National Ocean Service
Cooperative Oxford Laboratory

1) The most recent laboratory evaluation for the Cooperative Oxford Laboratory was conducted as part of a comprehensive NOS internal program evaluation concluded in 1999. This document is a large notebook and in unavailable in pdf format. We suspect the substance of this report may be marginally relevant to the Research Review Team.

2) Please provide a brief history, and mission of your laboratory /center.

In 1960 construction of a new laboratory was completed on 11+ acres fronting on the Tred Avon River adjacent to the town of Oxford, Maryland. The land was donated to the Federal Government's Department of Interior, Bureau of Commercial Fisheries, Fish and Wildlife Service to conduct research in support of an oyster industry that was experiencing devastating losses in production in both Delaware and Chesapeake Bays. Initially three programs were developed, an Ecology Program, an Oyster Culture Program, and the Oyster Mortality Program. During the first decade program goals were directed toward oyster research and resulted in development of new standards to study molluscan diseases, identification of the spore stages of the disease that was causing the mass mortalities of oysters, and the development of special stains to aid in the identification of the causative agent. In 1970, the laboratory was moved from USDI to NOAA within the USDC and the basic science learned in studying diseases of oysters was expanded to study diseases of fish and crustaceans. Research extended to both inshore and offshore stocks and from biotic to abiotic causes of disease. A new age of research had begun. The use of electron-microscopy to identify micro parasites, bacteria, and viruses and the application of immunological techniques to identify parasites and other pathogens were implemented.

In the 1980s the laboratory came under new NOAA management with the formation of the National Marine Fisheries Service, Northeast Fisheries Science Center. There were efforts to consolidate NMFS laboratories and potentially move programs to other locations within NMFS. At one point, the programs at Oxford were identified for relocation to a number of NMFS laboratories. In 1987, the State of Maryland offered a solution to keep the programs at Oxford via a Cooperative Agreement with Maryland Department of Natural Resources. The State of Maryland agreed to absorb the cost of operating the facility, while taking the opportunity to house state programs at the facility synergistic with the federal programs. The agreement has been renewed three times (every 5 years) and is now being revised to include not only our partners in MD DNR but also new partners including the NMFS Chesapeake Bay Program and the University of MD. In1995, the Oxford Laboratory was formally transferred to the Southeast Fisheries Science Center of NMFS with administrative responsibilities assigned to the Beaufort Laboratory. During the following four years a number of significant events occurred. The facility underwent complete refurbishing by the State of Maryland; an additional 6,800 sq. ft. of office space was added to the existing laboratory structure. The rehabilitation was completed in September 1998. In 1996 a research vessel, the R/V

LAIDLY, was obtained from NOAA Corps to support planned increases in habitat research in the Chesapeake Bay. The Oxford Laboratory remained under the administrative auspices of the Beaufort Laboratory until February 28, 1999, when it was transferred to the NOS/CCEHBR and became the sixth Branch in the Center designated as the Pathobiology Branch. This transition was part of the larger reorganization of the National Ocean Service and formation of the National Centers for Coastal Ocean Science. Today the Branch's focus remains on molluscan and crustacean health and disease, using enhanced molecular techniques to address this complex subject.

3) Please provide a listing of *major* customers of the laboratory /center, with a one sentence description of what is being done for them.

- Land and Resource Use Management & Planning Authorities (federal, state and local levels of government) – Research on effects of point and non-point sources of pollution on the coastal environment and ecology.
- State Shellfish Agencies and the Shellfish Industry – Information on human pathogens (viruses, bacteria) in shellfish including sources, modes of transmission, control points, and corrective measures.
- Coral Health Disease and Health Consortium (CDHC) established by the US Coral Reef Task Force - Development of the Coral health Disease Registry at Oxford. The primary objectives of this research is to coordinate with CDHC to organize and coordinate scientific resources nationally and internationally to address coral health issues, with emphasis on the diagnosis, etiology and epizootiology of coral diseases and bleaching.
- NOAA Chesapeake Bay Office – To coordinate research activities between Oxford and CBO in addressing high priority research issues in the Chesapeake Bay, which can be applied as regional and national models on relevant environmental issues. For example, development of HCCP based Protocols for the Introduction of *Crassostrea ariakensis* for the Chesapeake Bay will provide federal guidance on future research and aquaculture issues in the US involving new species introductions.
- Invasive Species Coordination among International Organizations and Federal Agencies (EPA, USGS, US ACE), and Inter-Agency Task Forces (e.g. Chesapeake Bay Interagency Task Force/Panel)- Coordination of issues involving management/prevention of invasive species introductions into US coastal wasters.

