Salinas Valley Water Project Flow Prescription for Steelhead Trout in the Salinas River

Monterey County Water Resources Agency
893 Blanco Circle
Salinas, CA 93901

October 11, 2005

Salinas Valley Water Project
Flow Prescription
for Steelhead Trout in the Salinas River

Prepared By:
Monterey County Water Resources Agency
Chris Moss, Associate Water Resources Engineer
Howard Franklin, Principal Hydrologist
Germán Criollo, Senior Hydrologist
Robyn Gingerich, Water Resources Technician
Jason Demers, Water Resources Technician

Hagar Environmental Science
Jeff Hagar, Senior Fisheries Biologist

With Technical Support From:
RMC Water & Environment, Inc.
WRIME, Inc.
ENTRIX, Inc.

October 11, 2005

Table of Contents

List of Tables

List of Figures

Appendices

List of Acronyms and Abbreviations

AF	acre-feet
CCC	Criterion Continuous Concentration
CCRWQCB	Central Coast Regional Water Quality Control Board
CDFG	California Department of Fish and Game
cfs	cubic feet per second
CMC	Criterion Maximum Concentration
CVRWQCB	Central Valley Regional Water Quality Control Board
DPR	California Department of Pesticide Regulation
ESA	Federal Endangered Species Act
GC	gas chromatograph
HES	Hagar Environmental Science
msl	mean sea level
NMFS	National Marine Fisheries Service
MCWRA	Monterey County Water Resources Agency
ng/L	nanograms per liter (or parts per trillion)
NGVD	National Geodetic Vertical Datum
OSR	Old Salinas River
Q	annual mean flows
RPD	relative percent difference
SRDF	Salinas River Diversion Facility
SVIGSM	Salinas Valley Integrated Groundwater and Surface water Model
SVWP	Salinas Valley Water Project
TMDL	Total Maximum Daily Load
USGS	United States Geological Survey
WSE	water surface elevation

Introduction

ESA Section 7 Consultation with the National Marine Fisheries Service (NMFS) for the Salinas Valley Water Project (SVWP) has resulted in the specific rates and timing of flows described herein for steelhead trout (*Oncorhynchus mykiss*) in the Salinas River. This Flow Prescription is considered a stand-alone document, which may be modified upon mutual agreement of the Monterey County Water Resources Agency (MCWRA) and NMFS outside formal ESA Consultation.

Guiding Principles

The Flow Prescription referenced herein contains flow requirements for steelhead trout (*Oncorhynchus mykiss*) in the Salinas River.

MCWRA management of Salinas River flows for steelhead trout is based on the following principles:

a. MCWRA is the public agency charged with the long-term management and preservation of water resources in the Salinas Valley. The Salinas Valley groundwater basin serves the needs of all water users. The primary goals of the Salinas Valley Water Project (SVWP) are to:

   - Stop seawater intrusion,
   - Improve the long-term hydrologic balance between recharge and withdrawal, and
   - Provide a sufficient water supply to meet existing needs and to serve as the foundation to meet future water needs.

   This Flow Prescription takes into account meeting the above project goals.

b. MCWRA is responsible for flood control within Monterey County, as mandated by the State of California, and defined in its Agency Act. Flood prevention operations place responsibility on MCWRA in the event of large floods. Therefore, any releases of water from Nacimiento or San Antonio Reservoirs will be made with consideration given first to safety, including flow conditions and the structural integrity of Nacimiento and San Antonio Dams.

c. As its primary priority, this proposal targets providing steelhead migration to and from the lower Salinas River Basin, which includes the Arroyo Seco and the lower Nacimiento River, and Monterey Bay, through the mainstem of the Salinas River. Steelhead Trout passage and habitat is known to occur in the upper Arroyo Seco. Spawning and rearing habitat in the Arroyo Seco is recognized to be the highest quality and most accessible in the lower Salinas River Basin. Releases of water from Nacimiento and San Antonio Reservoirs in efforts to facilitate such passage will provide benefits in and passage to the Arroyo Seco, lower Nacimiento River and other potential habitat areas of the upper Salinas River.

d. An adaptive management approach is essential to ensuring the proposed actions achieve their desired effects, because

   i. The natural hydrology and hydraulics of the Salinas Valley system are highly variable, and MCWRA has the ability to influence only a portion of this system;

   ii. It will take time to fully understand how the project will affect the primarily natural, yet partially man-altered, hydrologic and hydraulic Salinas Valley system;

iii. A typical steelhead life-cycle is on the order of 4 to 5 years, with a high degree of variability; and
iv. It will take time to fully understand how project operations benefit one species of fish without severe harm being caused to other beneficial water uses within the system.

e. The Arroyo Seco is largely an unregulated river; meaning surface water flows are natural and not controlled in any fashion. Therefore, this proposal provides triggers and methodologies for allowing passage into and out of the Arroyo Seco to and from the ocean through the mainstem Salinas River.

f. Because of the variability of the natural hydrologic and hydraulic system under consideration, this proposal relies on well-defined passage event triggers for reservoir releases related to adult steelhead upstream migration and smolt outmigration.

g. This proposal utilizes U.S. Geological Survey (USGS) stream gage data from the Arroyo Seco near Soledad and the Arroyo Seco below Reliz gages as a basis for triggering and counting adult upstream fish passage events in the Arroyo Seco and Salinas Rivers. Fish passage and count observations in the Carmel River indicate that a flow of 340 cubic feet per second (cfs) or greater at the Arroyo Seco near Soledad USGS Gage during the months of January, February and March may indicate that adult steelhead trout are ready to move up the Salinas River from Monterey Bay (NMFS, April 2005). Because of the high recharge capacity of the lower reaches of the Arroyo Seco, a trigger of 173 cfs at the Arroyo Seco below Reliz gage is a more precise indicator of basin readiness to receive fish and fish passage into the Arroyo Seco.

h. This flow prescription for steelhead trout was evaluated using the Salinas Valley Integrated Groundwater and Surface water Model (SVIGSM), Version 6.2, which provides a representation of groundwater-flow conditions and stream flows in the Salinas River, Arroyo Seco and other tributaries, and the interaction between the surface water and groundwater in the lower Salinas Valley Basin. This version of the SVIGSM was modified to incorporate features required to best characterize the hydrology of the Salinas River and its interaction with the groundwater system. Though the SVIGSM is considered a planning tool and its results are considered estimates only, MCWRA believes that the SVIGSM is the best available tool for evaluation of whether this flow prescription meets the goals stated in item (a) above.

   SVIGSM results of June 23, 2005 #4C were used in development of this Flow Prescription.

Nacimiento and San Antonio Combined Reservoir Storage

Combined reservoir storage refers to the total water stored in Nacimiento and San Antonio Reservoirs. The following combined reservoir storage must occur before releases of water will be made from Nacimiento and/or San Antonio Reservoirs for steelhead flows in the Salinas River:

(a) Releases of water from Nacimiento and/or San Antonio Reservoirs will be made when combined water storage is 220,000 acre-feet or more (total storage in Nacimiento plus total storage in San Antonio). At such time when combined storage surpasses 220,000 acre-feet, releases will be made in accordance with triggers and flow criteria described in the Adult Upstream Migration and Juvenile Passage to the Lagoon sections; and

(b) Releases of water from Nacimiento and/or San Antonio Reservoirs will be made for engineered smolt outmigration flows when combined water storage is 150,000 acre-feet or more (total storage in Nacimiento plus total storage in San Antonio), as described in the Smolt Outmigration Section.

The above 220,000 acre-feet minimum combined storage value is derived from the sum of the following water uses:

Average annual conservation releases from reservoirs with the Project operational (BA p. 2-8, Entrix, 2002) ……………………………………...	172,000 acre-feet
Average annual irrigation diversion (DEIR/EIS p. 1-9, EDAW, 2001)………	9,700 acre-feet
Nacimiento Reservoir minimum pool……………………………………...	22,300 acre-feet
San Antonio Reservoir dead pool……………………………………………..	10,000 acre-feet
Approximately two months minimum releases from Nacimiento and San Antonio Reservoirs……………………………………………………………	6,000 acre-feet
Total Combined Reservoir Storage	220,000 acre-feet

The above 150,000 acre-feet minimum combined storage value is derived from the need to provide steelhead smolt outmigration flows during the time period of March 15 through May 31. The use of larger minimum combined storage did not allow what NMFS considered sufficient frequency smolt outmigration flows (during ESA Section 7 consultation). The application of the 150,000 acre-feet minimum combined storage trigger, in combination with flow triggers in the Arroyo Seco and Nacimiento River above Nacimiento Dam, to smolt outmigration block flows (See Smolt Outmigration section for definition of block flow) allows what NMFS considers sufficient frequency of flows to support smolt outmigration.

Adult Steelhead Upstream Migration

For purposes of establishing criteria for adult steelhead upstream migration on the mainstem Salinas River, and for purposes of monitoring and recording adult steelhead upstream passage conditions, the adult upstream passage “season” is defined as January 1 through March 31. Adult upstream migration flows for April will be addressed through flow releases for outmigrating smolts and project releases for diversions. Natural flows provide fish passage and/or prepare the basin for fish passage. Fish passage flows for January will be provided through natural flows in the system.

Adult Upstream Passage Stream Flow Criterion

Adult upstream passage triggers and flows are designed to provide and track historical numbers of passage days for adult fish migrating upstream. The objective of the upstream passage triggers and flows is to maintain upstream passage conditions that are similar to conditions that existed prior to implementation of the proposed project.

Based on a limited study of stream flow conditions in the lower reaches of the Salinas River, and in the absence of additional information, NMFS recommends a minimum stream flow of 260 cfs in the vicinity of Chualar to provide adequate adult upstream passage conditions (NMFS, 2005). Therefore, adult upstream passage conditions are considered represented as five or more consecutive days of mean daily flow of 260 cfs or larger mean daily flow, as measured by USGS Salinas River near Chualar stream gage (11152300), when the mouth of the Salinas River is open to the ocean.

Historical Adult Upstream Passage

Salinas River near Chualar USGS stream gage data begins in water year 1977. In order to compare the number of adult upstream passage days that occur at the Chualar stream gage site with historical conditions prior to 1977, a correlation with the Salinas River near Spreckels USGS stream gage, which dates back to 1930, is needed. For the months of February and March of 1977 through 2003, the period of interest for reservoir releases to enhance upstream migration, when flow at the Chualar gage is above 260 cfs, flow at the Spreckels gage is above 150 cfs 98 percent of the time (Figure 1), allowing comparison of historical adult upstream passage days to the 260 cfs stream flow criterion at Salinas River near Chualar. Therefore, historical numbers of adult upstream passage days may be achieved in the Salinas River by providing 260 cfs at Salinas River near Chualar for the same number of days as 150 cfs near Spreckels historically occurred.

Of particular importance is upstream migration during normal years, as little or no adult steelhead passage has historically occurred during dry years, and wet years will, by their nature, provide adequate adult upstream passage flows and number of days.

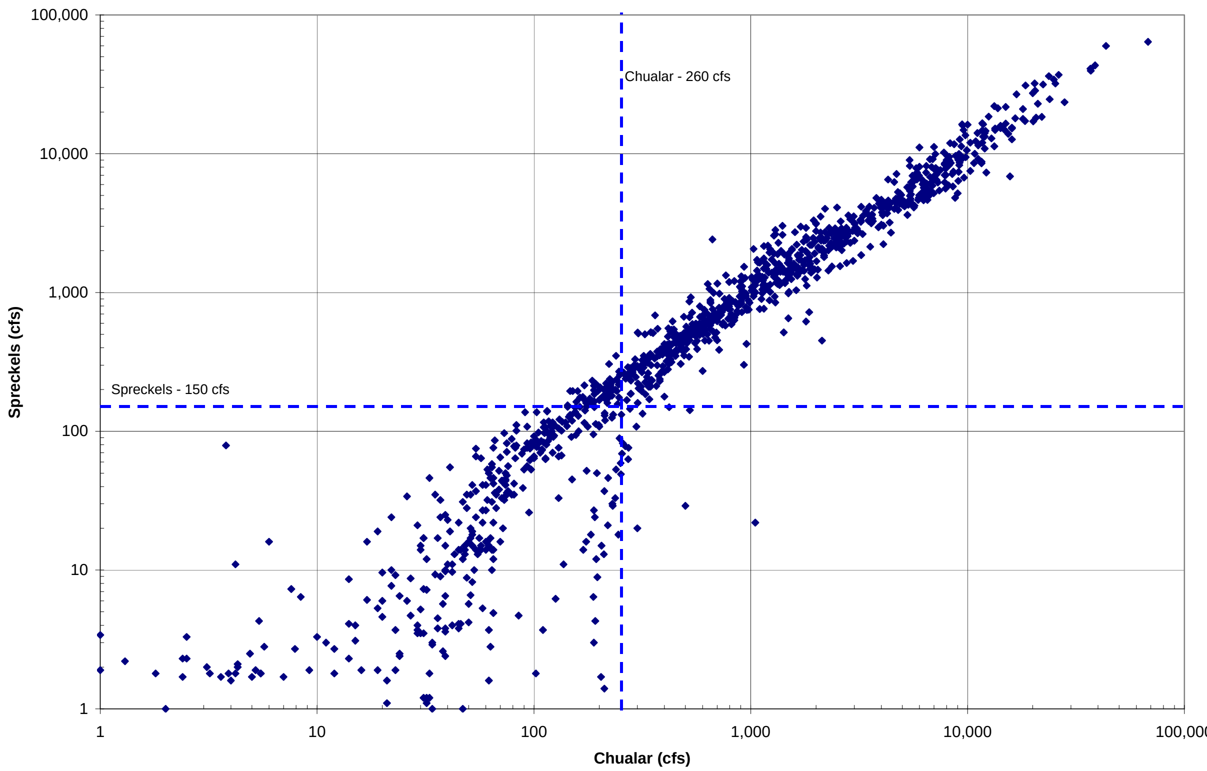


Figure 1. Correlation of Flow at Salinas River near Chualar and Salinas River near Spreckels for February and March 1977 – 2003 (USGS data)

Historical median adult upstream passage days Salinas River near Spreckels USGS stream gage data for the period of 1949-1994 are shown in Table 1.

Table 1. Upstream Adult Migration Historical Passage Days at Salinas River near Spreckels USGS Stream Flow Gage (1949-1994).

Hydrologic Year-Type	Median No. of Upstream Passage Days Jan 1-Mar 31	10% Variance (Passage Days)
All Year Types*	27	3
Dry Normal	16	2
Normal	47	5
Wet Normal	73	7

* All Year Types includes dry, dry-normal, normal, wet-normal, and wet

Adult Upstream Passage Achievement

MCWRA will achieve, on a 10-year average, the number of upstream passage days for the hydrologic year-type indicated in Table 1 within a 10 percent variance. This will be accomplished by natural flows in the Salinas River system and augmentation of natural flows with releases from Nacimiento and/or San Antonio Reservoirs when the following triggers listed below are met during the time period beginning February 1 and ending March 31. When the triggers occur, the adult upstream flow criteria of 260 cfs, or higher, mean daily flow at Salinas River near Chualar must be met for five or more consecutive days.

Triggers:

- 220,000 acre-feet (AF), or higher, combined water storage in Nacimiento and San Antonio Reservoirs

  AND

- Mean daily flow of 340 cfs, or higher, at Arroyo Seco near Soledad, CA (USGS stream gage 11152000)

  AND

- Mean daily flow of 173 cfs, or higher, at Arroyo Seco below Reliz Creek near Soledad, CA (USGS stream gage 11152050)

Adaptive Management Opportunity to Achieve Additional Adult Upstream Migration Days

When necessary, MCWRA will provide flow at Salinas River near Chualar meeting adult upstream migration flow criteria to provide migration days in addition to those provided by responding to the above flow triggers. This will be accomplished by adaptively managing water releases from Nacimiento and/or San Antonio Reservoirs to augment the receding leg of the flow hydrograph at the Salinas River near Chualar stream gage location. When hydrologic conditions permit, MCWRA may maintain adult upstream passage flow after triggers are no longer met, such as between storm events, when meteorological forecasting indicates the imminent possibility of trigger flows reoccurring. The benefit to the MCWRA is that additional passage days are provided between flow events with less water than if attempting to re-establish passage conditions after flows have receded. The benefit to migrating steelhead is additional availability of continuous upstream passage conditions. 22 illustrates an example where MCWRA augmentation of flow between natural runoff events could gain three additional days of adult upstream passage conditions.

Allowance for Stream Gage Variability

MCWRA will document USGS determined mean daily flows in the mainstem Salinas River and the total number of adult upstream migration days, computed from USGS data for the Salinas River near Chualar gage, for each year. Because USGS data typically becomes final approximately one year after the water-year for which it is computed, annual reports will be available one year in arrears. Further, USGS gage data has a plus or minus ten percent level of accuracy. Therefore, MCWRA will manage the system to provide passage flows that are within 10 percent of the minimum passage flow as measured at the Salinas River near Chualar USGS stream gage. In addition, MCWRA will manage flow releases within 10 percent of the adult upstream migration flow triggers as measured at the USGS stream gages Arroyo Seco below Reliz near Soledad (11152050) and Arroyo Seco near Soledad (11152000).

By the nature of this flow prescription, MCWRA will make operational decisions based upon provisional mean daily and real-time USGS stream flow data. Such provisional USGS data used by MCWRA in flow delivery decision-making may not always coincide with final published USGS data.

An adult steelhead upstream migration action flow chart describing actions to be taken regarding adult upstream migration is shown in Figure 3.

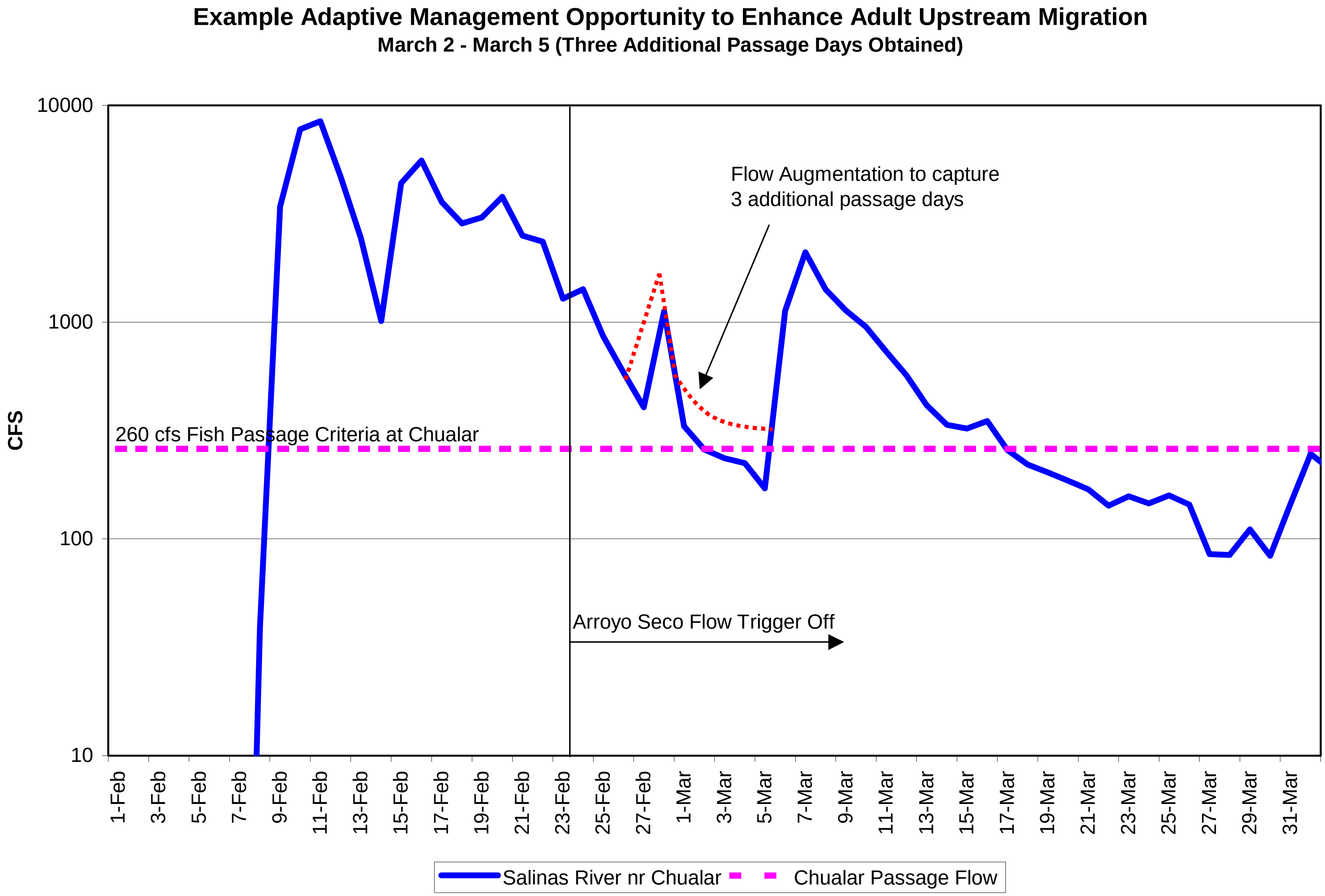


Figure 2. Example Adaptive Management Opportunity to Enhance Adult Upstream Migration

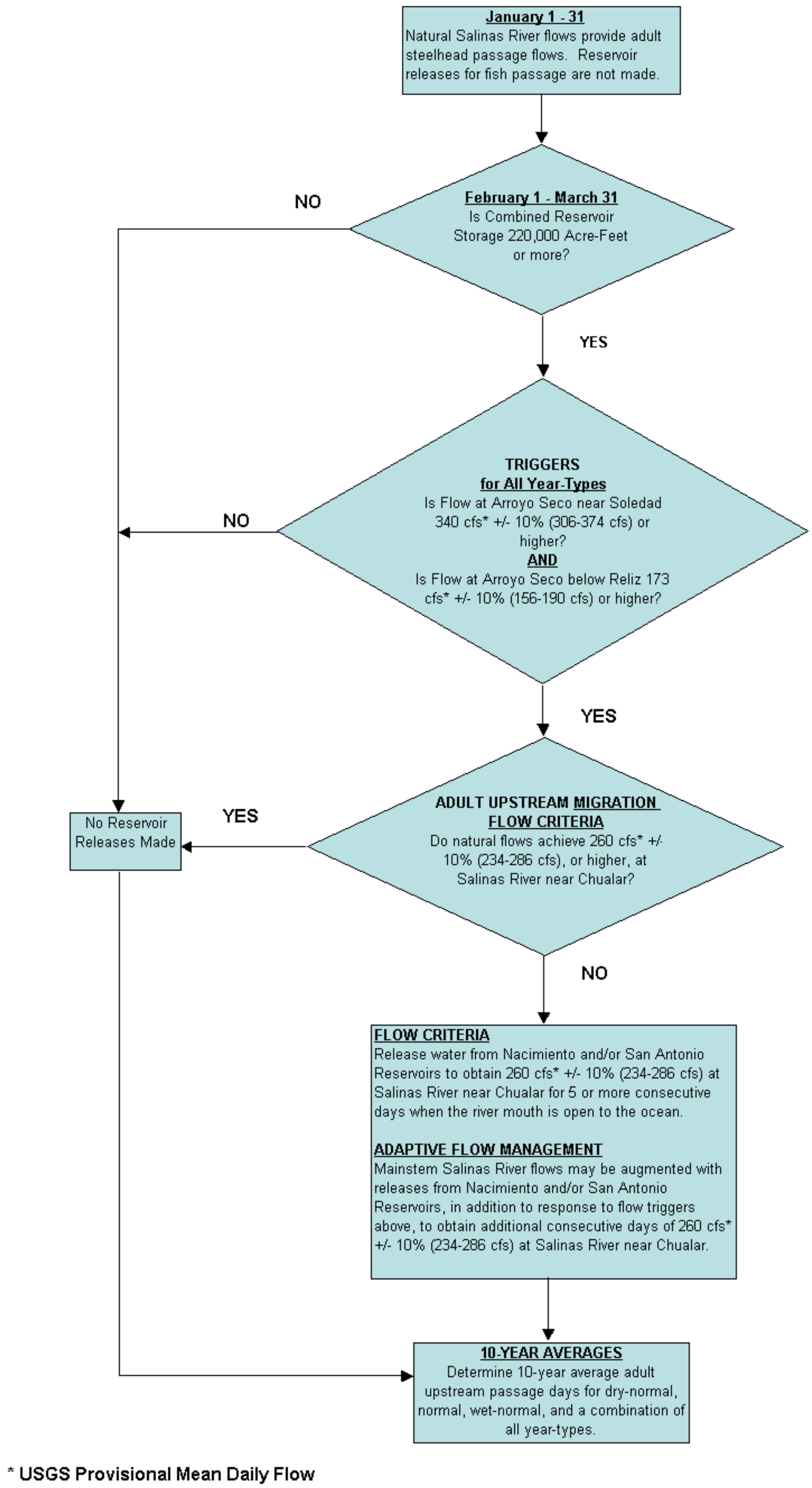


Figure 3. Adult Upstream Migration Action Flow Chart

Smolt Outmigration

On March 15 of each year, when combined water storage in Nacimiento and San Antonio Reservoirs is 150,000 AF or more, MCWRA will categorize the year type based on an indexing of unimpaired annual mean flows at the Arroyo Seco near Soledad USGS stream gage (11152000) as described in Appendix A. If the year type is determined to be a "normal" category (dry- normal, normal, or wet-normal), then smolt outmigration triggers apply through May 31. If on March 15 the year type is determined to be a "dry" or "wet" category, then smolt outmigration triggers, and reservoir releases to supply a block-flow, will not be in effect and thus no action will be taken by MCWRA to supply block flows. When the March 15 year-type determination results in a "dry" or "wet" category, the year type will be re-evaluated on April 1. If on April 1 the year type is determined to be a "normal" category (dry-normal, normal, wet-normal), then smolt outmigration triggers apply through May 31. If on April 1 the year type is determined to be a "dry" or "wet" category, then smolt outmigration triggers, and reservoir releases to supply a block-flow, will not be in effect for the remainder of the year. In "normal" category year types, if triggers are met, reservoir releases to supply a block flow will occur only once.

Smolt Outmigration Triggers

Combined Reservoir Storage Trigger

- **IF** combined water storage in Nacimiento and San Antonio Reservoirs on March 15 is 150,000 AF, or higher, **AND** one of the following flow triggers occur:

  Flow Triggers

  - Mean daily flow of 125 cfs, or higher, at Nacimiento River below Sapaque Creek near Bryson, CA (USGS stream gage 11148900)

    OR
  - Mean daily flow of 70 cfs, or higher, at Arroyo Seco below Reliz Creek near Soledad, CA (USGS stream gage 11152050)

  THEN the following block-flow criteria will be met in the mainstem Salinas River:

Block-Flow Criteria

- Mean daily flow of 700 cfs, or higher, for five consecutive days (Days 1 through 5) at Salinas River at Soledad, CA (USGS stream gage 11151700), **THEN**
- Mean daily flow of 300 cfs, or higher, for Day 6 and beyond at Salinas River near Spreckels, CA (USGS stream gage 11152500), as described below.

  Block-Flow Days Occur as Follows:

  - A block-flow is a minimum of 20 days duration, as described below:
    - Day 1 is the first day that 700 cfs or higher mean daily flow occurs at Salinas River at Soledad after triggers occur between March 15 and May 31
    - If day 1 begins between March 15 and April 1, then block-flow criteria must be met until April 20, as follows:

Block-Flow Day	Block-Flow Criterion
Day 1 through Day 5	700 cfs, or higher, mean daily flow at Salinas River at Soledad
Day 6 through April 20	300 cfs, or higher, mean daily flow at Salinas River near Spreckels

(The total number of block-flow days in this scenario may range from 20 to 45.)

- If day 1 begins after April 1, then block-flow criteria must be met for 20 days, as follows:

Block-Flow Day	Block-Flow Criterion
Day 1 through Day 5	700 cfs, or higher, mean daily flow at Salinas River at Soledad
Day 6 through Day 20	300 cfs, or higher, mean daily flow at Salinas River near Spreckels

A successful engineered block flow is considered to consist of stream flow in the Salinas River near Soledad of 700 cfs, or more, for five consecutive days, and flow near Spreckels of 300 cfs, or more, for at least 15 consecutive days thereafter, totaling a minimum of 20 days to a maximum of 45 days. It is possible for the 20 to 45 day engineered block-flow to occur during the time period of March 15 to June 20. However, the vast majority of engineered block-flows are likely to occur in March and April.

"Block-Flow" Occurrence

The above smolt outmigration block-flow triggers and criteria were modeled over the period of record of 1949-1994 using the SVIGSM version 6.2. Results show smolt outmigration block-flows being triggered in 12 of 18 (67%) normal category years (dry-normal, normal, wet-normal). A review of historical flow data over the last 10 years, 1995-2004 indicates that block-flow triggers would have occurred 6 of 8 (75%) normal category years. For the period of 1949-2005, combining modeled results and the last 10 years historical occurrence, 18 of 26 (69%) normal category years trigger a smolt outmigration block-flow. The following table shows various periods of record (modeled and historical) and the corresponding occurrence of smolt outmigration block-flow triggers (Table 2):

Table 2. Modeled and Historical Occurrence of Smolt Outmigration Block-Flow Triggers

Period	No. of Normal-Category Years	No. of Years Block Flows Occurred	Percent of Normal-Category Years	Comments
1949 - 1994	**18**	**12**	**67%**	*SVIGSM Simulation – 46 year period*
1995 - 2005	**8**	**6**	**75%**	**Application of Triggers to Historical Record**
1949 - 2005	**26**	**18**	**69%**	**Combination of Rows 1 and 2 above**
1949 - 1958	6	3	50%	SVIGSM Simulation - 10 year period
1959 - 1968	4	3	75%	SVIGSM Simulation - 10 year period
1949 - 1968	10	6	60%	SVIGSM Simulation - 20 year period
1969 - 1978	4	4	100%	SVIGSM Simulation - 10 year period
1959 - 1978	8	7	88%	SVIGSM Simulation - 20 year period
1949 - 1978	14	10	71%	SVIGSM Simulation - 30 year period
1979 - 1988	3	2	67%	SVIGSM Simulation - 10 year period
1969 - 1988	7	6	86%	SVIGSM Simulation - 20 year period
1959 - 1988	11	9	82%	SVIGSM Simulation - 30 year period
1949 - 1988	17	12	71%	SVIGSM Simulation - 40 year period
1985 - 1994	1	0	0%	SVIGSM Simulation - Last 10 year period of model

Hydrographs of all normal year types from SVIGSM analysis showing modeled mean daily flows for the streamflow locations listed below for the period March 1 through June 30 are included in Appendix A, Figures A-1 through A-22. Hydrographs of recent historical data are shown in Appendix A, Figures A23 through A-31.

- Salinas River near Spreckels, CA
- Salinas River at Soledad, CA
- Nacimiento River below Sapaque Creek near Bryson, CA
- Arroyo Seco below Reliz Creek near Soledad, CA

The hydrographs in Appendix A also show modeled or historical combined (Nacimiento and San Antonio) reservoir storage.

<u>Post Block-Flow Arroyo Seco Smolt Outmigration Flow</u>
Sufficient flow from the Arroyo Seco may occur such that steelhead smolts may migrate to the ocean after completion of a block-flow.

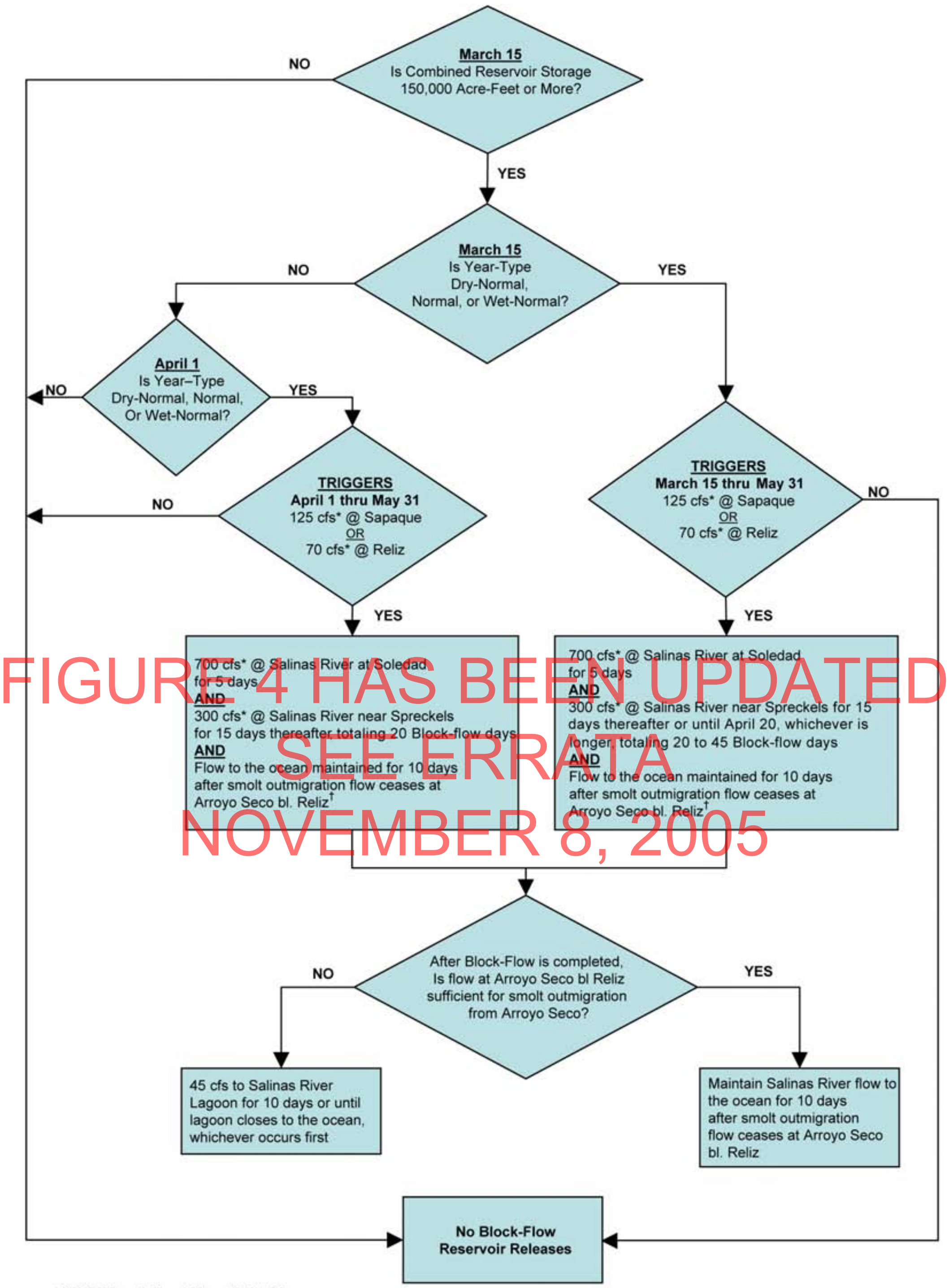
If after a block-flow is completed, outmigration of steelhead smolts from the Arroyo Seco to the ocean could still occur, such will be facilitated as follows:

Salinas River flow to the ocean will be maintained for 10 days after smolt downstream passage at Arroyo Seco below Reliz Creek near Soledad, CA (USGS stream gage 11152050) no longer occurs. The flow at which smolt outmigration no longer occurs at the Arroyo Seco below Reliz gage location is conservatively assumed to be 1 cfs, until further study shows otherwise. The flow at which the Salinas River lagoon will remain open to the ocean is expected to generally range from 80 to 150 cfs.

<u>Post Block-Flow Kelt Passage to Lagoon Criterion</u>
To provide passage for downstream migrating kelts (adult steelhead returning to the ocean), after smolt outmigration block-flow criteria has been met, a minimum flow of 45 cfs to the lagoon will be provided for 10 additional days, or until the Salinas River mouth has closed to the ocean, whichever comes first.

If the post block-flow Arroyo Seco smolt outmigration flow occurs, and as a result, Salinas River flow to the ocean is maintained for 10 or more days after completion of a block-flow, then the kelt passage to the lagoon criterion is satisfied, and flow to the lagoon becomes governed by Juvenile Passage to the Lagoon criteria.

<u>Smolt Outmigration Action Flow Chart</u>
A steelhead smolt outmigration action flow chart is shown in Figure and describes the actions to be taken regarding smolt outmigration.



*USGS Provisional Mean Daily Flow

†1 cfs USGS Provisional Mean Daily Flow at Arroyo Seco bl. Reliz stream gage will be used until further study indicates otherwise.

Figure 4. Smolt Outmigration Block Flow Action Flow Chart

Juvenile Passage to the Salinas River Lagoon

It is believed that juvenile steelhead may move downstream from tributary spawning areas to the Salinas River lagoon during the period of approximately April 1 through June 30. Sufficient flow is needed to propel the juvenile fish downstream.

The following will occur when combined storage in Nacimiento and San Antonio Reservoirs is 220,000 AF or more:

> For the period of April 1 through June 30, if an engineered block flow does not occur and the lagoon is open to the ocean, 45 cfs will flow to the lagoon for 10 days and 15 cfs will pass to the lagoon thereafter through June 30. If an engineered block flow does occur, a flow of 15 cfs will be maintained to the lagoon for the period after the post-block flow 45 cfs ceases through June 30. (See Smolt Outmigration for further description of these flows.)

If during the period of April 1 through June 30 combined reservoir storage drops below 220,000 acre-feet, then the above flows will cease and a flow of 2 cfs will be maintained to the lagoon as described below. The above flows (45 or 15 cfs) to the lagoon will recommence during this period when combined reservoir storage reaches 220,000 acre-feet.

A flow of 2 cfs will be maintained to the lagoon as long as SRDF irrigation diversions are occurring or conservation releases from Nacimiento and/or San Antonio Reservoirs are being made to the Salinas River. This 2 cfs flow to the lagoon is tied only to SRDF irrigation diversions and conservation releases, and is thus independent of combined reservoir storage volume. (See Salinas River Lagoon for further description of this flow to the lagoon.)

The smolt outmigration passage period overlaps the juvenile passage period from April 1 through as late as June 20. When flow in the mainstem of the Salinas River is sufficient for steelhead smolt to pass downstream to the ocean, flow conditions are also sufficient for juvenile steelhead passage to the lagoon. Therefore, smolt outmigration flow triggers and criteria, when they occur, will govern flow for juvenile downstream passage. (See the Smolt Outmigration for description of smolt outmigration triggers and flow criteria.)

A juvenile downstream passage action flow chart is shown in Figure 5.

PARAGRAPH 3 (INDENTED) HAS BEEN UPDATED
SEE ERRATA
NOVEMBER 8, 2005

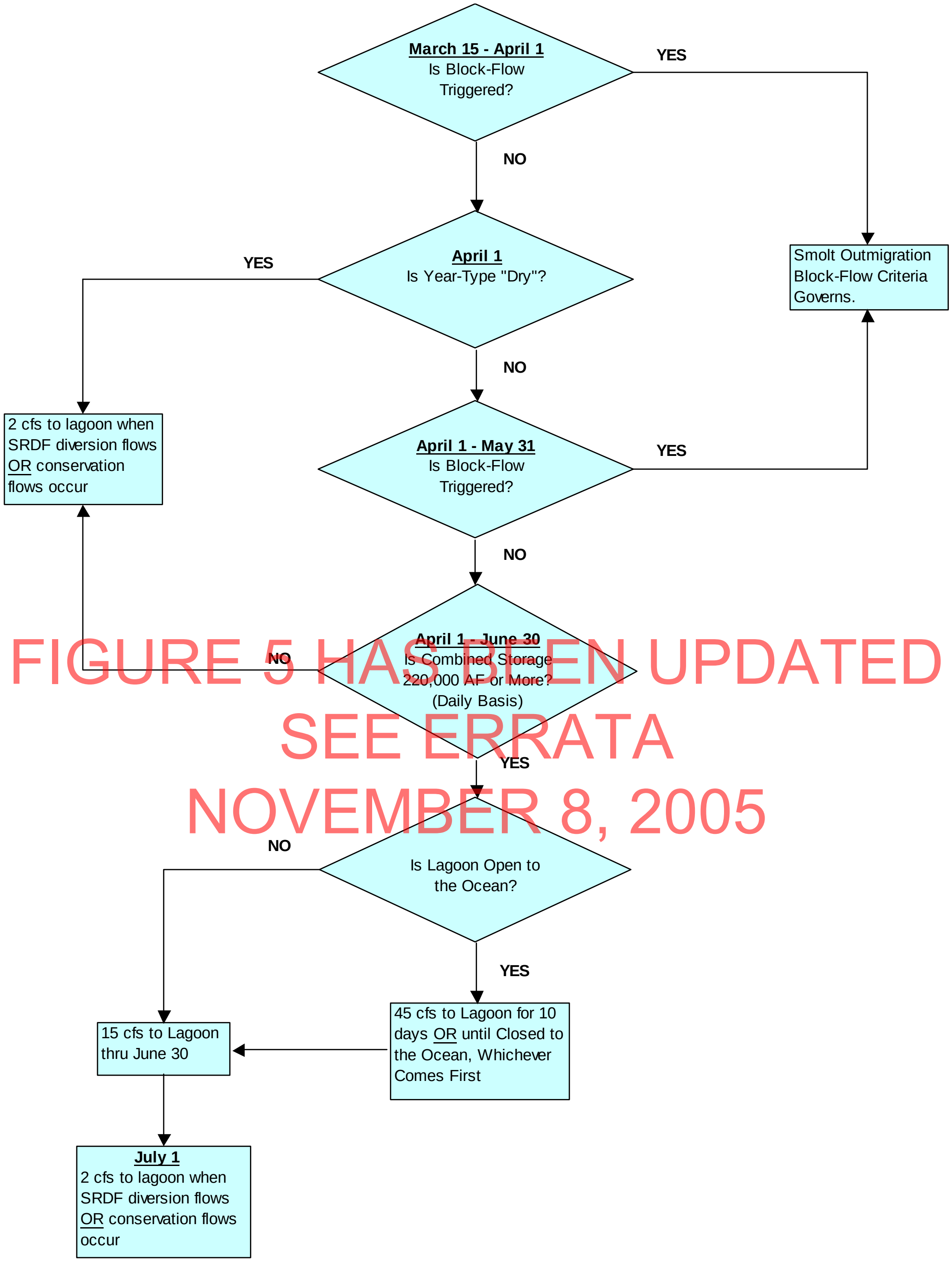


Figure 5. Juvenile Downstream Passage Action Flow Chart

Salinas River Lagoon

Lagoon Water Surface Elevation

When the Salinas River lagoon is closed to the ocean during any time of year, lagoon water surface elevation (WSE) will be maintained at a maximum of 3.0 feet (National Geodetic Vertical Datum, NGVD, as measured at the staff gage located near the Old Salinas River slide gate inlet). When the lagoon is closed to the ocean, MCWRA will regulate lagoon WSE by modulation of the slide gate at the inlet to the Old Salinas River (OSR) channel.

When the lagoon is open to the ocean, the OSR slide gate will be closed and lagoon WSE regulated by Salinas River flow, ocean tides and wave action. When open to the ocean, lagoon WSE can fluctuate from approximately 2 to 6 feet.

Fish Screen at Inlet to the Old Salinas River Channel

A fish screen meeting NMFS and California Department of Fish and Game (CDFG) design criteria will be in place at the inlet to the OSR whenever it is open via the slide gate. Modification to the slide gate structure will be required to accommodate fish screens.

Winter Lagoon Inflows

Inflow to the Salinas River lagoon varies widely in winter months and will continue to do so during SVWP operations. During winter months when the lagoon is open to the ocean, the OSR slide gate will be closed. When the lagoon is closed to the ocean, the OSR slide gate will be opened when it is necessary to regulate the lagoon WSE (and regulation of lagoon WSE can be accomplished within the slide gate's flow capacity).

Spring Lagoon Inflows

Steelhead smolts are believed to move from rearing areas down the mainstem Salinas River through the lagoon and to the ocean during the period of approximately mid-March through May. Natural flows during that period of year, or engineered "block flows," or a combination of natural flow and engineered block flow will provide the means for smolts to migrate to the ocean. Natural flow means flow in the Salinas River, or tributary thereof, that is not augmented by releases from Nacimiento and/or San Antonio Reservoirs. Engineered block flows are created by releases of water from Nacimiento and/or San Antonio Reservoirs described in the Nacimiento River below Nacimiento Dam and San Antonio River below San Antonio Dam Sections. The Salinas River lagoon sandbar is mechanically opened to the ocean when lagoon WSE reaches 6 feet according to procedures described in Table 6.

An additional criterion that may cause engineered flow releases from Nacimiento and/or San Antonio Reservoirs to reach the ocean is flow in the Arroyo Seco sufficient for smolt outmigration to the Salinas River. When flow is sufficient for smolt downstream passage to occur at Arroyo Seco below Reliz Creek USGS stream gage, flow in the Salinas River will be maintained to keep the river mouth open to the ocean for 10 days after smolt passage flow ceases at Arroyo Seco below Reliz. (The minimum smolt passage flow at Arroyo Seco below Reliz is not yet determined, however a conservative minimum flow of 1 cfs will be used until determined otherwise.)

Engineered block flows will most often maintain flow to the ocean longer than smolt downstream passage flow criteria at the Arroyo Seco below Reliz Creek USGS gage. In other words, smolt passage flow will most likely cease at Arroyo Seco below Reliz Creek 10 or more days before a smolt outmigration block flow ceases.

A successful engineered block flow is defined in the Smolt Outmigration section. The vast majority of engineered block-flows are likely to occur in March and April.

When an engineered block flow period is complete, to provide kelt passage to the lagoon, 45 cfs will be allowed to bypass the SRDF and flow to the lagoon for 10 days after the last block flow day or until the lagoon closes, whichever comes first (see Smolt Outmigration Section).

Lagoon Maintenance Inflows

The following will occur when combined storage in Nacimiento and San Antonio Reservoirs is 220,000 AF or more:

> For the period of April 1 through June 30, if an engineered block flow does not occur and the lagoon is open to the ocean, 45 cfs will flow to the lagoon for 10 days and 15 cfs will pass to the lagoon thereafter through June 30. If an engineered block flow does occur, a flow of 15 cfs will be maintained to the lagoon for the period after the post-block flow 45 cfs ceases through June 30. (See Smolt Outmigration and Juvenile Passage to the Lagoon for further description of these flows.)

A flow of 2 cfs will be maintained to the lagoon as long as SRDF irrigation diversions are occurring or conservation releases from Nacimiento and/or San Antonio Reservoirs are being made to the Salinas River. This 2 cfs flow to the lagoon is tied only to SRDF irrigation diversions and conservation releases, and is thus independent of combined reservoir storage volume.

Lagoon maintenance flows are shown in the Juvenile Downstream Passage Action Flow Chart.

Frequency of Lagoon Opening to the Ocean Before March 1

For the period of 1964 through 2000 (36 years), the lagoon opened to the ocean before March 1 a total of 30 winters (Table 4). It is recorded that the lagoon opened more than once before March 1 in seven of those 30 winters (1965-66, 1972-73, 1981-82, 1983, 1985-86, 1994-95 and 1996). For the 36 years presented in Table 4, the lagoon opened to the ocean a total of 40 times. Of the 40 total lagoon openings, 28 occurred before February 1 (70%).

It was determined by NMFS (2005) that historical median number of adult upstream passage days occurring in the Salinas River before Nacimiento and San Antonio Dams were constructed was essentially equivalent to the number of adult upstream passage days occurring after the dams were constructed. Adult upstream migration triggers and flow criteria described in the Adult Upstream Migration section of this Flow Prescription are based on achieving adult passage days similar to historical medians.

Historically, 70 percent of lagoon openings that occurred before March 1 occurred between November 1 and February 1, during the period when, after SVWP implementation, natural river flows will provide adult upstream passage. Under SVWP operations the variability of Salinas River winter flows will be unchanged, and median numbers of adult steelhead upstream passage days are not expected to change from historical occurrences. It is therefore, anticipated that the frequency of lagoon opening before March 1 under SVWP conditions will not substantially change from historical occurrences.

Frequency of Lagoon Opening to the Ocean After March 1

MCWRA has estimated flows in the Salinas River that may result from SVWP operations, including the occurrence of engineered smolt outmigration block flows, using the SVIGSM version 6.2. The SVIGSM provides a representation of groundwater-surface water interaction and stream flow estimates in the lower

THE LAGOON MAINTENANCE INFLOWS SECTION HAS BEEN UPDATED
SEE ERRATA
NOVEMBER 8, 2005 AND JANUARY 27, 2006

Salinas Valley Basin. Though the SVIGSM is considered a planning tool and its results are considered estimates only, MCWRA believes that the SVIGSM is the best available tool for evaluation of the many SVWP stream flow parameters. A period of record consisting of water years 1949 to 1994, totaling 46 years, with hydrologic and SVWP fishery and operational flow parameters was analyzed using the SVIGSM.

It is possible that the Salinas River lagoon will be closed to the ocean leading into March and natural and/or engineered block flows after March 1 will require management of the Salinas River lagoon sandbar such that flow will reach the ocean. Once the lagoon is open to the ocean, flow of approximately 80 to 150 cfs in the Salinas River near Spreckels will generally maintain the opening to the ocean. However, MCWRA has observed the lagoon remain open to the ocean at flows in the Salinas River near Spreckels of 30 cfs.

While lagoon conditions are not explicitly modeled by the SVIGSM, estimates can be made using modeled stream flow output. In order to estimate the frequency of occurrence for the need to open the lagoon to the ocean after March 1, SVIGSM estimated stream flow results for Salinas River near Spreckels below 80 cfs for five or more consecutive days prior to March 1 were considered periods when the lagoon was closed to the ocean. For example, if SVIGSM results for Salinas River stream flow near Spreckels were less than 80 cfs during February 24-28, the lagoon was considered closed to the ocean on March 1 and would require opening if significant flow to the lagoon were to occur.

The SVIGSM simulated stream flows for the Salinas River near Spreckels indicate that there is potential for the lagoon to be closed to the ocean after March 1 and a natural or block flow subsequently occurred requiring that the lagoon be opened to the ocean in 12 of the 46 years analyzed (26%). Five of the 12 years are estimated to require lagoon opening before March 6. Two of the 12 years showed the possibility of requiring lagoon opening twice after March 1. Of the 12 years that the lagoon may need to open to the ocean after March 1, eight are dry or dry-normal year types (67%), and 4 are normal, wet-normal or wet year types (33%). The years for which lagoon opening was considered necessary are shown in Table 3. Figures C-1 to C-46 in Appendix C display stream flow hydrographs generated from SVIGSM results and used in this analysis.

For the historical period of water years 1965 through 2000 (36 years), the only period for which consistent written lagoon opening records are known, lagoon openings to the ocean occurred after March 1 three times (8%), April 1965, March 1991, and March 1992, normal, dry and dry-normal year types, respectively. Historical lagoon conditions are shown in Table 4.

Based on SVIGSM stream flow results for project conditions, it is estimated that the frequency of lagoon openings after March 1 may increase from historical occurrence of 8 percent to perhaps 26 percent, with the majority of occurrences in drier year types.

The increase in lagoon openings is partially due to the occurrence of engineered block flows. SVIGSM results show that block flows induce lagoon opening after March 1 in four years, while natural flows induce lagoon openings after March 1 in nine years. SVIGSM results show a greater frequency of occurrence of lagoon opening after March 1 resulting from natural flows than occurred historically (3 in 36 = 8% historically vs. 9 in 46 = 20% SVIGSM). The longer period of record considered in the SVIGSM analysis may account for one year's difference due to proportionality of periods of record. The additional five years difference may occur because the lagoon may have historically remained open at flow rates less than 80 cfs, which was observed in spring 2005, or because flow conditions for the years prior to the historical lagoon opening record may have required lagoon opening, or due to model inaccuracies, or a combination of reasons. Regardless of SVIGSM results, MCWRA expects that engineered block flows for the purpose of steelhead smolt outmigration occurring March 15 or later will require more frequent lagoon opening compared to present conditions. It is also reasonable to expect that natural flows will periodically give cause for opening the lagoon to the ocean after March 1.

