into three sections to provide advice/expertise on (i) freshwater/inland species/projects, (ii) anadromous species/projects and (iii) marine species/projects.
- The consultants highlighted the need to develop watershed plans and recommended several components required in developing comprehensive watershed management plans.
- Screening, review and evaluation processes were recommended by the consultants for the program.
- Long term funding mechanisms to sustain the program and help offset costs of managing an expanded recreational fishery were recommended by the consultants. These included :
  - Introduction of a Recreational Fish Stamp at a cost of \$5 to be administered by an NGO umbrella group would gross approximately \$500,000 annually.
  - Establishment of a Recreational Fisheries Trust Fund to be administered by the aforementioned NGO group.
  - Cooperative Projects/Donations from Corporations and Industry.
  - Establishment of a Fish Habitat Restoration Fund which would accept funds from court fines or court decisions regarding habitat degradation by industry or individuals.
  - Fund raising by community/conservation groups under the proposed NGO umbrella group. Stakeholders need to be trained to implement various types of fund raising mechanisms.
  - Implementation of structured access and user pay mechanisms in specific watersheds as described by the consultants in this report.
- The specific recommendations for each RFA suggested by the consultants should be implemented.

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