In a Dry Climate . . .

We live in a dry area – sounds obvious but we all know that our climate is always on the edge of a drought, punctuated by semi-regular flood events and fires.

Arid ecosystems do have a lot in common. One of their shared characteristics is slow response to disturbance. It takes our riparian areas longer to grow trees than in a wetter climate. It takes more management to install plantings than to allow for natural regeneration, and success rates of plantings may be lower than in more resilient areas.

In our area, trees do establish and grow naturally, wherever there are good growing conditions. This might include added run-off from irrigated agriculture, a fence, or a grazing management plan to benefit woody vegetation. It's worth the trouble.

So plant some trees today!

In many river systems, natural recruitment is the best method, but in the Shasta River watershed conditions are so greatly changed from "natural" that planting may be the only viable method for re-establishing trees. *Photo by Erika Nortemann.*

Bibliography and Resources

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For more information please contact:
NRCS at 530-842-6123 or FWS Partners Program at 530-842-5367.

Why Plant Trees along the Shasta River in Northern California?

Native willows planted along the Shasta River and caged for protection. *Photo by Erika Nortemann.*

Created by

The Shasta River Riparian Working Group

Why Plant Trees in Riparian Areas?
Trees adjacent to a river provide habitat for birds and animals, but they can also cool the air and maintain cooler river water through shading, which in turn can improve water quality in the streams and provide enhanced instream habitat.

Trees Keep Water Cooler
Tree planting can help maintain summer water temperatures in a range cool enough to sustain salmonids (i.e., no higher than 70° F). "Riparian vegetation shading can potentially reduce minimum, mean, and particularly maximum daily, temperatures over the distance of a single reach (five to seven miles)." (2) The Shasta River is listed as impaired by the NCWQCB for temperature and dissolved oxygen. These two constituents of water are linked because warmer water can increase the biologic activity in the stream, which will use more oxygen with diurnal (day/night) fluctuations. Warm tailwater inputs, lack of shade, and reduced flow may contribute to higher water temperatures in the river.

Air Temperatures
Air temperature drives our summer riparian conditions, and even heats the water in the river at times. Trees can cool air temperatures by shading and transpiration.

Water Temperatures Matter, Too
Water and air temperatures interact within the river corridor. The Shasta River generally gets warmer as it runs down-stream, but stream temperatures can vary due to spring up-wellings, tailwater inputs, and available riparian shade.

Shade—What's it good for?
Shade is needed to keep the sun's rays from striking the water and transmitting solar energy or heat to the water. A 2007 study determined that continuous canopy reduces solar radiation by 90% (2). This is important because a bank planting that provides continuous cover has more value than a sprinkling of trees within an area (3). Solar radiation is the driver of the system and shade can block the sun's ability to warm the water. Shade cannot cool the water by itself, but rather protects the temperature of the water from further heat absorption. In streams such as ours, the value of shade is high due to our natural low flow conditions in late summer. Native fish likely developed and adapted to a system that had lots of trees with shade along the river corridor. Planting trees brings the river closer to those conditions.

Shade trees moderate water temperature and instream productivity. Trees also provide nutrient sources, uptake of nutrients, and create habitat and cover for wildlife, shade for livestock, and thermal refugia for aquatic species.

Naturally occurring trees along the Shasta River. *Photo by Shasta Valley Resource Conservation District staff.*

Trees Use Water
A 2004 study found that a single cottonwood tree in an arid climate uses about 50 to 132 gallons of water on a typical day; and willows use between of 8 to 26 gallons water per day. Using these numbers, total water use for the 30 miles along the Shasta River on both sides was calculated. It was assumed an average of 6 trees per 100 feet of bank length if the bank is lined continuously with vegetation. This works out to 0.23 cubic feet per second (cfs) of water use annually. Nevertheless, a conservative estimate based on a more widely-spaced riparian vegetation indicates that the expected range of water use by riparian vegetation along the Shasta River would be approximately 1-5 cfs' (3).The average flow of the Shasta River during the growing season (April through September) is about 30 cfs. So if the entire length of the Shasta River was vegetated with trees, 3 to 16 percent of the summer base flow would be used by evapotranspiration.

Benefits to the River
Of course trees are valuable to the ecosystem as a whole. Thinking about our Shasta River as a system is not difficult, and is often the most relevant way to look at things. Tree planting is valuable to wildlife, both on land and in the water. Riparian vegetation is valuable for its flood control values, holding soil in place, allowing for orderly spreading and slowing of high flows. Tree roots are also a benefit to the soil by creating a sponge effect which slows and cools subsurface water and tailwater flows back to the river from the water table. And once trees die and fall into streams, the resulting instream woody debris becomes complex habitat that benefits aquatic organisms.