Table 3. Summary of Estimated Lagoon Opening Occurrence after March 1 based on SVIGSM Results

Year Modeled	Hydrologic Year-Type	Estimated Block Flow Induced Lagoon Opening after March 1	Estimated Natural Flow Induced Lagoon Opening after March 1	Estimated Lagoon Opening 2X per Yr After March 1	Estimated Date of Induced Lagoon Opening
1949	Dry-Normal		X		Mar 3
1950	Dry-Normal	X			Mar 23
1953	Dry-Normal	X	X	X	Mar 19/Apr 29
1954	Dry		X		Mar 20
1956	Wet-Normal	X			Apr 13
1963	Wet		X		Mar 27
1965	Normal	X			Mar 15
1981	Normal		X		Mar 4
1985	Dry		X		Mar 28
1987	Dry		X		Mar 5
1991	Dry		X	X	Mar 3/Mar 20
1992	Dry-Normal		X		Mar 3
Totals	12 years	4 years	9 years	2 years	

Table 4. Salinas River Lagoon Open/Closed to Ocean History

Water Year	Date First Open or beginning of season	Date Last Open or end of season	Minimum Days Available for Migrating Steelhead
1964-65	14 April 1965	After 5 May 1965	21
1965-66	26 November 1965	13 December 1965	17
	14 January 1966	28 January 1966	14
	7 February 1966	28 February 1966	21
1966-67	7 December 1966	Did Not Close	175
1967-68	Open all Summer	23 October 1967	0
	12 December 1967	22 December 1967	10
1968-69	19 January 1969	After 18 March 1969	58
1969-70	12 January 1970	After 17 April 1970	95
1970-71	30 November 1970	After 17 January 1971	48
1971-72	29 December 71	11 January 1972	13
1972-73	17 November 1972	11 January 1973	55
	18 January 1973	After June 1973	133
1973-74	20 November 73	Did Not Close	192
1974-75	Open all Summer	3 December 1974	32
	5 December 1974	31 May 1975	177
1975-76	9 October 1975	7 November 1975	6
1976-77	Did Not Open	Did Not Open	0
1977-78	19 December 1977	Did Not Close	163
1978-79	Open all winter/summer	After June 1 1979	211
1979-80	26 December 1979	16 July 1980	157
1980-81	28 January 1981	After 20 March 1981	51
1981-82	15 November 1981	10 December 1981	25
	6 January 1982	Did not close	145
1982-83	Open all year	Did not close	211
1983-84	Open all summer	31 October 1983	0
	12-14 Nov 1983	12-14 Nov 1983	0
	26 November 1983	After 10 Feb 1984	76
1984-85	10-11 Feb 1985	12 February 1985	0
1985-86	5-7 December 1985	5-7 December 1985	0
	14 February 1986	After June 13 1986	106
1986-87	14 February 1987	After 20 March 1987	34
1987-88	Did Not Open	Did Not Open	0
1988-89	Did Not Open	Did Not Open	0
1989-90	Did Not Open	Did Not Open	0
1990-91	21 March 1991	2 June 1991	71

(Continued on next page)

Table 4 (continued). Salinas River Lagoon Open/Closed to Ocean History

Water Year	Date First Open or beginning of season	Date Last Open or end of season	Minimum Days Available for Migrating Steelhead
1991-92	14-15 February 1992	2 March 1992	17
	9 March 1992	20 March 1992	11
1992-93	10 January 1993	~ 9 May 1993	-
1993-94	21 February 1994	not available	-
1994-95	7 January 1995-closed overnight	not available	-
1994-95	8 January 1995-closed overnight	not available	-
1994-95	9 January 1995-closed overnight	not available	
1994-95	10 January 1995	~ 6 November 1995	
1995-96	9 November 1995	not available	
	1 February 1996	29 March 1996 (or after)	58+
1996-97	11 December 1996	not available	
1997-98	8 December 1997	~ 11 September 1998	
1998-99	16 November 1998	~ 3 May 1999	
1999-00	24 January 2000	not available	

<u>Time Duration for Lagoon Opening to Ocean</u>
Engineered smolt outmigration block flows will pass through the lagoon and to the ocean at rates of approximately 300 to 500 cfs. When the lagoon is closed during the period leading up to an engineered block flow, inflow to the lagoon will "ramp-up" beginning at 0 to 50 cfs (the approximate practical capacity of the OSR slide gate) and reach 300 to 500 cfs within approximately 48 hours. Inflow to the lagoon from natural flows (flows not including releases from Nacimiento or San Antonio Reservoirs) will ramp-up at variable rates, but can increase from 0 cfs to over 1,000 cfs within 24 hours.

Based on lagoon stage-volume determined measurements in October 1999 by Hagar Environmental Science (HES) from the river mouth upstream 4.3 miles (very near the diversion facility location of river mile 4.8), if the lagoon is closed to the ocean, the estimated time the lagoon will fill from 3 to 6 feet WSE at various rates of inflow is shown in Table 5. The above-cited Salinas River lagoon stage-volume relationship is included in Appendix D.

PARAGRAPH 1 HAS BEEN UPDATED
SEE ERRATA
NOVEMBER 8, 2005

Table 5. Estimated Time to Raise Salinas River Lagoon WSE from 3 to 6 feet

Inflow to Lagoon (cfs)	Estimated Time to Raise Lagoon from 3 to 6 feet WSE (hours)*
100	75
150	50
300	25
500	15
750	10
1,000	8
1,200	6

* Based on estimated lagoon volume from Appendix D. Lagoon volume, and thus rate of water surface rise, may vary year to year due to river deposition or scour.

Under engineered block flow conditions when inflow to the lagoon is primarily from reservoir releases, the lagoon is expected to rise from 3 to 6 feet WSE and be opened to the ocean within 1 to 3 days from the time that inflow begins. When inflow to the lagoon is primarily from natural flow, the time frame from beginning of inflow to opening to the ocean will vary, but can rise from 3 to 6 feet WSE and be opened to the ocean within 1 day due to the flashy nature of the lower Salinas River and its tributaries.

Mechanical Salinas River Lagoon Sandbar Opening Procedure

Under conditions when the lagoon is closed to the ocean and natural or engineered flows raise the lagoon WSE to 6 feet, MCWRA mechanically opens the lagoon sandbar to the ocean to prevent flooding of properties located around the lagoon. The procedure presented in Table 6 has historically been employed by MCWRA for opening the lagoon to the ocean, and will continue to be the procedure for mechanically opening the lagoon sandbar to the ocean during SVWP operations. The procedure in Table 6 applies to mechanical lagoon opening any time of year.

The necessity for mechanical opening of the lagoon to the ocean may occur at any time of the day or night, and in severe weather conditions. Procedures described in Table 6 may be delayed or otherwise modified for personnel safety reasons.

THIS SECTION HAS BEEN UPDATED
SEE ERRATA
DECEMBER 19, 2005

Table 6. Procedure for Mechanically Opening the Salinas River Lagoon Sandbar to the Ocean

Condition	Action
Lagoon WSE reaches 5 feet *Action step 1 may begin earlier as inflow to the lagoon approaches 1,200 cfs or greater. The process of opening the lagoon to the ocean would begin at 5 feet WSE because under conditions of 1,200 cfs inflow, the lagoon could reach 6 feet WSE rapidly and begin flooding adjacent lands before opening to the ocean is complete.*	1. MCWRA crew prepares for mechanical opening of lagoon. Mobilization may take 4 hours. Involved regulatory agencies are advised of pending action. Equipment is pre-positioned. 2. State Parks may escort MCWRA equipment and crew to the lagoon-opening site, at State Park's discretion. 3. MCWRA crew and equipment on-site. 4. Slide gate to OSR is closed and remains closed as long as there is an outlet to the ocean through the sandbar. If predicted river flow is low the slide gate may be left open during lagoon opening preparation. Flow will be allowed to pass into the OSR to the extent possible with out flooding properties along the OSR. 5. MCWRA crew will begin excavating a channel approximately 10-feet wide by approximately 6-10 feet deep, depending on sandbar height, starting on the lagoon side of the sandbar. MCWRA crew will utilize an excavator to open a channel through the sandbar whenever possible, which requires less excavation than using a bulldozer and avoids having equipment operate in water. 6. A sand plug is left in the middle of the excavated channel, which prevents flow from the river mouth. Sand plug top elevation is set at 6 feet.
Lagoon WSE at 6+ feet and high tide is at peak	1. Sand plug is over-topped and washed out when lagoon WSE reaches 6+ feet. Lagoon opens to ocean. 2. When lagoon WSE reaches approximately 6 feet water begins to flood low-lying agricultural fields. 3. As lagoon WSE raises, flow through channel increases and scours a larger opening, causing decline of lagoon WSE.
Falling to low tide after opening lagoon sandbar	Lagoon opening to ocean is complete.
Lagoon sandbar closes	Agency opens slide gate to OSR, and adjusts to regulate lagoon WSE.

Blanco Drain

Storm Maintenance District No. 2, commonly known as Blanco Drain, was established in 1942 and subsequently conveyed to the Monterey County Flood Control and Water Conservation District, now the MCWRA. The Blanco Drain drainage area consists of approximately 6,400 acres of farmland with scattered rural houses, and crossed by several county roads. The drainage area boundary is shown in Figure 6.

Water from Blanco Drain has been determined to be less than desirable for use as irrigation water within the SRDF service area. Because the existing confluence of Blanco Drain and the Salinas River occurs upstream of the SRDF site, Blanco Drain water will therefore be diverted, via buried pipeline, to the Salinas River at a point downstream of the SRDF site whenever the SRDF diversion dam is impounding water for irrigation use. Blanco Drain water will flow to the Salinas River at its present location when the SRDF diversion dam is lowered and not impounding water for irrigation. The route of the Blanco Drain diversion pipeline is shown on Figure 7.

The diversion of Blanco Drain discharge downstream of the SRDF will not change the discharge quantity to the Salinas River. Multiple estimates of flow from Blanco Drain from April to October have been made over the last few years and do not correlate well. The historical Blanco Drain pump flow is therefore not well known, with estimates ranging from around 1,000 to over 5,000 gallons per minute. The pump should not have such variability in flow, which leads MCWRA to believe flow estimates are highly suspect. MCWRA will install a flow meter on the Blanco Drain pump as soon as possible to accurately quantify this issue. The annual quantity of water discharged from the Blanco Drain pump station to the Salinas River is however, variable, and is estimated to be between 1,000 and 2,000 AF per year.

The Central Coast Regional Water Quality Control Board (CCRWQCB) has listed Blanco Drain on the impaired water body listing pursuant to Section 303(d) of the Clean Water Act for pesticides, with medium priority. The CCRQWCB is developing Total Maximum Daily Load (TMDL) criteria for Blanco Drain through the Clean Water Act for agricultural discharge. Over time, practices implemented to meet CCRQWCB TMDL's should reduce contaminant loads entering Blanco Drain, thus improving the quality of water reaching the Salinas River.

During the Federal Endangered Species Act Section 7 Consultation for the SVWP, NMFS raised concern about the levels of organophosphate pesticides diazinon and chlorpyrifos in Blanco Drain water discharging to the Salinas River and the potential effects on steelhead trout and their food organisms, particularly in the Salinas River lagoon. Affects of diazinon and chlorpyrifos on steelhead trout are outlined in Appendix C of the *Salinas Valley Water Project Flow Proposal for the Biological Needs of Steelhead in the Salinas River*, by NMFS, dated April 2005. NMFS' concern with levels of diazinon and chlorpyrifos originating from Blanco Drain water are based on data from The Watershed Institute, California State University Monterey Bay report titled *Monitoring Chlorpyrifos and Diazinon in Impaired Surface Waters of the Lower Salinas Region* (Kozlowski, et al., March 31, 2004).

MCWRA has no regulatory control over water discharged into Blanco Drain. Results from Kozlowski (2004) are a potential overestimate of true environmental values (Kozlowski, 2004, p. 141 and Spurlock, 2004). In another study that partially overlapped with the time period of Kozlowski (2004), the California Department of Pesticide Regulation (DPR) collected 16 samples from Blanco Drain near Cooper Road in a four-month period during the summer of 2003. Detection of chlorpyrifos occurred in one of the 16 samples (Spurlock, 2004). However, MCWRA recognizes that benefits to fish habitat downstream of

Blanco Drain, particularly the Salinas River lagoon if steelhead rear there during summer and fall, may occur with improved Blanco Drain water quality. MCWRA will therefore work to improve the quality of water discharging from Blanco Drain into the Salinas River.

<u>Blanco Drain Discharge Contaminant Load Reduction Work Plan Outline</u>
MCWRA will implement the work plan outlined in Table 7 to reduce diazinon and chlorpyrifos concentration of Blanco Drain discharge water to the Salinas River through vegetated water treatment (also referred to as "constructed wetland"), a process of allowing drain water to slowly pass through vegetation whereby contaminants are retained, thus reducing the downstream contaminant load. A schematic of this approach is shown in Figure 8. This method of contaminant reduction has been shown to be successful in other locations and applications (Schulz, 2001; Schulz, 2004; Moore, 2002; Sherrard, 2004; Stearman, 2003). This approach is viewed as the least intrusive, most cost effective approach to improving discharge water quality from Blanco Drain. In this effort, MCWRA will seek partnerships with other parties to accomplish mutual goals and increase resource use efficiencies, to the extent possible.

The focus of this work is to implement a treatment system to reduce diazinon and chlorpyrifos loads, organophosphate pesticides, if found present in Blanco Drain water discharged into the Salinas River. Activities and land use practices outside the treatment system boundaries are outside the scope of this effort.

Table 7. Blanco Drain Discharge Contaminant Load Reduction Work Plan Outline

Phase	Description	Estimated Duration
Preliminary Design	Identify resources and develop needed expertise. Identify preliminary design parameters specific to Blanco Drain, design preliminary vegetated treatment system and define preliminary monitoring plan.	1 month
Site Identification	Identify specific site(s) and landowner(s) most feasible/amenable to installation and operation of vegetated treatment system. Complete access, construction, maintenance and monitoring agreement(s), as needed.	2 months
Final Design	Adapt design and monitoring plan to site specific needs, finalize system design.	1 month
Construction	Construct vegetated treatment system.	2 months
Vegetation Establishment	A vegetation establishment period will be required prior to reaching maximum contaminant retention performance.	3 years
Maintenance	Perform necessary maintenance of vegetated treatment system for maximum feasible contaminant reduction in discharged water, including pre- and post-winter storm maintenance.	Periodic
Monitoring	Monitoring will be performed to establish the effectiveness of the treatment system to reduce contaminant load in water discharged to the river. A monitoring plan will be developed to include monitored location(s), parameters, frequency, field and laboratory protocols.	Periodic
Reporting	Report monitoring results and effectiveness of vegetated treatment system – to be included in the annual report submitted to NMFS.	Annually
Evaluation and Refinement	Evaluate results and make system revisions, as necessary, to achieve maximum feasible contaminant reduction in discharged water. (Examples of such revisions may be addition of, or change in vegetation species, maintenance techniques, or monitoring methods.)	Periodic

TABLE 7 HAS BEEN UPDATED
SEE ERRATA
JANUARY 27, 2006

Potential Contaminant Load Reduction

Studies have shown significant chlorpyrifos load retention in relatively long, narrow constructed wetlands of various vegetative species (Schulz, 2004). Studies pertaining to diazinon retention in constructed wetlands have not been found by MCWRA, however, it appears reasonable to believe that diazinon will behave similarly to chlorpyrifos when subjected to constructed wetland conditions. Though specific diazinon and chlorpyrifos load retention results cannot be guaranteed for Blanco Drain, it appears reasonable to expect retention results in the 50 to 75 percent range.

Timeline for Success

It is estimated to take a duration of up to three years to fully establish the vegetated treatment system within Blanco Drain. Within 60 days of treatment system construction completion, monitoring for load reduction of diazinon and chlorpyrifos will begin. MCWRA will work to achieve a minimum of 50 percent diazinon and chlorpyrifos load reduction, if found present, in the Blanco Drain through vegetative treatment within three years of SVWP start-up. For the three year period thereafter, MCWRA will work to meet CDFG water quality criteria, consisting of Criterion Maximum Concentration (CMC) and Criterion Continuous Concentration (CCC), for diazinon and chlorpyrifos, if found present, in the Blanco Drain through vegetative treatment. Diazinon CMC is 80 ug/l, CCC is 50 ug/l; Chlorpyrifos CMC is 20 ug/l, CCC is 14 ug/l (NMFS, 2005).

This timeline for success is reasonable as CDFG water quality criteria, CMC and CCC, are time-averaged concentrations not to be exceeded more than once in three years on average.

Vegetated Treatment System Maintenance

Maintenance of the vegetated treatment system will depend upon the plant species used, flow and site conditions. Removal of debris or replacement of removed or damaged vegetation may be required after large winter flows. In order to maintain drainage channel flow capacity, trimming of vegetation may be necessary. MCWRA will periodically observe vegetation growth and channel flow capacity and maintain the treatment system to provide optimal contaminant reduction along with adequate drainage flow capacity.

An evaluation of the potential effects of Blanco Drain discharge on steelhead is included in Section 5.4.1.4 of the Supplement to the BA for the SVWP.

THIS PAGE HAS BEEN UPDATED
SEE ERRATA
NOVEMBER 8, 2005 AND JANUARY 27, 2006

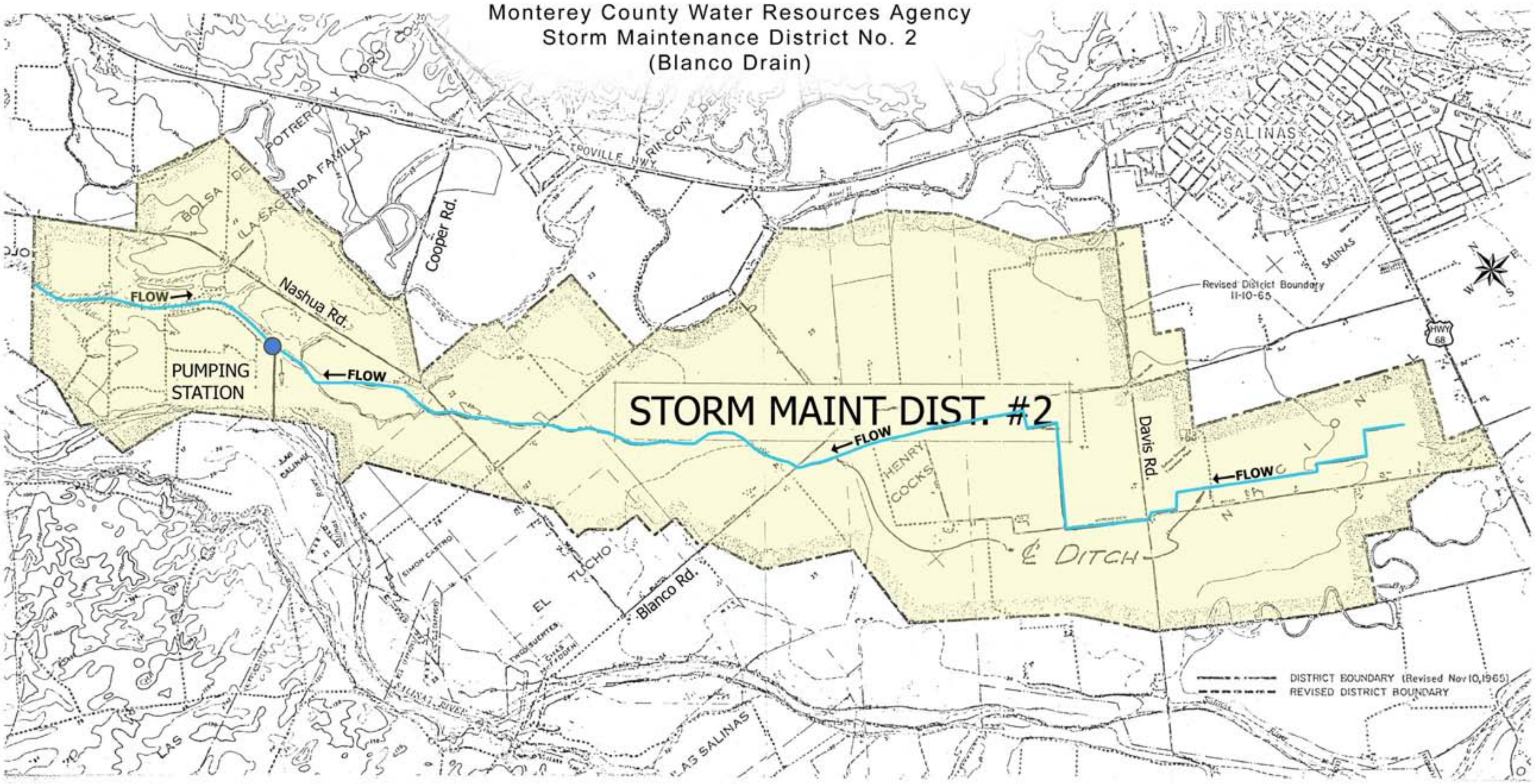


Figure 6. Storm Maintenance District No. 2 (Blanco Drain) Drainage Area

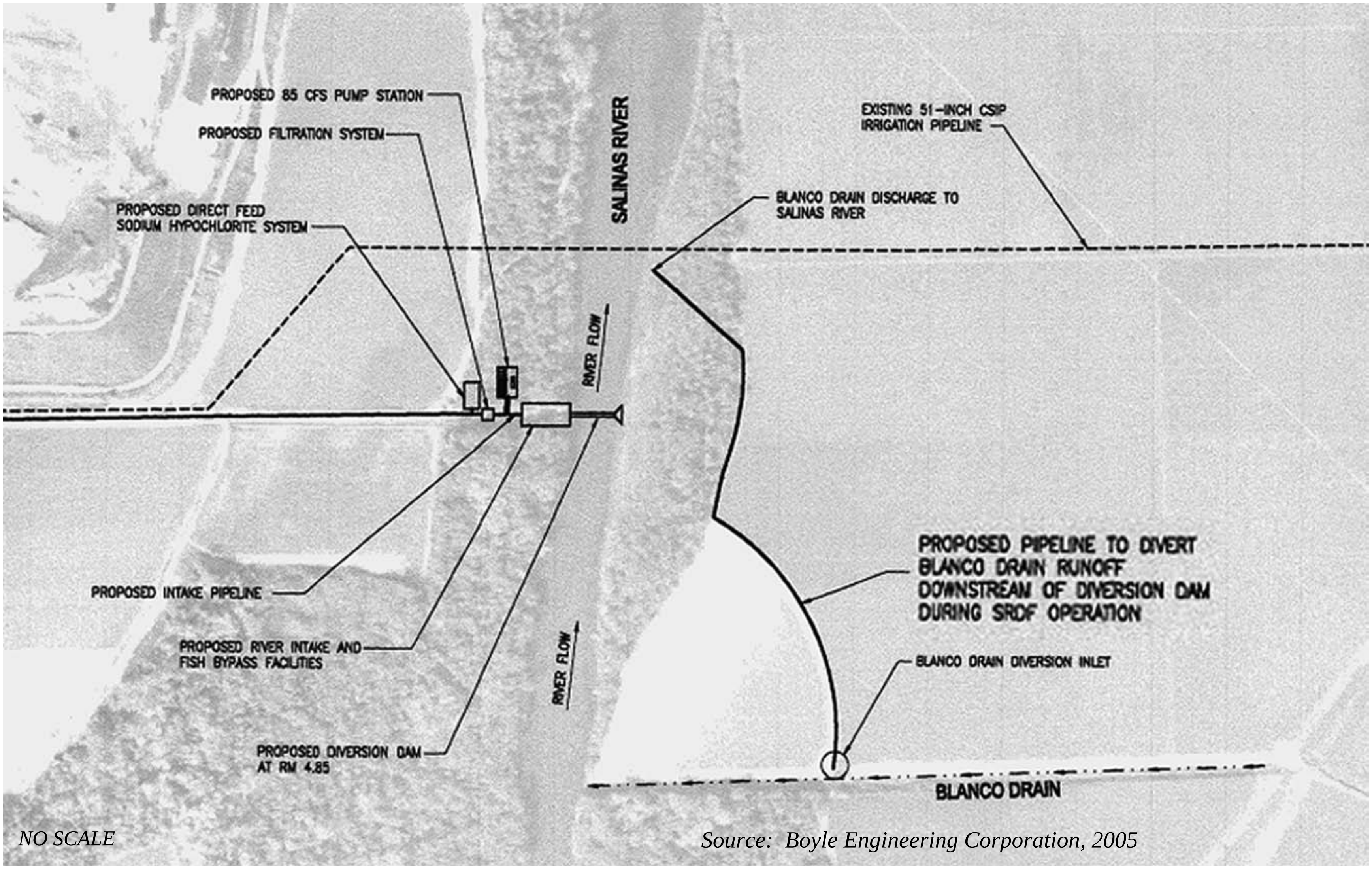


Figure 7. Blanco Drain Diversion Pipeline Proposed Location

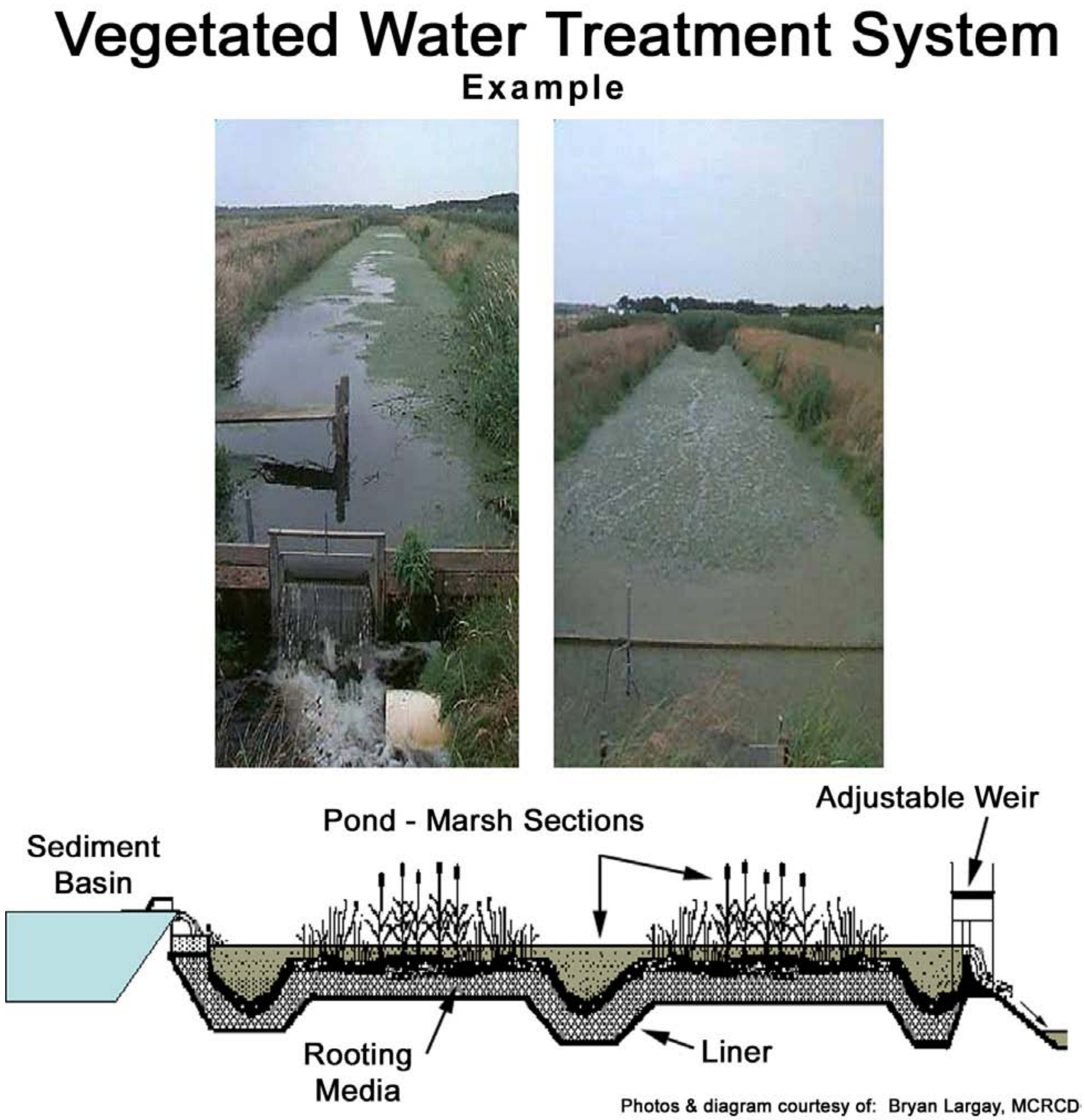


Figure 8. Vegetated Water Treatment System Example

Nacimiento River Below Nacimiento Dam

Flood Control Priority

MCWRA is responsible for flood control within Monterey County, as mandated by the State of California, and defined in its Agency Act. With respect to Nacimiento and San Antonio Reservoir operations, flood prevention is of highest priority. Therefore, all releases of water from Nacimiento and San Antonio Reservoirs will be made with consideration given first to safety, which is inclusive of all necessary operations related to flood prevention.

Nacimiento River Rate of Stage Decline Below Nacimiento Dam

Operation of the SVWP will require the regulation of releases from Nacimiento and San Antonio Reservoirs, flood control and conservation storage reservoirs. At Nacimiento Dam, two high-level gates are located immediately below the spillway, with invert elevation of 755 feet, for flood control release purposes. Maximum flow through the high-level gates is approximately 4,500 cfs (fully open gates and full reservoir). With respect to regulation of the rate of decline in stage of Nacimiento River below Nacimiento Dam, MCWRA is limited when utilizing the high-level gates. Operation of both high-level gates must be concurrent, with incremental changes in gate opening of no less than 25% of the total opening.

Based on data from the Nacimiento River below Nacimiento Dam near Bradley CA USGS stream flow gage (11149400), analysis of operations shows that the maximum rate of decline that can be expected in the stage of Nacimiento River below Nacimiento Dam varies between approximately 1.7 feet per hour to approximately 1.0 foot per hour when operating the high level gates at incremental changes of 50% to 25%. The rate of decline of Nacimiento River stage below Nacimiento Dam is also dependent upon reservoir elevation behind the high-level gates when the gates are closing.

The low-level outlet works at Nacimiento Dam feed a small hydroelectric generation plant. The maximum release capacity of the low-level outlet works is approximately 650 cfs (full reservoir). The hydroelectric power plant optimum flow capacity is approximately 420 cfs. Existing low-level outlet works construction does not allow fine flow regulation without shutting down power generation or unacceptably risking damage to the hydroelectric generation plant between approximately 650 and 420 cfs.

Based on data from the Nacimiento River below Nacimiento Dam near Bradley USGS stream flow gage (11149400), when regulating flows less than approximately 420 cfs, rates of decline in Nacimiento River stage below Nacimiento Dam are expected to vary between approximately 0.4 foot per hour to approximately 0.1 foot per hour when releases incrementally decrease between approximately 250 cfs to 50 cfs. The MCWRA, by incrementally decreasing releases by no more than 100 cfs every 4 hours will be able to minimize the rate of decline in stage below Nacimiento Dam to approximately 0.30 feet/hour or less. Through continued operational experience the MCWRA will endeavor to operate the reduction of releases from Nacimiento Reservoir to minimize the rate of decline in stage in the Nacimiento River below Nacimiento Dam to the extent possible.

Rearing Habitat Flow Study for Nacimiento River Below Nacimiento Dam

It has been determined that a flow of 60 cfs will provide adequate spawning habitat in Nacimiento River below Nacimiento Dam. Accordingly, this Supplement to the BA for the SVWP provides a minimum flow release of 60 cfs from Nacimiento Reservoir for the period of the eighth day after an adult steelhead passage day occurs on the Salinas River near Spreckels after January 1 through May 31. From June 1 until the following year's spawning flow criteria is met, rearing conditions in Nacimiento River below

Nacimiento Dam must be maintained for steelhead fish. Adequate rearing flow for that reach of river has not been determined. Therefore MCWRA will conduct a Steelhead Rearing Habitat Flow Study for Nacimiento River below Nacimiento Dam. The study plan will be submitted to NMFS biology staff for concurrence. The final report will be submitted for NMFS biology staff approval. Until such study is completed and a minimum rearing habitat flow is identified and concurred with by NMFS biology staff, 60 cfs will be the minimum "rearing flow" for Nacimiento River below Nacimiento Dam from June 1 until the following year's spawning flow criteria is met. Therefore, the minimum release from Nacimiento Reservoir is 60 cfs for the entire year until a rearing habitat flow is identified. This minimum flow criterion will be in effect as long as the surface elevation of Nacimiento Reservoir remains above elevation 687.8 feet mean sea level (msl), the reservoir's minimum pool. Water will not be released below this elevation by the MCWRA.

<u>Outlet Works Maintenance/Repair</u>

Maintenance and repair of Nacimiento Dam low-level and high-level outlet works is required from time to time. MCWRA will reduce or stop flows through Nacimiento Dam low-level and/or high-level outlet works if MCWRA determines it necessary to ensure the safety of personnel performing maintenance or repair work. MCWRA will endeavor to schedule reduction or cessation of flows as to minimize impacts to steelhead fish in lower Nacimiento River. MCWRA will document the occurrence and duration of any flow reduction or cessation for maintenance or repair purposes and include such documentation in the annual report submitted to NMFS.

<u>Drought Conditions</u>

Under drought conditions, the MCWRA will evaluate reservoir storage with regard to the continuation of minimum releases. When the water surface of Nacimiento Reservoir is at or below elevation 748 feet msl recommendations may be presented to NMFS for a reduction of the minimum flow criterion.

San Antonio River Below San Antonio Dam

Flood Control Priority

MCWRA is responsible for flood control within Monterey County, as mandated by the State of California, and defined in its Agency Act. With respect to Nacimiento and San Antonio Reservoir operations, flood prevention is of highest priority. Therefore, all releases of water from Nacimiento and San Antonio Reservoirs will be made with consideration given first to safety, which is inclusive of all necessary operations related to flood prevention.

Minimum Release

Information available on habitat conditions in the approximately five miles of the San Antonio River downstream of San Antonio Dam indicate that spawning and rearing habitat is limited by substrate, channel form and temperature conditions, as well as flow. Therefore, the release of additional flow from San Antonio Reservoir is unlikely to result in improvement in steelhead spawning and rearing opportunities. It is therefore impractical to invest in studies to determine flow releases necessary to support spawning and rearing activity in the lower San Antonio River. MCWRA will maintain a minimum release flow of 3 cfs from San Antonio Reservoir until such a time as the surface elevation of San Antonio Reservoir is at or below elevation 666 feet msl, the reservoir's minimum pool.

Outlet Works Maintenance/Repair

Maintenance and repair of San Antonio Dam low-level outlet works is required from time to time. MCWRA will reduce or stop flows through San Antonio Dam low-level outlet works if MCWRA determines it necessary to ensure the safety of personnel performing maintenance or repair work. MCWRA will endeavor to schedule reduction or cessation of flows as to minimize impacts to steelhead fish in the Salinas River. MCWRA will document the occurrence and duration of any flow reduction or cessation for maintenance or repair purposes and include such documentation in the annual report submitted to NMFS.

Drought Conditions

Under conditions of extreme or impending drought, the MCWRA will evaluate reservoir storage conditions with regard to the continuation of minimum releases. When the water surface of San Antonio Reservoir reaches what MCWRA determines to be critically low levels, recommendation for cessation of flow may be presented to NMFS.

Monitoring Plan

This monitoring plan replaces section 2.3.5.2 of the Biological Assessment for the Salinas Valley Water Project, Salinas River, CA, dated May 30, 2002.

Introduction

SVWP compliance with the ESA has resulted in this Project Description, Flow Prescription and other items included in this Supplement to the Biological Assessment. The sum of those items makes up a plan to improve passage and habitat conditions for steelhead trout (*Oncorhynchus mykiss*) in the lower Salinas River system, thus supporting opportunity for an increase in their population. Monitoring of selected parameters is advised to determine the effects of the SVWP Flow Prescription and Project Description on passage and habitat conditions, and life cycle of steelhead trout in the lower Salinas River system. The various parameters necessary to monitor may be placed into the following three general categories: (1) Physical Parameters, those parameters affecting steelhead passage, consisting of stream flows, channel characteristics, and water elevations/depths, (2) Habitat Parameters, consisting of water quality parameters affecting steelhead habitat, and (3) Steelhead Population, life-stage populations and trend, consisting of estimated enumeration of steelhead at various life-stages and estimated predator influence over time. Take minimization measures are included and described in this monitoring plan.

It is the objective of this monitoring plan to effectively identify how the SVWP enhances opportunity for steelhead use of the lower Salinas River system, and to identify the effects of the various actions implemented as part of the SVWP on the steelhead population. Upon start-up of the SVWP, MCWRA will implement the monitoring plan described herein. MCWRA may modify monitoring methods and/or timing from that described herein to ensure monitoring personnel safety.

Physical Parameters

a. SRDF Performance Monitoring

   i. MCWRA will complete a one-time SRDF intake screen entrance velocity measurement. Necessary adjustments will be made to comply with NMFS fish screen entrance velocity standards prior to project start-up. The purpose of regulating intake screen entrance velocity is to prevent impingement of fish on the screen.

   ii. MCWRA will complete a one-time SRDF fish ladder flow performance test to verify stage-flow characteristics for the full range of SRDF impoundment operational stages. The purpose of this test is to definitively identify flow characteristics through the fish ladder for accurate flow regulation and monitoring during SRDF operation.

b. Lower Salinas River System Flow and Elevation/Depth Monitoring

   i. For the purpose of monitoring passage flow trigger occurrences and determining steelhead passage conditions in the lower Salinas River system, MCWRA will monitor provisional real-time, and provisional and final mean daily flow, as reported by the USGS, at the following stream flow gages:
      (1) Nacimiento River below Sapaque Creek near Bryson, CA (USGS Stream gage 11148900)
      (2) Nacimiento River below Nacimiento Dam near Bradley, CA (USGS Stream gage 11194400)
      (3) Salinas River at Soledad, CA (USGS Stream gage 11151700)
      (4) Arroyo Seco near Soledad, CA (USGS Stream gage 11152000)

(5) Arroyo Seco below Reliz Creek near Soledad, CA (USGS Stream gage 111520500)
(6) Salinas River near Chualar, CA (USGS Stream gage 11152300)
(7) Salinas River near Spreckels, CA (USGS Stream gage 11152500). (This gage also effectively serves as inflow to the SRDF Impoundment.)

ii. For use in determining steelhead passage conditions in the lower Salinas River system and rearing habitat conditions in the Salinas River lagoon, MCWRA will monitor provisional real-time, and provisional and final mean daily flow, as reported by the MCWRA, at the following locations:
(1) San Antonio Reservoir releases at the San Antonio Dam outlet works

iii. For use in determining steelhead passage conditions in the lower Salinas River system and rearing habitat conditions in the Salinas River lagoon, MCWRA will monitor from April to when the diversion dam is lowered, the provisional real-time, and provisional and final mean daily flow, as reported by the MCWRA, at the following locations:
(1) Flow through the SRDF fish ladder
(2) Flow over the top of the SRDF dam

iv. For use in determining steelhead rearing habitat conditions in the Salinas River lagoon, MCWRA will monitor the following:
(1) Provisional and final mean monthly flows for the period of April through the first significant storm flow for Blanco Drain discharge to the Salinas River.
(2) Lagoon water surface elevation at the Old Salinas River (OSR) channel slide gate for the entire water-year
(a) Once, or more, per week during periods when lagoon elevation is stable
(b) Two to five times per week during periods when lagoon conditions are less stable, such as prior to sandbar management operations, when the sandbar is in the process of closing, or when the lagoon is closed to the ocean and inflow to the lagoon is substantially higher or lower than outflow through the OSR channel slide gate.

v. For use in determining fish passage and habitat conditions in the SRDF Impoundment, MCWRA will monitor the following on an hourly basis:
(1) Impoundment water depth

Habitat Parameters

c. Water Quality Monitoring

i. Water Temperature: MCWRA will monitor minimum, maximum and mean daily water temperature via electronic instrumentation and data logger for the period of April through October at the locations described below.
(1) Nacimiento River near Nacimiento Ranch (approximately 5 miles downstream of Nacimiento Dam)
(2) Nacimiento River near Highway 101 (approximately 10 miles downstream of Nacimiento Dam)
(3) Near the inlet to the SRDF Impoundment (approximately three miles upstream of the diversion dam)
(4) SRDF Impoundment near the diversion dam during SRDF operation (when the dam is in the raised position).

(5) Salinas River lagoon near Highway 1 where measurement instrument access and security are adequate. Temperature will be monitored at two depths at this location, near-surface and mid-water.
(6) Salinas River lagoon at a point estimated to be representative of lower lagoon conditions, downstream of Highway 1 where measurement instrument access and security are adequate. Temperature will be monitored at two depths at this location, near-surface and mid-water.

If water temperature data presents consistent patterns after a sufficient period of time, water temperature monitoring frequency may be reduced.

ii. Dissolved Oxygen: MCWRA will monitor dissolved oxygen (DO) via electronic instrumentation and data logger at the locations and frequencies described below. In addition, once per month MCWRA will obtain DO readings at one-foot depth intervals at each of the locations described below when water depth is more than three feet.
(1) SRDF Impoundment near the diversion dam during SRDF operation (when the dam is in the raised position) no less than once per 6-hour period. DO will be measured at a point approximately mid-water depth. The depth of DO measurement may vary due to the varying nature of impoundment water surface elevation during SRDF operations.
(2) Salinas River lagoon near Highway 1 for the period of April through December no less than once per 6-hour period. DO will be measured at a point approximately mid-water depth.
(3) Salinas River lagoon at a point estimated to be representative of lower lagoon conditions, downstream of Highway 1 where measurement instrument access and security are adequate. DO will be measured at a point approximately mid-water depth.

iii. Salinity: MCWRA will monitor salinity as specific electrical conductance (SEC) via electronic instrumentation and data logger at the locations and frequencies described below. In addition, once per month MCWRA will obtain DO readings at one-foot depth intervals at each of the locations described below when water depth is more than three feet.
(1) SRDF Impoundment near the diversion facility inlet during SRDF operation (when the dam is in the raised position) no less than once per 6-hour period. The ubiquitous nature of surface water SEC will allow its measurement at the SRDF inlet to be considered representative of river water at that location.
(2) SEC will be measured at two locations in the Salinas River lagoon due to the natural potential for and occurrence of seawater influx into the lagoon.
(a) Salinas River lagoon near Highway 1 for the period of April through December no less than once per 6-hour period. SEC will be measured at two depths at this location, near-surface and mid-water.

(b) Salinas River lagoon at a point estimated to be representative of the lower lagoon region conditions, downstream of Highway 1 where access and measurement instrumentation may be secured, for the period of April through December no less than once per 6-hour period. SEC will be measured at two depths at this location, near-surface and mid-water.

iv. Diazinon and Chlorpyrifos: MCWRA will monitor for diazinon and chlorpyrifos (organophosphate pesticides) in the surface water at the following locations and frequencies:
   (1) Blanco Drain discharge to the Salinas River no less than four times during the SRDF operating season (once in April, June, August and October). The monitoring location will be upstream of the point Blanco Drain discharge meets the Salinas River.
   (2) Salinas River lagoon near Highway 1 (when the lagoon is closed to the ocean) no less than four times during the SRDF operating season (once in April, June, August and October).
   (3) Salinas River lagoon at a point estimated to be representative of the lower lagoon region conditions, downstream of Highway 1 where access and measurement instrumentation may be secured (when the lagoon is closed to the ocean) no less than four times per year during the SRDF operating season (once in April, June, August and October).

Steelhead Population

d. Adult Upstream Migrant Population: MCWRA will employ dual frequency identification sonar (DIDSON) technology to estimate the number of upstream adult migrants entering the Salinas River. The location of instrument deployment will be determined through consultation with other DIDSON users with appropriate knowledge and experience and NMFS biology staff, considering site geometry, access and security. A reasonable location may be at or near the SRDF dam site. The period of deployment will be January 1 through March 31 when steelhead passage flow is occurring. Steelhead images collected by the DIDSON will be archived for reporting and later reference.

e. Smolt Outmigrant Population: Enumeration of the steelhead smolt outmigrant population over time is considered the best indication of overall steelhead population trend in the Salinas River system. MCWRA will employ DIDSON technology to estimate the number of downstream smolt migrants in the Salinas River system. DIDSON monitoring for smolt outmigrants will occur from April 1 through May 31. The instrument will be deployed at a location to be determined through consultation with other DIDSON users with appropriate knowledge and experience and NOAA biology staff, considering site geometry, access and security. The location of downstream smolt monitoring may be different than the location of upstream adult migrant monitoring since the diversion dam may be in the raised position beginning April 1. Steelhead images collected by the DIDSON will be archived for later reporting and reference.

f. SRDF Operation to Maximize Monitoring Opportunity: Diversion of river flow for irrigation use will begin each year no earlier than April 1. However, MCWRA may operate the SRDF dam prior to April 1 to manage river flow for improving adult upstream migrant or smolt downstream migrant monitoring, if such conditions present. For example, river flows during late March may be of quantity, stage and controlled nature such that raising all but one segment of the SRDF dam allows for narrowing of flow bypassing the dam for optimum DIDSON observation or trapping efficiency. MCWRA will notify NMFS when the diversion dam is raised specifically for steelhead monitoring purposes.

g. Fall Impoundment Fish Survey: Smolt and/or juvenile steelhead may hold in the SRDF impoundment over the summer and fall when the impoundment is in place. In order to determine if steelhead and predatory fish use the SRDF impoundment, MCWRA will survey fish present in the impoundment in the fall of the year. When the SRDF irrigation deliveries are finished for the season (by October 31), a survey of fish will be performed as the diversion dam is lowered and the impoundment pool slowly released downstream.

Nets will be used to direct and contain the fish in a pool of sufficient depth. The fish will then be transferred from the holding pool to a point where they can move to the lagoon.

The following data will be collected from captured steelhead fish:

- Measured Length
- Weight
- External Condition. This includes characteristics of progress of transition from freshwater parr stage to seawater tolerant smolt stage. This includes the degree to which parr marks have faded or disappeared, the degree to which the skin has become silver in appearance, and darkening of the trailing edge of the tail fin (caudal margin).
- Scale sample from representative fish.
- Fish Count
- Photograph of representative fish

The following data will be collected from captured non-steelhead fish species:

- Species Identification and Count
- Measured or Estimated Length
- Representative External Condition

In addition to the fish population parameters above, the following data will be collected to determine representative impoundment habitat conditions:

- Date the diversion dam was raised and impoundment formed
- Mean daily impoundment WSE and water depth
- Mean daily water velocity through the impoundment, determined from mean daily impoundment inflow and stage
- Mean Weekly Water Temperature, Salinity, DO and Turbidity

The Fall Lagoon Fish Survey will be performed prior to this Fall Impoundment Fish Survey so that steelhead use of the lagoon can be distinguished from steelhead use of the impoundment.

The Fall Impoundment Fish Survey may be discontinued if it is demonstrated that steelhead successfully use the impoundment.

h. Nacimiento River below Nacimiento Dam Steelhead Fry Stranding Survey: The potential for steelhead fry becoming stranded during decline in Nacimiento River stage below Nacimiento Dam is presently unknown. The purpose of this survey is to determine if steelhead fry become stranded in the Nacimiento River below Nacimiento Dam after river stage declines to a steady state at minimum spawning release of 60 cfs.

PARAGRAPH 1 (g.) HAS BEEN UPDATED
SEE ERRATA
NOVEMBER 8, 2005

In late-March or April of years when substantial adult upstream migration is detected, a steelhead fry stranding survey will be performed shortly after releases from Nacimiento Dam are reduced from 125 cfs to minimum spawning release of 60 cfs at increments greater than 25 cfs. For example, if substantial adult upstream migration is detected between January and March, thus substantial fry may be found in Salinas River tributaries in spring, and flow below Nacimiento Dam will be reduced to below 125 cfs, a fry standing survey will be conducted in Nacimiento River from below the dam to approximately Highway 101 immediately following an incremental decrease in the rate of release of more than 25 cfs.

The survey will document the following:

- Rate of flow decrease and river stage decline
- Location and estimated numbers of stranded steelhead fry

If surveys in two separate years are completed and steelhead fry are present, but little or no stranding is found, this survey will cease. If stranding is found to occur, then MCWRA will act to minimize fry stranding as follows:

- If stranding is isolated to few or small areas, MCWRA may pursue streambed alteration for the benefit of stranded steelhead fry, through proper permitting authorities.
- If steelhead fry stranding occurs in numerous or larger areas, MCWRA will modify the incremental rate of decrease in Nacimiento Reservoir releases to the extent possible.

Take Minimization Measures

Some aspects of this monitoring plan, such as migrant trapping, snorkel, and bank observations, may involve take of endangered steelhead. These actions will be conducted such that impacts to the fish are minimized. Minimization measures are outlined below:

- All ESA-listed fish handled out-of-water for the purpose of recording biological data will be anesthetized for invasive procedures, such as tissue collection and tagging. Anesthetized fish will be allowed to recover (e.g. in a recovery bucket) before being released. Fish that are simply counted must remain in water but do not need to be anesthetized.

- ESA-listed fish will be handled with care and kept in water to the maximum extent possible during sampling and data collection procedures. Holding unit water will be circulated and replenished. The transfer of ESA-listed fish will be performed with a sanctuary net that holds water during transfer to prevent the added stress of an out-of-water transfer.

- ESA-listed juvenile fish will not be handled if the water temperature exceeds 21 degrees Celsius (70 degrees Fahrenheit) at the capture site. Under these conditions, ESA-listed fish may only be identified and counted. If any adult ESA-listed fish are captured incidental to sampling for juveniles, they will be released without further handling.

- Visual observation protocols (such as snorkeling and stream side surveys) will be used instead of intrusive sampling methods whenever possible, especially if the objective is to simply ascertain whether steelhead are present.

- Traps will be removed from use when flow conditions become hazardous to fish or if there is any indication that the survival of ESA-listed fish will be affected by increasing water flows or other conditions.

- Due caution will be exercised during spawning ground surveys to avoid disturbing, disrupting, or harassing adult steelhead when they are spawning. Walking in the stream will be avoided whenever possible, especially in areas where steelhead are likely to spawn.

- Traps or live boxes will be examined no less than every 6 hours to minimize migration delay and harm to steelhead.

THE FIRST BULLET HAS BEEN MODIFIED
SEE ERRATA
NOVEMBER 8, 2005

SVWP Steelhead Flow Prescription Summary and Illustrative Example

Figure 9 is an illustration of hypothetical Salinas River hydrographs displaying examples of natural flows and reservoir releases for steelhead trout and irrigation diversion.

Illustrative Example of Salinas Valley Water Project Stream Flows

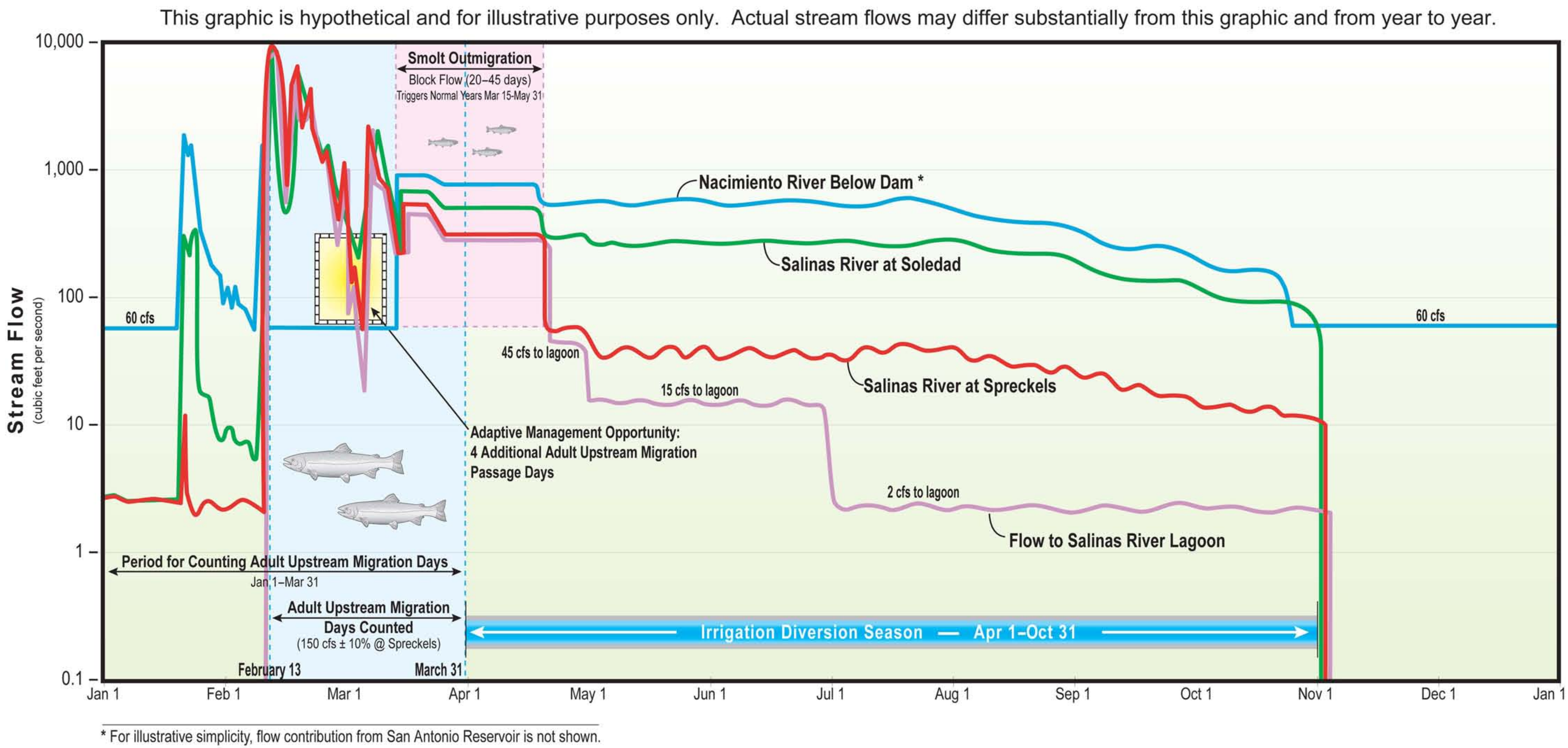


Figure 9. Illustrative Example of Salinas Valley Water Project Stream Flows

References

ENTRIX, Inc. and EDAW, Inc. 2002. Biological Assessment for the Salinas Valley Water Project, Salinas River, California. Prepared for U.S. Army Corps of Engineers on behalf of Monterey County Water Resources Agency. May 30.

