Hawai‘i Wetlands and the Pacific Island Plant Restoration (PIPR) Database

Christopher F. Puttock and Laura M. Crago

HCC 2008

Pacific Island Plant Restoration

A management tool for habitat restoration in the Pacific Version 2.0

Republic of Palau
Guam
Federated States of Micronesia
Commonwealth of the Northern Mariana Islands
American Samoa
Hawaiian Islands

NRCS Natural Resources Conservation Service

Hawai'i Conservation Alliance
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Evolution of the PIPR project

- 2003 COE workshop provided need
- 2004 Hawai‘i riparian plant restoration (Crago, Puttock & James) v.1.0
- 2005 Hawai‘i riparian plant restoration (Crago, Puttock & James) v.2.0
- 2006 W Pacific Island plant restoration (Crago & Phillipson) v.1.0
- 2008 Pacific Island plant restoration (Crago & Puttock) v.2.0

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What's in the Database I

A decision key based on 24 multi-state attributes

- Scoring of species on life requirements
  - What the plant needs to thrive. Site attributes?

What's in the Database I

A decision key based on 24 multi-state attributes

- **Scoring of species on life requirements**
  - **What the plant needs to thrive. Site attributes?**
- **Scoring of species on restoration project requirements**
  - **What are your goals? Desired attributes?**

What's in the Database II

- 155 plant species in the PIPR database
- 104 are native to Hawai‘i and 22 introduced
- 91 in Hawai‘i riparian (OBL to FACU)
- 56 in Hawai‘i wetlands (OBL to FAC)

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- Basic floristic information (description, distribution, habitat, habitat indicator, images)
- Pests and Diseases
- Soil Reactivity
- Propagation and Trials
- Wildlife benefits

Restoration of Hawaiian Wetlands

Goals of wetland restoration

- **Restoring for control of invasive plants**
- **Restoring for Hawaiian (agri)culture**
- **Restoring for native plants**
- **Restoring for native wildlife**


Restore to this?


Or restore to this?
Whatever we do it should benefit . . .

Wetlands for wildlife

How different are today's wetlands from the past

Plant biodiversity in Hl's lowland wetlands

	Today
Aquatic herbs	20
Ferns	15
Woody plants	38
Dicot herbs	42
Monocot herbs	16
Sedges	35
Grasses	27

How different are today's wetlands from the past

Plant biodiversity in Hl's lowland wetlands

	Today	1000bp
Aquatic herbs	20	2
Ferns	15	5
Woody plants	38	7
Dicot herbs	42	5
Monocot herbs	16	1
Sedges	35	12
Grasses	27	1

How different are today's wetlands from the past

Plant biodiversity in Hl's lowland wetlands

	Today	1000bp	2000bp
Aquatic herbs	20	2	2
Ferns	15	5	4
Woody plants	38	7	5
Dicot herbs	42	5	3
Monocot herbs	16	1	0
Sedges	35	12	12
Grasses	27	1	1

