

A Survey of Catfish Management in the United States and Canada

Paul H. Michaletz¹

Fisheries Research Biologist

and

Joe G. Dillard²

Fisheries Research Supervisor

Missouri Department of Conservation

1110 South College Avenue

Columbia, Missouri 65201

¹Corresponding author. Phone: 573-882-9880, ext. 3254. Fax: 573-882-4517. E-mail:

michap@mail.conservations.state.mo.us

²Present address: Director, Missouri Watershed Information Network, University of Missouri

Outreach and Extension, 232 Agriculture Engineering Building, Columbia, Missouri 65211.

Phone: 573-882-0085. Fax: 573-884-5650. E-mail: dillardj@missouri.edu.

ABSTRACT

Resource agencies in the United States and Canada were surveyed to assess the status of the management of catfish species (primarily channel catfish Ictalurus punctatus, blue catfish I. furcatus, and flathead catfish Pylodictis olivaris). Catfish were considered to be either moderately or highly important to sportfish anglers by 32 agencies. Commercial fishing was allowed in at least some waters in 28 states. Catfish populations were managed primarily by creel limits and gear restrictions and less frequently by size limits. Put-grow-take fisheries for channel catfish were popular in small impoundments and most catfish stockings were associated with these fisheries. Gill nets and electrofishing were most commonly used to sample catfishes and catch-per-unit effort, size structure, and creel information were frequently used to evaluate catfish populations. Major constraints to the management of catfishes mostly included: 1) low priority or angler interest, 2) inadequate habitat, 3) inadequate data, and 4) inadequate sampling. Inadequate supply of catfish for stocking was also a major constraint for small impoundments. Although catfish provide important fisheries over a wide geographical area, most resource agencies do not intensively manage catfish populations with the notable exceptions of put-grow-take and put-take fisheries in small impoundments.

We conducted a survey of catfish management in the United States and Canada during the fall and winter of 1997-1998. We surveyed fisheries resource agencies from all fifty states, the District of Columbia, and two provinces (Manitoba and Ontario) where catfish fisheries were known to occur. We obtained a 100% response ($N=53$) after some follow-up work was done. Our objectives were to assess the importance of catfish fisheries and the status of their management. Specifically, we hoped to gain information on how agencies managed their catfish populations that would be beneficial to our agency, the Missouri Department of Conservation, and other agencies managing catfish populations. Catfishes (Ictaluridae) are receiving increasing attention from anglers and biologists. For example, biologists and anglers recently met at the 1st International Ictalurid Symposium to discuss the biology and management of catfishes.

We are aware of two previous nationwide surveys directed toward catfish management. Vanderford (1984) conducted a survey of channel catfish Ictalurus punctatus management in the United States. He solicited information on the importance, sampling, regulations, stocking, and population dynamics of channel catfish. Marshall (1991) requested information on sportfishing regulations and stocking of channel catfish. When appropriate, we compared our findings with those of the two previous surveys.

A written survey containing 10 questions was sent to each resource agency along with a cover letter containing survey instructions. In the survey, water bodies were divided into three categories: 1) small impoundments, 2) reservoirs, and 3) streams and rivers. Small impoundments were defined as small state-owned or community-owned waters usually less than 202 hectares (500 acres) in surface area. Reservoirs were defined as large U.S. Corps of Engineers or private power company waters. We instructed respondents to include small natural lakes into the small impoundment category and large natural lakes into the reservoir category. We were primarily interested in management pertaining to channel catfish, blue catfish Ictalurus furcatus, and flathead catfish Pylodictis olivaris, and asked specific questions about these species. We also included an "other" species category for these species-specific questions. In all cases, species in the "other" category consisted of bullheads Ameiurus spp. and white catfish Ictalurus catus. For most questions, respondents were asked to check all answers that applied. Hence, many questions had multiple answers from single respondents. The answer choices given to respondents are presented below in the figures associated with each question. A space for comments was also included for each question. Comments were useful in interpreting answers and gaining further insight into management practices. Below, we grouped questions and responses into five topics. The actual order of the questions in the survey was slightly different than they appear here.

Importance of Catfishes

How would you rank the importance of catfish to anglers in your state?

Catfishes were most important to anglers in the midwestern and southern United States (Figure 1), which corresponds to the geographical range of the three catfish species with the most recreational importance (Pflieger 1997). Not surprisingly, Vanderford (1984) and Marshall (1991) reported similar findings for the importance of channel catfish. Sixteen respondents (30%) ranked catfishes as highly important, 16 (30%) as moderately important, and 21 (40%) as of low importance. Several states used statewide angler surveys to determine the relative

importance of catfishes to sport fishing.

In addition to sport fisheries, do you have commercial fisheries for catfishes in your state?

Commercial fisheries for catfishes existed in 28 states. However, 17 states indicated that these fisheries were limited to a few specific waters such as large rivers including the Mississippi River, certain portions of the Great Lakes, or some large reservoirs. Commercial fisheries were most common in streams and rivers and least common in small impoundments (Figure 2A).

Do you have self-sustaining populations and fisheries?

