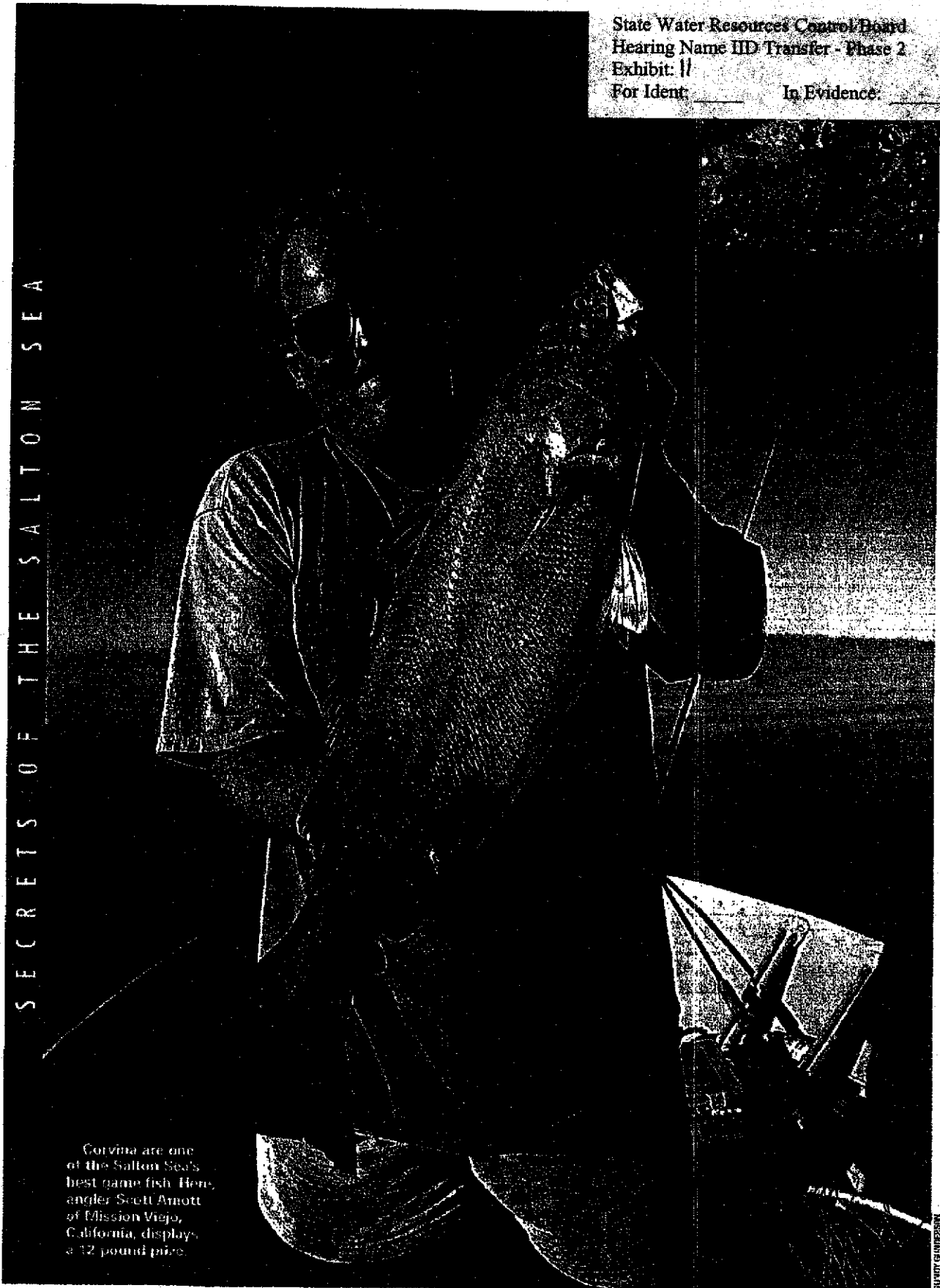


SECRETS OF THE SALTON SEA

Corvina are one of the Salton Sea's best game fish. Here, angler Scott Amott of Mission Viejo, California, displays a 12-pound prize.



State Water Resources Control Board
Hearing Name IID Transfer - Phase 2
Exhibit: //
For Ident: _____ In Evidence: _____

BY BILL KARR

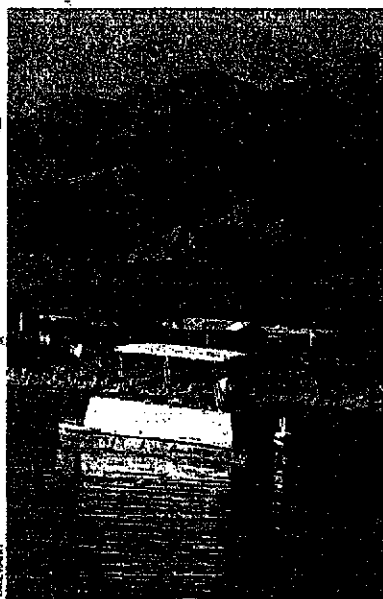
SECRETS OF THE SALTON Sea

One hour of fishing and over a dozen fish of three different species to the boat. Not bad. But not as good as it can get at the Salton Sea in Southern California. If you can get past the bad hype, bad publicity and sometimes the bad smell, you can experience the best fishing to be found in California. In fact, some even say Salton Sea has the best fishing in the world.

