# DELTA LANDSCAPE SCENARIO PLANNING TOOL

*Developing a tool to assist users with developing, analyzing, and evaluating different restoration and land use scenarios in the Delta.*

▶ **Overview:** This project, funded by the Delta Stewardship Council, will develop tools to assist users with developing, analyzing, and evaluating different restoration & land use scenarios in the Delta. Specifically, in its first iteration, tool will calculate how proposed land cover modifications will impact a suite of **landscape metrics**. While the initial focus of the tool will be on metrics related to ecosystem function, the tool will be developed in a modular fashion that allows for a wide range of analyses (including those related to agriculture, flood control, recreation, etc.). Ultimately, we envision a tool that can help the users analyze the landscape at multiple scales, determining, for example, how a single proposed project would influence alter metrics in its immediate surroundings, or how a larger regional strategy comprised of many individual projects would cumulatively impact the whole Delta. A tool that can quickly evaluate key metrics in a repeatable and standardized way will help agencies and other stakeholders anticipate how projects will affect performance measures (such as those required under the Delta Plan) and to track actual progress towards goals and objectives as projects are implemented. There are clear potential actions of such a tool in project design, evaluation, tracking, and reporting.

▶ **Scenario development:** To assist with the process of scenario development (the creation and digitization of alternative land cover and restoration scenarios), the project plans to develop the following resources. First, SFEI will compile and produce spatial datasets that can inform the development of science-based restoration scenarios, such as basic maps of elevation, historical and contemporary habitat type distribution (**"guiding datasets"**). A key component of guiding datasets package will be a set of spatially-explicit maps of restoration opportunities and landscape potential (**"landscape restoration opportunities"**). These restoration opportunities, which are based on SFEI's "Delta Landscapes Project," will serve as a pre-developed menu of complementary and locally-appropriate potential land cover modifications that can serve as a starting point for users developing their own scenarios. In addition to being made available in a single package, the guiding datasets will also be added to an online **web map** to allow users without GIS capabilities to view and utilize the layers. Possible scenarios to initially evaluate include projects planned under the CNRA EcoRestore initiative, the Delta Public Lands Strategy, and a "business as usual scenario" that looks at the possible impacts of continued urban development, subsidence, and, sea-level rise on the current landscape.

*Are used to inform the development of...*

*Which are analyzed to generate and compare...*



**Guiding datasets:**
- Landscape restoration opportunities analyses
- Elevation
- Historical & contemporary habitats
- Sediment supply, soil conditions, groundwater supply
- Infrastructure (levees, intakes, roads, etc.)
- ???

**Landscape scenarios:**
- e.g., EcoRestore
- Delta Public Lands Strategy
- Individual project design alternatives
- "Business as usual
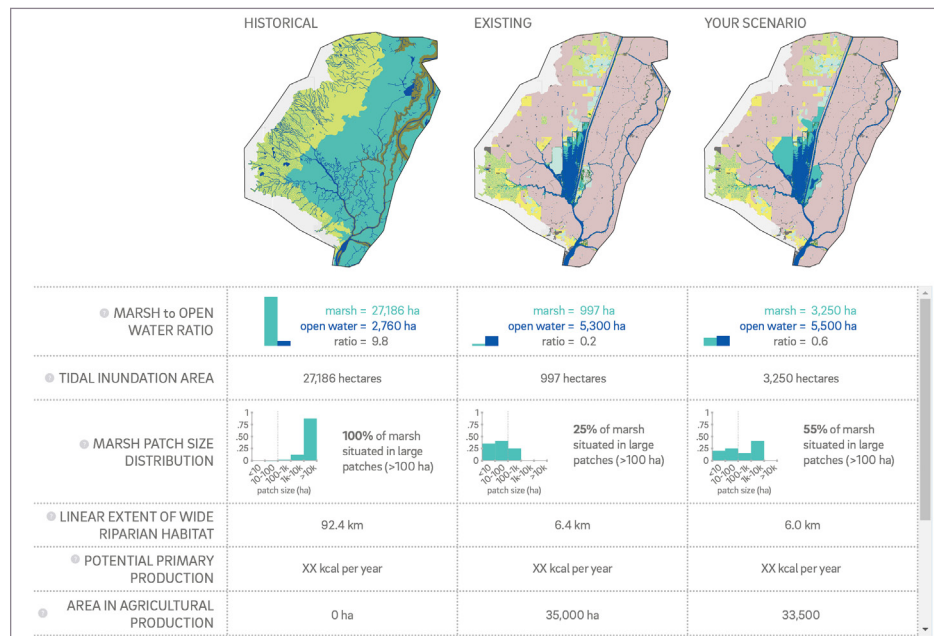- ???