All but four agencies reported having self-sustaining populations of either channel catfish, blue catfish, flathead catfish, or a combination of these species. Alaska does not have any freshwater catfish species. Maine, Rhode Island, and New Hampshire have only self-sustaining populations of bullheads and white catfish. Self-sustaining populations of channel catfish were more widely distributed than those of blue catfish or flathead catfish (Figure 2B), likely because of their broader geographic range (Pflieger 1997). Self-sustaining populations of three major catfish species were more common in reservoirs and streams and rivers than they were in small impoundments. Vanderford (1984) found that channel catfish reproduced in waters of all states except Alaska and the far northeastern states, and also found that most reproduction occurred in large rivers and reservoirs. Predation by largemouth bass *Micropterus salmoides* and other predators frequently restricts or eliminates natural recruitment of catfishes in small impoundments (Marzolf 1957; Krummrich and Heidinger 1973; Storck and Newman 1988).

Management

Are you managing specifically for catfishes in your state?

Thirty-five agencies (34 states, one province) indicated they were specifically managing for catfishes, although several indicated that it was only in a few waters or only by creel limits. Most management effort was directed toward channel catfish in small impoundments (Figure 2C). Vanderford (1984) found that 31 states actively managed channel catfish. Our survey is not directly comparable to Vanderford's because we did not specifically target channel catfish.

How are you managing catfish populations?

Catfish populations were managed mostly by creel limits and gear restrictions and less frequently by size limits (Figure 3). The use of creel limits and especially size limits has increased since the previous surveys. Both our survey and Marshall's (1991) found that 33 states had creel limits for catfish which was higher than the 21 states reported by Vanderford (1984). The number of states with size limits on at least some waters increased from two (Vanderford 1984) to 10 (Marshall 1991) to 18 for this survey. Iowa reported a size limit for commercial anglers only. Manitoba has a maximum size limit of 610 mm (24 in) on channel catfish in the Red River.

Put-grow-take and put-take fisheries were popular especially in small impoundments (Figure 3). Put-take fisheries primarily occurred in urban areas. Put-grow-take fisheries in small

impoundments were present in several states where catfish were either not present or not managed in other waters.

Stocking

Do you routinely manage catfish populations by stocking (species, sizes, stocking rates, frequency)?

Channel catfish were much more commonly stocked than were blue catfish and flathead catfish (Figure 2D). Thirty-three states reported stocking channel catfish compared to 34 states found by Vanderford (1984) and 37 states reported by Marshall (1991). Channel catfish were most frequently stocked into small impoundments (Figure 2D) where self-sustaining populations were less common (Figure 2B). Five states stocked blue catfish into small impoundments and three states stocked them into reservoirs. Mississippi routinely stocked flathead catfish fry into a nursery pond for later release into a reservoir.

Many states reported broad ranges in stocking size and stocking rate for a particular category of water. In order to summarize this information, we chose to use the midpoint of the range in either stocking size or stocking rate. Sometimes an agency would report different stocking sizes, stocking rates, or frequencies of stocking for different types of fisheries (i.e., put-take, put-grow-take) or different sizes of water bodies (within the same category of water). In these cases, we report the midpoint in these variables for each different type of fishery or size of water body. Thus, some respondents have more than one stocking size, stocking rate, or frequency attributed to them within a particular category of water.

Channel catfish were stocked at a wide range of sizes, stocking rates, and frequencies within each category of water (Figure 4). Sizes ranged from about 50 mm (2 in) to over 375 mm (15 in) total length and stocking rates ranged from about 25 fish/ha (10 fish/acre) to over 400 fish/ha (160 fish/acre). Channel catfish were stocked as frequently as every two weeks to only occasionally. Most channel catfish were stocked at sizes of 175-250 mm (7-10 inches) in small impoundments, similar to that reported by Marshall (1991), probably to reduce their vulnerability to predation (Krummrich and Heidinger 1973; Storck and Newman 1988; Mestl and Maughan 1993). Larger fish were stocked into urban lakes to support put-take fisheries. Stocking size was usually smaller for reservoirs and streams and rivers (Figure 4). Channel catfish were usually stocked at a rate of 25-125 fish/ha (10-50 fish/acre) annually in small impoundments but rates were usually lower in reservoirs and rivers. Marshall (1991) found that stocking rates ranged from 5-4,900 fish/ha (2-2,000 fish/acre) but were usually 25-250 fish/ha (10-100 fish/acre). Several states used different stocking frequencies depending upon the type of fishery and the expected angler harvest. For example, small urban impoundments with put-take fisheries were stocked much more frequently than were rural impoundments receiving little fishing pressure.

Blue catfish were stocked at sizes, stocking rates, and frequencies similar to channel catfish. They were stocked into small impoundments at sizes ranging from 75-300 mm (3-12 in) and at rates of <12 to 250 fish/ha (<5-100 fish/acre) mostly on an annual basis. In reservoirs, they were stocked at 50-300 mm (2-12 inches) at rates of 2-250 fish/ha (1-100 fish/acre).

What are the purposes of stocking catfishes?

