





Symbiota: a specimen-based biodiversity portal platform

Edward Gilbert Nico Franz Corinna Gries



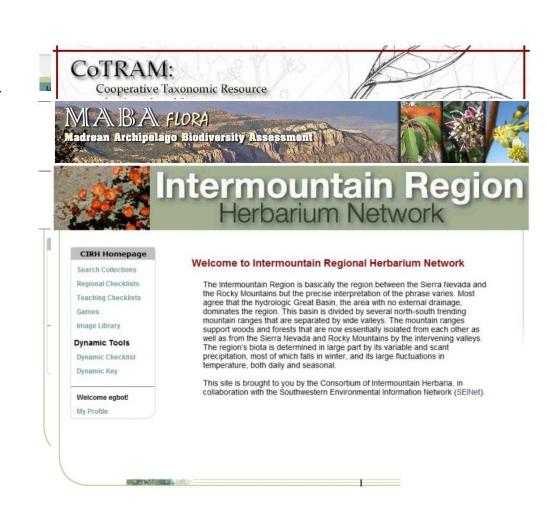
Symbiota Biodiversity Portals

- Virtual flora/fauna
- Specimen search engine
- Biodiversity inventories
 - Floras, faunas, biotas, BioBlitz surveys
- Identification keys
- Images, distribution maps, descriptions, taxonomy, etc.



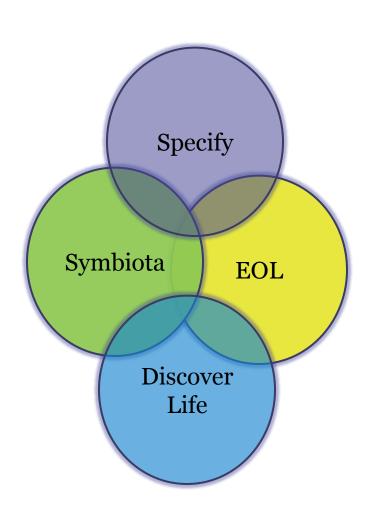
SYMBIOTA - Virtual Flora

- Custom look & feel
 - CSS, config files
- Open source
- Modular
- Distinct datasets
 - Taxonomic scope
 - Geographic scope
- Framework architecture



Duplication -vs - Niche Overlap

- Encyclopedia of Life (EOL)
- Specify
- GBIF
- Discover Life
- Navikey / Lucid / Xper2
- Symbiota
 - Community Data Portals
 - Specimen based
 - Biodiversity CMS



Consortia of Collection

- Baseline data
- Expert reviewed vouchers
- Verifiable
- Proof of occurrence
- Reproducible
- Millions of occurrence records



TCN Portals

- Lichen Consortium
 - 36 collections
 - 902,664 occurrences
- Bryophyte Consortium
 - 28 collections
 - 1,300,135 occurrences
- MycoPortal
 - 23 collections
 - 686,042 occurrences







Online demo1 - Dynamic Key



SEINet Home

Search Collections Image Library Plant Games Links

Flora Projects

Arizona

Colorado Plateau

Now Movien

Intermountain

NPS Flora

USEWS Flora

MABA Flora

Sonoran Desert

Teaching Checklists

Dynamic Floras

Dynamic Checklist Dynamic Key

Sitemap

Welcome to SEINet

The Southwest Environmental Information Network was created to serve as a gateway to distributed data resources of interest to the environmental research community in Arizona and beyond. Through a common web interface, we offer tools to locate, access and work with a variety of data.

SEINet is more than just a web site - it is a suite of data access technologies and a distributed network of departments, museums and agencies that provide environmental information. Initially created to integrate databases within the Arizona State University, SEINet is growing to extend this network to other partners within the Southwest.

To learn more about the features and capabilities available through this site, read Making Good Use Of SEINet or visit the Symbiota Help Pages. Join SEINet as a regular visitor and please send your feedback to seinetAdmin@asu.edu. Visit the Data Usage Policy page for information on how to cite data obtained from this web resource.

