NatureServe Network Biodiversity Observation Data Standard

March 2020

NatureServe Network

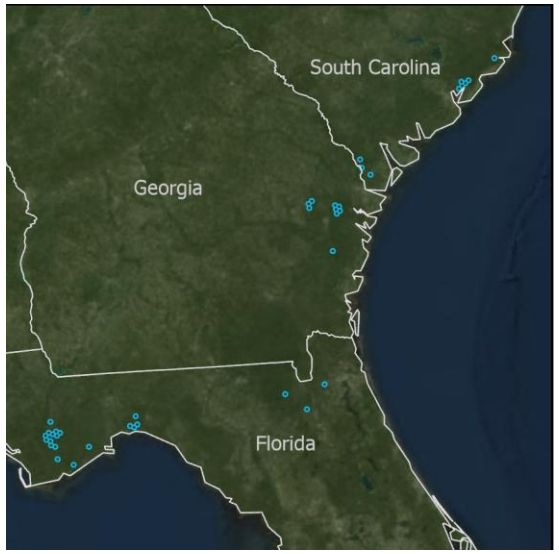
Why We Need an Observation Data Standard

Our focus has largely been on Network-collected occurrence data for key locations of demonstrable conservation value. But:

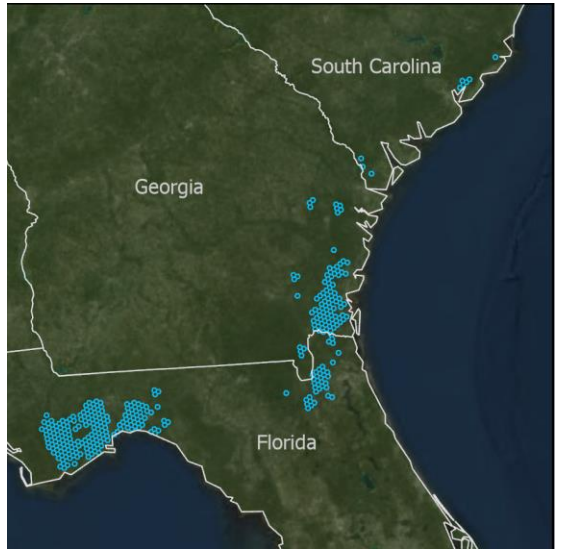
- With increasing pressures on biodiversity, there is an increasing need for rapid and more comprehensive biodiversity assessments.
- There is an increasing volume of observation data available from citizen science and other data collection efforts across the globe.
- We've reached a critical moment where we must bring together a diversity of relevant data to address rising conservation challenges.

Standard - Facilitate Core Network Products

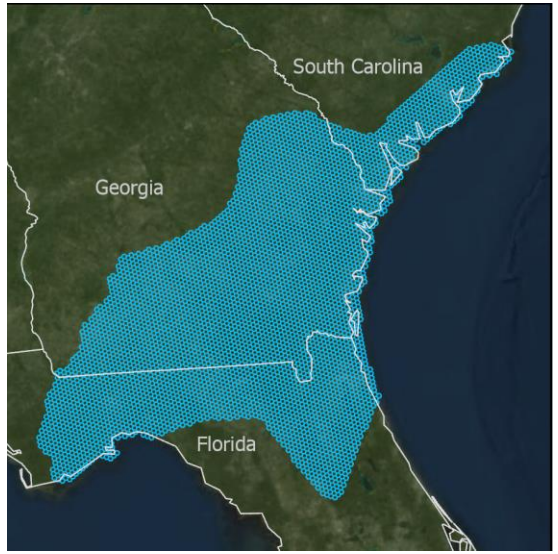
- Spatial Distribution Products
- Conservation Status Assessments
- Quality and Condition Assessments
- More…



Element Occurrences



Predicted Distribution



Range

Spatial distribution products

Vision

Collect and aggregate professionally vetted, standardized observation data of at-risk species and ecosystems to support effective conservation and management

- Compatible with existing NatureServe data schemas (i.e., Biotics)
- Positioned to accept data from external sources (interoperable with Darwin Core)
- Designed to meet Network Program needs
- Support the development of priority Network products

Observation Data Standard Work Group

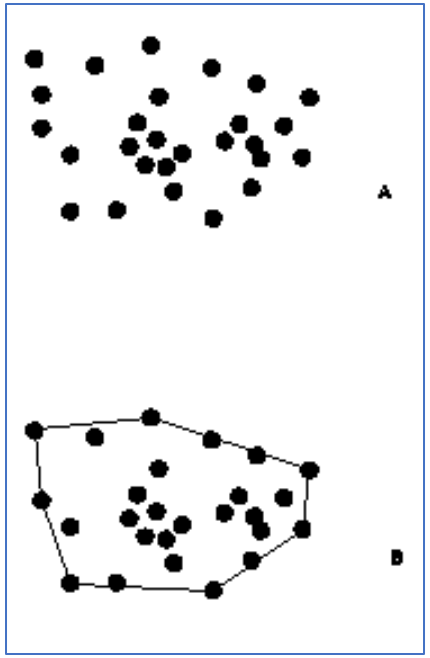
We established a work group of 18 NatureServe staff and Network members to develop the standard, building on past efforts

- 2006: first draft of an observation data standard
- 2016: Network's Spatial Methodology Review Team reviews standard, makes recommendations for new standard
- 2020: Observation Standard Work Group takes it over the line

- Work Group followed guidance for setting Network Standards
- Guidance vetted by Section Councils

Work Group Objectives

- Recommend a comprehensive set of biodiversity observation data fields that are relevant to most of the Network's programs and meet individual program needs
- Identify a core set of biodiversity observation data fields that can be aggregated to produce key Network-wide products:
  - Spatial Distribution Products
    - Element Occurrences
    - range maps
    - hexagon grid-observations
    - habitat suitability models
  - Conservation Status Assessments
    - establish geographic extent to support ranking
  - Quality and Condition Assessments



