

Con páginas en Español

Name \_\_\_\_\_

# DELTA DISCOVERY VOYAGE



# WATER PATROL

## ACTIVITY BOOK

The more you know about water – where it comes from and where it goes – the more you can wisely use and conserve this important resource.



## Delta Discovery Viaje

## ¿Qué es la onda con el Delta?

Fluyendo hacia el sur, el poderoso río Sacramento se encuentra con el río San Joaquín justo al sur de Sacramento, en un área llamada Delta. Aquí los dos ríos se mezclan con afluentes más pequeños para formar un laberinto de vías fluviales que rodean muchas islas. La agua fresca de los ríos rueda hacia el oeste a través de una estrecha rotura en la Cordillera de la Costa y se encuentra con la agua salada de la bahía de San Francisco. La estuario Bay-Delta es el estuario más grande de la costa oeste de Norte de America, donde la mezcla de agua fresca y salada proporciona un ambiente que soporta muchos tipos de plantas y animales. Originalmente, las tierras pantanosas de la Delta fueron un refugio para

cazadores, debido a la abundante vida silvestre. Después de que se descubrió oro en California, los agricultores comenzaron a plantar en la tierra fértil de la Delta para proporcionar alimentos a los mineros. Estos agricultores comenzaron la construcción de diques para drenar el terreno pantanoso. Las áreas drenadas fueron transformados en isla productivas de drenadas. Las drenadas de la Delta aún son importantes hoy en día. El agua del la Delta se bombea y se transporta por todo el Estado. Los canales y acueductos llevan el agua de la Delta a las ciudades alrededor del área de la bahía, a millones de acres de tierras de cultivo en el Valle de San Joaquín y a 15 millones de personas en



Millones de personas dependen del Delta para el agua potable.

el sur de California. Sin embargo, las poblaciones de muchas especies natales del pescado han disminuido. Muchas cosas podrían ser la contribución a la decadencia incluso sequía, calidad del agua pobre, desviaciones acuáticas y la presencia de especies no natales que compiten por la comida. ■

## Estudiantes buscan la verdad de la Delta

Este año los estudiantes del quinto grado de todo el Condado de Contra Costa se embarcarán en un viaje para descubrir la verdad acerca de el Sacramento-San Joaquin Delta. Ellos planean un período intenso de clases de estudio, combinado con un emocionante viaje de campo al bordo del buque de investigación Brownlee, para determinar cómo pueden ser buenos administradores de la Delta de en medio ambiente de le Delta. Descubrirán cómo las personas dependen de la Delta para la agua potable, agricultura, industria, recreación y cómo los peces y la vida silvestre

necesita una saludable Delta para sobrevivir. Estudiante Ian Quizative comentó: “El futuro de la Delta estará en nuestras manos. Como estudiantes, tenemos que averiguar qué amenazas frente la Delta, y también qué podemos hacer para ayudar”. ■



## Historia de palabras Alluvial y Delta

La palabra “DELTA” es el lugar donde los ríos se ventilan justo antes de vaciarse en el mar. Técnicamente, las “DELTAS” se llaman “ventiladores aluviales”. Aluvial viene de la palabra latina “Alluere”, que significa “lavar contra”. Los aficionados aluviales se han hecho de terrenos que han sido depositados o dejados por el agua. La gente griega empezaron a usar la palabra “DELTA” porque la forma triángulo les recordaba la forma triangular de la letra que llamaban “DELTAD”, que se convirtió en nuestra letra “D”.

¿por que piensan que la palabra en español, Lluvia, viene de la palabra alluvial? ¿ven alguna similitud con la palabra “aluvial”?\*\* ■

## Querida

Definiciones para lo siguiente:

Acre-foot	Ichthyology
Adaptation	Invertebrate
Bacteria	Levee
Bay	Mercury
Benthos	Microscopic
Bioaccumulation	Native Species
Biodegradable	Nutrient
Conservation	Photosynthesis
Decomposer	Plankton
Delta	Pollution
Density	Potable
Detritus	Producer
Effluent	Recycled Water
Environment	Salinity
Ecology	Salt Water
Endangered	Scavenger
Estuary	Tides
Filter Feeder	Vertebrate
Food Chain	Wastewater
Food Web	Water Cycle
Fresh Water	Watershed
Habitat	Wetlands
Hydrology	

## ¿No hay agua nueva!

Los estudios de agua del mundo han llegado a la conclusión de que no hay nuevas fuentes de abastecimiento de agua para la creciente población mundial. Evidentemente, la misma agua ha sido acostumbrarse a través y a lo largo de millones de años.

