



BREEDING RIPARIAN LANDBIRDS



CHAPTER SUMMARY

Central Valley riparian areas – land alongside rivers and streams – were severely degraded by the end of the 20th century. Partnerships between landowners, non-profits, and government agencies aimed at restoring and protecting riparian areas have seen success, especially in the last decade.

This chapter describes the conservation objectives for riparian habitat restoration and enhancement needed to support self-sustaining, resilient populations of breeding riparian landbirds in the Central Valley. These objectives are based on population and breeding density objectives for a group of 12 focal bird species.

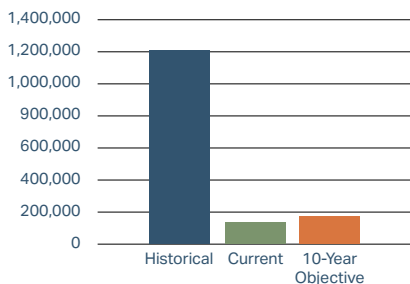
The Conservation Delivery chapter in Section I integrates these habitat objectives with the habitat objectives for other bird groups in the Implementation Plan to present total habitat needs in the Central Valley. The chapter then describes conservation actions for achieving these integrated habitat objectives.

HABITAT TYPE

Riparian habitats are transitional areas between land and water ecosystems, ranging from swift rapids and waterfalls of steep canyons to slow moving water in floodplains. Riparian vegetation is structurally complex and may contain a canopy, subcanopy, and understory layers.



RIPARIAN HABITAT ACREAGE



HABITAT SUCCESS STORIES

since the 2006 Implementation Plan

- A total of 8,102 acres of riparian forest has been restored in the Central Valley since the last CVJV update in 2006. This has increased the total riparian habitat in the Central Valley by approximately 20 percent.
- Counting only large-scale riparian restoration efforts, more than 1.8 million trees and shrubs have been planted across the Central Valley since 2006.
- In 2017, the U.S. Congress approved a boundary expansion for the San Joaquin River National Wildlife Refuge. This expanded boundary now encompasses 34 river miles on both sides of California's second largest river, providing a blueprint for river corridor conservation that benefits the birds of the Pacific Flyway as well as fish and terrestrial wildlife.
- A stable population of yellow warblers has recolonized restored agricultural fields along the San Joaquin River. This species was thought to be locally extinct, with the nearest occurrences more than 40 miles away.

SHORT-TERM OBJECTIVE (CURRENT + ADDITIONAL):

173,500 ACRES OF HIGH-QUALITY RIPARIAN HABITAT

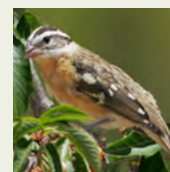
WHAT'S NEEDED?

32,000 ADDITIONAL ACRES

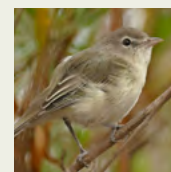
BIRD SPECIES INCLUDE:

Representative bird species in Central Valley riparian habitats:

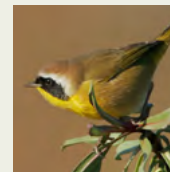
Species of special concern:



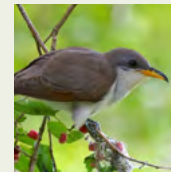
Black-headed grosbeak*



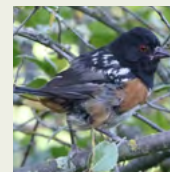
Least Bell's vireo***



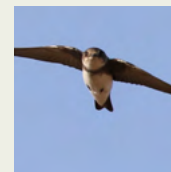
Common yellowthroat*



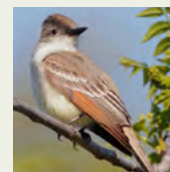
Yellow-billed cuckoo****



Spotted towhee**



Bank swallow*****



Ash-throated flycatcher*

* Image: Tom Grey ** Image: Stephen Fettig *** Image: Robert A. Hamilton **** Image: Ed Harper ***** Image: Stephen Fettig

(1) Common yellowthroat - Tom Grey (2) San Joaquin River NWR - River Partners (3) Lazuli bunting - Tom Grey (4) Dos Rios Ranch and San Joaquin River NWR - River Partners

INTRODUCTION

Riparian areas provide important ecosystem services, recreational opportunities, and habitat for wildlife. The Central Valley was once a vast mosaic of native riparian forest, wetlands, and uplands. Historically, riparian habitat was concentrated along the Sacramento and San Joaquin Rivers and their tributaries, as well as the rivers and streams flowing into the Tulare Basin. By the end of the 20th century, over 95 percent of the Central Valley's historical riparian forest had been lost and almost all the major rivers were dammed and are now highly regulated (Katibah 1984). Several riparian landbird species in this region are endangered, threatened, or have some level of special conservation status. This is an indication that the loss of Central Valley riparian forest has severely degraded conditions for wildlife.

