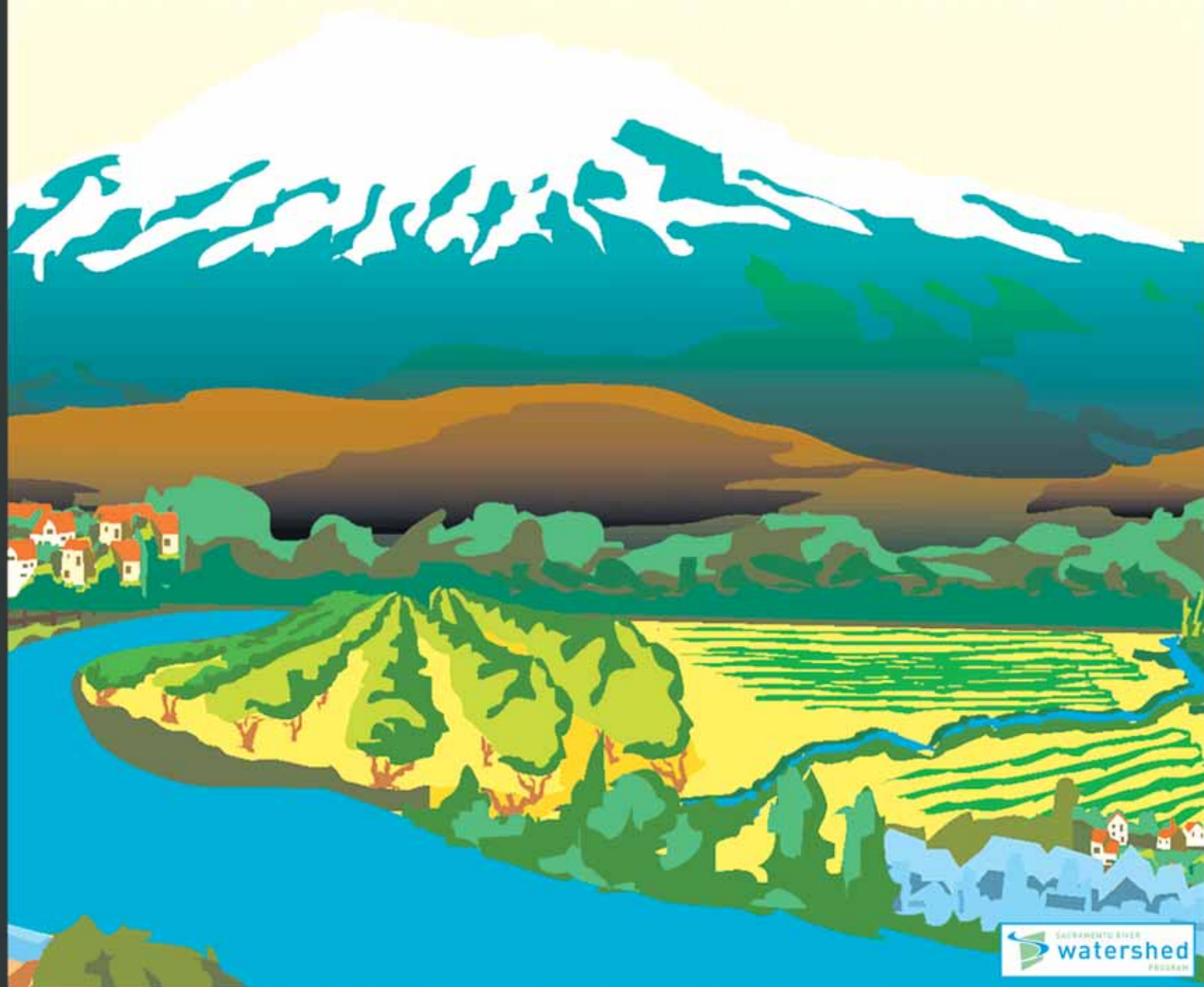


# A Journey through the Sacramento River Watershed





# Welcome to the Sacramento River!

## Hello Friends!

My name is Buckeye Beaver and I am here to guide you as we explore the waters of the Sacramento River Watershed. Look for me on the pages that follow, and I will lead you through different parts of the watershed and let you know how you can visit them yourself.

As one of the largest watersheds in the United States, the Sacramento River Watershed serves as an important source of drinking water and recreation for Californians, as well as a vital economic artery for commerce and agriculture. Therefore, preserving and maintaining the health of the watershed is crucial. As you travel with me through the watershed you will learn many things about this important natural treasure:

- Where the Sacramento River begins and ends
- How the river has changed over time
- Wildlife, birds, and plants along the river
- Why people need the river
- How to learn, play, and work at the river

Inside this newspaper is information and details about how you and your family can get to know the Sacramento River Watershed, and activities and websites for all to explore. Preserving the watershed and its resources is the mission of the Sacramento River Watershed Program. The Program provides a forum to share information and maintain a shared vision of the Sacramento River Watershed. Serving as a regional organization, the Sacramento River Watershed Program conducts watershed monitoring activities, provides outreach and education, and offers support to partners throughout the entire 27,000 square-mile watershed—from the Oregon border to the Delta. To learn more about the Sacramento River Watershed Program visit

[www.sacriver.org](http://www.sacriver.org).

# What is a watershed?

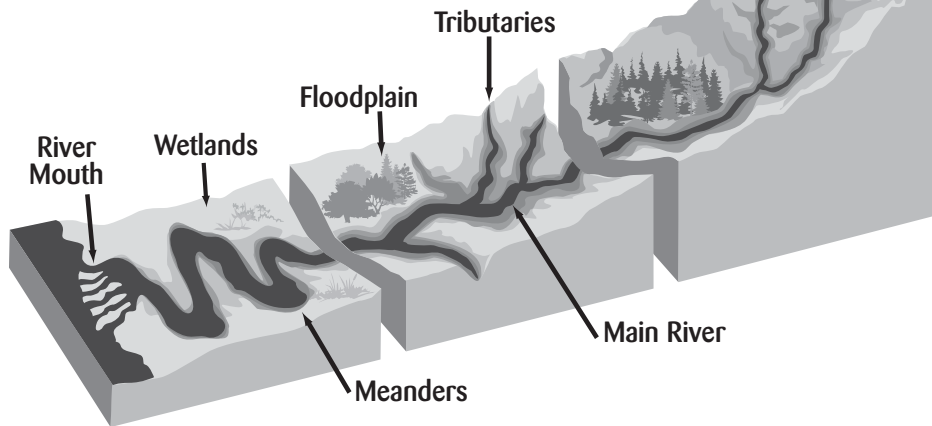
Rain and snow fall to the earth, flow into little streams, then those little streams join to make bigger streams, finally forming a river, lake or other body of water. All the land where this water falls and flows is called a watershed.

Everywhere on earth is part of a watershed. Our part of the world the Sacramento Valley—is in the Sacramento River Watershed. The Sacramento River Watershed is the biggest watershed in California and has many tributaries. Along its nearly 400-mile journey, the Sacramento River flows down from Northern California then meanders through the Sacramento Valley where it meets several other rivers on its way to the Pacific Ocean.

There are others parts of the watershed that are important, too, even though they are not part of the land-forms. These include the soils and minerals that the water brings down from the mountains, the native plants that grow in the riparian or riverside areas, and the fish and wildlife that depend on the river.

Why is it important to know about our watershed? We all know that without water life could not exist. It is good to think about where our water comes from, how we can keep it clean and how we can make sure there is enough to go around these things are necessary to the quality of our lives. People concerned about the

environment also know that understanding our watershed will help us preserve our mountain forests and meadows, valley grasslands and wetlands, and all of the fish and wildlife that depend on those ecosystems. The pages in this newspaper will help you learn about the whole watershed, and will guide you to websites and other resources that can help you learn even more. You can see a great map of our watershed in the center of this newspaper.



Cup your hands together and imagine that rain is falling on them. Pretend that your fingers are the Sierra Nevada and the space between your fingers are creeks coming out of the mountains. Now imagine that the palms of your hands are the Sacramento Valley and the space between your two hands is the Sacramento River, flowing out to the ocean. You have a watershed in your hands!

## Watershed Fun

Ready for some great activities about watersheds? Visit [www.swrcb.ca.gov/education/school/](http://www.swrcb.ca.gov/education/school/) where you will find interactive games, word puzzles, experiments and coloring pages. Parents and teachers: there is plenty for you at this site as well, sponsored by the State Water Resources Control Board. Look around for curricula, posters, general information and contacts.

