

Short-term ranging patterns of bottlenose dolphins (*Tursiops truncatus*) in and around St. Joseph Bay, Florida

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Abstract:

In 1999 and 2004, bottlenose dolphins along the Florida panhandle experienced two unusual mortality events in which over 227 dolphins died. The majority of these strandings were located near St. Joseph Bay, but it is not known which stock(s) were impacted. This project represents the first effort to identify dolphin ranging patterns in this region. We used two methods to determine these patterns: photo-identification surveys and radio-tracking of individuals. Photo-identification surveys were undertaken during April – May 2004 and February – June 2005. Over 130 individuals have been identified, and over one-third of these have been identified in multiple seasons. In April 2005, NOAA sponsored a capture-release health assessment of dolphins in the region; nine individuals were tagged with VHF radio transmitters. These dolphins were monitored daily through boat, aerial, and/or vehicle tracking for over 50 days. Seven radio-tagged animals have been located more than 10 times with five being located more than 30 times. The tracking region covered by boat and/or truck included approximately 65 km of coastline. To ensure that tagged animals were not leaving this area, extended aerial tracking was conducted five times during May and June, ranging approximately 125 km to the east and to the west of St. Joseph Bay. Individual animal's known maximum distance from capture location ranged from 15–100 km. Two animals, which were not heard for 20 or more days, reappeared within 50 km of their capture locations, suggesting that these individuals had ranged greater than 100 km. In contrast, two animals had a typical daily ranging pattern of less than 10 km. These data, along with ongoing photo-identification surveys and biopsy dart sampling for genetic analyses will help in determining the movement patterns of bottlenose dolphins in the St. Joseph Bay region of the Florida panhandle, leading to improved definitions of stock designations.

Introduction:

Bradshaw and Bradshaw (2002) defined a utilization area (UA) as the region in which an individual conducts its normal activities (resting, foraging, predator avoidance, etc.) during the course of a study period. Radio tracking of individuals can be used to define utilization areas as well as range overlap between individuals. The intent of this study was to radio track bottlenose dolphins near St. Joseph Bay to determine their utilization areas and range overlap. This research is a first step towards determining the distributions of individual dolphins within the geographic region of the 1999 and 2004 unusual mortality events.

Methods:

Bottlenose dolphins in and around St. Joseph Bay, Florida (Fig. 1a) were temporarily captured and restrained using practices similar to those implemented by the Sarasota Dolphin Research Program (Wells et al., 2004). A VHF radio transmitter (MM130, Backmount Transmitter, Advanced Telemetry Systems, Inc., Isanti, MN), mounted in a modified bullet tag, was attached to the dorsal fin of individual bottlenose dolphins, using a 1/4" threaded Delrin pin with non-stainless steel nuts on each side of the dorsal fin (Fig. 2). The VHF transmitters were tested prior to the health monitoring event and at sea level had a range of approximately 7–8 km. Transmitter range from aircraft was estimated to be over 15 km. Radio tracking surveys were conducted every day from April 18 – May 25, with the goal of locating each tagged animal every day. During June and July, radio tracking surveys were performed 3–4 times per week. The primary tracking platform was a 7 m long center-console vessel. Vessel tracking coverage was approximately 90 km of coastline per day (Fig. 1b). When weather conditions were too poor to track by vessel, animal locations were triangulated from a land-based vehicle. Vehicle tracking coverage was approximately 120 km of coastline per day (Fig. 1c). To ascertain if individual animals were leaving the area covered by boat or vehicle, aerial surveys were flown six times over the tracking period in a Cessna O-2A "Skymaster" fixed with two, strut mounted 'H' antennas. To cover the estuarine and coastal waters, the aircraft stayed approximately 2 km offshore of the coastline. Aerial tracking coverage was approximately 260 km of coastline per day (Fig. 1d).

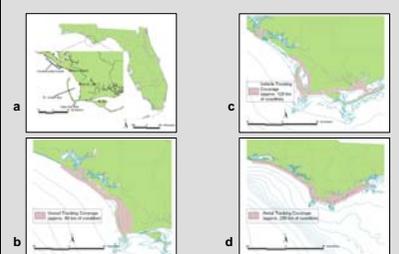


Figure 1: (a) Dolphins were captured at locations between Cape San Blas and Crooked Island Sound, including St. Joseph Bay. Geographic coverage by (b) vessel, (c) vehicle, and (d) aerial tracking.



Figure 2: Dorsal fin with radio transmitter.

