

EWA SALMON DECISION PROCESS

**Exhibit
DWR - 3**

EWA Salmon Decision Process

- Salmon Decision Process is a guideline for salmon and water quality protection in the Delta and at the Delta export facilities
- Purpose is to improve documentation, transparency, consistency and objectivity
- Used to help meet ESA and Water Rights regulatory requirements
- Salmon Decision Process is updated continuously with latest data analysis, information and protection needs
- Salmon protection and water quality protection operations frequently opposite

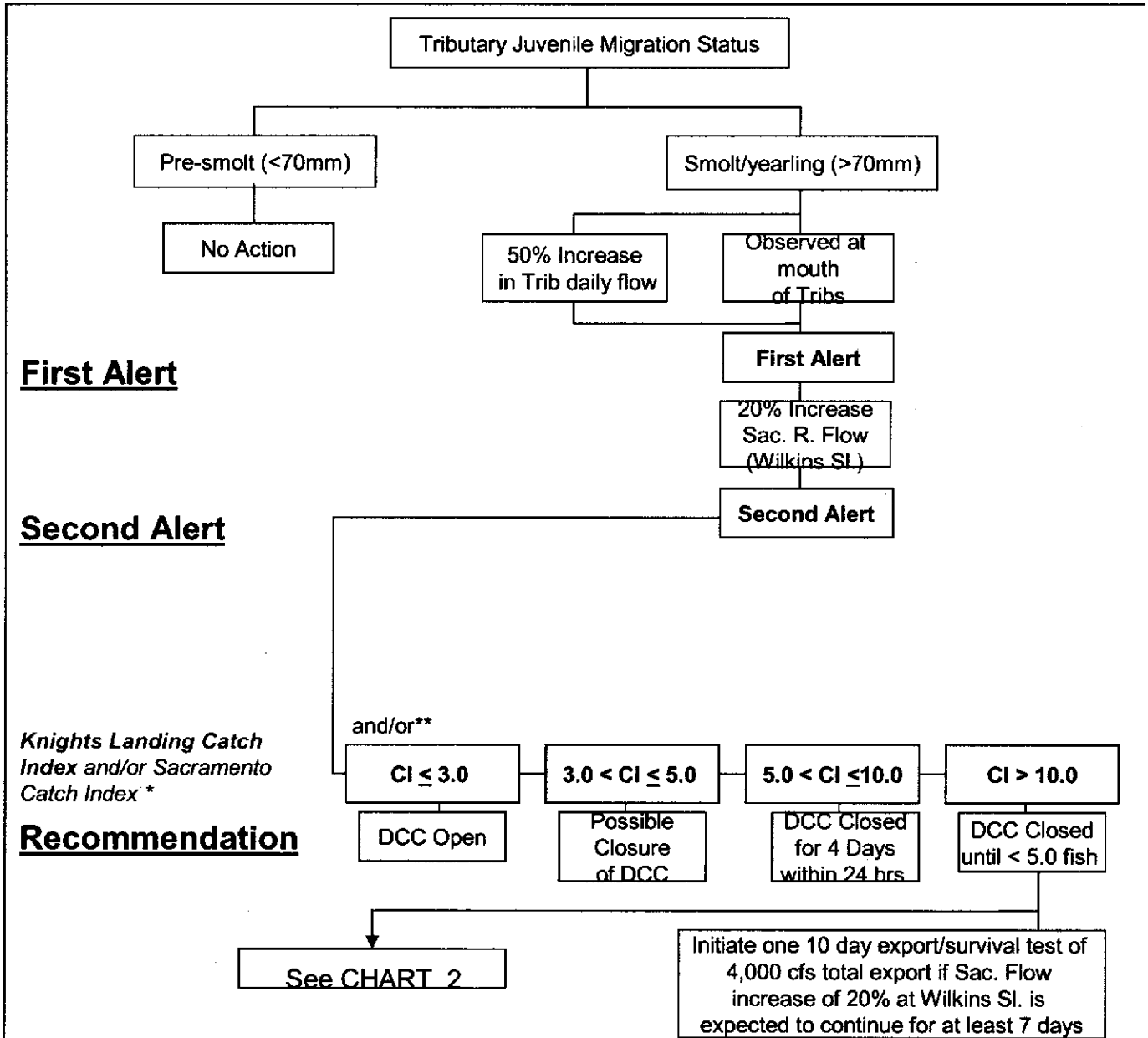
Salmon Decision Process is a guideline for salmon and water quality protection in the Delta and at the Delta export facilities

- Not strict rules due to uncertainty in both fish and water quality protection
- Real-time decisions based on real time monitoring
- Developed by fish management and water project agency staff
 - DFG, USFWS, NOAA, DWR, USBR, EPA
- Upstream, Delta, and Delta export facilities monitoring
 - Fish abundance and distribution
 - Water flow, turbidity, temperature and salinity
- Protection actions are modifying DCC and exports operations

Salmon Decision Process is updated continuously with latest data analysis, information and protection needs

- Updated 3 times since 1999/2000
- Original emphasis Oct – Feb, final expectation, year-round
- 2000/2001 Standardized fish monitoring stations, Knights Landing, E/I ratio, upstream criteria for export reductions
- 2001/2002 Explicit water quality criteria, WOMT, removed upstream criteria for export reductions, "older juveniles" Chinook for multiple runs
- 2002/2003 Annotated decision process
- 2004/2005 Re-defined DCC closure criteria, explicit "Other Quantitative Biological Considerations", Winter Run Juvenile Production Estimate

**Chart 1 - Fall/Winter Juvenile Salmon Decision Process
(Oct 1 - Jan 31) Migration Period**



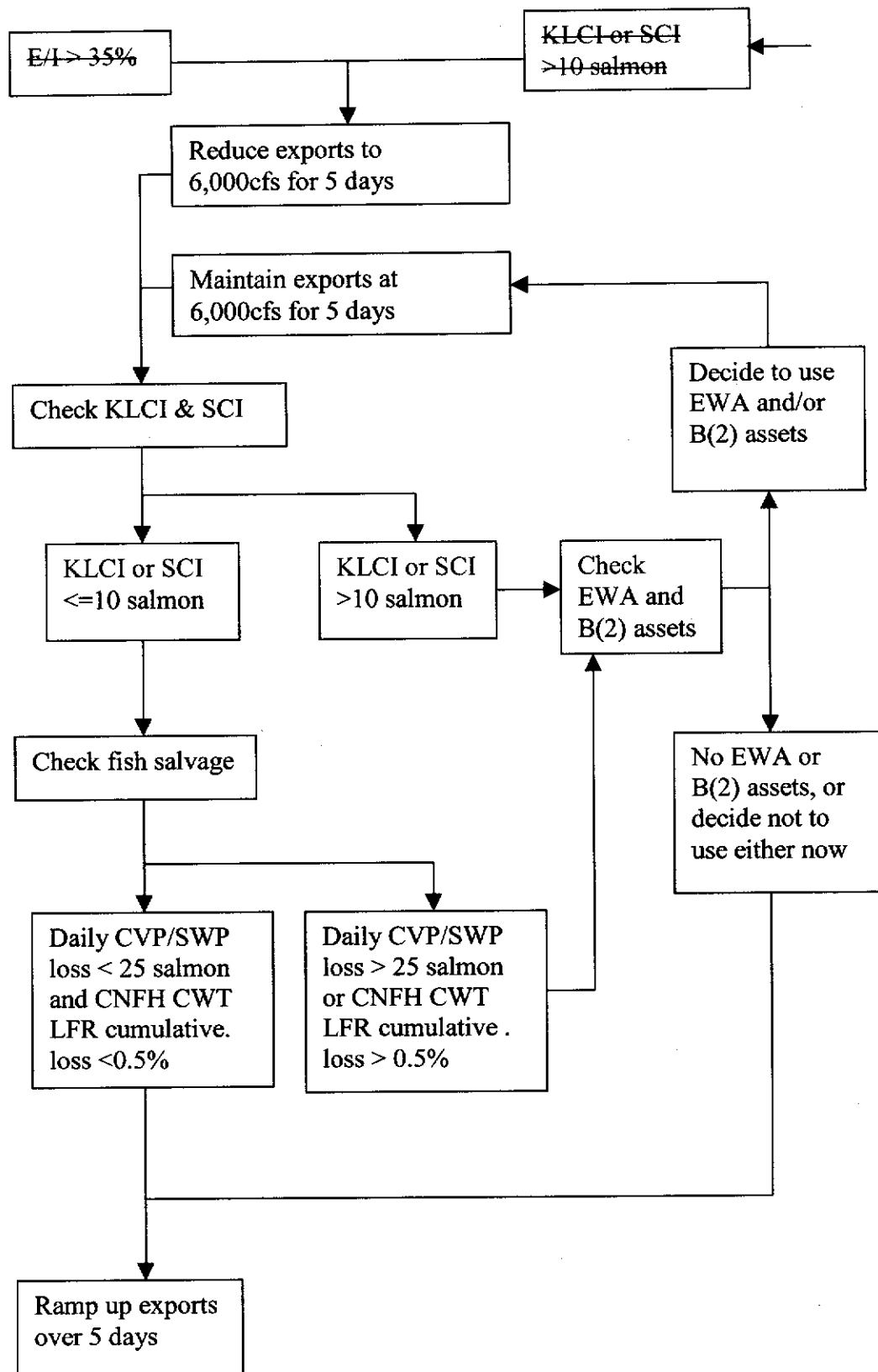
First Alert

Second Alert

*Knights Landing Catch Index and/or Sacramento Catch Index **

Recommendation

**Effort normalized to one 24 hour trap-day for the Knights Landing Catch Index and 10 trawls and 8 beach seine hauls per two-day sampling period in the Sacramento Catch Index.
**Ideally, Knights Landing and Sacramento catches would confirm each other, however, protective criteria may be implemented based on either site.*



