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Golden Gate Audubon Society

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September 21, 1999

Mr. Rick Breitenbach and Mr. Lester Snow
CALFED Bay/Delta Program
1416 Ninth Street, Suite 1155
Sacramento, CA 95814

Dear Mr. Breitenbach and Mr. Snow:

The following are the comments of the Golden Gate Audubon Society and Audubon-California on the Programmatic Environmental Impact Statement /Environmental Impact Report (PEIS/PEIR), CALFED Bay-Delta Program.

We believe that this document is fundamentally flawed for the many reasons cited below.

1) CALFED boasts that the Estuary's environmental problems will be solved through adaptive management. However, CALFED has removed from the adaptive management toolbox the basic tool of water.

Almost all agree that the Estuary's basic problem has been twofold, water diversions and habitat loss. Yet in the adaptive management toolbox CALFED only provides for habitat restoration. CALFED quite clearly states that there will be no increase in freshwater flow water into the Estuary. In fact, there may even be a net decrease in total flows through the Golden Gate. While some may believe that the CALFED prescription of increased short-duration "pulse" flows is the solution for declining fisheries, we suspect that it is not the answer. If it is not, adaptive management will be a useless tool for solving the problem if it cannot call upon increased water flows as a management option.

Since CALFED does not provide for the potential for net increased freshwater flows, it is disingenuous to proclaim that adaptive management can be used to solve the Estuary's problems.

Simply put, since increased freshwater flows into the Estuary may be an essential element for restoring the Estuary and since the "adaptive management" toolbox does not include such increased flows, it is dishonest to claim that adaptive management can be used to solve the Estuary's problems.

Since adaptive management is, in a real sense, the linchpin of CALFED claims to resolving environmental problems ("Central features of the Program are...adaptive management; (pg. 9-3)", and is a core component of the PEIS/PEIR this flaw undermines the entire foundation of this PEIS/PEIR and invalidates the document.

We believe that in a revised PEIS/PEIR it must be made clear that increased flows to the Delta and through the Golden Gate will be available for the adaptive management process.

Furthermore, even the amount of restoration proposed in the ERPP is, we believe, grossly inadequate to the needs of restoring the Estuary. Especially glaring is the lack of attention to the restoration needs of San Francisco Bay itself. This has been an ongoing flaw in the CALFED process. The ERPP is described as a process to restore the San Francisco Estuary, yet San Francisco Bay itself receives scant mention in the document and its restoration needs are simply not addressed. Leaving restoration planning to ill-defined "watershed planning" leaves the public in the dark as to what is exactly proposed for restoration.

2) The PEIS/PEIR is flawed in its use of the term "saline emergent wetlands".

"Table 10. Continued
Ecosystem Habitat
Element Basis for Selection as an Ecosystem Element
Saline emergent wetland habitats, including brackish and saline wetlands, are important habitat-use areas for fish and wildlife dependent on marshes and tidal shallows in the Bay-Delta and support several special-status plant species. "
Volume I Ecosystem Restoration Program Plan
I. PROGW Introduction to Habitat Visions
104 June ,1999"

While the term "saline emergent wetlands" may be technically accurate in describing wetlands that are either salt or brackish, it is an inappropriate term to use in the context of the San Francisco Estuary which contains tidal brackish marshes that provide a habitat type that is distinct from that provided by tidal salt marshes. These brackish marshes provide habitat for a suite of species distinctly different from those inhabiting the Estuary's tidal salt marshes.

This has all been documented previously during the Bay/Delta Hearings. At those hearings, our consultant, Steven Granholm, provided detailed analysis of the species dependent upon the approximately 5000 acres of brackish unmanaged marshes of Suisun Bay (see enclosed and see Bay/Delta records of September 8-10, 1987, Bay/Delta Estuary Uses: Wildlife). These include such species as the Suisun song sparrow and river otter and many species of ducks such as the mallard, ruddy duck, Northern Pintail, etc. Dr. Granholm further stated that the alteration of these brackish marshes into salt marshes would lead to a decline and probable disappearance of these species and thus a decline in the wildlife values and diversity of the Suisun marshes. The California Native Plant Society, also in the Hearings, indicated that several listed plants, Masons lilaeopsis for one, are also dependent upon the brackish nature of these marshes and are also threatened by increasing salinization of Suisun Bay.

From this testimony it is clear that there is a very real distinction between the brackish and salt marshes of San Francisco Estuary. Lumping both types of marshes under one classification, saline emergent wetlands, is thus completely deceptive, inappropriate and inaccurate.

By combining these wetland types into one classification the PEIS/PEIR erroneously suggests that restoring any of the categories of saline emergent wetlands will suffice for all species found in saline emergent wetlands. Furthermore, by using this single category it is impossible to tell whether mitigation proposals are appropriate.

For example, to mitigate for declining Suisun Marsh species the PEIS/PEIR proposes to increase "saline emergent habitat" (Table B: Bay Region: Proposed CALFED

Actions Evaluated in the MSCS, page 2 of 11, Multi-Species Conservation Strategy). From such a statement it is impossible to tell whether this means to increase brackish marsh habitat (which will be true mitigation) or salt marsh habitat (which will not help the species under discussion).

An analysis, *Suisun Marsh and San Pablo Bay: Expected Salinity Levels Under the 1995 Water Quality Control Plan* (see enclosed), prepared for us by Philip Williams and Associates indicates that under the 1985 Water Quality Control Plan the unmanaged brackish marshes of Suisun and San Pablo Bays will turn increasingly saline. This in turn will result in the probable extirpation of species as described above (Granholm).

