

VegBank

A vegetation field plot archive

Sponsored by:

The Ecological Society of America - Vegetation Classification Panel

Produced at:

The National Center for Ecological Analysis and Synthesis

Principal Investigators:

Robert K. Peet, University of North Carolina

John Harris, National Center for Ecological Analysis & Synthesis

Michael D. Jennings, U.S. Geological Survey

Dennis Grossman, NatureServe

Marilyn D. Walker, USDA Forest Service

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Ecological Society of America



National Center for Ecological
Analysis and Synthesis



NatureServe



Federal Geographic Data Committee



Gap Analysis Program



National Biological Information Infrastructure



National Science Foundation

Background

The ESA Vegetation Classification Panel was established in 1993 with a mandate to support the emerging U.S. Vegetation Classification

Partner Organizations

Ecological Society of America

Role: to develop and implement professional standards, including peer review, for documentation and classification of vegetation

NatureServe

Role: to develop, support & maintain a standard vegetation classification for conservation, inventory, and monitoring

Partner Organizations

U.S. Federal Geographic Data Committee Vegetation Subcommittee

Role: to establish within the Federal community standards for accuracy, documentation and quality of vegetation data, and standards for vegetation classification

USGS – BRD / NBII

Role: to “make the NVC system, and its associated data and information products, broadly accessible by incorporating them in the NBII federation.”

Vegetation Panel Findings

- A standardized, refereed, and widely-used vegetation classification for the United States is urgently needed for assessment, management, and inventory of the nation's ecosystems.
- The classification must be based on standardized nomenclature, terminology, methods, and data management.
- Without a set of nationwide standards, data from different sources cannot be integrated, compared, or evaluated.

A Federal Standard

- In 1997 the Federal government adopted as its standard the “National Vegetation Classification.”
- However, only the standards for the physiognomic levels of the hierarchy were adopted in detail.
- A detailed floristic classification based on quantitative field data was adopted only in concept.

Physiognomic categories

Category Example

Class *Woodlands*

Subclass *Mainly Evergreen Woodlands*

Group *Evergreen Needle-leaved Woodlands*

Subgroup *Natural/Seminal*

Formation *Evergreen Coniferous Woodland with
Rounded Crowns*

Floristic categories

Alliance *Juniperus occidentalis*

Association *Juniperus occidentalis /
Artemesia tridentata*

Standards for Vegetation Classification

The Panel and its partners have been working to develop standards for the floristic levels of the classification covering:

- Terminology
- Plot data acquisition
- Identification and documentation of vegetation types
- Formal description and peer review of types
- Information dissemination and management.