Guiding Principles

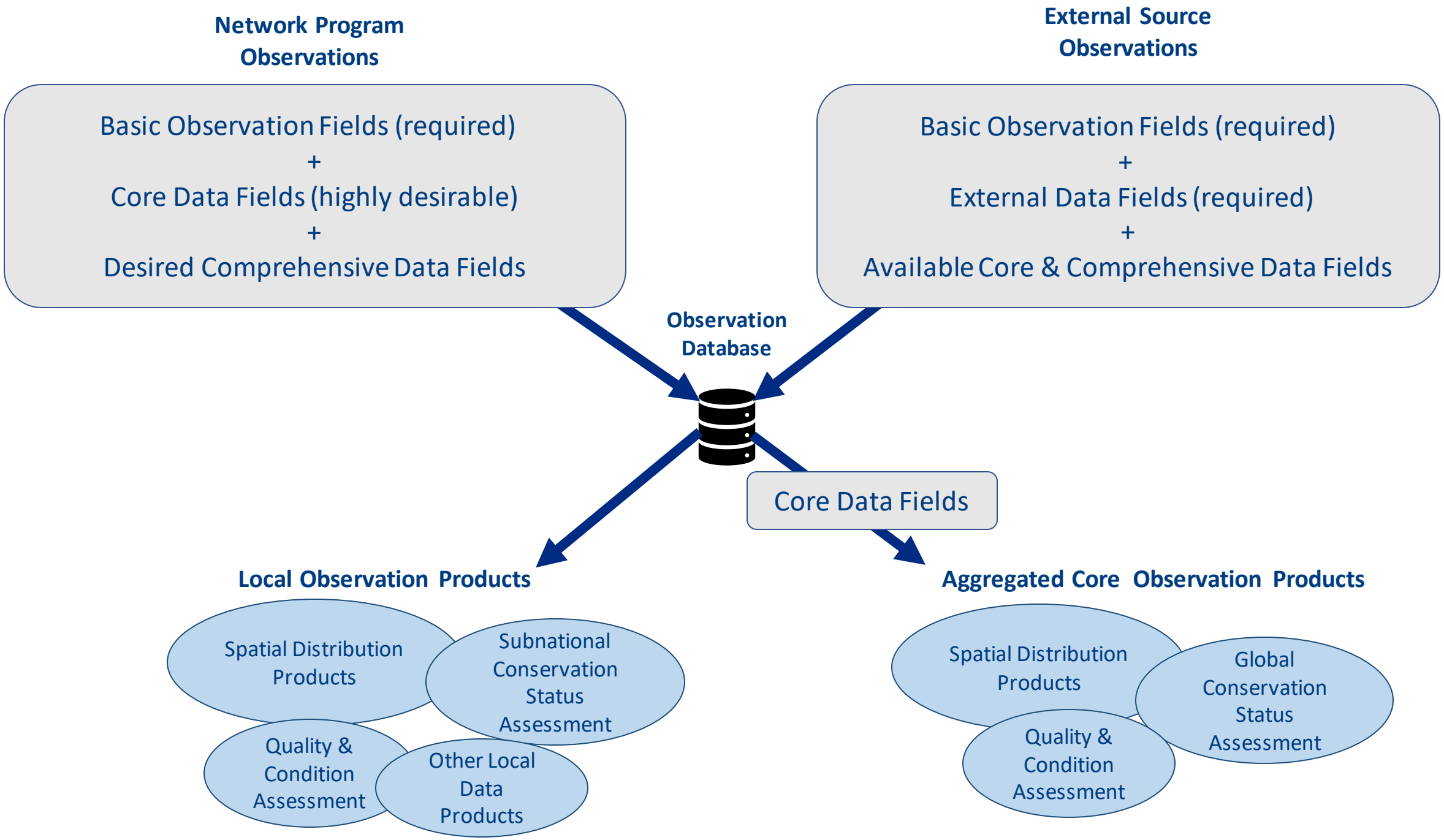
- Keep it simple
  - Require only what is needed to meet product needs
- Maximize compatibility with Darwin Core (international standard)
  - Standardize what makes sense
  - Meet specific Network business needs
- Provide Options
  - Accommodate compatible ways to collect and manage similar data
- Consider the need to query data
  - use domain tables as appropriate to support data queries
- Promote assessment of data quality
  - facilitate assessment of the quality and confidence of observation records
- Ease the uptake and management of large amounts of data
  - facilitate aggregation of large observation data sets from multiple sources
- Use quantitative data
  - where possible, make observation attribute data quantitative

Observation Definition

- An observation is "*an occurrence, or documentation of lack of an occurrence, of an organism, a set of organisms, or an ecosystem type through a data collection event at a location at a given time by an observer(s).*"
- Documentation of
  - a species or ecosystem
  - at a location
  - at a given time
  - by a sensor (human or machine).

Biodiversity Observation Data Standard

- **What:** species taxa or ecosystem types observed (e.g. taxon id)
- **Where:** location of the observation (e.g. latitude & longitude)
- **When**: time the species or ecosystem was observed (e.g. date)
- **Who:** names of the observers (e.g. observer)
- **Details:** what's going on there?: (e.g. condition, migratory use)
- **Other:** administrative (e.g. dataset name, collection id)


Network Program Observations
Basic Observation Fields (required)
+
Core Data Fields (highly desirable)
+
Desired Comprehensive Data Fields
External Source Observations
Basic Observation Fields (required)
+
External Data Fields (required)
+
Available Core & Comprehensive Data Fields
Observation Database
Core Data Fields
Local Observation Products
Spatial Distribution Products
Subnational Conservation Status Assessment
Quality & Condition Assessment
Other Local Data Products
Aggregated Core Observation Products
Spatial Distribution Products
Global Conservation Status Assessment
Quality & Condition Assessment

Basic Observation Fields

(19 fields)

WHAT	WHERE	WHEN	WHO	DETAILS	OTHER
Scientific Name	Lat & Long	Observation Date	Observer	Observation ID	Record Created By
or	*or*	*or*			Record Creation Date
Common Name	Line	Verbatim Date			
or	*or*	*or*			
Higher Classification Level, Name, & ID	Polygon	Observation Start Date & End Date			
	Coordinate System				
	Geodetic Datum				

Fields Needed for Data from External Sources

(in addition to Basic Fields)

WHAT	OTHER
Concept Reference Citation & ID	Dataset Name & ID
Name Used in Concept Reference & ID	Global ID
Year Name was Published	

Core Product Fields

(in addition to Basic Fields)

WHAT	WHERE	DETAILS
Taxon ID	Locational Uncertainty Type	Data Sensitivity Category & Data Sensitive?
	Locational Uncertainty Distance (if Type = Estimated)	Migratory Use
	Locational Uncertainty Unit (if Type = Estimated)	Conceptual Feature Type
		Detected?
		Condition of Element Comment
		Suitable for EO?
		Suitable for Modeling?

