Academic research, delta smelt, and public policy: a personal history

Peter Moyle

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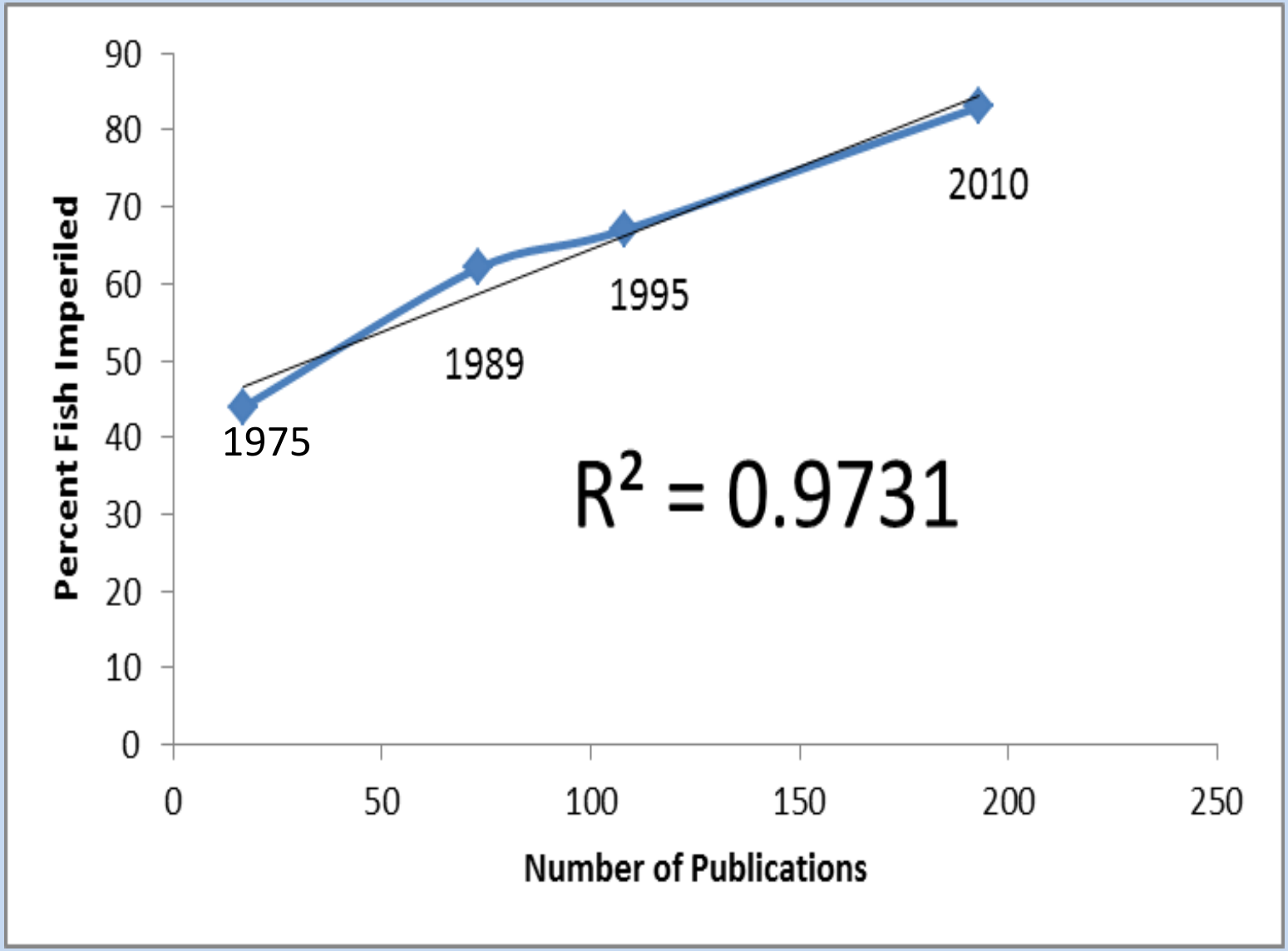
Native Delta Fishes

Relationship between cumulative publications of Peter Moyle and fish imperilment in California



OCCURRENCE OF KING (CHINOOK) SALMON IN THE KINGS RIVER, FRESNO COUNTY

California Fish & Game 56(4): 314-315

M.Sparkman

REPRINT FROM
Calif. Fish and Game 56(4): 314–315. 1970.

OCCURRENCE OF KING (CHINOOK) SALMON IN THE KINGS RIVER, FRESNO COUNTY

On April 3, 1970, three small (10.5–11.0 cm, TL) king salmon, *Oncorhynchus tshawytscha*, were taken from Mill Creek, about 150 m above its confluence with the Kings River, by myself and students of my Ichthyology class. The mouth of Mill Creek is about 2 km below Pine Flat Dam. The presence of salmon in the Kings River drainage has not been reported since the fall of 1942 when Chester Woodhull and William A. Dill, biologists with the Department of Fish and Game, collected small king salmon in the same general area from which the present fish were taken (unpublished report, 1942).

The king salmon has probably not been a regular member of the fish fauna of the Kings River for many decades, if ever. The river drains into Tulare Lake which is connected to the San Joaquin River, by Fresno Slough, only during years of high water. Thus, any salmon in the Kings River would most likely be strays from the yearly run up the San Joaquin River. Nevertheless, the 1942 report by Woodhull and Dill indicates that previous to 1927, when a direct connection to the San Joaquin River, the Kings River by-pass, was constructed, salmon occasionally went up the Kings River during the high water years. It would seem likely that this occurred more often before irrigation diversions reduced flows in the lower part of the Kings River. After 1927, salmon runs occurred with greater frequency, especially noticeable runs occurring in 1927, 1938 and 1940. No runs have been noticed in recent years, presumably because the construction of Friant Dam has resulted in decreased flows into the San Joaquin River since 1946, thus virtually eliminating the San Joaquin run that was the source of the Kings River salmon. However, the winter of 1968–69 was one of exceptionally high precipitation and run off, and the high water allowed a few king salmon to reach the upper San Joaquin region. On July 1, 1969, a 30 inch male king salmon was caught by an angler below Friant Dam (D. Christenson, pers. comm.).

Apparently a few king salmon also made it up the Kings River, where they spawned. It is possible that salmon were present in the Kings River in other years after 1942 as well, but they went by unnoticed simply because no one had looked for them.

The three present salmon were taken from a large pool in Mill Creek which had a temperature of 21 C. The temperature of the Kings River was 13 C. Aside from this temperature difference, there was nothing to prevent the salmon from entering the Kings River. Other fish collected from the Creek, in approximate order of abundance, were: Sacramento squawfish (*Ptychocheilus grandis*), California roach (*Hesperoleucus symmetricus*), green sunfish (*Lepomis cyanellus*), Sacramento sucker (*Catostomus occidentalis*), carp (*Cyprinus carpio*), rainbow trout (*Salmo gairdnerii*), smallmouth bass (*Micropterus dolomieu*), white catfish (*Ictalurus catus*), largemouth bass (*M. salmoides*), golden shiner (*Notemigonus crysoleucas*), and bluegill (*Lepomis macrochirus*).—*Peter B. Moyle, Department of Biology, Fresno State College, Fresno, California 93710. Accepted June 1970.*

