JUNE SUCKER

This lesson plan has been created as a resource for fourth grade teachers to teach the new core standards to their students. It integrates language arts, social studies, and science standards in a meaningful and fun way. To see which specific standards are addressed, please refer to them below.

OBJECTIVE:

This game is designed to help students experience a few environmental changes affecting the population of June sucker, which are endemic to Utah Lake. It is hoped that after participation, this activity and group discussion will prepare students to write a report about the history of Utah Lake. Specifically, about the historical events that led to the demise of the Lake's ecosystem and the steps now being taken to repair the mistakes of the past.

STANDARDS ADDRESSED:

4th Grade Language Arts

4.W.1 Writing Standard 1
Write opinion pieces on topics or texts, supporting a point of view with reasons and information.

4.W.2 Writing Standard 2
Write informative/explanatory texts to examine a topic and convey ideas and information clearly.

4.W.8 Writing Standard 8
Recall relevant information from experiences or gather relevant information from print and digital sources; take notes and categorize information, and provide a list of sources.

4.RI.4 Reading Informational Text Standard 4
Determine the meaning of general academic and domain-specific words or phrases in a text relevant to a *grade 4 topic or subject area*.

4th Grade Science

Standard 5: Students will understand the physical characteristics of Utah's wetlands, forests, and deserts and identify common organisms for each environment.

Objective 2: Describe the common plants and animals found in Utah environments and how these organisms have adapted to the environment in which they live.

c. Describe some interactions between animals and plants of a given environment.

e. Find examples of endangered Utah plants and animals and describe steps being taken to protect them.

Objective 4: Observe and record the behavior of Utah animals.

c. Research or report on the behavior of a species of Utah fish (e.g. feeding on the bottom or surface, time of year and movement of fish to spawn, types of food and how it is obtained).

4th Grade Social Studies

Standard 1: Students will understand the relationship between the physical geography in Utah and human life.

Objective 3: Analyze how human actions modify the physical environment.

Standard 2: Students will understand how Utah's history has been shaped by many diverse people, events, and ideas.

Objective 3: Explain the development of the economy in Utah.

a. Explain the relationship between supply and demand.

c. Explore cultural influences from various groups found in Utah.

TEACHER BACKGROUND:

- The teacher should consider viewing Chapters 3, 5 & 7 of the *Utah Lake: Legacy* video.
  - *Utah Lake: Legacy,* Chapter 3 (*YouTube Link*) (*UEN Link*)
  - *Utah Lake: Legacy,* Chapter 5 (*YouTube Link*) (*UEN Link*)
  - *Utah Lake: Legacy,* Chapter 7 (*YouTube Link*) (*UEN Link*)
  - Utah Lake Carp Removal Video (*YouTube Link*) (*UEN Link*)

June sucker

The June sucker, *Chasmistes liorus*, is endemic to Utah Lake (not found elsewhere in the world) and was listed as endangered by the U.S. Fish and Wildlife Service in 1986. The June sucker can be found throughout Utah Lake. It has been documented in and near many of the Lake's tributaries; however the Provo River continues to be the main spawning location. June sucker adults leave Utah Lake and swim up the Provo River and other tributaries to spawn in June of each year. Spawning occurs in shallow riffles over gravel or rock substrate. Fertilized eggs sink to the stream bottom, where they hatch in about four days. No parental care is given to eggs or young. Although the species was once abundant in Utah Lake, it is now extremely rare.

Major causes of the June sucker's decline include flow alterations, pollution, and drought, hybridization with other sucker species, and competition with and predation from exotic fish species.

The June Sucker Recovery Implementation Program (JSRIP) is a multi-agency cooperative effort charged with coordinating and facilitating the recovery of June sucker, while balancing and accommodating water resource needs of the human population. The Program focuses its activities on six recovery elements to ensure a diversified and balanced approach towards recovery. The recovery elements are (1) Nonnative and Sport Fish Management, (2) Habitat Development and Maintenance, (3) Water Management and Protection, (4) Genetic Integrity

and Augmentation, (5) Research, Monitoring, and Data Management, and, (6) Information and Education. It has created the June Sucker Recovery Plan to help the June sucker recover.

The plan identifies competition with and predation by introduced fish species, as well as reduction of and modification to habitat and altered hydrology as the main reasons the June sucker population has decreased. The recovery plan's goals are to (1) prevent extinction, (2) down list to threatened status, and (3) delist the species. At the time of its listing in 1986, there was a population estimate of less than 1,000 individuals. The recovery efforts, including restocking efforts, have greatly benefitted the June sucker population in Utah Lake.

A June Sucker

(Below are selected excerpts from the book *Utah Lake: Legacy*)

JUNE SUCKER

MORE FISH THAN PEOPLE. (adapted from pg. 43)

For years, Ute bands had harvested the resources of Utah Lake. But it was a diamond in the rough for newly arriving settlers. In the early 1800s, 13 species of fish lived in the Lake. The population of June sucker (one of the Lake's native and predominant fish species) likely ran into the millions. Fish easily outnumbered people in the valley in 1851; a census taken that year lists the human population at 1,505.

As more people arrived, many without enough provisions to last through hard winters, the demand for fish grew. The 1850s brought such a flood of Mormon pioneers that demand turned into a desperate need. Settlers and Ute Indians began to fish every available body of water, including the Provo, American Fork, Jordan, and Spanish Fork rivers. Such intense fishing led to heated competition between the native people and their new neighbors.

In 1853, Utah's territorial legislature passed a law prohibiting the "Needless Destruction of Fish," but it did not seem to slow local fishermen. Some strung gill nets across the Provo River day and night; others seined the river and the Lake during all hours. Excessive fishing during the spawning season meant that instead of reproducing, fish swam directly into the confines of fishermen's nets. Also in 1853, city and county officials debated the issue of who would supervise fishing rights on Utah Lake and in the Provo River.

It was finally decided that the city of Provo (by authority of the Provo City Charter) would control fishing in the Provo River, while Utah County would preside over fishing on Utah Lake. But the locals were not the only ones to cast their nets and lines. Word spread about the Lake's generous offering of fish, and fishermen from neighboring valleys descended upon the area. Who could blame these hungry pioneers after hearing stories of being able to pluck tasty trout or sucker out of the water with their bare hands, or catch all they wanted by simply dragging unbaited hooks through the water?

