San Francisco Bay: An E-Navigation Prototype Laboratory

CDR Jason Tama and LCDR Amy Wirts
Prevention Department
USCG Sector San Francisco
Topics of Discussion

• AIS ATON Applications
• AIS Information as a Waterways Management Tool
• Leveraging AIS to Share Met-Hydro Data
• Way Ahead & Lessons-Learned
Dynamic, Mixed Use Waterway

USCG Sector San Francisco

San Rafael - Richmond Bridge
Carquinez Bridge and Strait
Benicia-Martinez Bridge
Golden Gate Bridge
San Mateo Bridge
Anchorages 8 & 9

>130,000 transits managed annually
Coast Guard Planning Considerations on San Francisco Bay
AC34 World Series
2-7 October, 2012
America’s Cup 2012:
First Use of AIS ATON in SF Bay
Current USCG AIS Aids to Navigation in SF Bay Area

Offshore Applications
1. SF Buoy
2. TSS Check-in Points (17 aids)

Approach Application
1. Mile Rocks Light

Inshore Applications
1. Harding Rock
2. SF-Oakland Bay Bridge (5 aids)
AIS ATON Offshore Application: VTS Reporting Points
AIS ATON Approach & Inshore Use: Mile Rock & Harding Rock
AIS ATON Inshore Application:
San Francisco-Oakland Bay Bridge West Span

2,229-ft 1,072-ft 1,079-ft 2,210-ft
OVERSEAS REYMAR Allision:

- Tank ship transiting northbound in ballast
- Fog ~ ½ nm visibility (decreased at bridge)
- Ebb current ~ 3 knots
- Paper charts
- RACON outage
- C-D vs. D-E span
- Human Factors
SF-Oakland Bay Bridge AIS ATON
Displayed on AIS-integrated Radar
NAIS as Waterways Mgmt Tool: Fuel Switching Impacts on Ship Routing

CA Air Resources Board (CARB):

- Requires use of cleaner fuels within 24 nautical mile zone (from islands)
- **July 1, 2009**
  - MGO with a 1.5% sulfur limit, or
  - MDO with a 0.5% sulfur limit
- **August 1, 2012**
  - MGO with a **1.0%** sulfur limit, or
  - MDO with a 0.5% sulfur limit
- **January 1, 2014**
  - MGO with a **0.1%** sulfur limit, or
  - MDO with a **0.1%** sulfur limit
Fuel Switching Impacts on Ship Routing From Local VTS Data

SF Bay Outbound Transits by TSS Lane

Observed marked increase in use of Western Traffic Lane
Fuel Switching Impacts on Ship Routing from NAIS Data

April 2009

April 2010
NAIS Use as Waterways Management Tool:
Development of America’s Cup Regulated Area

The 34th America’s Cup Races
July - September 2013
NAIS Use as Waterways Management Tool: Development of America’s Cup Regulated Area

USCG Traffic Plan for 2013 America’s Cup
NAIS Vessel Tracks Analysis for 34th America’s Cup
Final Traffic Management Plan for 34th America’s Cup

USCG Safety Zone & Traffic Plan

USCG Safety Zone (Race Area)

Transit Zone

No Entry

No Litter/Anchor

Non-motorized Vessels (<20 ft)

1000 yd
NAIS as Waterways Mgmt Tool: TSS Modifications
Exiting and Proposed TSS & Areas of Special Biological Interest
Exiting and Proposed TSS & Rockfishing Locations

Proposed Traffic Separation Scheme
Off San Francisco
Discussion Alternatives v10, May 2012

DRAFT
For discussion only
Do not circulate

Sources: Recommended TSS from USCG.
Whale densities from ACCESS and Keppler et al.
Fishery revenues from Ecostress 2009. AIS vessel
densities from NOAA Coastal Services Center.
For more information refer to layer descriptions.

Nautical Miles
Final TSS Reduced Co-incidence Between Whales & Shipping

Dransfield et al
PRBO and SFSU
AIS as a Waterways Management Tool: AIS-Messaging to Enhance Nav Safety

Current State of AIS Text Messaging

NOAA 10KT Speed Recommendation in effect in approaches to SF Bay due to Whale sightings

America’s Cup Regulated Area in Effect, use caution in Central Bay
Visibility less than 1nm at Bay Bridge. Use designated fairways for transit.
Leveraging AIS to Share Met-Hydro Data: NOAA PORTS Visibility Sensors
NOAA PORTS
Meteorological and Tide Stations
AIS-PORTS Display: Future State(?)

Vertical Clearance: 204'

RH: 80%
Air Temp: 65F
Vis: 6NM
Way Ahead

• Seek feedback! Is this technology useful?
• Explore ways to increase demand
  – If you build it, they will come...
  – Target “Early Adopters”
• Continue to explore additional applications through proactive stakeholder engagement (e.g., HSC, Pilots, Ferries, Other Users, Bridge/Port Authorities, etc)
Lessons Learned

• Stakeholder partnership is critical to identifying most viable applications
• Limited population of users/vessels currently capable of realizing full benefits (USCG is no exception!)
• AIS ATON: tremendous potential to enhance safety
  – Physical ATON enhancement
  – Additional ATON where physical is impractical
• AIS Messaging: info sharing enhancements
• NAIS is a powerful waterways management tool
• Capital investment required to achieve full potential
Questions & Discussion

Commander Jason Tama
jason.p.tama@uscg.mil
510-437-3133

Lieutenant Commander Amy Wirts
amy.e.wirts@uscg.mil
415-399-7401