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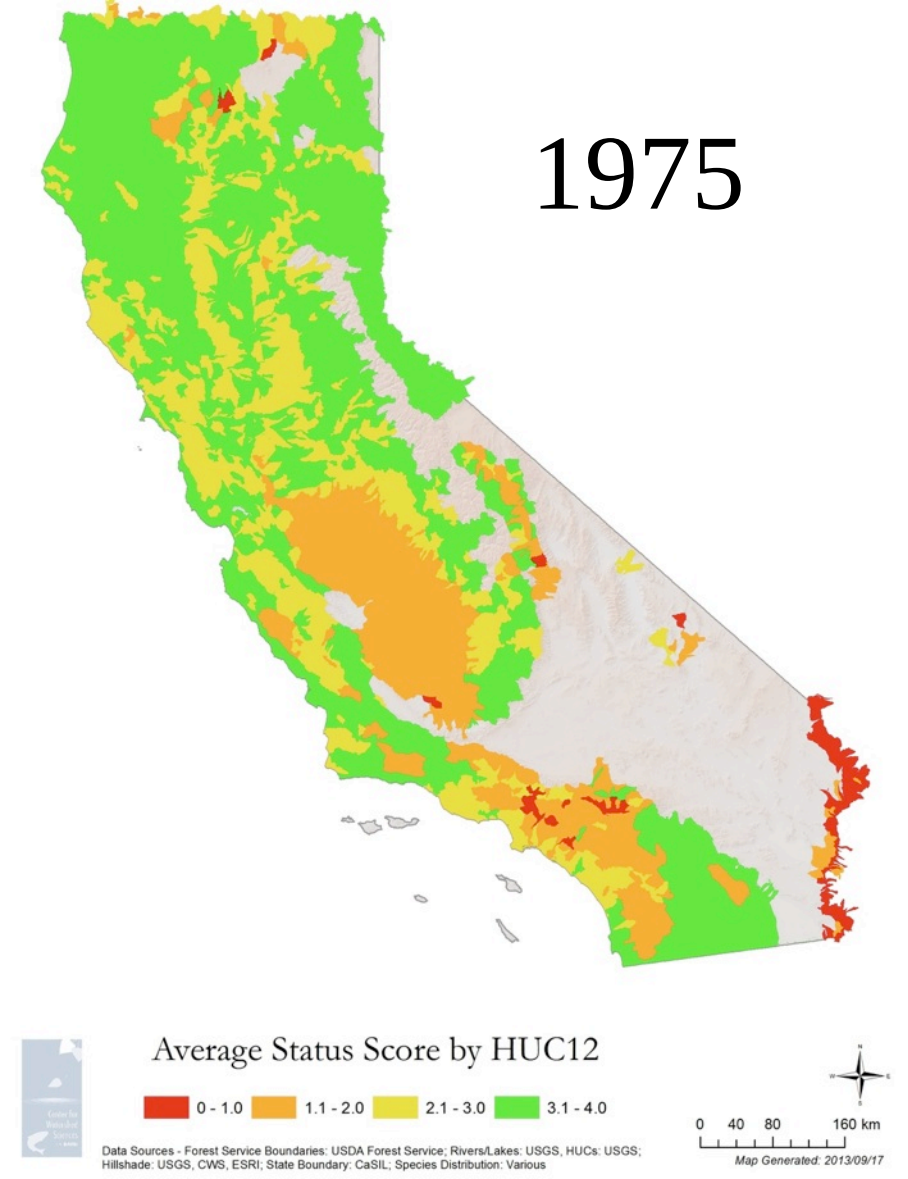
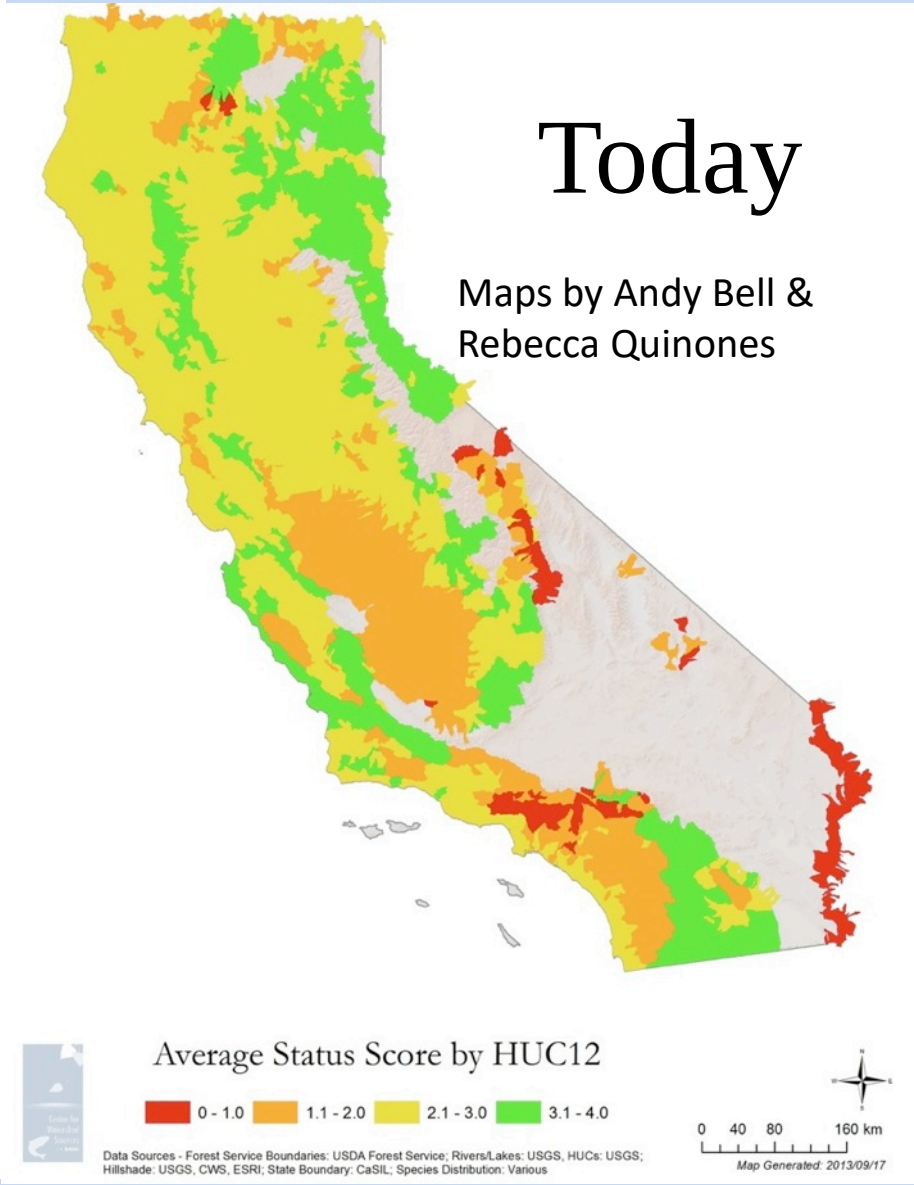
Inland Fishes OF CALIFORNIA

Peter B. Moyle





AVERAGE STATUS SCORES: NATIVE FISHES

GREEN – BEST RED - WORST

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Env. Biol. Fish. Vol. 7, No. 3, pp. 229–242, 19

Life history characteristics of tule perch (*Hysterocarpus traski*) populations in contrasting environments

