

# User Friendly Plans for <u>Riparian Habitat</u> <u>Invasive Species Eradication</u> & Restoration

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# Two River Corridors: San Diego County

✓ San Diego River

17 miles, 12 miles surveyed = approx. 220ac. riparian (not counting 5 miles in managed areas)

✓ Otay River Valley

15 miles & 1835ac. surveyed = approx. 365 ac. riparian (not counting open water reservoirs & upland areas)



# San Diego River Study Area



# **Otay River Valley Study Area**



# Lower Urban Area City Park Department



# FSDRIP AREA City Special Assessment Zone



# <u>Golf Course</u> Federal Ownership



# Sand Mining Private Ownership



## Pilot Restoration Project City Wastewater Dept. on Water Dept. Land









**Topics** 

✓ Species Mapped & Amounts

✓ Mapping For Riparian Restoration

 Habitat Restoration Master Plan Components

✓ Prioritizing Restoration Sites



# ✓ Species Mapped

Weed Species Mapped			S.D. River	Otay River
1.	Giant Reed	Arundo donax	Х	X
2.	Pampas Grass	Cortaderia selloana	Х	Х
3.	Exotic Broadleaf Trees			
	B razilian pepper	Schinus terebinthifolius	Х	Х
	C alifornia (Peruvian)pepper	Schinus molle	Х	Х
	eucalyptus	Eucalyptus spp.	Х	Х
	evergreen ash	Fraxinus udhei	Х	Х
	Other exotic trees:			
	bottlebrush	Callistemon citrinus	Х	Х
	c arrotwood	Cupaniops is anacardioides	Х	
	C hinese elm	Ulmus parvifolia	Х	
	edible fig	Ficus carica	Х	
	myoporum	Myoporum laetum	Х	Х
	oleander	Nerium oleander	Х	
	olive	Olea eureopea	Х	Х
	silk oak	Grevillea robusta		Х
	tree tobacco	Nicotiana glauca		X
4.	Palms			
	Mexican fan palms	Washingtonia robusta	X	Х
	C anary Island date palm	Phoenix ca nariensis	X	X
5.	Castor Bean	Ricinis communis	Х	Х
6.	Tamarisk	Tamarix ramosissima	X	X
7.	Ludwigia	Ludwigia peploides	X	

### **Comparative Mapping Results**

	S.D. River		Otay River	
	Acreage		Acreage	
WEED TYPE	Summary	%	Summary	%
Giant Reed	37.95	58.0	14.29	3.0
Pampas Grass	0.55	0.8	2.18	0.5
Exotic Broadleaf Trees				
Brazilian Pepper	6.85	10.4		
California Pepper			8.71	1.8
Evergreen Ash	0.63	1.0	0.04	0.0
Eucalyptus	6.27	9.6	51.35	10.6
Myoporum			0.77	0.1
Other Exotic Trees	2.48	3.8	1.07	0.2
TOTAL BROADLEAF TREES	16.23	24.7	61.94	12.8
Palm Trees				
Large Palms	0.40	0.6		
Medium Palms	1.37	2.1		
Small Palms	0.68	1.0		
TOTAL NON-SEEDLING PALMS	2.45	3.7	0.70	0.1
TOTAL SEEDLING PALMS	0.07	0.0		
Castor Bean	2.42	3.7	5.00	1.0
Tamarisk	0.98	1.5	399.63	82.6
Ludwigia	4.97	7.6		
SHEET TOTALS	65.62	100.0	483.74	100.0

### Percent Riparian Weed Cover

### ✓ San Diego River

65.62 Acres of Invasive Weeds = 30%

12 miles X avg. 150 ft. wide = approx. 220ac. riparian

### ✓ Otay River Valley

### 483.74 Acres of Invasive Weeds = 52%

(not counting open water & upland covers)

Native/Non-Native Riparian = 1845 acres - Open Water = 926 acres

# Mapping for Riparian Restoration

#### <u>Watershed/Planning Level Plans</u> <u>Not User Friendly</u>

- In-house from 1:2400 aerials
- Few access overlays: ownership/utility/fence/access rds.
- Inadequate for restoration
- Often focus on 1-2 weed species

### Habitat Restoration Plans User Friendly

- Low elev. aerials & groundtruthing
- Include/field truth access overlays: parcel nos./over-under utilities/fences
- Scale transferrable to const. docs.
  & mitigation acreage need
- Include dominant weed species
  & potential new ones



