

# Hanson Russian River Ponds Floodplain Restoration: Feasibility Study and Conceptual Design

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*to be added*



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*Cover photo by Brian Cluer, NOAA's National Marine Fisheries Service*

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- D. Literature Review**
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# Hanson Russian River Ponds Floodplain Restoration: Feasibility Study and Conceptual Design

## Executive Summary

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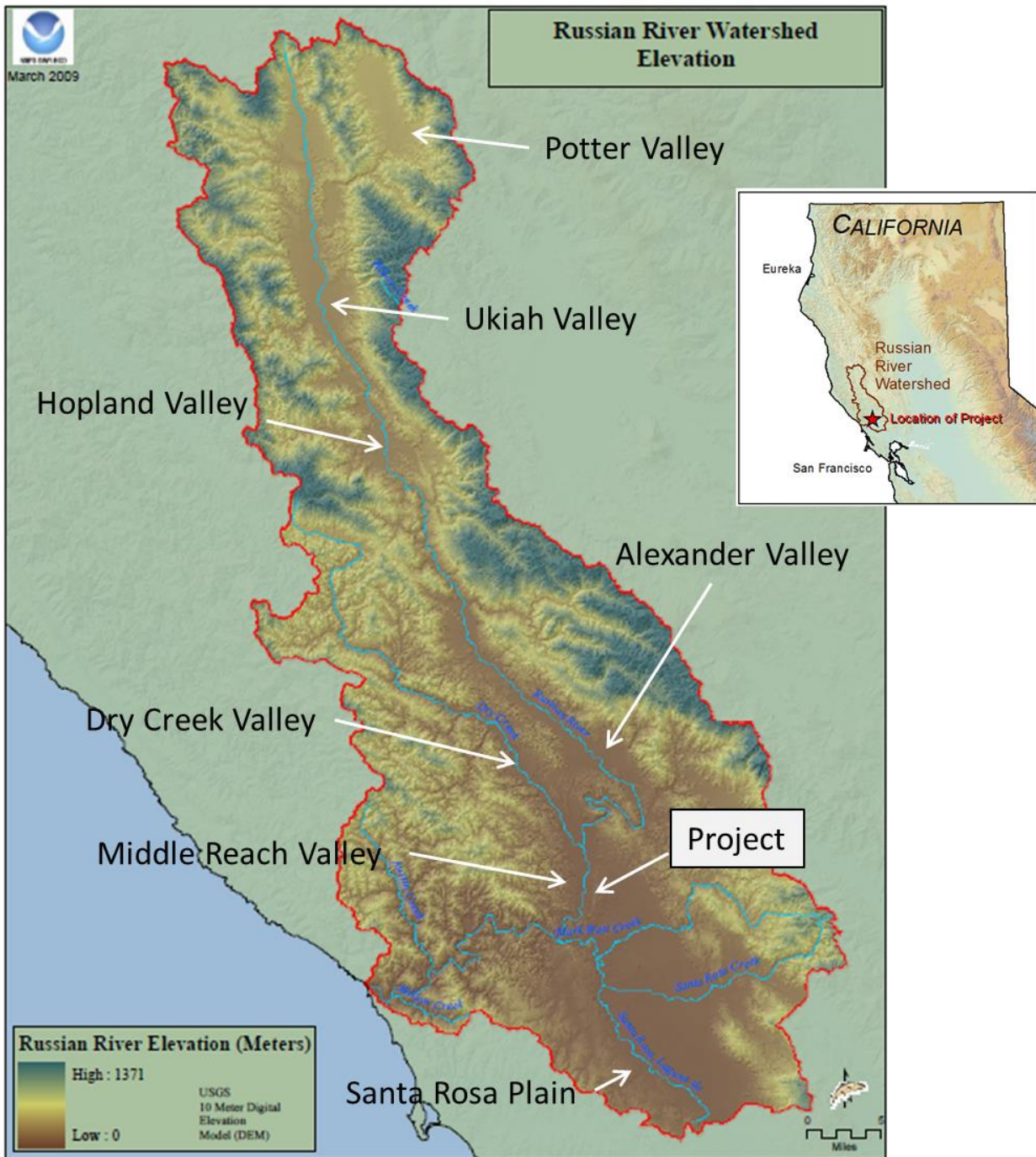
Sonoma County's Russian River valleys are well known for their scenic beauty, surrounding rolling hills, oak woodlands, extensive vineyards, and fine wines. Less well known is that many of these valleys have channelized streams and levees, and retired gravel mining ponds along the river banks, a legacy of open pit aggregate mining. The Middle Reach Valley of the Russian River, where the Hanson Russian River Ponds Floodplain Restoration Project is located (Figure A), has approximately 800 acres of these gravel ponds (Figure B). The ponds are separated from the river by an unstable levee system preventing the river from connecting with the floodplain, thus eliminating ecologically critical off-channel slow shallow water floodplain habitats. Historically the broad alluvial valley habitats provided critical nursery, rearing, and refuge habitat for juvenile steelhead, coho and Chinook salmon – all federal Endangered Species Act listed species. The historical floodplain also afforded critical habitat for other sensitive native wildlife species such as western pond turtle, foothill yellow-legged frog, and migrating songbirds and waterfowl.

