



PREFACE

The preparation of this work, *Enhancing and Caring for the Laguna*, has occurred over a two year period with the active involvement of many individuals and organizations. This final report represents the capstone to the Restoration and Management Plan (RMP) project: it will become an important tool for planning and securing grant funding for future on-the-ground habitat restoration projects. The publication of this RMP is another important milestone on the path to the Laguna's ecological restoration.

The plan defines clear goals in a number of areas: habitat restoration, ecological research, flood management, stream channel improvements, sedimentation reduction, water quality enhancements, recreational access and trail development. Very specific objectives and priorities are defined for each of these goals. Here, in summary, are the considerations involved in this effort and the goals that have been expressed by the diverse community of stakeholders who so generously participated.



EXECUTIVE SUMMARY

The full text of this plan spans two volumes: Volume I consists of eleven chapters which explain the process that was followed, lays forth the issues discussed, the proposals that were sounded, and the decisions that were made regarding the restoration and management of the Laguna de Santa Rosa watershed. Volume II consists of six appendices and fifteen maps which present much of the important data that was assembled and organized during the course of this work.

This plan is significant for several reasons. First, it captures the accumulated knowledgebase of the Laguna: what are its natural and biological resources, what are its impairments, who is involved and who is responsible, what did the Laguna look like and what could it be restored to. Second, it distills the hopes of the community at large: what do we value, what is our collective vision for the future, and what projects are most important. Third, it provides guidelines for what needs to be restored:



what species are at risk, which habitats are most affected, and what specific opportunities exist for immediate restoration. And fourth, it identifies the gaps in our understanding: where do we need to conduct new research.

The first chapter, *Defining the Need*, summarizes the entire work; for the quickest understanding of what the RMP project was all about, this introductory chapter can serve as a proxy for reading the full text.

The second chapter, *Working with the Community*, explains the process that was followed for involving stakeholders, for soliciting their input, and for consulting with specialists. In addition to the stakeholder groups, experts from a variety of science, engineering and regulatory backgrounds were called upon to temper the community's vision with technical, practical, and legal constraints. The fundamental rule followed throughout the period of community involvement, was to seek as much diversity of opinion as possible through the use of the very broadest possible definition for the term "stakeholder".

Charting a Course, the third chapter, encapsulates the entire set of goals that were derived from the work. Specific objectives to be pursued for restoration, management, monitoring, and research are enumerated in considerable detail, with recommended action items spelled out for many of these objectives. The full body of work listed in these objectives may appear to be daunting at first glance—some things may take years to complete, others decades—but some parts of this work can begin to bear fruit almost immediately. Getting started is easy, and indeed, has already begun.

In *Restoring, Managing and Monitoring*, the underpinnings of good restoration ecology and the adaptive management framework are explained. Strategies for effectively putting these concepts into use are described, with separate discussions on each of the major habitat types that occur in the watershed: streams, seasonal wetlands, open-water wetlands, perennial marshes, upland marshes, riparian areas, grasslands and oak savannah.

One of the early steps in restoration is to define the underlying values that help to set overall restoration goals. The underlying value most frequently cited in the course of this work was biological diversity. In *Controlling Invasive Species*, the working assumption is that non-indigenous plant and animal species that exhibit aggressive, highly competitive characteristics, act to reduce biological diversity. Strategies for controlling the spread of invasive wildland weeds are explained in this chapter.

In *Preserving Biological Diversity*, the legal framework of the Endangered Species Act (ESA) is cited as the context for listing very rare plants and animals as being threatened or endangered. Society has upheld this

legal framework and used it as the basis for regulatory protections and land use policy; the distribution of state and federal grants has also been aligned with the ESA. But through the considerations of the stakeholders, a second important value surfaced: keeping common species common—that is, emblematic species and species that have broad ecological function, should receive our attention and care as well as those that are rare. In this chapter we delve deeply into the issues regarding the conservation of vernal pool plants and the California Tiger Salamander. Anadromous fish have also been heavily impacted in the watershed: this chapter touches on water quality and water quantity issues, the need for riparian cover, and the problem of man-made barriers to fish migration.

Water is the source of all life, thus a clean and adequate supply of water for wildlife, agriculture and human use creates a nexus between the Laguna watershed and several important civil and regulatory agencies. Coupled with our desire to protect property from flood damage and the key role that the Laguna's large floodplain provides as a downstream flood protection gateway, the question of maintaining adequate water transport capacity enters the equation as well. In *Sustaining our Water Resources*, we examine the list of pollutants that are known to occur in the watershed. We also look at strategies for reducing erosion and sedimentation, and strategies for retaining the watershed's natural flood control capabilities.

The task of organizing the watershed's data has been simplified through the use of computer software. In *Mapping Geographic Data* we list the types of spatial data that have been assembled and consulted for this work: planning and human use, land cover, natural resources, and historical data. All of the cartography in Volume II, plus many other cartographic services—used for intermediate planning and visualization—was derived from these sources. The assembly of this data supported good placed-based decision making throughout the term of this work.

The designs for individual restoration projects in the watershed need to reflect the forces of nature—and climate, soils and topography top this list, providing the geophysical basis for understanding these forces. In *Characterizing the Watershed*, we examine the geological foundation of the watershed's landforms and the geomorphology of the most recent sub-era. Precipitation patterns vary greatly in the watershed—annually from 27” in the south to 62” atop the Mayacamas—which has a direct impact on the pattern of vegetation within the watershed. In this chapter we also present, in narrative form, a description of the Laguna's signature biological communities.