During the 1850s, alteration of the natural flow of the Provo and Jordan rivers began. Many canals and diversion dams were built for irrigation. These human acts were among the first negatively to impact the habitat of the native fish. Yet, enough sucker and trout thrived to contribute to the building of the Fillmore Statehouse, Salt Lake City's Church of Jesus Christ of Latter-day Saints (LDS) Temple, and the fence around Temple Square. Leaders of the Church established tithing yards, which received fish shipped from Utah Lake and its tributaries. Loyal church members were expected to pay 10 percent of every catch to the Church as tithing. For several decades, thousands of pounds of "tithing fish" were distributed as payment for public workers tasked with building many landmarks.

FISH THROUGH TRAGEDY. (from pg. 44)

As if the challenges of creating new settlements in the rugged West were not great enough, pioneers in 1855 faced increasingly bitter times. The population grew rapidly, but people were not the only residents. Millions upon millions of grasshoppers flew in to ravage wheat and other crops. That year, the prolific insects invaded the Utah Territory from Cache Valley in the north to Parowan in the south, damaging whole fields and destroying most of the grain in the territory.

JUNE SUCKER

One observer wrote that the greedy insects filled the skies for three miles deep – forming such enormous clouds that they seemed to eclipse the sun. Drought also set in, pilfering already-low irrigation water sources and ruining crops. Herds of livestock died. Forest fires killed many of the wild animals that the Utes depended on for food. It must have seemed like the end of the world. Once again, desperate pioneers and Native Americans turned to fishing the Lake and every river and creek that ran into it. Eating fish was the only way many people survived.

In this letter to his son, Heber C. Kimball described the extent of the devastation in 1855:

"From this place [Salt Lake City] there is not fifty acres now standing of any kind of grain in Salt Lake Valley and what is now standing, they are cutting it down as fast as possible. In Utah County, the fields are desolate, in Juab Valley not a green spear of grain is to be seen, nor in Sanpete, nor in Fillmore. In Little Salt Lake [near Parowan] they are still sowing, also at Cedar City, that county being so much later the grain is not yet up, but the grasshoppers are there ready to sweep down the grain as soon as it comes up. In the north as far as Box Elder the scenery is the same … and to look at things at this present time, there is not the least prospect of raising one bushel of grain in the valleys this present season. … I must say there is more green stuff in the gardens in S.S.L. City than there is in all the rest of the counties, still there is a great many of the gardens in the city entirely ruined. Brother Wm. C. Staines told me this morning that he had 500,000 young apple trees come up and they are all cut down to the ground and many gardens where the peach trees were full of peaches, every leaf and peach are gone."

—Davis Bitton and Linda P. Wilcox "Pestiferous Ironclads: The Grasshopper Problems in Pioneer Utah," Utah Historical Quarterly, 46, #4.

(adapted from pg. 48)

Introduced carp and native sucker from Utah Lake came to the aid of the poor on many later occasions. During the 1890s, a severe depression gripped Utah and the rest of the nation. LDS Church groups and municipalities worked with the fishermen of Utah Lake to bring free fish to the destitute of Salt Lake City and other communities. During World War I, much of the country's beef was sent to Allied troops fighting in Europe. Many people ate fish from the Lake as a replacement for red meat, and free fish were once more distributed among the poor of Salt Lake City. During the Great Depression of the 1930s, Utah Lake's commercial fishermen were called upon to relieve the widespread suffering of unfortunate families along the Wasatch Front. The fishermen were more than willing to donate fish for municipal government officials to dispense free-of-charge.

In the late 1800s, commercial fishing companies proliferated, sparking rivalries for prime fishing areas and creating healthy price competition. In the late 19th century, one of the most enduring commercial fishing companies was born. The Loy family, through a marital connection to the Christofferson family, began a four-generation legacy of commercial fishing in Utah Lake that continues today. Bill Loy, Jr. leads his crew onto the Lake all year long. The carp he catches are shipped all over the world selling for 40 cents per pound in Compton, California and up to $18 per pound in Beverly Hills.

Loy, Jr. has caught as many as 128,000 pounds (primarily carp) out of the Lake. Once he caught a 4-foot-long, 50-pound catfish. Catching a fish that large with a rod and reel would take some amount of skill. But Loy confessed talent had nothing to do with it. "It got caught in the net," he said. For the record, he is as skilled an angler as he is a commercial fisherman.

[*Update: Loy, Jr. has demonstrated the ability to remove millions of pounds of fish each year. In early 2010, he was awarded a contract to remove 5 million pounds of carp from Utah Lake in one year, the first year of a seven-year carp removal effort.*]

FISH TROUBLE. (from pg. 50)

Both humans and Mother Nature contributed to the demolition of Utah Lake's native fish community. In 1872, a dam was constructed across the Jordan River (the Lake's only outlet) for using the Lake as a storage reservoir. In the coming decades, the high-mountain reservoirs were created to retain increased springtime runoff. Some of these reservoirs still exist and continue to provide water to the Wasatch Front for agriculture, industry, recreation, and municipalities.

The reservoirs and irrigation practices initiated a gradual change in Utah Lake's water quality, and this resulted in the deaths of many fish. Return flows from irrigation raised the Lake's water temperatures and increased turbidity. Thousands of tons of sucker died during the drought of the 1890s, when rivers were drained in an effort to water parched fields. These actions left fish stranded on dry river beds to perish. A severe drought in the early 1930s prompted farmers to dewater the Provo River in a futile attempt to save their dying crops. At the same time, Utah Lake shriveled to an alarming average depth of one foot. Scientists later concluded the native fish population never fully recovered from the effects of such catastrophic droughts and the continuing practices of poorly managed irrigation.

Carp

The common carp, *Cyprinus carpio*, is native to Eurasia, but has been widely introduced in the United States, including in water bodies throughout Utah. Carp cause problems in many areas of Utah, where they compete with native fish species and/or destroy habitat used by native fishes and waterfowl.

