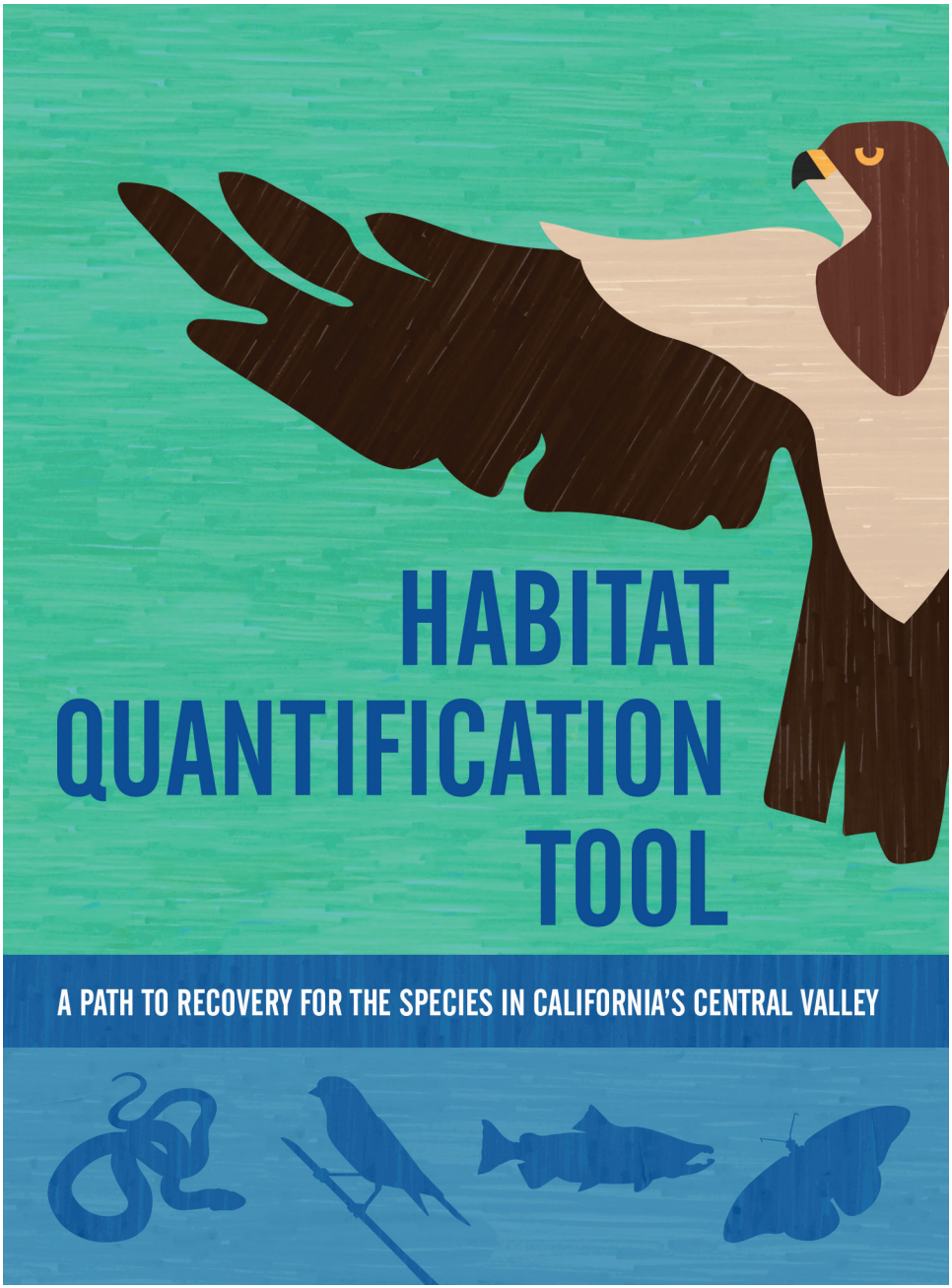


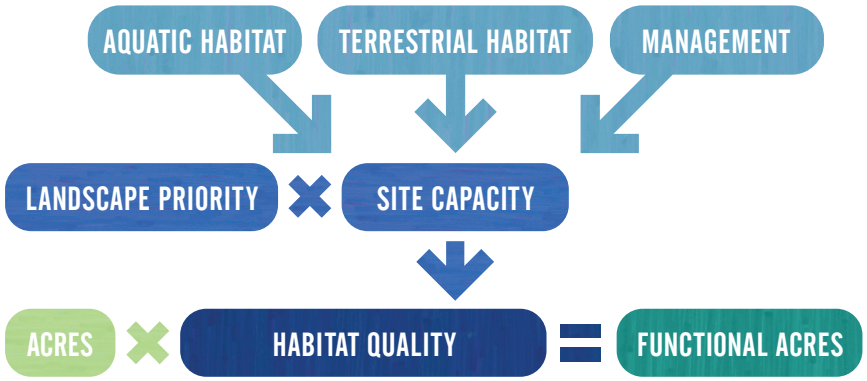
*Traditional conservation tools focus on acreage, but not enough on the quality of those acres. The **Habitat Quantification Tool (HQT)** – developed by EDF and partners in conjunction with scientists and technical experts – uses a different approach designed to bring greater confidence to conservation decisions.*

HOW THE HQT WORKS

The HQT evaluates both quantity *and* quality of habitat using a unit called "functional acres." Habitat quality is determined using the best available science on a particular species' habitat needs. The HQT accounts for a number of critical and beneficial habitat attributes across the full life cycle of a species. If any critical attribute is absent at a site, that site is considered unsuitable for the species. Each beneficial feature is measured as a percent of optimal condition (that is, 100% functionality) using a unique, data-derived scoring curve.

By using this tool before, during and after a conservation or development project, regulatory agencies can more precisely assess environmental impacts and generate positive outcomes for wildlife.

What goes into a functional acre?



A Multi-Species, Multi-Scale Approach

The HQT has been customized to measure functional acres for a variety of special-status species in California's Central Valley. This Multi-Species HQT streamlines the process of habitat restoration and management by giving users a consistent approach for evaluating conservation opportunities on a site for a suite of species, including the Swainson's hawk, a guild of riparian landbirds, the giant garter snake, the Chinook salmon and the monarch butterfly. Other species may be included in the future.

For each animal, the Multi-Species HQT accounts for habitat quality at project site and landscape scales. This multi-scale approach, combined with complete transparency, allows for better information sharing and collaboration across the Central Valley. For example, it can inform decisions about where to implement conservation projects to achieve the greatest benefits. This ultimately supports better conservation planning across multiple agencies and prevents fragmented patches of healthy habitat amidst a vast matrix of poor habitat.