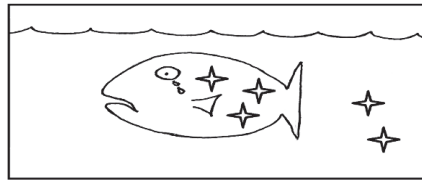
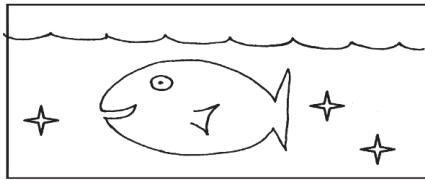
Un experto en la materia, el Dr. H. Tuoh, dijo: “Mi investigación indica que si no fuera por el ciclo del agua sería realmente mala suerte. Tenemos que hacerlo mejor con la escasez de agua fresca que tenemos en la tierra”. ■

\* Water Education Foundation, “Layperson’s Guide to the Delta”

\*\* Metropolitan Water District of Southern California, “Water Times”

# 2 Mercurio y Contaminación

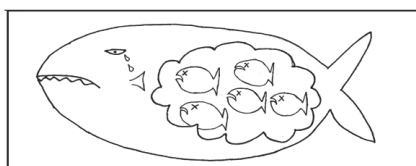
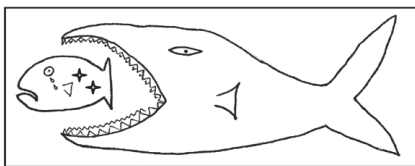
## Acumulación Biológica y el aumento Biológico



= Contaminación por mercurio

Los contaminantes, como el mercurio, se liberan en la Delta de la industria y los productos químicos domésticos. ¡Las plantas y los animales que viven en áreas contaminadas absorben el mercurio simplemente por estar a su alrededor! Tener toxinas, como el mercurio, en sus cuerpos puede hacer que tener bebés sanos, atrapar alimentos e incluso moverse, sea difícil!

## Aumento Biológico: De la cadena alimentaria (comida) de biología



= Contaminación por mercurio

Cuando los animales que han absorbido toxinas de medio ambiente (bioacumulación) son comidos por depredadores, los depredadores pueden entonces absorber algunas de las toxinas de sus presas. **El mercurio se transmite de presa a depredador.** A menudo, los depredadores grandes y "superiores" tienen niveles muy altos de mercurio porque a medida que se pasa a lo largo de la cadena alimentaria, el mercurio se concentra en los cuerpos de los principales depredadores. Estos niveles pueden ser peligrosos para su salud. ¿Puedes nombrar cualquier pez que sea "top" depredadores que puedas comer?

¿Cómo puedes ayudar? Cuando tienen productos químicos traigan esos químicos a la instalación (HHW) de recolección de residuos peligrosos del hogar, así nosotros colectivamente podemos mantener las toxinas fuera de la vida silvestre del Delta y fuera de usted!

## Bio-Math: Striped Bass & Mercury

If a striped bass is 12 years old and has a concentration of 0.9 ppm (parts per million) of mercury in its blood, how much mercury (in ppm) has it been absorbing yearly, on average?

<b>1</b>		÷		=		ppm of mercury per year
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Using your answer from #1, how many years does it take for a striped bass to reach 0.45 ppm of mercury in its blood?

<b>2</b>	ppm of mercury per year	X	_____ years	=	<b>0.45</b> ppm of mercury in its blood
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If each plankton a striped bass eats has absorbed 4 units of mercury from its habitat, and the bass loses half (or 0.5) of the mercury it eats back into the habitat, how many plankton does it have to eat before it has 600 mercury units in its body? 256 mercury units? 50 units?