Common carp are opportunistic feeders, eating mostly insects and other invertebrates. It is usual for carp to consume plant matter as well. Young carp eat zooplankton and phytoplankton. Carp spawn during the spring and summer, usually in shallow water. Large numbers of eggs (large females can produce well over 1 million eggs) are released into the water and hatch in one to two weeks. Carp often inhabit slow-moving areas, and they are very tolerant of poor water conditions.

Aquatic vegetation has been severely impacted by the introduction of carp into Utah Lake. The lack of aquatic vegetation has contributed to the decline of native fish species and reduced water clarity near the shore. Results from research efforts conducted by the June Sucker Recovery Implementation Program (JSRIP) suggest reducing and controlling the carp

population is feasible. Scientific literature suggests reducing the carp population by 75% and maintaining it at that level is a prerequisite for the re-establishment of aquatic vegetation.

Restoring the ecological health of Utah Lake is impeded by the environmental impact of large numbers of common carp including loss of water clarity and biodiversity. In the most recent lake-wide survey conducted, common carp represented an overwhelming 91 percent of the fish biomass (weight) in the Lake. A lake-wide approximation of the carp population is 7.5 million age 2+ harvestable-size fish. Large-scale mechanical removal of carp from Utah Lake has been determined to be possible with commercial fishing techniques. The goal of the removal program is to remove 5 million pounds of carp each year for seven years. This effort should reduce the carp population below its reproductive potential so their recovery is slow and controllable. Target reduction levels are based on scientific literature which suggests an ecosystem-level response to the removal would include the restoration of rooted aquatic plants, increased biodiversity, more stable predator-prey interactions, and improved water quality.

TEACHER MATERIALS:

- *Utah Lake: Legacy,* Chapter 3 (*YouTube Link*) (*UEN Link*)
- *Utah Lake: Legacy,* Chapter 5 (*YouTube Link*) (*UEN Link*)
- *Utah Lake: Legacy,* Chapter 7 (*YouTube Link*) (*UEN Link*)
- Utah Lake Carp Removal Video (*YouTube Link*) (*UEN Link*)
- Whistle
- Instructions for playing June sucker Utah Lake Game (pgs. 8-10)
- Cards for activity of June Sucker Utah Lake Game (pgs. 12-17)
- Pictures and descriptions of June sucker-related topics (pgs. 18-21)
- June sucker History Chart (pg. 21)
- Chart of Utah Lake Native Fishes (pg. 23)
- Utah Project WILD June sucker article (pgs. 24-28)
- Internet information for June Sucker (pg 29)
- Internet information for Carp (pg. 30)

STUDENT MATERIALS:

- Class set of June sucker game cards (Cut and laminate the cards. Read instructions for play to determine the quantity of each card, pgs. 11-15).

VOCABULARY:

- Adaptation
- Environment
- Behavior
- Endemic: Natural to or belonging only to a specific place.

- Fry: A larvae (baby) fish.
- Plankton: Plankton are small organisms found in the water column of Utah Lake. The June sucker eats the plankton found in the middle of the water column.

PROCEDURE:

This lesson plan includes an activity and a writing component. The activity should be done first.

Activity – Game:

UTAH LAKE JUNE SUCKER GAME

Instructions:

1. Hand out one Utah Lake Card per student.
2. Select one area of the gym to be Utah Lake and another to be Provo River spawning grounds.
3. Identify one area (near the teacher) to be the dead zone/new role area.
4. Explain different roles students will play during the activity. The game works somewhat like tag, but each student must hold his/her identifying card in one hand during play.
    A. **June sucker** - These students will swim around eating plankton (move hands like jaws eating). When told by the teacher it's June, they swim to the spawning ground to lay eggs (A card representing the eggs will be placed in a bucket next to the river entrance. The adult June sucker will grab an egg card and place it on the gravel bed), and then go back to the Lake area. If tagged by a predatory fish, they must go to the new role area.
    B. **Aquatic Vegetation** - These students stay in the same location in the Lake. They are waving their arms as if being moved by water. When a June sucker fry is touching them, the fry are safe and cannot be eaten. Adult June suckers are not safe when touching a plant. If touched by a carp, the carp escorts the aquatic vegetation to the dead zone.
    C. **Fry** - These students come into the game through the Provo River and swim to the Lake. In the game, they represent the eggs that will hatch. They cannot leave the river until an adult June sucker has placed eggs on the gravel bed. They enter Utah Lake after they have completed four to ten sit-ups (this represents the 4-10 days it takes for the fry to hatch). Next, they swim to the Lake area. They hide from the predatory fish by touching the Aquatic Vegetation. They are safe from the carp. The student must clap their side ten times and move to another plant (representing fry do not just sit as they are constantly in search of food and predator avoidance).

D. **Predatory fish** - This student hunts and finds a June Sucker adult or fry. They must tag the fish and then bring the fish to the dead zone area where the eaten fish are reassigned roles and the predator immediately re-enters the Lake. Utah Lake has several predatory fish including walleye, catfish, carp, and white bass.
E. **Carp** - This student eats aquatic vegetation by tagging them, and walking the aquatic vegetation to the dead zone (one at a time).

Game Setup: - Rounds

ROUND ONE - Balanced Lake

1. These numbers represent the amount of students assigned to each role.
   A. **Carp** - zero (fourth round only-one carp will be introduced in round four).
   B. **Fry -** (baby June suckers) – (10%) students in the Provo River area waiting for the spawning season. Half should have a star on the card.
   C. **Aquatic Vegetation** - (50%) of the students are placed in the Lake area.
   D. **Predator** - 1 student in the Lake area.
   E. **June suckers** - All remaining students. Half should have a star on the card.
2. Each time the whistle blows, students must stop, freeze, and listen to instructions.
3. Announce to begin activity. Allow a couple of minutes to pass while the predator eats a few fish and brings them to the new assignment area.
4. Blow whistle & freeze. Announce the FIRST JUNE SPAWNING SEASON. The Predator can still hunt. Adult June sucker fish head to spawning grounds and place an egg from the bucket to the river, fry fish enter the game at the spawning ground after the grown up fish make it there.
5. While the game is in progress, students who have been eaten by carp or other predators will go to the dead zone and give their card to the teacher. The teacher hands out fry cards to those students. They reenter the game as a fry.
6. Blow whistle for the SECOND SPAWNING SEASON.
7. Allow a few moments of play, then stop the game and discuss.