How different are today's wetlands from the past

Plant biodiversity in Hl's lowland wetlands

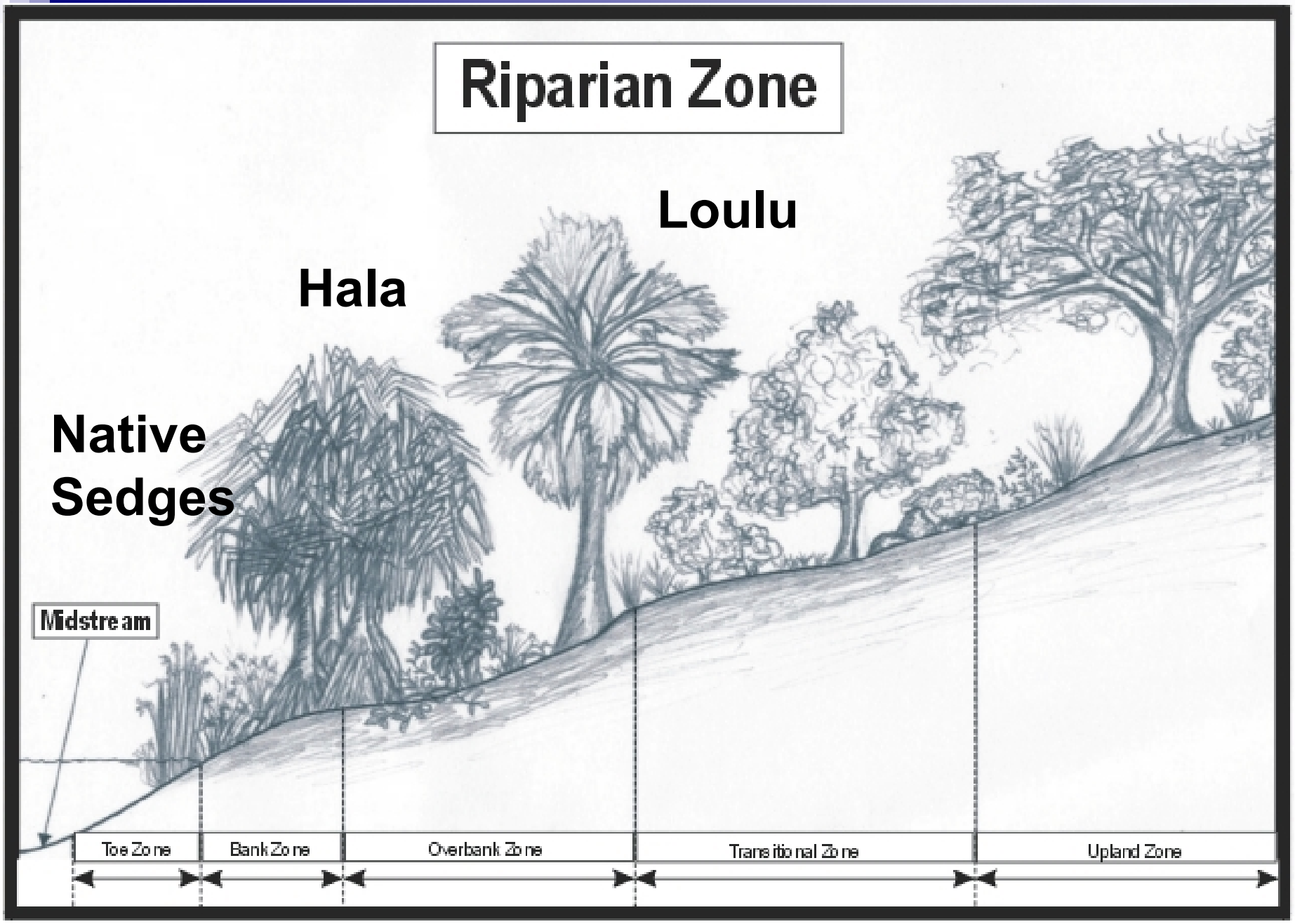
	Today*	1000bp	2000bp
Aquatic herbs	20	2	2
Ferns	15	5	4
Woody plants	38	7	5
Dicot herbs	42	5	3
Monocot herbs	16	1	0
Sedges	35	12	12
Grasses	27	1	1

