

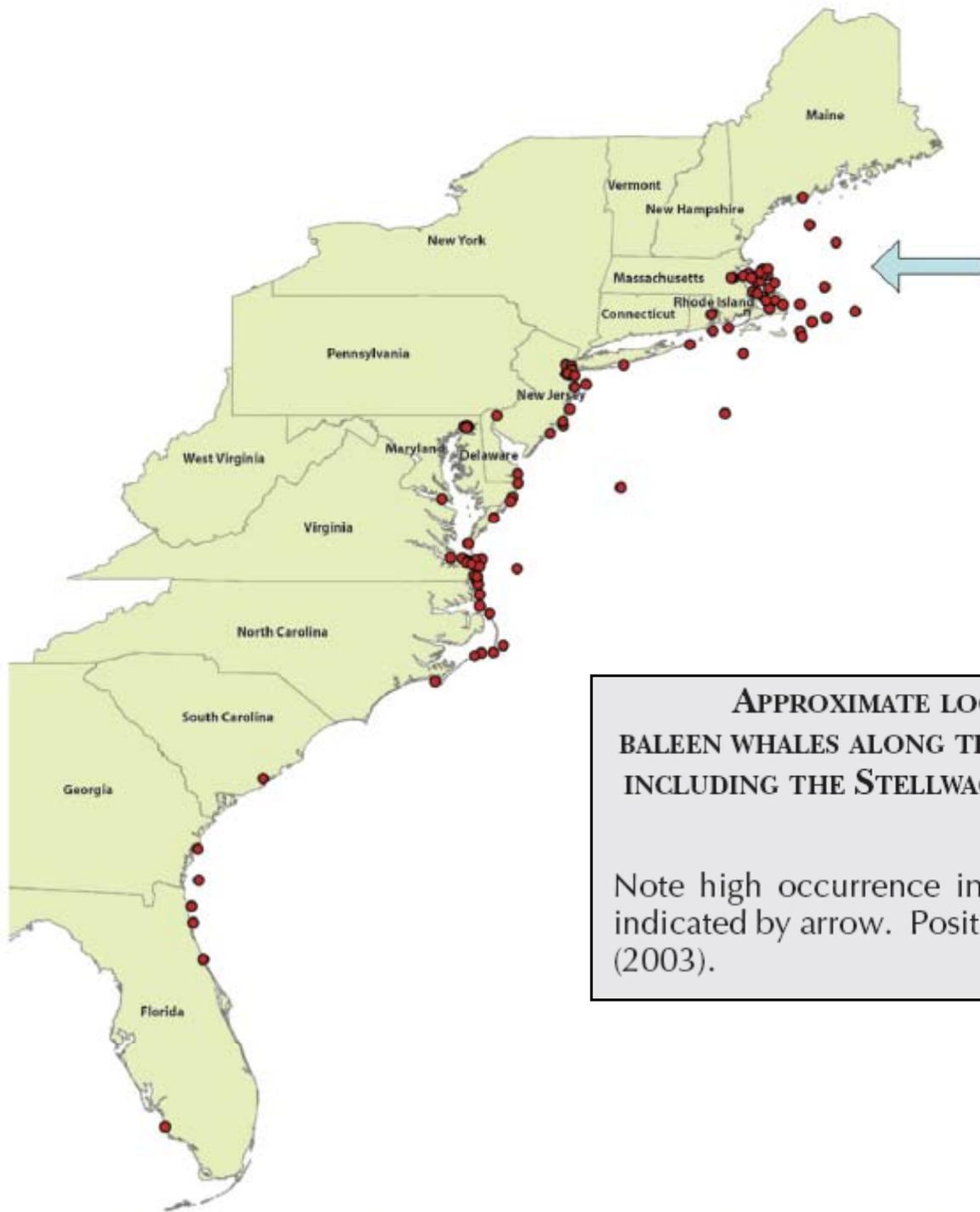
# Right whale AIS Project (RAP)

## Acoustic Detections in the Boston Approaches



**Center for Coastal and Ocean Mapping**  
**NOAA/UNH Joint Hydrographic Center**

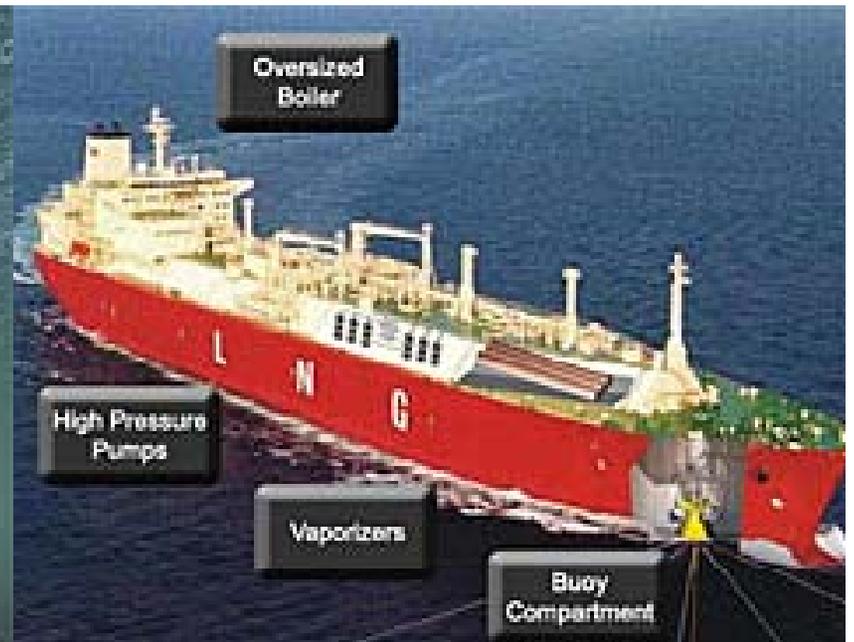
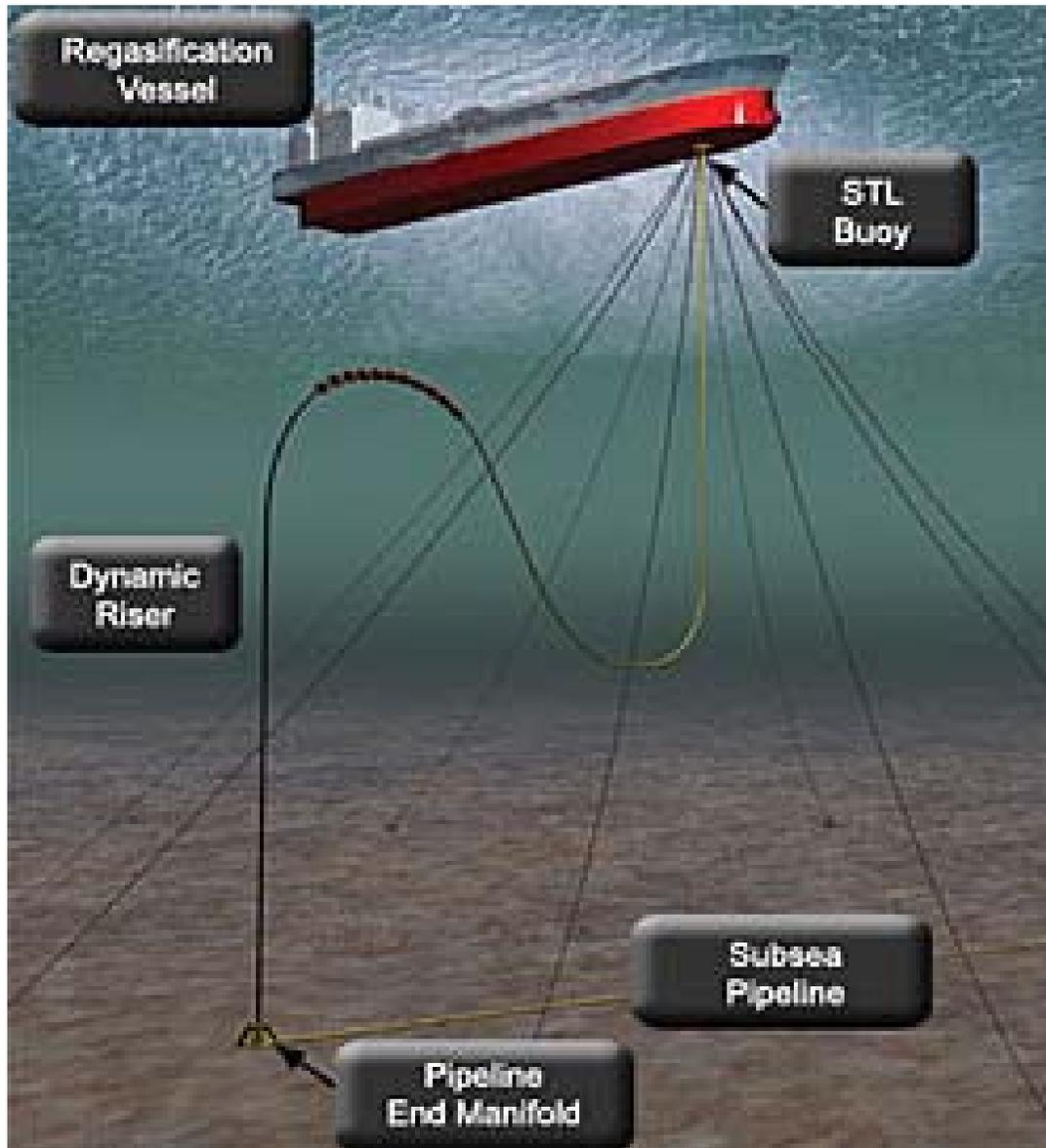
Andy Armstrong  
18 Nov 2008



**APPROXIMATE LOCATION OF SHIP STRIKES TO  
BALEEN WHALES ALONG THE EASTERN SEABOARD OF THE U.S.  
INCLUDING THE STELLWAGEN BANK SANCTUARY FROM 1979-  
2002.**

Note high occurrence in and around the sanctuary where indicated by arrow. Positions inferred from Jensen and Silber (2003).

