SALTON SEA REHABILITATION: REBUILDING A CRITICAL AVIAN ECOSYSTEM

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PROCESS

- Goals and Objectives
- Analysis + Design
- Process
  - Research
  - Inventory
  - Inventory Refinement
  - Program
  - Refinement of Problems
  - Analysis
  - Design
  - Final Design and Evaluation
  - Evaluation and Critique
GOALS

• IMPROVE THE SALTON SEAS CAPACITY TO SUPPORT HEALTHY ECOSYSTEMS.

• MAINTAIN THE SALTON SEA AS PART OF THE PACIFIC FLYWAY.

• REHABILITATION OF ECOSYSTEM HEALTH.
Objectives

- Salinity reduction and maintenance at 40 g/l or lower.
- Improve water retention through surface area reduction.
- Reduce the effects of poor water mixing and high temperatures through increased sea depth.
- Nutrient load reduction
- Improve quality of fish supply
- Improve bird habitat
Salton Timeline

- 4 million BCE: Marine incursions into the Salton Trough
- 50,000 BCE: Lakes up to ten times larger periodically filled the basin
- 2,500 BCE: Human settlement
- 1200 CE: Lake Cahuilla dries up
- 1605 CE: Salton Trough refills after dam accident
- 1960 CE: Many fish species thrive
- 1970 CE: Hurricane Kathleen and flooding
- 1983 CE: 150,000 eared grebes die on the sea shore
- 1986 CE: Avian botulism outbreak
- 1988 CE: 20,000 birds die
- 1994 CE: Yacht Club opens
- 1999 CE: Selenium warning issued
- 1999 CE: 7.6 million tilapia die
- 1999 CE: Sonny Bond Act passed
**Salton Inflows**

- **The Whitewater River**: 79,000 acre-feet per year, draining the San Bernardino and San Jacinto Mountains.

- **The Salton Sea**:
  - Surface drainage estimated at 106,000 acre feet per year.
  - San Felipe Creek, 1,000 acre feet per year.
  - Natural runoff and rainfall contribute 445,000 acre feet per year.

- **The New River**:
  - 436,000 acre-feet of water per year
  - Widely regarded as the most polluted water in the United States.
  - Deposits 5 x 10^8 kg of sediment into the Salton Sea each year.
Salton Inflows (Contd)

- Alamo River: 48%
- New River: 34%
- Whitewater River: > 1%
- San Felipe Creek: 6.1%
- Surface Drainage: 8.2%
- Runoff: 3.6%
Around 400 species of birds have been documented at the Salton Sea including endangered and threatened species.
SITES OF BIRD DIE-OFFS AND PUPFISH HABITATS
LAND OWNERSHIP
EXISTING CONDITIONS

PROBLEMS
- Hypersalinity
- Pollutants
- Disease
- Anoxic Water
- High Temperatures

OBJECTIVES, GOALS
- Salinity Stabilization
- Pollutant Reduction
- Continued Disease Management
- Water Mixing
- Reduced Water Temperatures

FINAL RESULT
- Healthy Ecosystem
- Maintenance of Pacific Flyway Stop

THE CHOCOLATE MOUNTAINS

66° EVAPORATION

2-3° PRECIPITATION

THE SANTA ROSA MOUNTAINS
**Salton Sea**

- Total Acreage: 236,800 Acres
- Design Acreage: 148,048 Acres
- Perimeter: 69 Miles

Required fill: 4,281,278,144 cubic yards

Available fill: 716,552,320 cubic yards per year

After 10 years: 7,165,523,200
Salton Sea Depth Increase

Graph showing Salton Sea depth over time (keep sea level constant at -228 ft)
SALT REMOVAL

ROUGHLY 10,000 ACRES OF TRADITIONAL SALT PONDS WOULD BE NEEDED TO KEEP CURRENT SALINITY CONSTANT.

TO ACHIEVE A 20% REDUCTION IN SALINITY, MUCH MORE AREA WOULD BE NEEDED, OR ENHANCED METHODS WOULD BE REQUIRED.

POSSIBLE DESALINATION OR ENHANCED EVAPORATION SALT TOWERS.

MORE MODELING WOULD BE REQUIRED TO IDENTIFY HOW TO MEET THE NEEDS OF THE SEA.

DISPOSAL SITE WOULD BE REQUIRED

3,434,000 METRIC TONNES PER YEAR
EVAPORATION

Intensive, high land requirements

DESALINATION

Expensive and energy intensive
Enhanced Evaporation Alternative

Up to 44% more effective than simple evaporation ponds
Mostly native plantings with the exception of the Barnyard Grass.

Selections provide cover and habitat for bird species.

Many of these species are already in use in the Sonny Bono Salton Sea National Refuge.
PREFERRED NESTING HABITATS
PREFERRED HABITAT OF NESTING SPECIES
CONCLUSION

DECREASE IN SALINITY TO 40 g/l AND A 40% DECREASE IN THE SURFACE AREA OF THE SALTON SEA WOULD EFFECTIVELY IMPROVE THE ABILITY OF THE SEA TO BECOME A HEALTHY HABITAT FOR BIRDS IN THE PACIFIC FLYWAY.

SALINITY REDUCTION METHODS WOULD NEED TO BE MORE THOROUGHLY EVALUATED AND MODELED.

REHABILITATION OF THE SALTON SEA WOULD IMPROVE THE QUALITY OF THE FISHERY AS WELL AS THE VIABILITY OF THE SALTON SEA AS A CRITICAL STOP IN THE PACIFIC FLYWAY.

LONG TERM POTENTIAL TO SAVE WATER FOR THE COLORADO RIVER.
References

• Redlands Institute for GIS DATA.
• The Jepson Manual.