ASWM webinar on Novel Ecosystems, November 19, 2015

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1998-present

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Salt marsh beetles

(restoration indicators)

(Photo: D. McIntire)

Excerpts from the debate:

Reed canary grass in stormwater swale

Hobbs, Higgs, & Harris (2009):

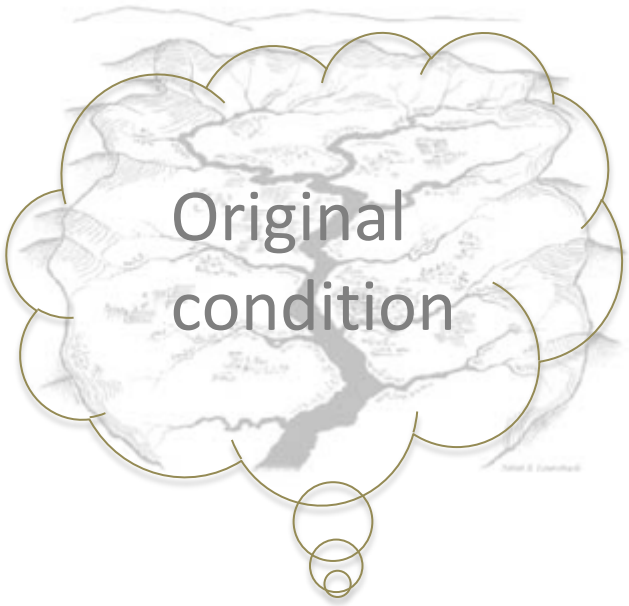
• "…novel systems will require significant revision of conservation and restoration norms and practices away from the traditional place-based focus on existing or historical assemblages…"

Murcia, Aronson, Kattan, Moreno-Mateos, Dixon, & Simberloff (2014):

• "no explicit, irreversible ecological thresholds allow distinctions between 'novel ecosystems' and 'hybrid' or 'historic' ones."

• "no clear message as to what practitioners should do with a 'novel ecosystem.'

• "ecosystems of many types are being conserved, or restored…despite severe degradation that could have led to their being pronounced 'novel'."



Issues with the debate…

Novel-ites say: You can't turn back the clock; "original conditions" are unachievable, so we must admit that ecosystems are novel; replace "restoration" with "intervention," and pick novel targets (Hobbs, Higgs, Harris…2009)

The claim that early practitioners insisted on achieving some "original" condition is a popular myth.

I say: Even the earliest restorationists did not expect to turn back the clock; we've always dealt with novelty….. (Leaflet 37 at arboretum.wisc.edu)

Over 80 yrs, Curtis Prairie became a **regional icon** for restoration

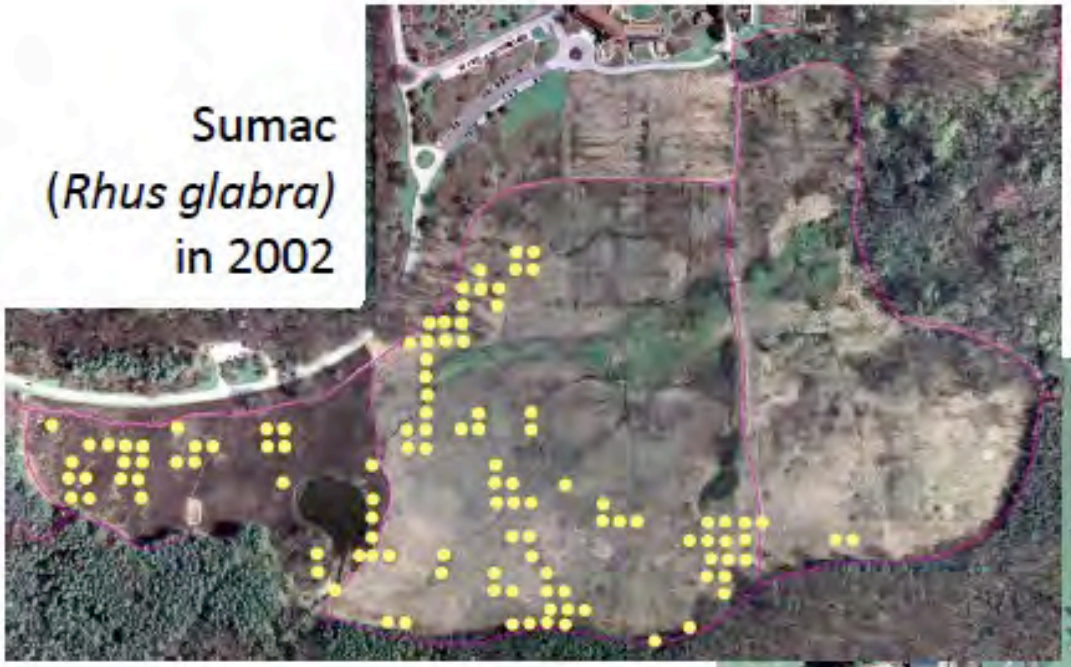
In 1934, Leopold called for presettlement communities