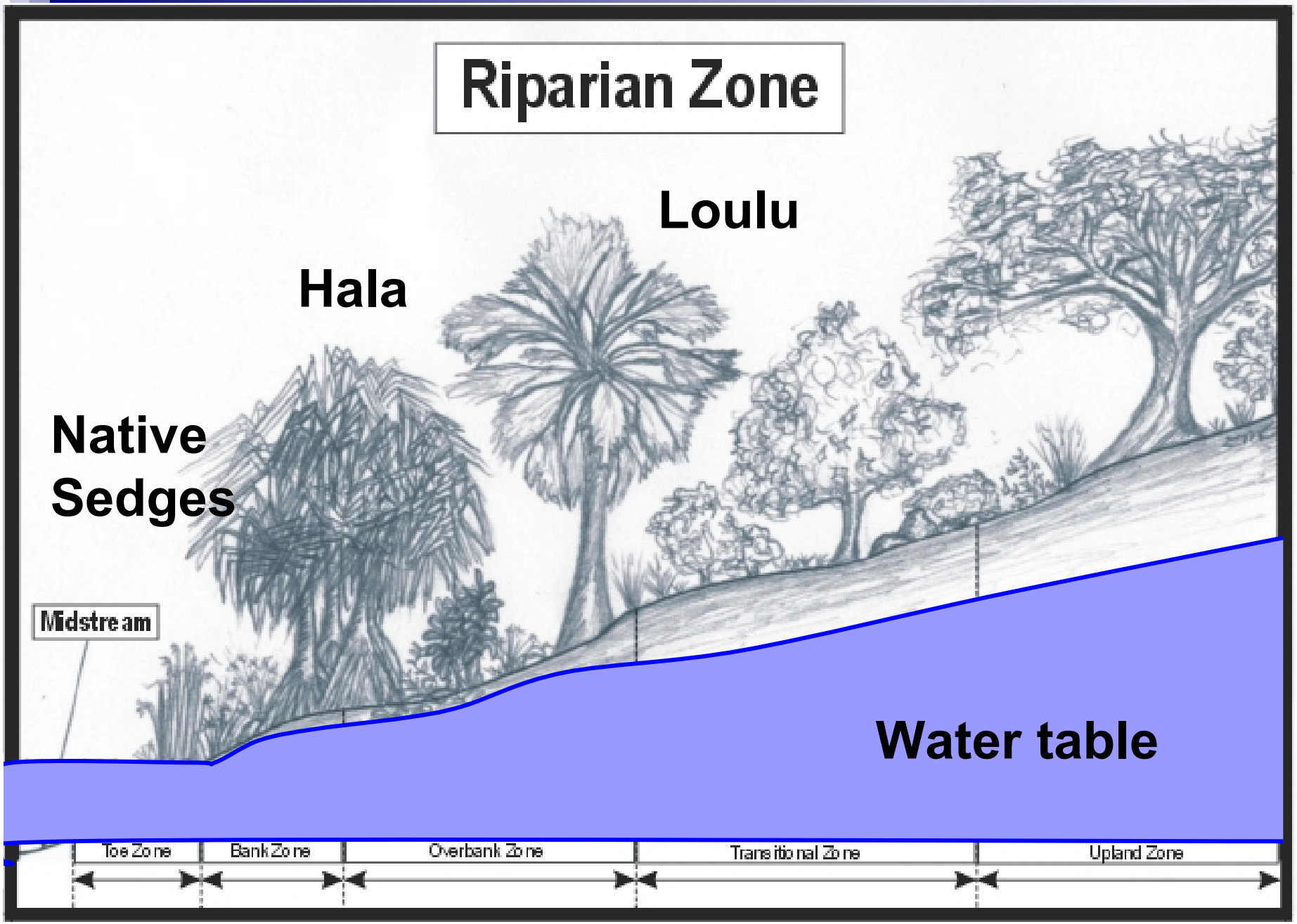
*~800% increase in wetland plant biodiversity

So what did Hawai‘i’s prehistoric wetlands really look like?

Typical transect

- Mudflats
- Sedgeland with few forbs
- Loulu or Hala forests


Riparian Zone
Loulu
Hala
Native
Sedges
Midstream
Toe Zone
Bank Zone
Overbank Zone
Transitional Zone
Upland Zone


Riparian Zone
Loulu
Hala
Native
Sedges
Midstream
Water table
Toe Zone
Bank Zone
Overbank Zone
Transitional Zone
Upland Zone