Catfishes were stocked for a wide variety of reasons including establishing new

populations, maintaining put-take and put-grow-take fisheries, supplementing existing populations, and controlling overabundant sunfish *Lepomis* spp. or bullhead populations (Figure 5). Stocking was most commonly associated with put-grow-take fisheries in small impoundments. Flathead catfish were sometimes used for predator control in small impoundments.

Population Assessment

What methods do you use to sample/evaluate or monitor your catfish populations?

A wide variety of methods were used to sample catfishes but gillnetting and electrofishing were the most common (Figure 6). Gillnetting was used mainly in small impoundments and reservoirs while electrofishing was used equally in all water categories. Hoop nets were used mostly in streams and rivers. Creel information (included in “other” category) was used by several agencies that did not conduct population sampling. Several respondents indicated that they collected catfishes during general fish surveys and did not specifically target catfishes. Vanderford (1984) found that respondents from only eight states reported they had found a satisfactory sampling method for channel catfish. The methods that these states reported varied widely, much like our survey results. It appears that effective sampling methods for catfishes remain elusive.

What criteria do you use to evaluate catfish populations and fisheries?

Catch-per-unit effort for sampling gear, size structure, and angler catch information were most typically used to evaluate catfish populations and fisheries (Figure 7). Catch-per-unit effort and size structure information are easily obtained from fish surveys and are frequently used to evaluate populations of many different fish species (Nielsen and Johnson 1983). Other parameters such as age structure, growth rates, and mortality are more difficult to determine and are not used as often. Several agencies used creel information in lieu of population data to evaluate catfish fisheries.

Major Constraints

What do you feel are the major constraints to the management of catfish in your state?

We categorized responses to this question into several broad groups (Table 1). The most common responses across all water categories were: 1) low priority/angler interest, 2) inadequate habitat, 3) inadequate sampling, or 4) inadequate data. Inadequate supply of fish for stocking was also a major constraint for small impoundments. We did not include less-common responses (<3 responses for all water categories) in Table 1.

Summary

Catfishes provide important fisheries over a broad geographic range of North America. Yet, most resource agencies do not intensively manage catfish populations with the notable exceptions of put-grow-take and put-take fisheries in small impoundments. Catfish populations are difficult to sample and consequently are difficult to assess and manage. Catfish populations are usually regulated only by creel limits or gear restrictions if they are regulated at all.

However, the use of size limits has increased nine fold since Vanderford's (1984) survey.

Many states invest heavily into stocking large channel catfish fingerlings into small impoundments to maintain put-grow-take or put-take fisheries. For example, the Missouri Department of Conservation invested 31% of its total annual warmwater hatchery budget to produce channel catfish (FY95 Federal Aid Public Lake Management Report). Despite the large investment of money and effort into stocking channel catfish in small impoundments, relatively little effort is directed toward evaluating and managing these fisheries. Again, this is likely due to a lack of adequate sampling methods.

Management of catfish populations will continue to be problematic unless adequate sampling methods are found. It may be necessary to use creel information to assess catfish populations as several states are doing. Unfortunately, creel information is expensive to obtain and is often difficult to collect for catfish species. Catfish anglers frequently fish at night, from shore, or with methods other than rod and reel and hence may not be included in standard creel surveys. In some cases, catfish anglers represent a relatively small percentage of the total angling population, making it difficult to collect sufficient information to precisely estimate creel statistics.

Our goal was to gather information which would be helpful to our agency and others in managing catfish populations. The survey results suggested that there are some important information gaps which hinder our abilities to effectively evaluate and manage catfish populations. We suggest that future studies on catfish focus on identifying and developing effective sampling methods, criteria for assessing populations, criteria to determine stocking rates and frequency, and methods for obtaining creel information.

Acknowledgments

We thank the 53 respondents for their helpful information. We also thank Earl Buckner and Ann Anderson for their assistance with conducting the survey. John Stanovick and Steve Weithman provided helpful comments on an earlier draft.

References

- Krummrich, J. T., and R. C. Heidinger. 1973. Vulnerability of channel catfish to largemouth bass predation. *Prog. Fish-Cult.* 35:173-175.
- Marshall, J. A. 1991. Nationwide survey of channel catfish sportfishing regulations. Ohio Department of Natural Resources, Wildlife Inservice Note 644, Columbus.
- Marzolf, R. C. 1957. The reproduction of channel catfish in Missouri ponds. *J. Wildl. Manage.* 21:22-28.
- Mestl, G., and O. E. Maughan. 1993. Survival of channel catfish fry and fingerlings in small ponds. Pages 98-103 in M. D. Porter, K. L. Gee, J. R. Jackson, and S. L. Hensley, editors. *Proceedings of the symposium on pond management in Oklahoma*. The Samuel Roberts Noble Foundation Inc., Ardmore, Oklahoma.
- Nielsen, L. A., and D. L. Johnson, editors. 1983. *Fisheries techniques*. American Fisheries Society, Bethesda, Maryland.
- Pflieger, W. L. 1997. *The fishes of Missouri*. Revised edition. Missouri Department of Conservation, Jefferson City.

