Meeting Host

Manaaki Whenua
Landcare Research

Supporting Partner

Land Information New Zealand
Toitū te whenua

Meeting Sponsors

NIWA
Taihoro Nukurangi

horizons regional council

koordinates

Environmental Summit: Consolidated view from earth science to biodiversity

105th OGC Technical Committee

Palmerston North, New Zealand

Josh Lieberman

6 December 2017

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Making location count.

Ideas

- OGC activities and standards evolve from fundamentals of geospatial representation to domain specific features and capabilities
- OGC Web services support sharing and integration of geodata around the globe and across diverse communities of data users. An exposure opportunity and hazard.
- The value of geospatial data and standards connects to consensus on relevant geographic features and associated attributes.
- Straightforward (!) to agree on and publish a stream channel, a geologic terrane, a soil unit, climatic zone
- More fraught to connect geography, species occurrence, population dynamics, and ecological processes that make up biodiversity
- Advances in tracking, DNA speciation, and large-scale modeling may change this equation

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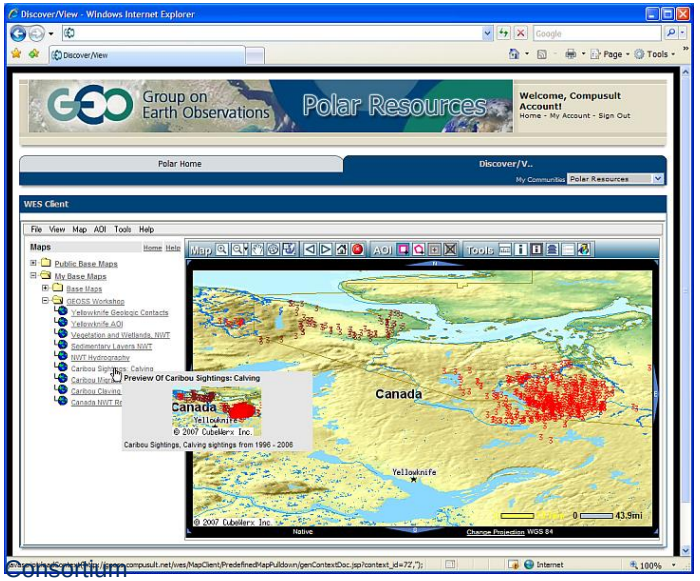
OGC Contributions in the Biosphere

- Environmental features
  - GeoSciML geologic features
  - GWML groundwater features
  - HY_Features surface water features
  - SoilML soil features
  - Earth Observation synoptic images and coverages
  - Variety of met-ocean-marine features – time series, columns, transects, cubes
  - SWE features
- Biological features
  - Interactions with GBIF & TDWG / BIS on metadata
  - IPY Geonorth Caribou migration points



Other Biology Activities

- NSF Earthcube projects, e.g. Coral Reef Science & Cyber infrastructure-Network (CRESCYNT). Species databases, image analysis software and 3d mapping used to monitor the decline of the coral reef's structural changes, coral disease and bleaching and sea temperatures.
- Arctic SDI Pilot: migration of important terrestrial mammals (Caribou or others) in order to support habitat management activities (e.g. Boreal Caribou Recovery Strategy).

GBIF / TDWG Darwin Core

- a Taxon core, which lists a set of species, typically coming from the same region or sharing common characteristics
- an Occurrence core, which lists a set of times and locations at which particular species have been recorded
- an Event core, which lists field studies (including the protocols used, the sample size, and the location for each).
  - **eventID**: an identifier specific for the event in a dataset
  - **parentEventID**: an identifier that groups events
  - **samplingProtocol**: name, reference, description of method or protocol used during sampling event
  - **sampleSizeValue**: numeric value for the size (duration, length, area or volume) of a sample in a sampling event. Must have a corresponding sampleSizeUnit
  - **sampleSizeUnit**: the unit of measure of the size (sampleSizeValue)
  - **organismQuantity**: a number for the quantity of organisms. Must have a corresponding organismQuantityType
  - **organismQuantityType**: the type of quantification system used for the quantity of organisms

