Section 1-General Information

Title of Existing Project: Understanding impacts of climate, urbanization, and water supply management on waterbird habitat and ecology

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Ecoregion for the work: Central Valley (but approach could also be applied across other ecoregions).

Section 2 – Partners and Management Relevance

Partners Participation and Management Relevance: Funding is required to adapt and incorporate results of the climate-urbanization-water management scenario modeling project into Central Valley Joint Venture (CVJV) habitat conservation planning. The primary mission of the Central Valley Joint Venture (CVJV) is to provide for the habitat needs of waterfowl, waterbirds and other migratory and resident birds in the Central Valley of California. Comprised of 9 conservation organizations, 11 state and federal agencies, and one corporation, the CVJV uses a food energy modeling approach to establish habitat objectives and design habitat conservation for waterfowl and other waterbirds. The CVJV has recently initiated efforts to update its Implementation Plan and understanding how climate, urbanization, and water supply management options could impact future availability of water supplies and habitats supported by those water supplies is critically important for this conservation planning process.

During the past 2 ½ years, a team of USGS, Stockholm Environment Institute, Ducks Unlimited, and University of California-Davis scientists supported with funding from the CA-LCC, USFWS-Region 8, Central Valley Joint Venture, Delta Waterfowl Foundation, and California Department of Fish and Wildlife has worked to develop and implement modeling tools to evaluate projected impacts of climate, urbanization, and management of water supplies on the amount and timing of water that is available to support waterbird habitats in the Central Valley of California. Work has included: ***a)*** improving the Water Evaluation And Planning (WEAP) model used by the State of California and others, which accounts for water distribution system limitations, to better predict water supplies available for wetlands and agricultural habitats of importance to waterfowl and other waterbirds; ***b)*** researching, developing, and entering data that are necessary to model impacts of climate, urbanization, and proposed management changes of water supplies into WEAP; ***c)*** applying various climatic, urban growth, and water management scenarios in WEAP to estimate amount and temporal availability of water and supported waterbird habitats; ***d)*** estimating impacts of each scenario on wintering waterfowl food supplies and avian bioenergetics using TRUEMET and agent based modeling; and ***e)*** identifying waterbird resources in the Central Valley that are most at risk due to climate change, urbanization, and changing water management. Modeling has been completed for numerous scenarios and major Central Valley basins (see progress reports and project webpage for more information: http://www.werc.usgs.gov/Project.aspx?ProjectID=204) and funding is needed to accomplish the critically important objective of helping the CVJV develop management strategies to account for climate and other factors by adapting and incorporating results of the project into their conservation planning. (See attached letter of support from the CVJV).

How work implements CA LCC Strategic Plan: This work directly implements numerous elements of the CA LCC Strategic Plan and supports the LCC's guiding principles by strengthening existing partnerships, providing enhanced science capability by accounting for climate change and other stressors to improve conservation delivery, and providing agencies with critical information and tools to improve management of wildlife populations and habitats.

The CVJV is a major conservation organization comprised of over 20 partner organizations, and since 1986, has facilitated most bird habitat conservation in the Central Valley. The existing scenario modeling project has worked to address CVJV information needs and CA-LCC priorities by ***a)*** developing tools that will help managers allocate resources based on scenario evaluation; ***b)*** adding value to CVJV conservation by providing analyses of land use changes due to climate/urbanization/water supply scenarios; ***c)*** developing models at basin scale needed by CVJV to address need to judge if current habitat plan is adequate to support goal waterbird pops under climate/planning scenarios; ***d)*** modeling frequency/intensity/impact of climate-driven occurrence of water supplies that are inadequate for goal waterbird pops; ***e)*** identifying/assessing impacts of urbanization/changes in water management on waterbird habitat/ecology; ***f)*** providing data to better understand waterbird responses (condition/survival) to climate change; and g) developing methods to predict waterbird habitat change for the CV. The goal of this additional proposed work is to work with the CVJV to adapt the scenario modeling project results and modeling tool so they can be used by the CVJV to incorporate climate, urbanization, and water supply management impacts on waterbird habitats into its conservation planning.

