Marine Information Objects (MIOs)

Part 1: What They Are and Why Important

Dr. Lee Alexander, Univ. of New Hampshire

Michel Huet, IHB

Marine Information Objects (MIOs)

- Chart and navigation-related information that supplement the minimum information required by IMO ECDIS
  - Additional, non-mandatory
  - Not covered by existing standards (e.g., IHO S-57, IHO S-52, or IEC 61174)
  - The "everything else"
  - Points, lines, areas, features, objects

Two types of Electronic Charting Systems

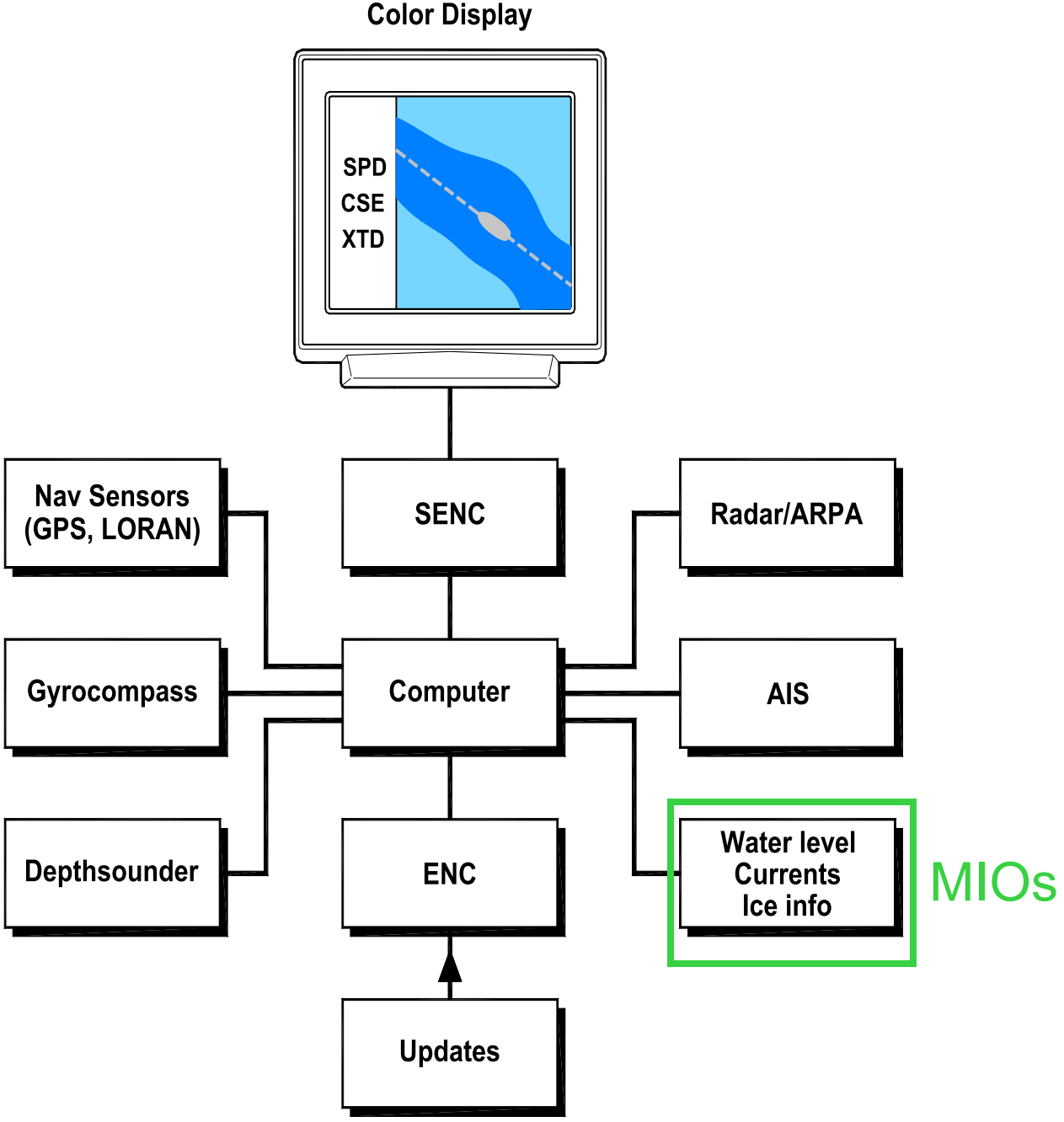
ECDIS - Electronic Chart Display and Information System

- IMO Performance Standards
- IHO data and display specifications
- IEC testing/certification reqmnts
- ECDIS has been accepted by IMO as suitable for meeting chart requirements of SOLAS.