## Watershed Wordsearch

Find the words below in the wordsearch on the right

- DELTA
- FLOODPLAIN
- MEANDER
- RIVER
- TRIBUTARY
- WETLANDS
- ESTUARY
- HEADWATERS
- RIPARIAN
- SACRAMENTO RIVER
- WATERSHED

Y	Y	F	X	I	K	Y	D	Y	M	H	R	V	O	S	G
R	X	L	V	U	K	E	F	W	H	E	D	I	A	L	O
A	Q	O	V	O	L	L	T	L	E	E	A	C	C	A	T
T	T	O	I	T	V	T	B	G	H	T	R	N	F	O	H
U	Y	D	A	V	T	H	Y	S	O	A	L	Q	D	R	E
B	X	P	Q	S	L	Q	R	K	M	H	T	A	T	E	V
I	R	L	T	U	A	E	O	E	E	U	P	Z	N	Q	R
R	X	A	K	H	T	Z	N	A	J	U	D	V	A	D	L
T	K	I	I	A	B	T	D	E	S	T	U	A	R	Y	S
E	A	N	W	L	O	W	N	A	I	R	A	P	I	R	Z
T	N	K	T	R	A	R	O	X	C	I	C	R	W	H	Z
D	L	U	I	T	Y	C	E	K	W	I	N	M	R	T	U
M	N	V	E	W	W	G	M	V	P	A	V	U	P	N	F
H	E	R	R	V	V	B	X	W	I	T	J	R	O	Z	A
R	S	A	U	U	Q	K	G	P	K	R	M	D	C	C	H
H	F	F	Q	I	Y	M	T	S	Z	L	E	V	Q	D	W

Learn about parts of a watershed and find the words in the wordsearch (visit the glossary on page 16 to learn more!)



# How the Sacramento River Got Its Name

**N**ative Americans lived along the river for at least 4,000 years before European explorers and settlers came to California. These Native Americans probably had several names for what we now call the Sacramento River, giving names to specific places all along the waterway.

A Spanish Army Lieutenant named Gabriel Moraga was one of the first Europeans to explore the Central Valley of California. In the early 1800s, Moraga visited many rivers, and had the opportunity to name most of them including the Merced, Kings and San Joaquin rivers. In 1808, he led a small exploring party through the maze of bays and islands east of San Francisco Bay what we now call the Delta. When he came to a deep, clear, strongly moving river, many hundreds of feet across, he named it the Sacramento; which means "Blessed Sacrament." As Moraga traveled upstream, he entered the Sacramento Valley full of wild game including antelope, tule elk, deer, and even grizzly bears! Moraga kept a diary documenting his 29-day long expedition. Here is his account of two days during his travels.

## October 9, 1808

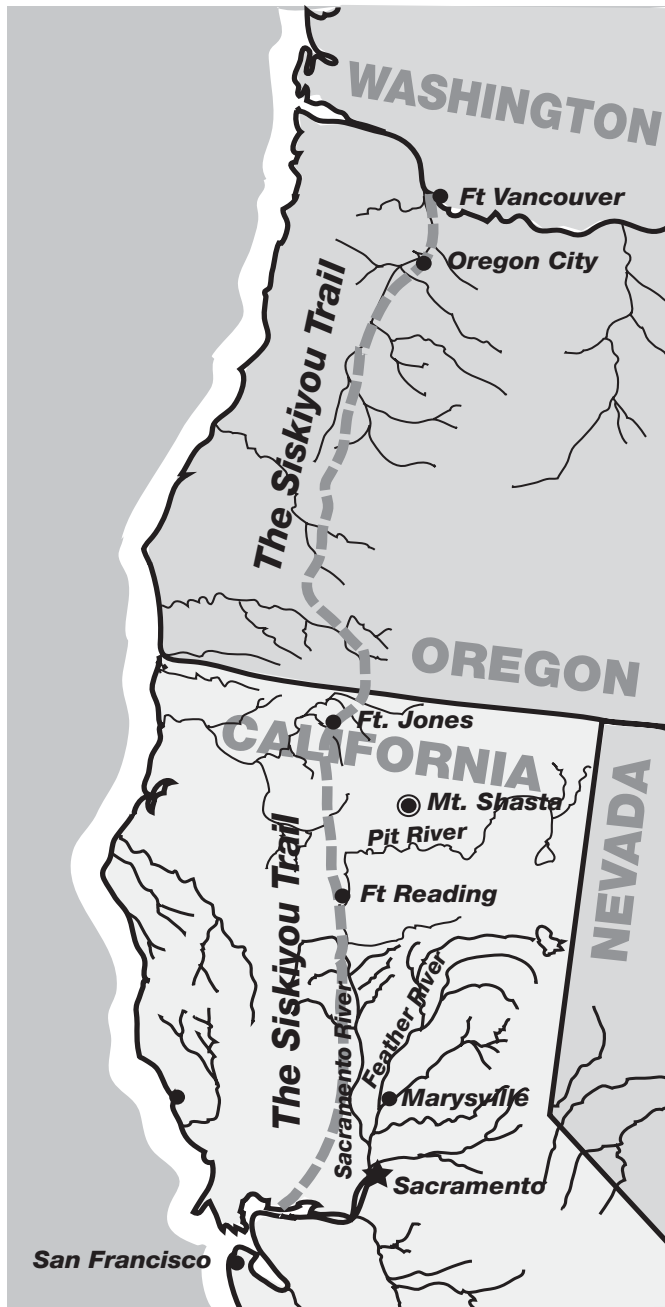
*Today we broke camp and moved to the river discovered yesterday, which we named the Sacramento. They have measured this river at 169 varas across (varas is a Spanish word which equates to ~ 33 inches). There are many Indians on this river.*

## October 10, 1808

*Today we crossed the river, although with some difficulty, and traveled approximately north-northwest. After about 7 leagues (a league=3miles) we came to a mountain range in the middle of the valley (what we now know as the Sutter Buttes). From here I continued in a westerly direction, and in about 3 leagues we stopped on the banks of a river which was found after traveling about 10 leagues today. This afternoon there were fifty-two natives with us in our camp; they agreed to come in the morning to guide us upstream, but they did not return. This is all for today.*

## Sacramento River Watershed is Rich in History

The Sacramento River helped form the track of a



trade and travel route known as the Siskiyou Trail, which stretched from California's Central Valley to the Pacific Northwest. The Siskiyou Trail closely paralleled the Sacramento River and took advantage of the valleys and canyons carved by the river through the rugged terrain of Northern California. Based on the original footpaths of Native Americans 5,000 years ago, the Siskiyou Trail was expanded by Hudson's Bay Company trappers in the 1830s, and expanded further by California Gold Rush in the 1850s. Today Interstate 5 and the Union Pacific Railroad occupy the path of the ancient Siskiyou Trail. Learn more about the Siskiyou Trail at [www.museumsiskiyoutrail.org](http://www.museumsiskiyoutrail.org).



## Mount Shasta City Park

Here I am at the Mount Shasta City Park headwaters of the Sacramento River. Underneath the park is a big spring that gushes icy, clear water from a lava tube originating deep within Mount Shasta, a 14,179-foot dormant volcano and fifth highest peak in California. Hiking trails run through the Mount Shasta City Park featuring native plants. Picnic tables, barbecues, play fields, and playgrounds are all available for free. From Lake Street in Mount Shasta, drive north on N. Mount Shasta Blvd. to Nixon Road. Cross the railroad tracks and turn right into the Mount Shasta City Park.

**"Tracing rivers to their fountains makes the most charming of travels."**

**– John Muir**

## Activity

Pretend you would like to become a naturalist. Make a list of skills you are learning in school that would help you in such a job. Look through the newspaper's classified ads for a job listing in a nature-related field.

Standard: language Art–Reading 2

# Climate Change

**What is it?** Climate Change refers to an average increase in the Earth's temperature, which in turn causes changes in climate. A warmer Earth may lead to changes in rainfall patterns, a rise in sea level, and a wide range of impacts on plants, wildlife, and humans. These impacts include increased air pollution, changes in food and water supplies, and coastal flooding.

**What can we do?** Climate change may be a big problem, but there are many little things we can do to make a difference. If we try, most of us can do our part to reduce the amount of greenhouse gases that we put into the atmosphere, which trap energy in the atmosphere and make the Earth warmer.