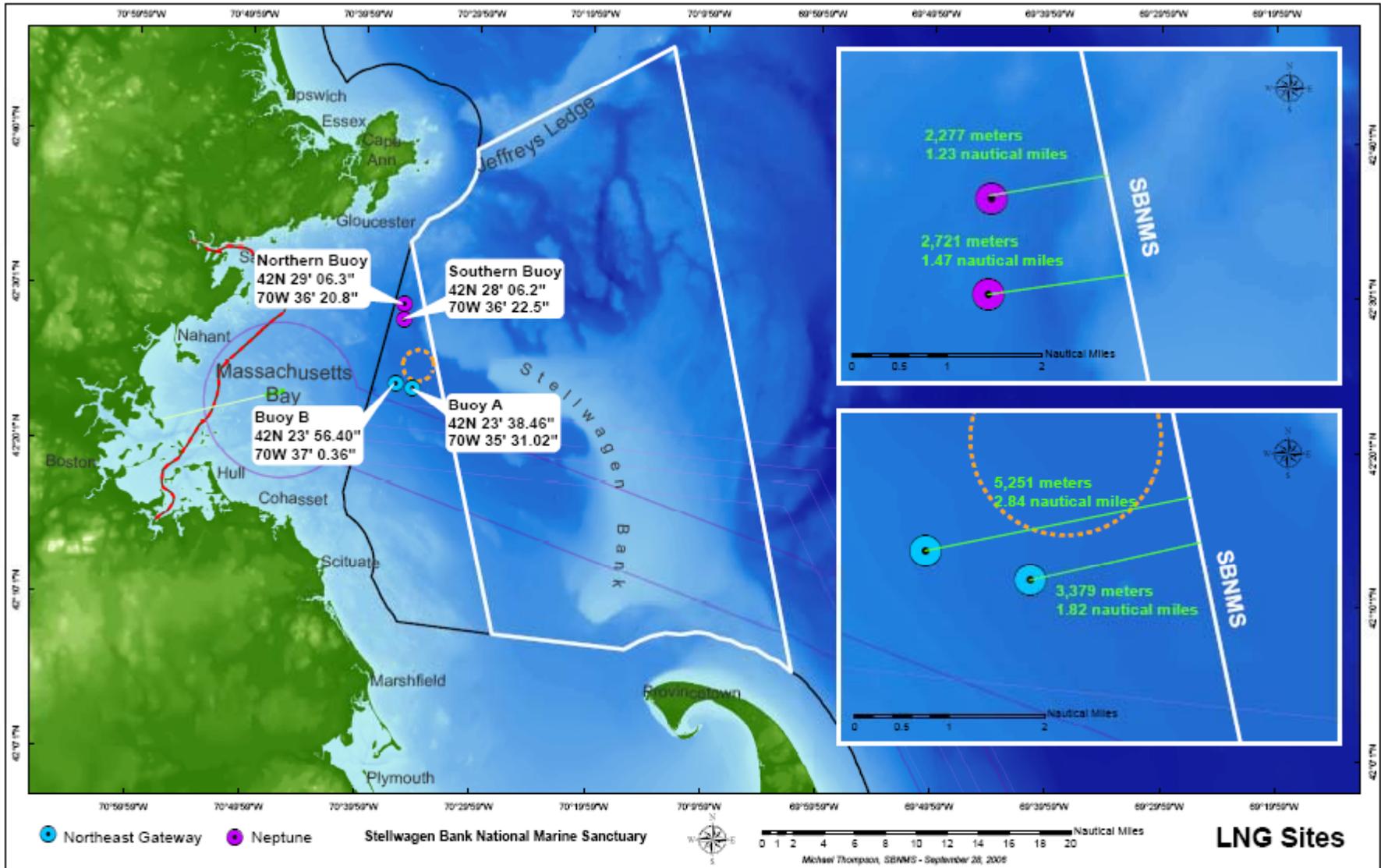
# Liquefied Natural Gas (LNG) Deepwater Ports in Massachusetts Bay



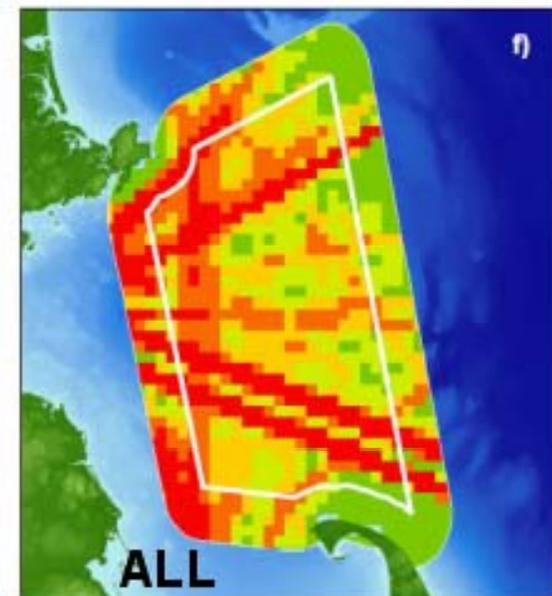
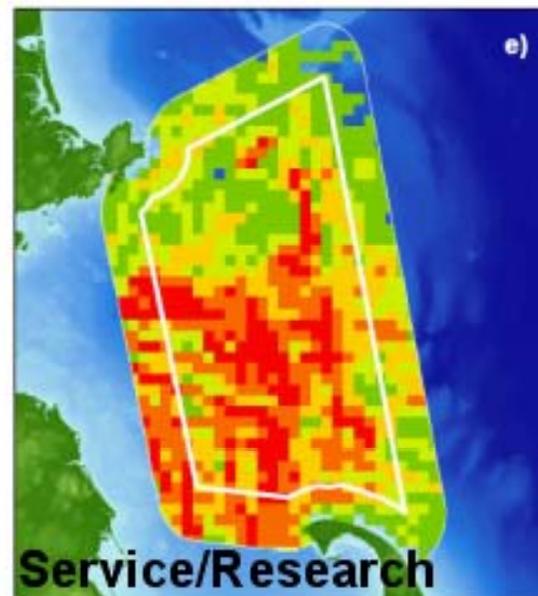
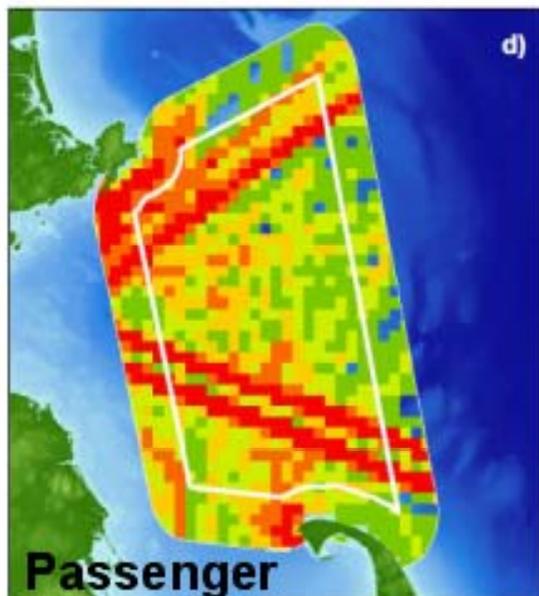
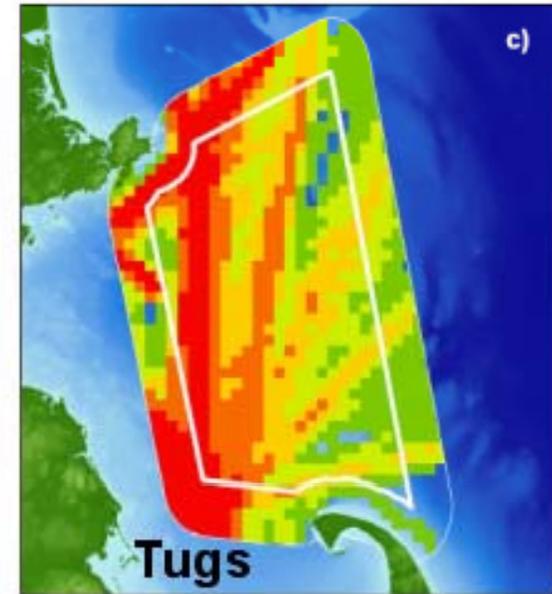
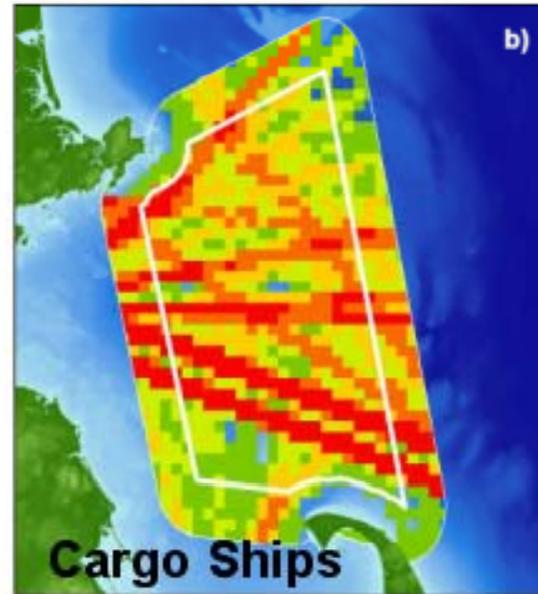
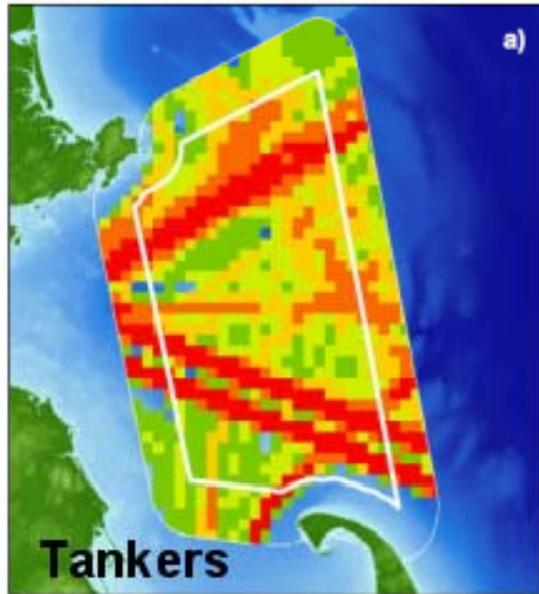


