

Appendix D

Special Status Species Potentially Present in the Study Area

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

Location

San Joaquin County, California



Local office

San Francisco Bay-Delta Fish And Wildlife

☎ (916) 930-5603

📅 (916) 930-5654

650 Capitol Mall

Suite 8-300
Sacramento, CA 95814

NOT FOR CONSULTATION

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species¹ and their critical habitats are managed by the [Ecological Services Program](#) of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries²).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact [NOAA Fisheries](#) for [species under their jurisdiction](#).

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1. Species listed under the [Endangered Species Act](#) are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the [listing status page](#) for more information. IPaC only shows species that are regulated by USFWS (see FAQ).
 2. [NOAA Fisheries](#), also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Mammals

NAME	STATUS
Riparian Brush Rabbit <i>Sylvilagus bachmani riparius</i> Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/6189	Endangered

Reptiles

NAME	STATUS
Giant Garter Snake <i>Thamnophis gigas</i> Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/4482	Threatened
Northwestern Pond Turtle <i>Actinemys marmorata</i> Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/1111	Proposed Threatened

Amphibians

NAME	STATUS
California Tiger Salamander <i>Ambystoma californiense</i> There is final critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/2076	Threatened
Western Spadefoot <i>Spea hammondi</i> No critical habitat has been designated for this species.	Proposed Threatened

Fishes

NAME	STATUS
Longfin Smelt <i>Spirinchus thaleichthys</i> There is proposed critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/9011	Endangered

Insects

NAME	STATUS
Monarch Butterfly <i>Danaus plexippus</i> Wherever found There is proposed critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/9743	Proposed Threatened
Valley Elderberry Longhorn Beetle <i>Desmocerus californicus dimorphus</i> Wherever found There is final critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/7850	Threatened

Crustaceans

NAME	STATUS
Vernal Pool Fairy Shrimp <i>Branchinecta lynchi</i> Wherever found There is final critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/498	Threatened
Vernal Pool Tadpole Shrimp <i>Lepidurus packardii</i> Wherever found There is final critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/2246	Endangered

Flowering Plants

NAME	STATUS
Large-flowered Fiddleneck <i>Amsinckia grandiflora</i> Wherever found There is final critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/5558	Endangered

Wherever found

No critical habitat has been designated for this species.

<https://ecos.fws.gov/ecp/species/1616>

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

This location overlaps the critical habitat for the following species:

NAME	TYPE
Delta Smelt <i>Hypomesus transpacificus</i>	Final
For information on why this critical habitat appears for your project, even though Delta Smelt is not on the list of potentially affected species at this location, contact the local field office. https://ecos.fws.gov/ecp/species/321#crithab	

Bald & Golden Eagles

Bald and Golden Eagles are protected under the Bald and Golden Eagle Protection Act ² and the Migratory Bird Treaty Act (MBTA) ¹. Any person or organization who plans or conducts activities that may result in impacts to Bald or Golden Eagles, or their nests, should follow appropriate regulations and implement required avoidance and minimization measures, as described in the various links on this page.

The [data](#) in this location indicates that no eagles have been observed in this area. This does not mean eagles are not present in your project area, especially if the area is difficult to survey. Please review the 'Steps to Take When No Results Are Returned' section of the [Supplemental Information on Migratory Birds and Eagles document](#) to determine if your project is in a poorly surveyed area. If it is, you may need to rely on other resources to determine if eagles may be present (e.g. your local FWS field office, state surveys, your own surveys).

Additional information can be found using the following links:

- Eagle Management <https://www.fws.gov/program/eagle-management>
- Measures for avoiding and minimizing impacts to birds
<https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds>
- Nationwide avoidance and minimization measures for birds
<https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation->

[measures.pdf](#)

- Supplemental Information for Migratory Birds and Eagles in IPaC

<https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action>

Bald & Golden Eagles FAQs

What does IPaC use to generate the potential presence of bald and golden eagles in my specified location?

The potential for eagle presence is derived from data provided by the [Avian Knowledge Network \(AKN\)](#). The AKN data is based on a growing collection of [survey, banding, and citizen science datasets](#) and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are an eagle ([Bald and Golden Eagle Protection Act](#) requirements may apply).

Proper interpretation and use of your eagle report

On the graphs provided, please look carefully at the survey effort (indicated by the black vertical line) and for the existence of the "no data" indicator (a red horizontal line). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort line or no data line (red horizontal) means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list and associated information help you know what to look for to confirm presence and helps guide you in knowing when to implement avoidance and minimization measures to eliminate or reduce potential impacts from your project activities or get the appropriate permits should presence be confirmed.

How do I know if eagles are breeding, wintering, or migrating in my area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating, or resident), you may query your location using the [RAIL Tool](#) and view the range maps provided for birds in your area at the bottom of the profiles provided for each bird in your results. If an eagle on your IPaC migratory bird species list has a breeding season associated with it (indicated by yellow vertical bars on the phenology graph in your "IPaC PROBABILITY OF PRESENCE SUMMARY" at the top of your results list), there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

Interpreting the Probability of Presence Graphs

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. A taller bar indicates a higher probability of species presence. The survey effort can be used to establish a level of confidence in the presence score.

How is the probability of presence score calculated? The calculation is done in three steps:

The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.

To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is $0.25/0.25 = 1$; at week 20 it is $0.05/0.25 = 0.2$.

The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

Breeding Season ()

Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort ()

Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps.

No Data ()

A week is marked as having no data if there were no survey events for that week.

Survey Timeframe

Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.

Migratory birds

The Migratory Bird Treaty Act (MBTA) ¹ prohibits the take (including killing, capturing, selling, trading, and transport) of protected migratory bird species without prior authorization by the Department of Interior U.S. Fish and Wildlife Service (Service).

1. The [Migratory Birds Treaty Act](#) of 1918.
2. The [Bald and Golden Eagle Protection Act](#) of 1940.

Additional information can be found using the following links:

- Eagle Management <https://www.fws.gov/program/eagle-management>
- Measures for avoiding and minimizing impacts to birds
<https://www.fws.gov/library/collections/avoiding-and-minimizing-incident-take-migratory-birds>
- Nationwide avoidance and minimization measures for birds
- Supplemental Information for Migratory Birds and Eagles in IPaC
<https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action>

Measures for Proactively Minimizing Migratory Bird Impacts

Your IPaC Migratory Bird list showcases [birds of concern](#), including [Birds of Conservation Concern \(BCC\)](#), in your project location. This is not a comprehensive list of all birds found in your project area. However, you can help proactively minimize significant impacts to all birds at your project location by implementing the measures in the [Nationwide avoidance and minimization measures for birds](#) document, and any other project-specific avoidance and minimization measures suggested at the link [Measures for avoiding and minimizing impacts to birds](#) for the birds of concern on your list below.

Ensure Your Migratory Bird List is Accurate and Complete

If your project area is in a poorly surveyed area, your list may not be complete and you may need to rely on other resources to determine what species may be present (e.g. your local FWS field office, state surveys, your own surveys). Please review the [Supplemental Information on Migratory Birds and Eagles document](#), to help you properly interpret the report for your specified location, including determining if there is sufficient data to ensure your list is accurate.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, see the "Probability of Presence Summary" below to see when these birds are most likely to be present and breeding in your project area.