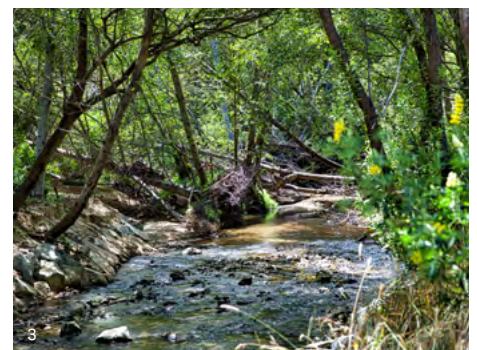
Protecting, restoring, and managing Central Valley riparian areas can increase habitat connectivity, restore ecosystem processes, and improve ecosystem function. In turn, this provides wildlife habitat and benefits people in the surrounding communities. These benefits include improving water quality, recharging groundwater, reducing flood risk, supporting pollinators and organisms that help control agricultural pests, providing recreational opportunities, increasing property values, and attracting wildlife watchers and hunters who help support local economies.

In recent decades, government agencies and private organizations have worked together to begin restoring riparian ecosystems by planting riparian vegetation, restoring or mimicking natural hydrology, and reconnecting floodplains and habitat fragments (Golet et al. 2008). These efforts are reflected in several major planning or restoration projects that are underway. For example, the San Joaquin River Restoration Program is returning flows to the river with the goal of restoring naturally-producing and self-sustaining populations of salmon and other fish (Matthews 2007). The recently-adopted 2017 Central Valley Flood Protection Plan Update, developed by the California Department of Water Resources, includes a sophisticated Conservation Strategy that is intended to integrate riparian restoration into projects designed to reduce flood risk to Central Valley communities.

The CVJV has established conservation objectives for riparian habitat restoration, and for population size and breeding density of a representative suite of bird species. This chapter explains these conservation objectives and how they can be applied to reach the conservation goal.

CONSERVATION GOAL

The Central Valley Joint Venture's long-term goal is for Central Valley riparian ecosystems to have sufficient high-quality riparian habitat to support genetically robust, self-sustaining, and resilient bird populations.



(1) Yellow warbler - Tom Grey (2) Riparian habitat at Bobelaine Sanctuary - Brian Gilmore (3) Riparian habitat - Steve Martarano, USFWS

WHICH SPECIES ARE INCLUDED?

The conservation objectives focus on 12 bird species that breed in riparian habitat in the Central Valley and that represent a broad range of life histories and specific habitat needs (Table 12.1). They include species that have or warrant special management status or have experienced population declines or reductions in breeding range in the Valley, and/or species that are useful for monitoring the effects of management actions in Valley riparian ecosystems.

For some species, this is because they are common enough to provide sufficient sample sizes for analyses. Managing riparian habitat to support local populations of this full suite of focal species should, in turn, support diverse and healthy riparian ecosystems (Chase and Geupel 2005).



Nuttall's woodpecker - Tom Grey

SPECIES (SCIENTIFIC NAME)	CONSERVATION STATUS ^a	MIGRATORY STATUS	NEST SUBSTRATE	HABITAT & VEGETATION ASSOCIATIONS
Yellow-billed cuckoo (western distinct population segment) (<i>Coccyzus americanus</i>)	FT, SE, CCV	Migrant	Tree	Large contiguous patches of riparian forest, especially cottonwood-willow
Nuttall's woodpecker (<i>Picoides nuttalli</i>)	--	Resident	Tree, 1° cavity	Mature riparian woodland
Ash-throated flycatcher (<i>Myiarchus cinerascens</i>)	--	Migrant	Tree, 2° cavity	Mature, open riparian woodland
Least Bell's vireo (<i>Vireo bellii pusillus</i>)	FE, SE, CCV	Migrant	Shrub	Dense, shrubby early- to mid-successional riparian
Bank swallow (<i>Riparia riparia</i>)	ST	Migrant	Burrow	Cut banks, dependent on meander migration, colonial breeder
Spotted towhee (<i>Pipilo maculatus</i>)	--	Resident	Ground	Dense understory and ground cover
Song sparrow (<i>Melospiza melodia</i>)	BSSC ^b , CCV ^b	Resident	Herb, Shrub	Dense understory
Yellow-breasted chat (<i>Icteria virens</i>)	BSSC	Migrant	Shrub	Dense, shrubby riparian thickets
Common yellowthroat (<i>Geothlypis trichas</i>)	--	Migrant	Herb, Shrub	Dense understory and ground cover, especially near river edges and wetlands
Yellow warbler (<i>Setophaga petechia</i>)	BSSC	Migrant	Shrub	Riparian thickets, especially willows
Black-headed grosbeak (<i>Pheucticus melanocephalus</i>)	--	Migrant	Tree	Complex habitat with large trees and dense understory
Lazuli bunting (<i>Passerina amoena</i>)	--	Migrant	Herb, Shrub	Open scrubby and early-successional riparian, edges