4) A summary of research being conducted

- Invasive Species - Oxford Pathobiology Branch current areas of research include aquatic nuisance species management, prevention and control. International, National and Regional (e.g. *Crassostrea ariakensis* introductions into the Chesapeake Bay) in focus. Long Term research.
- Diseases in Marine Organisms – examples include molluscan shellfish disease research, juvenile oyster disease, disease impact on natural resources, marine

environmental biotechnology and improved diagnosis of marine invertebrate diseases, Great Lakes studies of copepods and Mycobacteria in Striped Bass. International, National, and Regional. Long term research.

- Pollution – Cryptosporidium and Bacterial Source Tracking including bacterial and prtotozoan shellfish pathogens. Research focus is on Chesapeake Bay issues which can be applied as regional/nationals models. National. Intermediate Term research at present but will become a focal point for long term research in the Chesapeake Bay.
- Coral Reef Research - including collaborations with the Coral Health Disease and Health Consortium (CDHC) established by the US Coral Reef Task Force., participation in the first official meeting of the CDHC convened in Charleston, SC in January 2002 and development of the Coral health Disease Registry at Oxford. The primary objectives of this research is to coordinate with CDHC to organize and coordinate scientific resources nationally and internationally to address coral health issues, with emphasis on the diagnosis, etiology and epizootiology of coral diseases and bleaching. International and National. Intermediate term research at present but will be a long term research effort.
- Development of Cooperative COL and CBO Research – with the recent addition of CBO staff to Oxford (COL), we are now developing long term research plans involving staff at both COL and CBO addressing fisheries, natural resource and pollution issues in the Chesapeake Bay. Recently, CCEHBR , CBO and Oxford staff were funded in a competitive grant process by EPA to conduct additional contaminant surveys for the Chesapeake Bay region addressing top priority pollution issues within the Bay. We will continue to develop joint research interactions between COL and CBO. National and Regional. Short Term at present but this will become a long term research interaction.

5.) Please provide a listing of 3-5 major accomplishments in the last five years.

- Development of methods for determining disease identification and impact in marine invertebrates and vertebrates; including oyster, shrimp and crab diseases. A recent example is a Disease Survey of Great Lake Amphipods. Diporeia amphipods have declined considerably in the Great Lakes. A survey revealed numerous diseases agents associated with mortalities. This collaboration with the Great Lakes Environmental Research Laboratory is exploring interrelationship dynamics of various physical and biological factors such as high sedimentation, diminished food supplies, and virulent parasites that may synergistically cause declines in Diporeia populations.
- First National Coastal Survey of Cryptosporidium spp. in Commercial Shellfish Reported. The distribution, prevalence, and infectivity of Cryptosporidium spp. in commercially marketed shellfish from 17 Atlantic and Gulf coasts states and one Canadian Province were reported. Of 49 samples, 4% of the 1225 shellfish examined were found to harbor Cryptosporidium.
- Spatial and temporal distribution of mycobacteriosis in striped bass. Scientists at the Oxford Laboratory are working to define the spatial and temporal distribution

of mycobacteriosis, a serious disease currently at epizootic levels in Chesapeake Bay striped bass. Examination of archived tissues from 1970 to present has shown evidence of the disease over 10 years prior to previous reports. In addition, presumptive mycobacteriosis has been identified in samples of the coastal migratory stock collected off of North Carolina and efforts are underway to examine the Roanoke River stock. This information is critical in defining the scope of the problem, and identifying potential sources of the pathogen.

- Coral Disease and Health Consortium (CDHC) was established by the US Coral Reef Task Force. The first official meeting of the CDHC was convened in Charleston, SC in January 2002. The primary objectives of the CDHC are to organize and coordinate scientific resources nationally and internationally to address coral health issues, with emphasis on the diagnosis, etiology and epizootiology of coral diseases and bleaching. An outgrowth of this workshop was the development of the International Coral Health Disease Registry, which is a compilation of the numerous diseases observed in corals world-wide, developed at the Oxford Laboratory.

6.) Please provide a summary of legal mandates for the work in the laboratory/center.

- Reorganization Plan No. 4 of 1970
- Coastal Ocean Program
- Coastal Zone Management Act
- Coral Reef Conservation Act
- Endangered Species Act of 1973
- Estuary Protection Act
- Estuary Restoration Act of 2000
- Federal Insecticide, Fungicide, and Rodenticide Act
- Fish and Wildlife Coordination Act
- Harmful Algal Bloom and Hypoxia Research and Control Act of 1998
- Magnuson-Stevens Fishery Conservation and Management Act
- Marine Mammal Protection Act
- National Aquaculture Act