**Change a Bulb.** Energy-saving compact fluorescents (CFs) now rival the cozy, warm light of traditional bulbs. They use a fraction of the electricity, which means lower electricity bills and millions of tons less global warming pollution. And in the summer, because they don't burn as hot as incandescent bulbs, they'll lower your cooling bills. If every household replaced just three 60-watt incandescent bulbs with CF bulbs, the pollution savings would be like taking 3.5 million cars of the road!

**Save Electricity.** Whenever we use electricity we help put greenhouse gases into the air. Turn off the lights, television, and computer when you are not using them.

**Drive Smart.** A well-tuned car with properly inflated tires burns less gasoline—cutting pollution and saving you money at the pump. If you have two cars, drive the one with better gas mileage whenever possible. Better yet, skip the drive and take public transit, walk, or bicycle when you can.

**Recycle.** Recycle cans, bottles, plastic bags, and newspaper. When you recycle, you send less trash to the landfill and help save natural resources, like trees and oil.

**Shop Smart.** Did you know that you can help the environment if you buy recyclable products instead of non-recyclable ones? Recyclable products are usually made out of things that already have been used. It usually takes less energy to make recycled products than to make new ones. The less energy we use, the better.

**Plant Trees.** Planting trees is fun and great way to reduce greenhouse gases. Trees absorb carbon dioxide, a greenhouse gas, from the air.

**Teachers!** The U.S. Environmental Protection Agency has some great resources to teach kids about global warming. Check out [www.epa.gov/climatechange](http://www.epa.gov/climatechange). You can also order a free "Global Warming Wheel Card Classroom Activity Kit."

# Do you know where you are?

**S**ure, you know the name of your state, your town, and your street, but what do you know about the world around you? See if you can answer these questions.

## 1. Where does your drinking water come from?

Local reservoirs and streams and groundwater are the primary sources of water supply for communities in the Sacramento Valley. Many farms and urban areas receive water from the federal Central Valley Project, which begins at Shasta Dam on the Sacramento River near Redding and stretches to Bakersfield. Water from the State Water Project, which begins at Oroville Dam on the Feather River near Oroville and extends all the way to Southern California also serves farms and major urban areas. The City of Sacramento relies on the numerous rivers in the area including the Sacramento and American, but groundwater is also an important resource for the community. Conservation of water is important in California and is the most cost effective and environmentally sound way to reduce our demand for water—save water whenever you can! Check out [www.monolake.org/socalwater/wctips](http://www.monolake.org/socalwater/wctips) topten for tips on conserving water in and around your home.

## 2. What is the average annual rainfall in our area?

Average annual rainfall in the Sacramento River Watershed varies quite a bit. In the upper reaches near Redding, there is an annual average rainfall of approximately 33 inches, which decreases as you go South: Red Bluff = 25 inches, and Sacramento = 17 inches. To learn more about weather in your area, visit [www.noaa.gov](http://www.noaa.gov) and follow the climate links. Check out the education links as well you'll find plenty of terrific activities related to weather and climate change.

## 3. When was the last full moon?

The moon seems to change shape in the sky, going from just a sliver to full and round and back again every 28 days. You can find information on the next full moon by visiting [www.farmersalmanac.com](http://www.farmersalmanac.com) and follow the astronomy link.

## 4. Name five edible native plants.

Careful here! Don't eat anything you aren't sure of. You might try cattail roots, wild blackberries, pine nuts, and wild mustard. Miner's lettuce and California wild grapes are also delicious! For more information on native plants, visit the California Native Plant Society at [www.cnps.org](http://www.cnps.org).

## 5. Where does your garbage go?

Garbage doesn't just "go away." Everything that we throw out takes up space in a landfill, which means we have less space for houses, parks, and wildlife. Garbage from our homes is picked up and trucked to a nearby landfill. You can help reduce the amount of garbage going to the landfill by recycling (and make money .05 per beverage container!) Find a recycling center near



you at [www.bottlesandcans.com/where.php](http://www.bottlesandcans.com/where.php)

## 6. Name three rivers that flow through the San Joaquin Valley.

If you need help on this one, see the center map in this newspaper. The Sacramento River is the longest river in California (nearly 400 miles long). The point at which rivers join together is known as a confluence.



Plan a family outing to the Sacramento River. "Buy" everything you will need from the trip using advertisements and classified ads from the newspaper. Remember to include picnic supplies, camping equipment (if you are planning on staying all night), any special clothing you might need (such as hiking boots), and first aid supplies. Add up the costs of your trip, be sure to include money for gas and any entry fees you might need.

Standard: Mathematics – Number Sense

# Shasta Dam and Lake

**S**hasta Lake is made by stopping the flow of the Sacramento River behind Shasta Dam, the second largest dam in the United States. Many people like to use Shasta Lake to picnic, camp, and participate in water sports. The U.S. Forest Service operates the Shasta Lake Visitor Information Center where you can get more information on recreational opportunities ([www.fs.fed.us/r5/shastatrinity](http://www.fs.fed.us/r5/shastatrinity) or call 530-275-1589). Looking for more information about the area? The U.S. Bureau of Reclamation offers free tours of Shasta Dam daily, which includes a 428-foot elevator ride down to the base of the dam. Visit [www.usbr.gov/mp/ncao/shasta/index.html](http://www.usbr.gov/mp/ncao/shasta/index.html) for more information.





# Changes Over time...

Change is part of nature: leaves change with the seasons, fruit ripens, tadpoles turn into frogs, storms move in and out of the sky. Just like the rest of nature, rivers change, too. Some of the changes along the Sacramento River, such as the amount of water flowing down the riverbed or the appear-

ance of seasonal plants, occur naturally every year. Other changes, such as water carving out a pathway through a mountain, happen over thousands or even millions of years. Still other changes to the Sacramento River have happened not through the actions of nature, but through the actions of people.

## The River's Floodplain

Many different creeks and rivers flow into the Sacramento River. Many of these creeks get their water from melted snow that flows down from the Sierra Nevada and coastal mountains. When the snow melts too fast for the banks of the river to hold it in, water overflows onto the floodplain (the lowland right around the river). People often think of floods as a bad thing, but floods are a natural part of the life of the river. Floods help build habitats for wildlife by creating side streams and small islands as they flow through a riverbed. Rushing water from a flood also clears away old vegetation and brings in new plants. Just outside of Sacramento is the Yolo Bypass, which is a flood bypass designed to convey excess flood waters from the Sacramento River in order to protect Sacramento and nearby communities from flooding. The Yolo Bypass forms a valuable

wetland during many months, and in the summer it is used for agriculture. You can visit the Yolo Wildlife Area in the Yolo Bypass, 7 days a week from sunrise to sunset except during periods of flooding. Information on public tours and volunteer opportunities can be found at [www.yolobasin.org](http://www.yolobasin.org).

## What is a wetland?

Wetlands are unique areas with features that change from season to season. Hundreds of plants and animal species call wetlands their home or a nice place to visit. Wetlands are found all over the world where low-lying lands meet water, or where rivers meet oceans. Water moves very slowly through wetland areas. When they are not underwater, wetland soils remain water-logged all of the time. Wetlands include marshes, swamps, bogs, and wet meadows.

## Why are wetlands important?

For many years people thought of wetlands as soggy, useless land. Now people are trying to save and protect wetlands because we understand why they are important. It is especially important in California because about 90% of Californian wetlands have been converted to agricultural and urban uses.

Many animals depend on wetlands for some part of their life cycle, like fish, frogs and mosquitoes. Wetland plants are very productive and support a rich web of life, from simple molds to mammals. They also provide shelter and food for fish.

Wetlands provide flood control by soaking up the water that falls as rain and also slow the spring snow-melt run-off. Wetlands make the water clearer and filter out things that make the water impure, like chemical pollution.

## A hike with a great view

Few things worth remembering come easy and so it is at Feather Falls. At 640 feet, it is the sixth tallest waterfall in America, free-falling in a silver band of water into a granite canyon, the kind of sight that can leave you feeling refreshed for weeks.

You have the option for taking the short route, which is 3.5 miles one way, but more difficult than the other 4.5 mile option. The trailhead is located east of Oroville, near the small town of Feather Falls. Visit [www.fs.fed.us/r5/plumas/publications/pdfs/hiking/fr\\_feather\\_falls\\_infomap.pdf](http://www.fs.fed.us/r5/plumas/publications/pdfs/hiking/fr_feather_falls_infomap.pdf) for a map and more information.



