

This report is available on Reclamation's Website at:
<http://www.usbr.gov/lc/region/saltnsea/daar.html>

Salton Sea Restoration Project



DRAFT Alternatives Appraisal Report



U.S. Department of the Interior
Bureau of Reclamation
Lower Colorado Region
Boulder City, Nevada

January 2000

CONTENTS

Chapter 1. Introduction	1
I Purpose	1
II Scope of Report	2
III Authority	2
IV Relationship to Other Projects	3
A. Draft Salton Sea Restoration Project EIS/EIR	3
B. California 4.4 Plan	4
Chapter 2. Alternatives Development Process	7
I Alternatives Development Process	7
II Alternatives Considered in Detail	8
A. No Action Alternative	10
B. Common Actions in All Alternatives	11
Fish Harvesting	11
Shoreline Cleanup	12
Improved Recreational Facilities	15
Integrated Wildlife Disease Program	16
Long-Term Management Strategy	17
Strategic Science Plan	18
C. Evaporation Ponds—Alternative 1	19
Current Inflows, Alternative 1, Phase 1	19
Pupfish Pond	23
North Wetland Habitat	24
Current Inflows, Alternative 1, Phase 2	27
Export	27
Inflows of 1.06 maf per Year, Alternative 1, Phase 1	27
Displacement Dike	27
Inflows of 1.06 maf per Year, Alternative 1, Phase 2	28
Import from the Central Arizona Salinity Interceptor	28
Inflows of 0.8 maf per Year, Alternative 1, Phase 1	29
Inflows of 0.8 maf per Year, Alternative 1, Phase 2	29
Flood Flows via Existing Facilities	29

D.	Enhanced Evaporation System at	
	Bombay Beach—Alternative 2	31
	Current Inflows, Alternative 2, Phase 1	31
	North Wetland Habitat	33
	Current Inflows, Alternative 2, Phase 2	33
	Inflows of 1.06 maf per Year, Alternative 2, Phase 1	33
	Displacement Dike	35
	Flood Flows	35
	Inflows of 1.06 maf per Year, Alternative 2, Phase 2	35
	Import of Central Arizona Salinity	
	Interceptor Water	35
	Inflows of 0.8 maf per Year, Alternative 2, Phase 1	35
	Inflows of 0.8 maf per Year, Alternative 2, Phase 2	35
E.	EES at Salton Sea Test Base—Alternative 3	35
	All Inflows, Alternative 3, Phases 1 and 2	35
F.	Evaporation Pond and EES—Alternative 4	36
	Current Inflows, Alternative 4, Phase 1	36
	North Wetland Habitat	36
	Pupfish Pond	37
	Current Inflows, Alternative 4, Phase 2	37
	Expanded EES	37
	Inflows of 1.06 maf per Year, Alternative 4, Phase 1	37
	Displacement Dike	37
	Flood Flows	37
	Inflows of 1.06 maf per Year, Alternative 4, Phase 2	38
	Import of Central Arizona Salinity Interceptor	38
	EES	38
	Inflows of 0.8 maf per Year, Alternative 4, Phase 1	38
	Inflows of 0.8 maf per Year, Alternative 4, Phase 2	38
G.	In-Sea EES in Evaporation Pond—Alternative 5	38
	Current Inflow Conditions, Alternative 5, Phase 1	38
	North Wetland Habitat	39
	Current Inflows, Alternative 5, Phase 2	39
	Export	39
	Inflows of 1.06 maf per Year, Alternative 5, Phase 1	39
	Displacement Dike	39
	Flood Flows	40
	Inflows of 1.06 maf per Year, Alternative 5, Phase 2	40
	Import of Central Arizona Salinity Interceptor	40
	Inflows of 0.8 maf per Year, Alternative 5, Phase 1	40
	Inflows of 0.8 maf per Year, Alternative 5, Phase 2	40

H.	Phase 2 Export and Import Options	40
	Export to Expanded Enhanced Evaporation System	41
	Export to Gulf of California	42
	Export to Pacific Ocean	43
	Export to Palen Dry Lakebed	44
I.	Summary of Alternative Features	46
J.	EES at Salton Sea Test Base, Alternative 3, New Information	49
III	Alternatives Considered and Eliminated from Detailed Study	49
A.	Diking Alternative	49
B.	Water Treatment Alternatives	50
C.	Combined Route between San Diego and the Salton Sea ..	50
D.	Flood Flows via New Facilities	51
E.	Import from Point Loma Wastewater Treatment Plant ...	52
F.	Import from San Bernardino	53
	Chapter 3. Geological Conditions	55
	Chapter 4. Analysis of Alternative Effectiveness	57
I	Common Actions in All Alternatives	58
A.	Fish Harvesting	58
B.	Shoreline Cleanup	58
C.	Improved Recreational Facilities	59
D.	Integrated Wildlife Disease Program	59
E.	Long-Term Management Strategy, Including Strategic Science Plan	59
II	Alternatives, Phases 1 and 2	60
III	Alternatives without Imports	63
IV	Alternatives without Displacement Dike	63
	References	65
	Abbreviations and Acronyms	67
Attachment A	Engineering Considerations and Additional Detailed Costs	
Attachment B	Salton Sea Accounting Model	
Attachment C	Simulation Projections of Effectiveness Charts	
Attachment D	Sensitivity Analysis Charts	

Tables

1	Summary of Salton Sea Restoration Project alternative actions	9
2	Features of phase 1 components	46
3	Features of phase 2 options	47
4	Summary of costs for Phase 1 Alternatives	48
5	Appraisal level geologic description for the Salton Sea alternatives	56
6	Fault sources—Salton Sea study area	56
7	Summary comparison of modeling results after phase 1, with and without phase 2 alternatives	62

Figures

	Location map	frontispiece
1	Fish harvesting/shoreline cleanup conceptual facility plan	13
2	Fish harvesting/shoreline cleanup pier plan	14
3	Evaporation ponds and displacement dike location	20
4	North and south dike cross section	22
5	Typical dike cross-section for north wetland habitat and Pupfish Pond	25
6	Potential locations of north wetland habitat and Pupfish Pond	26
7	Evacuation gates at Detention Channel No. 1 and Salt Creek	30
8	Enhanced evaporation system module	32
9	Location of Bombay Beach and Salton Sea Test Base site for EES	34
10	Pipeline routes to and from Salton Sea	follows 42
11	Seismicity of magnitude 3 and greater, 1932-1998, in Salton Sea study area	follows 56
12	Comparison of salinity among the alternatives at 1.363, 1.06, and 0.80 million acre-feet per year of inflow	follows 62
13	Comparison of elevation among the alternatives at 1.363, 1.06, and 0.80 million acre-feet per year of inflow	follows 62
14	Comparison of area among the alternatives at 1.363, 1.06, and 0.80 million acre-feet per year of inflow	follows 62