Hagar Environmental Science (HES). 2005. Salinas River Lagoon Stage-Volume Relationship – Technical Memorandum. Prepared for Monterey County Water Resources Agency. February 14.

Kozlowski, D. and F. Watson, M. Angelo, J. Larson. 2004. Monitoring Chlorpyrifos and Diazinon in Impaired Surface Waters of the Lower Salinas Region. The Watershed Institute, CSU Monterey Bay. Report No. WI-2004-03.

Moore, M.T. and R. Schulz, C.M. Cooper, S. Smith, Jr., J.H Rodgers, Jr. 2002. Mitigation of Chlorpyrifos Runoff Using Constructed Wetlands. Chemosphere 46 (6): 827-835.

National Oceanographic and Atmospheric Administration – National Marine Fisheries Service (NOAA). 2005. Salinas Valley Water Project Flow Proposal for the Biological Needs of Steelhead in the Salinas River. April.

Schulz, R. and S.K. Peall. 2001. Effectiveness of a Constructed Wetland for Retention of Non-Point Source Pesticide Pollution in the Lourens River Catchment, South Africa. Environmental Science Technology 15; 35 (2): 422-426.

Schulz, R. 2004. Field Studies on Exposure, Effects, and Risk Mitigation of Aquatic Non-Point Source Insecticide Pollution: A Review. Journal of Environmental Quality 33: 419-448.

Sherrard, R.M. and J.S. Bearr, C.L. Murray-Guld, J.H. Rodgers, Jr., Y.T Shah. 2004. Feasibility of Constructed Wetlands for Removing Chlorothalonil and Chlorpyrifos from Aqueous Mixtures. Environ. Pollut. 127 (3): 385-394.

Spurlock, F. 2004. Analysis of Recent Chlorpyrifos Use and Surface Water Monitoring Data. Memorandum. California Environmental Protection Agency, Department of Pesticide Regulation. January 28.

Stearman, G.K. and D.B. George, K. Carlson, S. Lansford. 2003. Pesticide Removal from Container Nursery Runoff in Constructed Wetland Cells. Journal of Environmental Quality 32: 1548-1556.

Water Resources and Information Management Engineering, Inc. (WRIME). 2005. Salinas Valley Integrated Groundwater and Surface water Model. Version 6.2. Model Results: June 23, 2005 #4C.

APPENDIX A

Year Type Categorization

A determination of year type (dry, normal, wet) is made based on an indexing of unimpaired annual mean flows (Q) at the USGS stream gage on the Arroyo Seco near Soledad (USGS Stream Gage 11152000). In order to develop year type criteria, the annual mean flows for the period of October 1901 to September 2000 were calculated based on daily mean stream flow obtained from published USGS data. The annual mean flows for the Arroyo Seco near Soledad were ranked in descending order; and plotting positions were assigned to each year. The stream flows corresponding to the 25th, and 75th, percentile were selected as the threshold flows for wet, normal, and dry categories respectively. Additionally, normal year types were subcategorized into wet-normal, normal, and dry-normal categories. The following chart shows the exceedance of Arroyo Seco near Soledad annual mean flows (Figure A-1).

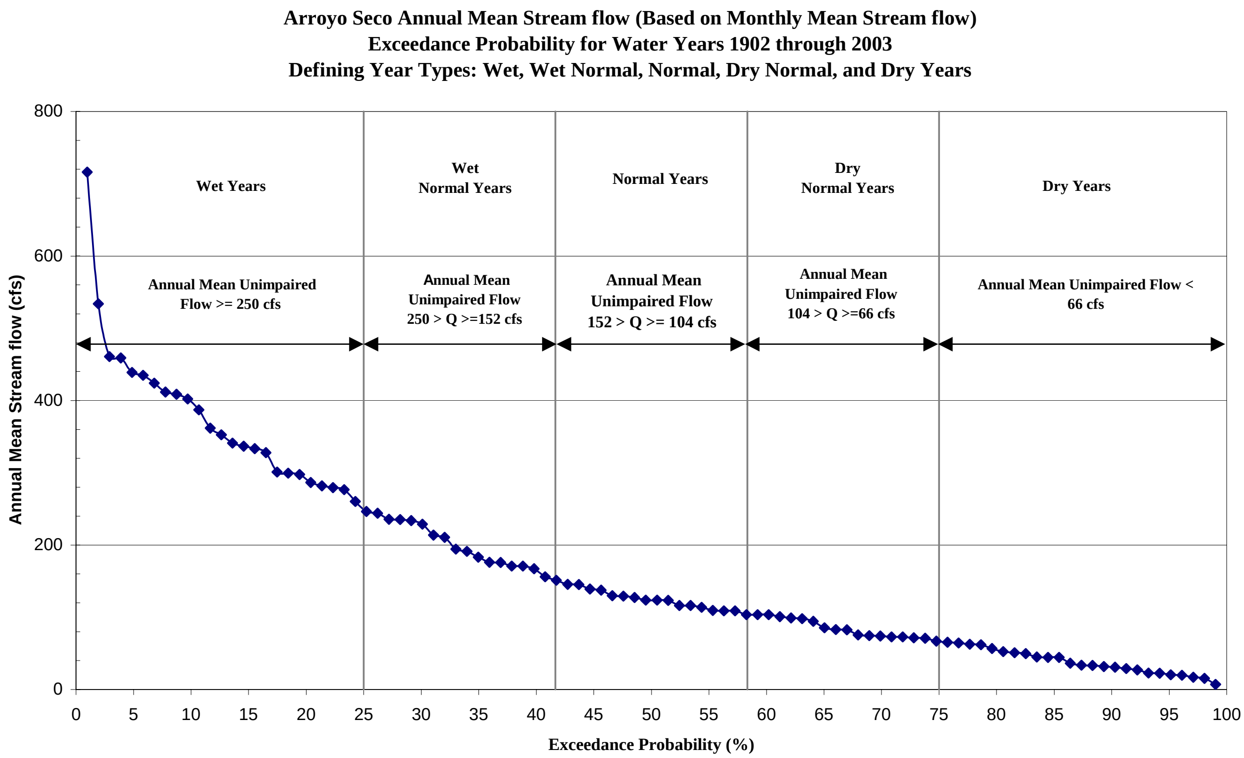


Figure A-1. Arroyo Seco Annual Mean Stream flow

On the basis of this indexing, water years in the period of record were categorized to the following annual mean flows (Q) at the Arroyo Seco near Soledad (USGS Stream Gage 11152000):

- Wet: Q >= 250 cfs
- Wet-Normal: 250 cfs > Q >= 152 cfs
- Normal: 152 cfs > Q >= 104 cfs
- Dry-Normal: 104 cfs > Q >= 66 cfs
- Dry: Q < 66 cfs

Year Type Determination:
Year type determinations will be made on March 15 and/or April 1 to establish the activity of triggers for block-flow releases necessary for smolt outmigration. This year type determination will be based on provisional USGS data of mean daily flow at the Arroyo Seco near Soledad. Mean daily flows will be used to estimate annual mean flow (normally defined from October 1 through September 30). Analysis of historical data indicates that the MCWRA can expect to accurately determine year type approximately 84% of the time on March 1, and by April 1, year types can be accurately determined approximately 88% of the time.

Year Type Reporting:
As noted, year type determinations will be made based on provisional USGS data of mean daily flow at the Arroyo Seco near Soledad (USGS Stream Gage 11152000). Also, it is recognized that year type designation may change between March 15 and April 1, depending on the intensity of rainfall events occurring after March 15. Even after April 1 the MCWRA's ability to accurately determine year type is approximately 88%. For example, if on April 1 the year type determination were to indicate "dry" conditions, smolt outmigration triggers would not be activated. Subsequent review of processed (published) USGS data could possibly re-classify the year type designation to "dry-normal". If such a case were to occur, for purposes of project reporting, the year type designation would be evaluated as originally classified and acted upon on April 1.

Year Type Annual Indexing and Categorizing:

Preceding project start-up, and as part of annual reporting, the most recently published USGS gage data will be utilized for the indexing of unimpaired annual mean flows at the USGS stream gage on the Arroyo Seco near Soledad (USGS Stream Gage 11152000), extending the period of record beyond September 2000. This indexing of annual mean flows will be used to categorize year type for the next year, to annual mean flow categories at the Arroyo Seco near Soledad.

APPENDIX B

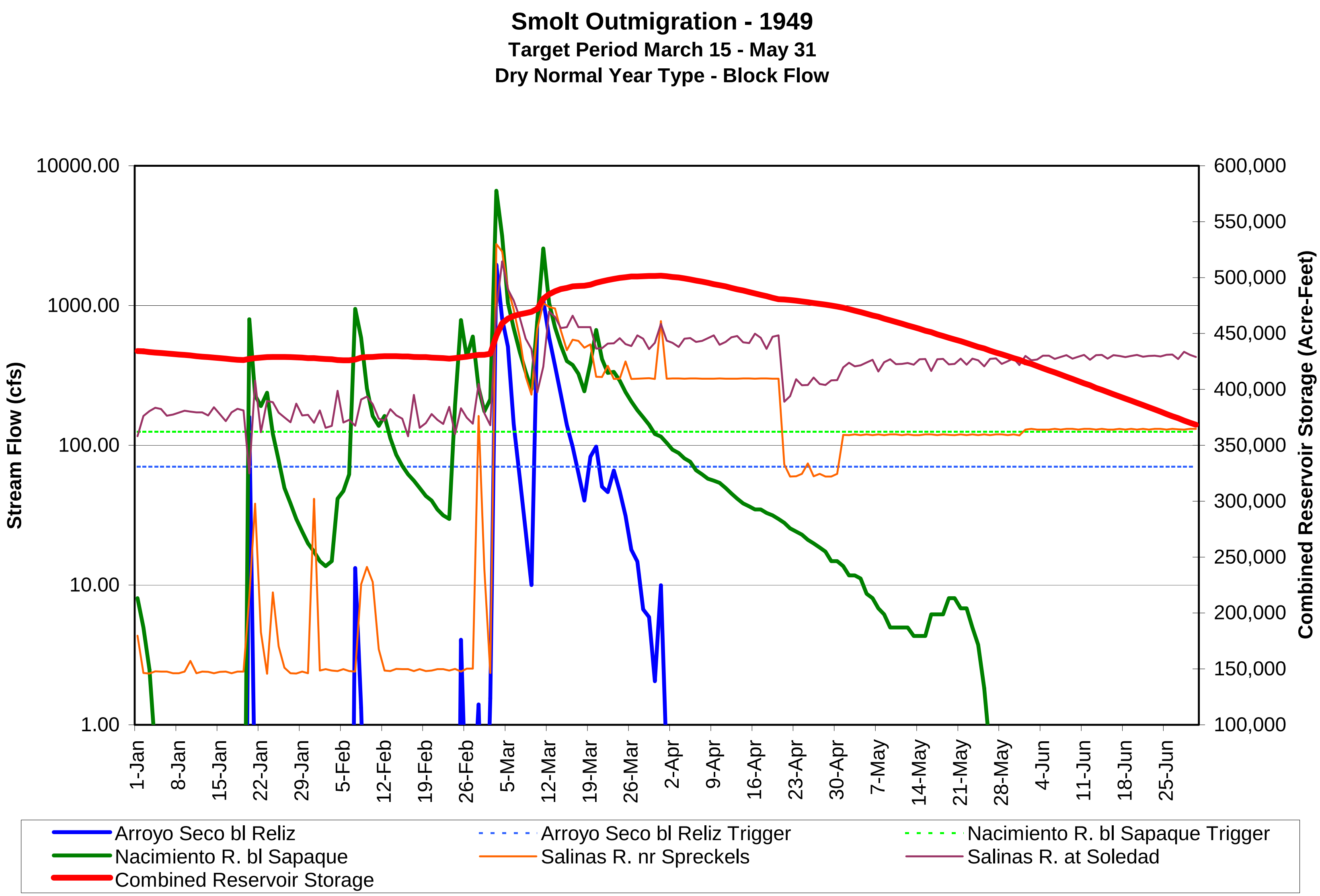


Figure B-1. Smolt Outmigration – 1949 (Dry Normal Year Type – Block Flow)

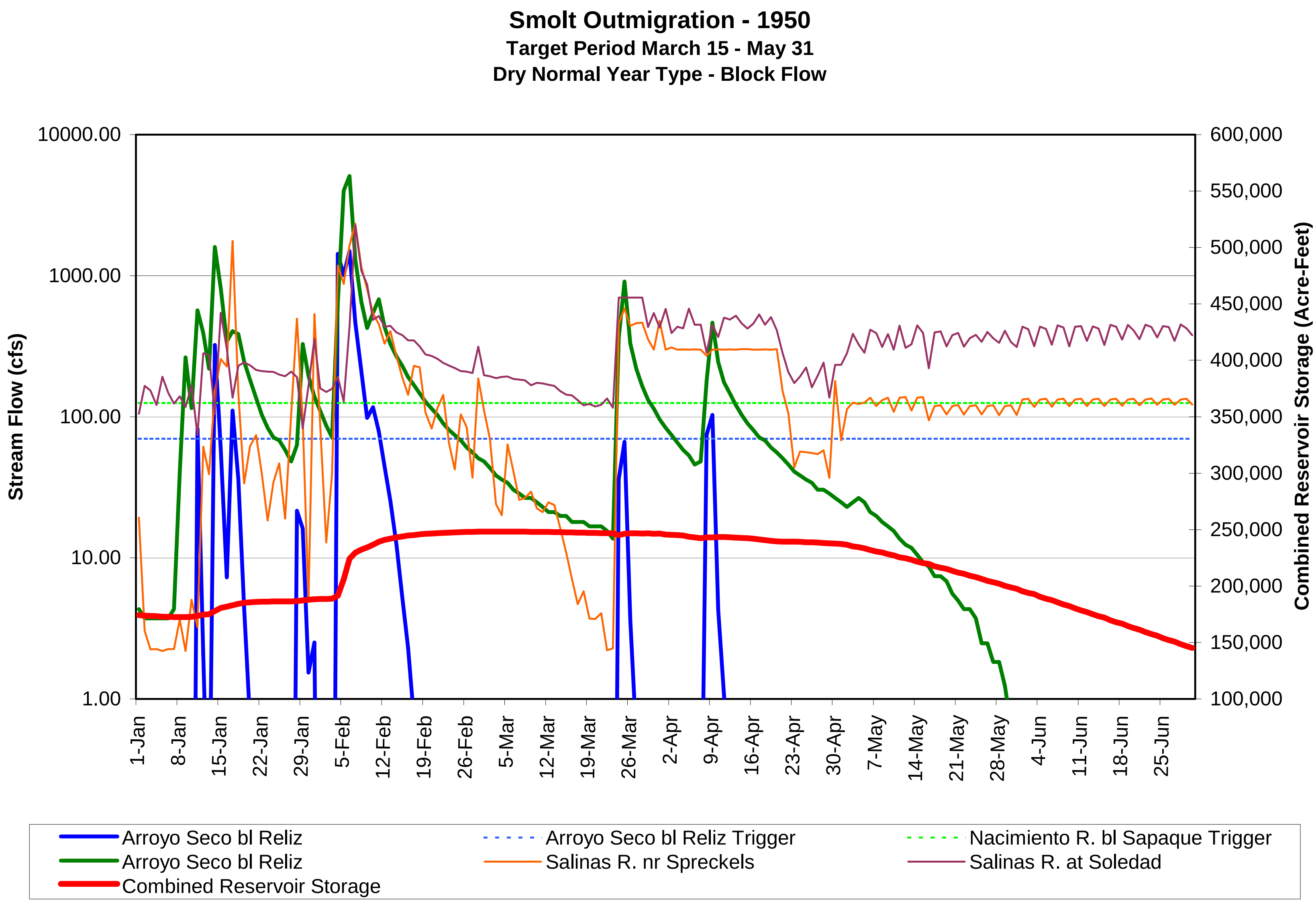


Figure B-2. Smolt Outmigration – 1950 (Dry Normal Year Type – Block Flow)

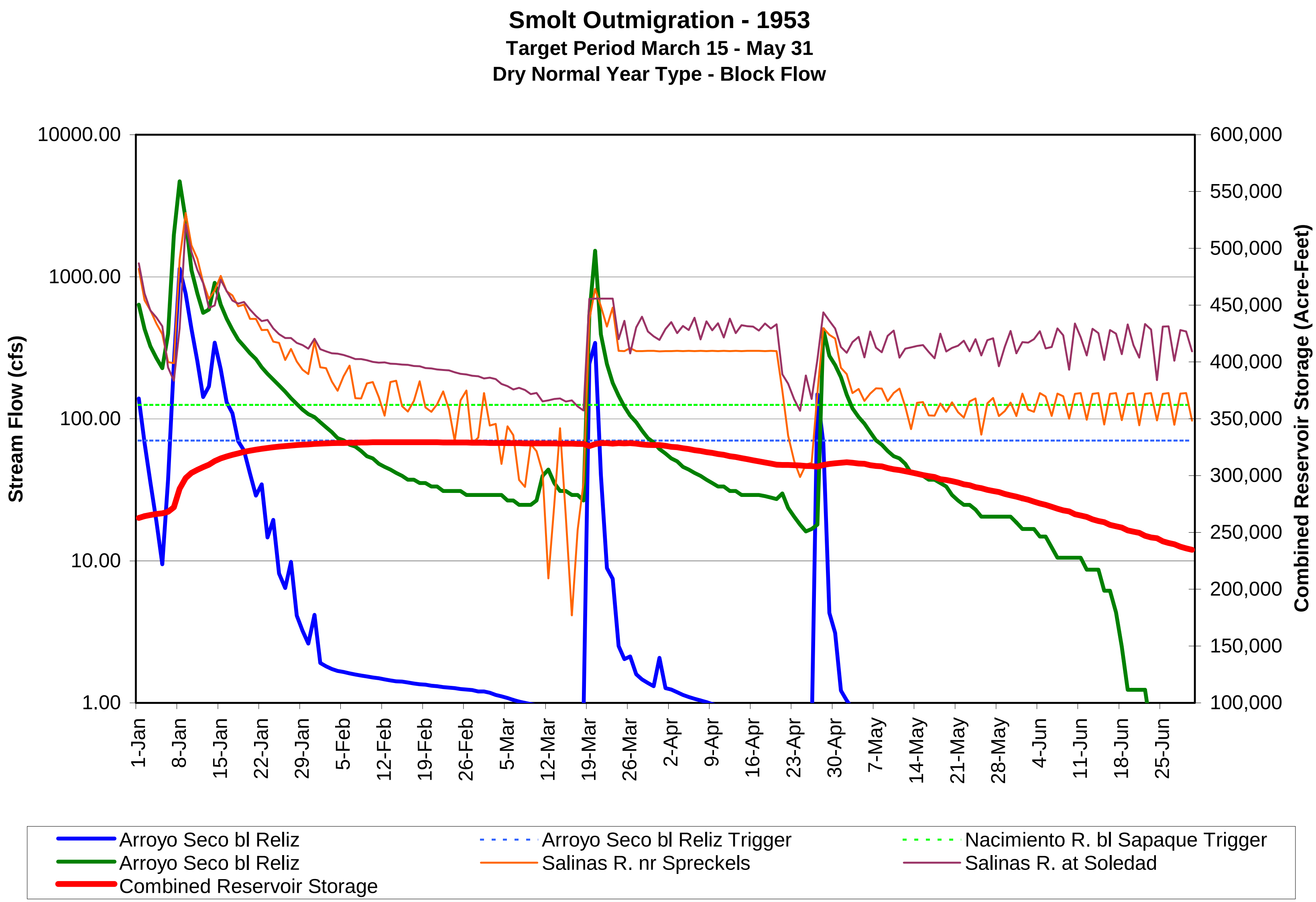


Figure B-3. Smolt Outmigration – 1953 (Dry Normal Year Type – Block Flow)

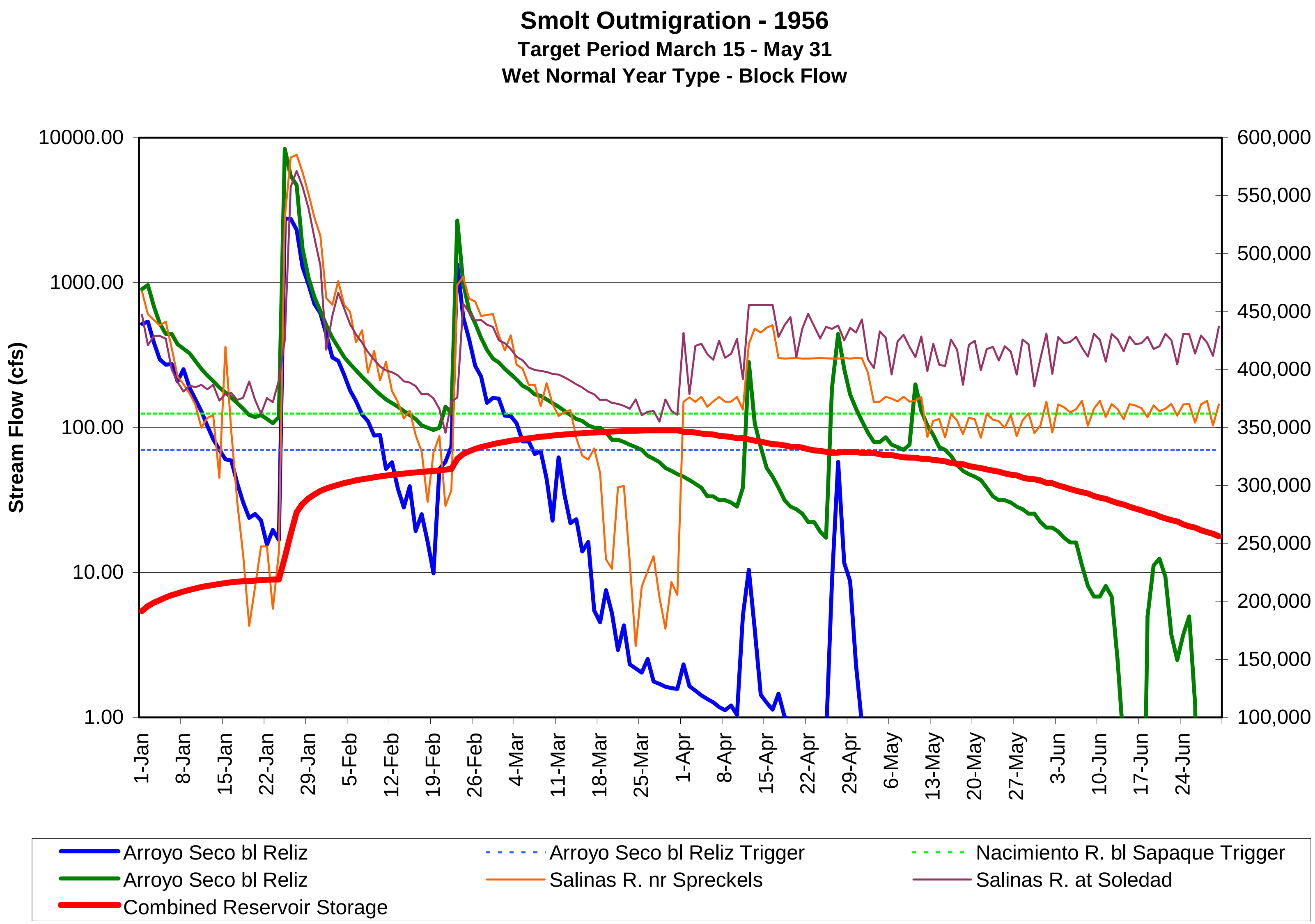


Figure B-4. Smolt Outmigration – 1956 (Wet Normal Year Type – Block Flow)

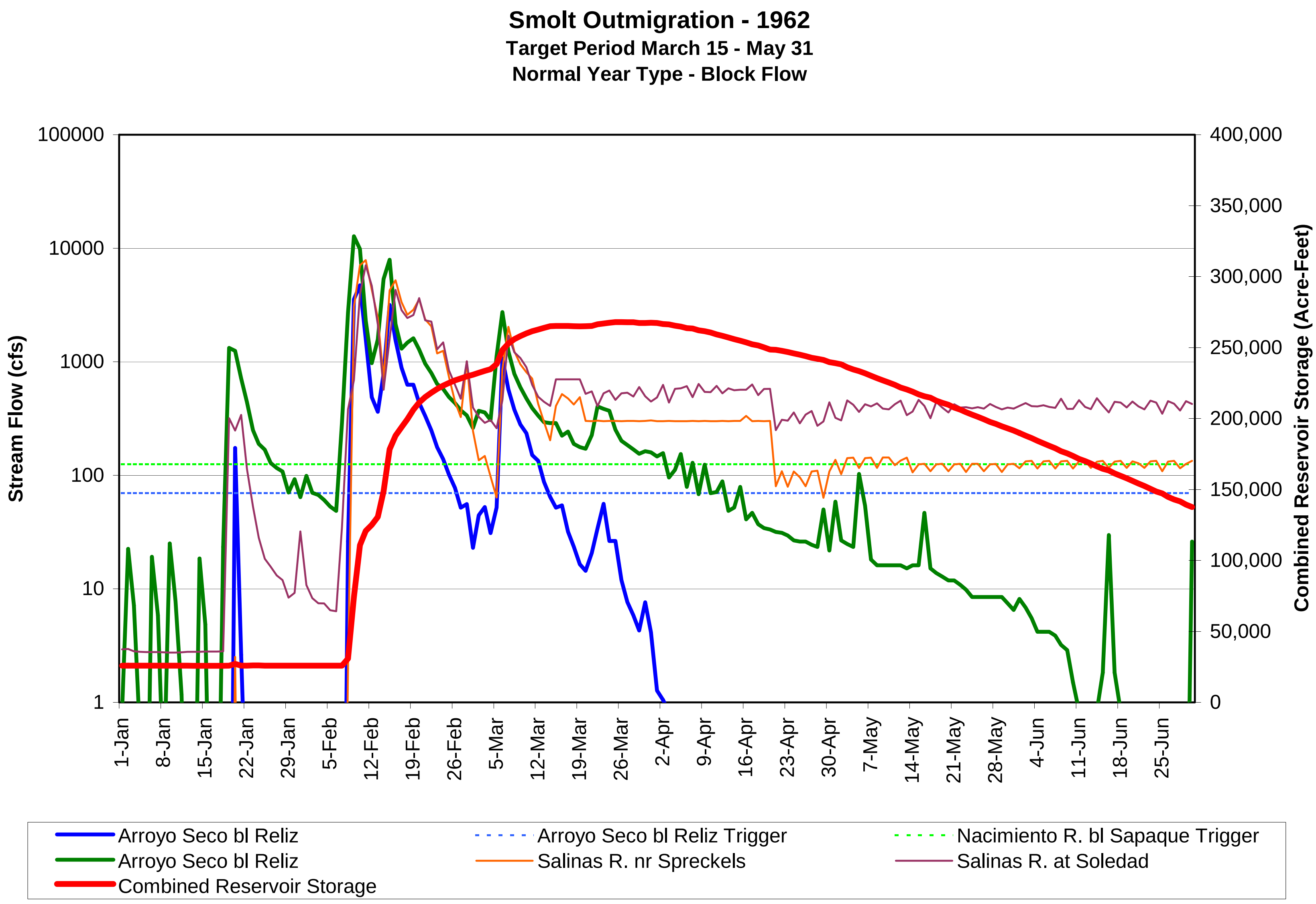
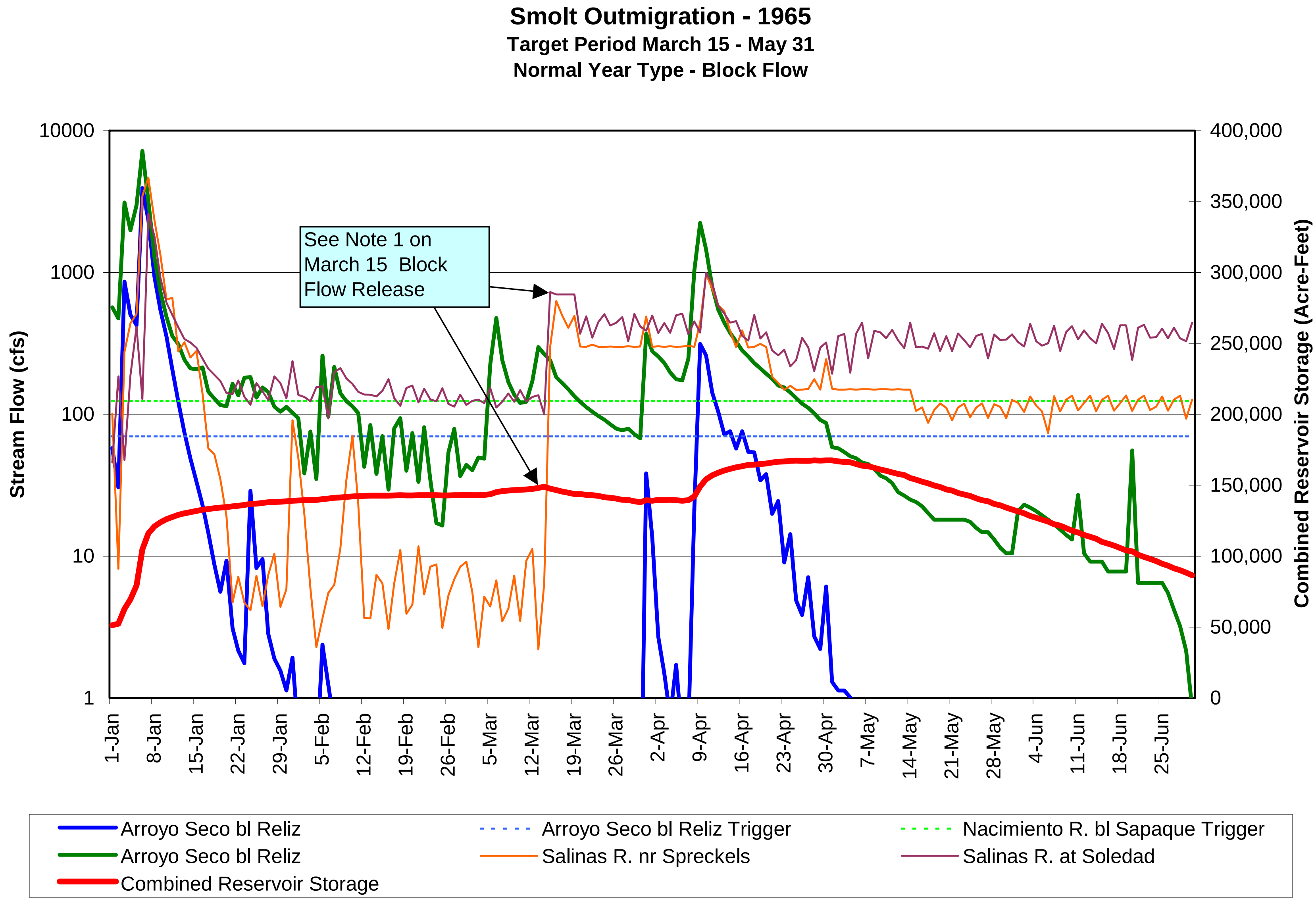


Figure B-5. Smolt Outmigration – 1962 (Normal Year Type – Block Flow)



Note 1:

The SVIGSM calculates combined reservoir storage on March 15, 1965 (a normal year-type) to be 147,663 AF, which is 2,337 AF below the 150,000 AF combined storage trigger to allow smolt outmigration block flow releases from Nacimiento and/or San Antonio Reservoirs. This model run includes 60 cfs minimum flow release from Nacimiento Reservoir for twelve months per year, every year. The effect of the year round 60 cfs release drops combined reservoir storage below 150,000 AF (to 147,663 AF) on March 15, 1965 versus previous model runs. However, the 60 cfs is based on adult spawning flow analysis for Nacimiento River below Nacimiento Dam. Rearing flow for that reach has not yet been determined, though rearing flow is thought likely to be somewhat less than 60 cfs. If the rearing flow were 40 cfs for the two months of November and December 1964, combined storage would have increased by several thousand AF on March 15, 1965, thus reaching the 150,000 AF threshold and triggering a block flow release. Therefore, for purposes of this modeling effort, a smolt outmigration block flow release is shown and counted for the year 1965.

Modeled data simulates 60 cfs minimum flow release from Nacimiento Reservoir twelve months per year, every year, (which is the adult spawning flow value) and does not simulate a rearing flow for summer/fall months because a rearing flow has not yet been determined for Nacimiento River below Nacimiento Dam, and the 60 cfs value is thought to be somewhat conservative for the rearing flow.

Figure B-6. Smolt Outmigration – 1965 (Normal Year Type – Block Flow)

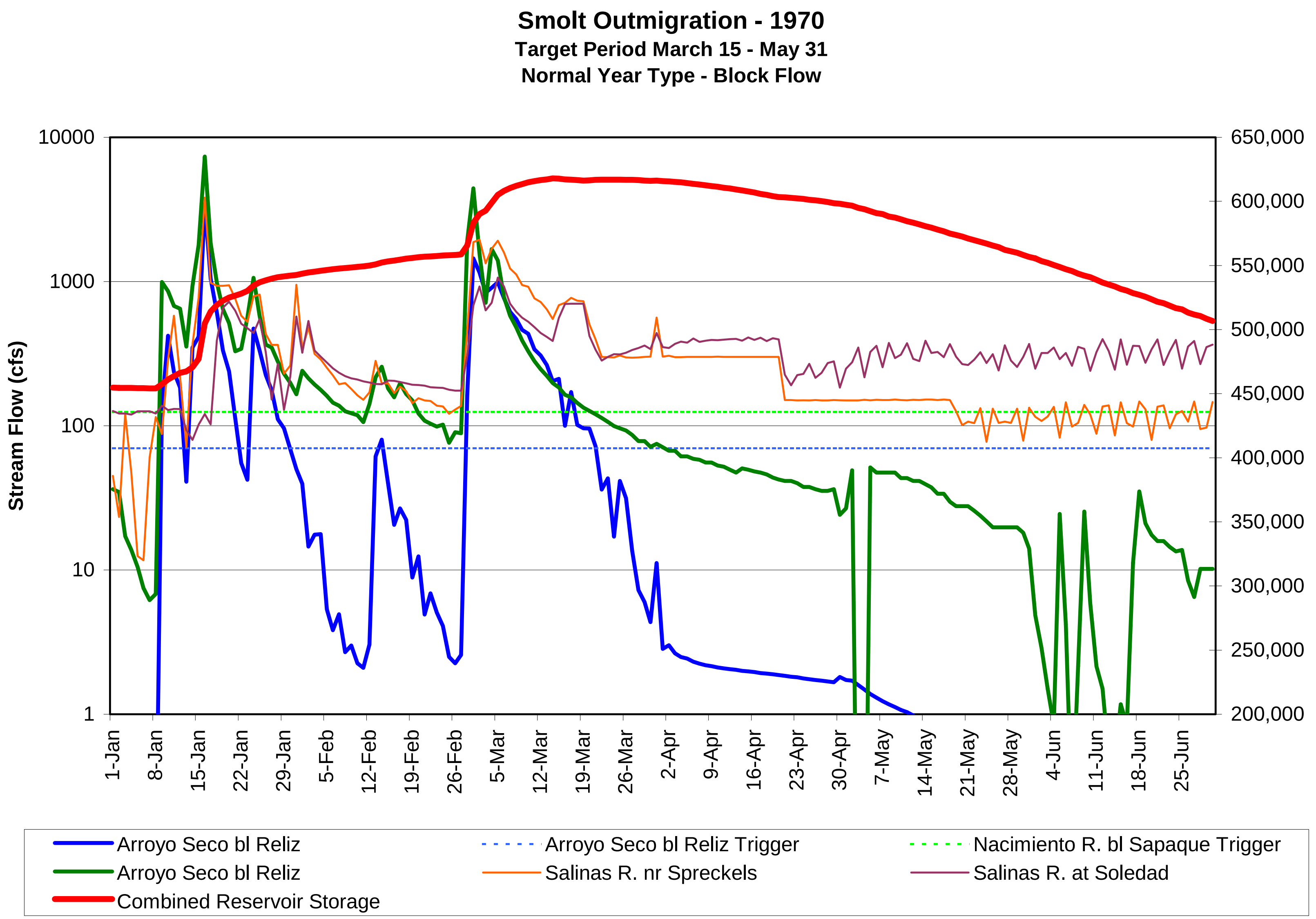


Figure B-7. Smolt Outmigration – 1970 (Normal Year Type – Block Flow)

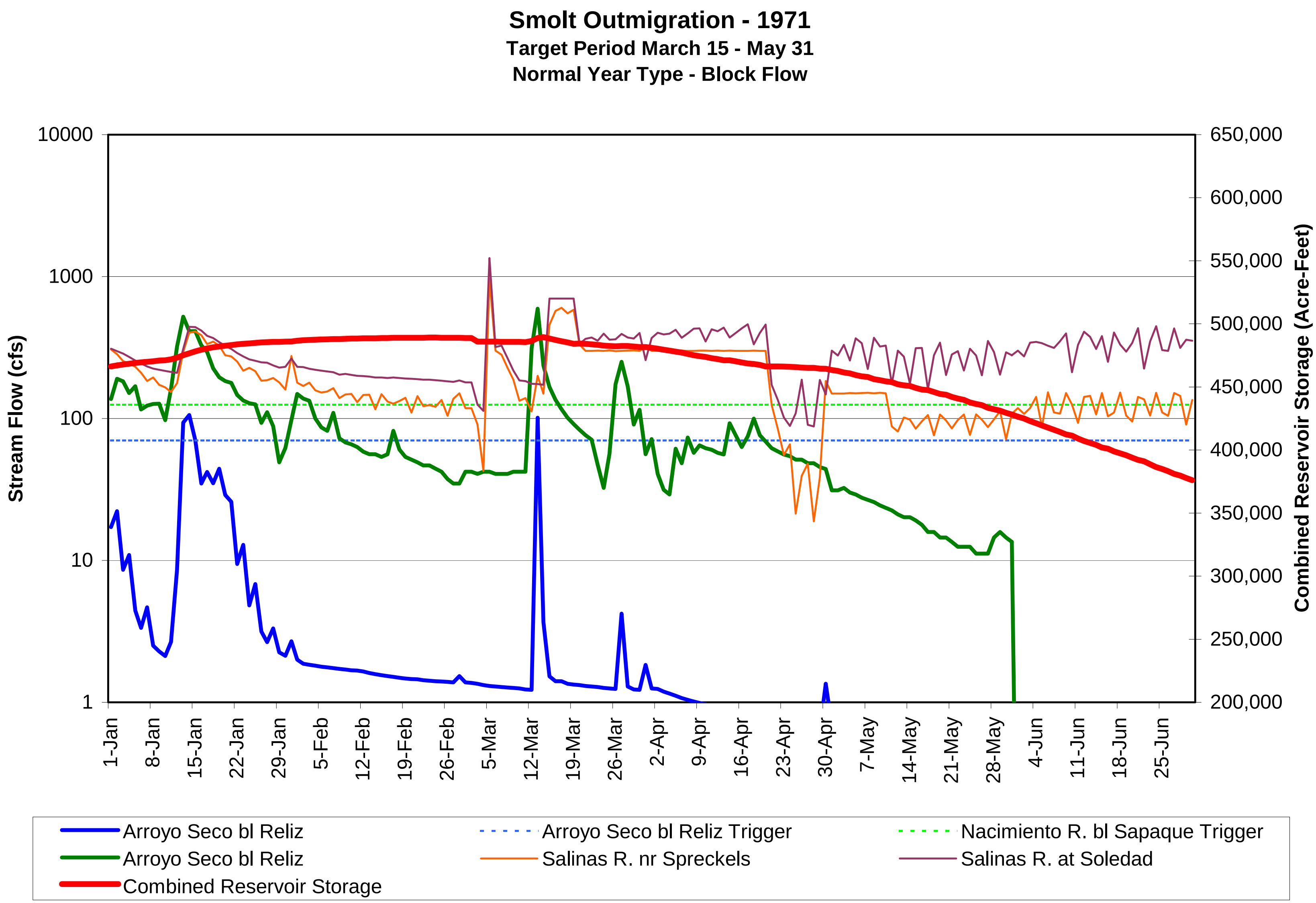


Figure B-8. Smolt Outmigration – 1971 (Normal Year Type – Block Flow)

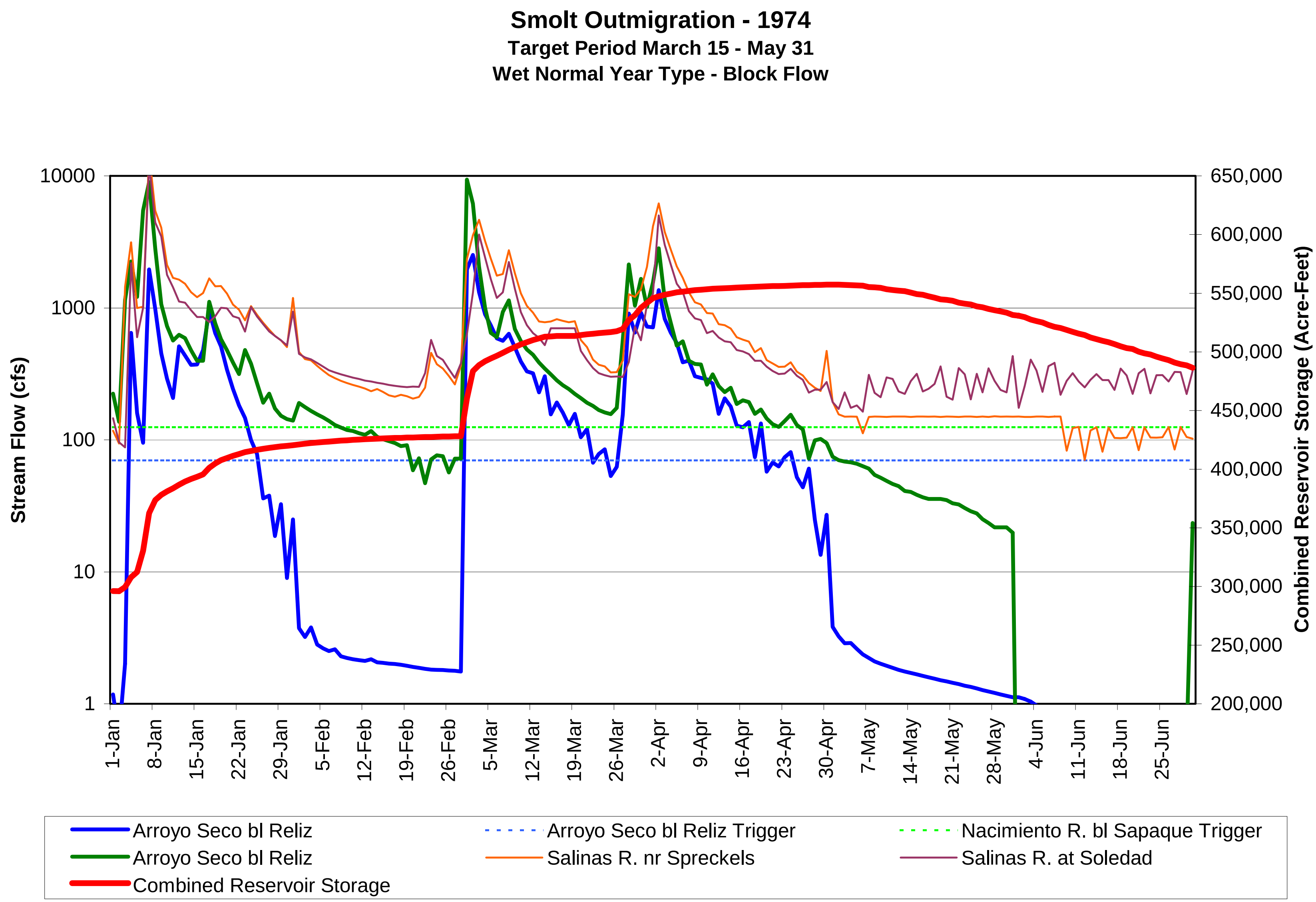


Figure B-9. Smolt Outmigration – 1974 (Wet Normal Year Type – Block Flow)

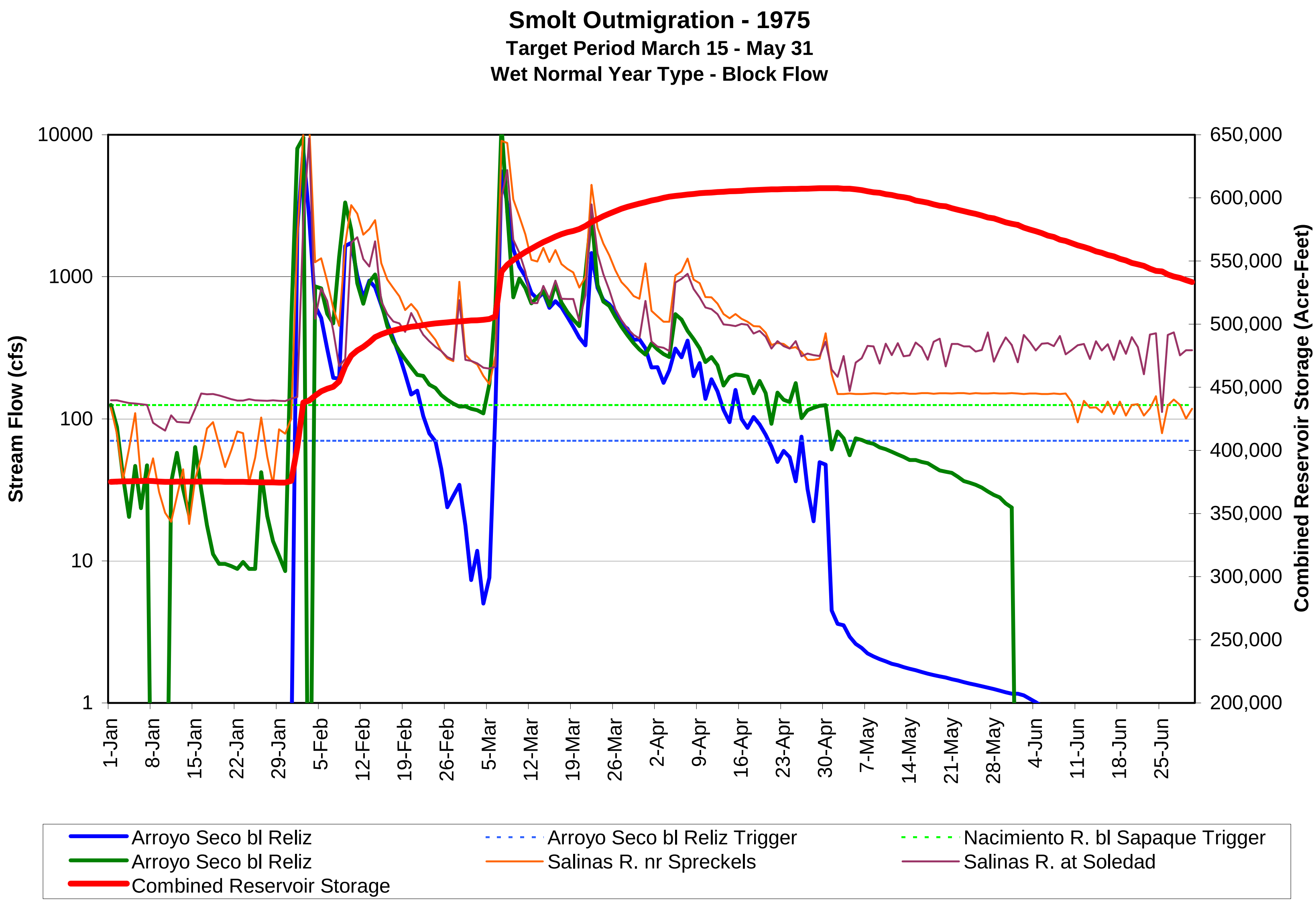


Figure B-10. Smolt Outmigration – 1975 (Wet Normal Year Type – Block Flow)

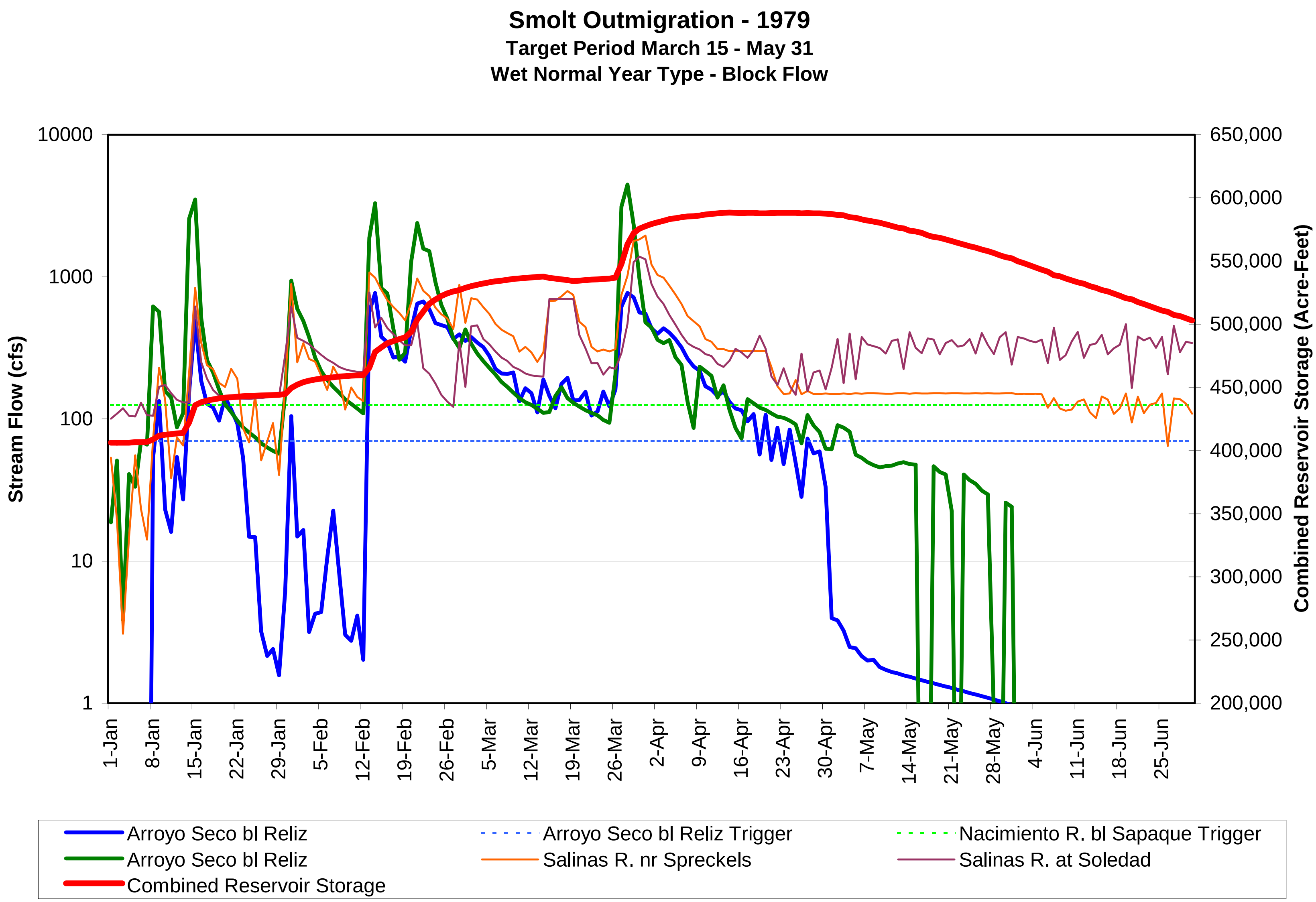


Figure B-11. Smolt Outmigration – 1979 (Wet Normal Year Type – Block Flow)