# GERRY E. STUDDS STELLWAGEN BANK NATIONAL MARINE SANCTUARY

## Construction and Operation of Deepwater Ports for LNG

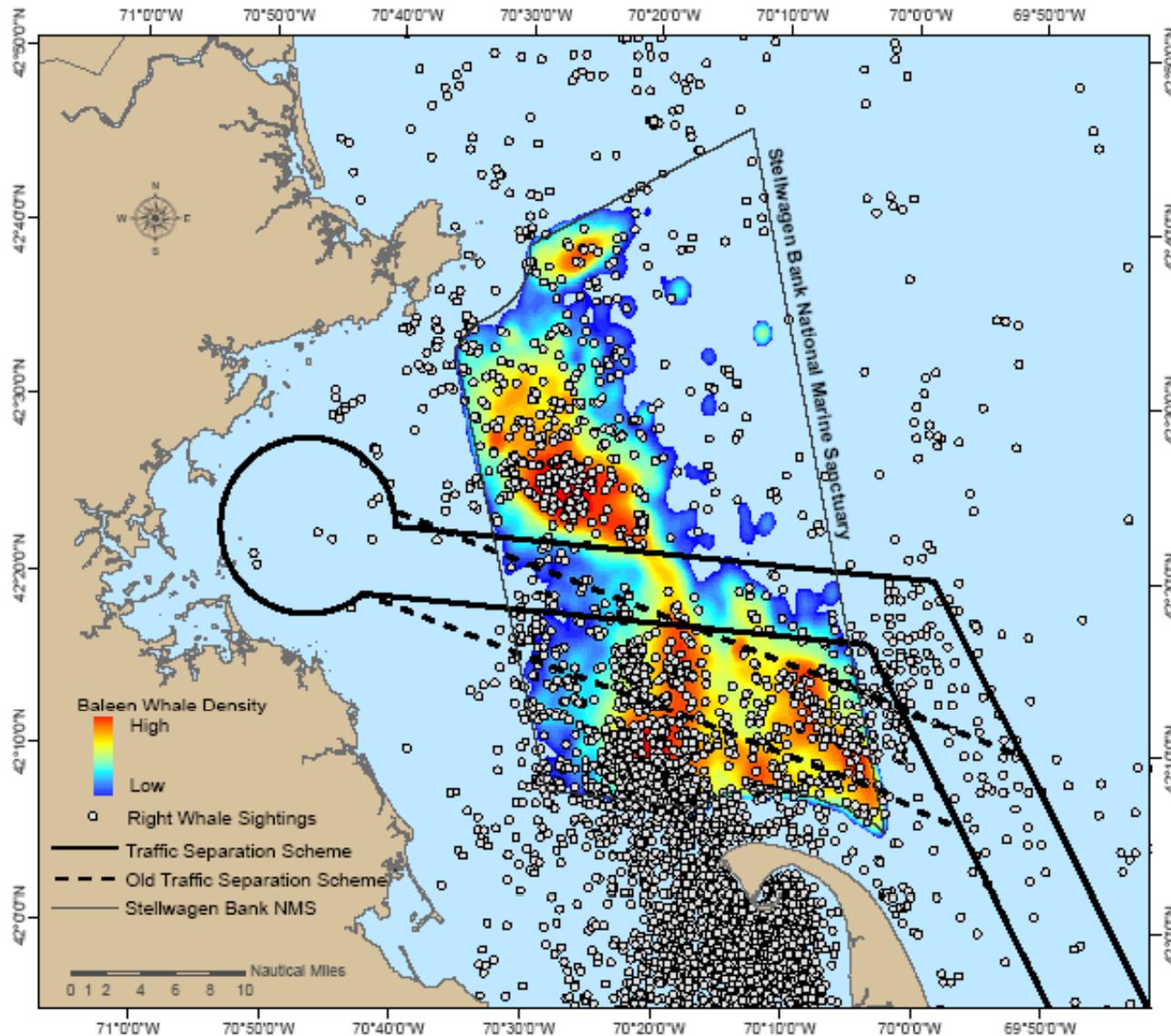


# Vessel Types are Distributed Differently in Space





# GERRY E. STUDDS STELLWAGEN BANK NATIONAL MARINE SANCTUARY



## Original TSS

Humpback 41,742  
Right 402  
Fin 9,365  
Minke 10,233

Total =

**61,742**

## Revised TSS

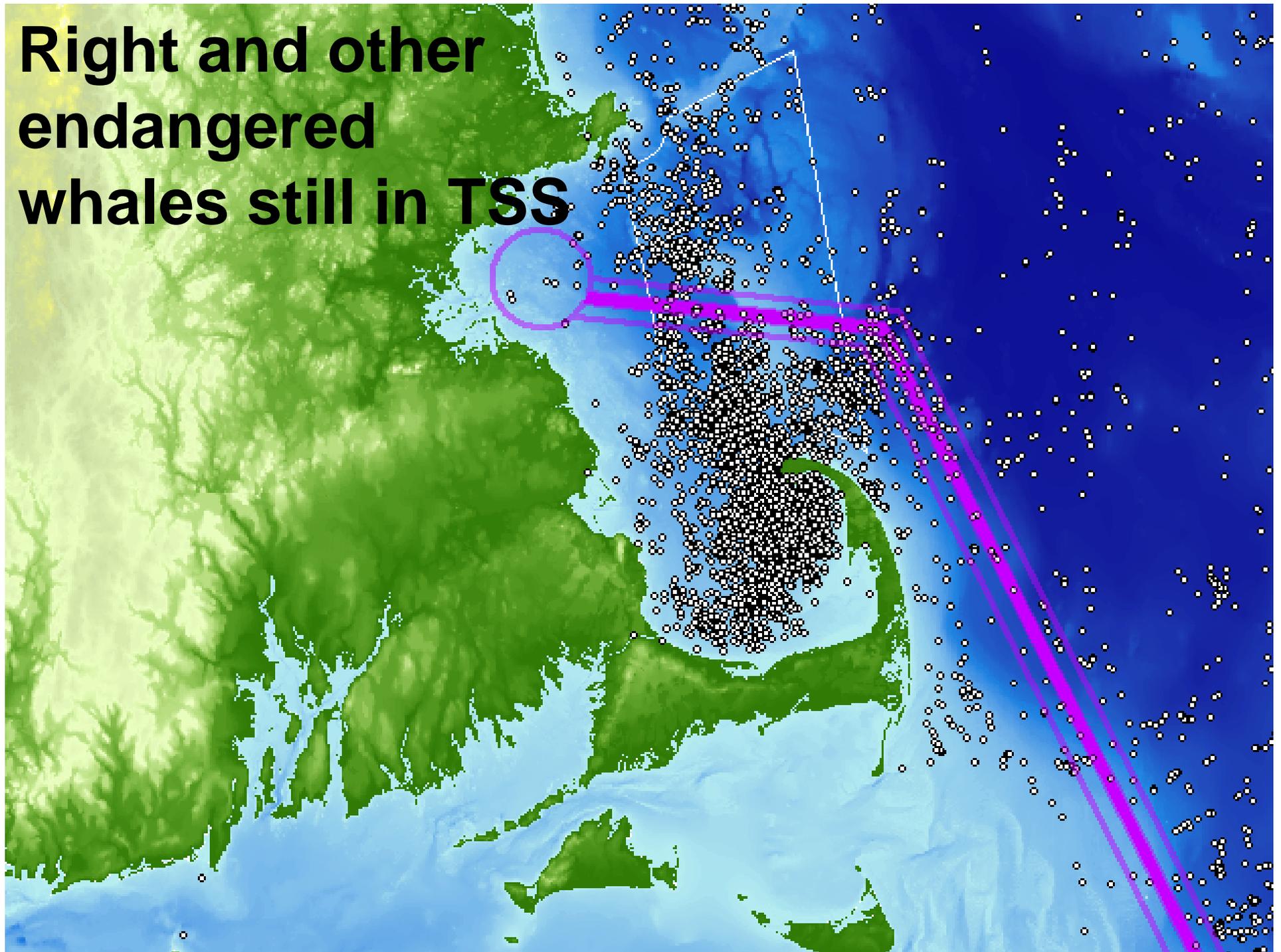
Humpback 7,864  
Right 71  
Fin 2,286  
Minke 1,701

