SALTON SEA Restoration Project

SEA NOTES

A Quarterly Newsletter of the Salton Sea Restoration Project

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Salton Sea Draft Goals and Objectives Developed by the SSA, Burec, Public

The Salton Sea Authority and the Bureau of Reclamation, working with stakeholders and members of the public, developed five goals to help guide the project. To develop alternatives that address these goals, and eventually a long-term monitoring program, it was necessary to better define each goal.

Goals were divided into sets of objectives, which in many cases overlap and result in mutual benefits. The five goals and their objectives (indicated with a bullet) are listed below:

(Photo: Milt Friend, Salton Sea Science Subcommittee)

Five distinct goals and their objectives have been developed for the Salton Sea, based in part on input from the public.

1 Maintain the Sea as a repository for agricultural drainage:

- Slightly lower and maintain water surface elevation; and
- Protect agricultural resources from potential windblown Sea sediments and associated potential air quality effects.

2 Provide a safe, productive environment at the Sea for resident and migratory birds and endangered species:

- Enhance freshwater marsh habitat;
- Maintain open-water habitat;
- Provide and protect islands for roosting and nesting;
- Maintain foraging habitat;
- Protect shoreline pools and creeks; and
- Stabilize water surface elevation.

3 Restore recreational uses at the Sea:

- Stabilize water surface elevation;
- Maintain salinity at 40 parts per thousand or lower;
- Improve aesthetics by minimizing

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Narrowing Down the Alternatives

The Salton Sea Authority and Bureau of Reclamation have been studying ways to accomplish the goals of the Salton Sea Restoration Project in the areas of agriculture, wildlife, fisheries, recreation, and economic development. The most critical issues remaining to be addressed are stabilizing water elevation and improving water quality, the most obvious threat to which is the Sea's increasing salinity level. Concern over the potential for the Sea's fishery industry to collapse means emphasizing proven technology—there is not enough time to test new technology to solve the Sea's problems.

Alternatives Screening—Each of the dozens of proposed alternatives was evaluated based on twenty criteria developed and refined through a series of public workshops. The top five criteria included agricultural interests, wildlife, elevation control, disposal issues, and salinity and other water quality issues. Two alternatives that scored well included pumping Salton Sea water to the Gulf of California and importing water through Yuma, Arizona, and building a south pond system. While these basic alternatives further the goals of the project, other components will be needed to attain restoration

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The State of the Sea

The often maligned Salton Sea is in fact an amazing biological system that provides habitats for hundreds of species of fish and wildlife.

Nearly 400 bird species have been observed at the Salton Sea, along with 41 mammal species, 18 reptile species, four amphibian species, and 16 fish species. The Sea also provides habitat to support at least four endangered or threatened bird species—brown pelican, peregrine falcon, bald eagle, and Yuma clapper rail. In fact, about a third of the world's Yuma clapper rail population depends on adjacent wetland habitat created by the Sea's freshwater drains. The Sea also provides winter or migration habitat for 125,000 waterfowl, two million grebes, and well over 100,000 shorebirds. The Sea is increasingly used by brown pelicans, with substantial numbers appearing during certain periods of the year.

The freshwater agricultural drains and ponds around the Sea support largemouth bass, catfish, tilapia and carp, the mosquitofish and its cousin, the sailfin mollie, the longjaw mudsucker and red shiner (two species used as baitfish), and the endangered desert pupfish. These species are important forage for larger fish, predatory birds, and other wildlife. The saltwater environment of the Sea is home to tilapia, longjaw mudsucker, sargo (a bass-like fish), threadfin shad (a type of herring), and two croaker species, the orange-mouth corvina and bairdiella.

An abundance of invertebrates in the Salton Sea's freshwater and marine ecosystems is largely responsible for supporting the vast numbers of fish and wildlife species. Among the insects and aquatic invertebrates, the most notable species are the waterboatman, the pileworm, and the amphipod, a small crustacean. The waterboatman and amphipod are found in both freshwater and saltwater/freshwater environments and are an important food source for many fish and bird species. The pileworm provides an unusual and critical link in the food chain. In most lake environments the food chain from primary food source to game fish ordinarily follows four steps; but in the Salton Sea, the food chain has five steps—plant plankton to animal plankton to bacteria and pileworm to bairdiella and tilapia to corvina. The Salton Sea does not contain a crustacean that feeds on plant plankton and passes food energy on to larger game fish; rather, in the absence of a natural predator, crustaceans die and sink to the bottom where they are ingested by pileworms. In this role, pileworms provide the link between animal plankton and the bairdiella and tilapia, which become the important food sources for the corvina. SN

From time to time, since shortly after the Sea was formed, fish and bird species in the Salton Sea have died off in great numbers.

