N E W S L E T T E R

OKLAHOMA CHAPTER - AMERICAN FISHERIES SOCIETY

October, 1980 Vol 2(2)

The Oklahoma Chapter, American Fisheries Society has been involved in several activities since the Fall, 1979 business meeting. This newsletter is intended to update you on these activities and prepare you for the Fall, 1980 business meeting coming up this November 14, in Norman. The meeting will be in Sky Terrace Room in the Oklahoma Memorial Student Union Building on the OU campus. We will meet following the Fish and Wildlife Conservation Section's Afternoon Session.

At the Spring meeting, March 14, 1980, procedures and problems of setting water quality standards and current water pollution problems were discussed and a review of existing water quality standards was started.

The Chapter's review of current water quality standards began in earnest after the Spring meeting by members of the Water Quality Committee.

Specific committee goals and members working toward accomplishing each specific goal are as follows:

Toxic Substances: Ron Suttles, Charles Scott, Ric Hunter

Bioassay: Susan Torrans, Jim Grimshaw

Intermittent Streams and Water Quality: Mike Wright, Charlie Marshall Ron Suttles, David Martinez

Species Diversity Index: Bill Cox, Bob Lynch, Conrad Kleinholtz

Nonpoint Source Considerations: Steve Hensley, David Martinez

Biological Monitoring: Charles Scott, Mike Wright, Kim Erickson

The Water Quality Committee will continue to function throughout the upcoming year, providing an update on its progress at this business meeting and tentatively presenting a final report for membership action at the Fall, 1981 business meeting.

The Membership Committee, composed of Gene Gilliland, Susan Torrans, Steve Hensley, and Ken Ashburn, has been active during the year and will provide a report at the Fall business meeting.

The Topics Committee, composed of David Combs, Fred Heitman, Conrad Kleinholtz, and Bill Cox, has been active and provided a list of topics for future meetings. During the Fall business meeting, we will need to select one of the topics developed by the committee as the basis of our 1981 Spring meeting.

The following topics were selected by the committee:

1. Effects of sedimentation created by current forest practices on the aquatic communities on warmwater streams in Oklahoma.

2. Current fisheries management practices, including:

   a. Regulation for fish management, as viewed by law enforcement officials, biologists, administrators, and anglers.

   b. Use of exotic species, philosophy of length limits, the value of supplemental stocking in fish management.

   c. Involvement of various organizations in management of fisher resources in Oklahoma.

The first topic appears to be an ideal subject for a Spring meeting combining both presentation of information and field review. Additionally at some point in time, a topic on minimum stream flows and effects on fisheries could be beneficial.

The Chapter's by-laws were reviewed and do not need to be amended

at the present time. Therefore, the Chapter will continue to operate under the existing by-laws and copies will be distributed at the Fall business meeting.

The President wrote letters to the Oklahoma Congressional Delegation in support of the D-J Expansion Program, as part of the parent society's efforts. During the Fall business meeting, the D-J expansion efforts will be reported on by President-Elect, Dr. Harold Namminga.

During the interim, the President and Secretary-Treasurer met with members of the Wildlife Society to discuss and review the water transport system. Enclosed for your reference is a letter sent to Representative Robert S. Kerr III by this group and a suggested resolution for passage by both societies. The Wildlife Society has passed the resolution and the Fisheries Society will consider similar passage during the Fall meeting.

A draft agenda for the Fall business meeting is included for your reference. Please plan to attend and bring your 1981 dues, $1.00.

TENTATIVE AGENDA

Fall Business Meeting

November 14, 1980
Sky Terrace Room, Oklahoma Memorial Student Union Building
University of Oklahoma
Norman, Oklahoma

1. Business and Committee Reports
   a. Secretary-Treasurer's Report
   b. Membership Committee Report
   c. Water Quality Committee Report
   d. Topics Committee Report
2. Selection of Topic, Time & Location of Spring Meeting
3. Review of Chapter Dues and Membership Duration
4. Review of Procedures for Passage of Resolutions
5. Distribution of By-Laws
6. Report on D-J Expansion
7. Approval of Resolution Regarding Oklahoma's Proposed Water Transport System
8. Old Business
9. Election of Officers, President-Elect & Secretary Treasurer
10. Establish Chapter Committees for 1981
11. New Business
12. Set 1981 Meeting
13. Adjournment