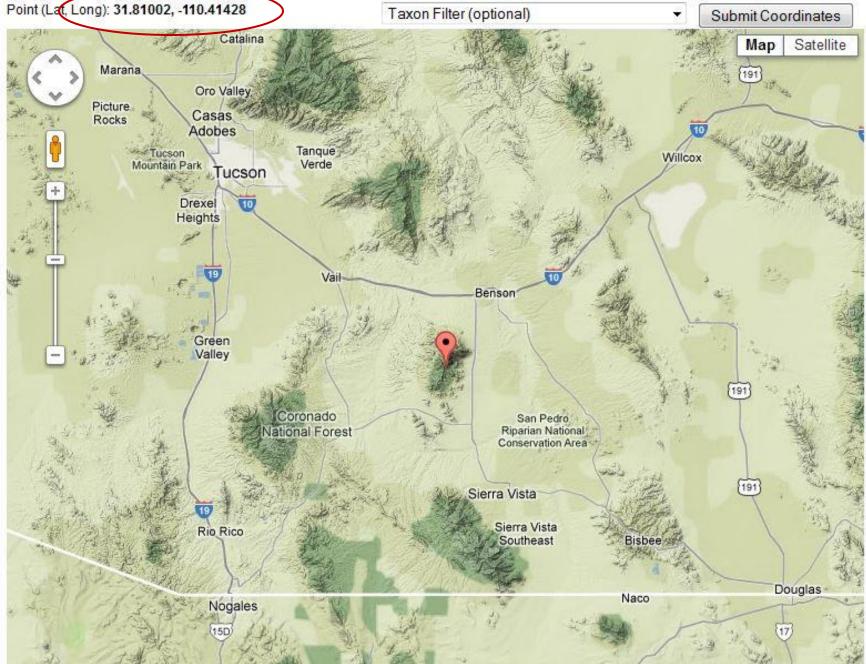
Development of SEINet, Symbiota, and several of the specimen databases have been supported by National Science Foundation Grants (DBI 9983132, BRC 0237418, DBI 0743827, DBI 0847966)

Plant of the Day



What is this plant? Click here to test your knowledge

Home > Dynamic Map Pan, zoom and click on map to capture coordinates. Upon submitting coordinates, a species list will be generated by looking at all specimens collected within the area. More Details Point (Lat. Long): 31,81002, -110,41428 Taxon Filter (optional)



oqout	My Profile		Hel
ome >> 31.81002, -110	0.41428; within 20 miles K	ey	
Taxon:		31.81002, -110.41428; within 20 miles	
All Species		31.61002, -110.41426, Within 20 miles	
Display/Reset	t Species List	Species Count: 1357	
Display as: Scie	entific Name ▼	Acanthaceae	
Plant		Anisacanthus thurberi	
habit		Carlowrightia arizonica	
herb		Carlowrightia linearifolia	
shrub		Carlowrightia texana	
tree		Dicliptera resupinata	
□ vine		Dyschoriste schiedeana	
grass-like		Elytraria imbricata	
30 A P S P S	desert succulent	Justicia sonorae	
fern & allies		Carlowrightia arizonica Carlowrightia linearifolia Carlowrightia texana Dicliptera resupinata Dyschoriste schiedeana Elytraria imbricata Justicia sonorae Ruellia nudiflora Tetramerium nervosum	
aquatic		Tetramerium nervosum	
longevity			
annual or big	ennial	Adoxaceae	
perennial		Sambucus nigra	
		Aizoaceae	
		Trianthema portulacastrum	
		Alismataceae	

Alisma triviale

Welcome Max Licher!

CARROLL R.

11-7-28 TS (15-11-11-11-11-11-11-11-11-11-11-11-11-1	190000			
<u>Loqout</u>	My Profile			<u>Help</u>
Home >> 31.81002	2, -110.41428; within 20 miles K	еу		
Taxon:		24 04002 440 44420	n 00 miles	
All Species ▼		31.81002, -110.41428; withi	n 20 miles	
Display/R	Reset Species List	Species Count: 62		
Display as:	Scientific Name ▼	Adoxaceae		
Plant		Sambucus nigra	1	
habit herb		Anacardiaceae		
shrub tree		Rhus microphylla	0	
sap		Rhus virens	1	
☐ latex ab	sent (sap clear) esent	Bignoniaceae		
Leaves		Catalpa bignonioides	1	
type		Chilopsis linearis	2	
simple		Tecoma stans	1	
compoi stipules	und	Cannabaceae		
W	s absent s present	Celtis reticulata	1	
arrangeme				
alternat	e	Cupressaceae		
opposit	te	Juniperus coahuilensis	<i>P</i>	
whorled	i	Juniperus deppeana	0	
	d/clustered along stem	20	\$100 m	
blade marg	in	Ericaceae		



Welcome Max Licher! Logout My Profile Help Home >> 31.81002, -110.41428; within 20 miles Key Taxon: 31.81002, -110.41428; within 20 miles All Species -Display/Reset Species List Species Count: 10 Display as: Scientific Name -Adoxaceae Plant Sambucus nigra habit Bignoniaceae shrub ▼ tree Catalpa bignonioides Tecoma stans Leaves type Cupressaceae simple compound Juniperus coahuilensis arrangement Juniperus deppeana opposite whorlod Oleaceae blade margin entire Fraxinus gooddingii toothed Fraxinus velutina lobed Rubiaceae Fruit consistency at maturity Cephalanthus occidentalis dry/leathery