ECS - Electronic Chart System

- Anything other than ECDIS
- RTCM performance & ISO data standards
- Use a wide variety of EC data

ECDIS COMPONENTS



IMO-compliant ECDIS

ENC Definition:

"*all the chart information necessary for safe navigation and may contain supplementary information in addition to that contained in the paper chart which may be considered necessary for safe navigation.*"

COLLECTION AND USE OF HYDROGRAPHIC DATA

IHO Paper Chart
Standard. M-4

IHO TRANSFER STANDARD S-57

DIGITAL HYDRO-GRAPHIC DATA BASE

Digital Hydrogra
IHO Standa

CD ROM
Electronic Navigational Chart

OTHER GIS APPLICATIONS

MONITORING HUMAN ACTIVITIES AND DEVELOPMENT

Coastal Zone Management

LONG TERM MANAGEMENT (Erosion, Pollution, Water Levels etc) DISASTER-MANAGEMENT (Accidental Pollution)

Environmental Management

BIOLOGICAL PHYSICAL

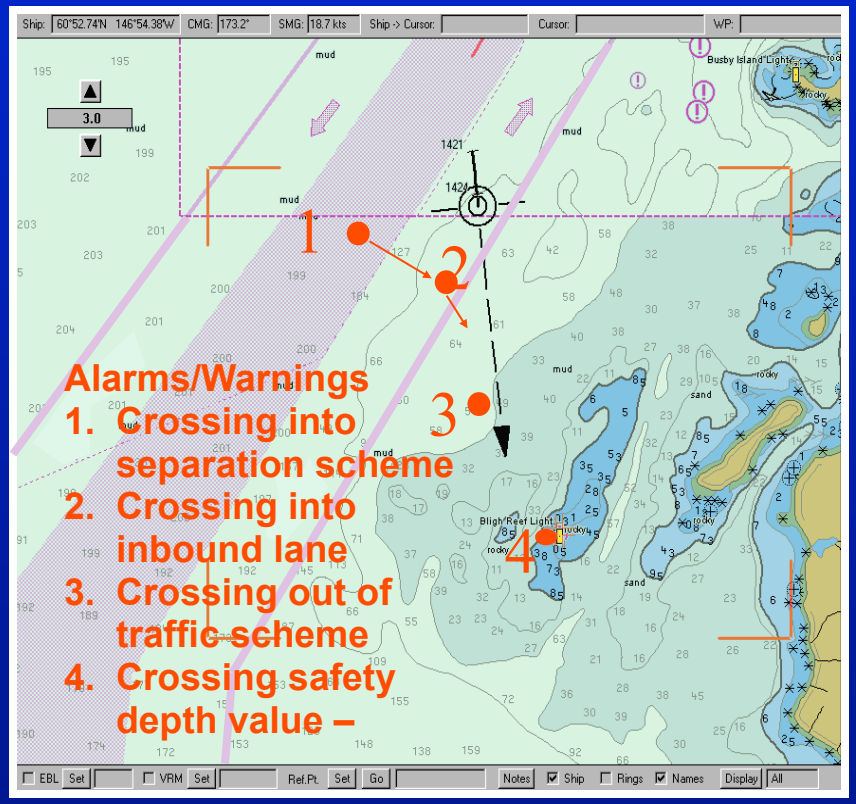
Resource Management

BAT
MAP

Electronic Navigational Chart (ENC)

- Database of chart features
- Produced in conformance to IHO S-57 Standards
- Displayed on ECDIS using IHO S-52 colors and symbols
- Software can provide alarms/ warnings and use “intelligence” of data
- chart is background for display of other navigation information, e.g.,

  Ownship
  Radar
  AIS
  MIOs



Bligh Reef, Prince William Sound, Alaska

(site of EXXON VALDEZ grounding)

