| Pile Type | Sound Level (single strike) | | |
|---|---|---|---|
| Wood piles:[1] | 180 $dB_{peak}$ | 170 $dB_{RMS}$ | 160 dB SEL |
| Concrete piles:[2] | 192 $dB_{peak}$ | 176 $dB_{RMS}$ | 174 dB SEL |
| Steel H-piles[3]: | 190 $dB_{peak}$ | 175 $dB_{RMS}$ | 155 dB SEL |
| 12-inch steel piles: | 208 dBpeak[4] | 191 dBRMS[5] | 175 dB SEL[6] |
| 14-inch steel piles: | 195 $dB_{peak}$ @ 30m[7] | 180 $dB_{RMS}$ @ 30m[8] | |
| 16-inch steel piles[8]: | 200 $dB_{peak}$@ 9 m | 187 $dB_{RMS}$ @ 9m | |
| 24-inch steel piles[9]: | 212 $dB_{peak}$ | 189 $dB_{RMS}$ | 181 dB SEL |
| 30-inch steel piles[10]: | 212 $dB_{peak}$ | 195 $dB_{RMS}$ | 186 dB SEL |
| 36-inch steel piles[11]: | 214 $dB_{peak}$ | 201 $dB_{RMS}$ | 186 dB SEL |
| 60-inch dia. steel piles[12]: | 210 $dB_{peak}$ | 195 $dB_{RMS}$ | 185 dB SEL |
| 66-inch dia. steel piles[12]: | 210 $dB_{peak}$ | 195 $dB_{RMS}$ | |
| 96-inch dia. steel piles[12]: | 220 $dB_{peak}$ | 205 $dB_{RMS}$ | 195 dB SEL |
| 126-inch dia. steel piles[12]: | 213 $dB_{peak}$ @ 11m | 202 $dB_{RMS}$ @ 11m | |
| 150-inch dia. steel piles[13]: | 200 $dB_{peak}$ @ 100m | 185 $dB_{RMS}$ @ 100m | |

1. Timber piles, 12-inches in diameter, have been measured underwater by Illingworth and Rodkin and are published in the draft Pile Driving Compendium which as of the date of this update has not yet been released as final. Illingworth and Rodkin (2004) have compared the shape of the sound wave between steel piles and timber piles and found that the timber pile produced a more 'rounded' wave than with steel piles. This means that although the peak sound levels may be similar, the waveform appears more stretched out than for steel piles and the rise time is relatively slower. A slower rise time means that the shock wave produced with each pile strike is not as severe presumably resulting in less damage to the fish. The effect is similar to the difference between a push and a punch.

2. Concrete piles measured had 36-inch diameter and 4 –inch wall thickness (~419 Lbs/ft weight per unit length (MacGillivray et al. 2007). Concrete piles with 24-inch diameter have been measured by POV, and sound levels range between 190 dBpeak and 205 dBpeak (DesJardin 2003 pers. comm..). While there have been no documented fish kills with the installation of concrete piles, the Services may require sound mitigation strategies or monitoring because of the lack of formally documented effects (CalTrans 2003 personal communication).

3. Illingworth and Rodkin, pers. comm. (2004). Illingworth and Rodkin (2004 personal communication) measured 10-inch steel H-piles in a slough approximately 6 feet deep at 10 meter distance from the pile to range between 180 – 195 dB (160-177 dB RMS). They also measured 10-inch steel H-pile at Noyo Bridge with peak levels at 180 dB (165 dB RMS) at 30 meters from the pile. An H-pile driven on shore next to the water produced peak levels in the water of 170-175 dB (155-162 dB RMS) at 23 meters from the pile. The measurements at Noyo Bridge were highly variable due to the shallow water.

4. Illingworth and Rodkin (2002).

5. CalTrans (2003 personal communication) has measured the sound energy emanating from driving 12-inch diameter steel piles to range between 180 – 190 dB, and 14-inch diameter steel piles to range between 195 and 200 dB. Vibratory driving has been shown to be 10 – 20 dB lower than impact driving steel piles of similar diameter (CalTrans 2003 personal communication).

6 Laughlin (2006).

7.. Reyff (2003).

8. Laughlin, Jim. 2004. Underwater Sound Levels Associated with the Construction of the SR 240 Bridge on the Yakima River at Richland. WSDOT, Office of Air Quality and Noise, Seattle, WA. September 2004. 33 pages.

9. Laughlin (2005a).

10. Laughlin (2005b).

11. Laughlin (2007).

12. Reyff (2003).

13. Reyff (2003).