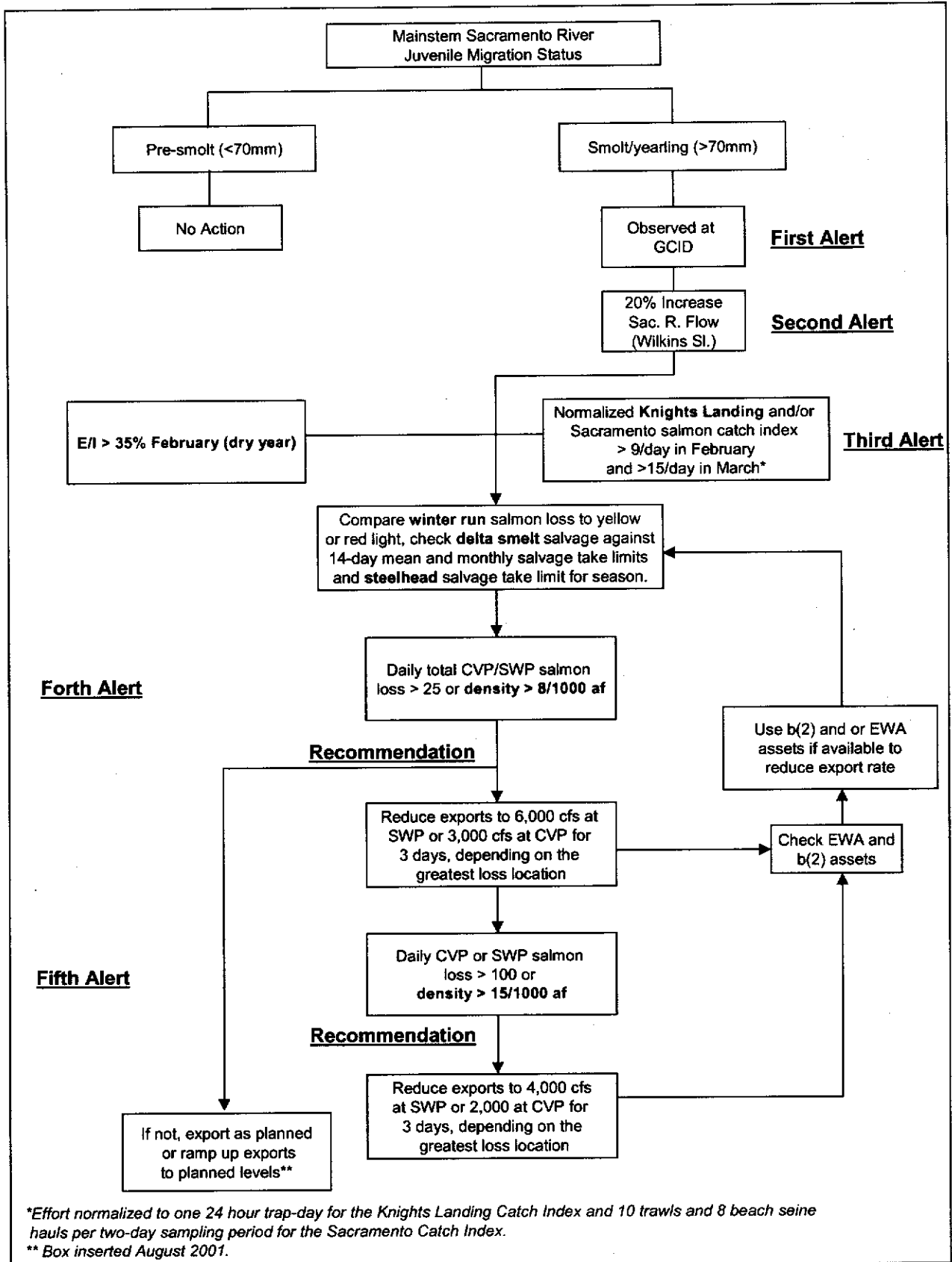
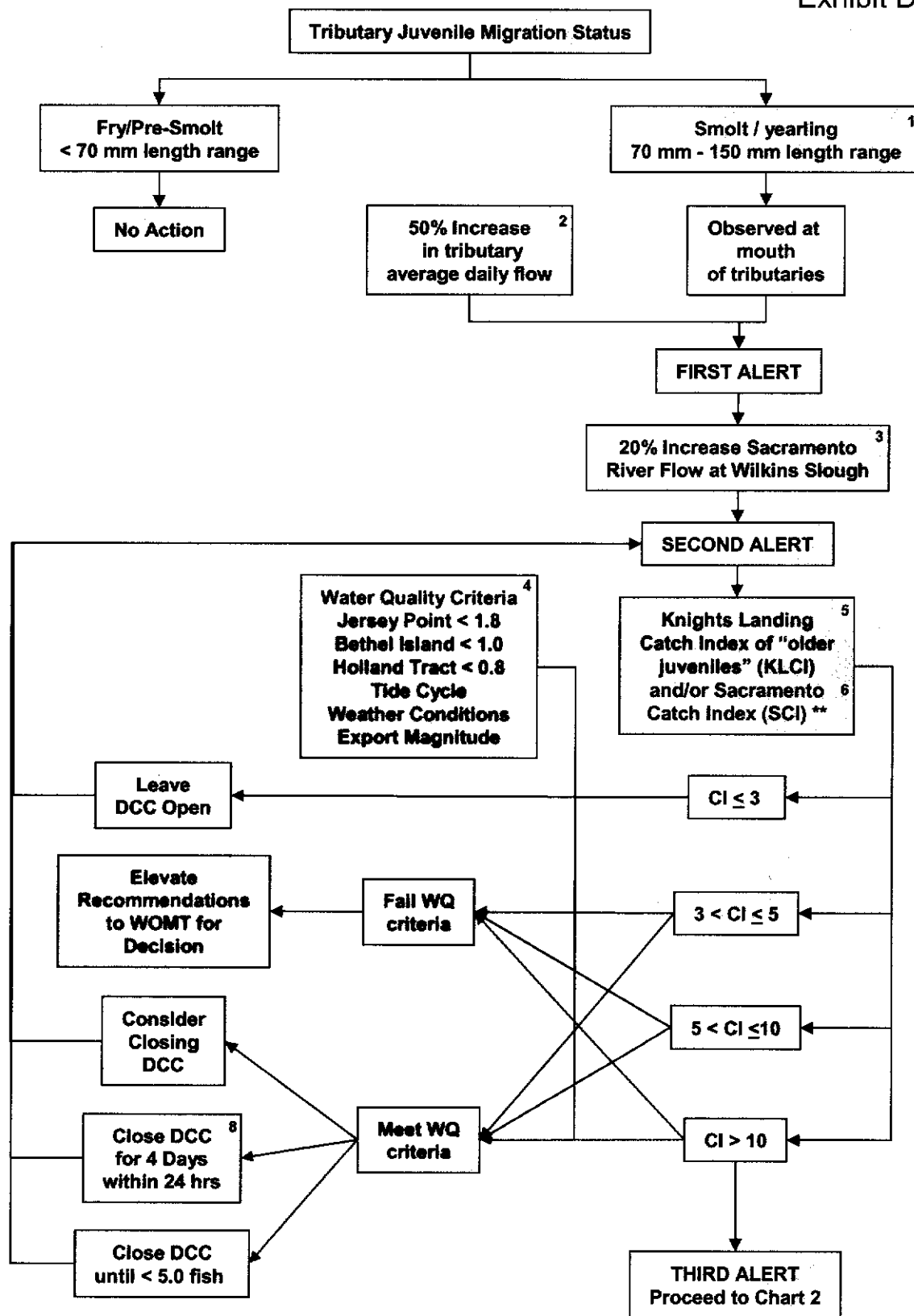
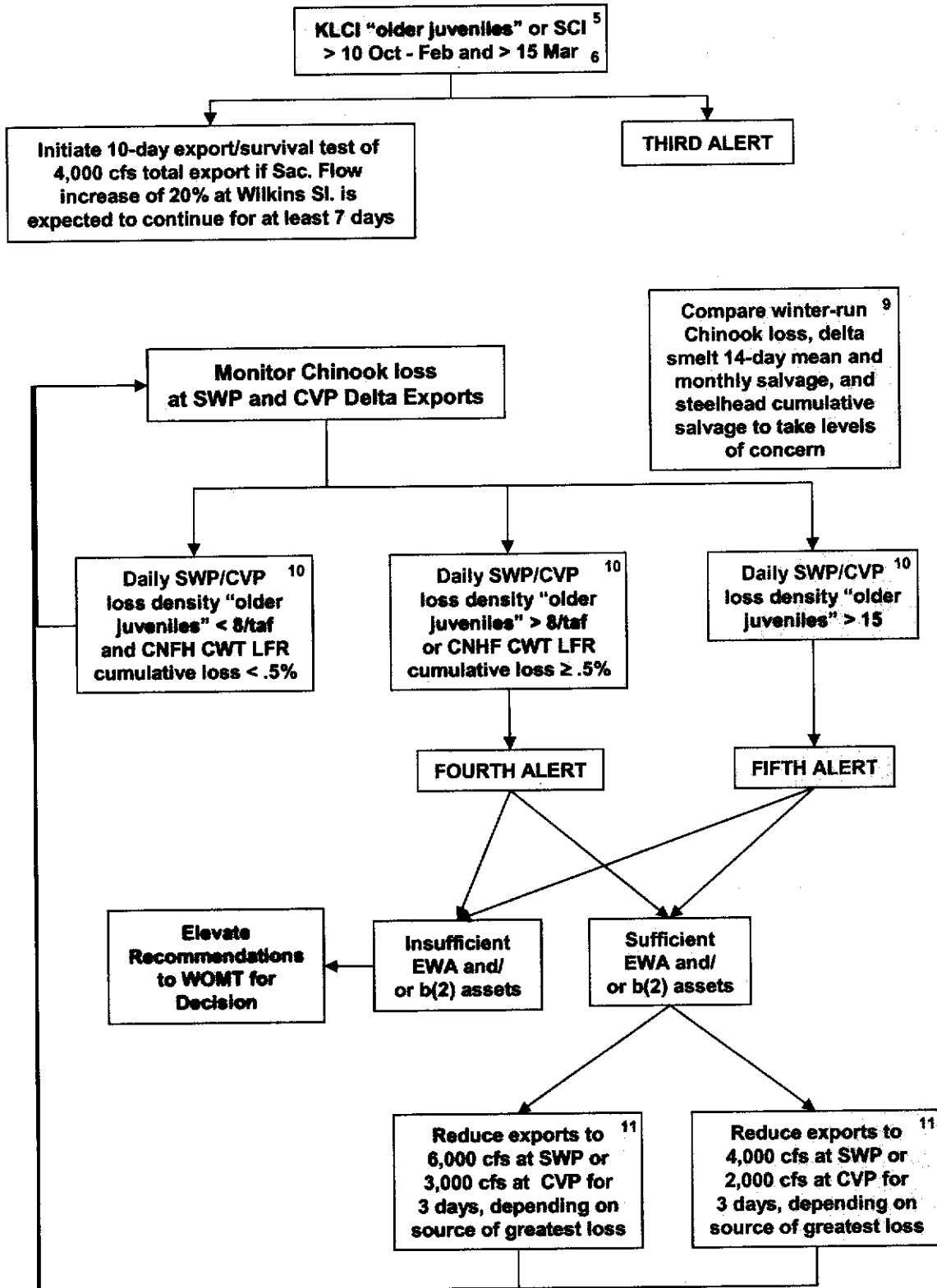