^a Conservation status designations: FE, FT, federally endangered or threatened species; SE, ST, state endangered or threatened species; BSSC, state bird species of special concern; and CCV, species ranked among the most vulnerable to climate change (Gardali et al. 2012).

^b In the Central Valley, only the Suisun and Modesto subspecies are considered species of special concern or ranked as climate change vulnerable.

TABLE 12.1 Riparian focal species: Conservation status and habitat associations during the breeding season.

WHICH GEOGRAPHIC AREAS ARE INCLUDED?

Conservation objectives were defined for four of the five planning regions in the CVJV's Primary Focus Area, excluding Suisun: Sacramento, Yolo-Delta, San Joaquin, and Tulare (Figure 12.1). Suisun was excluded for its lack of freshwater riparian habitat.

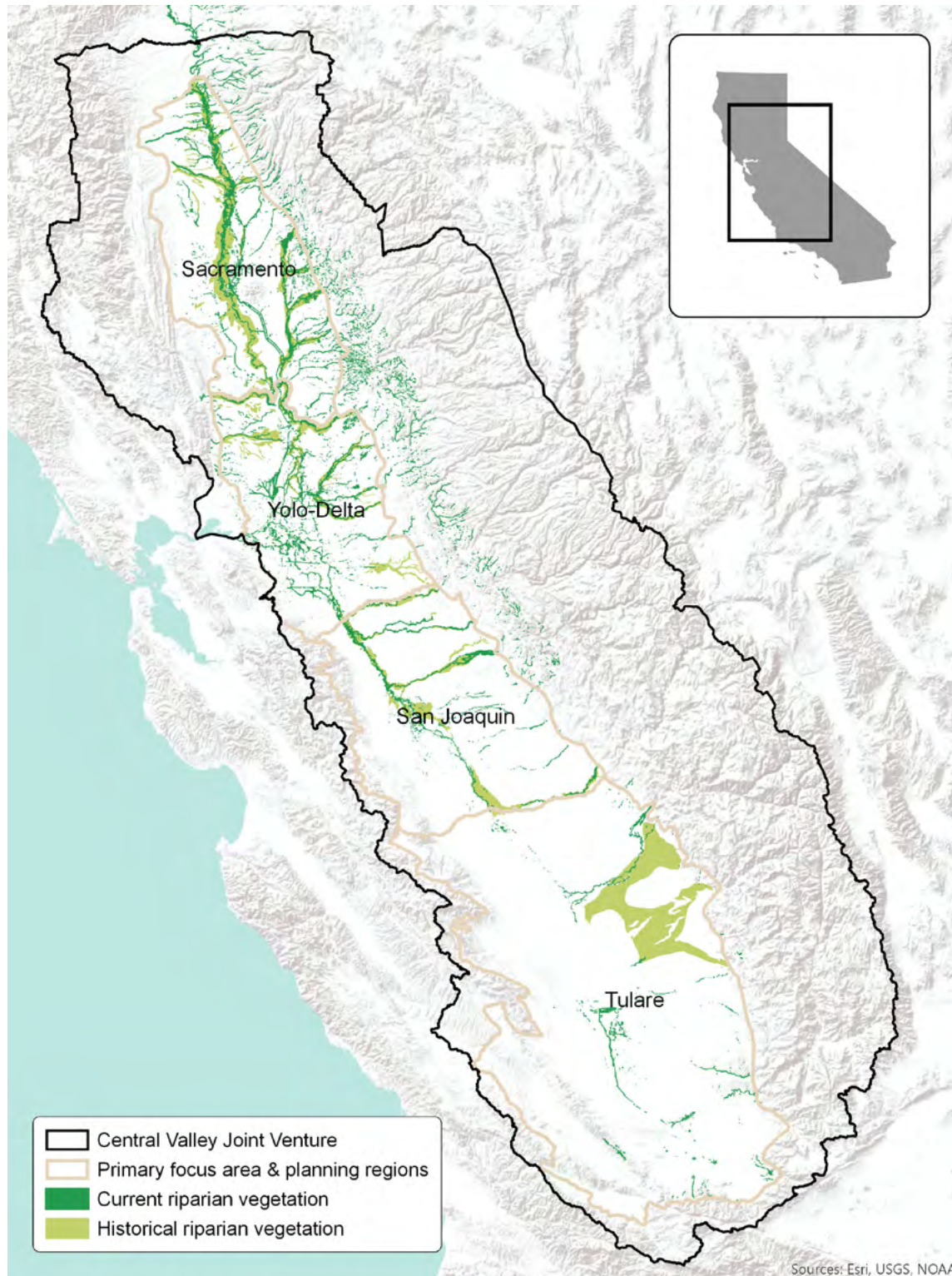


FIGURE 12.1 Central Valley Joint Venture perimeter and Primary Focus Area, divided into planning regions. Also shown are estimated areas of historical (pre-1900) and current riparian vegetation.

CURRENT CONDITIONS

Current Population Sizes and Trends

Survey data collected between 2008 and 2014 were used to estimate current Valley breeding population sizes of the focal bird species. These population sizes range from very small (<1,000 individuals) to large (>100,000 individuals) (Figure 12.2). More than half of the populations are currently small (<10,000 individuals) or very small (<1,000 individuals) and may be at risk of extirpation. Least Bell's vireo is largely extirpated in the Central Valley so population sizes are assumed to be near zero. Yellow-breasted chat and black-headed grosbeak both exhibit significant, long-term declining trends in the Coastal California Bird Conservation Region (BCR 32), which encompasses the Central Valley, and both bank swallow and yellow-billed cuckoo populations are estimated to have steeply declining trends with an average decline of more than 30 percent every 10 years. The cuckoo's population size is small and the trend estimates are uncertain. In addition, only five of the 12 focal species are currently considered resilient, meaning they have viable or large populations in at least two planning regions.

Current Habitat

Historically, the CVJV's Primary Focus Area contained more than 1.2 million acres of riparian habitat (and possibly much more; estimates of historical habitat acreage vary widely). In contrast, today only an estimated total of 141,600 acres of riparian vegetation exists in this area, of which nearly half is within the Sacramento planning region (Figure 12.1 and Table 12.2). Data from 2012 California Department of Fish and Wildlife (CDFW) riparian vegetation GIS layers (references in Dybala et al. 2017b) were used to estimate the current extent of riparian vegetation.

As a further indicator of current habitat conditions, the findings that over half of the regional focal species' populations are currently small or very small, that two species have steeply declining population trends, and that fewer than half of the focal species are considered resilient, suggest significant habitat loss and degradation. These findings indicate there is considerable room for improvement in Central Valley riparian ecosystems.