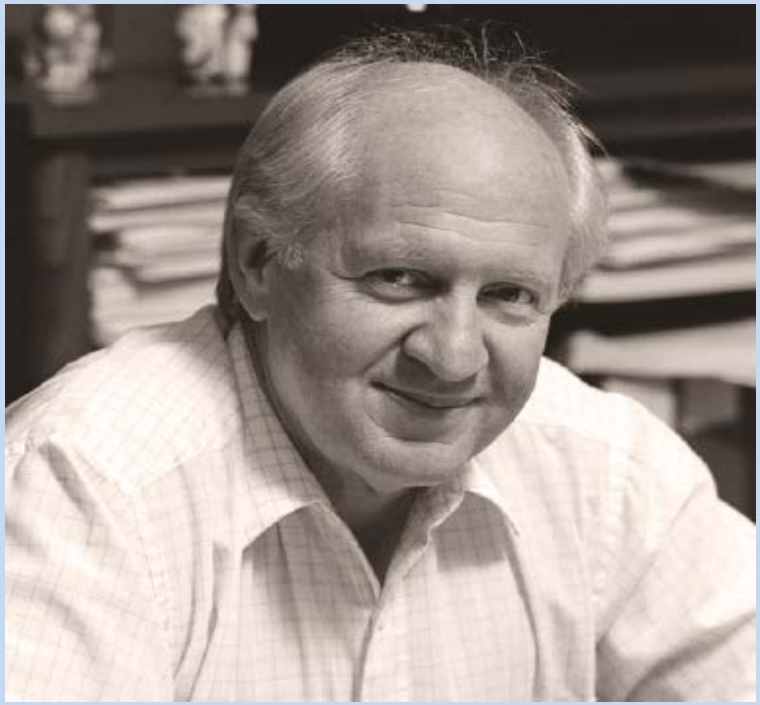
Donald M. Baltz & Peter B. Moyle

Department of Wildlife and Fisheries Biology, University of California, Davis, CA 95616, U.S.A.

1982 Environmental Biology of Fishes 7(3):229-42.

Goals of Suisun Study

- Monitor fish populations
- Understand communities
- Train students



Dr Randy Brown 1937-2006

LIFE HISTORY OF SPLITTAIL (CYPRINIDAE: *POGONICHTHYS MACROLEPIDOTUS*) IN THE SACRAMENTO-SAN JOAQUIN ESTUARY[1]

The Sacramento-San Joaquin estuary is the largest on the west coast of North America. Because of its comparatively young geologic age, <8,000 yr (Atwater 1979), its fish fauna is a mixture of native freshwater and marine species, to which numerous exotic species have been added in the past 100 yr (Moyle 1976). The ranges of two extant species, the delta smelt, *Hypomesus transpacificus*, and the splittail, *Pogonichthys macrolepidotus*, are restricted to the estuary. Both species are abundant but their biology is nevertheless poorly known, since most fisheries research in the estuary has concentrated on species of major economic importance, especially the introduced striped bass, *Morone saxatilis* (Stevens 1980; Collins 1982).

The fish communities of the estuary are changing, however, as new species are introduced and as con-

Daniels & Moyle
1983
Fisheries Bulletin

Transactions of the American Fisheries Society 123:498–507, 1994
American Fisheries Society

Changes in Abundance and Distribution of Native and Introduced Fishes of Suisun Marsh

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PATTERNS IN DISTRIBUTION AND ABUNDANCE OF A NONCOEVOLVED ASSEMBLAGE OF ESTUARINE FISHES IN CALIFORNIA

PETER B. MOYLE,[1] ROBERT A. DANIELS,[2] BRUCE HERBOLD,[1]
AND DONALD M. BALTZ[3]

ABSTRACT

The patterns of distribution and abundance of the fishes of Suisun Marsh, a portion of the Sacramento-San Joaquin estuary in central California, were studied over a 54-month period. Total fish abundance in the marsh exhibited strong seasonality; numbers and biomass were lowest in winter and spring and highest in late summer. Freshwater inflow was highest in the winter and lowest in late summer, when salinities and temperatures were highest. Twenty-one species were collected on a regular basis; the 10 most abundant were *Morone saxatilis, Pogonichthys macrolepidotus, Gasterosteus aculeatus, Hysterocarpus traski, Cottus asper, Spirinchus thaleichthys, Acanthogobius flavimanus, Catostomus occidentalis, Leptocottus armatus*, and *Platichthys stellatus*. Another 21 species occurred in small numbers on an irregular basis. Twenty of the 42 species had been introduced to California since 1879. Of the 21 common species, 14 were residents, 4 were winter seasonals, and 3 were spring/summer seasonals. The resident species fell into two groups: a group of native species that were concentrated in small dead-end sloughs and a group of native and introduced species that were most abundant in the larger sloughs. The seasonal species were also a mixture of native and introduced species. Total fish abundance and species diversity declined through the study period, which seemed to be related to strong year classes of some species early in the study and the prevalance of freshwater conditions late in the study. The structure of the fish assemblage was fairly consistent over the study period but changes are expected in the near future. The structure of the Suisun Marsh fish assemblage was similar to that found in other river-dominated estuaries, despite the mixture of native and introduced species.

tive, and seasonal fish groups,
ı, a portion of the San Francisco
ıflow and increases in salinity.
ons in introduced and seasonal
species were found more often
loughs, and introduced species
dictable than in an earlier (and
introduced species with similar
creasing water diversions from
ɔwfin goby *Acanthogobius flavi-*
in recent years, whereas other
eflect estuary-wide changes and
| species are altering fish com-

Transactions of the American Fisheries Society 121:67–77, 1992

1992.

Transactions American Fisheries Soc. 121: 67-77

Life History and Status of Delta Smelt in the Sacramento–San Joaquin Estuary, California

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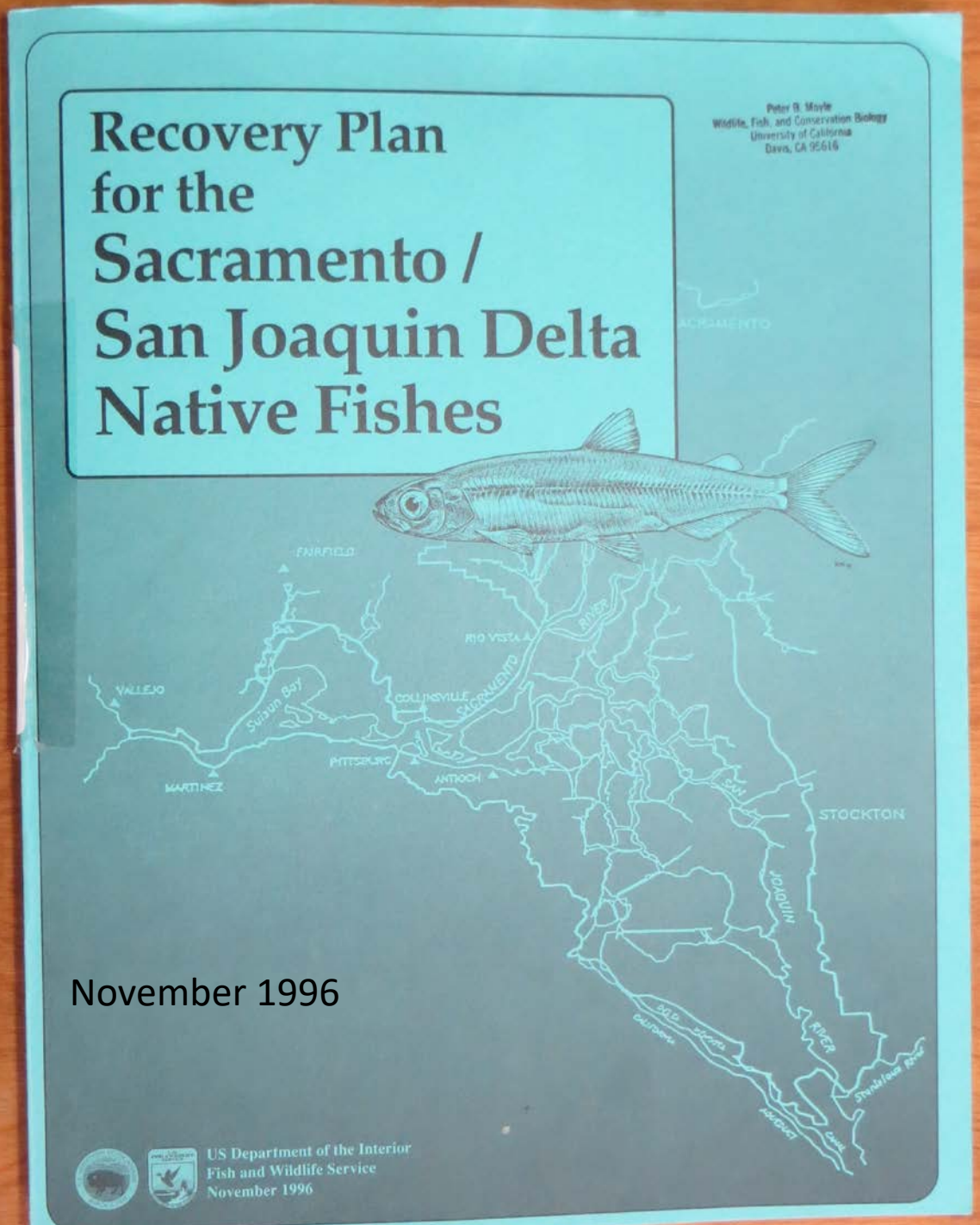
4001 North Wilson Way, Stockton, California 95205, USA

