Begging behavior by the common bottlenose dolphin (Tursiops truncatus) near Savannah, Georgia: prevalence, spatial distribution, and social structure

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Abstract

Illegal feeding of cetaceans, especially the common bottlenose dolphin (Tursiops truncatus), has led to begging behavior in many areas worldwide. This behavior involves risks to both humans and dolphins that could lead to injury, illness, or even death. In addition, anthropogenic food sources can lead to changes in social structure within a population. The purpose of this study was to quantify begging behavior, examine spatial variables that may influence the distribution of begging, and examine the social structure of dolphins with respect to begging in the waters around Savannah, Georgia, USA. Surveys were conducted throughout inshore waters in summer 2009 and 2010. We observed begging on 44% of survey days and in 14% of sightings. A multivariate linear analysis (Mantel test) indicated that beg sightings per km were significantly related to sightings per km (\(p = 0.889, p = 0.001\)), mean dolphin group size (\(p = 0.182, p = 0.047\)), path distance to fishing piers (\(p = 0.087, p = 0.038\)), and space (\(p = 0.057, p = 0.037\)); however, all other variables (e.g., boat densities and distance to shrimp docks, dolphin tour docks, marinas, and boat ramps) were not significantly correlated to beg sightings per km. Social analyses indicated a well-differentiated society; however, there was no clear division between begging and non-begging individuals. Community division by modularity resulted in 5 social clusters, 4 of which contained both beggars and non-beggars. Begging dolphins were mixed throughout the social network, indicating a potential risk of further spread of the behavior through social learning. When compared to other areas with illegal feeding issues, Savannah had the highest rates of begging behavior. The exceptionally high rate and wide spatial and social distribution indicate begging could cause significant problems for the animals near Savannah. In addition, there was no correlation between human usage areas and begging locations; rather, where there were dolphins, there was begging. Finally, in contrast to other locations worldwide, there was no social segregation related to these human-dolphin interactions.

Introduction

In other study areas worldwide:

**Prevalence**

- Rates of human-dolphin interactions vary between 3-26% (Finn et al., 2000; Powell and Wells, 2011)

**Spatial Distribution**

- Spatial distribution of human-interaction behaviors are often associated with human usage areas such as boat ramps (Samuels and Bejder, 2004), fishing piers and bridges (Powell and Wells, 2011), slow speed zones (Cunningham-Smith et al., 2009).
- Human-interactions are often confined to small areas
  - Panama City, FL - interaction area < 3.4 km² (Samuels and Bejder, 2004)
  - Sarasota, FL - 6.8 km stretch of ICW (Cunningham-Smith et al., 2009)

**Social Structure**

- Segregation based on human-interactions (i.e., shrimp trawlers; Chivers and Corkeron, 2001)

Objectives

- Assess the prevalence of begging behavior by bottlenose dolphins in Savannah, Georgia.
- Examine spatial variables that may influence begging behavior by bottlenose dolphins in Savannah, Georgia.
- Examine the social structure of bottlenose dolphins in Savannah, Georgia with respect to begging.

Methods

Surveys along set transects

- April through August 2009 and 2010
- All boats passed were recorded
- Detailed sighting data recorded for each group of dolphins encountered

**Prevalence of Begging**

- Percent of days with begging observed
- Percent of sightings with begging observed

**Social Analysis**

- Conducted in SocProg 2.4 Compiled
- All non-call individuals with 6 or more sightings were included in analysis

**Spatial Analysis**

- 1 km grid cells
- Standardized by total distance on effort in each grid cell
- Partial Mantel test

Results

**Prevalence**

- Savannah, GA: Sarasota, Panama, Cookburn

<table>
<thead>
<tr>
<th></th>
<th>Savannah, GA</th>
<th>Sarasota, FL</th>
<th>Panama City, FL</th>
<th>Cookburn City, FL</th>
<th>Sound, Australia</th>
</tr>
</thead>
<tbody>
<tr>
<td>% Days</td>
<td>64%</td>
<td>26%</td>
<td>13%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>% Sightings</td>
<td>22%</td>
<td>4%</td>
<td>14%</td>
<td></td>
<td>16%</td>
</tr>
<tr>
<td>Individuals</td>
<td>59</td>
<td>24</td>
<td>14</td>
<td></td>
<td></td>
</tr>
<tr>
<td>% Catalog</td>
<td>20%</td>
<td>14%</td>
<td>16%</td>
<td></td>
<td></td>
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<tr>
<td>Area (km²)</td>
<td>230</td>
<td>3.4</td>
<td></td>
<td></td>
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<tr>
<td>Distance (km)</td>
<td>84</td>
<td>6.8</td>
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</tr>
</tbody>
</table>

(Samuels and Bejder, 2004; Finn et al., 2000; Powell and Wells, 2011)

**Spatial Distribution**

- Dolphins and boats were both distributed throughout the entire study area. Both were found in lower densities in the Wassaw National Wildlife Refuge (red box).

**Social Structure**

- The Savannah catalog contains 108 individuals with ≥ 6 sightings each: 42 (39%) confirmed beggars, 55 (51%) confirmed non-beggars, and 11 (10%) unassigned individuals.
- There was structure found within the Savannah dolphin catalog.
- Estimate of “Social Differentiation” = 0.89
- Community division by modularity identified 5 Social Clusters with a modularity of 0.303.
- 4 of the social clusters (22-27 dolphins each) contained both confirmed beggars and confirmed non-beggars.
- 1 social cluster contained only 2 dolphins, both of which were confirmed beggars.
- See poster by C. Kovacs (58-12) for additional information about these social clusters and shrimp trawler interactions.

Conclusions

**Prevalence**

- Begging was found at a rate in Savannah several times higher than any other known area worldwide. By all metrics (% days, % sightings, % catalog, area, and distance) the Savannah area has the worst begging problem in the world.

**Spatial Distribution**

- Begging was found over a wide spatial scale and the strongest spatial trend found was with dolphin sightings per km.
- There was little correlation between begging and human usage areas or boat traffic. This was surprising since the distribution of human-interaction behaviors elsewhere has been shown to be related to areas of high human use.

**Social Structure**

- Although there was social differentiation detected, beggars and non-beggars were found together in 4 of the 5 social clusters.
- Social structure was NOT influenced by begging.
- Instead, social structure may be influenced by spatial use of individual dolphins or associations with shrimp trawlers (see poster by C. Kovacs, 58-12).
- The high rate and wide distribution of begging behavior could indicate a high risk of injury or death and reduced reproductive success for the Savannah dolphins.

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Literature Cited