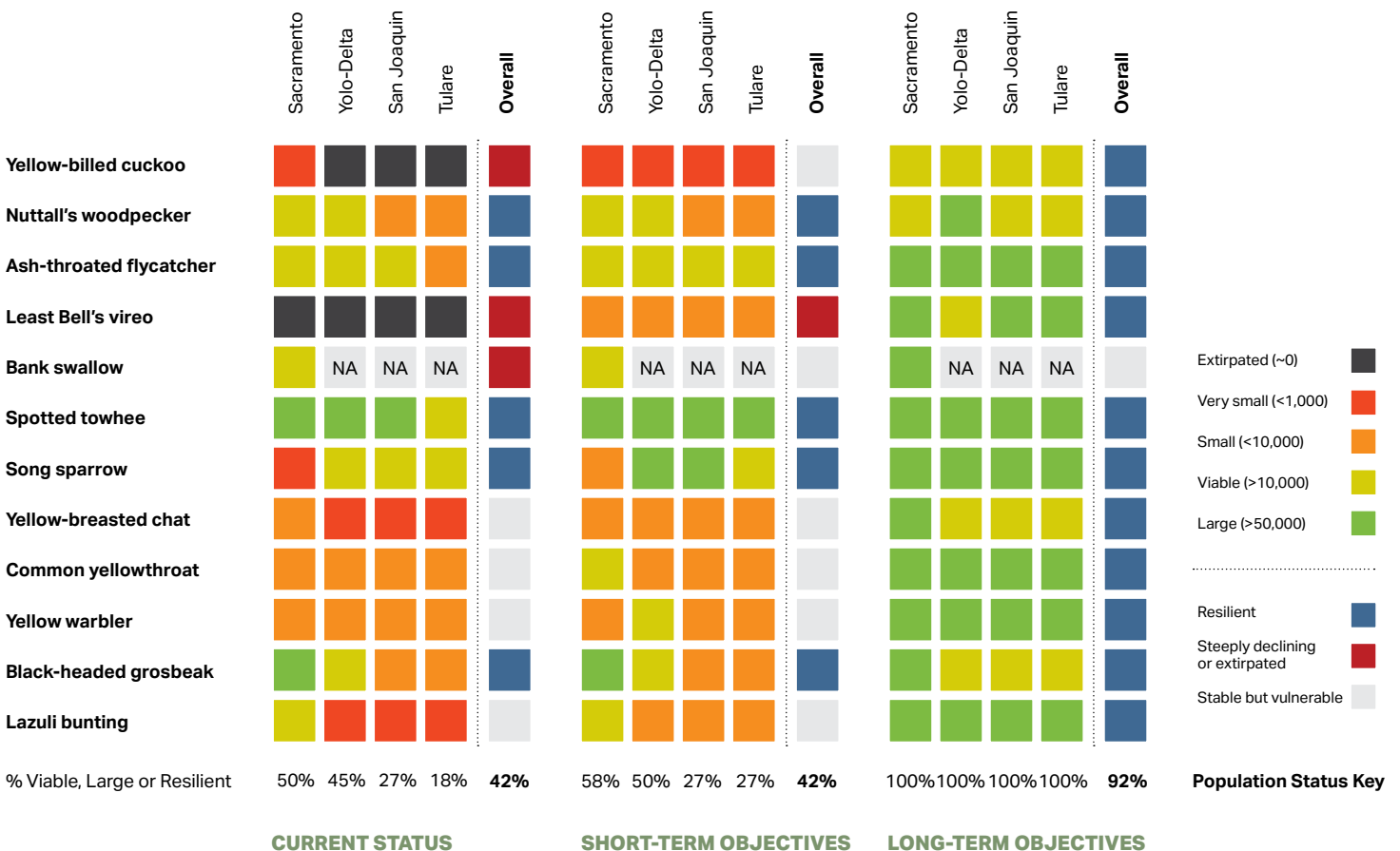


FIGURE 11.2 Population status and objectives for Central Valley focal riparian bird species.

DEVELOPING THE CONSERVATION OBJECTIVES



Bank swallows - Tom Grey

Population Objectives

To develop the long-term population objectives for each focal species in each of the study's planning regions, the first step was to develop a population status framework based on general principles of conservation and population biology (Dybala et al. 2017a). The framework is structured as a hierarchy of four population size categories that mark milestones in becoming a genetically robust, self-sustaining, ecologically functional, and resilient population. The categories are: very small (<1,000), small (<10,000), viable (>10,000), and large (>50,000). Two additional modifiers describe steeply declining populations (>30 percent decline over 10 years), which are at high risk of extirpation regardless of population size, and resilient populations, which should be more capable of recovering from an environmental catastrophe in one part of the range if they have more than one self-sustaining sub-population.

The population status framework was used to define long-term (100-year) population objectives for each focal species in each planning region. The objectives are for each species to be stable or increasing, at least viable (>10,000 individuals), preferably large (>50,000 individuals), and resilient (more than one viable or large regional population). Special status species are treated slightly differently. For bank swallow, this Implementation Plan simply adopts the population objec-

tive defined in the existing bank swallow conservation strategy: 50,000 (equivalent to large) for the Sacramento region (BANS-TAC 2013), the only region of the Valley with evidence of current colony occupation. Because yellow-billed cuckoo does not yet have a recovery plan with already defined population objectives, this Plan defines a preliminary population objective of viable (>10,000 individuals) for all four planning regions. Least Bell's vireo does have a draft recovery plan (USFWS 1998), but it does not define specific numerical population objectives, so this Plan treats it like any other focal species.

Breeding Density and Habitat Objectives

Because so much historical riparian habitat in the Central Valley has been lost and degraded, it is likely that many of the focal species' regional populations are currently limited by available habitat and that the current breeding densities of many of the focal species may be unusually low due to reduced habitat quality. Therefore, meeting the population objectives would require both habitat restoration and enhancement efforts to increase both the total area of habitat available to species and their average breeding densities. The Plan defines long-term habitat and breeding density objectives such that achieving both would result in meeting the long-term population objectives.

Excluding bank swallow and yellow-billed cuckoo (which were treated separately), potential breeding densities were determined by examining density estimates reported for Breeding Bird Census (BBC) plots in riparian vegetation in the western United States (1988-2009; Gardali and Lowe 2006). In many cases, current Central Valley breeding densities are far lower than BBC densities. The Plan defines long-term density objectives for each species

in each planning region as the 75th percentile of the observed BBC densities, unless the species' current regional density already exceeded this objective. In that case, the objective is to maintain the current density.