- Spatial Distribution Products
- Conservation Status Assessments
- Quality and Condition Assessments

Comprehensive Fields

https://www.natureserve.org/conservation-tools/observation-data-standard

https://tranxfer.natureserve.org/download/Longterm/SE_Office/lee/ns-obs-data-standard-v1.0.html

NatureServe Biodiversity Observation Data Standard (Version 1.0)

Connecting Science With Conservation

Show core fields ⇅ and key columns ⇆ | Search | Show all fields ↕ | Show all columns ↔

Click a cell to see its full text. Click a column heading to see its definition. Download a Microsoft Excel version of this table.

Category	Group	Field Label	Field Name (Database)	Definition	Darwin Core Equivalent	Biotics Equivalent	nonDarwin	Field	Basic
WHAT	Identification	Confirmation of	identificationVerificationStatus	Confidence that the	identificationVerificationStatus			Database	
WHAT	Taxon	Taxon ID	element_subnational_id	An identifier for the	taxonID	EST/EGT_ID		Database	
WHAT	Taxon	Accepted Usage ID	acceptedNameUsageID	An identifier for the	acceptedNameUsageID			Database	
WHAT	Taxon	Accepted Usage	acceptedNameUsage	The full name, with	acceptedNameUsage	Use formatted scientific name.		Database	
WHAT	Taxon	Parent ID	parentNameUsageID	An identifier for the	parentNameUsageID	If genus_species and/or		Database	
WHAT	Taxon	Parent Usage	parentNameUsage	The full name, with	parentNameUsage				
WHAT	Taxon	Original Name Usage	originalNameUsageID	An identifier for the	originalNameUsageID				
WHAT	Taxon	Original Usage	originalNameUsage	The taxon name, with	originalNameUsage				
WHAT	Taxon	Concept Reference	concept_reference_id	Unique ID of the	nameAccordingToID	con			E
WHAT	Taxon	Concept Reference	nameAccordingTo	Citation for the	nameAccordingTo				E
WHAT	Taxon	Name used in	concept_name_id	Idenfitication number		ELE			E
WHAT	Taxon	Name used in	concept_name	Scientific name used					E
WHAT	Taxon	Author of Scientific	concept_author	Author of the		CON			
WHAT	Taxon	Name Published in ID	namePublishedInID	An identifier for the	namePublishedInID				
WHAT	Taxon	Name Published in	namePublishedIn	A reference for the	namePublishedIn				
WHAT	Taxon	Name Published in	namePublishedInYear	The four-digit year in	namePublishedInYear				E
WHAT	Taxon	Taxon Concept ID	taxonConceptID	An identifier for the	taxonConceptID				
WHAT	Taxon	Verbatim Scientific	verbatim_scientific_name	Name as it appeared					
WHAT	Taxon	Scientific Name ID	scientific_name_id	An identifier for the		SCIENTIFIC_NAME.scientific_name_i	Biotics field	Database	
WHAT	Taxon	Scientific Name	scientificName	The full scientific	scientificName	Name used in concept reference		Field form	O

Online Data Standard

Learn More

Additional Resources:

- A Biodiversity Observation Data Standard for the NatureServe Network - Final Report
- Observation Data Standard (Excel)

Comparison with Darwin Core

Maximize compatibility with Darwin Core (DwC):

- follow Darwin Core standards as much as possible;
- balance with Network needs & products (e.g., compatibility w/ Biotics)

Darwin Core fields clearly identified in the standard:

- Basic Fields (19): 15 part of DwC
- Core Fields for products (12): 2 are part of DwC

