Interagency Ecological Studies Program for the Sacramento-San Joaquin Estuary

NEWSLETTER

Spring 1993

Readers are encouraged to submit brief articles or ideas for articles. Correspondence, including requests for changes in the mailing list, should be addressed to Randy Brown, California Department of Water Resources, 3251 S Street, Sacramento, CA 95816-7017.

SUISUN MARSH

SWRCB Decision 1485 required DWR and USBR, as water right permittees, to develop a plan of protection for Suisun Marsh. This plan, together with an EIR/EIS (1984), would provide a monitoring network, physical facilities, and operation and management procedures that would maintain the marsh as a brackish wetland. D1485 called for a plan implementation date of October 1, 1984. With SWRCB approval, DWR, USBR, DFG, and Suisun Resource Conservation District negotiated the Suisun Marsh Preservation Agreement (1987) to outline action on an extended timeline. The Agreement developed specific water quality objectives for Suisun Marsh that are coordinated with installation of facilities described in the Plan of Protection. Salinity objectives developed for the marsh were based on needs for waterfowl food production in the diked, seasonally managed wetlands.

Suisun Marsh Biological Assessment

Brenda Grewell, DWR

SWRCB's 1991 Water Control Plan called for a biological assessment of special status species and the undiked tidal wetlands of Suisun Marsh. SWRCB will use information obtained from this assessment to determine whether adopting salinity objectives proposed in the Plan of Protection would jeopardize the continued existence of any rare, threatened, or endangered species, adversely affect or destroy habitat essential to the continued existence of those species, or result in incidental take of those species.

The biological assessment for special status species in Suisun Marsh is underway. A plan of action was developed by a work group led by DWR's Environmental Services Office and represented by SWRCB, DFG, USFWS, USBR, and USEPA. Environmental Specialist Brenda Grewell (DWR) is coordinating this effort.

The project includes two simultaneous approaches. One phase involves mathematical models to determine salinity and flow ranges resulting from proposed projects and actions taken pursuant to the Plan of Protection. The second phase includes an assessment of the distribution and habitat characteristics of species of concern in the project area. Information generated from these two efforts will be merged in the impact analysis.

So far, progress on the simulation element includes development of model geometry from Martinez to the Golden Gate, calibration of a hydrodynamics model incorporating this geometry, and verification of the hydrodynamics model using tide data since May 1988. The salinity model using the developed geometry is now being calibrated and verified using data from water years 1987 through 1990. Kamyar Guivetchi, Associate Engineer (DWR), is coordinating this phase of the study with DWR's Division of Planning.

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Progress on the biological field element includes identification of unmanaged tidal wetland in the core study area, identification of species of concern, development of background support information through literature searches, and initiation of intensive field surveys for sensitive species. Field surveys are being conducted by Brenda Grewell (DWR), Curtis Hagen (DFG), Laura Briden (DFG), and Terri Gaines (DWR). All undiked tidal marshes in the interior Suisun Marsh have now been surveyed for sensitive plant species.

One high point of the field surveys has been the discovery of the rare Suisun Slough thistle *(Cirsium hydrophilum)* in two areas of Suisun Marsh. This extremely rare federal candidate species was thought to be extinct. A previously unknown population of soft bird's beak *(Cordylanthus mollis* spp. *mollis)* was found in the Hill Slough Wildlife Area. This state-listed rare plant is known to only three other locations in Suisun Marsh, and it appears to be the largest population in the entire estuary. The distribution of Mason's lilaeopsis, soft bird's beak, Suisun Marsh aster, and Delta tule pea has been mapped, and many previously unknown populations have been described. All of these species are widely distributed in Suisun Marsh.

The study also includes an evaluation of general vegetation characteristics in the undiked tidal marshes. *Scirpus robustus,* a brackish marsh indicator species, is found in undiked wetland along the Contra Costa shoreline from McAvoy Harbor area through Carquinez Strait. It is one of the dominant species on the west end of Ryer Island, Roe Island, Seal Island, and in the marshes from the Mothball Fleet area westward through Carquinez Strait. This species is absent in the less saline, eastern regions of Suisun Marsh.