### Mapping for Riparian Restoration



### Mapping for Riparian Restoration



Otay River Watershed Tamarisk & Giant Reed Control Program



Otay River Watershed Tamarisk & Giant Reed Control Program



# Mapping Tools for Riparian Restoration



#### **Digital Maps From Aerials**



Manual Maps From Aerials

In Field & Office



#### **Digital Maps in Field**

# **Restoration Base Map Components**

- Lowlevel Aerials: Map at 50-100 Scale <u>Easily Translated to Construction Docs.</u>
- Map All Dominant Invasive Species <u>Assures Best Chance for Native Recovery</u>
- Local Property/Road/Fence/Utility Overlays <u>Defines Who has Control & Access</u>
- Hand vs Digital Base Map Preparation <u>Preparation/Checking by Botanist Critical</u>
- Label Each Weed Polygon Sq. Ft. <u>Allows Definition of Future Restoration Projects</u>

### Base Map Field Groundtruthing

- Use Aerial Photo Base Maps in Field <u>Develops Habitat Pattern Recognition</u>
- Maps/Corrects Features Not Already Mapped In-House For Example: Eucalptus/Fences/Underground Utilities
- Favor Manual Over Digital Faster & Generally More Accurate
- Adds Corridor Specific Species Verfies Importance of Invasives Selected for Mapping Adds Locations of New Unknown Invasives
- Assure Final Maps Checked by Groundtruther <u>Assures Final Maps Are Correct</u>

### Map Discrepancies



#### PILOT PROJECT TREE REMOVALS

	Large	Medium	Small	
	12"+ DBH	6-12" DBH	1-6" DBH	TOTALS
Unmapped:	26	24	10	60
Total Trees Mapped:	9	44	35	88
<b>Total Trees Removed:</b>	35	68	45	148
% of Total Trees Mapped:	26%	65%	78%	59%
% Increase During Install:	289%	55%	29%	68%

Assume a 10-20% increase in overall weed acreage in planning for mitigation

# Habitat Restoration Master Planning

### 1) Use Restoration Friendly Weed Mapping Scale

### 2) Map & Plan for Eradication of All Major Species

#### 3) **Provide Master Implementation /Maintenance Specs.**

- Weed eradication
- Habitat Restoration e.g. master plant palettes & planting specs.

#### 4) Provide 5-Yr. Monitoring Program & Success Standards

- Weed eradication
- Habitat Restoration e.g. master plant palettes & planting specs.

### 5) <u>Provide Prioritization Approach</u>

6) Provide for Long-term Maintenance

### **Restoration Master Plant Palettes**

<b><u>Riparian Woodland Container/Cutting Palette</u></b> (used 35-50 feet from river bank in areas less than 3 ft. above water table)					
Common Name	<u>Species</u> <u>Size</u>	Plts./Acre <u>%</u>	<u>Cover</u>	Spacing O.C.	
Baccharis salicifolia	mulefat	ctngs./1-gal	347	20%	6 ft.
Pulchea sericea	arrow-weed	1-gal.	69	5%	6 ft.
Salix exigua	sandbar willow	ctngs./1-gal	138	10%	6 ft.
Salix lasiolepis	arroyo willow	ctngs./1-gal	208	<b>B</b> 15%	6 ft.
Taller Willow		ctngs./1-gal	100	20%	
Salix gooddingii	black willow				10 ft.
Salix laevigata	red willow				10 ft.
Salix lucida ssp. lasiandra	lance-leaf willow			10 ft.	
Tall Canopy Tree		<u>1-gal/tree p</u>	ot 0	25%	
Acer negundo spp. cal.	California boxwood				20 ft.
Platanus racemosa	western sycamore				20 ft.
Populus fremontii	Fremont cottonwood	l		20 ft.	
Lower Shrubs	1-gal	70-156	5%		
Hymenoclea monogyra	leafy burrobush				6 ft.
Rosa californica	California rose				4 ft.
Sambucus mexicana	Mexican elderberry				6 ft.
Vitis girdiana	desert grape			6 ft.	

# Prioritizing Restoration Sites

#### Defensibility

- Top down vs worst sites first
- Seed/propagule dispersal biology
- Closeness to other weed populations

### Priority by Species

- Some species degrade habitat more than others
- Don't piecemeal weed clearance or other will invade
- Prioritize areas with most habitat degrading weeds first

#### Costs/Difficulty of Control

- Favor sites that do not have to be purchased
- Economy of scale for larger sites but smaller sites may not need revegetation
- Professionals vs volunteers: Cost vs Quality
- Funding sources: mitigation vs grants
  e.g. SEP or CDFG Anadromous Fish Program

## **Prioritizing Restoration Sites**

### Ease of Equipment/Utility Access

### Parcel Ownership

- Public vs Private
- Internal Management Competition

### Permitting Issues

- No. of Agencies:
  e.g. RGP41: avoids RWQCB
- Public & Private Mitigation Needs
- Difficulty of Master Permitting

### Public Relations Issues

- Select least controversial sites first
- Educate public before implementation

# <u>Thanks</u>



### Brad Burkhart- BEC/ECORP