VARIATIONS OF PLAY

(Additional rounds help teach how each change affected the June sucker fish. Played the same as round one, with the following additions.)

JUNE SUCKER

ROUND TWO - Irrigation

1. Play continues as normal except when you get to the spawning season, blow the whistle, and stop play.
2. Some players have a star on their June sucker or fry card. If a player has a star and is in the Provo River, they were trapped in a field or irrigation canal and died.
3. Teacher may instead choose those with no star.

ROUND THREE - Unregulated Fishing

1. Play continues as normal except when you get to the spawning season, blow the whistle, and stop play.
2. All players with a star on the card (teacher may choose no star to keep the selection random), and are in the river or Lake, were caught by fishing nets and used for food by the early settlers of Utah.
3. These fish will need to return to the dead zone.

ROUND FOUR - Introduction of Carp

1. Play continues as ROUND ONE, except add one carp to the play.
2. Additional rounds can be played by varying the amount of carp to demonstrate the affect carp have on June sucker population.
3. The teacher may now hand out additional cards for carp or predatory fish to those in the dead zone.
4. This round stops when there is only one June sucker remaining.

DISCUSSION

1. Return to class and discuss the June sucker and Utah Lake.
    A. Ask students to think back on the activity.
    B. What things can be done to save the June sucker from becoming extinct?
2. Include the following points in the discussion.

Discussion Points:

Only a few problems were addressed during this activity that has actually caused the June sucker to become endangered. There are other reasons that will be discussed in the module of "The Business of Abusing a Beautiful Lake" activity.

- The problem – Dams and fishing nets prevent fish from spawning.
    - Solution – Laws passed to prevent fishing nets from blocking the Provo River during spawning season and fishways by dams so fish can move past the dam to spawn.

- The problem – Irrigation water, and thus fish in the water, is taken out of streams. When irrigation ends, the fish are trapped in dry channels. They are prevented from returning to the Lake and die.
    - Solution – screen the ditches so water can get through to the farms, but fish cannot.
- The problem – Introduction of bottom-feeding carp uprooted the aquatic vegetation. This contributed to the murky (turbid) water as well as eliminated places for young June sucker fish to hide from predators.
    - Solution – remove 75% of the carp population to allow plants to become reestablished, one of the goals of the June Sucker Recovery Implementation Program.
- The problem – June sucker fish are fewer and fewer. The young are unable to get to Utah Lake and when they can, do not survive in the Lake.
    - Solution – Rear more June sucker in a fish hatchery such as the ones in Springville and Logan. After the suckers grow to 8", they are released into the Lake to help build the population.
    - Solution – Restore stream habitat so fish can successfully spawn and create habitat for protecting the fry.
    - Solution – Ensure flows of streams and rivers are adequate to allow the fish to return to the Lake.

Following the discussion, show the video about carp removal efforts (*YouTube Link*) (*UEN Link*).

Writing Assignment

1. Teach phrases that link opinions and reasons, such as: for example, for instance, in order to, in addition.
2. Review the previous activity and discussion and during the review, place emphasis on the Lake before and after the carp were introduced.
3. Outline a paper with an introduction, body paragraphs, and conclusion about the population of June sucker.
4. Have students write a paper based on their knowledge and experience on the demise of the June sucker population.

ASSESSMENT:

Observe the students' participation in the activity and assess their written report.

EXTENSIONS:

Have students create their own "round" using Utah Lake's history.

JUNE SUCKER

ADDITIONAL REFERENCES:

None.

INTERNET RESOURCES (see pgs. 30-31):

- Additional information about June sucker
- Additional information about Common Carp