Breeding season surveys for California clapper rails have identified populations in four areas of Suisun Marsh with a wide range of habitat variables. Salt marsh harvest mouse trapping is underway, and this federally-listed endangered species occupies a number of undiked tidal marshes with adequate escape cover from high tides.

In 1993, efforts will focus on supplementing sensitive species data in Suisun Marsh and upstream and downstream of the central study area; continuing the modeling studies, analyzing water quality data; and continuing analysis of biologic field data. SWRCB has requested the final biological assessment by April 1996. The project team has the goal of completing this effort at least a year ahead of schedule.

Western Suisun Marsh Salinity Control Project

Kamyar Guivetchi, DWR

USBR and DWR are preparing an EIS/EIR for the proposed Western Suisun Marsh Salinity Control Project, which encompasses Phases III and IV of the Plan of Protection. The objective is to lower channel water salinity to help meet D1485 standards. Planning and environmental review began in June 1990, a public scoping session was held in December 1990 to receive input on the scope and issues to be addressed, and a Scoping Report was distributed to the public in August 1991.

Between September 1991 and October 1992, USBR and DWR screened nearly 275 proposed alternative actions employing source water quality and quantity investigations, biological field surveys, and hydrodynamic and salinity model studies. All but nine individual alternative actions and eighteen combinations were set aside during the screening process because they did not meet prescribed criteria. The screening process, criteria, results, and descriptions of the remaining nine individual actions are presented in a Screening Report scheduled for distribution in May.

During the screening, three individual alternative actions were identified that, taken together, would likely meet project objectives with relatively few adverse environmental impacts. USBR and DWR have proposed a salinity control test to obtain additional field data on these three alternatives before proposing permanent actions for western Suisun Marsh. This test is described in Appendix A of the Screening Report.

Actions that were not set aside during the screening process are now being evaluated for potential environmental and socioeconomic impacts. The Draft EIS/EIR for the Western Suisun Marsh Salinity Control Project is scheduled for review and comment in October 1994 unless the salinity control test is attempted during 1994 and 1995. In that event, the Draft EIS/EIR would be distributed after the test, in October 1995.

If you would like a copy of the Screening Report, contact Kamyar Guivetchi at 916/445-7094. Comments received within 30 days of the distribution date will be considered in the environmental review process and environmental document.

WINTER CHINOOK SALMON

Randy Brown, DWR

On February 12, the National Marine Fisheries Service released its biological opinion on operation of the CVP and SWP. The opinion concluded that proposed operation would jeopardize the winter Chinook and contained a reasonable and prudent operational scenario that would result in non-jeopardy. The opinion also contained an incidental take permit for the projects' Delta operations. Principal conditions related to the Delta are:

- Delta Cross Channel closure from February 1 through April 30 in all water years.
- Positive QWEST in the lower San Joaquin River from February 1 through April 30 in all water years, based on 14-day running averages.
- No greater than -2000 QWEST from November 1 through January 31 in all water years, based on 14-day running averages.
- A combined CVP/SWP Delta take limit of 1 percent of the expected number of winter-run outmigrants. Take is calculated from salvage using factors for screening efficiency, predation loss, and handling loss. Allowable take for 1992 broodyear outmigrants is 2700.
- Extensive monitoring and reporting requirements. USFWS staff, under direction of Marty Kjelson, is sampling in the lower Sacramento River (below Glenn-Colusa Irrigation District) and in the Delta.

As of March 31, the combined take was at 1,632. In late February, the take at the SWP increased from about 800 to 1,200 in a few days, so the pumps were shut off for several days. When pumping resumed, it was at about 2,000 cfs; after about a week at that rate, pumping was increased to and has remained at about 3,200 cfs.

