Applying a Bioassessment and Monitoring Framework for Public Lands and Trust Resources in Coastal and Estuarine Habitat in the United States

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Collaborators: Chesapeake Bay Program (over 25 Federal Agencies, 6 States, the District of Columbia, and numerous local customers and partners)

Statement of Problem: There are no spatially or temporally consistent programs that monitor environmental contaminants in terrestrial vertebrates in the United States. In 1997, a retrospective analysis of contaminant exposure and effects data was undertaken for amphibians, reptiles, birds and mammals along the Atlantic coast. A "Contaminant Exposure and Effects--Terrestrial Vertebrates" (CEE-TV) database, and a second database that describes biological and ecotoxicological data of 25 vertebrate species commonly used as sentinels of pollution, was compiled through computerized searches of published literature, reviews of existing databases, and solicitation of unpublished reports from conservation agencies, private groups, and universities (Rattner et al., 1997, 2000). The CEE-TV database can be searched, sorted, directly queried, and imported into a Geographic Information System to examine spatial patterns and to identify data gaps. It has been widely acknowledged that the next logical step is to expand these Atlantic coast databases to include the Gulf coast, Pacific coast, the coasts of Alaska and Hawaii, the Great Lakes, and other sentinel species. Information of this nature is essential for converting these regional databases to a nationwide resource of contaminant information.

Objectives:

1. Assemble information on contaminant exposure and effects in terrestrial vertebrates in estuarine and coastal habitat along the Atlantic Coast and Gulf of Mexico.

2. Maintain and update CEE-TV database for biota in estuarine and coastal habitat in appropriate geographic regions.

3. Organize and summarize contaminant exposure and effects data by type of contaminant, geographic location, time period, species, and sample matrix (e.g., egg, tissue, carcass) in tabular and map form.

4. Analyze the data using descriptive and inferential statistical methods to determine differences in the number of records, concentrations of contaminants detected, and measures of contaminant exposure and effect among species, states, estuaries, and broad geographic regions.

5. Describe and compare temporal trends and apparent data gaps (by estuarine and coastal habitat, state, and Department of the Interior properties) of contaminant concentrations for taxa and individual species included in the CEE-TV database.

6. Rank watersheds on the basis of the density of CEE-TV data, and indices of watershed condition, vulnerability to pollution, and potential for wildlife management activities.

Approach:

Retrospective contaminant exposure and effects data for free-ranging terrestrial vertebrates residing in estuarine and coastal habitat of the Atlantic coast, Gulf of Mexico, the Pacific Coast, Alaska, Hawaii, and the Great Lakes was identified and retrieved. Source documents were reviewed to identify contaminant exposure and effects data from coastal and estuarine habitat. Unless obvious flaws in data quality are detected, all information was coded for entry into the CEE-TV database. Information in the CEE-TV database was searched, sorted and queried. Spatial and temporal trends in exposure and effects information were examined using descriptive and exploratory statistical methods. Spatial and temporal data gaps were identified and prioritized, with particular emphasis on Department of the Interior properties.

Selected Reports and Other Products:

Databases, Delivered: Barnett Rattner and coworkers, 1999, Contaminant Exposure and Effects--Terrestrial Vertebrates Database, USGS

Report, Delivered: Cohen, J.B., B.A. Rattner, and N.H. Golden, Use of retrospective data to assess ecotoxicological monitoring needs for terrestrial vertebrates residing in Atlantic coast estuaries: Ecotoxicology 12:365-375.

Report, Delivered: Golden, N.H., and B.A. Rattner, Ranking terrestrial vertebrate species for utility in biomonitoring and vulnerability to environmental contaminants: Reviews in Environmental Contamination and Toxicology 176:67-136, 2003.

Report, Delivered: Rattner, B.A., 2004, Wildlife toxicology information and data gaps for terrestrial vertebrates in Chesapeake Bay: USGS-Patuxent Wildlife Research Center Science Brief for Resource Managers, 2 p.

Report, Delivered: Rattner, B.A., J.L. Pearson, N.H. Golden, J.B. Cohen, R.M. Erwin, and M.A. Ottinger, Contaminant Exposure and Effects—Terrestrial Vertebrates database: trends and data gaps for Atlantic Coast estuaries: Environmental Monitoring and Assessment 63:131-142, 2000.

Report, Planned: B.A. Rattner, N.H. Golden, K.M. Eisenreich, R.L. Hothem, R.L. Kershnar and T.W. Custer, 2004, Contaminant Exposure And Effects--Terrestrial Vertebrates Database: Trends And Data Gaps For Coastal and Estuarine Habitat, and the Great Lakes of the United States, To be determined

Report, Planned: B.A. Rattner, K.M. Eisenreich, N.H. Golden, M.A. McKernan, R.L. Hothem, and T.J. Custer, Retrospective ecotoxicological data and information needs for terrestrial vertebrates residing in coastal and estuarine habitat in the United States.

Websites, Delivered: Barnett Rattner and coworkers, 1999, Biological and Ecotoxicological Characteristics of Terrestrial Vertebrate Species Residing in Estuaries, USGS

Relevance and Benefits: This study summarizes recent and relevant contaminant exposure and effects data and compiles valuable and readily accessible ecotoxicological information for natural resource managers, scientists and the public for use in various research, management and conservation programs. Within the Department of the Interior, this effort can be linked to ongoing and proposed coastal and wetland initiatives, Natural Resource Damage Assessments, and National Wildlife Refuge and National Park monitoring being undertaken by the USGS, U.S. Fish and Wildlife Service, and the National Park Service. Some data layers generated by this project will be used by the Regional EMAP program of the U.S. Environmental Protection Agency, the National Oceanic and Atmospheric Administration, the Department of Defense, and the U.S. Department of Agriculture, as well as by state game and conservation agencies, and non-governmental conservation organizations. The data generated from this project will enable natural resource managers, scientists and the public to better implement various research, management and conservation programs.