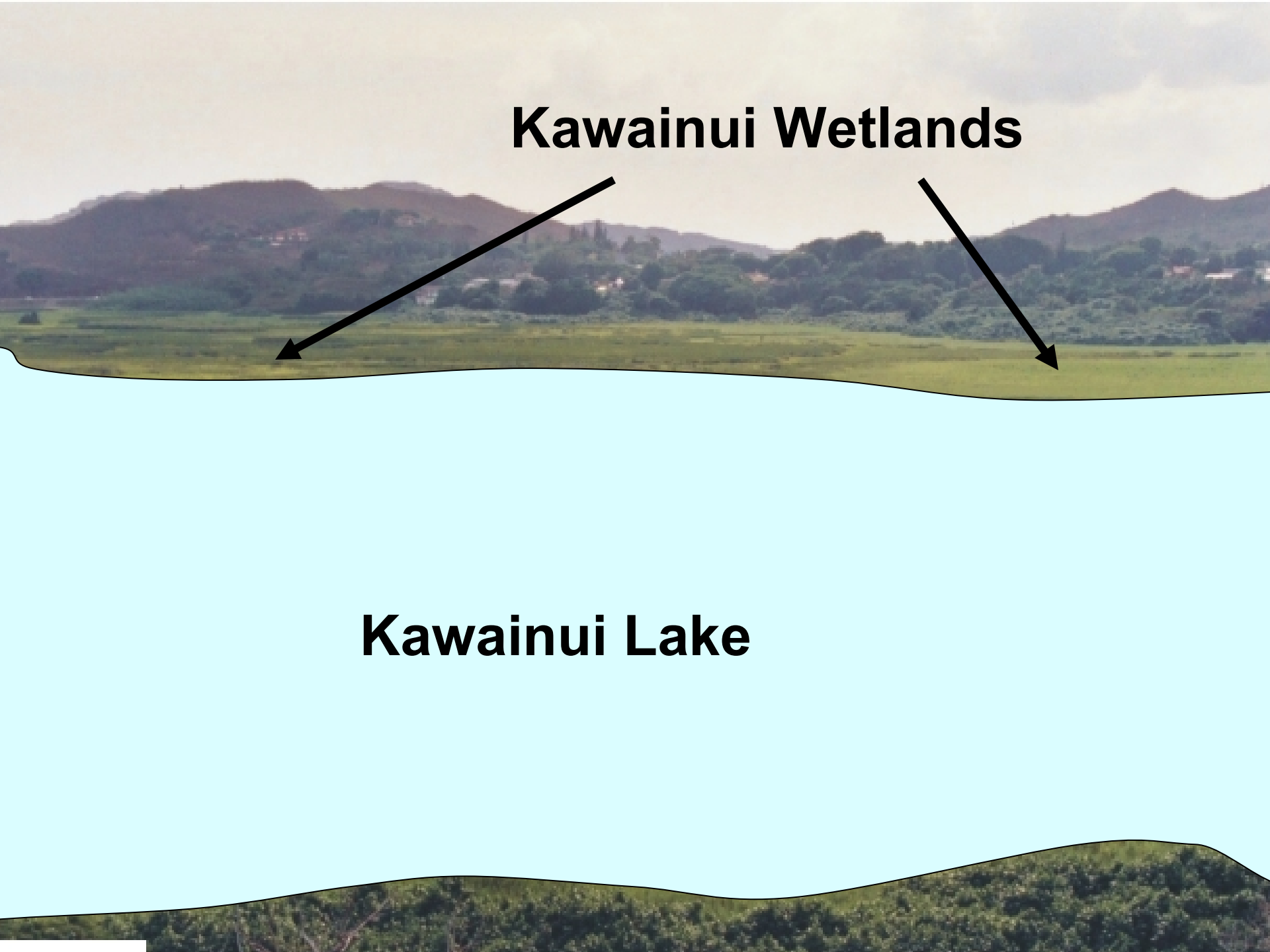

© L.M. Crago


Cyperus laevigatus
Ps. Makaloa is really good for making mats

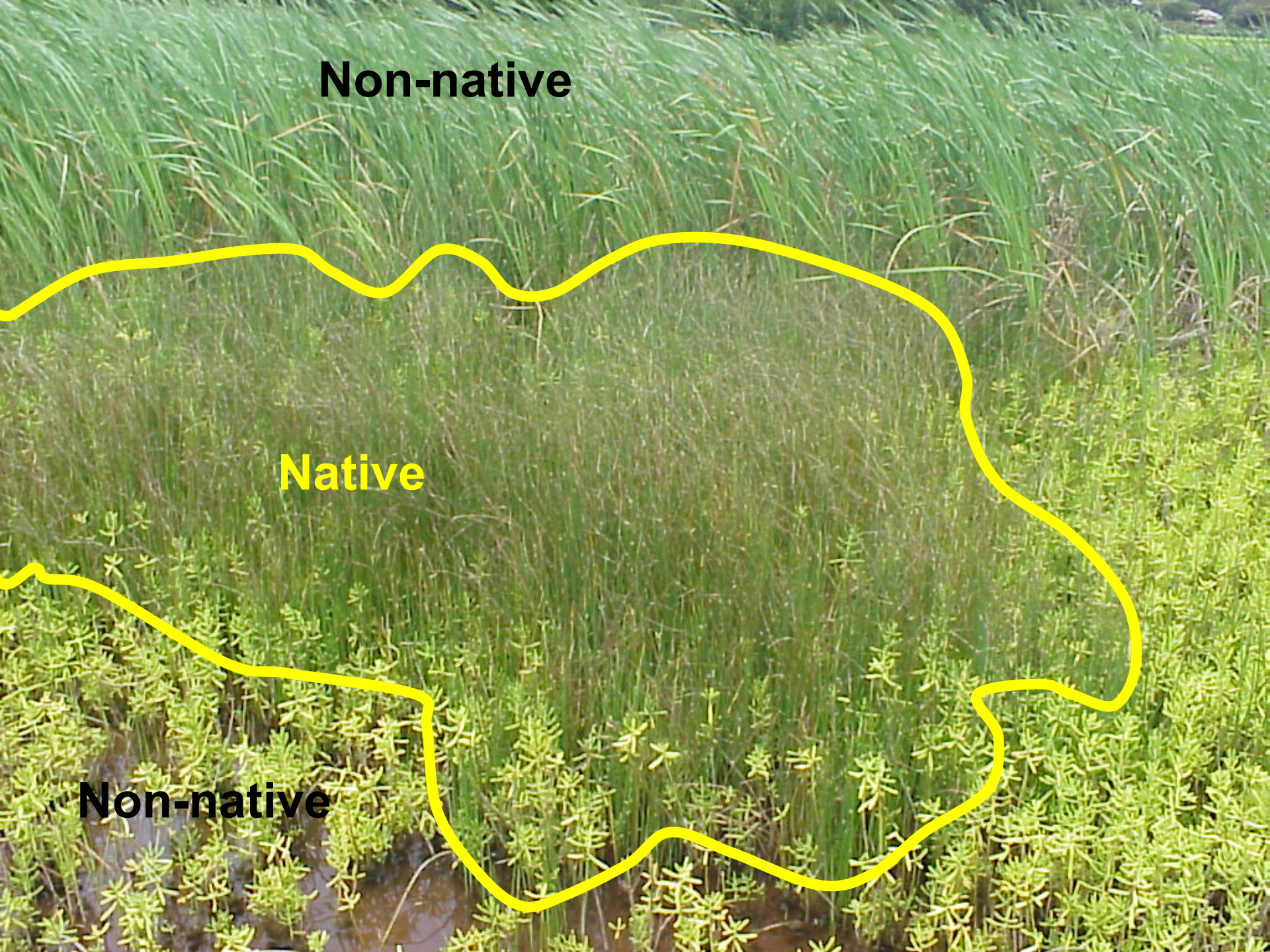
Hala woodland on lava


NO MORE LOULU FOREST


Restore Kawainui Marsh?
