

A wide-angle photograph of a coastal wetland restoration site. The foreground is filled with green marsh grasses growing in shallow, muddy water. A central path of dry, brownish soil and sparse vegetation leads towards the background. In the distance, a row of multi-story apartment buildings is visible under a clear blue sky with light clouds.

Herbicide Use in Habitat Restoration: Organic Vs. Outcome

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Recent Increase in Herbicide Restrictions

- In just the last few years, we have seen over 50 California cities, counties, and other governments and NGO **banning the use of herbicide** at some level
- In some cases, the bans are for all herbicides, and in other cases it is **specific to the herbicide glyphosate**, one of our most widely used herbicide in habitat restoration
- **Organic herbicides are being recommended** for use in the place of glyphosate or other synthetic herbicides
- The **impacts of these bans and restrictions on habitat restoration** is substantial, and needs to be part of the discussion for any changes in policy on the use of herbicide

History of Vernal Pool Restoration in Southern California

- In the 1990's most vernal pool restoration efforts for **mitigation had failed or were failing** to meet expectations
- Agencies were **stepping up requirements** for planning, implementation, success criteria, and financial commitments
- **Largest vernal pool restoration for mitigation** approved in San Diego County on Otay Mesa, with over 300 vernal pools and over 70 acres of upland watershed
- Included **6 of the 7 federally listed endangered vernal pool species** in San Diego County
- **Keys to success** were the high success criteria expectations, strict requirements to meet those criteria, and adequate funding to achieve those expectations
- Success criteria included **10% maximum weed cover** in the vernal pools and the upland areas

History of Vernal Pool Restoration – Greater Expectations

- With a **10% total weed cover requirement**, we weren't going to be allowed to ignore the non-native grassland and forb species
- Requirements to **hand weed in the vernal pools** was challenging and expensive, but achievable
- Hand weeding in the upland watershed areas (often 10x or more the area) was infeasible, mechanical removal would be insufficient to achieve 10% weed cover, and **herbicides were not permitted** on the project
- We wanted to consider the use of herbicide in the upland watershed areas, but there were **many concerns**

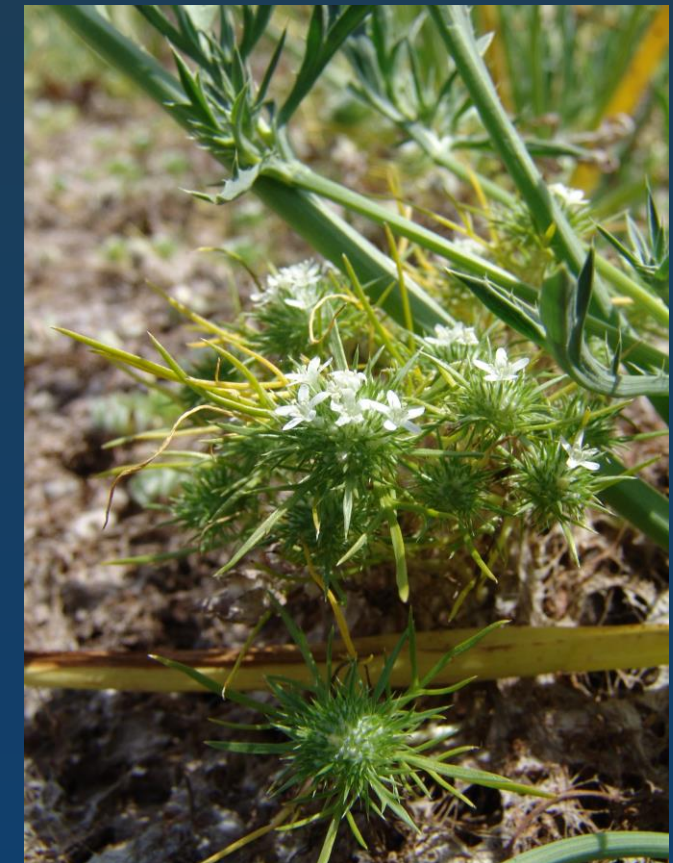
Herbicide Use in Vernal Pool Restoration – Concerns

