**Introduction**

- Addressing questions concerning ecology, biodiversity and ecosystems at regional, national, and global scales requires analyses to look beyond localised studies and datasets collected from a single point in time and space.
- The required global research initiatives and synthetic vegetation analyses are often limited however, because of difficulties in sharing or combining datasets.
- Can we facilitate synthetic research by means of an exchange schema for plot-based vegetation data?

**Methods**

- In 2003, the Ecoinformatics Working Group and the Council of IAVS endorsed the development of an exchange standard for vegetation plot data.
- In 2007 and 2008 two workshops were held at NESCent in Durham, NC. The first formulated a common set of goals, concepts, and terminology. The second developed these concepts into an XML schema that catered for a wide cross-section of the plot-based vegetation research community.
- The schema also incorporated elements from other schemas (e.g. EML, TCS, DwC v2) to maximize reuse and compatibility.
- Early drafts were subsequently presented at TDWG 2008, a BIEN workshop at NCEAS 2008, IAVS 2009, and INTECOL 2009.

**Developing Tools and Exchanging Data**

- The draft exchange schema can be viewed and discussed via its Wiki at http://wiki.tdwg.org/wiki/bin/view/Vegetation/WebHome.

**Databases**

- NVS
- BIEN
- TurboVeg
- VegBank
- SALVIAS

- A single format reduces effort for writing import and export methods, and simplifies addition of new tools and databases.

**Tools**

- Taxon name
- Scrubbing tools
- Geo-location & validation tools
- Analysis tools: VegAss, JUICE
- Analysis tools: CANOCO, TWINSPAN

**Results**

- The exchange schema for plot-based vegetation data (Veg-X) allows for observations of vegetation at both individual plant and aggregated observation levels.
- It ensures that observations are fixed to physical sample plots at specific points in time, and makes a distinction between the entity of interest (e.g. an individual tree) and the observational act (i.e. a measurement).
- Veg-X supports repeated measurements, allows observations of entities to be grouped following various criteria, and ensures that the taxonomic concept associated with an observation is maintained.
- Veg-X has been successfully tested with VegetWeb, reviewed by VegBank, and adopted by NVS and BIEN.

**Conclusions**

- Exchange standards together with ecoinformatics tools built around those standards will allow scientists to efficiently combine plot data over extensive spatial and temporal gradients in order to perform analyses and make predictions from local to global scales.
- The schema will also facilitate the development of common tools and reduce effort required to extract data into many different formats.

1. AVS – International Association for Vegetation Science
2. NESCent – National Evolutionary Synthesis Center
3. NML – Extensive Mark-up Language
4. EML – Ecological Metadata Language
5. TCS – Taxon Concepts Schema
6. DwC – Darwin Core v2
7. TDWG – Taxonomic Databases Working Group
8. BIEN – Botanical Information and Ecology Network
9. IAVS – International Association for Vegetation Science
10. NVS – New Zealand National Vegetation Survey Databank
11. VegBank – Vegetation plot database of the Ecological Society of America’s Panel on Vegetation Classification
12. NZVS – New Zealand Vegetation Survey
14. NCEAS – National Center for Ecological Analysis and Synthesis
15. INTECOL – International Congress of Ecology
16. VegWeb – Central Vegetation Database of Germany
17. VegBank – Vegetation plot database of the Ecological Society of America’s Panel on Vegetation Classification
18. AVS – Journal of Applied Vegetation Science
19. TurboVeg
20. NEW DB

**Veg-X Component Parts**