Let’s remove the floating introduced weeds


Kawainui Wetlands
Kawainui Lake


Typical modern wetland transect


Non-native
Native
Non-native

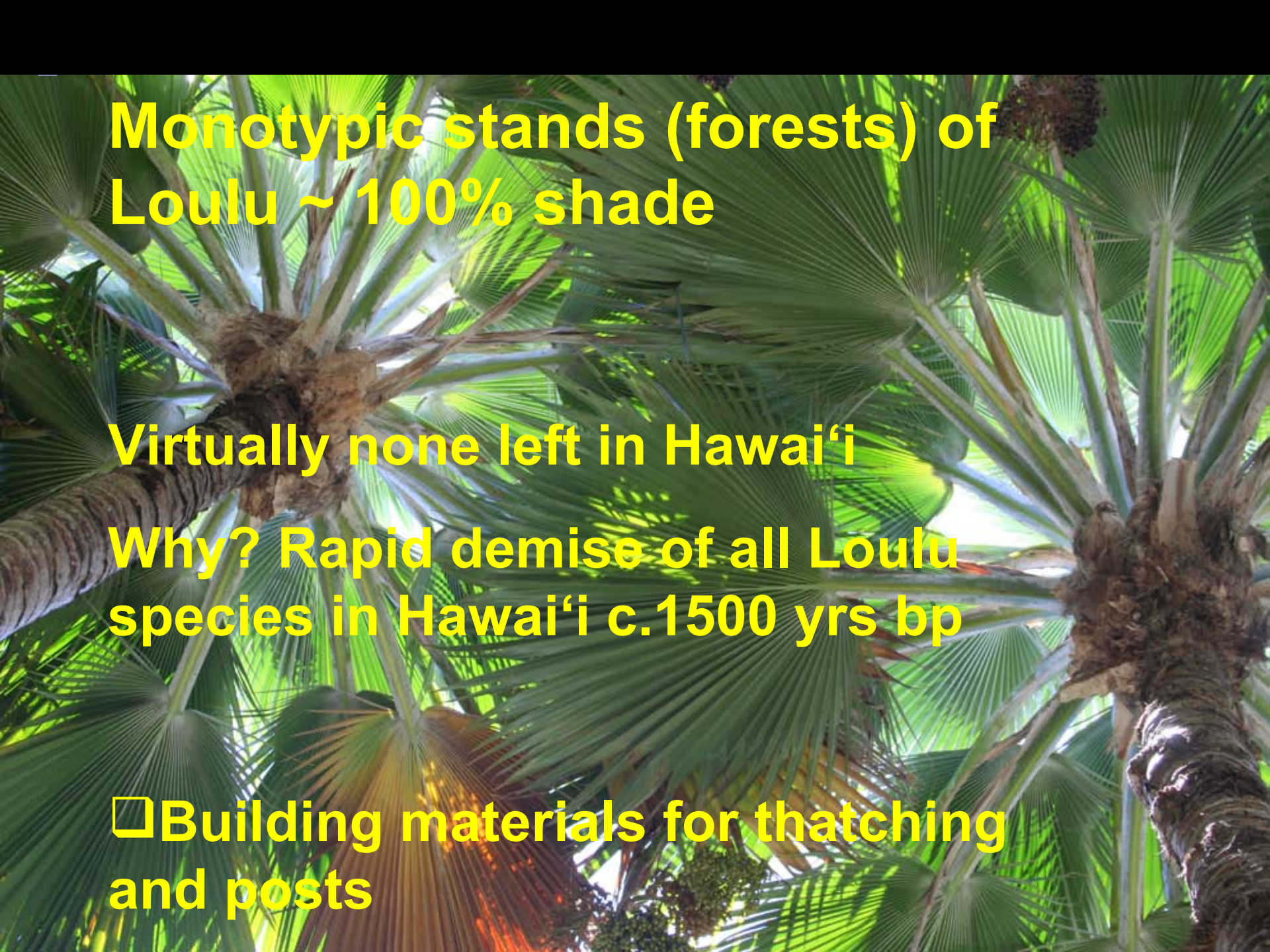

Why do we treat Loulu like coconut palms
- as feature trees

A dense planting of Loulu