Total =

**11,922**

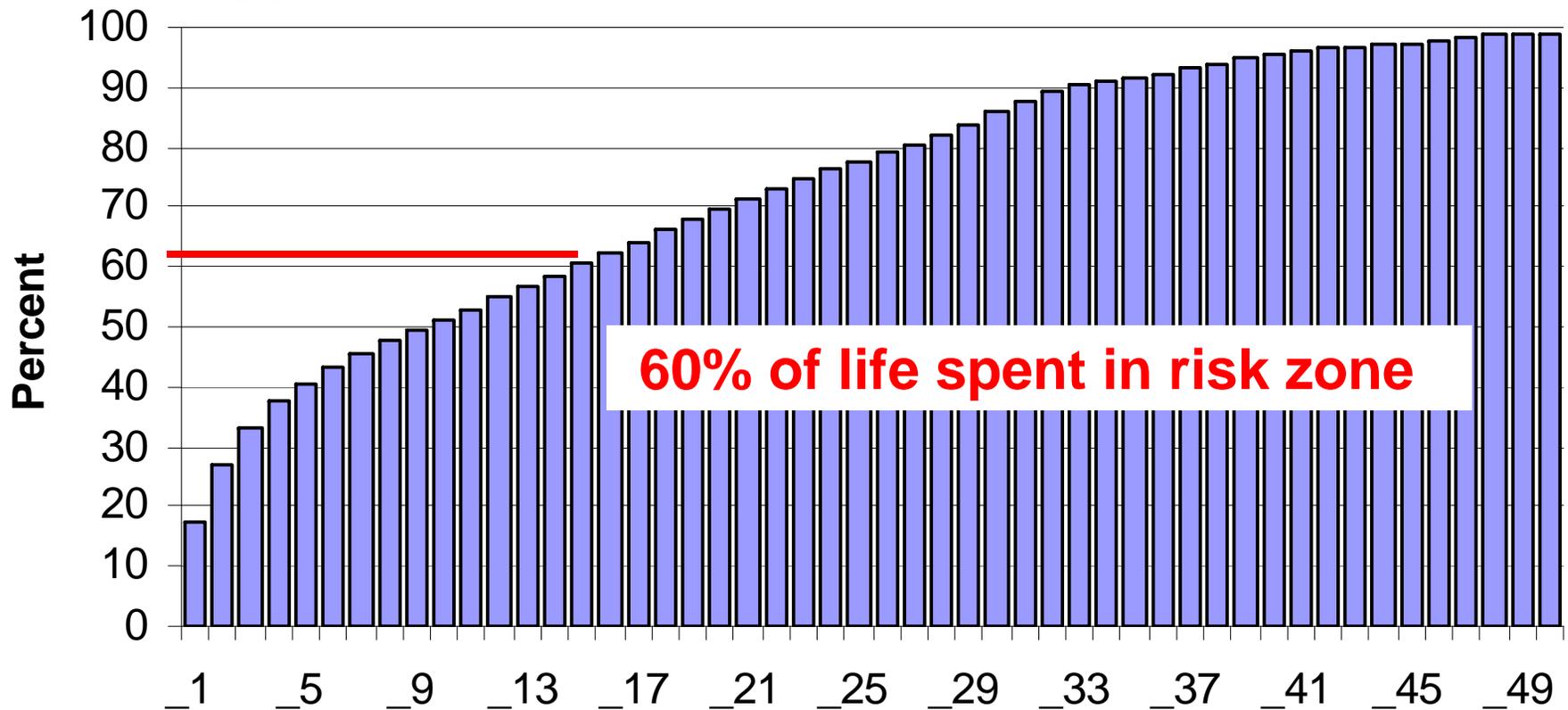
( 81% reduction in risk)

# Right and other endangered whales still in TSS





### Cumulative Time at Depth (05-08) Humpback whales



38 Animals; 231.30 hours

Depth

# Using Auto-Buoys to Detect Whale Calls in the Boston TSS

## Partners:

Northeast Gateway & Suez Energy; Cornell University, UNH CCOM, ICAN, IFAW National Park Service, National Marine Fisheries Service, Stellwagen Bank NMS, United States Coast Guard, Woods Hole Oceanographic Institution



## Leads:

NOAA/NMS – David Wiley  
Cornell – Chris Clark  
CCOM/JHC – Kurt Schwehr

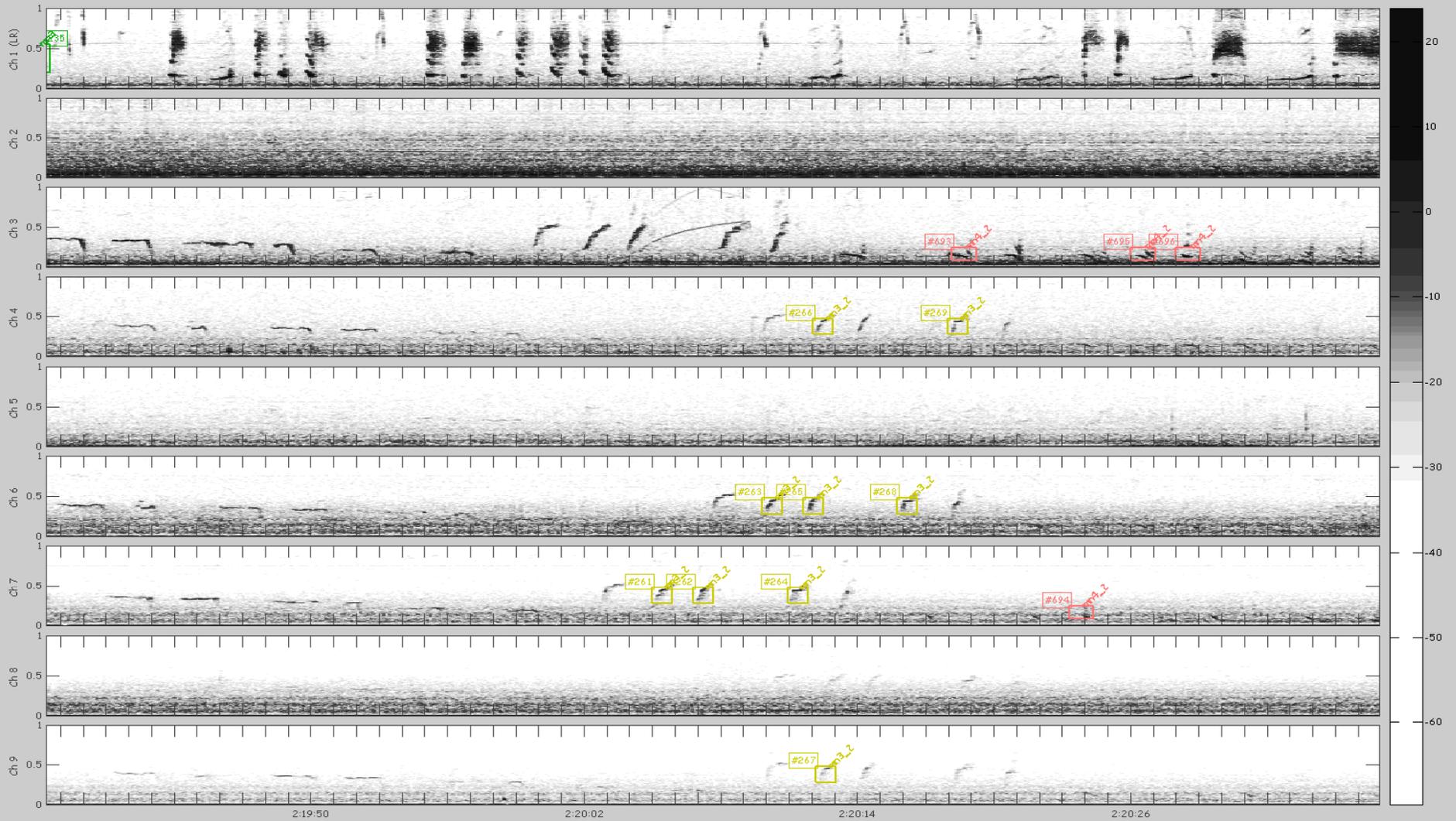
# Auto-Buoys

- **Moored buoys**
- **Hydrophones to detect whale calls**
- **Computer software to identify right whale call**
- **Satellite transmitter to immediately send data to land base for confirmation & communication**



XBAT Sound - 20070415

File Edit View Sound Filter Feature Detect Log Annotate Measure Window Help EXT SVN



