September 24, 2020

Module 4-

The cartographic representation of this geographic information reports on the location of the information: the information is the “input” of a map

Representation\_ the active process of observing the world and symbolizing those observations to make meaning

Geographic representation: abstracting observations of the world, often results in a model

Cartographic representation:

The process of symbolizing geographic representation

Why map habitats, Florida?

1. Florida Imperiled Species Management Plan

2. Impact assessments:

-monitor habitat loss and degradation resulting from changes in the environments

- assess susceptibility to storms or events like oil spills

- predict the impact of non-native species

3. Fisheries management

- sustainable fisheries act of 1996

- introduced the concept of essential fish habitat

Essential Fish habitat-

“Those waters and substrate necessary to fish for spawning, breeding, feeding or growth for maturity”

“The habitats required to support a sustainable fisher and the managed species contribution to a healthy ecosystem” (NOAA)

Definitions of Marine Habitats:

Areas that are significantly different from their surrounds in the terms of physical, chemical and/or biological characteristics, when observed at a particular spatial and temporal scale

May provide nursery 3D structure to shelter from predators, food resources, favorable physical of hydrodynamic conditions.

Mangroves, reef, sand, rocky, outcrops, sea grass beds, delta with particular temperature and salinity

Habitat generalists vs habitat specialists

Temporal scales can be:

-life stages

-migrations

-pre/post disturbance

Three main types of habitat mapping

Defining surrogacy- a measurable entity that will represent, or substitute for, a more complex element of biodiversity that is more difficult to define or measure: proxy

When you can ensure that you have a 100% coverage, we use surrogates to measure, it might be easier (cheaper), this is not always true

Do we need surrogates? Not always, sometimes you can map the species directly from remotely sensed data (e.g, habitat- forming species, engineer species)

Potential surrogates

* LiDar
* Still photographs
* Motion pictures
* Echosounders

The seafloor has the most potential to use surrogates, mostly benthic habitat mapping

Potential surrogates for the seafloor

* Motion picture
* Echosounders (physical structure, and biological)
* Sidescan sonar (physical structure, and biological)

Validating potential surrogates:

- Grab samples, videos, physico-chemical samples

- random sampling

-Stratified sampling ( by depth, sedimentary regimes slopes) -> will guide which data is used to stratify (e.g sedimentary= backscatter classes)

Videos are continuous and can be “resampled”

Ensure both spatial and environmental types of coverage

Habitat Mapping

#1 abiottice surrogates

Unsupervised classification with limited to no biological validation

Validating potential surrogates:

Number of species on the y and number of samples/transects/individuals on the x of this graph

Unsupervised classifications- go not need to require the use to specify any information about the features contained in the image, but the user might need to specify some information (number of classes)

The software explores the data and uses stats to compute the clusters

Strategy 1: Abiotic surrogates

- unsupervised classification with limited or no biological validation

-useful to characterize broad potential habitats, not necessarily specific habitats

Visual expert interpretation

Subjective

Elements of analysis

-tone

-colour

-texture

-pattern

-shape

-size/dimensions

-shadow

-association

-arrangement

With technology- unsupervised classifications

- do not require the user to specify any information about the features contained in the image, but the user might need to specify from information (number of classes)

-The software explores the data and uses statistics to compute cluster that represent groups of pixels with similar spectral/acoustical/statistical properties

Strategy 2: Assemble first predict later

-unsupervised classification with biological variables

Strategy 3: predict first, and assemble later

- supervised classification

-spectal/acoustic/statistical signatures are developed from specified locations in the image, called training sites

- training sites are usually built using vector polygons or points

-need some experience in photointerpretation, some knowledge of the are or some ground-truthing data

-the software then characterizes the statistical patterns of the representative area and classifies the image

-Use the in situ in the beginning of the workflow

-Workflow into a habitat model

-That habitat model will spit out a map

Object- oriented classification:

- recent method, also called object- based image analysis

- two-step process: segmentation and classification

-instead of grouping similar individual pixels together, we first segment the imagery into objects based on spectral, geometrical, and topological characteristics (segmentation)

-it can consider characteristics of features such as the shape, texture, pattern, etc

-pixels are grouped into segments (objects) that share similarity

Evaluation of classifications:

- several methods exist to assess the quality of a classification

- one of the most common consists in randomly selecting pixels, compare with what we think it is to the result of the classification ( so what we know that is actually there)

- acceptable quality depends on purpose

- In supervised approaches from ecology (predictive models) validation metrics are come complicated

Spectral/account/ stats signatures are developed from specified locatios n the image, site

Training sites are usually built using a