Types of MIOs

Tides / water levels
Ice coverage
Meteorological
Oceanographic
Marine Habitats (e.g., coral reefs)
Environmental Protection (e.g., Marine Protected Areas)
Archeological
Security
Pipelines/cables
Aids-to-navigation

IHO – IEC HGMIO

- Harmonization Group on Marine Information Objects
- Subsidiary of Two Committees:

  IHO CHRIS

  TSMAD (S-57 objects/attributes, ENC Prod Spec)

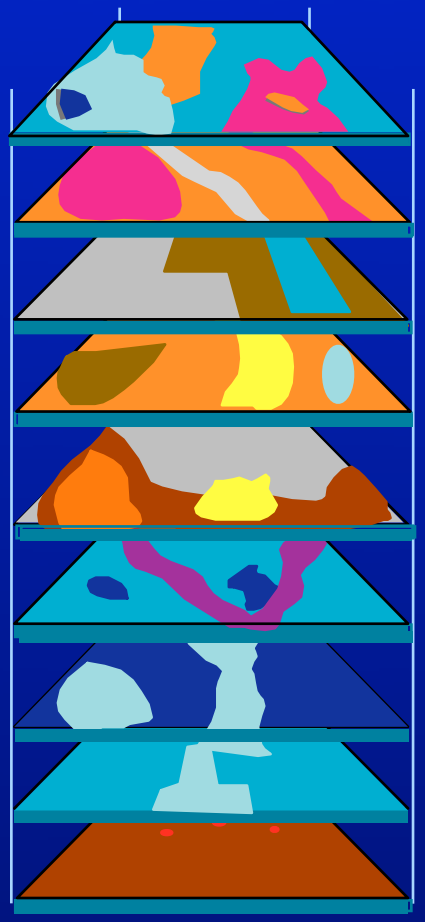
  C&SMWG (S-52 Colours and Symbols)

  IEC TC80

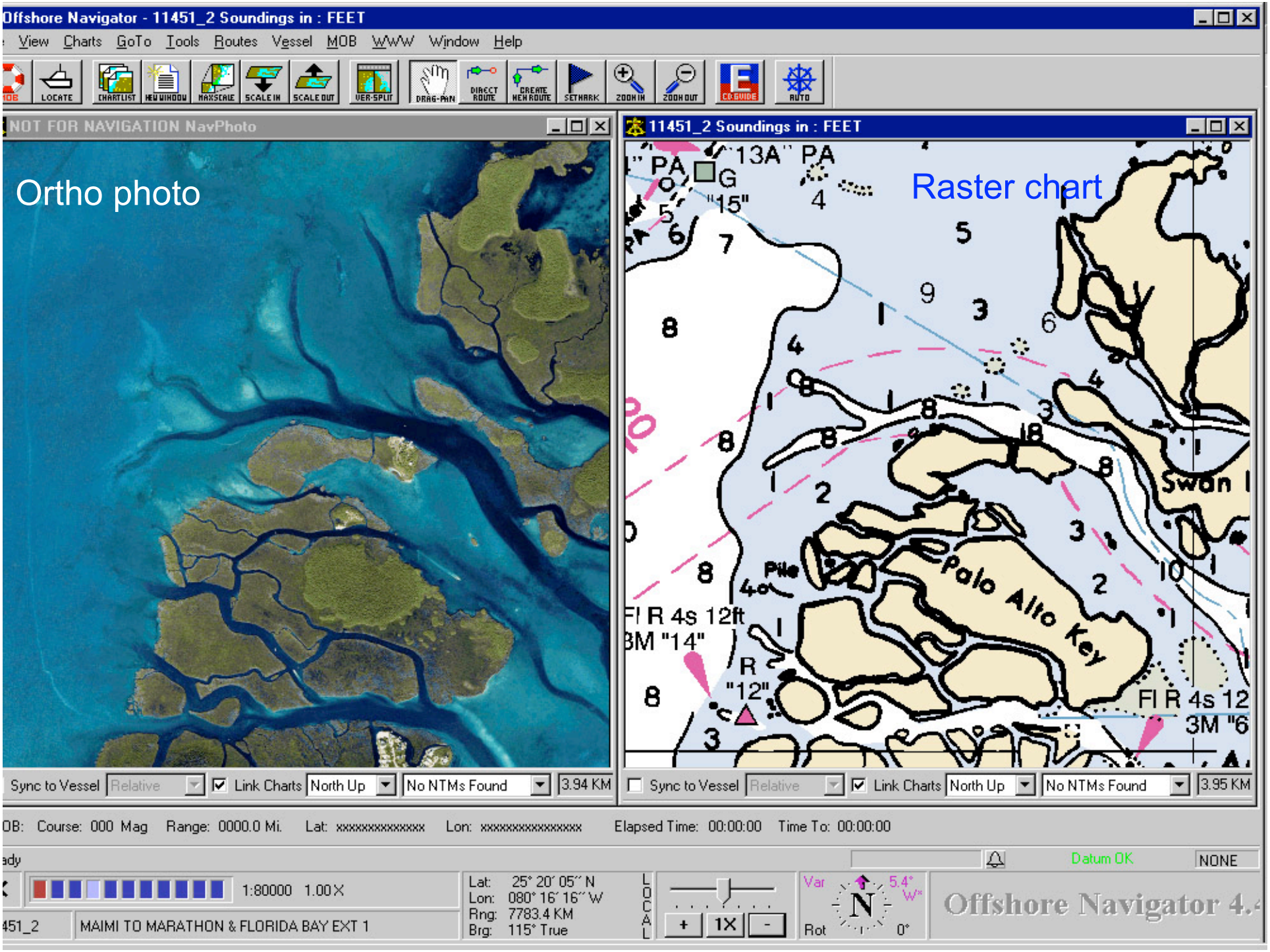
  WG7 (ECDIS)