- Storck, T., and D. Newman. 1988. Effects of size at stocking on survival and harvest of channel catfish. *N. Am. J. Fish. Manage.* 8:98-101.
- Vanderford, M. J. 1984. Channel catfish management in the 50 states. Central States Small Impoundment Work Group and the U.S. Fish and Wildlife Service Cooperative Survey.

Table 1. Major constraints to the management of catfishes in North America among water categories.

Categories	Number of responses		
	Small Impoundments	Reservoirs	Streams & Rivers
Low priority/angler interest	11	16	12
Inadequate habitat	10	9	11
Inadequate sampling	4	4	4
Inadequate data	3	3	7
Inadequate supply of fish for stocking	8	2	0
Fiscal	5	2	1
Politics	1	3	1

Figure 1. The importance (low, medium, or high) of catfishes to anglers of the United States and Canada.

Figure 2. Presence of commercial fisheries (panel A), self-sustaining populations (panel B), specific management (panel C), and routine stocking (panel D) of channel catfish, blue catfish flathead catfish, and other catfish species among small impoundments, reservoirs, and streams and rivers in the United States and Canada. The “other” species category included bullheads and white catfish.

Figure 3. Methods of managing catfish populations in small impoundments, reservoirs, and streams and rivers in the United States and Canada. Methods include gear restrictions (Gear), creel limits (Creel), size limits (Size), trophy fishery (Trophy), put-take fishery (PT), put-grow-take fishery (PGT), and other (Other). The “other” category included seasonal closures and feeding.

Figure 4. Stocking size (panel A), stocking rate (panel B), and stocking frequency (panel C) for channel catfish in small impoundments, reservoirs, and streams and rivers in the United States. No stocking was reported in Canada or the District of Columbia. The numbers on the x-axis for panels A and B indicate the beginning of the size or rate class.

Figure 5. Purposes for stocking catfishes into small impoundments, reservoirs, and streams and rivers in the United States. Categories are establishing a new population (New), put-take fishery (PT), put-grow-take fishery (PGT), supplemental stocking (Suppl), predator control (Control) and other (Other). The “other” category included increasing fishing opportunities, developing trophy fishery, reestablishing populations, and determining contribution of stocked fish to the existing population.

Figure 6. Methods used to sample, evaluate, or monitor catfish populations in small impoundments, reservoirs, and streams and rivers in the United States and Canada. Methods are gillnetting (Gill), trap netting (Trap), electrofishing (EF), hoop netting (Hoop), limb, trot, or jug lining (LTJ), rotenoning (Rot), and other (Other). The “other” category included the use of creel data, catfish trapping, trawling, trammel netting, basket trapping, slat trapping, and angling.

Figure 7. Criteria used to evaluate catfish populations and fisheries in small impoundments, reservoirs, and streams and rivers in the United States and Canada. Criteria are catch-per-unit-effort for sampling gear (CPUE), size structure (Size), age structure (Age), growth rates (Grow), mortality rates (Mort), angler exploitation (Exp), angler catch or harvest rate (Catch), and other (Other). The “other” category included population estimates, number or weight removed, body condition, and standing stock.