- These vernal pool mitigation sites are often **designed to maximize capture of the watersheds** and direct it into the vernal pools
- With the concentration of water, comes a **concentration of any water quality issues** or chemical contamination



Herbicide Use in Vernal Pool Restoration – Concerns

- Establishing **populations of aquatic or semi-aquatic plants**, including 5 federally endangered vernal pool plant species in just San Diego County alone.
- These species often have physiological and anatomical feature that allow them to **absorb minerals, gases and other chemical compounds** more readily



Herbicide Use in Vernal Pool Restoration – Concerns

- Establishing populations of **aquatic crustaceans and other aquatic invertebrates**, as well as **amphibians** that breed in the vernal pools
- Aquatic invertebrates and amphibians are two animal groups that are well known to be **very sensitive to chemical changes and/or contamination** in their environment



Herbicide Use in Vernal Pool Restoration – Implementation

- Working with the wildlife agencies in the 1990's, we were able to **conduct tests on the effectiveness and safety** of using herbicides in watershed areas that support vernal pools and other sensitive species
- Included **detailed training of restoration crews**, including training on spot spraying application methods and training on botanical identification
- **Glyphosate was the herbicide of choice** because it is non-selective (kills grasses, forbs, and perennial weeds), it is systemic (transfers from leaves to roots and meristem), and it quickly loses its effectiveness within a few days

Herbicide Use in Vernal Pool Restoration – Success

- For 25 years, glyphosate and other herbicides have been used extensively and successfully in vernal pool restoration, with many hundreds of vernal pools restored to support the sensitive plants and animals that depend on them, just in San Diego County alone
- Keeping the upland watershed areas at 10% weed cover with the use of herbicide has been critical in keeping the vernal pools at 10% weed cover using hand weeding
- Aquatic or semi-aquatic vernal pool plants have been brought back from the brink of extirpation in our County (California Orcutt's grass) or from the brink of total extinction (Otay mesa mint)
- I have never had to re-inoculate a single vernal pool for San Diego fairy shrimp

Herbicide Use in Vernal Pool Restoration – Management

- Tools, techniques, and lessons learned in the 25 years of vernal pool restoration are **now applied by public and private land managers** who have vernal pools in their preserves and open spaces
- **City of San Diego Vernal Pool Habitat Conservation Plan (VPHCP)**