Sapindaceae

fleshy

Welcome Max Licher!

panicle

ORDER SEE

ogout My Prof	ile		<u>Help</u>
Home >> 31.81002, -110.41428; within	20 miles Key		
Taxon:			
All Species	31.81002, -110.41428; within	20 miles	
Display/Reset Species List	Species Count: 5		
Display as: Scientific Name	Adoxaceae		
Plant	Sambucus nigra	1	
habit	Biana		
shrub	Bignoniaceae		
	Tecoma stans	1	
Leaves	Section 19 Constant Constant Constant		
type	Oleaceae		
compound)	Fraxinus gooddingii		
compound type	Fraxinus yelutina		
once-pinnately compound	rraxinus veiulina		
trifoliolate (w/ 3 leaflets) arrangement	Sapindaceae		
opposite	Acer negundo	1	
Inflorescence			
position			
axillary			
terminal terminal			
type			
raceme			
umbel			

SEINet Southwest Environmental Information Network



Acer negundo L. 🤳

Go to Encyclopedia of Life...

Family: Sapindaceae

boxelder, more...

[Negundo aceroides (L.) Moench more



Max Licher

VPAP Treatment

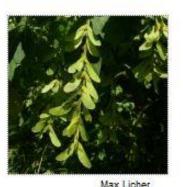
JANAS 29(1)

Plant: tree; to 10 m high, sparsely to densely pubescent on young growth and lower leaf surfaces, usually dioecious; young twigs glabrous to densely pubescent, often more or less glaucous, the epidermis smooth, greenish or reddish, the older twigs more or less rough, gray; buds covered by two reddish, tan, or vellowish valvate scales, these sparsely to densely hairy, the pubescent inner scales greatly elongating as the bud opens Leaves: mainly 3-foliolate, occasionally 3-lobed, 3.5-13.5 cm long, 3.5-18 cm wide, concolorous, the terminal leaflet up to 11 cm long. by 8 cm wide, the lateral leaflets up to 9 cm long by 6 cm wide; apex of leaflets acute to acuminate; base of leaflets rounded to cuneate, sometimes oblique in lateral leaflets, sometimes acuminate in terminal leaflets; petiole 2-7.5 cm long, green or reddish; margin of leaflets coarsely toothed or lobed, the teeth acuminate to obtuse INFLORESCENCE: inflorescences many flowered, the staminate umbel-like, the pistillate racemose Flowers; ca. 5 mm long, less than 1 mm wide at base of perianth, the perianth greenish-yellow, with ca. 4 subelliptic segments ca. 0.2-2 mm long, the receptacle blending with filiform pedicel; pedicels 1-4 cm long Fruit; samaras 2.3-3.6 cm long, the wing 0.7-1.4 cm wide, the infructescences up to 15 cm long Misc: Riparian habitats and other wet wooded areas; 900-2750 m (3000-9100











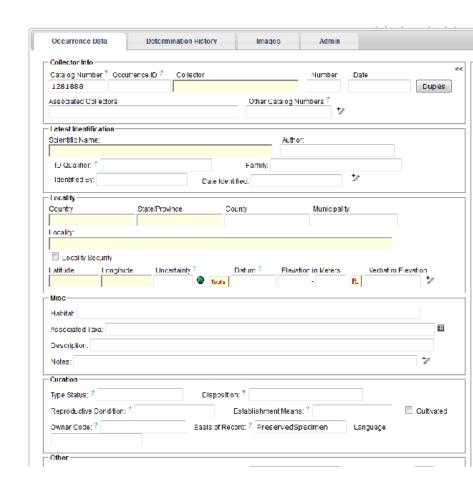
Open Interactive Map

Max Licher

Max Licher

Symbiota - Biodiversity CMS

- Read-only user interface
- Password Protected
 - Online Browser-based application
 - Platform independent
 - Globally accessible
 - No special software installation (free)
 - Make use of web services