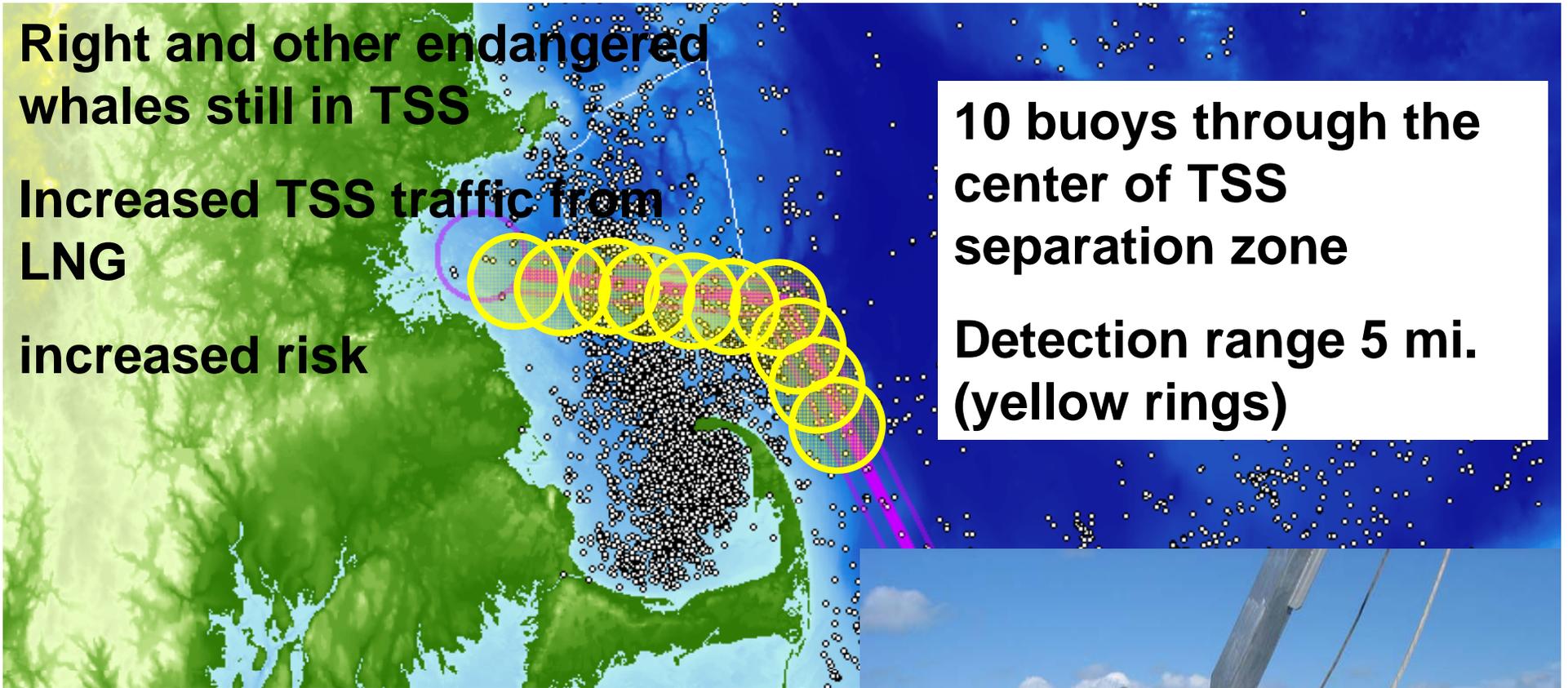
**Right and other endangered whales still in TSS**

**Increased TSS traffic from LNG**

**increased risk**

**10 buoys through the center of TSS separation zone**

**Detection range 5 mi. (yellow rings)**



**Ship Strike Mitigation for LNG Terminal -**

**CG required construction and operation of real-time acoustic detection buoys in TSS to notify LNGs of presence of endangered whales**





- 1) Buoys detect a specific right whale call and send detection to land center (Cornell University)
- 2) LNG ship is called



# Right Whale Listening Network

Bioacoustics Research Program

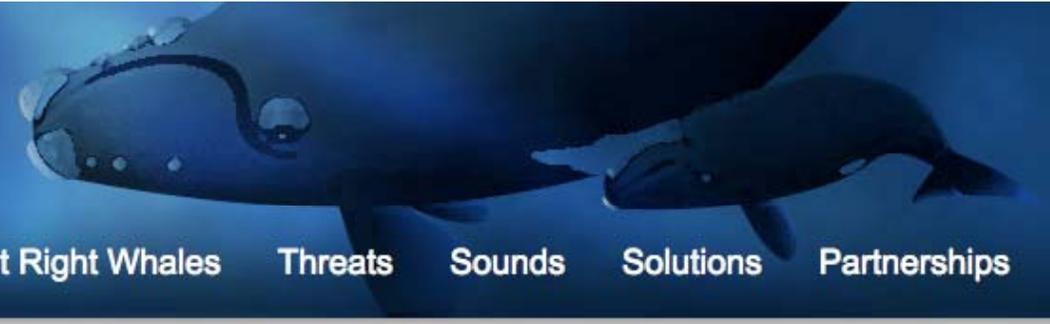
About Right Whales

Threats

Sounds

Solutions

Partnerships



Learn about the five-step detection process:

1. Detect

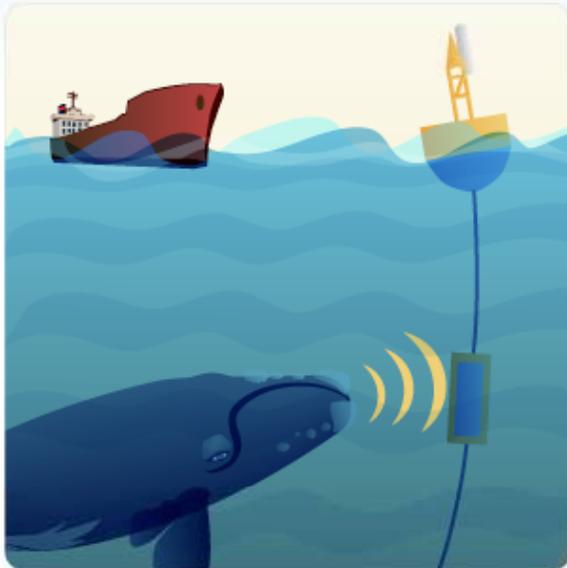
2. Transmit

3. Analyze

4. Notify

5. Avoid

## Whale in the shipping lanes!



A whale is swimming near the shipping lanes, occasionally making "up-calls" to stay in touch with other whales in the area. Captains of large, fast-moving ships often can't see them in time to avoid collisions.

New auto-detection buoys installed in some shipping lanes monitor the water for right whale calls 24 hours per day. Calls from whales within 5 nautical miles are loud enough to be recorded on the buoy's hydrophone, mounted 60 to 120 feet beneath the surface.

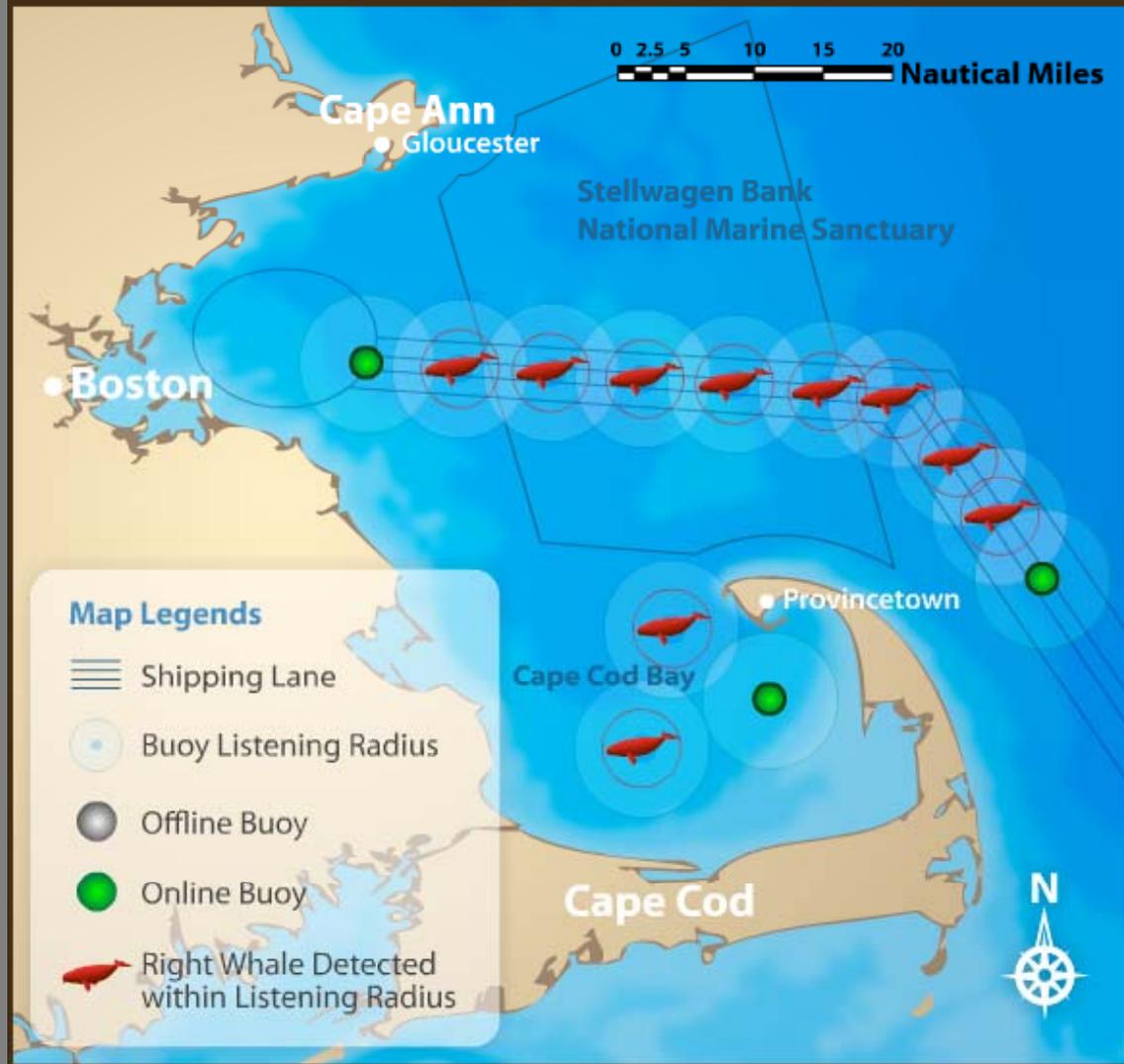
Listen to a right whale's up-call:



[Step 2 > Transmit the data back to Cornell](#)

# Web based notifications <http://listenforwhales.org>

227 Right Whale Calls Detected Within 24 Hours.



# Data included in Right Whale Alert Sent by NMFS



## Right Whale Alert



TO: Brenda/Misty Rone/Nelson  
NEFSC/PSB

DATE: 05/05/05

NEW SIGHTINGS:

