



PART I

THE WILLOW CREEK WATERSHED EDUCATION
PROGRAM

Information for Educators





Willow Creek Watershed Education Program



Organization Description

Stewards of the Coast and Redwoods (Stewards), founded in 1985, is a nonprofit environmental organization that works cooperatively with the California Department of Parks and Recreation (DPR) in the Russian River Sector. Our mission is to promote education, preservation and restoration of the natural and cultural resources of Russian River area state parks in partnership with DPR through interpretation and stewardship.

Stewards is a leader in supporting volunteer interpretive activities. With modest resources, Stewards provides funding for recruitment, training, and support to a corps of 250 regular state park volunteers who recognize the importance of educational and interpretive activities in raising awareness about environmental protection and preservation in the state parks we support. We have a proven record of attracting knowledgeable volunteers who return year after year. Last year, Stewards-supported volunteers gave over 9,000 hours of service, valued at over \$170,000.

Registration Information

Please visit our website to download a registration form or you can use our online reservation system at www.stewardsofthecoastandredwoods.org/schoolforms.htm.

There is no cost to participate in the program, but we expect your commitment to fulfill the pre-visit activities in Part II of the manual. You will be provided with the following at no cost:

- Watershed Education Teachers Manual
- Classroom visit (1-1/2 hours)
- Field site visit (3-3 1/2 hours)
- Student Journal materials
- Life cycle of Salmon poster

Additional Materials (May be purchased at our cost)

If you choose, you can purchase the following items at our cost. You can also rent any of these items for a refundable deposit and the cost of shipping and handling.

- Streamkeepers Field Guide (from Adopt-a-Watershed Foundation) - \$20 cost, \$2 rental
- Return of the Salmon Video - \$20 cost, \$2 rental
- Lifecycle of the Salmon Video - \$10 cost, \$2 rental
- Laminated map of the Willow Creek Watershed - \$2 rental

Additional Support

Stewards encourages you to take your educational goals a step farther by encouraging you and your students to go back to your school and home watersheds and get involved with citizen groups that are helping to restore them. We also can offer you an opportunity to incorporate service learning into your curriculum goals through your participation at Watershed Day, which takes place in western Sonoma County each year in May. There also may be restoration opportunities in the Willow Creek watershed that you could participate in. Just ask us and we will assist you in whatever way we can.

Assessment

Stewards is very committed to evaluation and assessment, both internally and externally. Teachers and students are asked to comment on their experiences with this program by way of a written evaluation. Manuals undergo evaluation by state park staff, volunteers and teachers. After each volunteer training program, participants are asked to evaluate instructors and the material presented. The Willow Creek Education Program team meets to assess the program on an ongoing basis. Program feedback is welcomed as we strive to create an acclaimed program in Sonoma County.

Thank you very much for your interest.

Willow Creek Watershed Education Program Project Description

Project Location

Willow Creek is a tributary of the lower Russian River in coastal Sonoma County. The Willow Creek watershed drains an area of approximately 8.7 square miles, nearly all of which is owned and managed by two large landowners. State Park lands cover the approximate lower half of the watershed; Mendocino Redwoods Company owns most of the upper half. The lower Willow Creek valley within the park contains significant, undeveloped wetland and riparian habitats. The upper watershed is primarily forested land, with intermixed grasslands.

Background Information

The Willow Creek Watershed Education Program is one component of a larger Willow Creek Restoration and Management Project, which offers a unique opportunity to aid in the recovery of native steelhead trout and perhaps even the return of coho salmon in Willow Creek. Only two landowners, the California Department of Parks and Recreation (DPR) and Mendocino Redwoods Company (MRC), own most of Willow Creek watershed. Both parties, and the local public, are committed to the recovery of salmonids. In addition, key components needed for a healthy salmonid population (i.e., a healthy riparian zone and adequate summer low flows) are already present. For these reasons, this project has a high potential to aid the recovery of salmonids in the watershed. Besides the landowners, other public and private partners have an interest in the success of this project. Project partners include: Stewards of Slavianka, California State Parks, Mendocino Redwood Company, California Department of Fish and Game, and Prunuske Chatham, Inc.