- Land was cultivated, then a horse pasture
- The target was tallgrass prairie, which required planting, prescribed fire…..

	1966	2002	
Native spp.	212	230	Restoration continues
Exotic spp.	33	35	to curb shrub invasions
Native *Cornus racemosa*	15%	53%	

Zedler & Zedler 1966; Snyder2004

Native shrubs must be controlled to “re-restore” prairie



Sumac
(*Rhus glabra*)
in 2002

Gray dogwood
(*Cornus racemosa*) in 2002

2015: Arboretum staff used mowing & herbicide, in addition to burning & hand-cutting.

Issues with the debate…

Novel-ites call it intervention

Critics say: The word "restoration" is essential to support conservation; it's unwise to give up trying to restore

(Murcia et al. 2014)

My view: Define "restoration" broadly, to include recovery of species and services within *regions*

"Hey, let's intervene…"

won't energize volunteers

Try: "Let's restore a wetland!"

A 1950s example….

Issues with the debate: Why do we need new words for old ideas?

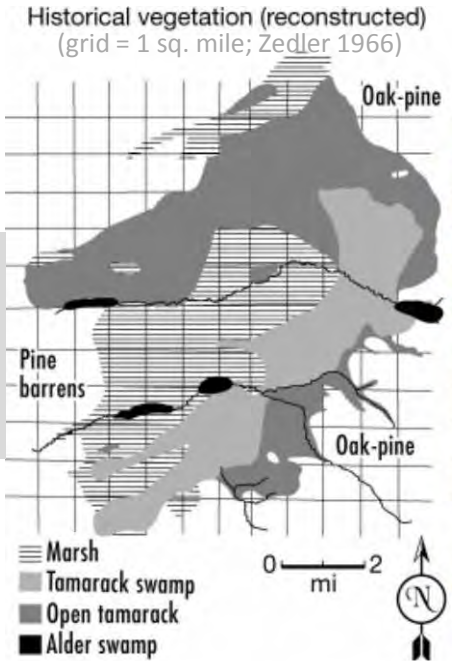
1950s: Game managers restored greater prairie chickens

-north of their historical range

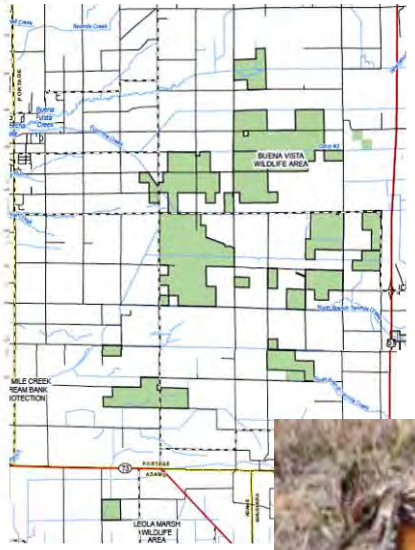
-where people drained wetlands, wildfires oxidized peat, and farmers grew bluegrass for seed and pastures

Now, patches in non-native grasslands are mowed to create booming grounds

1850s



2015



Marshes & swamps on sand & peat

Conservation lands for greater prairie chicken

photoshelter.com/img-get

2020site.org/trees/alder

Issue: The debate adds confusion

Cheonggyecheon River, Seoul, S. Korea:

Is this ecological restoration or not? What difference would a new word make?