BENEFITS OF THE HQT

Key Attributes of the Multi-Species HQT

- **Science-based:** continually factors in the best available science – no guesswork involved
- **Consistent:** provides a common language – functional acres – for all parties
- **Transparent:** provides an objective measure of impacts and benefits everyone can understand – and tracks and reports outcomes to avoid "black box" decision making
- **Comprehensive:** measures quantity and quality, site- and landscape-scale habitat conditions, and direct and indirect impacts
- **Scalable:** can inform conservation projects from small- to large-scale efforts that cross jurisdictions
- **Flexible:** adjusts for changes in the landscape over time, such as climate impacts
- **Efficient:** using the HQT requires only the time to conduct a field-site survey and familiarity with biological assessments, Microsoft Excel, and GIS and mapping software, such as Google Earth
- **Strives for net benefit:** improved accounting means improved tracking of progress toward the goal of creating net benefit
- **Achieves the highest return on investment:** directs conservation dollars – both public and private – to activities and projects that provide the greatest habitat benefit

Increase Your Project's Effectiveness

As an appraisal tool, the HQT has the flexibility to bring value and increased transparency to any conservation, restoration or mitigation project. It provides the scientific integrity and streamlined efficiency needed to move projects at a larger scale and faster pace, which benefits every stakeholder involved – especially the species in need.

Status of the Central Valley Multi-Species HQT

The Multi-Species HQT is essential to the Central Valley Habitat Exchange, a program that rewards landowners for achieving conservation outcomes on their properties, including productive agricultural lands. The tool is regularly updated as new science becomes available.