A scientific fisheries study released just this past year, part of a \$5 million survey to be completed by 2002 and headed up by Barry Costa-Pierce, director of the National Oceanic and Atmospheric Administration's Sea Grant Program, said "The fishery study found that for its size, the 35-mile-long sea produces more fish than almost anywhere else on the planet," adding the Salton Sea is "... home to one of the most productive fisheries in the world."

Beyond the fishing, though, this vast inland sea is critical to more than 400 species of birds, and many species of fish, fowl, mammals and invertebrates, many of them threatened or endangered, and entirely dependent upon the survival of the Salton Sea for their own continued existence. And man himself will find his very health and well-being threatened should this vast body of water die or dry up.

A recent study confirms the Salton Sea is the best fishing in California. Now all we have to do is keep the fish and the ecosystem alive.



Impossible? Not at all, and the death of the Salton Sea, despite its current healthy fishery and high productivity rate, is a distinct possibility with current "water conservation" measures, transfers of water flows and a growing thirst for water by an ever-growing population grown accustomed to water waste in an arid desert.

The Salton Sea takes up 380 square miles of Southern California landscape and is about 228 feet below sea level, and yet it is virtually ignored by everyone in the state, including most anglers, visitors, waterskiers, and even politicians. Even many of the locals want it to be kept "invisible," because they cherish their private backyard playground. Some even refuse to admit there could be a problem with this vast inland ocean. But problems there are.

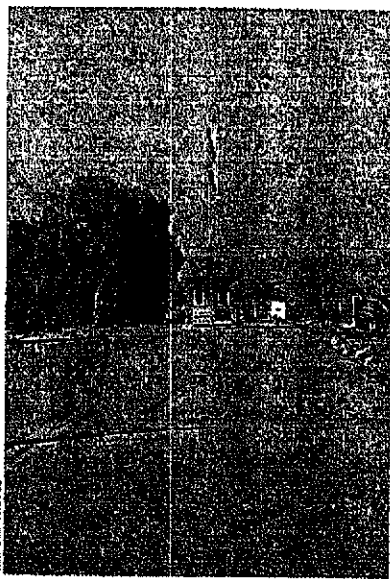
It's taken decades to make something as big as the Salton Sea so invisible, but it was finally accomplished through the combined efforts of farmers who need it as an "agricultural sump," its official legislative designation, and its improper depiction as being a "manmade" body of water. That description has been, and still is, promoted by the Metropolitan Water District and is actually now still parroted by almost every major media source, including the Associated Press.

Blind acceptance by the media of the Salton Sea as a "manmade" body

of water, from the local press to *National Geographic* and the Associated Press, through the insistence of farmers and water-mongers who want the water that flows into the Salton Sea, has resulted in politicians writing off Salton Sea as a viable spot for recreation, visitation, habitation, protection or even discussion.

Even the Environmental Protection Agency is reluctant to take action to protect this thriving ecosystem, and the threatened and endangered species therein, based on the historical and inaccurate rhetoric that Salton Sea is "manmade." They only want to protect that which is "natural," regardless of the inaccuracy of claims of Salton Sea being "manmade," and the current dependency on the sea of threatened and endangered species.

Fortunately, Mother Nature has seen fit to completely ignore the dictates of man (and politicians,) and has continued to maintain the Salton Sea as one of the most flourishing and life-filled bodies of water in California, the United States, and maybe even the world. But that can, and will, change unless steps are taken to construct one of the programs designed to begin lowering the salt content of the Salton Sea. Over the past few years there



■ Top center, guide Ray Garnett of Salton Sea Beach is one of the only guides left. Right, drainage ditches like the Johnson Street Drain, provide fresh water to keep the sea's salinity diluted. Above, the state park system offers plenty of accommodations.



have been seasons of low or no fish reproduction due to high salinity levels, and any extended such pattern would result in no new fish, and death of the existing adults would leave the sea dead.

There are no two ways about it: one of the largest ecological disasters ever to occur in California, and possibly the nation, would take place should the Salton Sea die, or dry up, both of which are not only possible, but probable, if steps are not taken to ensure its survival.

Imagine, if you will, the loss of Salton Sea: Fish and wildlife and endangered species that live there would be gone; a vast salt and selenium bed of dust of over 400 square miles would be driven throughout Southern California with any wind; tourism in Palm Springs, Palm Desert and the entire counties of Riverside, Imperial and Coachella would disappear with the clouds of choking dust. Certainly agriculture would disappear under the dust, and health problems would escalate to insurmountable proportions.

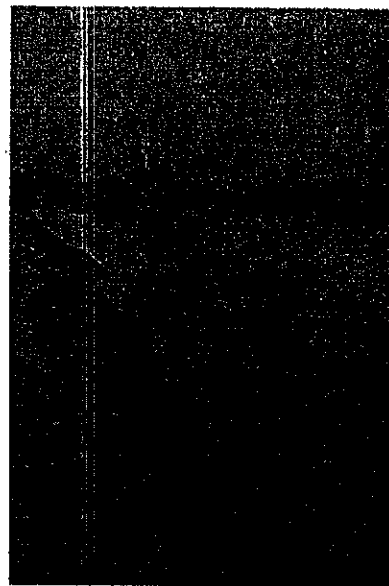
Here's the history of the Salton Sea, the story of dozens of battles that have been waged to save it, where we stand today, and what must transpire to save this magnificent body of water.