CALFED does not apparently intend to remedy this situation. No actual increase of flows into Suisun is proposed by CALFED. CALFED only proposes larger pulses of water at certain times of the year. The overall effect of these pulse flows is nullified by greater water exports at other times of the year resulting in potentially even less net flows into Suisun Bay. As a result, the extirpation (or, regarding the plants species, extinction) of species in Suisun Bay's brackish unmanaged marshes is a likelihood that is not addressed by the PEIS/PEIR.

The PEIS/PEIR does not address this issue and does not propose mitigation for the impacts of this increased salinization of Suisun's brackish unmanaged marshes other than proposing to increase saline emergent habitat which, as we have shown above, is a misleading and deceptive term. Since CALFED proposes to increase saline emergent wetlands but does not provide increased flows to ensure that these saline emergent wetlands are brackish, one must assume they will be salt marsh. Increasing saline emergent tidal salt marshes will not improve conditions for saline emergent brackish marsh dependent species.

The PEIS/PEIUR must be rewritten so as to provide true mitigation for these significant impacts.

3) The PEIS/PEIR alternatives are evidently designed to result in the need for dams, surface storage and diversion facilities. Because the PEIS/PEIR fails to adequately address reasonable and achievable means of conserving water and means to improve water quality that do not entail the construction of new dams and diversion facilities, such facilities become inevitable. For example, the PEIS/PEIR fails to include a significant "land-retirement" alternative although a study prepared for BDAC clearly indicated that the retirement of marginal and unproductive farm land could result in the conserving of over 1 million acre feet of water per year. The PEIS/PEIR fails to adequately address the use of new treatment plants for improved water quality, thus forcing an unreasonable time schedule for improving Delta water quality or for developing a peripheral canal.

The PEIR/PEIS must be redone so as to provide a viable Alternative that adequately includes land retirement and other **enforceable** water conservation mechanisms, and water quality mechanisms other than diversions. Such an Alternative is feasible and if appropriately developed will eliminate the need for surface storage and diversion facilities.

The North Delta diversion proposal should be deleted from the document. This puts the whole program on an absurd timetable and does not give alternative water quality programs a chance to work.

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4) The Assurances component of the PEIS/PEIR is so vague as to be meaningless. Assurances is an essential component of the CALFED program. Without it there can be no trust in the appropriate implementation of any of the Alternatives. Without trust there will be no implementation, or at the least, many years of litigation before implementation can take place. Thus, the Assurances part of the PEIS/PEIR must receive a full and complete description even in a Programmatic Document. This has not been done.

To conclude, the PEIS/PEIR has too many problems to be next re-issued as a Final PEIS/PEIR. We believe that the document must be rewritten in order to correct the clear bias for the development of surface storage and diversion facilities. An Alternative that is based on water conservation and land retirement, and that solves water quality problems through technology rather than through increased diversions has not been presented despite the feasibility of such an Alternative. The PEIS/PEIR should be rewritten with such an Alternative included and hopefully as the Preferred Alternative.

A revised draft PEIS/PEIR must include an analysis of the impacts of increased salinization on the unmanaged brackish marshes of Suisun Bay. The deceptive use of the term "saline emergent wetlands" must be corrected. Appropriate mitigations for those impacts must be provided. Such mitigations must include, we believe, a net increase of freshwater flows into Suisun Bay.

A detailed Assurances package must be presented rather than one that simply lists ideas.

Thank you for your attention to our concerns.

Sincerely yours,

Arthur Feinstein
Executive Director, Golden Gate Audubon
Board Member, Audubon-California

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MEMORANDUM

DATE: February 16, 1999

TO: Arthur Feinstein, Golden Gate Audubon Society

FROM: Betty Andrews, P.E.

RE: Suisun Marsh and San Pablo Bay: Expected Salinity Levels Under the 1995 Water Quality Control Plan
(PWA Ref # 1309)

At your request, Philip Williams & Associates, Ltd. (PWA) has undertaken a brief review of the November 1997 Draft Environmental Impact Report (DEIR) for Implementation of the 1995 Bay/Delta Water Quality Control Plan and its subsequent revisions through May, 1998. This memorandum is based primarily on review of that document.

PURPOSE

The primary goal of our review was to identify the salinity levels in Suisun Marsh and San Pablo Bay that could be expected from the implementation of the 1995 Bay/Delta Water Quality Control Plan (WQCP). The DEIR attempted to address this issue in its assessment of impacts of the WQCP.

FINDINGS

1. The DEIR makes no attempt to compare proposed salinity conditions to any baseline other than simulated No Project conditions and the conditions during the very recent 1984-1994 period.

2. No description is provided of any any ecosystem functions which require more than the presence of certain salinity levels at certain times of the year.

3. No justification for the objectives appears to be provided in the DEIR, though it may exist elsewhere. Similarly, no overarching goals for the amount of fresh, brackish, and salt marsh in Suisun are associated with the numeric objectives as presented in this document.

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4. The compliance locations included in the objectives do not address channel salinity concerns for most of the unmanaged brackish tidal marshes of Suisun, which lie at the perimeter of Suisun Bay, Grizzly Bay, and Honker Bay.