Figure 9. February-March Juvenile Salmon Decision Process (Feb 1 - Mar 31)



2001/2002 Chinook decision process October through March (Chart 1 of 2).



2001/2002 Chinook decision process October through March (Chart 2 of 2).

Annotation - 2003 Salmon Decision Process

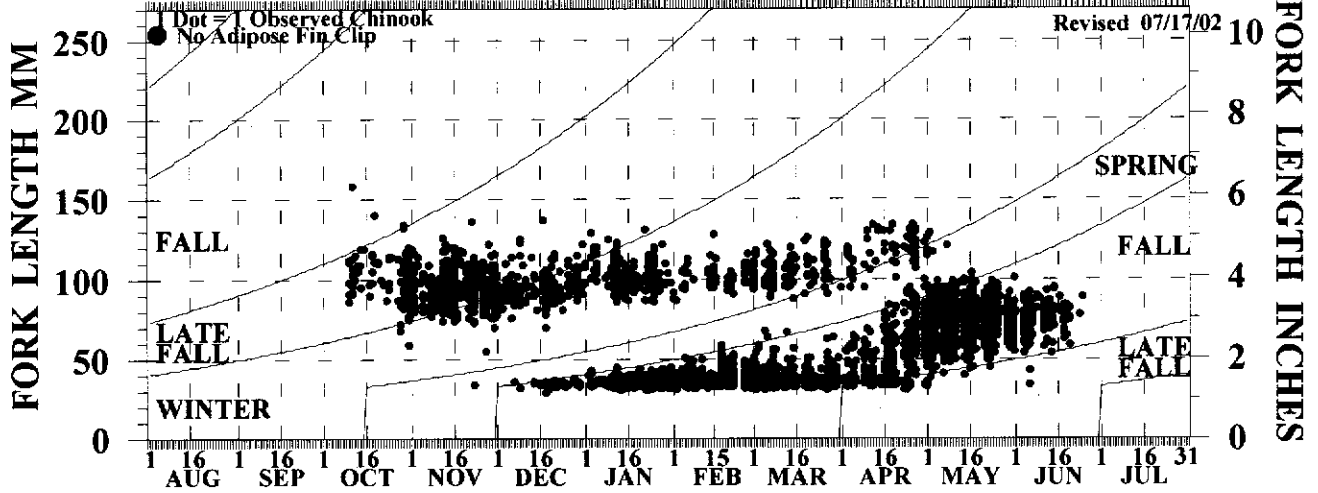
- 1 - Mill, Deer and Butte creeks are the most important populations of spring Chinook today (DFG, ???). DFG operates rotary screw traps near the mouths of these three tributaries to monitor the emigration of spring run yearlings, and later, spring run and fall run fry.
- 2 - Juvenile Chinook in the spring Chinook tributaries less than 70 mm between October and April are fall run or spring run fry or pre-smolts (Figure 1) and not the focus of the Salmon Decision Process actions.
- 3 - Juvenile Chinook in the spring run tributaries greater than 70 mm between October and April are spring run yearlings (Figure 1) and the focus of the Salmon Decision Process actions.
- 4 - Yearling spring run are difficult to trap, due to their low numbers and strong swimming ability, therefore a significant increase in flow is a surrogate for trapping yearling spring run. The first significant flow in October is associated with the beginning of emigration (Figures 2 - 4).
- 5 - Yearling spring run at the mouths of the spring run tributaries are in the Sacramento River and are susceptible to Delta mortality factors associated with the Delta Cross Channel (DCC) and SWP/CVP export operations.
- 6 - The "First Alert" is the early warning criteria for closing the DCC..
- 7 - Wilkins Slough is the flow gage near Knights Landing and about 35 miles upstream of the Delta. A significant flow increase at Wilkins Slough is associated with juvenile emigration past Knights Landing (Figure 5).
- 8 - The "Second Alert" is the warning criteria for closing the DCC. The First and Second alerts are important warning criteria because information and data dissemination, and agency coordination for an action can take several days.
- 9 - Catches Indexes at Knights Landing and/or Sacramento are the criteria upon which the first action is based; closing the Delta Cross Channel Gates (DCC) (Figures 6 and 7). The raw catches are standardized to one day of effort, but do not include catch efficiency. Depending on the catch magnitude, there are several options for closing the DCC, ranging from not closing them, and continuing to monitor catch at KL and/or Sac, to closing them until the catch index decreases to 5 fish per day.
- 10 - Closing the DCC for fish protection can adversely impact Delta salinity from November through January. Without Sacramento River freshwater flowing through the DCC and into the central Delta to the bay, saline ocean water can intrude into the central and southern Delta. Water project operators developed an objective set of water salinity criteria that indicate when the Delta becomes susceptible to salinity intrusion if the DCC is closed and exports are maintained

(from Art).

- 11 - Fish and water salinity needs are frequently mutually exclusive, with respect to the DCC position, from November through January. Under the situation, if the Data Assessment Team (DAT) and Operations and Fish Forum (OFF) can't resolve the contradiction, they elevate it to the Water Operations Management Team (WOMT).
- 12 - The KL and/or Sac catch index of > 10 from November through February, and > 15 from March through April indicates the "Third Alert". A significant number of juvenile Chinook are in the Delta and potentially exposed to the south Delta exports in the following weeks.
- 13 - FWS conducts a juvenile Chinook Delta survival experiment each year in December and January. The goal is to try to determine the relationship between survival, exports and flow. The objective is 10 consecutive days of consistent environmental parameters, exports and inflow. The criteria to achieve the objective is a KL and/or Sac catch index > 10 , and projected Sacramento River flow increased by 20%.
- 14 - Juvenile Chinook loss at the exports is the only export reduction criteria. The two loss criteria are based on non-clipped Chinook loss density (Figure 8), and Coleman late fall hatchery Chinook cumulative loss. Non-clipped Chinook loss density and hatchery Chinook cumulative loss are the "Fourth and Fifth alerts".
- 15 - Fish Management Agencies (MA) determine whether there is sufficient EWA assets to reduce exports. If there are insufficient EWA assets, the MAs elevate the issue to WOMT for resolution.
- 16 - If EWA assets are sufficient, the MAs reduce exports for a number of days and resume monitoring loss.

