

## NATIONAL MARINE MAMMAL TISSUE BANK PROGRAM HISTORY

In 1989 the National Oceanic and Atmospheric Administration (NOAA) and the National Marine Fisheries Service (NMFS) initiated the development of the National Marine Mammal Tissue Bank (NMMTB) as a result of a massive die-off of bottlenose dolphins (*Tursiops truncatus*) in 1987-88. A large number of animals stranded along the Atlantic coast of the United States and although it was concluded that a naturally occurring toxin, brevetoxin, was likely the cause of death (Geraci, 1989), environmental pollution was suspected due to high levels of contaminants. It was also determined then that baseline data of anthropogenic contaminants was relatively unknown but needed for future reference. The NMMTB was developed to provide this reference data as well as other valuable information by collecting and banking marine mammal tissues for long-term storage for retrospective analyses. The guidelines for the NMMTB were based on the already established goals and protocols of the Alaska Marine Mammal Tissue Archival Project (AMMTAP). This project was established in 1987 through an agreement between NOAA's National Ocean Service (NOS), the National Institute of Standards and Technology (NIST) and the Minerals Management Service (MMS) to help determine contaminant levels of marine mammals that were taken primarily during native subsistence hunts in Alaska (Becker, et al., 1988; Becker, et al., 1991). Tissues were also collected and banked for long-term archival using standardized protocols. Currently the AMMTAP is conducted by the United States Geological Survey (USGS) Biological Resource Division in cooperation with NOAA's NMFS and NIST.

In 1990 a demonstration phase of the NMMTB began evaluating the collection protocols that were developed in order to obtain tissues from animals taken during incidental catches and strandings from coastal locations throughout the U.S. The New England Aquarium (NEA), Boston, MA., assisted NOAA/NMFS and NIST personnel in the initial collection of two species of marine mammals, the harbor porpoise (*Phocoena phocoena*), taken during incidental catches, and the pilot whale (*Globicephala melana*), taken during mass strandings. Protocols were developed that identified the criteria to determine whether an animal was suitable for sampling as well as the logistics and procedures for collecting and processing samples from these events. Efforts have been extended to sampling on the west coast, as well as the southeast Atlantic and Gulf of Mexico regions. Animals are collected through incidental catches, single and mass strandings as well as subsistence hunts in Alaska through the AMMTAP, and the species list has expanded to include other cetaceans as well as some pinnipeds, and fissionpeds.

In 1992, the NMMTB program was formally established by the Marine Mammal Health and Stranding Response Act (Public Law 102-587) and was expanded and combined with the Marine Mammal Stranding Network to become a larger program that resulted in several components; Stranding Networks, the NMMTB, and Monitoring and Quality Assurance. This expansion is now known as the Marine Mammal Health and Stranding Response Program (MMHSRP) and is coordinated by the NMFS in cooperation with the USFWS. The MMHSRP is focused on animal health assessment, real-time contaminant monitoring, specimen banking, response to strandings and mass mortalities, quality assurance/quality control of analytical results, and the management of

a nationwide database on the health of marine mammal populations. The NMMTB and the quality assurance program are administered by NIST. In 1995 the quality assurance program was formalized and became the National Marine Analytical Quality Assurance Program (NMAQAP). More information about the NMAQAP can be found at <http://www.nmfs.noaa.gov/pr/health/aqa.htm>.

After the demonstration phase the New England Aquarium continued to collect tissues for the NMMTB. In addition, other federal and non-federal partners have been formally trained by NIST personnel and collect samples for the NMMTB. These partners include:

NMFS  
USFWS  
University of North Carolina at Wilmington  
New England Aquarium  
Marine Mammal Center  
NOAA/NOS CCEHBR Laboratory  
Mote Marine Laboratory  
Cape Cod Stranding Network  
AIS, Inc.  
Hubbs Sea World Research Institute  
US Geological Survey/Biological Resources Division  
North Slope Borough Department of Wildlife Management  
Alaska Department of Fish and Game  
Minerals Management Service  
Alaska Nanuuq Commission  
University of Alaska-Fairbanks  
Alaska Sea Life Center

Over 1,000 animals have been collected for the NMMTB from 41 species of cetaceans, pinnipeds and fissipeds. There have been approximately 1,300 marine mammal tissue specimens collected from the MMHSRP from 29 species outside of Alaska and 1,510 tissue specimens collected from 16 species in Alaska. Blubber, adipose tissue, liver and kidney tissues are primarily collected from each animal, along with a few muscle samples that have been collected in the past but are no longer collected as part of the NMMTB.

The goal of the NMMTB is to establish and maintain a bank of marine mammal tissues for the purpose of:

1. Providing samples for future retrospective analyses for new analytes of interest;
2. Providing samples for future analyses using improved analytical technique and;
3. Providing a resource of samples that have been collected and stored in a systematic and well-documented manner for comparing results over time to identify if environmental trends exist.

Sample collection and archival protocols were based on the AMMTAP for Alaska species (Becker et al, 1988; 1991) and although there have been a few small updates that have been made over time, the goals and focus of the NMMTB have remained the same following these protocols.

Tissue samples are primarily obtained from stranding network personnel that have been trained by NIST personnel to collect and process tissues for the NMMTB. Animals and tissues selected for collection and archival must meet specific criteria before they can be collected. The following is the criteria that an animal must meet before it is considered for banking in the NMMTB:

1. Animal appears to be 'normal' and 'healthy';
2. Animal is not bloated;
3. Animal is Code 2 (fresh dead);
4. There is no obvious scavenger damage;
5. Body cavity is intact;
6. Post-mortem time elapse is not more than 24 hours.

The NMMTB Specimen Access Policy was developed in order to maintain control over the release of banked specimens. A NMMTB Tissue Request Form and research proposal must be submitted to the MMHSRP Program Manager, Office of Protected Resources, NMFS along with additional criteria. A copy of this access policy as well as the tissue request form can be found at <http://www.nmfs.noaa.gov/pr/health/tissue/>.

After tissues are collected following the NMMTB protocols, they are shipped frozen to and maintained by the NIST in two locations, the National Biomonitoring Specimen Bank (NBSB) in Gaithersburg, MD and the Marine Environmental Specimen Bank (Marine ESB) in Charleston, SC at the Hollings Marine Laboratory. Currently all sample are shipped frozen to the Marine ESB in Charleston, SC where they are stored in liquid nitrogen vapor phase freezers (-150 °C).