<b>3</b>	4 units of mercury	X	1/2 or 0.5 mercury lost	X	_____ number of plankton	=	<b>600</b> mercury units in its body
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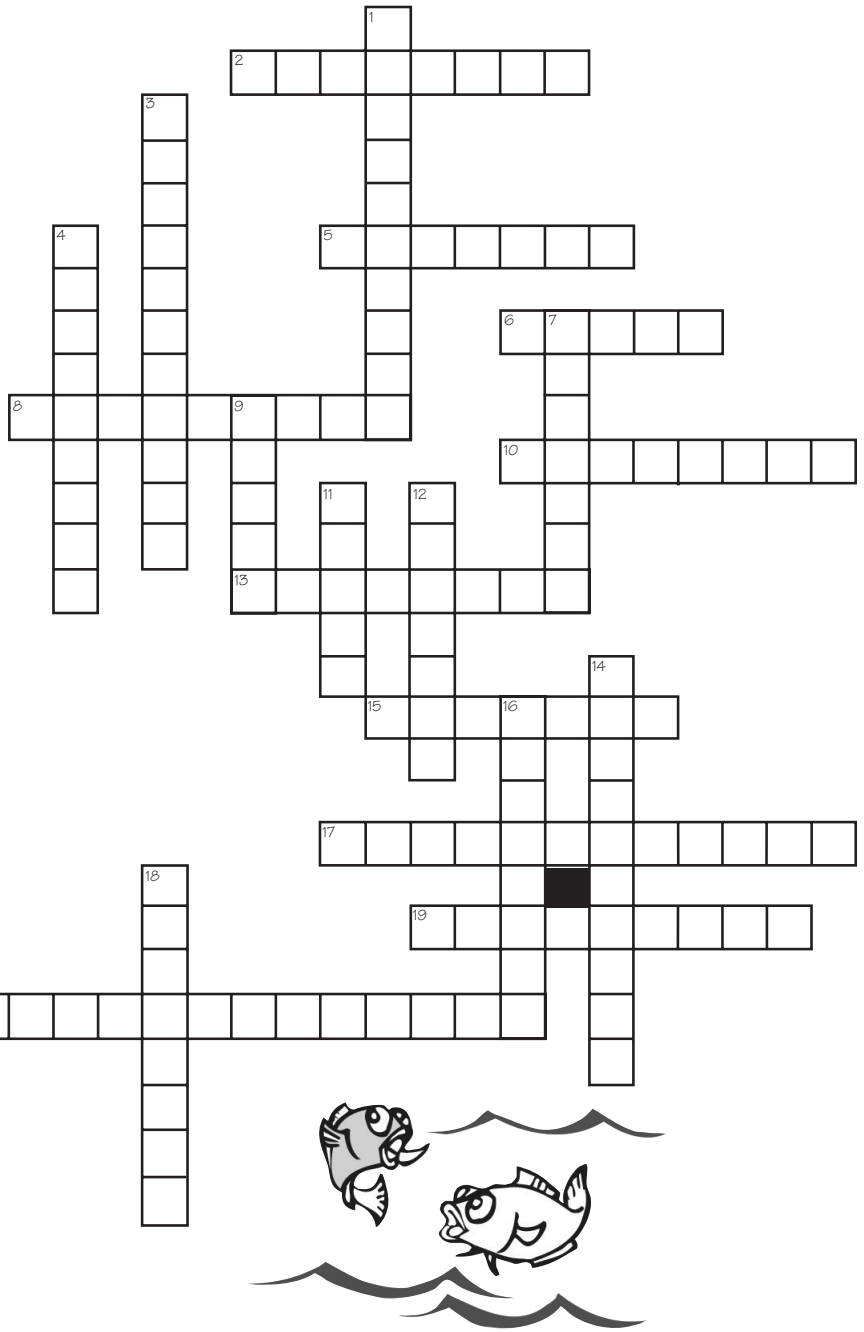
# 3 Delta Discovery Crossword

## Across

2. An organism that makes food (green plants are an example).
5. Area in which an organism normally lives.
6. An embankment built to prevent a river from overflowing.
8. Harmful impact on the environment resulting from human activities.
10. Drifting aquatic animals and plants.
13. The amount of salt in the water.
15. Organisms in an ecosystem, shows who eats whom.
17. An animal lacking a true backbone.
19. Where the water falling to earth drains into a common source.
20. The process by which plants make food.

