

Agricultural Groundwater Replenishment with BasinScout™

A Decision Support Tool for Visualizing, Optimizing, and Tracking Conjunctive Water Management

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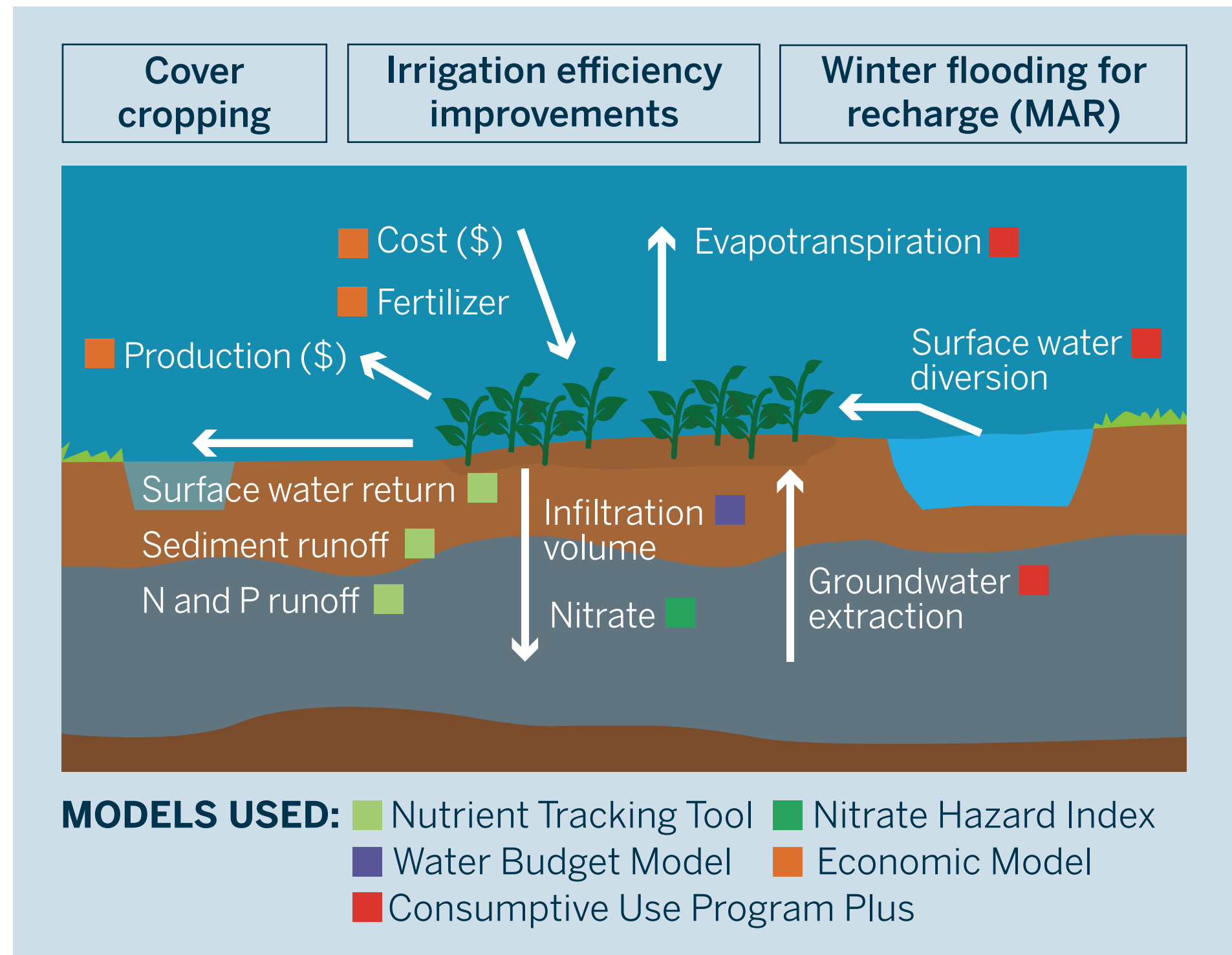
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Agricultural Best Management Practices (BMPs) can play a significant part in reaching groundwater sustainability goals for SGMA compliance. However, to incorporate BMPs into Groundwater Sustainability Plans (GSPs), it is necessary to fully quantify their implementation costs, recharge contributions, and impacts on groundwater demand. The BasinScout™ toolkit supports GSP development by estimating field-specific BMP feasibility and costs, the associated groundwater quantity and quality benefits, as well as other benefits to surface water and

