Matilija Canyon *Arundo Donax* Survey

Summer 2001

Conducted by the Matilija Coalition, a program of the Surfrider Foundation, Ventura County Chapter

And

Environmental Interns from Great Pacific Ironworks and Patagonia, Inc.

Matilija Canyon Arundo Donax Survey

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I. Introduction

As part of the broader effort to restore the Ventura River watershed, staff of the Matilija Coalition and interns from Patagonia, Inc. conducted a survey of *Arundo donax*, a non-native giant reed species, on a portion of Matilija Canyon above Ojai, California, during the Summer of 2001. Starting in the upper reaches of the canyon, the surveyors used global positioning systems (GPS) to record location, size, and health data on Arundo over a five-mile stretch of Matilija Creek and its floodplain. This survey provided insight into the nature and magnitude of infestation in the area and served as a significant first step in the "top down" restoration of the Ventura River watershed.

II. *Arundo Donax* in Matilija Canyon

The most obvious impact of Matilija Dam is the accumulation of silt, sand, and cobble in its reservoir, which is fed by Matilija Creek, a tributary of the Ventura River. Sedimentation has diminished the capacity of the basin by 90% from the intended seven thousand acre-feet. The filled reservoir now hosts a variety of non-native plant species,

among them *Arundo donax*, a giant reed native to the Indian subcontinent and introduced to the Western United States by Spanish settlers. Although historically useful for fencing, roofing, and fiber production, the benefits of introducing Arundo do not outweigh its negative impact on the Ventura River watershed.

Often mistaken for bamboo, Arundo grows rapidly in water-rich environments to heights over thirty feet. Transported downstream during flooding, thickets arrive on Ventura County beaches after major storms. Uprooted plants left upstream settle on stream banks and sandbars where small amounts of Arundo root, or rhizome, sprout easily and become large patches in a few months and colonies within a few years. Like Yellow Starthistle in the Imperial Valley and Kudzu in the Southeastern United States, Arundo donax does not belong in Ventura County's waterways for several reasons. Arundo promotes excessive algae growth, higher water temperature, and crowds out native plants. The plant grows densely and diverts natural stream flow, reducing the habitat value of the stream and accelerating erosion that causes property damage and necessitates expensive repairs. Arundo also wastes water in Ventura County's drought-prone climate by using five times the amount of water as native plants.

The Matilija Reservoir provides the ideal environment for Arundo root, or rhizome, to grow as it decreases the slope of the creek and slows the flow of water. Once sprouted in water-rich soil, Arundo can grow as much as four inches a day. Although

likely that Arundo grew in Matilija Canyon before construction of the dam, the modification of the creek has allowed forests of Arundo to grow throughout, most pervasively in the reservoir. Clumps in lower concentrations are prevalent miles upstream, with lessening concentration as it moves deeper into the canyon.

III. Project Preparation

The Matilija Coalition participates in the Ventura County Arundo Task Force, which seeks to manage non-native plant species in Ventura County. There is little baseline data for a management effort in the Ventura River watershed, and although acres of Arundo can be seen in the reservoir, not even rough acreage estimates exist. It was concluded that field surveying would be the most effective way to collect data in preparation for broader control efforts. Each clump required identification and measurement – if even one plant escaped documentation, the possibility of further infestation in the watershed would remain.

The dynamic nature of Arundo presents a major complication. The location of Arundo can change from year to year, as high water winter/spring flows in "flashy" Matilija Canyon uproot clumps from banks and floodplains and moves them downstream. Thus, the plant must be monitored and surveyed regularly. It was found that the most effective tool for tracking the growth and travel of Arundo is GPS used in conjunction with GIS software, and the creation of an easily modified database. For this task the Matilija Coalition purchased a Garmin E-Trex® global positioning system and TOPO! Mapping software, with the intention of using ArcView GIS following the field survey.