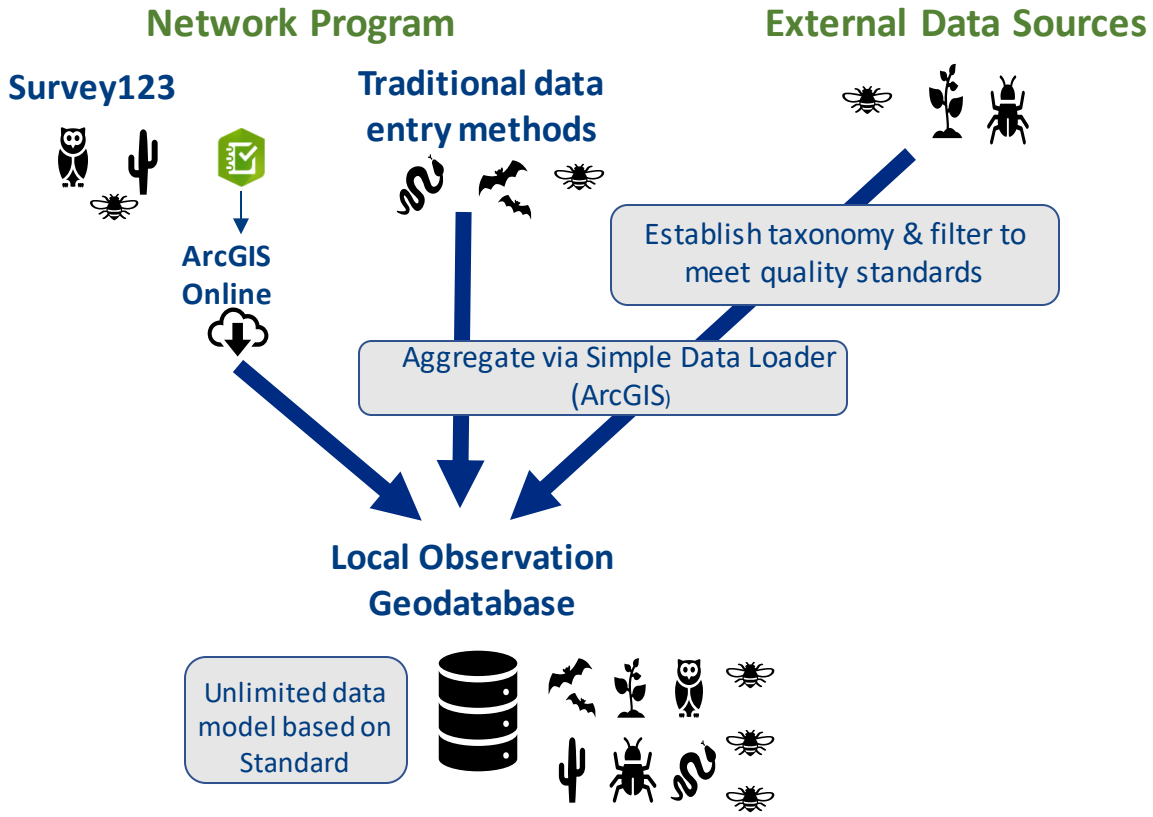
Collect and Aggregate Observations

Collect Field Data

- Survey123 (ArcGIS)