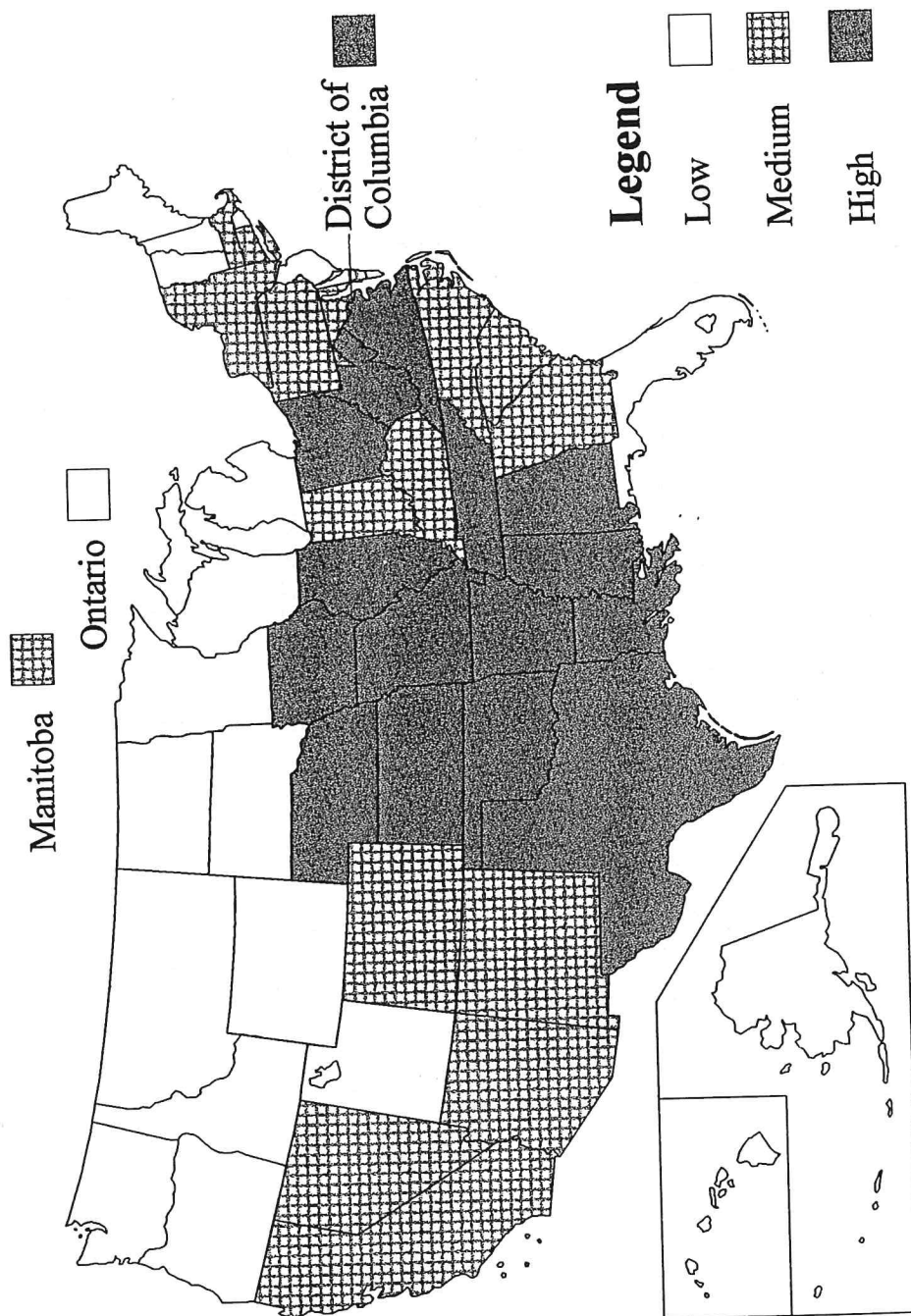


Fig. 1

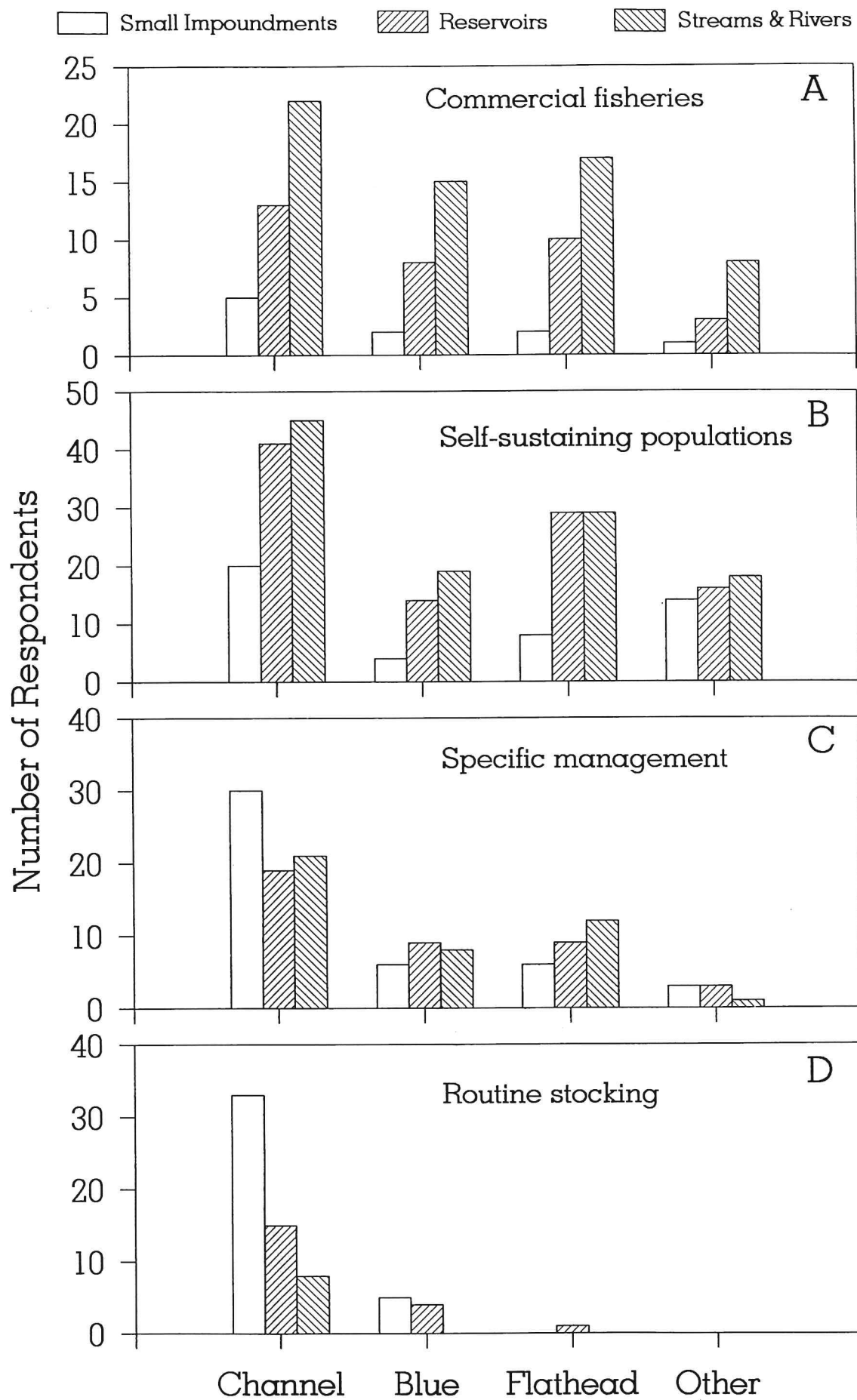