The next step was to calculate the minimum area of riparian habitat in each planning region that would be required to reach specified benchmarks. The benchmarks include: All 10 remaining focal species reach the threshold for a viable population (>10,000 individuals) in each planning region; 7 of the 10 focal species reach the threshold for a large population (>50,000 individuals) in each planning region; and each focal species has at least one large regional population.

To track progress during the lifespan of this Plan, short-term (10-year) habitat objectives were established that represent one-tenth of the long-term objectives.

Density objectives for bank swallow were not defined because an average density per unit area of riparian vegetation is less applicable to a colonial-nesting species. These species are expected to respond more to the availability of suitable nesting sites than to the addition of riparian vegetation acres. Yellow-billed cuckoo was also treated differently because breeding densities for this species are highly variable and difficult to estimate (Hughes 2015). Instead, the cuckoo's regional breeding density objective was calculated as the average density required to reach a population size of viable in each region, assuming the long-term habitat objectives were met. These density objectives are well within the range of observed cuckoo breeding densities in other regions.

Additional details on the sources of data, methods, results, and references can be found in Dybala et al. (2017b).

CONSERVATION OBJECTIVES

Habitat

The Plan defines short-term (10-year) and long-term (100-year) habitat objectives for riparian vegetation in each of the four planning regions (Table 12.2). These habitat objectives represent the estimated total extent of riparian vegetation required to meet the population objectives for all 12 focal species in each planning region. In total, the long-term objectives represent 36 percent of the estimated historical extent of riparian vegetation in the Central Valley.

PLANNING REGION	LONG-TERM HABITAT OBJECTIVE	CURRENT ESTIMATE	ACRES NEEDED (DIFFERENCE)	ACRES NEEDED BY 2030 (10%)
Riparian Vegetation				
Sacramento	151,671	67,897	83,774	8,377
Yolo-Delta	91,925	32,869	59,056	5,906
San Joaquin	108,626	24,949	83,677	8,368
Tulare	108,626	15,893	92,733	9,273
Total	460,849	141,608	319,241	31,924

TABLE 12.2 Short-term (10-year) and long-term (100-year) habitat objectives for breeding riparian birds. Objectives (in acres) are shown by planning region along with current estimates of existing habitat and the estimated additional acres needed to meet the habitat objectives. (Sums may not be exact, due to rounding in original data.)

Population

The Plan defines long-term (100-year) population objectives of >10,000 or >50,000 individuals for each of the focal species in each planning region (Figure 12.2). These population objectives represent the estimated population sizes needed to reach the goal of genetically robust, self-sustaining, resilient populations.

SPECIES	SACRAMENTO	YOLO-DELTA	SAN JOAQUIN	TULARE
Yellow-billed cuckoo	0.066	0.109	0.092	0.092
Nuttall's woodpecker	*0.274	*0.544	0.227	0.227
Ash-throated flycatcher	*0.498	*0.866	*0.460	0.460
Least Bell's vireo	0.497	0.497	0.497	0.497
Bank swallow	--	--	--	--
Spotted towhee	*2.134	*2.166	*2.334	2.334
Song sparrow	1.213	*1.349	*1.755	1.755
Yellow-breasted chat	0.330	0.330	0.330	0.330
Common yellowthroat	0.606	0.606	0.606	0.606
Yellow warbler	0.557	0.557	0.557	0.557
Black-headed grosbeak	*0.881	0.382	0.382	0.382
Lazuli bunting	0.611	0.611	0.611	0.611

*No density objectives were set for bank swallow, and density objectives for the Tulare region were set equal to objectives for the adjacent San Joaquin region. * Density objective is to maintain current average density.*

TABLE 12.3 Long-term (100-year) average breeding density objectives for each riparian focal species in each planning region.

Breeding Density

The Plan defines long-term (100-year) average breeding density objectives for each focal species in each planning region (Table 12.3). These density objectives represent the estimated average breeding densities that could be reached with improvements in both the quality and quantity of riparian ecosystems in each planning region.



APPLYING THE CONSERVATION OBJECTIVES

Applying the Breeding Density Objectives

The breeding density objectives can be used in several ways. At habitat restoration sites, they can be used to demonstrate that the restoration activities are creating quality habitat in which the focal species are ultimately able to meet or exceed the density objectives. Similarly, in existing habitat, they can be used to demonstrate the effectiveness of habitat enhancement activities in which the focal species' breeding densities improve and ultimately meet or exceed the density objectives. Finally, they can be used as part of a project planning process to project the potential number of individuals of each focal species that a restoration or enhancement project site may be able to support. Progress toward the breeding density objectives can be tracked through regular surveys of riparian breeding birds at project sites, and overall by surveying throughout each planning region.

