CROSSWALKING THE DATA:
THE COASTAL & MARINE ECOLOGICAL CLASSIFICATION STANDARD (CMECS)

2012 NOAA NGI Diversity Summer Internship,
Coastal & Marine Geospatial Lab
Nyambura G. Njagi
Dr. James Gibeaut
06/08/12

NYAMBURA G. NJAGI

- Second-year master's student

- Geospatial Surveying Engineering Program, Texas A&M University-Corpus Christi

- MA Development Studies, University of KwaZulu-Natal, Durban, South Africa

- BA English Literature, Spelman College, Atlanta, GA

- Research Interests:

  - GIS and spatial statistics in Environmental, Ecological, Social & health-related fields

DR. JAMES GIBEAUT

- Endowed Chair for Geospatial Sciences, Harte Research Institute for Gulf of Mexico Studies (HRI), Texas A&M University-Corpus Christi

- Director, Coastal & Marine Geospatial Lab, HRI

- Associate Professor of Geology, Texas A&M University-Corpus Christi

- Expertise
  - Coastal Morphodynamics
  - GIS
  - Modeling Sea-level Rise

CMECS PROJECT OVERVIEW

- Update a fish and aquatic habitat dataset from CMECS 3 to the current CMECS version.

- What is CMECS?

WHAT IS CMECS?

Coastal and Marine Ecological Classification Standard
STRUCTURE: SETTINGS AND COMPONENTS

BIOGEOGRAPHIC SETTING — Ecoregions defined by climate, geology, and evolutionary history

AQUATIC SETTING — Zones defined by salinity, coastal proximity, and tidal regime

Water Column Component
Structure and Characteristics of the Water Column

Geoform Component
Geomporphic Structural Character of the Coast or Seafloor

Substrate Component
Character and Composition of Surface and Near-Surface Substrates

Biotic Component
Assemblages of Benthic or Suspended/Floating Biota

BIOTOPE Combination of abiotic habitat and associated species

MORE CMECS

- June 4 - FGDC approved CMECS as national standard for marine & coastal classification
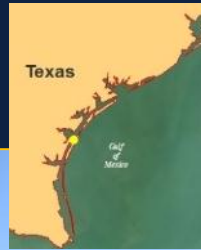
- June 19 – Annual GOMA Conference

MUSTANG ISLAND/PACKERY CHANNEL, TX

Biogeographic Setting

Realm
Temperate North Atlantic

Province
Warm Temperate NW Atlantic

Ecoregion
Northern Gulf of Mexico

Aquatic Setting

System
Estuarine

Subsystem
Estuarine Coastal

Tidal Zone
Estuarine Coastal Subtidal
Estuarine Coastal Intertidal
Estuarine Coastal Supratidal

Water Column Component

Water Column Layer
Estuarine Coastal Surf. Layer/ Lower Water Column

Salinity Regime
Euhaline (30 to < 40 PSS)

Water Temp. Regime
Warm or Very warm

Hydroform Class
Current

Hydroform
Wind-driven Current

Geoform Component

Tectonic Setting
Passive Continental Margin

Physiographic Setting
Lagoonal Estuary
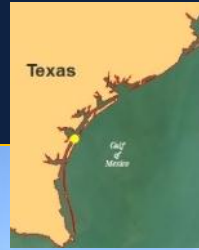
Geoform Origin
Geologic

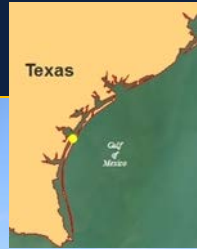**Geoform** Channel L2

Geoform Type Tidal Channel/Creek L2

Geoform Flat L2

Geoform Type Back Barrier Flat L1*

WC – Vertical Layering, Water Temp., Salinity, hydroform of water column

GC - Geomorphic/Structural char. of coast

Substrate Component

Substrate Origin
Geologic Substrate
Substrate Class
Unconsolidated Mineral Substrate
Substrate Subclass
Fine Unconsolidated Substrate
Substrate Group
Sandy Mud

Biotic Component

Biotic Setting
Benthic Attached Biota
Biotic Class
Aquatic Vegetation Bed
Biotic Subclass
Aquatic Vascular Vegetation
Biotic Group
Seagrass Bed
Biotic Community (H. wrightii)
Biotic Class
Scrub-Shrub Wetland
Biotic Subclass
Tidal Scrub-Shrub Wetland
Biotic Group
Tidal Mangrove Shrubland
Biotic Community
Avicennia germinans /
Batis maritima Shrubland

