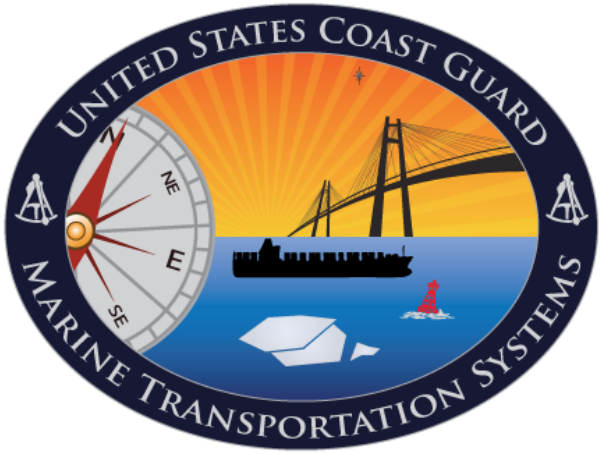
Status of Assessment: Future of NDGPS



CG-5PW

U.S. Department of Transportation

Research and Innovative Technology Administration

RITA

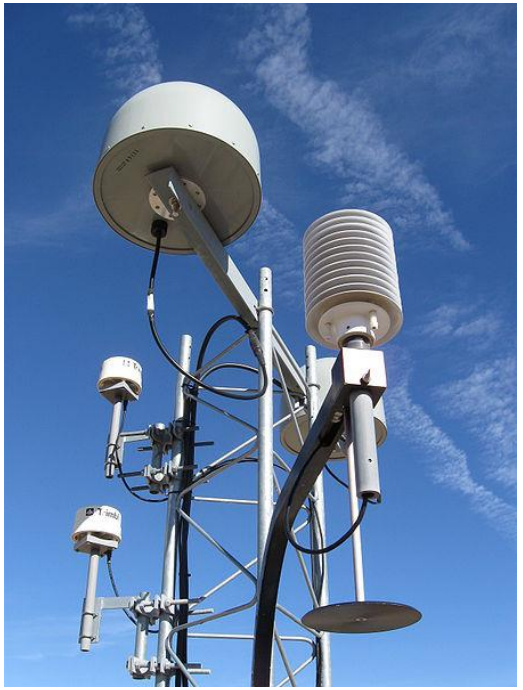
Civil GPS Service Interface Committee (CGSIC)

Nashville, TN; September 16, 2013

LT Luke Byrd Timothy A. Klein

Analysis - Future NDGPS Investment Decisions

- Joint DHS/USCG and DOT/RITA *Federal Register* Notice (FRN) Request for Public Comments [78 FR 22554; April 16, 2013]
  - Public comment period closed July 15
  - Docket still open for additional comments
  - USCG–2013–0054; RITA–2013–0001



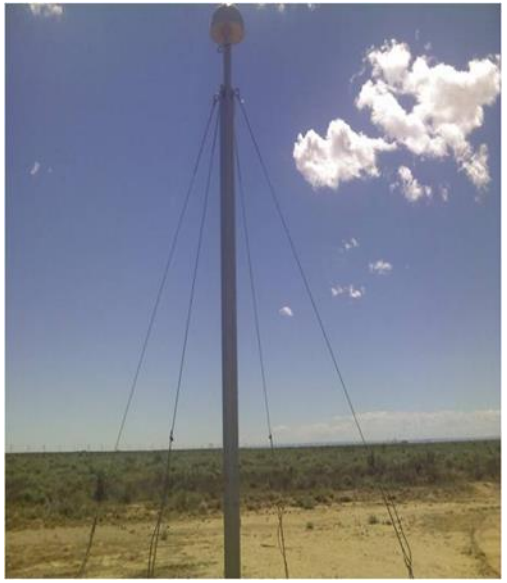
- Outreach to User Community
  - FRN announcement/articles in trade press
  - Distribution to known interested parties
  - Distribution via CGSIC lists and GPS.gov
- USG Requirements Assessments
  - USCG all elements (e.g., ATON, small boat)
  - DOT all elements (e.g., surface, maritime)
  - All USG agencies via the National Space-Based PNT Executive Committee/Executive Steering Group (ESG)