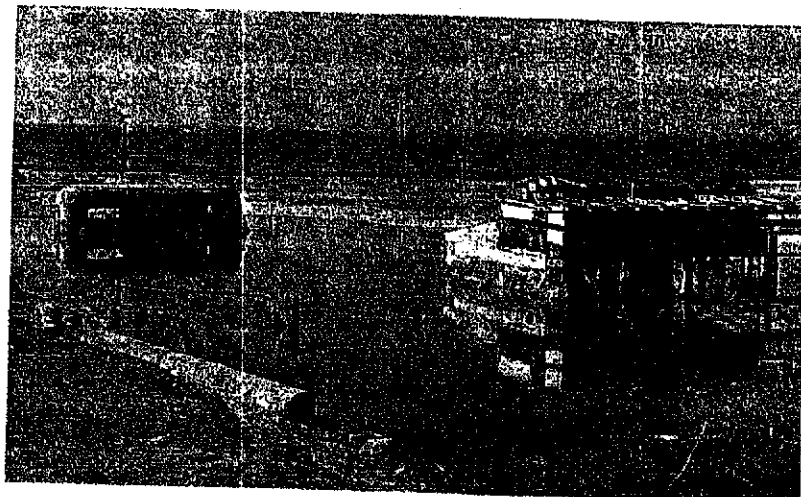
Historically, the Salton Sea Basin was part of the Sea of Cortez and its upper reaches stretched into what is now Indio. I have found seashells and freshwater clam shells from the ancient

Lake Cahuilla while hunting quail near the Thermal Airport, and there are rumors of a Spanish galleon that sank in the same area while searching for an inland passageway to the Pacific Ocean from the Sea of Cortez.

Eventually the Colorado River built up a land bridge through its ever-growing, ever-moving alluvial fan — sometimes flowing into the Salton Sink and sometimes into the Sea of Cortez. At this point the inland lake, now cut off from the Sea of Cortez and known as Lake Cahuilla, filled the Imperial Valley and was far larger than the Salton Sea. Flows from the Colorado River kept it fresh enough to harbor freshwater fish, and even trout. The Cahuilla Indians "netted" fish either while it was part of the Sea of Cortez, or while it was a huge inland sea, constructing rock enclosures that would fill with the incoming waters and strand fish on the outgoing, which they collected. These fish traps are still visible in the foothills above Salton Sea Beach, Salton City and Desert Shores.

Finally the Colorado River maintained a steady flow into the Sea of Cortez, away from the Salton Sink, and the vast body of water evaporated, leaving only widely scattered springs, ponds, meandering rivers that disappeared into marshland and a few lingering species such as the desert pupfish and some shorebird species. Lake Cahuilla, however, the predecessor of the Salton Sea, never went away





■ Despite heroic attempts to hold back the ever-rising Salton Sea, some buildings, homes and businesses, like these at Bombay Beach, were given up for lost and now provide rookeries for bird life at the sea.

entirely and, eventually, the Colorado River again began its swings into different river courses — now flowing into the Sea of Cortez, and now into the Salton Sink.

It was because of these periodic fluctuations of flow that the current Salton Sea came into being when, in 1905, construction workers trying to divert part of the Colorado River back into the Salton Sea Basin for irrigation actually blew out a levee and the

Colorado River again did what it had been doing since pre-history: flowed into the Salton Sea Basin and again filled it with water. Because man was involved with this huge snafu of trying to harness Mother Nature, water-mongers and farmers, afraid that any protections given to the Salton Sea as a "natural" body of water would hurt their farming practices, called it "man-made." The nomenclature was wrong then and it's still wrong. The history

of the Salton Sea precedes our very existence in California.

Since water flows downhill, it wasn't hard for the next step to be the official designation of the Salton Sea as an "agricultural sump," not exactly a word that encourages development, recreation or the thought of a vast, life-filled playground. Even so, the Salton Sea became a huge playground for those looking for recreation from all over Southern California.

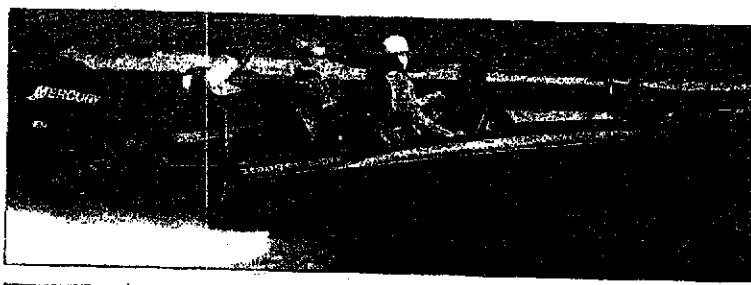
In more recent history, local, county, state and finally federal agencies recognized the value of the Salton Sea, but at the same time found a number of problems that made it very difficult getting a consensus to fix the problem.