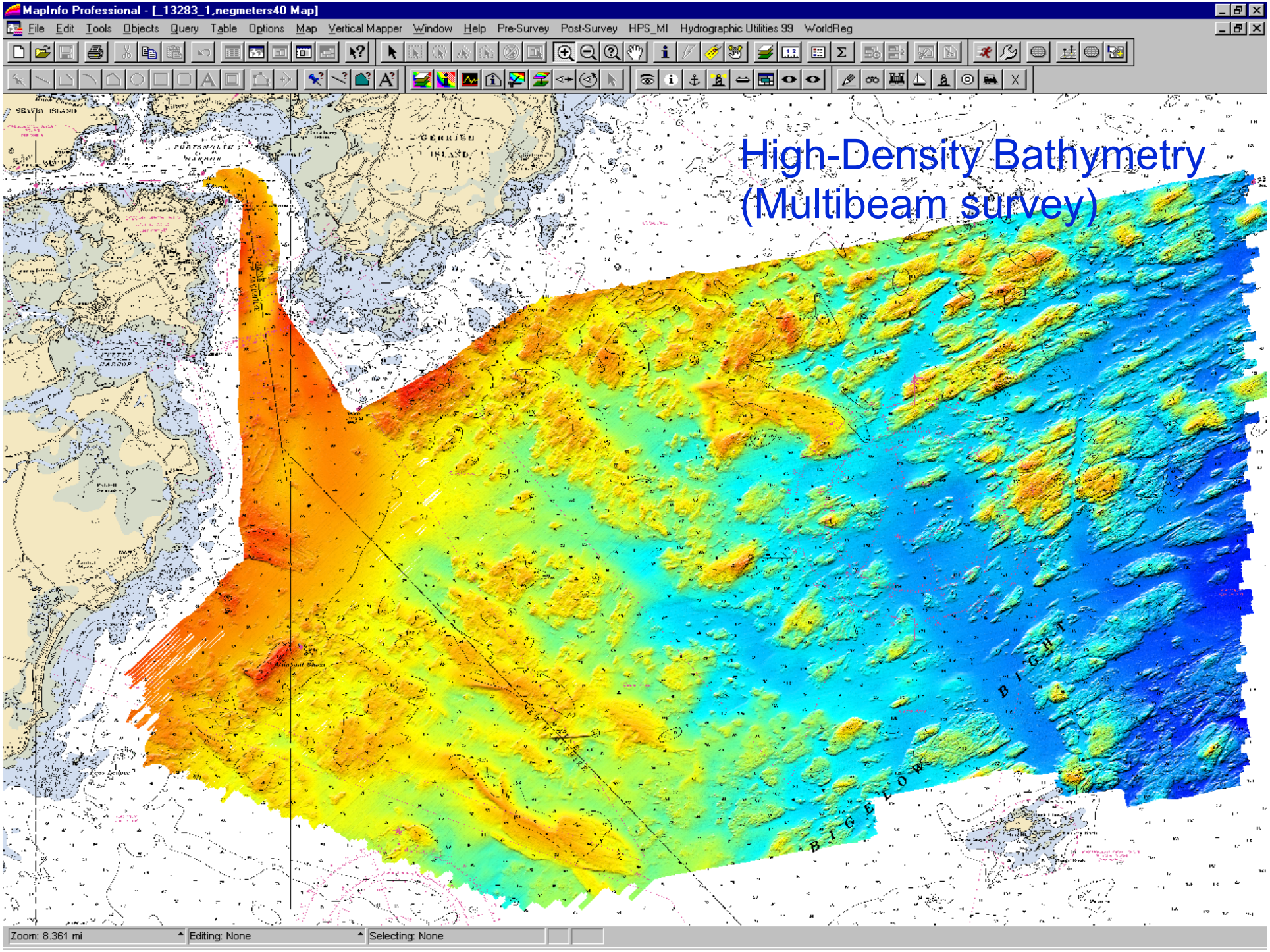
  WG13 (Navigation Display)