5. There does not appear to be information in the DEIR that allows conclusions to be directly drawn regarding expected salinities in Suisun Bay, Grizzly Bay, and Honker Bay. Instead, data is provided for stations to the east in the Delta and to the north in the interior of the Suisun Marsh. Data is provided on the average monthly X2 position; relative to existing conditions, it will move downstream for all alternative implementations of the flow objectives in the months of November and February through September, indicating a relative freshening of the area in these months on average. Increased salinities are typical in October and January. The greatest Delta outflow, and therefore the greatest reduction in salinities, would occur under Flow Alternative #5.

6. The operation of the SMSCG have had far more significant effect on interior Suisun Marsh salinities than any of the alternatives for implementing the WQCP will. However, implementation of the WQCP alone will significantly reduce salinities in the western interior marsh at station S-97 over existing conditions. Interior marsh salinities will primarily affect managed marshes (largely duck clubs).

7. The original D-1485 goal of providing full mitigation for CVP and SWP impacts on Suisun Marsh appears to have been abandoned.

WQCP OBJECTIVES FOR SUISUN MARSH

A discussion of the evolution of the standards is provided on pages VII-1 to 8.

Specific salinity objectives (expressed as EC, or electrical conductivity) are included in the WQCP for specific locations in the Eastern and Western portions of Suisun Marsh. (See Attachment A for the statement of the objectives.) Figure 1 shows the locations of the referenced stations. Three locations, identified as C-2, S-64, and S-49, are specified for the eastern marsh, and four locations, identified as S-21, S-42, S-97, and S-35, are specified for the western marsh. In addition, the western marsh also includes water supply intakes for waterflow management areas on Van Sickle and Chipps Islands, though no more specific location is identified. The objectives apply to the October - May period, and range from 8.0 (February - March only) - 19.0 (October only) mmhos/cm. The numeric objectives are described as the "maximum monthly average of both daily high tide EC values (mmhos/cm) **or demonstrate that equivalent or better protection will**

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be provided at the location" [emphasis added]. The eastern marsh objectives are the same under the WQCP as they were under the amended D-1485.

The "Brackish Tidal Marshes of Suisun Bay" are provided with a narrative objective given in footnote 10:

> Water quality conditions sufficient to support a natural gradient in species composition and wildlife habitat characteristic of a brackish marsh throughout all elevations of the tidal marshes bordering Suisun Bay shall be maintained. Water quality conditions shall be maintained so that none of the following occurs: (a) loss of diversity; (b) conversion of brackish marsh to salt marsh; (c) for animals, decreased population abundance of those species vulnerable to increased mortality and loss of habitat from increased water salinity; or (d) for plants, significant reduction in stature or percent cover from increased water or soil salinity or other water quality parameters.

According to the discussion on page VII-8, the narrative objective "is expected to be achieved through compliance with the year-round outflow objectives," and was included "to ensure that the tidal marshlands receive adequate protection."

It is important to note that all of the compliance stations identified are well inland of the bay edge, where many of the unmanaged tidal brackish marshes lie (see Figure 2). The compliance stations appear to be well-situated to address salinities affecting managed marshes, but not the preponderance of the unmanaged tidal brackish marshes of the region. These marshes will probably be most directly affected by the Delta outflow objectives, and are not addressed by the Suisun Marsh alternatives described below. Implementation of those objectives are evaluated by examining a number of different flow alternatives, which I will only generally discuss following the description of the Suisun Marsh Alternatives.

SUISUN MARSH ALTERNATIVES CONSIDERED

The DEIR is constructed in an unusual fashion: different sets of alternatives are considered to meet different sets of objectives under the WQCP. The set of six alternatives considered specifically to meet the Suisun Marsh Salinity Objectives are briefly described on pp. II-34 - II-36 and again in Chapter VII, the chapter describing the environmental effects of implementing the Suisun Marsh Salinity Objectives. Table VII-12 from page VII-65, which summarizes the alternatives, is included as Attachment B.

The first two alternatives are included for comparison as "No Project" alternatives; they assume D-1485 base hydrology, not WQCP flows. The others assume WQCP flows and different facilities construction plans and Green Valley Creek flow augmentation schedules. Each alternative assumes operation of the Suisun Marsh

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Salinity Control Gates (SMSCG) to meet the objectives to the extent possible. A discussion of each alternative follows.

Suisun Marsh Alternative 1 - Base Case and No Project Alternative A
Assumes D-1485 Delta outflow objectives. The State Water Project (SWP) and Central Valley Project (CVP) are responsible for meeting the Suisun Marsh objectives. No further actions are taken to meet the western marsh objectives, and the western marsh objectives are not met at some times. This is the alternative described by the DEIR as the default if no further action is taken by the SWRCB.

Suisun Marsh Alternative 2 - Cordelia-Goodyear Ditch: No Project Alternative B
Like Alternative 1 except that the Cordelia-Goodyear Ditch is constructed with two associated tide gates to meet objectives at S-35, and up to 80 cfs of flow augmentation occurs in Green Valley Creek to meet objectives at S-97. Figure 3 shows the assumed configuration of the Cordelia-Goodyear Ditch. This system would be used to move up to 225 cfs net flow over a tidal cycle of lower salinity water from Cordelia Slough to Goodyear Slough. A tide gate on the downstream (northern) end of Goodyear Slough would prevent higher salinity water from moving upstream during flood tide on Suisun Slough.