In a draft of additions to the Salton Sea Project Report dated Nov. 16, 1973, from the United States Bureau of the Interior, Bureau of Reclamation, Southern California Planning

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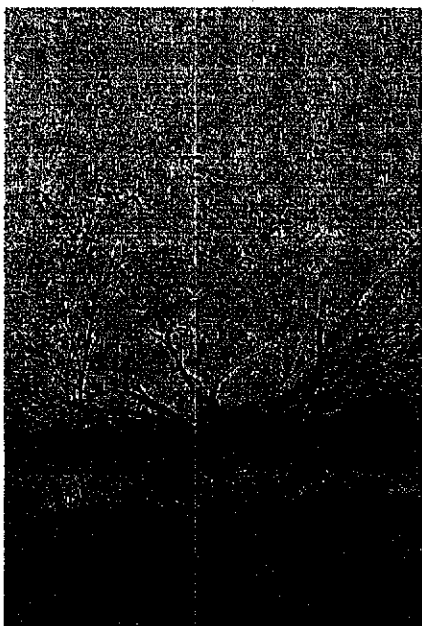
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Office, and Lower Colorado Region, the Program Manager of the Salton Sea Project, A.O. Peck, stated the problems confronting the Salton Sea — problems that still exist today:

— **Salinity:** Inflow to the Sea transports dissolved salts and, because there is no surface outflow, salinity is increasing. Continuation of this rise in salinity will eventually eliminate fish life and create unfavorable conditions for recreation and seashore development.

— **Water level:** An imbalance between historic inflows and evaporation has caused unstable water levels which have adversely affected public and private property. Future rising levels could affect drainage from surrounding farmlands and could also inundate shoreline developments. Falling levels could necessitate abandonment, relo-



■ Hundreds of thousands of ducks and geese use the sea and nearby Wister State Wildlife Refuge for seasonal homes. Nearly 400 species depend on the sea for survival.

cation or modification of existing shoreline facilities.

— **Algae blooms:** Inflow to the sea also transports large quantities of mineral nutrients, which produce abundant growths of algae. Algae blooms discolor the water and, upon death and decomposition, often cause temporary anoxic conditions locally. These conditions occasionally prove fatal to fish and produce unpleasant odors.

The above pieces of the puzzle can all be fitted together easily in today's Salton Sea, but the story of life in the Salton Sea is the very beginning, and it's fascinating.

In referring to records of the Salton Sea Coordinating Council, an organization headed up by this writer and begun in 1984 to help solve the problems of the Salton Sea, the sea provided the best fishing of any body of water in California for years, according to the DFG. The 9-fish limit for corvina was frequently attained and many times exceeded 100 pounds of fish, with corvina over 20 pounds common.

After going through some slow years and relatively slow fishing due to increased salinity that impacted spawning, the corvina population is now once again surging upwards and quality fish of 4 to 12 pounds are once again prevalent throughout the Salton Sea, with bigger fish mixed in now and then. As recently as 12 years ago the average size corvina was more like 6 to 15 pounds, with plenty in the 18- to 25-pound range.

Croaker suffered cyclical changes in population numbers as the competing tilapia populations rose and fell within the sea, and sargo suffered the same fate. Sargo population levels were so low a decade ago that repeated efforts by anglers to capture some for studies resulted in no fish at all. More recently, however, corvina anglers have reported sargo being caught at The Target and other areas in the sea, so they are still in existence.

"We don't know how many fish are in the Salton Sea," Terry Foreman, a Department of Fish and Game biologist in the Chino office, told *WO* for this story, "but with the increase in the numbers of tilapia, providing a rebound for the corvina fishery, they're numbered in the billions. The total number of tilapia is staggering, especially when you consider fish kills on the order of 8 million fish, after which it's hard to tell the difference in population levels."

Those fish kills also trigger rumors of pollution and unsafe fish to those who don't know the mechanics of the Salton Sea. In truth, the huge die-offs at the Salton Sea and resultant piles of dead and rotting fish alongside the sea,



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BILL COHR

■ Above, angler Neil Pauly pulls in a fighting corvina, while at right the author relaxes with a beautiful catch. Top left is an excellent tilapia Mozambique specimen in full spawning colors. Tilapia are prolific in the Salton Sea.



BILL KARE

Notices in the California Department of Fish and Game fishing regulations warned of high selenium levels in fish from the Salton Sea, were incorrectly attributed to all species of fish, whether they met the supposed "danger" warning levels or not. For instance, while some species of fish were considered above the invented "danger" level, other fish that were under that level were also included in the warning. More recent studies by Costa-Pierce have confirmed that in

are the result of a very simple and natural explanation: a high level of nutrients in the sea. During certain times of the year those nutrients cause a massive algae bloom in certain areas. The algae produce oxygen when photosynthesizing, but when they die in large quanti-

ties their decomposition uses up this oxygen and that can produce lethal conditions. This can create a "dead" zone in the sea where all fish are killed. It's all perfectly natural and has nothing to do with unhealthy water or abnormally introduced chemicals or toxins.



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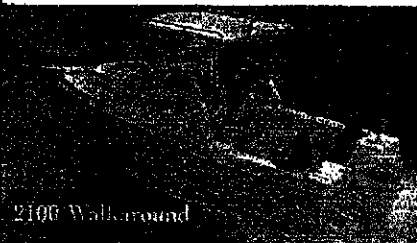
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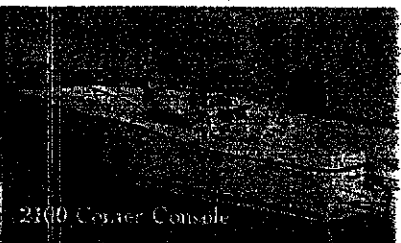
Which Striper boat?



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2100 Center Console

■ The author's son Zach Karr of Tempe, Arizona, with a limit of fat conchina caught throwing lures in the south end of the sea. Far right, brackish waters support thriving populations of birds.

checking tons of fish from the Salton Sea, "... researchers did not notice any unusual percentage of abnormalities."