Pritchardia martii
© C.F.Puttock


Loulu on Nihoa
Pritchardia remota
Arecaceae
© Sheila Conant


Monotypic stands (forests) of
Loulu ~ 100% shade



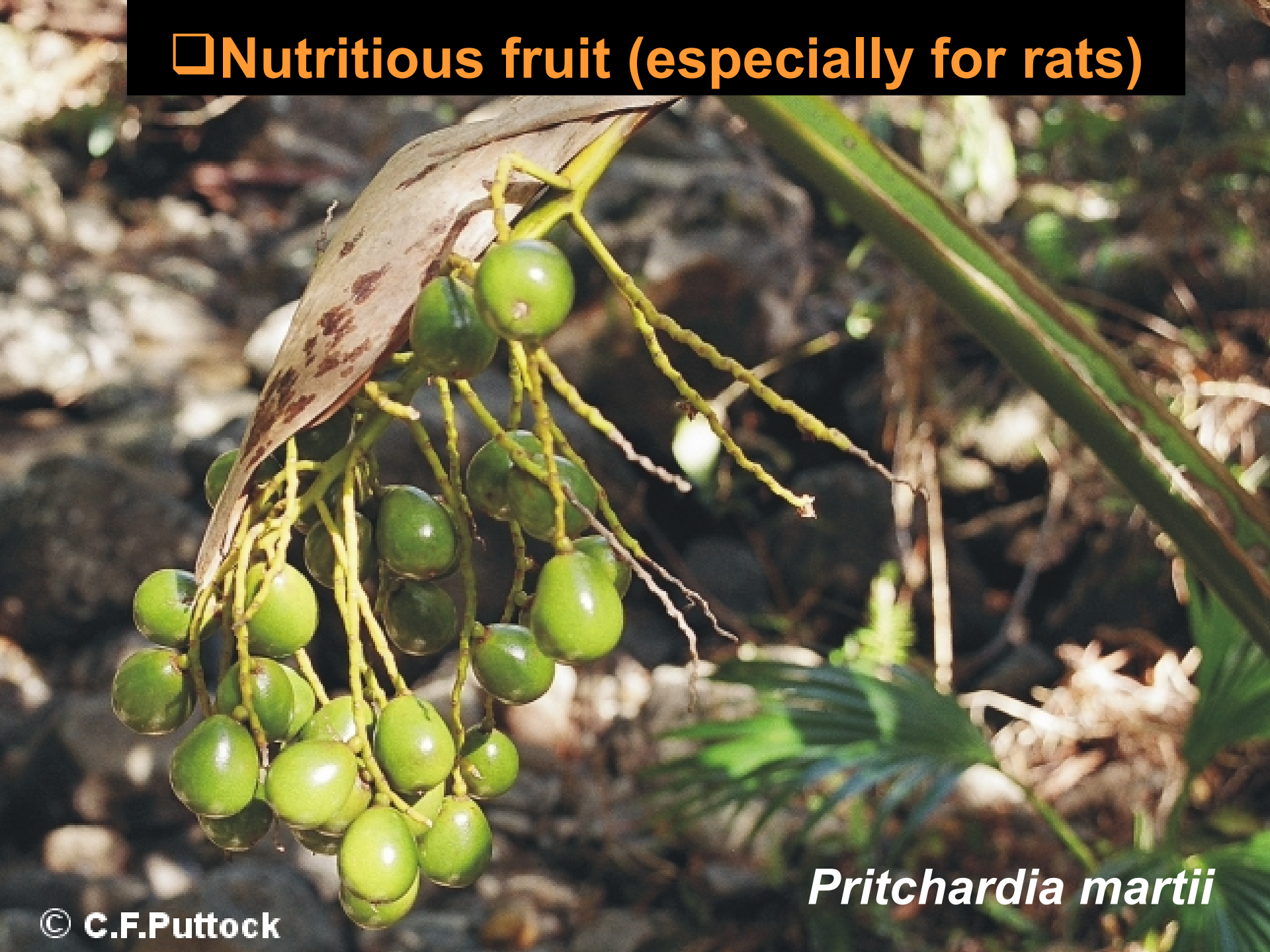
Monotypic stands (forests) of Loulu ~ 100% shade

Virtually none left in Hawai‘i

Why? Rapid demise of all Loulu species in Hawai‘i c.1500 yrs bp

- Building materials for thatching and posts

❑Nutritious fruit (especially for rats)



Pritchardia martii

To improve the survival for these Loulu …..