The Sea's fish are under stress from the cumulative effects of elevated salinity, dissolved nutrients, and dramatic water quality fluctuations that can be lethal to them. Additionally, when fish and birds become stressed, diseases can gain a foothold, causing massive die-offs. While these events have been well documented, the links between water quality and disease for the Sea's birds and fish are poorly understood.

The tilapia, an exotic fish species from Africa, is the most abundant fish in the Salton Sea. Millions of dead tilapia frequently wash up along the shoreline, causing a sharp decline in recreational fishing. Perhaps tilapia are dying due to regular infusions of water that is low in oxygen and high in ammonia. Diagnostic studies have shown that tilapia are infected with a variety of parasites and bacteria, and preliminary experimental studies have shown tilapia to be susceptible to botulism toxin. But exactly how these factors relate to the death of millions of fish is unknown.

High levels of salinity are known to lower fish reproduction rates. Late egg and early larval development of the corvina, bairdiella, and sargo dropped considerably as salinity increased from 1987 to 1989. And, although the sargo spawned during periods of high salinity, all its larvae died.

Just as food energy transfers through the food chain, disease can pass from one species to another. An unusual finding at the Sea has been Type C botulism in fish-eating birds. Over 10,000 pelicans and 14,000 herons, egrets, and gulls died from Type C botulism in 1996. This has not been reported elsewhere, and the suspected association among tilapia, Type C botulism, and fish-eating birds is under investigation. In addition to botulism, Newcastle disease, avian cholera, salmonellosis, and possibly toxins produced by algae have accounted for the deaths of thousands of birds.

Clearly there are far more questions than answers regarding fish and wildlife health at the Salton Sea. To understand the effects of environmental quality and the occurrence of disease, the Salton Sea Authority has funded several studies that are underway. (See insert for more information on the Salton Sea Science Subcommittee efforts.) SN

(Photo: Milt Friend, Salton Sea Science Subcommittee)

1905: Salton Sea is formed → *1930s: Sea designated as agricultural runoff collector* → *1940s: Game fish species introduced* → *1950s: Salton Sea resorts are a big attraction* → *1960s/1970s: Warnings on declining water quality; tourism declines* → *1993: Salton Sea Authority is formed*

SEA SCIENCE

A Good Friend at the Sea

(Photo: Patti Kroen, Tetra Tech)

Dr. Milt Friend is the Executive Director of the Salton Sea Science Subcommittee.

The Salton Sea Restoration Project is indeed fortunate to have a friend in high places—Dr. Milton Friend, in fact—who is the Executive Director of the Science Subcommittee. Milt was appointed by consensus of the Research Management Committee and is the primary spokesman for science issues associated with the Salton Sea.

Prior to coming to the Sea, Milt developed the National Wildlife Health Center from concept to an internationally recognized program and was the director for its first 23 years. After receiving a BS degree at the University of Maine and an MS from the University of Massachusetts, Milt went on to receive his PhD in Veterinary Science, Wildlife Ecology/Epidemiology, from the University of Wisconsin, where he remains an adjunct full professor in the Department of Animal Health and Biomedical Sciences.

In addition to his numerous duties with the Science Subcommittee, Milt logs countless hours as an invited speaker at major national and international scientific meetings and forums.

Did we mention that Milt is also an accomplished photographer? SS

"Science for the Salton Sea" Symposium Held in Riverside

The Salton Sea Science Subcommittee, the US Geological Survey, and the University of California jointly sponsored a one-day symposium on January 5, 1999, in Riverside, California. Addressing the symposium were invited speakers with expertise in bird ecology, fish populations, fish and wildlife disease, hydrology, geology, contaminants, and aquatic ecosystems.

This was the first of several meetings to be sponsored by the Salton Sea Science Subcommittee in 1999, with subsequent meetings expected to provide forums for more specialized discussions on long-term needs of the Sea's unique ecosystem. SS

What is the Science Subcommittee?

