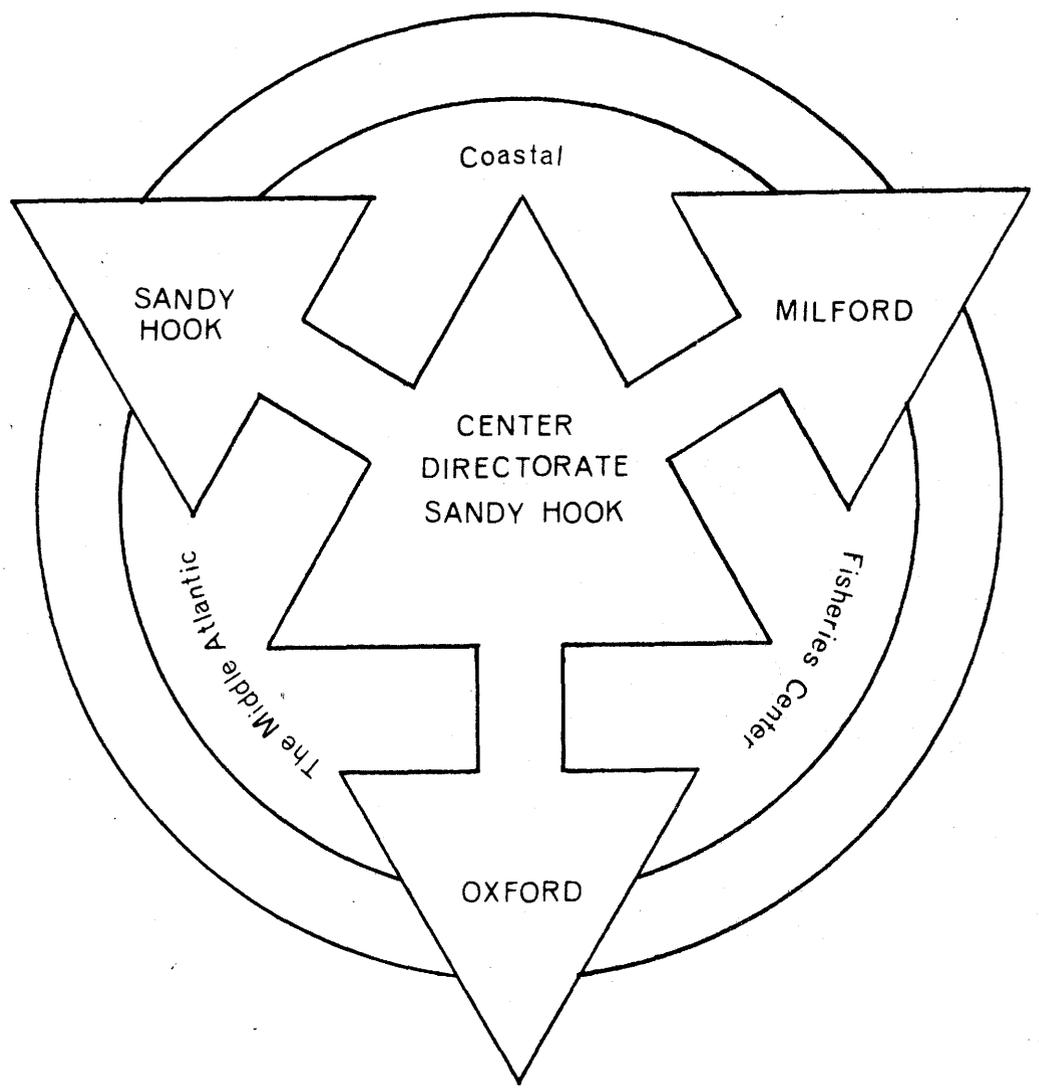




RESEARCH PROSPECTUS: ASSESSMENT OF THE HEALTH OF FISHERY
RESOURCES INHABITING "KEPONE"-AFFECTED
ECOSYSTEMS

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Northeast Region

MIDDLE ATLANTIC COASTAL FISHERIES CENTER



INFORMAL REPORT NO. 96

March, 1976

Research Prospectus: Assessment of the health of fishery resources
inhabiting "kepone"-affected ecosystems

Need:

It is now well known that the pesticide kepone, a chlorinated hydrocarbon with a relatively long half life, has been found in a large number of poikilotherm vertebrates and invertebrates from the James River, Virginia. It is not known how kepone, in the concentrations observed, affects sessile and migratory fishery resources.

Adequate knowledge of the health status of estuarine and marine fishery resources, however, is fundamental to successful application of fishery management, conservation, and rehabilitation programs. Thus, there is a real need for reliable, up-to-date information on how acute and chronic exposure to chemical pollutants, in this case kepone, affect food-web organisms and living marine resources throughout their life histories. Ideally, the entire sequence of possible lethal and sublethal host responses should be assessed. This would include pathology studies from initial receipt of the stimulus through the several subtle or frank metabolic, structural, behavioral, developmental, reproductive, and other functional and genetic disorders (including neoplasias) that may occur. Increased susceptibility of hosts to infection or the enhancement of infectious agents which may produce minor or profound secondary effects should also be studied.