## Down

1. Modification of an organism in order to survive in its habitat.
3. The study of fish.
4. The study of water.
7. The study of relationships between organisms and their environment.
9. Rising and falling of seas.
11. Where the Sacramento and San Joaquin join.
12. The bottom dwelling community.
14. An animal with a backbone.
16. Dead plant and animal material, and the bacteria decomposing them.
18. An organism that eats plants and/or animals.



### Try these vocabulary words:

Adaptation  
Benthos  
Consumer  
Delta  
Detritus  
Ecology

Food Web  
Hydrology  
Habitat  
Ichthyology  
Invertebrate  
Levee

Photosynthesis  
Plankton  
Pollution  
Producer  
Salinity  
Tides

Vertebrate  
Watershed

# 4 Water Sources

Our Water is A-mazing!

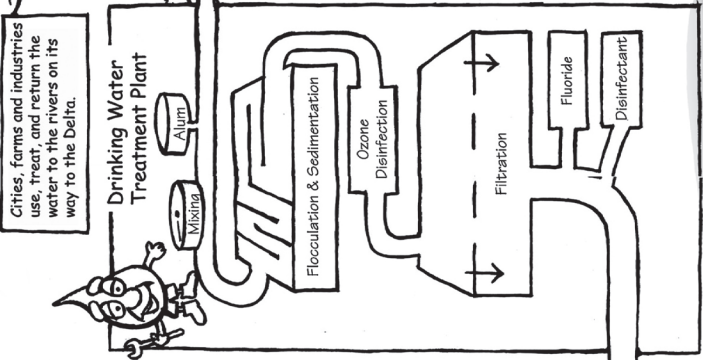
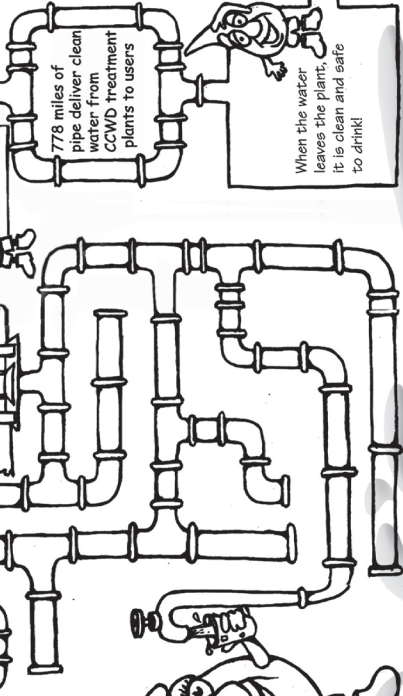


Water is essential for all living things.

Lawns and plants use a lot of water.

More water is used in the bathroom than any other room in our home!

Water... what would we do without it!



Cities, farms and industries use, treat, and return the water to the rivers on its way to the Delta.

Water flows down the 43 mile Contra Costa Canal to water treatment plants.

Fresh water is stored in the reservoir to mix with Delta water when Delta salinity is high.

Water is pumped from the Delta to the Los Vaqueros Reservoir or down the canal to the treatment plants.

Pumps push the water up to the reservoir.

CONTRA COSTA WATER DISTRICT

The two largest rivers in California, the Sacramento and the San Joaquin, bring water into the Delta.