Online Demo 2

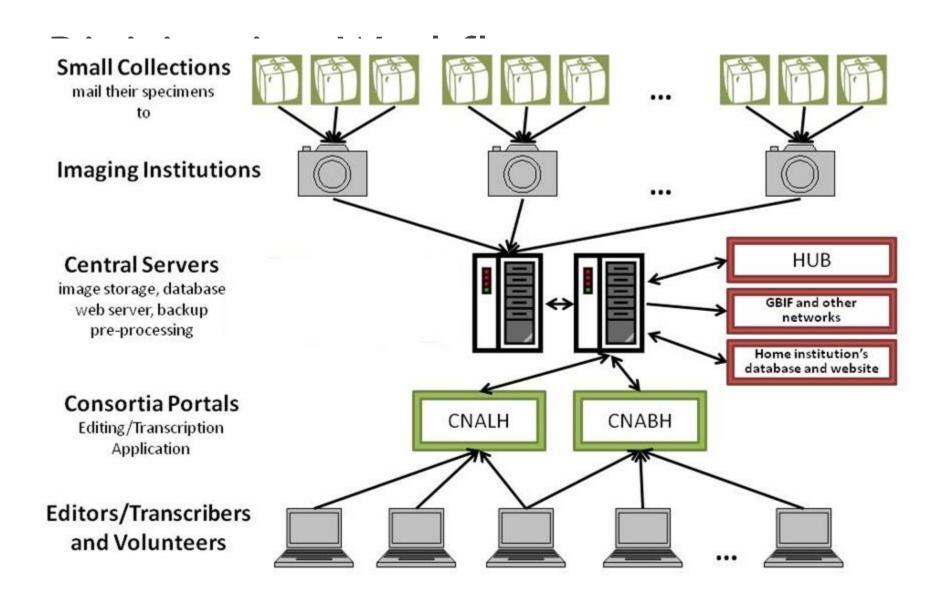
- Search Acarospora within Arizona
 - Show edit form by fixing a couple bad georeference errors
 - Show GeoLocate integration
 - Display Review Edits interface

Goals and Scope

- NSF ADBC (#1115116)
- ~ 2.3 million specimen
 - 90% of all specimens
 - 900,000 lichens
 - 1.4 million bryophytes
- > 60 non-governmental
 US herbaria (95%)
 - Mexico, US, Canada
- 16 digitization centers







Online Demo 3

	ation History Images			
Collector Info				Label Processing
Catalog Number ? Occurrence ID ?	Collector	Number Date		
1281888			Dupes	
Associated Collectors	Other Catalog Nu	umbers ?		Lichens of New York
		7		Ex Links Houseworth Chi
Latest Identification				Ex Lichen Herbarium of James C. Lendemer (hb. Lendemer) DUPLICATE
Scientific Name:	Author	r.		Dictyocatenulata alba Finley & Morris
				Det. James C. Leudener - September 20, 2004
ID Qualifier: ?	Family:			UNITED STATES OF AMERICA. NEW YORK. ESSEX COUNTY: Un the base of a small maple (Acer), in a mixed hardwood
Identified By:	Date Identified.	•		DOICH (ACET, Judians, Betula) with a croall received the second
	Date Identified.			#21 elev. 500 ft UTM 18 585231F 4904273N - Let and 152 122 Pt
ocality				Ling. 75° 35' 54" W - Assoc app.: Phlyotis so., sterile morely to concerne
Country State/Province	e County	Municipality		sep. Graphis scriptu, Rimaline sp Thalius cortectous, crustose, thick, gray, ascernia scalent, tan
				"cupitulur" white; conidia globuse to subglobuse, multice lulur, colorless, 10µm x 6- 16µm.
ocality:				
				Collection data is a second second
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Locality Security				Collection data. James C. Lendemer at al. #3025 w/ participents of 2004 A. Lercy Andrews Foray September 18, 2004 – 18. September 2004 – 18. IX. 2004
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Althude Longitude Uncert. Misc Habitat Associated Taxa: Description. Notes: Curation Type Status: ? Reproductive Condition: ?	Clisposition: ?	- ft.	Cultivated	w/ participents of 2004 A Lercy Andrews Poray September 18, 2004 – 18. September 2004 – 18. DC 2004 Lichens of New York Ex Lichen Herbarium of James C. Lendemer (hb. Lendemer) DUPLICATE Dictyocaterulata alba Finley & Morris Qej. James C. Lendemer 29, 2004 UNITED STATES OF AMERICA. NEW YORK, ESSEX COUNTY.: On the base of a small maple (Acer), in a mixed hardwood forest (Acer, Juglans, Belula) with a small maple (Acer) purtions of drainage for Holcomb Pond into Ausable River, along NY Route 1 #21. clev. 500 ft. UMM 18 585231E 4904273N Lat. 44ÂP
	© Touts Disposition: ? Establishment Means	- ft.	Cultivated	w/ participents of 2004 A Lercy Andrews Poray September 18, 2004 – 18. September 2004 – 18. IX. 2004 Lichens of New York Ex Lichen Herbarium of James C. Lendemer (hb. Lendemer) DUPLICATE Dictyocaterulata alba Finley & Morris Rel. James C. Lendemer 29, 2004 UNITED STATES OF AMERICA. NEW YORK, ESSEX COUNTY.: On the base of a small maple (Acer), in a mixed hardwood forest (Acer, Juglans, Belula) with a small maple (Acer rubrum) swamp, low < portions of drainage for Holcomb Pond into Ausable River, along NY Route I #21. clev. 500 ft. UTM 18 58523IE 4904273N Lat. 44² 17䀙 IZ䀙 IX䀙 IXÄ€™ IXÄ
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OCR Challenges