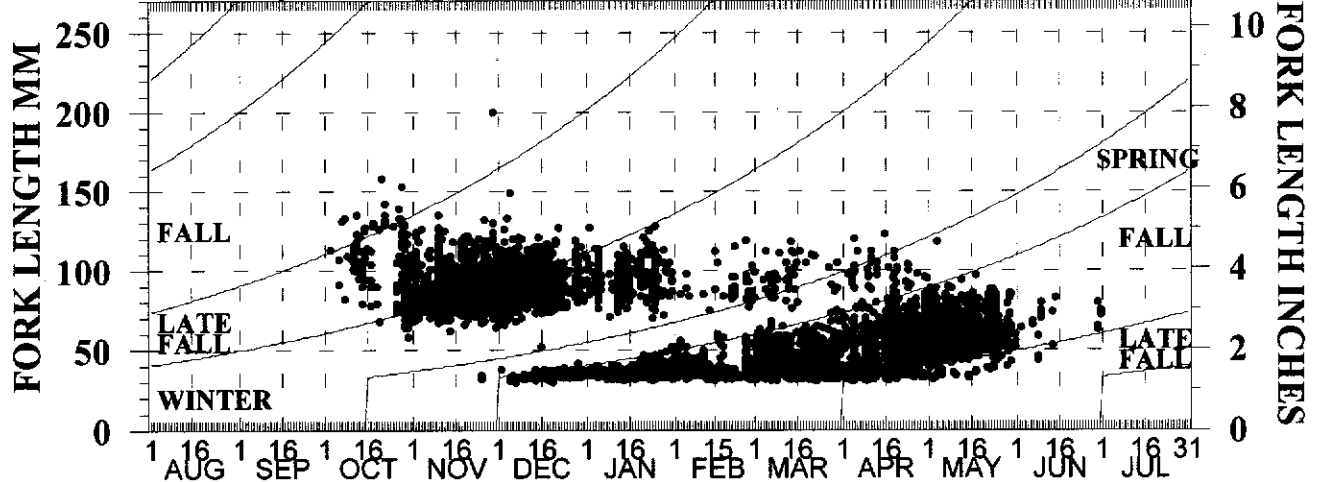
Chinook Recovered In Mill Creek

Rotary Screw Trap 8/1/1995 Through 6/20/2002



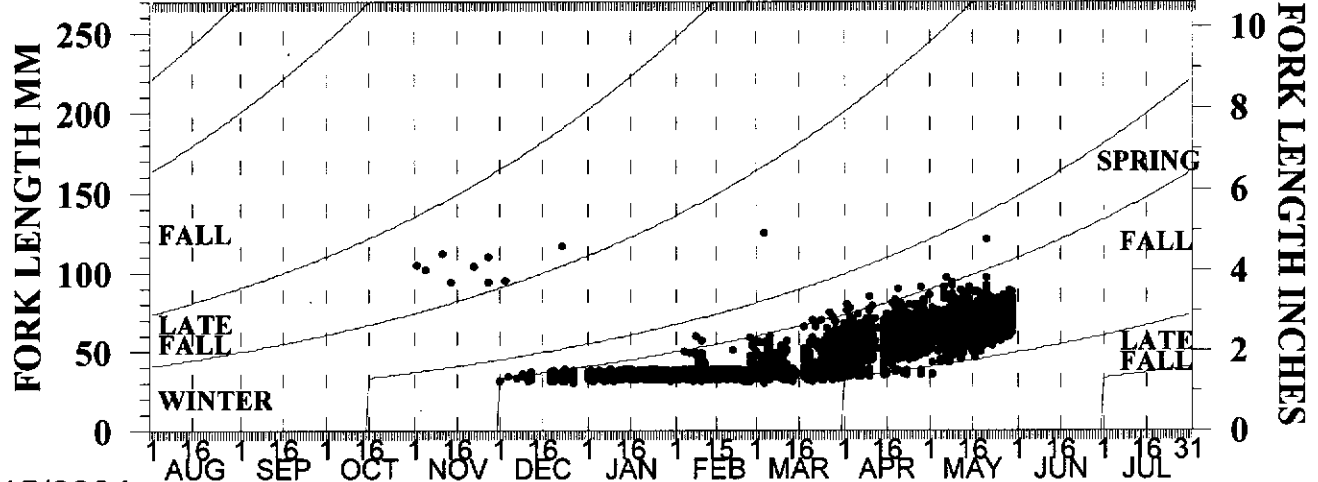
Chinook Recovered In Deer Creek

Rotary Screw Trap 8/1/1995 Through 5/30/2002

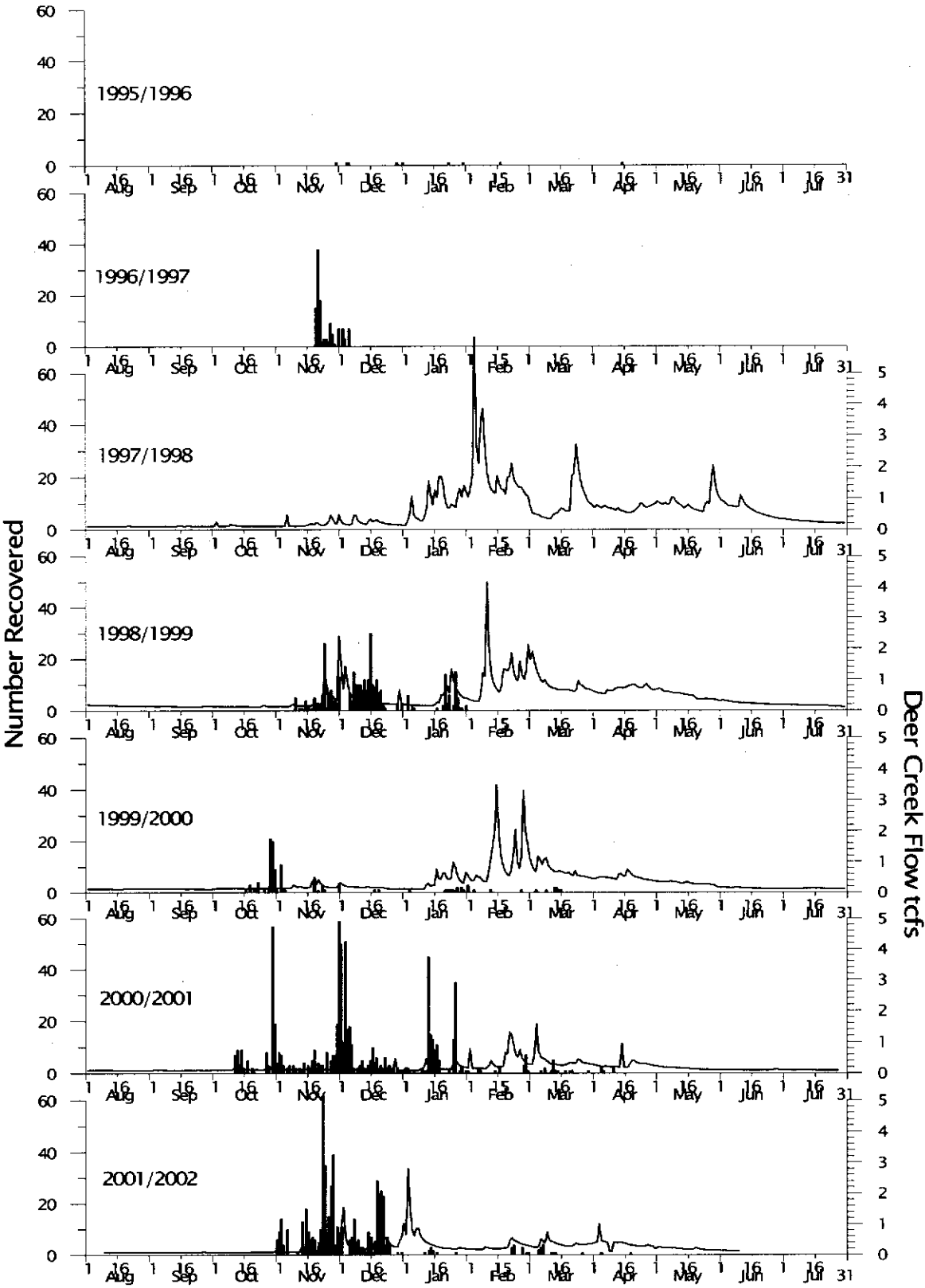


Chinook Recovered In Butte Creek

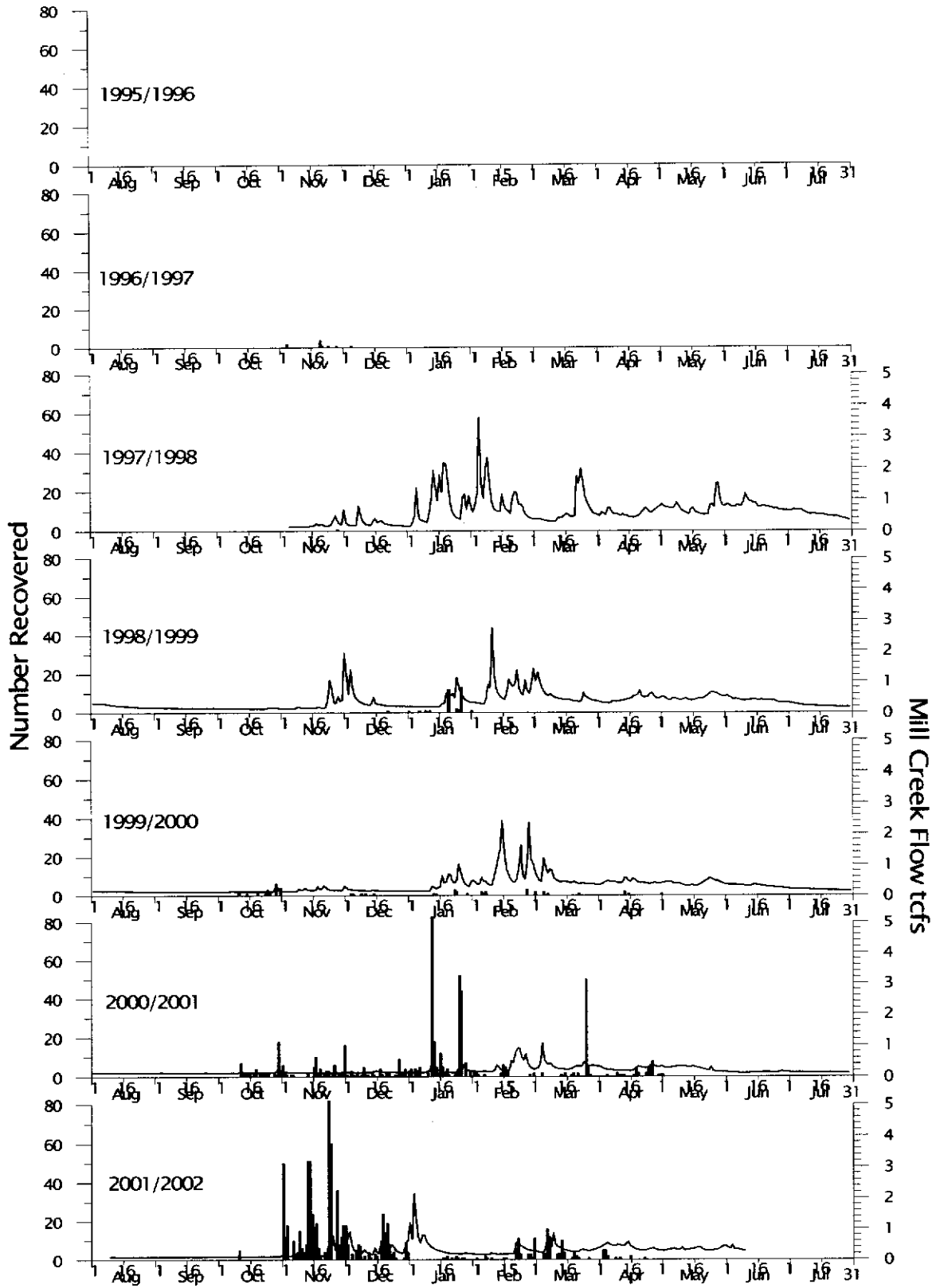
