

CENTRAL VALLEY JOINT VENTURE SPECIAL ISSUE

The Science of Setting Conservation Objectives for Birds in California's Central Valley: An Introduction

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INTRODUCTION

The papers in this special issue provide the scientific methods used to develop quantitative population and habitat objectives for birds in the Central Valley of California as part of the Central Valley Joint Venture's (CVJV's) Implementation Plan update (CVJV 2006). The approaches described in the papers are meant to provide a methodology that is transparent, repeatable, and can be applied to other ecosystems and taxa. Topics include focused approaches to conservation objective setting for non-breeding and breeding shorebirds as well as non-breeding and breeding waterbirds. Two papers outline the process for setting population and habitat objectives for riparian and grassland-oak savannah ecosystems. At-risk bird species are treated separately. A final paper provides an overall framework for quantitative objective setting that can be more generally applied to wildlife conservation.

What Are Conservation Objectives and Why Set Them?

Objectives in conservation are formal statements detailing a desired outcome of a plan or project. The most effective objectives are those that are specific, measurable, result-oriented, practical, and transparent. Objectives can be made at the population level—the desired number of organisms in a population or specific geography—and then translated into space—the number of hectares needed to meet the population objective.

Setting conservation objectives is central to conservation planning and implementation. Conservation objectives can provide focus for conservation planning efforts by defining how much habitat; how many individuals or populations, and where conservation should occur to meet an overarching conservation goal (Tear et al. 2005). Conservation objectives can also unify stakeholders, make conservation actions more efficient, focus monitoring efforts, and help prioritize the investment of resources.

Though generating clear and scientifically defensible conservation objectives is a critical component of many planning efforts, the process of establishing objectives is not straightforward, is infrequently documented, and information on how to do it is sorely lacking (Nicholson and Possingham 2006; Wilhere 2008; Brown et al. 2015). The papers in

this special issue address the challenges of setting conservation objectives for birds in California's Central Valley. These papers use the best available science and local data to set objectives in a manner that is transparent, well-documented, and repeatable.

Why Set Conservation Objectives for Birds in California's Central Valley?

Despite massive losses of habitat, the Central Valley's wetlands, riparian forests, and grassland-oak savannah woodlands still provide some of the most important bird habitat in North America. For example, nearly three million ducks, two million geese, and 350,000 shorebirds continue to overwinter in this region (Shuford et al. 1998; Olson 2014), making the Central Valley an internationally important area for migratory waterbirds in the Pacific Flyway (Fleskes 2012; Gilmer et al. 1982; WHSRN 2003). Hence, prioritization of conservation actions in the Central Valley for these waterbirds and landbirds is a critical step toward increasing their populations.

While these conservation efforts focus on increasing habitat for a diversity of birds, they offer a number of co-benefits. In general, biodiversity may be crucial for long-term resilience of ecosystem functions and the services they underpin (Oliver et al. 2015). In particular, restored riparian areas filter water and promote groundwater recharge (Tabacchi et al. 2000; Mander et al. 2005), capture carbon and prepare ecosystems for change (Lewis et al. 2015; Matzek et al. 2015; Seavy et al. 2009), provide habitat for native fish and wildlife (Knopf and Samson 1994; Pusey and Arthington 2003; Gardali et al. 2006; Golet et al. 2008), protect soil and support pollinators (Kremen et al. 2002; Power et al. 2010), and increase property values and provide recreational opportunities (Colby and Smith-Incer 2005; Bark et al. 2008).

The Central Valley Joint Venture Implementation Plan

The Central Valley Joint Venture (CVJV)—a coalition of 20 state and federal agencies, private conservation organizations, and one regulated utility—is in the process of setting conservation objectives for birds, and identifying strategies to meet those objectives.

Recognizing the need to have scientifically defensible objectives, the CVJV prioritized the peer-reviewed publication of the methods used to develop these quantitative population and habitat objectives for birds in the Central Valley. This special issue provides the results of this effort. Although the details of the approach for each of the bird groups varies based on the amount and type of available data, each manuscript covers the following components of objective setting: (1) specific framework/process, (2) analytical methods, (3) current status (e.g., population size, trends), (4) long-term and short-term objectives by geography, and (5) a discussion of the strengths and limitations of the approach.

The papers in this special issue cover the approaches used for setting conservation objectives in the Central Valley for non-breeding shorebirds (Dybala et al. 2017c), breeding shorebirds (Strum et al. 2017), and non-breeding and breeding waterbirds (Shuford and Dybala 2017). Two papers present the processes used to set population and habitat objectives for conservation of birds in riparian (Dybala et al. 2017b) and grassland-oak savannah ecosystems (DiGaudio et al. 2017). Shuford and Hertel (2017) present a framework for setting objectives for at-risk species in the Central Valley. Finally, Dybala et al. (2017a) offer a broad framework for setting quantitative objectives for wildlife conservation. We believe these papers provide an example for similar planning efforts that will be useful to other researchers and conservation planners around the world.