The Science Subcommittee was established as an independent and objective advisory board to provide scientific evaluations and recommendations to support the NEPA/CEQA effort. The subcommittee's recommendations will be the scientific basis for choosing among alternatives to mitigate the Salton Sea ecosystem and to restore recreational, wildlife, and economic values. The subcommittee also determines information gaps, identifies science and information needs, and recommends projects to fund. The subcommittee seeks outside expertise, if necessary, when evaluating specific scientific issues and also serves as an information conduit, preparing evaluations, technical briefings, presentations, and reports. Many of the subcommittee's activities are carried out by subgroups.

The Science Subcommittee consists of one member from each of these organizations:

US Fish and Wildlife Service
US Bureau of Land Management
US Bureau of Reclamation
US Geological Survey
US Environmental Protection Agency
US Army Corps of Engineers
Los Alamos National Laboratory
Torres Martinez Desert Cahuilla Indians
California Department of Fish and Game
California Environmental Protection Agency
California Department of Water Resources
Riverside County
Imperial County
Salton Sea Authority
Coachella Valley Water District
Imperial Irrigation District
University of California, Riverside
San Diego State University
University of Redlands
Imperial Valley College SS

Salton Sea Authority Funds Scientific Studies at the Sea

A coordinated research effort is needed to complete the NEPA/CEQA process and to provide a sound scientific basis for addressing environmental issues at the Sea. The Salton Sea Science Subcommittee is coordinating the scientific efforts and studies funded by the Salton Sea Authority through the Research Management Committee (RMC). The RMC consists of one high-level representative each from the Salton Sea Authority, the state of California, the US Department of the Interior, the California Water Resources Center, and the Torres Martinez Desert Cahuilla Indian Tribe. The Science Subcommittee recommend studies to the RMC that should be considered for funding.

Last year, the Science Subcommittee requested proposals to provide scientific information on the Sea's condition. The subcommittee evaluated the proposals received and recommended that the Salton Sea Authority fund the studies listed below, which are underway:

Salton Sea Fishery—Barry Costa-Pierce, a world-renowned expert on tilapia from the University of Southern Mississippi Institute of Marine Science, is studying the Salton Sea fishery. His group is sampling the Sea's fish population at stations in the middle of the Sea, at the mouths of the Alamo and New rivers, and along the shoreline. A preliminary sampling in January 1999 found substantial populations of orange-mouth corvina, gulf croaker, sargo, and tilapia.

(Photo: Doyle Stephens, USGS)

As part of a limnological study at the Sea, a researcher collects plankton samples with a special net.

San Diego State University Biological Limnology—This study is exploring the Sea's biological components and their interactions and complements the Bureau of Reclamation's chemical and physical study of the Sea. This investigations are monitoring variation in certain characteristics of the sea, such as temperature and salinity, at five fixed stations. The study builds on SDSU's independent investigations at the Sea, done under the direction of Dr. Stuart Hurlbert, Director of the Center of Inland Waters.

Scripps Institution of Oceanography Algal Toxins—Dr. John Faulkner of Scripps is investigating whether or not toxins from algae are in water and in benthic invertebrates at the Salton Sea. Samples for algal toxins are being collected and analyzed. Preliminary results have disclosed the presence of toxins, which are being further analyzed and evaluated for their potential toxicity to fish and birds.

(Photo: Richard Vogl, Levine Fricke)

A researcher prepares to lower a device to collect a sediment sample from the floor of the Salton Sea.

USGS National Wildlife Health Center Survey of Selected Microbial Pathogens—Drs. Tonie Rocke and Mark Wolcott, along with staff in Madison, Wisconsin, are looking for avian botulism toxin production within the Sea, along with some common human and wildlife pathogens, including salmonella. Samples have been taken from both water and sediment, and the analysis includes both routine microbiological culture and advanced molecular biology techniques.

US Bureau of Reclamation Chemical and Physical Limnology of the Sea—Scientists from the Ecological Research and Investigations Group are investigating the chemical and physical conditions of the Sea by gathering information on such things as general physical conditions, water quality parameters, and nutrients. Samples are being taken from the Sea itself and from sampling points slightly upstream of the outflows of the New, Alamo, and Whitewater rivers, the Sea's three main tributaries.

Levine-Fricke-Recon Sediment Study—This work recently has been completed. Samples taken from throughout the Sea were analyzed for metals, volatile organic compounds, semivolatile organic compounds, and agricultural chemicals and their residues. The distribution of these compounds within the Sea has been mapped, along with such characteristics as the distribution of silt, sand, and clay, based on sediment size. A striking finding has been an absence of detectable levels of pesticides in any of the sediment samples evaluated. Also, the elevated concentrations of metals and selenium have been primarily localized in limited deep water areas of the Sea.