Floating & Suspended Biota
Biological comp. of coastal/marine benthos

Texas
Gulf of Mexico

CMECS PROJECT OVERVIEW

- Need for data crosswalking

- Most crosswalks are between different classifications

- My crosswalk is a CMECS to CMECS conversion

METHODS

I. Convert CMECS units from v.3 to current version

II. Create a Lookup table

III. Crosswalk Data

STEP I: DATA CONVERSION

CONVERT UNITS

- Formatted CMECS 3 database of units from documentation

- Compared CMECS 3 & current version

- Determined equivalents for each CMECS 3 unit

RESULTS

1. **CMECS 3**
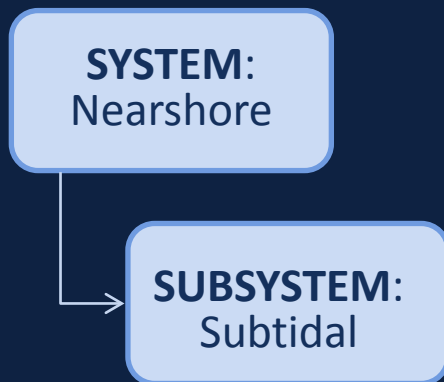   1. System/Subsystem
   2. 5 Components

2. **Current CMECS**
   1. Aquatic Setting
   2. Biogeographic Setting
   3. 4 Components
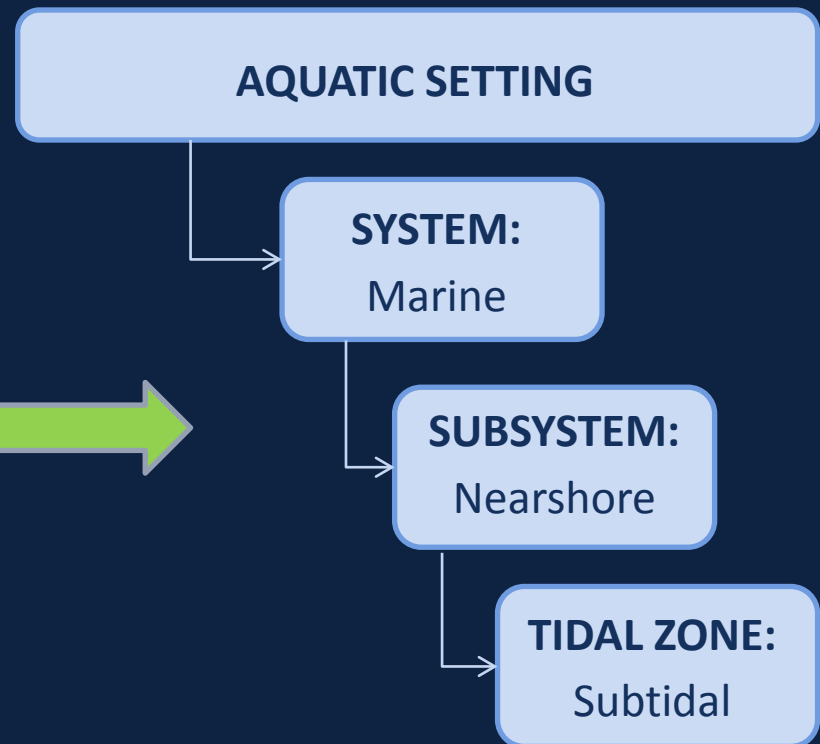
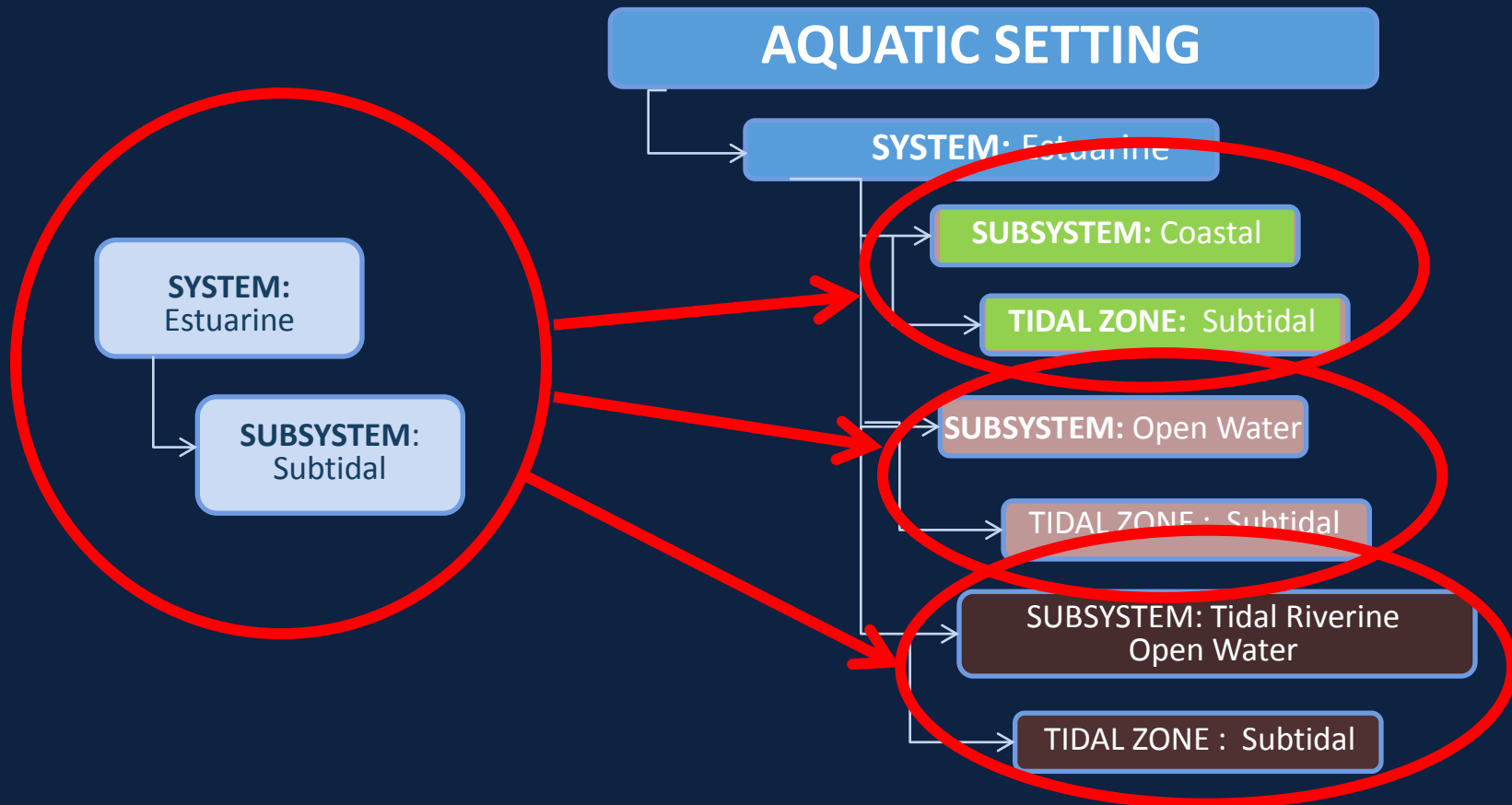3. **Mostly 1 to Many Relationships**