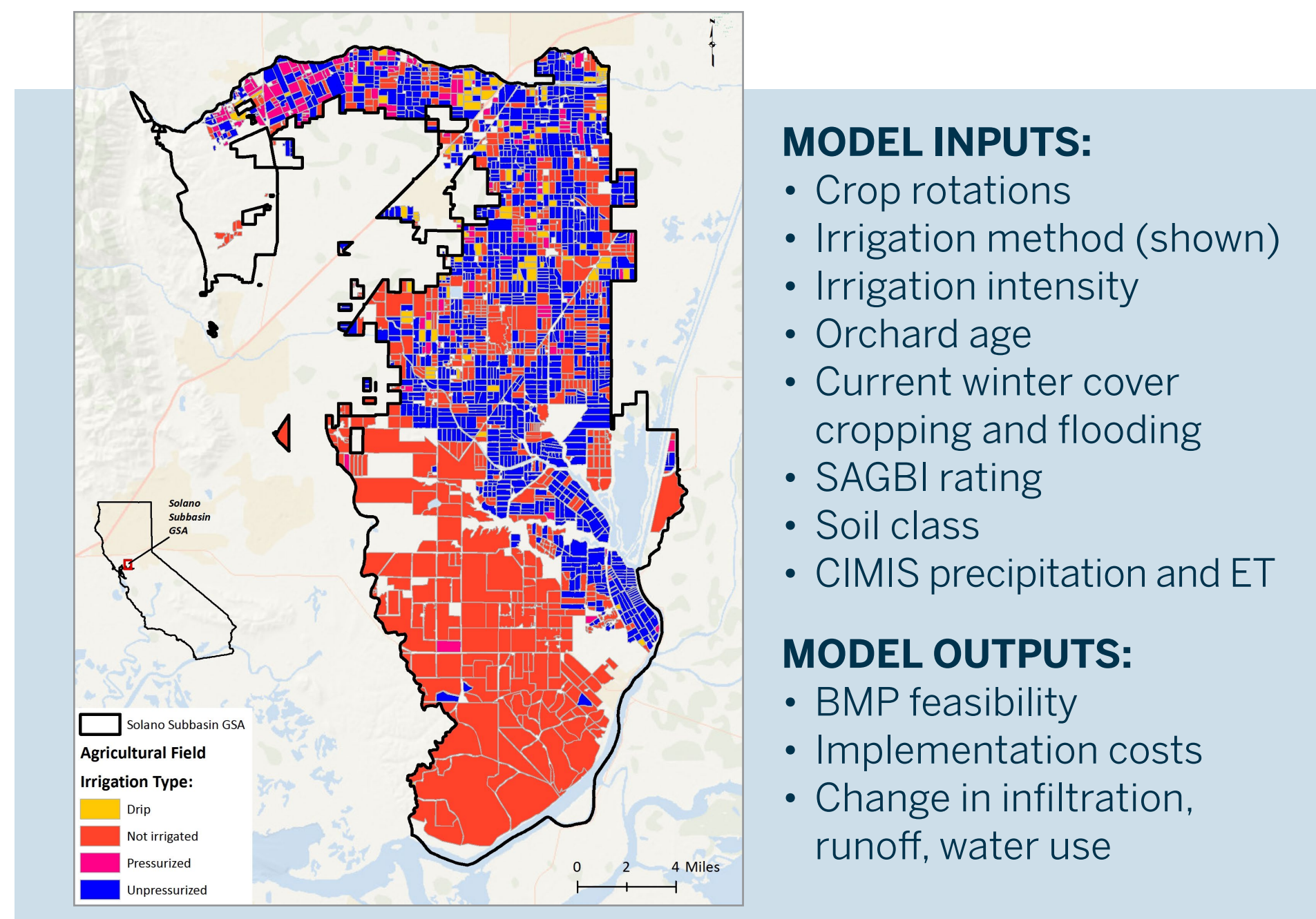
groundwater dependent ecosystems. These results, aggregated at the basin-scale, reveal the potential long-term impact of BMPs on the water budget. Further, multi-objective optimization enables the site-specific prioritization of implementation projects to achieve groundwater targets within financial and other constraints. BasinScout also supports stakeholder outreach and funding efforts for BMP implementation, thereby making it a broadly applicable tool for groundwater managers.