## Fluvial Geomorphology

FLUVIAL GEOMORPHOLOGY (pronounced: Fah -Loo-Vee-Ale Gee-Oh-Morf-All-Oh-Gee) -- can you say that three times really fast?

It's a big mouthful, which is simple to understand. Fluvial has to do with rivers, Geo-has to do with the earth, and Morphology has to do with how something is formed or structured. So fluvial geomorphology is about what the land around a river is like and how it got that way. Keep in mind that changes to the land and river can take thousands or even millions of years. These changes, in fact, are continuing to happen, but then happen so slowly we don't really notice them.

## Lassen Volcanic National Park

Plan a visit to Lassen Volcanic National Park, the only national park in the Sacramento River Watershed, and witness earth's shaping forces at work! The remarkable hydrothermal features in Lassen Volcanic National Park include roaring fumaroles (steam and volcanic-gas vents), thumping mud pots, boiling pools, and steaming ground. Water from rain and snow that falls on the highlands of the park feed the hydrothermal system. Once deep underground, the water is heated by a body of hot or molten rock beneath Lassen Peak. Rising hot water boils to form boiling pools and mud pots. Super-heated steam reaches the surface through fractures in the earth to form fumaroles. These features are related to active volcanism and are indications of the ongoing potential for further eruptions from the Lassen "volcanic center." Teachers: check out the park's website at [www.nps.gov/lavo/](http://www.nps.gov/lavo/) for some great curriculum materials!



The Sacramento Bee/Randy Pench

# People need the river

## Celebrate the Maidu

Celebrate the living Maidu culture every year on the first Saturday in October at the Effie Yeaw Nature Center ([www.effieyeaw.org](http://www.effieyeaw.org)) in Carmichael, CA. The annual event called “Maidu Indian Day” brings people from many areas of the region to participate with and learn about the first people of the American, Bear, Feather, and Yuba River areas. Watch Maidu dancers and traditionalists and basket weaving demonstrations by native basket weavers! Taste traditional foods such as acorn, deer meat, salmon and native raisins! Play Maidu games and listen to traditional Maidu stories and make crafts! Learn the uses for native plants by the Maidu people on nature walks through the Nature Center’s 77-acre preserve! These activities and more are some of the things to do, see, smell, and taste at this event. The Effie Yeaw Nature Center’s replica Maidu summer village with the large grinding rock provides the setting for this day-long event designed to impart a greater understanding of the Maidu people and their relationship with their ecosystem.

### Modern Central Valley People

Even though we might not be as aware of our close connection to the Sacramento River as the Maidu were, we still need the river! When we turn on our faucets, flush our toilets or water our gardens, that water comes from the river or water deep in the earth, called groundwater. Groundwater is replenished in part by water that soaks into the earth as it flows down the river.

Without water from the Sacramento River, our farmers would not be able to grow the food we eat. When we need time to enjoy the beauty of nature and relax with friends and family, the creeks and rivers provides those places for us.

Teachers! There are some great activities (K-12) illustrating why people need rivers at [www.nationalgeographic.com/geographyaction/rivers](http://www.nationalgeographic.com/geographyaction/rivers).



magnifying glass to see them! Some baskets are woven so tightly they can hold water and can be used for cooking while other baskets are made in different shapes and sizes for storage, bowls, trays, cradles, and traps. To make the baskets, the Maidu gathered dozens of different kinds of wild plants, bark and roots.

The Maidu used their baskets to carry the acorns back to their homes where they were processed into acorn meal. Mortar holes were used by the women to process acorn into meal with stone pestles. If you visit the Effie Yeaw Nature Center’s replica Maidu village you can see some of the mortar holes that were used for processing acorns. Mortar holes on

granite outcroppings are found near many of the old village sites throughout the foothills around the eastern portion of the Sacramento River Watershed. The Maidu supplemented their acorn diet with hundred’s of other edible plants, fish from the many streams and rivers, and wildlife caught on hunting expeditions.

The Maidu lived in large, circular houses that were built partially underground and warm in the winter

and cool in summer. These houses were made by covering a pole and log framework with a heavy layer of brush and earth. With a central fire in the house, this made for good warmth in the winter. In the summer many members of the permanent village would move into the floodplains of the rivers to hunt, fish and gather plant materials near the water’s edge. Those that spent the summers away from the permanent village would make a temporary summer village. They built a hu (pronounced: whooo) or tule-covered shelter to store their belongings and usually worked under a shade shelter or under the trees. In the summer they enjoyed sleeping under the stars. The Sacramento River Watershed provided all that the Maidu needed. It was a perfect home.



California has many place names that are words from languages other than English. Native people and explorers gave places names that reflected their cultures. Read the newspaper for stories with California datelines (the place from which a story originated) that appear to be from another culture. Do some research and determine the origin of these names. Are the people whose culture is reflected in the names still in the area? Why or why not? Is one culture represented more often than the others? Can you translate the names into English? (e.g. mariposa means butterfly in Spanish)

Standard: Social Studies—Research, Evidence, and Point of View

**“The rivers are our brothers. They quench our thirst. They carry our canoes and feed our children. You must give to the rivers the kindness you would give to any brother.”**

**— Chief Seattle**

### Native Americans

Before the westward expansion brought large numbers of European immigrants to California, the Sacramento River Watershed was populated by many Native American people. This area had at least three culturally distinct tribal groups including the Yana, Wintun, and Maidu Indians. The Maidu occupied many villages ranging from small extended family units to large villages having more than 500 people. The Sacramento River Watershed provided abundant fresh water, food, and other resources to allow for a rich culture that included much time for ceremonies, trading, dance, art, and games.

The Maidu were excellent wild-land managers that incorporated techniques like fire ecology, pruning, weeding, and seed casting to enrich the landscape so that it would continue to provide abundance for the people and the wildlife on which they depended. In the springtime, some of the Maidu would leave their villages for days to go food gathering. In the fall, they harvested their primary dietary staple—acorns from healthy forests of oak trees—in vast quantities. The healthy forests were a result of the tending techniques used by the Maidu people. As an example, they would care for their family’s oak trees by keeping the area underneath the trees clear. Their use of fire would smoke pests from the trees that could damage their important food source—acorns.

The Maidu were also great basket makers, weaving detailed and useful baskets ranging from thimble-sized to huge feast baskets several feet in diameter! The stitches on some of the baskets were so fine that you needed a



# Wildlife in and Along the River

Most birds have a poor sense of smell, but the **Turkey Vulture** can smell decaying meat from high in the sky.

Kingfisher

Most ducks make their nests on the ground, but the **Wood Duck** nest in hollow trees 30 to 60 feet off the ground

Tree Swallow

Acorn Woodpecker

The **Gray Fox** is the only member of the dog family that can climb trees

Bald Eagle

Snowy Egret

Mule Deer

Bobcat

California Quail

Green Heron

Common Merganser

People belong at the river, too -- we're all a part of nature

Hooded Merganser

A **Great Blue Heron** stands 4 feet tall and has a 6-foot wingspan

Muskrat

**Chinook Salmon** are also known as King Salmon

The **Western Pond Turtle** rarely lives in ponds, but prefers rivers with slow moving water

## Activity:

Look at the wildlife in the river picture on this page. Choose an animal and then learn more about it from your library or by visiting [www.enature.com](http://www.enature.com). Then write a poem, a story, or draw your own picture.

