

1 **Previously Discarded Other Stressors Conservation Measures**

2 **Conservation Measure NNIS1: Fund Implementation of the California Aquatic**
3 **Invasive Species Management Plan.** Support interagency coordination to implement
4 the California Aquatic Invasive Species Management Plan (CDFG 2008) at a funding
5 level of \$\$_____ over the term of the BDCP. Although the plan is a “living” document
6 and will undergo revisions in the future, the plan currently calls for the establishment of
7 the California Agencies Aquatic Invasive Species Team (CAAIST) and the Aquatic
8 Invasive Species Working Group (AISWG) to coordinate non-native species prevention,
9 minimization of impacts, and prioritization of actions.

10 **Rationale:** Aquatic invasive species management activities conducted by the State
11 are spread across several agencies¹. Currently, the agencies conduct specific AIS
12 activities without the benefit of a formal coordinating framework. The California
13 Aquatic Invasive Species Management Plan (CAISMP) (CDFG 2008) was drafted as
14 the organizational and implementation document for the creation of two new
15 coordinating entities, one consisting of members of the seven state agencies currently
16 involved with aquatic invasive species (CAAIST) and one consisting of a broader
17 range of interests (e.g., NGOs, stakeholders, federal agencies, and research
18 institutions). The CAAIST would be led by CDFG’s State Invasive Species
19 Coordinator, would consist of lead members from each state agency, and would
20 report to executive level managers to implement actions described in the Plan. The
21 CAISMP is one component in a national and regional network of aquatic invasive
22 species management plans that are based on the models developed by the federal
23 interagency Aquatic Nuisance Species Task Force which was charged with
24 implementing the Nonindigenous Aquatic Nuisance Prevention and Control Act of
25 1990.

26 One of the highest priority actions in the CAISMP is to secure funding for state
27 aquatic invasive species staff (CDFG 2008) and the funding of an Environmental
28 Scientist position at CDFG to support the two proposed entities (J. Horenstein pers.
29 comm.). This conservation measure would fund the CDFG staff position to facilitate
30 the creation and support the operation of these two coordinating entities at a funding
31 level of approximately \$100,000 per year over the term of the BDCP (J. Horenstein
32 pers. comm.). There is currently a funded position that fulfills the goals of this
33 conservation measure through June 2010. This conservation measure could fund
34 additional years.

35 Although it is difficult to predict the potential effects of future introductions of non-
36 native species, there are well-documented examples of deleterious effects caused by
37 non-natives introductions into the Delta. If past introductions are an indication of

¹ These agencies include California Department of Fish & Game (DFG), the California Department of Food and Agriculture (DFA), the California Department of Boating and Waterways (DBW), the California State Lands Commission (SLC), the California Department of Water Resources (DWR), the State Coastal Conservancy (SCC), the State Water Resources Control Board (SWRCB) and nine regional water quality control boards (RQWCBs).

1 future introductions, there will likely be large ecosystem scale effects of non-natives in
2 the Delta.

3 **Conservation Measure NNIS2: Evaluate Effects of and Implement Actions (If**
4 **Necessary) to Reduce Commercial Vessel Fouling.** Support the development of the
5 California State Lands Commission's (CSLC) Commercial Vessel Fouling Program to
6 prevent future invasions of non-natives into the Delta from commercial vessels at a
7 funding level of \$ [redacted] over the term of the BDCP. This conservation measure would
8 provide funding for the program to conduct targeted research to characterize the
9 introduction risk posed by commercial vessel fouling and, if necessary, develop and
10 adopt regulations that prevent or minimize introductions via vessel fouling and support
11 the development of hull husbandry technology.

