

1 Michael A. Brodsky
Law Offices of Michael A. Brodsky
2 201 Esplanade, Upper Suite
Capitola, CA 95010
3 Telephone: (831) 469-3514
4 Facsimile: (831) 471-9705
Email: michael@brodskylaw.net
5 SBN 219073

6 Attorney for Protestants Save the California Delta Alliance, et al.

7 **BEFORE THE CALIFORNIA STATE WATER RESOURCES CONTROL BOARD**

9 **IN RE CALIFORNIA WATERFIX**
10 **CALIFORNIA DEPARTMENT OF**
11 **WATER RESOURCES AND U.S.**
12 **BUREAU OF RECLAMATION**
13 **PETITION FOR CHANGES IN**
14 **WATER RIGHTS, POINTS OF**
15 **DIVERSION/RE-DIVERSION**

PROTESTANT SAVE THE CALIFORNIA
DELTA ALLIANCE, ET AL.'s WRITTEN
TESTIMONY OF CHARLES SALTER

16
17
18
19
20
21
22
23
24
25
26
27
28

1 I, Charles Salter do hereby declare:

2 **I. Summary of Testimony**

3 **DWR Misunderstands the Relationship Between Existing Background Noise**
4 **and the Expected Annoyance from Intruding Noise.**

5 In planning the California WaterFix Project, and accounting for the effects on surrounding
6 communities of the noise from driving tens of thousands of piles involving millions of pile strikes,
7 DWR made a fundamental error by assuming that because the communities and locales where the
8 pile driving will take place are quiet rural communities, the large amount of intruding sound from
9 pile driving will be less disruptive to community life. DWR planned the Project using “the general
10 principal that receptors in less noisy areas may tolerate greater increases in noise than communities
11 already exposed to higher levels.” (Bay Delta Conservation Plan / California WaterFix Final
12 Environmental Impact Report, Response to Comments, Save the California Delta Alliance
13 Comment Letter of 7-12-27; SCDA-84¹.) In making this assumption, DWR misunderstood
14 published literature on noise annoyance. In fact, the quiet rural nature of Delta communities and the
15 large difference in both character and level between existing ambient noise and intruding
16 construction noise, “penalizes” the intruding noise by an additional 5 to 12 decibels based on the
17 literature that DWR misunderstood. (T.J. Shultz, “Synthesis of Social Surveys on Noise
18 Annoyance,” Journal of the Acoustical Society of America, Vo. 64, No. 2, p. 384; SCDA-77².) I am
19 familiar with the work of Mr. Shultz and worked with him before he passed away. DWR is
20 misapplying Mr. Schultz’s work and the literature on noise annoyance factors that depends on it.

21 Common sense tells us that sudden new loud noises that are different in quality from
22 existing background noise will be disruptive. Common human experience also tells us that loud
23 noises introduced into a landscape of peace and quiet will be annoying and disruptive. These
24 common understandings of human experience are borne out by the scientific literature on noise
25 annoyance. DWR’s misunderstanding of the amount of disruption that will be caused by pile

26 _____
27 ¹ SCDA-84 is a true and correct copy of the Bay Delta Conservation Plan / California WaterFix
28 Final Environmental Impact Report, Response to Comments, Save the California Delta Alliance
Comment Letter of 7-12-27.

² SCDA-77 is a true and correct copy of T.J. Shultz’s article, “Synthesis of Social Surveys on Noise
Annoyance,” Journal of the Acoustical Society of America, Vo. 64, No. 2.

1 driving noise is contrary to common sense and established acoustical engineering principals. It
2 represents a significant engineering error in project planning.

3 **Project Noise From Pile Driving Will Be Very Loud, Unreasonably Interfering With**
4 **Recreational Boating and Community Life.**

5 A substantial amount of in-water pile driving will take place at the three intakes, located
6 near Hood on the Sacramento River. A total of 3090 foundation piles and 7500 sheet piles will be
7 driven in the water (BA Appendix 3.E Pile Driving Assumptions for the Proposed Action; SCDA-
8 82³.) In addition, several thousand piles will be driven on land to support the realignment of
9 Highway 160, intake control structures, and sedimentation basins at the intakes.

10 The noise levels from pile driving activity at the three intakes projecting out over the
11 Sacramento River will reach 91 dB for a zone of 800 feet from the pile driving and 85 dB for a zone
12 1600 feet from the pile driving activity. 91 dB is approximately as loud as an emergency vehicle
13 siren. The noise levels from construction activity and pile driving will likely reach 76 to 80 dBA at
14 the Town of Hood, 75 dBA at the Clarksburg Marina, 79 dBA at the edge of the Town of
15 Clarksburg, 76 dB in the center of Clarksburg at the Clarksburg Library, and 75 dBA in the center
16 of Clarksburg at the Clarksburg School campus.