PUT THE HQT TO WORK FOR YOUR PROJECTS

Contact: Daniel Kaiser, Environmental Defense Fund
dkaiser@edf.org | edf.org/HQT

HQT in Action

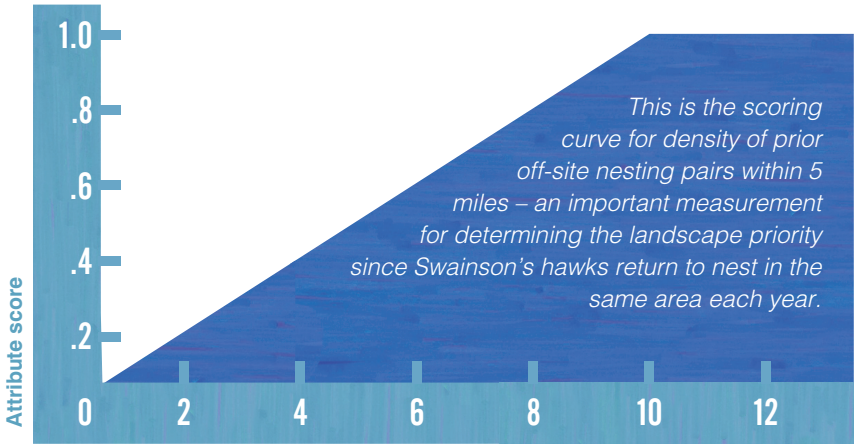
SWAINSON'S HAWK

*The **Swainson's hawk** – a threatened species in California – is losing its foraging and nesting grounds as open agricultural lands in the Central Valley are rapidly developed or converted to other uses. Approximately 95% of California's remaining Swainson's hawk population lives in the Central Valley, so the conservation and management of high-quality habitat on remaining agricultural lands is crucial to this species' survival.*

Customizing Functional Acres for the Swainson's Hawk

To measure habitat quality for a project site, the HQT weights site habitat features related to foraging and nesting capacities, such as the number and type of suitable on-site nest trees. It also takes into account harmful management features, such as the use of rodenticide.

The HQT also factors in the landscape priority – how well the landscape surrounding the plot can support Swainson's hawks. It takes into account the hawk's regional density, the distance to and density of off-site nesting and the extent of protected habitat nearby, as well as other features.



The habitat attribute scores at the site and landscape scales are combined into the habitat quality score and multiplied by the acreage of the project area to determine the functional acres of the site.

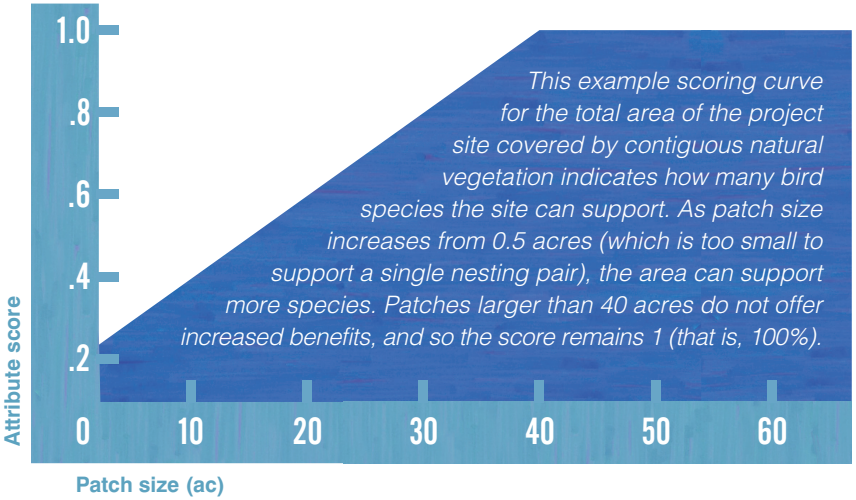
HQT in Action

RIPARIAN LANDBIRDS

*Riparian vegetation provides critical habitat for California's birds, but they have lost about 90% of this habitat. The HQT evaluates habitat for a guild of **riparian landbirds** (including species like the blue grosbeak, spotted towhee and yellow-breasted chat), which means a more efficient, consistent process for assessing and designing restoration projects for a number of species.*