6 km of a street and elevated hwy were removed to uncover an ancient streambed.

Park elements: Treated water is pumped 6 km upstream to flow over the concrete bottom; native plants are in containers

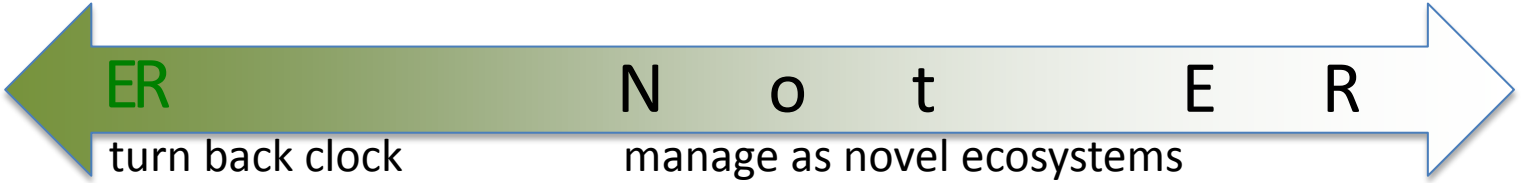
Inhabitat.com

Restoration elements:

~200 native plant species + a downstream segment with riverine substrate and aquatic biota

Ecological restoration (ER) forms a spectrum

- Hobbs et al.



- Palmer & Ruhl (Nov. 2015) narrow the definition of ER to create 2 classes:
  - to distinguish ER intended by environmental laws

- My view: ER aims for natural land forms, native species, & ecosystem functions
  - Self-sustainability is a rarely-achieved ideal; aim for it but don't require it
  - Recovery Plans for endangered species embrace habitat restoration

Curtis Prairie

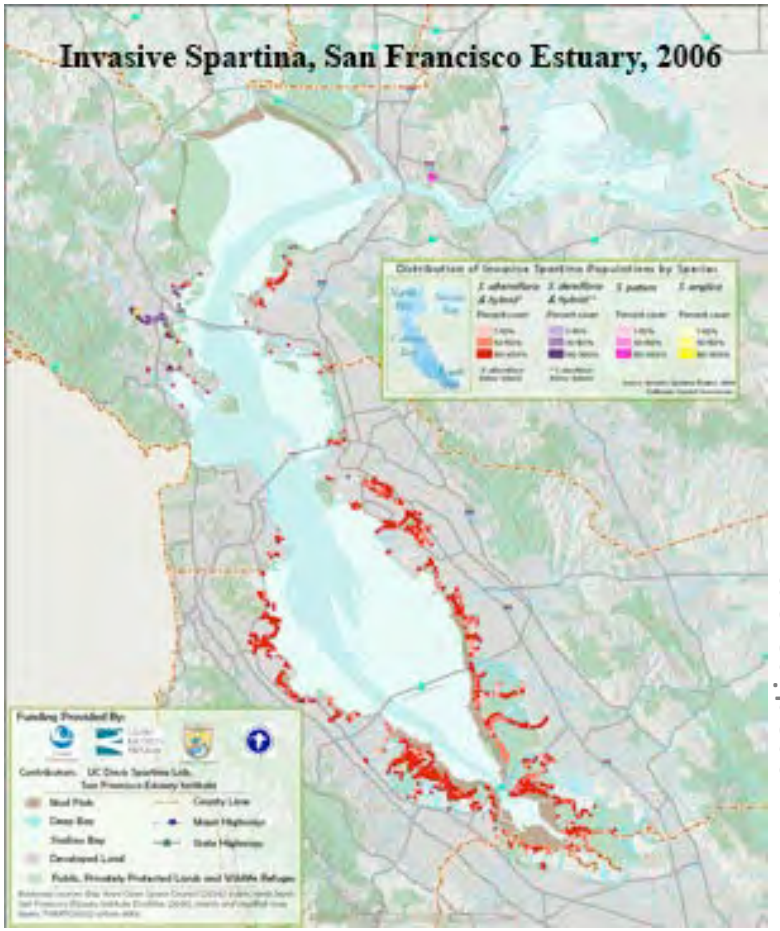
A remaining issue

When to stop trying to turn back the clock?