Red Tail Hawk

The gentle **Kingsnake** loves to catch and eat rattlesnakes

Most **Beavers** along the San Joaquin River do not build dams, but burrow into the river bank with their front door under water

The **Tiger Salamander** is becoming very rare because of habitat destruction

Rainbow Trout

Catfish

Small Mouth

Blue Gill

Sunfish

Dragonfly

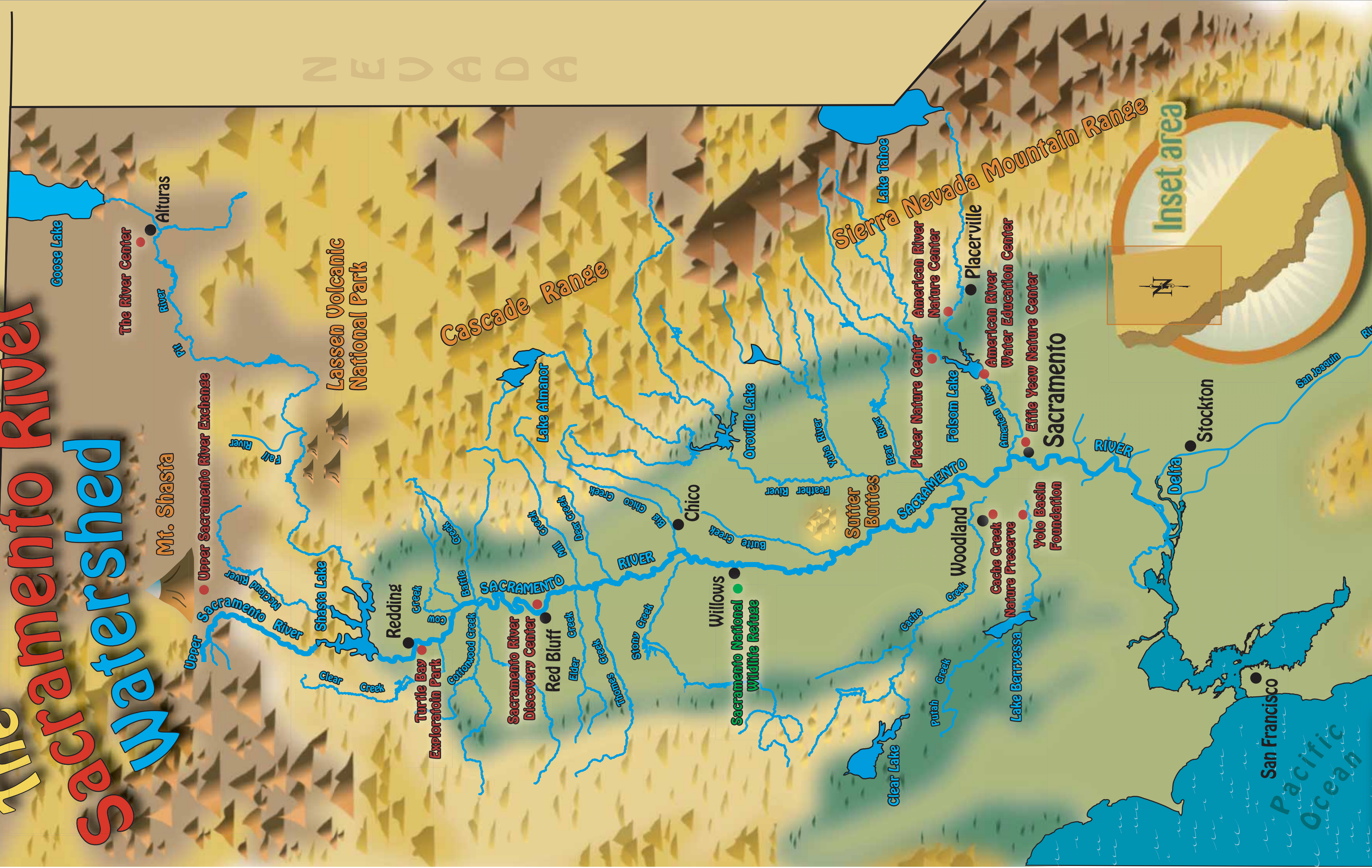
Diving Beetle

Crayfish

Dragonfly Nymph



# The Sacramento River Watershed



The Sacramento River Watershed

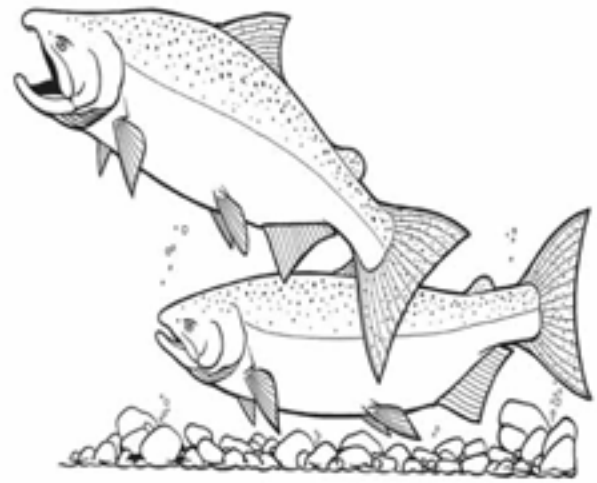


# The Life of a Salmon

## What is a salmon?

Salmon are fish that live part of their lives in fresh water, and part in the ocean. They hatch in a stream, live there for several months, and then swim to the sea, where they grow up. Then they migrate back

to the streams where they were born to lay their eggs. They are able to find their way home by memorizing the smell of their home stream before they migrate to sea. There are several kinds of salmon, but Chinook salmon are the ones found in the Sacramento River Watershed.



As the salmon migrate from the ocean to their home streams, their color and shape changes. Males get hooked jaws with sharp teeth. In some species, their backs get humps. Both males and females change color.

## Why Do We Need Salmon?

Salmon are part of a healthy ecosystem. Many animals eat salmon: bears, eagles, sea lions, killer whales, and more. When salmon numbers decrease, these animals do also.

Salmon are an important part of the culture and livelihoods of many Native American people. Many people enjoy watching salmon as they migrate upstream and spawn.



## Journey to the Sea

Once the egg yolk is gone, the baby salmon, called fry, get hungry, and leave their gravel nests. They will eat anything that floats by, but insects are their favorite! In spring, the salmon fry become restless. They turn silvery in color and lose their spots. As snow melts in the mountains and water in the stream flows faster, the young salmon begin swimming to the sea. Now they are called smolts. The journey is a dangerous one. Some smolts die along the way by being eaten by bigger fish or birds, or getting sucked into pumps and canals that carry water to our crops. Finally, the smolts arrive in the San Francisco Bay Delta. Here, the young salmon adapt to salt water and eat as much as they can so they will have a better chance of survival before they enter the ocean.

## Building a Nest

Did you know that salmon build nests? But instead of sticks, their nests are made of gravel. The female digs her nest by swishing her tail up and down to loosen gravel from the streambed. After she lays her eggs, she covers the nest with more gravel. The gravel protects the eggs from hungry trout and birds, but also has plenty of spaces for water to run through. A big female Chinook salmon can lay about 6,000 bright red, pea-sized eggs!

## Spawning

While the female salmon is building her nest, the male is busy chasing off all other males. He also does a courtship "dance" as he quivers and swims back and forth over the female's back. When the female is ready to lay her eggs, he moves alongside her and fertilizes them. This is called spawning. All salmon die after they spawn.

## Life in the Sea

Once they enter the sea, Chinook salmon may swim 2,000 miles out to sea! While they are living in the sea, salmon are close to the top of their food chain. They eat squid, shrimp, and small fish. Their main predators are sea lions and killer whales. When they are ready to spawn, they return to their fresh-water home stream.

## Migration

Salmon can tell the difference between water from different places. Young salmon memorize the smell of their home stream before they migrate to the sea. When they are ready to return to fresh water, they follow the smell home.



**Fish Moon**  
I see salmon.  
The beautiful glitter  
as in my dreams.  
It is midnight.  
The salmon jump over the  
moon.  
They splash as they fly.  
It is time for spawning.  
The salmon drifting away  
on top of the water.

Maddelyn Copper  
7th Grade  
Durham, CA

## Another free activity pack

Teachers and parents! California's Central Valley Habitat Joint Venture has three Habitat Fun Packs full of activities and games about Central Valley birds. These three guides are for grades K-3, 4-6, and junior/senior high school. You can download a FREE copy at [www.calwaterfowl.org/fun\\_packs.htm](http://www.calwaterfowl.org/fun_packs.htm) or call (916) 648-1406.



# Salmon in Trouble

Today, many kinds of salmon are disappearing; some have even been listed as endangered species. Salmon are in trouble mostly because their habitats—the places where they live—are in trouble. Some rivers have been blocked by dams, which help people by providing us with electricity and a way to store water. But dams have been hard on salmon because they block them from getting upstream to where they used to spawn. Some rivers are too warm, muddy, or polluted for salmon.

## Helping the Salmon

As water is taken from rivers and sent to cities and farms, sometimes there is not enough water left over for fish. Only recently did people learn that we must conserve water and set some aside for fish. We also need to help fish get safely past the obstacles we have created such as dams. Here are some things people can do to help salmon!

- We can build fish ladders, which look like big, watery stair steps, to help salmon swim over the dams.

- We can put screens over places where people take water from streams, so that fish will not be sucked into pumps.
- We can help make warm, muddy streams cool and clear again, by planting new trees and putting up fences to keep cattle from trampling streambanks.
- We can conserve water to insure that there is enough in the streams for the salmon to swim.