Point Reyes Bird Observatory Bird Study at the Salton Sea—This study is documenting population sizes, seasonal abundance, and habitat associations for the key groups of birds in the Salton Sea area. A suite of surveys, each tailored to a group of bird species, is documenting such groups as shorebirds, waterfowl, and passerines. Studies are focusing on species that are listed as threatened or endangered or of management concern by the state and federal governments, as well as species that have been heavily affected by recent die-offs. The importance of different habitats for birds is being measured by evaluating species richness, diversity, and abundance.

Additionally, the University of Redlands, through a grant from the US EPA, is mapping the Sea's vegetation. Wetlands along the north, west, and east shores have been mapped using global positioning systems and one-meter resolution digital photographs. The New and Alamo river drainages also have been mapped to the US-Mexico border. The remaining wetland areas within the National Wildlife Refuge are being mapped. SS

Salton Sea Authority and Burec narrow down alternatives

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goals; the lead agencies, with support from the Science Subcommittee, are developing these other components (see enhancement sidebar, below.) The current engineering effort focuses on refining designs, mixing and matching components, and providing decision-makers with more information about costs, locations, and environmental consequences.

(Photo: Milt Friend, Salton Sea Science Subcommittee)

The most critical issues remaining to be addressed are stabilizing water elevation and addressing such water quality issues as the Sea's increasing salinity level.

No Action—Project alternatives must be evaluated against a scenario in which nothing is done to alter existing conditions. The No Action Alternative, as it is called, describes probable future conditions, based on the potential for current conditions to continue, plus other assumptions about physical, biological, and socioeconomic features that might occur without the project. The No Action Alternative includes historic and existing conditions and any changes or programs that have been approved and funded.

Predicting the Sea's future conditions, however, is complicated by uncertainties of future water flows into the Sea. The flow of water will depend on external factors not associated with the Salton Sea Project, and the timing of the flow is unknown. The No Action Alternative will be based on the current conditions of the Sea, projected into the next 30 to 100 years, assuming an annual average inflow of about 1.3 million acre-feet (MAF) of water. The effects of the Salton Sea Restoration Project also will be evaluated as if there were incremental reductions from the current conditions, assuming annual average future inflows of both 1.0 and 0.8 MAF.

Phasing of Alternatives—Since inflows to the Sea could be substantially reduced in the future, the alternatives are being evaluated to assess the effects of the range of inflows from the current 1.3 MAF per year to a future condition of as low as 0.8 MAF per year. The need for imported water increases substantially as annual inflows decrease, so water could be imported as a later contingency phase of the project if the need arises because of reduced inflows. In addition, a system that concentrates salinity in ponds within or near the Sea could operate for a number of years before a long-term solution to disposing of salt residue is found. In the long term, salt residue could be disposed of via a pipeline or by stockpiling it in a local facility, such as a landfill. Thus, a pond system with or without enhanced evaporation could be constructed in phase 1, a long-term disposal facility or pipeline could be constructed in phase 2, and water could be imported as a contingency phase 3. If disposal plans and phase 2 pipelines or landfills do not materialize, another contingency phase 3 project could be to construct wildlife ponds near the Wildlife Refuge. SN

Alternatives Enhancements—Building Value

The lead agencies, the Science Subcommittee, and others are developing alternative enhancements to improve the primary alternatives' ability to restore the Sea.

The Alternatives Development Working Group also is coming up with a process to evaluate scientific and technical feasibility. Some of the enhancements under consideration to meet project goals and objectives include the following:

- Using revegetation and other soil stabilization techniques;
- Creating islands for roosting and nesting habitat with adequate protection from predators;
- Planting trees along tributaries for roosting sites;
- Possibly periodically relocating pupfish;
- Applying alum to reduce selenium and nutrients;
- Installing aeration and flocculent settling systems;
- Harvesting fish; and
- Using trash skimmers and beach cleaning equipment. SN

Alternatives Workshops Schedule

- **May 11: La Quinta, Imperial Irrigation District Boardroom, 6 to 9 PM**
- **May 12: Salton City, Lions Club, 9 AM to noon**
- **May 13: San Diego, Board of Supervisors office, 1600 Pacific Ave., 6 to 9 PM**

For additional information, contact the Salton Sea Authority at (760) 564-4888.

Draft goals and objectives

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odor; and

- Maintain state Class I recreational quality status.