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Recommendation to add language to the Oklahoma Water Quality Standards concerning the Monitoring of Toxic Substances in Sediment and Fish Tissue

submitted by

Oklahoma Chapter of the American Fisheries Society

November 1980

Biological monitoring is the regular, systematic use of organisms to determine environmental quality. In water quality management, chemical-physical monitoring determines the concentration or level of the various parameters in water. However, there is presently no reliable way, other than using an organism, to determine the integrated, collective impact of these parameters upon the ecosystem. The use of biological monitoring in water quality assessments entails determining changes in species diversity, distribution, frequency, composition, and abundance of aquatic life. It also involves determining the acute and chronic toxicity and biomagnification of certain parameters to aquatic organisms. This paper deals with the need for additional provisions in the Oklahoma Water Quality Standards to monitor and analyze toxic pollutants in aquatic life and sediment.

At present, the Oklahoma Water Quality Standards does not have an established policy or methodology concerning levels of toxic substances in the tissues of aquatic animals or sediment nor are there any set standards of criteria for comparison of levels. There has been some dispute over the use of fish tissue and sediment levels in the standards. The basic argument is that the standards deal primarily with the protection of water quality and the abatement of pollutants in the water resources of the state. However, the standards also require that the designated beneficial uses of Oklahoma's waters be maintained and protected. The use of fish tissue analyses is particularly helpful in protecting beneficial uses such as fish and wildlife propagation and smallmouth bass fisheries. Many fear that fish tissue and sediment levels would be used to issue compliance violations and require overly restrictive controls for dischargers. Some states have attempted to do this with little success. We believe that a more realistic approach is to utilize tissue and sediment levels to identify and alert water quality management agencies to specific or wide ranging problems with toxic substances in state waters.

Fish tissue and sediment analyses provides an additional tool for monitoring changes in the aquatic environment and has become a standard component of toxic monitoring and surveillance studies. Since most toxic substances tend to accumulate in bottom sediments and tissues of organisms, their analyses provides information on the transport of pollutants, human health concerns, stability of the aquatic ecosystem, and serves as a excellent environmental barometer. In some cases, fish tissue or sediment analyses may be the only way to detect certain toxic substances. A good example of this is the recent detection of PCB's in Fort Gibson Lake.

There is no concise method to adequately assess the impact of toxic substances on aquatic organisms from tissue or sediment analyses. Currently, the only way to accurately determine the impact of toxics is through systematic bioassay studies where concentrations in water can be controlled to arrive at acute and chronic toxicity levels (LC 50's). There is no doubt that high concentrations of toxic substances in fish tissue are sublethal. However, very little

work has been conducted to correlate tissue or sediment levels with sublethal effects such as alteration of reproductive capability, metabolism, physiology, or behavior. High levels of toxic pollutants in fish tissue do degrade the aesthetics, sport and commercial fisheries, and overall economic and environmental well being of a water course.

There are two recognized methods for determining toxic substances in fish tissue. Whole fish tissue analysis utilizes the entire fish for sampling toxics. This method produces a body concentration that accounts for toxic substances in fatty tissues and vital organs such as the liver, kidneys, and brain. Whole fish analyses provides a good indication of toxic contamination because the entire body burden if reflected. Whole fish samples are primarily used in comprehensive monitoring programs for the widespread detection of toxics. The Fish and Wildlife Service uses this method exclusively in their National Pesticide Monitoring Program. Since there is no standard for comparison, the evaluation is somewhat subjective. However, knowledge of the parameter and the organism sampled coupled with experience in reviewing whole fish data improves the accuracy of the analysis.

The other method involves sampling edible fish tissue (fillets). This method is used by the Food and Drug Administration (FDA) and health departments to determine levels of toxic substances in commodities consumed by humans. The FDA have published action levels which are used to compare samples to indicate problems with certain toxic parameters. Two types of monitoring is performed. The survey sample is normally a composite of fish fillets and is primarily used to identify problem areas. The compliance sample is utilized in determining violations of the action levels by commercial enterprises.