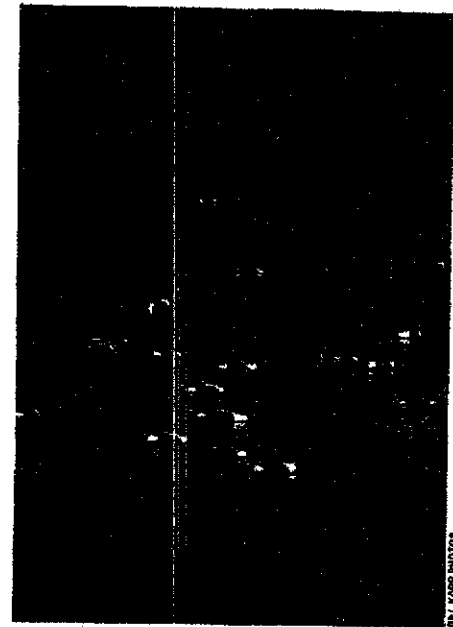
That high nutrient level in the Salton Sea is a major concern for Dr. Stuart Hurlbert, Director of the Center for Inland Waters at the San Diego State University, who said that "high environmentally unsustainable rates of (human) population growth in the Salton Sea watershed and in those parts of California hoping to siphon water out of it are the greatest medium -- and long-term threats -- to a healthy Salton Sea."

Why? Because they cause two things: a higher nutrient level flowing into the Salton Sea and less water to dilute those nutrients and counteract the salinity of the sea.

"These (referring to population increases) will cause increased nutrient inputs to the sea, further aggravating its



already hypereutrophic state," he continued. "They will favor increased water diversions to coastal California, decreased Salton Sea inflows, and a shrinking and saltier sea. They will increase the cost of the engineering projects needed to counter these trends."

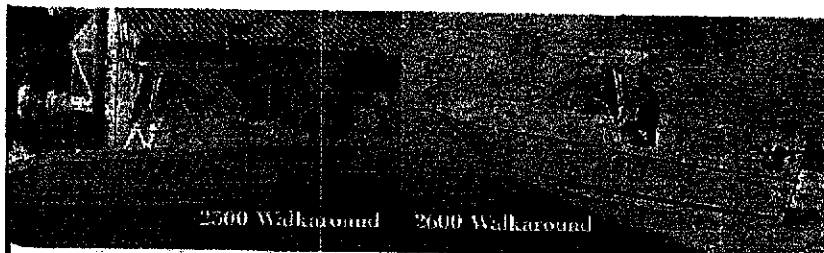


SAL HARRIS PHOTOS

Hurlbert points a finger directly at high immigration rates as the most controllable cause of the Salton Sea's long term problems, and relates them to the same environmental problems that are now rampant in all of California and the nation. Almost

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■ Camping lakeside at Johnston's Landing on the south shore is ideal for anglers with their own boat. Below, sonic lures like this Rapala entice corvina in the low-visibility waters of the Sea.

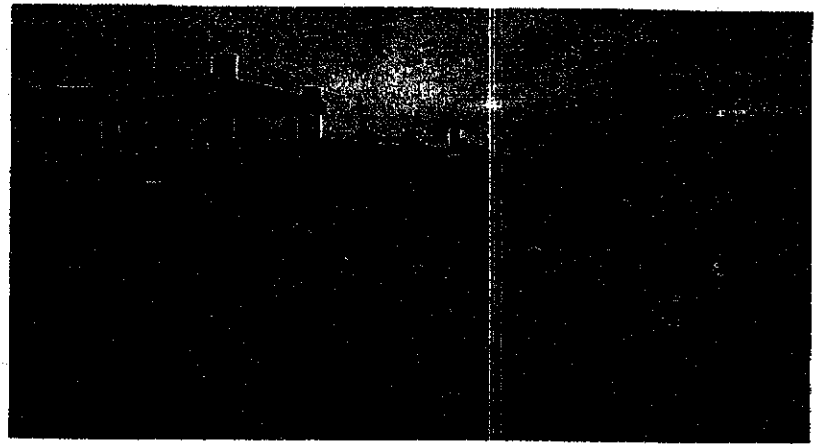
every environmental excess is caused by the impact of too many people.

High salinity levels, however, are what stop reproduction in the Salton Sea. Salinity in the ocean is approximately 34,000 to 35,000 ppm, and the Salton Sea currently is somewhere between 41,000-44,000 ppm, although the salinity level fluctuates seasonally with rainfall by as much 1,000 or 2,000 ppm.

Originally it was believed that corvin a propagation would cease and eggs would not hatch and survive as



BLINDY QUAINES/SHUTTER PHOTOS



salinity increased to 39,000 and 40,000 ppm, but the corvina themselves adapted to higher salinity levels and apparently spawns have continued, although not every year. As salinity increases there are only two options to keep the Sea alive: 1) To maintain some degree of freshwater input and find answers to problems associated with the resultant rising sea levels, or 2) find a means to remove salts from the Salton Sea.

During its heyday, the Salton Sea saw surging growth along its shoreline

and use that reached a remarkable, for those 1960s days, million recreation days of use a year. Then came major fluctuations in the level of the sea and flooding of homes, businesses and entire communities. Major construction of dams and berms was required to save towns like Bombay Beach and to protect valuable farmland in the southeastern end of the sea.