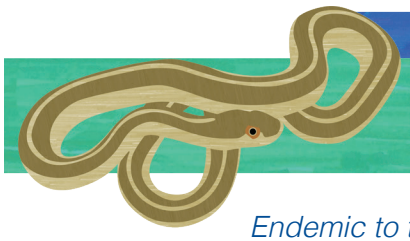
Customizing Functional Acres for Riparian Landbirds

For these species, the HQT evaluates special habitat features, attributes of the site's riparian vegetation, and management practices that allow for successful breeding and foraging. Since the focal species have variable habitat requirements, the HQT assigns higher scores when a diversity of habitat needs are met at a site.



At the landscape level, the HQT accounts for riparian habitat quality in the surrounding area as well as the number of focal species supported nearby. In addition, features like large feedlots nearby will decrease the landscape priority.

The habitat attribute scores at the site and landscape scales are combined into the habitat quality score and multiplied by the acreage of the project area to determine the functional acres of the site.



HQT in Action

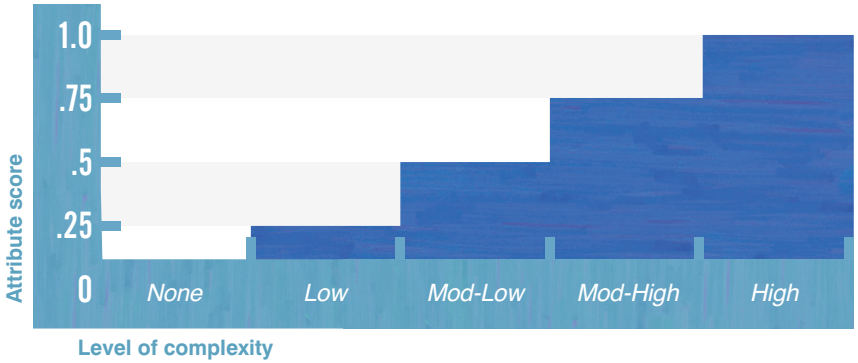
GIANT GARTER SNAKE

Endemic to the Central Valley, the ***giant garter snake*** *has lost over 90% of its original habitat. It has adapted, learning to rely on rice fields, managed marshes and surrounding upland areas, but ongoing development and changing climate conditions continue to fragment and shrink the remaining habitat of this threatened species.*