12 **Rationale:** Prevention of non-native species introductions is the most cost effective
13 and environmentally sensitive method to respond to non-native invasive species
14 (CDFG 2008). New introductions of aquatic organisms are often caused by release of
15 organisms in ballast water discharges and by dispersal of organisms growing on the
16 outside surfaces of hulls (Takata et al. 2006). The California State Lands Commission
17 (CSLC) has an existing Ballast Water Program to prevent new non-native species
18 introductions that includes ballast water management tracking, compliance,
19 enforcement, research, education, and outreach (Falkner et al. 2007). The Ballast
20 Water Program is fully funded by a fee system and is >90% successful in gaining
21 compliance of vessel operators (N. Dobroski, pers. comm.). However, hull
22 husbandry to prevent fouling of non-native species introductions into California is not
23 currently regulated by CLSC. This topic has gained interest among regulators
24 recently but does not have the level of infrastructure, knowledge base, or technology
25 needed to be effective.

26 The Marine Invasive Species Act of 2003 directed the CSLC to analyze the risk of
27 introductions via vessel fouling in consultation with a technical advisory group which
28 produced a list of recommendations (Takata et al. 2006). While vessel fouling
29 primarily transports marine species over long distances the same vessels frequently
30 make multiple stops along the west coast of North America and can move organisms
31 that are adapted to brackish water environments from port to port. The highest
32 priorities identified in the studies include: 1) authorizing the CSLC to develop and
33 adopt regulations that prevent or minimize introductions via vessel fouling; 2)
34 expanding and coordinating targeted biological research directed towards
35 characterizing the introduction risk posed by commercial vessel fouling with other
36 state and federal agencies, and; 3) supporting research promoting technology
37 development (Takata et al. 2006).

38 Although it is difficult to predict the potential effects of future introductions of non-
39 native species, there are several well-documented examples of deleterious effects
40 caused by non-natives introductions into the Delta. Two non-native invasive aquatic
41 plants, water hyacinth (*Eichhornia crassipes*) and Brazilian waterweed (*Egeria*
42 *densa*), have reduced habitat quantity and quality for many native fishes in the
43 Planning Area (NMFS 2004), and possibly are providing habitat for non-native
44 centrarchids. The introductions of two clams from Asia, the overbite clam (*Corbula*

1 *amurensis*) and the Asian clam (*Corbicula fluminea*) have resulted substantial effects in
2 the Delta in just 20 years. These clams are considered ecosystem modifiers because of
3 their wide ranging effects on the aquatic ecosystem and specific native species. Both are
4 highly efficient filter feeders that reduce phytoplankton and zooplankton in the water
5 column, which can be food for native fishes, such as delta smelt and young Chinook
6 salmon (Kimmerer and Orsi 1996, NMFS 2004, Center for Biological Diversity 2007).
7 Several introduced invertebrate species that are food for several covered fish species
8 have replaced native species in the low salinity zone, and may have led to lower
9 foraging efficiency, starvation, and reduced growth rates of these fishes (Moyle 2002).
10 If past introductions are an indication of future introductions, there will likely be large
11 ecosystem scale effects of non-natives introduced in the Delta in the future. Further,
12 although not yet in the Delta, zebra (*Dreissena polymorpha*) and quagga mussels
13 (*Dreissena bugensis*) may be introduced soon. These mussels have been observed to
14 cause >90% mortality of native bivalves when introduced in other parts of North
15 America (Ricciardi et al. 1996).

16 **Conservation Measure NNIS4: Recommend Hazard Analysis and Critical Control**
17 **Points Plans to NEPA/CEQA Lead Agencies.** The BDCP Implementing Entity will
18 recommend to NEPA and CEQA lead agencies proposing projects in the Delta that they
19 prepare a Hazard Analysis and Critical Control Points Plan. The BDCP Implementation
20 Entity would prepare a document that summarizes the necessary contents of a well
21 formed Hazard Analysis and Critical Control Points Plan and would provide this
22 document to NEPA and CEQA lead agencies along with specific comments on the
23 proposed project.

24 **Rationale:** The goal of developing a Hazard Analysis and Critical Control Points
25 Plan is to minimize the inadvertent spread of non-native invasive species while
26 conducting activities for other purposes (especially activities that involve disturbance
27 or movement of water, substrate, or vegetation). These plans allow entities that
28 engage in such activities to analyze critical control points of non-native “hitch hikers”
29 in their list of tasks and to adjust their activities accordingly. Many of the provisions
30 to be included in the plans could be derived from existing agency developed plans.