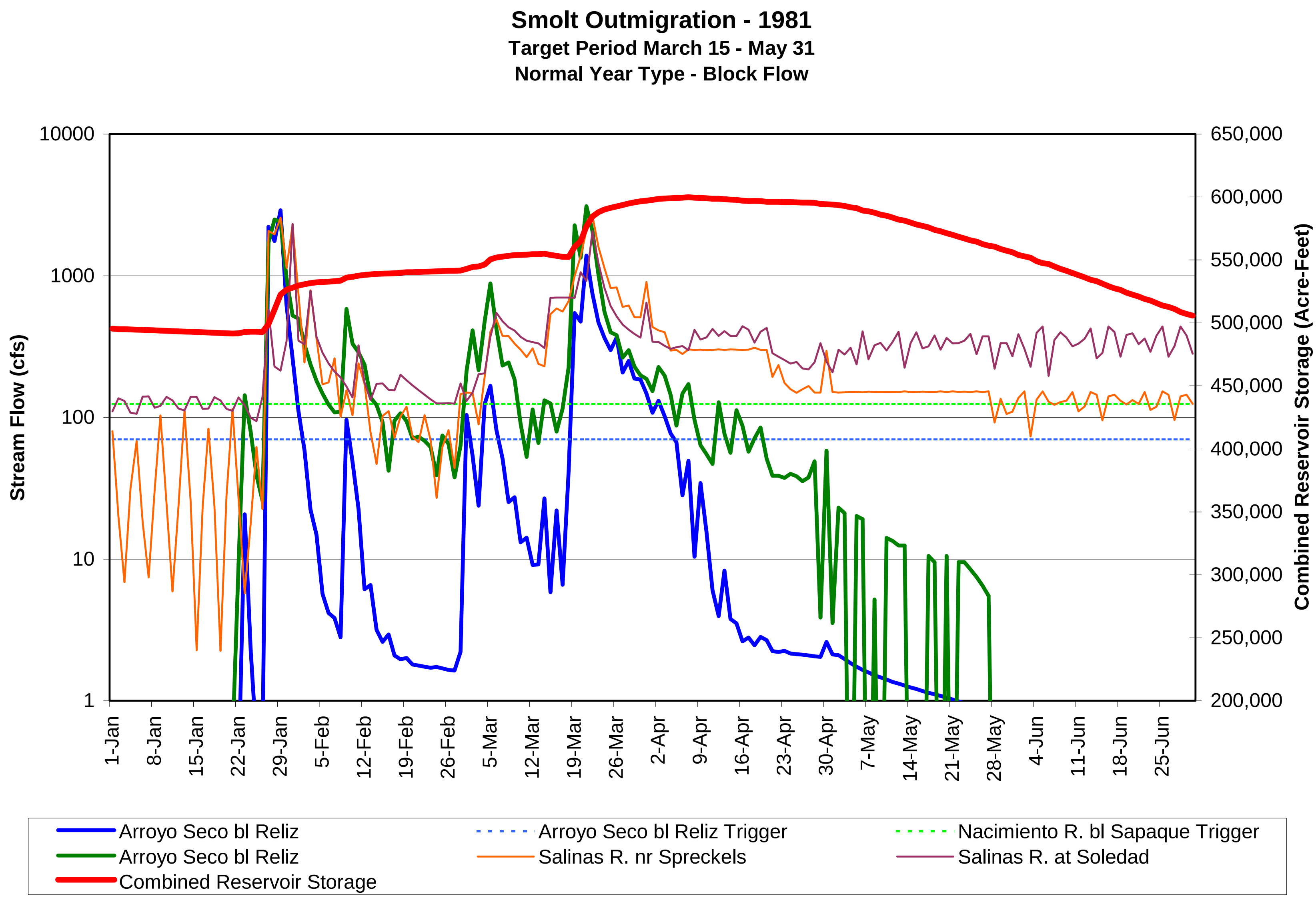


Figure B-12. Smolt Outmigration – 1981 (Normal Year Type – Block Flow)

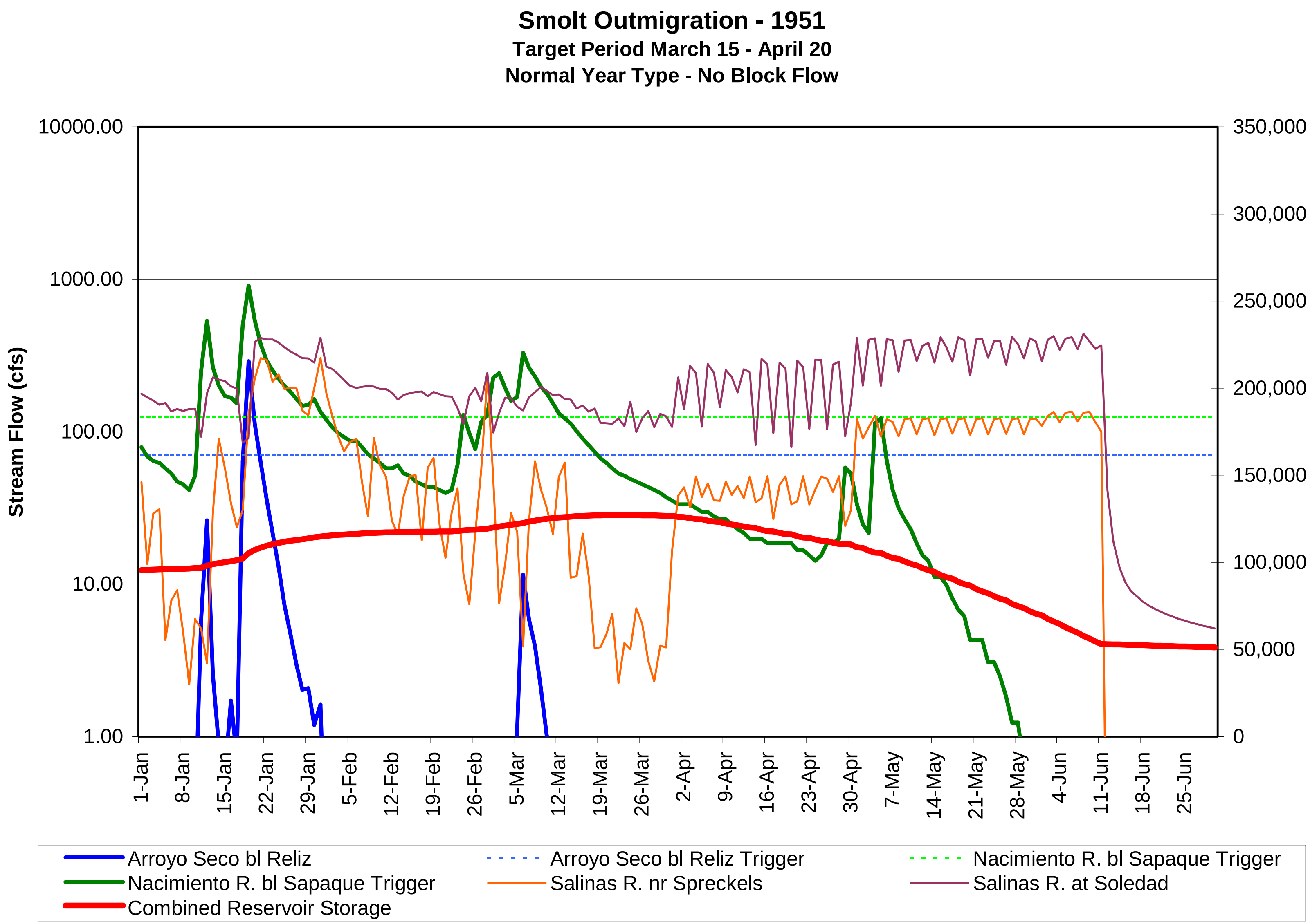


Figure B-13. Smolt Outmigration – 1951 (Normal Year Type – No Block Flow)

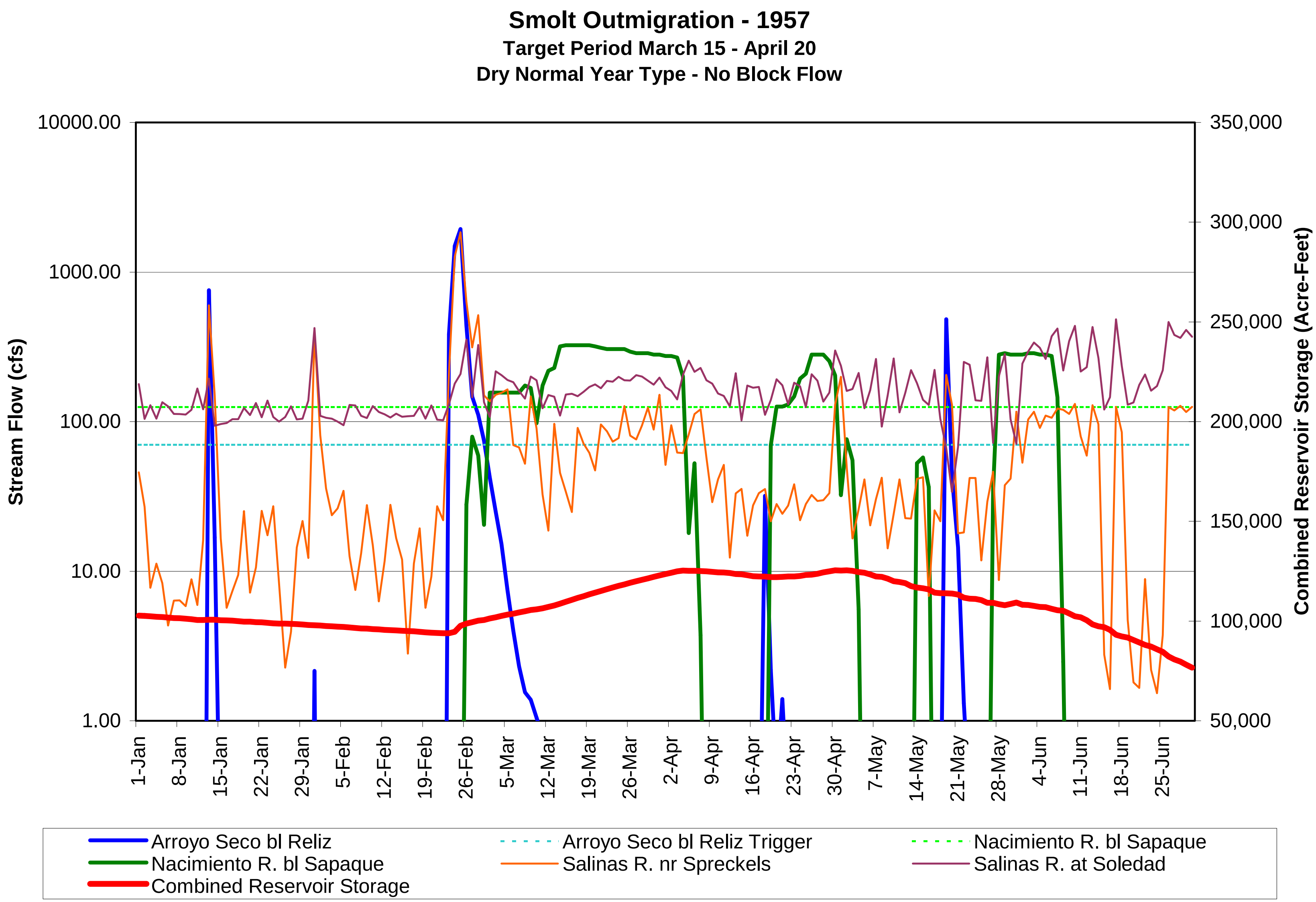


Figure B-14. Smolt Outmigration – 1957 (Dry Normal Year Type – No Block Flow)

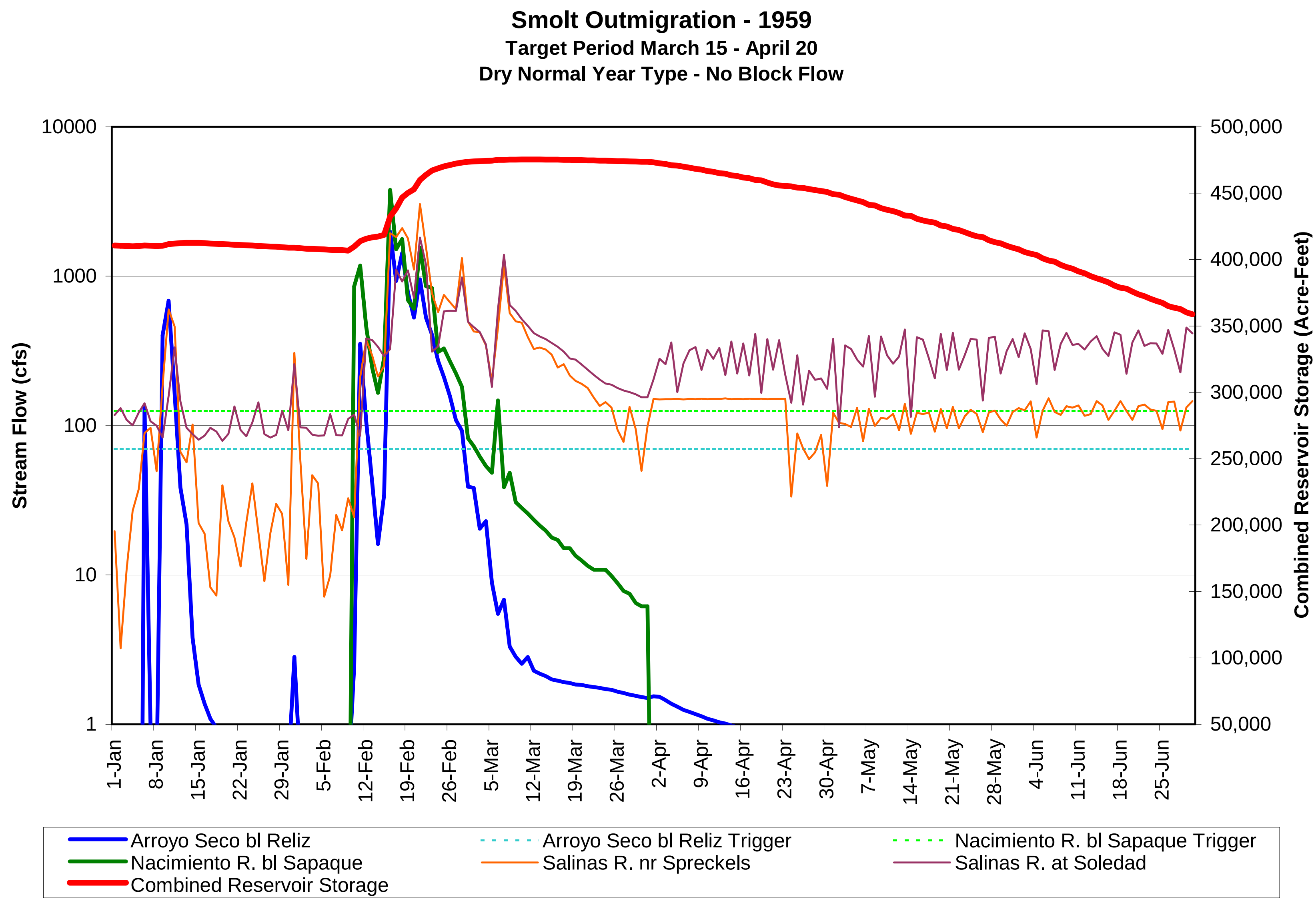


Figure B-15. Smolt Outmigration – 1959 (Dry Normal Year Type – No Block Flow)

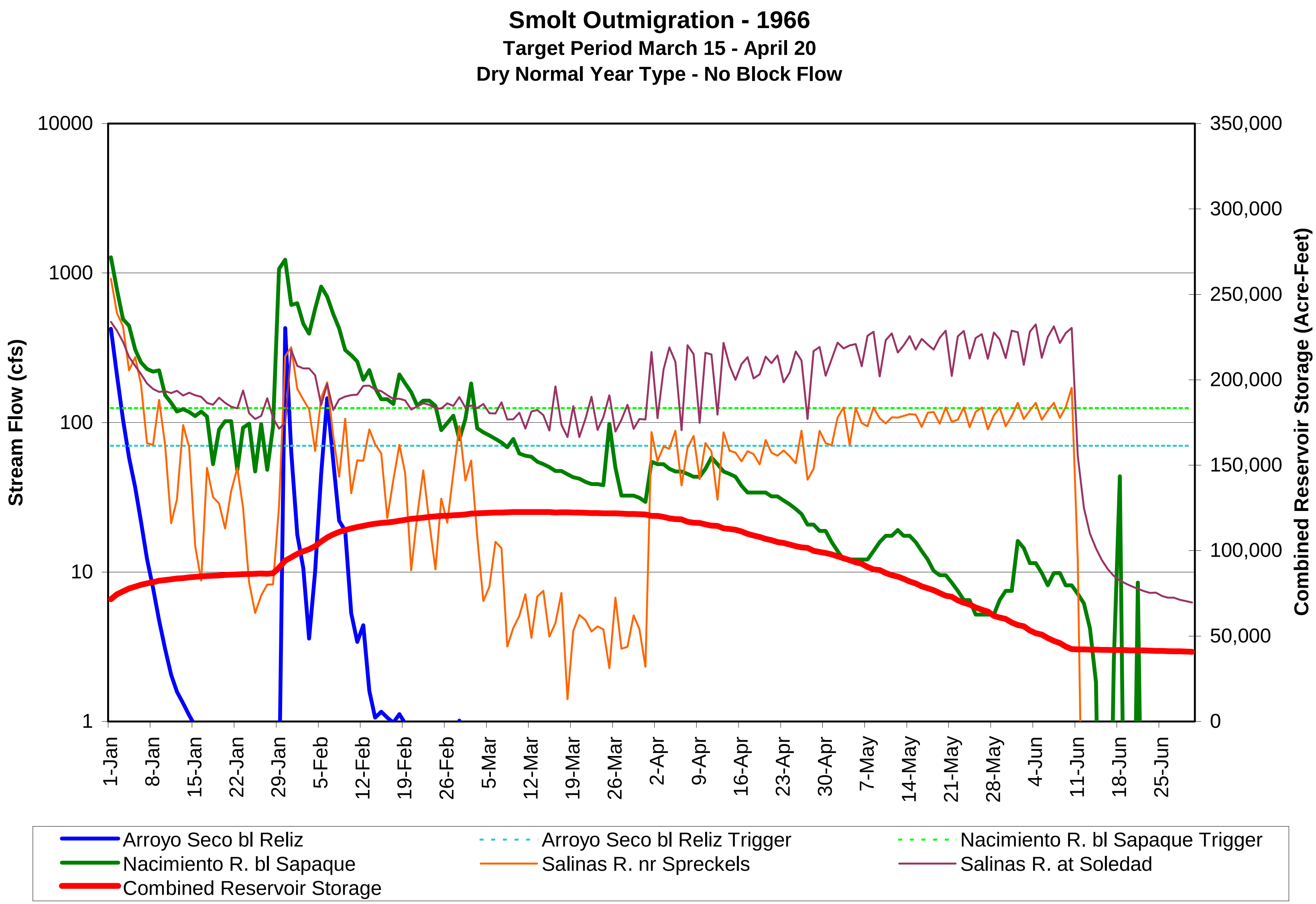


Figure B-16. Smolt Outmigration – 1966 (Dry Normal Year Type – No Block Flow)

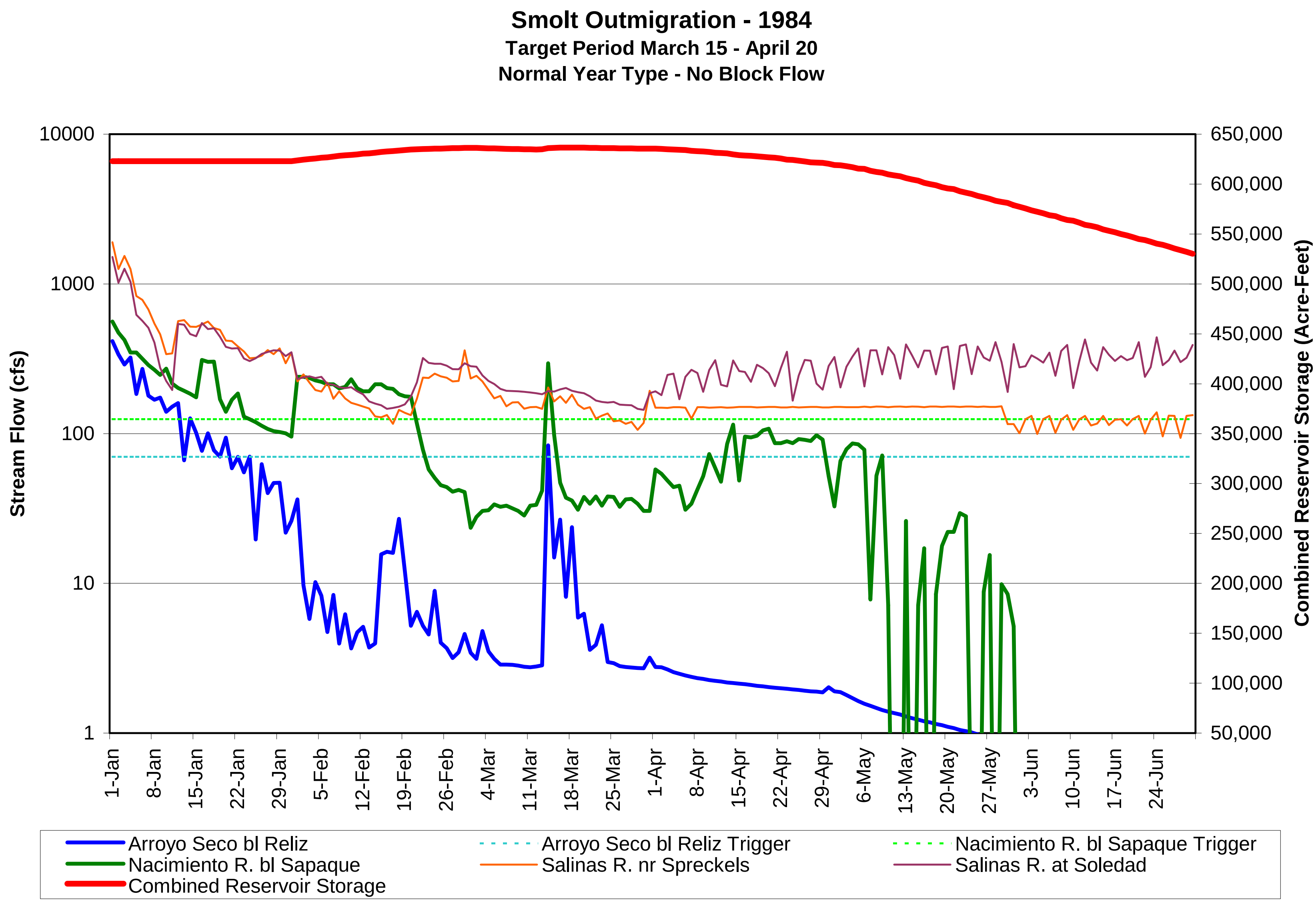


Figure B-17. Smolt Outmigration – 1984 (Normal Year Type – No Block Flow)

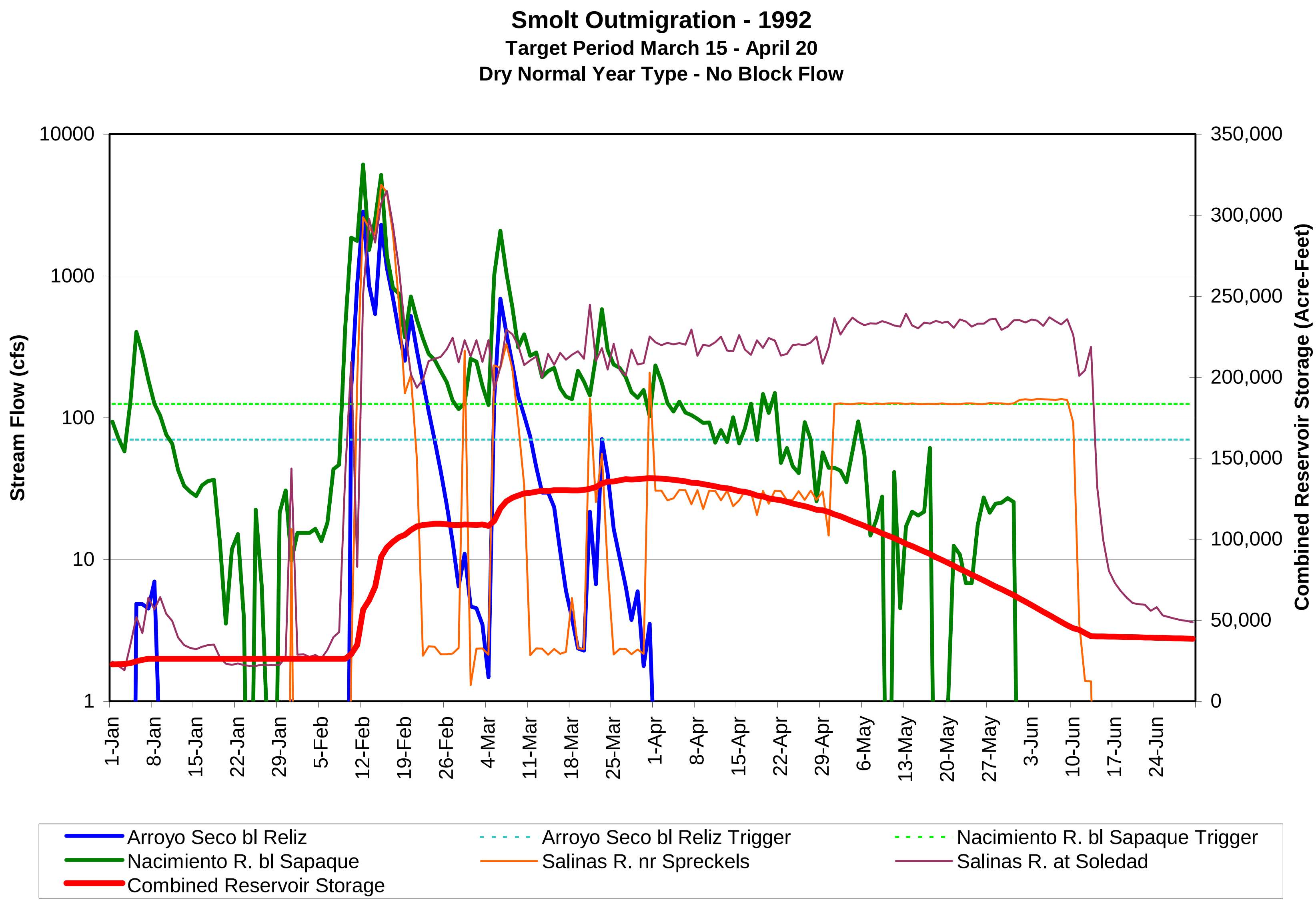


Figure B-18. Smolt Outmigration – 1992 (Dry Normal Year Type – No Block Flow)

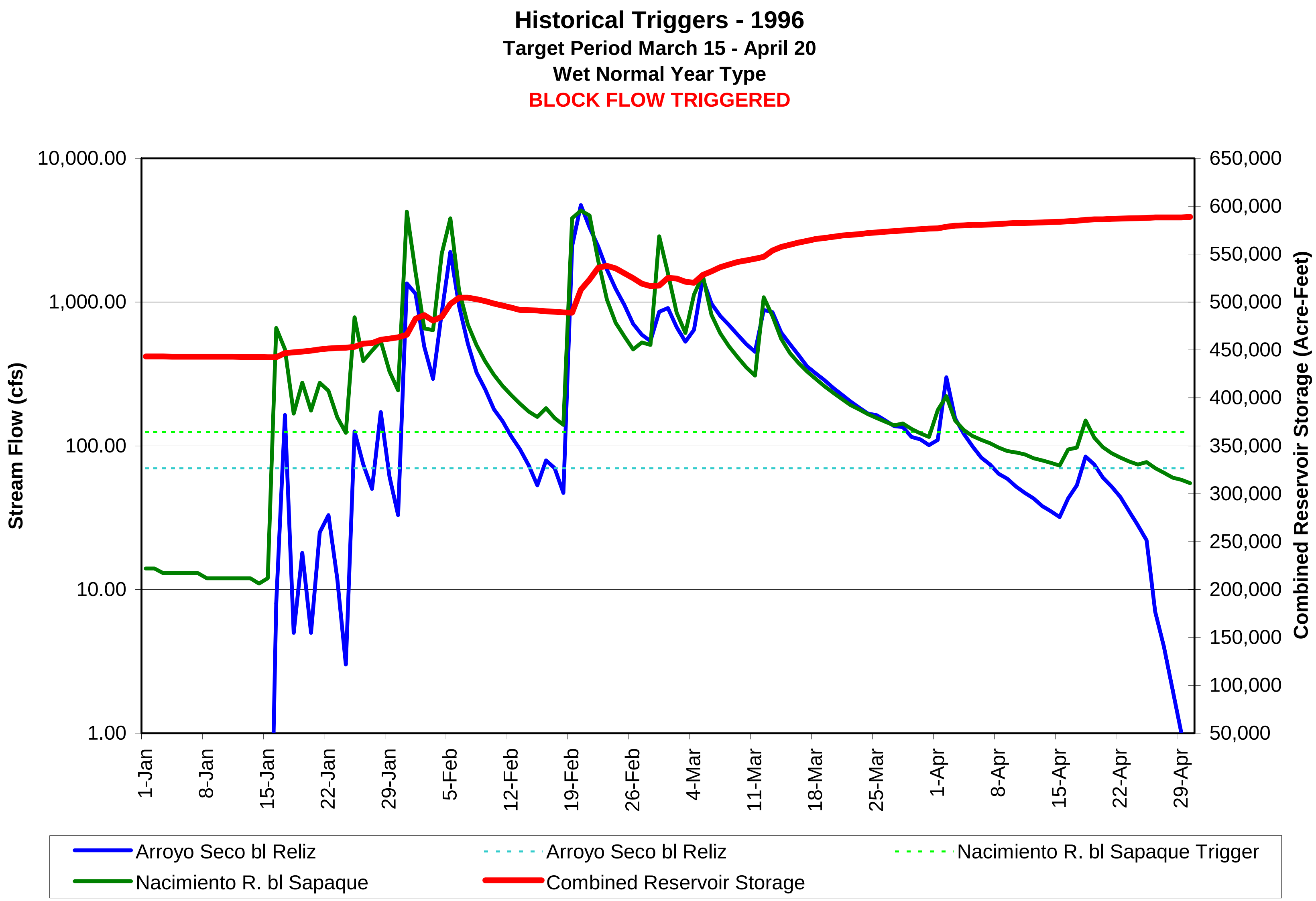


Figure B-19. Historic Triggers – 1996 (Wet Normal Year Type – Block Flow Triggered)

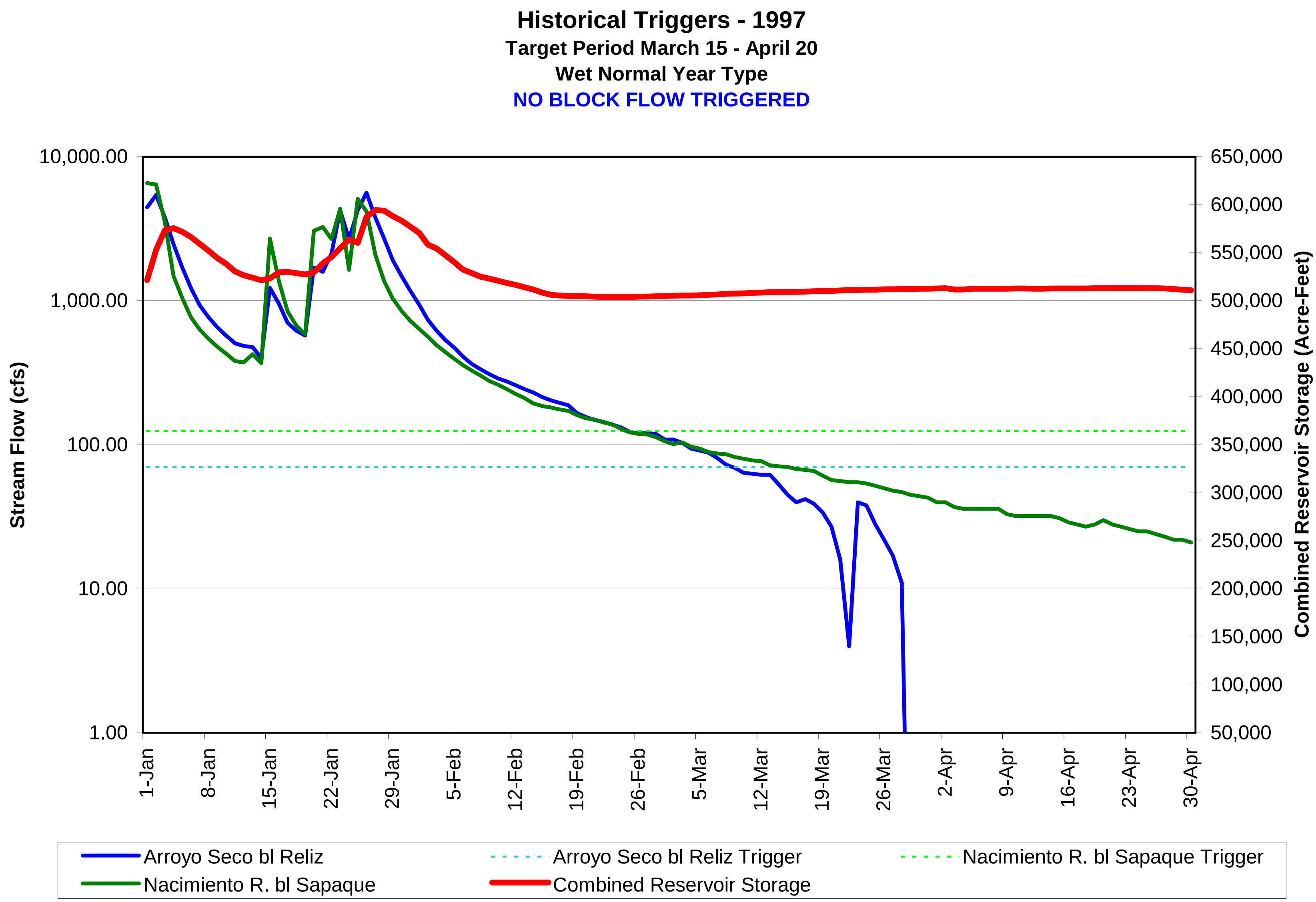


Figure B-20. Historic Triggers – 1997 (Wet Normal Year Type – No Block Flow Triggered)

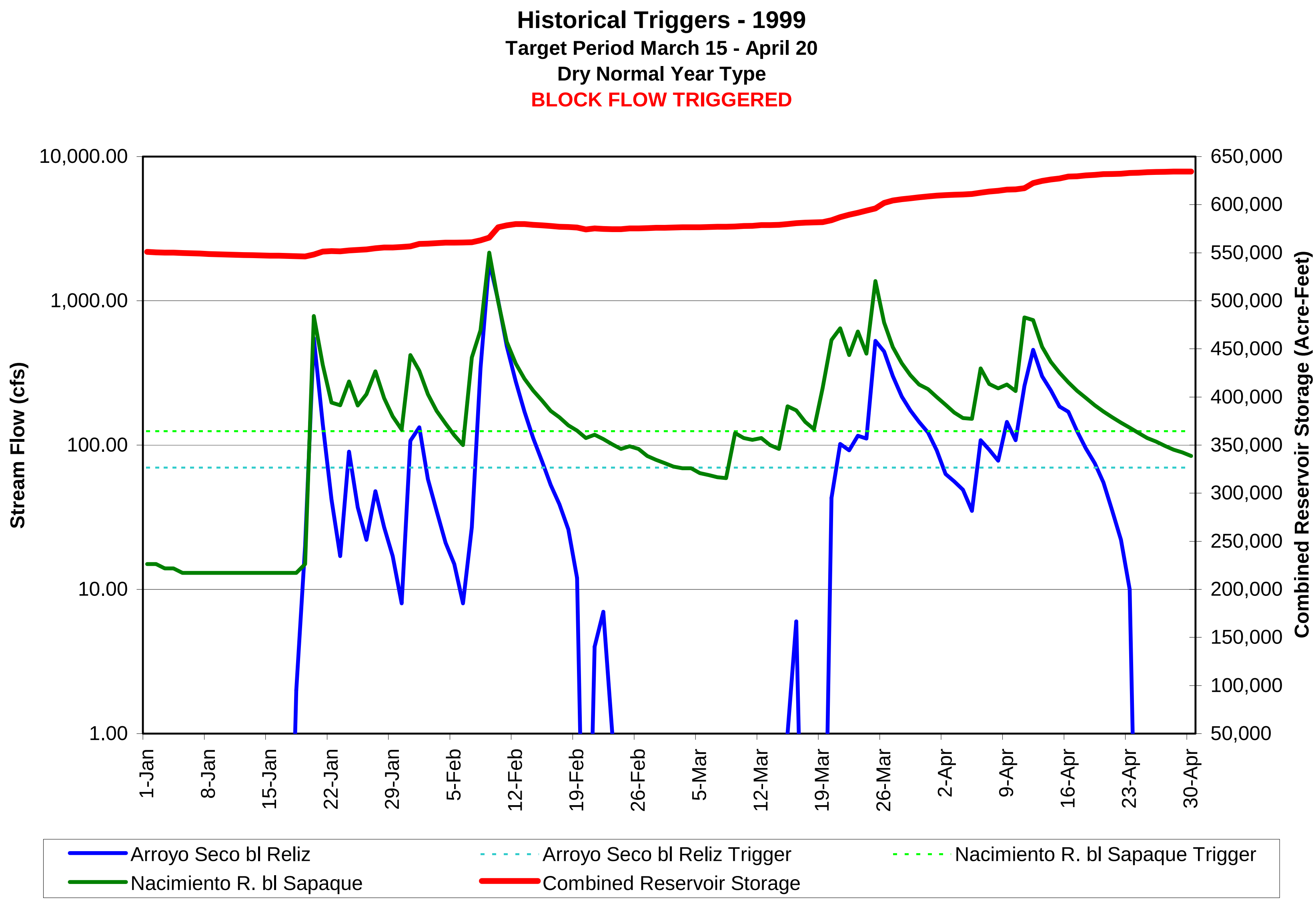


Figure B-21. Historic Triggers – 1999 (Dry Normal Year Type – Block Flow Triggered)

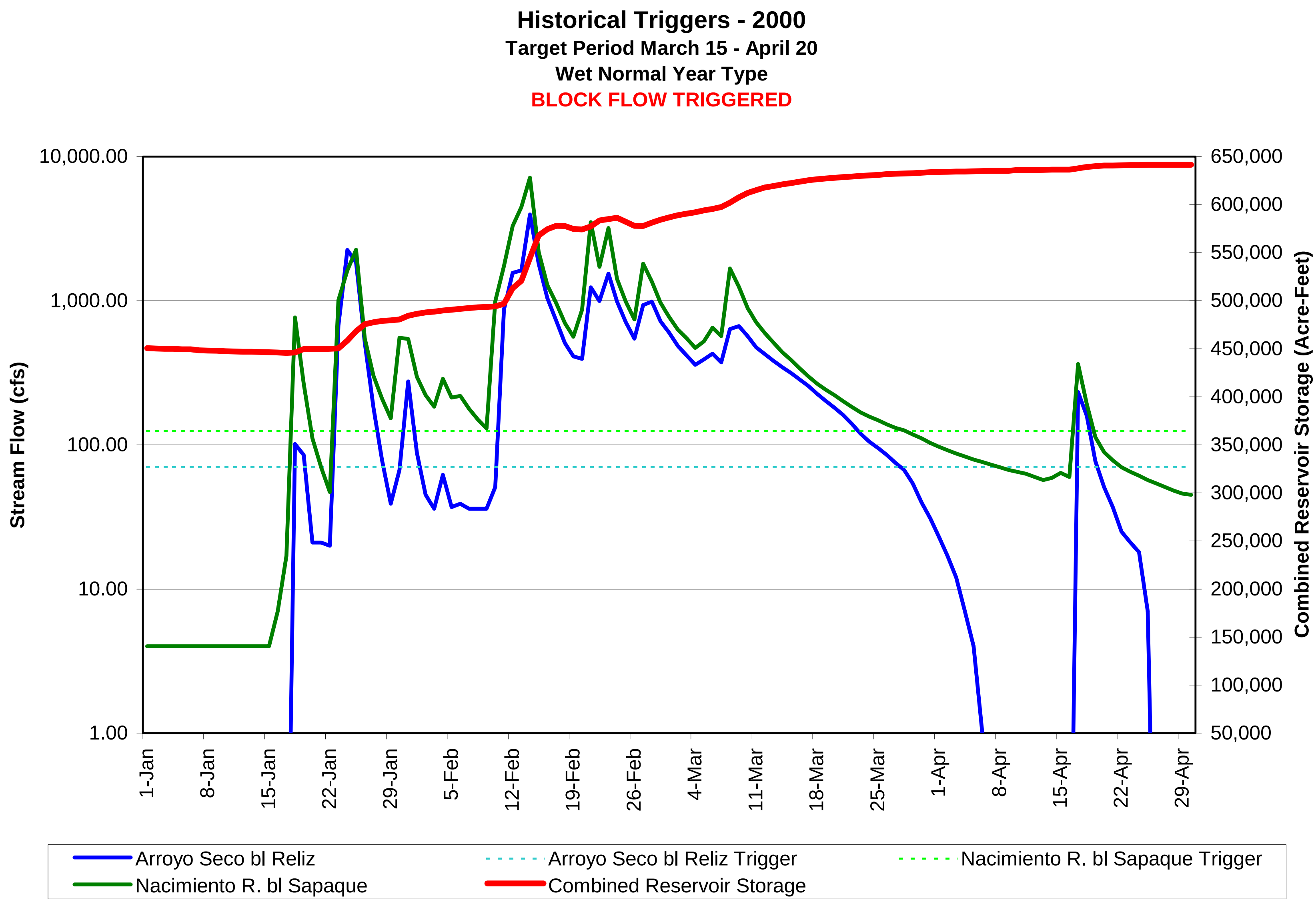


Figure B-22. Historic Triggers – 2000 (Wet Normal Year Type – Block Flow Triggered)

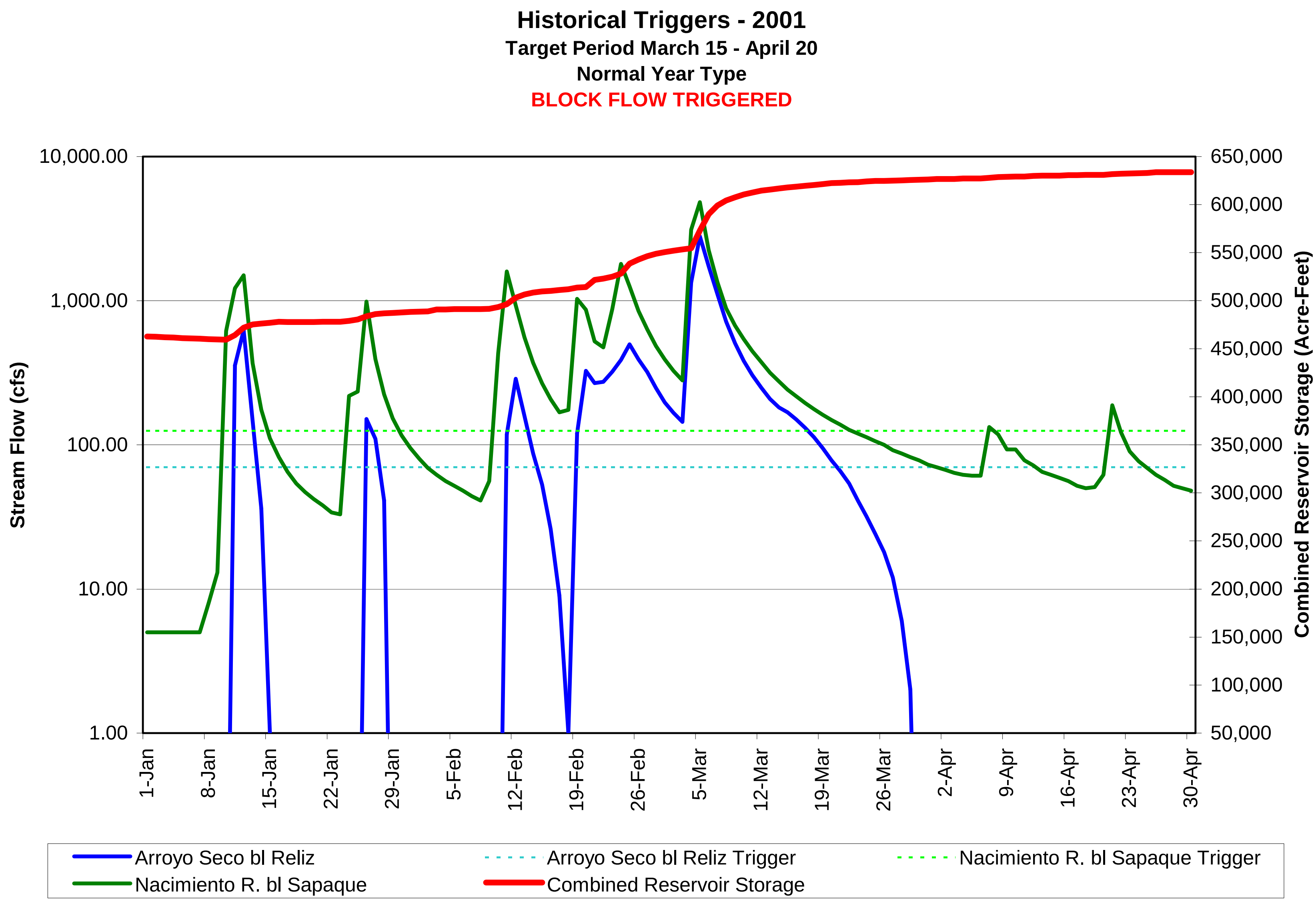


Figure B-23. Historic Triggers – 2001 (Normal Year Type – Block Flow Triggered)

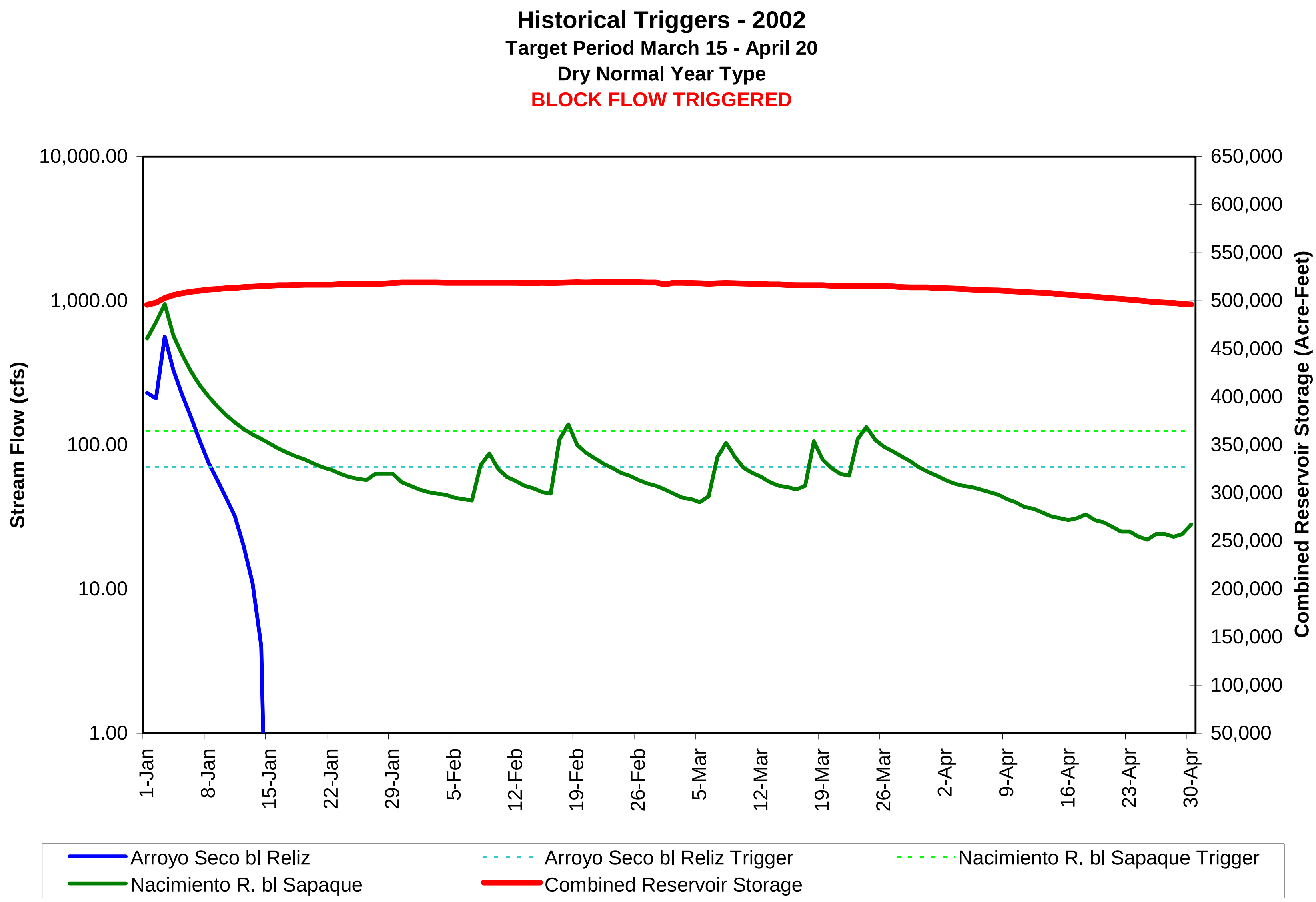


Figure B-24. Historic Triggers – 2002 (Dry Normal Year Type – Block Flow Triggered)

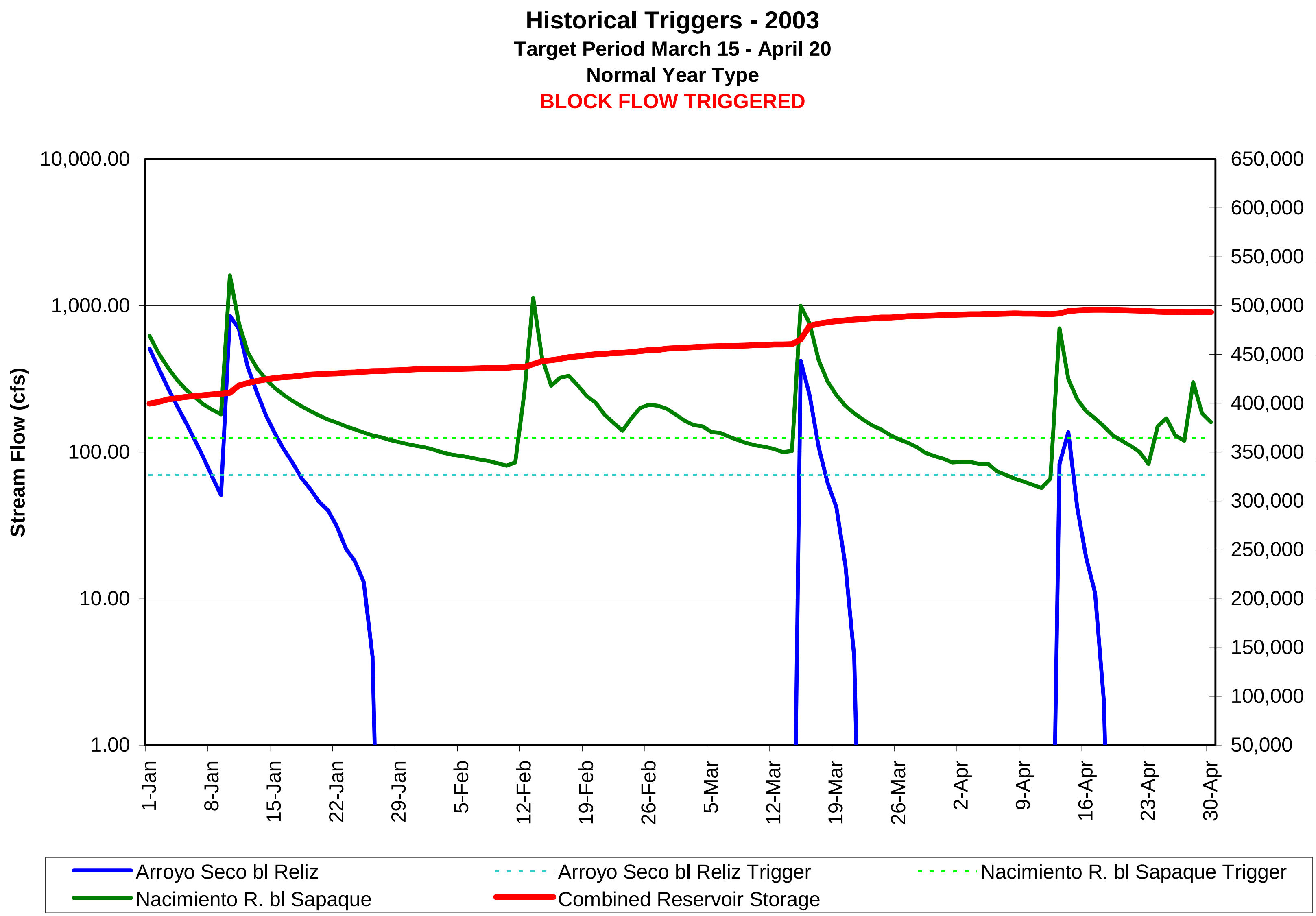


Figure B-25. Historic Triggers – 2003 (Normal Year Type – Block Flow Triggered)