Fig. 2

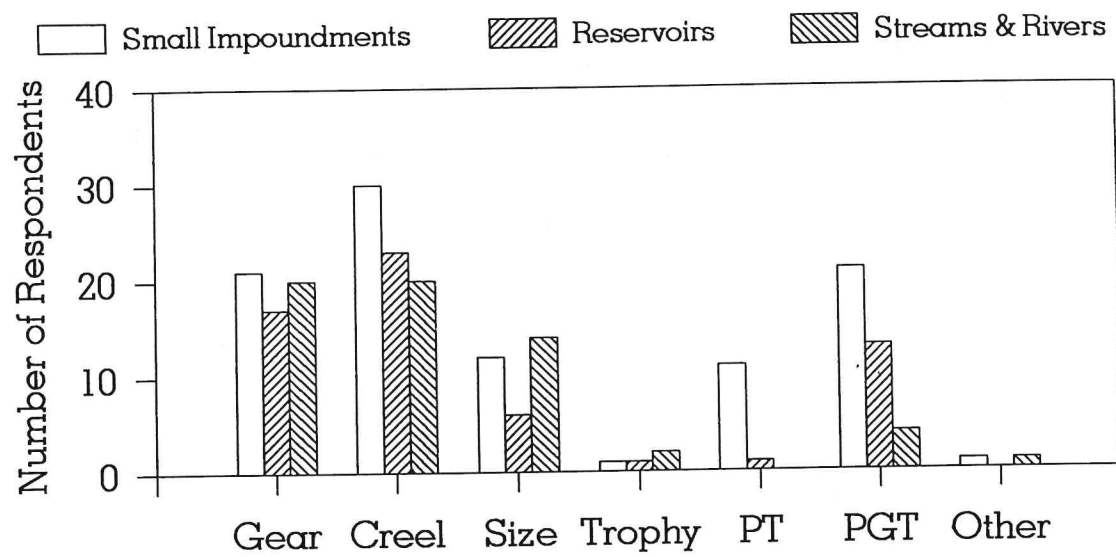


Fig. 3

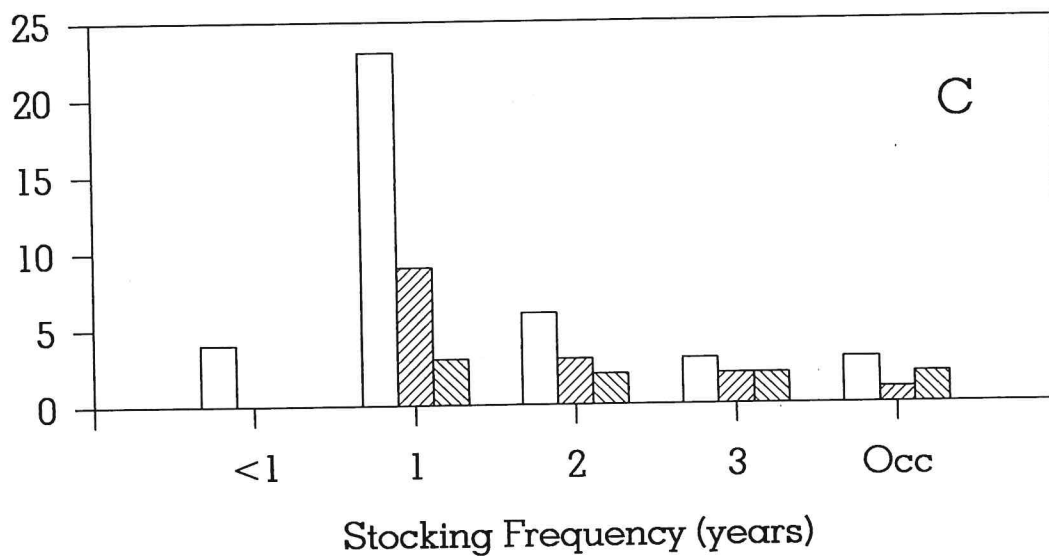