31 Although it is difficult to predict the potential effects of future introductions of non-
32 native species, there are well-documented examples of deleterious effects caused by
33 non-natives introductions into the Delta. If past introductions are an indication of
34 future introductions, there will likely be large ecosystem scale effects of non-natives in
35 the Delta.

36 **Conservation Measure NNIS5: Fund Education and Outreach Position in CDFG**
37 **Invasive Species Program.** Fund a position in the CDFG Invasive Species Program that
38 is dedicated to outreach and education on the effects, prevention, control, and
39 introduction of non-native species into the Delta and who administers a Bay/Delta
40 volunteer early detection network (see Conservation Measure NNIS3.1). The staff person
41 would also develop additional funding sources to cover materials costs and student intern
42 costs. Start-up funding would be approximately \$160,000 the first two years and
43 \$120,000 per year afterwards over the term of the BDCP (J. Horenstein pers. comm.).

1 These funds would support the following specific actions:

- 2 1. Develop and distribute printed material (posters, brochures, and articles) for
3 specific industry sectors and user groups (such as boat charter operators, marinas,
4 angling guides, fishing tournament organizers, bait shops, aquarium stores, and
5 dredging contractors).
- 6 2. Develop permanent interpretive displays at marinas, boat ramps, and fishing sites.

7 **Rationale:** Educating the public about the effects of non-native species on native
8 species and ecosystems could reduce future intentional and unintentional
9 introductions into the Delta and reduce the spread of existing non-native species in
10 the Delta (CDFG 2008). Many people do not realize the extent of threat that aquatic
11 invasive species pose and how their own actions could lead to new introductions
12 (CDFG 2008).

13 **Conservation Measure NNIS11: Reduce Mortality of Released Salvaged Fish by**
14 **Non-Native Predators.** Support the strategies under development by DWR to reduce
15 predation mortality of salvaged covered fish species at release sites of CVP/SWP
16 facilities at a funding level of \$\$ over the term of the BDCP.

17 **Rationale:** Anecdotal information indicates that predatory fish, including non-native
18 species, congregate near the four regular release locations of CVP/SWP salvage
19 facilities (DWR 2005). It is thought that these predators have learned to gather near
20 the pipe exits when flushing pumps are activated, resulting in increased risk of
21 predation to salvaged fish. Salvaged fish are released in high concentrations in a
22 relatively small area and, upon release, tend to be disoriented and stressed and are
23 sometimes injured, resulting in higher predation rates.

24 The Department of Water Resources' Bay-Delta Office is currently working
25 collaboratively with other state and federal agencies to assess the extent of predation
26 mortality at four SWP salvage release sites (DWR 2005). In the study, DWR is
27 assessing the abundance and composition of predatory fish near release sites and
28 predation movement and behavior before, during, and after releases using standard
29 fish sampling methods (e.g., beach seines), bioacoustics, underwater cameras, and
30 acoustic tagging. It is anticipated that this work will provide the necessary
31 information to assess the importance of predation of salvaged fish. If predation
32 mortality is deemed a significant stressor to salvaged fish, this study will provide
33 information used to identify and evaluate new technologies to reduce or avoid
34 predation of released fish. A report on their findings is expected in December 2008.
35 This conservation measure could fund technologies that are proposed by the
36 December 2008 report.

37 This conservation measure is expected to reduce predation of salvaged fish that are
38 typically at higher risk to predation. However, it is unlikely that this measure will
39 have population level effects on the covered species.

40 **Conservation Measure TOC06: Support Reassessment of Pesticide Labels and**
41 **Urban Use Reporting to Reduce Pesticides Reaching the Delta.** Encourage and
42 provide support to the California Department of Pesticide Regulation, Delta County

1 Agricultural Commissioners, and the U.S. Environmental Protection Agency to (1)
2 reassess current regulations, including evaluation of current pesticide labels, and (2)
3 improve urban pesticide use reporting requirements.