Figure 1 shows the distribution of sizes of untagged Chinook salmon captured at SWP's Skinner Fish Protective Facility over the past few months. Classification as to race is based on a system developed by DFG staff at Red Bluff. None of the 28,000 tagged winter-run juveniles released by Coleman National Hatchery in late January has been captured at either the CVP or SWP facility this winter.

Figure 2 is a plot of winter Chinook juveniles captured by USFWS midwater trawling in the Sacramento River near Sacramento and flow in the Sacramento River. Most winter-run outmigrants passed Sacramento in mid-March, and that may not have been related to flow. The Coleman Hatchery marked winter Chinook passed Sacramento during this same period. Sampling at Glenn-Colusa ID indicated that most of the young wild winter run passed this location (near Hamilton City) by the end of December.

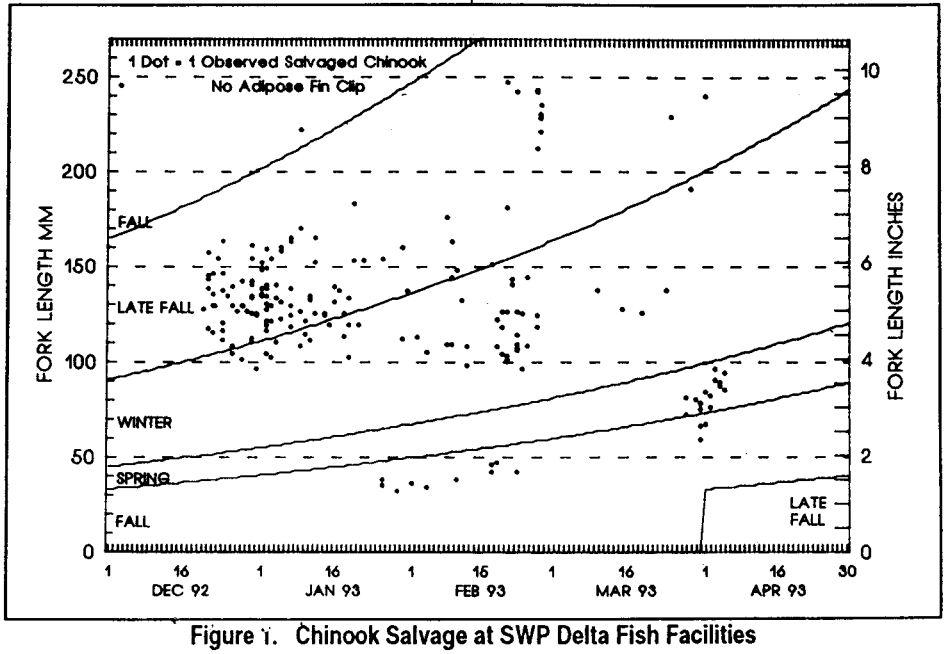

Figure 1. Chinook Salvage at SWP Delta Fish Facilities

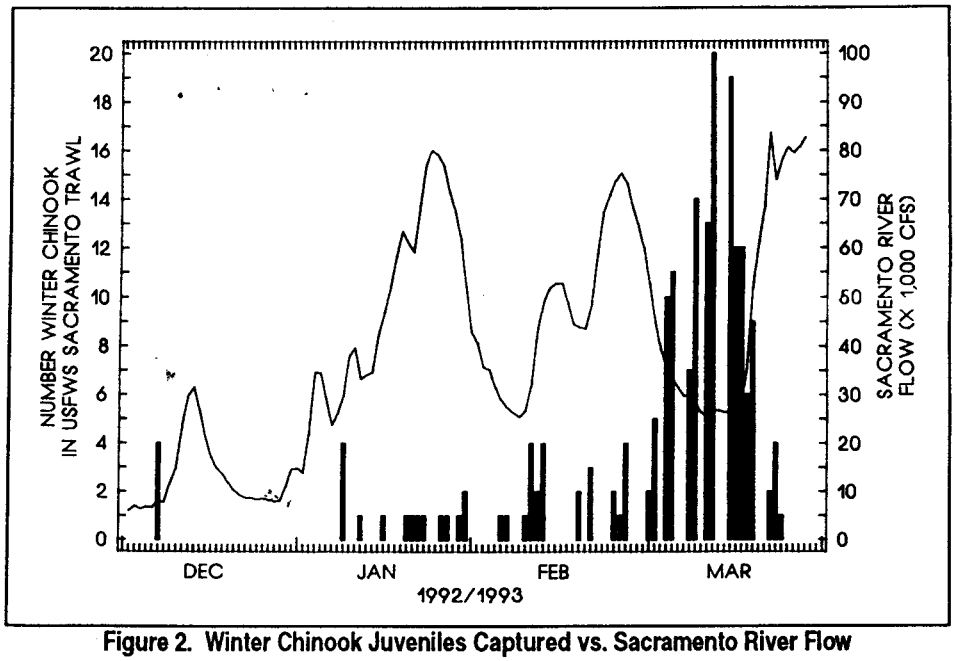

Figure 2. Winter Chinook Juveniles Captured vs. Sacramento River Flow

TWITCHELL ISLAND ACQUISITION

Kate Hansel, DWR

As part of the Western Delta Water Management Program, DWR has acquired about 2,900 acres (80 percent) of Twitchell Island. Multiple objectives of the Western Delta program include:

- Improving levees for flood control.
- Protecting Delta water quality.
- Providing habitat for waterfowl and wildlife.
- Minimizing oxidation and subsidence.
- Identifying potential wildlife habitat mitigation opportunities for present and future water development projects.

Twitchell Island is the first of several islands that may be acquired as part of the program. To implement objectives of the program, DWR is upgrading the island's levees along the San Joaquin River, has contracted with USGS to study subsidence on the island, and is developing a wetlands restoration plan for the island.

DWR and USCE recently began discussing a federal/state cost-sharing program for wetlands restoration at Twitchell Island. USCE has funding for environmental restoration projects at sites on or adjacent to its existing projects (authorized by Section 1135, Water Resources Development Act of 1988).