Rotary Screw Trap 8/1/2002 Through 7/31/2003



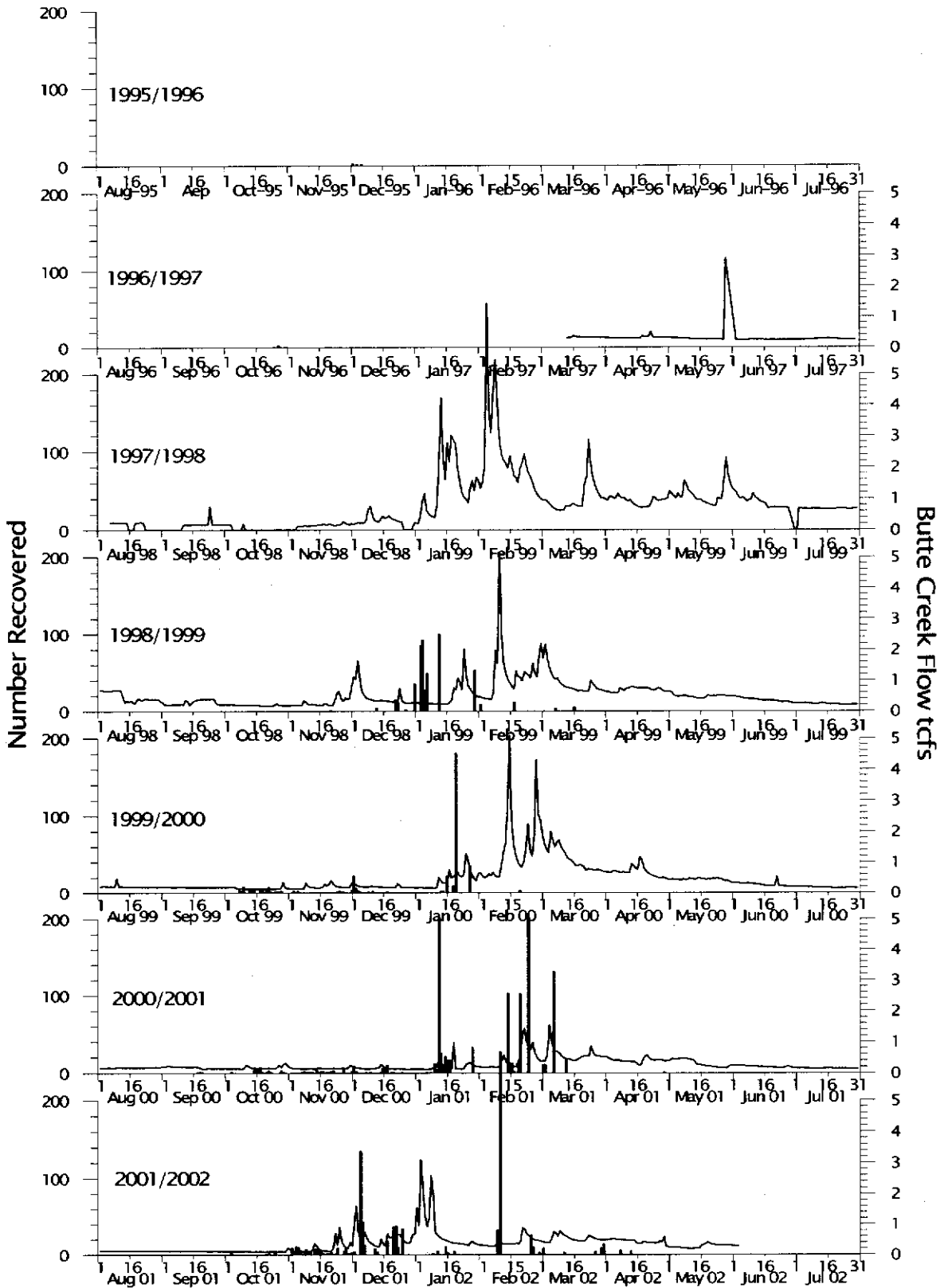
NUMBER OF OLDER JUVENILE CHINOOK RECOVERED IN THE DEER CREEK ROTARY SCREW TRAP, 1995/96 – 2001/02



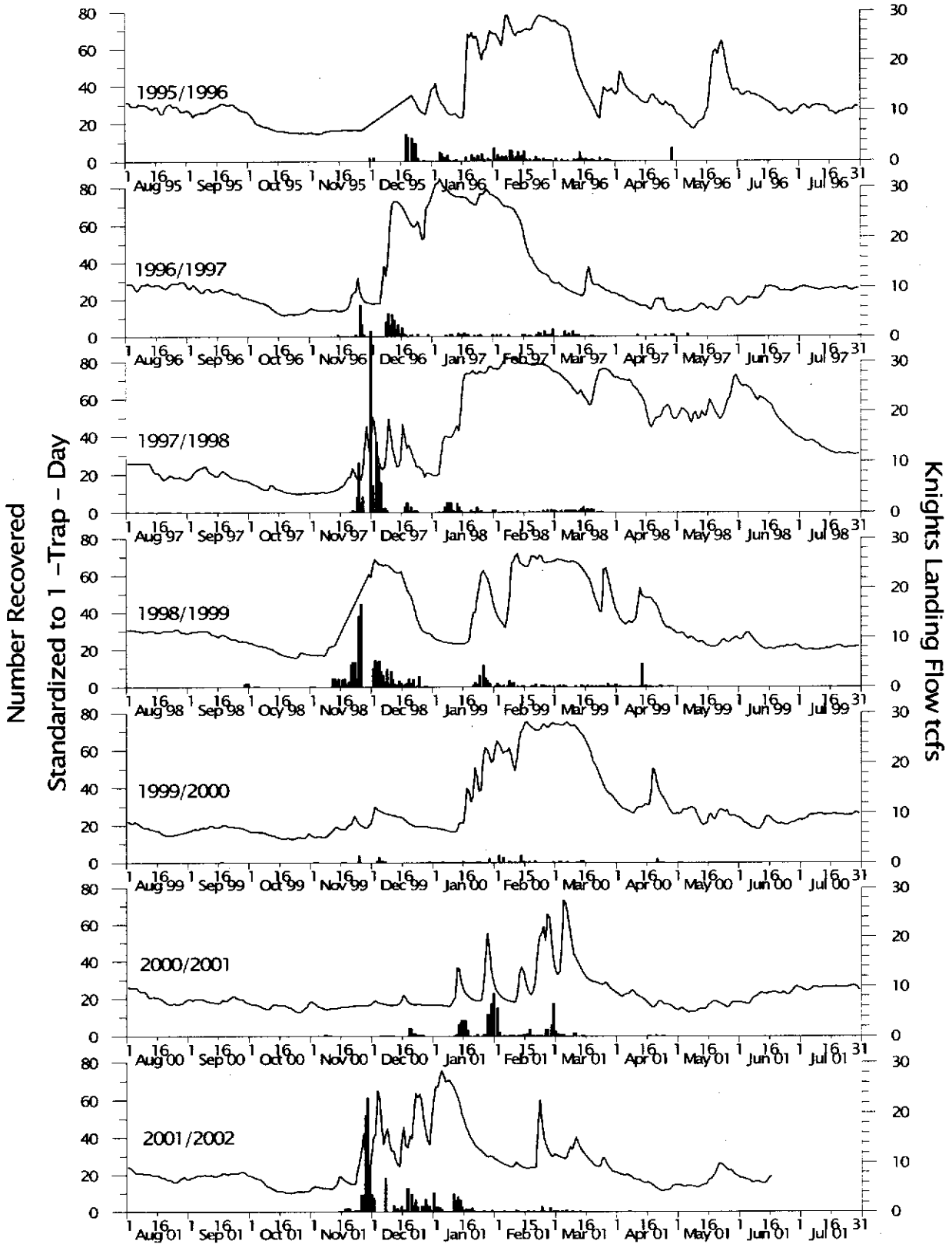
NUMBER OF OLDER JUVENILE CHINOOK RECOVERED IN THE MILL CREEK ROTARY SCREW TRAP, 1995/96 - 2001/02