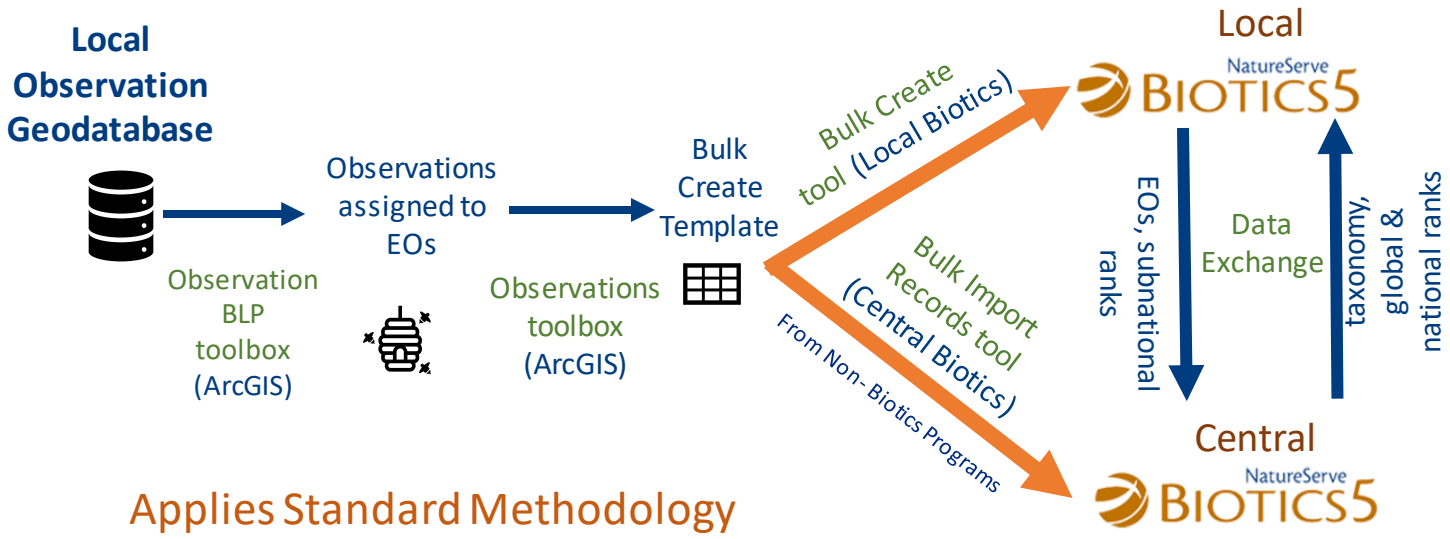
Aggregate Observations

- Simple Data Loader (ArcGIS) – crosswalks data models

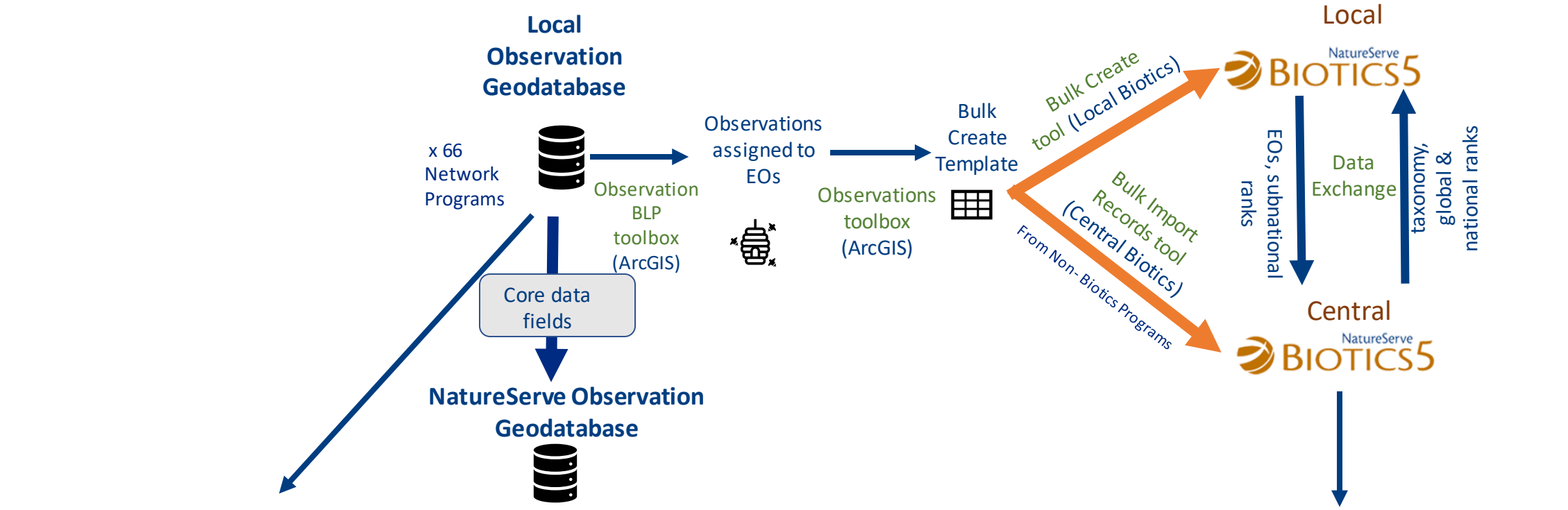


Create EOs from Observations

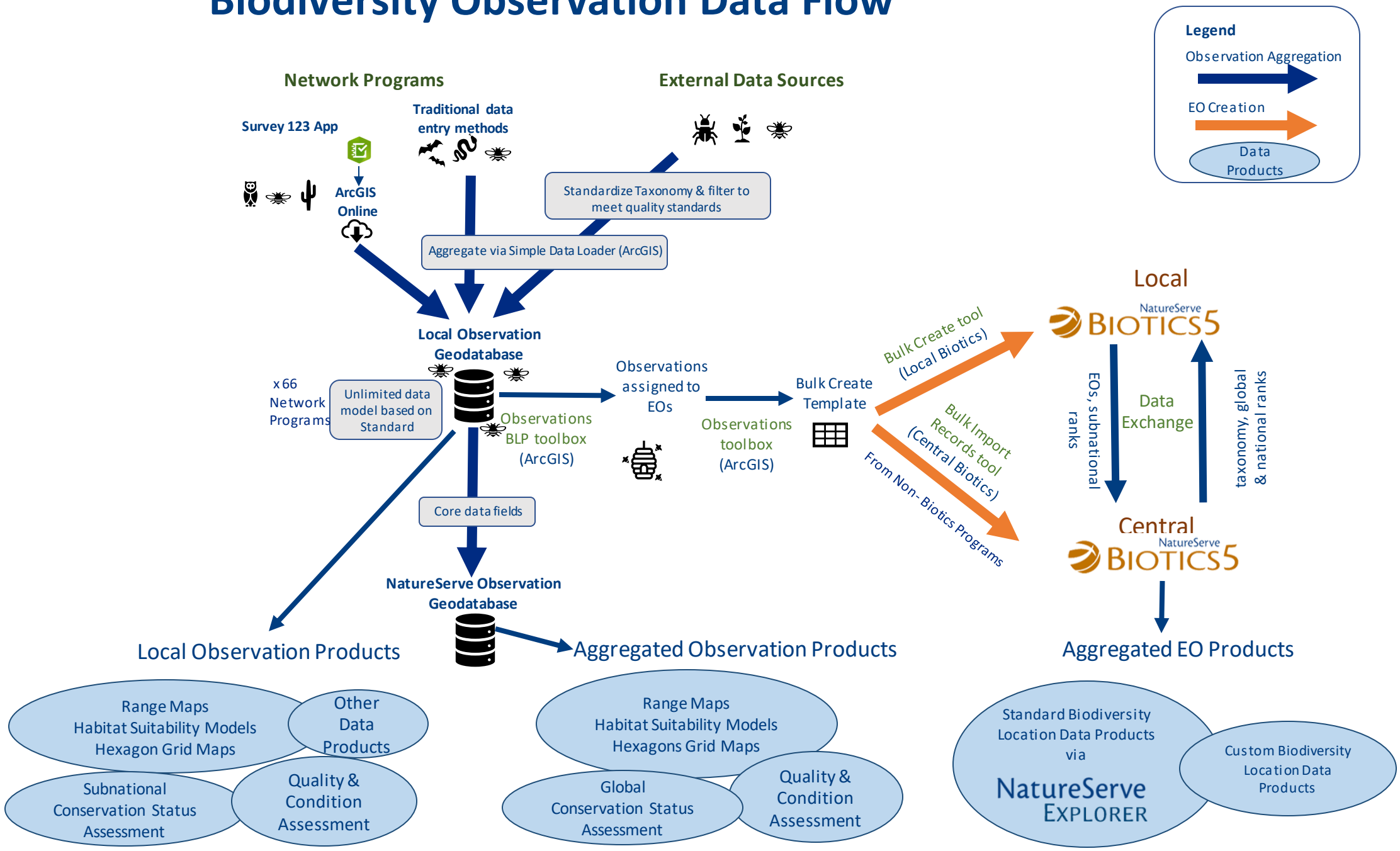
- Observation Bulk Load Prep (BLP) toolbox (ArcGIS)- assigns observations to new or existing EOs
- Observations toolbox (ArcGIS)– formats data and populates geodatabase for import into Biotics
- Bulk Create tool (Local Biotics) – creates Source Features and EOs in local Biotics
- Bulk Import Records tool (Central Biotics) – creates Source Features and EOs in Central Biotics - using data from programs that don't use Biotics.