REFERENCES

- Bark RH, Osgood DE, Colby BG, Katz G, Stromberg J. 2009. Habitat preservation and restoration: do homebuyers have preferences for quality habitat? *Ecol Econ* 68:1465–1475. <https://doi.org/10.1016/j.ecolecon.2008.10.005>
- Brown CJ, Bode M, Venter O, Barnes MD, McGowan J, Runge CA, Watson JEM, Possingham HP. 2015. U.S. protected lands mismatch biodiversity priorities. *Proc Natl Acad Sci USA* 112(32):4342. <https://doi.org/10.1073/pnas.1509189112>

- Colby B, Smith-Incer E. 2005. Visitor values and local economic impacts of riparian habitat preservation: California's Kern River Preserve. *J Am Water Resour Assoc* 41:709–717.
<https://doi.org/10.1111/j.1752-1688.2005.tb03765.x>
- [CVJV] Central Valley Joint Venture. 2006. Central Valley Joint Venture implementation plan—conserving bird habitat. Sacramento (CA): U.S. Fish and Wildlife Service. [cited 2017 March 03]. Available from: http://www.centralvalleyjointventure.org/assets/pdf/CVJV_fnl.pdf
- DiGaudio RT, Dybala KE, Seavy NE, Gardali, T. 2017. Population and habitat objectives for avian conservation in California's Central Valley grassland–oak savannah ecosystems. *San Franc Estuary Watershed Sci* 15(1).
<https://doi.org/10.15447/sfews.2017v15iss1art6>
- Dybala KE, Clipperton N, Gardali T, Golet GH, Kelsey R, Lorenzato S, Melcer R Jr, Seavy NE, Silveira JG, Yarris GS. 2017a. A general framework for setting quantitative population objectives for wildlife conservation. *San Franc Estuary Watershed Sci* 15(1).
<https://doi.org/10.15447/sfews.2017v15iss1art8>
- Dybala KE, Clipperton N, Gardali T, Golet G, Lorenzato S, Melcer R, Seavy N, Silveira J, Yarris G. 2017b. Population and habitat objectives for avian conservation in California's Central Valley riparian ecosystems. *San Franc Estuary Watershed Sci* 15(1).
<https://doi.org/10.15447/sfews.2017v15iss1art5>
- Dybala KE, Reiter ME, Hickey CM, Shuford WD, Strum KM, Yarris GS. 2017c. A bioenergetics approach to setting conservation objectives for nonbreeding shorebirds in California's Central Valley. *San Franc Estuary Watershed Sci* 15(1).
<https://dx.doi.org/10.15447/sfews.2017v15iss1art2>
- Fleskes JP. 2012. Wetlands of the Central Valley of California and Klamath Basin. In: Batzer D, Baldwin A, editors. *Wetland habitats of North America: ecology and conservation concerns*. [cited 2017 March 03]. Berkeley (CA): University of California Press. p. 357–892. Available from:
<http://www.ucpress.edu/book.php?isbn=9780520271647>
- Gardali T, Holmes AL, Small SL, Nur N, Geupel GR, Golet GH. 2006. Abundance patterns of landbirds in restored and remnant riparian forests on the Sacramento River, California, U.S.A. *Restor Ecol* 14:391–403.
<https://doi.org/10.1111/j.1526-100X.2006.00147.x>
- Gilmer DS, Miller MR, Bauer RD, LeDonne JR. 1982. California's Central Valley wintering waterfowl: concerns and challenges. [cited 2017 March 03]. *Trans N Am Wildl Nat Resour Conf* 47:441–452. Available from:
<http://digitalcommons.unl.edu/usfwspubs/41/>
- Golet GH, Gardali T, Howell CA, Hunt J, Luster RA, Rainey W, Roberts MD, Silveira JG, Swagerty H, Williams N. 2008. Wildlife response to riparian restoration on the Sacramento River. *San Franc Estuary Watershed Sci* 6(2).
<http://escholarship.org/uc/item/4z17h9qm>
- Knopf FL, Samson FB. 1994. Scale perspectives on avian diversity in western riparian ecosystems. *Conserv Biol* 8:669–676.
<https://doi.org/10.1046/j.1523-1739.1994.08030669.x>
- Kremen C, Bugg RL, Nicola N, Smith SA, Thorp RW, Williams NM. 2002. Native bees, native plants, and crop pollination in California. *Fremontia* 30:41–49.
http://www.cnps.org/cnps/publications/fremontia/Fremontia_Vol30-No3and4.pdf
- Lewis DJ, Lennox MS, O'Green A, Creque J, Eviner V, Larson S, Harper J, Doran M, Tate KW. 2015. Creek carbon: mitigating greenhouse gas emissions through riparian restoration. Novato (CA): University of California Cooperative Extension in Marin County.
- Mander Ü, Hayakawa Y, Kuusemets V. 2005. Purification processes, ecological functions, planning and design of riparian buffer zones in agricultural watersheds. *Ecol Eng* 24:421–432.
<https://doi.org/10.1016/j.ecoleng.2005.01.015>
- Matzek V, Puleston C, Gunn J. 2015. Can carbon credits fund riparian forest restoration? *Restor Ecol* 23:7–14.
<https://doi.org/10.1111/rec.12153>
- Nicholson E, Possingham HP. 2006. Objectives for multiple-species conservation planning. *Conserv Biol* 20:871–881.
<https://doi.org/10.1111/j.1523-1739.2006.00369.x>
- Oliver TH, Heard MS, Isaac NJB, Roy DB, Procter D, Eigenbrod F, Freckleton R, Hector A, Orme CDL, Petchey OL, et al. 2015. Biodiversity and resilience of ecosystem functions. *Trends Ecol Evol* 30:673–684.
<https://doi.org/10.1016/j.tree.2015.08.009>