4 **Rationale:** As more evidence of toxic effects of highly toxic pesticides, such as
5 pyrethroids, is discovered, there is an increasing need to reassess the benefits of using
6 such toxics relative to environmental costs. For example, pyrethroids are thought to
7 be highly toxic to fish and other aquatic species at concentrations that are below
8 current detection limits (Weston et al. 2004, Amweg et al. 2005, Werner 2007). This
9 conservation measure would direct the BDCP Implementing Entity to encourage and
10 support the California Department of Pesticide Regulation, Delta County Agricultural
11 Commissioners, and the U.S. Environmental Protection Agency to reassess current
12 regulations on which pesticides can be used in the Delta, in what quantities, and
13 locations in which they are used.

14 The SWRCB's Draft Strategic Workplan (SWRCB et al. 2008) contains an element
15 indicating that they plan to coordinate with these agencies to "determine what
16 information is needed to determine whether there is need for increased enforcement
17 activities or restrictions on pesticide use in the Delta." The Draft Strategic Workplan
18 indicates that their efforts will be completed in the near term (before June 2009).

19 **Conservation Measure TOCO8: Coordinate with Agencies Regulating Dredging.**

20 The BDCP Implementing Entity will coordinate with NEPA /CEQA lead agencies
21 implementing or approving dredging projects in the Delta. Input would be provided on
22 how best to reduce loads of toxics, sediment resuspension, and other stressors generated
23 by dredging to minimize adverse effects on covered species and on habitat restoration
24 and other projects implemented by the BDCP.

25 **Rationale:** Dredging has known environmental impacts, including resuspension of
26 sediment and toxics (pyrethroids, legacy pollutants) into the water column, reduced
27 dissolved oxygen concentrations, and reduced turbidity, that are required to be
28 minimized, avoided, and mitigated through regulations (US Army Corps of Engineers
29 2007). There are multiple state and federal regulatory agencies that must approve
30 dredging projects in the Delta.² Under this conservation measure, the BDCP
31 Implementing Entity would be a reviewing entity to ensure that dredging projects do
32 not adversely affect BDCP conservation efforts.

33 **Conservation Measure TOCO9: Fund Pollution Prevention Programs for**

34 **Recreational Boaters.** Support "Keep the Delta Clean" and "Boating Clean & Green"
35 programs aimed at reducing pollution by recreational Delta boaters to reduce toxic inputs
36 to the Delta at a funding level of \$\$_____ over the term of the BDCP.

37 **Rationale:** There are currently 6.4 million annual boater days in the Delta and Suisun
38 Bay (URS Corporation 2007). This number is expected to increase with the
39 expanding population. These boats may contribute untreated sewage, oil and fuel,

² The agencies include: U.S. Environmental Protection Agency (USEPA), U.S. Army Corps of Engineers (USACE), San Francisco Bay Regional Water Quality Control Board (SFBRWQCB), San Francisco Bay Conservation and Development Commission (BCDC), and State Water Resources Control Board (SWRCB).

1 hazardous waste (e.g., antifreeze, lead-acid batteries, toxic paint, etc.), and overboard
2 trash to the Delta, resulting in adverse effects on covered fish species.

3 The “Keep the Delta Clean” program is conducted by the Contra Costa County Public
4 Works Watershed Program and has previously received grant funding from the State
5 Water Resources Control Board and CALFED. The goal of the program is “to
6 educate boaters about safe and environmentally friendly boating while improving
7 access to pollution prevention services at marinas throughout the Delta.” The
8 program distributes free boater kits for Delta boaters, provides free oil recycling and
9 oil absorbent exchanges, and publishes free maps with highlighted locations for
10 environmental services (sewage pumpout stations, battery drop-off locations, oil
11 recycling centers, etc.).