JUNE SUCKER ACTIVITY CARDS

June Sucker
Adult

June Sucker
Adult

June Sucker
Adult

June Sucker
Adult

JUNE SUCKER ACTIVITY CARDS

June Sucker

Fry

June Sucker

Fry

June Sucker

Fry

June Sucker

Fry

JUNE SUCKER ACTIVITY CARDS

Aquatic Vegetation

Aquatic Vegetation

Aquatic Vegetation

Aquatic Vegetation

JUNE SUCKER ACTIVITY CARDS

Carp

Carp

Predatory Fish

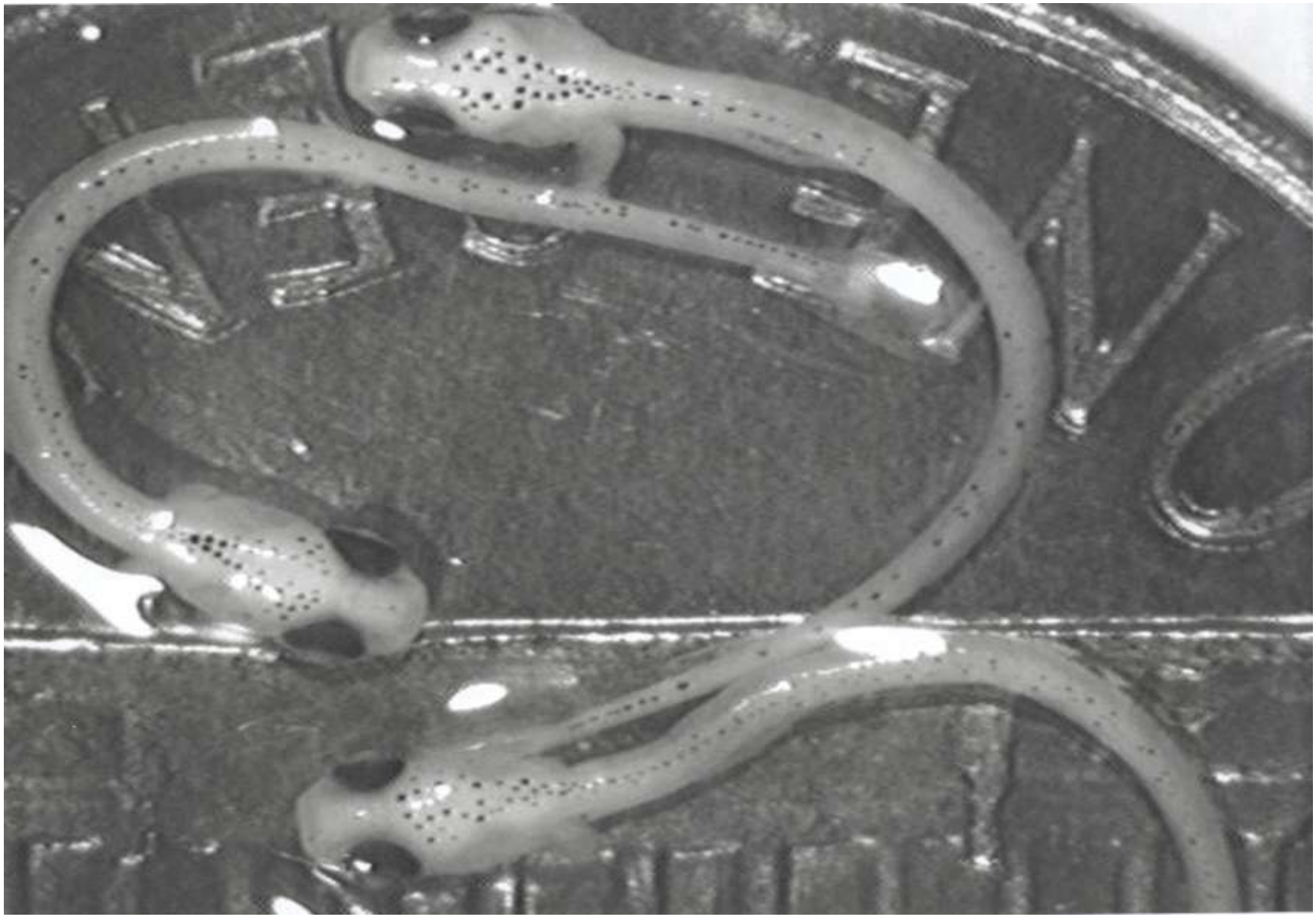
Predatory Fish

JUNE SUCKER ACTIVITY CARDS

JUNE SUCKER PICTURES

Experimental cages that exclude carp allow scientists to examine the potential to restore aquatic vegetation. (Photo by Chris Keleher)

JUNE SUCKER PICTURES



Tiny June sucker (as seen here on a penny) are usually less than three weeks old when they drift down river from spawning beds, and are easy prey for nonnative fish (Photo by Craig Ellsworth).

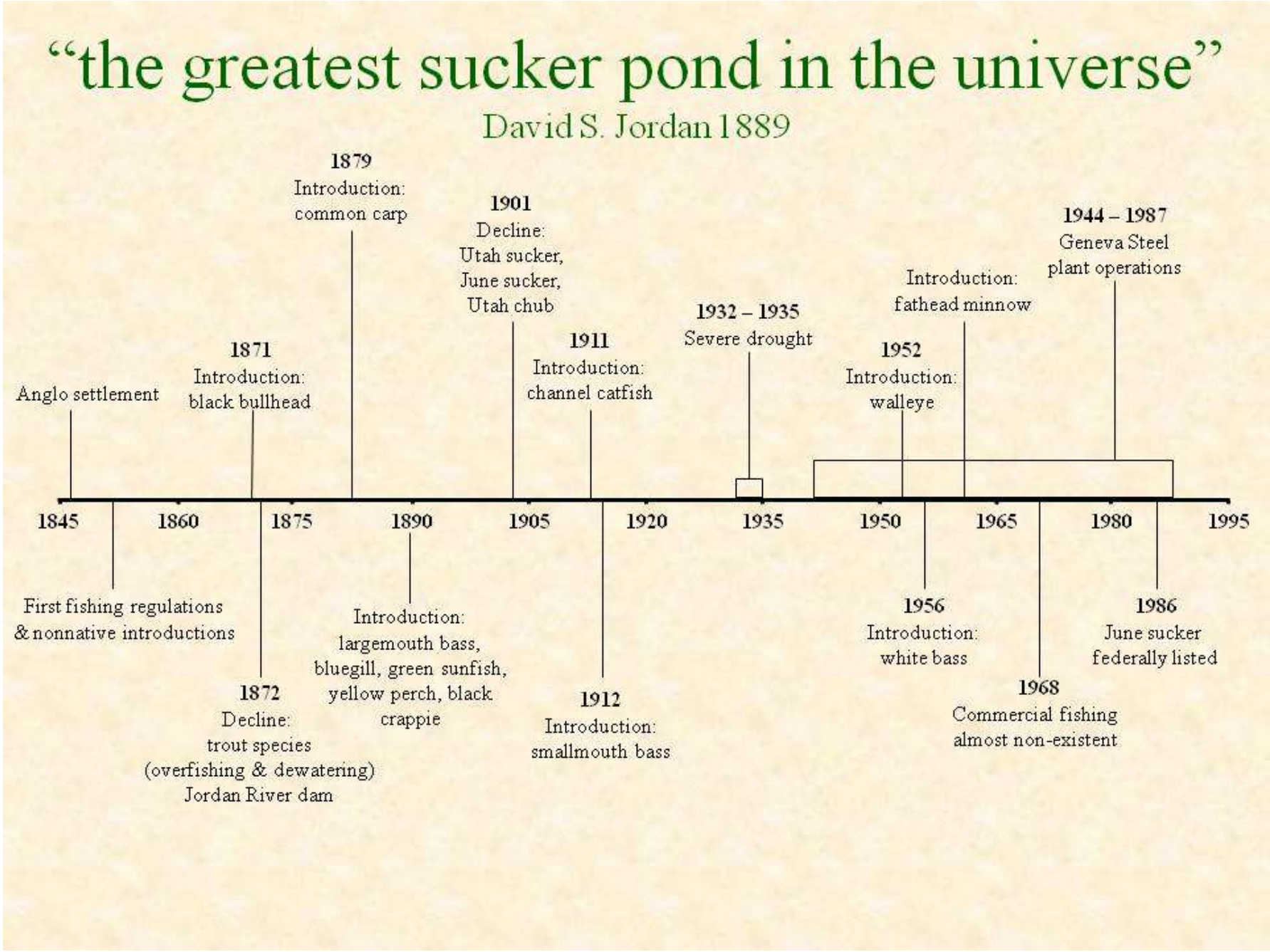
JUNE SUCKER PICTURES

A carp

JUNE SUCKER PICTURES

A June sucker

GREATEST JUNE SUCKER POND



Utah Lake Native Fishes


1


2

3 Extinct


4


5


6


7


8


9


10


11


12


13

1 June Sucker
2 Utah Sucker
3 Utah Lake Sculpin
4 Bonneville Cutthroat Trout
5 Least Chub
6 Bonneville Redside Shiner
7 Mottled Sculpin
8 Leatherside Chub
9 Utah Chub
10 Speckled Dace
11 Long Nosed Dace
12 Mountain Whitefish
13 Mountain Sucker