SF Bay salt marshes are being restored to native *Spartina foliosa*

by eradicating hybrid *Spartina alterniflora x foliosa*

- Proponents argue that too much has been spent (~$20 M), so we <u>can't</u> quit
- Opponents argue that too much has been spent, so we <u>must</u> quit.



My view: Unsure; waiting for results of

- replanting *S. foliosa* and
- impacts on endangered species

www.spartina.org

Restorationists can offer much more than new words for old ideas…
like learning **what <u>is</u> restorable** in highly modified urban wetlands

- Cultural services
  - Recreation – bird watching
  - Esthetic enjoyment – art, photos
- Limitations
  - Isolated habitats
  - Exotic species
  - Lost marsh-upland transition
  - Altered hydrologic dynamics
    - Excess surface freshwater inflow
    - Excess sediment inflow
    - Less fresh groundwater
    - Reduced connectivity due to roads & berms

Sweetwater Marsh NWR
In Chula Vista, on San Diego Bay

(Callaway and Zedler 2004)

Still, San Diegan's restored ~20 acres of Famosa Slough, primarily for birds

It's not a duplicate of historical salt marsh + mudflat + tidal pools

But it produces bird food!

Photo: Karen Strauss

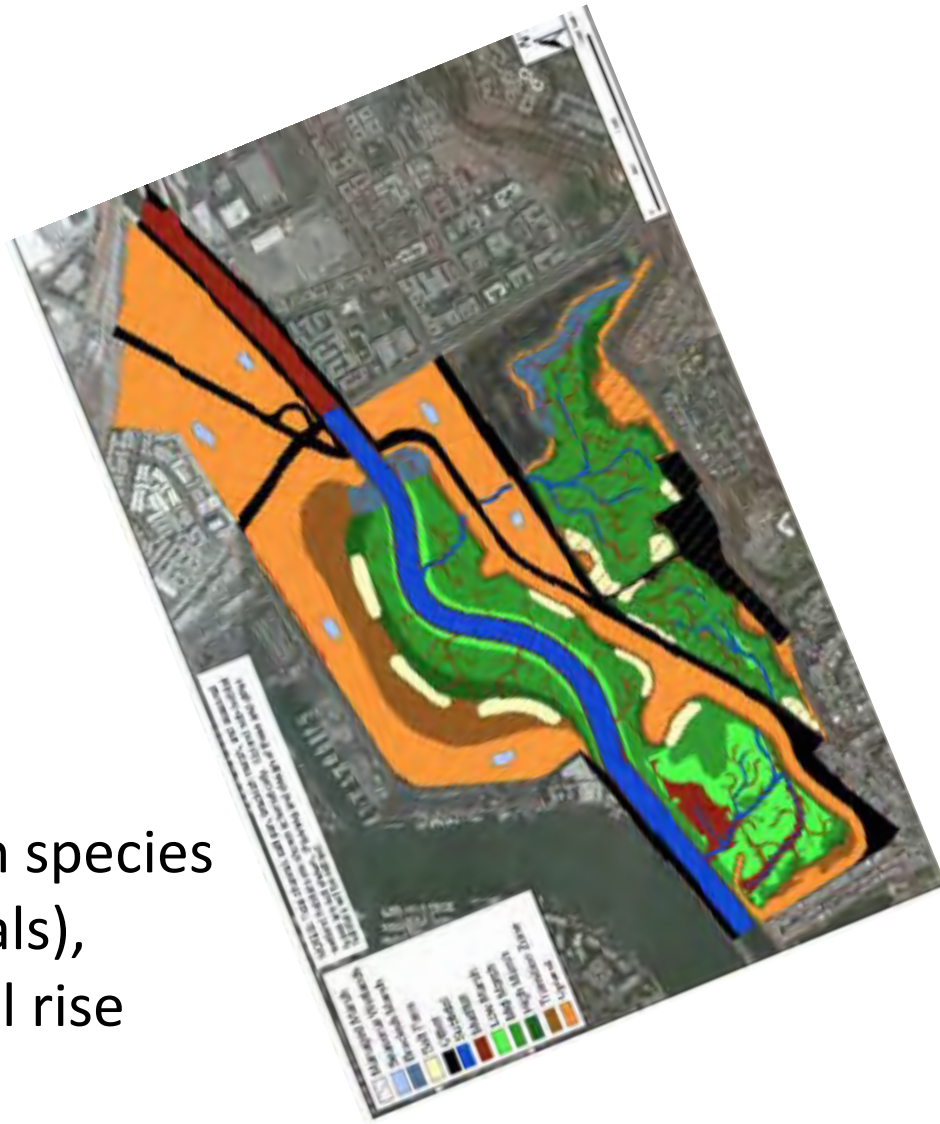
Night heron

What target is suitable for this altered wetland in an altered watershed?

Most was converted to Marina del Rey and is not restorable

Ballona Wetland, north of LAX

Planners envision recontouring the site and restoring tidal influence



- That will restore native salt marsh species (even endangered plants & animals), plus it will accommodate sea level rise

How did we learn to restore species and services in highly altered Tijuana Estuary—surrounded by 3 cities?

By using **Adaptive restoration**

Experimentation showed what is achievable & why

We tested which species & how many to plant…

1997 Exp't

(Callaway et al. 2003,Lindig-Cisneros & Zedler 2002, Doherty et al. 2011)

5 of 8 marsh-plain species needed to be planted

Diverse plots were not self-sustaining on a smooth plain (Bonin & Zedler 2008)

1997: Diverse plots had 6 species

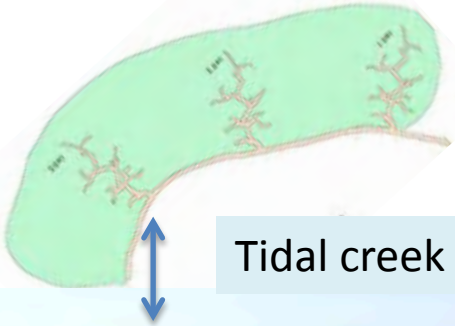
2011: Perennial pickleweed dominated