Model Field-Specific BMP Feasibility, Costs, and Benefits

Comprehensive assessment of current agricultural practices and their groundwater demand is important to describe the **Plan Area** and **Basin Setting**, especially when developing the **Hydrogeologic Conceptual Model** and **Water Budget** for the basin.



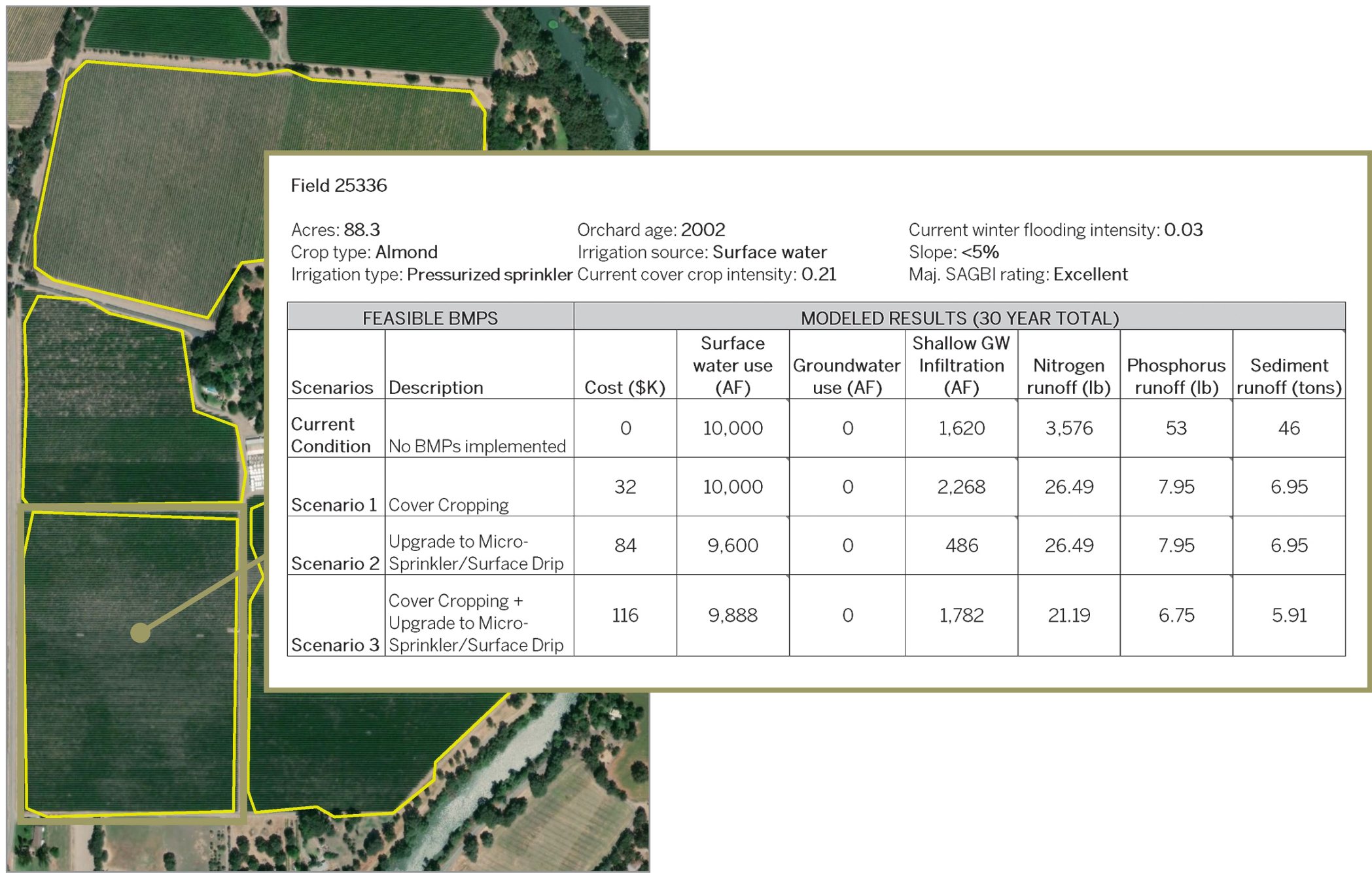
BMPs currently considered in BasinScout and the field-level changes modeled, given the implementation of each BMP.