17 Because of the intruding construction and pile driving noise is of a different character from
18 ambient noise in these quiet rural locations and because the intruding noise is impulsive, it will have
19 an annoyance factor even greater than the extreme increase over ambient noise levels would
20 indicate. The construction noise and pile driving noise will significantly interfere with some
21 recreational activities, and will substantially deter use of the Clarksburg Marina. It will interfere
22 considerably with speech communication in the communities of Hood and Clarksburg, requiring
23 people to raise their voices. Interference with such a basic activity as speech is likely to have a
24 significant negative impact on the communities, making them unattractive places to live and visit.

25 It is our understanding that structural engineering experts will be presenting a proposal to
26 DWR during these California WaterFix hearings that suggests the use of alternative construction

27 _____
28 ³ SCDA-82 is a true and correct copy of the Biological Assessment, Appendix 3.E Pile Driving
Assumptions for the Proposed Action.

1 methods that do not involve impact pile driving. The assessment of structural methods is beyond
2 our expertise, however, from an acoustical engineering point of view if any alternative method is
3 available that would avoid the significant hardship that pile driving will cause to these communities
4 and recreation on the Sacramento River, in our opinion it would be unreasonable not to adopt the
5 alternative method (prohibiting impact pile driving) as a requirement of any permit issued for
6 construction of the Project.

7 **II. The Delta and the Quiet Rural Communities of Hood and Clarksburg Will Be**
8 **Adversely Affected By Intruding, Impulsive Pile Driving and Construction**
9 **Noise; The Quiet Rural Setting Makes DWR's Noise Problem Worse, Not**
10 **Better.**

11 Construction of the California WaterFix Project includes the driving of 23,900 piles at
12 twelve construction areas spread across the Delta. (SCDA-82; *see also* SCDA-85⁴ and SCDA-73⁵
13 for overview location of pile driving at three intakes, eight barge docks, and the Clifton Court
14 Forebay.) Project proponent, the California Department of Water Resources ("DWR"), intends to
15 drive the piles with a combination of vibratory and impact techniques. Pile driving produces a
16 significant amount of noise and pile driving is a common source of community annoyance and
17 complaints with regard to noise from construction projects (SCDA-75⁶.) Impact driving generally
18 produces louder noise than vibratory driving. DWR estimates that for the portion of the pile driving
19 done with the louder impact technique there will be a total of 10,909,704 strikes from the impact
20 hammers. (SCDA-82.) We have performed an analysis based on the pile size, pile type, energy
21 delivered from the impact hammer, and record data available from measurements of noise generated
22 by similar pile driving projects in the past. We estimate that the sound from the ten million plus
23 impact hammer strikes will be 115 dBA at a distance of 50 feet from the source. 115 dBA is very
24 loud, roughly equivalent to the sound produced by a siren on an emergency vehicle. The United
25 States Department of Health and Human Services, National Institute for Occupational Safety and
26 Health, promulgated a recommended standard of 28 seconds as the maximum safe amount of time

27 ⁴ SCDA-85 is a true and correct copy and accurate depiction of construction activity at the three
28 intakes and Meadows Slough.

⁵ SCDA-73 is a true and correct copy and accurate overview depiction of construction activity.

⁶ SCDA-75 is a true and correct copy of the Spring 2000 issue of Piledrivers.org Magazine.

1 that a worker should be exposed to sounds as loud as 115 dBA. (U.S. Department of Health and
 2 Human Services, Criteria for a Recommended Standard, Occupational Noise Exposure, Revised
 3 Criteria 1998, p. 2; SCDA-79⁷.) Construction schedules show that pile driving will occur
 4 intermittently over seven years or longer. (BA Appendix 3.D, Construction Schedule for the
 5 Proposed Action; SCDA-83⁸.) Construction of the California WaterFix Project will produce a lot of
 6 noise over a large area for a long time.

7 The foundation piles will be 42 inch diameter steel piles 100 feet long. Four or more pile
 8 driving rigs will be operating simultaneously. To study the expected noise levels from these piles,
 9 we reviewed a detailed compendium of pile driving noise data published by the Washington State
 10 Department of Transportation (WSDOT) in their Biological Assessment Preparation Manual
 11 (“BAPM”); SCDA-80⁹.) The BAPM assembles data from several different measurements of pile
 12 driving noise, with noise level measurements including 113 dBA, 114 dBA, and 115 dBA for 36
 13 inch diameter steel piles at a distance of 50 feet. The Manual also states the following:

14 When conducting an in-air noise assessment involving impact driving of hollow steel piles,
 15 USFWS [U.S. Fish and Wildlife Service] currently recommends assuming a noise level of
 115 dBA L_{max}^{10} at 50 feet [for 30-inch piles].