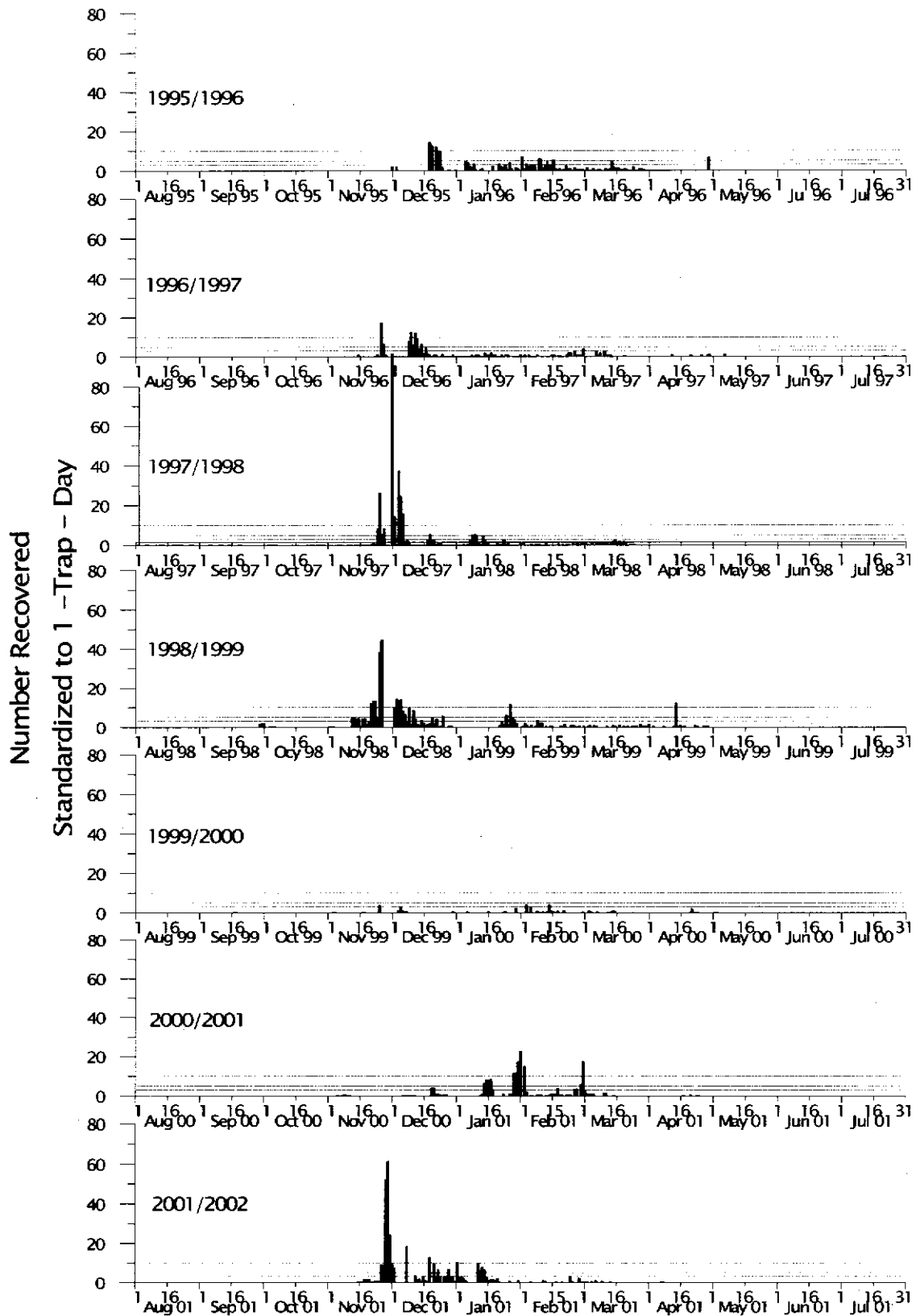
NUMBER OF OLDER JUVENILE CHINOOK RECOVERED IN THE BUTTE CREEK ROTARY SCREW TRAP AT OKIE DAM, 1995/96 – 2001/02



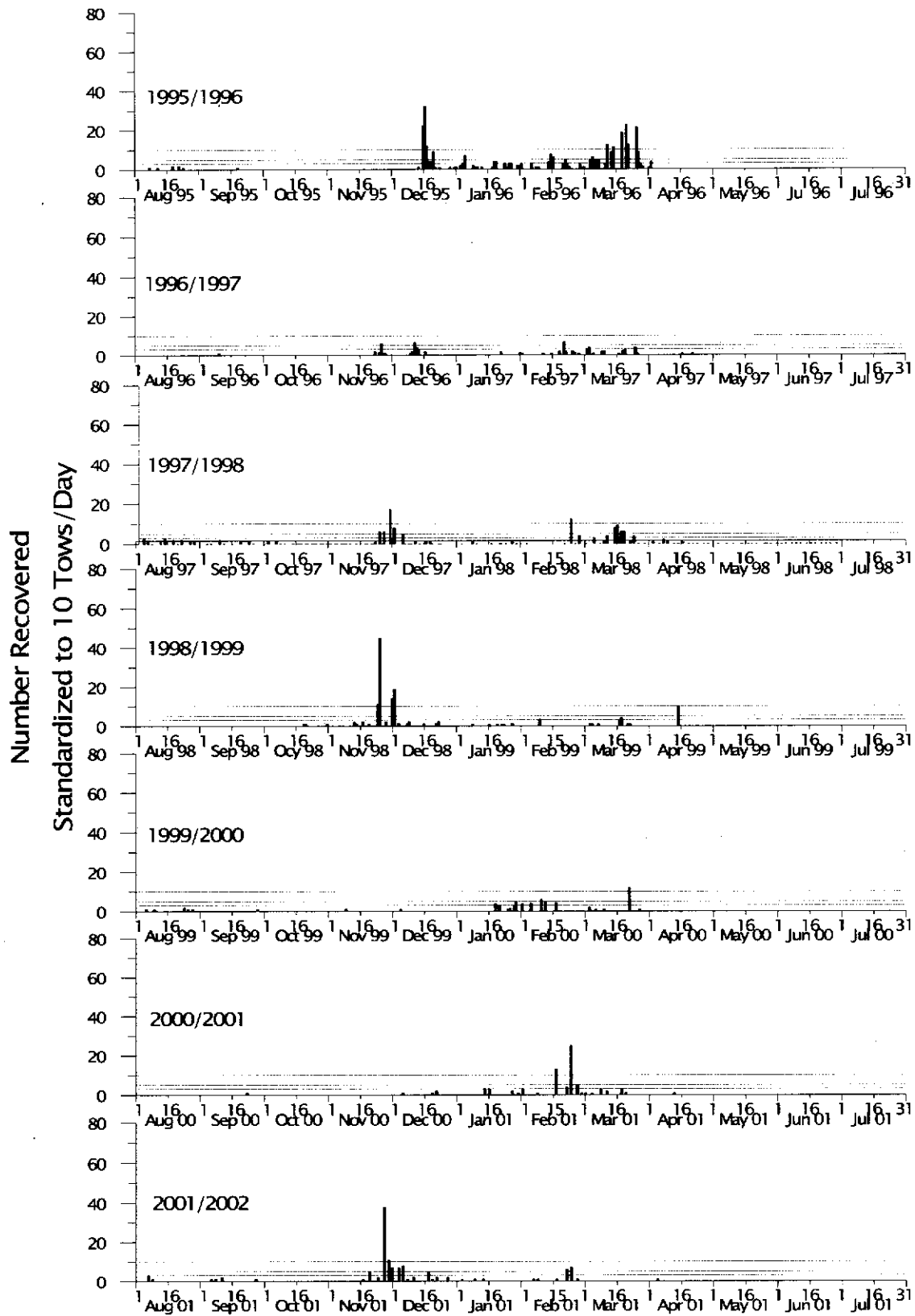
NUMBER OF OLDER JUVENILE CHINOOK RECOVERED IN THE KNIGHTS LANDING ROTARY SCREW TRAP, 1995/96 – 2001/02