**Landscape analyses & metrics:**
- Habitat type area
- Marsh patch size, distance, core area
- Riparian corridor width
- Inundation extent by type
- Acres with subsidence reversal or carbon sequestration practices
- Ecosystem services
- ???

▶ **Scenario analysis:** The landscape scenario planning **GIS tool** will analyze user-generated landscape scenarios using a variety of metrics. With a wide range of potential impacts from restoration actions in the Delta (spanning the interconnected systems of ecosystem function, water supply, flood control, agriculture, and recreation), there is also a wide range of potential metrics that a comprehensive landscape scenario planning tool should ultimately be able to evaluate. With this in mind, the planned approach for this phase of work is to develop a tool that initially focuses on metrics related to ecosystem function, but is designed in a way that allows for the addition of additional metrics during future phases. More specifically, the initial focus of this task will be to develop the tool's capabilities to evaluate a suite of well-established landscape metrics ("the Delta Landscapes metrics"; SFEI-ASC 2014). These landscape metrics, originally developed as part of the Delta Landscapes Project, were specifically designed to evaluate support for ecological functions at the landscape scale, have received substantial review from local scientists, and are already situated within a science foundation for landscape-scale restoration (SFEI-ASC 2016). Other priority metrics for initial development might include a selection of Delta Plan performance measures, or other simple metrics related to agriculture, water supply, flood control, or recreation. Final metrics will be determined with input from potential tool users to determine priorities and feasibility.

▶ **Scenario evaluation:** Once scenario analysis is complete, the landscape scenario planning tool will output results in formats that are useful for agency staff, restoration planners, and other stakeholders. At a minimum, these **tool outputs** will include tabular or graphic data with quantitative outputs for each metric/analysis. Depending on the needs of users identified through the workshop, the tool could also automatically generate a report that compares scenarios, compares the calculated metrics against established targets/baselines, characterizes the functional implications of the anticipated changes in metrics, or highlights potential modifications to the scenario (based on, for example, problematic components or missed opportunities).

▶ **Project outreach:** In addition to creating a website to provide access to the tool and related resources, SFEI will host multiple workshops to set project priorities and receive feedback on tool prototypes. Once the tool is completed, SFEI will also host a series of training sessions. Contact Sam Safran at sams@sfei.org for more information.

*Hypothetical tool outputs* for a scenario in the northwest Delta (note not actual tool results; numbers only examples).



| | HISTORICAL | EXISTING | YOUR SCENARIO |
|---|---|---|---|
| MARSH to OPEN WATER RATIO | marsh = 27,186 ha<br>open water = 2,760 ha<br>ratio = 9.8 | marsh = 997 ha<br>open water = 5,300 ha<br>ratio = 0.2 | marsh = 3,250 ha<br>open water = 5,500 ha<br>ratio = 0.6 |
| TIDAL INUNDATION AREA | 27,186 hectares | 997 hectares | 3,250 hectares |
| MARSH PATCH SIZE DISTRIBUTION | 100% of marsh situated in large patches (>100 ha) | 25% of marsh situated in large patches (>100 ha) | 55% of marsh situated in large patches (>100 ha) |
| LINEAR EXTENT OF WIDE RIPARIAN HABITAT | 92.4 km | 6.4 km | 6.0 km |
| POTENTIAL PRIMARY PRODUCTION | XX kcal per year | XX kcal per year | XX kcal per year |
| AREA IN AGRICULTURAL PRODUCTION | 0 ha | 35,000 ha | 33,500 |

**Examples of potential tool uses & applications**

- Allow Delta Plan agencies to predict the impacts and track the actual effects of restoration projects on Delta Plan performance measures

- Operationalize the use of science-based landscape metrics in the planning process

- Assist grant-making agencies with evaluating landscape-level effects of proposed projects

- Integrate results from multiple models