16 (SCDA-80, p. 7-14.)

17 We based our analysis on a pile driving noise level of 115 dBA at 50 feet, considering that
 18 the project would involve the use of multiple pile drivers working simultaneously to install larger
 19 42-inch piles, both factors likely to increase noise levels. We used the standard formula:

20 The formula for calculating the drop off is the
 21 source level plus $10 \cdot \log_{10}(D_1/D_2)$, where D_1 is the reference position and D_2 is the
 22 receiver position. For example if a impact pile driver has a reference level of 113
 23 dBA at 50 feet the noise level at 500 feet would be calculated as follows for
 conditions where excess attenuation is not anticipated:

$$Received\ level = 113dBA + 20Log_{10}(50/500) dBA$$

25 ⁷ SCDA-79 is a true and correct copy of the U.S. Department of Health and Human Services,
 Criteria for a Recommended Standard, Occupational Noise Exposure, Revised Criteria 1998.

26 ⁸ SCDA-83 is a true and correct copy of the Biological Assessment Appendix 3.D, Construction
 Schedule for the Proposed Action.

27 ⁹ SCDA-80 is a true and correct copy of the Washington State Department of Transportation’s
 Biological Assessment Preparation Manual.

28 ¹⁰ L_{max} (Maximum Sound Level) – The maximum sound level for a specified measurement period
 of time as defined in ASTM E1686.

SCDA-65

1 *Received level = 113+(-20) dBA*

2 *Received level = 93 dBA*

3 (Illington & Rodkin, Sound Levels Associated with Driving Steel Piles; SCDA-76¹¹.)

4 Exhibits SCDA-67, SCDA-68, and SCDA-69¹² are maps showing the location of the
5 foundation pile driving at each of the three intakes respectively. We have calculated the noise level
6 at a distance of 800 feet and 1600 feet out onto the river from the in-water pile driving activity. The
7 dark green shaded area on the map will experience noise equal to or greater than 91 dBA. The light
8 green shaded area will experience noise levels equal to or greater than 85 dBA. The Occupational
9 Noise Exposure recommended criteria provide for no more than 2 hours of exposure to noise of 91
10 dBA. The noise level of 91 dBA reaches all the way across the river at intakes #3 and #5 and almost
11 all the way across at intake #2. Recreational boaters seeking a quiet experience and traversing the
12 Sacramento River at the locations of the intake pile driving will be substantially dissuaded from
13 traveling past the intakes. We have been informed that boating 5 MPH zones will be enforced at the
14 intake locations. In my opinion, it is likely that most boaters will choose not to boat past these
15 intakes due to annoyance and discomfort brought about by a long slow slog past very loud noise,
16 and will instead plan their boating activity to avoid these locations. DWR may, in fact, have to
17 physically close the river (or the portion of the river closest to pile driving) to boating at the intake
18 pile driving locations in order to protect those boaters who might venture past the area from hearing
19 damage.

20 It is my understanding that DWR has posited the Clarksburg Fishing Access Area, shown on
21 map SCDA-68, directly across the river from intake #3, as a mitigation for the loss of bank fishing
22 opportunities where intake construction will displace fishing. However, the Clarksburg Fishing
23 Access Area will be subject to noise levels of up to 91 dBA from pile driving directly across the
24 river. In my opinion, individuals seeking a spot to fish will avoid the Clarksburg Fishing Access
25

26 _____
27 ¹¹ SCDA-76 is a true and correct copy of Illington & Rodkin, Sound Levels Associated with
28 Driving Steel Piles.

¹² SCDA-67, SCDA-68, and SCDA-69 are true and correct copies and accurate depictions of the
location of pile driving at the intakes and distances of noise travel.

1 Area due to the loud noise and the Clarksburg Fishing Access Areas does not present a reasonable
2 alternative fishing location for those displaced from bank fishing at the intake construction sites.

3 The towns of Hood and Clarksburg are in close proximity to intake pile driving activities,
4 with Hood between intakes #3 and #5 and Clarksburg up and across river from intake #2. Exhibit
5 SCDA-70¹³ shows the location of intake #3 and #5 pile driving and construction activities and with
6 the small town of Hood in between the two intake construction sites. Exhibit SCDA-71¹⁴ shows the
7 location of intake #2 pile driving and construction activity and the location of the town of
8 Clarksburg and the Clarksburg Marina upstream. Exhibit SCDA-85 shows the construction zone
9 that extends around all three intakes, engulfs the Town of Hood and portions of Clarksburg,
10 reaching the Clarksburg Marina.