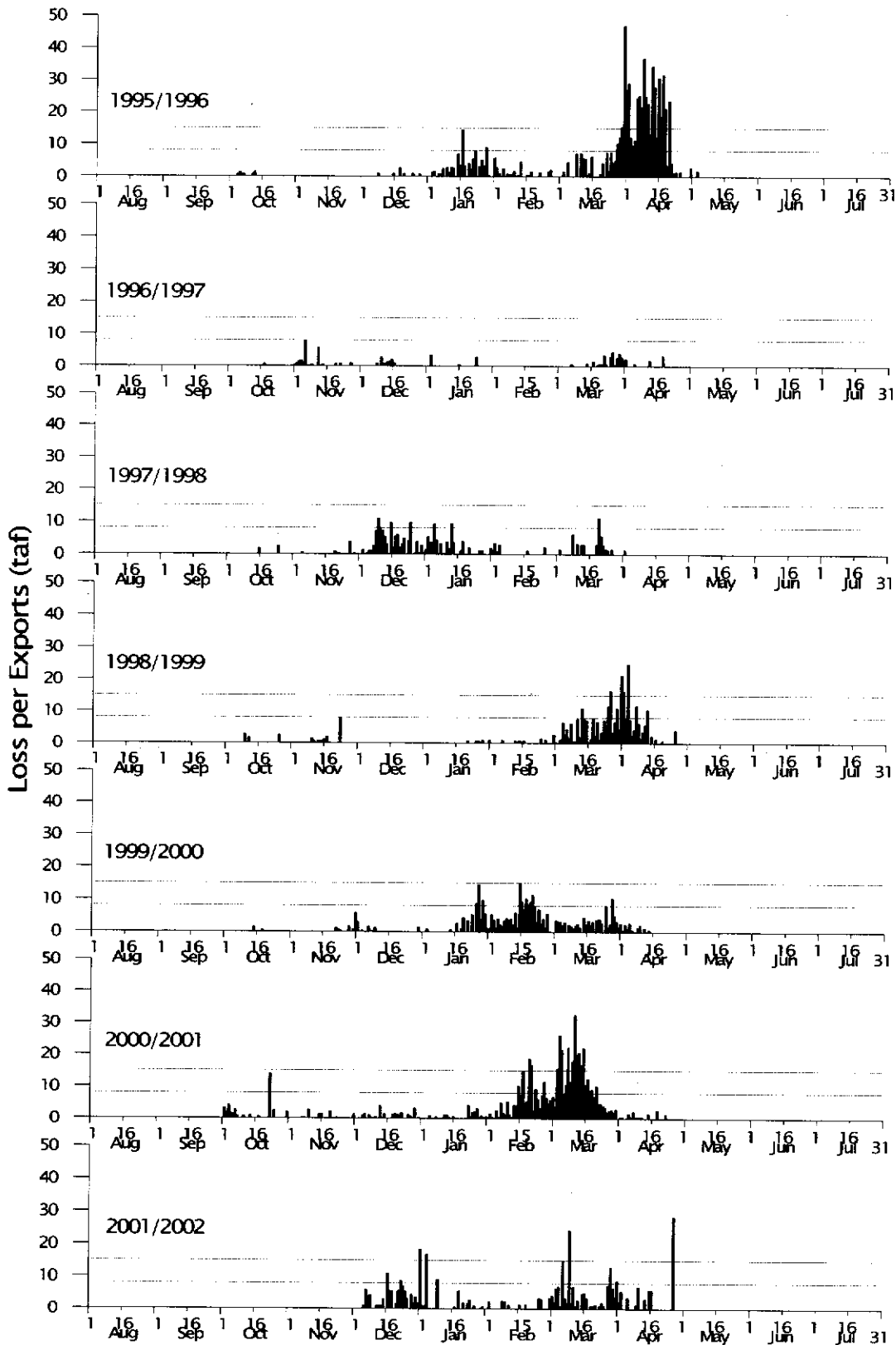
NUMBER OF OLDER JUVENILE CHINOOK RECOVERED IN THE KNIGHTS LANDING ROTARY SCREW TRAP, 1995/96 – 2001/02