- We can conserve electricity to lessen the need to build more hydropower dams.

## Fish Hatcheries also Help Salmon

Fish hatcheries help make up for spawning habitat that has been lost. Adult

salmon are caught and spawned at the hatchery. Hatchery workers put the eggs into plastic trays. Cold, clean water runs through the trays. When the salmon fry hatch, they are put into concrete ponds called raceways. The fry are fed until they are ready to migrate to the sea. But once they have been released, the young salmon must survive without any help, just like wild salmon do.



# Salmon Close Up!

You can check out salmon up close and personal by visiting a stream with lots of adult salmon returning. Good places to see fish in the wild include the Sacramento River and Battle Creek. You can also see fish when they return to a fish hatchery. The Coleman Fish Hatchery in Anderson, along Battle Creek, offers exciting opportunities to view the hatchery building, rearing raceways, spawning operations, and of course the fish ladder! Come October through January and watch the salmon coming home to spawn! You can also visit a fish hatchery in Oroville or Rancho Cordova:

## Coleman National Fish Hatchery (on Battle Creek)

Anderson (I-5 North to Balls Ferry Road)

[www.fws.gov/redbluff/coleman.html](http://www.fws.gov/redbluff/coleman.html)

(530) 365-8622

## Feather River Fish Hatchery

Oroville (Table Mountain Blvd)

[www.dfg.ca.gov/hatcheries/feather-river](http://www.dfg.ca.gov/hatcheries/feather-river)

(530) 538-2222

## Nimbus Salmon and Steelhead Hatchery

Rancho Cordova (I-50 to Hazel Ave)

[www.dfg.ca.gov/hatcheries/nimbus](http://www.dfg.ca.gov/hatcheries/nimbus)

(916) 358-2820



# Salmon in Trouble

## What Can You Do to Help Salmon?

Unscramble the words in ( ) to find out!

Conserve \_\_\_\_\_ (ertwa); if you use less, there will be more water for salmon.

Recycle and reuse paper. Saving \_\_\_\_\_ (seret) will help save salmon.

Volunteer to help \_\_\_\_\_ (treros) streams by planting trees.

Don't dump oil, antifreeze, or other chemicals into street drains. Many drains empty into \_\_\_\_\_ (siverr)!

Talk to your \_\_\_\_\_ (endsfri) and \_\_\_\_\_ (rentspa) about salmon and what they can do to help.

Answers: Water, trees, friends, rivers, restore, parents



Want to learn more about the wildlife in your area? Visit one of the several nature centers located in the Sacramento River Watershed. Many of the nature centers offer wildlife exhibits, informational tours, hiking trails, and field trip opportunities.

**The River Center**  
136 Henderson Street  
Alturas, CA  
Telephone: 530-233-5085  
[www.centralmodocrivercenter.org](http://www.centralmodocrivercenter.org)

**Upper Sacramento River Exchange**  
5819 Sacramento Avenue  
Dunsmuir, CA  
Telephone: 530-235-2012  
[www.riverexchange.org](http://www.riverexchange.org)

**Turtle Bay Exploration Park**  
840 Auditorium Drive  
Redding, CA  
Telephone: 530-243-8850  
[www.turtlebay.org](http://www.turtlebay.org)

**Sacramento River Discovery Center**  
1000 Sale Lane  
Red Bluff, CA  
Telephone: 530-527-1196  
[www.srdc.tehama.k12.ca.us](http://www.srdc.tehama.k12.ca.us)

**Placer Nature Center**  
3700 Christian Valley Road  
Auburn, CA  
Telephone: 530-878-6053  
[www.placernaturecenter.org](http://www.placernaturecenter.org)

**American River Nature Center**  
348 Highway 49  
Coloma, CA  
Telephone: 530-621-1224  
[www.arconservancy.org](http://www.arconservancy.org)

**American River Water Education Center**  
7794 Folsom Dam Road  
Folsom, CA  
Telephone: 916-989-7100  
[www.usbr.gov/mp/arwec](http://www.usbr.gov/mp/arwec)

**Effie Yeaw Nature Center**  
2850 San Lorenzo Way  
Carmichael, CA  
Telephone: 916-489-4918  
[www.effieyeaw.org](http://www.effieyeaw.org)

**Cache Creek Nature Preserve**  
34199 County Road 20  
Woodland, CA  
Telephone: 530-661-1070  
[www.cachecreekconservancy.org](http://www.cachecreekconservancy.org)

**Yolo Basin Foundation**  
45211 Chiles Road  
Davis, CA  
Telephone: 530-758-1018  
[www.yolobasin.org](http://www.yolobasin.org)



# You are the Solution to Stormwater Pollution!



## Stormwater Trivia!

### Only Rain Down the Storm Drain

1. Water that flows into storm drains goes through treatment before it enters our creeks and rivers.

True or False?

2. You can help protect our waterways by:

- a) taking your car to a car wash
- b) using less fertilizer and pesticides
- c) taking leftover paint and oil to a hazardous waste center
- d) picking up pet waste and disposing it properly
- e) all of the above

3. Wastewater from our homes and stormwater from streets and parking lots end up at the same place for filtering and cleaning.

True or False?

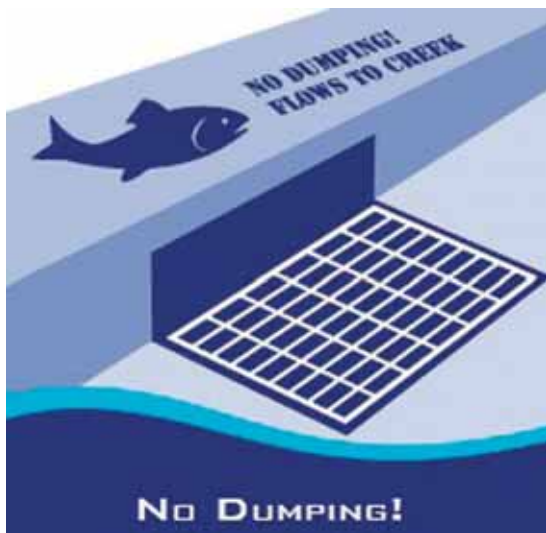
4. It is important to pick up your pet's waste so that it doesn't pollute our local waterways. True or false?

5. Stormwater runoff is:

- a) rain
- b) melted snow
- c) irrigation
- d) all of the above

Answers: 1. false, 2. e, 3. false, 4. true, 5. d

**D**id you know that everyday activities such as driving, gardening, and washing our cars can harm our local creeks and streams? Urban runoff (stormwater from rainfall and outdoor watering) can pick up oil, dirt, litter, pesticides, fertilizer and other materials left on the ground and in streets, which can enter the gutter or storm drain. After stormwater or urban runoff flows into storm drains, it eventually ends up in the nearest creek or river without treatment. This is called stormwater pollution and it's unhealthy for the animals, fish, and other creatures that use these waterways as their homes.



There are many fun and easy things you and your family can do at home, school, and outdoors to prevent stormwater pollution and help keep our creeks and rivers clean and healthy. Here's how you can help prevent stormwater pollution!

### At Home

- Take your car to the carwash or wash it on the lawn
- Bring leftover toxic materials to a household hazardous waste collection site
- Use water-based paints and rinse paint brushes in the sink
- Purchase "less toxic" household and garden products
- Use alternative pest control methods to reduce pesticide use

### At School

- Start a recycling center for paper, glass, and cans
- Always put trash in trash cans and never in the street
- Ride your bike or the bus, or carpool with a friend

### Outdoors

- Remind your parents to not apply fertilizer or herbicides on the lawn if rain is forecasted
- Use kitty litter to soak up spilled oil from your drive way; sweep it up and throw it in the trash can
- Pick up your pet's poop using a plastic bag or pooper scooper; then throw it in the trash can
- Sweep sidewalks and patios rather than hose debris into the gutter

### Be Stormwater Smart!

You may not know it, but activities that you do in and around the home can affect our local creeks and rivers. Take

a look at the picture on the back cover to see if you can find which activities can contribute to stormwater pollution.

Now that you have identified some activities that are harmful to our waterways, list other activities that you can do at home to make sure that our creeks and rivers are clean and healthy.