***Analysis of current versus historical conditions shows that the eight-mile Russian River Middle Reach Valley's geomorphic and ecological attributes are degraded to historic lows.***

The 358-acre Hanson property, located just west of the Sonoma County town of Windsor, includes four retired gravel ponds (Figure C) providing an opportunity to address the extensive ecological losses within the reach. With the support of the property owner, Hanson Aggregates Mid-Pacific, Inc., the Endangered Habitats Conservancy, NOAA's National Marine Fisheries Service, Sonoma County Permit and Resource Management Department, California State Coastal Conservancy, and U.S. Geological Survey completed this feasibility study evaluating ecological restoration alternatives for the Hanson property.

The feasibility study identified a restoration alternative that achieves the primary project goal of re-establishing a stable seasonal river-floodplain interface. This re-connection will begin to unwind and restore essential ecological attributes and habitat-forming processes to the Russian River ecosystem and address a primary project objective of contributing to the recovery of listed steelhead, coho, and Chinook salmon. Additional project objectives include establishing science-based standards and strategies for similar river restoration projects; promoting and demonstrating the use of the state Surface Mining and Reclamation Act (SMARA) to achieve ecosystem restoration; and accommodating public access for recreation, environmental education, and wildlife observation.

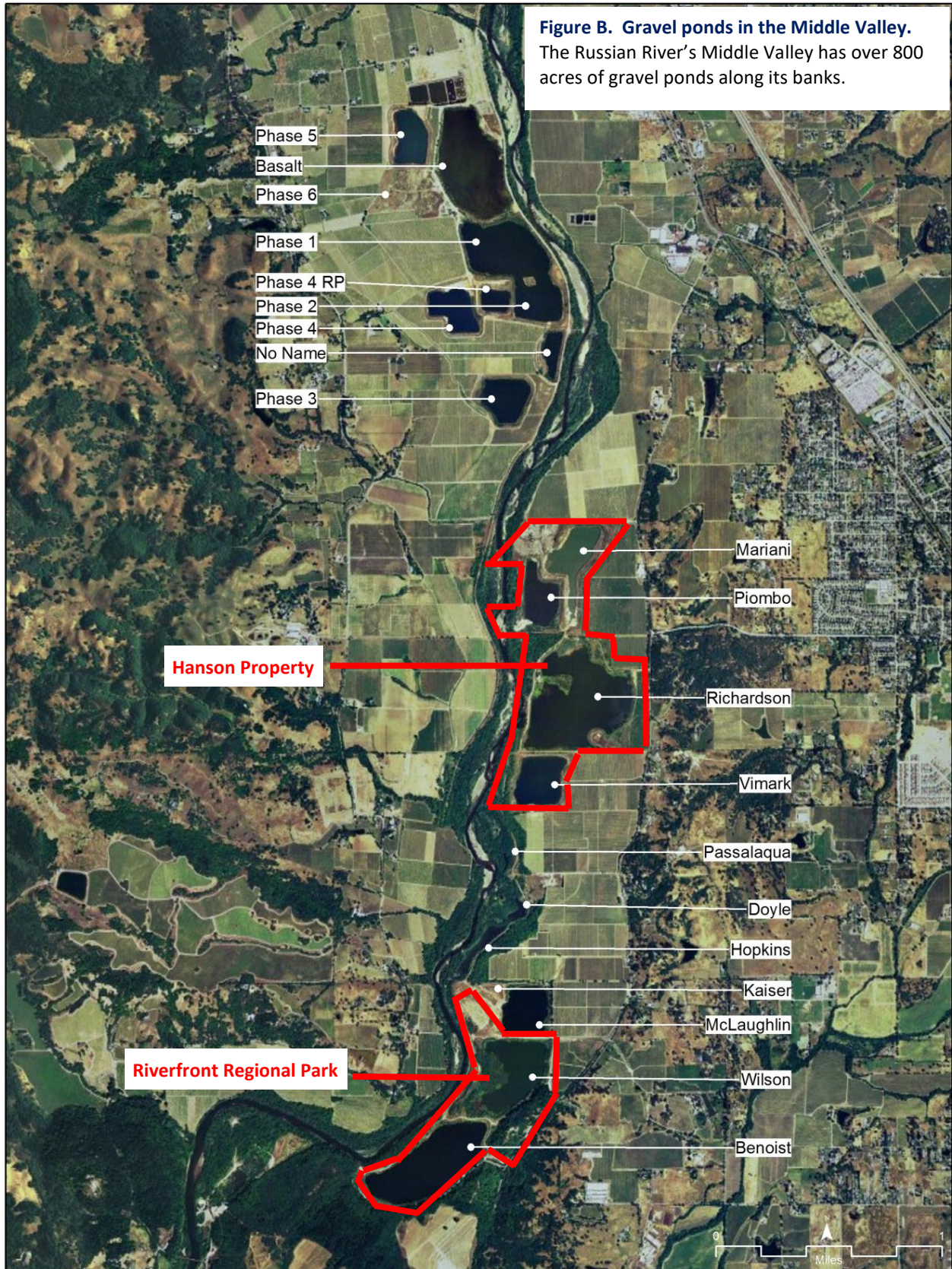