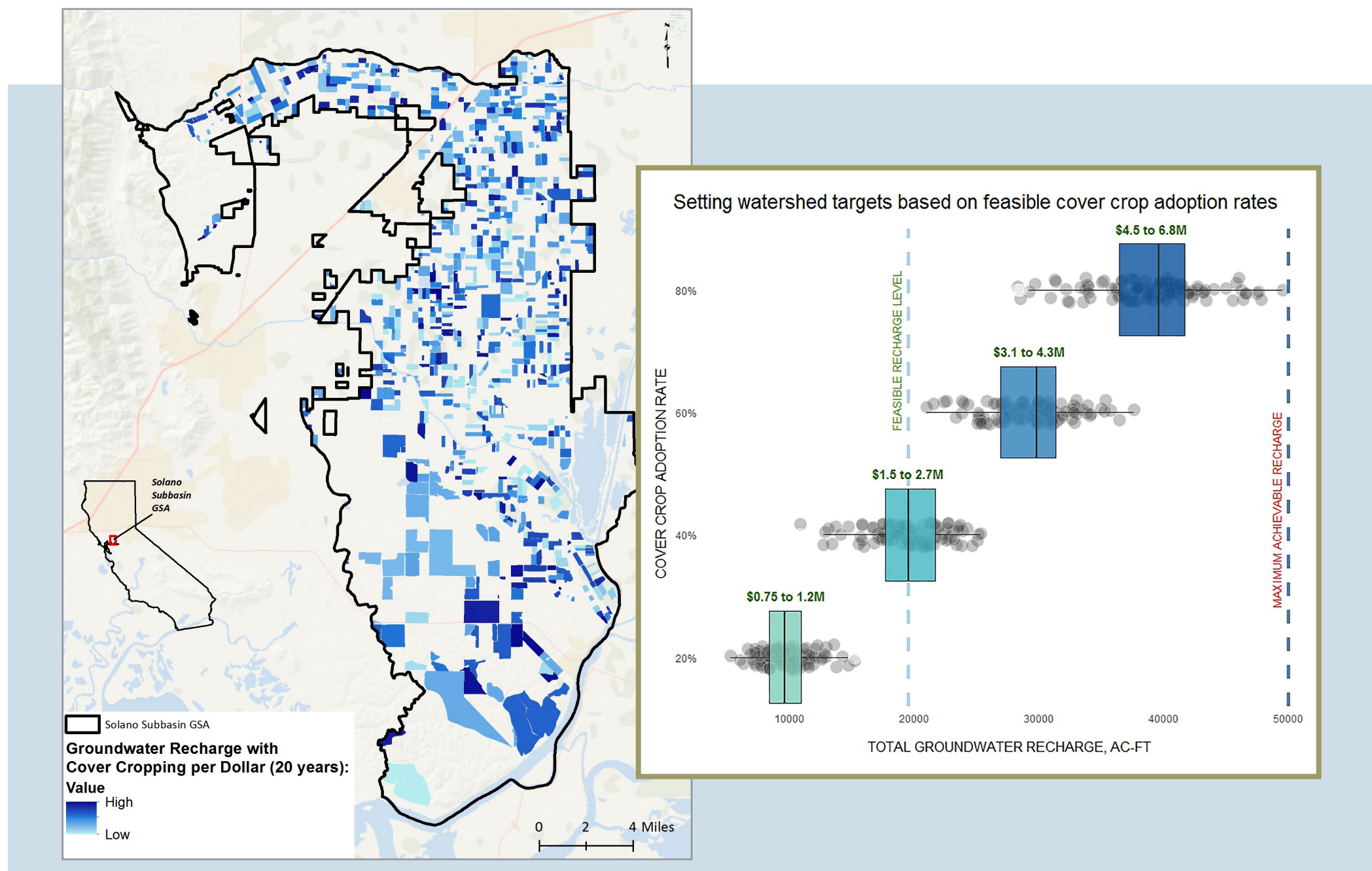
Field-level data inputs for feasibility and cost-benefit models include publicly available data as well as current cropping and irrigation practices derived from machine learning.

Evaluate Potential Recharge at Field- and Basin-Scale

The basin-wide recharge potential from BMP implementation can be used in groundwater modeling to develop **sustainability goals** and **measurable objectives** for the basin. Field- and basin-level results facilitate **public engagement** in the GSP development process.