Review the FAQs

The FAQs below provide important additional information and resources.

NAME	BREEDING SEASON
Belding's Savannah Sparrow <i>Passerculus sandwichensis</i> <i>beldingi</i> This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/8	Breeds Apr 1 to Aug 15
Bullock's Oriole <i>Icterus bullockii</i> This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds Mar 21 to Jul 25
California Gull <i>Larus californicus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Mar 1 to Jul 31
Clark's Grebe <i>Aechmophorus clarkii</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Jun 1 to Aug 31

Common Yellowthroat <i>Geothlypis trichas sinuosa</i>	Breeds May 20 to Jul 31
This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/2084	
Lawrence's Goldfinch <i>Spinus lawrencei</i>	Breeds Mar 20 to Sep 20
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9464	
Northern Harrier <i>Circus hudsonius</i>	Breeds Apr 1 to Sep 15
This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/8350	
Nuttall's Woodpecker <i>Dryobates nuttallii</i>	Breeds Apr 1 to Jul 20
This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/9410	
Oak Titmouse <i>Baeolophus inornatus</i>	Breeds Mar 15 to Jul 15
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9656	
Olive-sided Flycatcher <i>Contopus cooperi</i>	Breeds May 20 to Aug 31
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/3914	
Santa Barbara Song Sparrow <i>Melospiza melodia graminea</i>	Breeds Mar 1 to Sep 5
This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/5513	
Tricolored Blackbird <i>Agelaius tricolor</i>	Breeds Mar 15 to Aug 10
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/3910	

Western Grebe *aechmophorus occidentalis*

Breeds Jun 1 to Aug 31

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

<https://ecos.fws.gov/ecp/species/6743>

Western Screech-owl *Megascops kennicottii cardonensis*

Breeds Mar 1 to Jun 30

This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA

Wrentit *Chamaea fasciata*

Breeds Mar 15 to Aug 10

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Yellow-billed Magpie *Pica nuttalli*

Breeds Apr 1 to Jul 31

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

<https://ecos.fws.gov/ecp/species/9726>

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read "[Supplemental Information on Migratory Birds and Eagles](#)", specifically the FAQ section titled "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the

3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

Breeding Season (🟡)

Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (I)

Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

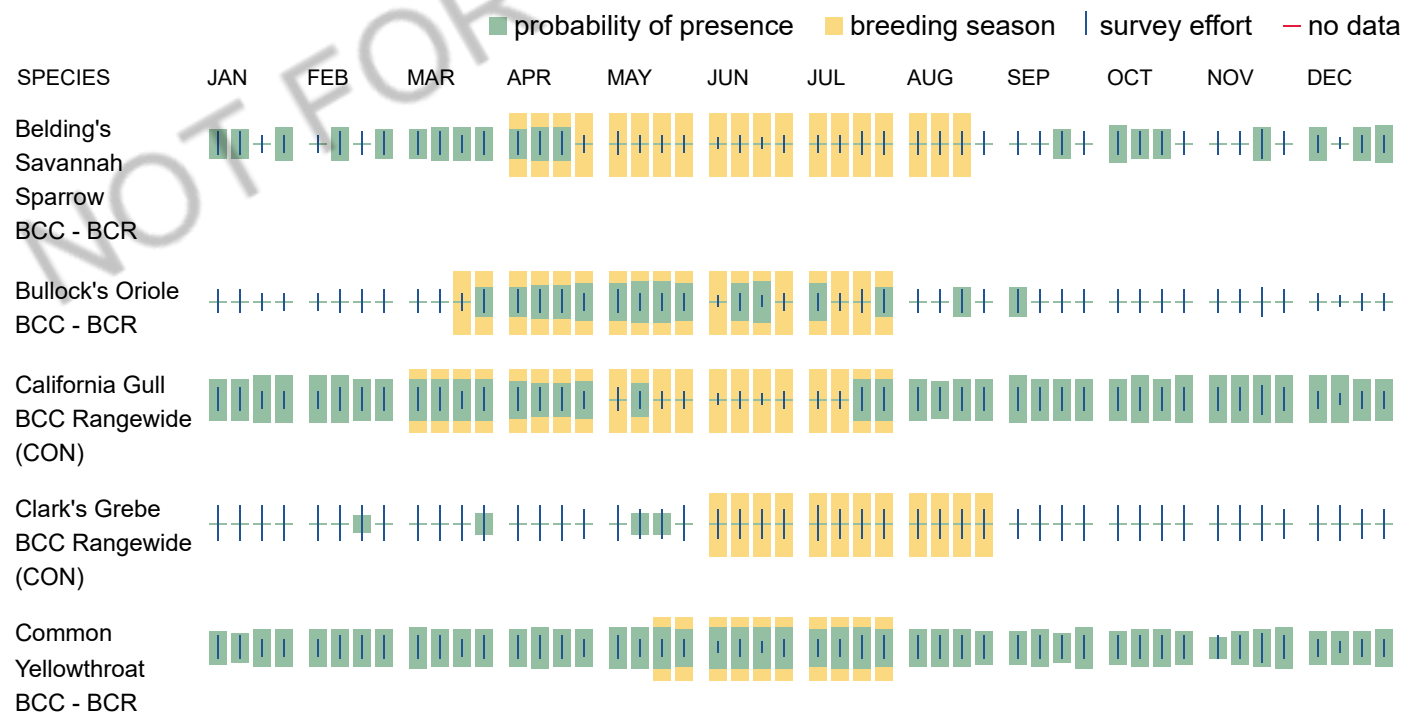
To see a bar's survey effort range, simply hover your mouse cursor over the bar.