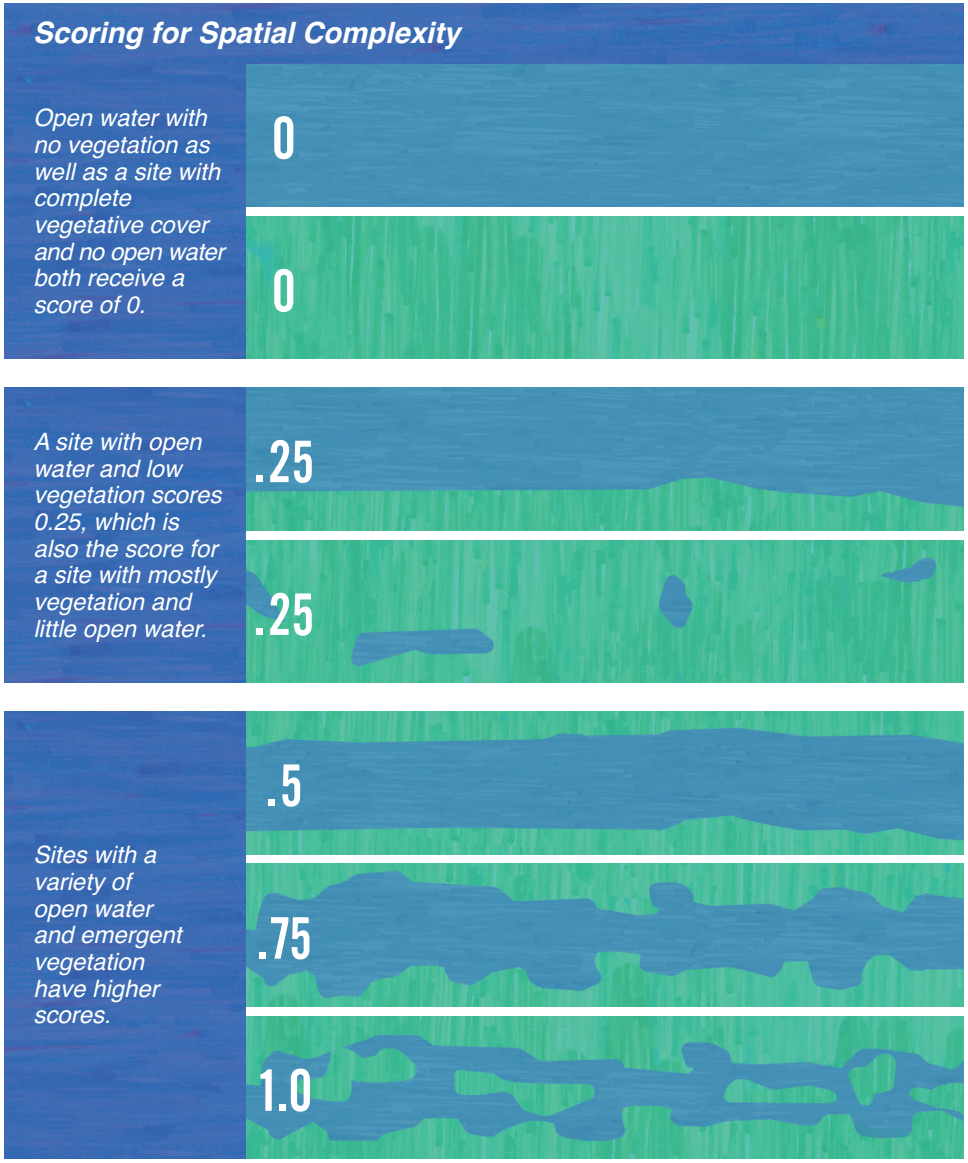
Customizing Functional Acres for the Giant Garter Snake

Giant garter snakes need different site conditions during their active period and their dormant period. While active from mid-March to September – during the dry season – they use rice fields, freshwater marshes, sloughs, ponds, irrigation and drainage canals, and other aquatic habitats for feeding and cover. They overwinter in dry dens.

The HQT takes these seasonal needs into account to ensure the species can thrive year-round. It accounts for the site's capacity to support the snakes by measuring the duration, extent and complexity of wetland conditions, types of aquatic features and terrestrial conditions, among other features.



This is the scoring system for the spatial complexity of a site. The giant garter snake thrives in a more complex environment, where there is a variety of open water and emergent vegetation in which to hunt and take cover from predators. Too little or too much emergent vegetation receives a score of 0; as variety increases, so does the score. The optimal degree of complexity scores a 1.

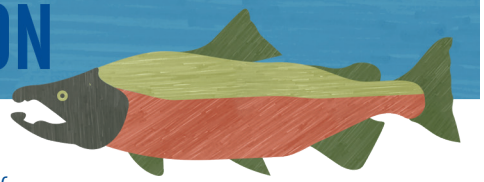


The HQT also determines the landscape priority by its location in the snake's range and how well the site is connected to other off-site aquatic habitats, including tule marshes – the species' historic habitat.

The habitat attribute scores at the site and landscape scales are combined into the habitat quality score and multiplied by the acreage of the project area to determine the functional acres of the site.