Abstract.—The delta smelt *Hypomesus transpacificus* is endemic to the upper Sacramento–San Joaquin estuary. It is closely associated with the freshwater–saltwater mixing zone except when it spawns in fresh water, primarily during March, April, and May. The delta smelt feeds on zooplankton, principally copepods. Its dominant prey was the native copepod *Eurytemora affinis* in 1972–1974 but the exotic copepod *Pseudodiaptomus forbesi* in 1988. Because the delta smelt has a 1-year life cycle and low fecundity (mean, 1,907 eggs/female), it is particularly sensitive to changes in estuarine condit 1981 throughout the delt sities. Surveys encompass 1983. After 1983, howeve nsities throughout most of in the diversion of inflowi ricted the mixing zone to eased the entrainment of nable population size is li nance of net seaward flow sent.

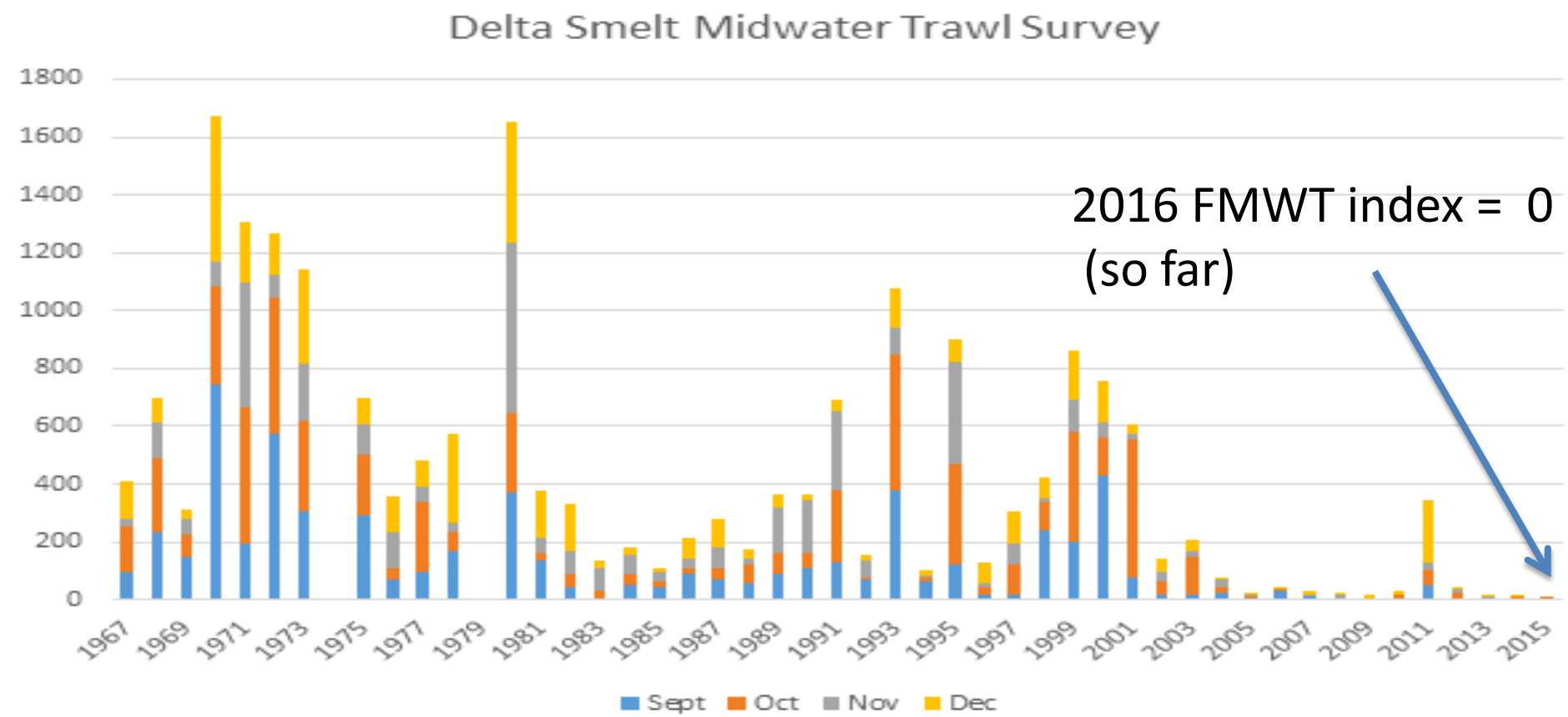


November 1996

Delta smelt
Longfin smelt
Sacramento splittail
Green sturgeon
Spring run Chinook
Late-fall run Chinook
SJ fall run Chinook
Sacramento perch