- Issues
 - Old fonts
 - Faded labels
 - Form labels
 - Handwritten labels
 - Specialized terms
- Solutions
 - Image treatments
 - OCR tuning
 - Dictionaries
 - Consensus OCR

PLANTS OF NEW MEXICO Herbarium of Arizona State University Parmelia ulophyllodes (Vain.) Sav. Dona Ana Dona Ana Dona Ana Dona Mexico State University HABITAT ON Juniperus T. H. Nash #7914 T. H. Nash #7914 T. H. N.

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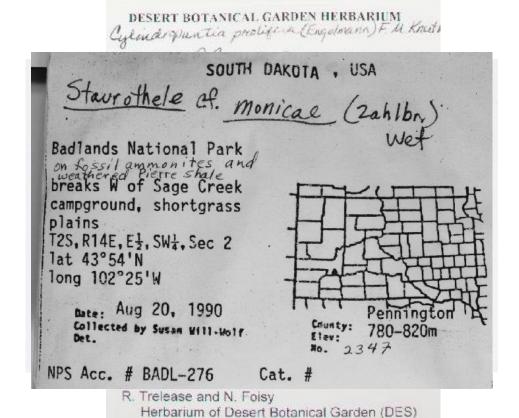
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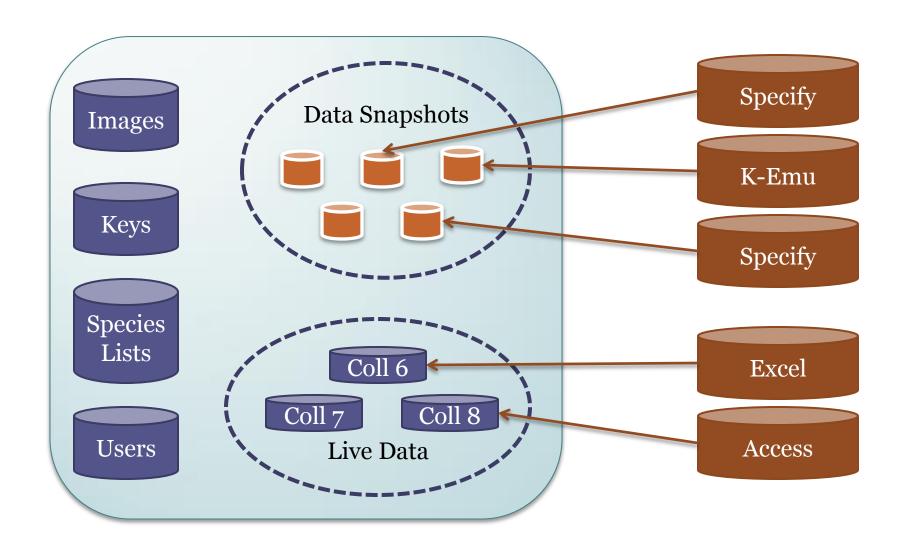
PLANTS OF NEW r~1ExIco
¹¹ Herbarium of Arizona State University
Parmelia ulophyllodes (Vain.) Say.
^a COUNTY Ҽâ€â€œâ€œ
Z Joranada Experimental Station -
Z Joranada Experimental Station - New Mexico State University
_ """"' on Juniperus
V _{ELEV.} '4400
ⁿ EEILLEETUR DATE
T DU T. H. Nash #7914 8/27/73
<u> </u>

NLP Challenges

- Issues
 - Variable layouts
 - Loose standards
 - OCR error
- Solutions
 - Authority tables
 - Levenshtein distance
 - Word stats
 - Format recognition
 - Parsing profiles
 - Duplicate harvesting



Integrated Specimen Model



Demo 4: Specimen Import

- Methods
 - Flat file
 - DiGIR, IPT, Tapir
 - Direct DB read
 - Darwin Core Archive
- Typical issues
 - Diverse schemas
 - Data types
 - Determination history
 - Images