The public's strong desire to engage directly with the Laguna's wild areas, necessitated a thorough engagement in the question "Which publicly owned lands within the Laguna should be open to the public?" In the chapter *Developing Trails and Recreation*, we examine the consequences of public access and propose four complementary ways to make this happen.

The final chapter of Volume I, *Exploring the Historical Record*, delves into the evidentiary documents that portray what the watershed looked like before 1840. Several excerpts, from journals and diaries of early visitors to the area, capture the image of a fertile landscape teeming with abundant wildlife. This vivid picture makes today's biological diversity appear somewhat faded—a clear indication that recent hopeful trends have not fully reversed the losses that occurred in the past two centuries.

Volume II contains fifteen maps covering a variety of thematic elements: habitat diminution and impairment, historical context, public access, gauging stations, geology, and precipitation. The six appendices provide the technical data that Volume I draws from: invasive species in the watershed, threatened and endangered species in the watershed, water quality listings and standards, the *Ludwigia* Management Plan, regional geophysical data, and excerpts from the historical record.



BEST PRACTICES

Several general rules for good restoration and management comprise a sort of "working bible" for planners and practitioners in the Laguna. When followed, these *best practices* will help ensure that the community's goals for the Laguna are eventually achieved. Each of these is well documented in the narratives of chapters 4 through 7, but for emphasis are listed here:

1. Identify reference sites for each geophysical region and use them as the basis for restoration plans.
2. Maintain genetic integrity by restoring with locally adapted plants collected from nearby reference sites.
3. Design restoration projects that form linkages between existing high-quality habitats in order to reduce overall fragmentation.
4. Conserve nearby land uses, such as ranches and farms, which supplement the needs of wildlife.
5. Share monitoring results from restoration projects with other land managers to build an informed and ecologically-aware community.

6. Control invasive exotic species in the early stages of an infestation, when a rapid response will have the greatest impact.
7. Evaluate invasive species control strategies using the best available data: consider grazing, mowing, burning, disking, tarping, pesticides, and combinations of these.
8. Prune excessive vegetation in urban creeks using on-site biologically trained staff to make habitat-sensitive decisions.
9. Install vegetative buffer strips in new developments to trap sediments and to filter out water-borne chemical pollutants from urban runoff.
10. Continue reaching out to agricultural producers using grant programs that support wetland reserves, riparian fencing, dairy quality assurance, and erosion prevention programs for vineyards, orchards, and equestrian facilities.



PRIORITIES

Several places in the Laguna have surfaced as priority conservation and restoration sites. These include the CDFG Laguna Wildlife Area north of Occidental Road, the Laguna “Middle Reach” extending from Sebastopol to Occidental Rd, the vernal pool conservation areas of the Santa Rosa Plain, the flood control channels to the east of Stony Point Road, the ranchlands of the Gossage/Washoe sub-watershed area, and the landslide-prone areas of Sonoma Mountain.

In terms of habitat types, the most severely impacted ecosystem has been the perennial wetlands that were historically located between the original Mark West Creek confluence and Sebastopol. The loss of wetlands and the encroachment onto the adjacent floodplain has so greatly altered the landscape that the Laguna’s formerly prominent role in bird migration is in jeopardy.

Some of the plan’s priorities are straightforward and work can begin immediately: for example, enhancement of riparian forests, planting more oak trees, establishing fence line hedgerows, and removing undesirable invasive exotics, can all be easily accomplished.

But other priorities suggest the need for new knowledge. For instance, how do we manage the vernal pools of the Santa Rosa Plain in a way that guarantees the survival of the plants and animals now threatened with extinction? Or, how can we manage our floodplains to provide downstream flood protection while also supporting diverse zones of vegetation and wildlife habitat? Or, how can hydraulic changes be made to enhance

habitat while retaining flood storage and flood conveyance capacities? Answers to these types of questions will improve our ability to enhance the Laguna. And because this type of rigorous credible knowledge of the local ecology will be an ongoing component of our work, the establishment of a *Laguna Wetlands Research Institute* will become one of our first priorities.

Many of the plan's priorities can be carried out locally by volunteers: mapping the distribution of specific plants, surveying streams for barriers to fish passage, ground-truthing the data developed in our GIS-labs, surveying areas of high-quality habitat for reference sites, and participating in habitat surveys such as bird-counts. Already this type of community support has proven to be beneficial. And fun.

There is still much to be learned. The physical, chemical, and biological interactions occurring in the Laguna's bottoms have been dramatically altered: good limnological studies are critically necessary if we are to properly restore the Laguna's ecological balance. Likewise, a very real possibility exists that the California Tiger Salamander will become extinct, on our watch, and in spite of our best intentions, simply because we don't know enough about the species' behavior and needs. And controlling the aggressive spread of *Ludwigia*, here and elsewhere, will require careful study of the plant's morphology, genetics, population dynamics, and ecological interdependencies. In all, the role of research, both fundamental and applied, is thought to be critically important towards the long-term balance being sought for the Laguna de Santa Rosa.



The California State Coastal Conservancy, which has championed the preservation and enhancement of our state's coastal and fresh-water wetlands, has been the principal sponsor for the project. Additional funding has been generously provided by the Sonoma County Water Agency, the City of Santa Rosa, and the Community Foundation Sonoma County.