Courtesy of Joe Tomelleri

Internet Resource of June Sucker

UTAH'S WILD NOTEBOOK

Utah Lake's endangered fish and you. What's the connection?

June sucker

By Diana Vos
Project WILD Coordinator

A LOOK BACK in time:

The story of Utah Lake and its June suckers begins about 15,000 years ago. That's when Lake Bonneville, which covered nearly half of what is now the state of Utah, began to drain and dry up.

When the lake disappeared about 10,000 years ago, it left behind several large lakes. One of these lakes became known as Utah Lake, the largest freshwater lake west of the Mississippi River.

One of the fish that swam in Lake Bonneville was the June sucker. As the lake retreated, the June sucker and 12 other fish species, including the Bonneville cutthroat trout and the Utah sucker, became isolated within Utah Lake. These native fish thrived in their new environment, and millions of June suckers filled the shallow lake.

The situation is much different today, however. Fewer than 1,000 adult June suckers live in Utah Lake, and the fish is now federally listed as an endangered species.

What changed 150 years ago?

This is where the ancestors of many of us come into the story. For the state's early residents—Native Americans, Spanish explorers in the 1700s, fur trappers and traders in the early 1800s, the Mormon pioneers who arrived in 1847 and the stream of settlers who followed—Utah Lake was a treasured resource that provided needed water and food. Its fish played a significant role in the area's settlement and literally fostered the growth of civilization in Utah.

In 1848, an early frost killed most of the Mormon pioneer's crops. Swarms of grasshoppers destroyed what was left. The residents in the valley were faced with starvation. To find food, the pioneers organized fishing companies and turned to Utah Lake.

Using large nets (seines) made of cotton, flax or yarn, the pioneers caught thousands of pounds of cutthroat trout, June suckers, Utah suckers and other fish. Driven by hunger, more people fished even more frequently over time. Records from 1855 hunger relief efforts show that 2,301 pounds of fish were dispensed through Salt Lake City's public works department. During the summer of 1856, fishing companies organized by Mormon wards caught tons of fish, including one ward that reported catching about eight tons.

In those early days, the number of fish in Utah Lake seemed infinite. The

Invasive plant species are causing a change in Utah Lake's habitat.

Internet Resource of June Sucker

Found only in Utah Lake and once numbering in the millions, the June sucker is now threated with extinction.

abundance of fish is reflected in an 1854 recollection of George Washington Bean, one of Provo's first settlers, "So great was the number of suckers and mullets passing continuously upstream that often the river would be full from bank to bank, as thick as they could swim for hours and sometimes days together."

Because the number of fish in the lake seemed to be infinite, little thought was given to their long-term survival. People seined night and day and even placed stationary gill nets across the mouth of the Provo River where the fish were attempting to spawn. Utah Lake's fish became a valuable commodity, and laws that regulated fishing methods and the number of fish that could be taken from the lake were often disregarded.

A variety of other events also threatened the health of Utah Lake's fish. During the 1850s, numerous canals and diversion dams were built for irrigation. These dams presented barriers that did not allow the fish to move up the rivers and streams to spawn. Unscreened ditches also carried thousands of adult and newly hatched fish onto farmers' fields, instead of back to the lake. Rivers and streams that led to and from the lake were straightened, channeled and dredged to divert water, expedite the delivery of water and provide flood control. These changes caused water levels to fluctuate and damaged habitat.

Fish populations also suffered greatly in the1880s when a portion of the Provo River was de-watered for irrigation, killing close to one million spawning suckers. In the 1880s, sugar beet processing waste and sawdust from sawmills was also dumped into streams that feed the lake. Sewage dumping followed in the 1890s.

All of these factors led to a serious decline in Utah Lake's native fish populations. But instead of instituting regulations to protect the native fish, non-native fish were introduced into Utah Lake. It was hoped that these non-native fish would allow the lake to continue to provide a food source and a commercial fishery.

Carp and the June sucker:

The decision to introduce non-native fish, especially carp, resulted in a series of events that changed Utah Lake forever.

Introduced into Utah Lake in 1881, carp now comprise more than 90 percent of the fish biomass in the lake. Carp are a hardy fish that are very popular in other parts of the world, but their aggressive foraging habits have destroyed Utah Lake's aquatic vegetation. The loss of vegetation makes it easier for waves to stir up sediments, which causes the water in the lake to be more turbid, or muddy, in appearance. High levels of nutrients from runoff and waste water treatment plants also fuel algae growth. This algae growth can deplete oxygen levels and kill fish.

The lack of aquatic vegetation leaves young June suckers without cover in which to hide. This lack of cover makes them vulnerable to predation by white bass and walleye, two of the more than 20 non-native fish species that have been introduced to the lake.

What's special about June suckers?

Of the 13 native fish that once lived in Utah Lake, the June sucker is one of only two fish that are still found there.

The June sucker is a member of the

Internet Resource of June Sucker

lakesucker family, Castostomidae. Their peak spawning time occurs during the month of June, and that's how the June sucker got its name. A large steel-gray fish with a white belly, June suckers grow to 17 to 24 inches long and weigh about five pounds. Their head is wide and rounded, with a distinct hump on their snout.