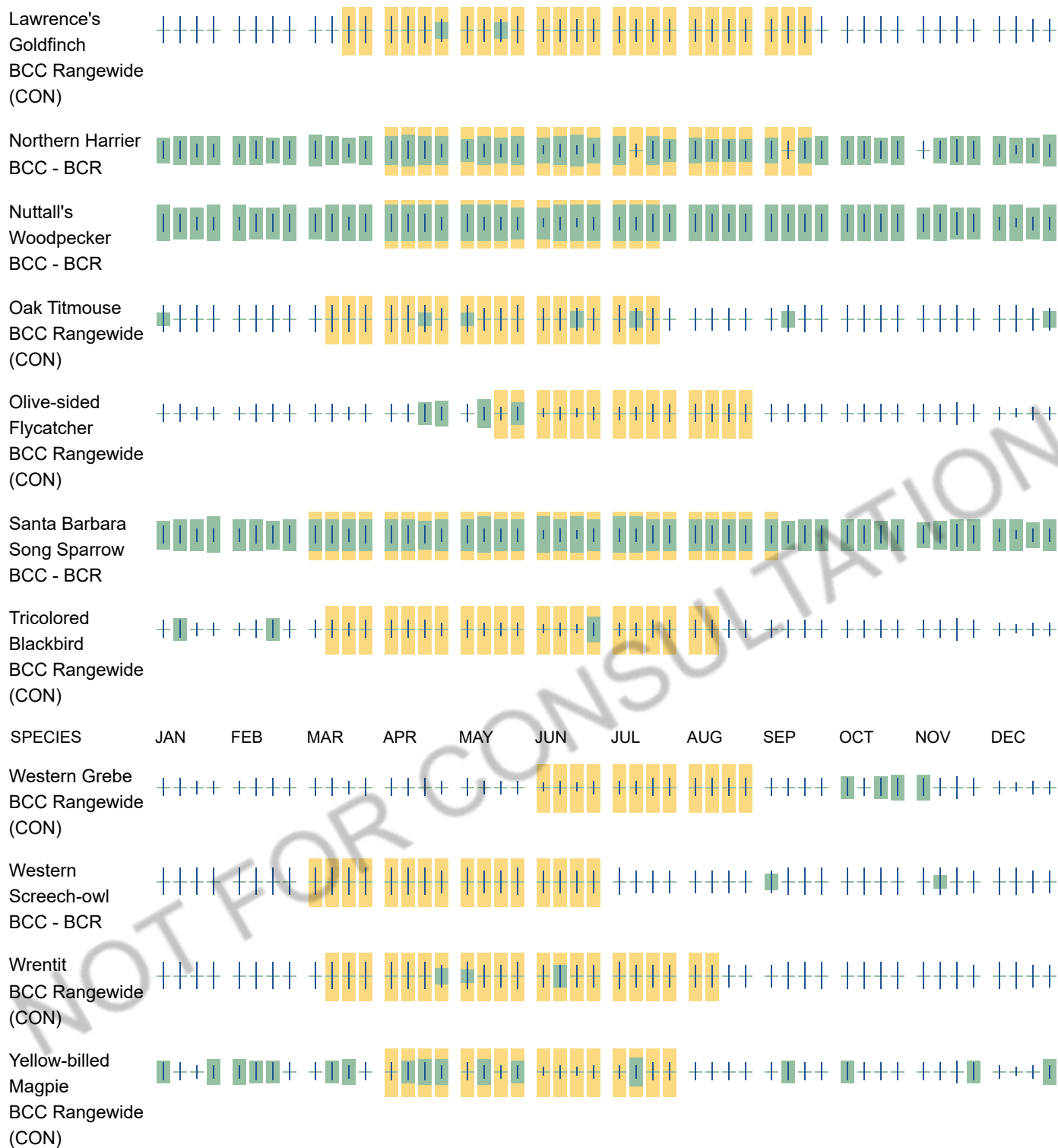
No Data (—)

A week is marked as having no data if there were no survey events for that week.

Survey Timeframe

Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.





Migratory Bird FAQs

Tell me more about avoidance and minimization measures I can implement to avoid or minimize impacts to migratory birds.

[Nationwide Avoidance & Minimization Measures for Birds](#) describes measures that can help avoid and minimize impacts to all birds at any location year-round. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is one of the most effective ways to minimize impacts. To see

when birds are most likely to occur and breed in your project area, view the Probability of Presence Summary. [Additional measures](#) or [permits](#) may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the list of migratory birds that potentially occur in my specified location?

The Migratory Bird Resource List is comprised of [Birds of Conservation Concern \(BCC\)](#) and other species that may warrant special attention in your project location, such as those listed under the Endangered Species Act or the [Bald and Golden Eagle Protection Act](#) and those species marked as “Vulnerable”. See the FAQ “What are the levels of concern for migratory birds?” for more information on the levels of concern covered in the IPaC migratory bird species list.

The migratory bird list generated for your project is derived from data provided by the [Avian Knowledge Network \(AKN\)](#). The AKN data is based on a growing collection of [survey, banding, and citizen science datasets](#) and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) with which your project intersects. These species have been identified as warranting special attention because they are BCC species in that area, an eagle ([Bald and Golden Eagle Protection Act](#) requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, and to verify survey effort when no results present, please visit the [Rapid Avian Information Locator \(RAIL\) Tool](#).

Why are subspecies showing up on my list?

Subspecies profiles are included on the list of species present in your project area because observations in the AKN for **the species** are being detected. If the species are present, that means that the subspecies may also be present. If a subspecies shows up on your list, you may need to rely on other resources to determine if that subspecies may be present (e.g. your local FWS field office, state surveys, your own surveys).

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the [Avian Knowledge Network \(AKN\)](#). This data is derived from a growing collection of [survey, banding, and citizen science datasets](#).

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go to the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, or migrating in my area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating, or resident), you may query your location using the [RAIL Tool](#) and view the range maps provided for birds in your area at the bottom of the profiles provided for each bird in your results. If a bird on your IPaC migratory bird species list has a breeding season associated with it (indicated by yellow vertical bars on the phenology graph in

your "IPaC PROBABILITY OF PRESENCE SUMMARY" at the top of your results list), there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are [Birds of Conservation Concern](#) (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the [Bald and Golden Eagle Protection Act](#) requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially BCC species. For more information on avoidance and minimization measures you can implement to help avoid and minimize migratory bird impacts, please see the FAQ "Tell me more about avoidance and minimization measures I can implement to avoid or minimize impacts to migratory birds".

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the [Northeast Ocean Data Portal](#). The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the [NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf](#) project webpage.

Proper interpretation and use of your migratory bird report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please look carefully at the survey effort (indicated by the black vertical line) and for the existence of the "no data" indicator (a red horizontal line). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list does not represent all birds present in your project area. It is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list and associated information help you know what to look for to confirm presence and helps guide implementation of avoidance and minimization measures to eliminate or reduce potential impacts from your project activities, should presence be confirmed. To learn more about avoidance and minimization measures, visit the FAQ "Tell me about avoidance and minimization measures I can implement to avoid or minimize impacts to migratory birds".

Interpreting the Probability of Presence Graphs

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. A taller bar indicates a higher probability of species presence. The survey effort can be used to establish a level of confidence in the presence score.

How is the probability of presence score calculated? The calculation is done in three steps:

The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.

To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is $0.25/0.25 = 1$; at week 20 it is $0.05/0.25 = 0.2$.

The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

Breeding Season ()

Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort ()

Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps.

No Data ()

A week is marked as having no data if there were no survey events for that week.

Survey Timeframe

Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.

Facilities

Wildlife refuges and fish hatcheries

Refuge and fish hatchery information is not available at this time

Wetlands in the National Wetlands Inventory (NWI)

Impacts to [NWI wetlands](#) and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local [U.S. Army Corps of Engineers District](#).

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

This location overlaps the following wetlands:

RIVERINE

[R1UBTx](#)

A full description for each wetland code can be found at the [National Wetlands Inventory website](#)

NOTE: This initial screening does **not** replace an on-site delineation to determine whether wetlands occur. Additional information on the NWI data is provided below.

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters.