By improving species densities, fewer acres of habitat are required to meet the population objectives, and in turn the conservation goals. Therefore, the CVJV encourages efforts to improve conditions in existing riparian vegetation. Such habitat enhancement efforts might include removing invasive plant species or increasing diversity in the composition and structure of riparian vegetation.

Applying the Habitat Objectives

The habitat objectives represent estimates of the total area of riparian habitat required to enable focal species' Central Valley populations to reach the long-term population objectives, and therefore the total area required to reach the Plan's long-term conservation goal. Subtracting the estimated current amount of riparian vegetation from the long-term objective provides the estimated additional acres needed in each region (Table 12.2), assuming none of the current extent is lost.

To track progress within this Plan's timeline, short-term (10-year) habitat objectives for each region were set at one-tenth of the long-term additional acreage needed. These additional acres can be achieved through habitat restoration.

For the purposes of this chapter, "habitat restoration" means conversion of land that is not currently covered by the target land cover type into the target land cover type. For riparian habitat, this includes establishing new areas with native riparian-associated shrubs and trees (based upon the 2012 riparian vegetation GIS layer).

The acreage of new riparian vegetation created by a restoration project in one of the planning regions would count as contributing to these habitat objectives. Overall progress toward the riparian vegetation objectives can be tracked through updates to CDFW vegetation GIS layers (<https://www.wildlife.ca.gov/Data/BIOS/Dataset-Index>).

"Habitat enhancement," in this situation, indicates managing existing riparian vegetation to improve habitat quality. The acreage of enhanced riparian vegetation should not be counted toward the habitat objectives. Instead, habitat enhancement should be measured using the breeding density objectives as described previously.

The habitat objectives can be used to measure the contribution of an individual project to the CVJV goals. They can also be used to guide other planning processes with respect to the magnitude of restoration that is needed within each region.

(1-4) Habitat restoration at San Joaquin NWR Hageman Unit - River Partners



SUCCESS STORY



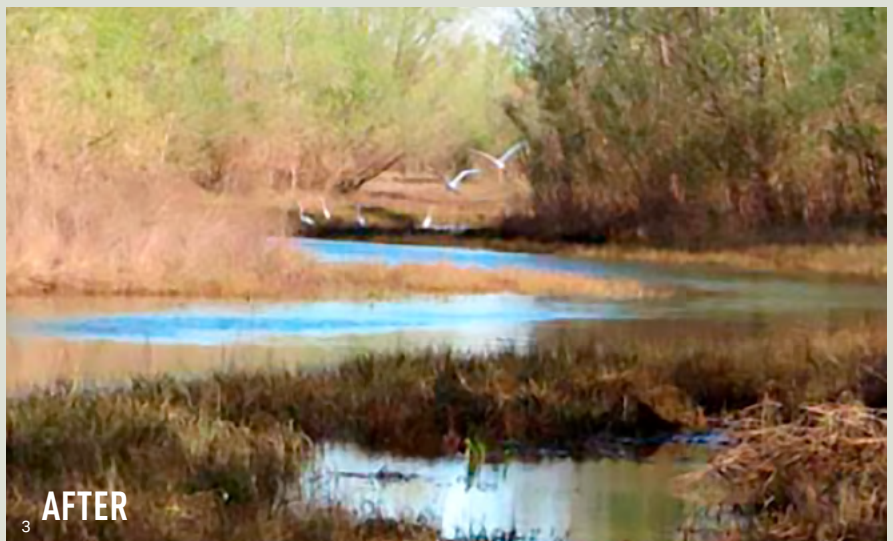
LEAST BELL'S VIREO REAPPEARS IN THE CENTRAL VALLEY

The 2005 discovery of least Bell's vireo, a species previously thought extinct in the Central Valley, heralded a huge success in efforts to restore riparian bird habitat in the San Joaquin Valley. The birds were found on the San Joaquin River National Wildlife Refuge, in a tree planted by River Partners (a CVJV partner) two years earlier. Engaged since 2002 in the largest contiguous riparian restoration project in California, CVJV partners have detected least Bell's vireo in five additional years in forests planted on the refuge.



River Partners adapts restoration methods in response to feedback from CVJV partners. As a result, 1- to 2-year-old restoration sites in the most recent phase of the project achieved breeding densities equivalent to 3- to 6-year-old densities in the first phase for six CVJV riparian focal species. River Partners is now achieving the CVJV breeding density objective for song sparrows within two years of completing restoration.