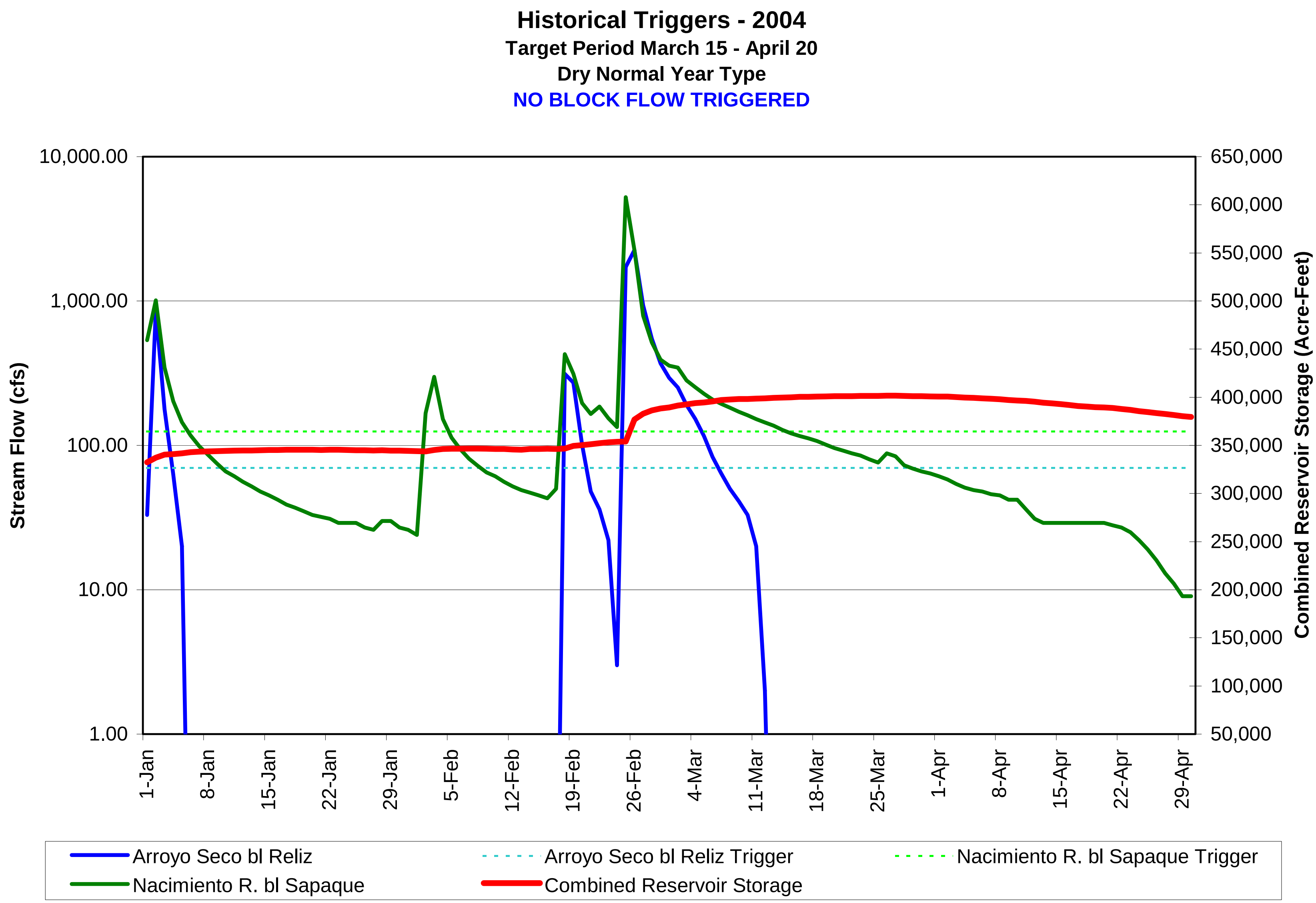


Figure B-26. Historic Triggers – 2004 (Dry Normal Year Type – No Block Flow Triggered)

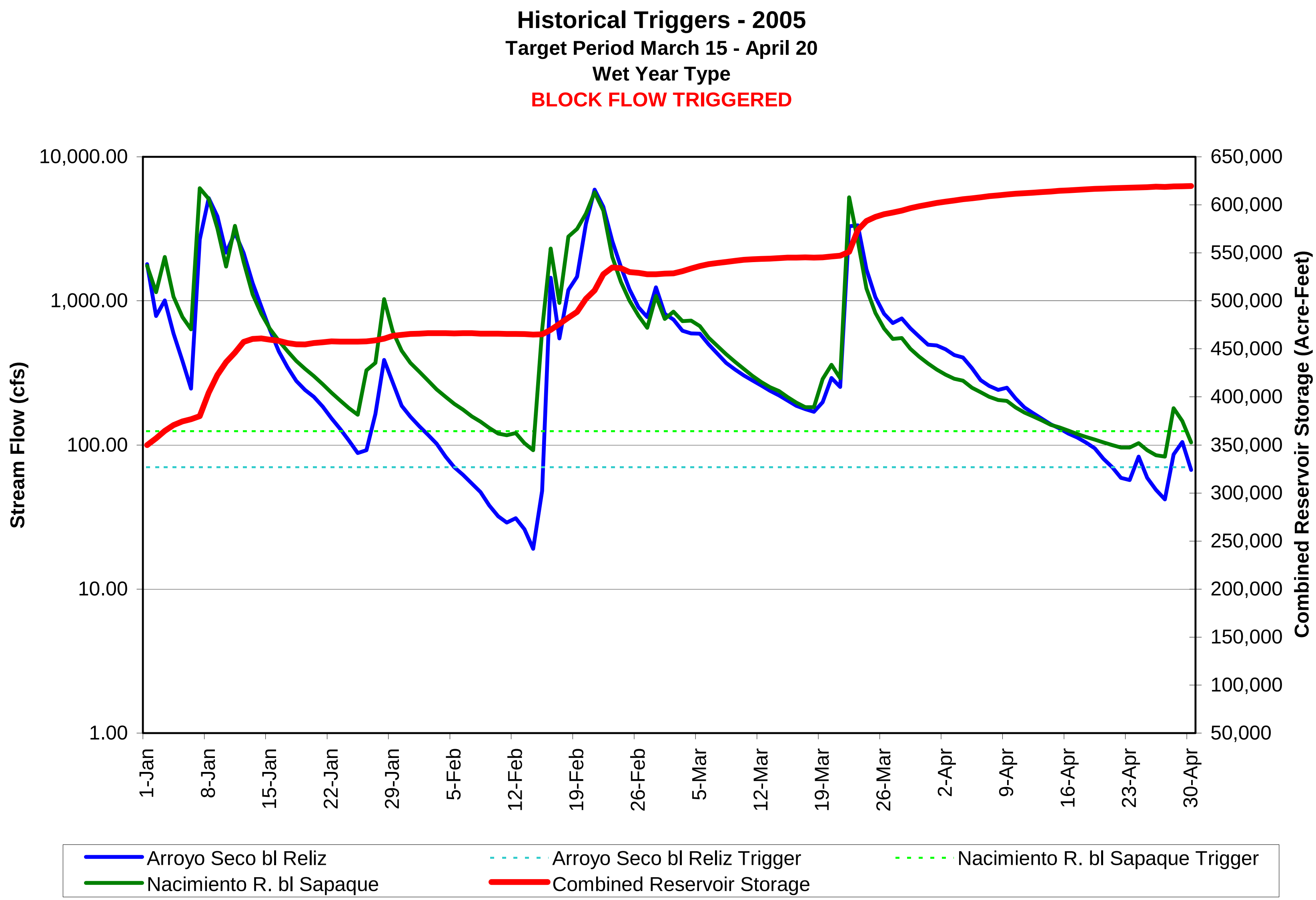


Figure B-27. Historic Flows 2005 (Wet Year Type – Block Flow Triggered)

APPENDIX C

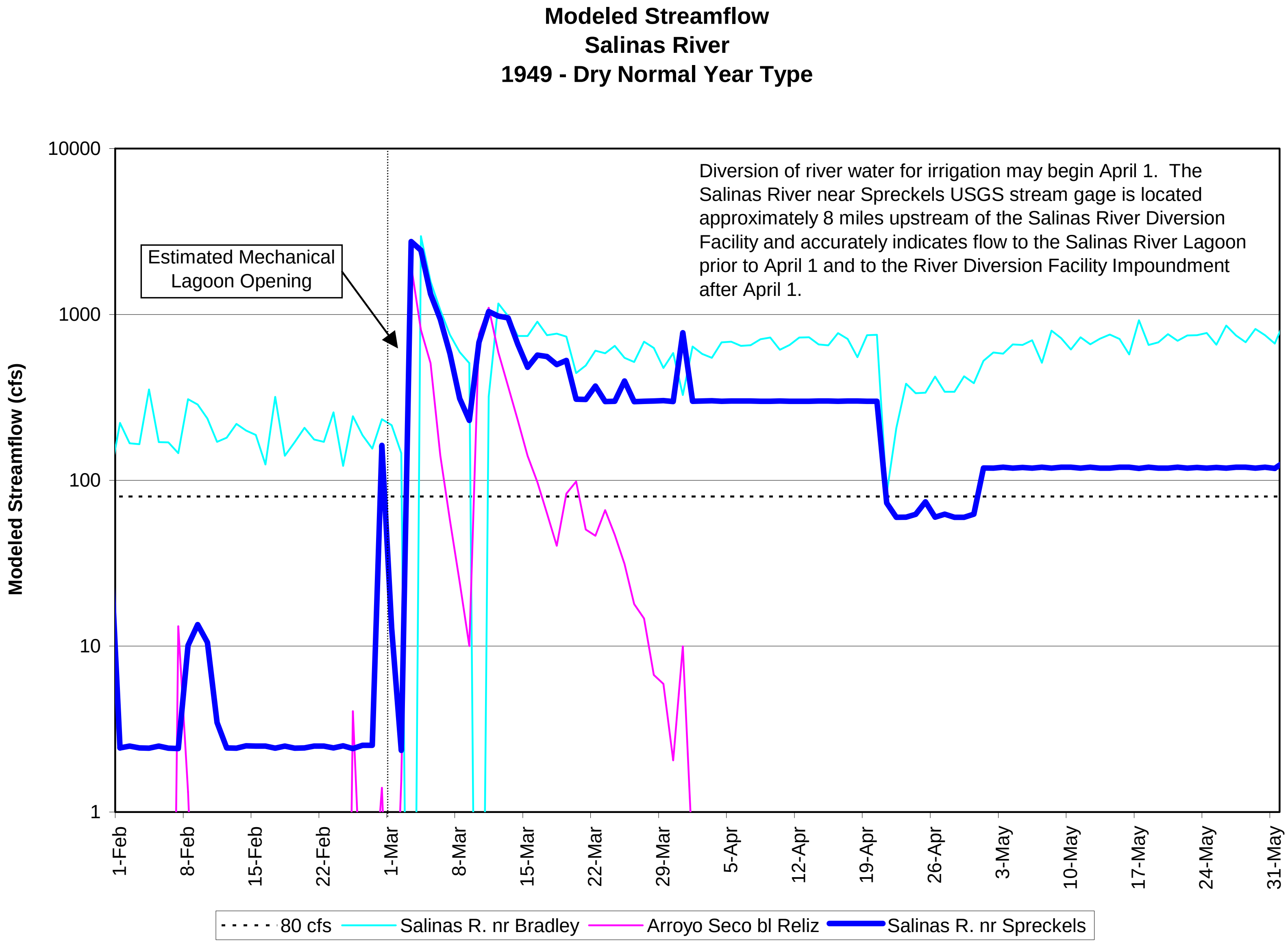


Figure C-1. Modeled Streamflow Salinas River – 1949 (Dry Normal Year Type)

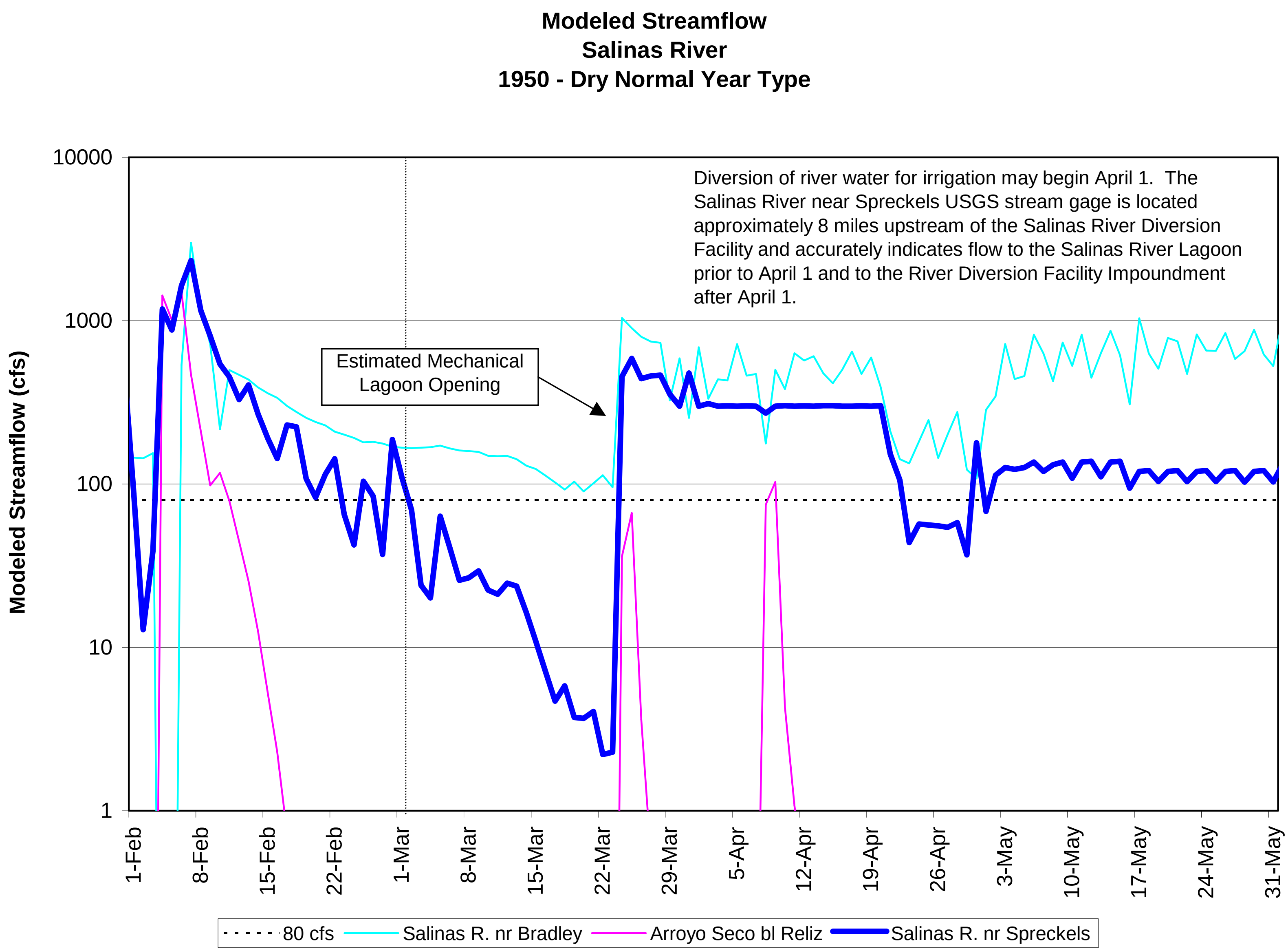


Figure C-2. Modeled Streamflow Salinas River – 1950 (Dry Normal Year Type)

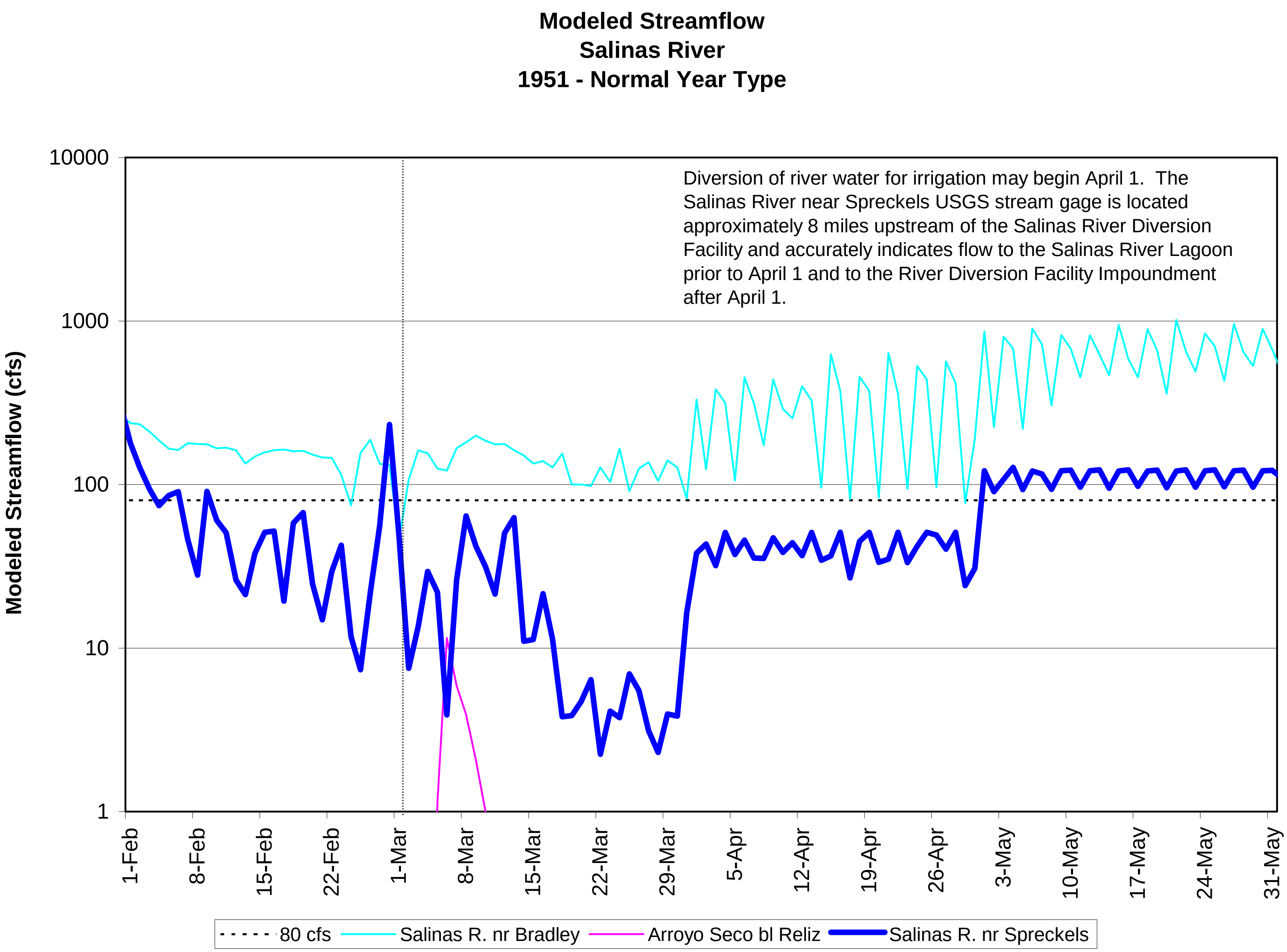


Figure C-3. Modeled Streamflow Salinas River – 1951 (Normal Year Type)

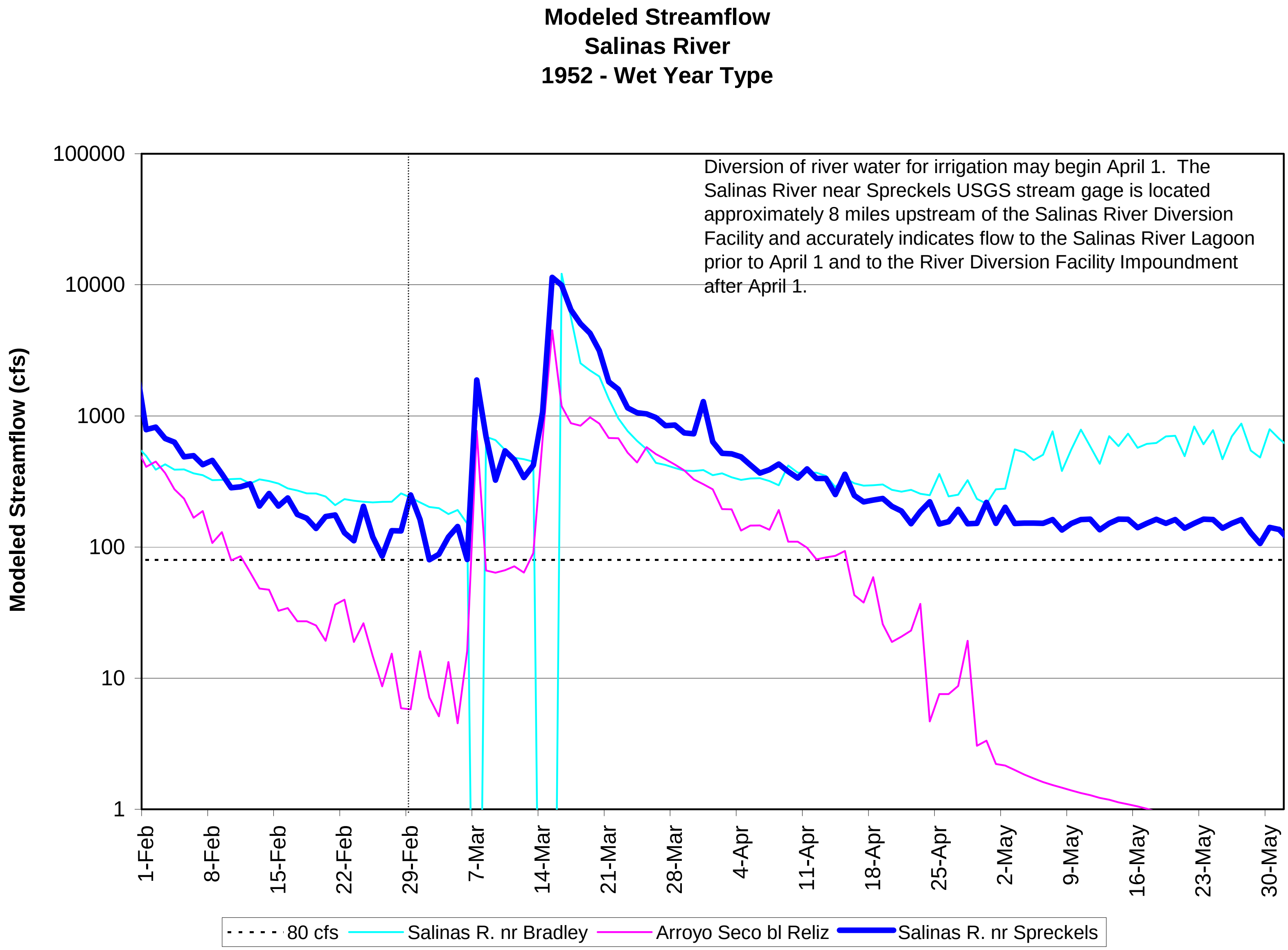


Figure C-4. Modeled Streamflow Salinas River – 1952 (Wet Year Type)

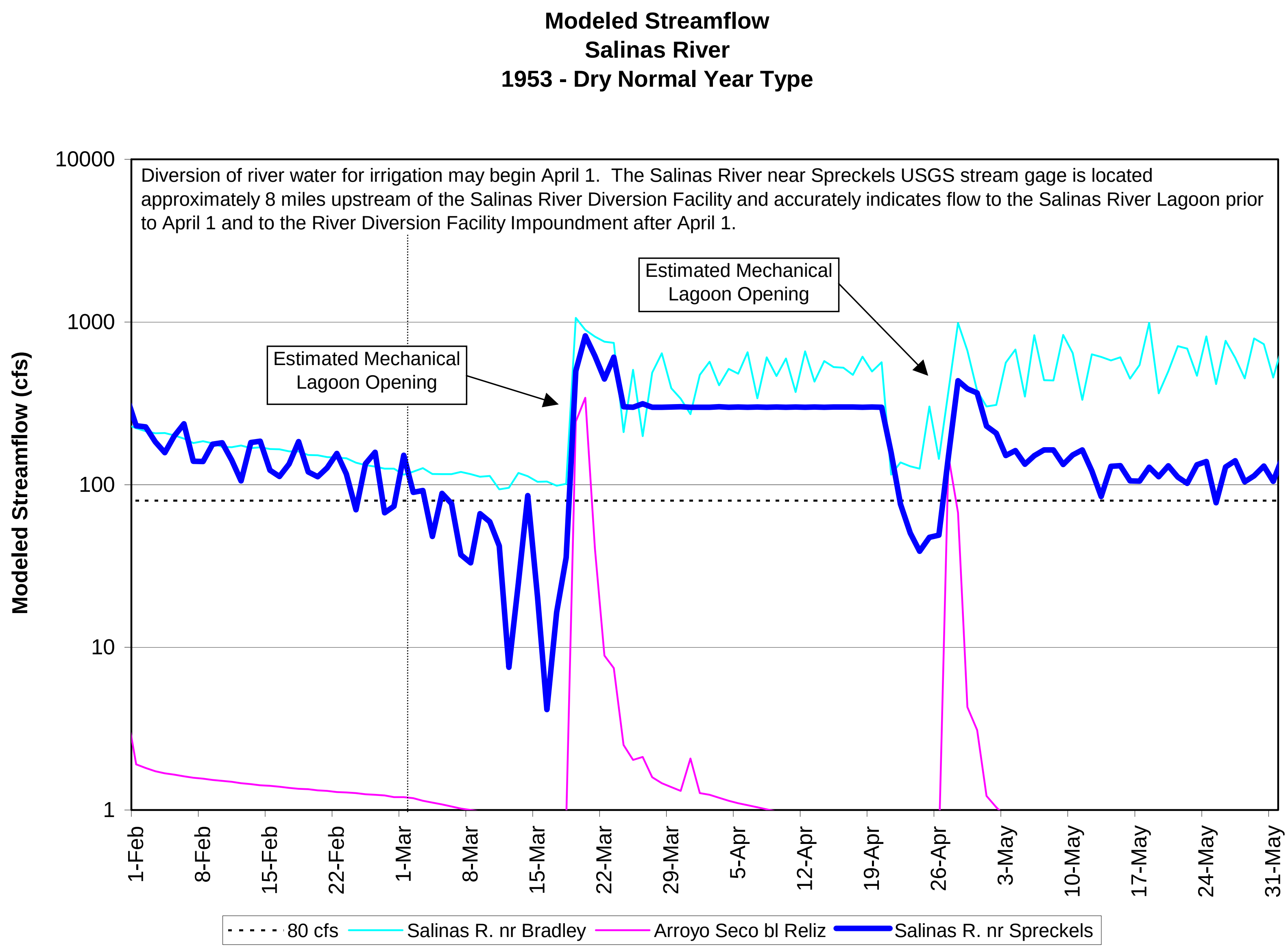


Figure C-5. Modeled Streamflow Salinas River – 1953 (Dry Normal Year Type)

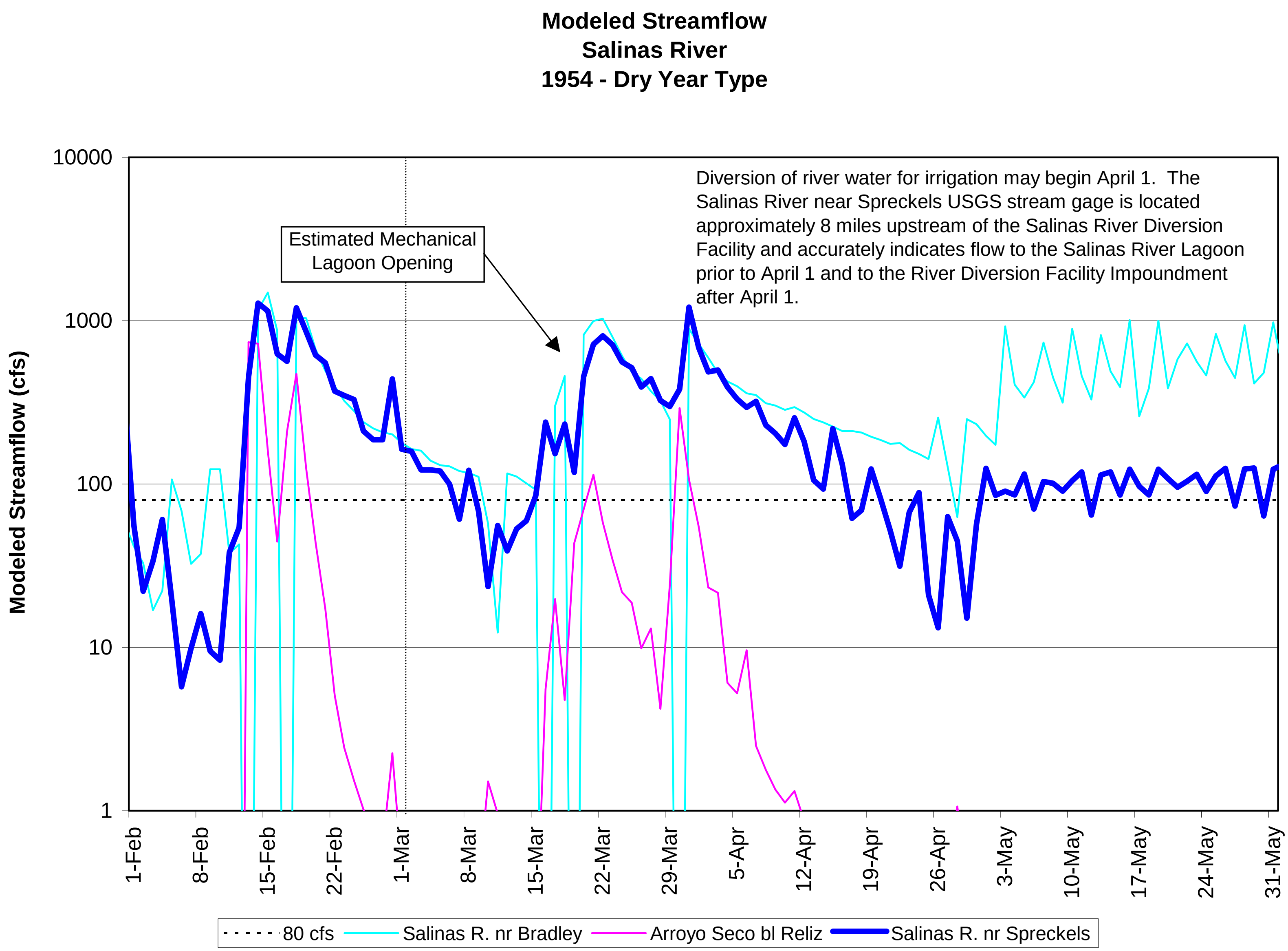


Figure C-6. Modeled Streamflow Salinas River – 1954 (Dry Year Type)

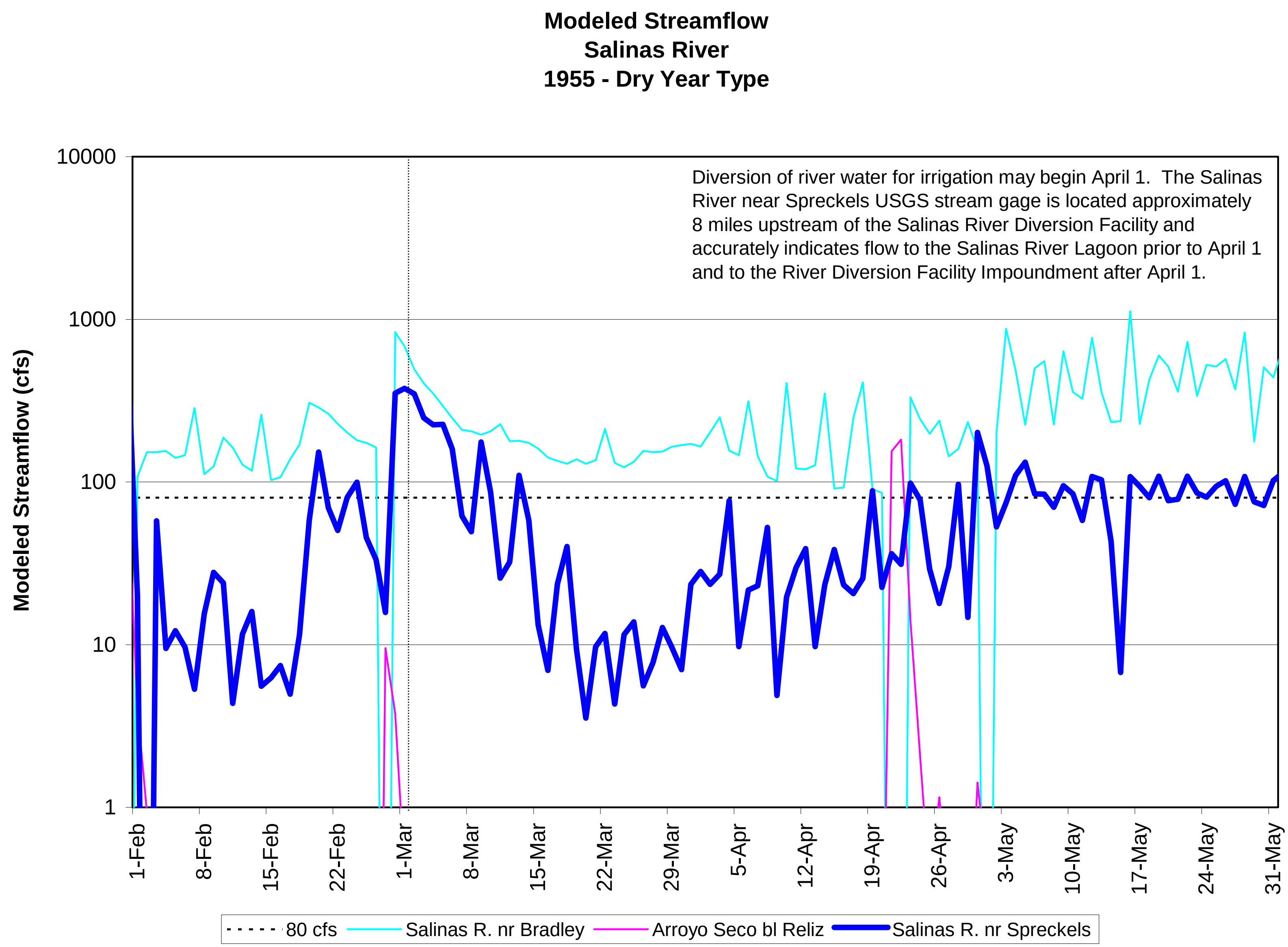


Figure C-7. Modeled Streamflow Salinas River – 1955 (Dry Year Year Type)

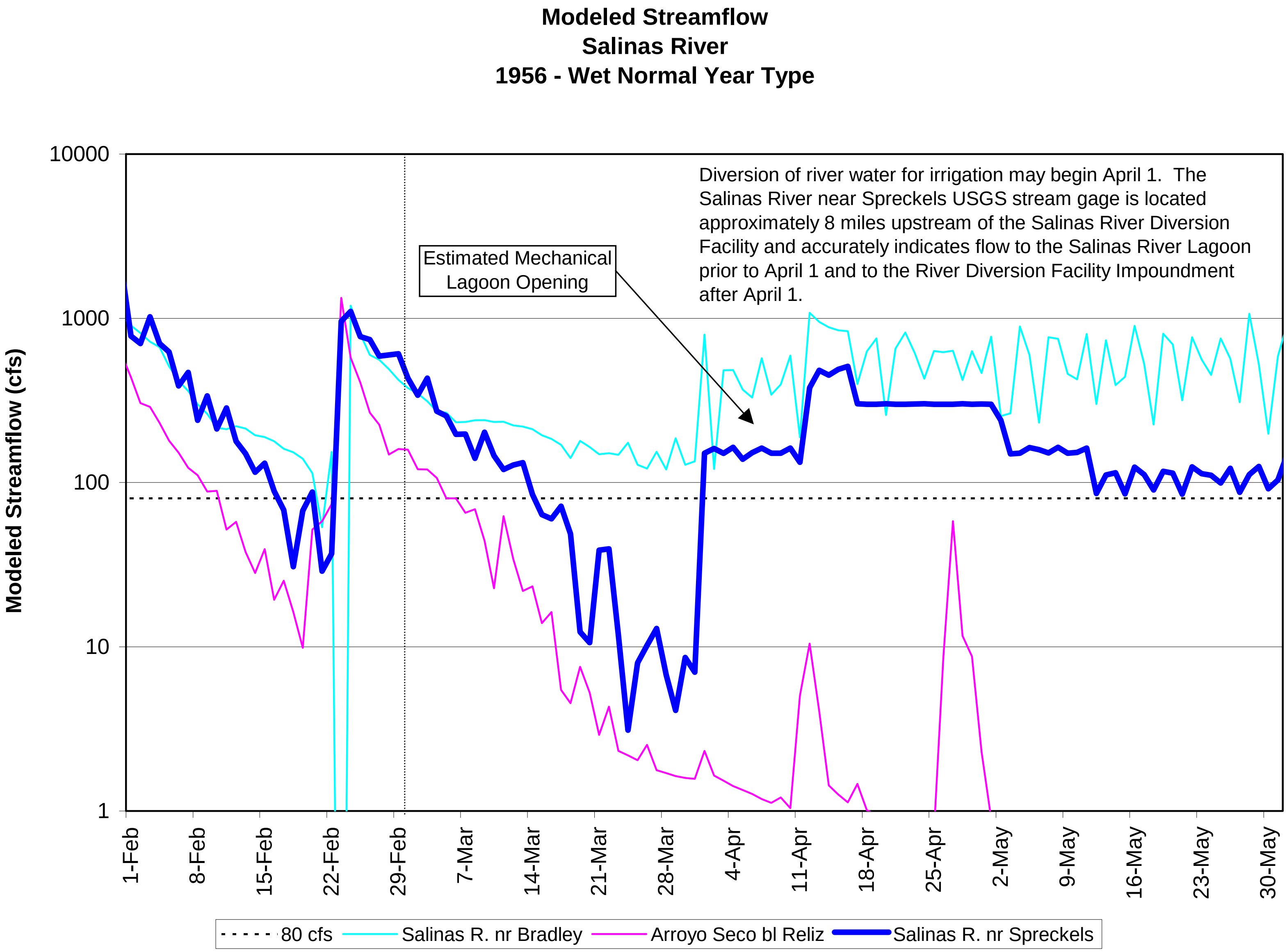


Figure C-8. Modeled Streamflow Salinas River – 1956 (Wet Normal Year Type)

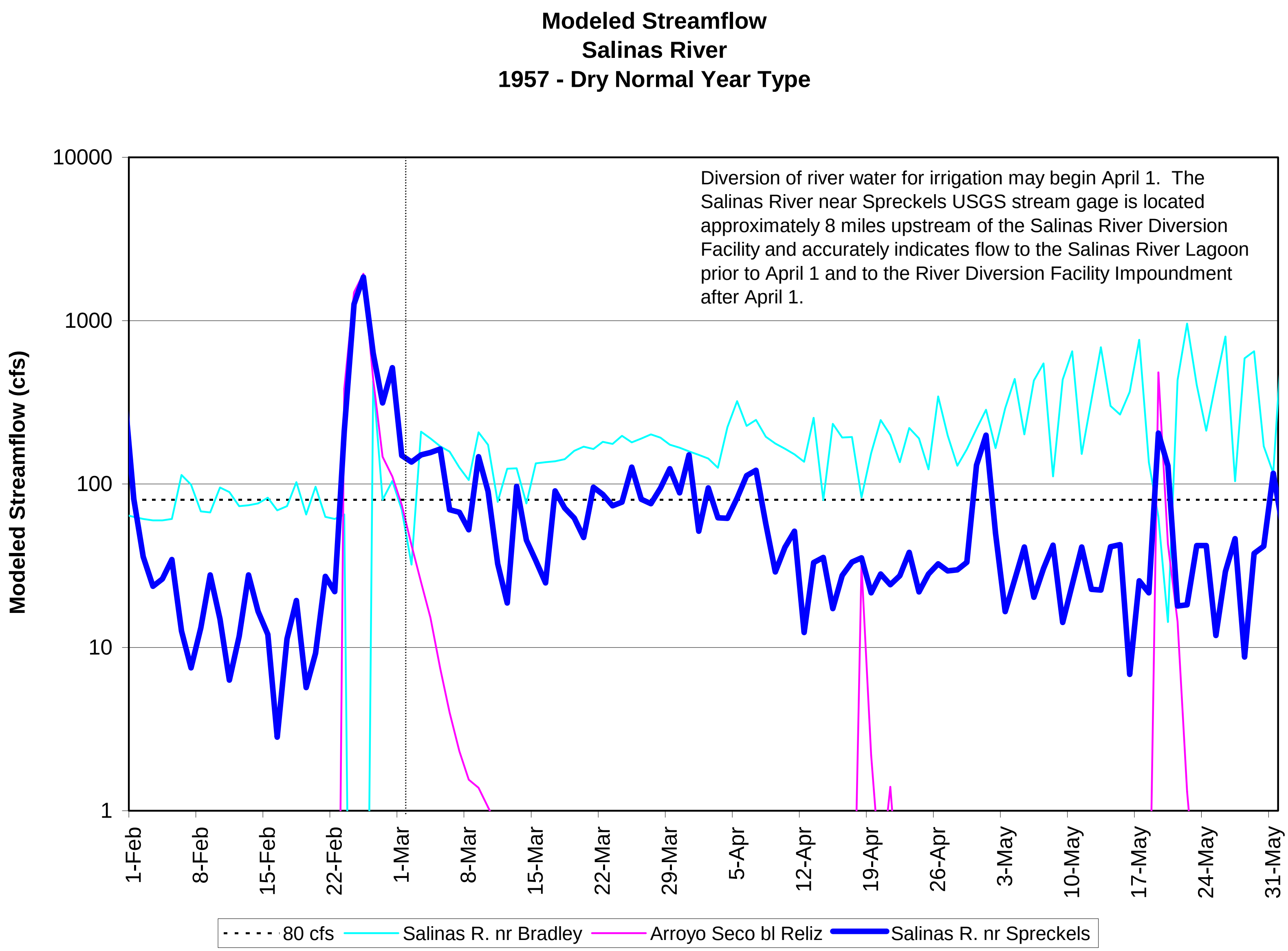


Figure C-9. Modeled Streamflow Salinas River – 1957 (Dry Normal Year Type)

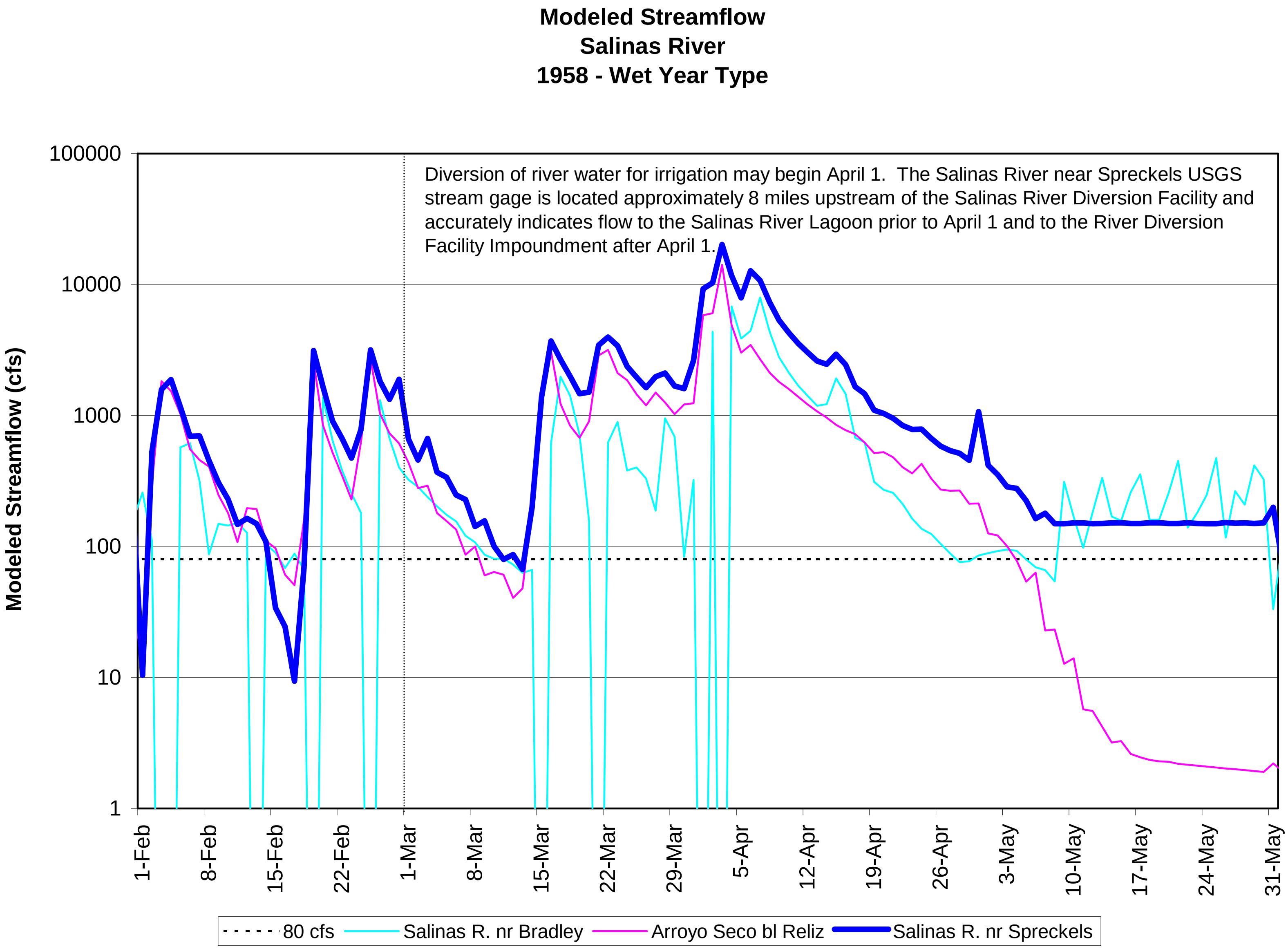


Figure C-10. Modeled Streamflow Salinas River – 1958 (Wet Year Type)

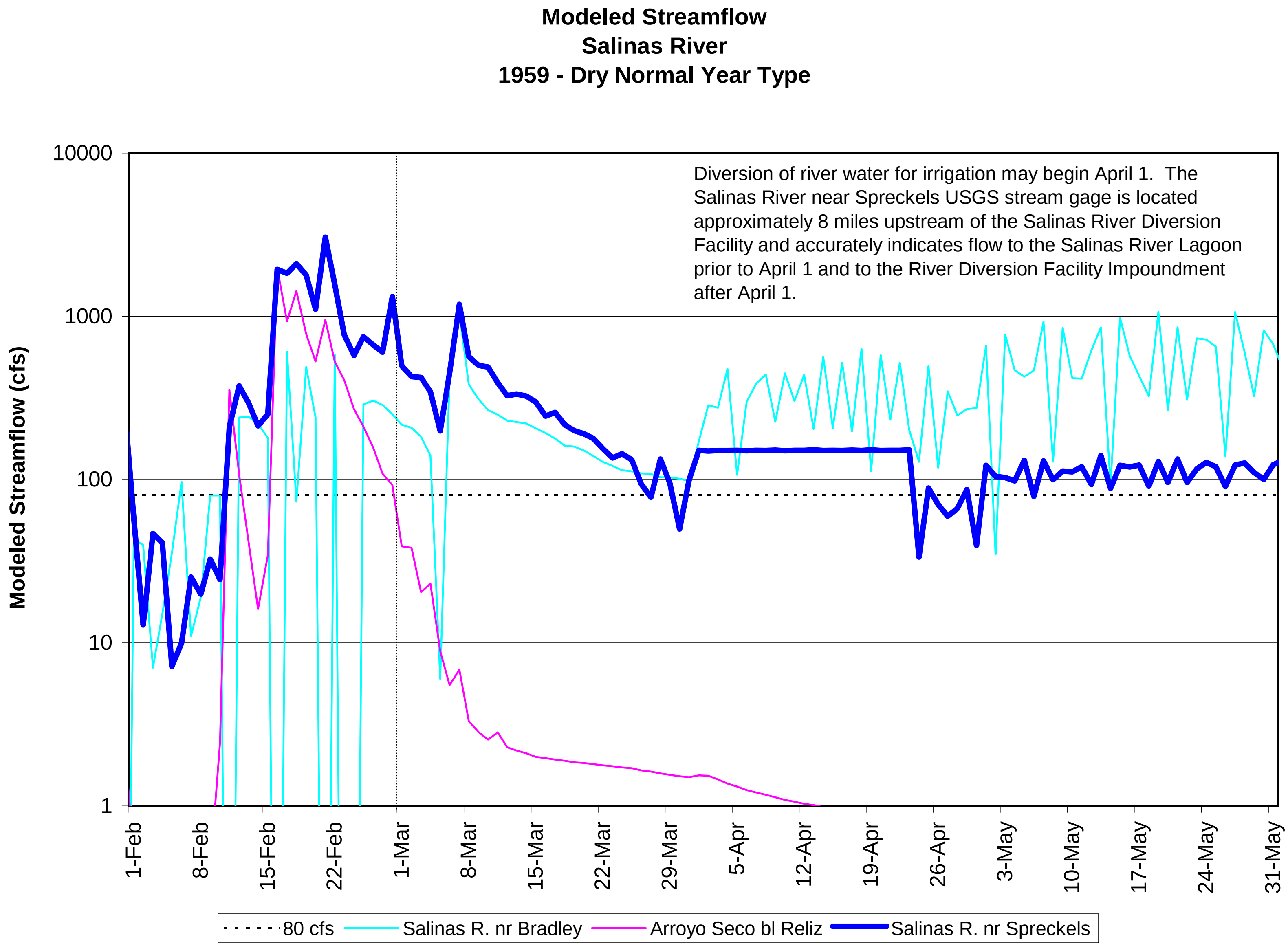


Figure C-11. Modeled Streamflow Salinas River – 1959 (Normal Year Type)

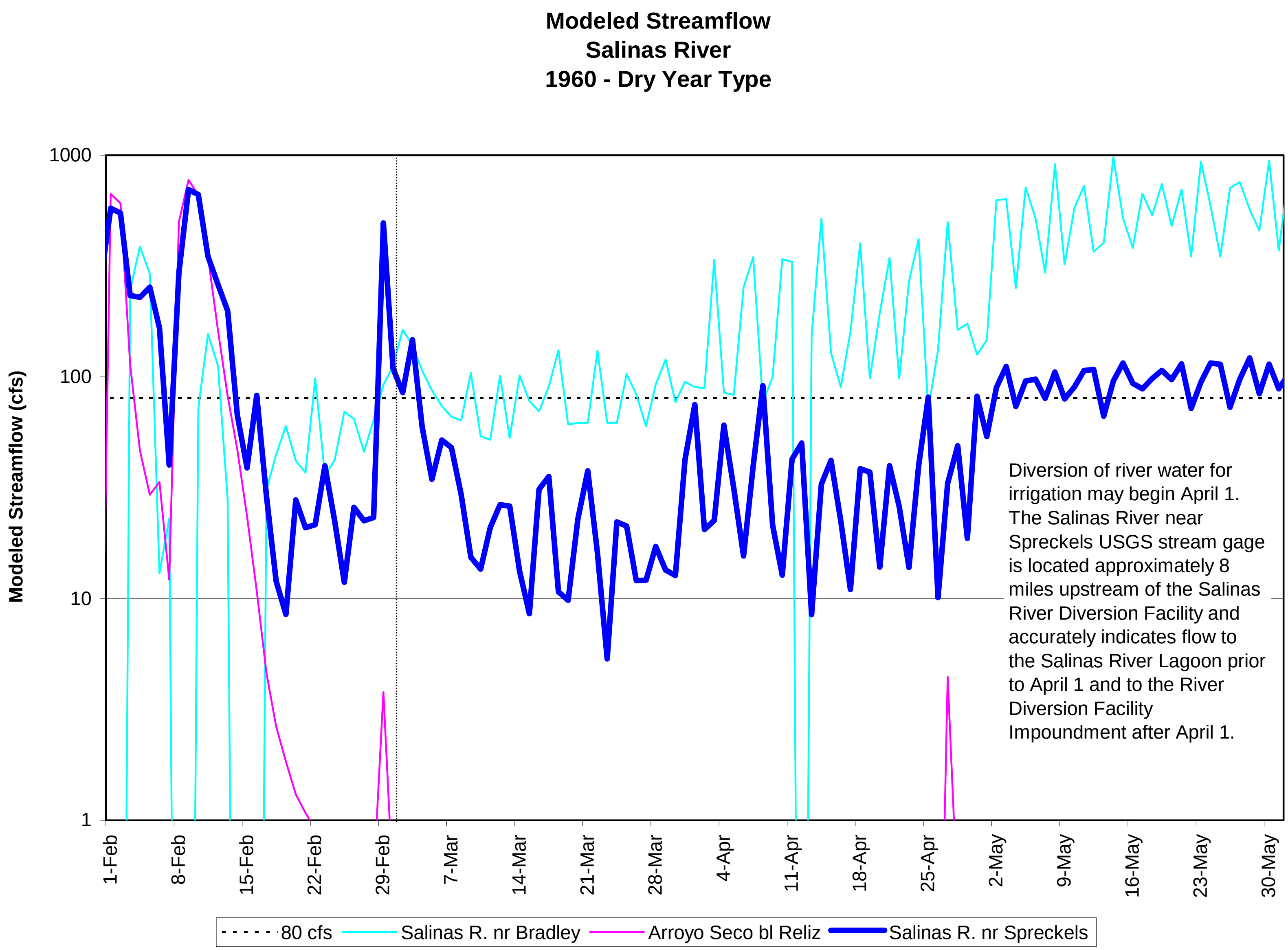


Figure C-12. Modeled Streamflow Salinas River – 1960 (Dry Year Type)