Some deepwater reef communities (coral or tubercid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate Federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

NOT FOR CONSULTATION

Appendix A
CNDDDB Export Table

Scientific Name	Common Name	Taxonomic Group	Federal Status	California Status	Habitats	General Habitat	Micro Habitats	Likelihood of Occurrence in Action Area
Spirinchus thaleichthys pop. 2	longfin smelt - San Francisco Bay-Delta DPS	Fish	Endangered	Threatened	Aquatic Estuary Marine bay Sacramento/San Joaquin flowing waters	Pelagic and anadromous within the Sacramento-San Joaquin River Delta, San Francisco Bay, and Gulf of the Farallones. Spawns in lower freshwater reaches of Sacramento and San Joaquin Rivers. First year in Suisun Bay; later SF Bay or Gulf of the Farallones.	Occurs in salinities ranging from pure freshwater to pure saltwater; typically salinities ranging from 14-28 parts per thousand (ppt). Generally occupies water temperatures from 61-68F, with spawning occurring in water temperatures from 41-58F.	Low to Moderate
Acipenser medirostris pop. 1	green sturgeon - southern DPS	Fish	Threatened	None	Aquatic Estuary Marine bay Sacramento/San Joaquin flowing waters	Spawning site fidelity. Spawns in the Sacramento, Feather and Yuba Rivers. Presence in upper Stanislaus and San Joaquin Rivers may indicate spawning. Non-spawning adults occupy marine/estuarine waters. Delta Estuary is important for rearing juveniles.	Spawning occurs primarily in cool (11-15 C) sections of mainstem rivers in deep pools (8-9 meters) with substrate containing small to medium sized sand, gravel, cobble, or boulder.	Low to Moderate
Hypomesus transpacificus	Delta smelt	Fish	Threatened	Endangered	Aquatic Estuary	Sacramento-San Joaquin Delta. Seasonally in Suisun Bay, Carquinez Strait and San Pablo Bay.	Seldom found at salinities > 10 ppt. Most often at salinities < 2ppt.	Low to Moderate
Oncorhynchus mykiss irideus pop. 11	steelhead - Central Valley DPS	Fish	Threatened	None	Aquatic Sacramento/San Joaquin flowing waters	Populations in the Sacramento and San Joaquin rivers and their tributaries.		Low to Moderate
Thamnophis gigas	giant gartersnake	Reptiles	Threatened	Threatened	Marsh & swamp Riparian scrub Wetland	Prefers freshwater marsh and low gradient streams. Has adapted to drainage canals and irrigation ditches.	This is the most aquatic of the gartersnakes in California.	None
Desmocerus californicus dimorphus	valley elderberry longhorn beetle	Insects	Threatened	None	Riparian scrub	Occurs only in the Central Valley of California, in association with blue elderberry (Sambucus mexicana).	Prefers to lay eggs in elderberries 2-8 inches in diameter; some preference shown for "stressed" elderberries.	None
Actinemys marmorata	northwestern pond turtle	Reptiles	Proposed Threatened	None				None
Lepidurus packardi	vernal pool tadpole shrimp	Crustaceans	Endangered	None	Valley & foothill grassland Vernal pool Wetland	Inhabits vernal pools and swales in the Sacramento Valley containing clear to highly turbid water.	Pools commonly found in grass-bottomed swales of unplowed grasslands. Some pools are mud-bottomed and highly turbid.	None
Sylvilagus bachmani riparius	riparian brush rabbit	Mammals	Endangered	Endangered	Riparian forest	Riparian areas on the San Joaquin River in northern Stanislaus County.	Dense thickets of wild rose, willows, and blackberries.	None
Vireo bellii pusillus	least Bell's vireo	Birds	Endangered	Endangered	Riparian forest Riparian scrub Riparian woodland	Summer resident of Southern California in low riparian in vicinity of water or in dry river bottoms; below 2000 ft.	Nests placed along margins of bushes or on twigs projecting into pathways, usually willow, Baccharis, mesquite.	None
Spea hammondi	western spadefoot	Amphibians	Proposed Threatened	None	Cismontane woodland Coastal scrub Valley & foothill grassland Vernal pool Wetland	Occurs primarily in grassland habitats, but can be found in valley-foothill hardwood woodlands.	Vernal pools are essential for breeding and egg-laying.	None
Ambystoma californiense pop. 1	California tiger salamander - central California DPS	Amphibians	Threatened	Threatened	Cismontane woodland Meadow & seep Riparian woodland Valley & foothill grassland Vernal pool Wetland	Lives in vacant or mammal-occupied burrows throughout most of the year; in grassland, savanna, or open woodland habitats.	Need underground refuges, especially ground squirrel burrows, and vernal pools or other seasonal water sources for breeding.	None

Attachment 2

Bioacoustics Evaluation

Memorandum

April 3, 2026

To: Ed Williams, Eagle Materials

From: Delaney Inman and Michelle Havey, Anchor QEA

Re: Nevada Cement Company LLC Stockton Terminal Modernization Project Bioacoustics Evaluation

Introduction

The *Nevada Cement Company LLC Stockton Terminal Modernization Project* (the Proposed Action) includes pile driving to support rehabilitation of Berth 3/4, the replacement of Bunkers 6 and 7, and the installation of new foundations to support structures as described in the *Biological Assessment* (BA), prepared to assess potential effects on federal endangered species. Underwater noise from pile driving has the potential to adversely affect fish and marine mammals. Both the California Department of Fish and Wildlife (CDFW) and National Marine Fisheries Service (NMFS) require that the effects of underwater noise from construction on fish and marine mammals be evaluated as part of the permitting process. This memorandum presents a summary of the bioacoustics evaluation conducted to assess the Proposed Action's potential underwater noise impacts from pile driving on fish and marine mammals potentially present in the action area.

Key Project Components

As described in the BA, 24-inch steel pipe piles would be installed with a vibratory hammer, and 16-inch concrete piles would be installed with an impact hammer. To comply with the approved in-water work window for salmonoids in the action area, pile driving would occur only between July 1 and November 30. The bioacoustics evaluation presented here is based on a worst-case scenario: it includes modeling of a combination of the most noise-intensive pile types, the highest possible number of piles per day, and multiple 16-inch concrete piles being installed landside at the same time. A summary of piles planned for installation is presented in Table 1. The location of permanent piles is shown in Figures 1 through 8.

The Proposed Action includes avoidance and minimization measures specifically addressing potential adverse effects to aquatic habitats and species from pile installation. These measures include the following:

- Any in-water construction activities (i.e., pile driving) would occur during the approved environmental work window (July 1 to November 30) over 3 years to be protective of special status species.

- Construction would take place 6 days a week during daylight hours and would not exceed 10 hours per day.
- To reduce potential impacts from noise due to pile driving, the Proposed Action would implement one or more of the following, as needed:
 - Use vibratory methods for installation of piles to the extent practicable.
 - Implement a soft-start technique.
 - Use a bubble curtain or cushion block if an impact hammer is employed.

It should be noted that the area of impact occurs in an area under regular use for commercial marine transportation.

Table 1
Proposed Action Pile Details

Temporary or Permanent	Pile Diameter/ Sheet Thickness (inches)	Pile Material	Installation Method	Approximate Water Depth (meters) at Installation Location ¹	Attenuation Method	Number of Piles	Piles Per Day ²	Number of Days	Estimated Number of Impact Strikes for Each Pile Type ²	Vibratory Minutes for Each Pile Type (per day) ²
Permanent	24-inch	Steel pipe (batter piles)	Vibratory	10.6	None	75	2	38	n/a	60
Permanent (in-water)	16-inch	Square concrete	Impact	4.7	Bubble curtain and wood cushion blocks	95	2 to 4	24 to 48	270	n/a
Permanent (landside remote)	16-inch	Square concrete	Impact	30.5 to 61 meters from waterline	Wood cushion blocks	76	4 to 5	16 to 19	350	n/a
Permanent (landside dome)	16-inch	Square concrete	Impact	30.5 to 61 meters from waterline	Wood cushion blocks	1,642 ³	10 to 20	83 to 165	350	n/a

Notes:

1. Approximate depth or range of depths at high tide.
2. Piles per day, minutes, and strikes per pile are approximate, based on input from the project engineer.
3. Project design shows that 1,856 16-inch concrete piles will be installed landside. Of the 1,856 piles, 76 are remote piles and 1,780 are dome piles. 138 of these dome piles are more than 200 feet from the waterline and are therefore not included in this analysis.