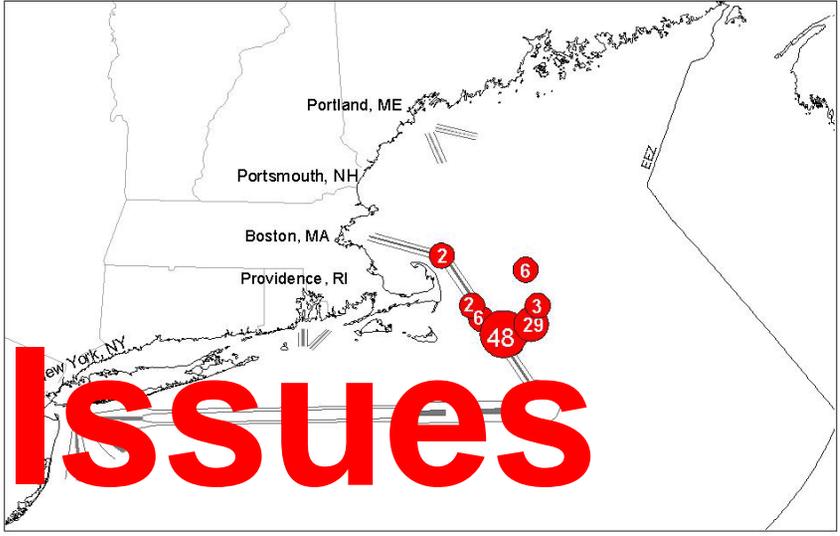
- 2 in the vicinity of the Boston shipping lanes in an 8 nm radius around position 42-09N 069-55W
- 2 in the vicinity of the Boston shipping lanes in an 8 nm radius around position 41-37N 069-36W
- 3 in an 8 nm radius around position 41-37N 068-54W

PERSISTENT AGGREGATIONS:

- 6 in an 8 nm radius around position 42-00N 069-02W
- 29 in the vicinity of the Boston shipping lanes in an 11 nm radius around position 41-29N 068-58W
- 48 in the vicinity of the Boston shipping lanes in a 15 nm radius around position 41-19N 069-16W
- 6 in the vicinity of the Boston shipping lanes in an 8 nm radius around position 41-29N 069-30W

MARINERS ARE URGED TO KEEP A SHARP LOOKOUT AND  
USE CAUTION AROUND RIGHT WHALES.

PAGES (Including Cover): 2



Update: Right Whale Zones for May 5, 2005

**NOTE:** Aggregations of 3 or more whales may persist for two or more weeks. There are large aggregations of right whales located either in or within close proximity to the Boston Shipping Lanes. These animals are feeding at the surface and are at especially high risk for vessel collision.

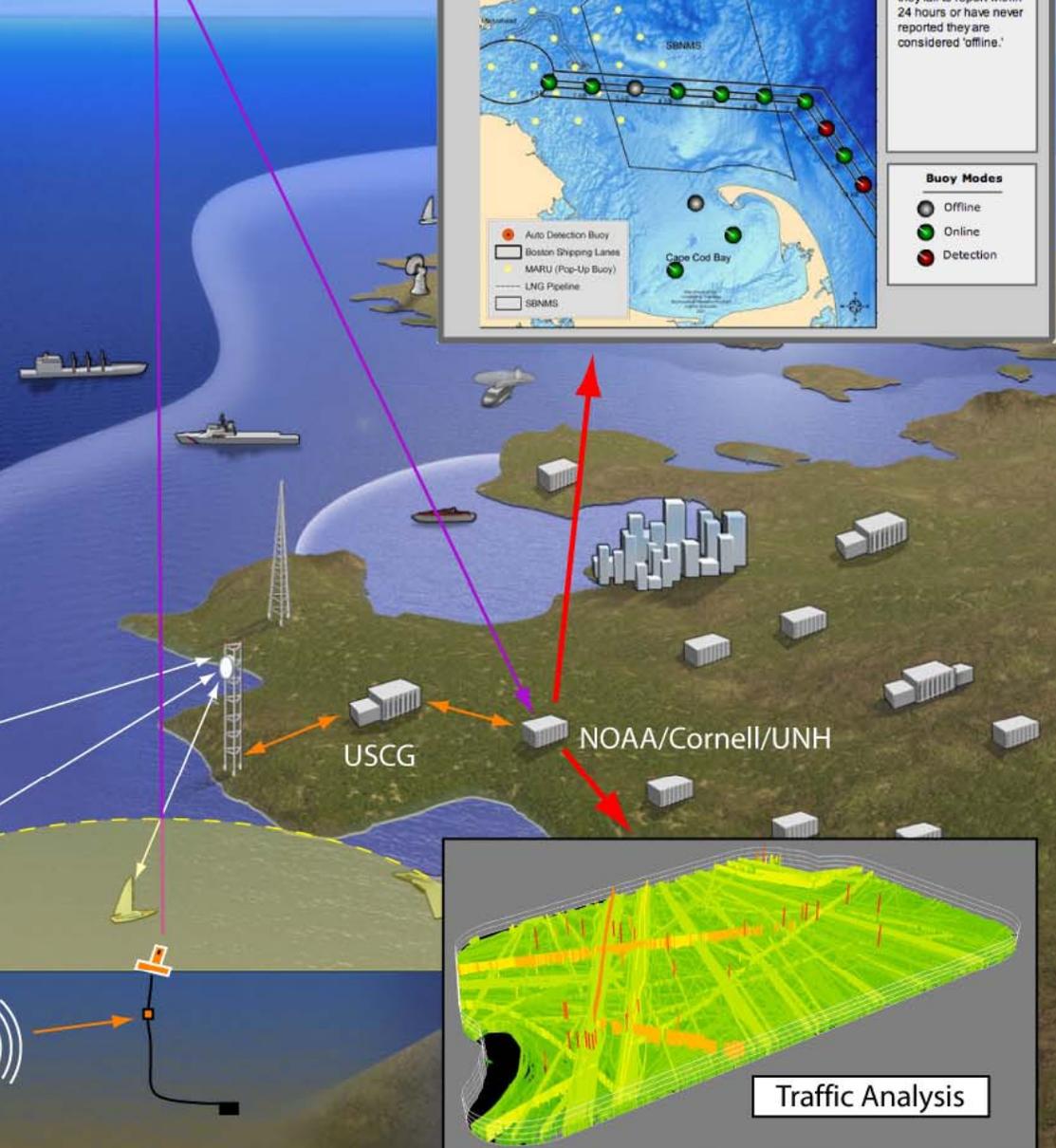
**BE ADVISED THAT WHALES MAY NOT REMAIN AT REPORTED LOCATIONS. WHALES MAY ALSO OCCUR AT UNREPORTED LOCATIONS WITHIN AND ADJACENT TO IDENTIFIED CRITICAL HABITAT AREAS. VESSEL OPERATORS ARE REMINDED TO USE CAUTION AND PROCEED AT SAFE SPEEDS IN AREAS USED BY RIGHT WHALES. NOAA SUGGESTS SPEEDS BELOW 12 KNOTS WHEN CONSISTENT WITH SAFETY OF NAVIGATION. INTENTIONALLY APPROACHING WITHIN 500 YARDS OF RIGHT WHALES IS PROHIBITED AND IS A VIOLATION OF FEDERAL LAW. PLEASE REPORT ALL RIGHT WHALE SIGHTINGS TO 978-585-8473 OR TO THE COAST GUARD VIA CHANNEL 16.**



**National Marine Fisheries Service (NMFS)**  
Northeast Fisheries Science Center  
Woods Hole, MA

**A BETTER WAY**

IRIDIUM



Alkebulan - [Info (1:4,000) USST218 857 1:10,000 User Display North Up]

Nav GPS AIS Info Map Mag Rx  
All Targets Chart Controls Whales

18:40 (hhmm) REMAINING

**Right Whale Detected**

LNG vessels required to stay below 10 knots

RESTRICTION CODE: 2007-09-21 05:18:00  
Whale detected: 2007-09-20 05:18:00

[Additional Information](#)

**Whale Aware Electronic Chart Display**

UTC 16:44:13 Could not pen, vessel is in  
UTC 18:01:32 Could not pen, vessel is in  
UTC 18:02:44 Could not pen, vessel is in

Kurt Schwehr  
CCOM/JHC/SBNMS

### Whales Detected

Last Whale Heard: 2008-01-24 11:34:21 GMT on Buoy TSS-AB10

Current time: 2008-01-24 21:52:25 GMT

Buoys report their status periodically. If they fail to report within 24 hours or have never reported they are considered 'offline.'