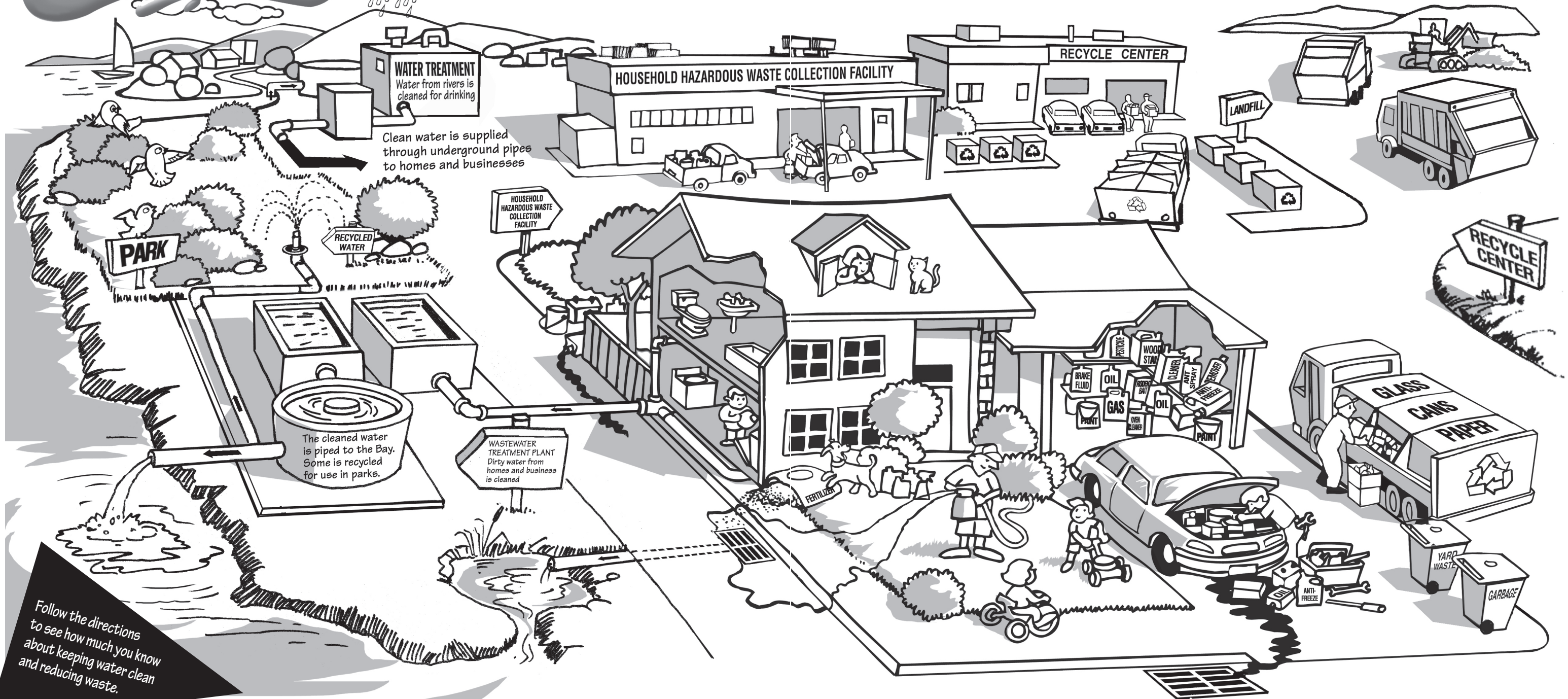
## California Water Facts:

- Water is the only substance on earth that naturally occurs in all three states of matter (solid, liquid, and gas)
- There is no "new" water - the same water continuously goes through the water cycle (evaporation, transpiration, condensation, and precipitation.)
- Although the Delta comprises just 1% of California's total area, 40% of the state is in the Sacramento - San Joaquin River Delta watershed.
- 2/3 of all Californians depend upon the Delta for at least part of their water supply.
- The population of California continues to grow, but the amount of available fresh water remains the same. Cities, farmers, industry, and the environment all depend upon this limited supply.

There are some great websites on the Internet where you can find out more about your water and the environment. Here are a few suggestions:  
 Contra Costa Water District: [www.ccwater.com/education](http://www.ccwater.com/education) (look at the online resources and water related links)  
 Central Contra Costa Sanitary District: [www.centralsan.org](http://www.centralsan.org)  
 United States Geologic Society: <http://ga.water.usgs.gov/edu>  
 Environmental Protection Agency: [www.epa.gov/water/kids.html](http://www.epa.gov/water/kids.html)

# Pollution Patrol

Understanding how you affect the environment is the first step in taking good care of it. What you do at home can affect the water in creeks and the Delta. You can help save resources by reducing, reusing, and recycling.



Follow the directions to see how much you know about keeping water clean and reducing waste.