Results:

Nine individual dolphins, six females and three males, were radio tagged between April 18 - 28. Minimum transmission durations of individual tags ranged from 14 to 96 days (Table 1). A dolphin's utilization area was estimated by measuring the distance of shoreline within its farthest east and west location, and multiplying that distance by the maximum distance the dolphin was located offshore. Individual utilization areas ranged from 76 to 384 km² (Table 1). Two dolphins (X09 and X13) were not detected for 20 or more days within the vessel and vehicle survey area, but were discovered within 50 km of their capture locations during aerial surveys. In contrast, two animals (X01 and X02) had a typical daily ranging pattern of less than 10 km. Each dolphin's range overlapped that of at least three other tagged dolphins and one individual's (X11) range overlapped those of seven other dolphins (Fig. 3). In the most extreme case, X01 and X02 had almost identical utilization areas (Fig. 3 and 4). Partially overlapping utilization areas were also observed between dolphins (e.g. X04 and X05) (Fig. 3 and 4). Some dolphins though, had ranges that did not overlap (e.g. X09 and X13) despite their proximity within the study area (Fig. 3 and 4).

ID	Sex	Age	Radio Tagging Date	Date of Last Radio Signal	Min. # days transmitting	Estimated utilization area (km ²)	Max. distance sighted from capture location (km)
X01	F	18	18-Apr-05	7-Jun-05	53	76	19
X02	M	32	18-Apr-05	27-Jun-05	73	84	21
X04	M	29	19-Apr-05	8-Jul-05	83	112	24
X03	F	9	20-Apr-05	3-May-05	14	160	25
X05	F	31	20-Apr-05	17-Jul-05	91	184	27
X08	M	24	25-Apr-05	25-Jul-05	94	228	51
X09	F	-	25-Apr-05	5-Jul-05	74	384	96
X11	F	24	28-Apr-05	18-May-05	21	200	32
X13	F	9	28-Apr-05	5-Jul-05	69	268	67

Table 1: Summary of 2005 data from radio tagged bottlenose dolphins in and around St. Joseph Bay.

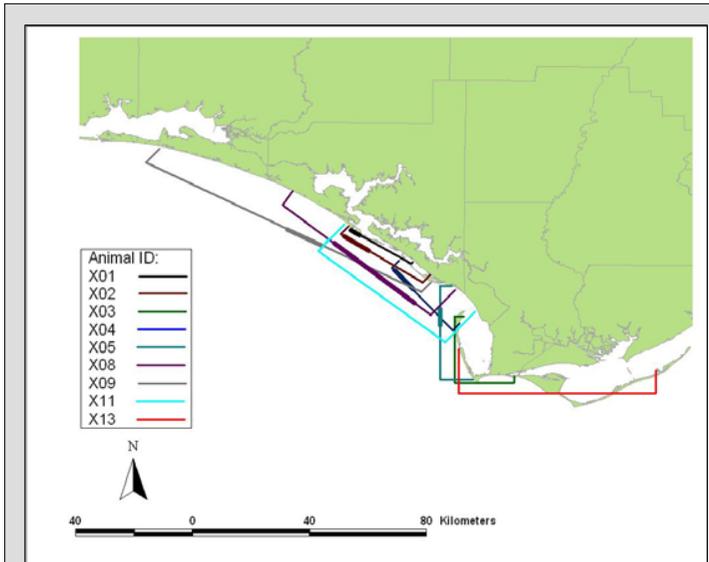


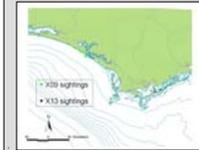
Figure 3: Utilization areas of individually tagged dolphins. All individuals were observed in bays, sounds, or within 4 km of coastline. For individuals with >20 sightings, thicker sections of lines indicate areas that contain 50% or more of their sightings.



Overlapping utilization areas



Partially overlapping utilization areas



Non-overlapping utilization areas

Figure 4: Examples of differing patterns of overlap between individual utilization areas during the study period.

Conclusions:

- Each bottlenose dolphin had a distinct utilization area, which varied in size from 76 to 384 km². Most dolphins were routinely located within the 120 km study area defined by vessel and vehicle tracking. The utilization areas of each of these dolphins overlapped with those of at least three other individuals.
- Two individuals, X09 and X13, were not located routinely within the 120 km study area, but were located by aerial tracking approximately 50 km from their capture location. Their behavior suggests a different use pattern for this area, venturing farther along the coast or possibly seaward.
- These combined results suggest that the St. Joseph Bay region may represent an area of overlap between adjacent groups of dolphins along the Florida panhandle.
- The duration of radio tracking was insufficient to identify seasonal or longer-term patterns. Photographic identification and genetic analyses, as well as planned subsequent radio tracking should help to elucidate these patterns.
- This research is the first step towards identifying individual dolphin's distribution along the Florida panhandle. These results, although preliminary, suggest that the 1999 and 2004 unusual mortality events may have impacted multiple stocks of dolphins along the Florida panhandle, and/or that dolphins originating in regions to the east and west may now be utilizing habitat vacated by dolphins that died during the UME. Identifying dolphin community structure throughout the Florida panhandle remains an important focus of future research.

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References: Bradshaw, S. D. and F. J. Bradshaw. 2002. Short-term movements and habitat use of the marulipal honey possum (*Tarsipes rostratus*). *Journal of Zoology* London, 258: 343-348.