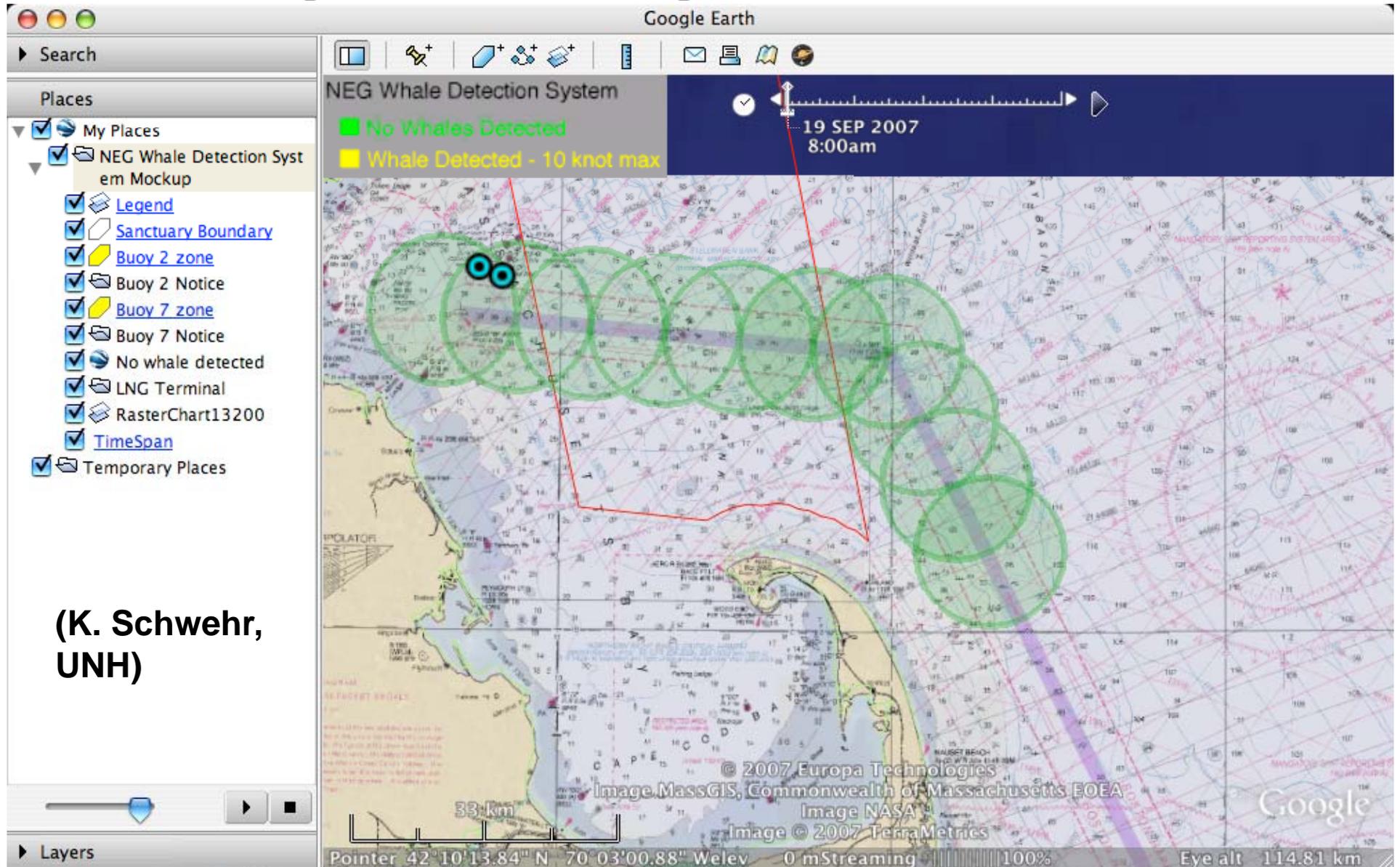
**Buoy Modes**

- Offline
- Online
- Detection

**Traffic Analysis**

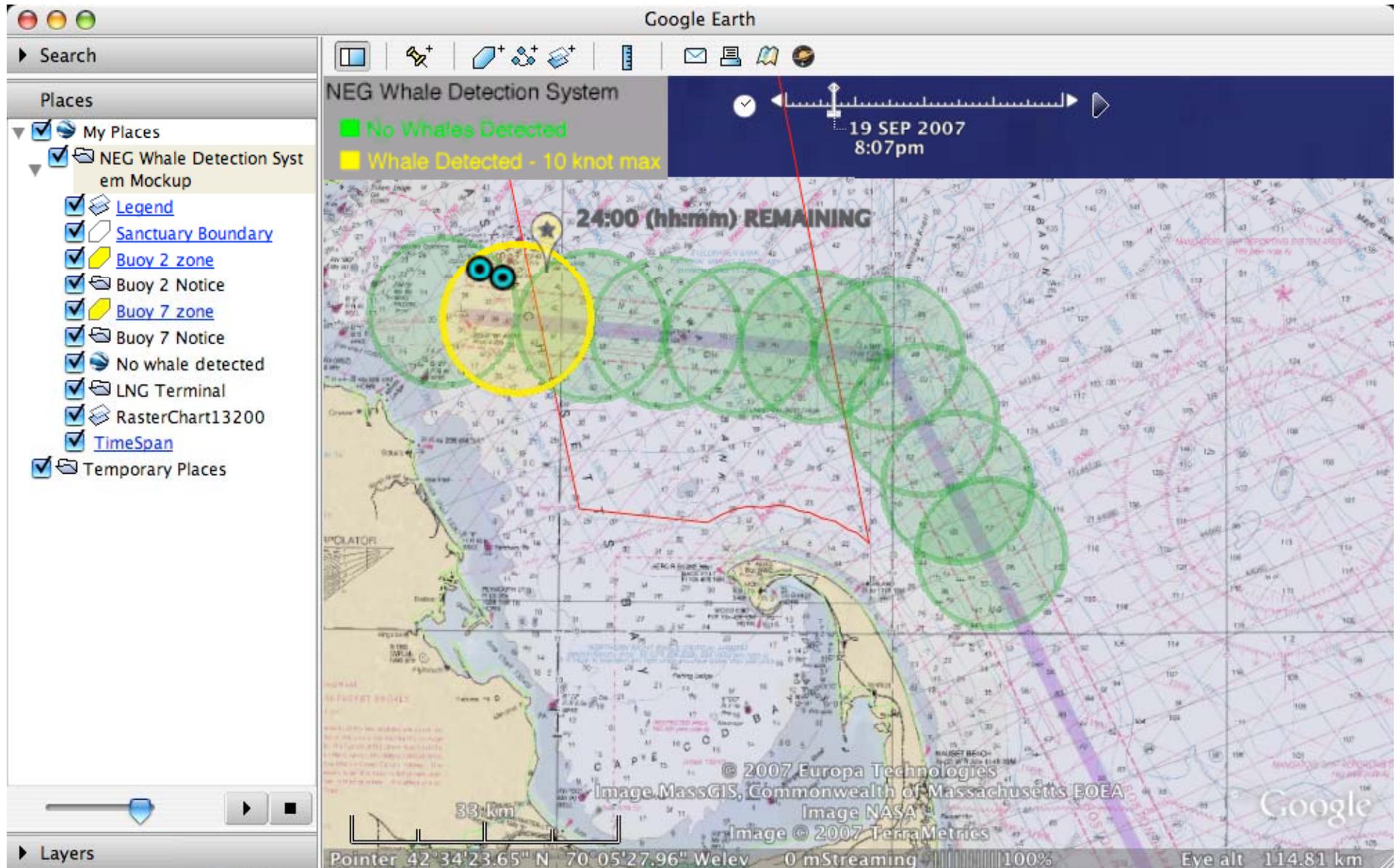
# AIS-Based Notification System (LNG)

## All green - no right whale detects



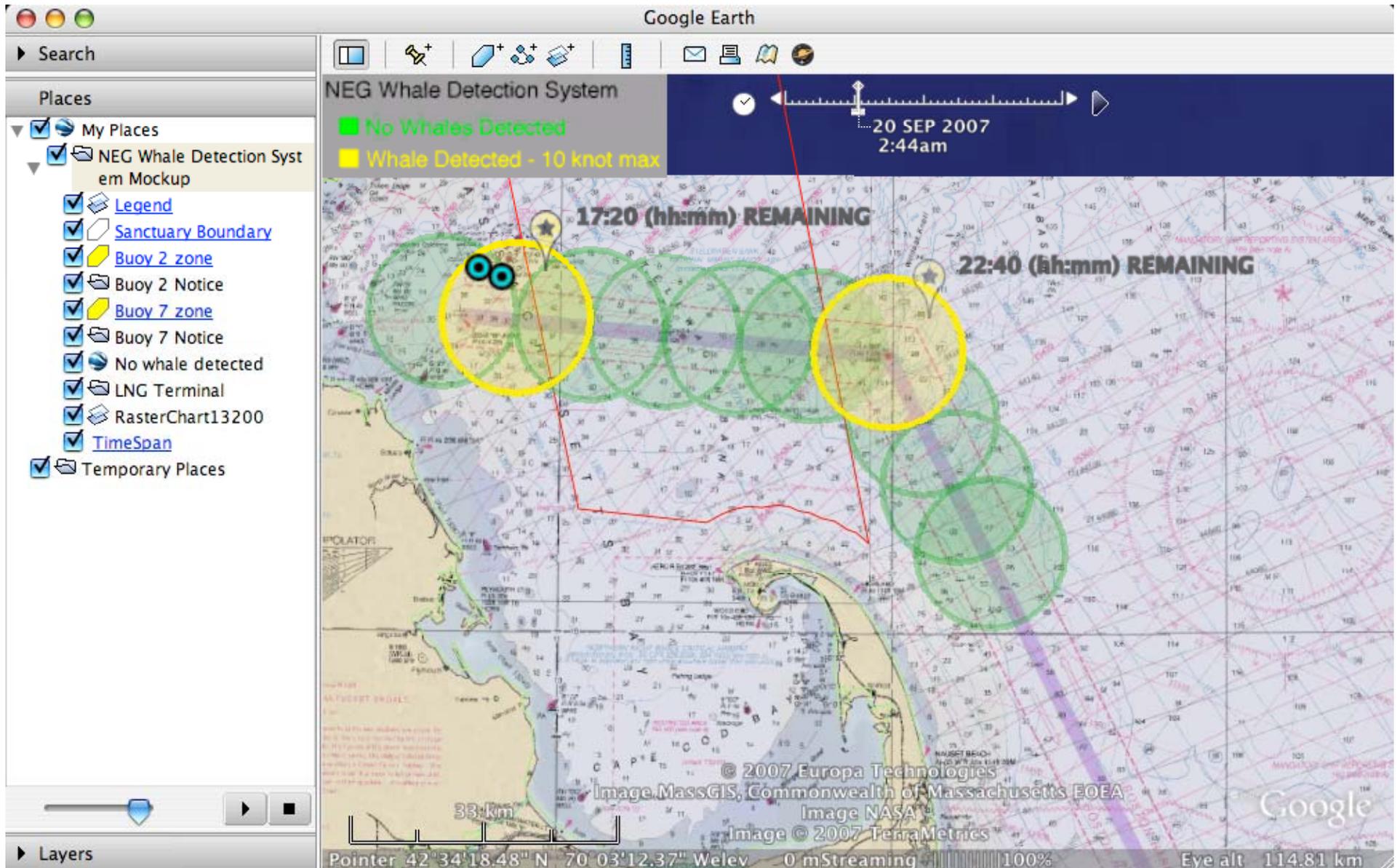
(K. Schwehr,  
UNH)