- 1** Where does your water go?  
**Draw a line** to follow the path of dirty water from the house to the treatment plant. Then draw a line to follow the path of clean water to the Bay.
- 2** **Find and circle** 4 places where water could be polluted with oil or chemicals that might harm our creeks, the Delta, or the Bay.
- 3** **Find and list** 3 things that can be hazardous waste if not used up or disposed of properly.
 

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- 4** **Find and mark** an X on the place where you can take leftover paint, oil, fluorescent lights, or other household wastes to be recycled, reused, or disposed of safely.
- 5** **Draw a drop** of water where:
  - water is being wasted
  - water is being reused

# 6 Información del Agua

## Matemáticas Delta

1.  $\frac{2}{3}$  de la población de California recibe al menos parte de su agua del delta sacramento-san joaquin. La población de California es casi 40 millones. ¿Cuántos californianos dependen del agua de la Delta?

2. California es un estado grande y cubre 156,000 millas cuadradas. 62,400 millas cuadradas de California se encuentra en la cuenca hidrográfica de la Delta del Sacramento-San Joaquin, lo que significa lluvia y derretidas drenajes de nieve en la Delta. ¿Qué porcentaje de California está dentro de la cuenca hidrográfica Delta?

3. Aunque la cuenca hidrográfica de la Delta es bastante grande, la Delta en sí es sólo el 1% de la superficie total de California. ¿Cuántas millas cuadradas cubre la Delta?

### One Small Way You Can Make A Big Difference



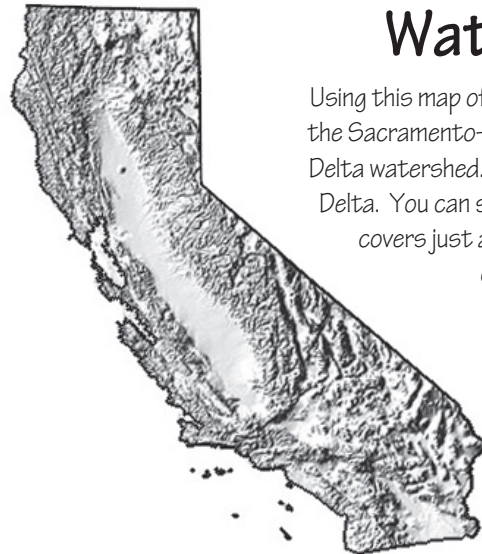
Have you ever seen a sign like this stenciled onto the ground

near a storm drain on a street?

Storm drains are designed to take storm runoff back to local creeks and then out to the Delta. Water that goes down the storm drain does not get treated before it ends up in the creeks, streams and Delta. Anything that gets washed into the storm drain also ends up in the Delta.

Here are some simple ways you and your family can help keep the Delta clean:

- Dispose of household waste properly.
- Clean up after your pets.
- Use yard chemicals like fertilizer and pesticides sparingly.
- Move vehicles for street sweeping.



### Watershed

Using this map of California, outline the Sacramento-San Joaquin River Delta watershed. Put a star on the Delta. You can see that the Delta covers just a small part of the overall watershed.

### A Few Questions for Discussion

1. You know that water on earth is naturally recycled. This process is called the water cycle. Discuss what would be different about the earth if there was no natural water cycle.
2. Describe how snow in the mountains ends up as the water we drink in our homes.
3. What is meant by the saying "Everyone lives downstream from somebody else" - Why is that important to us?

# 7 Water Wise Word Search

There are 25 words about keeping water clean hidden in this word puzzle. Words may be written up and down, or from left to right.

**Can you find and circle the following 25 hidden words?**



- Bacteria
- Bay
- Biodegradable
- Central San
- Conserve
- Delta Diablo
- Environment
- Estuary
- Filter
- Hazardous
- Mercury
- Pollution
- Protect
- Recycle
- Reuse
- River
- Sewer
- Sludge
- Storm drain
- Test
- Toxic
- Treatment
- Wastewater
- Water District
- Watershed



# 8 Pre-Trip Quiz Delta Discovery Voyage

1. What two major California rivers form the Delta?

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2. The water in the Delta is saltier in the fall than in the spring. Why do you think this is?