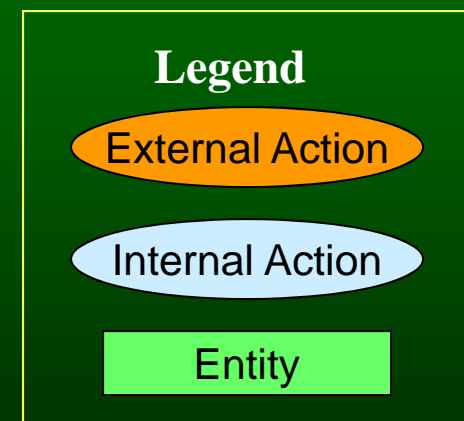
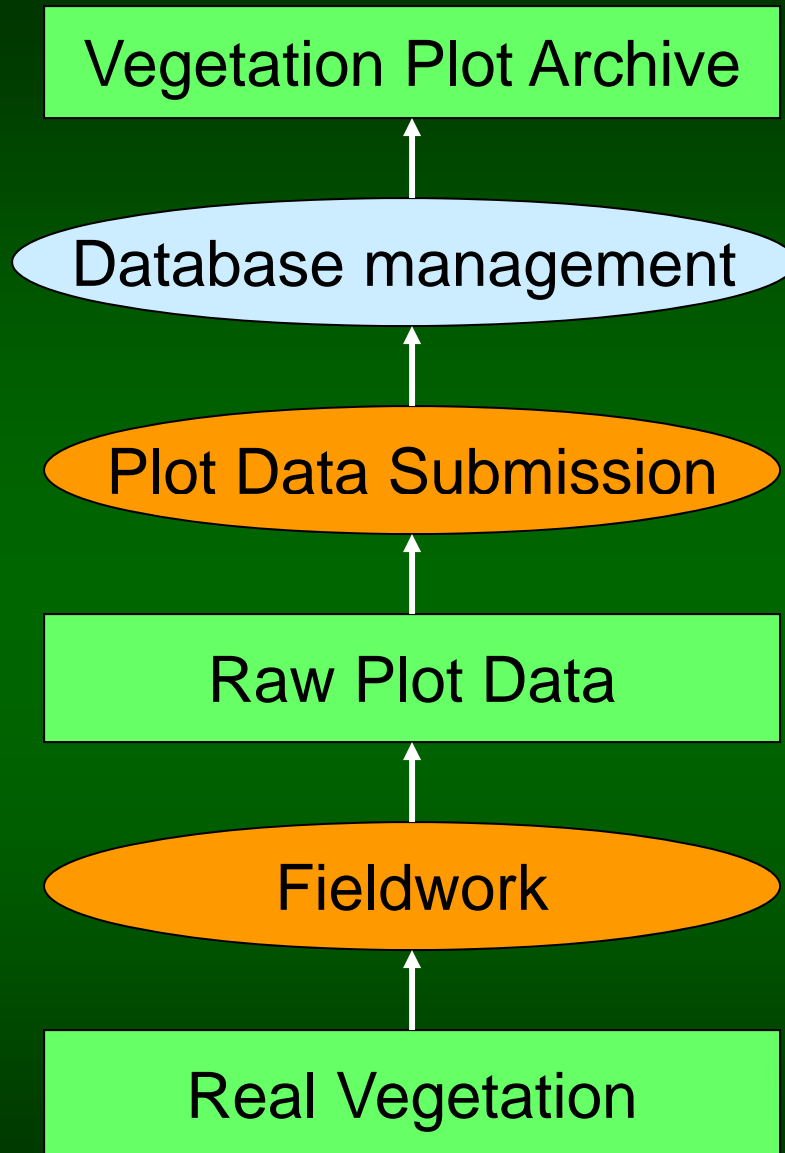
Version 1.0 due for release in spring 2002