Vibratory hammers generally produce less sound than impact hammers and are often employed as an avoidance measure to reduce the potential for adverse effects on fish that can result from impact pile driving. There are no established injury or behavioral criteria for fish from vibratory pile driving, as resource agencies have not identified adverse effects on fish resulting from vibratory pile driving (Caltrans 2020). Thus, formal fish analyses presented in this memorandum are limited to effects from impact hammer installation. Potential behavioral effects from vibratory hammer installation have also been provided for reference.

Acoustic Criteria

Fish

Acoustic criteria intended to protect fish from harm and mortality due to pile-driving activities were adopted by the California Department of Transportation (Caltrans), the Federal Highway Administration, CDFW, the U.S. Fish and Wildlife Service, and the National Oceanic and Atmospheric Administration (NOAA) Fisheries Northwest and Southwest Regions in 2008 (Fisheries Hydroacoustic Working Group 2008). These criteria are referred to as “interim injury criteria,” and NOAA Fisheries routinely uses these criteria to evaluate underwater noise impact thresholds for pile-driving noise impacts to fish, as listed in Table 2.

Table 2
NOAA Fisheries Fish Injury and Behavior Thresholds (Impact Pile Driving)

Injury		Behavior
Peak	Cumulative SEL	
206 dB (all fish)	• 187 dB (fish size of 2 grams or more) • 183 dB (fish size of less than 2 grams)	150 dB RMS (all fish)

Notes:

Source: Fisheries Hydroacoustic Working Group 2008

dB: decibel

RMS: root-mean-square

SEL: sound exposure level

NOAA Fisheries developed a worksheet titled “NMFS Multi-Species Pile Driving Calculator” to calculate the distances within which various injury criteria are exceeded (NOAA 2025). A worksheet was completed for each of the Proposed Action’s pile-driving activities; these worksheets are provided as Attachment 1. This worksheet also provides an informal behavioral threshold for fish during vibratory pile driving. This threshold is 150 decibel (dB) root-mean-square (RMS) for all fish, the same as for impact hammer installation. As mentioned above, these isopleths are provided for reference in sections below but are not formal. The Analysis Methods section of this memorandum describes how the required variables were determined for the Proposed Action.

Marine Mammals

In 2018, NMFS produced advanced acoustic threshold determination guidance for marine mammals to evaluate potential exposure to injurious and disturbance levels of sound, referred to as Levels A and B, respectively (NOAA 2018). This guidance specifies methodologies for determining the received levels, or acoustic thresholds, at which marine mammals are expected to experience temporary or permanent shifts in hearing sensitivity due to acute, incidental exposure to underwater anthropogenic noise.

Level A Impacts

The determination of the permanent hearing threshold shifts (PTS) onset isopleths (i.e., injury distances) in this memorandum is based on the “NMFS Multi-Species Pile Driving Calculator” referenced above (NOAA 2025). Sound source levels are measured as either peak sound pressure level (peak) or cumulative sound exposure level (SEL) for impulsive sound and as SEL for non-impulsive sound. Table 3 identifies the impact pile driving and vibratory pile driving acoustic thresholds established in the 2018 guidance for each hearing group for onset of PTS.

The Multi-Species Pile Driving Calculator (NOAA 2025) includes several methods for calculating the PTS isopleth distances of various marine mammal hearing groups based on noise levels generated by impulsive (i.e., impact) or non-impulsive (i.e., vibratory) pile driving. The variables used in the Multi-Species Pile Driving Calculator (NOAA 2025) include the following: pile-driving source sound level, number of piles per day, activity duration (number of strikes or minutes of pile driving), and transmission loss. Worksheets were completed for the Proposed Action’s pile-driving activities; these worksheets are provided as Attachment 1. The Analysis Methods section describes how the required variables were determined for the Proposed Action.

The only marine mammal that has potential to occur in the action area is the harbor seal, a member of the phocid pinniped hearing group. Thus, the acoustic threshold is only presented for phocid pinnipeds in subsequent sections of this memo.

Table 3
NOAA Fisheries In-Water Level A Acoustic Thresholds (PTS Onset) for Marine Mammals

Criterion	Level A Hearing Groups, PTS Onset (Received Sound Level)
	Phocid Pinnipeds (e.g., Harbor Seal)
Impulsive Sound Source (Impact Pile Driving)	
Peak	218 dB
Cumulative SEL	185 dB
Non-Impulsive Sound Source (Vibratory Pile Driving)	
Cumulative SEL	201 dB

Notes:

Source: NOAA 2018

The recommended accumulation period is 24 hours.

Dual Thresholds (impulsive): Use one resulting in largest effect distance (isopleth).

SEL thresholds incorporate frequency weighting functions.

All dBs are referenced to 1 micro Pascal (re: 1uPa).

Level B Impacts

The determination of the disturbance isopleths (i.e., behavioral distances) in this memorandum is based on the output of a 15 log *R* practical (or semicylindrical) spreading loss (PSL) model also presented in the Multi-Species Pile Driving Calculator (NOAA 2025). Table 4 identifies the impact pile driving and vibratory steel sheet driving acoustic thresholds established in the 2018 guidance (NOAA 2018) for marine mammals. The PSL model calculates the distance to pile-driving disturbance thresholds based on noise levels generated by impulsive (i.e., impact) or non-impulsive (i.e., vibratory) pile driving. The variables used in the PSL model include the site ambient sound level (if available), source sound level, and transmission loss. The PSL model worksheet was completed for the Proposed Action's pile-driving activities (Attachment 1). The Analysis Methods section describes how the required variables were determined for the Proposed Action.

Table 4
NOAA Fisheries In-Water Level B Acoustic Thresholds (Behavioral Disturbance) for Marine Mammals

Marine Mammals	Impact Pile Driving Disturbance Threshold ¹	Vibratory Pile Driving Disturbance Threshold ¹
Cetaceans	160 dB RMS	120 dB RMS
Pinnipeds		

Notes:

Source: NOAA 2018

All decibels are referenced to 1 micro Pascal (re: 1uPa).

1. Based on NOAA Fisheries guidance (NOAA 2018).

In-Air Noise

There is a possibility that harbor seals will haul out or come out of the water to rest on land during pile driving activities. Because there are no established in-air behavioral or injury disturbance thresholds for marine mammals, the in-air harassment zone for harbor seals was conservatively defined as the area in which pile-driving noise has not yet attenuated to ambient sound levels. Based on noise studies, airborne sound from a single source (i.e., a “point” source) radiates uniformly outward in a spherical pattern as it travels away from the source. In this memorandum, the determination of the in-air noise zone is based on the output of the formula shown in Equation 1, which calculates construction noise levels at specific distances from a point-source sound. The Analysis Methods section describes how the variables required for this formula were determined for the Proposed Action.