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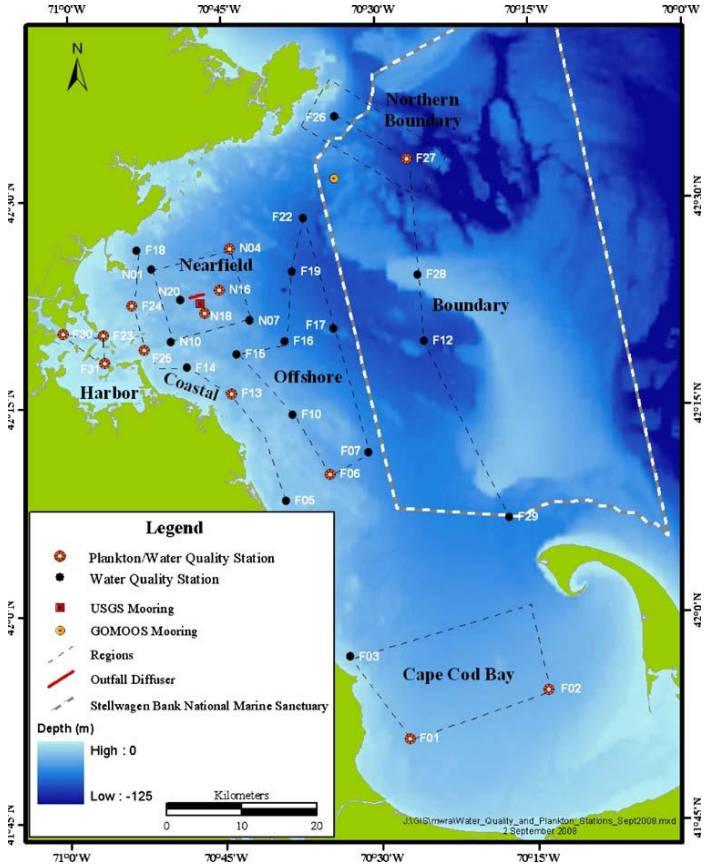
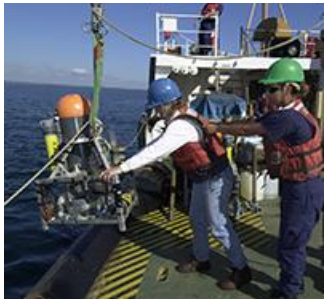
KNB Ecological Metadata Language

- The Ecological Metadata Language (EML) is a metadata standard developed by the ecology discipline and for the ecology discipline.
- "EML was designed with the following standards *in mind*: Dublin Core Metadata Initiative, the Content Standard for Digital Geospatial Metadata (CSDGM from the US geological Survey's Federal Geographic Data Committee (FGDC)), the Biological Profile of the CSDGM (from the National Biological Information Infrastructure), the International Standards Organization's Geographic Information Standard (ISO 19115), the ISO 8601 Date and Time Standard, the OpenGIS Consortiums's Geography Markup Language (GML), the Scientific, Technical, and Medical Markup Language (STMML), and the Extensible Scientific Interchange Language (XSIL)."