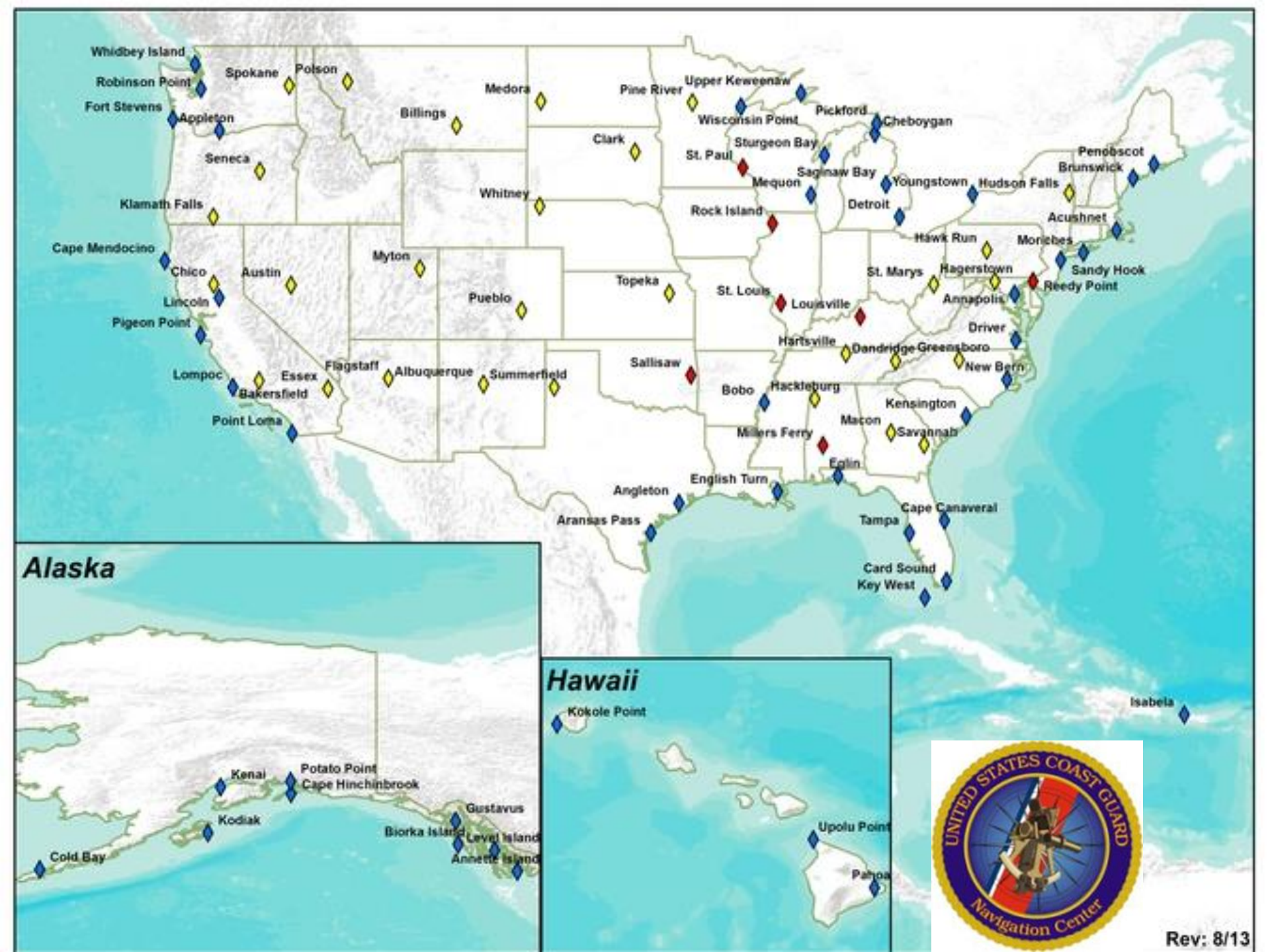
Contributing Factors for Assessment

- Contributing factors driving assessment timing and decisions
  - (1) Coast Guard changes in policy to allow aids to navigation (ATON) to be positioned with a GPS receiver using Receiver Autonomous Integrity Monitoring (RAIM)
  - (2) increased use of Wide Area Augmentation System (WAAS) in commercial maritime applications
  - (3) limited availability of consumer-grade NDGPS receivers
  - (4) no NDGPS mandatory carriage requirement on any vessel within U.S. territorial waters
  - (5) the May 1, 2000 Presidential Directive turning off GPS Selective Availability
  - (6) continuing GPS modernization
  - (7) the Federal Railroad Administration's determination that NDGPS is not a requirement for the successful implementation of Positive Train Control

Comments/Information Sought

- Asked the following questions of interested members of the public; and Federal, state and local agencies;
  - (1) To what extent do you use the NDGPS in its current form for positioning, navigation, and timing?
  - (2) What would be the impact on NDGPS users if the NDGPS were to be discontinued?
  - (3) If NDGPS were to be discontinued, what alternatives can be used to meet users' positioning, navigation, and timing requirements?
  - (4) What potential alternative uses exist for the existing NDGPS infrastructure?
- ACOE sites (7) not included in assessment
- Responses have been few




Whidbey Island
Robinson Point
Fort Stevens
Spokane
Polson
Appleton
Seneca
Klamath Falls
Cape Mendocino
Chico
Lincoln
Pigeon Point
Lompoc
Bakersfield
Point Loma
Essex
Flagstaff
Albuquerque
Austin
Myton
Billings
Medora
Whitney
Pueblo
Topeka
Summerfield
Sallisaw
Bobo
Hackleburg