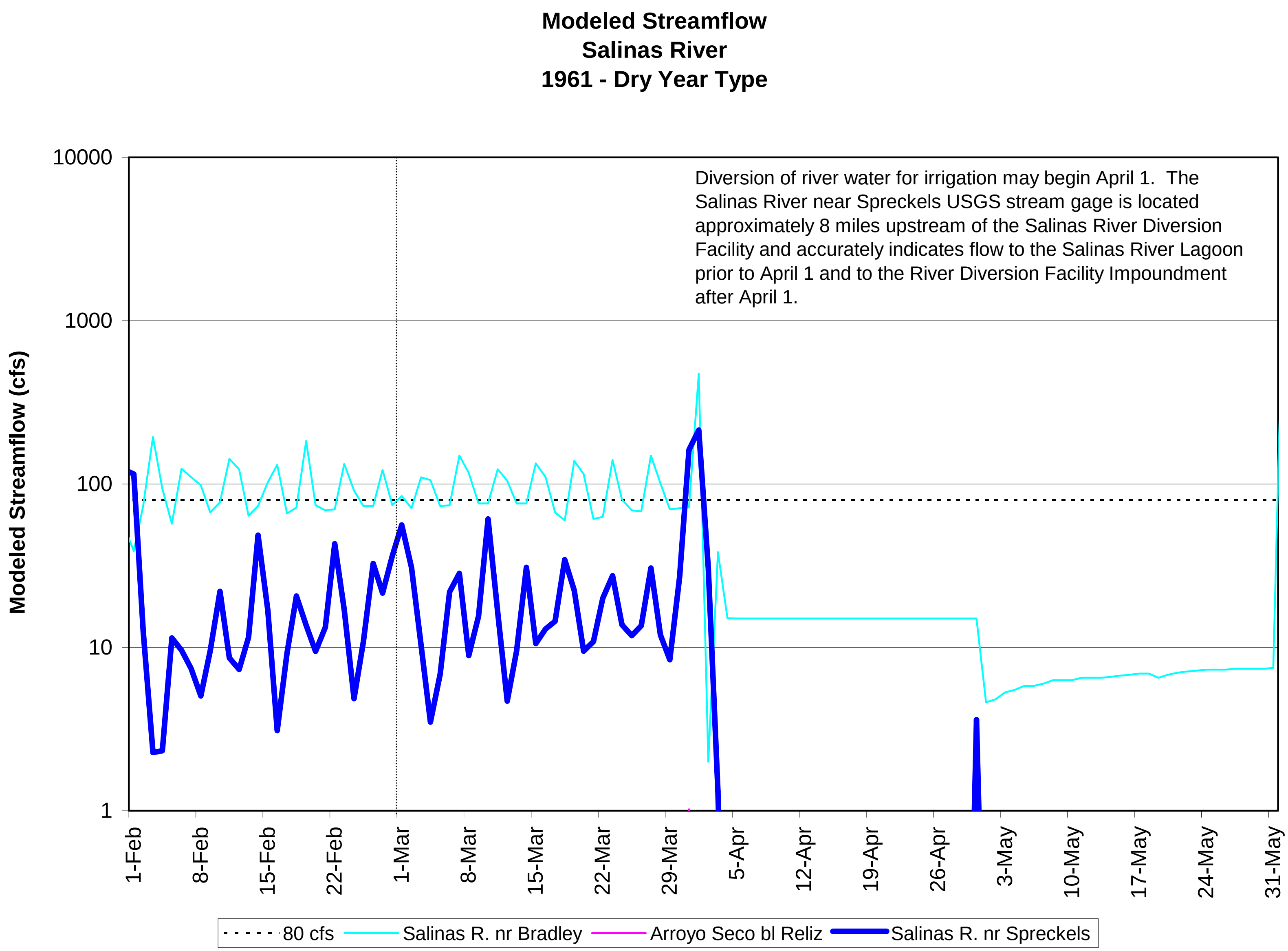


Figure C-13. Modeled Streamflow Salinas River – 1961 (Dry Year Type)

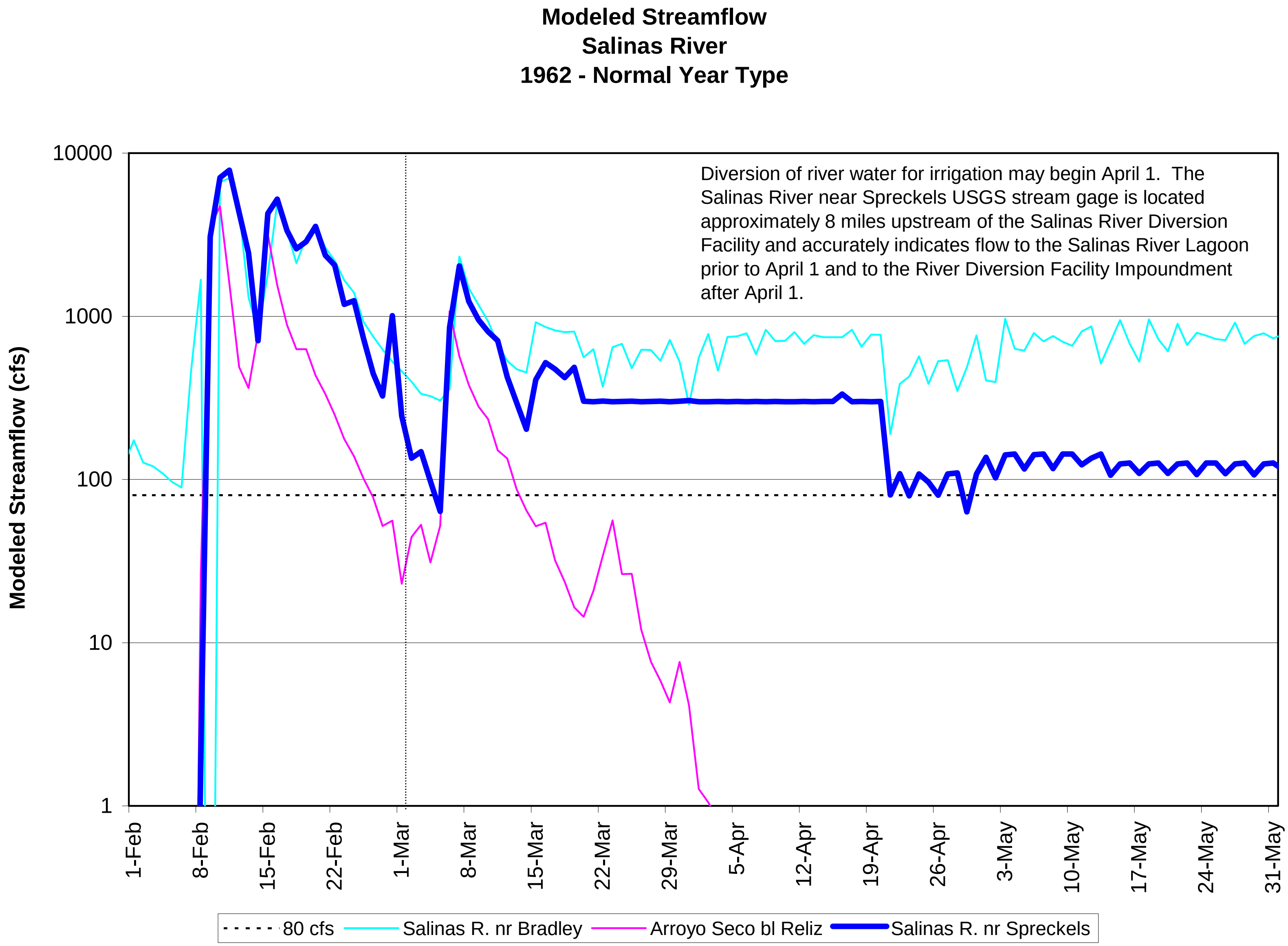


Figure C-14. Modeled Streamflow Salinas River – 1962 (Normal Year Type)

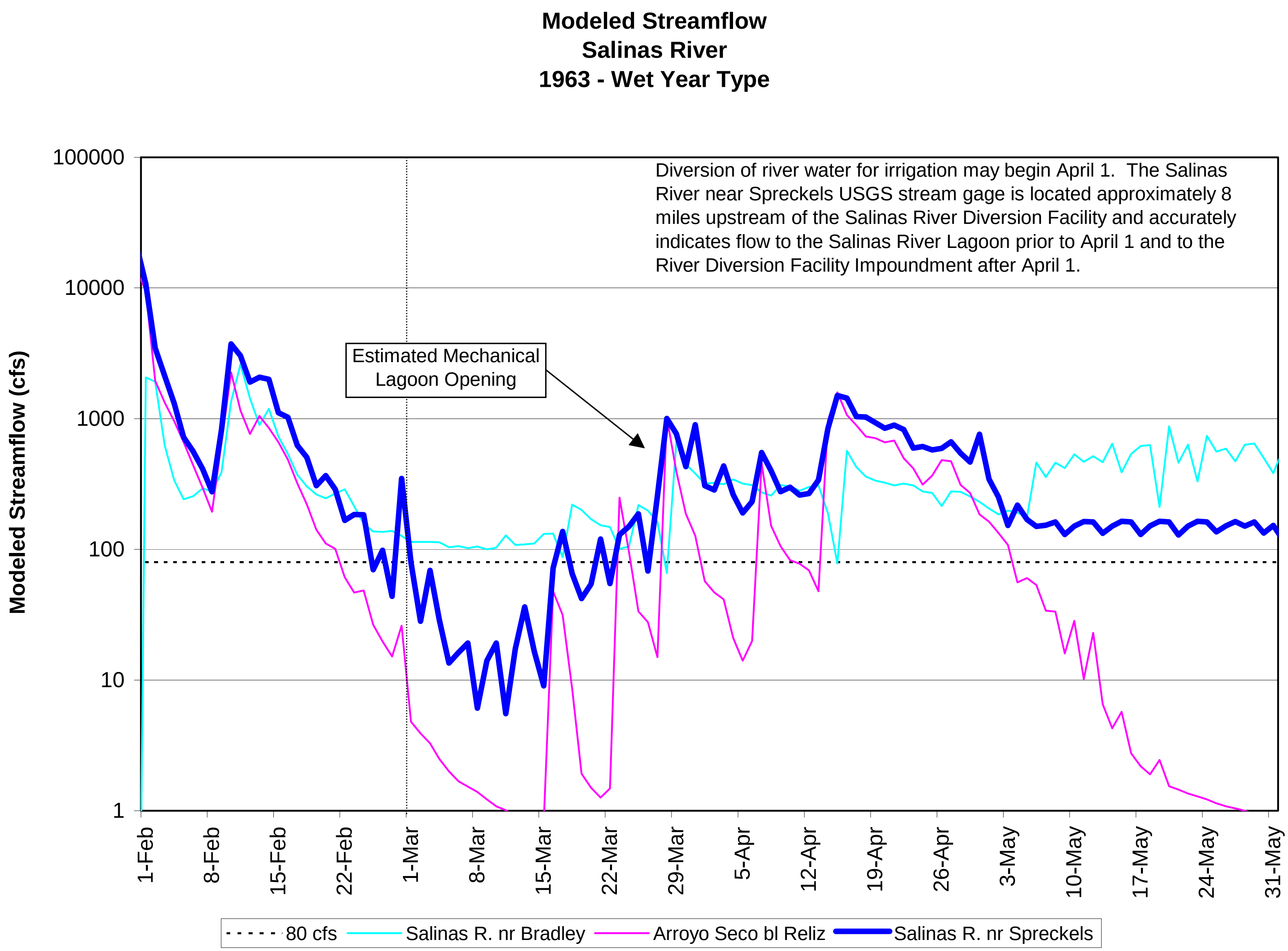


Figure C-15. Modeled Streamflow Salinas River – 1963 (Wet Year Type)

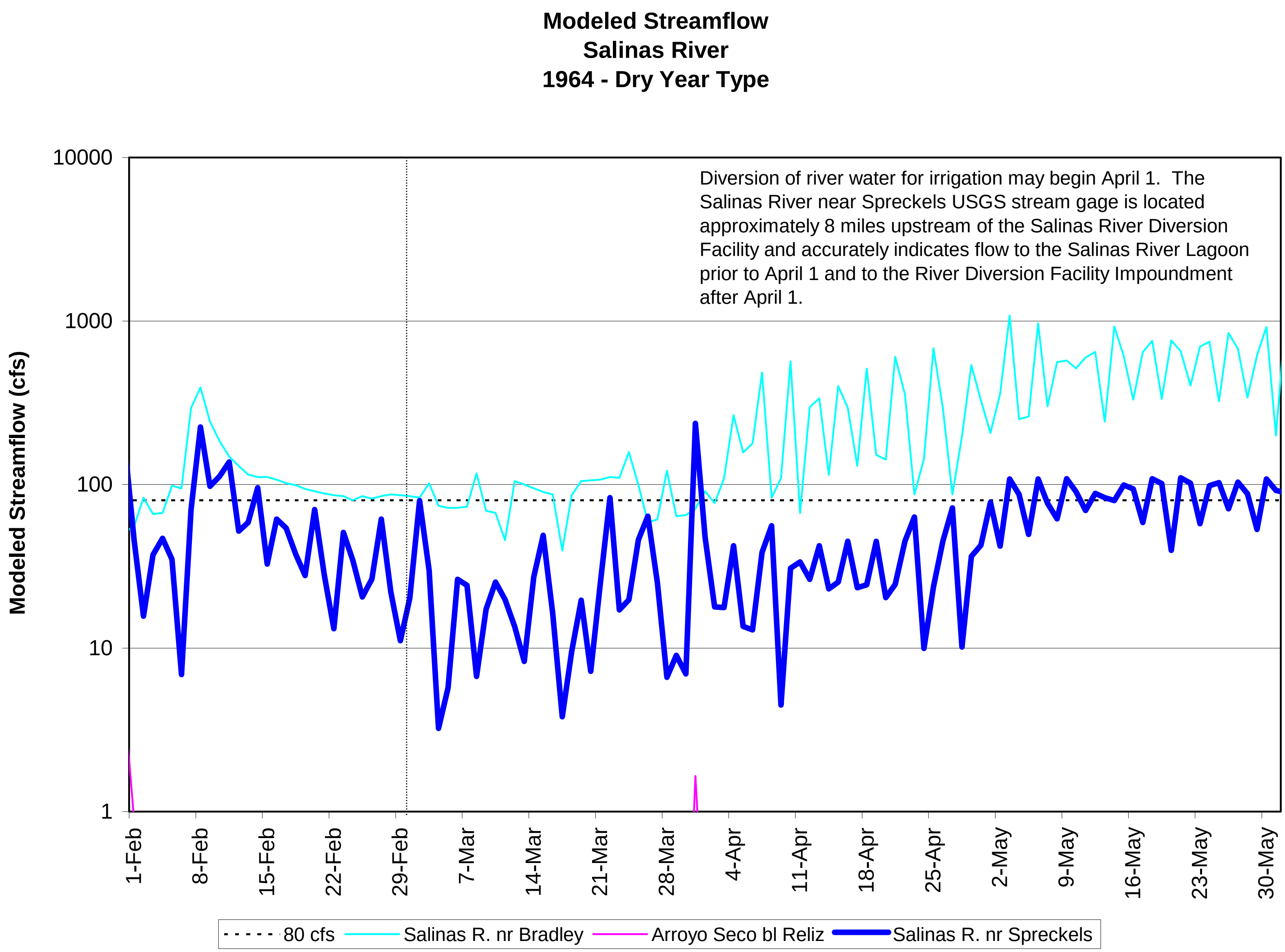


Figure C-16. Modeled Streamflow Salinas River – 1964 (Dry Year Type)

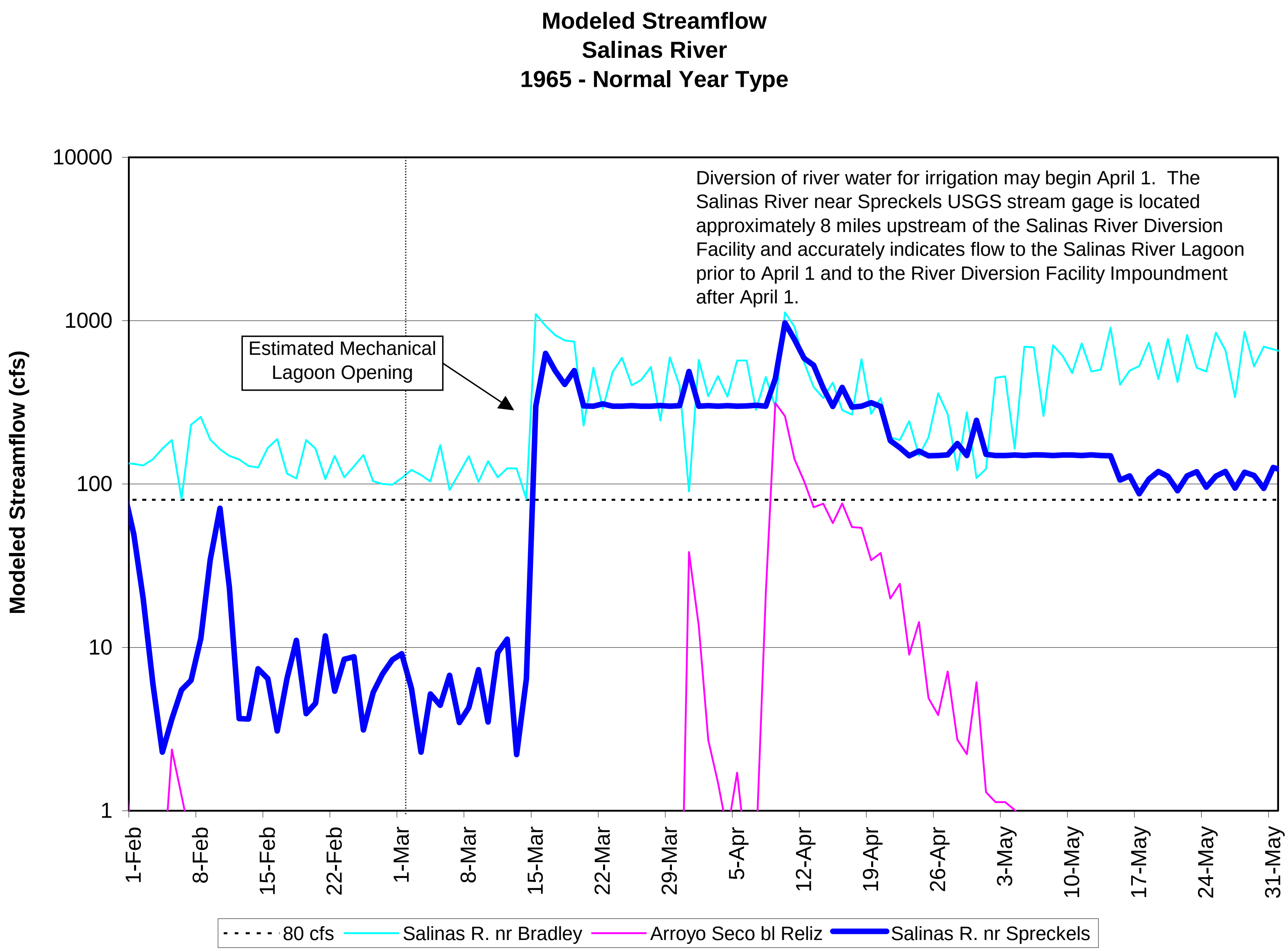


Figure C-17. Modeled Streamflow Salinas River – 1965 (Normal Year Type)

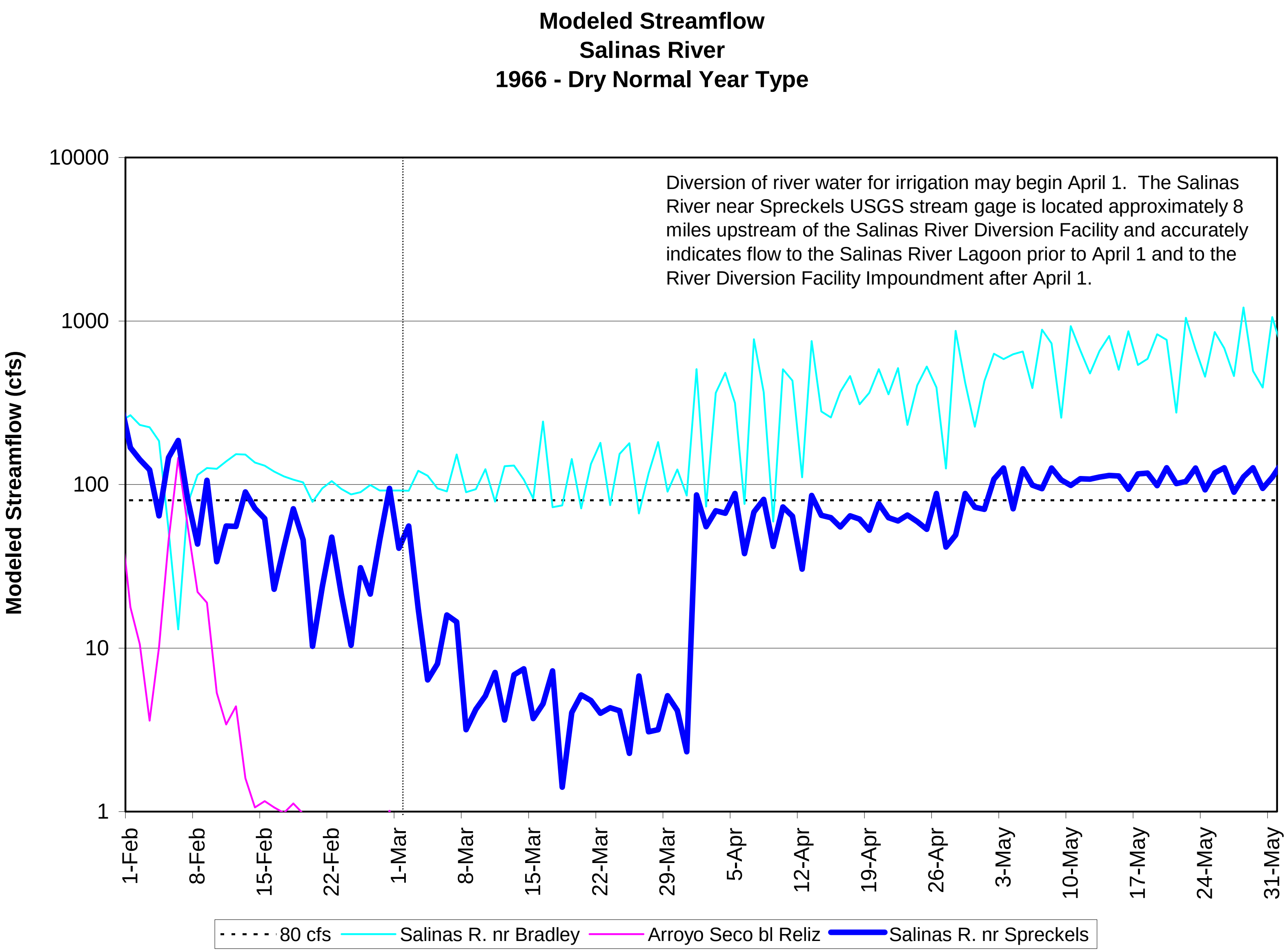


Figure C-18. Modeled Streamflow Salinas River – 1966 (Dry Normal Year Type)

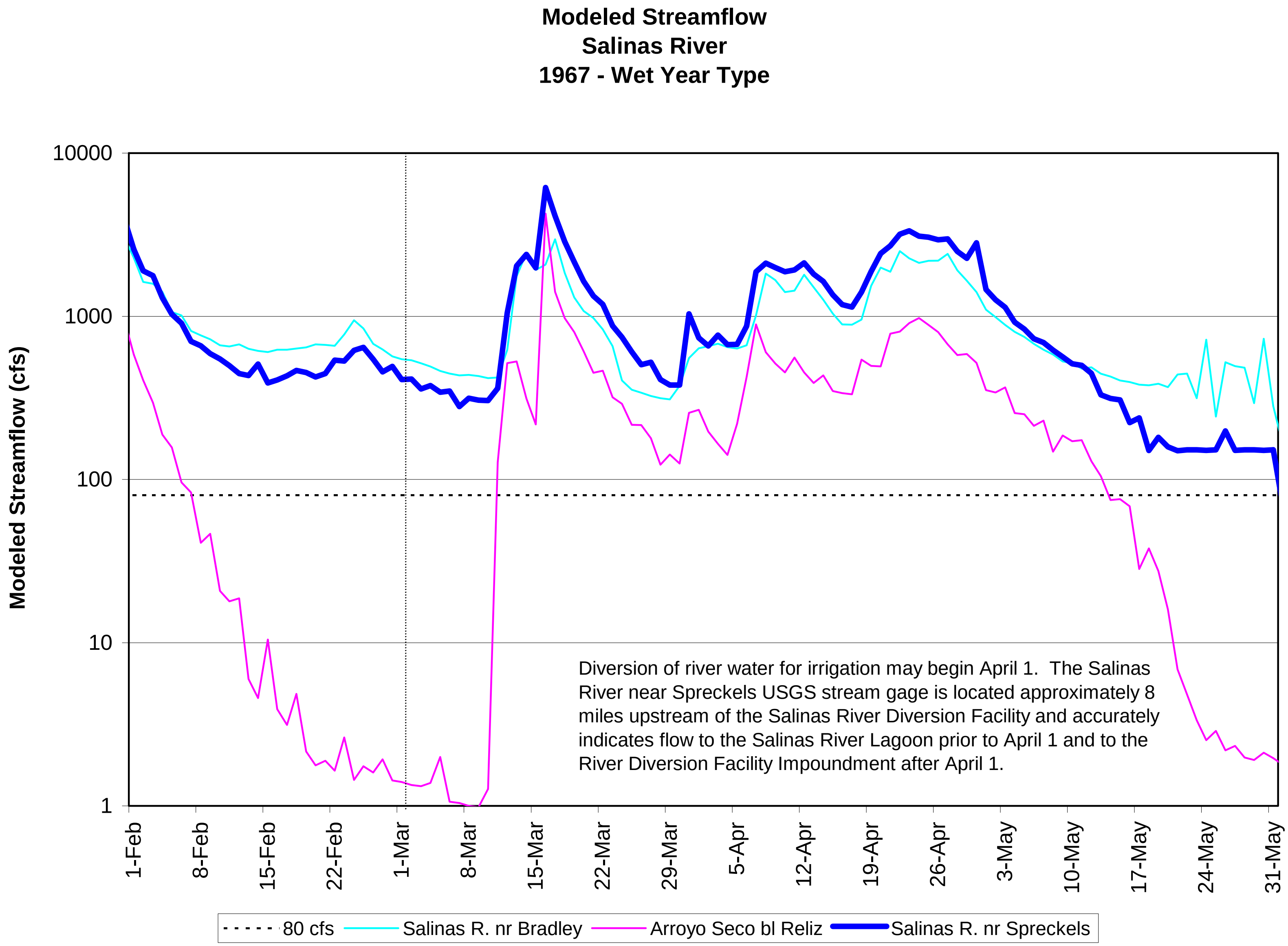


Figure C-19. Modeled Streamflow Salinas River – 1967 (Wet Year Type)

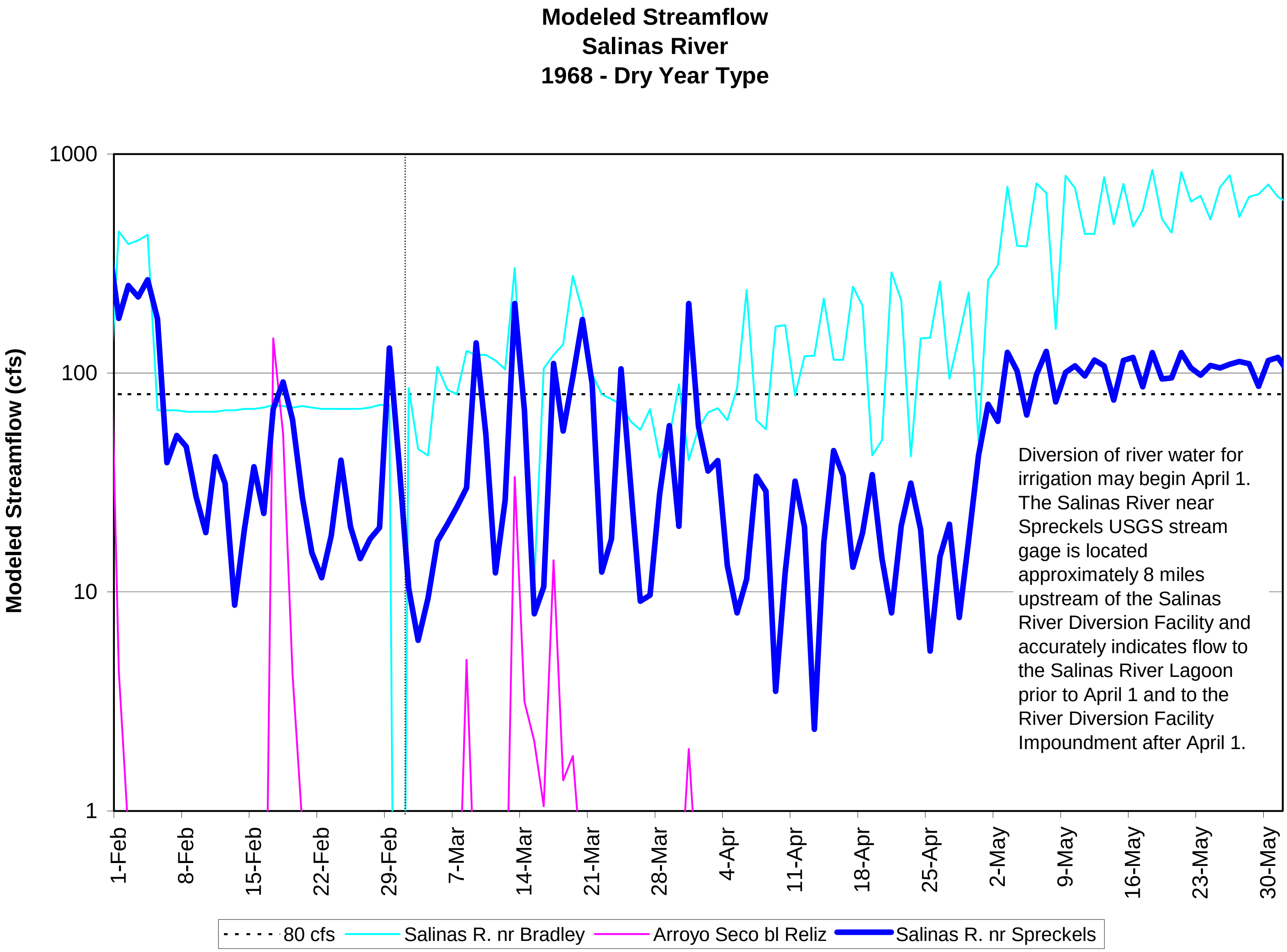


Figure C-20. Modeled Streamflow Salinas River – 1968 (Dry Year Type)

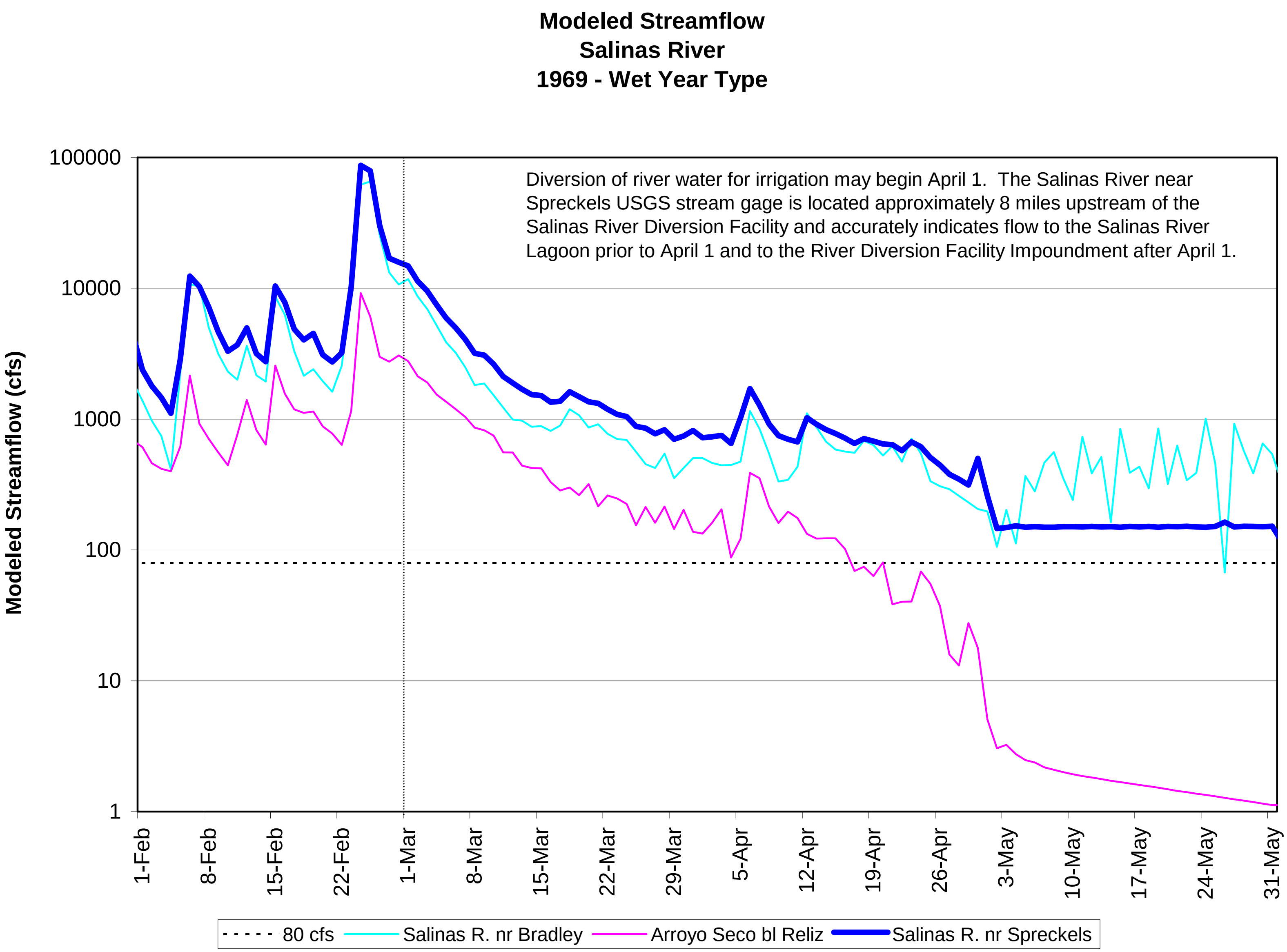


Figure C-21. Modeled Streamflow Salinas River – 1969 (Wet Year Type)

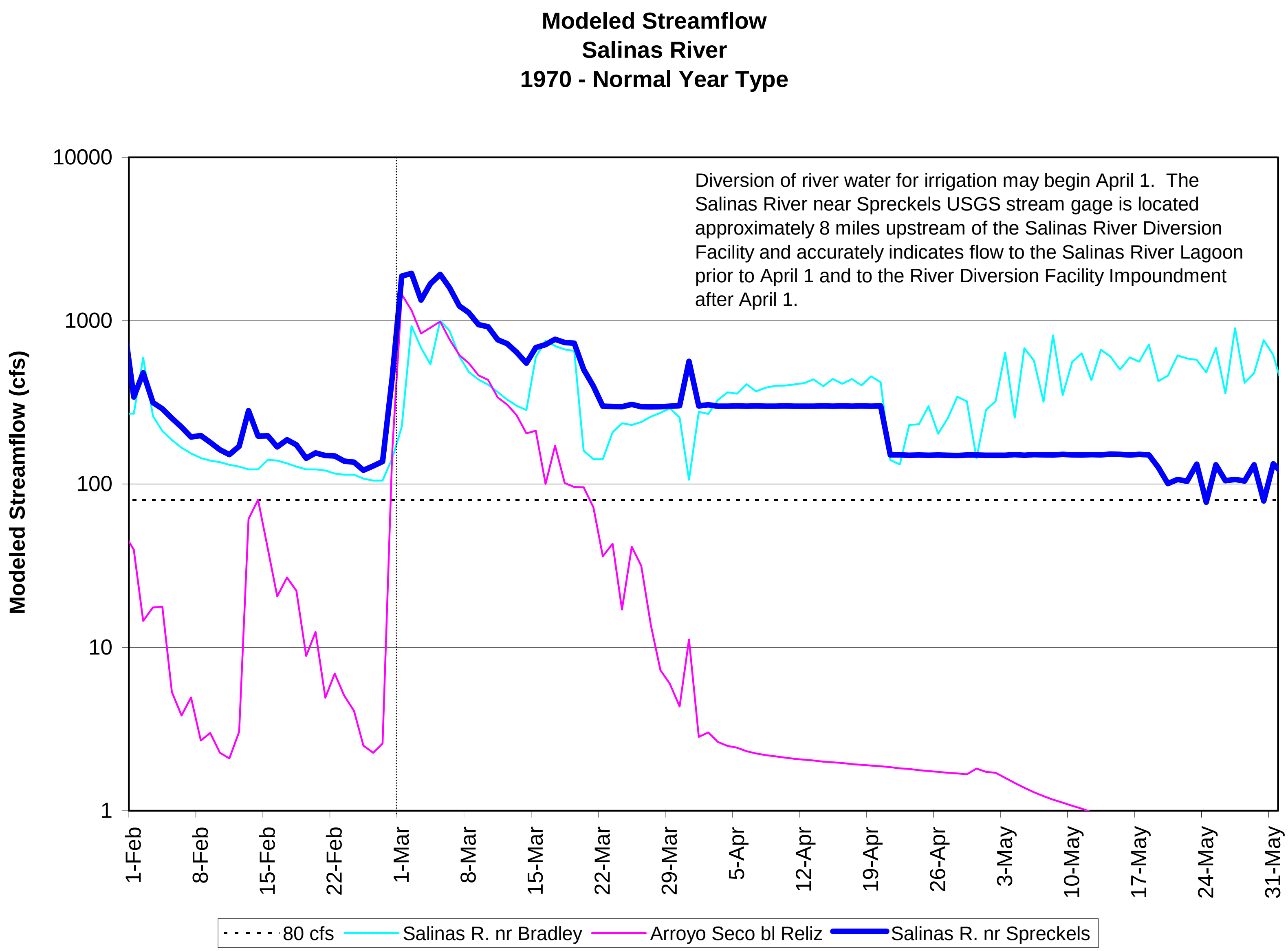


Figure C-22. Modeled Streamflow Salinas River – 1970 (Normal Year Type)

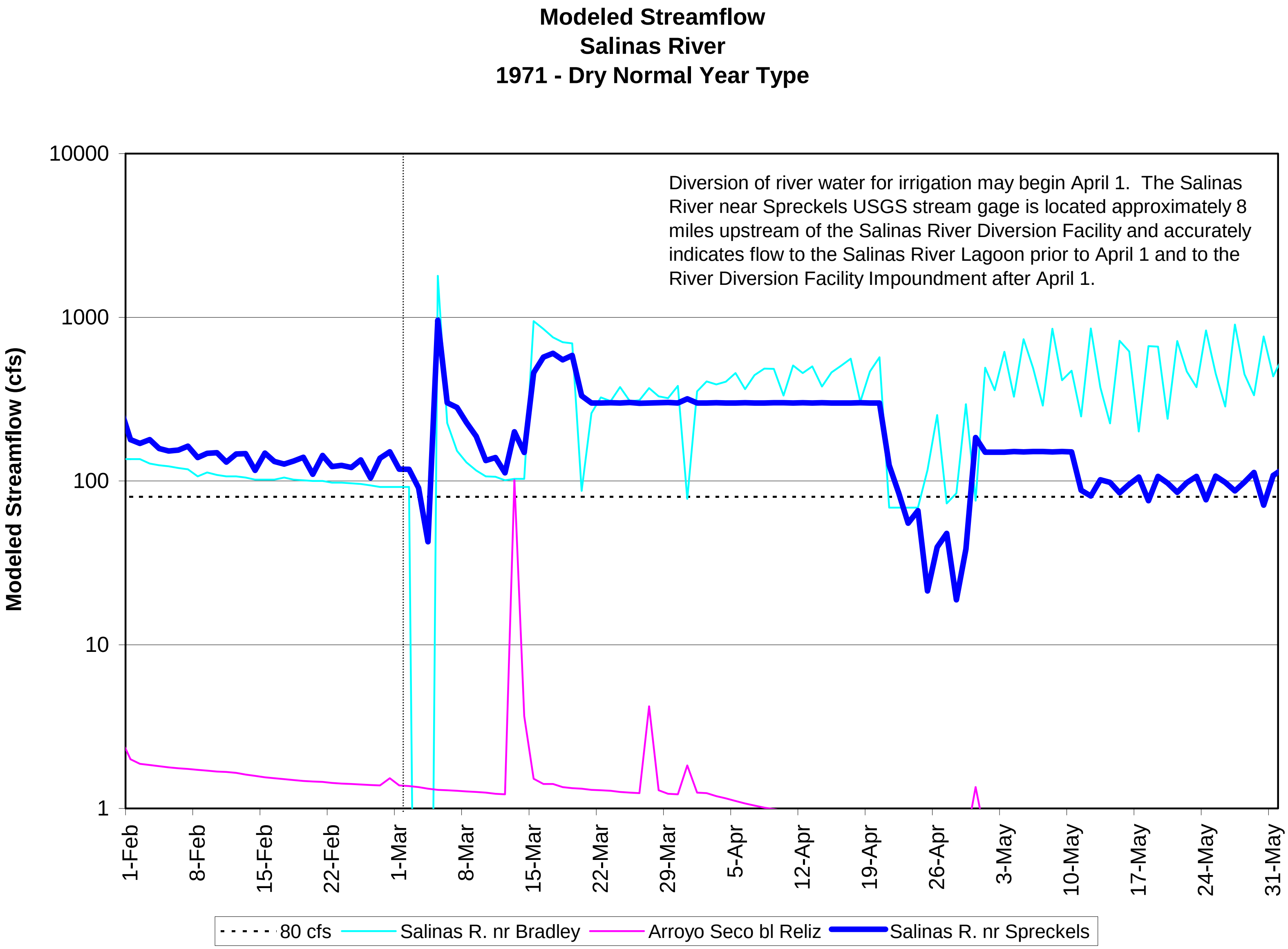


Figure C-23. Modeled Streamflow Salinas River – 1971 (Dry Normal Year Type)

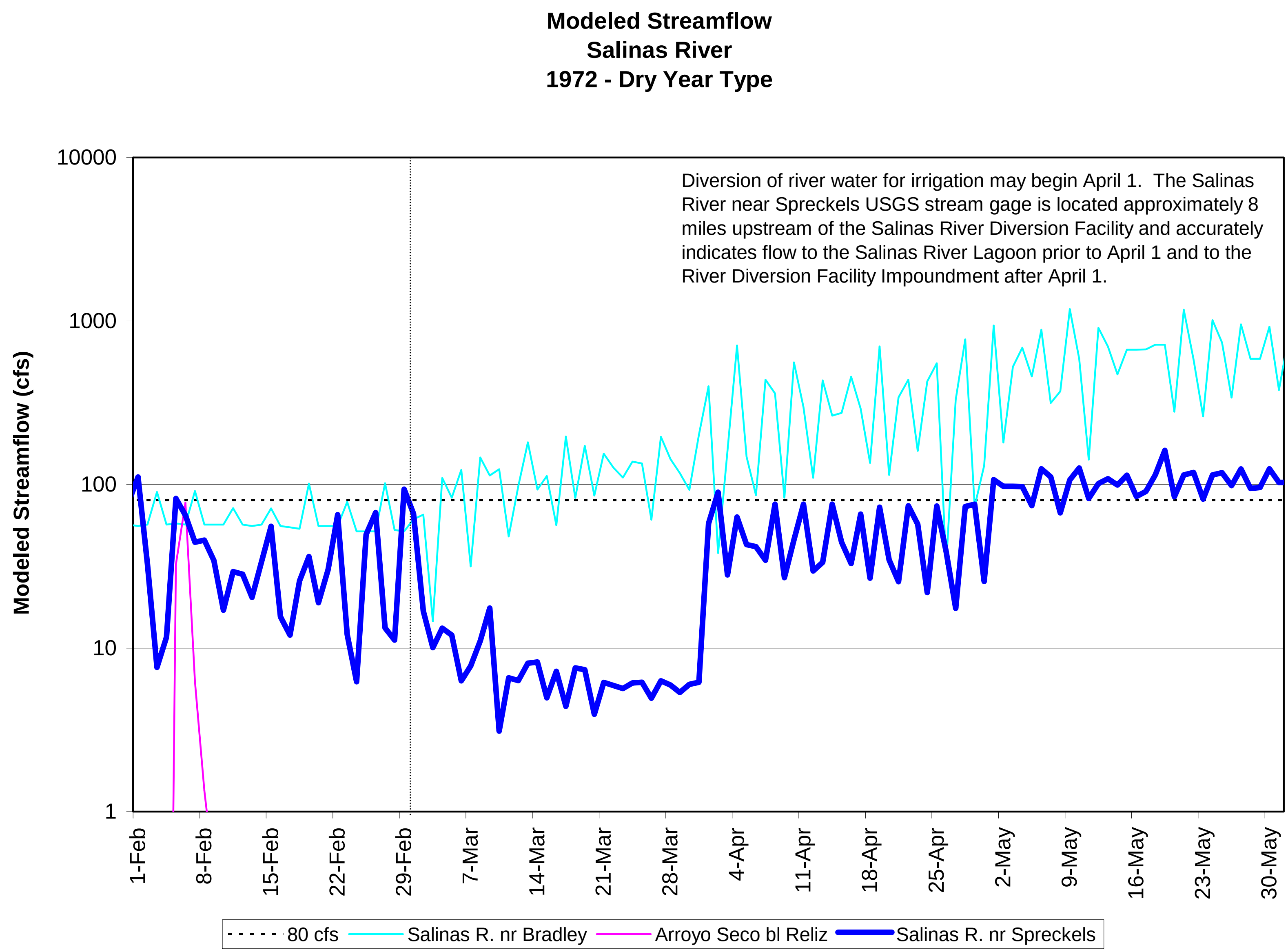


Figure C-24. Modeled Streamflow Salinas River – 1972 (Dry Year Type)

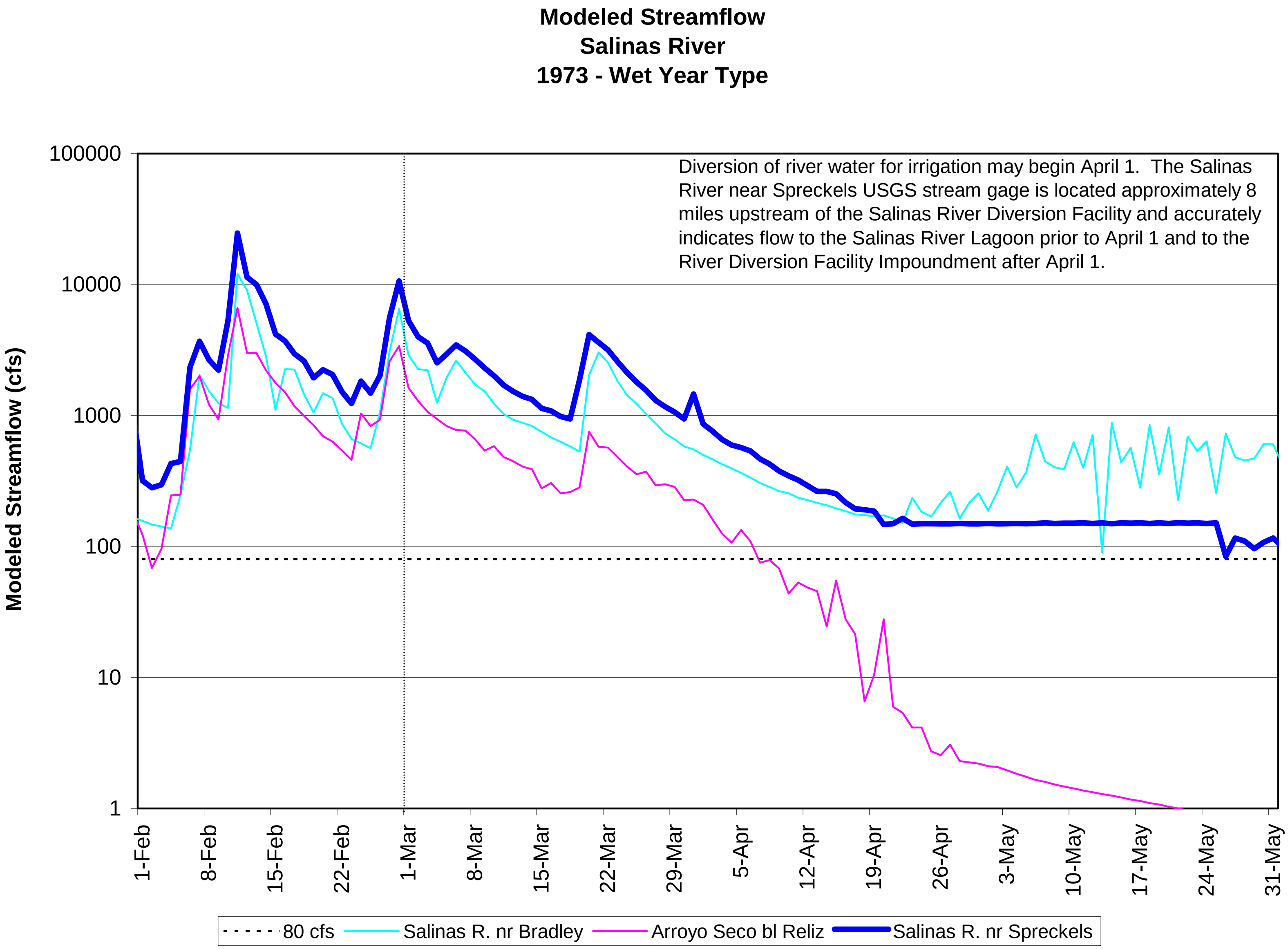


Figure C-25. Modeled Streamflow Salinas River – 1973 (Wet Year Type)

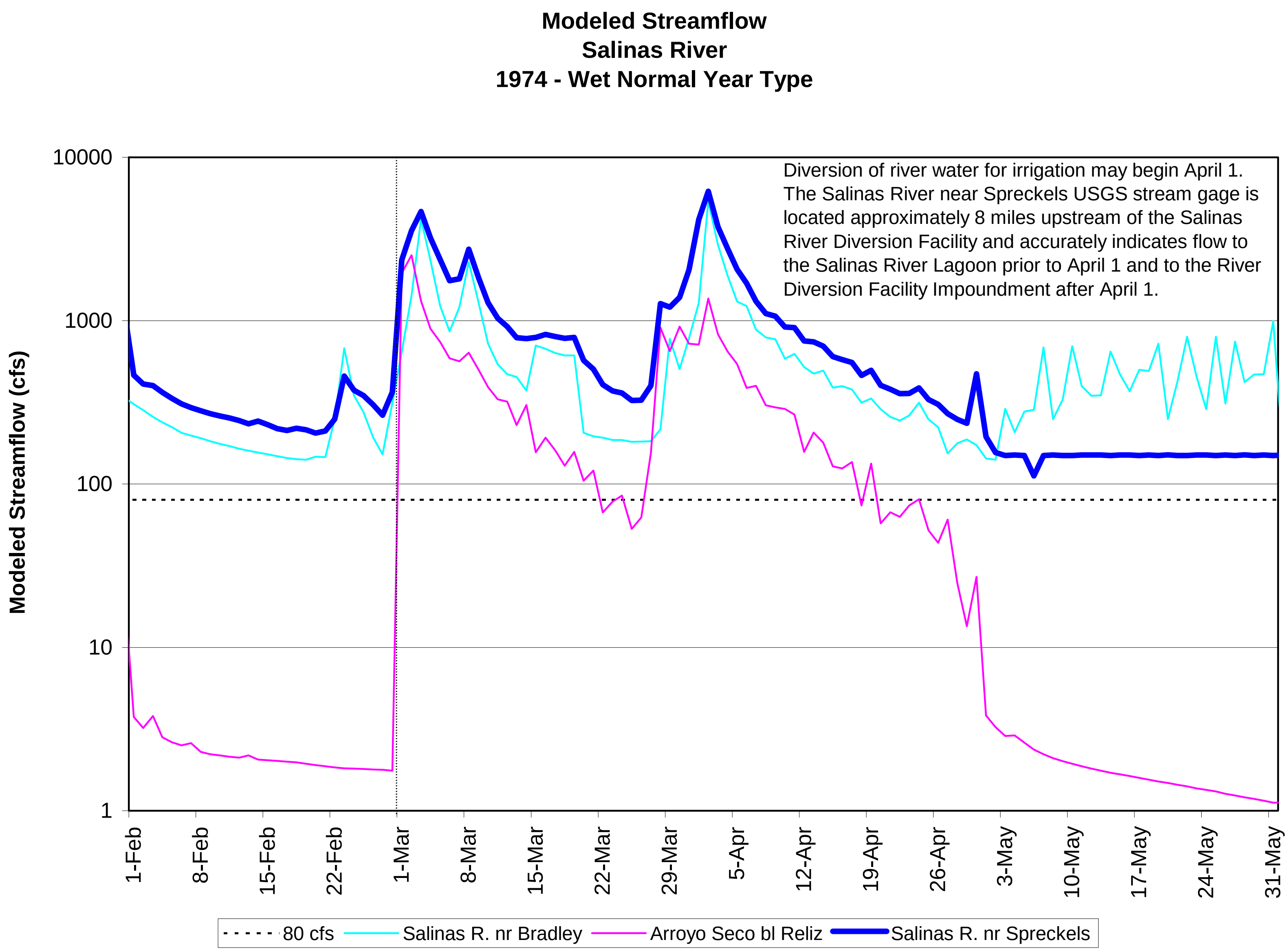


Figure C-26. Modeled Streamflow Salinas River – 1974 (Wet Normal Year Type)