Annual pickleweed needed shallow pools where perennials couldn't dominate

(Varty & Zedler 2008)

More on heterogeneity……

A 6-year, 8-hectare experiment ± heterogeneous topography showed that tidal creek networks



- removed more sediment,
- improved plant survival, and
- provided access for fish to feed on invertebrates in marsh-plain pools

(Wallace et al. 2005, O'Brien & Zedler 2006 Larkin et al. 2008)

At Sweetwater marsh, SD Bay, a 5-yr experiment ± N addition showed that sandy dredge spoil could not grow cordgrass tall enough for an endangered rail to build its nests

(research with Langis, Zalejko, Boyer, Lindig-Cisneros, Williams, Desmond, and more)

Adaptive restoration: “learning while restoring”

- No need to transplant 3 of the 8 species
- “Diversity effects” were short-lived on a smooth plain; so, leave it bumpy

- Heterogeneous topography enhanced: transplant survival, persistence of an annual among perennials, food web support & sediment transport

- Sandy dredge spoil could not supply enough N for cordgrass to grow tall; hence, it did not support nesting by endangered rails; so, restore rail habitat on clayey soil

Conclusion: Let's stop debating and move on…

- "Restoration" is the key to public support;
  - let's use a b r o a d definition
- We have to deal with disturbed lands;
  - let's use field experiments to find effective methods to restore what we can, where we can

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Powerful reason to move on: See: **Presidential Memoranda | whitehouse.gov**

On Nov. 3, President Obama directed 5 federal resource agencies to aim for net increases (or no net loss) in natural resources, and to compensate (in advance) for development impacts.

Agencies have 1-2 years to provide guidance.

Conclusion: Let's stop debating and move on…

- "Restoration" is the key to public support;
  - let's use a broad definition
- We have to deal with disturbed lands;
  - let's use field experiments to find effective methods to restore what we can, where we can
- Let's make adaptive restoration the new norm.

Salt marsh beetles

(Photo: D. McIntire)

"Hey Jude, don't make it bad
Take a sad [site] and make it better"
(McCartney & Lennon)