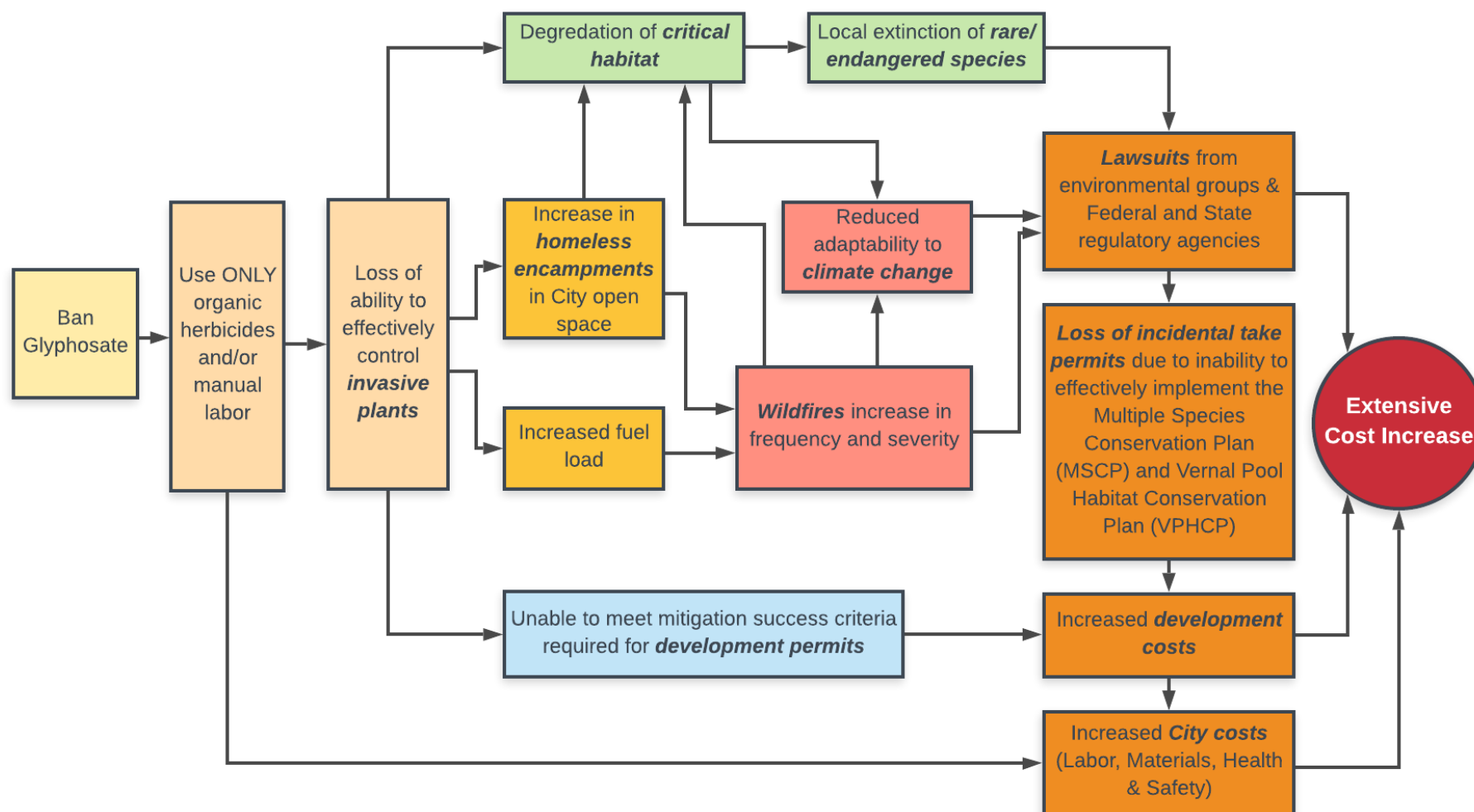


City of San Diego VPHCP – Herbicide Use

- The City of San Diego VPHCP was written to guide the implementation of habitat management and preservation for the 7 federally listed species, and the 2,800 vernal pools in the City of San Diego's preserve lands
- The goals and expectations of , as well as the budgets to achieve these goals and expectations, was based on the assumption of herbicide use
- Based on a series of Cease and Desist orders received by the City Attorney, the City was threatening to prohibit the use of glyphosate and other non-organic herbicides in 2019
- Various Departments and Divisions within the City pushed back with documentation on the ramification of banning glyphosate and other non-organic herbicides

City of San Diego VPHCP – Ramification of Herbicide Ban

Potential Impacts Resulting from Banning the Use of Glyphosate in City of San Diego Open Space



- **Lawsuits** from environmental groups and agencies
- **Loss of Incidental Take Permits** tied to management under the MSCP and VPHCP
- **Increase in development cost**
- Increase in City's cost for open space management by **8-25x the current cost!**

Current Status and Next Steps

- The City is in the process of **updating and expanding their Integrated Pest Management Plan (IPMP)**, expected to be released for public review in the first half of 2021
- This Plan will include **evaluation of herbicide use and the alternatives** to herbicide, with respect to effectiveness, safety, and cost
- The City's Open Space Division, which implements the MSCP and VPHCP, has been given **temporary permission to continue the use of glyphosate and other non-organic herbicides** while the IPMP is being developed and reviewed
- It will also be important to **track the use of these organic herbicides alternatives where applied**, not just their effectiveness, but also their impacts on the environment
- Just because these organic herbicide are **derived naturally, doesn't mean they are safe** for use in and around sensitive biological resources
- It will be of utmost importance that land managers and scientist who work on and study the implementation of habitat management **provide input in this process**
- **The outcry against herbicides is substantial, so any counter argument is going to need to be as well**

THANK YOU!



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