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OBSERVATIONS ON THE OCCURRENCE AND DISTRIBUTION OF BOTTLENOSE DOLPHINS (*TURSIOPS TRUNCATUS*) IN UPPER GALVESTON BAY

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Preliminary Findings

Background

Galveston Bay (GB) is the largest estuary in Texas, rests adjacent to the nation's energy capital, and is located in the most populated region of the state. The Houston Ship Channel (HSC) divides GB and is an avenue for heavy maritime traffic ending at the Port of Houston in the northwest. Consequently, GB has suffered degraded water quality due to anthropogenic influences. Current concerns include heavy metals, chlorinated organic compounds, and pathogenic bacteria, making GB a high priority for biological monitoring. Historically, common bottlenose dolphins (*Tursiops truncatus*) have been documented in lower GB, the Galveston Ship Channel and Bolivar Roads. Surveys conducted in the 1990's suggested limited dolphin activity in upper GB. Until recently, no other surveys have been conducted in this region. Based on these previous studies and current observations, dolphins likely forage frequently in the HSC, the region most concentrated by toxic pollutants. Determining the foraging ecology of these understudied dolphins is crucial to understanding their life history and assessing potential risks to the population.

Objectives

- Estimate dolphin distribution, relative abundance, site fidelity, and human interactions in upper GB
- Establish a long-term monitoring plan for the region

Methods

- Boat-based photo identification (photo-id) surveys followed meandering routes conducted in upper GB & HSC (Fig. 1) using standardized protocols
- Photos analyzed following standardized methods & archived in FinBase
- Two seasons defined based on environmental conditions:
  - Summer-Fall (SF): June- October
  - Winter-Spring (WS): November- May
- Relative abundance= # of dolphins sighted (d) per kilometer (km) surveyed

Preliminary Results

- 13 surveys conducted from Mar. 2013 – Dec. 2014 covered 577 km, resulting in 54 group sightings containing 361 dolphins (Table 1)
- Identified 160 distinct individuals some with 2 or more sightings (n = 51)
- Dolphins sighted year round, however concentrations of dolphins sighted were higher in SF (p=0.021, Mann-Whitney *U*=31, one-tailed)
- Group size ranged from 1-31, with larger groups sighted during SF
- No significant difference in group size between season (p=0.055, Mann-Whitney *U*=376, one-tailed)
- 30% of groups sighted were patrolling around shrimp boats, 24% were bow-riding on a vessel (Fig. 2)

Discussion

- Preliminary data suggests that dolphins regularly utilize the upper GB with a seasonal variation in abundance of dolphins in upper GB peaking in SF
- Dolphins often associate with vessels in upper GB & the HSC

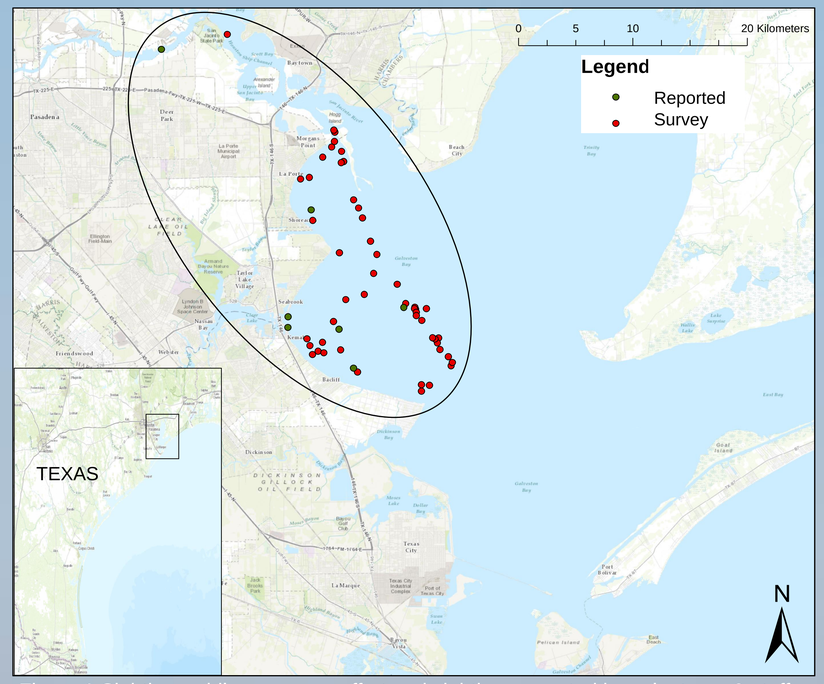

Figure 1 Sightings while on survey effort and sightings reported by volunteers & staff from March 2013 – December 2014 in survey area

Date	Survey Dist.* (km)	Total # of Sightings	Total # of Dolphins	Total # of Calves	Total # of Young of Year
27-Mar-2013	0	3	21	1	0
28-Aug-2013	76	10	39	2	0
14-Feb-2014	24	3	6	0	0
24-Mar-2014	65	1	1	0	0
10-Apr-2014	13	1	4	2	1
16-May-2014	56	2	7	1	0
4-Jun-2014	32	4	87	18	5
2-Jul-2014	44	10	73	11	1
11-Aug-2014	66	4	5	0	0
15-Oct-2014	70	2	9	2	0
23-Oct-2014	28	9	96	15	1
20-Nov-2014	66	2	4	1	0
4-Dec-2014	37	3	9	3	0
TOTAL	577	54	361	56	8

Table 1 Summary of surveys conducted Mar. 2013- Dec. 2014. Row color represents season based on environmental conditions (white = WS; green = SF).

*Survey Distance = Total # km surveyed while on effort under good or excellent sighting conditions

Future Research

Objectives

- Estimate habitats used for foraging in the GB ecosystem
- Estimate proportions of different prey consumed by dolphins
- Delineate year-round residents & seasonal transients

Figure 2 Left: example of boat-based photo-id survey near shrimp boat; Right: example of dolphin patrolling shrimp boat.

Methods

- Conduct 10 photo-id surveys & 6 remote biopsy surveys per month from June 2015 – May 2016 following standardized protocols
- Compare $\delta^{13}C$ & $\delta^{15}N$ values to different sub-bays in GB using stable isotope analysis (SIA)
- Use previous published data on prey items & Bayesian mixing models ($\delta^{13}C$, $\delta^{15}N$) to estimate proportions of prey consumed
- Pair photo-id survey data and SIA results to estimate foraging areas & seasonal occurrences of individuals

Expected Results

- Dolphins with ↓ $\delta^{13}C$ likely foraging in upper GB or Trinity Bay
- Dolphins with ↑ $\delta^{13}C$ likely foraging in lower GB, or East/West Bay
- $\delta^{15}N$ will vary depending on trophic levels consumed & location
- Transients will have depleted $\delta^{13}C$ & enriched $\delta^{15}N$
- Estimate proportions of prey consumed using Bayesian models
- Photo-id survey data & SIA will reveal evidence of site fidelity

Discussion

As apex predators, bottlenose dolphins act as sentinels for the overall health of the GB ecosystem. My proposed research will contribute to basic life history knowledge of the GB population and identify key foraging habitats. My data will also be useful for future management plans by providing insight to prey selection and documenting bioaccumulated contaminants for ecosystem modeling.

Part of the Texas Bottlenose Dolphin Research Collaborative

A cooperative network of scientists & institutions facilitating the creation of a long-term monitoring program with goals to provide population distribution & abundance estimates, identify natural & human-generated risks and establish baseline health parameters for Texas bay, sound, estuary & near-coastal bottlenose dolphins.

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