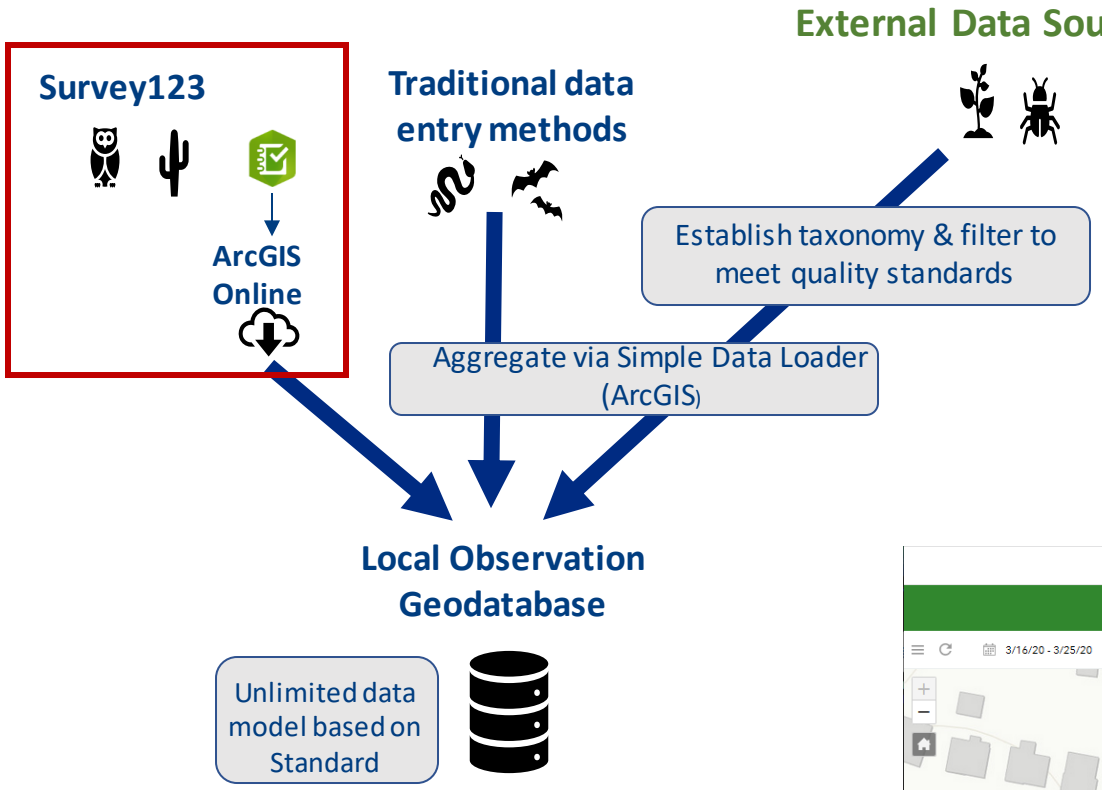
Create Products



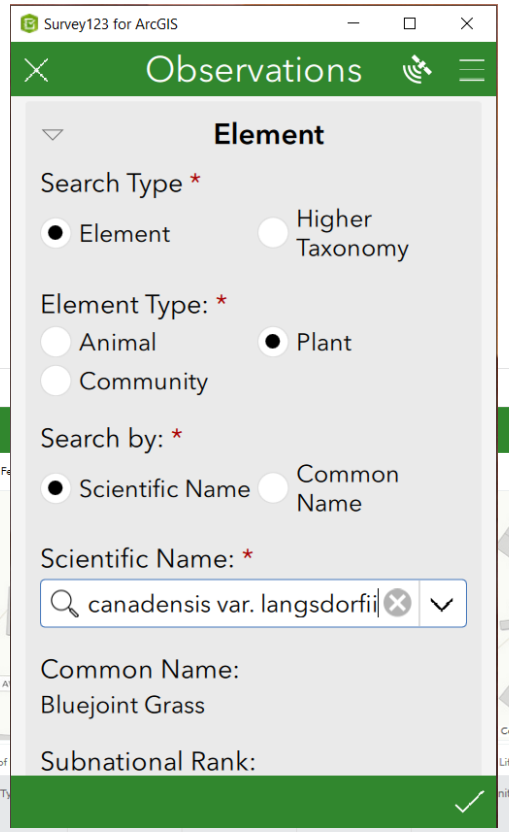
Biodiversity Observation Data Flow



Survey 123 Demo



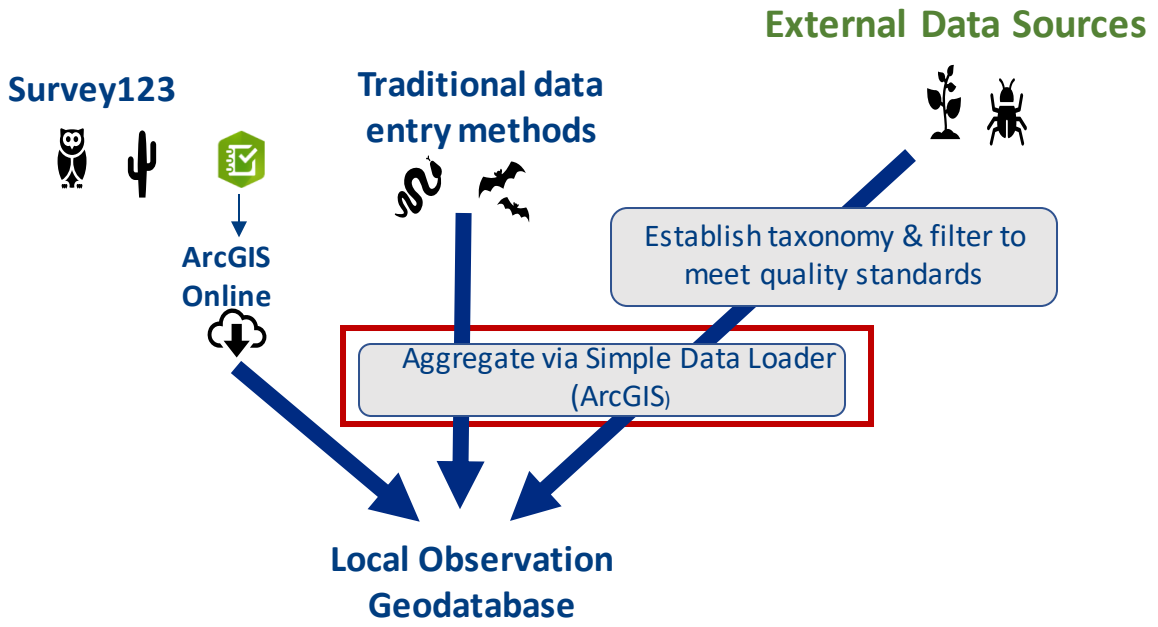
Test out the Observations survey

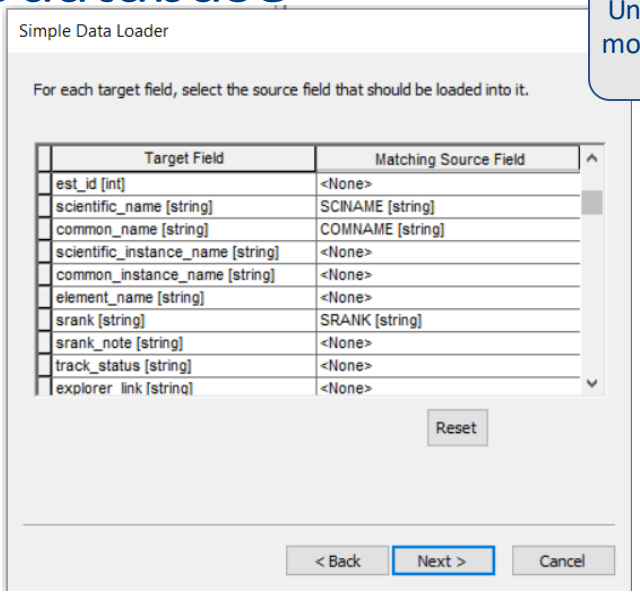


- Data collection tool based on Observation Data Standard
- Customizable
- Smartphones, tablets, laptops
- Data entry by anonymous user or arcgis.com user