BAY/DELTA OVERSIGHT COUNCIL

Barbara McDonnell (BDOC)

The Bay/Delta Oversight Council was created by Governor's Executive Order in December 1992 to advise the administration on long-term solutions to problems that have and continue to plague the Sacramento-San Joaquin estuary. The 22 individuals appointed to BDOC represent agricultural interests, urban water agencies, and environmental constituencies.

The Governor has asked BDOC to address issues encompassing water supply, water quality, fish and wildlife restoration, and levee and channel maintenance. He did not set geographical limits within which the BDOC must focus efforts to define solutions. Early indications from BDOC members suggest solutions may be sought in distant parts of California by way of water conservation, water reclamation, and conjunctive use of ground water, in addition to physical solutions within the estuary.

In three meetings so far, BDOC has accepted a work program that calls for setting objectives, defining criteria to measure how well alternative solutions meet the objectives, and developing and analyzing solutions. The Governor set a goal for BDOC to reach consensus and recommend a solution by December 1995. He also mandated that BDOC deliberations be conducted within the framework of the California Environmental Quality Act, which means BDOC must consider the health of the estuary at all stages of its deliberations so the overall environmentally superior solution will be recommended.

During the next 3 months, BDOC will consider issues relating to water quality, fish and wildlife, and water supply. Parties with divergent views will present briefing papers, and BDOC will discuss possible objectives related to those issues. Meetings are scheduled for April 16, May 21, and June 25.

ANNOUNCEMENT

Firms interested in receiving information on consultant contract opportunities with the Bay/Delta Oversight Council should contact Barbara McDonnell, Deputy Executive Officer, at 916/657-2666. Subject areas may include civil engineering, hydrologic modeling, water quality, estuary biology, terrestrial biology, wetlands, historic preservation, environmental impact analysis, and public involvement.

