Climate-wise Landscape Connectivity: Why, How, and What Next

A Report for California's Fourth Climate Change Assessment

Prepared by

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HIGHLIGHTS

- Climate-wise connectivity is an emerging area of conservation science focused on maintaining and restoring resilient landscapes to facilitate species movement required for range shifts expected with climate change.
- Increasing the amount of habitat throughout the landscape is one of the most effective strategies to help California's species adapt to climate change. Additionally, the protection of climate refugia, elevation and other geographic gradients that may help slow the rate of climate change that species may experience, and movement corridors will help facilitate persistence and range shifts.
- 13 approaches to design climate-wise connectivity, based on either focal species or landscape structure, were identified and each approach aligns with different conservation objectives, start and end points, and input data.
- Structural connectivity approaches based on land use/land cover are a good proxy for species movement patterns and are recommended as a first start for statewide corridor modeling in combination with climate information, particularly on refugia (areas where today's climate will persist into the future and places with low climate velocity); where possible, empirical data on species movement should be used for model validation and local planning.
- Riparian corridors should be included in connectivity planning because of their importance as natural movement corridors, climate gradients, and refugia, and also because they provide co-benefits to protecting water resources and hazard mitigation.
- Robust scientific data, especially animal movement paths, camera trap data, and roadkill surveys, in combination with climate change assessments and connectivity models, can help with siting and justifying connectivity projects.
- Opportunities for successful corridor implementation include creating a common vision of connected landscapes, accounting for the multiple benefits of corridors, partnerships between stakeholders, close collaboration with scientists, climate-wise connectivity planning, communication among partners and with the public, laws and regulations focused on conserving connectivity to guide resource agencies, and incentive programs for private landowners.

- A framework to guide corridor implementation is proposed based on the literature and interviews with conservation professionals in California that includes: the role of partnerships; planning; data and analysis; opportunities and challenges; and various strategies producing conservation outcomes.
- California should advance policies and funding mechanisms aimed at increasing connectivity conservation, integrating habitat connectivity objectives into local land use planning and infrastructure upgrades and maintenance, and developing incentive programs to increase private landowner participation.
- In sum, California can make rapid progress towards creating climate-resilient landscapes by using appropriate modeling approaches to design corridors that will help animals and plants move in response to climate change, protecting climate refugia, continuing to conduct scientific field research on species movement, and following the framework developed here to guide on-the-ground connectivity implementation.

- Papers published based on the report:

Keeley A.T.H., D.D. Ackerly, D.R. Cameron, N.E. Heller, P.R. Huber, C.A. Schloss, J.H. Thorne, A.M. Merenlender. 2018. New concepts, models, and assessments of climate-wise connectivity. Environmental Research Letters 13:073002.

Keeley A.T.H., G. Basson, D.R. Cameron, N.E. Heller, P.R. Huber, C.A. Schloss, J.H. Thorne, A.M. Merenlender. 2018. Making habitat connectivity a reality. Conservation Biology, in print.