Data Upload Module

Arizona State University Vascular Plant Herbarium

Last Upload Date: 21 December 2011 3:25:52

View/Edit Metadata

Satellite Upload (File Upload)

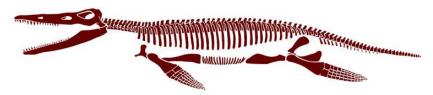
Source Field	Target Field		
catalognumber	catalognumber	•	
family	family	•	
sciname	sciname	•	
scientificnameauthorship	scientificnameauthorship	•	
identifiedby	identifiedby		
dateidentified	dateidentified		
typestatus	typestatus		
recordedby	recordedby		
recordnumber	recordnumber	•	
associatedcollectors	associatedcollectors	•	
eventdate	eventdate	•	
associatedtaxa	associatedtaxa	•	
dynamicproperties	dynamicproperties	•	
verbatimattributes	verbatimattributes	•	
reproductivecondition	reproductivecondition	•	
cultivationstatus	cultivationstatus	•	
establishmentmeans	octablichmontmoans		

Selecting a Database

- Excel NO please
- Access, File Maker, other home grown
- KE E-Mu
- Argus
- Specify
- Symbiota
- Combination?!

FilteredPush

MUSEUM OF COMPARATIVE ZOOLOGY



HARVARD UNIVERSITY



Agriculture and Agri-Food Canada Agriculture et Agroalimentaire Canada



University of California, Davis



Harvard University Herbaria



University of Massachusetts, Boston

PI James Hanken

Maureen A. Kelly David B. Lowery Paul J. Morris Robert A. Morris

James A. Macklin

Bertram Ludacher Lei Dou

Former Project Participants
Chinua Iloabachie
Timothy McPhillips
Donna Tremonte
Zhimin Wang