DELTA SMELT

Randy Brown, DWR

On April 5, USFWS listed the Delta smelt as threatened. USFWS prepared a draft biological opinion, which concluded the proposed operation of the SWP and CVP would jeopardize the continued existence of this species of fish. The draft opinion included a reasonable and prudent alternative for 1993, consisting of QWEST and pumping criteria plus studies to provide more information to help determine long-term operational scenarios to protect Delta smelt. The final opinion is expected to be released by the Portland office in early April.

On April 2, the California Fish and Game Commission set in motion a listing process that will result in the Delta smelt being listed as threatened by mid-summer.

USBR, USFWS, DFG, and DWR will soon begin consultation on the biological opinion for long-term operation of the water projects. Consultation will include preparation of a comprehensive biological assessment of the impacts of water project operation on Delta smelt.

DWR and DFG are organizing a workshop to bring participating agencies up to speed on results of research and monitoring efforts by the agencies and consultants. The workshop, originally scheduled for April 8, will be held in Stockton on May 13, and is by invitation only.

TIMES THEY ARE A'CHANGING, AND SO MUST THE INTERAGENCY PROGRAM

Leo Winternitz, DWR

The Interagency Program is 22 years old. The fact it has lived this long indicates its importance to the regulatory, water planning, and fishery agencies, but it does has its problems. Many study elements have continued because "we have always done them". New elements have been added to some studies, sometimes without deference to duplication. The Coordinators are now faced with how to make the Interagency Program relevant in light of the environmental, political, and planning issues of the 1990s.

In October 1992, the Coordinators tackled the problem. They formed a Review Committee and assigned its members to thoroughly review each of the Interagency Program's study elements. The objective is an improved program that is responsive to today's needs, such as the Endangered Species Act, draft water right decisions, Public Law 575, and fishery and water improvement projects.

The Review Committee has reviewed all 31 study elements and has interviewed all the project managers. It has considered recommendations from parties outside the Interagency Program, including Legal and Planning from DWR and the State Water Contractors. The committee intends to have a draft report completed for the Coordinators' review by May 12. Implementation of the revised Interagency Program is scheduled for January 1994.

The Interagency Directors held their annual meeting on April 5 to discuss the overall program. During the briefing, staff emphasized the need to change the program.

PACLIM REPORT

Proceedings of the Ninth Annual Pacific Climate (PACLIM) Workshop are available by calling Mary at 916/323-7203. (Tell her you'd like Technical Report 34.) The proceedings include two interesting articles on the role of ocean temperature on salmon stocks.

As background, the PACLIM workshops have been held each spring at Asilomar since 1984. An interdisciplinary group of atmospheric scientists, hydrologists, oceanographers, and biologists meets to present papers and discuss climate in the eastern North Pacific and western North America and its impacts on hydrologic and biologic properties in the region. The Tenth Annual Workshop was April 4-7.

SUISUN BAY FIELD STUDY

Jon R. Burau, USGS

The relative importance of gravitational circulation and net tidal transport in Suisun Bay in creating salinity gradients and a high-turbidity zone is unknown. Alone, either process is capable of producing the circuitous particle paths that lead to relatively long residence times and accumulations of particles, plankton, and fish larvae. Separating the effects of these physical mechanisms on transport is a necessary step in evaluating freshwater inflow variations.

As part of the Interagency Program Hydrodynamics Element, USGS began a field study in mid-December to quantify the physical transport mechanisms in Suisun Bay. The initial focus is to quantify movement of salt through the bay. Understanding how salt moves will provide a basis for understanding how the more complex non-conservatives are transported and mixed. Then field studies can focus on transport of particles and organisms directly.

"Salt balance" is a term used to describe a balance between those mechanisms that tend to push salt water toward the ocean and those that account for intrusion of salt into the bay. In an estuary as dynamic as Suisun Bay, the salt field is never truly in equilibrium. Nevertheless, the salt balance is a useful concept that collectively refers to all those mechanisms that control salinity distribution within the estuary at any given time. Mechanisms that control the salt balance can be separated into horizontal and vertical processes, even though estuarine flows are fully 3-dimensional.