Suisun Marsh Alternative 3 - WQCP Only
Same as Alternative 1, but with WQCP outflow objectives in effect.

Suisun Marsh Alternative 4 - WQCP with Cordelia-Goodyear Ditch & Flow Augmentation
Same as Alternative 2, but with WQCP outflow objectives in effect.

Suisun Marsh Alternative 5 - WQCP with SMPA Amendment III Management Actions
This alternative assumes that WQCP outflow objectives in effect and a series of management actions, including both structural and nonstructural measures, are implemented. These measures are described in greater detail on pp. VII-22 and VII-24, 25, and are summarized below:

- institute a staffed *Water Management Program* to improve practices throughout the marsh;
- implement a *Joint-Use Facilities Program* to promote cooperative and efficient use of water delivery and leaching systems for managed wetlands;
- complete a project to *redirect Morrow Island Drainage* to Suisun Bay to reduce salinities in Goodyear Slough and on managed wetlands supplied from this source;
- institute a program to use 20 portable pumps to provide lower salinity water to managed wetlands during low tide diversions and better removal of soil salts during drainage;

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- prepare updated *Management Plans* to individual landowners to improve salinity conditions on their property;
- fund the *Fairfield-Suisun Sewer District - Green Valley Creek Intertie*; two alternative approaches to funding and facilities construction are considered; and
- *operate the SMSCG in September* to meet October salinity objectives when certain end of August salinity conditions exist.

The DEIR notes that some of these actions cannot be modeled. In particular, they note that the operation of portable pumps and other actions of the Water Manager are intended to reduce soil salinities as necessary to produce suitable vegetation for waterfowl. It is implied that success in achieving this goal will meet the criteria of demonstrating "equivalent or better protection [than the numerical objectives] is provided at the location." This alternative is identified as the environmentally preferred alternative (p. VII-66).

Suisun Marsh Alternative 6 - WQCP with Flow Augmentation

"Multiple parties are responsible for full implementation of the WQCP western marsh objectives through flow augmentation in Green Valley Creek." Sources will include:

- Fairfield-Suisun Sewer District;
- upstream reservoirs (Lake Madigan and Lake Frey);
- if needed, Lake Berryessa.

Pages VII-25, 26 include a discussion of what agreements and other actions would be necessary to effect this Alternative. Pages VII-58 to 60 provide a discussion of many fisheries-related concerns associated with flow augmentation of Green Valley Creek.

SUISUN MARSH ALTERNATIVES: EXPECTED EFFECTS ON SALINITY, HYDROLOGY, AQUATIC RESOURCES

The hydrodynamic and water quality model known as DWRDSM (Suisun Marsh Version) was used to simulate conditions under each of the alternatives for meeting the numerical objectives described above. The model simulates the average monthly high tide salinities for the 1922-1994 time period. Model results are provided at each of the 7 compliance stations identified in the objectives.

Hydrology Impacts

The DEIR discusses hydrologic changes as a result of implementing different alternatives only at the following locations or facilities: Green Valley Creek, Lake Madigan, Lake Frey, Sacramento River, the North Bay Aqueduct, Fairfield-Suisun Sewer District, Putah-South Canal, and Lake Berryessa. Since changes in

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these locations do not directly address changes in Suisun Marsh or San Pablo Bay, they are not summarized in this memorandum. They are discussed on pages VII-42 to 47.

The DEIR summarizes by saying "[t]he Suisun Marsh alternatives will result in channel water salinities **slightly different** from historic conditions" [emphasis added]. Salinities throughout the marsh are described as being lower under WQCP hydrology compared to D-1485 hydrology.

The WQCP salinity objectives are met in most months under all alternatives in the eastern and central marsh. Salinities at the western compliance stations, S-35 and S-97 are shown to often exceed the objectives; most of the discussion of impacts focuses on these two stations.

Salinity Impacts

The model assumes operation of the SMSCG as needed, based on salinities at S-21, S-35, S-49, and S-64 during the October - May control season. A separate assessment was made of the effect of the SMSCG on salinity under both D-1485 and WQCP hydrology. They were operated less frequently under WQCP hydrology as compared to D-1485 hydrology. The SMSCG were found to be highly effective in meeting salinity objectives in the eastern marsh and at S-42 and S-21 in the western marsh, with objectives being exceeded at these locations only occasionally (0 - 11% of the months) in only February and March under each of the Alternatives.[1] Operation of the gates was most often triggered by the western marsh stations S-35 and S-21. As control of the SMSCG rests with the Department of Water Resources and the US Bureau of Reclamation alone, the DEIR concludes that assessment of the alternatives should focus entirely on their ability to meet compliance at the stations identified as S-35 and S-97, in the western marsh.

Focusing on these two stations, it is apparent that Alternative 6 does the best job of meeting the standard at the stations identified as S-35 and S-97, in the western marsh. Alternative 6 also results in the lowest overall salinity levels during the control season. Alternative 4 does as well as Alternative 6 in meeting the objective at S-97 (though with higher overall salinities than Alternative 6 during the control season), but it does less well than Alternative 6 at meeting the objective at S-35. The DEIR notes that the water cost under Alternative 6 is much greater than under Alternative 4. The DEIR further notes that a peak October augmentation rate of 900 cfs would be needed to meet the objectives at S-35. On average, Alternative 6 requires an additional

[1] Alternatives 4 and 6 have no occasions of exceeding the objectives at the stations in the eastern marsh and in the western marsh at S-42, S-21. Alternative 1 has the poorest compliance record at these same locations, though exceedance still occurs to only a very limited extent.