Approximately 4,600 feet upstream from its confluence with the Russian River, Willow Creek has filled in with sediment. In certain segments of the creek, no bed or banks remain. These conditions limit, and will continue to limit, the upstream migration of spawning salmonids to periods when the valley is flooded. Downstream migration of juveniles in spring is, and will continue to be, blocked.

The filled channel condition of Willow Creek upstream of the second bridge is attributed to channel modifications that were begun before 1953, as well as increased sediment yield from land use practices in the watershed. Prior to 1953, Willow Creek was relocated, straightened, and probably widened, apparently to facilitate agriculture. Such channel modifications often create a condition that traps sediment as is illustrated by the fact that unmodified reaches of Willow Creek upstream and downstream are not filled with sediment to the same degree. The increased sediment yield from the watershed is attributed to road construction, timber harvesting, and livestock grazing beginning before 1900. Sediment supply derived from landsliding and surface erosion has decreased since the 1960s.

Willow Creek Watershed Education Program

Project Objectives

This hands-on outdoor education program for 6-12th grades is providing school groups an opportunity to:

- Learn about the attributes and importance of a watershed;
- Learn about the lifecycle of salmonids;
- Discover how sedimentation affects the watershed and salmonid habitat;
- Conduct field studies that measure the water quality of Willow Creek;
- Work on restoration projects that affect healthy changes in the watershed and meet the needs of Willow Creek using a service learning model;
- Disseminate information about Willow Creek through presentations at community events;
- Reflect on the value of their work for the environment, for their community and for themselves.



Willow Creek Watershed Education Program

Project Activities

Components

The curriculum was developed and pilot tested with our initial partner schools during 2001-2002. School groups are offered an engaging learning opportunity including a pre-site classroom visit, an on-site field experience, and post-site visit activities. We encourage schools to visit the watershed in the fall and then again in the spring to observe the seasonal differences.

The curriculum calls for:

- **Pre-site Classroom Visit:** Trained watershed volunteers come into the classroom and present general information about the Willow Creek watershed and set-up stations to prepare students for the field studies that will be done during their site visit. Preparation includes information about safety and watershed etiquette, ways of assessing erosion and sedimentation, the water quality parameters needed for a healthy stream, how to use water quality test equipment and recording forms, and an introduction to the world of benthic macro-invertebrates and how they determine stream health. Schedule approximately 1- 1½ hours for the classroom visit.
- **Site Visit:** During the site visit, students work in groups with trained volunteers observing the watershed and areas where there have been agricultural, logging, and road construction impact. They learn how to assess the health of the stream and how to determine whether or not salmon could survive in the habitat. They also collect benthic macro-invertebrates and learn to identify them for water quality assessment purposes. Schedule approximately 3½ hours at the site.
- **Post-site Activities:** Suggested activities include data analysis, possible community awareness and action projects, and reflection exercises such as journal writing and art projects.
- **Restoration (Service Learning) Component:** We can schedule one or more restoration days throughout the school year to meet service learning objectives. These days could include some or all of the following: field site clean-ups (trash & debris removal), native plant, streambed, or riparian habitat restoration.
- **Long-term Educational Experience:** We also plan to offer the opportunity for a long-term educational experience spanning a semester, school year, or even several years. The vision for this program includes the same elements of the one-day program, however teachers will make a long-term commitment to visit the watershed on a regular basis to undertake monitoring activities related to restoration efforts being done by professionals, track progress (or decline), and generally get on-site exposure to a damaged watershed and the measures needed to restore it to

Elements of our Program

Curriculum

The curriculum takes into consideration the different learning styles including: verbal/linguistic, logical/mathematical, visual/spatial, interpersonal, intrapersonal and naturalist. In addition, the different scientific thinking processes were considered in developing the curriculum for middle school and high school. At the middle school level students learn by:

- Observing the watershed first hand;
- Communicating their knowledge through classroom reports and community presentations;
- Comparing data they record at different field study locations;
- Relating their results to the overall conditions in the watershed; and
- Making inferences about future environmental changes based on increased health of the watershed.

