Executive Summary

Human use in Prince William Sound, Alaska is not evenly distributed spatially or temporally. Certain locations within this remote area are more desirable for a variety of reasons including: distance from communities, presence of glaciers and post-glacial landscapes, availability of landing areas, protected anchorages, sport fish streams, cabins and wild game concentrations (Murphy et al 2004). Human use "Hot Spots" are important areas in PWS where human use is more concentrated relative to surrounding areas. In many cases these locations are physiographic bottlenecks restricting access to desirable inter-tidal areas and their associated upland opportunities for recreation activities. They also vary seasonally based on wildlife distribution (important for both harvest and viewing activities) and weather conditions.

Several disparate data sources describing various human uses of PWS exist but have not previously been collected in one location or analyzed comprehensively to identify areas of relatively higher concentrations of overall human use. In such areas competing uses (e.g., wildlife viewing and hunting) may converge at certain times, potentially resulting in detrimental effects upon one another and creating a larger cumulative impact on associated resources. It is critical for the sustainable management of human use in an area hosting a number of *Exxon Valdez* Oil Spill injured resources (both recovered and recovering) that the location, timing, and nature of these human use hot spots be well understood by resource managers.

The objectives of this project were to (1) review contemporary spatial and tabular data to create a GIS database characterizing known concentrations of human use and their seasonal patterns; (2) conduct a comprehensive spatial analysis of the data collected in order to identify hot spots of human activity in PWS and evaluate the potential for spatial and temporal (seasonal) overlap with EVOS injured resources and lingering oil; (3) identify locations where combinations of human use activity may be detrimental to the overall recovery of the injured service of recreation and tourism; (4) validate predicted hot spots using a combination of regional experts from land management agencies, other land owners including Alaska Native tribes and Corporations, and area communities; and (5) evaluate methodology for empirical validation of the hot spots predicted by this analysis relative to data integrity, the spatial extent and season of use.

The study area includes the waters and uplands of PWS, bounded by Blying Sound and the Gulf of Alaska to the south and the Chugach Mountains to the north. Montague, Hinchinbrook and Hawkins Island fall within the study area as does the coastline adjacent to the town of Cordova, Alaska; the Copper River Delta and associated coastline was not included in the study area.

We determined that existing management units as defined by land management agencies (Forest Service and State of Alaska) were not small enough to define a human use concentration area at a spatial scale useful for analyzing the potential impacts of human use on other resources of the Sound. Thus, we created a layer of General Areas (GAs) within our study area. These spatial units are based mainly on geography and established USGS place names; the majority of these areas are water bodies such as bays, inlets and fjords. Some upland GAs were defined based on known human use patterns; these areas tend to be smaller in size and are generally locations of known use concentration. A total of 537 GA polygons encompassing the water and adjacent uplands of the Sound were defined. Existing management unit boundaries were incorporated into the GA delineation wherever possible; these included Analysis Areas used by Forest Service

special use permit administrators as well as statistical polygons established by the Alaska Department of Fish and Game (ADF&G) Sport Fish Division to analyze data collected from commercial sport fishing guides operating in the Sound. GA names were assigned based on existing place names wherever possible, to ensure ease of use by a variety of management agencies and the public.

After identifying known categories of human use in the Sound, we reviewed existing spatial and tabular data sources describing these uses. Over forty different data sources were reviewed, including existing spatial data, tabular spreadsheets, anecdotal data, published trade paperbacks, peer reviewed publications, unpublished data obtained from agency and University researchers, personal communication with agency personnel and other local area subject matter experts, Alaska Native Corporation land use specialists, and Forest data including special uses permit data, campsite inventory data, and cabin reservations databases. Data were evaluated for accuracy, completeness and applicability. Several data sources found were available only as non-spatial tabular data (such as ADF&G harvest records); selected data sets were attributed with place names and either digitized or joined to existing spatial reference layers. New data were collected where critical data gaps were identified; for instance, a ranking of popular overnight anchorages was compiled with the help of local long-time boat captains. Selected datasets were compiled into a geodatabase for use in a Geographical Information System (GIS). All spatial data used in this project and contained in the geodatabase are in the coordinate system North American Datum of 1983 (NAD83) Universal Transverse Mercator, zone 6N (UTM 6N).

Public review and input was sought at open house meetings in the PWS communities of Whittier, Valdez and Cordova. Further input was sought from Forest staff, biologists at ADF&G, land use specialists from Alaska Native Corporations with lands in PWS, university researchers, and local area experts including several long-time commercial outfitter guide operators and special use permit holders.