The Middle Atlantic Coastal Fisheries Center (MACFC) has a long history of multidisciplinary research on infectious disease and environmental pollution-induced disorders of marine fish, crustaceans, and molluscs. With modest supplements of financial and personnel support to our existing programs, we can be of some assistance to state and federal agencies in efforts to gain greater understanding of the role of kepone as it affects the well-being of living marine and estuarine resources.

We propose the following short-term projects (selected to ensure timely delivery of useful information to managers).

Field Studies of Finfish:

Selected tissues (liver, kidney, brain) from finfish collected from the James River, showing elevated levels of kepone, will be examined for histopathology including neoplasia. In cooperation with agencies responsible for collections, dissections, and preparations of tissues for kepone analyses, subsamples of tissues, appropriately fixed, will be received at the Oxford Laboratory for sectioning, staining, mounting, microscopic examination, and interpretation of observations. Striped bass, a migratory species, will be examined.

..... \$12,000.00

Laboratory Studies on Finfish:

Selected tissues (liver, kidney, brain) of finfish species acutely or chronically exposed to kepone in experimental bioaccumulation, and toxicity studies will be examined histologically, as above, for pathology and abnormalities. This work would be done in cooperation with agencies undertaking the experimental studies. Subsamples of tissues, fixed appropriately, will be received at the Oxford Laboratory for sectioning, staining, mounting, microscopic examination, and interpretation of the following: sheepshead minnow, striped bass, as available.

.....\$12,500.00

Molluscan Laboratory Studies:

Comparative histopathology of kepone-affected filter-feeding and detritus-feeding molluscs will be conducted on Macoma balthica and Crassostrea virginica. These studies will be similar to ongoing studies at Oxford using newly developed methods and recirculated aquarium systems to quantitatively feed or expose molluscs to various concentrations of pollutants. Chemical analyses of kepone residues in tissues will be accomplished extramurally.

.....\$15,000.00

Laboratory Studies on Blue Crabs:

Histopathologic examination of blue crabs used to study effects of kepone-laden sediment (toxicity, accumulation) and ecologic effects (acute and chronic) will be carried out in collaboration with other federal agencies. Protocol of exposure, experimental design, etc., should be discussed in depth before work is to begin and training provided to a technician from Oxford for standardization of dissections.

.....\$15,000.00

Oyster Cytogenetics:

Chromosomal anomalies in the larval offspring of oysters from kepone-degraded areas will be studied. This may be accomplished by either of two approaches: (1) induction of spawning in the laboratory of naturally conditioned oysters during the normal spawning period June-July from the kepone-degraded area in the James and from a "control area", "uncontaminated" by kepone; (2) in the laboratory, unexposed control oysters and oysters previously exposed for various periods and to various levels of kepone during gametogenesis, will be "conditioned" and then induced to spawn. Regardless of approach to be used, fertilized eggs (larval) 6, 12, 24, 48 hours old should be fixed in Carnoy's solution and sent to the Center's Milford Laboratory for chromosomal analyses.

.....\$8,800.00

Additional desirable studies if funds are available:

Molluscan Field Studies -- Replicated studies on kepone-induced histopathology in oysters

Twenty-five oysters, subsamples from all oyster samples taken for (1) kepone uptake, (2) duration rates, (3) acute and chronic tests, etc., (i.e., from each study, each site and each collection) will be furnished to the Oxford Laboratory for preparation, fixation, examination and interpretation.

.....\$15,000.00

Histopathological field studies on resident molluscs

Histopathological examination and gametogenesis studies will be carried out on resident molluscan (Rangia cuneata, Crassostrea virginica, and Macoma balthica) species collected at from 3 to 5 points along a transect, beginning close to the source of kepone discharge and continuing to the mouth of the James River. Samples collected four times/year (seasonally) and consisting of 25 animals per site. Furnished to Oxford Laboratory.

.....\$20,000.00

Summary: Prospectus Budget:

EPA

1. Field Studies of Finfish	\$12.0K
2. Laboratory Studies of Finfish	12.5K
3. Molluscan Laboratory Studies	15.0K
4. Laboratory Studies on Blue Crabs	15.0K
5. Oyster Cytogenetic Studies	8.8K
6. Support	<u>20.7K</u>
Total:	\$84.0K

Optional Studies:

1. Molluscan Field Studies: Oysters	\$15.0K
2. " " " : Resident shellfish	20.0K
3. Support	<u>11.5K</u>
Total:	\$46.5K

Flow Diagram: Proposed NMFS/MACFC Research Responsibilities