4 Maintain a viable sport fishery at the Sea:

- Maintain a healthy habitat for orange-mouth corvina and sargo;
- Minimize massive fish kills; and
- Eliminate health advisory on eating fish.

5 Identify opportunities for economic development around the Sea:

- Reduce or eliminate odor;
- Implement objectives for sport fisheries and fish and wildlife;
- Maintain a clean shoreline; and
- Reduce the occurrence of algal blooms. SN

1997: Science Subcommittee formed → *May 1998 NOI and NOP filed* → *July 1998: Scoping meetings held* → *October 1998: Alternatives workshops held* → *Summer 1999: Draft EIS/EIR* → *December 1999: Final EIS/EIR* → *200?: Construction begins*

Paying for the Improvements: Where Some of the Money May Come From

If the city or county you live in needs money to build new schools or to put together a public transit system, it can establish a special financing district to raise the necessary funds. But the Salton Sea, although a significant piece of California real estate, is neither a city nor a county; thus this revenue-producing mechanism isn't an option for the Salton Sea Authority. So where can the Authority look for a steady source of revenue to pay for the ongoing restoration work and the future maintenance of the Sea?

State Senator Dave Kelley has written Senate Bill 223 to address the problem. If passed by the Legislature, it would allow the Salton Sea Authority to establish an infrastructure finance district to help pay for restoring the Sea. As Senator Kelley says, "It took many years for the Sea to deteriorate. It will require many years of ongoing management to sustain restoration."

The beauty of Senator Kelley's legislation is that the financing district would not raise taxes; instead, it would rely on increased property values for revenue. Because much of the real estate surrounding the Sea is publicly owned, any revenue generated by the new district will never cover all the operations and maintenance costs associated with restoration; but the financing district that would be established through the legislation would contribute funds to the effort. Moreover, Congress requires that a restoration plan be submitted by January first of next year, and establishing a financing district for the Sea will demonstrate California's willingness to provide local financial support for restoring the Sea.

Salton Sea property values will go up as the Sea is restored and the area becomes a destination for vacationers, recreationists, and retiring baby-boomers. The increased tax income that will result from higher property values will help fund the Sea's ongoing restoration and maintenance.

SB 223 won't itself establish the special financing district; instead, it will allow the Salton Sea Authority and the local communities to define the district. The final say will be up to the voters.

If the vision for restoring the Salton Sea becomes reality, as expected, local property values—and property taxes—will inevitably rise. Senator Kelley's bill seeks to earmark some of this increased revenue to help pay for the restoration effort.

The bill is set for hearing on April 7. SN

Some Helpful Definitions to Know

If you decide to become more involved in the Salton Sea Restoration Project process or if you're simply following the project developments, you may encounter certain words and phrases that are new to you. Here are some terms from this newsletter that may be unfamiliar:

Technical Advisory Committee (TAC)—A group of individuals who make recommendations to the Salton Sea Authority Board on issues related to Salton Sea Authority activities. The TAC includes members of the Salton Sea Authority and ex-officio members from Torres-Martinez Desert Cahuilla Tribe, Bureau of Reclamation, US Fish and Wildlife Service, California Department of Fish and Game, California Department of Water Resources, California Regional Water Quality Control Board, Coachella Valley Association of Government, Imperial Valley Association of Governments, and Southern California Association of Governments.

Limnology—The scientific study of bodies of fresh water, especially lakes.

Aquifer—A geological unit containing sufficient saturated permeable rock to yield significant amounts of water.

Invertebrate—Any animal that lacks a spinal column or backbone. Examples are insects, worms, and snails.

Phytoplankton—Minute, free-floating aquatic plants.

Zooplankton—Small or microscopic animal organisms that float in bodies of water.

Planktivorous—A description of an organism that feeds on plankton.

Piscivorous—A description of an organism that feeds on fish.

Detritus—Loose material or debris (such as rock fragments or plant or animal particles) that result from disintegration.

Calendar of Meetings

Contact Salton Sea Authority (760) 564-4888 or check the webpage, www.lc.usbr.gov to confirm locations and times of meetings.

- Science Subcommittee meets the third Wednesday of each month from 8 AM to 5 PM. Next meeting: April 21.
- Salton Sea Board of Directors meets the third Thursday of each month at 2 PM. Next meeting: April 22.
- Technical Advisory Committee meets the first Wednesday of each month at 10 AM. Next meeting: May 5.

If you know of a meeting or conference related to activities at the Salton Sea and would like it included on this calendar, please give us a call.

How to Contact Us

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