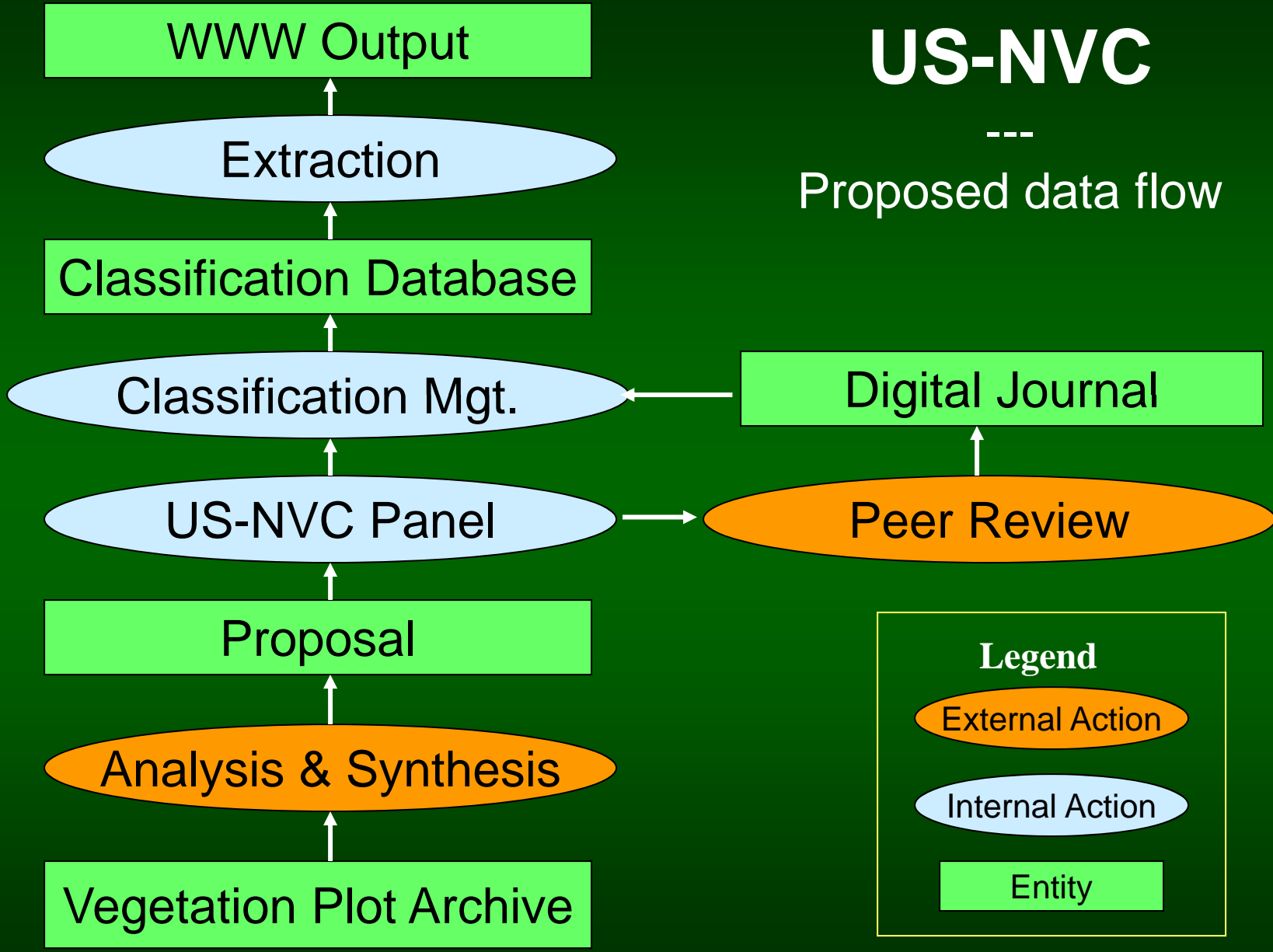
The Missing Piece

The missing core component is the data infrastructure needed to manage the anticipated 10^7 plots and 10^4 plant associations, and to distribute this over the web in a continually revised, perfectly updated form.

The Plot Archive

Information Flow





A vegetation plot archive?

There is currently no standard repository for plot data.

A repository is needed for:

- Plot storage and preservation
- Plot access and identification
- Plot documentation in literature/databases