River Partners' restoration efforts – based on recommendations from the California Partners in Flight Riparian Bird Conservation Plan – will protect and restore more than 5,000 acres within the San Joaquin River NWR and adjacent private lands, including the Dos Rios Ranch. Over the past 10 years, the project has attracted more than \$50 million for the permanent protection of 2,285 acres, including restoration of 600 acres.



(1) Least Bell's vireo - Robert A. Hamilton (2) & (3) Vireo habitat restoration at San Joaquin River NWR Hageman Unit - River Partners

ADDITIONAL CONSERVATION CONSIDERATIONS

Adapt habitat restoration to extreme weather events

The CVJV recommends anticipating extreme weather events, like drought and flood, when developing plans and designing riparian restoration (Gardali et al. In prep.; Perry et al. 2015). For example, consider whether current designs use plant species and varieties that will continue to thrive under projected climate conditions, including changes in temperature and precipitation, more extreme weather patterns, and changes in hydrology and groundwater availability. The long-term success of current riparian restoration efforts will depend on whether species being planted now will survive for decades. Incorporating shifting climate patterns into restoration planning should become as standard as the typical attention paid to soils and hydrology (Griggs 2008).

Plan for species-specific habitat needs

In addition to a general strategy of restoring and enhancing riparian vegetation, individual species have habitat needs that will require attention to patch size, location, and vegetation structure. For example, the yellow-billed cuckoo requires large, contiguous patches of riparian vegetation (Gaines 1974). Restoration efforts must therefore strategically locate habitat to maximize continuous, uninterrupted areas of riparian vegetation. Nesting least Bell's vireos use a well-developed and layered canopy, with highest foliage density within one to two meters of the ground (Kus 1998), thus requiring restoration efforts to pay specific attention to vegetation structure.

Restore hydrological processes

Specific attention should be given to promoting natural river processes where it is feasible. These efforts could include removing river bank revetment,

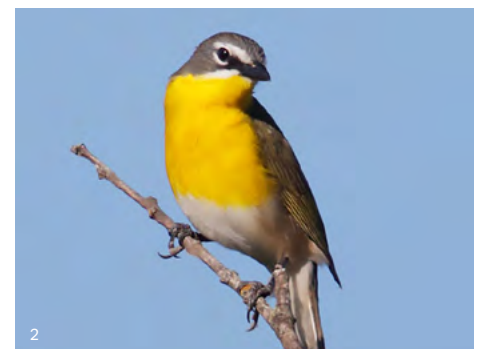
using set-back levees and conservation easements to protect river meander, and adopting flow regimes that maintain and improve river processes. For example, bank swallows depend on suitable nesting sites in cut banks created by river flows. Similarly, the least Bell's vireo, yellow-breasted chat, and lazuli bunting are all associated with scrubby, early- to mid-successional riparian vegetation, and seasonal flooding would help provide the disturbance that generates the early-successional vegetation used by these species. In addition, promoting natural river processes may improve the conditions for further riparian restoration and management through sediment deposition, groundwater recharge, and seed dispersal (Florsheim and Mount 2003; Opperman 2012), ultimately benefiting many riparian species. Integrating the habitat needs of riparian wildlife with recovery efforts for Central Valley fishes, including salmon, is an exciting opportunity.

Inhibit brown-headed cowbirds

Recommendations for minimizing the risk of cowbird parasitism are well-established and include managing for a dense shrub layer, managing grazing and mowing near riparian areas, and minimizing the availability of nearby cowbird food sources, such as those provided by dairies and feedlots (Dybala et al. 2014). The most common recommendation for minimizing cowbird risk is simply to restore habitat. Specifically, improve the continuity of large tracts of high-quality habitat, widen narrow corridors, and minimize edges, all of which may have the added benefit of reducing access by many nest predators (Dybala et al. 2014).

Consider benefits to waterbirds

In addition to providing habitat for riparian landbirds, riparian vegetation also provides roosting and nesting habitat for some waterbirds (see Breeding and Non-Breeding Waterbirds chapter). For these waterbirds, the amount of riparian vegetation is not as important as the location of this habitat near suitable foraging habitat, such as managed wetlands and postharvest-flooded crops. Riparian vegetation that is strategically located adjacent to waterbird foraging habitat will contribute to the habitat objectives for both breeding riparian landbirds and some waterbirds.



(1) Least Bell's vireo nest - Julie Rentner (2) Yellow-breasted chat - Tom Grey

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