Equation 1

$$L_{max} = L_{max,50\ ft} - 25 \cdot \log(D/D_0)$$

where:

L_{max} = highest A-weighted sound level occurring during noise event while noise is being measured

$L_{max,50\ ft}$ = highest A-weighted sound level measured for construction activities at the reference distance of 50 feet

D = distance from noise source

D_0 = reference measurement distance of 50 feet

Analysis Methods

Source Sound Levels

Source sound levels for pile driving were obtained from the *Technical Guidance for Assessment and Mitigation of the Hydroacoustic Effects of Pile Driving on Fish: Appendix I, Compendium of Pile Driving Sound Data* (compendium; Caltrans 2020). The compendium includes pile-driving noise monitoring data for a variety of pile sizes installed at projects in California, Oregon, Washington, Alaska, New York, Nebraska, Hawaii, Florida, Virginia, and Idaho. The compendium was reviewed to identify projects with comprehensive noise monitoring data for pile driving most similar to that of the Proposed Action (i.e., projects in close proximity or having similar pile-driving depths and with peak, cumulative SEL, and RMS monitoring data).

As detailed in Table 1, pile installation water depths vary from 4.7 to 10.6 meters. The 24-inch steel batter piles will be installed in approximately 10.6 meters of water, while the 16-inch concrete piles

installed in water will be placed in approximately 4.7 meters of water. Additionally, 1,856 16-inch concrete piles will be installed landside, 1,718 of which are located between 100 and 200 feet of the waterline. Caltrans guidance recommends that piles driven within 200 feet of the water be evaluated for underwater effects to fish and marine mammals; therefore, these piles are analyzed in this report (Caltrans 2020).

There are limited data for piles driven on land. The existing data suggest that, in most cases, underwater noise levels generated by pile driving on land are lower than those generated by pile driving directly into water, primarily due to decoupling of the pile surface from the water. The attenuation rate normally assumed for hydroacoustic analysis is 4.5 dB per doubling of distance; however, attenuation through the ground is greater than that in water, ranging from 6.0 dB for hard rocky soil or industrial areas to 8.4 dB for soft silty or sandy soils. The landside piles for this project will be driven in a developed, rocky, industrial area; therefore, the 6.0-dB attenuation rate is most appropriate. Using Equation 4-1 from the compendium, this equates to an attenuation factor, or transmission loss constant, of 20 (CalTrans 2020). Accordingly, an attenuation factor, or transmission loss constant, of 20 was applied in the analysis rather than the standard transmission loss constant of 15 typically used for in-water pile driving (Attachment 1).

An air bubble curtain is a commonly used device for reducing underwater noise levels during in-water pile driving. Air bubble curtains may be confined, which are most often used in situations where there is potential for high-water current velocities, or unconfined. Unconfined systems, such as the system proposed for this project, are appropriate for low-current areas. Unconfined bubble curtain systems have achieved attenuation ranging from 5 to 30 dB, depending on factors such as whether the system is multiple or single stage, its configuration relative to the piles, and currents. Due to this range of results, no specific sound level reduction is recommended in the compendium. Therefore, this memorandum applies the most conservative estimate of a 5-dB reduction from the use of a bubble curtain during installation of the waterside 16-inch concrete piles.

The Washington State Department of Transportation (2006) conducted a study to evaluate the effectiveness of several cushion-block material types in reducing underwater sound generation during the driving of 12-inch-diameter steel pipe piles. The study results showed reductions in sound levels relative to having no cushion block in place from 4 to 5 dB (nylon cushion blocks) up to 11 to 26 dB (wood cushion blocks). However, no specific sound level reduction is recommended in the compendium (Caltrans 2020) due to the limited nature of the study. Accordingly, this memorandum, does not assume any reduction from use of a wood cushion block for the installation of 16-inch concrete piles, either waterside or landside.

24-Inch-Diameter Steel Pipe Batter Piles

The most comparable source sound level data for impact hammer installation of 24-inch-diameter steel pipe piles included in the compendium were collected during construction of the Prichard Lake

Pumping Station (Caltrans 2020). This reference project included installation of 24-inch-diameter steel pipe piles in Sacramento, California (Table 5). This project was selected due to its pile size. There was no project in the compendium with a similar water depth to this project. The pile installation water depth at Prichard Lake Pumping Station ranged from 0.25 to 3 meters.

Table 5
Pile Source Sound Levels (Pile Driving with Impact Hammer)

Pile Type	Source Sound (at 10 Meters)			Attenuation (dB)	Transmission Loss Coefficient
	Peak Sound (dB)	SEL (Single Strike)	RMS (dB)		
24-inch-diameter steel pipe (source sound, no attenuation)	--	0	153	0	15

16-Inch Square Concrete Piles (In-Water)

The most comparable source sound level data for impact hammer installation of 16-inch-square concrete piles included in the compendium were collected during construction of the Westside Boat Launch (Caltrans 2020). This reference project included installation of 16-inch square concrete piles in Bodega Bay, California (Table 6). This project was selected due to its pile size and pile installation water depth of 2 meters, which most closely reflects depths for the Proposed Action's pile locations. A 5-dB reduction was applied for the use of a bubble curtain.

Table 6
Pile Source Sound Levels (Pile Driving with Impact Hammer)

Pile Type	Source Sound (at 10 Meters)			Attenuation (dB)	Transmission Loss Constant
	Peak Sound (dB)	SEL (Single Strike)	RMS (dB)		
16-inch-diameter concrete (source sound, no attenuation)	193	160	168	0	15
16-inch-diameter concrete (source sound, 5-dB attenuation for use of bubble curtain)	188	155	163	5	15

16-Inch-Square Concrete Piles (Landside, Within 200 Feet)

The most comparable source sound level data for impact hammer installation of 16-inch square concrete piles included in the compendium were collected during construction of the Westside Boat Launch (Caltrans 2020). This reference project included installation of 16-inch-diameter concrete piles in Bodega Bay, California (Table 7). This project was selected due to its pile size, which most

closely reflects depths for the Proposed Action's pile locations. There are no reference projects in the compendium where piles are installed landside, so this project, with a water depth of 2 meters, was most appropriate. There is a possibility that two pile driving crews will run simultaneously for this project element. Should this occur, there will be an increase in the noise levels generated by the activity. As necessitated by the rules for decibel addition, a 3 dB increase was applied to the source sound for the possibility of simultaneous installation of two piles (WSDOT 2020). As mentioned above, an attenuation transmission loss constant of 20 was applied for these calculations.