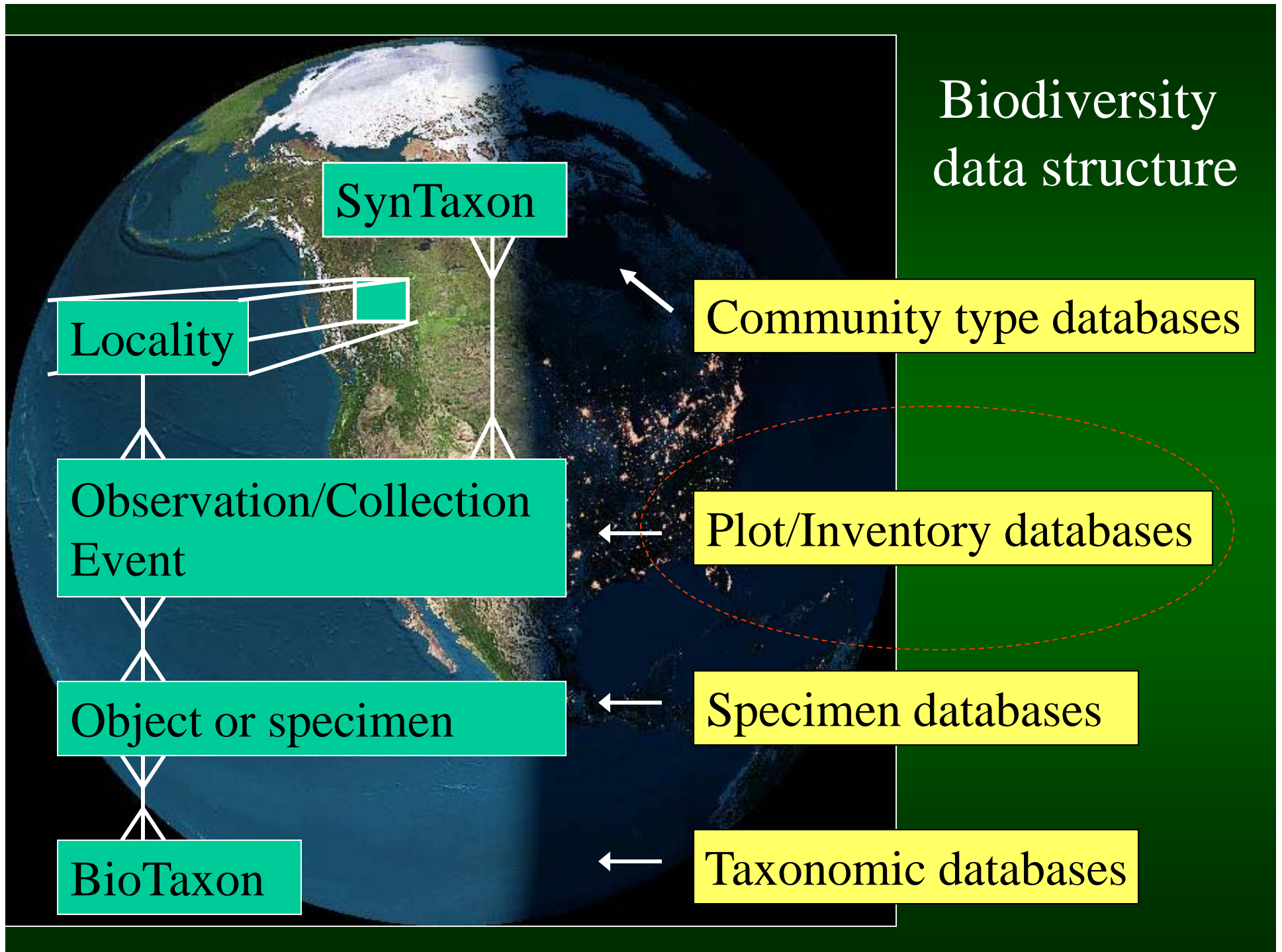
VegBank

- The ESA Vegetation Panel is currently developing a public archive for vegetation plots known as *VegBank* (www.vegbank.org).
- *VegBank* is expected to function for vegetation plot data in a manner analogous to *GenBank*.
- Primary data will be deposited for reference, novel synthesis, and reanalysis.

EcoInformatics ?

Massive plot data have the potential to create new disciplines and allow critical syntheses.

- Remote sensing. What is really on the ground?
- Theoretical community ecology. Who occurs together, and where, and following what rules?
- Monitoring. What changes are really taking place in the vegetation?
- Restoration. What should be our restoration targets?
- Vegetation & species modeling. Where should we expect species & communities to occur after environmental changes?



The Taxonomic database challenge:

Standardizing organisms and communities

The problem:

Integration of data potentially representing different times, places, investigators and taxonomic standards.

The traditional solution:

A standard list of organisms / communities.