Miliers Ferry
Eglin
Angleton
English Turn
Aransas Pass
Tampa
Cape Canaveral
Card Sound
Key West
Kensington
Macon
Savannah
New Bern
Greensboro
Dandridge
Hartsville
Driver
Annapolis
Hagerstown
St. Marys
Hawk Run
Moriches
Sandy Hook
Reedy Point
Acushnet
Penobscot
Brunswick
Hudson Falls
Youngstown
Detroit
Saginaw Bay
Mequon
Rock Island
St. Louis
Louisville
Sturgeon Bay
St. Paul
Cheboygan
Pickford
Wisconsin Point
Upper Keweenaw
Pine River
Clark
Isabela
Alaska
Kenai
Potato Point
Cape Hinchinbrook
Kodiak
Gustavus
Biorka Island
Level Island
Annette Island
Cold Bay
Hawaii
Kokole Point
Upolu Point
Pahoa
UNITED STATES COAST GUARD
Navigation Center
Rev: 8/13

FRN Responses – 35 Unique Responses

Category	Respondents	Summary Comments
Maritime-Related (U.S.)	• 9 Pilots' Organizations + 2 individual members	• Universally opposes DGPS reduction/removal in pilotage areas; several technical/safety concerns • Universal negativity to WAAS as substitute augmentation system in pilotage and navigation • Most correspond to USCG Vessel Traffic Service (VTS) areas (e.g., Houston, New York, Seattle)
	• 2 private industry partners	• Quotes IALA R-121 that removal of SA does not remove requirement for augmentation • Uses data acquisition for underwater investigations
Non-Maritime (U.S.)	• 3 State DOTs • 2 Local DOT/DPW	• Uses for highway design and monument integrity • Uses CORS data for RTN; not use broadcast • Uses DGPS-based CORS for project control, post-processing, automated survey and construction • Uses DGPS – critical for survey, mapping, GIS and data sets, coastal and maritime navigation and environmental applications • Suggests use in GPS+GLONASS streaming RTK applications

FRN Responses – 35 Unique Responses (2)