To improve the survival for these Loulu …..

…..try this density

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Playing the PIPR Database

- Pacific Island 2008 v.2.0 LucID 3 for PC or Mac (155 species)
  - http://hawaiiconservation.org
- Supersedes

  Hawai‘i Riparian 2005 v.2.0 LucID 2 for PC (103 species)
  - http://hbs.bishopmuseum.org/botany/riparian/
- Need Assistance with LucID
  - http://lucidcentral.com

Acknowledgements

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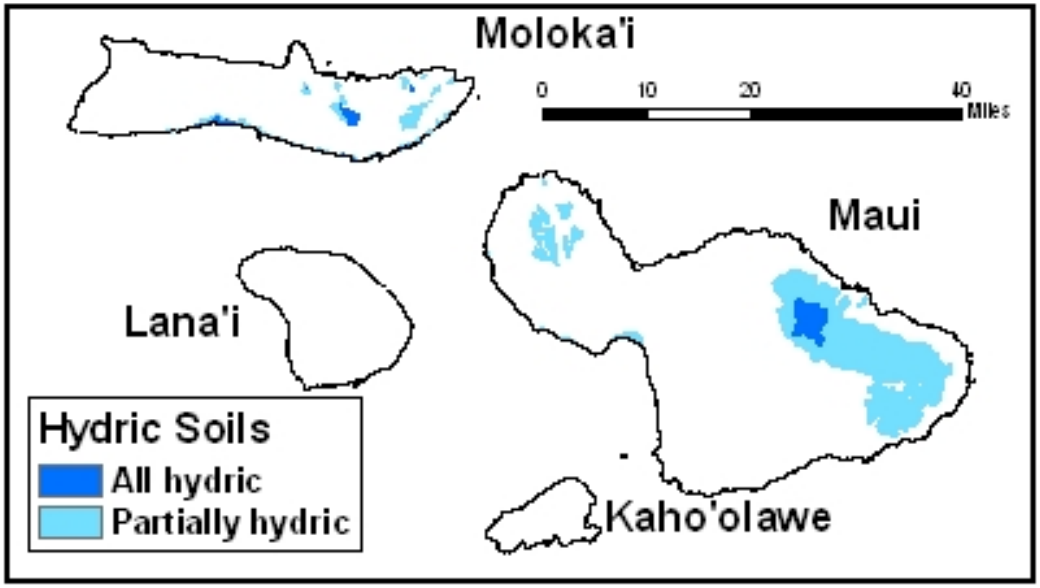

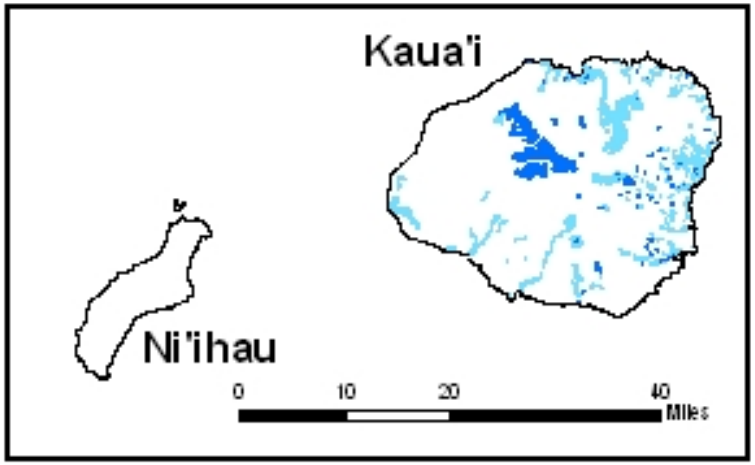

HYDRIC SOILS

A hydric soil is a soil that formed under conditions of saturation, flooding or ponding long enough during the growing season to develop anaerobic conditions in the upper part. Hydric soils along with hydrophytic vegetation and wetland hydrology are used to define wetlands.