Standard lists are available

Representative examples for higher plants include:

* *North America / US*

USDA Plants <http://plants.usda.gov/>

ITIS <http://www.itis.usda.gov/>

NatureServe <http://www.natureserve.org>

* *World*

IPNI International Plant Names Checklist

<http://www.ipni.org/>

IOPI Global Plant Checklist

<http://www.bgbm.fu-berlin.de/IOPI/GPC/>

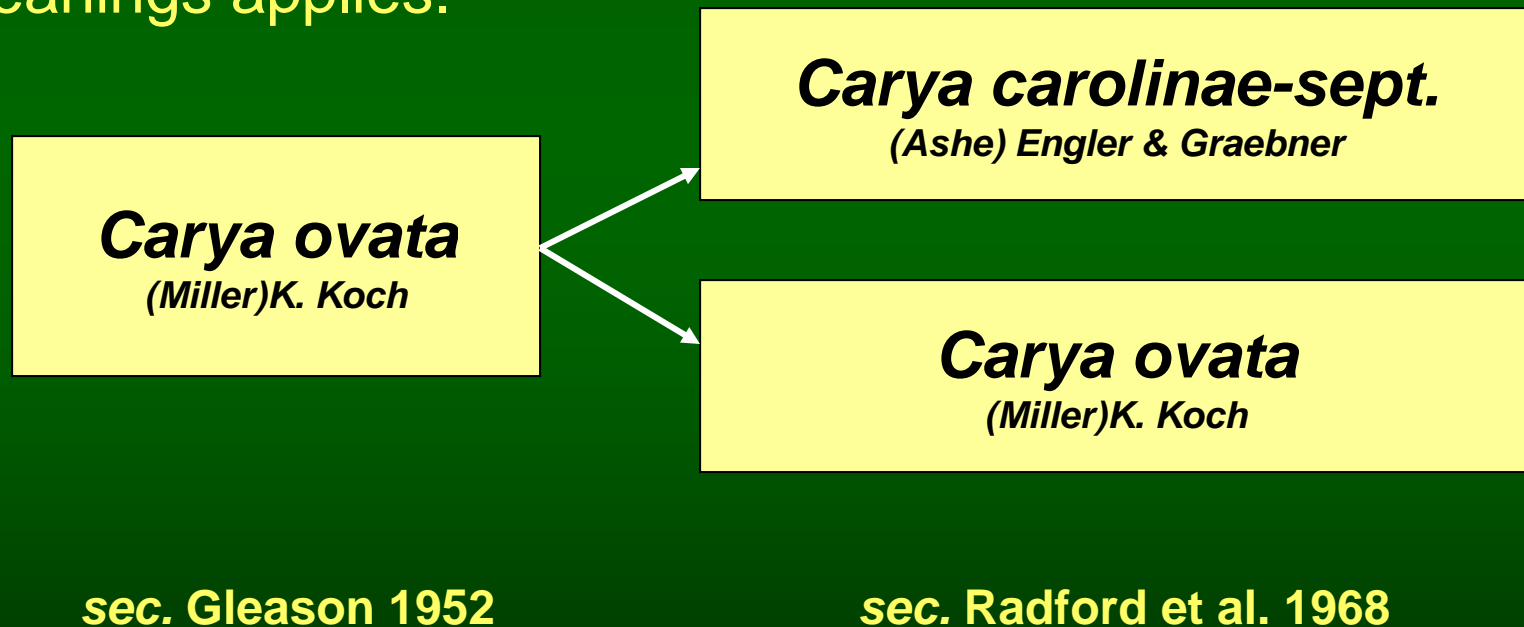
Most standardized taxon lists fail to allow effective integration of datasets

The reasons include:

- The user cannot reconstruct the database as viewed at an arbitrary time in the past,
- Taxonomic concepts are not defined (just lists),
- Multiple party perspectives on taxonomic concepts and names cannot be supported or reconciled.