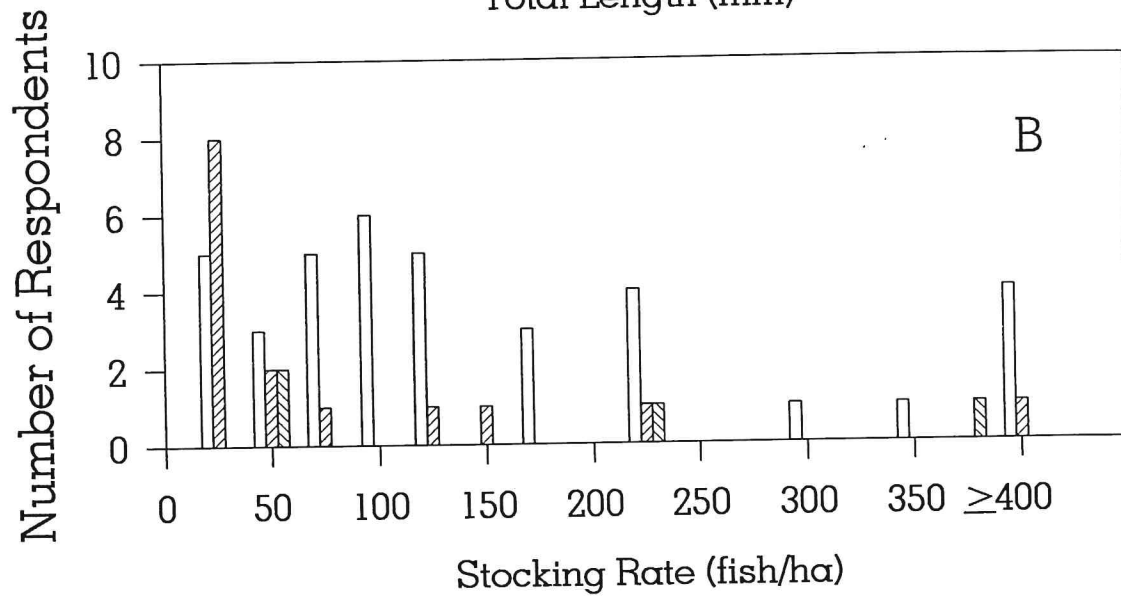
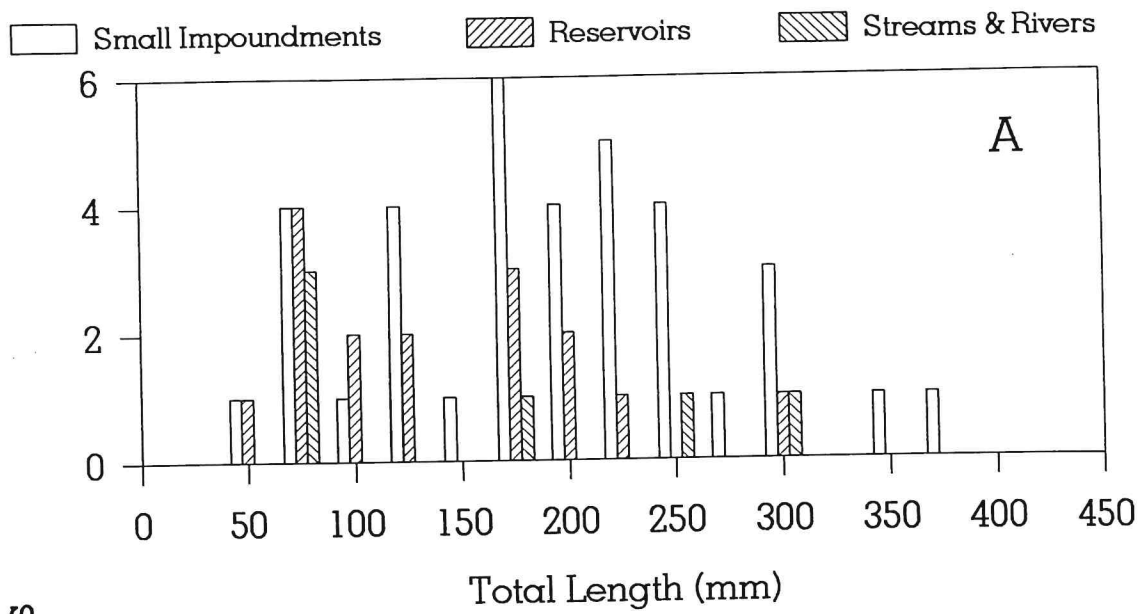