## Activity

**Pollution from products created to make life easier for people is hurting our rivers.**

**Clip an article from the newspaper showing a pollution problem that could harm the San Joaquin River. Read the article to answer the 5 Ws of a newspaper story, who, what, where, when, and why (and sometimes, how). Offer a possible solution to make the issue less of a problem for the river.**

**Make a list of products you have at home that can be harmful to rivers and streams.**

Standard: Language Arts  
– Reading 2

## Sacramento National Wildlife Refuge Complex



**W**atersheds are not just made of moving water like rivers and streams. They also include marshy areas called wetlands, like marshes and swamps. One of the largest remaining areas of wetlands in California is in the Sacramento River Watershed, and it is easy to visit! Right off of Interstate 5, ninety miles north of Sacramento you will find the Sacramento National

Wildlife Refuge Complex, which is comprised of six wildlife refuges. Waterfowl migrate here by the millions from as far away as the Arctic regions of Alaska, Canada, and Siberia, making the Sacramento Valley the single most important wintering area for waterfowl along the Pacific Flyway! The best time to visit is October through February. For a map and more information, visit [www.fws.gov/sacramento/valleyrefuges/index.htm](http://www.fws.gov/sacramento/valleyrefuges/index.htm) or call 530-934-2801.

# Friendly Bugs to the Rescue!

We have many beneficial bugs in the area that eat pests found in our home and gardens. When we use poisons to kill bad bugs, we can end up killing good bugs that would otherwise eat bad bugs. Next time you see one of the garden friendly bugs below, it may be feasting on not so friendly pests!

## Lady Bugs

Both the adults and larvae feast on aphids. Ladybugs also are called “lady beetles” and “coccinellids.” Approximately 5,000 species exist, and more than 350 are native to North America.

## Lacewings

Green lacewing larvae eat pests such as aphids. The adults are pollinators that feed on flower nectar. Adults are around a half-inch long. Mothers lay their eggs on foliage, which hatch in a few days. Mothers lay as many as 300 eggs over a three- to four-week period. Nearly 90 species of lacewings are in North America, which also are brown.

## Spiders

Some spiders spin webs to catch their prey, while others hunt on the ground or make clever traps and tunnels. Spiders only bite people to defend themselves. Only approximately 200 species have bites that pose health threats to humans. Spiders have eight legs and no wings or chewing mouth parts. Bodies of the smallest spiders are approximately a half inch and bodies of the biggest are approximately 3.5 inches.



## Ground Beetles

At night, these fierce predators use their strong jaws to eat garden pests such as snails and slugs. Approximately 20,000 species exist worldwide, with 2,200 in North America. Most are shiny and black with ridged wing covers. Some ground beetles squirt a bad-smelling liquid from their stomachs to defend themselves. Most ground beetles use hairs on their legs to clean their antennae. They mostly are found under tree bark or logs or among rocks or sand near rivers and ponds.



## Dragonflies

Dragonflies eat pests such as mosquitoes, flies and moths. As they fly, they form a basket with their legs and scoop up prey in midair. They are found in lakes, ponds, streams and wetlands. Large dragonflies can live as long as five years, whereas smaller ones can live as long as three years.



## Parasitic Mini-Wasps

Many species of tiny wasps lay their eggs in pests like aphids or caterpillars. Their eggs hatch and the young eat the pests from the inside and kills them. If you look closely at a colony of aphids, you can often spot the aphids that have been attacked. They look like dried up aphid shells, which are called “mummies”.



## What's BUGging You?

Choosing ways to manage pests without using pesticides is part of a process called Integrated Pest Management—or IPM. Become an IPM expert by matching each pest problem with a less toxic way to solve it.

Draw a line to connect each question with the correct answer.

- |  |   |
|--|---|
| <p>1. You see aphids all over a plant in your garden. What should you do?</p> <p>2. What's a good way to keep ants and roaches out of your home?</p> <p>3. There are yellow jackets flying around your home. What should you do?</p> <p>4. How do you keep mosquitoes from using your yard to lay eggs?</p> <p>5. You have a ton of snails in your garden. How do you get rid of them?</p> <p>6. You see a big spider on a plant in your garden? What should you do?</p> | <p>A. Don't swat at them—you might get stung! These pests are attracted to meat scraps and sweets. Keep garbage and recycling bins covered and keep food in sealed containers during picnics or outdoor events.</p> <p>B. Keep food in closed containers, clean up crumbs, and have an adult seal entry ways where these pests are coming in the house.</p> <p>C. Squish them or put them in a bucket of soapy water.</p> <p>D. Make sure there is no standing water around your home like water cans, open containers, wheelbarrows, and potted plant saucers where these pests can breed.</p> <p>E. Leave it alone. It might be eating a lot of pests.</p> <p>F. Spray down the infested plant with a garden hose to wash off these plants.</p> |
|--|---|

Answers: 1-F, 2-B, 3-A, 4-D, 5-C, 6-E

## Discovery Park and American River Parkway

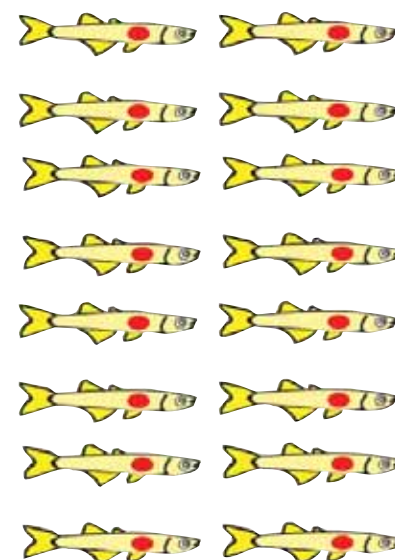
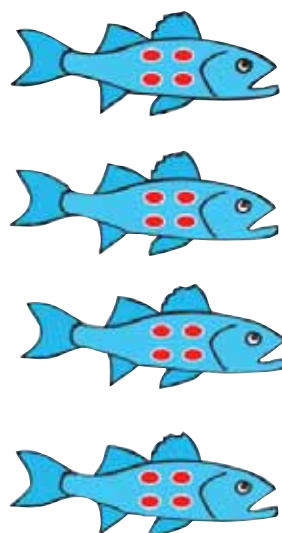
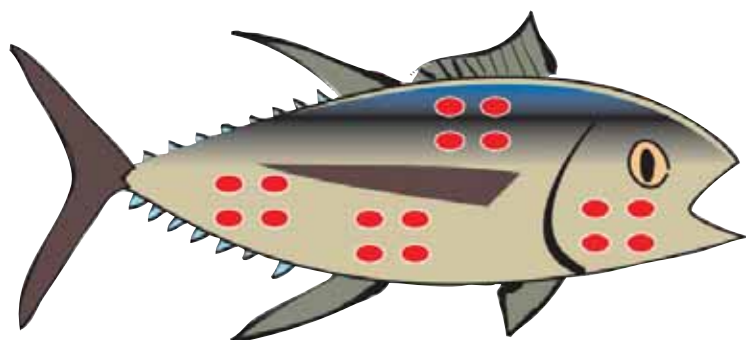
Discovery Park is where the American River meets the Sacramento River. Gold was discovered along the American River more than a hundred years ago, but you will discover the “jewel of Sacramento”—the 23-mile American River Parkway. More than 5 million visitors enjoy this unique wildlife and recreation area annually. Fishing, boating and rafting opportunities lure water enthu-

siasts. Picnic sites, golfing, guided natural and historic tours and much more are often just steps away from the paved trails. Access to the Parkway is available at various points off of Highway 50. Specific activities, features and directions for many of our popular Parkway access sites are located at [www.sacparks.net/our-parks/american-river-parkway/docs/ParkwayMap.pdf](http://www.sacparks.net/our-parks/american-river-parkway/docs/ParkwayMap.pdf)





# Be Healthy: Eat Fish, But Choose Wisely!



Count the red mercury dots in each fish. Notice how the bigger fish have more mercury than the smaller fish.

## What is mercury? Why is it in the fish we eat?

Mercury is a silvery metal that comes from the earth. It is used to make special light switches and other useful products – you may have seen it in a thermometer at home. Mercury is also in coal that is burned to generate energy. Tiny pieces of mercury land in water all over the world. In California, mercury is also found in rivers that are near old gold and mercury mines.

Once mercury is in the water, the mercury turns into a more harmful form. This mercury moves up the food chain from small insects, to small fish that eat the insects, to bigger fish that eat the smaller fish. The older and bigger the fish, the more mercury it has in its body. You can't tell how much mercury is in a fish just by looking at it.