HQT in Action

CHINOOK SALMON

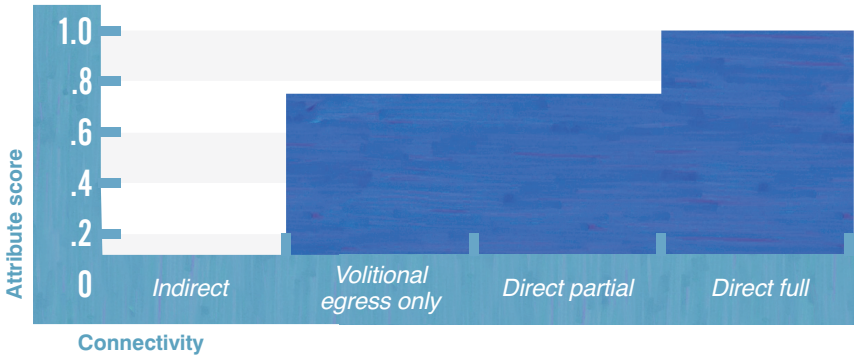


*The floodplains of the Central Valley are the spawning grounds for four genetically distinct runs of **Chinook salmon**, an ecologically and economically valuable species. These fish make their way to the Pacific Ocean and back again to reproduce, and they need abundant inundated floodplain habitat connected to their migratory waterways. Unfortunately, dams and flood protection levees block juvenile salmon from reaching this habitat essential for their survival.*

Customizing Functional Acres for the Chinook Salmon

The HQT evaluates site capacity for juvenile Chinook salmon by the total acreage of floodplains, presence of pesticides and contamination, number of days a given number of acres are flooded, and other factors that contribute to salmon success.

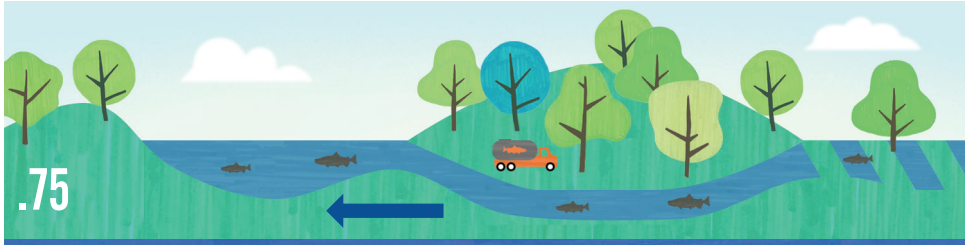
Landscape priority for the Chinook salmon is determined by landscape type and by the timing and abundance of runs present in the area.



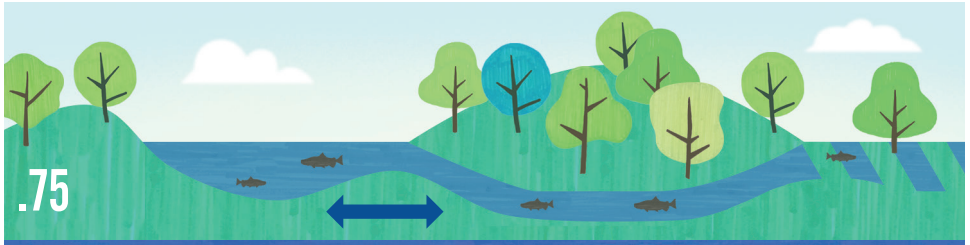
This example scoring function shows how the HQT scores the hydraulic connectivity of a site, which impacts how easily juvenile salmon can access floodplain habitat. There are four categories of hydraulic connectivity; direct full connectivity, where water and fish can move directly on and off the floodplain, is the best for salmon. Direct partial connectivity and volitional egress receive the same score.

Scoring for Connectivity

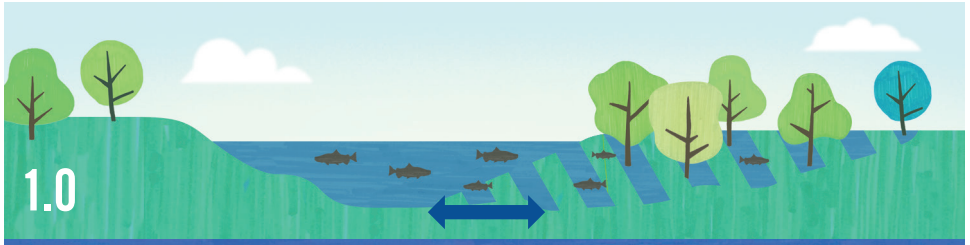
Indirect Connectivity: Water moves from the channel to a nearby depression through subsurface flow. Fish have no access to the nearby depression.



Volitional Egress Only: Fish are hauled to a floodplain but are able to move off the floodplain and back to the main channel on their own.



Direct Partial Connectivity: Water and fish move on and off the floodplain through a conduit, like a slough or irrigation canal.



Direct Full Connectivity: Water and fish move directly on and off the floodplain.