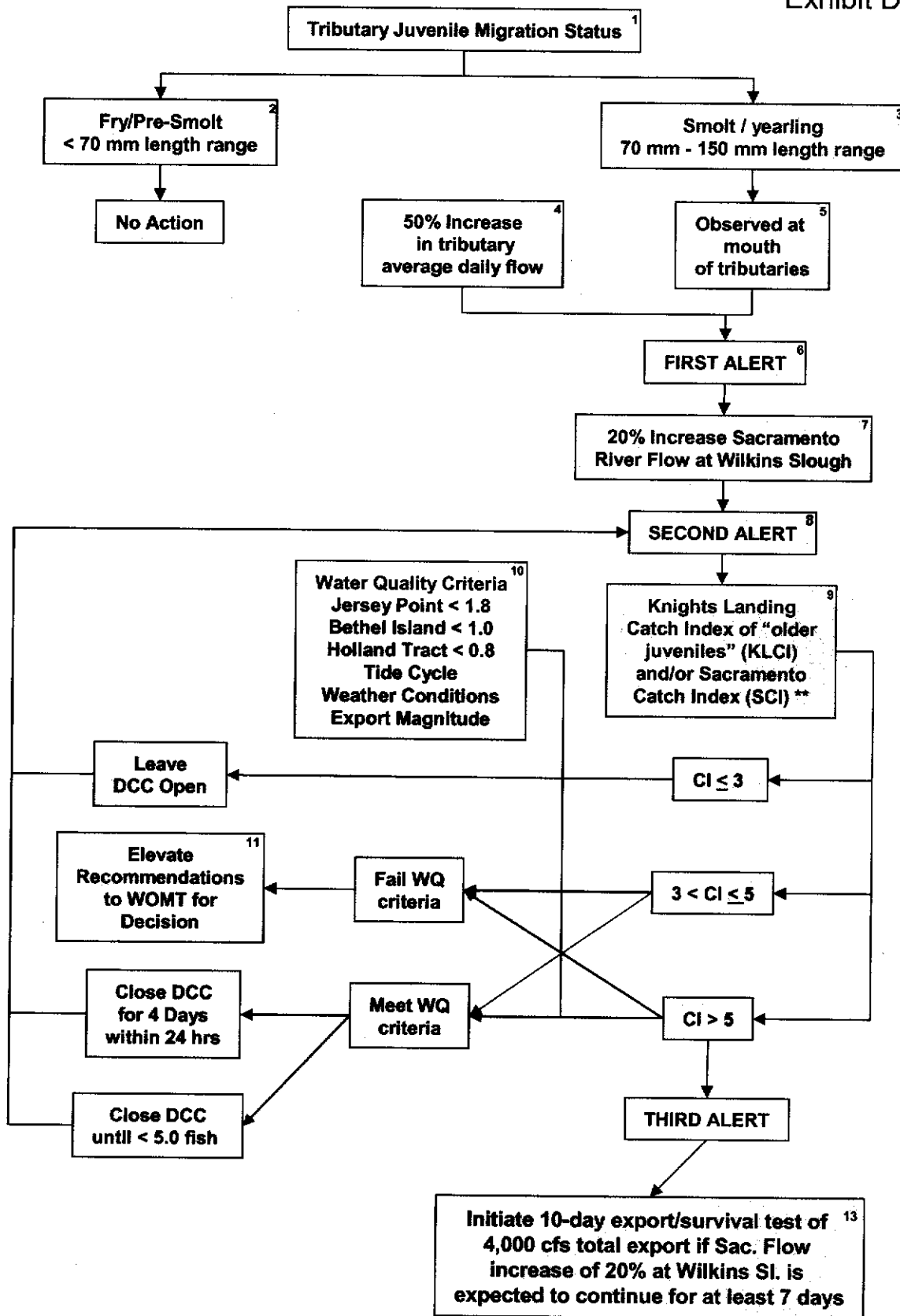


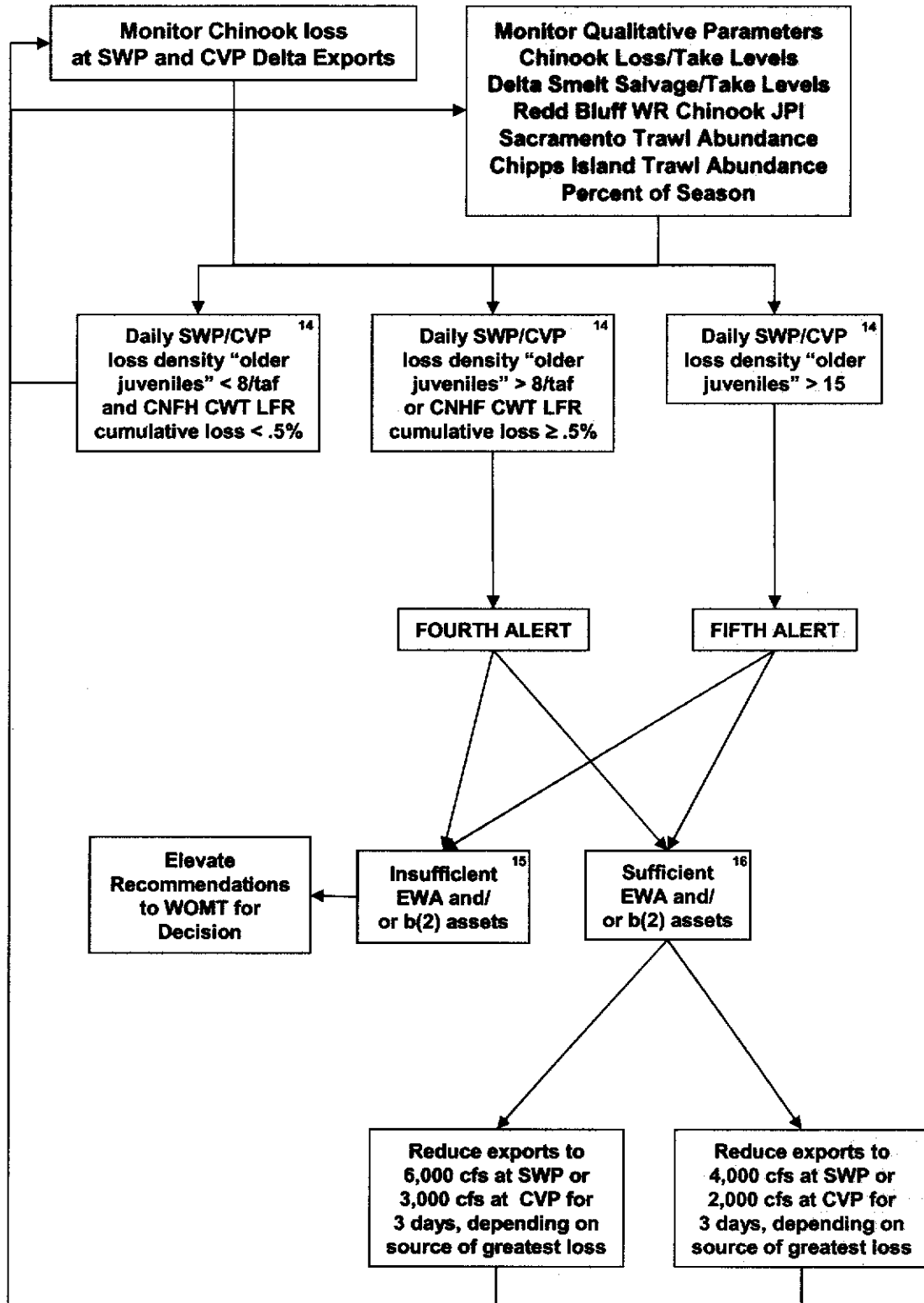
NUMBER OF OLDER JUVENILE CHINOOK RECOVERED IN THE SACRAMENTO TRAWL, 1995/96 - 2001/02



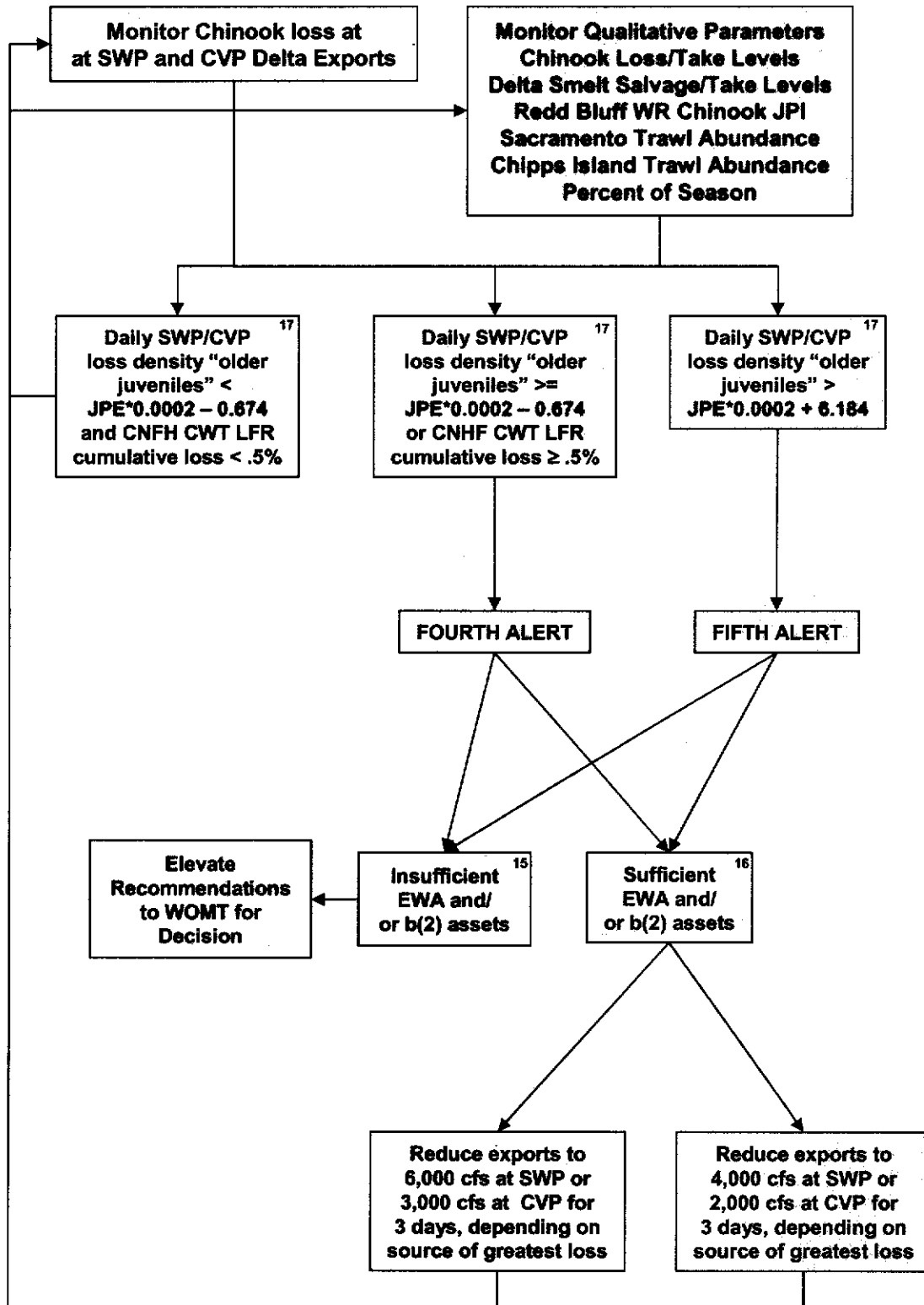
LOSS PER EXPORTS (taf) OF OLDER JUVENILE CHINOOK SALVAGED AT THE SWP & CVP EXPORT FACILITIES, 1995/96 - 2001/02







2004/2005 Chinook decision process 10/01 – 2/15 (Chart 2 of 3).



2004/2005 Chinook decision process 2/15 - 4/15 (Chart 3 of 3).

Salmon protection and water quality protection operations frequently opposite

- Gates closed for fish protection, and gates open for interior Delta water quality protection
- Conflict under dry conditions from Oct through Feb
- Summary of operations under Salmon Decision Process
 - 2000/2001
 - Closed DCC 12/22/00 for 4 days. Pulse of salmon entered Delta, water quality adequate, reduced exports to compensate
 - Closed DCC 1/12/00 for 11 days. Large pulse of salmon entered Delta, water quality adequate, exports reduced for fish protection. Environmental water cost 40 taf
 - Closed DCC 1/26/00 6 days, or until 2/1/00. Fish continued to enter Delta, water quality adequate, exports reduced for fish protection. Environmental water cost 60 taf

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- Summary of operations under Salmon Decision Process (continued)
 - 2001/2002
 - Closed DCC 11/21/01 for 9 days. Pulse of fish entered Delta, water quality adequate
 - Opened DCC 11/29/01 for water quality. Water quality deteriorated unexpectedly. Reduced exports to compensate
 - Closed DCC 12/4/02 until 2/1/02. Fish still entered Delta, water quality improved, high flows through December 01 and January 02
 - 2002/2003
 - DCC closed 10/16/02 for 4 days for salmon survival experiment. One gate broke when BR tried to open it on 10/20/02; repairs completed 11/12/02
 - DCC closed 12/3/02 for fish experiment, and to protect yearling spring run. Water quality adequate, exports reduced due to low storage and flow. Little environmental water costs
 - DCC opened 12/11/02 to maintain water quality during storm. Fish concerns low, conserving environmental water for later in December 02
 - DCC closed 12/16/02 due to high flows in Sacramento River until 2/1/03

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- Summary of operations under Salmon Decision Process (continued)
 - 2003/2004
 - DCC closed 12/2/03 for fish protection based on predicted storm. Water quality borderline, but adequate
 - Operators able to maintain gates closed until flows increased in the Sacramento River
 - DCC gates remained closed until 2/1/04 due to high flows in the Sacramento River