When we eat fish with a lot of mercury in it, the mercury gets into our bodies too. Too much mercury can hurt our brain development and cause other health problems, especially for babies and young children. That's why it's a good idea to follow the Safe Eating Guidelines when you catch fish.

## Safe Eating Guidelines

Which fish are the healthiest for you? How much can you safely eat? Where should you go fishing? Safe Eating Guidelines have the answers. The guidelines tell you the safest kinds of fish to catch and eat, and also the fish you should avoid because of mercury. It is especially important for all kids

to follow the guidelines, along with their parents. There are Safe Eating Guidelines for all the places on the map below including the American River, Feather River and the Delta. New guidelines are being developed for the Sacramento River and other places. Before you go fishing, or before you eat fish that your family or friends have caught, check this website for the latest information: [www.oehha.ca.gov/fish.html](http://www.oehha.ca.gov/fish.html).

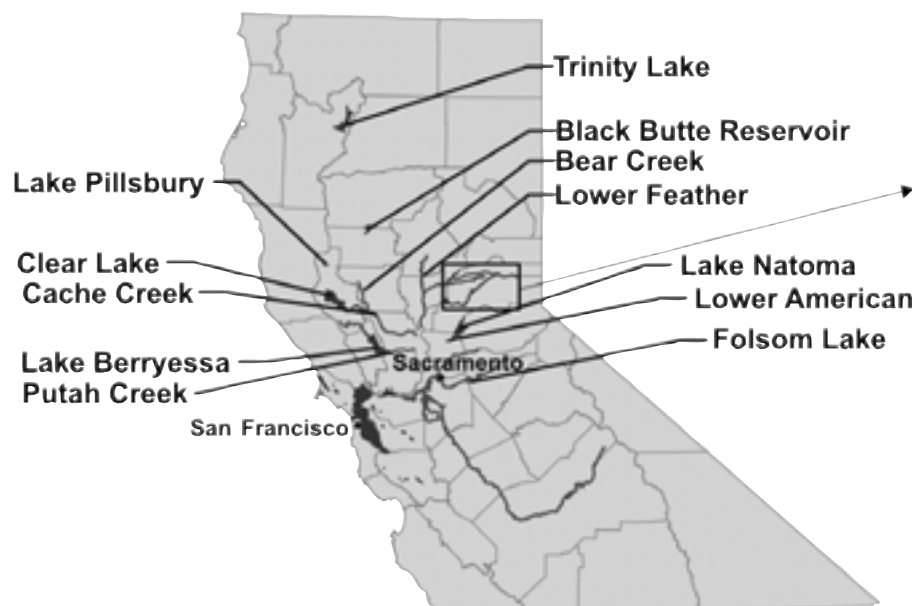
## Benefits of Eating Fish

Eating fish is good for you. Fish are a great source of protein and minerals. And, when you eat fish your body gets special benefits from something called omega-3 fatty acids. The omega-3s can help your brain develop and make your heart healthier. Some scientists also have found that the omega-3s in fish can help your body avoid getting cancer and other chronic diseases. Be healthy, eat fish!



## Go Fishing!

Learn how to fish with the California Department of Fish and Game!  
Visit the Fishing in the City website at:  
[www.fishinginthecity.org](http://www.fishinginthecity.org) for more information.



# River of Words

## What did you discover in your watershed?

Do you like to create art or poetry? Each year, River of Words, a non-profit organization, conducts an international poetry and art contest for youth on the theme of watersheds. The contest is designed to help youth explore the natural and cultural history of the place they live, and to express, through poetry and art, what they discover. Eight grand prize winners (four in poetry, four in art) will win a trip to the award ceremony at The Library of Congress in Washington, D.C.; one hundred finalists win prizes and ribbons. Winning work is published in the annual River of Words anthology and exhibited at the organization's Young at Art Gallery in Berkeley and at other venues around the world. All participants receive a "Watershed Explorer" certificate.

In turn, the Sacramento River Watershed Program (SRWP) gathers all entries from communities within the Sacramento River Watershed and conducts a regional competition. Winners of the SRWP River of Words contest are announced in multiple press releases and receive prizes such as River of Words T-shirts and books. Winning artwork and poetry are also posted on the SRWP website [www.sacriver.org](http://www.sacriver.org). Eight grand prize winners and eight finalists are chosen for both artwork and poetry in the following four categories:

Category I:	Grades K – 2
Category II:	Grades 3 – 6
Category III:	Grades 7 – 9
Category IV:	Grades 10-12

**"Who hears the rippling of rivers will not utterly despair of anything."**

– Henry David Thoreau

**"The song of the river ends not at her banks but in the hearts of those who have loved her."**

– Buffalo Joe



## Who is eligible?

Children between the ages of 5-19, who are not yet in college.

## When is the deadline?

Entries must be postmarked by February 15, 2008.

## Is there an entry fee?

No, the contest is free to enter.

## May more than one piece be submitted?

Yes, but each entry must have a separate entry form. Entry forms are available for downloading at [www.riverofwords.org](http://www.riverofwords.org).

## How do I enter?

You may enter the contest through your school, environmental club, scout

troop, art organization or any other such group, or you may enter the contest on your own. Group entries should be sent to River of Words together in one envelope or package, rather than individually. All entries must be sent with a completed entry form and mailed to:

**River of Words**  
P.O. Box 4000-J  
Berkeley, CA 94704

## Where can I get more information?

Visit River of Words' website at [www.riverofwords.org](http://www.riverofwords.org). For information regarding SRWP please contact Mary Lee Knecht at [marylee@sacriver.org](mailto:marylee@sacriver.org) or visit [www.sacriver.org](http://www.sacriver.org).

## Dive in and learn more!

Want to learn more about watersheds? The Environmental Protection Agency has a free watershed education program on its website. It's great for high school teachers who are planning lessons, students doing research, and all citizens who want to educate themselves. Visit [www.epa.gov/owow/wtr1/watershed/wacademy/acad2000/ecology/](http://www.epa.gov/owow/wtr1/watershed/wacademy/acad2000/ecology/)

## How to Get Involved

Did you know that there are more than 70 local groups and organizations working hard to protect and enhance the Sacramento River Watershed? You can visit [www.sacriver.org](http://www.sacriver.org) for a map and directory of local watershed groups and Resource Conservation Districts. These folks can provide more information on our local creeks and rivers. Many of these groups also have volunteer opportunities!

## Activity

Take a stand on the issue of changing nature to benefit man. You can either oppose the issue or support it. Write a letter to the editor defending your stand. You will first need to check the newspaper's Opinion page for guidelines for such letters.

Standard: Social Science – Research, Evidence, and Point of View; Language Arts–Writing 1

## San Francisco Estuary



**H**ere we are at the final stop on our watershed tour—Crissy Field. This is the San Francisco Estuary, where the water from the Sacramento and San Joaquin rivers joins with seawater flowing in from the Pacific Ocean. More kinds of plants and animals live or visit here than any other place in our watershed. Because this area is heavily used by people as well, balancing the needs of nature and humans requires careful planning. Crissy Field is 100 acres of windswept shoreline restored to natural beauty and made accessible by a trail for walkers, joggers, and bicyclists. On your next visit to San Francisco, be sure to stop in and get a good look at the final destination of the Sacramento River. Visit [www.crissyfield.org](http://www.crissyfield.org) or call (415) 561-7752.



# Be Stormwater Smart: See how many activities below contribute to stormwater pollution.



## GLOSSARY

**Confluence:** the point at which two or more rivers join together.

**Estuary:** an area where fresh water meets salt water; for example, bays, mouths of rivers, and salt marches.

**Floodplain:** the lowland that borders a stream or river, usually dry but subject to flooding.

**Headwaters:** the source and upper reaches of a stream or river.

**Meander:** the winding of a stream channel in the shape of a series of looplike bends.

**Riparian Habitat:** area alongside rivers and streams with a high diversity of plant and animal species.

**River:** a natural stream of water with considerable volume, larger than a brook or creek.

**Sacramento River:** California's largest river

**Smolt:** a young salmon

**Tributary:** a stream that joins another stream or body of water.

**Watershed:** the area that drains to a common waterway, such as a stream, lake, estuary, wetland, aquifer, or even the ocean

**Wetland:** the area between dry land and open water; some wetlands are covered with a shallow layer of water.

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California Department of Water Resources

California Resources Agency

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Cities of Sacramento, Rancho Cordova, Citrus  
Heights, Folsom, Elk Grove and Galt)

State of California

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