Ecological data quality

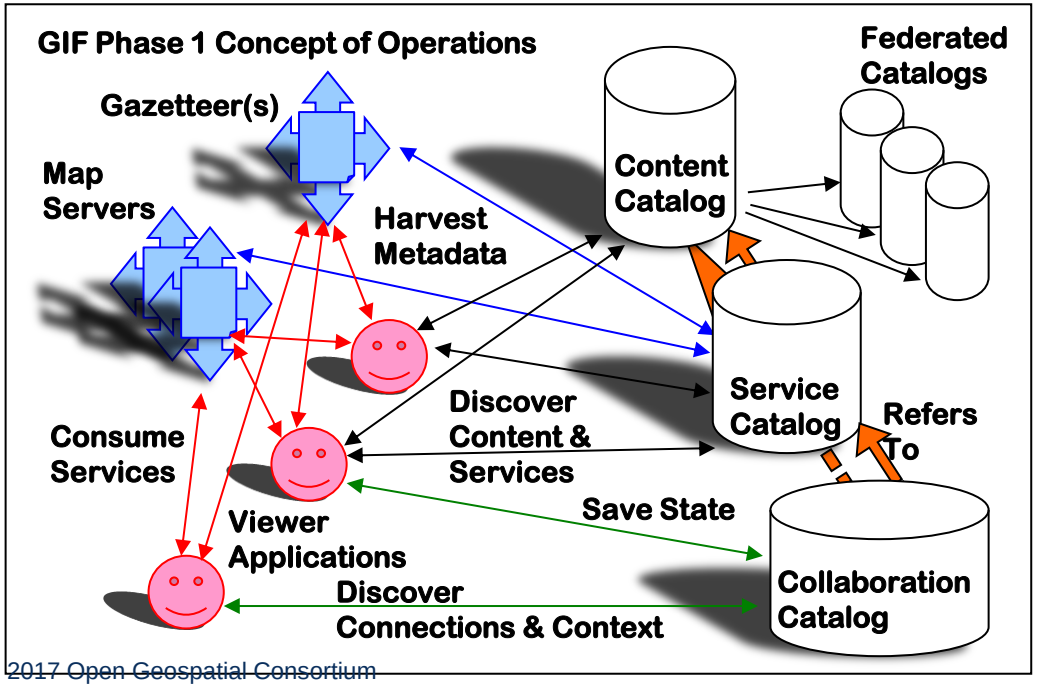
- Boston Harbor / Mass Bay monitoring project
  - Phytoplankton primary production measurements to predict dissolved oxygen effects
  - Involves workflow of sampling, measurements, lab studies
  - Much later, radiance data was found to have been taken in ship shadow, invalidating a large part of the work.





NBII

- "The **National Biological Information Infrastructure** (NBII) was a program coordinated by the United States Geological Survey's Biological Informatics Office within the USGS Biological Resources Discipline. Its purpose was to facilitate access to data and information on the biological resources of the United States, utilizing government agencies, academic institutions, non-government organizations, and private industry." *wikipedia*
- Architecture for OGC-conformant NBII Geospatial Information Framework developed in 2004
- NBII was terminated 15 January 2012.



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Populations and DNA

- A grizzly bear passes through a hair-snagging system used to study the DNA of bears using a wildlife overpass above the Trans-Canada Highway in Banff National Park. Credit: Banff Wildlife Crossings Project. The study collected some 10,000 hair samples from black bears and grizzlies