Foundation Data Layers for Marine GIS

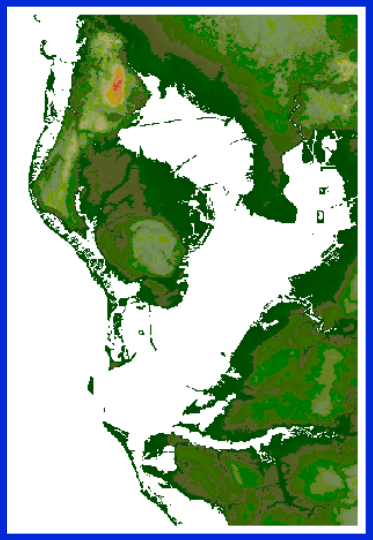


- Shoreline
- Bathymetry
- Cadastral (boundary)
- Environmental Sensitivity Index
- Habitat and species location
- Benthic mapping (seagrass, corals, …)
- Ports and vessel traffic
- Geo-regulations

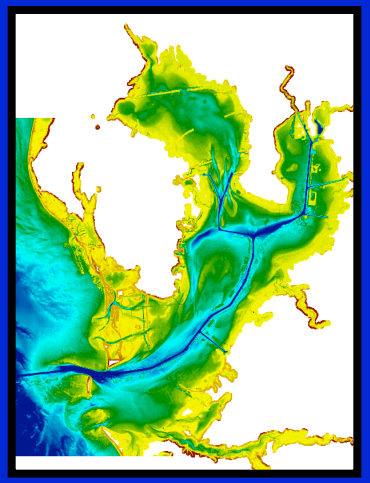

Offshore Navigator - 11451_2 Soundings in : FEET
View Charts GoTo Tools Routes Vessel MOB WWW Window Help
LOCATE
CHARTLIST
NEW WINDOW
MAXSCALE
SCALE IN
SCALE OUT
VER-SPLIT
DRAG-PAN
DIRECT ROUTE
CREATE NEW ROUTE
SETMARK
ZOOM IN
ZOOM OUT
CG GUIDE
AUTO
NOT FOR NAVIGATION NavPhoto
Ortho photo
11451_2 Soundings in : FEET
Raster chart
13A
"15"
"12"
Swan I
Palo Alto Key
Pile
Fl R 4s 12ft
3M "14"
Fl R 4s 12
3M "6
Sync to Vessel
Relative
Link Charts
North Up
No NTMs Found
3.94 KM
3.95 KM
OB: Course: 000 Mag Range: 0000.0 Mi. Lat: xxxxxxxxxxxxx Lon: xxxxxxxxxxxxxx Elapsed Time: 00:00:00 Time To: 00:00:00
Datum OK
NONE
1:80000 1.00X
451_2
MAIMI TO MARATHON & FLORIDA BAY EXT 1
Lat: 25° 20' 05" N
Lon: 080° 16' 16" W
Rng: 7783.4 KM
Brg: 115° True
LOCAL
+
1X
-
Var
5.4° W
Rot
0°
Offshore Navigator 4.