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California State Coastal Conservancy, Sonoma County, NOAA's National Marine Fisheries Service  
and California Wildlife Foundation.***



**Figure A. The alluvial valleys of the Russian River watershed.** The Hanson Russian River Ponds Floodplain Restoration Project is located in the Middle Reach Valley just west of the town of Windsor, Sonoma County.



**Figure B. Gravel ponds in the Middle Valley.**  
The Russian River's Middle Valley has over 800 acres of gravel ponds along its banks.





## The Russian River Middle Reach of the Past

A 2014 historical ecology study by the San Francisco Estuary Institute indicates the Middle Reach alluvial floodplain and riparian forests were seasonally inundated by winter river flows that provided abundant off-channel shallow water floodplain habitats rich in food resources for fish and wildlife. The floodplain was a dynamic matrix of landscape features including meandering channels, tributary sloughs, spring-fed blind channels, oxbow lakes, seasonal wetlands, marshes, and extensive riparian forest. The river channel was relatively shallow and winter inundations spread across a large area, making these seasonal flood events a time of enhanced and highly productive fish habitat. The feasibility study examined restoration strategies that would recover those lost physical properties and ecological functions, and addressed other compromised hydro-geomorphic conditions such as increased flooding, ongoing channel incision, bank instability, and water quality related issues.