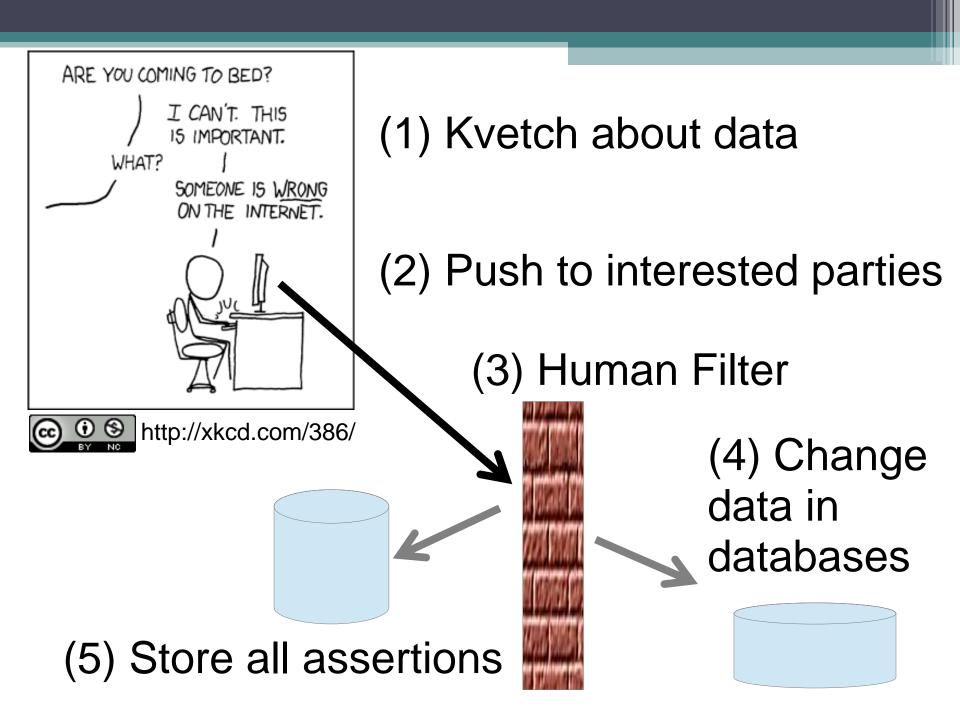


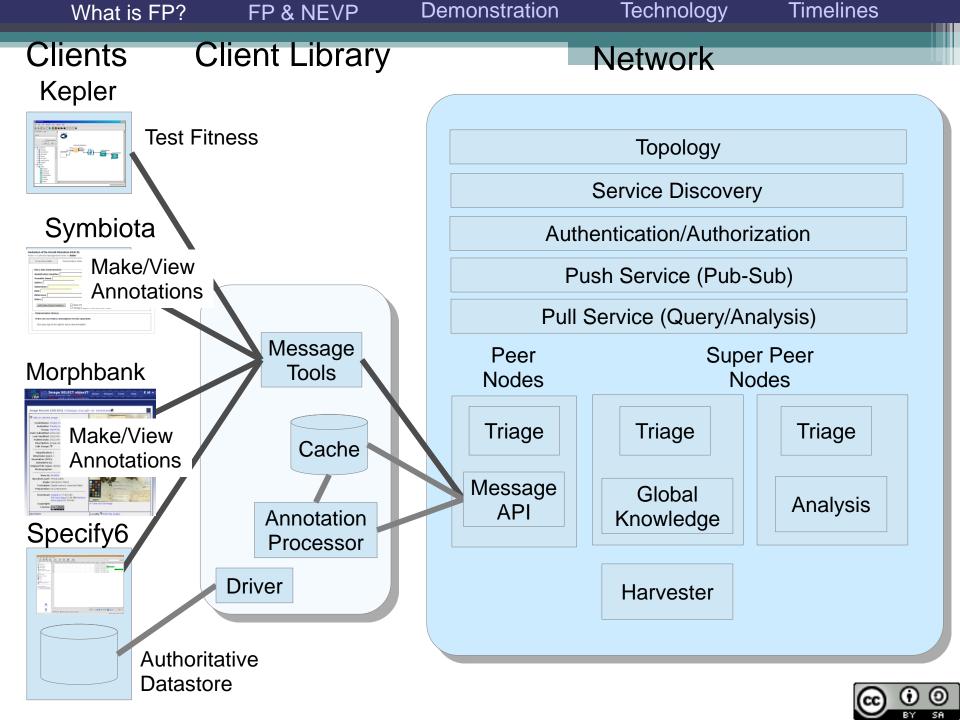
NSF: DBI #0960535 (Production, Starting Year 3 of 3.

NSF: DBI #0646266 (Prototype, Complete)

http://etaxonomy.org/FilteredPush







Biotic Inventories

- Floras / Faunas
- Research inventories
- BioBlitz
- Student lists
- Native Plant Societies
- Personal checklists

Arizona Flora

Project Managers: Arizona State University Vascular Plant Herbarium

Arizona is the third or fourth most floristically rich state in the US with perhaps as many as 3900 species of vascular plants. Over the last 60 years an average of ca. 12 new species records have been reported annually.

Research Checklists @ @

The \(\) symbol opens the species list as an interactive key.

- Agua Fria National Monument (in progress)
- Appleton-Whittell Research Ranch
- Arizona 3
- Arizona Spring Flora %
- ASU Arboretum Digital Field Guide
- ASU Types ⁹
- Buckeye Hills Recreational Area
- Buenos Aires National Wildlife Refuge
- Cabeza Prieta National Wildlife Refuge
- Camp Creek
- Canyon de Chelly National Monument
- Casa Grande Ruins National Monument §
- Castle Dome Mountains
- Chiricahua National Monument
- Eagletail Mountains Wilderness
- Escudilla Mountains
- Fort Bowie National Historic Site
- Grand Canyon National Park
- Hart Prairie
- Hassayampa River Preserve \(\)
- Huachuca Mountains
- Hummingbird Springs Wilderness
- Kofa National Wildlife Refuge (IP)
- Lake Pleasant Regional Park



Click to Open Map

Demo 5

Home > Arizona Flora > San Pedro Riparian National Conservation Area

San Pedro Riparian National Conservation Area N Games



Authors: Elizabeth Makings

Publication: Makings, E 2006. Flora of the San Pedro Riparian National Conservation Area, Desert Plants Vol. 22(2); 104 pp. Makings, E 2003. Flora of the San Pedro Riparian National Conservation Area, Cochise County, Arizona, M. S. Thesis, Arizona State University, Tempe

More Details

Species List

Families: 92 Genera: 359

Species: 622 (species rank)

Total Taxa: 631 (including ssp. and var.)