12 The “Boating Clean & Green” program is a statewide campaign conducted by the
13 Department of Boating and Waterways and California Coastal Commission that
14 began in 1997 to provide boater education and technical assistance that “promotes
15 environmentally sound boating practices to marine businesses and boaters in
16 California.” The program created the Dockwalker program, in which trained
17 volunteers distribute educational boater kits at marinas, boat ramps, and boat shows
18 and events. Since 1997, the program has presented at more than 50 boat shows and
19 events, posted 600 educational signs at marinas, and distributed 2,100 posters and
20 nearly 9,000 copies of clean boating publications.

21 This conservation measure would fund Delta-specific efforts by these two programs
22 by adding to existing efforts.

23 **Conservation Measure TOCO10: Fund the USFWS’ Pharmaceutical Disposal**

24 **Education Program.** Support the “SmarXt Disposal” public awareness campaign in the
25 Delta to reduce inputs of pharmaceuticals into the Delta at a funding level of \$\$ _____
26 over the term of the BDCP. This conservation measure could fund Delta-specific efforts
27 of this campaign that by funding promotional events or the distribution of brochures and
28 posters to the public and medical professionals whose wastewater empties into the Delta.

29 **Rationale:** The SmarXt Disposal program is a national program of the USFWS, in
30 collaboration with the American Pharmaceutical Association and the Pharmaceutical
31 Research and Manufacturers of America., designed to educate the public about and
32 raise awareness of the proper disposal of pharmaceuticals. The program is
33 specifically designed to reduce the amount of pharmaceuticals flushed down toilets or
34 poured down drains, which moves them to wastewater treatment plants and
35 eventually in waterways. The campaign produces educational brochures and posters
36 for both the general public and medical professionals. The campaign will also hold
37 promotional events to raise awareness of the importance of proper medication
38 disposal and the negative effects of pharmaceuticals on the environment and public
39 health.

40 Although SmarXt Disposal program is a national program, this conservation measure
41 would provide funding for efforts specific to the Delta, such as funding of a local
42 program coordinator.

1 **Conservation Measure TOCO11: Fund Education and Outreach for Urban Run-Off**
2 **and Stormwater Pollution Prevention Programs.** Support education and outreach
3 programs for city and county urban run-off and stormwater pollution prevention
4 programs in the Delta to reduce pollution into the Delta at a funding level of \$\$
5 over the term of the BDCP.

6 **Rationale:** Urban and stormwater run-off is a major contributor to pesticides, heavy
7 metals and other toxics. All major urban centers in the Delta, including Sacramento,
8 Stockton, and Tracy, and multiple smaller cities are under National Pollutant
9 Discharge Elimination (NPDES) MS4 permits to develop and implement a Storm
10 Water Management Plan/Program with the goal of reducing the discharge of
11 pollutants to the maximum extent practicable under Section 402(p) of the Clean
12 Water Act. All permit holders are required to incorporate an education and outreach
13 program as part of their stormwater management programs.

14 This conservation measure would make funds available to existing education and
15 outreach programs in the Delta as needed to carry out actions aimed to reduce effects
16 of urban and stormwater run-off on covered fish species in the Delta.

17 **Conservation Measure TOCO12: Fund a Comprehensive Real Time Monitoring,**
18 **Assessment and Response Program for Contaminants.** Contribute to the development
19 and implementation of a comprehensive real time monitoring, assessment, and response
20 program for contaminants in the Delta at a funding level of \$\$ over the term of the
21 BDCP.

22 **Rationale:** There is currently no comprehensive framework for gathering, compiling,
23 assessing, reporting, and responding to data on a real time basis for contaminants in
24 the Delta. Implementing a comprehensive, well coordinated program would be an
25 efficient way to identify and respond to toxic events in a timely manner to minimize
26 effects on covered species in the Delta as well as to establish temporal and spatial
27 baseline patterns of toxic events. Real-time monitoring and reporting would be
28 conducted for evidence of toxicity in water quality, phytoplankton, invertebrates, and
29 fish. Monitoring would be conducted year-round at multiple locations throughout the
30 Delta, potentially by DFG's Office for Oil Spill Prevention. If a toxic event occurs,
31 the program would allow rapid response to minimize effects of the event on covered
32 fish species and the rest of the ecosystem (BJ Miller, pers. comm.).