ONE-TO-ONE RELATIONSHIP

CMECS 3

CURRENT CMECS

SYSTEM: Nearshore

SUBSYSTEM: Subtidal

AQUATIC SETTING

SYSTEM: Marine

SUBSYSTEM: Nearshore

TIDAL ZONE: Subtidal

STEP II: CREATE LOOKUP TABLE

CMECS 3.0								CMECS 4.0										
Systems	[SySS]	Nearshore	NS	Sub Systems	[Subsys]	Subtidal	[1]	Aquatic Setting	[AS]	System	[SyS]	Marine	MA	Subsystem	[Subsys]	Marine Nearshore	MN
Systems	[SySS]	Neritic	NE	Sub Systems	[Subsys]	Intertidal	[2]	Aquatic Setting	[AS]	System	[SyS]	Marine	MA	Subsystem	[Subsys]	Marine Nearshore	MN
Systems	[SySS]	Oceanic	OC					Aquatic Setting	[AS]	System	[SyS]	Marine	MA	Subsystem	[Subsys]	Marine Nearshore	MN
Systems	[SySS]	Estuarine	ES					Aquatic Setting	[AS]	System	[SyS]	Marine	MA	Subsystem	[Subsys]	Marine Offshore	MF
Systems	[SySS]	Freshwater-Influei	FL					Aquatic Setting	[AS]	System	[SyS]	Marine	MA	Subsystem	[Subsys]	Marine Oceanic	MO
Systems	[SySS]	Lacustrine	LA	Sub Systems	[Subsys]	Limnetic	[1]	Aquatic Setting	[AS]	System	[SyS]	Estuarine	ES	Subsystem	[Subsys]	Estuarine Coastal	EC
				Sub Systems	[Subsys]	Littoral	[2]	Aquatic Setting	[AS]	System	[SyS]	Estuarine	ES	Subsystem	[Subsys]	Estuarine Coastal	EC
								Aquatic Setting	[AS]	System	[SyS]	Estuarine	ES	Subsystem	[Subsys]	Estuarine Coastal	EC
								Aquatic Setting	[AS]	System	[SyS]	Estuarine	ES	Subsystem	[Subsys]	Estuarine Coastal	EC
								Aquatic Setting	[AS]	System	[SyS]	Estuarine	ES	Subsystem	[Subsys]	Estuarine Coastal	EC
								Aquatic Setting	[AS]	System	[SyS]	Estuarine	ES	Subsystem	[Subsys]	Estuarine Coastal	EC
								Aquatic Setting	[AS]	System	[SyS]	Estuarine	ES	Subsystem	[Subsys]	Estuarine Coastal	EC
								Water Column Co	[WC]	Hydroform	[HC]	Water Mass	WM	Hydroform	[HY]	Mesoscale Lens	ML
								Water Column Co	[WC]	Hydroform	[HC]	Water Mass	WM	Hydroform	[HY]	Mesoscale Lens	ML
								Water Column Co	[WC]	Hydroform	[HC]	Water Mass	WM	Hydroform	[HY]	Winter Water Mass	WW
								Water Column Co	[WC]	Hydroform	[HC]	Water Mass	WM	Hydroform	[HY]	Ice	IC
								Water Column Co	[WC]	Hydroform	[HC]	Water Mass	WM	Hydroform	[HY]	Ice	IC
								Water Column Co	[WC]	Hydroform	[HC]	Water Mass	WM	Hydroform	[HY]	Ice	IC
								Water Column Co	[WC]	Hydroform	[HC]	Water Mass	WM	Hydroform	[HY]	Ice	IC
								Water Column Co	[WC]	Hydroform	[HC]	Water Mass	WM	Hydroform	[HY]	Ice	IC
								Water Column Co	[WC]	Hydroform	[HC]	Water Mass	WM	Hydroform	[HY]	Ice	IC
								Water Column Co	[WC]	Hydroform	[HC]	Water Mass	WM	Hydroform	[HY]	Ice	IC
								Aquatic Setting	[AS]	System	[SyS]	Lacustrine	LA	Subsystem	[Subsys]	Lacustrine Limnetic	LL
								Aquatic Setting	[AS]	System	[SyS]	Lacustrine	LA	Subsystem	[Subsys]	Lacustrine Littoral	LI

STEP III: CROSSWALK THE DATA

- Use Lookup table

- Allows automated/Semi-automated translation of fish and aquatic Ecosystem dataset

CONCLUSIONS

- Client specific CMECS to CMECS crosswalk
- Data conversion & Lookup table key
- Crosswalks between different systems needed
- Better use of spatial component needed
- Decision-making required

USE OF METADATA

- Metadata – "data about the data"

  - Who?

  - How?

  - When?

  - QA/QC?

- Project metadata

  - Explained CMECS 3 code

  - Hierarchical differences

CHALLENGES

- Critical thinking

- Example : One-to-many Problem

- Finding: End-user decision-making necessary

- Solution: Create Algorithm to output the possible outcomes

ACKNOWLEDGEMENTS

- DR. JAMES GIBEAUT, Internship Advisor, HRI

- DIANA DEL ANGEL, Coastal & Marine Geospatial Lab Manager, HRI

- WILLIAM NICHOLS, GIS Manager, HRI

- JOANN MOODY, Internship Coordinator, NGI-Diversity Internship Program

- TINA MILLER-WAY, Principle Investigator, NGI-Diversity Internship Program

- NOAA