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How is the Delta important to:

3. People who live in cities?

4. Fish and wildlife?

5. Farmers?

6. Name some recreational activities people do in the Delta.  
Unscramble these words:

fghnisi

bingoat

mmingsiw

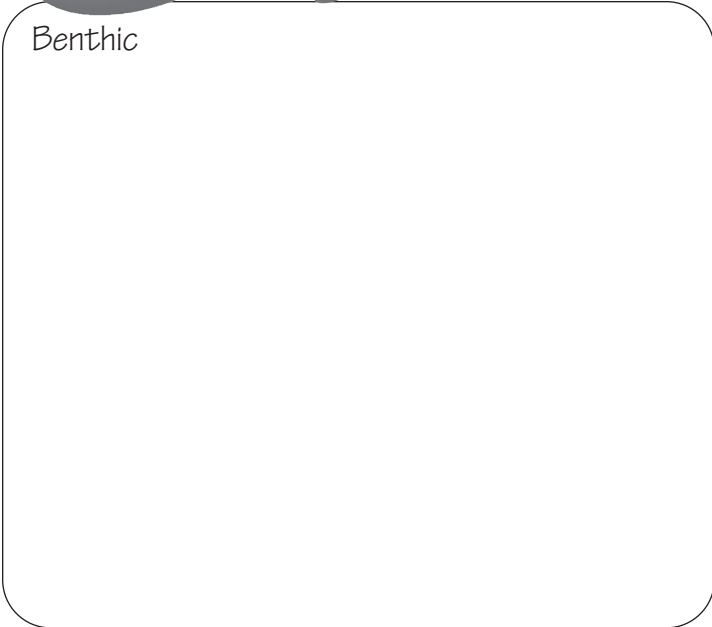
## True or False

- \_\_\_ 7. Most of the water in the Delta originates as snow in the Sierra Nevada Mountains.
- \_\_\_ 8. When it rains, the water that drains off my driveway and into the street is cleaned of pollution and chemicals before it empties into the Delta.
- \_\_\_ 9. The water we drink has never been used before.
- \_\_\_ 10. I can make a difference in the quality of water we drink and in the quality of water available for fish and other wildlife.
- \_\_\_ 11. The water we drink has never been used before.
- \_\_\_ 12. I can make a difference in the quality of water we drink and in quality of water available for fish and other wildlife.
- \_\_\_ 13. The water we drink has never been used before.

