

**Watershed Based Eradication of  
*Arundo donax* (giant reed):  
from pulling together to mapping  
to treating to re-planting**

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*Arundo donax*

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- **Non-native grass**
- **Highly invasive**
- **Spreads only asexually**
- **Low habitat value**
- **Flood/Fire risk**



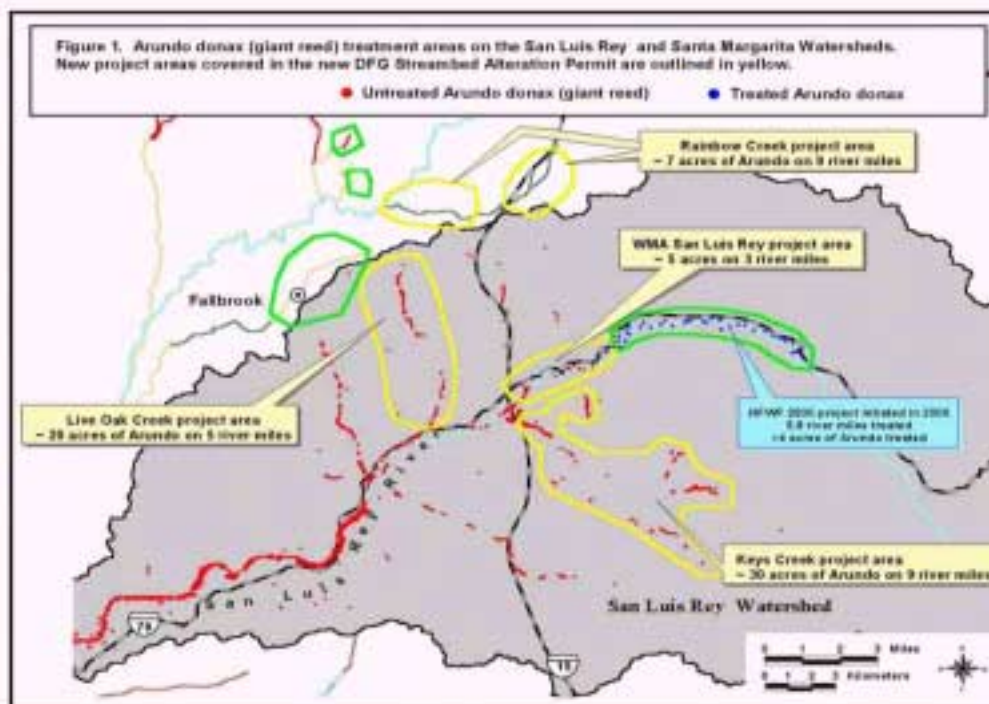


## Step 1: Pull together group

- Watershed based control
- WMA/RCD/other lead..
- NFWF PTI Grant
- Apply for \$
- Long term management and monitoring

## Step 2: Map infestation

- Scale of infestation
- Property ownership
- Budget
- Plan, track projects
- Map cheaply!

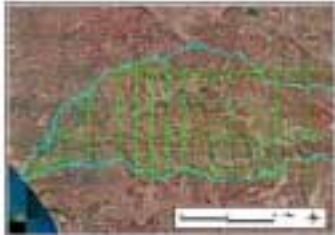


## How to map cheaply



### STEP 1

Acquire imagery:  
1 meter resolution imagery  
(orthorectified) for the entire  
watershed from SANDAG/SDSU.



### STEP 2

Print maps for field surveying:  
30 D-size maps (22"x34") each  
covering 2.4 miles x 3.3 miles.  
4 E-size maps (34"x44") for  
upper watershed areas with  
scattered *Arundo* distribution.



### STEP 3

Map exotic plant in the field:  
*Arundo* was mapped at two  
densities (80-100% & 50-80%  
cover). Other exotics were  
mapped as encountered.

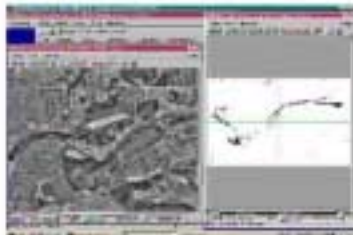
### STEP 4

Transfer from map to clean sheet:  
Traced *Arundo* polygons onto  
tracing paper/acetate with  
reference points (such as road  
intersections).



### STEP 5

Scan traced images and  
convert into polygon  
coverages (using GIS  
software such as  
TNT Mips by Microlimages)



### STEP 6

Georeference each  
image using GIS  
software



### STEP 7

Merge coverages  
and cleanup:  
Deleted reference markers  
using GIS software (such  
as ArcView by ESRI).

### STEP 8

Proof final  
coverage:  
Compared to field  
survey maps.