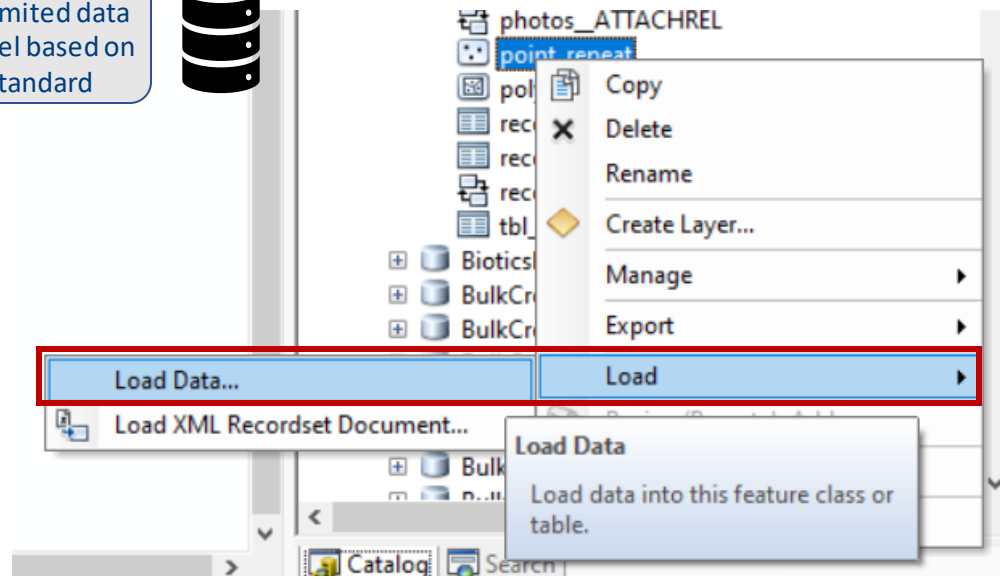
Simple Data Loader

- Esri tool which facilitates crosswalk from one data model to another
- Instructions found in this help topic
- Use of the Loader enables aggregation of data from multiple sources into a single geodatabase