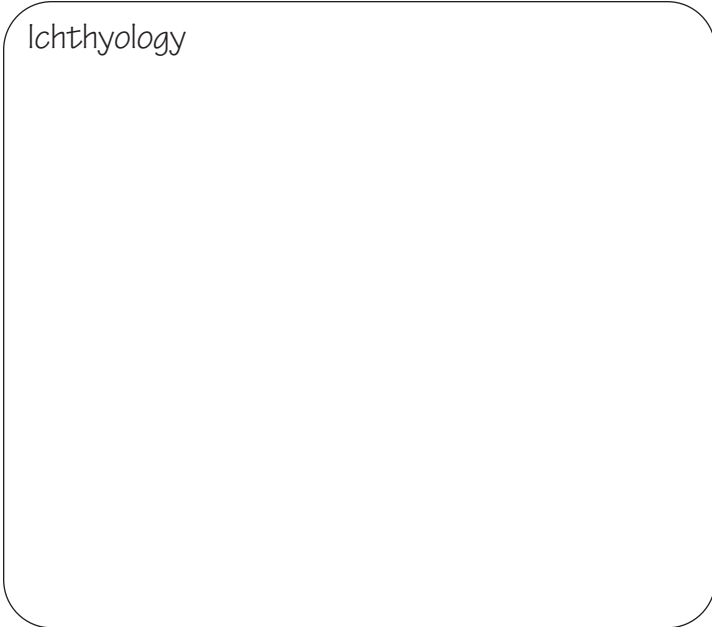
# 9 Post-Trip Report

Draw and describe what you did at each station aboard the R/V Brownlee

Benthic



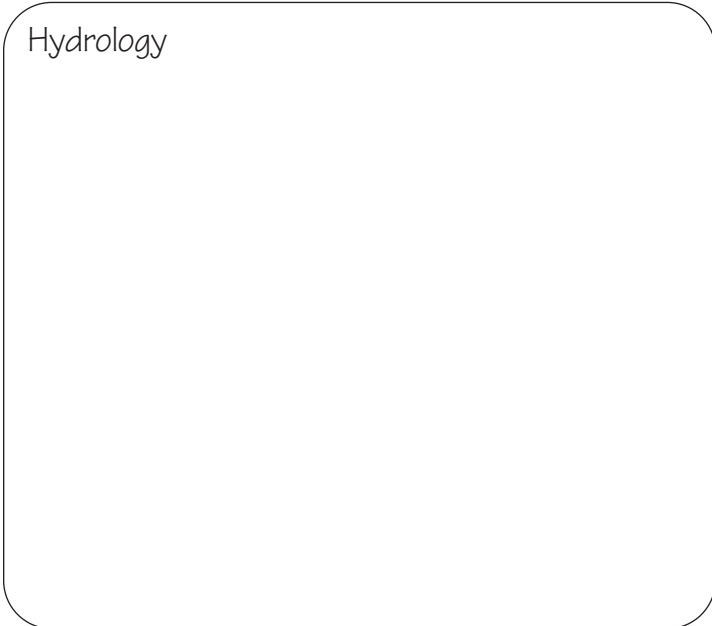
Ichthyology



Plankton



Hydrology



What 3 things will you share with your family and friends about this trip?

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What did you like most about this trip?

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# Drain Detectives

**Dear Parent:** Please help your child complete this survey to identify products in your home that can contribute to water pollution.



**1) Check off** any of the household hazardous wastes (HHW) that you have at home.

**2) Carefully store** leftover products for a trip to the HHW Collection Facility (see below).

**3) Remember to recycle** used motor oil by taking it to the HHW Collection Facility.



## Household Products

- Batteries
- Fluorescent bulbs & compact fluorescent lights (CFLs)
- Bleach, ammonia, cleaners
- Furniture polishes



## Paint Products

- Latex & oil-based paints
- Wood stain & varnishes
- Paint remover/paint thinner & solvents

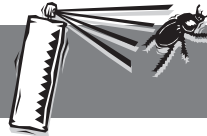
Other products labeled with caution, danger, poison, toxic, etc. What did you find?

- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_



## Personal Care Products

- Mercury fever thermometers
- Fingernail polish & remover
- Hair care, perfumes & colognes



## Garden and pest-control products

- Pesticides, herbicides, fertilizers



## Automotive Products

- Motor oil, gasoline, antifreeze
- Brake & transmission fluid
- Car batteries



## Miscellaneous

- Cooking oils & grease (large quantities, as from a turkey fryer)
- Chemicals

## Free HHW Collection Facilities

### Central County

#### Location

Central Contra Costa Sanitary District  
4797 Imhoff Place  
Martinez, CA 94553

#### Hours

Monday - Saturday, 9 a.m. - 4 p.m.  
Call for Holiday closures

**Call** 1-800-646-1431  
[www.centrsan.org](http://www.centrsan.org)

Communities eligible to use the HHW facility include: Alamo, Clayton, Clyde, Concord, Danville, Lafayette, Martinez, Moraga, Orinda, Pacheco, Pleasant Hill, San Ramon, Walnut Creek, and other unincorporated central county areas.



### East County\*

\*Also includes e-waste & sharps

#### Location

Delta Diablo  
2550 Pittsburg-Antioch Hwy,  
Pittsburg, CA 94509  
(between Loveridge & Somersville)

#### Hours

Thursday - Saturday, 9 a.m. - 4 p.m.  
Call for Holiday closures

**Call** 925-756-1990  
[www.ddsd.org](http://www.ddsd.org)

Antioch, Bay Point, Bethel Island, Brentwood Byron, Discovery Bay, Knightsen, Oakley and Pittsburg.

## Pharmaceutical Disposal

CCCSD's HHW Collection Facility does not accept pharmaceuticals. For a list of locations for free, safe disposal, go to [www.centrsan.org](http://www.centrsan.org) and click on the link in the bottom right corner.