

Climate Change Vulnerability Information

Riparian/Riverine Group

Sub-habitats:

Riparian vegetation/ Natural riverbank

Floodplain

Stream Channel

Species Groups & Species:

Amphibians

Green sturgeon

Hardhead

Native clams and mussels

Pacific lamprey

Riparian nesting birds

Sacramento perch

Salmonids

Splittail

Exposure – Measure of how much of a change in climate or other environmental factor a species or habitat is likely to experience.

Floodplain

- Current climate-change projections suggest that storm patterns and fluvial responses are expected to aggravate future risks of levee breaks ([Florsheim & Dettinger 2007](#), [PRBO 2011](#)).

Stream Channel

- Results suggest that the available cold pool behind Shasta could be maintained throughout the summer assuming median projections of mid-21st century warming of 2°C, but the maintenance of the cold pool with warming on the order of 4°C could be very challenging ([Yates et al. 2008](#)).
- Forecasts increases in the number of days above temperatures causing high mortality (especially along the Sacramento River) and a shift in thermal conditions for spawning to earlier in the year ([Wagner et al. 2011](#)).
- High temperature events will become more common, and may result in thermal stress for species with narrow temperature tolerance levels at one or more life stages ([PRBO 2011](#)).

Climate Change Vulnerability Information

Riparian/Riverine Group

Sensitivity – measure of whether and how a species or habitat is likely to be affected by a given change in climate

Riparian vegetation/ Natural riverbank

- Riparian habitat is an important feature of the Sacramento Valley and it is not known how it will be affected by climate change ([PRBO 2011](#)).
- **Riparian nesting birds:** [Stralberg et al. \(2009\)](#) predicts non-analog bird communities to develop in the southern Central Valley, but analogous bird communities to persist in the northern Central Valley. Similarly, [PRBO \(Modeling Bird Distribution Tool\)](#) uses climate models to project loss of riparian bird distribution throughout in the Central Valley for current resident species with heavier loss in the southern Central Valley.
- **Riparian nesting birds:** Bird species associated with riparian vegetation in the Sierra Nevada ranked as less vulnerable than those of other habitats, a difference that was significant using projections based on the PCM model (less warming, less drying; $P = 0.030$) but marginal using the GFDL model projections (more warming, more drying; $P = 0.050$) projections ([Siegel et al. 2014](#)).
- Riparian birds found to be less sensitive to climate change than wetland birds, but more sensitive than grassland or oak woodland associated birds. Consistent with projected changes in habitat availability due to climate change for the respective bird types ([Gardali et al. 2012](#)).

Amphibians

- [Davidson et al. \(2002\)](#) modeled current amphibian declines in the Central Valley including hypotheses of wind-borne pesticides, habitat destruction, UV radiation, and climate change. Decline patterns aligned with pesticides, not other hypotheses.
- Increased sedimentation and erosion from fires can have major impacts on the foothill yellow-legged frog. [California WaterBlog](#).

Adaptive Capacity – Ability to accommodate or cope with climate change impacts with minimal disruption.

Riparian vegetation/ Natural riverbank

- Riparian ecosystems are naturally resilient, provide linear habitat connectivity, link aquatic and terrestrial ecosystems, and create thermal refugia for wildlife: all characteristics that can contribute to ecological adaptation to climate change ([Seavy et al. 2009](#)).

Stream Channel

- Even though the timing of flows may be mediated by hydrological infrastructure, the ability to deal with extreme flow events will likely remain limited ([PRBO 2011](#)).
- Fishes requiring cold water ($<22^{\circ}\text{C}$) are particularly likely to go extinct ([Moyle 2013](#)).
- [Sommer \(2015\)](#) details that with floodplain restoration more available food for fishes will increase their tolerance to increased temperatures. Also restoration of frequency and duration of rearing habitat will increase adaptive capacity to changes in hydrology.
- Increased sediment due to upstream fires impacts native aquatic species, including salmonids and benthic macroinvertebrates. [California WaterBlog](#).