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15, 200 acre-feet of water compared to Alternative 4, and this water can be considered the amount necessary to meet the objectives at S-35 (p. VII-41).

Alternative 5 could result in a slight increase in salinity in Boynton Slough due to redirection of treated waterwater from that waterway to Green Valley Creek. The frequency and magnitude of the resulting failure to meet the objective at S-40 are still very low.

The area-frequency plots from the DEIR provided here as Figures 4 and 5 provide a sense of the degree of influence of the Alternatives on salinity (relative to the numerical objective) at these two stations. The distance above or below the 0 line indicates the size of the difference from the numerical objective (above means salinity higher than the objective, below means salinity lower than the objective). The frequency of the condition is indicated by the horizontal or X-axis. Again, Alternatives 1 and 2 are the No Project alternatives, and show the salinity-lowering effect of the WQCP outflows compared to D1485 outflows. Alternatives 1A and 3A indicate the result of these alternatives without operation of the SMSCG.

Aquatic Habitat Impacts

A 1993 study of fish populations in the marsh over a 14-year period (Meng et al. 1993), 1979-1992, found that there were long-term declines in abundance and species diversity. These were generally correlated with decreases in outflow and increases in salinity.

The DEIR notes that while salinities throughout the marsh are expected to be slightly lower under the WQCP than under historic conditions, salinity is only one of several factors affect brackish marsh vegetation patterns. Other factors include depth and duration of flooding and plant competition. A report on this and related issues is expected from the Suisun Marsh Ecological Workgroup prior to the SWRCB triennial review.

Alternative 4 may significantly affect species requiring brackish or salt marsh habitat, because it will involve the introduction of substantial quantities of low salinity water to the northwestern marsh through Green Valley Creek and the construction of the Goodyear-Cordelia Ditch system.

Alternative 5 will result in more widely fluctuating channel water salinity conditions than Alternatives 2 and 4 due to the smaller amount of Green Valley Creek augmentation. Due to the limited availability of effluent from the Fairfield-Suisun Sewer District and its current discharge through nearby Boynton Slough, there is unlikely to be a major change in salinity at S-97 under this alternative. Salinities in Boynton Slough would be slightly higher.

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Depending on the water source and release regime, flow augmentation under Alternative 6 may result in a "slight freshening effect" at S-97 (p. VII-53). However, Alternative 6 is described elsewhere as creating "conditions at S-97 far less saline than the historic condition, or under any of the other alternatives. Aquatic species in the western marsh preferring brackish conditions would tend to be displaced in favor of freshwater species" (p. VII-62). Flow augmentation would have no effect at S-35.

DELTA OUTFLOW: ALTERNATIVES

Eight alternatives are considered for implementing the flow objectives of the WQCP, including the Delta outflow objective. As previously mentioned, this objective is the one most likely to affect salinities in Suisun Honker, and Grizzly Bays, around which lie many unmanaged brackish tidal wetlands. It is also most likely to affect salinities downstream in San Pablo Bay.[2] Unfortunately, neither the objective nor the discussion of the results provides much direct information about the expected salinities in these waters. Salinity values are provided for stations in the Delta to the east, but only the relative location of X2 is provided for stations west of the Delta, including Suisun Bay. X2 is defined as the distance from the Golden Gate Bridge, in kilometers, of the 2 parts per thousand isohaline at one meter from the bottom of the channel. (This isohaline was agreed to be equivalent to a specific conductance of 2.64 mmhos/cm at the surface.) The simulation model DWRSIM was used to estimate the location of X2 under each of the alternatives.

In general, all of the flow alternatives considered have fairly similar effects on the movement of X2 relative to the base case. Data is provided on the average monthly X2 position; relative to existing conditions, it will move downstream for all alternative implementations of the flow objectives in the months of November and February through September, indicating a relative freshening of the area in these months on average under all of the flow alternatives. Increased salinities are typical in October and January. The greatest Delta outflow, and therefore the greatest reduction in salinities in Suisun Bay, would occur under Flow Alternative 5. According to Table VI-11 in the DEIR (p. VI-7), Alternative 5 would on average result in the greatest movement downstream of X2 in advancing months and the least movement upstream of X2 in retreating months of all the alternatives considered. It could therefore create the greatest reduction of salinities in Suisun Bay relative to the base case, though the expected salinties are not quantified.

The largest changes in X2 position compared to the base case would occur in the months of April - June, when X2 would move approximately 2 - 3 kilometers downstream on average for most of the flow alternatives considered.

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[2] There does not appear to be any description in the DEIR *aside* from the discussion of X2 on the effect of the WQCP on salinities at locations downstream of the western Delta, including San Pablo Bay.

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Perhaps the most important period for reduced salinities in the estuary is the March - May period, when most of the flow alternatives would result in a downstream shift of X2 of approximately 1.5 - 3.4 kilometers compared to the base case. This size of shift could be expected to result in a reduction in Suisun Bay salinities of only a very minor amount, likely to be much less than 1 ppt. During the modeled critical drought period, however, most of the flow alternatives would shift the X2 position by approximately 6.7 kilometers in March, 3.9 kilometers in April, and approximately 5.5 kilometers in May. These changes could represent a significant shift in salinities during a key season in very dry periods.