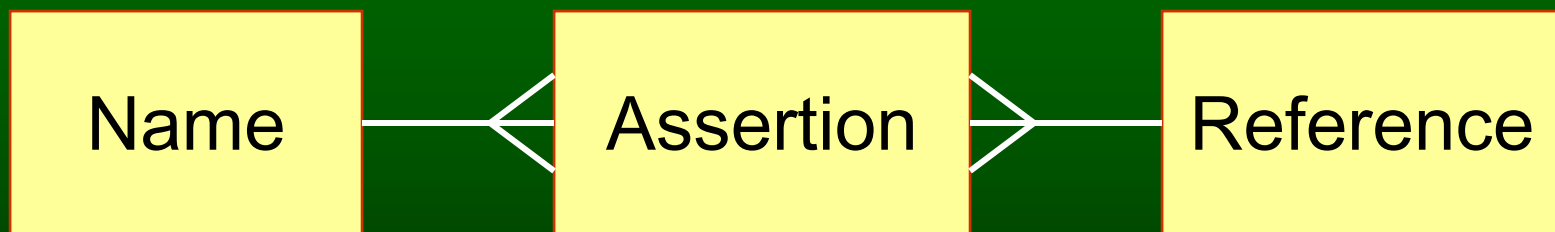
Three concepts of shagbark hickory

Splitting one species into two illustrates the ambiguity often associated with scientific names. If you encounter the name “*Carya ovata* (Miller) K. Koch” in a database, you cannot be sure which of two meanings applies.



An *assertion* represents a unique combination of a *name* and a *reference*

*“Assertion” is equivalent to
“Potential taxon” & “taxonomic concept”*



Six shagbark hickory assertions

Possible taxonomic synonyms are listed together

Names

Carya ovata

Carya carolinae-septentrionalis

Carya ovata v. *ovata*

Carya ovata v. *australis*



Assertions

(One shagbark)

C. ovata sec Gleason '52

C. ovata sec FNA '97

(Southern shagbark)

C. carolinae-s. sec Radford '68

C. ovata v. *australis* sec FNA '97

References

Gleason 1952 Britton & Brown

Radford et al. 1968 Flora Carolinas

Stone 1997 Flora North America



(Northern shagbark)

C. ovata sec Radford '68

C. ovata (v. *ovata*) sec FNA '97

(Inter)National Taxonomic Database?

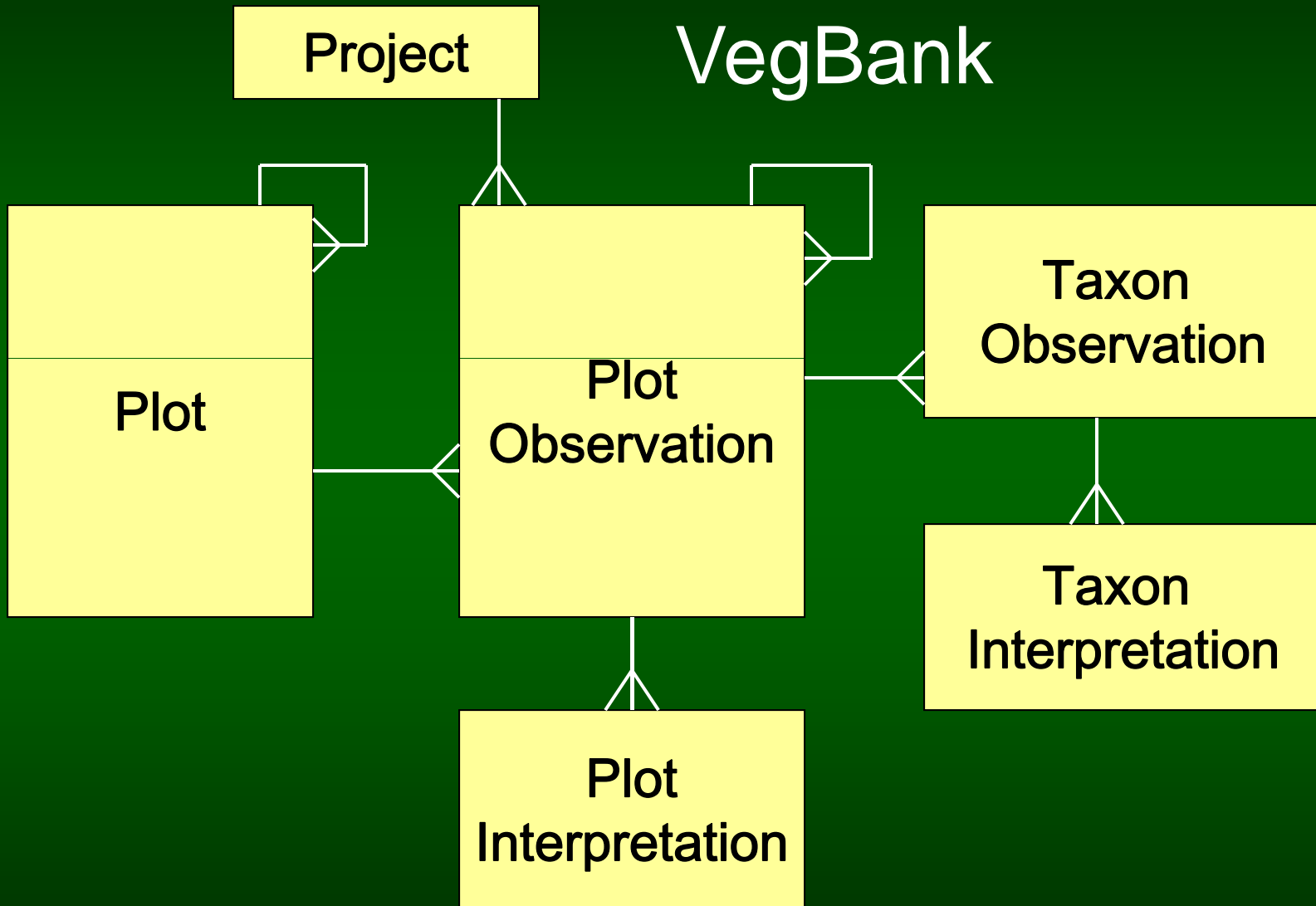
An upgrade for ITIS & Species 2000?