- Olson SM. 2014. Pacific Flyway data book 2014: waterfowl harvests and status, and hunter participation and success in the Pacific Flyway and United States. Vancouver (WA): U.S. Fish and Wildlife Service Division of Migratory Bird Management.
- Power AG. 2010. Ecosystem services and agriculture: tradeoffs and synergies. *Phil Trans R Soc B* 365:2959–2971. <https://doi.org/10.1098/rstb.2010.0143>
- Pusey BJ, Arthington AH. 2003. Importance of the riparian zone to the conservation and management of freshwater fish: a review. *Mar Freshw Res* 54:1–16. <https://doi.org/10.1071/MF02041>
- Seavy NE, Gardali T, Golet GH, Griggs FT, Howell CA, Kelsey R, Small SL, Viers JH, Weigand JF. 2009. Why climate change makes riparian restoration more important than ever: recommendations for practice and research. *Ecol Restor* 27:330–338. <https://doi.org/10.3368/er.27.3.330>
- Shuford WD, Dybala KE. 2017. Conservation objectives for wintering and breeding waterbirds in California's Central Valley. *San Franc Estuary Watershed Sci* 15(1). <https://doi.org/10.15447/sfews.2017v15iss1art4>
- Shuford WD, Hertel M KE. 2017. Bird species at risk in California's Central Valley: a framework for setting conservation objectives. *San Franc Estuary Watershed Sci* 15(1). <https://doi.org/10.15447/sfews.2017v15iss1art7>
- Shuford WD, Page GW, Kjelson JE 1998. Patterns and dynamics of shorebird use of California's Central Valley. [cited 2017 March 03]. *Condor* 100:227–244. Available from: <https://sora.unm.edu/sites/default/files/journals/condor/v100n02/p0227-p0244.pdf>
- Strum KM, Dybala KE, Iglecia MN, Shuford WD. 2017. Population and habitat objectives for breeding shorebirds in California's Central Valley. *San Franc Estuary Watershed Sci* 15(1). <https://doi.org/10.15447/sfews.2017v15iss1art3>
- Tear TH, Kareiva P, Angermeier PL, Comer P, Czech B, Kautz R, Landon L, Mehlman D, Murphy K, Ruckelshaus M, et al. 2005. How much is enough? The recurrent problem of setting measurable objectives in conservation. *Bioscience* 55:835–849. <https://academic.oup.com/bioscience/article/55/10/835/274365/How-Much-Is-Enough-The-Recurrent-Problem-of?searchresult=1>
- Tabacchi E, Lambs L, Guilloy H, Planty-Tabacchi A-M, Muller E, Decamps H. 2000. Impacts of riparian vegetation on hydrological processes. *Hydrol Process* 14:2959–2976. [http://onlinelibrary.wiley.com/doi/10.1002/1099-1085\(200011/12\)14:16/17%3C2959::AID-HYP129%3E3.0.CO;2-B/full](http://onlinelibrary.wiley.com/doi/10.1002/1099-1085(200011/12)14:16/17%3C2959::AID-HYP129%3E3.0.CO;2-B/full)
- Wilhere GF. 2008. The how-much-is-enough myth. *Conserv Biol* 22:514–517. <https://doi.org/10.1111/j.1523-1739.2008.00926.x>
- [WHSRN] Western Hemisphere Shorebird Reserve Network. 2003. Sacramento Valley as a site of international importance to shorebirds. [cited 2017 March 03]. Available from: <http://www.whsrn.org/site-profile/sacramento-valley>