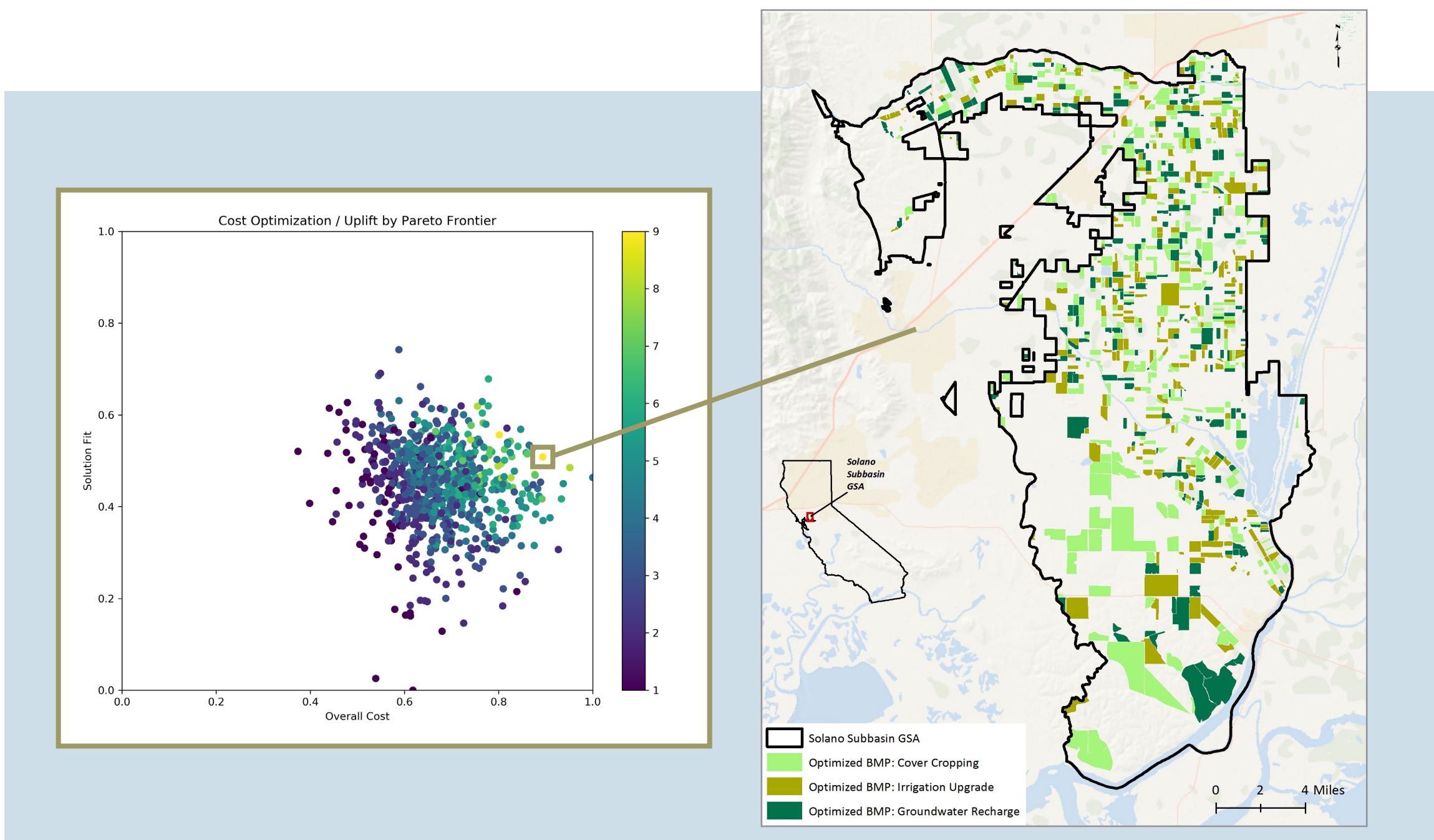
Field-level results show growers their options for contributing to SGMA compliance and the associated costs and groundwater and surface water benefits.