Fig. 4

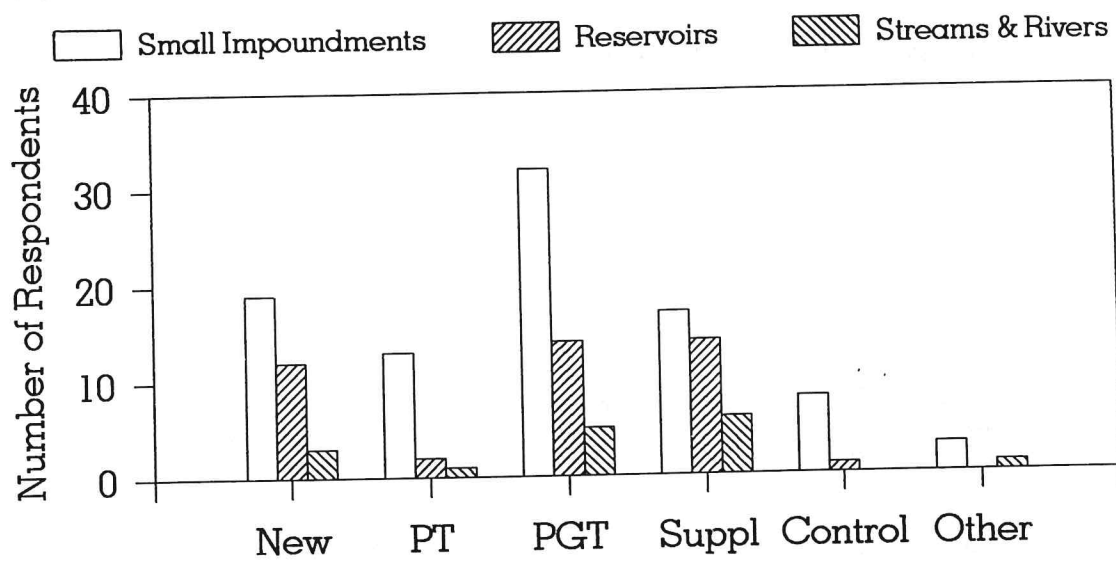


Fig.5

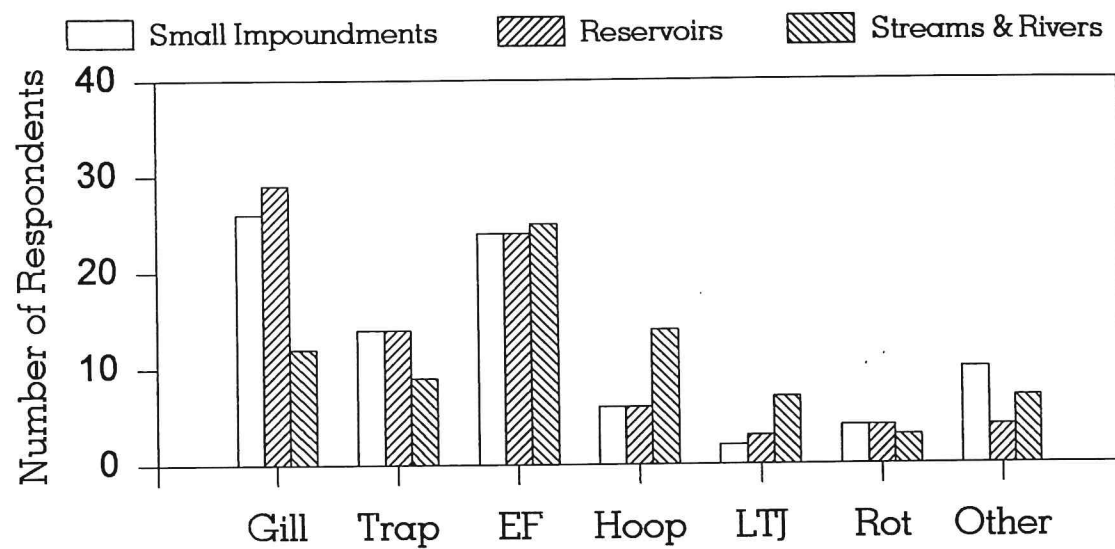


Fig. 6

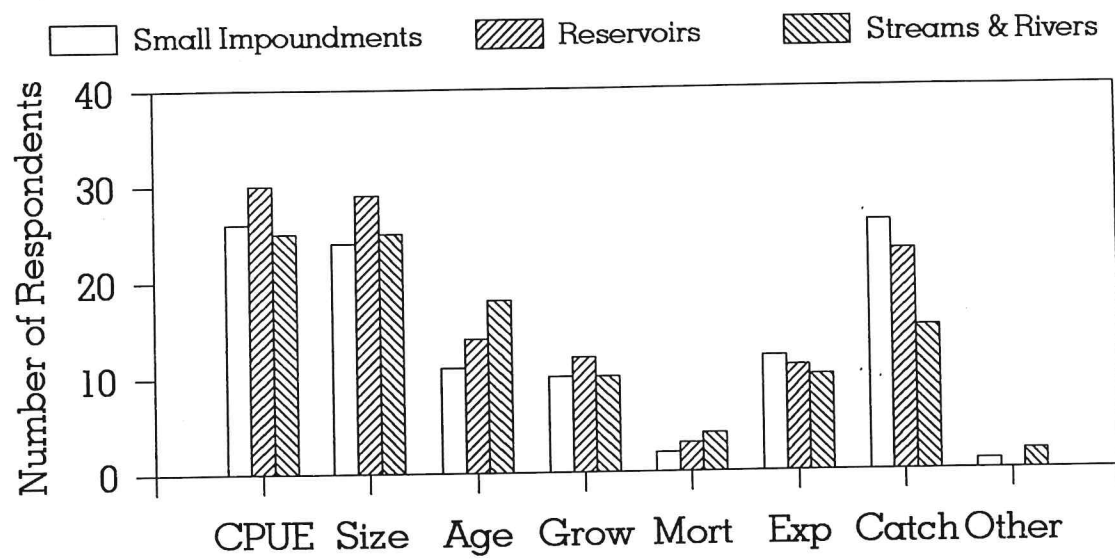


Fig. 7