- Driving 10 days
- Office 10 days
- Printing materials

Total cost under \$10,000  
350,000 acre area

### Step 3: Project planning & funding

- Use mapping to develop project costs
- Select project sites
- Match sites with grants based on ownership, site conditions
- Apply for grants (Prop 12/13, Urban stream, WRP, WC Board, etc..)



### Step 4: Obtain permits for projects

DFG: 1600	ACOE: 404 RGP:41?
CEQA: Exemption?	FWS Consultation

- Streamline permitting
- Obtain “Blanket Permits” covering multiple projects under one permit (same method, same group)
- Apply as group (cohesive management, accountability, long term management)
- Cater methods to permitting issues (avoid nesting season)
- Avoid triggering 404, CEQA

## Step 5: Select control methods for project areas



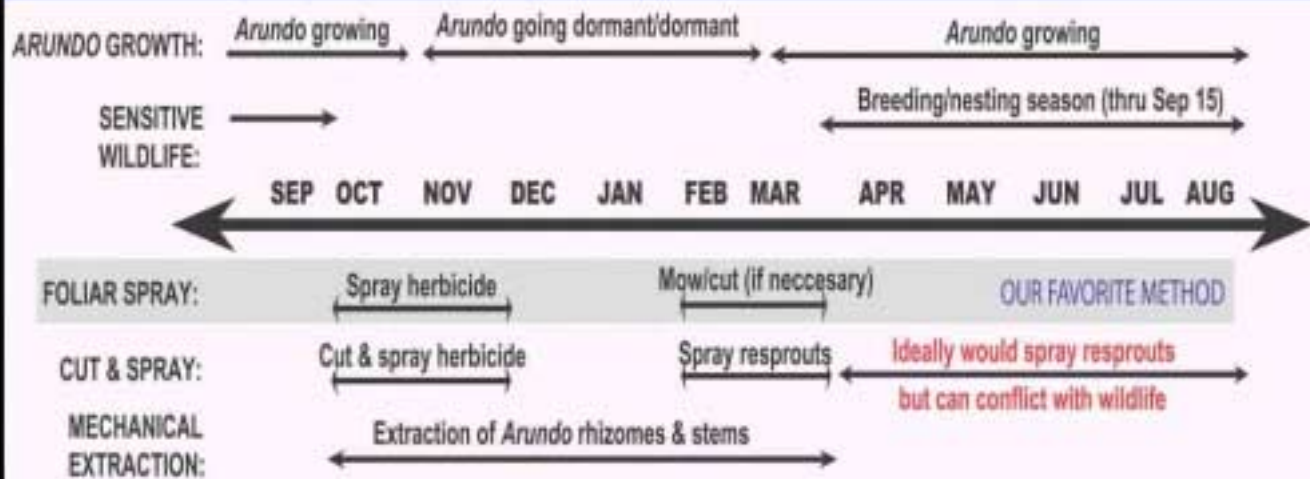
- Site conditions (access, native cover, topography, etc.)
- Cost
- Time of activity
- Number of repeated visits over time
- Flood/fire risk of treated stands
- Succession of vegetation after control
- Permitting issues

### The three most used methods

- 1) Foliar spray stand in fall: then leave, cut or mow;  
~\$4,000 - 10,000 for 3 year effort
- 2) Cut or mow and spray regrowth multiple times;  
~\$8,000 - 20,000 for 3 year effort
- 3) Mechanical extraction and spray regrowth;  
~\$15,000 - \$30,000 (?) for 3 year effort

### Key to controlling costs

- Avoid hand work (sawing, hauling, etc...)
- Avoid moving, handling, grinding, chipping biomass
- Use effective initial herbicide treatments (reduce re-treatment efforts)



## Cut/Mow and then application of herbicide



- Moderate to fairly effective
  - 50-100% Rodeo on cut stem surface
  - multiple high intensity retreatments required (5-10% Rodeo or Roundup)
- Retreatments can conflict with nesting, complicating permitting
- Biomass is greatly reduced, but does “regrow”
- Some skip initial cut stem treatment
- Higher cost (\$10,000 to \$20,000+ per acre)
- Reduces fire risk and flood damage



**1) Cut then treat stump (some skip stump application)**

**2) Regrow**

**3) Respray**



Extracting stems and rhizomes



Tubgrinder used to grind up *Arundo* stems and rhizomes



## **Mechanical control**

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- **Effective: but retreatment of regrowth for several years**
- **Too many steps: pull, haul, pile, move, grind, move, spread, then retreat site.....**
- **Permitting more complicated, retreatment nesting conflict**
- **Higher cost (>\$15,000 per acre)**
- **Good access required**
- **Removes biomass**
- **Good for thick stands, not small or intermixed**



Hammer-flail mower



## Mowing: lower biomass

- Great for lowering biomass (lower fire/flood risk)
- Aids replanting by providing mulch
- Each mower can do 1 to 3 acres a day
- Limited ability to work on complex topography/wet areas
- Low cost (~\$1,700 day) compared to hand work