Accusations began to fly, and taking the brunt of it was the Imperial Irrigation District in Imperial County. They were heralded as the "bad guys"

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for following simple farming practices they had followed for decades. But any inflow to the sea was deemed "damaging" by homeowners and businesses that were flooded, and court cases went against IID. While the Imperial Irrigation District was being condemned as the "bad guy," in fact, the water flowing from leached fields into the drains and eventually the Salton Sea was keeping this huge ecosystem alive!

Since then, IID has done all it can to come up with water conservation plans to avoid "excess" drainage flows into the Salton Sea, and at one point they even sold 100,000 acre feet of

"conserved" water to the Metropolitan Water District in Los Angeles, which they draw directly from the Colorado River before it even reaches the Imperial Valley. That, of course, means that less fresh water reaches the Salton Sea.

Exacerbating the problem is that the Metropolitan Water District has put in a formal request for the rights of up to 40 percent of all the inflows to the

■ Camping alongside the Salton Sea can be a very relaxing and fun experience if done in the spring, winter or fall before temperatures get into the 100-plus-degree bracket.

Salton Sea, including the Whitewater River and the Alamo River. Obviously they have no right to that water, but they are intent on stealing as much water from the Salton Sea as they can, regardless of the outcome. No decision has been reached as to their request as of our publication date.

Plans to save the Salton Sea have run the gamut of ideas, including multi billion-dollar plans and ones that were once only in the \$35-\$40 million bracket, but now are far more expensive due to inflation and governmental regulations that would require extensive studies and possibly mitigation agreements. In fact, a recent draft environmental impact statement examining how to restore and maintain the Salton Sea was declared "inadequate" according to the U.S.

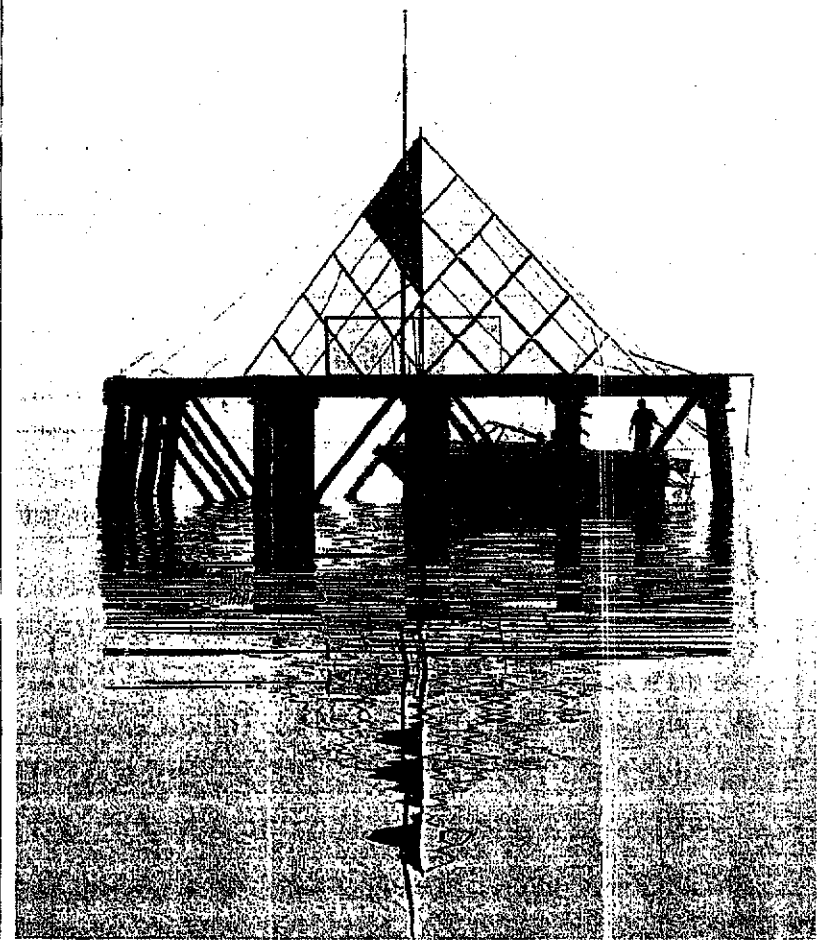
HISTORY OF FISH IN THE SALTON SEA

According to a recently published fish bulletin by the California Department of Fish and Game, "History and status of introduced fishes in California, 1871-1956," in which this writer is listed as a source, prior to 1948 the only fish in the Salton Sea were the striped mullet, western mosquitofish, desert pupfish, common carp and possibly some machete.