In the horizontal plane, two mechanisms dominate:

- Tide-induced, large-scale, residual circulation (important in the wide, shallow portions of the estuary), and
- Spatial variations in the tidal velocity distributions (important in the channels).

The first of these mechanisms involves long-term advective processes; the second is primarily a mixing mechanism. Both are controlled by the bathymetry. Because horizontal processes depend on the basin-scale interaction between the salt and velocity fields, these processes can only be realistically studied using numerical models. Therefore, numerical simulations of the salt field will be used to determine the extent to which horizontal processes control salinity distributions in Suisun Bay.

Vertical processes, on the other hand, are confined to the channels and can be effectively studied using relatively few data collection locations. Vertical processes that contribute to the salt balance include gravitational circulation, strain-induced stratification, and shear/buoyancy interaction. Field work this winter was designed to show how these processes influence the transport and mixing of salt within the system. The field study is still in progress.

Three Acoustic Doppler Current Profilers were deployed along the main channel in Suisun Bay, with stations at Chipps Island, near the naval weapons station at Port Chicago, and at Point Edith. The ADCPs sit on the bottom and collect a velocity profile every 10 minutes. Top and bottom salinity are also being collected at each site.

Configured along the landward/seaward axis of the estuary, the instruments should reveal the longitudinal variability in the vertical structure of the salt and velocity fields at the tidal and residual time scales in response to winter outflow. The instruments will generate single-point estimates of the gravitational circulation that may show how effectively gravitational circulation transports salt in Suisun Bay. Null zone position could be determined as it passes instrument locations. Importance of strain-induced stratification on gravitational circulation and vertical mixing may be inferred from simultaneous velocity and salinity information.

In addition, data from two arrays of Endeco current meters in Suisun Cutoff channel and in the channel between Roe and Ryer islands should permit an estimate of the salt flux through the northern part of Suisun Bay. Finally, data from two Endeco velocity meters and a salinity sensor deployed at the shoal/channel interface in Honker Bay will allow estimates of the exchange between the channel and shallows.

Data from the 17 instruments deployed in this experiment, plus compliance monitoring data from Mallard Island and Martinez, should give a fairly detailed picture of the vertical contribution to the longitudinal salt balance. All of the instruments deployed will be recovered in mid-May.

HYDROLOGY AND PUMPING

Sheila Greene, DWR

Figure 3 illustrates Delta inflows and outflows and project pumping over the past year. Winter 1993 has had the highest flows since 1986, and flows on the Sacramento River are expected to remain relatively high through May.

DWR recently released DAYFLOW for water year 1992. If you would like a copy, contact Sheila Greene at 916/323-8978.