At the high school level students use the same thinking processes as middle school, however they also have opportunities to:

- Compare their data with community monitoring groups and other high school classes; and
- Apply their new knowledge and come up with recommendations for future land use practices in the watershed.

Instruction

It has been found that teachers are looking for comprehensive curriculum-based programs that provide them with all the resources needed to conduct an engaging educational experience for their students. Stewards is committed to assisting teachers by:

- Developing a well-researched curriculum that addresses many of the state standards in multi-subject areas;
- Providing the in-classroom support and training to prepare students for their visit to the watershed;
- Supplying the materials and kits needed to conduct field studies;
- Offering transportation scholarships whenever possible;
- Providing volunteer staff support in the field; and
- Promoting opportunities for the students to showcase their work and receive acknowledgment for their accomplishments.

Expectation

Our program stresses the importance of creating a sense of inclusion for all students who participate. Inclusion activities and resources are suggested in the curriculum materials. The volunteer trainings will also address the importance of expecting that all students can succeed in this program regardless of their gender, race, or family background. In western Sonoma County, there are cultural groups that include logging and agricultural families as well as new age environmentalists. Our program strives to provide unbiased information about how each of these groups have lived and worked in the watershed and how everyone can now work cooperatively to affect positive changes and restore Willow Creek as a viable salmonid fishery.

Peer Support

Peer support is part of the design of this program. Working together in groups, students will succeed in completing the field studies and developing reports and presentations about their work. Stewards offers opportunities for students to work together on community restoration and conservation projects as well. In this way, they can gain a sense of stewardship that will hopefully last a lifetime.

The Willow Creek Watershed Education Program helps to achieve the following State of California Academic Content Standards:

Seventh Grade Science

Focus on Life Science

Structure and Function in Living Systems

- The anatomy and physiology of plants and animals illustrate the complementary nature of structure and function.

Physical Principles in Living Systems

- Physical principles underlie biological structure and functions.

Investigation and Experimentation- Scientific progress is made by asking meaningful questions and conducting careful investigations. To understand this concept and to address the content in the other three strands, students should develop their own questions and perform investigations.

Seventh Grade Mathematics

Measurement and Geometry

- Choose appropriate units of measure and use ratios to convert within and between measurement systems to solve problems.

Statistics, Data Analysis, and Probability

- Students collect, organize, and represent data sets that have one or more variables and identify relationships among variables within a data set.

Eight Grade Science

Focus on Physical Science

Motion- The velocity of an object is the rate of change of its position.

Chemistry of Living Systems (Life Sciences) - Principles of chemistry underlie the functioning of biological systems.

Investigation and Experimentation- Scientific progress is made by asking meaningful questions and conducting careful investigations. To understand this concept and to address the content in the other three strands, students should develop their own questions and perform investigations.

Eight Grade History-Social Science

Chronological and Spatial Thinking

- Explain how major events are related to one another in time.
- Construct various timelines of key events, people, and periods of the historical era they are studying.
- Use a variety of maps and documents to identify physical and cultural features of neighborhoods, cities, states, and countries, and to explain the historical migration of people, expansion and disintegration of empires, and growth of economic systems.

Historical Interpretation

- Explain the central issues and problems from the past, placing people and events in a matrix of time and place.
- Understand and distinguish cause, effect, sequence, and correlation in historical events, including the long-and short-term causal relations.
- Explain the sources of historical continuity and how the combination of ideas and events explains the emergence of new patterns.
- Recognize the role of chance, oversight, and error in history.