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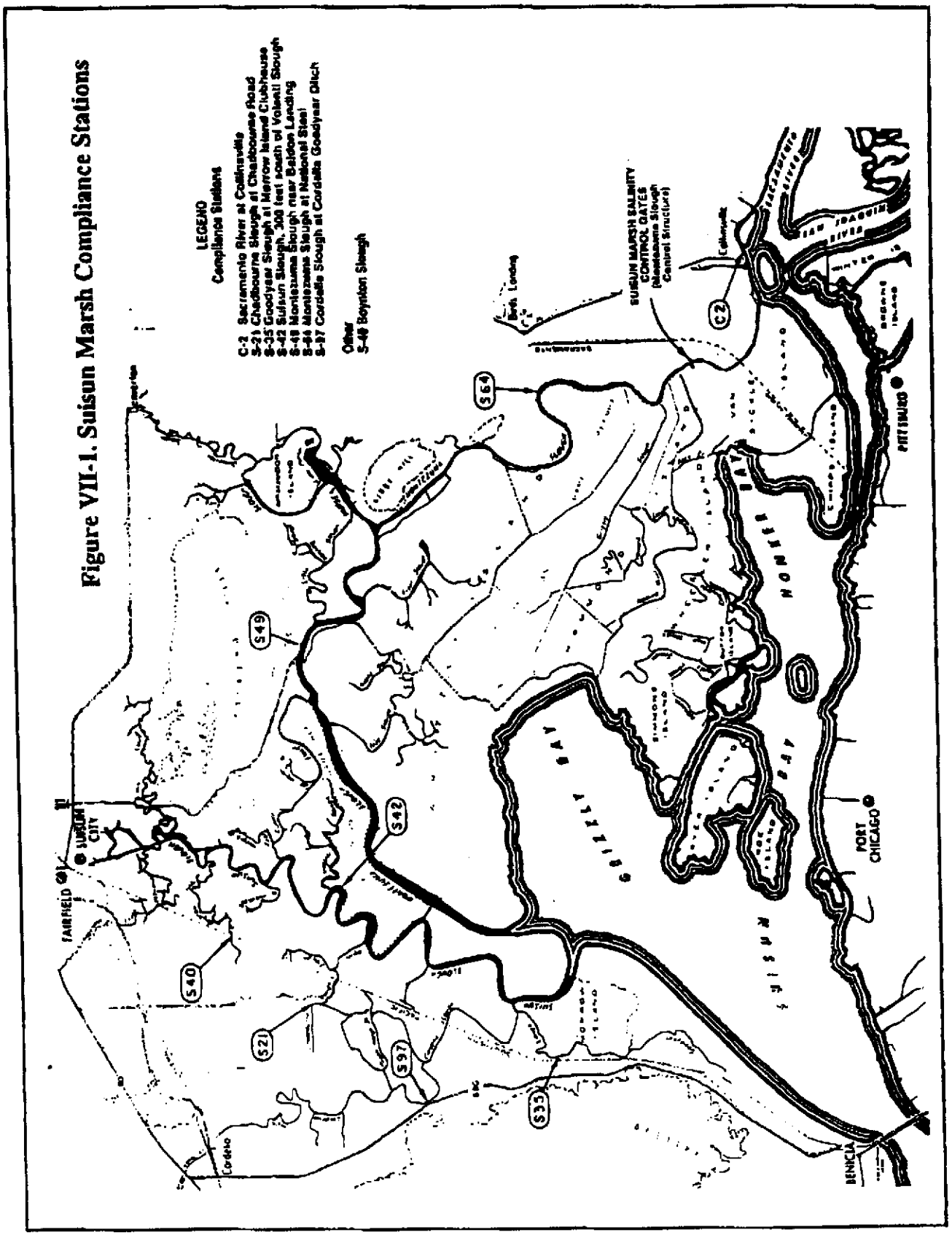