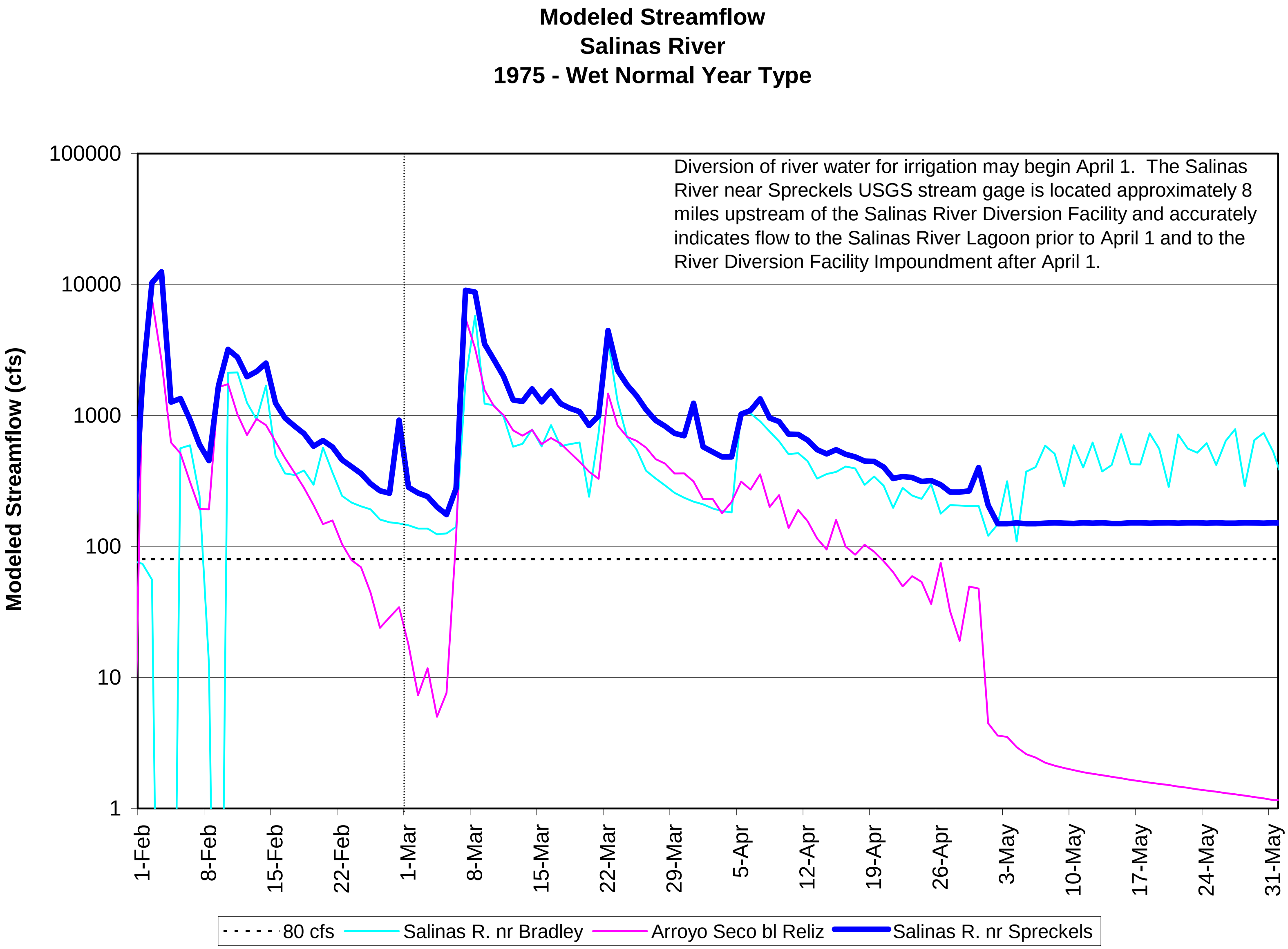


Figure C-27. Modeled Streamflow Salinas River – 1975 (Wet Normal Year Type)

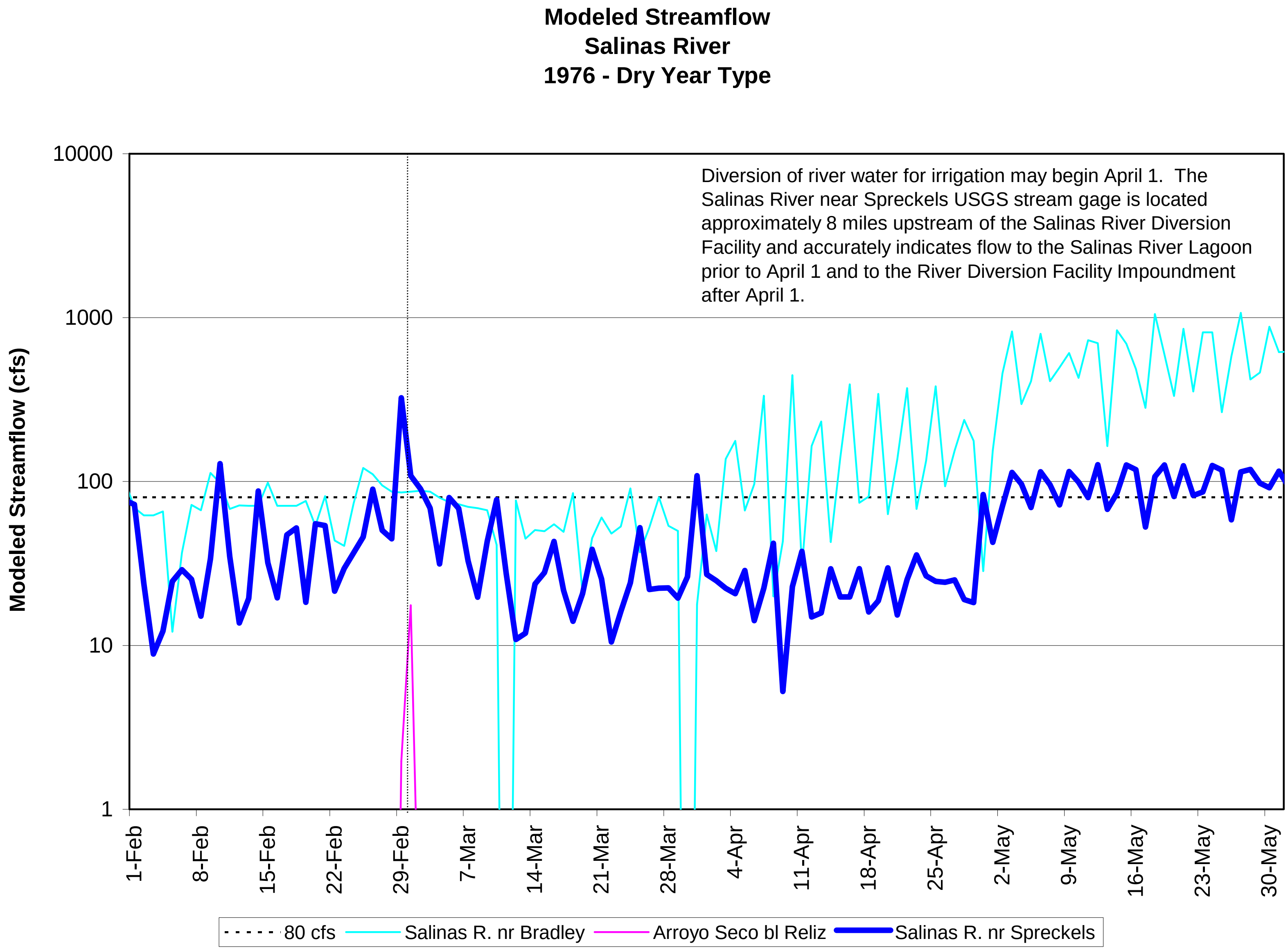


Figure C-28. Modeled Streamflow Salinas River – 1976 (Dry Year Type)

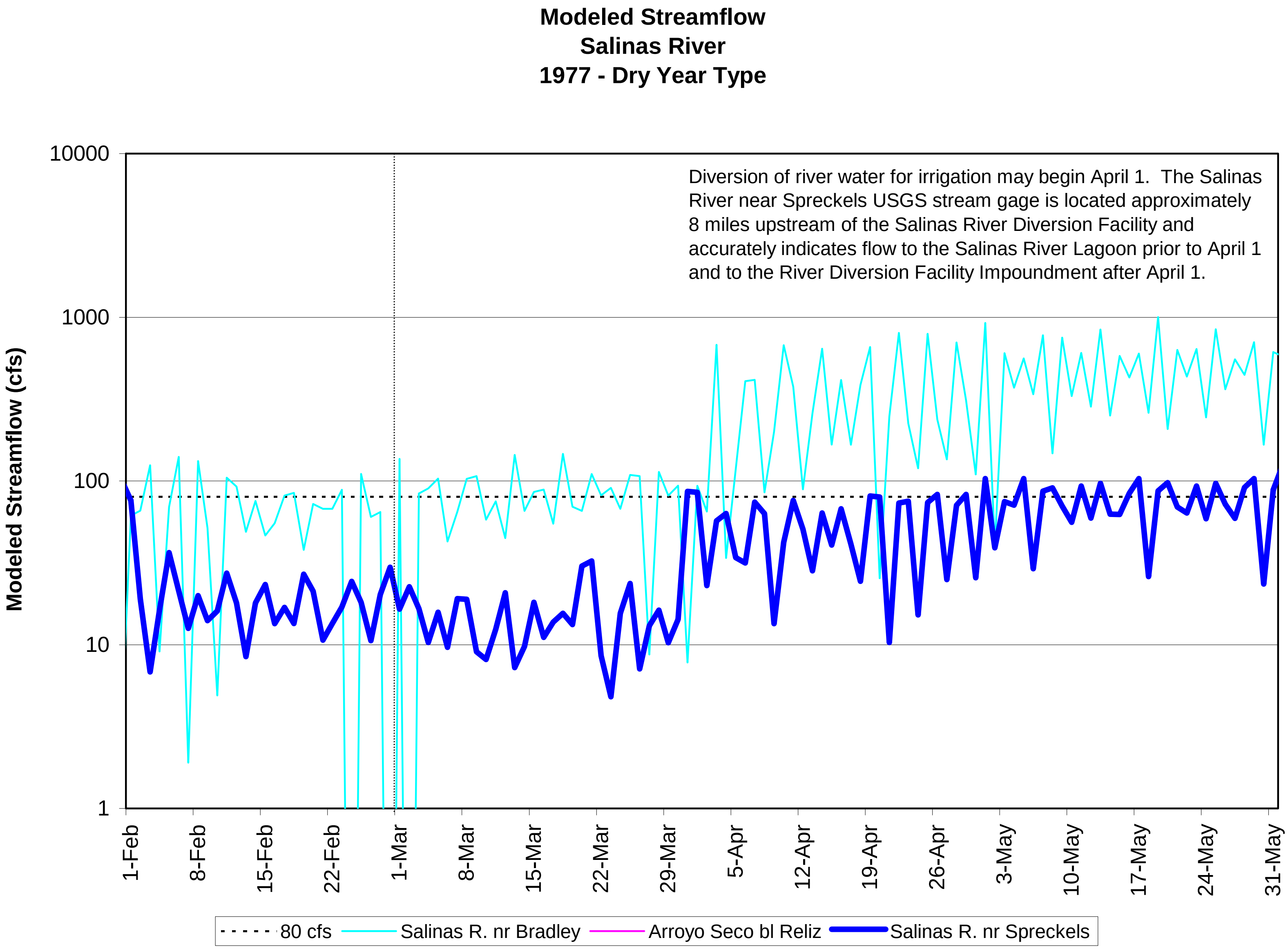


Figure C-29. Modeled Streamflow Salinas River – 1977 (Dry Year Type)

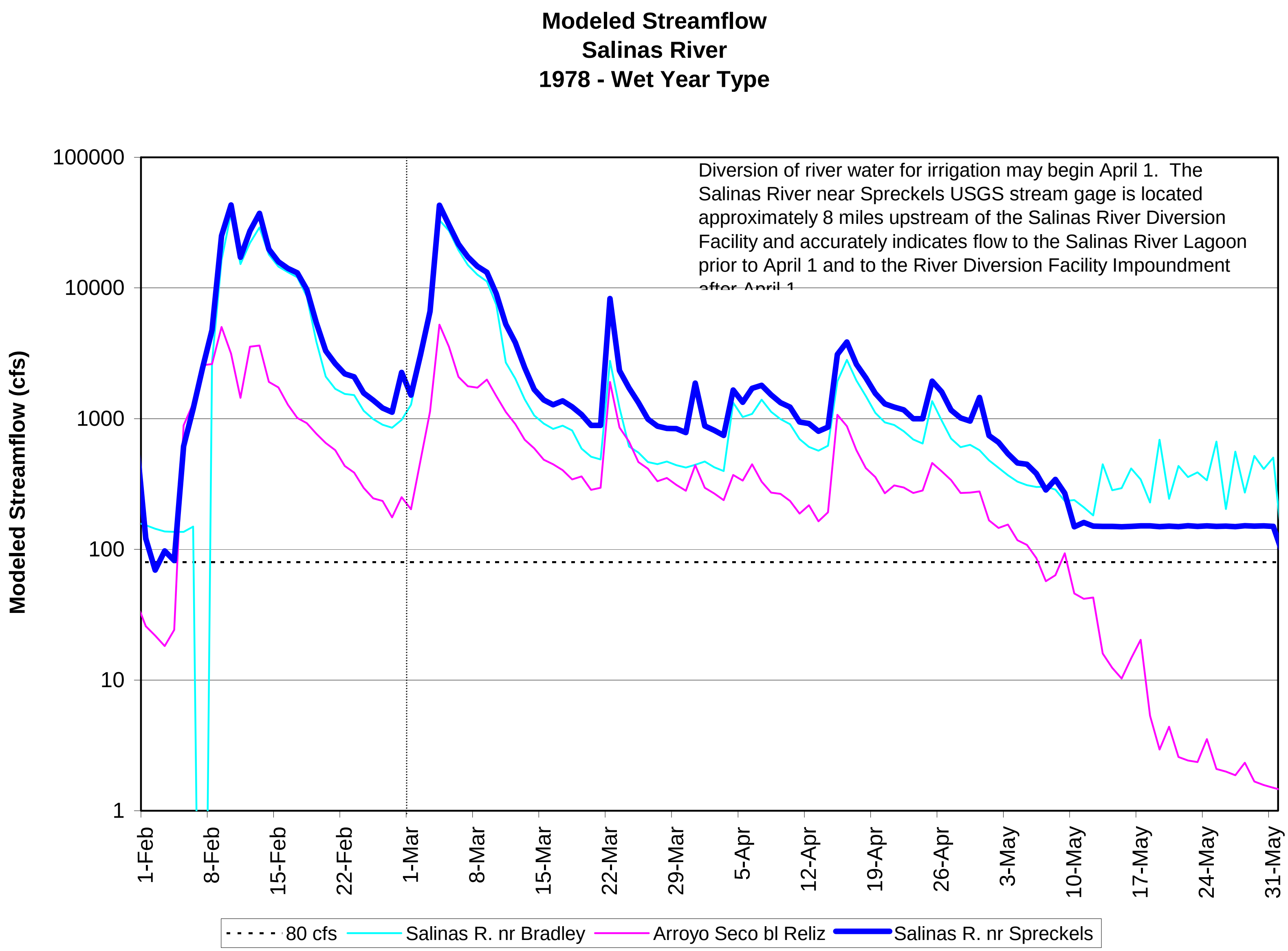


Figure C-30. Modeled Streamflow Salinas River – 1978 (Wet Year Type)

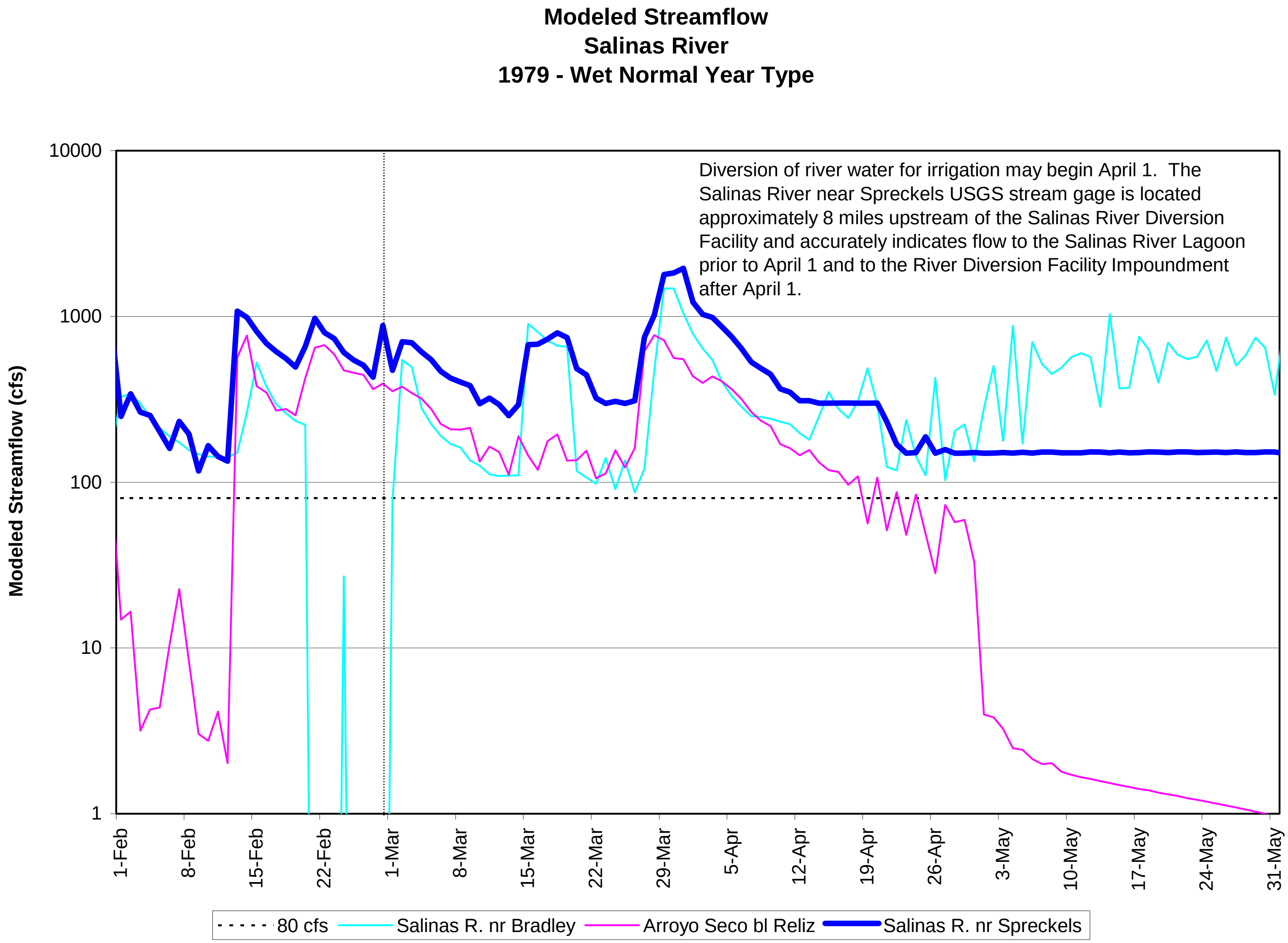


Figure C-31. Modeled Streamflow Salinas River – 1979 (Wet Normal Year Type)

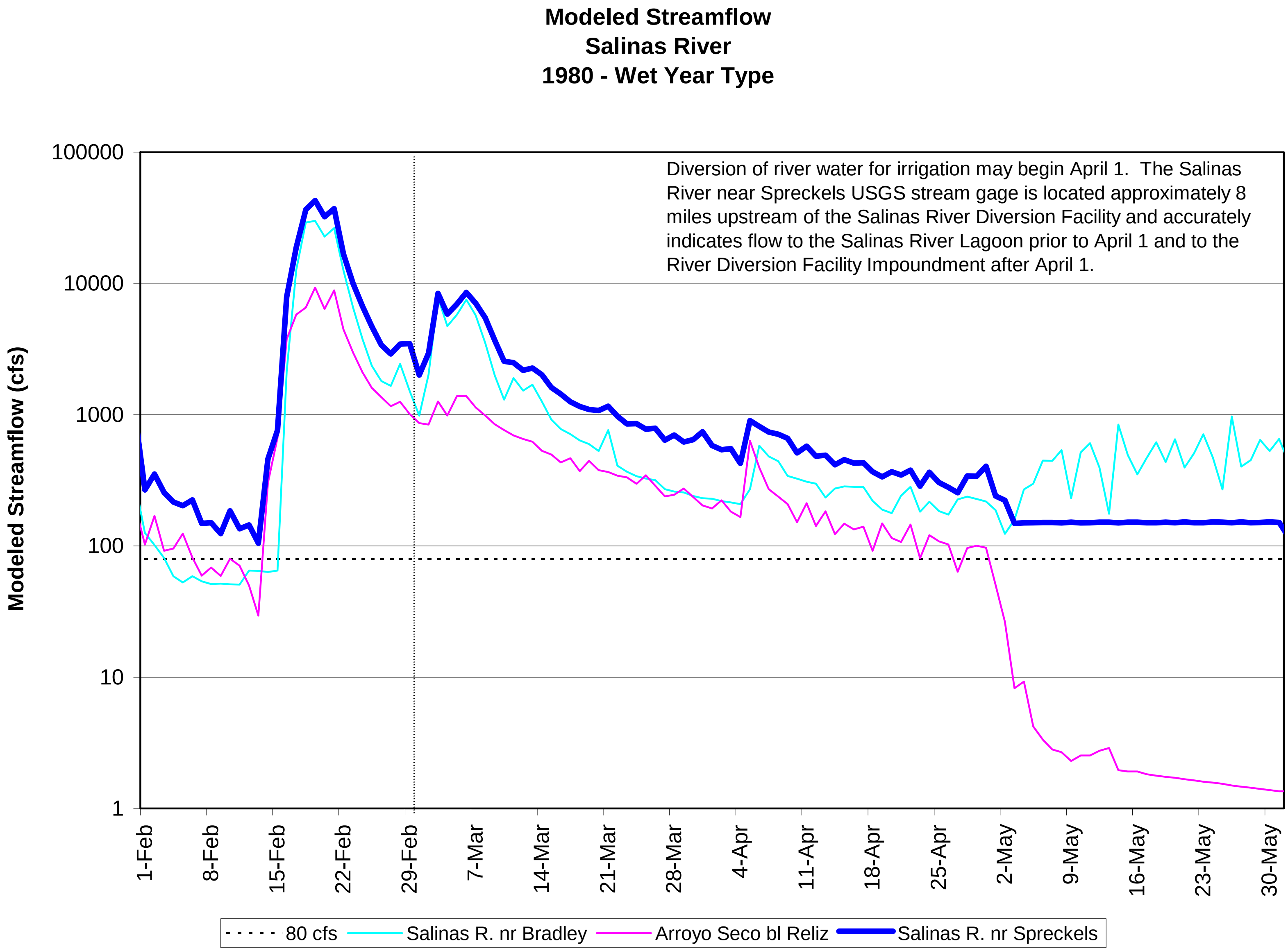


Figure C-32. Modeled Streamflow Salinas River – 1980 (Wet Year Type)

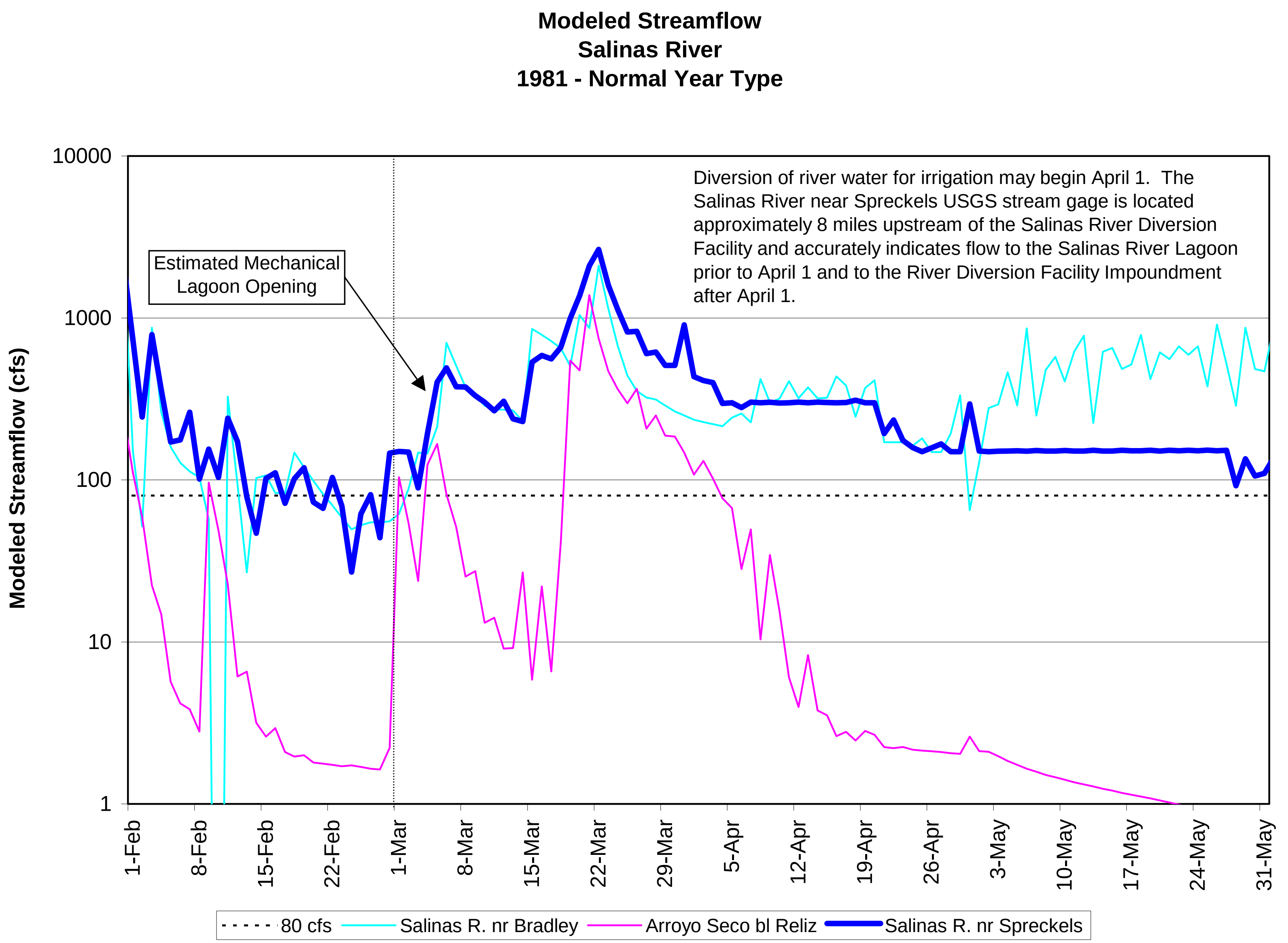


Figure C-33. Modeled Streamflow Salinas River – 1981 (Normal Year Type)

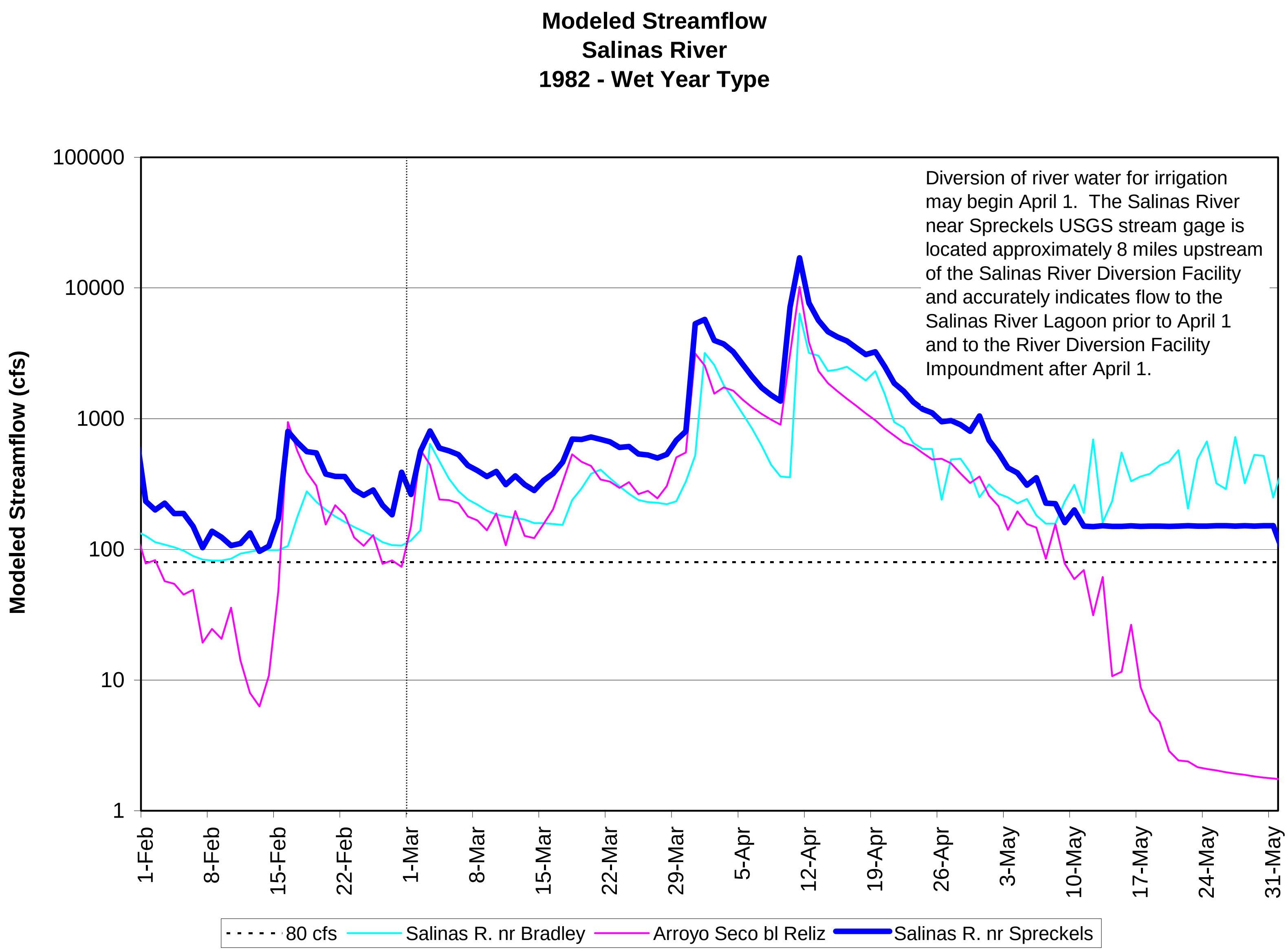


Figure C-34. Modeled Streamflow Salinas River – 1982 (Wet Year Type)

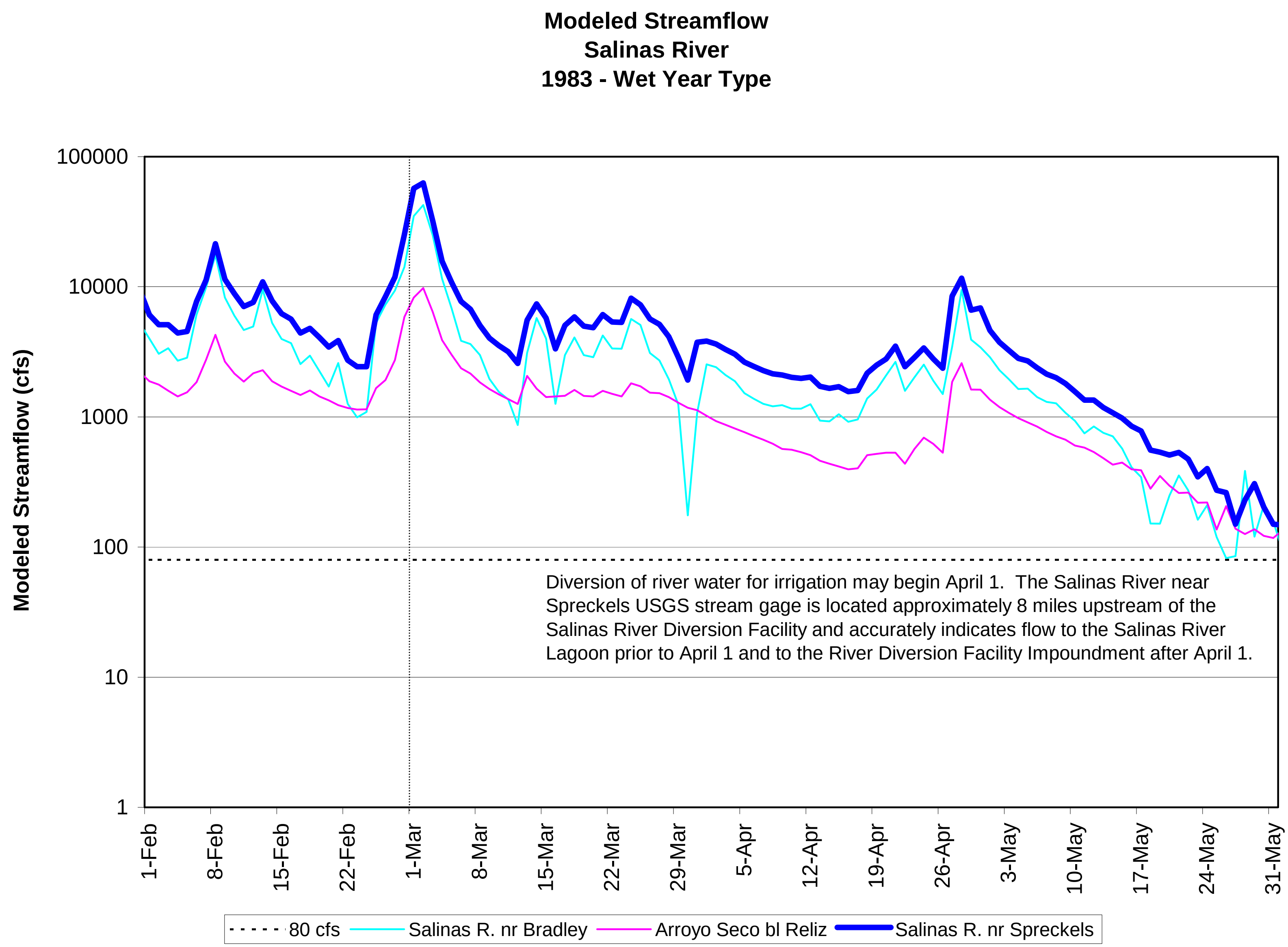


Figure C-35. Modeled Streamflow Salinas River – 1983 (Wet Year Type)

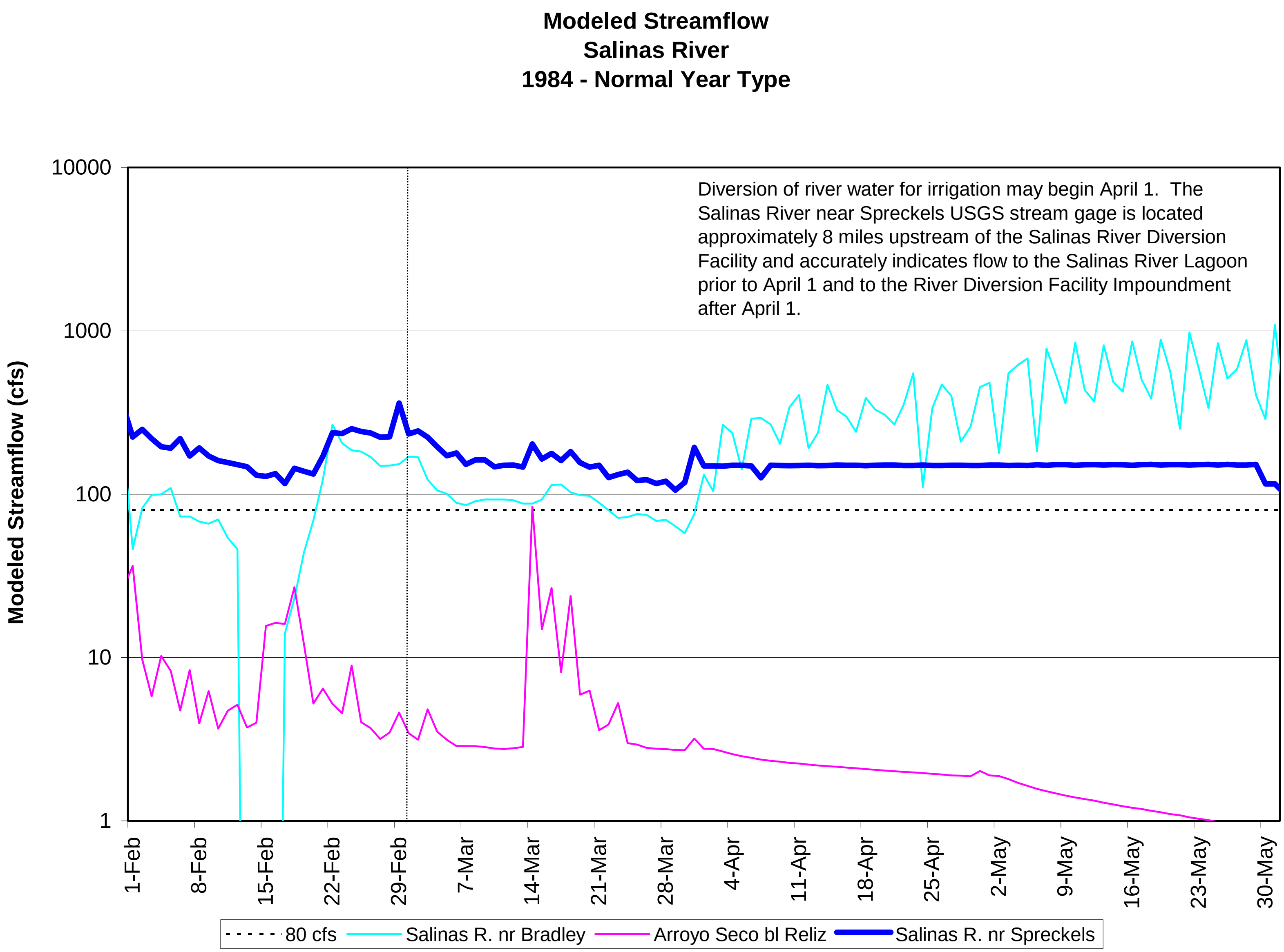


Figure C-36. Modeled Streamflow Salinas River – 1984 (Normal Year Type)

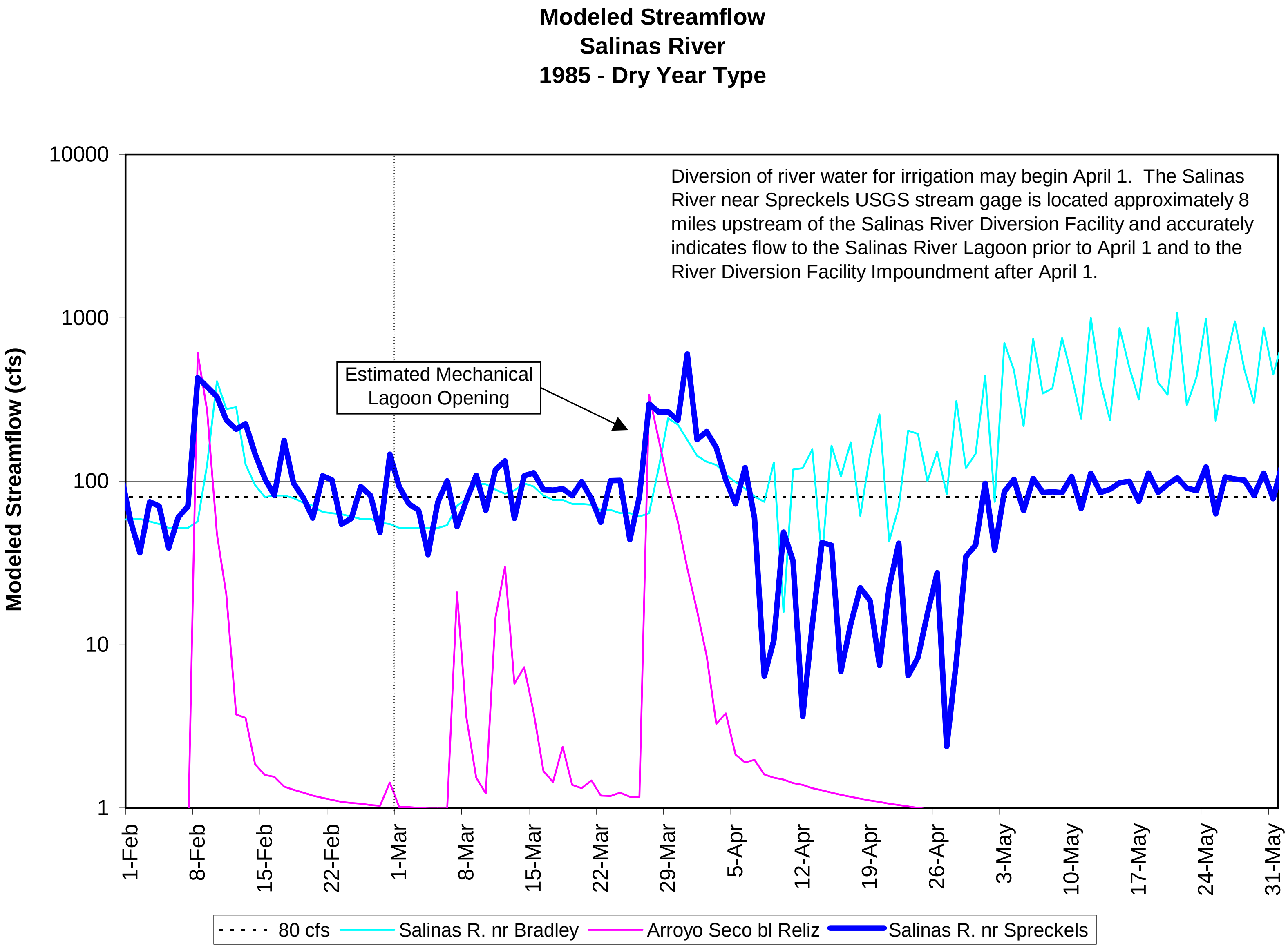


Figure C-37. Modeled Streamflow Salinas River – 1985 (Dry Year Type)

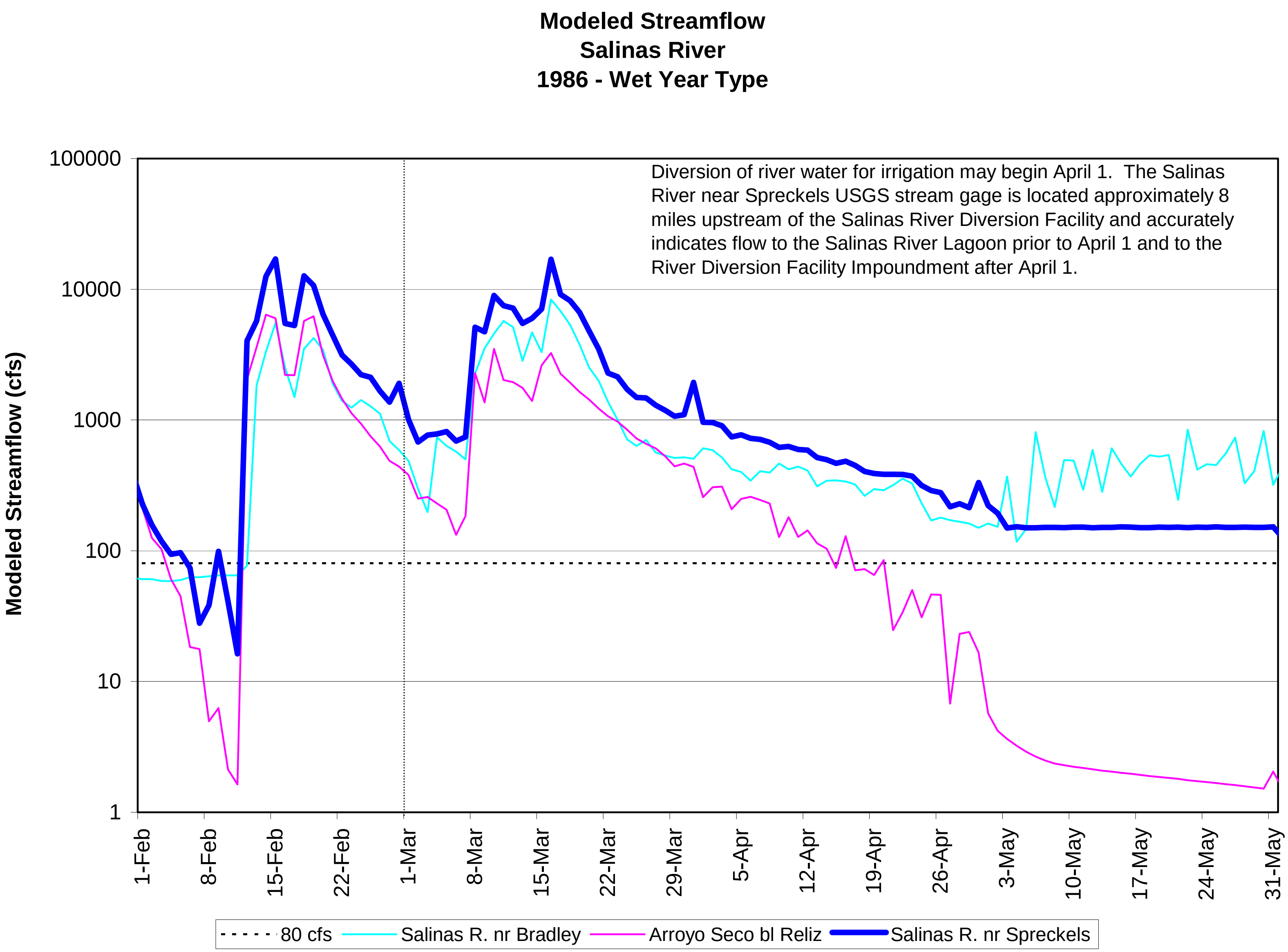


Figure C-38. Modeled Streamflow Salinas River – 1986 (Wet Year Type)

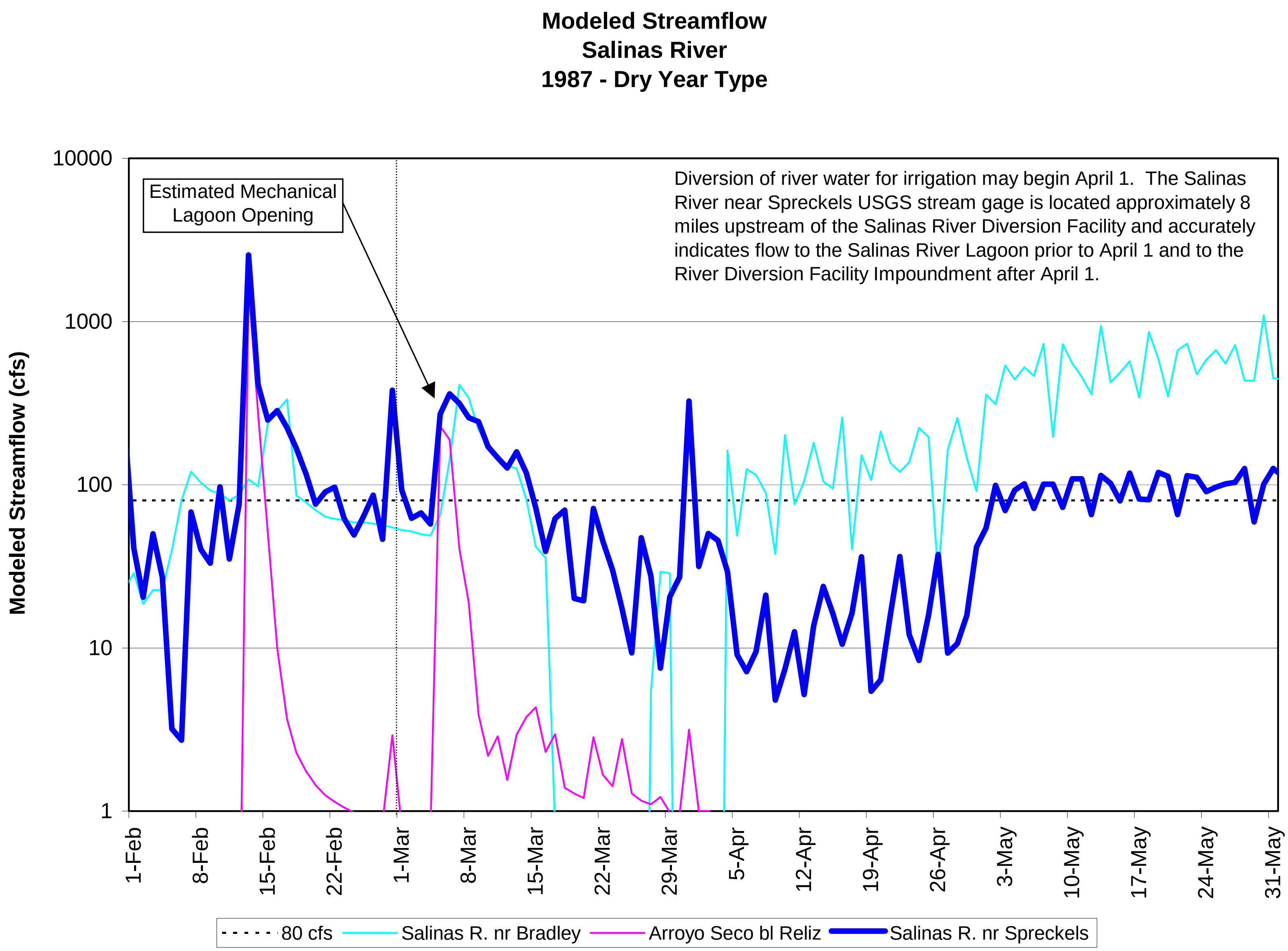


Figure C-39. Modeled Streamflow Salinas River – 1987 (Dry Year Type)

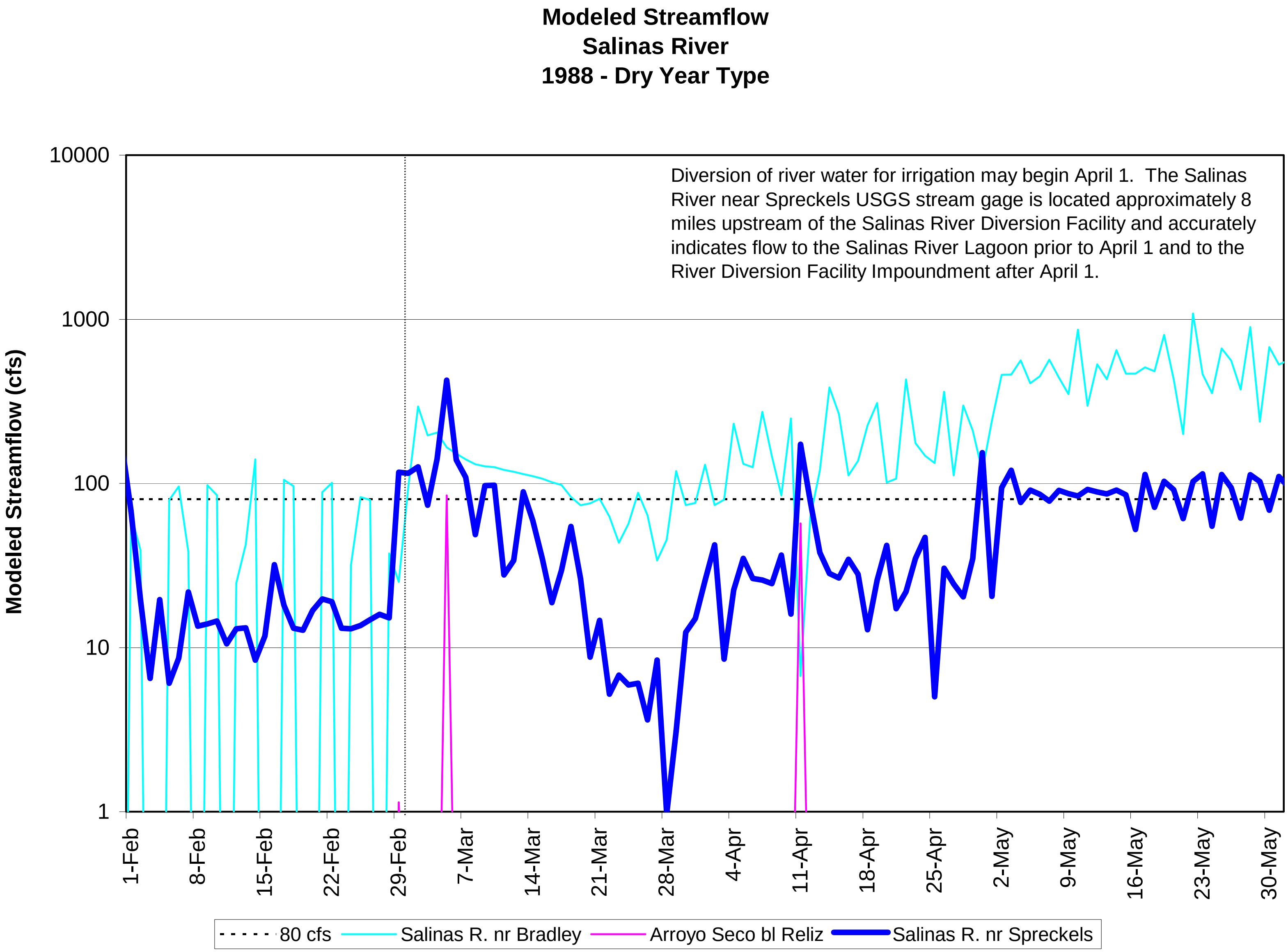


Figure C-40. Modeled Streamflow Salinas River – 1988 (Dry Year Type)

