Ecosystem-Scale Selenium Modeling in Support of Fish and Wildlife Criteria Development for the San Francisco Bay-Delta Estuary, California

Administrative Report

Appendix D: Compilation of field data for the Bay-Delta

U.S. Department of the Interior
U.S. Geological Survey
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Find the full report and other attachments at http://www.epa.gov/region9/water/ctr

APPENDIX D

Compilation of field data for the Bay-Delta

Table D1. Bird liver, muscle, and egg Se concentrations for the Bay-Delta.

Table D2. Bird egg Se concentrations for the Bay-Delta.

Table D3. Largemouth bass Se concentrations for the Sacramento River watershed, San Joaquin River watershed, and downstream Delta during 1999, 2000, 2005, and 2007.

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Table D5. Invertebrate Se concentrations for Mildred Island and Franks Tract during 2003-2004.

Table D1. Bird liver, muscle, and egg Se concentrations for the Bay-Delta.

species and location	tissue Se (µg/g dw)	diet
Suisun and San Pablo Bays (2004-2006) (Wainwright-De La Cruz et al., 2008)	liver (range)	
surf scoter overwintering	7.4-119 (n = 159)	Suisun Bay: 100% *C. amurensis*; San Pablo Bay: 52% *C. amurensis*
Suisun and San Pablo Bays (2004-2006) (Wainwright-De La Cruz et al., 2008)	egg (mean)	
surf scoter late Jan to spring	1.7 (n = 22)	Central Bay: *Venerupis philippinarum*
North Bay tidal marshes, 1998-1999(Schwarzbach et al., 2006)	egg (mean and range)	
California clapper rail	1.93 (1.12-3.13)	
North and South Bays prebreeding season Mar-Apr, 2005 (Ackerman and Eagles-Smith, 2009)	liver (mean and range)	
American avocet	7.9 (3.1-49)	
black-necked stilt	5.3 (2.3-41)	
Forster's tern	7.1 (3.7-14.5)	
Caspian tern	6.7 (4.8-14.4)	
San Pablo Bay March 2002 (Hunt et al., 2003)	muscle (mean)	
surf scoter	7.8	
greater scaup	8.7	
Suisun Bay, March 2002 (Hunt et al., 2003)	muscle (mean)	
surf scoter	13.3	
greater scaup	13.4	

Table D2. Bird egg Se concentrations for the Bay-Delta (Schwarzbach and Adelsbach, 2003).

Suisun Bay and San Francisco Bay, March-July, 2000 Suisun Bay, Delta, Stone Lake, Davis, Consumnes River, March-July, 2001	mean bird egg (µg/g dw)	n	minimum (µg/g dw)	maximum (µg/g dw)
snowy plover	1.5	3	0.9	2.0
American avocet	1.8	6	1.3	2.2
California clapper rail	1.6	6	1.3	1.7
Brandt's cormorant	2.1	2	1.9	2.3
Forester's tern	2.4	6	2.0	2.9
black-necked stilt	2.4	2	2.2	2.6
double-crested cormorant	2.6	8	2.3	3.0
California least tern	2.8	6	2.4	3.3
black-crowned night heron	3.5	11	2.5	4.6
snowy egret	4.2	9	3.7	4.9
great egret	3.0	15	2.0	7.8
all groups	2.8	74	0.9	7.8

Table D3: Largemouth bass Se concentrations for the Sacramento River watershed, San Joaquin River watershed, and downstream Delta during 1999, 2000, 2005, and 2007 (Foe, 2010). [Data from 2007 are given in bold.]

location	largemouth bass Se µg/g wb dw
Sacramento R @ Veterans Bridge	2.27±1.57
Sacramento R. @ RM 44	2.64±0.38; 1.47±0.65; **1.85±0.35**
Sacramento R. near Rio Vista	1.50±0.54; 1.74±0.43; **2.58±1.39**
San Joaquin R. @ Fremont Ford	1.94±1.12
San Joaquin R. @ Crows Landing	2.54; 2.69±0.40; 2.86±1.37
San Joaquin R. @ Vernalis	2.37;1.29±1.15;1.95±0.47; **2.44±0.13**
Old R. near Tracy	2.31±1.83; 2.41±1.11
San Joaquin R. @ Potato Slough	1.59;1.36±0.38;1.32±0.53 **2.57±2.12**
Middle R @ Bullfrog	1.76; 1.93±0.77; **2.14±0.37**
Franks Tract	1.66±0.70; 1.20±1.11; **2.37±0.29**
Big Break (most seaward, near Antioch)	1.57±0.67; 1.03±0.48; **2.86±1.02**
Discovery Bay	1.63±0.35
Whiskey Slough	1.74±2.39

Table D4. White sturgeon and *C. amurensis* Se concentrations (Stewart et al., 2004; Kleckner et al., 2010) and calculated TTFs.

seaward white sturgeon Se muscle (µg/g dw)	landward white sturgeon Se muscle (µg/g dw)	Carqueniz Strait (station 8.1) *C. amurensis* Se µg/g dw	Chipps Island (station 4.1) *C. amurensis* Se µg/g dw	seaward $TTF_{sturgeon}$	landward $TTF_{sturgeon}$
10.2 mean	6.91 mean	14.0 (1998)	mean 10.8 (range 5-16)	0.79	0.63
		12.6 (1999)			
		11.8 (2000)			
		14.1 (2001)			
		12.9 grand mean (range 5.4-20)			
		12.8 mean (2000-2001)			

Table D5. Invertebrate Se concentrations for Mildred Island and Franks Tract during 2003-2004. (Lucas and Stewart, 2007).

Mildred Island (August 2001)	
invertebrate	Se µg/g dw
stratiomyidae	0.60
corophium	1.1
damselfly	1.3
gammarus	0.88; 1.2
hyalella	1.4
aeshnidae	1.6
snail	1.8
bulk zooplankton	1.8
corbicula[a]	2.3; 2.8; 2.9
isopod	3.7
oligochaete	4.1; 4.8
fish (muscle)	Se µg/g dw
threadfin shad	0.99
inland silverside	1.4
redear sunfish[a]	1.4; 1.5
largemouth bass	1.6
Franks Tract (April 2002)	
invertebrate	Se µg/g dw
gammarus	0.91; 1.0
damselfly	1.3
hyalella	1.3
epiphytic material	1.5
bulk zooplankton	1.8
oligochaete	2.2
chironomid	2.7
planaria	3.6
corbicula	3.8
fish (muscle)	Se µg/g dw
largemouth bass	1.3
redear sunfish	1.5
inland silverside	2.0

[a]1999-2000.