All data were evaluated seasonally; no analyses were conducted using year-round data. Human use patterns in PWS are highly seasonal and are not distributed evenly throughout the Sound. Seasons were defined for this project based upon known weather patterns, hunting seasons and recreational use patterns; they are Spring (April 1 – June 14), Summer (June 15 – August 31), Fall (September 1 – December 31) and Winter (January 1 – March 31). Data were insufficient to develop valid relative ranks in the winter season, when human use of the Sound is low and mainly limited to commercial fishing and other commercial open water activities. Recreational use of PWS in the winter is very limited due to weather conditions. In general, use in the summer is more widespread throughout the Sound than use in the spring or fall which tends to be more concentrated near access ports and public use cabins.

Both measurable and locational/descriptive data were compiled. Three broad categories of human use with potential impacts to recovering resources were identified: beach use, fishing, and hunting. Measurable data (data layers for which a metric exists, for instance the number of nights reserved at a given cabin or the number of fishing trips conducted an area) were compiled from a number of data sources including ADF&G hunting and fishing data, Forest Service special use permit holder reported use, Forest Service and State of Alaska public use cabin reservation data, water taxi data, and others. These data were separated into season of use and converted to rasters

(grids); then each seasonal dataset was ranked into four classes using the Jenks Natural Breaks function in ArcGIS 9.3. These ranked datasets were combined to determine areas of relatively concentrated human use in PWS. Locational/descriptive data are also included in the GIS database. These include ferry routes, daily scenic tour routes, public use cabin locations, documented campsites, land use permit locations, potential attractions (tidewater glacier, wildlife areas, hiking opportunities), inhabited areas, aircraft landing site point locations and anchorage point locations.

Overall human use levels including beach use data, fishing data, and hunting data were summarized for each GA relative to the entire study area. No analyses were conducted at the Analysis Area scale; in other words, use levels for any GA are not relative to other GAs within the same Analysis Area but to all other GAs considered Sound-wide. Overall, use levels are higher in the western half of Prince William Sound than the eastern half. This is likely due to relative ease of access from Whittier, which is road-accessible and in close proximity to Anchorage, which is Alaska's major population center. Valdez is also a major access port, accessible from the Richardson Highway which connects PWS to Fairbanks and other interior Alaska communities. A substantial portion of recreationists entering PWS from Valdez use the western Sound. Highest use levels were found at areas closest to Whittier (particularly Blackstone Bay) and Valdez. Public use cabins, both Forest and State of Alaska, act as nodes of concentrated use. Designation and developments at State Marine Parks also appear to increase overall human use.

Overall numbers of people using PWS are the highest in Summer; however, we believe the highest potential for cumulative impacts of various uses and highest potential for conflict between different user types occurs in the Spring season when hunting, other beach use such as camping and day hiking, and fishing are all present in the Sound. In Summer, use is dominated by beach use and fishing; in Fall the dominant user group is hunters. Managers may be able to use calculated ranks of various uses within GAs to pinpoint areas of potential user conflict.

At the time of this analysis, existing data were lacking on the levels of use, patterns of use, and characteristics of private recreation users such as small motor boat users and kayakers not using the services of commercial guides. Subsistence harvest data are not considered in this project. Further analysis should be conducted as data become available.

The GIS database has high potential for further use by the Forest Service, State of Alaska, Alaska Native Corporations and other groups interested in the management of human use in PWS. Validation of identified human use hot spots should be considered. Periodic updating of established datasets (i.e. ADF&G hunting data, campsite inventories) should be conducted in concert with agency and university partners.

This project is one component of the ongoing PWS Framework. Concurrent projects under the initial data gathering phase of the PWS Framework include: The Evaluation of PWS User Experience; Spatial and Temporal Characteristics of PWS Subsistence Harvest Activities; PWS Sensitive Areas GIS Database and Mitigations Report; Black Oystercatcher Surveys in PWS; and a Recreation Capacity Analysis review. As all of these projects near completion, opportunities for collaboration and incorporation of new data will be identified. Future integration with

additional projects may result in changes to our understanding of human use distribution. To maximize efficient use of resources, empirical on-the-ground validation of predicted use patterns should be conducted after comprehensive review and integration of all available PWS Framework project data rather than attempting to validate each data set independently.