Read more at https://phys.org/news/2014-02-wildlife-gene-banff.html#jCp

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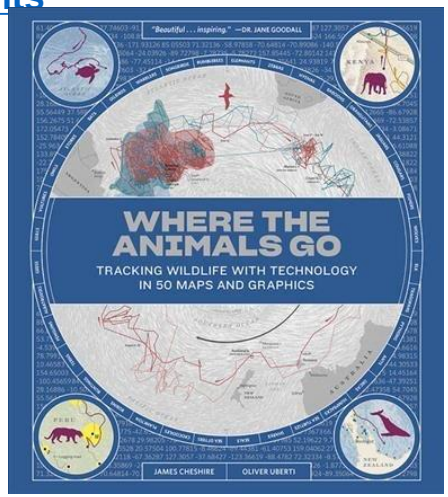
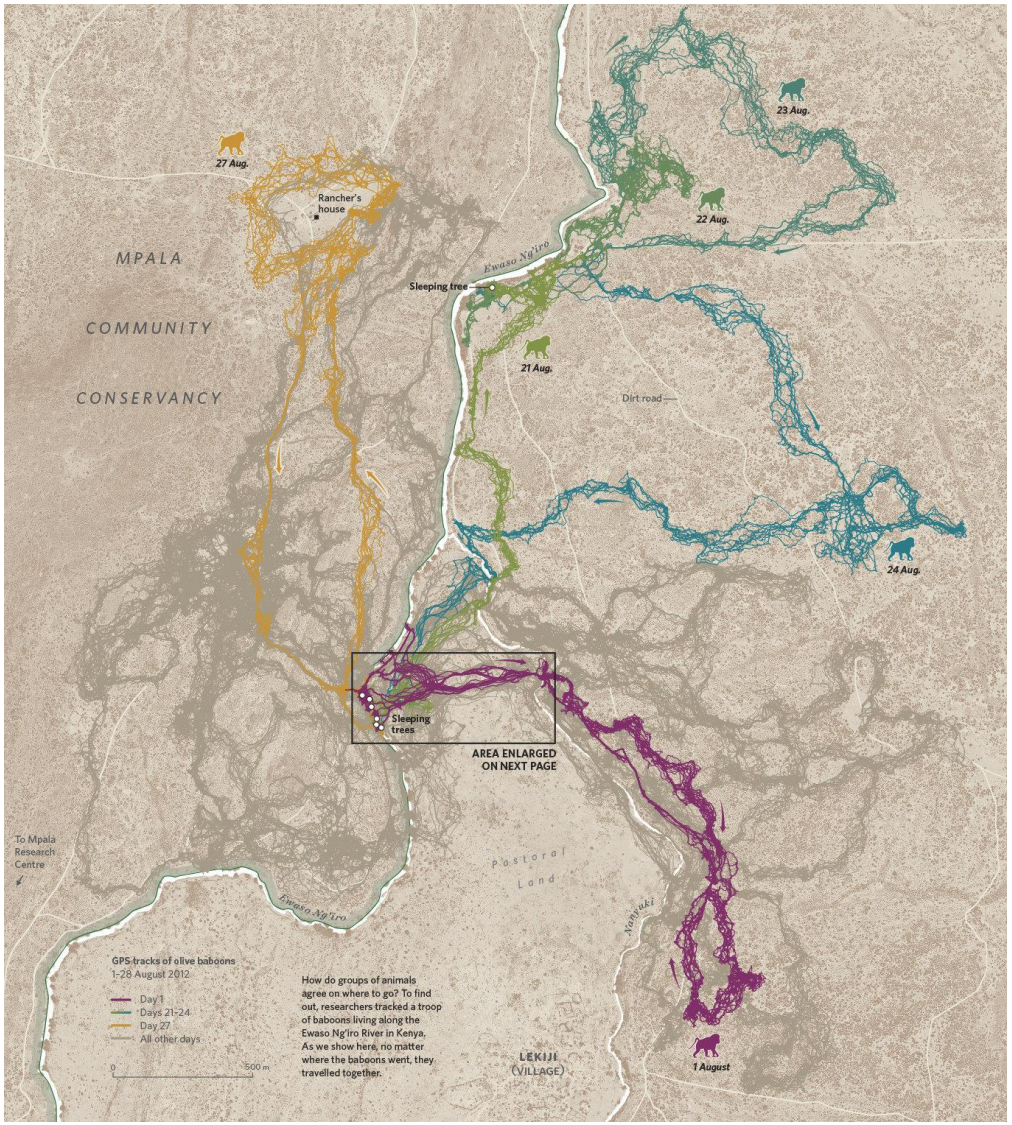
Where the Animals Go

A map in *Where the Animals Go* shows how baboons move near the Mpala Research Centre in Kenya, as tracked by anthropologist Margaret Crofoot and her colleagues in 2012. *Margaret Crofoot, University of California, Davis; Damien Farine, Max Planck Institute for Ornithology /Courtesy of Oliver Uberti*

https://www.npr.org/sections/13.7/2017/09/19/552047632/the-science-and-art-of-mapping-animal-movements





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Wildlife Big Data

- BirdCast, a regional migration forecast giving real-time predictions of bird migration for the first time ever. This uses machine learning to predict migration and roosting patterns of different species of birds.
- PAWS suggests patrol routes in Malaysia based on behavioural models, via Team leader from Rimba (https://www.siliconrepublic.com/innovation/earth-day-game-theory-poaching-wildlife-environment

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