FIGURE 1

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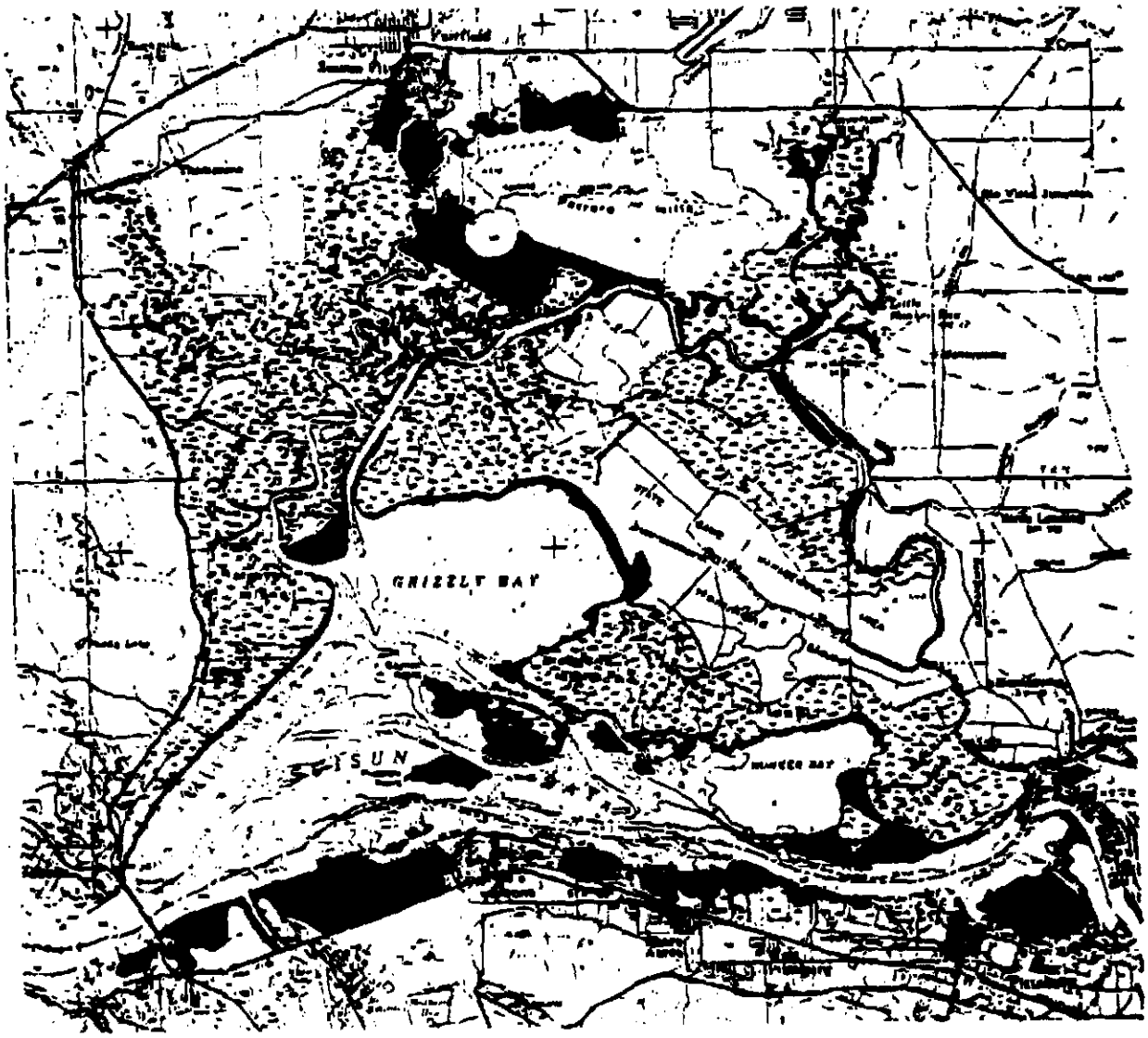

FIGURE 2:

DISTRIBUTION OF BRACKISH TIDAL MARSH IN SUISUN BAY

Philip Williams & Associates

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Figure VII - 6. Cordelia-Goodyear Ditch and Goodyear Slough Tide Gate