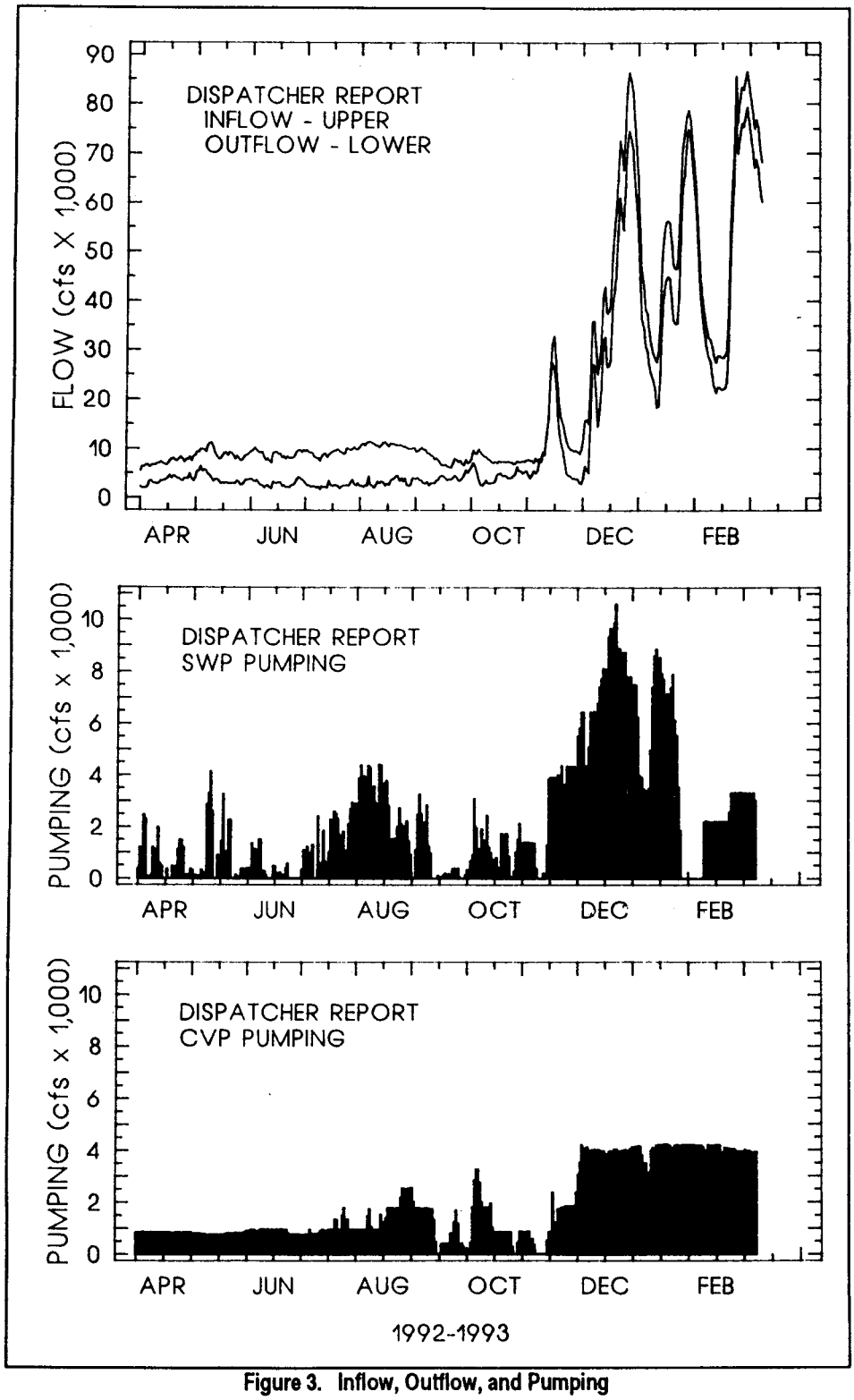

Figure 3. Inflow, Outflow, and Pumping

ESTUARY, NEWS OF THE ECOSYSTEM

The San Francisco Estuary Project recently launched a newsletter for activists, politicians, agencies, business people, and citizens interested in environmental protection of the estuary. The 8-page newsletter provides bimonthly briefs on what is being done on fronts such as wetlands, dredging, freshwater flows, fish and wildlife, endangered species, creek restoration, and pollution prevention. The goal is to put all these issues in a single context — the estuary ecosystem. The newsletter includes a calendar of public hearings and events, a list of recently published scientific studies, and opinion columns.

If you have a story idea for this new newsletter or if you'd like a sample copy, please call *ESTUARY* at 510/286-4392.

COMPMECH STRIPED BASS WORKSHOP

Webb Van Winkle of the Oak Ridge National Laboratory is organizing a June workshop in New York to review progress in the Electric Power Research Institute's striped bass component of its national program on compensatory mechanisms in fish mortality. This program involves building individual based striped bass models for striped bass populations in the Hudson River, Chesapeake Bay, Cooper-Santee (South Carolina), and Sacramento-San Joaquin estuary. Attendees from all four areas will review progress and discuss future directions. This is the third year of Interagency Program involvement in this effort and the final year of a DWR-funded contract with the University of South Carolina to provide the services of Dr. James Cowan. Dr. Cowan has a preliminary striped bass model for the Bay/Delta.