Delta smelt: extinction in wild is likely

Graph by Tom Cannon



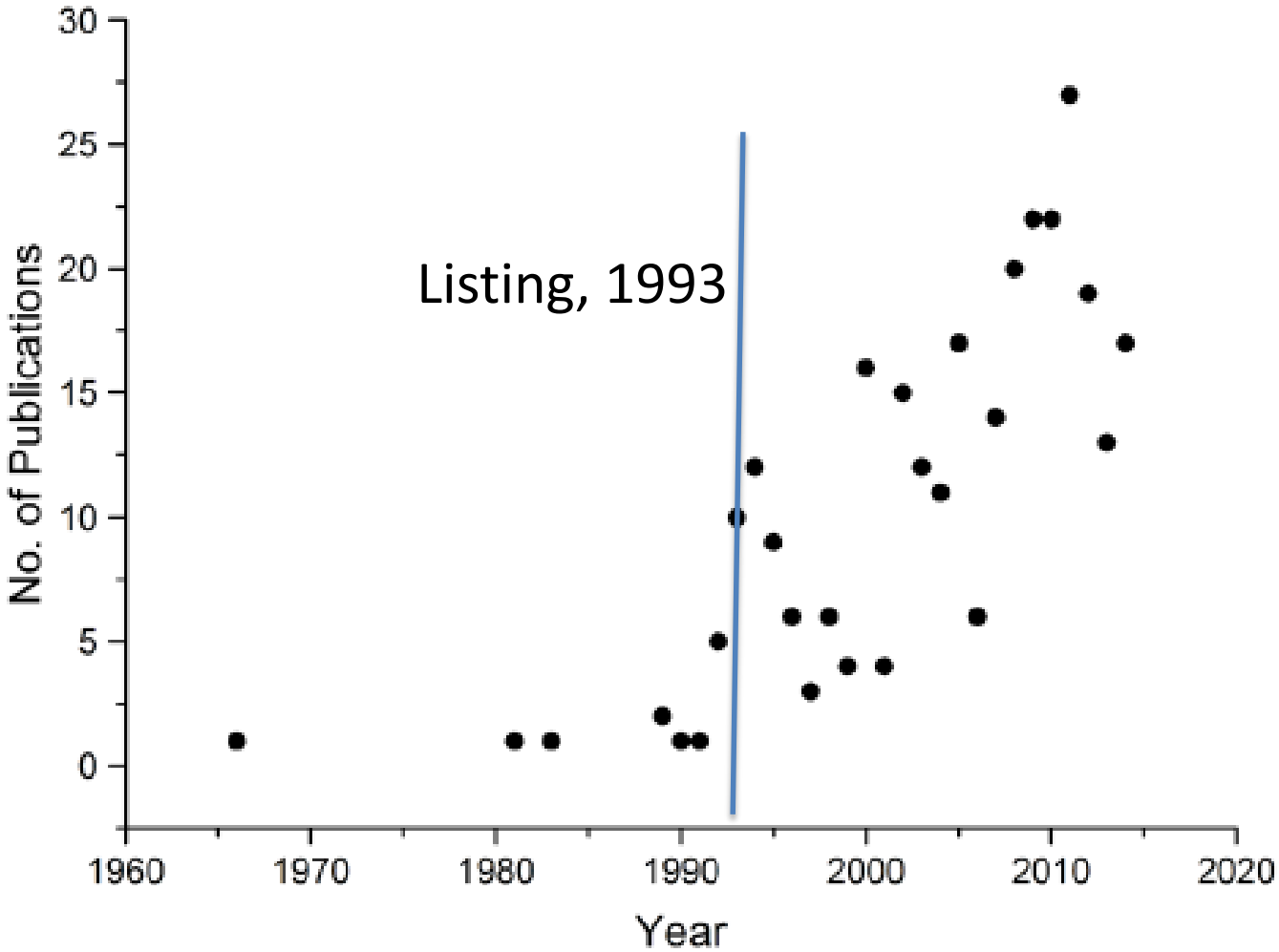
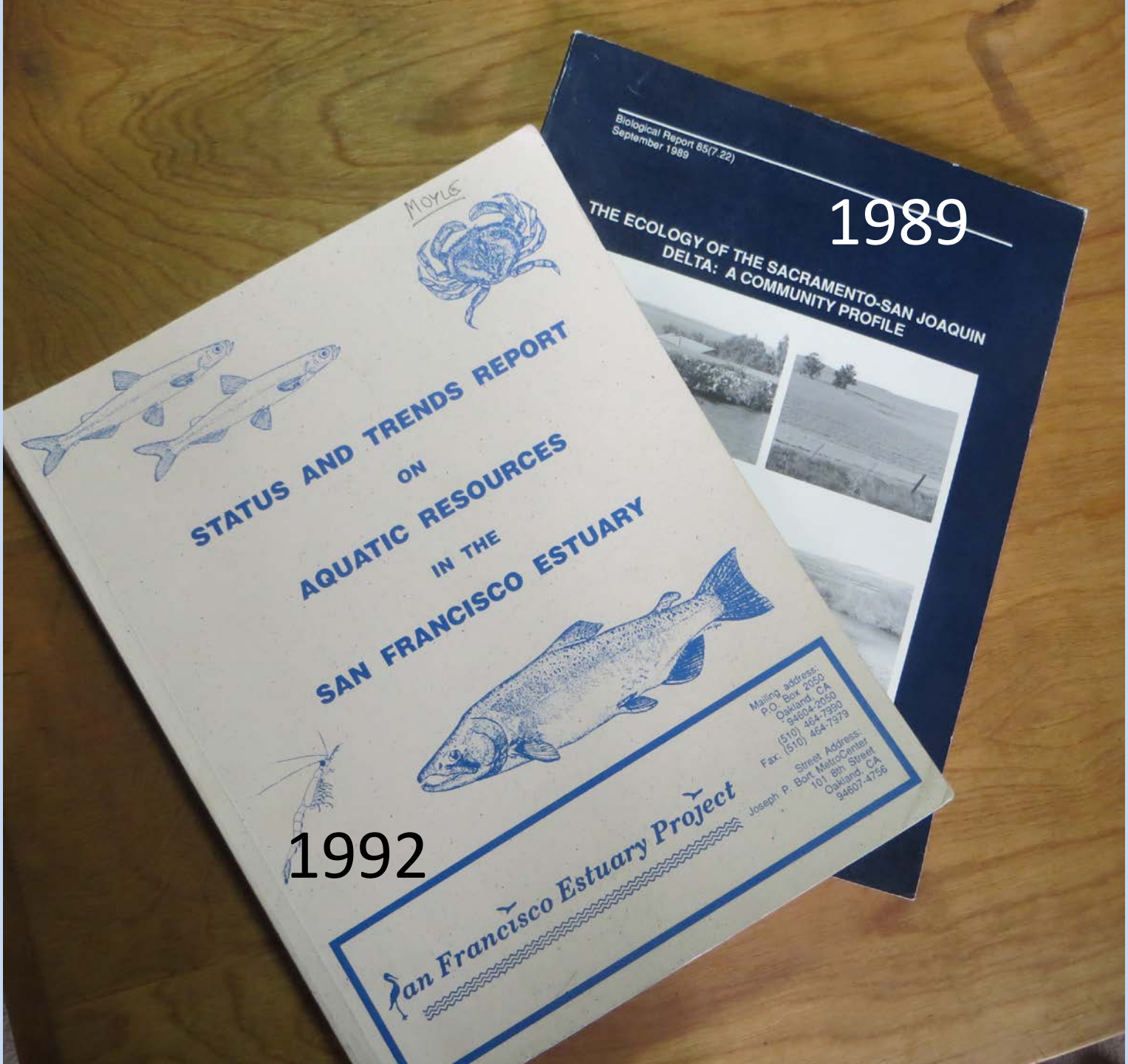


Figure 1 Number of peer-reviewed publications referring to Delta Smelt, by year. Data (from Google Scholar) include only publications with at least one citation.