Section 3 – Work Summary

Status of existing product deliverables and outreach efforts: The scenario modeling project has delivered products as promised including: ***a)*** results from adapting and applying the Water Evaluation and Planning model to better estimate water supplies and resulting wetland and agricultural habitats of importance to waterfowl and other waterbirds in the Butte, Sutter, Colusa, and San Joaquin basins through year 2065 (2099 for some) under numerous scenarios of varying climate, urbanization, and water management; ***b)*** results from methods developed and applied for integrating projected habitat data with TRUEMET and ABM bioenergetics models to evaluate adequacy of food supplies to support wintering waterfowl at CVJV-goal population levels; ***c)*** an in-prep manuscript documenting scenario modeling approach which will serve to guide similar efforts elsewhere; and ***d)*** results presented on a project webpage, in 2 major progress reports, in 3 conservation organization articles, and with 16 presentations at international, regional, or local conferences, workshops, and meetings.

Description of additional work relative to existing work: The overall goal of this additional work will be to help the CVJV understand and plan for impacts of climate, urbanization, and water supply management changes on future availability of water supplies and bird habitats. Specifically, this project will **a)** adapt the results of the climate-urbanization-water management scenario modeling project for inclusion in the updated CVJV Implementation Plan and **b)** provide the CVJV the tools necessary to evaluate impacts to water supplies and habitats of future proposed changes to water supply management. To accomplish these objectives the project team will work with the CVJV to determine the best way to incorporate scenario modeling results into the Implementation Plan update. This may include developing a separate chapter or developing sections within several chapters in the Implementation Plan to incorporate impacts of climate, urbanization, and water management on water supplies and habitats. Work may also include modeling additional water management scenarios suggested by the CVJV and expanded or refined focus on particular habitats, basins, or sub-basins. The steps used in the scenario modeling project will be described and documented in detail to provide the CVJV the information necessary to evaluate impacts to water supplies and habitats of changes to water supply management that may be proposed in the future. As part of this project, one or more scenario modeling examples will be worked through with the CVJV to ensure the model and process are described sufficiently and future evaluations can be accomplished.

Description of value added to existing work: Working directly with the CVJV to adapt the results and test the modeling tool developed by the existing scenario modeling project will ensure that projected impacts of climate and other stressors are incorporated into CVJV conservation planning. The Implementation Plan, which guides CVJV's conservation activities, is scheduled to be revised and updated starting this year. Thus, timing is ideal for this work.

Staff involvement and capabilities: Project team members have worked successfully with the CVJV as working group leaders and members and have an extensive record of producing and publishing project results of high quality and utility for the resource management community. Each team member has successfully fulfilled their role as described above on other projects and as demonstrated for this project in the deliverables listed below. Project team member involvement is listed below:

USGS-Western Ecological Research Center: Project lead, modeling, coordination, outreach, reporting
Stockholm Environment Institute: Adaptation and application of WEAP model
Ducks Unlimited, Inc.: Lead application of TRUMET bioenergetics modeling
University of California-Davis: Lead application of agent-based modeling
Central Valley Joint Venture: Collaborate on incorporation of results into Implementation Plan

Timeline for deliverables: <u>October 2013</u> – In addition to existing project summary report on scenario modeling results (e.g., water supplies, availability of wetland and agricultural habitats, food supplies vs. need for wintering waterfowl and other waterbirds under numerous scenarios of climate, urbanization, and water management in major Central Valley basins), we will report on progress made to adapt and incorporate results into CVJV conservation planning. <u>October 2014</u> – CVJV Implementation Plan chapter and/or chapter sections incorporating results of scenario modeling and description of method to follow to evaluate potential impacts to water supplies and habitats of future proposed changes to water supply management. <u>Various dates</u> – Results presented in updated project website and at appropriate conferences/workshops/meetings.

Section 4 – Budget (See attached).

$50K requested from CA-LCC matched by $116K in partner funding and in-kind contributions.

(*Letter of Support from Central Valley Joint Venture also attached).*