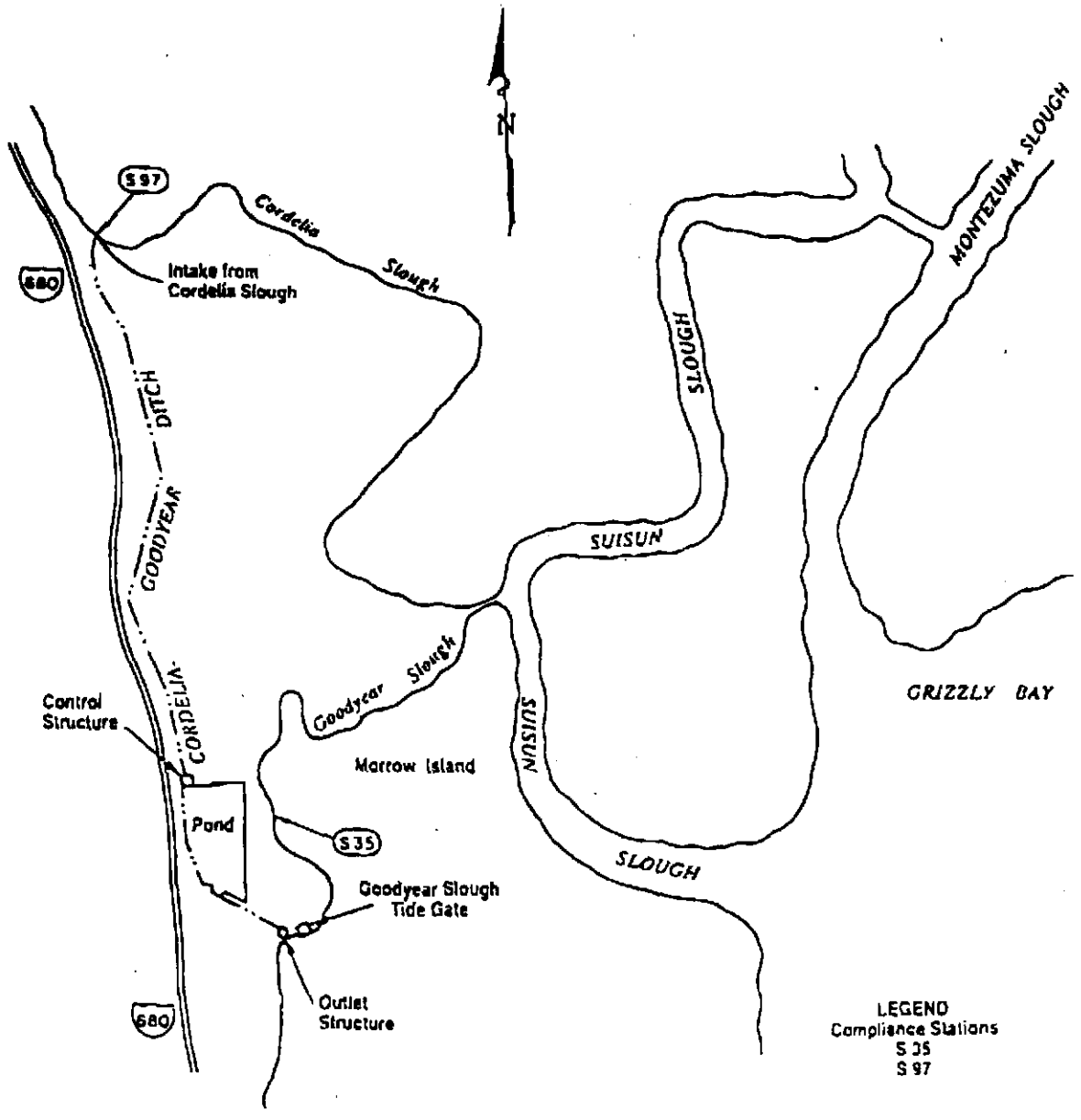

FIGURE 3

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Figure VII-13

S35 GOODYEAR SLOUGH AT MORROW ISLAND CLUB HOUSE
SALINITY AREA-FREQUENCY ANALYSIS 1/
OCTOBER THROUGH MAY OF WATER YEARS 1922-1994

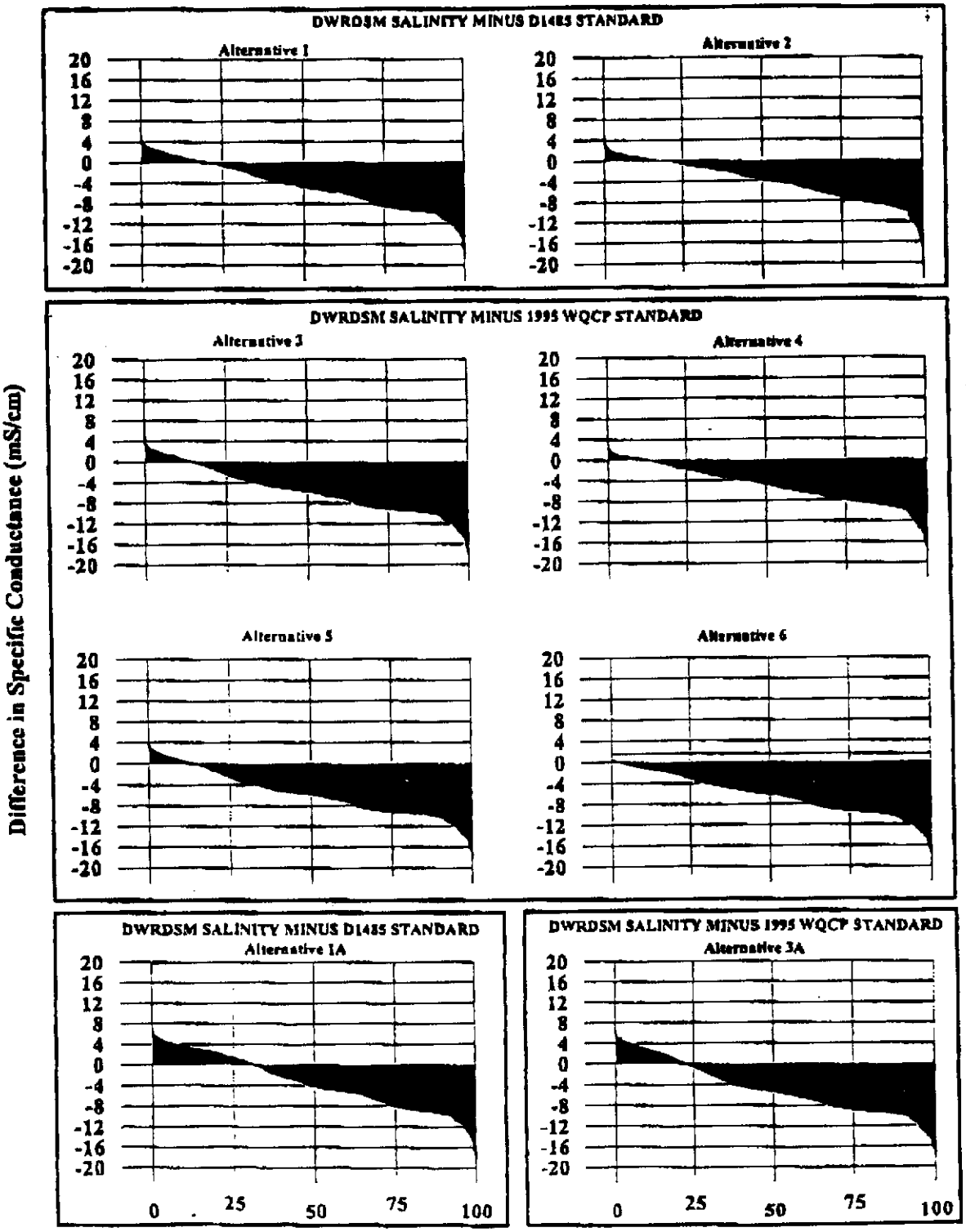

FIGURE 4