## The Russian River Middle Reach Today

Analysis of current versus historical conditions shows that the eight-mile Russian River Middle Reach Valley's geomorphic and ecological attributes are degraded to historic lows. Channel straightening, dredging, and levee building during the 1950s and 60s left the river bed deeply incised and isolated from the floodplain during all but the largest storm events. Subsequent decades of floodplain encroachment for aggregate mining and various land uses further diminished the ecological value of the reach, and the river continues to incise. Not surprisingly, the incised channel and over-steepened banks and levees separating the river from the floodplain and terrace gravel mining ponds are geotechnically unstable requiring frequent, expensive, and difficult to permit repairs.

Although the river has perennial flow, current conditions provide poor habitat for salmonids and other native fish. Even though the Russian is historically one of California's largest gravel bed rivers, the Middle Reach river channel today has essentially no suitable spawning gravel habitat for salmonids. During high flow events, the leveed and straightened channel provides little refuge from the artificially high water velocities and scant suitable refuge or rearing habitat. Furthermore, the ponds themselves provide ideal habitat for warm water non-native fish such as largemouth bass that prey on ESA-listed juvenile salmonids and native amphibian species.

Water quality in the Middle Reach is impacted by fine sediment during winter runoff events, and there are no remaining sediment deposition zones in the valley except during extreme flood events. In summer months, nutrient rich and artificially warmed water flows subsurface from the ponds into the river affecting downstream water temperature and quality. The deep, stratified ponds also promote biogeochemical processes that convert naturally occurring mercury into highly toxic methylmercury, and accumulate and cycle nutrients resulting in eutrophic conditions in the bottom of the ponds. This is a significant issue as the gravel ponds sit atop the relatively small and shallow alluvial aquifer that is the drinking water source for 600,000 residents in Sonoma and Marin Counties.

## Feasibility Study Outreach and Engagement

The feasibility study plan involved extensive outreach to stakeholders including agricultural interests, conservation groups, and adjacent landowners. Led by then-Sonoma County Supervisor Mike McGuire, several scoping meetings were held with resource and regulatory agencies, and local conservation organizations. The scoping meetings focused on long-standing concerns about the existing reclamation plans for the Hanson property, the feasibility study work plan, feasibility study goals and objectives, and ideas for developing an ecologically superior restoration plan for the property.

This advisory group became the Partners Planning Group offering input at key junctures during the development of the feasibility study. A Management Team, consisting of Endangered Habitats Conservancy (EHC), NOAA’s National Marine Fisheries Service (NMFS), Sonoma County Permit and Resource Management Department (PRMD) and the California State Coastal Conservancy (SCC), also convened the Scientific Working Group (SWG), a multidisciplinary panel of 30 technical experts and the smaller Peer Review Panel. The SWG reviewed the modeling methodology and evaluated results for several restoration scenarios, ultimately identifying the restoration alternative that best achieved the SWG-identified project goals and objectives. Throughout the study, the Peer Review Panel provided guidance to the Management Team and SWG in developing project goals, objectives, the alternatives analyzed, and feasibility study report conclusions.

## Key Feasibility Study Findings

The feasibility study employed an analytical framework guided by the restoration goals and objectives to explore a range of restoration alternatives. The development of the study was also guided by a review of relevant scientific literature. The literature search helped identify feasible restoration priorities, information gaps, necessary additional field data, and direct existing data compilation. A key component of the feasibility study was the contribution from the U.S. Geological Survey Geomorphology and Sediment Transport Laboratory of Golden, Colorado. The lab used state-of-the-art multidimensional surface-water and sediment transport /landscape evolution modeling of the eight-mile Middle Reach channel to evaluate the performance of restoration alternatives. Figure D illustrates the consensus restoration alternative that best achieves the geomorphic and ecological restoration goals and objectives of the project.