11 Charles Salter and Associates previously submitted a review of the noise analysis regarding
12 this area that was presented in the Project EIR (SCDA-74¹⁵.) In that analysis we found DWR's
13 assessment of noise impacts to be inadequate and opined that DWR underestimated noise levels at
14 Hood and Clarksburg by 10 to 15 dB or more. Our subsequent work, including more detailed study
15 of the expected source noise level from impact driving a 42 inch steel pile, confirms our earlier
16 opinion that DWR's analysis was inadequate and that noise levels will be significantly greater than
17 those stated by DWR.

18 Using a reasonable source noise assumption of 115 dBA for impact pile driving at 50 feet,
19 and considering the proximity of other construction noise sources immediately next to the town of
20 Hood, a reasonable estimate of the noise levels in the Town of Hood is between 76 dBA and 80
21 dBA. As explained in our EIR comments, noise from construction equipment in the immediately
22 adjacent construction yard will likely reach 76 dB in the town. The land-based and in-water pile
23 driving at intake #3 is about 4200 feet from Hood and the pile driving at intake #5 is about 6700
24 feet from Hood. Pile driving sounds will likely be about 80 dB in the town.

25 _____
26 ¹³ SCDA-70 is a true and correct copy and accurate depiction of construction features at intakes #3
27 and #5 and their relation to surrounding communities.

28 ¹⁴ SCDA-71 is a true and correct copy and accurate depiction of construction features at intake #2
and its relation to surrounding communities.

¹⁵ SCDA-74 is a true and correct copy of Charles Salter Associates July 12, 2017 comments on the
FEIR/S.

1 The Clarksburg Marina is about 1,800 to 2,000 feet from the nearest construction activity at
2 intake #2 and about 4700 feet from the in-water pile driving at intake #2. Pile driving and
3 construction sounds will likely be about 76 to 78 dB at the Clarksburg Marina, consistent with the
4 conclusions in our July 12 report.

5 DWR assumed an ambient background noise of 40 dBA for the communities of Clarksburg
6 and Hood. DWR should have performed ambient background noise measurements instead of
7 making assumptions, and the failure to perform ambient noise measurements is a significant flaw in
8 DWR's analysis. Even assuming an ambient level of 40 dBA, however, the intruding noise from
9 pile driving and construction will be up to 40 dBA higher than the assumed ambient level. The
10 intruding noise is also of a very different character than the ambient noise of these rural
11 communities. The pile driving noise is also of an "impulsive" character.

12 Contrary to DWR's conclusion that the quite rural nature of the locale makes noise less of a
13 problem, according to accepted acoustical assessment methodology, this characteristically different,
14 impulsive, intruding noise should be "penalized" 5 to 12 decibels when assessing the amount of
15 annoyance it will cause. This would put the weighted annoyance factor of Construction noise from
16 the WaterFix Project on the communities of Clarksburg and Hood at 81 to 92 dB.

17 In concluding that quiet communities better tolerate intrusive noise, DWR cites the Federal
18 Transit Administration, 2006 (SCDA-81¹⁶.) The Federal Transit document cites an article by
19 Theodore Schultz. The Schultz study is an Acoustical Society article published in August 1978
20 entitled, Synthesis of Social Surveys on Noise Annoyance. (SCDA-77.) This article shows that
21 annoyance studies throughout the world have a similar relationship between LDN and those who
22 are highly annoyed. On Page 384 of this paper, it discusses the effect of existing background noise
23 and defers to predictive systems for community annoyance such as the Composite Noise Rating
24 System and the ISO Standard for Assessment of Noise with respect to Community Response. These
25 documents consider the critical importance of comparing the existing background noise in a
26 community to the sound level and character of the intruding noise. For example, if an existing
27

28 ¹⁶ SCDA-81 is a true and correct copy of excerpts from the 2006 Federal Transit Administration
Transit Noise and Vibration Impact Assessment Manual.

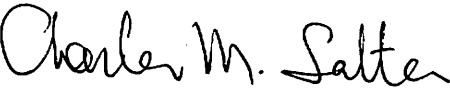
1 ambient consists of traffic noise, intruding pile driver noise obviously has a different character.
2 Thus, these community noise impact assessment systems “penalize” intruding impulsive noise an
3 additional 5 to 12 decibels to account for the difference in sound quality.

4 The significant amount of pile-driving at the Clifton Court Forebay, and the proposed 8 new
5 barge docks scattered throughout the Delta, as shown on SCDA-70–SCDA-73 and SCDA-85, will
6 have a similar negative impact on many recreational users in the vicinity of these construction areas.

7 Based on the foregoing, we strongly recommend that any permit for construction of the
8 California WaterFix facilities be conditioned on using a non-impact method of pile installation.

9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28

Executed this 30th day of November, 2017 at San Francisco, California,


Charles Salter