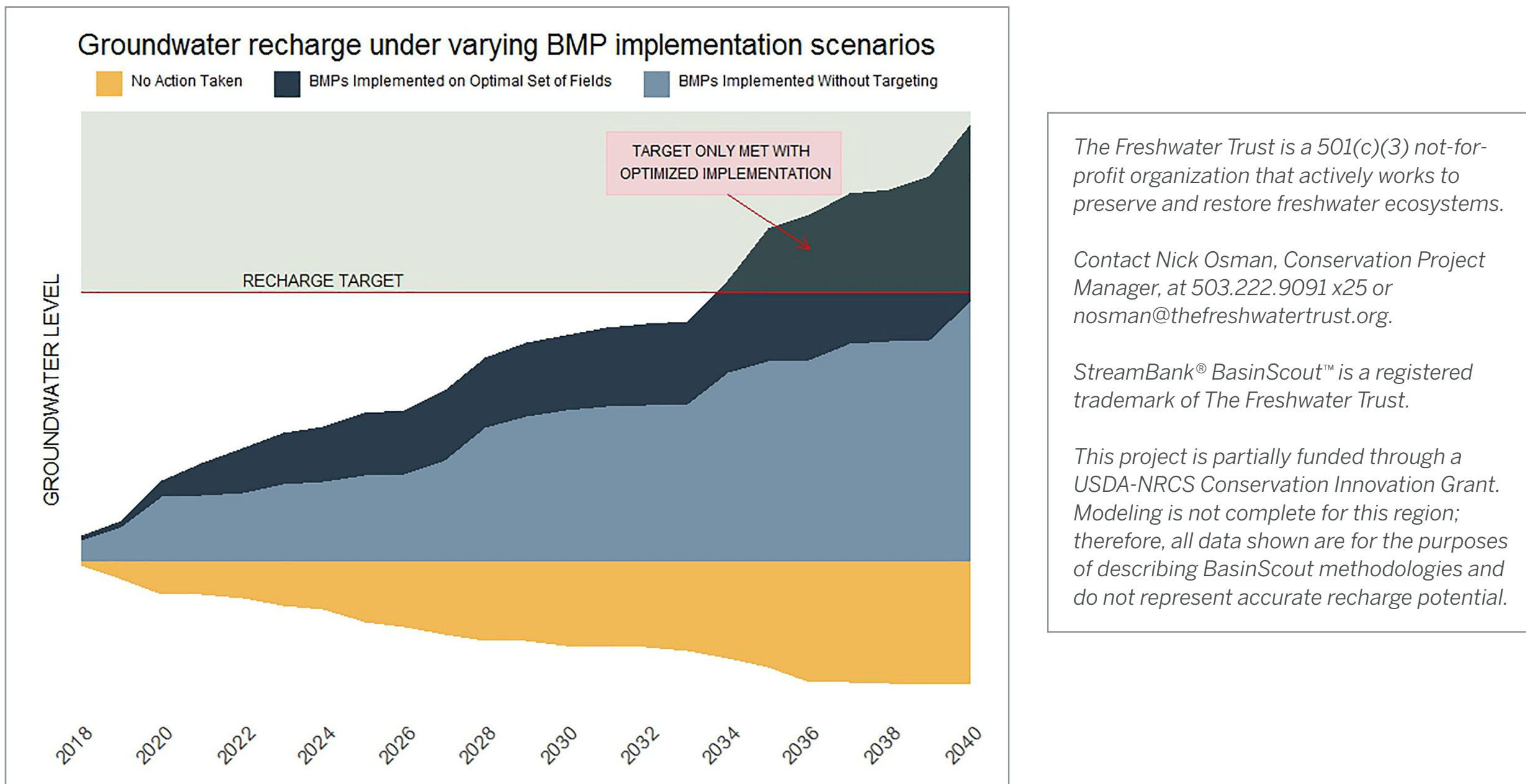
Basin-wide modeled results display potential changes in the water budget given BMP implementation. The user can select various timescales and anticipated levels of BMP adoption to view basin-wide results, but the selection of projects has not been optimized.

Achieve Targets through Implementation of Optimized BMPs

Optimization models are used to identify field-specific BMPs, implemented along a specific timeline, that will achieve sustainability goals and provide additional ecological benefits at minimal cost. These details support the inclusion of BMPs in GSP development by specifying the **implementation costs, schedule, and reporting framework**.



Program budgets and groundwater goals are used as objectives or constraints in optimization models to reveal the distribution and sequencing of BMPs throughout the basin that are available to achieve SGMA compliance.



The Freshwater Trust is a 501(c)(3) not-for-profit organization that actively works to preserve and restore freshwater ecosystems.

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An optimized BMP portfolio and implementation plan enables GSAs to prioritize landowner outreach efforts and show that the GSP represents a viable and realistic path to sustainability.