*Research indicates restored off-channel and wetland habitat complexes may support fish population densities as much as five times greater and growth rates up to six times higher than main channel habitats for coho salmon and other salmonid species endemic to the Russian River Basin (Swales and Levings 1989; Sommer et al. 2001, Hiner et al. 2009; Morley et al. 2005; Limm and Marchetti 2009; Peterson 1982).*

***The feasibility study determined that the preferred alternative is feasible and accomplishes the following project goals and objectives:***

- 1. Significantly increase salmonid habitat** by an order of magnitude including spawning gravels and shallow off-channel calm water winter and spring nursery, rearing, and refuge habitat for salmonids.
- 2. Make a significant contribution to recovery** of the federally- and state-listed Central California Coho salmon population, and federally-listed California Coastal Chinook salmon, and Central California Coast steelhead populations, and provide population level benefits for multiple federally- or state-listed Species of Special Concern.
- 3. Significantly reduce production of non-native fish populations** that prey on native fish species by eliminating the warm water habitats favored by the predators.
- 4. Halt ongoing river bed degradation** and scour by significantly reducing Middle Reach river flood elevations and water velocities, thus minimizing the erosive scour potential which has resulted in ongoing channel bed incision and destabilization of banks during high flow events.

5. **Improve onsite and downstream water quality** by eliminating the artificial open water ponds that seep warm water into the river, and by restoring annual seasonal floodplain sediment deposition to the reach.
6. **Stimulate ecosystem productivity** by restoring the natural seasonal floodplain pulse-flow dynamics of the valley, and increase aquifer recharge by restoring extensive annual floodplain inundation for significant durations in the winter and spring.
7. **Enhance overall ecosystem function** by restoring connectivity between the river channel and off-channel floodplain shallow water habitats, and seasonal aquatic ecotone interactions with riparian and upland habitats.
8. **Promote recovery of native flora and fauna** by restoring the natural seasonal variability of floodplain and river channel habitat complexity, and natural seasonal heterogeneity and connections of off-channel aquatic habitats under which native species have evolved and flourished.
9. **Restore the structure and function of the riparian corridor** by restoring the landforms and physical processes necessary for supporting a natural riparian vegetation progression from aquatic beds to mature seral stage upland riparian forests.
10. **Lowers water surface elevations** in the study area by approximately 1 meter for all flood flows including the 100-year flood event.
11. **Present an ecologically superior, feasible, and exemplary alternative to typical SMARA reclamation plans**, thus providing a science-based rationale to promote the use of SMARA to accomplish ecological restoration goals.
12. **Provide recreational and environmental education opportunities** compatible with ecosystem restoration.

