



HIIHWMS NOAA Fisheries Permit #782-1438

# SPLASH

A Comprehensive Study of North Pacific Humpback Whales  
Structure of Populations, Levels of Abundance and Status of Humpback Whales

## Information Sheet: Biopsy Sampling

### **Background Information:**

Researchers have successfully collected small biopsy samples from thousands of humpback whales worldwide. Collected tissues provide invaluable information on the health and genetic diversity of humpback whales. SPLASH will provide a large and comprehensive collection of tissue samples collected under a standard protocol. These data will be important to the long-term recovery of humpback whales.

### **Methodology:**

Small skin and blubber samples will be collected for genetic analysis, life history studies (e.g., pregnancy), and contaminants analyses using a small stainless steel biopsy dart discharged from a crossbow. Each dart is fitted with a flange or "stop" that regulates penetration of the dart and causes recoil after sampling. Flotation material secured to the shaft of the dart allows it to float on the surface and be retrieved after sampling.

### **Sampling Design:**

The SPLASH study is designed to provide broad geographic coverage of humpback whale summer and wintering areas in the North Pacific over multiple years. The research program plans to collect data in the winter/breeding areas for three years (2004-2006) and in the summer/feeding areas for two years (2004-2005). In all areas, effort will be allocated in a manner that is proportional to the density of animals. This will be the first time that humpback whale photo-identification and biopsy sampling will be done as part of an overall structure and study design throughout the North Pacific. Biopsy samples will be the fundamental source of data for investigating population structure. They can also be used for mark-recapture abundance estimation, and evidence of genetic bottlenecks due to whaling or extreme climatic change.

### **Objectives:**

1. Identify the population structure of the North Pacific stock of humpback whales and how this influences genetic diversity and exchange, helping to understand their resiliency to major impacts.
2. Determine pregnancy rates and measure other health parameters from biopsy samples.
3. Test for concentrations of chlorinated hydrocarbons and other lipophilic contaminants as well as other biomarkers of contaminant exposure.

### **Key Questions:**

1. Is the North Pacific population one large breeding population, or several discrete populations with very little interchange?
2. How many pregnancies survive to birth, and calves to weaning?
3. Are North Pacific humpback whales picking up high levels of toxins in any of their feeding areas?

### **Future Applications:**

Tissue collected for genetic and other analyses will add to previously archived samples collected from stranded animals and other biopsies. These data will significantly contribute to a better understanding of the species in the future. Since the analyses proposed by SPLASH will not use all of the tissues collected, the remainder will be archived as a baseline for this population at the beginning of this millennium. In that way, as new questions and analyses arise, the SPLASH samples will provide an invaluable legacy.



Center for Coastal Studies



For More Information go to: <http://hawaiihumpbackwhale.noaa.gov>



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## Information Sheet: Photo Identification

### **Background Information:**

The black and white patterns of humpback whales' flukes (tail) are unique to each individual as fingerprints are to humans. For over twenty years now, humpback whale researchers have been photographing the underside of humpback whale flukes in order to identify, catalog, and monitor individual whales. A central archive houses the images that are obtained. This process, known as photo-identification, has led to valuable information about such things as humpback whale population sizes, migration, sexual maturity, and behavior patterns. SPLASH will provide a large and comprehensive collection of identifications collected under a standard protocol across an entire ocean basin habitat. These data, combined with the commitment to make the central archive open and accessible to future researchers and managers, will be an important long-term contribution to the recovery of humpback whales.

### **Methodology:**

Photographs of pigmentation patterns and scarring on the ventral surface of the flukes, together with serration patterns along the trailing edge will be used to individually identify whales. To obtain photos, whales will be followed by permitted researchers in small or large survey vessels and photographed with 35-mm SLR or digital cameras equipped with telephoto lenses.

### **Sampling Design:**

The SPLASH study is designed to provide broad geographic coverage of humpback whale summer and wintering areas in the North Pacific over multiple years. The research program plans to collect data in the winter/breeding areas for three years (2004-2006) and in the summer/feeding areas for two years (2004-2005). In all areas, effort will be allocated in a manner that is proportional to the density of animals. This will be the first time that humpback whale photo-identification will be done as part of an overall structure and study design throughout the North Pacific. The initial target for photo-identification is 10% of the animals in each region during each season.

### **Objectives:**

1. Obtain a current estimate of overall abundance for the North Pacific stock of humpback whales including estimates for specific wintering and feeding areas and whether they are increasing or decreasing.
2. Determine key population parameters including reproductive and mortality rates as well as age/sex structure and pregnancy rates.



### **Key Questions:**

1. How many humpback whales are there in the North Pacific, and is their population increasing or decreasing?
2. Are there different stocks of populations, and to what extent do they intermingle?
3. What is the status of humpbacks in habitats which have not been visited since whaling days?

### **Future Applications:**

The SPLASH photographic catalog will be preserved as a legacy for use in future research and conservation. The data will significantly contribute to the photographic archive and to long-term sighting records for individual humpback whales which will lead to a better understanding of the species in the future.



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## Information Sheet: Studying Human Impacts

### **Background Information:**

Threats to humpback whales include entanglement in man-made ropes and nets, vessel strikes, degraded water quality, and underwater noise. The SPLASH study will provide useful data to evaluate a number of these human impacts in a more comprehensive manner than has been possible before. Entanglement in fishing gear is known to impede the recovery of some large whale populations. Although previous research has provided insight on the relationship between rates of entanglement and the age, sex, and geographic distribution of humpback whales in the Gulf of Maine, the entanglement rates of the North Pacific stock of humpback whales remain unknown. The broad geographic scope and large sample sizes of photographs obtained during SPLASH will allow the first comparison of the impact of this human activity for an entire ocean basin. In addition, it will allow researchers to examine other human impacts including the incidence of vessel strikes. Biopsy sampling will also provide valuable information for assessing the health of humpback whales.

### **Methodology:**

Photographs of flanks and tailstocks of whales will be taken in order for researchers to look for evidence of entanglement or vessel strike scarring. To obtain photos, whales will be followed by permitted researchers in small or large survey vessels and photographed with 35-mm SLR or digital cameras equipped with telephoto lenses. Small skin and blubber samples collected with biopsies will provide tissues to test for concentrations of chlorinated hydrocarbons and other lipophilic contaminants. Tissues can also be used to test for biochemical markers of contaminant exposure and other health assays currently being developed.

### **Sampling Design:**

These photographs will be taken simultaneously, as groups of whales are approached from the side for tissue sampling. Since the overall design of SPLASH is to find and photograph whales from all around the North Pacific, this will allow a comparison of the relative risks from human activities in different parts of the Ocean.

### **Objectives:**

1. Examine human impacts including the incidence of entanglement and ship strikes as well as obtain tissues for health assessment including toxicology.
2. Determine the rate of entanglement of humpback whales with evaluation of what regions suffer from the highest rates.
3. Determine the incidence of survived vessel collisions of the North Pacific stock of humpback whales and what areas have the highest incidence.

### **Key Questions:**

What areas are of the highest risk to the North Pacific humpbacks?  
Are these human impacts affecting their ability to recover?

### **Future Applications:**

SPLASH research will provide both insight into and a baseline on the incidence of entanglement and vessel strikes on the North Pacific stock of humpback whales. In addition, information from biopsy samples will provide information on contamination exposure and other health risks. The information gained from the study will allow managers to make appropriate decisions related to the long-term conservation of the endangered species. The data will also lead to a better understanding of how human impacts affect humpback whales.

*For More Information go to: <http://hawaiihumpbackwhale.noaa.gov>*