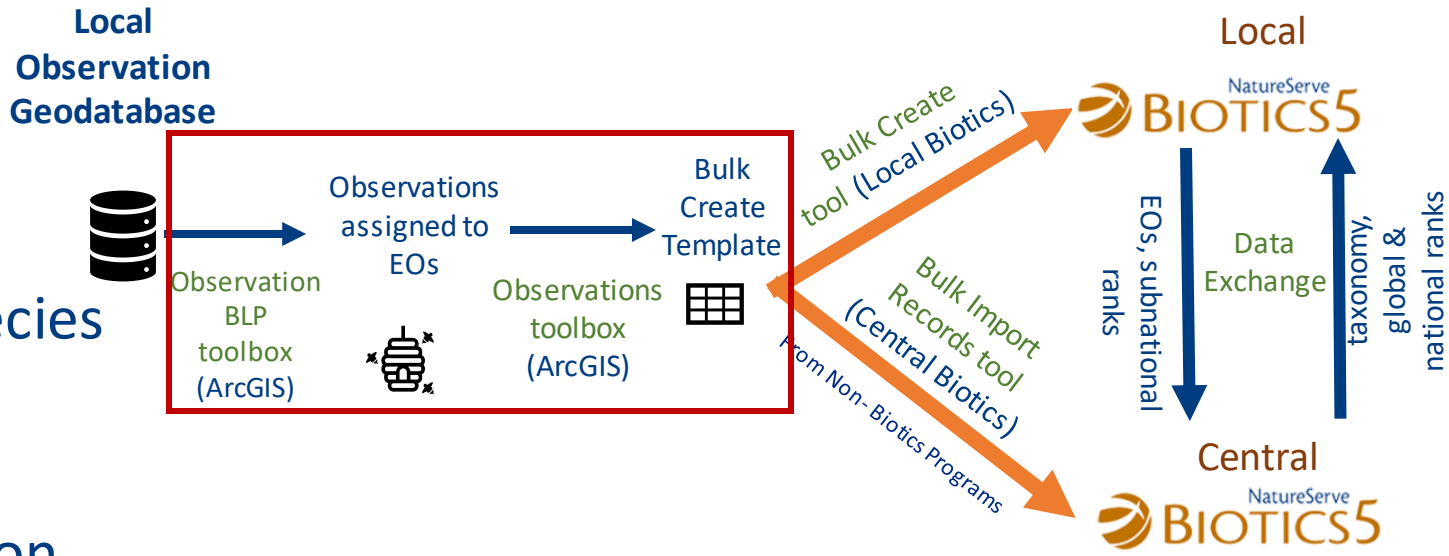




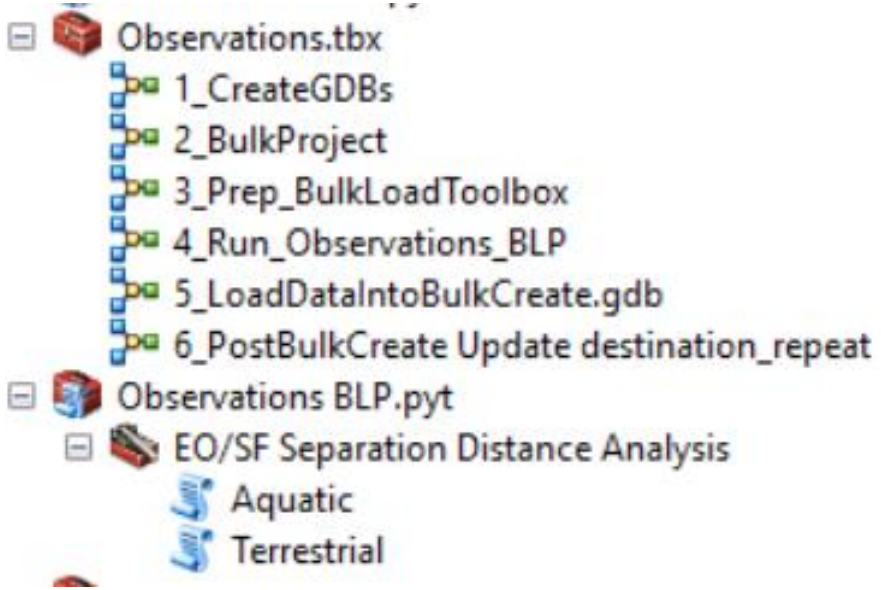
Unlimited data model based on Standard



Bulk Load Tools



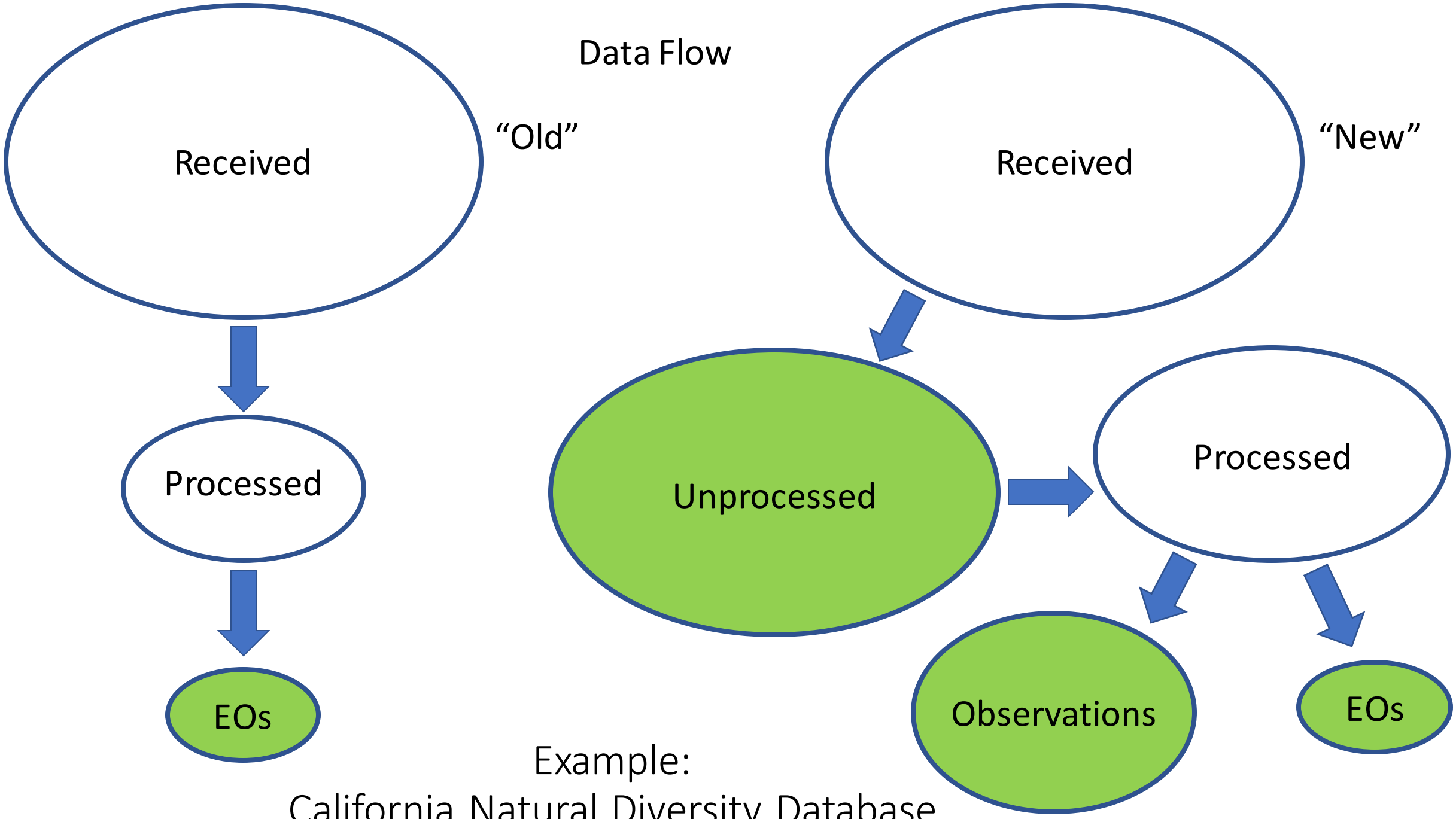
- Applies standard methodology
- Limits Observations to Tracked species (Y, P, W)
- Defaults to Suitable Habitat while allowing customization of separation distance
- Assigns Observations to new or existing EOs according to separation distance
- Populates BulkCreate.gdb template for import into Biotics 5
- Does not alter original data but adds to it



Example:
California Natural Diversity Database

CNDDB plans to use ODS to:

- Customize Survey123
  - Standardize data submission
  - Streamline data consolidation
- Inform development of observations data management system
  - Improve internal processing efficiency
  - Reduce data backlog
  - More data available to stakeholders and decision-makers



Example:
California Natural Diversity Database

Danaus plexippus pop. 1

Monarch Butterfly - California Overwintering Population (G4/T2: Imperiled)

CNDDB EOs
(overwintering sites)

iNaturalist Observations
(Research Grade)

Conclusion

- Our new observation standard and associated tools will help us develop our core products:
  - streamline network program observation data collection and management
  - facilitate use of external observation data
- Observations survey in Survey123 – from creating survey to Bulk Create
- Collect data via Survey123
- Test out the Observations survey!
- Upcoming trainings:
  - Thurs, Apr 2 from 2 – 3:30 PM (Eastern) - Installing the Observations survey, modifying, publishing, administering
  - Thurs, Apr 9 from 2 – 3:30 PM (Eastern) - Downloading survey results from Survey123 and bulk importing into Biotics