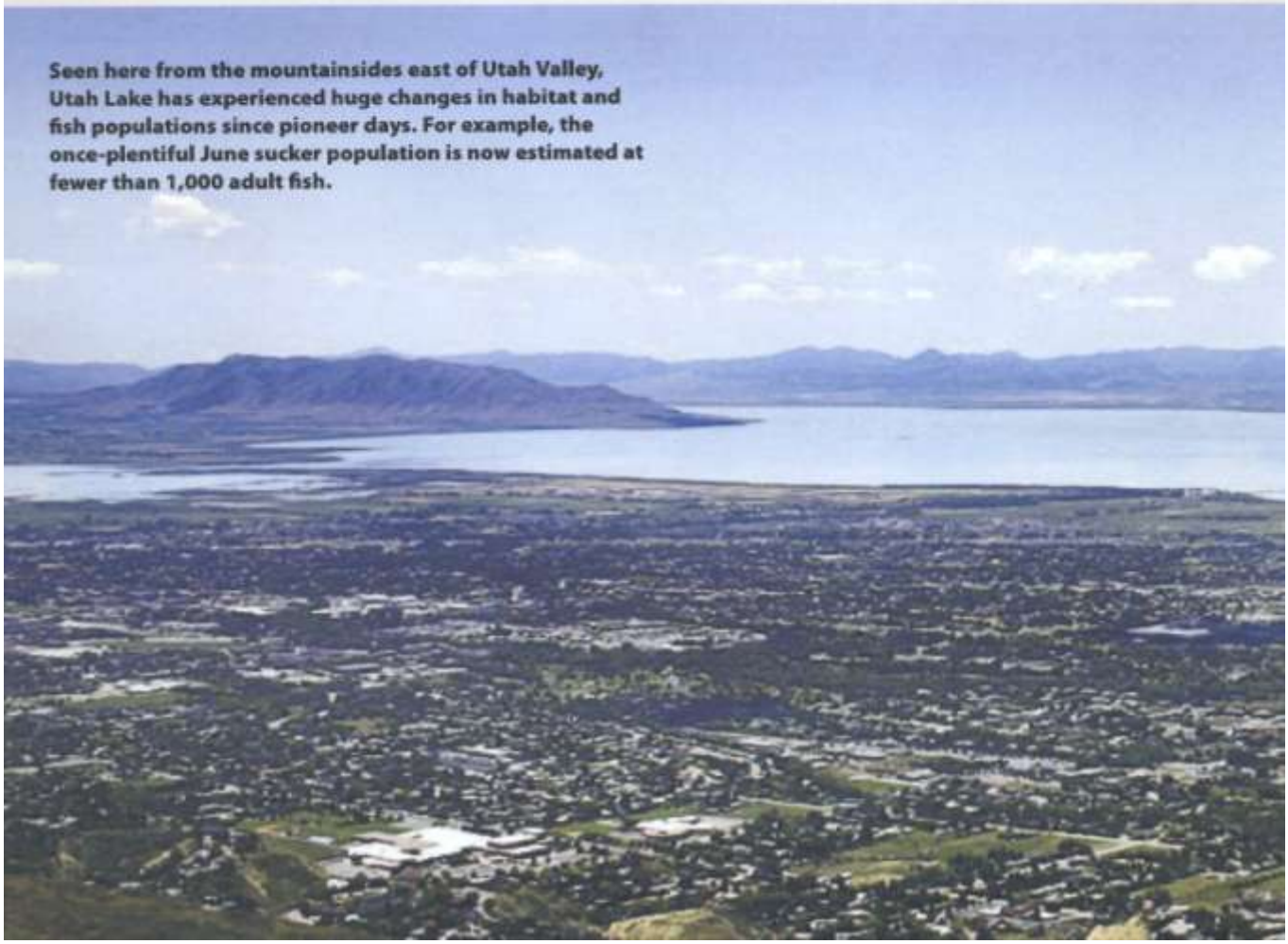
Pelagic planktivores, June suckers feed on single-celled zooplankton in the middle water column. They swim in groups and feed by opening their mouths, filtering out plankton with special structures called gill rakers.

June suckers are endemic to Utah Lake, which means they're found naturally only in Utah Lake and nowhere else in the world. A few refuge populations have been established elsewhere as part of a recovery program that was developed after the U.S. Fish and Wildlife Service listed the species as endangered on April 30, 1986.

Historically, June suckers were very abundant in Utah Lake. David S. Jordan, visiting the lake in 1889, reported millions of suckers in the lake and proclaimed Utah Lake, "...the greatest sucker pond in the universe." Commercial anglers reported large annual catches of suckers through the early 1900s. Between 1901 and 1905, an average of about 178 tons of suckers were harvested each year. In the early 1950s, the catch of suckers was still relatively high, with reports of as many as 1,250 suckers caught in a single day of commercial seining.

By the late 1970s, however, June sucker numbers had plummeted. The decline corresponds closely with the introduction of white bass and walleye to the lake in the mid-1950s. When they were listed as endangered in 1986, the wild June sucker population was thought to be less than 1,000 fish. A 1998 report indicated the wild adult spawning population was closer to 300 individuals.

The life cycle of the June sucker begins in the lower Provo River. Each spring, between April and June, adult June suckers enter the river from Utah Lake to spawn. In most years, the area where the fish can spawn is limited to the lower three miles of the river because an irrigation diversion doesn't allow the fish to pass farther upstream. In very wet years, they can migrate far-



Seen here from the mountainsides east of Utah Valley, Utah Lake has experienced huge changes in habitat and fish populations since pioneer days. For example, the once-plentiful June sucker population is now estimated at fewer than 1,000 adult fish.

Internet Resource of June Sucker

ther and can access an additional 1.9 miles of spawning habitat before they reach another irrigation diversion that's impossible for them to pass.

Soon after spawning, the adult suckers return to Utah Lake.

Depending on the temperature of the water, June sucker eggs hatch in four to 10 days. After they hatch, larvae emerge from the gravel bed where the eggs were laid and begin drifting downstream. Unfortunately, little is known about the early years of a June sucker's life because researchers haven't been able to capture any. It's believed the drifting larvae are either eaten by non-native fish in the Provo River, or they die because the altered habitat in the lake does not provide the food or temperatures the fish need to survive.