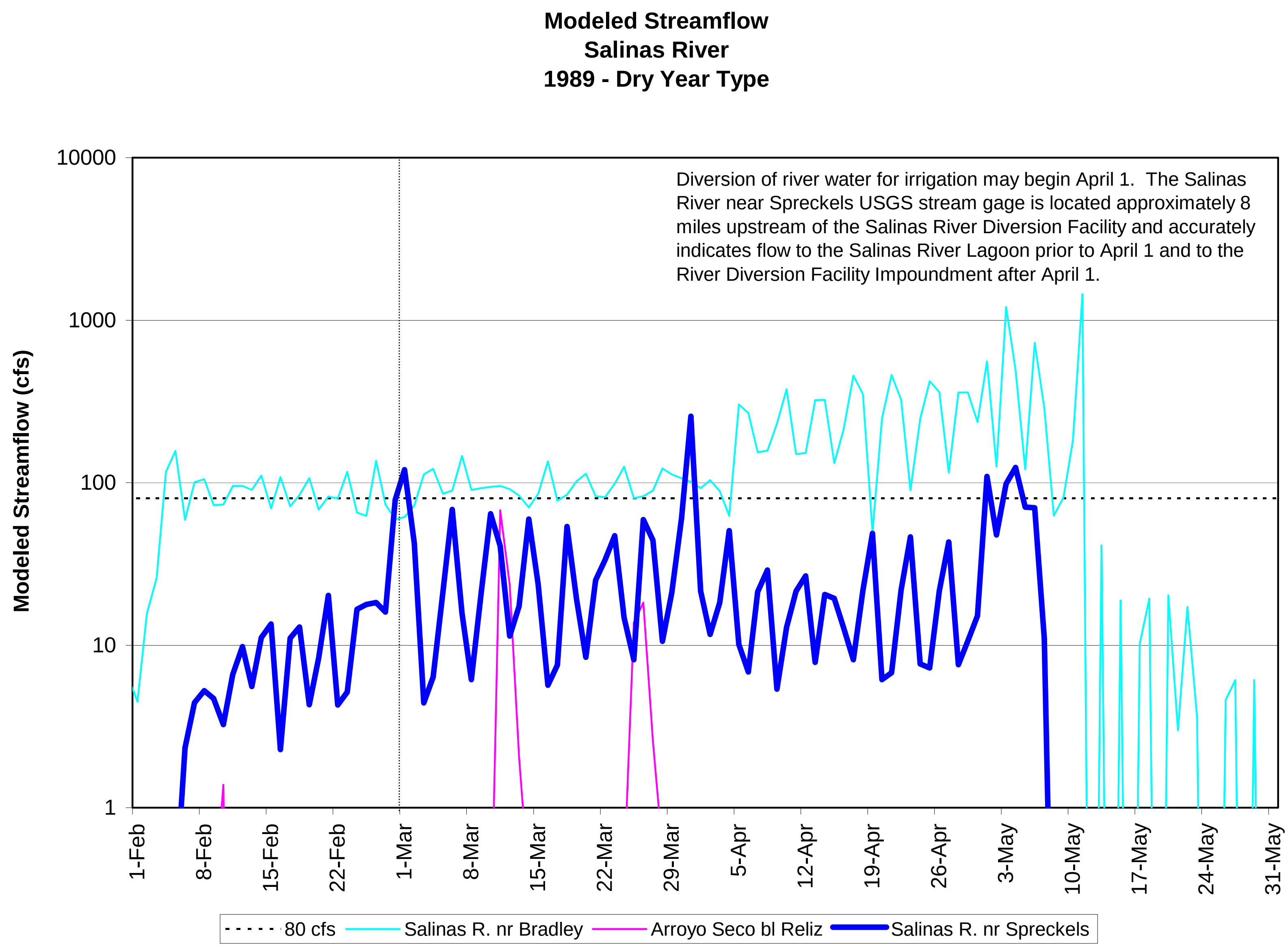


Figure C-41. Modeled Streamflow Salinas River – 1989 (Dry Year Type)

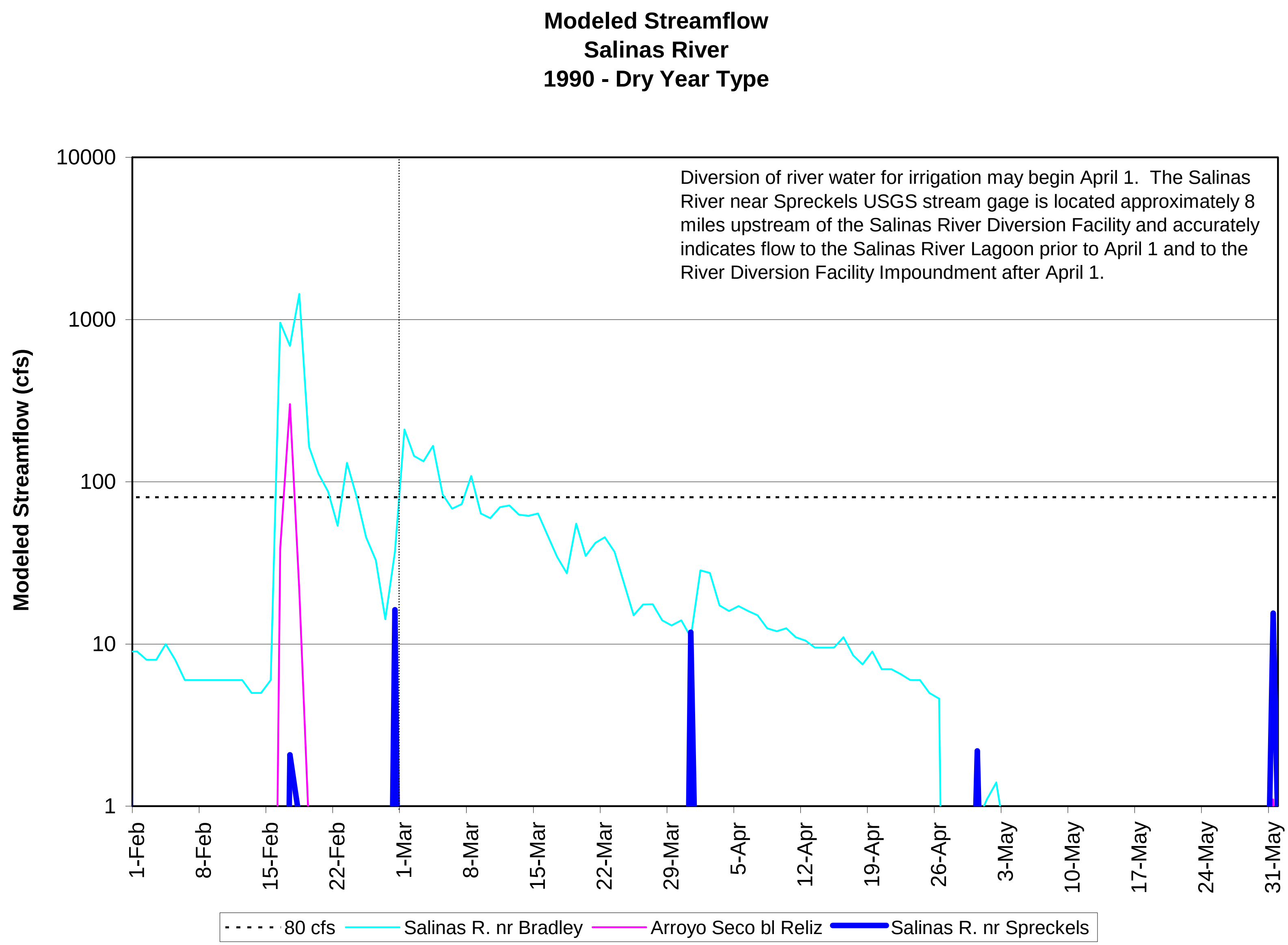


Figure C-42. Modeled Streamflow Salinas River – 1990 (Dry Year Type)

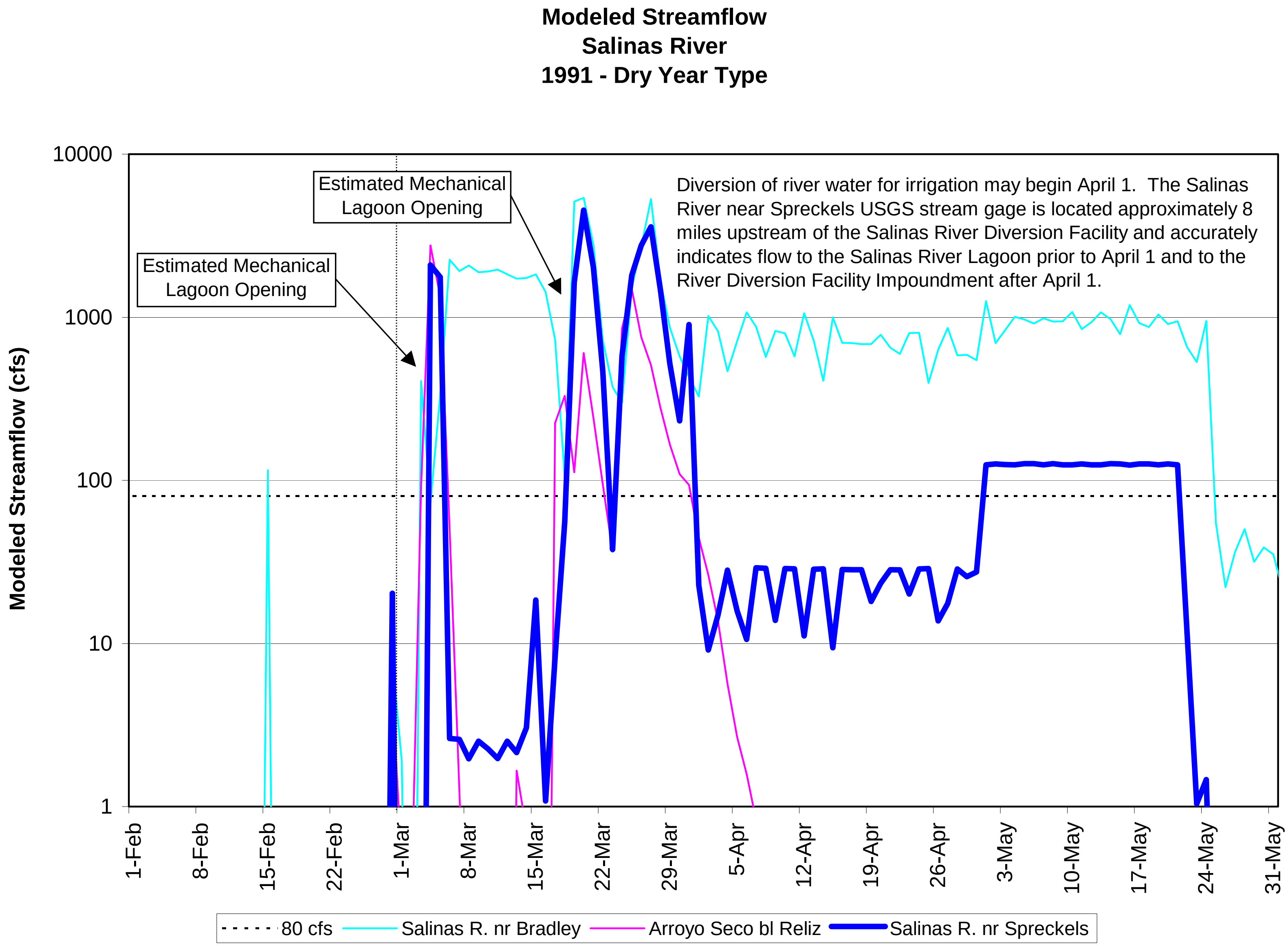


Figure C-43. Modeled Streamflow Salinas River – 1991 (Dry Year Type)

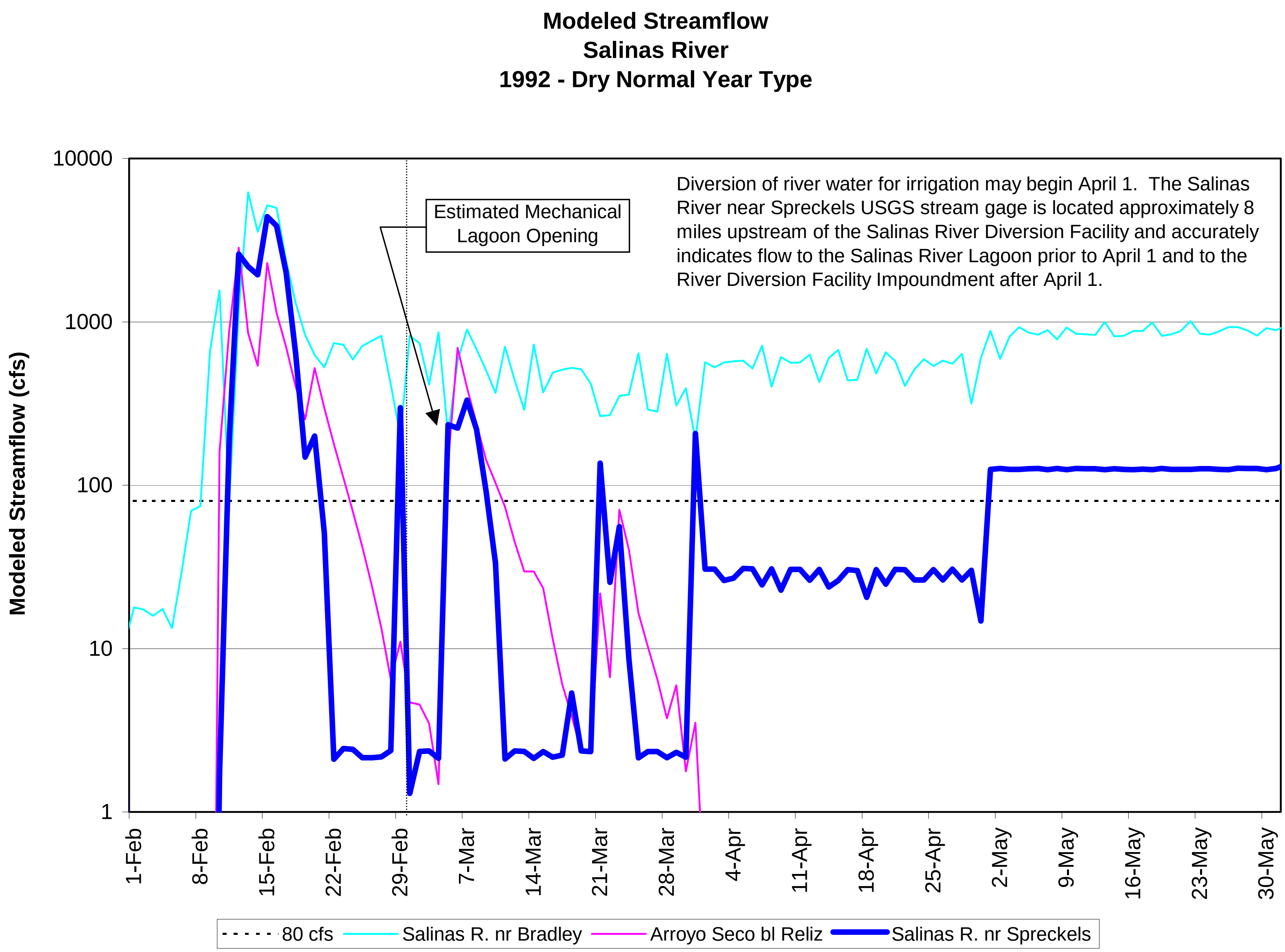


Figure C-44. Modeled Streamflow Salinas River – 1992 (Dry Normal Year Type)

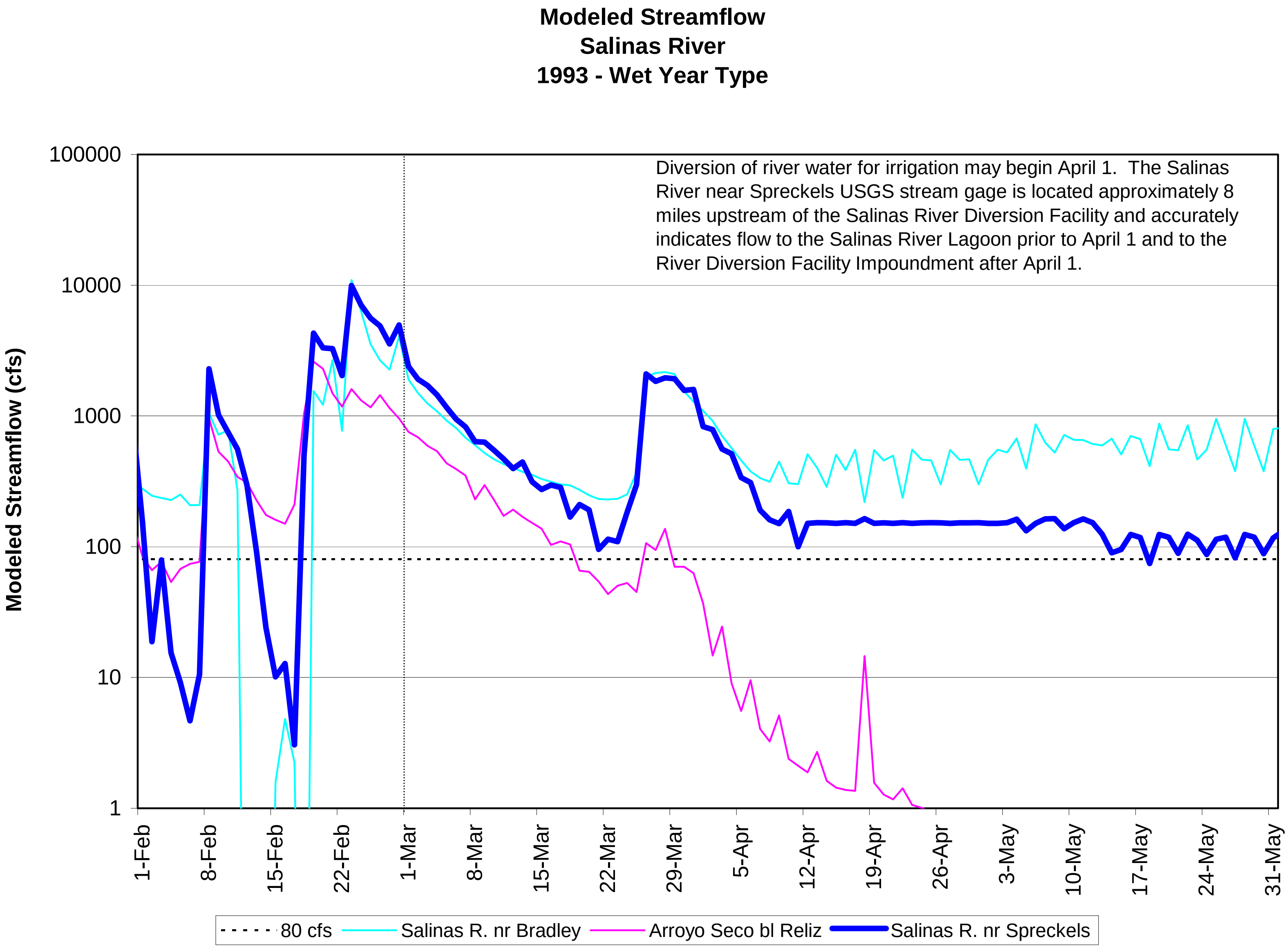


Figure C-45. Modeled Streamflow Salinas River – 1993 (Wet Year Type)

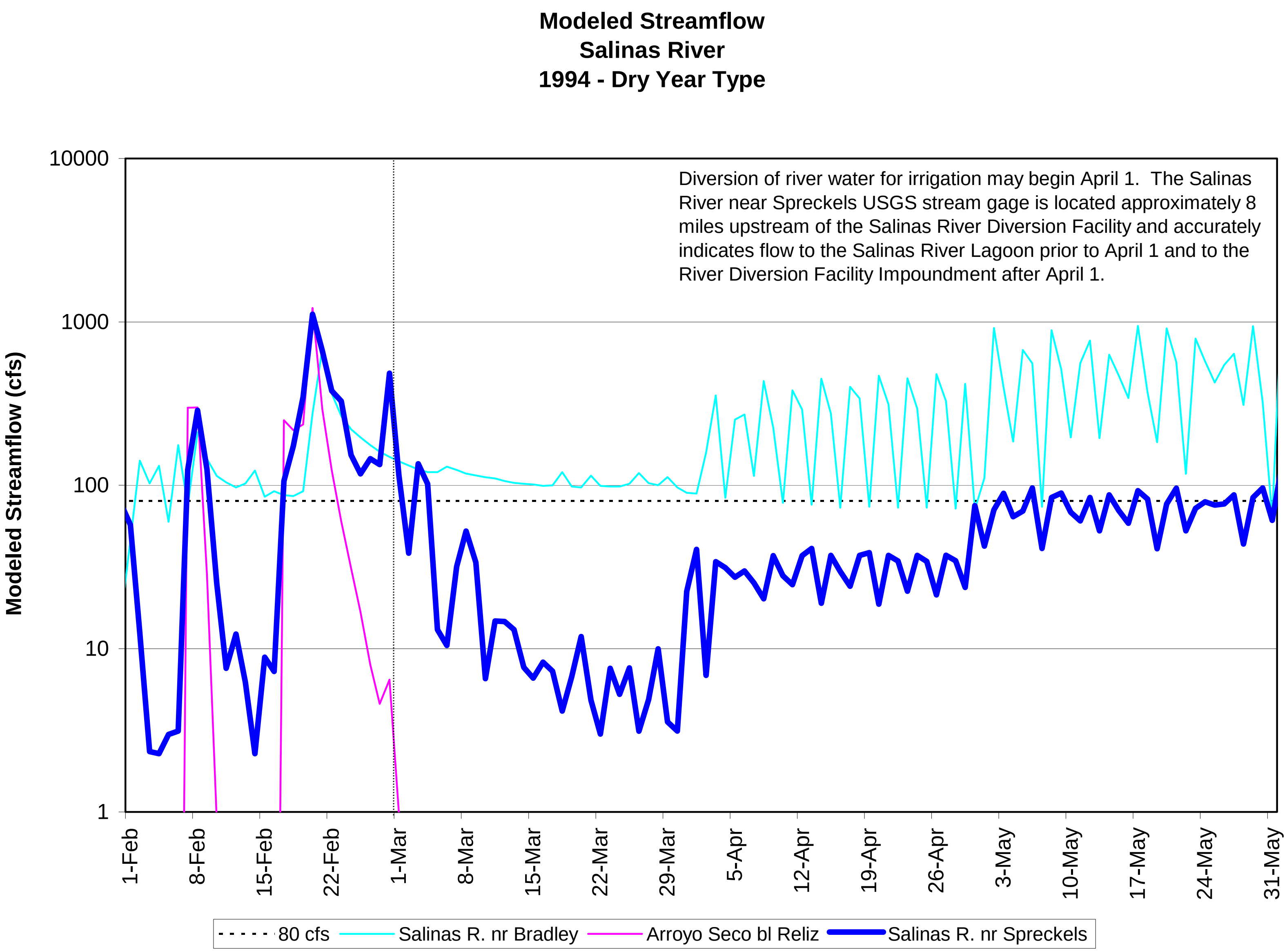


Figure C-46. Modeled Streamflow Salinas River – 1994 (Dry Year Type)

APPENDIX D

Technical Memorandum

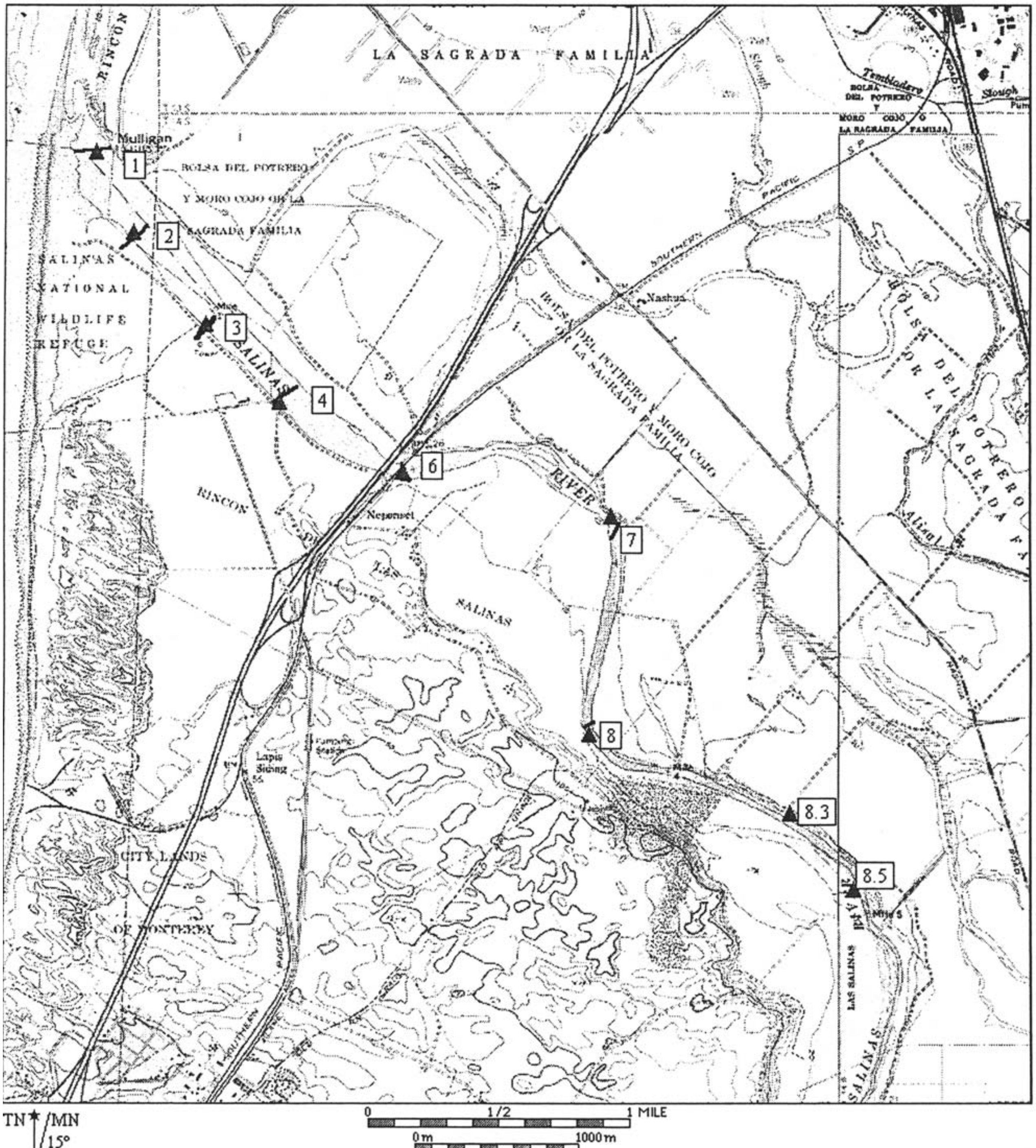
Prepared for: **Monterey County Water Resources Agency**
Prepared by: **Hagar Environmental Science**

Salinas River Lagoon Stage-Volume Relationship

The volume of the Salinas River Lagoon was estimated as a function of lagoon stage from a series of cross-sections measured in October, 1999 (HES 2001). The location of transects is shown in Figure 1. Cross sections were measured at eight locations to provide an indication of channel width and depth conditions throughout the lagoon and were selected to coincide as closely as possible with measurements taken in 1991 as presented in the Salinas River Lagoon Management Plan Administrative Draft (Habitat Restoration Group et al. 1991). Two stage/volume functions were developed, one for the part of the lagoon extending upstream from the mouth to approximately mile 4.3, near the location of the proposed SVWP diversion dam; the other extending upstream to mile 3.3 which is comparable to data reported by Habitat Restoration Group et al. (1991). Lagoon stage and volume estimates are presented in Table 1 and Figures 2 and 3.

Table 1 Salinas River Lagoon stage volume relationship

Stage (ft)	LagoonVolume (AF) from mouth upstream 4.3miles	LagoonVolume (AF) from mouth upstream3.3 miles
-3.0	0.2	0.2
-2.5	2.6	1.9
-2.0	13.7	12.0
-1.5	34.0	30.8
-1.0	67.7	62.7
-0.5	116.1	108.8
0.0	173.1	163.1
0.5	240.7	227.1
1.0	318.8	300.2
1.5	403.4	379.4
2.0	492.4	461.4
2.5	584.8	546.2
3.0	679.7	633.0
3.5	777.7	722.2
4.0	878.3	813.2
4.5	981.8	905.7
5.0	1086.9	998.9
5.5	1193.7	1092.9
6.0	1301.9	1188.2



Printed from TOPO! ©1999 Wildflower Productions (www.topo.com)

Figure 1. Lower Salinas River Lagoon Cross-Section Locations

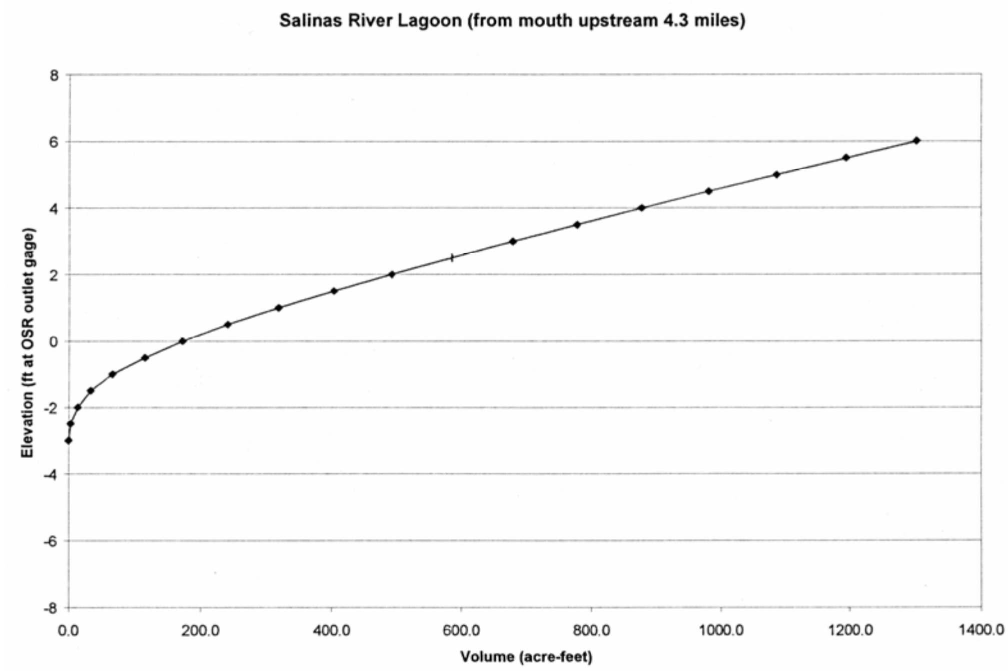


Figure 2. Salinas River Lagoon volume from mouth upstream 4.3 miles

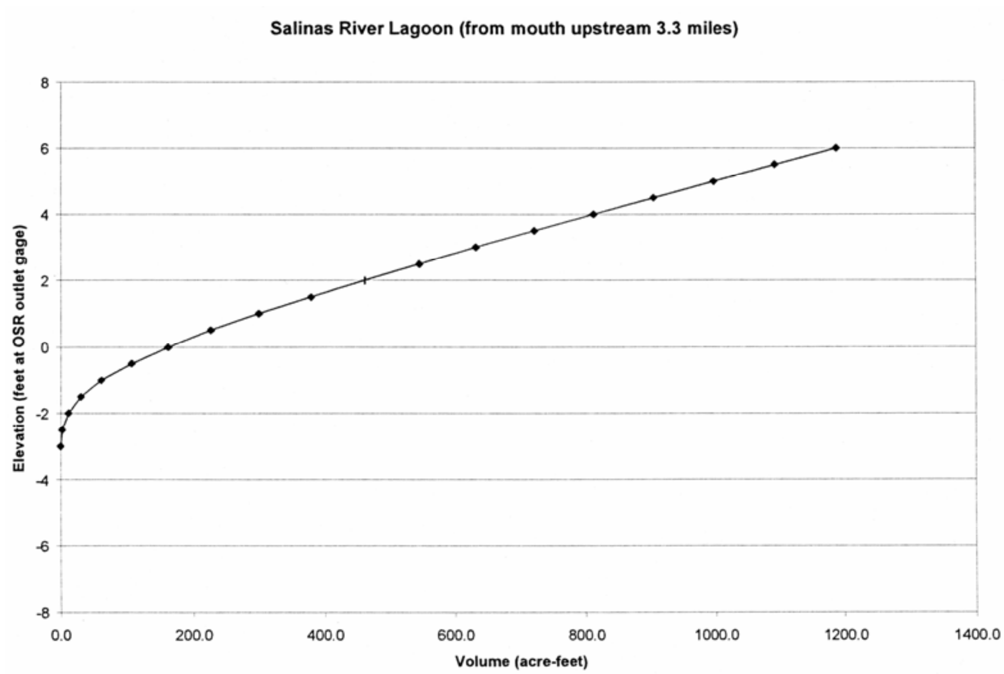


Figure 3. Salinas River Lagoon volume from mouth upstream 3.3 miles

Literature Cited

Habitat Restoration Group, Philip Williams and Associates, Wetlands Research Associates, and MCWRA Staff, 1991. *Administrative Draft Salinas River Lagoon Management and Enhancement Plan*. Prepared for The Salinas River Lagoon Task Force and Monterey County Water Resources Agency, June 19, 1991.

Hagar Environmental Science. 2001. Salinas River Lagoon Water Quality and Fish Populations, Appendix C-3 of the Draft Environmental Impact Report/Environmental Impact Statement for the Salinas Valley Water Project. SCH# 2000034007. Monterey County Water Resources Agency (MCWRA), Salinas, California.

ERRATA

MONTEREY COUNTY

WATER RESOURCES AGENCY

PO BOX 930
SALINAS, CA 93902
(831) 755-4860
FAX (831) 424-7935

CURTIS V. WEEKS
GENERAL MANAGER

STREET ADDRESS
893 BLANCO CIRCLE
SALINAS, CA 93901-4455

November 8, 2005

Mr. Dick Butler
National Marine Fisheries Service
777 Sonoma Avenue, Room 324
Santa Rosa, CA 95404

RE: Errata to the Salinas Valley Water Project Flow Prescription for Steelhead Trout in the Salinas River

Dear Mr. Butler:

You have received the *Supplement to the Biological Assessment for the Salinas Valley Water Project, Salinas River, CA* and the *Salinas Valley Water Project Flow Prescription for Steelhead Trout in the Salinas River* submitted with cover letter dated October 11, 2005. Discussions with your staff subsequent to submittal of those documents revealed that a few corrections and clarifications to the *Flow Prescription* are necessary. Accordingly, errata to the *Salinas Valley Water Project Flow Prescription for Steelhead Trout in the Salinas River* are attached.

Sincerely,

Chris Moss, P.E.
Associate Water Resources Engineer

Enclosure

cc: Curtis Weeks, Bill Phillips, Bob Meyer, Lauran Howard, Rob Johnson, Howard Franklin, MCWRA
Jeff Hagar, Hagar Environmental Science
Lyndel Melton, RMC

November 8, 2005

Errata to

Salinas Valley Water Project
Flow Prescription
for Steelhead Trout in the Salinas River

dated October 11, 2005

- Page 13 – Smolt Outmigration: Attached is a corrected Figure 4 – Smolt Outmigration Block-Flow Action Flow Chart.

- Page 14 – Juvenile Passage to Lagoon, and
  Page 17 – Salinas River Lagoon: The indented paragraph on Pages 14 and 17 is corrected to read:

  > For the period of April 1 through June 30, if an engineered block flow does not occur and the lagoon is open to the ocean, 45 cfs will flow to the lagoon for 10 days or until the lagoon closes to the ocean, whichever occurs first, and 15 cfs will flow to the lagoon thereafter through June 30. If an engineered block flow does occur, a flow of 15 cfs will be maintained to the lagoon for the period after the post-block flow 45 cfs ceases through June 30. (See Smolt Outmigration for further description of these fows.) The 45 cfs is to provide flow for kelts (adult steelhead returning to the ocean), post-block flow and non-block flow smolts to reach the ocean. The 15 cfs is to provide flow for juveniles to enter the lagoon.

- Page 15 – Juvenile Passage to Lagoon: Attached is a corrected Figure 5 – Juvenile Downstream Passage Action Flow Chart.

- Page 21 – Salinas River Lagoon: Add the following sentence to the end of the first paragraph in the section <u>Time Duration for Lagoon Opening to the Ocean</u>:

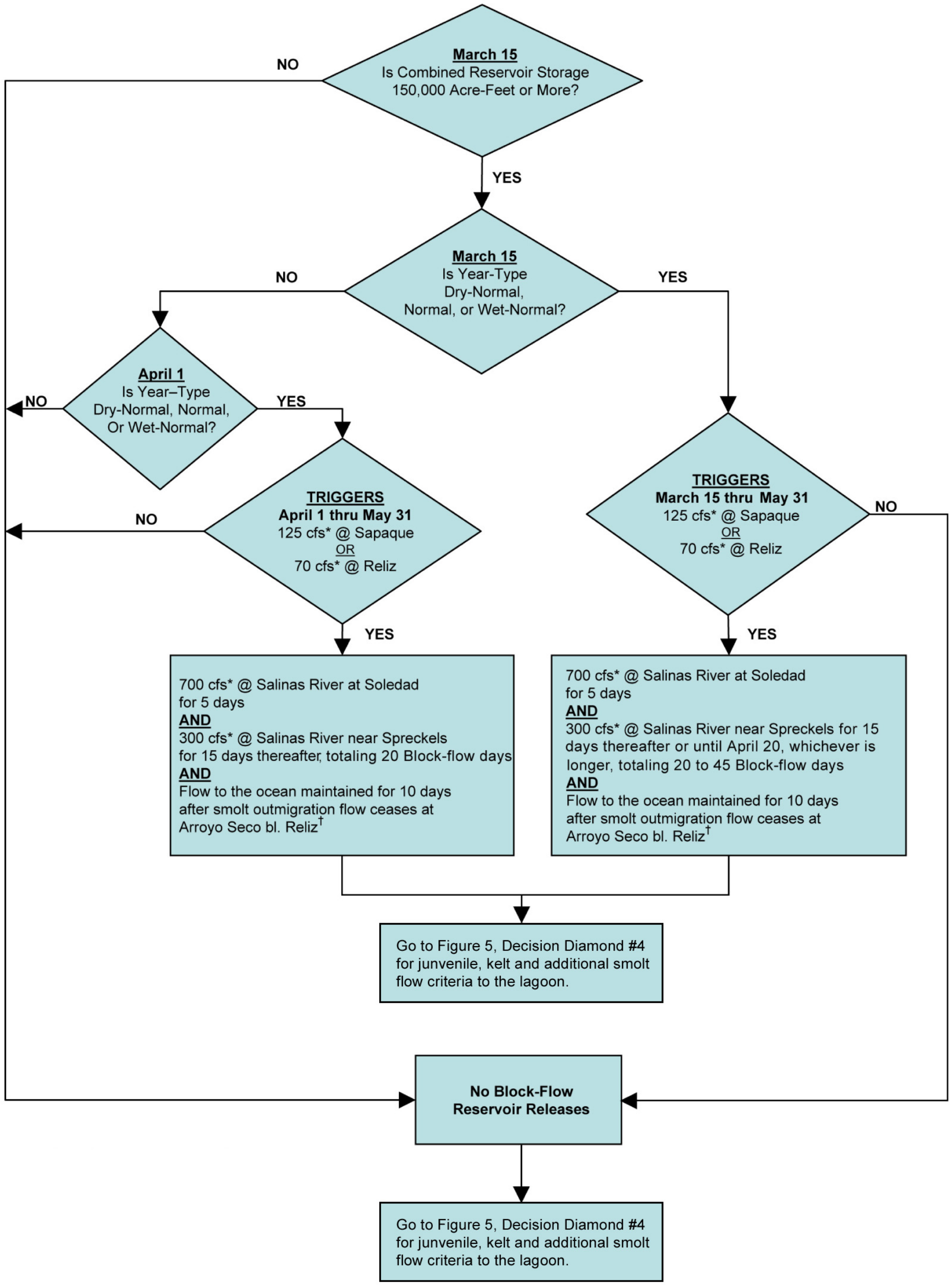
  > When mechanical opening of the lagoon is imminent, the OSR slide gate is operated in accordance with Action #4 described in Table 6.

- Page 26 – Blanco Drain: The chemical mass per unit solute in the last sentence of the paragraph titled <u>Timeline for Success</u> should be nanogram per liter (ng/l). The corrected sentence is:

  > Diazinon CMC is 80 ng/l, CCC is 50 ng/l; Chlorpyrifos CMC is 20 ng/l, CCC is 14 ng/l (NMFS, 2005).

- Page 37 – Monitoring Plan: In paragraph g. <u>Fall Impoundment Fish Survey</u>, delete the sentence under the last bullet beginning “The Fall Lagoon Fish Survey will be performed prior to…” The Monitoring Plan does not include a Fall Lagoon Fish Survey. That sentence was erroneously included and does not apply.

- Page 39 – Monitoring Plan: In the section titled <u>Take Minimization Measures</u>, delete all text of the first bullet on page 39 beginning “Due caution…” That text was erroneously included and does not apply.



*USGS Provisional Mean Daily Flow
†1 cfs USGS Provisional Mean Daily Flow at Arroyo Seco bl. Reliz stream gage will be used until further study indicates otherwise.

Figure 4. Smolt Outmigration Block Flow Action Flow Chart

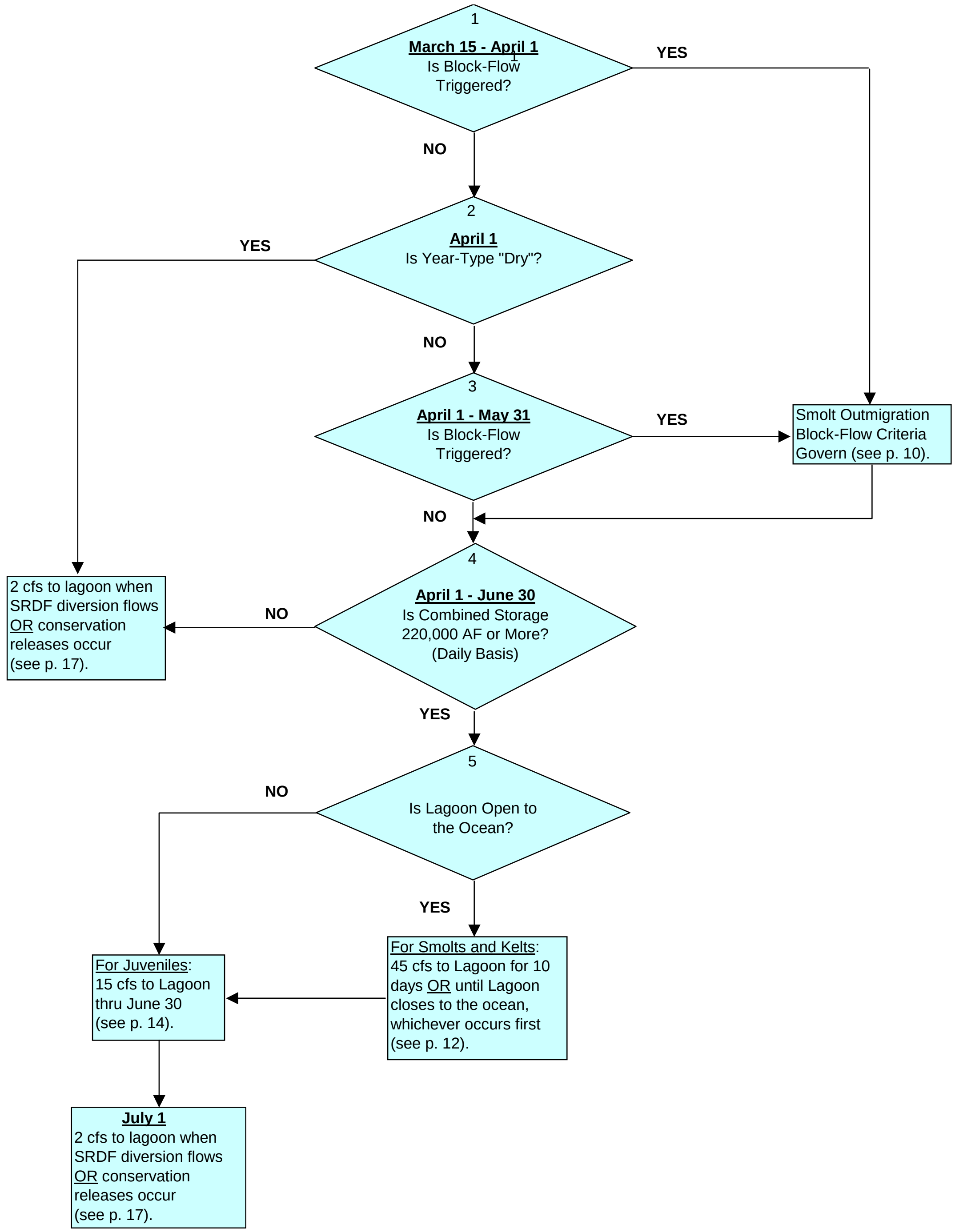


Figure 5. Juvenile Downstream Passage Action Flow Chart

MONTEREY COUNTY

WATER RESOURCES AGENCY

PO BOX 930
SALINAS, CA 93902
(831) 755-4860
FAX (831) 424-7935

CURTIS V. WEEKS
GENERAL MANAGER

STREET ADDRESS
893 BLANCO CIRCLE
SALINAS, CA 93901-4455

December 19, 2005

Mr. Dick Butler
National Marine Fisheries Service
777 Sonoma Avenue, Room 325
Santa Rosa, CA 95404-6528

RE: <u>Errata to the Salinas Valley Water Project Flow Prescription for Steelhead Trout in the Salinas River</u>

Dear Mr. Butler,

This letter is in response to a phone call from Joyce Ambrosius on December 15, 2005 requesting information concerning sandbar management at the Salinas River Lagoon.

Insert the following paragraph as the third paragraph under the heading <u>Mechanical Salinas River Lagoon Sandbar Opening Procedure</u> on page 22 of the *Salinas Valley Water Project Flow Prescription for Steelhead Trout in the Salinas River,* dated October 11, 2005.

> First consideration for sandbar management at the Salinas River Lagoon is safety to crewmembers during actual work on the sandbar. The precise location of lagoon opening will be selected and adaptively managed based on actual hydrologic and working conditions encountered at the site. However, it is anticipated that under most conditions selection of the lagoon opening location will occur as follows: Generally, mechanical lagoon opening to the ocean will be initiated from the lagoon side moving toward the ocean. The alignment of the mechanically opened path will generally be an extension of the alignment of the Salinas River channel directly to the ocean. This alignment generally intersects the ocean water line at an angle of approximately 30 to 45 degrees as shown on Figure S-12 of the *Supplement to the Biological Assessment for the Salinas Valley Water Project Salinas River, CA,* dated October 11, 2005.

Sincerely,

Chris Moss P.E.
Associate Water Resources Engineer

cc: Curtis Weeks, Bill Phillips, Bob Meyer, Rob Johnson, Howard Franklin, MCWRA
Jeff Hagar, Hagar Environmental Science

MONTEREY COUNTY

WATER RESOURCES AGENCY

PO BOX 930
SALINAS, CA 93902
(831) 755-4860
FAX (831) 424-7935

CURTIS V. WEEKS
GENERAL MANAGER

STREET ADDRESS
893 BLANCO CIRCLE
SALINAS, CA 93901-4455

January 27, 2006

Mr. Dick Butler
National Marine Fisheries Service
777 Sonoma Avenue, Room 325
Santa Rosa, CA 95404-6528

RE: Errata to the Salinas Valley Water Project Flow Prescription for Steelhead Trout in the Salinas River

Dear Mr. Butler,

In response to recent emails and discussions with your staff requesting information regarding Blanco Drain and flows to the Salinas River Lagoon, *Errata to the Salinas Valley Water Project Flow Prescription for Steelhead Trout in the Salinas River*, dated January 27, 2006, is enclosed.

Sincerely,

Chris Moss P.E.
Associate Water Resources Engineer

cc: Curtis Weeks, Bill Phillips, Bob Meyer, Rob Johnson, Howard Franklin, MCWRA
Jeff Hagar, Hagar Environmental Science

Errata to

Salinas Valley Water Project Flow Prescription For Steelhead Trout in the Salinas River

Dated October 11, 2005

- Page 17 – Salinas River Lagoon: Insert the following section after the last sentence in the section titled Lagoon Maintenance Inflows.

Post-Irrigation Diversion Season Lagoon Maintenance Inflow

At the end of the irrigation diversion season, the SRDF impoundment will be filled to its storage capacity of approximately 108 AF of river water. From the time that irrigation diversion is completed for the season, water will be allowed to pass from the full SRDF impoundment to the lagoon at a rate of 2 cfs until the impoundment is effectively emptied. A 2 cfs rate of flow from the 108 AF capacity impoundment is expected to occur for a duration of approximately 27 days. In no case will SRDF impounded water be stored for more than 29 days.

MCWRA reserves the right to empty the SRDF impoundment during this 27 day period of 2 cfs flow to the lagoon after the irrigation diversion season, if necessary to capture a period of time suitable to perform facility maintenance before river flows prevent such maintenance work. For example, the fish screens on the SRDF intake structure will likely require seasonal removal to prevent damage from high winter flows. If rains and river flows are forecasted during or immediately after the 2 cfs end-of-season flows to the lagoon, MCWRA may empty the SRDF impoundment for removal of fish screens before the 27 day period is up.

An analysis of flow in the Salinas River near Spreckels for the month of November for the years 1929 through 1956, the period of available USGS record prior to operation of Nacimiento Dam, shows that mean daily flow of 10 cfs was exceeded approximately 35 percent of the time, and 20 cfs was exceeded approximately three (3) percent of the time. It is anticipated that a flow of 10 to 20 cfs through the SRDF impoundment will not interfere with SRDF end-of-season maintenance work. Therefore the frequency of occurrence of the above maintenance exception appears to be small.

- Page 25 - Blanco Drain: Replace Table 7 with the table below:

Table 7. Blanco Drain Discharge Contaminant Load Reduction Work Plan Outline

Phase	Description	Estimated Duration
Preliminary Design	Identify resources and develop needed expertise. Identify preliminary design parameters specific to Blanco Drain, design preliminary vegetated treatment system and define preliminary monitoring plan.	Final Design will be completed prior to SRDF construction
Site Identification	Identify specific site(s) and landowner(s) most feasible/amenable to installation and operation of vegetated treatment system. Complete access, construction, maintenance and monitoring agreement(s), as needed.	
Final Design	Adapt design and monitoring plan to site specific needs, finalize system design.	
Construction	Construct vegetated treatment system.	2 months
Vegetation Establishment	A vegetation establishment period will be required prior to reaching maximum contaminant retention performance.	3 years
Maintenance	Perform necessary maintenance of vegetated treatment system for maximum feasible contaminant reduction in discharged water, including pre- and post-winter storm maintenance.	Periodic
Monitoring	Monitoring will be performed to establish the effectiveness of the treatment system to reduce contaminant load in water discharged to the river. A monitoring plan will be developed to include monitored location(s), parameters, frequency, field and laboratory protocols.	Periodic
Reporting	Report monitoring results and effectiveness of vegetated treatment system – to be included in the annual report submitted to NMFS.	Annually
Evaluation and Refinement	Evaluate results and make system revisions, as necessary, to achieve maximum feasible contaminant reduction in discharged water. (Examples of such revisions may be addition of, or change in vegetation species, maintenance techniques, or monitoring methods.)	Periodic

- Page 26 – Blanco Drain: Insert the following section on the bottom of page 26:

Blanco Drain Contaminant Load Reduction in the Absence of Vegetated Treatment

MCWRA will implement a vegetated treatment system for reduction of diazinon and chlorpyrifos loads in Blanco Drain water as described on pages 24, 25 and 26. In the event that it is determined that vegetated treatment is inadequate to reduce diazinon and chlorpyrifos loads from Blanco Drain into the Salinas River Lagoon, then MCWRA will pursue other options to achieve reduction results described in Potential Contaminant Load Reduction on page 26. In the absence of vegetative treatment, options to achieve contaminant load reduction from Blanco Drain discharge to the Lagoon include, but are not limited to, diverting water to the regional wastewater treatment plant for recycling, and diverting Blanco Drain water to Alisal Slough.