- Concept-based
- Party-neutral
- Synonymy and lineage tracking
- Perfectly archived

Where are we?

- Standards are being developed by various groups: FGDC, TDWG, IOPI, GBIF, etc.
- All organisms/specimens/communities in databases should be identified by linkage to an assertion = name and reference!

Core elements of VegBank



ESA standards for plot data

Four levels of standards:

- Submission (geocoordinates, dominant taxa)
- Occurrence (area, interpretation)
- Classification (cover values for all taxa)
- Best practice (cover values in strata)

Pick lists (48 and counting)

Conversion to common units

Method protocols

Concept-based interpretations

“Painless” metadata

VegBank

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VegBank is the vegetation plot database of the Ecological Society of America. VegBank consists of three linked databases: VegPlots contains the actual plot records, VegTypes contains the US National Vegetation Classification and other vegetation types submitted by users, and VegPlants contains all plant taxa recognized by ITIS as well as all other plant taxa recorded in plot records. Vegetation records, community types and plant taxa may be submitted to VegBank and may be subsequently searched, viewed, annotated, revised, interpreted, downloaded, and cited.

Login to VegBank

Username Password

VegBank is operated by the [Panel on Vegetation Classification](#) of the Ecological Society of America in cooperation with the [National Center for Ecological Analysis and Synthesis](#)