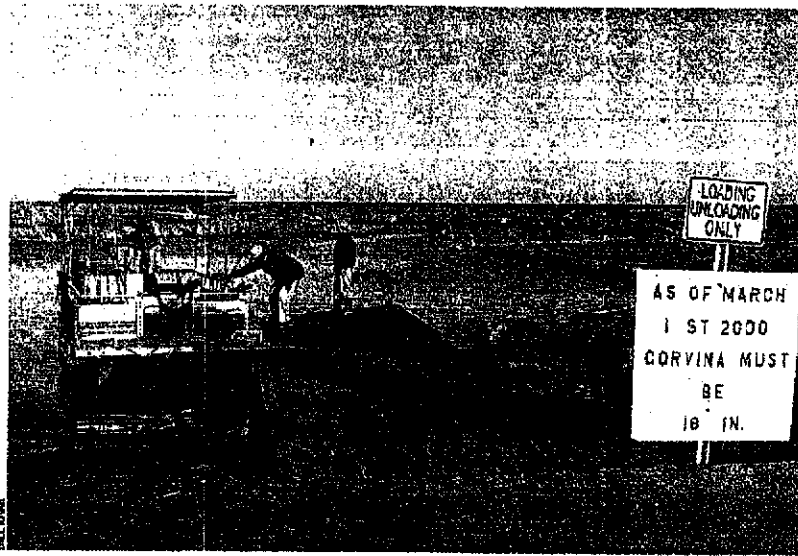
Long-jaw mudsuckers were found in 1951. In 1953 it was reported that four different expeditions arranged by the DFG had been made to the Sea of Cortez, and that 10,000 fish from the Sea of Cortez were planted in the Salton Sea. Most of the fish recoveries following the plantings were of *bairdiella* (Gulf croaker) and orangemouth corvina, which for years were the primary fish in the sea. In 1956 the sergo and shortfin corvina were also discovered to have breeding populations in the sea, and sergo had, and still have, established populations there.

All told, approximately 35,000 saltwater fish of 35 species were introduced into the Salton Sea, but the predominant species as of the 1970's were the orangemouth corvina, Gulf croaker and sergo. Two species of tilapia, the tilapia Mozambique and the tilapia Zilli, found their way into the Salton Sea, and the first verified report of the tilapia Mozambique in California was in 1964. In only a matter of years tilapia found their way into the drains of the Salton Sea, and the sea itself. They have been living and breeding in huge numbers since.

Bill Kerr



DAVID G. LARSEN



■ A minimum size limit was put on corvina last year, as noted at the boat launch at Red Hill Marina at the far south end of the Salton Sea. This area is one of the first to find great corvina fishing in the spring.

Environmental Protection Agency, because not enough attention was given to "detail." In their comments on the Salton Sea Reclamation Act of 1998, they questioned its ecological value to the nation. Obviously, nobody from the EPA has ever been there.

The one plan that was initially introduced decades ago and still offers the least expensive and most beneficial opportunity for removing salts from the sea is an enclosed dike system within the body of water that would act as an evaporation pond, collecting salts inside the enclosure and removing them from the main body of the sea. One study done by Boyd F. Thomas, Chairman of the Salton Sea Advisory Committee back in 1971, came up with a construction cost of \$35 million for the project, while the federal/state estimate was \$130 million.

An intensive study involving almost 200 pages, entitled the Salton Sea Project, Federal-State Feasibility Report, Review Draft, was performed by the U.S. Department of the Interior and The Resources Agency of California in August of 1973, and at that time they determined:

"Based upon the findings of the investigation it is concluded that:

- 1) Each of the four alternative plans presented in this report are economically and environmentally justified and financially feasible.
- 2) Each of the four alternative plans presented in this report are engineeringly feasible . . .
- 3) Of the four alternative plans, Plan D is the least-cost plan, with total

construction costs estimated to be \$58,000,000.

4) If any of the four alternative plans are authorized, possible cost savings by dredging the entire dike . . . should be thoroughly investigated.

5) Reimbursable project costs allocated to fish and wildlife recreation and land enhancement can be repaid with interest in 50 years or less, pro-

vided the State of California adopts suitable repayment arrangements."

The idea of ponding the sea for collection of salts is good for that singular purpose, and may keep it alive indefinitely, but other more involved ideas were also considered.

One consideration was a link-up with the Sea of Cortez in Mexico. The linking of the Salton Sea with the Sea of Cortez for a free exchange of water would flush the Salton Sea and mix the waters with the much less saline waters of the Cortez. Pumps would be used to pump water up to the gravity feed level from the Salton Sea, and then the downflow could run electric turbines generating power to be sold to help defray pumping costs and to help the power crunch currently being seen in California. Unfortunately, the sea is too large to be diluted by any piping system that could now be imagined.

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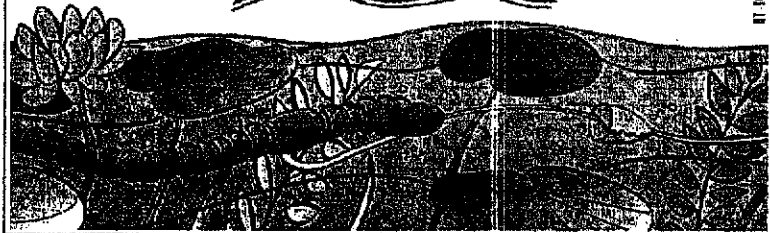
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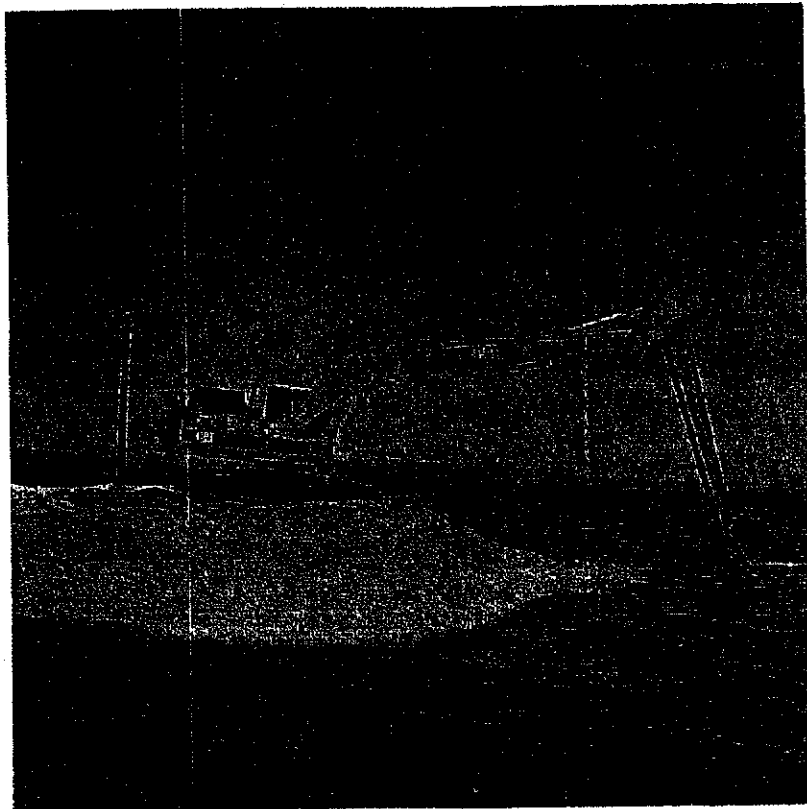