33 The Central Valley Regional Water Quality Control Board is currently developing a
34 work plan to establish both a long and short term framework for a regional
35 monitoring program (SWRCB et al. 2008). This framework will be developed
36 through a process that includes extensive coordination among multiple Water Board
37 programs, with outside agencies and stakeholders.

38 This conservation measure will provide funding for development and implementation
39 of this program to allow for early detection of and rapid response to toxic events
40 adversely affecting on covered species. The contaminant(s) could be removed (e.g.,
41 filtered out) from the system or the point source could be stopped more quickly.

42 **Conservation Measure OTWQ2: Coordinate with Willing Owners and Managers to**
43 **Improve Quality of Effluent from Managed Seasonal Wetlands.** Coordinate with

1 willing owners/managers of seasonal managed wetlands in the Delta and Suisun Marsh to
2 improve quality of water released from these wetlands by implementing best
3 management practices.

4 **Rationale:** The Fall flood-up on managed seasonal wetlands typically consists of one
5 or more complete flood and drainage cycles followed by consistent circulation
6 throughout the winter flooded period. The fall flood-up can cause low dissolved
7 oxygen plumes that can kill covered species in Suisun Marsh and Suisun Bay. These
8 areas are important habitat to delta smelt, longfin smelt, splittail and rearing juvenile
9 salmonids. Further, high levels of organic matter increase the biological oxygen
10 demand in receiving waters. In addition, elevated concentrations of methylmercury
11 have been associated with effluents from managed seasonal wetlands. With the large
12 number of privately managed seasonal wetlands in Suisun Marsh contributing
13 effluent to its channels connected to Suisun Bay, there is the potential for adverse
14 effects on covered fish species.

15 This conservation measure would allow the BDCP Implementing Entity to coordinate
16 with owners and managers of managed seasonal wetlands to improve the water
17 quality of effluent to benefit covered fish species by implementing best management
18 practices. There are multiple land, water, and vegetation modifying activities that
19 have been identified to reduce dissolved oxygen plumes and loads of BOD and
20 methylmercury into receiving waters in Suisun Marsh. These activities include ways
21 to reduce the amount of organic material in and reduce the residence time of ponded
22 water. The activities are currently being investigated for efficacy under a CALFED-
23 funded grant by Wetland and Watershed Sciences and DWR (C. Enright pers.
24 comm.). This BDCP Implementing Agency will use the results of this study as
25 guidance for formulating best management practices to implement.

26 **Conservation Measure HARV2: Fund Education and Outreach to Prevent Illegal**
27 **Harvest.** Support public education and outreach by the California Department of Fish
28 and Game to reduce illegal harvest of covered fish species by providing funding of
29 \$\$ [redacted] over the term of the BDCP.

30 **Rationale:** It is thought that a considerable number of situations of illegal harvest
31 occur out of an inability to distinguish between similar-looking species (P. Adams
32 pers. comm.). As a result, this conservation measure would serve to better educate
33 fishermen that may not know the distinguishing characteristics among species. In
34 addition to enforcement of illegal harvest, DFG's DBEEP is involved with education
35 and outreach efforts in the Delta to reduce unintentional poaching.

36 This conservation measure would fund the DBEEP to design and install multilingual/
37 pictorial signs and/or fliers (or other appropriate materials) at bait shops, boat ramps,
38 and public piers indicating the differences between protected and non-protected fish
39 species of similar appearance. The BDCP would also support printing costs in DFG's
40 annual Fishing Regulations publication to have diagrams of similar species and
41 distinguishing characteristics, similar to what is done to distinguish between steelhead
42 with a clipped (hatchery) and non-clipped (wild) adipose fin.