June suckers raised by the Division of Wildlife Resources in a hatchery are placed into Utah Lake when they're about 8 inches long, which is large enough to avoid predation. These fish have survived and have matured to the point that they've been able to spawn in the wild themselves. The ability of hatchery fish to survive, grow and reach sexual maturity shows that the bottleneck that's limiting the natural recruitment of June suckers is in the early stages of a fish's life.

June suckers reach reproductive maturity at age five or six and live to be about 40 years old.

To date, more than 8,500 juvenile June suckers have been released into Utah Lake. The total number that have survived to adulthood is not known,

Internet Resource of June Sucker

however. Total recovery of the fish will only be achieved after they're able to complete their entire life cycle in their native habitat.

Utah Lake and the June sucker:

Despite the significant role June suckers have played in Utah's history, a recent survey found that more than 83 percent of Utahns have never heard of them. And many of the people who have heard of the June sucker see the federally protected fish as a nuisance.

What many people don't realize is that recreating a healthy habitat for June suckers will benefit the entire Utah Lake ecosystem, the people who live around the lake and the area's economy. June suckers are considered an indicator species—a species whose health reflects the health of the ecosystem of which it is a part.

In April 2002, the June Sucker Recovery Implementation Program (JSRIP) was formed. The JSRIP has two intertwined goals: recover the June sucker so it no longer requires protection under the Endangered Species Act while allowing people to continue to develop and use water resources along the Wasatch Front.

The JSRIP is a broad coalition of federal, state and local groups, including the U.S. Fish and Wildlife Service, the Utah Department of Natural Resources, water resource agencies, and environmental and outdoor groups.

To help people understand more about June suckers and Utah Lake, the JSRIP has produced a book titled *Utah Lake: Legacy* that chronicles the history of the June sucker and its long-neglected home. An exceptionally well-done documentary based on the book aired on KBYU Channel 11 in spring 2006. A DVD of the program is available by request (see resources below).

Changing public attitudes about Utah Lake is an important step to cleaning up the lake. Other steps include ensuring good water quality by limiting the amount of pollutants that enter the lake; reducing the lake's carp population; reestablishing historic river and stream flows; and restoring spawning and nursery habitat.

Human use of Utah Lake has often been at odds with the June sucker .

Cleaning up Utah Lake and recovering the June sucker is a challenging, long-term project, and much of its success will depend on public support. This restored lake will be a jewel that future generations can enjoy, just like our ancestors did.

Resources:

- *Utah Lake: Legacy* by D. Robert Carter, Vanguard Media Group, 2003.(Check your local or school library, or order for $15)
- *Free Utah Lake: Legacy* DVD and Educator Study Guide. Request by e-mailing *BrendaLandureth@utah.gov.*
- June Sucker Recovery Implementation Program Web site: *www.JuneSuckerRecovery.org*
- June Sucker Recovery Implementation Program—Program Director's Office. (801) 538-5273.

More information: Getting WILD! Utah's WILD Notebook is produced by Utah's Project WILD program. WILD workshops, offered by the Utah Division of Wildlife Resources, provide teachers and other educators with opportunities for professional development and a wealth of wildlife education activities and materials for helping students learn about wildlife and its conservation. For a current listing of Project WILD educator workshops, visit the Project WILD Web site at *www.wildlife.utah.gov/projectwild* or send an e-mail to *DianaVos@utah.gov.*

Internet Resource of June Sucker

STATE OF UTAH
NATURAL RESOURCES
Division of Wildlife Resources

Common Name
JUNE SUCKER

Scientific Name
CHASMISTES LIORUS

View Utah Distribution Map

Photo by Unknown Photographer
Photo Courtesy of Utah Division of Wildlife Resources

The June sucker, *Chasmistes liorus*, is very narrowly distributed, occurring naturally in Utah Lake and the Provo River, and nowhere else in the world. Although the species was once abundant in Utah Lake, it is now extremely rare. Major causes of the June sucker's decline include flow alterations, pollution, and drought, hybridization with other sucker species, and competition with and predation from exotic fish species. The June sucker is Federally listed as endangered, and efforts to help recover the June sucker population are on-going.

Interestingly, although June suckers are members of the sucker family, they are not bottom feeders. The jaw structure of the June sucker allows the species to feed on zooplankton in the middle of the water column.

June sucker adults leave Utah Lake and swim up the Provo River to spawn in June of each year. Spawning occurs in shallow riffles over gravel or rock substrate. Fertilized eggs sink to the stream bottom, where they hatch in about four days. No parental care is given to eggs or young.

Sources:

- Biotics Database. 2005. Utah Division of Wildlife Resources, NatureServe, and the network of Natural Heritage Programs and Conservation Data Centers.
- Sigler, W. F. and J. W. Sigler. 1996. Fishes of Utah[:] a natural history. University of Utah Press. Salt Lake City. 375 pp.

Internet Resource of Carp

STATE OF UTAH
NATURAL RESOURCES
Division of Wildlife Resources

Common Name
COMMON CARP

Scientific Name
CYPRINUS CARPIO

View Utah Distribution Map

Photo by Unknown Photographer
Photo Courtesy of Utah Division of Wildlife Resources

The common carp, *Cyprinus carpio*, is native to Eurasia, but has been widely introduced in the United States, including in water bodies throughout Utah. Carp cause problems in many areas of Utah, where they compete with native fish species and/or destroy habitat used by native fishes and waterfowl.

Common carp are opportunistic feeders, eating mostly insects and other invertebrates. It is not unusual, however, for carp to consume plant matter as well. Young carp eat zooplankton and phytoplankton. Carp spawn during the spring and summer, usually in shallow water. Large numbers of eggs (large females can produce well over 1 million eggs) are released into the water and hatch in one to two weeks. Carp often inhabit slow-moving areas, and they are very tolerant of poor water conditions.

Sources:

- Biotics Database. 2005. Utah Division of Wildlife Resources, NatureServe, and the network of Natural Heritage Programs and Conservation Data Centers.
- Sigler, W. F. and J. W. Sigler. 1996. Fishes of Utah[:] a natural history. University of Utah Press. Salt Lake City. 375 pp.