Biological Report 85(7.22)
September 1989
THE ECOLOGY OF THE SACRAMENTO-SAN JOAQUIN DELTA: A COMMUNITY PROFILE
1989
MOYLE
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1992
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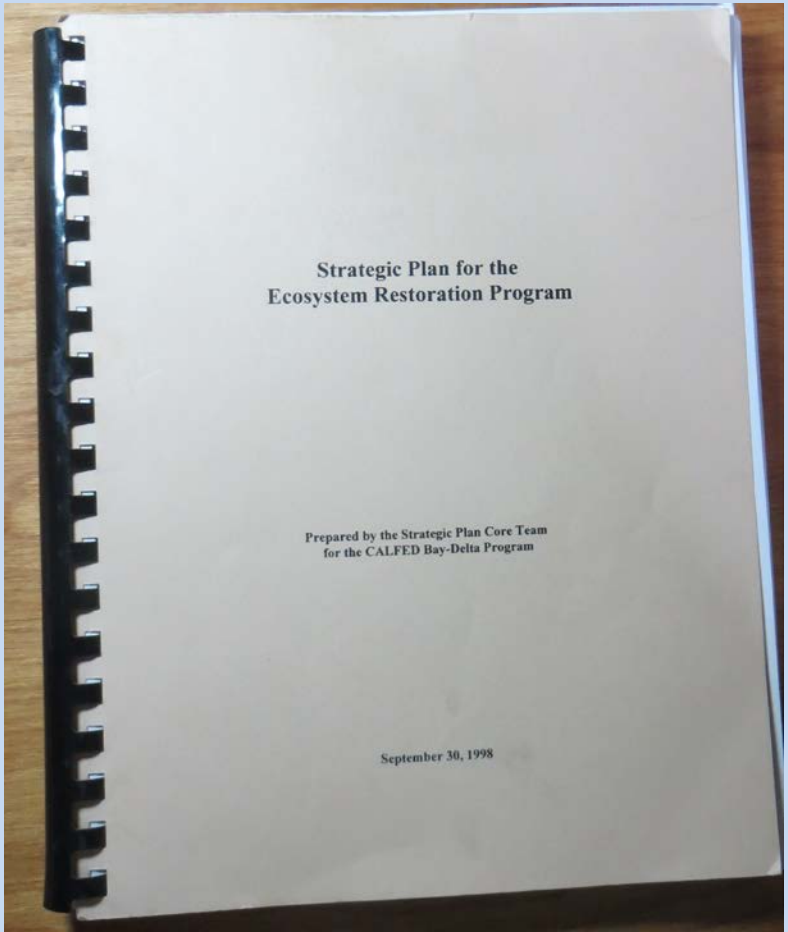
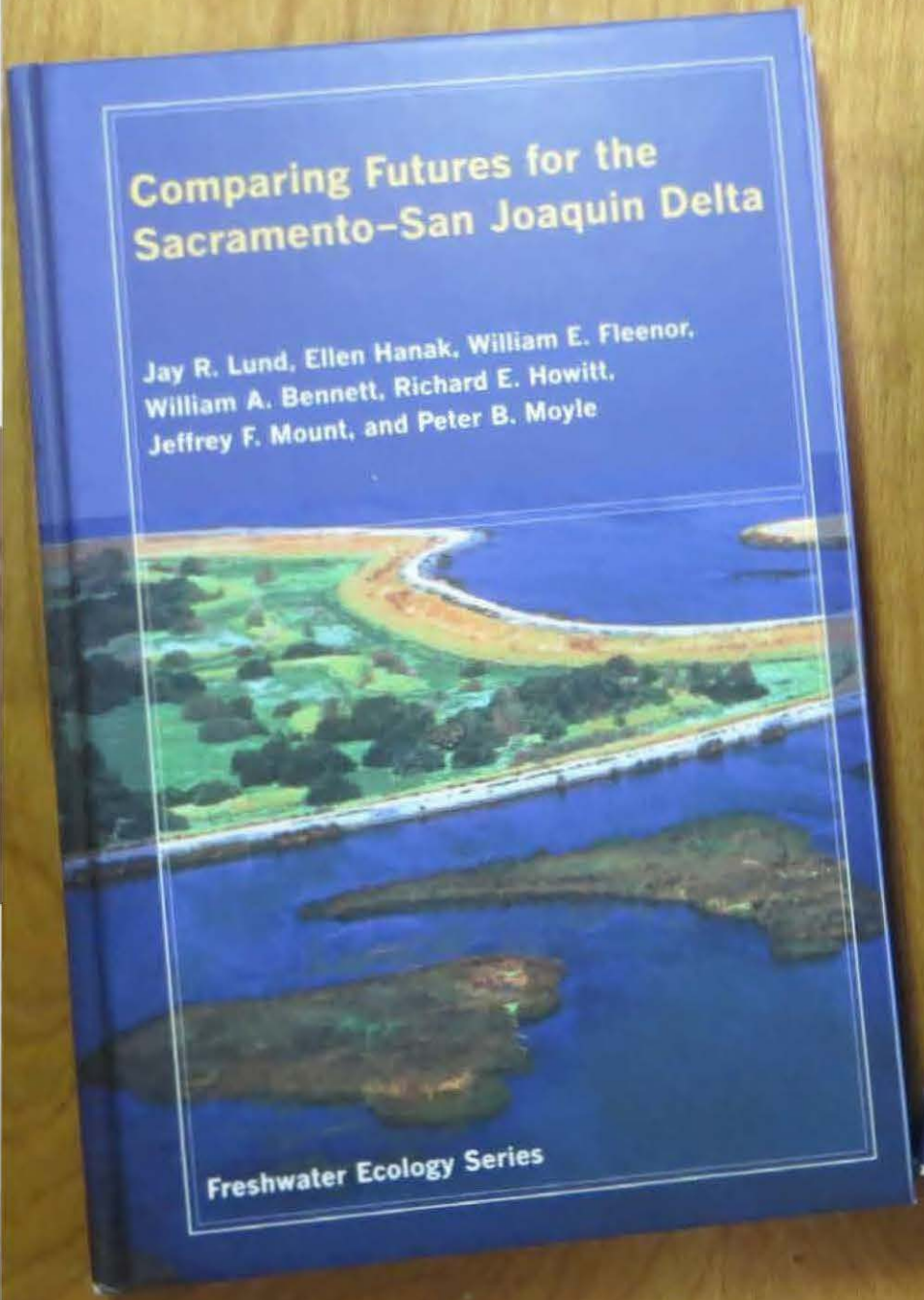
Strategic Plan for the Ecosystem Restoration Program -1998