News

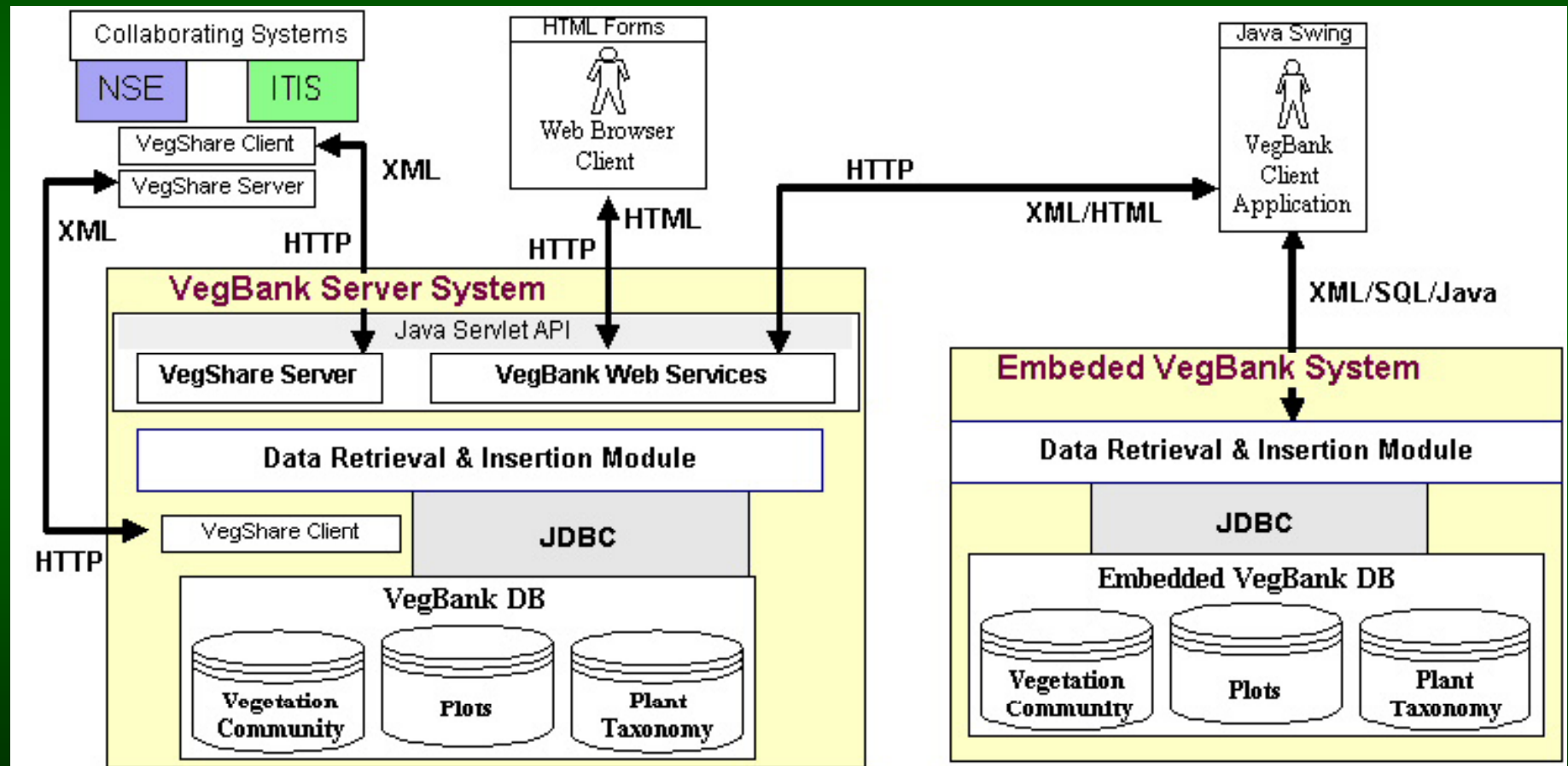
- VegBank [beta-release scheduled](#) for July 1, 2002.
- VegBank [Workshop & Fieldtrip](#) to be held ESA meeting in Tucson, August 2002.
- Governing Board approves [Bylaws](#) for Vegetation Panel.
- [Version 8](#) of the draft ESA Standards for Vegetation Classification to be released in April, 2002

It is interesting to contemplate a tangled bank, clothed with many plants of many kinds, with birds singing on the bushes, with various insects flitting about, and with worms crawling through the damp earth, and to reflect that these elaborately constructed forms, so different from each other, and dependent upon each other in so complex a manner, have all been produced by laws acting around us. -- Darwin

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Parallel Server and Client systems



VegBank Client Interface Tools

- Desktop client for data preparation and local use.
- Flexible data import, including XML.
- Tools for linking taxonomic and community concepts.
- Standard query, flexible query, SQL query.
- Flexible data export, including XML.
- Easy web access to central archive

Conclusions

1. A public archive is needed for vegetation plot data
2. Design for reobservation. Separate permanent from transient attributes.
3. Records of organisms should always contain a scientific name and a reference.
4. Design for future annotation of organism and community concepts.
5. Archival databases should provide time-specific views.