MapInfo Professional - [_13283_1,negmeters40 Map]
File Edit Tools Objects Query Table Options Map Vertical Mapper Window Help Pre-Survey Post-Survey HPS_MI Hydrographic Utilities 99 WorldReg
High-Density Bathymetry
(Multibeam survey)
BIGELOW BIGHT
Zoom: 8.361 mi
Editing: None
Selecting: None

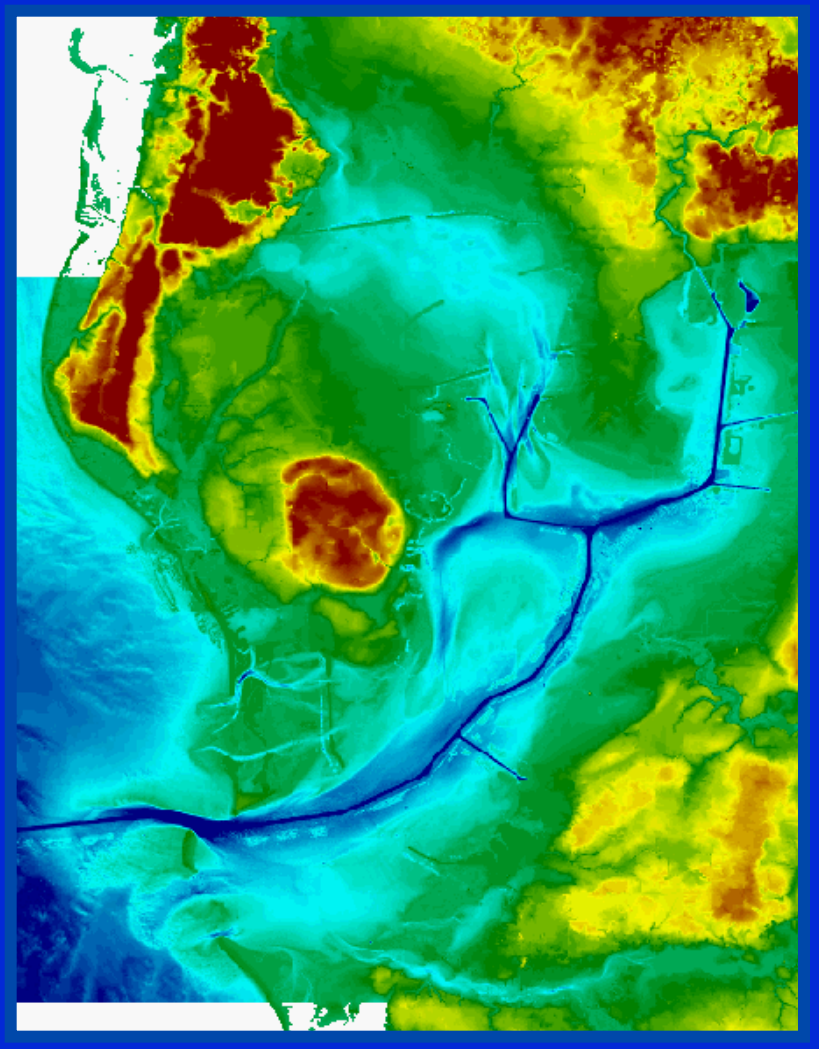
Integrated Topo-Bathy Database



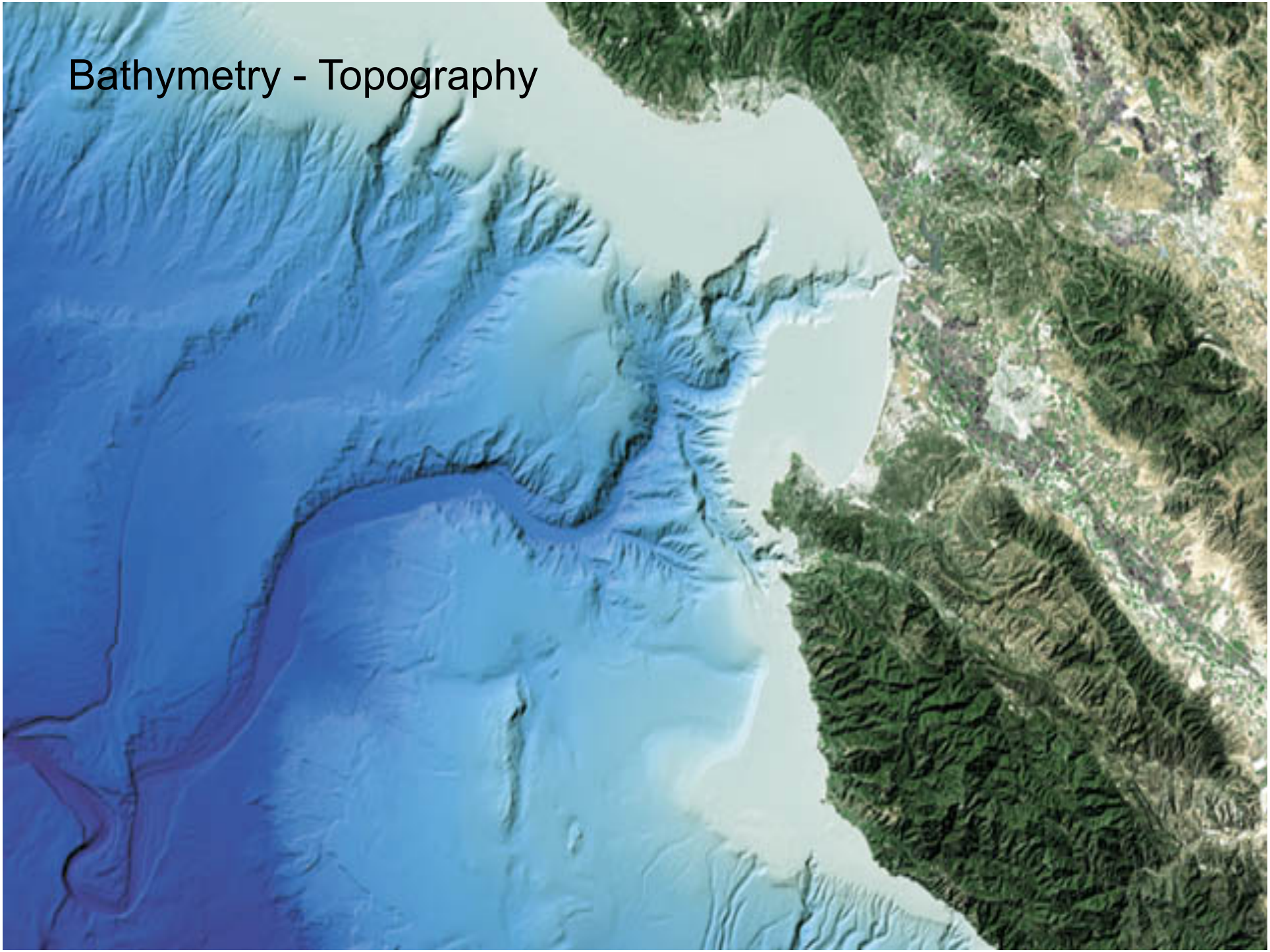
USGS Topography



NOAA Bathymetry



Integrated Topo-Bathy Model


Bathymetry - Topography

Benthic Mapping

Two basic types of MIOs

Static

Bathymetric (e.g., gridded data)

Geophysical data (seismic, gravity, magnetic)

Seafloor classification/physiography

Archeological (wrecks, heritage sites)

Critical Habitats (e.g., coral reefs, nesting sites)

Dynamic

Tides (predicted, real-time, forecast)

Current flow (speed, direction, time of occurrence)

Meteorological (wind speed/direction)

Oceanographic (wave height/direction, salinity, temp)

Ice Coverage

Goal for MIOs

- Supplemental information for "decision support"
  - Right information for task-at-hand
  - Voyage planning & route monitoring
- How displayed less important than data format and content
  - Accurate, timely, and "useable"
  - Provided in S-57 data format
  - Capable of being used with ENCs in ECDIS