Table 7
Pile Source Sound Levels (Pile Driving with Impact Hammer)

Pile Type	Source Sound (at 10 Meters)			Attenuation (dB)	Transmission Loss Constant
	Peak Sound (dB)	SEL (Single Strike)	RMS (dB)		
16-inch-diameter concrete (source sound, no attenuation)	193	160	168	0	20
16-inch-diameter concrete (source sound, no attenuation, two piles driven simultaneously)	196	163	171	0	20

Pile-Driving In-Air Noise

The Proposed Action occurs in an industrial area, where ambient noise levels are typically higher than in less-developed areas. Common daytime outdoor ambient sound levels for industrial areas have been measured at 67 A-weighted decibels (dBA) and ambient sound levels in high-density urban areas at 78 dBA (Engineering Toolbox 2003, WSDOT 2020). The more conservative ambient noise level of 67 dBA is applied for this analysis. Pile driving, both impact and vibratory, typically generate a noise level of 105 dBA at 50 feet from construction. Pile driving of two piles simultaneously will generate a noise level of 108 dBA at 50 feet from construction, based on the rules for decibel addition referenced above (WSDOT 2020).

Estimated Noise-Generating Assumptions

General Assumptions

NOAA Fisheries worksheets were used to calculate distances to the marine mammal injury (Level A) thresholds shown in Table 3 for vibratory and impact pile driving. The variables used in each Level A evaluation include the source sound levels described in the previous section, the default values listed here, as well as the Proposed Action-specific details outlined in the sections below.

The PSL model was used to calculate the distances to the marine mammal behavioral (Level B) disturbance thresholds shown in Table 4 for vibratory and impact pile driving. The variables used in

each Level B evaluation include the source sound levels described in the previous section, the default values listed here, as well as the Proposed Action-specific details outlined in the sections below.

Vibratory Driving of 24-Inch Steel Pipe Piles

The project engineers provided estimates of the duration to install a single pile and number of piles per day for vibratory installation of 24-inch steel pipe piles. Installation would take 30 minutes per pile, with a maximum of two piles per day installed (sequentially, not simultaneously), for a total maximum duration of 60 minutes of sound production within a 24-hour period over approximately 38 days of pile installation. The bioacoustics evaluation presented herein is based on a worst-case scenario.

Impact Driving of 16-Inch Concrete Piles (In-Water)

The project engineers provided estimates of the duration to install a single pile and number of piles per day for 16-inch concrete piles in-water. Installation would take 270 strikes per pile, with a maximum of four piles per day installed (sequentially, not simultaneously), for a total maximum of 1,080 strikes within a 24-hour period over approximately 24 days of pile installation. The bioacoustics evaluation presented herein is based on a worst-case scenario: it includes modeling the maximum sound production to install ninety-five 16-inch concrete piles in-water.

Impact Driving of 16-Inch Concrete Piles (Landside Remote)

The project engineers provided estimates of the duration to install a single pile and number of piles per day for 16-inch concrete piles above the waterline. Installation would take 350 strikes per pile, with a maximum of 5 piles per day installed, for a total maximum of 1,750 strikes within a 24-hour period over approximately 15 days of pile installation. The bioacoustics evaluation presented herein is based on a worst-case scenario; it includes modeling the maximum sound production to install seventy-six 16-inch concrete piles in the dry.

Impact Driving of 16-Inch Concrete Piles (Landside Dome)

The project engineers provided estimates of the duration to install a single pile and number of piles per day for 16-inch concrete piles above the waterline. Installation would take 350 strikes per pile, with a maximum of 10 to 20 piles per day installed (based on one or two concurrent hammers), for a total maximum of 3,500 to 7,000 strikes within a 24-hour period over 83 to 165 days of pile installation. The bioacoustics evaluation presented herein is based on a worst-case scenario: it includes modeling the maximum sound production to install one thousand six hundred forty-two 16-inch concrete piles in the dry.

Analysis Results

Fish

The variables (i.e., source sound levels, pile strikes per day, and transmission loss) described previously were entered into the NOAA Fisheries worksheets (NOAA 2025) to identify the distances to various fish injury and behavior thresholds for the Proposed Action's pile-driving activities. These results are presented in Table 8 and the pile driving worksheets are included as Attachment 1.

Figures 1 through 4 illustrate the sound pressure radii for physical injury or mortality and behavioral effects to fish from proposed pile-driving activities.

Peak or Cumulative Injury

Although several fish species could be in the vicinity of impact pile driving, the likelihood of injury is proportionate to the low likelihood of presence within the action area and the limit of effects to the duration of construction. Employment of soft-start techniques for impact pile driving would further limit the potential for injury. To experience injury from high sound pressure levels, exposed fish species would need to remain within the onset of physical injury zones shown in Figures 2 through 4 during impact pile driving.

The likelihood of fish occurrence within the peak physical injury zones shown in Figures 2 through 4 during the maximum 161 to 270 days of pile driving over 3 years between July 1 and November 30 is low. There is low to moderate potential for occurrence within the larger cumulative SEL onset of physical injury zones during the pile-driving period. Fish species may occur in these areas during the upstream migration of spawning adults and downstream migration, resting, and foraging of juveniles. There is no suitable spawning habitat for any fish species within the area potentially affected by pile driving. In addition, the onset of physical injury area generally lacks the quality forage and cover favored by fish species in the area, and high levels of vessel activity within this industrialized reach of the San Joaquin River likely further limits the presence of fish species within the physical injury zones shown in Figures 2 through 4.

The implementation of soft-start techniques for impact pile driving would encourage any individual fish within the project area to flee to adjacent suitable habitat. Soft-start techniques include bringing pile-driving or other loud equipment online slowly (as described in Section 4 of the BA), providing fish with the opportunity to disperse from the project area.

Based on the analysis presented, very few (if any) fish are expected to be present or remain within the onset of physical injury zone during pile driving. Fish presence would likely be limited to transitory presence during migration or foraging. Therefore, the potential risk of injury to fish is low to moderate.

Behavioral Effects

Within the areas shown on Figures 1 through 4, pile driving may result in behavioral impacts to fish species. This may include temporary abnormal behavior indicative of stress or a startle response. These responses are likely to diminish after a few pile strikes or as fish leave the area (Caltrans 2020).

The areas of the San Joaquin River immediately upstream and downstream of the pile-driving zone of effect would provide startled fish sufficient space to escape to open-channel waters, and elevated sound levels should not result in significant effects on these individuals. Adjacent channel areas provide habitat of similar or higher quality and adequate carrying capacity to support individual fish that are temporarily displaced during the pile driving. As described in Section 4 of the BA, construction equipment would be brought online slowly to further provide fish the opportunity to exit the pile-driving area of effect. For these reasons, and given that effects would be limited to the very brief construction period, the behavioral effects to fish from pile driving are anticipated to be minimal.

Marine Mammals

The variables (i.e., source sound levels, duration of sound production, and transmission loss) described previously were entered into the Marine Mammal Worksheet (NOAA 2020) to identify the distances to various marine mammal injury and behavior thresholds for the Proposed Action's pile-driving activities.

Based on source noise data available for the project pile types, the Multi-Species Calculator for vibratory hammer driving was used for 24-inch-diameter steel piles and 16-inch-diameter concrete piles to estimate the distances to physical injury (Level A) thresholds and to behavioral (Level B) thresholds. The results are summarized in Table 9, and the pile driving reports are included as Attachment 1. Figures 5 through 8 illustrate the sound pressure isopleths for physical injury for phocid pinnipeds and behavioral effects to all marine mammals from proposed pile-driving activities.

Land features would constrain a portion of the sound waves from propagating into adjacent waters. Therefore, the effective maximum PTS isopleth distances are less than some of the values presented in Table 9.