The FDA's action levels are the only established numerical standard for the comparison of toxics in fish. Concentrations of toxics in edible tissue are normally less than what occurs in whole fish samples. The action levels are based on concentrations that are safe for human consumption and may not represent what is happening in the aquatic ecosystem.

The published action levels and the corresponding parameters are presented below:

Aldrin/Dieldrin	0.3 parts per million
Chlordane	0.3 " " "
Endrin	0.3 " " "
Toxaphene	5.0 " " "
DDT/DDE/DDD	5.0 " " "
Mirex	0.1 " " "
Heptachlor	0.3 " " "
PCB's	5.0 " " "
Mercury	1.0 " " "

The use of bottom sediments in monitoring toxic substances is relatively new. No established standards exist that can be used to relate sediment concentrations to environmental degradation or affects on fish and wildlife. Some work has been done on the ratio of toxics in sediments to water and fish levels. The EPA and Corps of Engineers have done some work concerning toxics in dredged materials (EPA/COE, Criteria matrix for PCB bioaccumulation in dredged material proposed for dumping in New York Bight Mud Dump Site, unpublished). EPA Region VI has unofficially formulated guidelines for toxics in sediment. These guidelines consider the interaction of toxics in bottom sediments, interstitial water, and the water column. These guidelines are presented below:

Arsenic	5	ppm
Cadmium	2	"
Chromium (total)	100	"
Copper	50	"
Lead	50	"
Mercury	1	"

Sediment analyses provides an excellent method for detecting and monitoring toxics. This is primarily due to the fact that most heavy metals and organochlorines attach themselves to suspended solids and settle out in the bottom sediments and are less mobile than fish. The importance of sediment analyses was exhibited by the recent passing of state legislation (82 O.S., Suppl. 1980, Sec. 926.3) which gave the Oklahoma Water Resources Board authority to adopt standards for sediments.

In reviewing the different methods for analyzing toxic substances, it can be safely stated that tissue and sediment data cannot be used to precisely evaluate the impact of toxic pollutants on fish and wildlife resources. However, tissue and sediment analysis is a necessary component of water quality monitoring and management of water dependent beneficial uses in the state. Due to the paucity of information on this subject, the use of fish tissue or sediment levels for the enforcement of the water quality standards does not appear feasible at this time. However, we believe that the standards should endorse the use of such monitoring in identifying problem areas in the waters of the state. In view of the above concerns, the Oklahoma Chapter of the American Fisheries Society recommends that the Oklahoma Water Quality Standards be amended by adding the following new section:

MONITORING TOXIC SUBSTANCES IN SEDIMENT AND FISH TISSUE

Preventing and abating the discharge of toxic substances into Oklahoma's waters is an important objective of the standards. The occurrence of toxic pollutants in water, bottom sediments, and tissues of aquatic organisms can reach concentrations where the aquatic environment and designated beneficial uses are adversely impacted. In many situations, the analysis of water for toxicants may not provide sufficient information; therefore, additional monitoring is required. The analysis of bottom sediments and fish tissue is a proven and useful method to detect and monitor toxic pollutants. These analyses provide the data base necessary to identify problem areas and formulate solutions. The analyses of sediments and tissues for toxic substances is endorsed by the EPA's Basic Water Monitoring Program and is a vital part of Oklahoma's Ambient/Biological Trend Monitoring Program (305(b) Technical Report). Because of their significance, sediment and tissue analyses should complement the analyses of toxics in water. Listed below are specific parameters and their respective levels, which when exceeded in the tissue of fish species, shall be cause for concern and further investigation:

PARAMETER	LEVEL (milligrams/kilogram)
Aldrin/Dieldrin	0.3
Endrin	0.3
Chlordane	0.3
Toxaphene	5.0
Mirex	0.1
Heptachlor	0.3
DDT/DDE/DDD	5.0
Polychlorinated Biphenyls (PCB's)	2.0
Mercury	1.0