The habitat attribute scores at the site and landscape scales are combined into the habitat quality score and multiplied by the acreage of the project area to determine the functional acres of the site.

HQT in Action

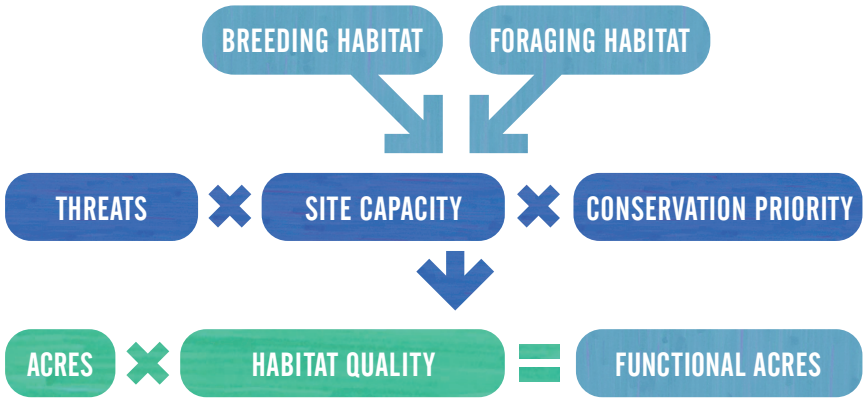
MONARCH BUTTERFLY

*Over the past two decades, the population of **monarch butterflies** has plummeted, bringing the butterfly dangerously close to extinction. The key factor in the monarch's demise is the loss of milkweed habitat across the United States, due largely to increased use of herbicide in agriculture. Now this iconic species is slated to face a U.S. Fish and Wildlife Service determination in 2019.*

Customizing Functional Acres for the Monarch Butterfly

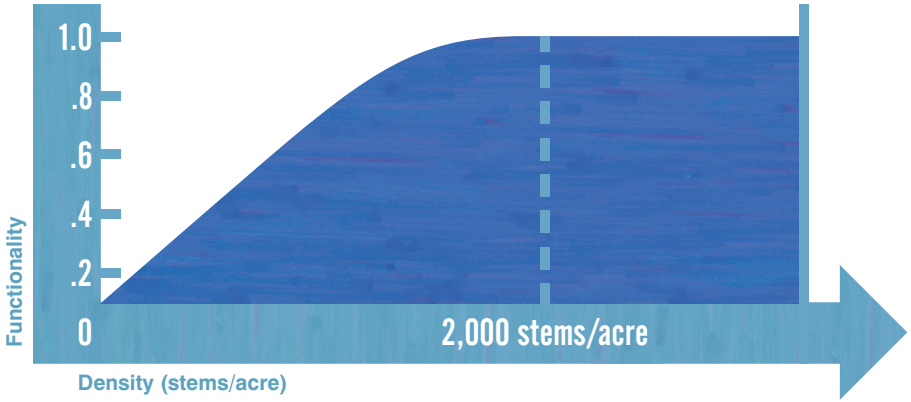
To measure habitat quality for a given plot of land, the HQT weights site-scale features related to breeding and foraging that the monarch requires throughout its life cycle, including density and diversity of milkweeds and nectar plants. It also takes into account threats like the risk of pesticide exposure and herbicide drift.

A functional acre for the monarch butterfly looks a little different than it does for other species included in the Multi-Species HQT.



Another component of the monarch HQT is the conservation priority of each region, which is a subjectively determined value based on the relative contribution of a region to overwintering colony populations – the occupied area of overwintering habitats being a key indicator of overall species health.

Scores for the different habitat features are used to determine the overall habitat quality score, which is then multiplied by the number of acres in the project area to determine functional acres for the site.



This scoring curve for density of native milkweed stems shows that this particular habitat attribute levels off at 2,000 stems per acre – meaning it reaches 100% functionality with no additional benefits to the monarch beyond this number.

PUT THE HQT TO WORK FOR YOUR PROJECTS

Contact: Daniel Kaiser, Environmental Defense Fund
dkaiser@edf.org | edf.org/HQT


EDF
ENVIRONMENTAL
DEFENSE FUND™
Finding the ways that work