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■ Dredging is a common sight at all of the marinas around the Salton Sea because high winds and wave action move sand and silt very much like winds move sand dunes. Extreme care must be taken by small boaters on Salton Sea, as the shallow water creates waves and breakers in short order. Some people, the author noted, have been known to actually surf Salton Sea during big storms.

At one stage this writer even approached the Army Corp. of Engineers about building an actual shipping channel from San Felipe to the Salton Sea complete with locks for the elevation change. Rather than scoff at the idea, they were willing to consider it if the other various entities agreed. At that time, however, county, state and federal authorities finally came together to form the Salton Sea Task Force to "begin," once again, working on a plan to save the Salton Sea.

At that time my feeling was that I had done all I could do for the Salton Sea. The Salton Sea Coordinating Council dissolved, leaving it up to the county, state and federal governments under the auspices of the Salton Sea Task Force to come up with a decision. Bad call, because the Salton Sea Task Force never amounted to anything, and its studies, ideas and recommendations fell on the everlasting "deaf ears" of a state not willing to solve a major problem within its borders.

Now, we are working with an entity called the Salton Sea Authority, which has the cooperation of all entities involved and a budget to work with. The above-named studies are being provided to the Authority, and with any luck there will be a consensus that now, finally, a project must be initiated to save Salton Sea.

Salton Sea has so far withstood the ravages of nature and the reduction of freshwater inflows to maintain an incredible ecosystem of life that even astounds scientists and biologists to this day. Some say that with a body of water so full of life, it's a long way from death. Unfortunately, the inexorable increase in salinity and compounding attempts at diverting freshwater and drain flows from the Salton Sea will eventually snuff out that spark of life. And once extinguished it will be too late to help. ☹

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SALTON SEA AUTHORITY MAKING HEADWAY

The Salton Sea Authority, a joint powers agency consisting of the counties of Riverside and Imperial as well as the Imperial Irrigation District and the Coachella Valley Water District, is seeking cost-effective, scientifically-based solutions for the Sea's problems.

The authority is working closely with the Department of Interior/ Bureau of Reclamation, the Torres Martinez Desert Cahuilla Tribe and state and federal agencies. Two separate projects that address salinity issues will be under way by the end of the year.

The authority board approved a \$143 million contract in October, 2000, for site work on an enhanced evaporation system pilot project. Next year the authority will construct and operate a series of small solar evaporation ponds.

Enhanced evaporation systems consist of mechanical equipment that creates and disperses a fine mist of water into the atmosphere. Once airborne, droplets of water evaporate while the salt falls into a containment area. The microscopic droplets greatly increase the surface area of water exposed to the air, thus enhancing evaporation rates.

Solar ponds have been used by the salt making industry for hundreds of years and the pilot project will evaluate whether they can also be used for salinity reduction purposes at the sea. That project will continue for at least a year.

The authority also has been engaged in a partnership with the U.S. Fish and Wildlife Service, National Wildlife Health Center and California Fish and Game in a wildlife disease management program on the Salton Sea that is already showing results. Additionally, it has helped address some of the aesthetic issues by assisting the Salton City Community Services District in a shoreline cleanup program.

Meanwhile, the authority and others are also looking to private industry for potential solutions to the sea's crowded tilapia population. The Authority has hired an expert in tilapia, fish markets and processing methods who has worked with many of the major processors along the West Coast to evaluate the potential commercial uses of the sea's fish.

Harvesting some of the rapidly reproducing fish would assist in nutrient removal from the sea's overly rich ecosystem. Another potential benefit from a harvest would be healthier fish stock that likely would be subject to less dramatic die-offs.

*Tom Kirk
Executive Director
Salton Sea Authority*

Western Outdoor News. He was director of the Inland Wetlands Coalition, Director for the Salton Sea Coordinating Council and currently is president of the Outdoor Writers Association of California. He also sits on the Youth Advisory Group for the California Waterfowl Association and is a member of the Advisory Committee to the DFG Game Bird Heritage Program. Karr has been intimate with Salton Sea since 1959 and wrote the book Fishing Salton Sea.