

A Hand-held, PDA Based System for Seabird Data Collection During Cetacean Surveys

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Abstract

New methodologies and technologies allow to record an ever-increasing number of complex and accurate field data at sea but information on different species, especially top predators, are rarely collected simultaneously in an effective manner. The concurrent data collection - both in space and time - on birds and cetaceans (especially dolphins) may allow a better understanding of ecological linkages in the marine ecosystem. Herein we describe a new approach involving direct entry of data by seabird observers using a hand-held, pen-based computer or PDA (Personal Digital Assistant), and illustrate a simple database design and its field use for seabird data recording during cetacean surveys. The data - collected through CyberTracker software - have the advantage of being date/time and GPS cross-referenced with cetacean data recorded on other computer platforms available on board (e.g. in our study: Logger software - developed by the International Fund for Animal Welfare - using a PC laptop) or with another PDA. The user-friendly PDA seabird database offers the benefits of: 1) easy adaptation to any other field protocol, 2) reasonable cost, and 3) easy handling in small vessels. [JMATE. 2008;1(1):9-11]

Keywords: computer, birds, marine mammals, technology, database design

Introduction

Real-time and synchronized collection of cetacean and seabird data at the same location at sea is becoming increasingly valuable for a variety of studies aiming to a better understanding of ecological linkages and the role of marine species in an ecosystem. The proposed use of a hand-held PDA allows real-time collection of seabird numeric and descriptive data. The seabird data can be easily cross-referenced with a main database of cetacean data via time and/or GPS thereby avoiding time consuming or postponed data entry with a likely risk of error.

By using PocketPC or PalmOS handheld computers with built-in Bluetooth wireless technology for GPS and CyberTracker software (<http://www.cybertracker.co.za/>) we were able to create our own data entry template and screen sequence for seabird data collection. CyberTracker was chosen because: 1) it can be downloaded for free, 2) it is easy to use and customize, 3) it gathers large quantities of geo-referenced data for field observations, 4) it uses plain, readable icons, 5) the database is easy to export for data analysis in Excel, Access, etc.

In addition to the handheld computer, CyberTracker software requires the accompanying PDA desktop software and a GPS (Global Positioning System) receiver. First, CyberTracker

software must be installed onto a computer with operating system Windows XP or 2000 (in our case the same PC laptop with Windows XP used for cetacean data collection in Logger) and then uploaded to a handheld, pen-based computer. It is also helpful to have the appropriate SD or Compact Flash Memory card for the computer used, to facilitate field back-ups, and removable/rechargeable batteries to ensure data collection throughout the entire survey.

To create a personalized database for seabird data collection any user can utilize or modify a "sample database" available in CyberTracker and simply follow the instructions. The user can create one or more screens (individual page views of the handheld PDA) selecting different choices (called elements) for each screen. Elements are data the user wishes to record in the field. For each screen, it is possible to create text, icons - either importing personalized icons or choosing from the CyberTracker image library - or both; the screen is pen-sensitive making the page scrolling and element choice fast and easy. The screen sequence can be designed in a flexible way depending on the user needs (e.g., different choices may lead to different screens, save screen 3 may bring user back to page 1, etc) and using "navigator" buttons (e.g., *Show Next*, *Show Back*, *Show GPS*, etc). After the screen sequence is designed, it can be uploaded to the PDA and synchronized. At the end of each cetacean survey, data from the PDA can be synchronized to the main computer and cross-referenced by date/time with cetacean data.

Seabird Data Collection With A PDA During Cetacean Surveys in Southern California

Field data on seabirds in Santa Monica Bay and the Southern California Bight are usually collected by one seabird observer (SBO) during cetacean surveys (Fig. 1). Seabird data are recorded during surveys both in absence and presence of cetaceans utilizing a *strip transect* method. A 300-m strip transect is suggested for concurrent data collection of seabird and cetacean data (2). The method requires recording data on seabirds that are found within a 300-m wide strip as the boat proceeds. There is one critical assumption in strip transect methods: the SBO must detect all seabirds within the sampling zone at any particular time during a chosen interval (for consistency, the interval must be the same used for cetacean sighting; e.g., in our study 5-min samples are used both during cetacean sightings and during the entire course of the survey for seabird data collection). The SBO will continuously monitor and record all birds present within the same 180 degree area relative to the SBO's position on the boat. The possible fields of view are: 1) 180° facing Bow, 2) 180° facing Port 3) 180° facing Stern, 4) 180° facing Starboard. The SBO should preferentially choose to look forward standing or setting in a high position. If there is glare or impaired visibility, he/she should opt for the field of

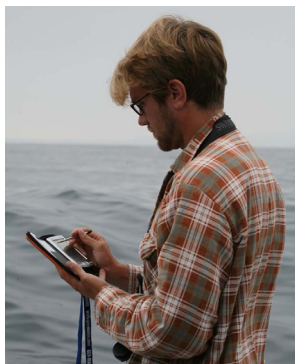


Figure 1: Seabird observer collecting data with a PDA.

view that provides the best viewing conditions.

The number and kind of birds observed are recorded on the PDA by an instantaneous sampling method (1), more recently described for dolphins as point samples (4). The SBO may encounter a situation when the bird abundance is so high that it becomes impossible to count and enter individual birds in real time. In these situations, it is helpful to count birds in blocks (as groups of 10's for example).