Category	Respondents	Summary Comments
Associations (U.S.)	• 1 Shipping Association	• Seeks measurement on relative position fixing capability of DGPS signal v. uncorrected GPS
	• 1 PNT Association	• Cites 30,000 daily navigation users in CONUS + tens of thousands at sea • Suggests NDGPS as most reliable augmentation for surface applications, and as backup for power, IT and other critical infrastructure outages; and natural disaster recovery
	• 1 Conservation Assn.	• Uses for GIS, emergency response
Private Sector	• 2 private industry partners	• Concerns for loss of critical accurate/reliable CORS stations for research, survey and mapping • Limits integration with SBAS and diversity of high integrity PNT services; suggests integration into national PNT network • Suggests integration with wide area nationwide Network RTK, and ubiquitous nationwide high accuracy location and timing

FRN Responses – 35 Unique Responses (3)

Category	Respondents	Summary Comments
Individuals	• 4 individuals	• Use for remote sensing elevation data/coastal management • Lose realtime NAD83 data, WAAS accuracy insufficient • Most accurate system for obstructed areas • Specific concerns for NDGPS broadcast and CORS loss in Alaska, Hawaii, Puerto Rico
International	• 3 international organizations	• Increasing use of Portable Pilot Navigation Systems/ Personal Pilot Units requiring reliable signal input • Concerns for loss of DGPS attributes and impact on broader aims of e-Navigation • Limits integration with SBAS; limits diversity of high integrity PNT services • No use in Canadian cadastral surveying; increasing use of WAAS, IGS, and commercial systems
Federal Agencies	• 5 Federal agencies	• CORS at DGPS sites critical; not use broadcast (2) • Concerns for accuracy impacts on OPUS solutions • Concerns for impacts of loss on space weather and severe storm models and operations, as well as CORS density • Can replace with WAAS, but not RAIM (accuracy) • No impact (2)

USG Responses

- U.S. Coast Guard (USCG)
  - No USCG requirement for NDGPS on USCG or commercial vessels, or for any other mission
  - No International Maritime Organization (IMO) requirement for carriage of a DGPS system
- U.S. Department of Transportation
  - No Federal Railroad Administration requirement for NDGPS to implement Positive Train Control
  - No St. Lawrence Seaway requirement for NDGPS for navigation
  - No requirements identified by any DOT Operating Administration
- Other USG Agencies (via PNT Executive Steering Group)
  - No mission requirements identified for NDGPS
  - Specific concerns for loss of CORS: density and site-specific
  - Dependencies identified for space weather and severe weather modeling and operations

Next Steps

- Identify and assess alternatives
  - Technical assessments of impacts of alternatives
  - Cost assessments of alternatives/use cases
    - Requires site-by-site assessment as well as systemic
    - Need to include costs for various scenarios:
      - Continuation/partial continuation/phased continuation
      - Partial/staged decommissioning – by site/use cases
      - Transfer to other parties
      - Hybrid alternatives
    - Ongoing O&M; environmental assessment and remediation; deconstruction; cost/benefit assessments

- Decision timeline: NET Summer 2014
  - FRN: Support FY16 budget request (implement NET FY16)
    - Existing O&M budgets (USCG and DOT) cannot support deconstruction and site remediation, especially if continuing service
  - Support planning/decision processes within USCG and USDOT

Continuing Responsibilities

- Uninterrupted NDGPS service to users as currently provided
  - Routine operations and maintenance of 85 NDGPS sites (49 USCG/Maritime, 29 DOT/Inland sites, 7 ACOE).
  - Watchstanding, troubleshooting, systems support engineering, systems analysis and reporting
- Public/user community information/involvement in decision processes and Next Steps, but no public meetings planned
- Continuation of DOT site recapitalization
  - Full funding received and work in progress
  - Sets long-term low-cost O&M baseline, 15 year service life
  - Sets a single “plug and play” configuration across USCG and DOT sites for reduced outyear O&M costs
  - Enables all possible alternatives/use cases for decision