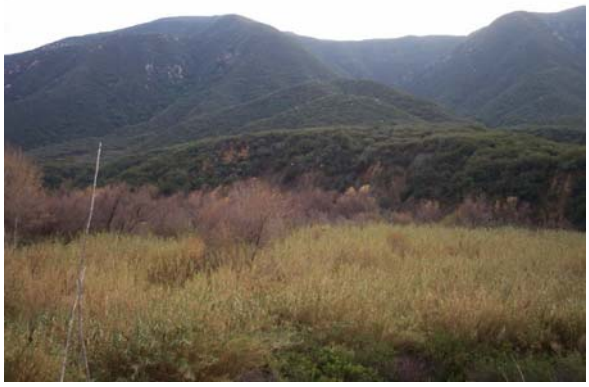
The labor-intensive nature of the survey suggested the Matilija Coalition utilize a large group of volunteers for the mapping project. After coordinating with Heather Sterling, Store Manager of Great Pacific Ironworks of Ventura, the Matilija Coalition arranged an internship project in which GPIW employees would conduct the survey. A three-hour training session along the banks of the Ventura River readied the interns for the project. Familiarizing themselves quickly with the GPS unit and the physical characteristics of Arundo, the interns began their work in the canyon in July 2001.

Referencing forms created by Northern Californian environmental group Team Arundo del Norte, the Matilija Coalition tailored data recording sheets and mapping protocol for the terrain and nature of Arundo in Matilija Canyon. Mapping crews would take to the field one at a time to avoid missed areas or overlap, and note their end point for ease of continuation for the next day's crew. Eight-hour workdays, transit included, would ensure timely completion of the project.

IV. Field Activities/Observations

The initial phases of mapping involved the designation of a starting point. Because Arundo infests while moving downstream during high-flow conditions, it is necessary to find the highest point of infestation and then map moving downstream. To the surprise of the Matilija Coalition, Arundo was found many miles up from the clumps originally believed to be farthest upstream. Several mapping days were spent finding a starting point at a location approximately seven miles above the dam. It was during this time that a seven-hour workday was adopted as hiking intensity increased and temperatures reached 100ºF.

Mapping crews of three to four persons worked most effectively, as one intern recorded, one operated the GPS unit, and the others "scouted" for new clumps. Several sets of eyes were needed to heavily vegetated landscape. The mapping methods and GPS operation quickly became routine, and within eight weeks the five-mile field survey was concluded at the point where sharply increased Arundo concentration forbade further surveying – where very literally a forest of Arundo began.



Surveyors noted that infestations usually occur on flood plains or high flow channels, not directly on stream banks as expected. This indicated that most of the present infestations occurred during floods. In addition, Arundo was seldom found in precipitous locations, but rather in flatter areas where flows slowed and rhizomes settled,

or under rocks and around trees that were once subjected to high flows. Clumps averaged ten feet wide and long, and twelve to eighteen feet high. Arundo did not infest two major tributaries of Matilija Creek, the Upper North Fork and Murrieta Creek.

V. Data Management

The Matilija Coalition's use of GIS allowed raw field data to be transformed directly into a workable map and associated database, which could then be used for analysis and presentations. The project was built using Arc View 3.1 and included four different themes: a digital raster graphic (DRG) base map, a digital orthophotoquad (DOQ) base map, Arundo field data, and photographic images. Exporting the Arundo data from the GPS unit into Arc View proved to be the most challenging aspect of the project. A multi-step process converted a text file to an Excel file, then to a .dbf. The .dbf file was imported into Arc View and lastly, converted to a shapefile. Attribute data collected in the field was added to the Arundo data while it was in the Excel format. Once in Arc View, the statistics function was then used to determine the total amount of Arundo surveyed in the canyon, calculated at over eleven acres of individual clumps.

The two different base maps used for the project were obtained from CD-ROMs, a DRG and a DOQ. It was the projection of the DOQ that set the project projection to UTM NAD83. The DRG was the basis for the primary view of the project, whereas the DOQ served more of a presentation purpose. Digital photographic images taken from the survey area were hot linked to their geographic locations as part of the DRQ view. The hotlink feature provides an interactive visual for presentations and is particularly helpful to show what Arundo is to those unfamiliar with it. In addition, Sierra Alder and

Tim Kirschner, employees of Patagonia, Inc, produced an official graphic presentation for Coalition use and display in the Great Pacific Ironworks store in Ventura.

VI. Conclusions

The Matilija Canyon Arundo Donax survey confirmed that this non-native giant reed grows throughout Matilija Canyon and in upstream locations miles higher than initially believed.. High concentrations in the Matilija Reservoir may prove nearly impossible to eradicate without heavy machinery and large work crews; however, removing the isolated clumps found in the upper canyon may be achieved with light tools and many volunteer hours. Most important, this simple survey trained the Matilija Coalition to effectively assess and map Arundo infestation in any location in the Ventura River watershed. The survey also put into perspective the magnitude of a major part of the restoration of the Ventura River – the project to control an acutely noxious non-native plant species from the watershed.