Table 8
Anticipated Underwater Noise Effects and Distances to Fish Injury and Behavior Thresholds (Pile Driving with Impact and Vibratory Hammer)

Pile Type	Hammer Type	Attenuation (dB)	Source Sound ¹			Maximum Number of Strikes or Vibratory Minutes per Pile	Maximum Number of Piles per Day	Maximum Strikes or Minutes per Day	SEL, Accumulated	Injury		Behavior ¹	
			Peak Sound (dB)	SEL (Single Strike)	RMS (dB)					Distance to 206 dB Peak (Meters)	Distance to 187 dB SEL (Meters)	Distance to 183 db SEL (Meters)	Distance to 150 dB SEL (Meters)
24-inch Steel pipe	Vibratory	0	--	--	153	30 minutes	2	60 minutes	--	--	--	--	15.8
16-inch Concrete (in-water)	Impact	5	188	155	163	270 strikes	4	1,080 strikes	185	0.6	7.7	14.3	73.6
16-inch Concrete (landside remote)	Impact	0	193	160	168	350 strikes	5	1,750 strikes	192	2.2	18.7	29.6	79.4
16-inch Concrete (landside dome, 1 pile at a time)	Impact	0	193	160	168	350 strikes	10	3,500 strikes	195	2.2	26.4	31.6	79.4
16-inch Concrete (landside dome, 2 piles simultaneously)	Impact	0	196	163	171	350 strikes	20	7,000 strikes	201	3.2	44.7	44.7	112.2

Notes:
1. These source sound levels are inclusive of the applied attenuation.
Source sound levels used are the same as noted in Tables 5 through 7.
All threshold distances are rounded to the nearest whole number.

Table 9
Estimated Distances to Marine Mammal Injury and Behavior Thresholds (Pile Driving with Impact or Vibratory Hammer)

Pile Type	Hammer Type	Attenuation (dB)	Source Sound (at 10 Meters) ¹			Distance (Meters) to Cumulative Marine Mammal Injury Thresholds	Distance (Meters) to Behavioral Threshold ¹	Distance (Meters) to In-Air Behavioral Harassment Threshold
						Phocid Pinnipeds		
			Peak Sound (dB)	SEL (Single Strike)	RMS (dB)	195 dB	160 dB RMS (Impact) 120 dB RMS (Vibratory)	
24-inch Steel pipe	Vibratory	0	--	--	153	3.5	1,584.9	500
16-inch Concrete (in-water)	Impact	5	188	155	163	12.6	15.8	
16-inch Concrete (landside remote)	Impact	0	193	160	168	27.0	25.1	
16-inch Concrete (landside dome, 1 pile at a time)	Impact	0	193	160	168	38.2	25.1	
16-inch Concrete (landside dome, 2 piles simultaneously)	Impact	0	196	163	171	76.3	35.5	665

Notes:
Source sound levels used are the same as noted in Tables 5 through 7.
All threshold distances are rounded to the nearest whole number.
1. These source sound levels are inclusive of the applied attenuation.

Conclusions

Note that the distances shown in Tables 10 and 11, illustrated in Figures 1 through 10, and described in this memorandum represent a conservative modeling scenario when considering the following:

- Sound impacts are effectively eliminated when sound waves encounter a physical obstruction such as the shoreline.
- Avoidance and minimization measures would be implemented, including the following:
 - Limiting in-water pile driving activities to the approved environmental work window (July 1 to November 30)
 - Instructing the contractor to use the preferred vibratory drivers to the extent feasible
 - Using soft-start techniques
 - Using a single impact hammer at a time with a cushion block

References

- Caltrans, 2020. *Technical Guidance for Assessment and Mitigation of the Hydroacoustic Effects of Pile Driving on Fish: Appendix I, Compendium of Pile Driving Sound Data*. October 2020.
- The Engineering ToolBox, 2003. *Outdoor Ambient Sound Pressure Levels*. Accessed June 6, 2025. https://www.engineeringtoolbox.com/outdoor-noise-d_62.html.
- Fisheries Hydroacoustic Working Group, 2008. Memorandum to: Applicable Agency Staff. Regarding: Agreement in Principle for Interim Criteria for Injury to Fish from Pile Driving Activities. June 12, 2008. <https://dot.ca.gov/-/media/dot-media/programs/environmental-analysis/documents/ser/bio-fhwg-criteria-agree-a11y.pdf>
- NOAA (National Oceanic and Atmospheric Administration), 2018. *2018 Revision to: Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (Version 2.0): Underwater Thresholds for Onset of Permanent and Temporary Threshold Shifts*. Silver Springs, Maryland: Office of Protected Resources, National Marine Fisheries Service. NOAA Technical Memorandum NMFS-OPR-59. April 2018. Available at: <https://www.fisheries.noaa.gov/resource/document/technical-guidance-assessing-effects-anthropogenic-sound-marine-mammal-hearing>.
- NOAA, 2020. "Marine Mammal Acoustic Technical Guidance: User Spreadsheet Tool." Version 2.2. Updated December 2020. Available at: <https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-acoustic-technical-guidance>.
- NOAA, 2025. "NMFS Multi-Species Pile Driving Calculator." National Marine Fisheries Service. September 2025. <https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-acoustic-technical-guidance-other-acoustic-tools>.

WSDOT (Washington State Department of Transportation), 2006. *Biological Assessment Preparation for Transportation Projects – Advanced Training Manual*. Olympia, Washington.

WSDOT, 2020. *Biological Assessment Preparation for Manual-Construction Noise Impact Assessment Update*. Olympia, Washington.

Figures

- Figure 1 Fish Disturbance Zone, 24-Inch-Diameter Steel Piles, Vibratory Hammer
- Figure 2 Fish Disturbance Zone, 16-Inch Square Concrete Piles (In-Water), Impact Hammer
- Figure 3 Fish Disturbance Zone, 16-Inch Square Concrete Piles (Landside Remote), Impact Hammer
- Figure 4 Fish Disturbance Zone, 16-Inch Square Concrete Piles (Landside Dome), Impact Hammer
- Figure 5 Fish Disturbance Zone, 16-Inch Square Concrete Piles (Landside Dome and 2 Piles Simultaneously), Impact Hammer
- Figure 6 Marine Mammal Disturbance Zone, 24-Inch-Diameter Steel Piles, Vibratory Hammer
- Figure 7 Marine Mammal Disturbance Zone, 16-Inch Square Concrete Piles (In-Water), Impact Hammer
- Figure 8 Marine Mammal Disturbance Zone 16-Inch Square Concrete Piles (Landside Remote), Impact Hammer
- Figure 9 Marine Mammal Disturbance Zone 16-Inch Square Concrete Piles (Landside Dome), Impact Hammer
- Figure 10 Marine Mammal Disturbance Zone 16-Inch Square Concrete Piles (Landside Dome and 2 Piles Simultaneously), Impact Hammer
- Figure 11 Marine Mammal Harassment Zone (In-Air)
- Figure 12 Marine Mammal Harassment Zone (In-Air and 2 Piles Simultaneously)

Attachments

- Attachment 1 NMFS Multi-Species Pile-Driving Acoustic Impact Worksheets (Level A)