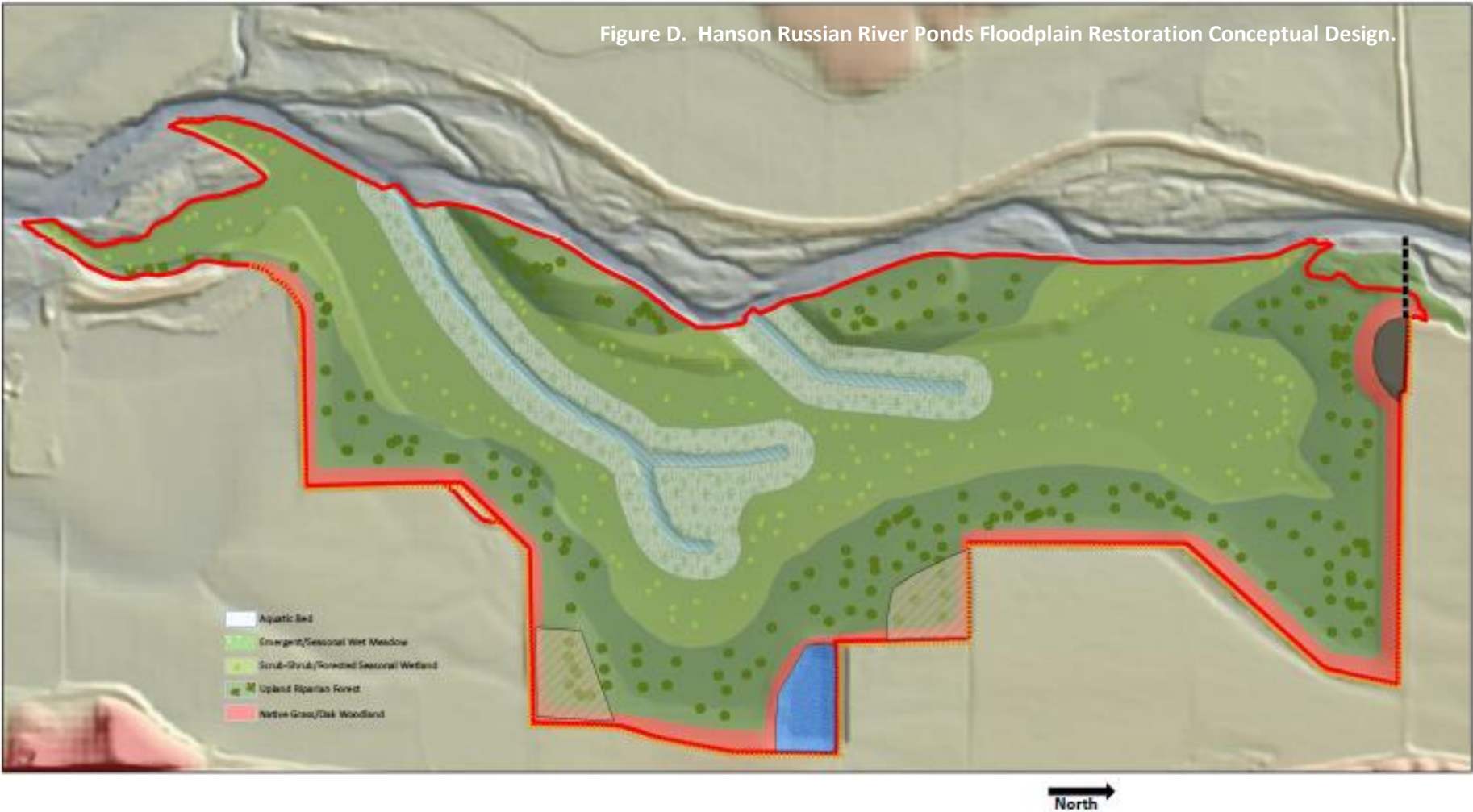


Figure C. The current configuration of the Hanson Russian River Ponds.





Figure D. Hanson Russian River Ponds Floodplain Restoration Conceptual Design.



	<p><b>SYMBOLS</b></p> <ul style="list-style-type: none"> <li>Potential Trail</li> <li>Potential Campground</li> <li>Potential Parking Lot</li> <li>Potential Water Storage</li> </ul>	<p>Project: <b>Hanson Russian River Gravel Pits Feasibility Study Report</b></p>	<p>Title: <b>Proposed Vegetation Zones and Land Features</b></p>	<p>Date Drawn: January 25, 2016</p>	
		<p>Location: <b>Near Windsor, Sonoma County</b></p>	<p>Scale: <b>1 centimeter = 30 meters</b></p>	<p>Drawn by: C. Gavette</p>	
		<p>Prepared for: <b>California Coastal Conservancy &amp; Sonoma County Permit and Resource Management Department</b></p>	<p>Checked by: B. Cluer</p>		

## Next Steps

Next steps toward the implementation of the preferred restoration scenario include:

- Secure approval from Sonoma County Permit and Resource Management Department and California Department of Conservation Office of Mine Reclamation for an amended reclamation plan that facilitates the initiation of the preferred ecological restoration alternative.
- Complete CEQA/NEPA review (Mitigated Negative Declaration or Environmental Impact Report), including impact analysis, detailed design and engineering plans.
- Concurrently, develop the implementation budget and funding strategy that includes a monitoring and adaptive management plan.
- Secure funding for preferred ecological restoration alternative.
- Secure fee title transfer from Hanson to Endangered Habitats Conservancy at no cost.
- Complete engineering and design of preferred restoration alternative and construct ecologically superior restoration plan over one or two construction seasons.
- Once restoration is complete, transfer property for long-term management and operation to an appropriate partner. Sonoma County Regional Parks has expressed interest in accepting the property to establish a campground, trails, and kayak launch to expand public access to the Russian River.