Page 1 of 2: 1 | 2

ACANTHACEAE

Anisacanthus thurberi Carlowrightia arizonica Carlowrightia linearifolia Carlowrightia texana Elytraria imbricata Ruellia nudiflora

ADOXACEAE

Sambucus nigra Sambucus nigra ssp. cerulea

AIZOACEAE

Trianthema portulacastrum



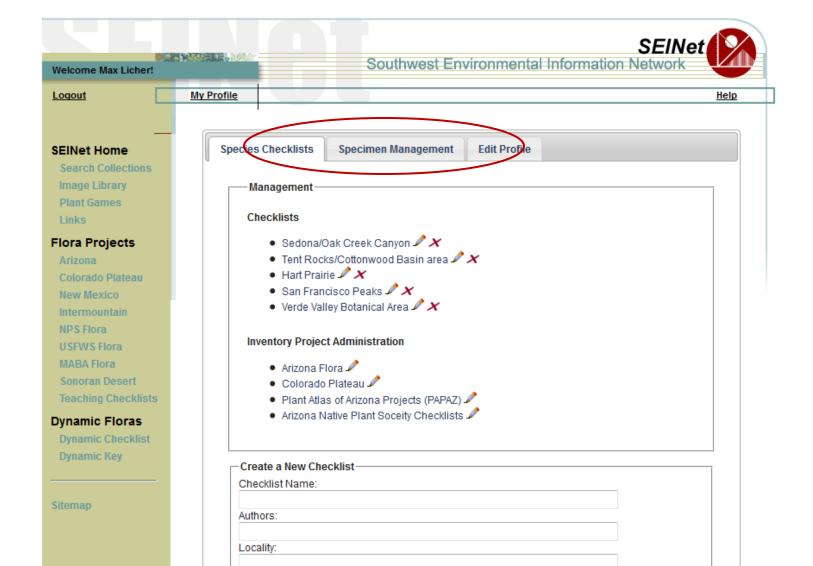


Plant Atlas of Arizona Project

- Arizona Native Plant Society
- Grand Canyon Trust
- Desert Botanical Garden
- U.S. Forest Service
- Northern Arizona University
- Museum of Northern Arizona

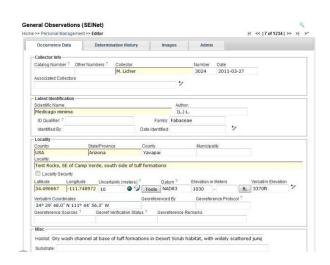


Personal Checklists Management



Personal Specimen Management

- Data entry
- Data Management
- Label Printing
- Cloud management
 - Password Protected
 - Web browser
 - Platform independent
 - Globally accessible
 - No special software
- Initially "Observations"



Plants of Arizona Scrophulariaceae Castilleja exilis A. Nels. USA, Arizona, Yavapai County, Mesquite Spring, Cottonwood Basin SE of Camp Verde. 34° 29' 02.5" N 111° 46' 16.7" W [NAD83] Elev: 930m. (3040ft) Damp bank at spring location, N facing slope. Riparian zone in desert scrub habitat. Annual herb. 45 to 65 cm, green bracts with red tips Associated species: Solidago altissima, Dalea candida, Epipactis gigantea, Schoenoplectus americanus, Toxicodendron rydbergii, Mimulus cardinalis, Salix laevigata, Fraxinus velutina, Salix gooddingii, Andropogon glomeratus M Licher 2792 Northern Arizona University Herbarium



Plants of Arizona

Scrophulariaceae

Castilleja exilis A. Nels.

USA, Arizona, Yavapai County, Mesquite Spring, Cottonwood Basin SE of Camp Verde. 34'29'02.5" 1111' 46' 16.7" W [NAD83] Elev. 930m. (3040ft) Damp bank at spring location, N facing slope. Riparian zone in desert scrub habitat.

Plants of Arizona

Scrophulariaceae

Castilleia exilis A Nels

USA, Arizona, Yavapai County, Mesquite Spring, Cottonwood Basin SE of Camp Verde. 34° 29' 02.5" N 111° 46' 16.7" W [NAD83]

Elev. 930m. (3040ft)

Damp bank at spring location, N facing slope. Riparian zone in decert scrub babilat

zone in desert scrub habitat. Annual herb, 45 to 65 cm, green bracts with red tips; infrequent

Associated species: Solidago altissima, Dalea candida, Epipactis gigantea, Schoenopolectus americanus, Toxicodendron rydbergii, Mimulus cardinalis, Salix Iaevigata, Fraxinus velutina, Salix gooddingii, Andropogon glomeratus

M. Licher 2792 16 July 2010

Northern Arizona University Herbarium



Plants of Arizona

Poaceae
Eragrostis cilianensis (All.) Vign. ex Janchen
USA, Arizona, Yavapai County, Confluence of
Mesquite and Cottonwood Springs, Cottonwood Basin
SE of Camp Verde.
34' 28' 59.2' N 111' 46' 22.1' W [NAD83]

Elev. 920m. (3020ft) Sandy riparian creek bed without surface water in desert

Voucher Network