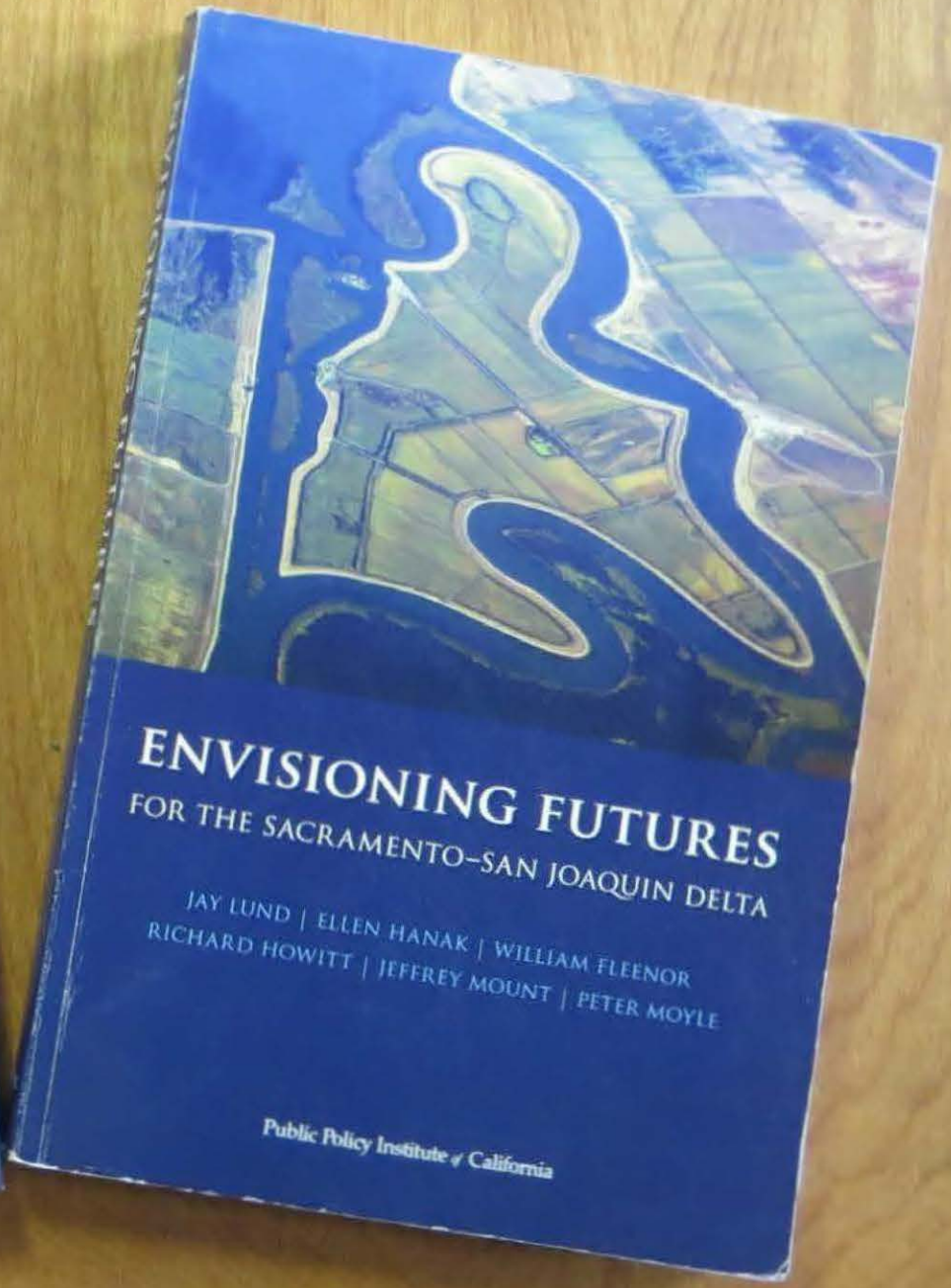


Strategic Plan Core Team

For the CALFED Bay-Delta Program

Michael Healey
Wim Kimmerer
Matt Kondolf
Rod Meade
Peter Moyle
Bob Twiss


Comparing Futures for the Sacramento–San Joaquin Delta
Jay R. Lund, Ellen Hanak, William E. Fleenor, William A. Bennett, Richard E. Howitt, Jeffrey F. Mount, and Peter B. Moyle
Freshwater Ecology Series


ENVISIONING FUTURES
FOR THE SACRAMENTO–SAN JOAQUIN DELTA
JAY LUND | ELLEN HANAK | WILLIAM FLEENOR
RICHARD HOWITT | JEFFREY MOUNT | PETER MOYLE
Public Policy Institute of California

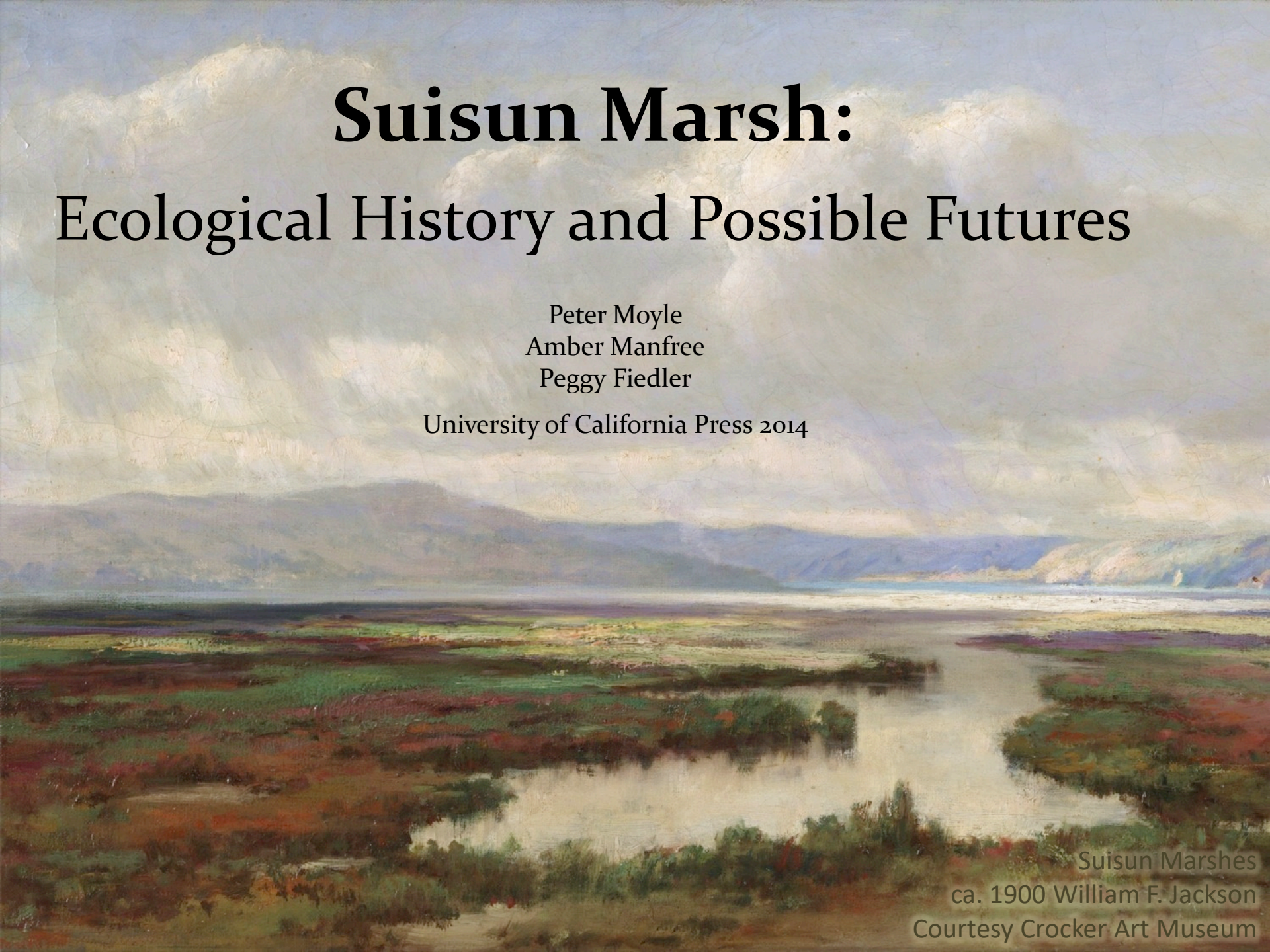

March 2007

Suisun Marsh:

Ecological History and Possible Futures

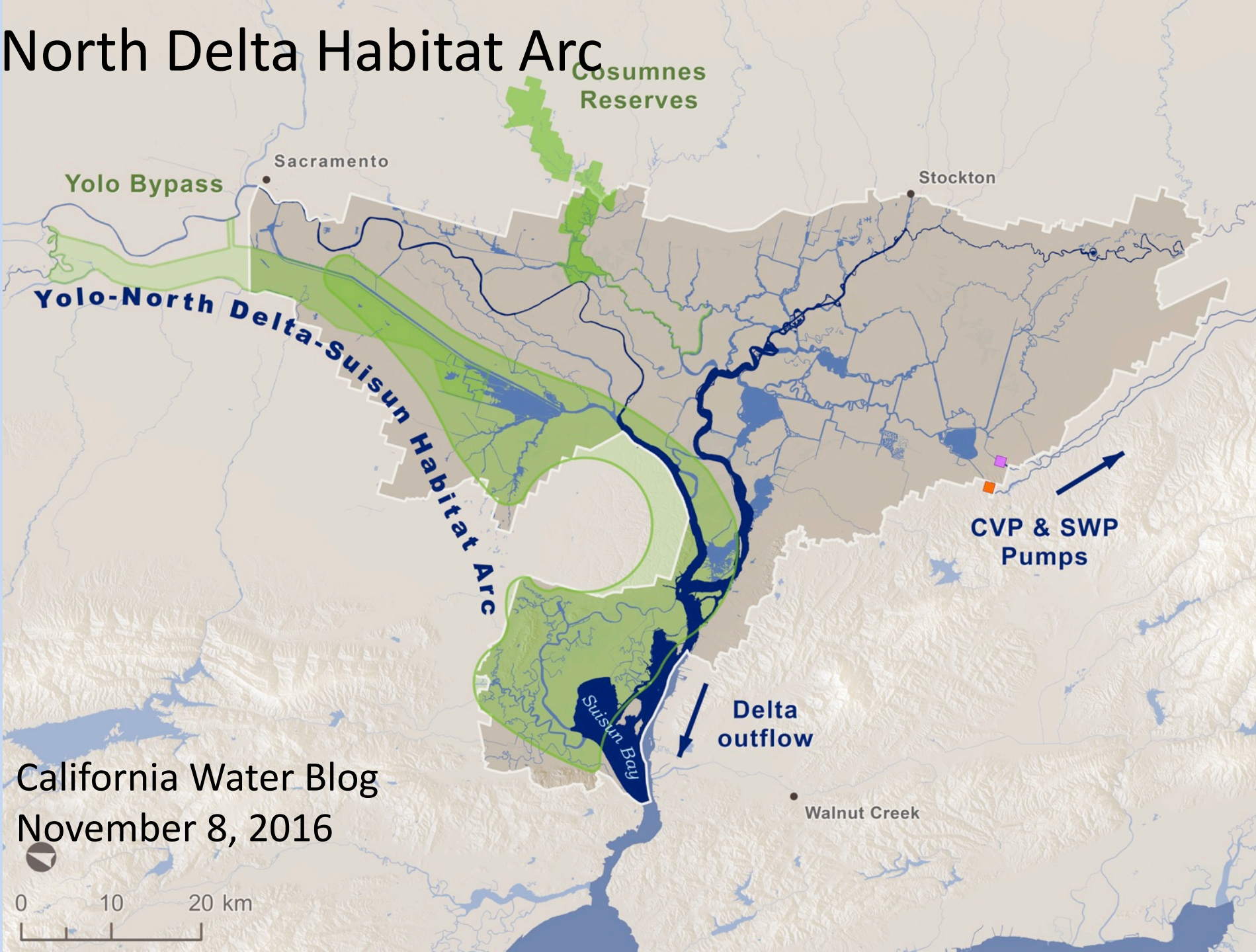
Peter Moyle
Amber Manfree
Peggy Fiedler

University of California Press 2014



Suisun Marshes
ca. 1900 William F. Jackson
Courtesy Crocker Art Museum

North Delta Habitat Arc



California Water Blog
November 8, 2016

Thanks for listening

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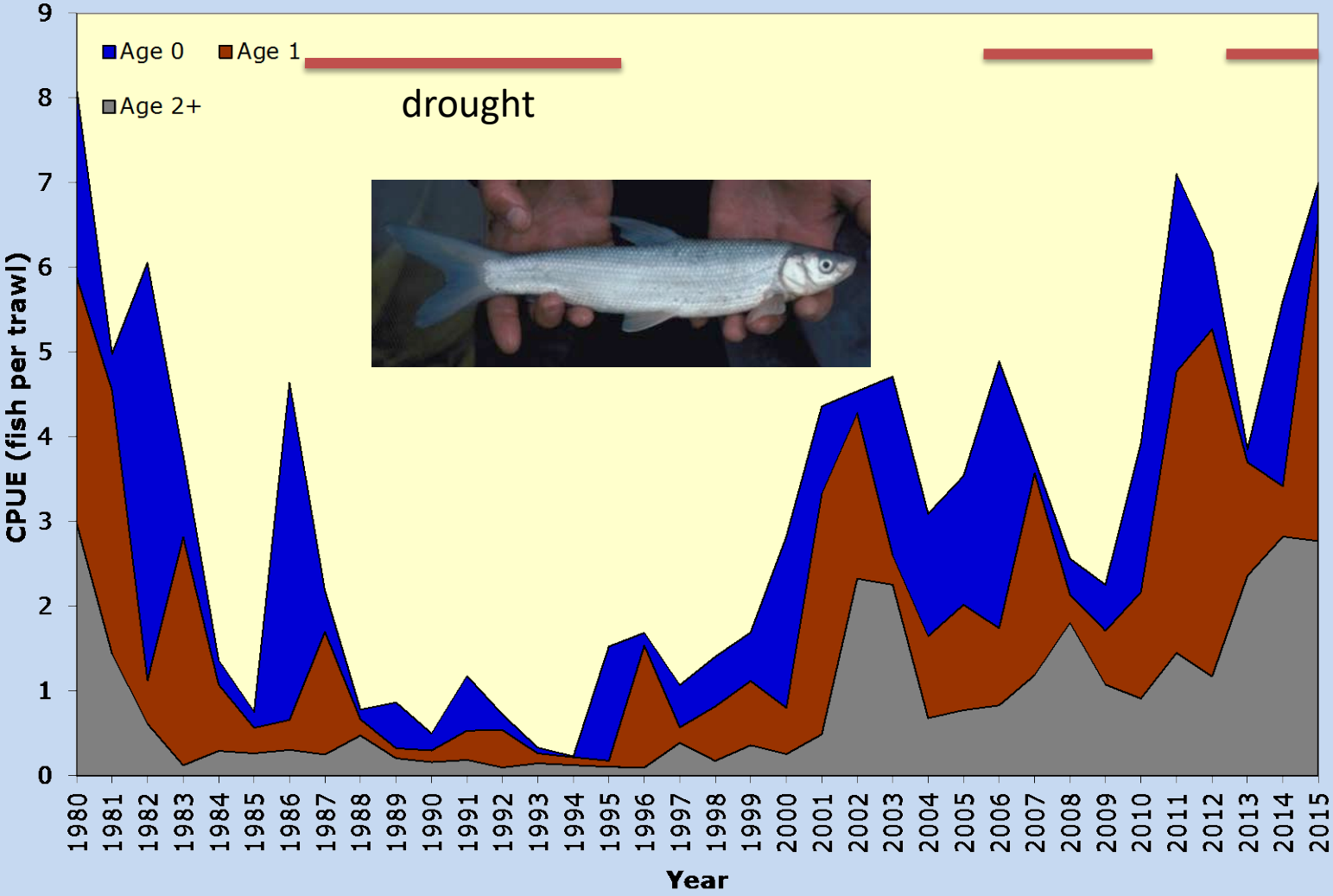
Splittail – Suisun Marsh



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Biology and Population Dynamics of Sacramento Splittail (*Pogonichthys macrolepidotus*) in the San Francisco Estuary: A Review

Peter B. Moyle[1], Randall D. Baxter[2], Ted Sommer[3], Ted C. Foin[4], and Scott A. Matern[5]

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