During the entire seabird data collection (see SEABIRD DATA COLLECTION DESIGN), the data on sea/weather conditions and cetacean sightings are entered by another database recorder in the software Logger on a laptop computer. For each survey, Logger displays a set of tabbed forms (in our study customized in: *Survey Info form*, *Log form*, *Sighting form*, etc) that are cross-referenced by an index. Logger allows automatic collection and storage of GPS and other NMEA data as well as manual entry of behavioral information on cetaceans, photo-identification data (photo-identification is a technique used to identify individuals in a group), video data, etc. During a dolphin sighting, dolphins are observed for 5-min and data recorded and stored at the end of 5-min intervals when the countdown timer rings throughout the sighting; the first data collection for the *Sighting Form* starts at the end of the first 5-min of observation of a focal group of cetaceans and the

data is stored at the end of each 5-min sample (3). The same method is used for seabird data collection. The SBO enters all the seabird data during the chosen time interval (5-min sample) moving back and forth between the different pages, but the GPS position is stored only at the end of each time interval. At the end of a survey, the data from the hand-held PDA are archived by synchronizing the data with the PC computer via USB. This database is then cross-referenced by time and position in the lab to the LOGGER database. All data are stored in a Microsoft Access database.

Seabird Data Collection Design

The Los Angeles Dolphin Project Bird Database was created using the software CyberTracker 3.0 running on a Palm Tungsten E2 handheld with built-in Bluetooth wireless technology for GPS (the database sequence design is available at the Cybertracker website).

The database is comprised of a *Start Menu* screen and six main data entry screens. These are shown in a sequence on the upper part of each page 1-6 and called *Data 1-6* (Fig. 2). Each screen also displays icons on the bottom of the page that help in navigating between screens (*Show Next*, *Show Back*), viewing the GPS status (*Show GPS*), storing the GPS data at the end of an interval (*Show Major Target*), and viewing the recorded data to edit it in the field (*Show Options*; all *sightings/active sighting*).

The *Start Menu* displays four icons with text representing: *Researcher Name*, *Research Vessel*, *Observation Position* and *Begin Survey*. When all data are entered in the *Start Menu*, the seabird data collection begins at 5-min intervals by selecting *Begin Survey* and clicking on *Show Next* to enter the data acquisition phase of the program.

The *Data 1* screen displays the name of 17 different seabird groups (e.g., gulls, grebes, cormorants, etc) typically found in the study area followed by the number *000*; the SBO can enter the number of specific birds observed for each category throughout the 5-min interval up to *999*. There are also categories for *uncertain* and *other* species in case the SBO is

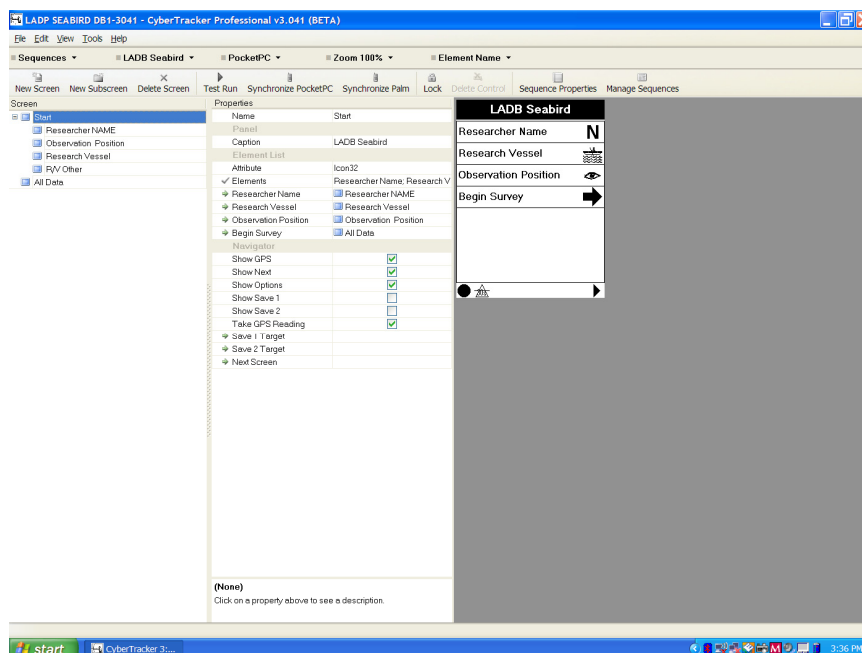


Figure 2: Example of screen for seabird data collection created in CyberTracker.

unable to determine the correct species or needs to write comments (e.g., sighting of a rare species of which the name is known, etc). Comments can be added at any time during the survey in *Data 6* by writing text that is recognized by the PDA. Screens *2 to 5* show a series of checklists where additional information may be entered: estimated distance from vessel to observed birds, age of observed birds (adults, non-adults, uncertain), bird behavior during survey with and without cetacean presence (e.g, passing by, steal fish, approaching cetaceans, etc), type of approach and separation between seabirds and cetacean schools and average distance between birds and cetaceans. During the 5-min interval, the SBO usually works in *Data 1* entering and updating the number of birds observed, but he/she can easily move back and forth between screens checking the appropriate categories and icons or changing the information as required. At the end of the 5-min interval, the SBO clicks on *Show Major Target* to store data and GPS and automatically returns to *Data 1*. At this point, *Data 1* is empty and ready for a new 5-min cycle. If *Researcher Name* or *Observation Position* changes any time during a survey, clicking on *Show Back* from *Data 1* will return to the *Start Menu*.

Authors' Remarks

The Los Angeles Dolphin Project database is not designed for complex data collection on seabirds and, for some of the data recorded, offers only broad-spectrum data estimates on seabirds recorded during a cetacean survey. It is recommended for users in need of general information on seabirds in a study area during cetacean surveys. The Los Angeles Dolphin Project Bird Database, however, can be easily modified.

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