# Right Whale detected at Buoy 2 Begin 24 hr countdown to clearing the speed limit

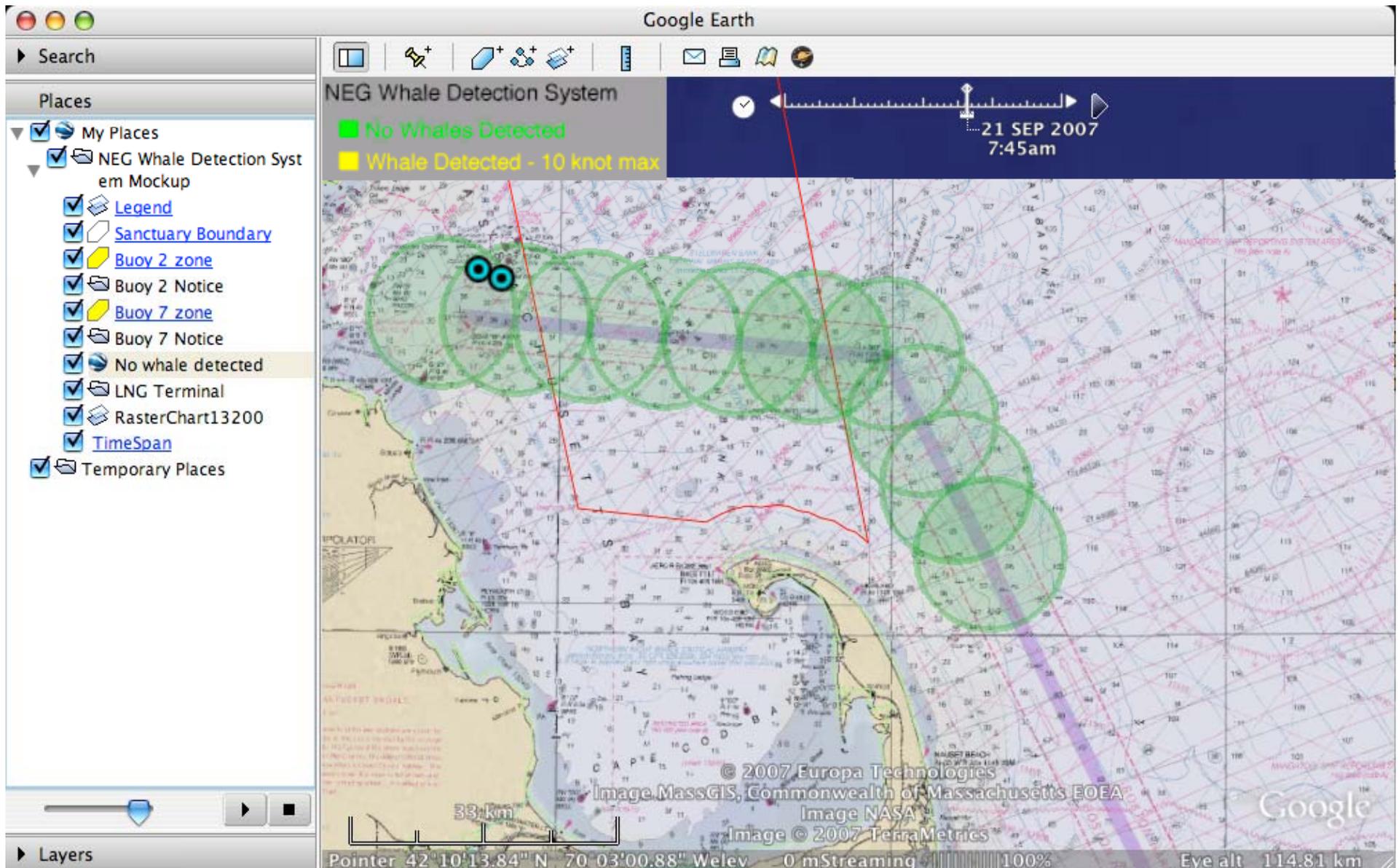


# Second right whale detection at Buoy 7

## Now have two separate countdowns



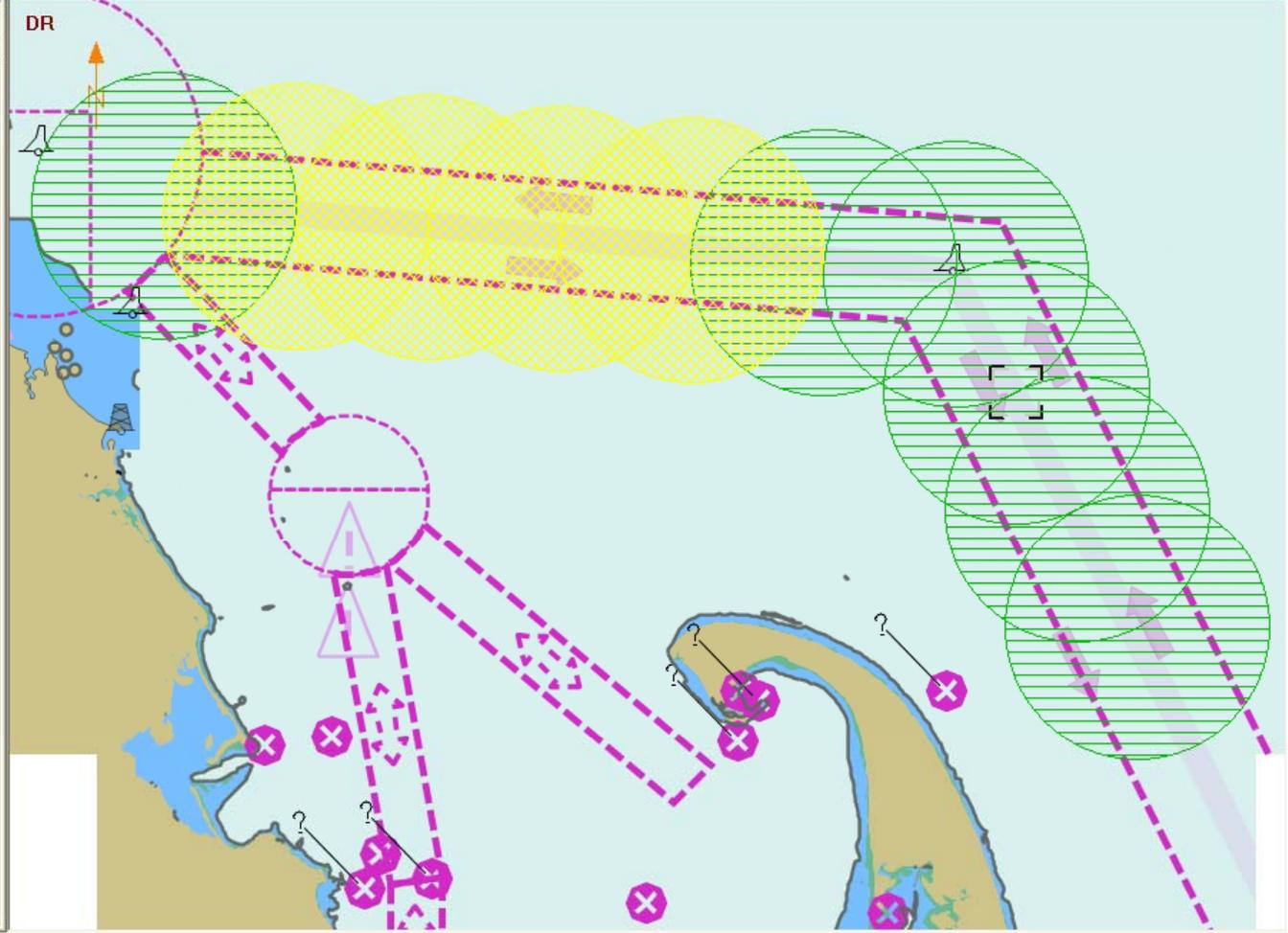
# The detection at buoy 7 expires Back to all green - no right whales detected



AIS Tx | AIS Rx | All Targets | S57 | S57 ? | S57 Lists  
 Basic | WorkBoat | Nav | Route | GPS | AIS Info | AIS ?  
 Survey | NavAids | Buoy Tending | Right Whale

**Time to Expire** -4h -54m -55s  
**Latitude** 42° 13' 47.19" N  
**Longitude** 069° 57' 18.37" W  
**Radius** 9260 m  
**Start Time** 2008.10.15 16:37:00  
**Type** Right whale detection  
**MMSI** 3669734

Timed Circular Notices	CPA	Type
3669734: Right whale detection	20:51:48	Timed Circular Notice
3669734: Restricted Area	20:49:45	Timed Circular Notice
3669734: Restricted Area	20:47:42	Timed Circular Notice
3669734: Restricted Area	20:45:39	Timed Circular Notice
3669734: Right whale detection	20:41:32	Timed Circular Notice
3669734: Right whale detection	20:39:28	Timed Circular Notice
3669734: Right whale detection	20:36:15	Timed Circular Notice
3669734: Right whale detection	20:33:02	Timed Circular Notice
3669734: Right whale detection	20:29:49	Timed Circular Notice
3669734: Restricted Area	20:43:35	Timed Circular Notice



# Questions?

