

East Turlock Subbasin Groundwater Sustainability Agency

Multibenefit Land Repurposing Program

ROTATIONAL/EXTENDED FALLOWING

How it Works

Extended Fallowing involves lengthening the interval between replanting of permanent crops such as orchards to at least three years for a given piece of land. Multiple benefits are promoted during these extended fallow periods by planting beneficial cover crops on the fallowed land. These cover crops can enhance soil health, prevent erosion and control dust, and provide habitat for pollinators and beneficial insects. Ten-year contract commitments may be achieved by rotating fallowed lands within a farm unit or by pooling with other sites across the program under an ETSGSA-coordinated pooling program.

+ Benefits



Soil Health – Improved soil structure, fertility, and microbial activity.



Erosion and Dust Control – Planting cover crops during the fallow period helps prevent soil erosion and dust emissions, protecting soil integrity and air quality.



Habitat and Biodiversity – Selected cover crops can provide habitat for pollinators and other beneficial species.



Nutrient Cycling – Improved nutrient cycling through nitrogen fixation, reducing the need for synthetic fertilizers.



Pest and Disease Management – Disrupt pest and disease cycles, resulting in reduced reliance on chemical controls.



Additional Considerations



Establishment and Maintenance of Cover Crops – Requires resources and knowledge to select appropriate cover crops and manage them effectively for optimal soil health benefits.



Potential for Weed Growth – Fallow periods can provide an opportunity for weeds to establish.



Long-term Sustainability Planning – Develop a long-term plan that integrates extended fallowing into broader farm management and sustainability goals, considering economic, environmental, and social factors.



Research and Innovation – Invest in research to optimize fallowing practices, cover crop selection, and management techniques for different soil types and climates.



Implementation Incentive Payment

The ETSGSA will be able to provide incentive payments to growers to implement multibenefit land repurposing using funding from a grant awarded to the GSA by the CA Department of Conservation.

East Turlock Subbasin Groundwater Sustainability Agency

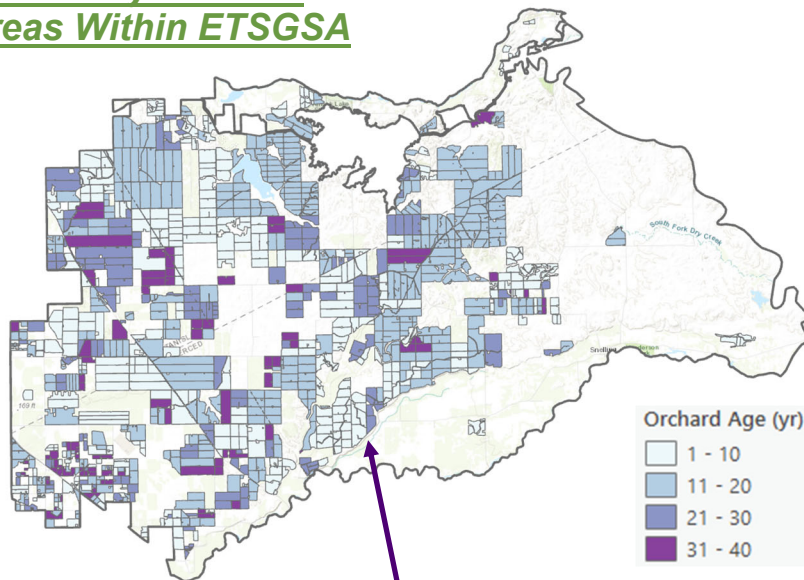
Multibenefit Land Repurposing Program

ROTATIONAL/EXTENDED FOLLOWING

Implementation Steps

- 1) **Planning** – Evaluate existing orchard rotations to identify optimal timing and schedule for rotational following.
- 2) **Cover Crop Design** – Choose appropriate cover crops based on local soil conditions, climate, and desired soil health benefits.
- 3) **Site Preparation** – Orchard tree removal, whole orchard recycling (optional), irrigation system removal or adjustment, and soil testing, as needed.
- 4) **Cover Crop Establishment and Maintenance** – Plant cover crops, hedgerows (optional), manage through mowing, grazing, or tilling, depending on the desired soil health benefits and farming practices.
- 5) **Maintenance & Monitoring** – Weed and pest control, monitoring of soil health, nutrients, moisture levels, etc.
- 6) **Adaptive Management** - Adjust rotations based on monitoring

Potentially Suitable Areas Within ETSGSA

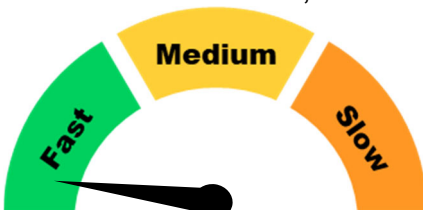


Priority Areas (12,607 acres identified as >20 years old): Areas with permanent crops like orchards that benefit from periodic rest and recovery, and areas where long-term soil health, water conservation, and sustainable agricultural practices would be most beneficial.

¹ Land area estimation from Formation Environmental Land Suitability Assessment. MLRP mapping is provided for preliminary planning purposes only. Project designs will need to be based on parcel-specific analysis.

Potential Permitting and CEQA Process

The general permitting and CEQA timeframe and complexity are shown below. However, permitting and CEQA requirements for specific projects may vary based on site- and project-specific conditions, and may be greater than indicated.



Permitting / CEQA



Permitting / CEQA Complexity

Additional Information / Resources:

- [NRCS Conservation Practice Standard | 327 Conservation Cover](#) (USDA)
- [Cover Cropping for Pollinators and Beneficial Insects](#) (SARE)
- [Center for Regenerative Agriculture and Resilient Systems](#) (CSU Chico)
- [Cover Cropping in the SGMA Era](#) (Sustainable Conservation, 2024)



For more information on the ETSGSA Multibenefit Land Repurposing Program visit: <https://turlockgroundwater.org/multibenefit-land-repurposing>

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Multibenefit Land Repurposing Program

ORCHARD SWALE REWILDING

How it Works

Orchard swale rewilding involves converting low-lying areas (swales) within orchards, typically prone to water accumulation or lower productivity, into areas of native / resident vegetation. This process includes removing orchard trees from these areas and planting beneficial cover crops or native / resident plant species, which can help restore natural ecosystems, improve biodiversity, enhance water management, and provide a range of environmental and community benefits. By allowing these areas to revert to more natural states, orchard swale rewilding can help balance agricultural productivity with ecological restoration.



+ Benefits



Water Management – Improved water infiltration, reduced runoff, enhanced groundwater recharge, reduced soil erosion.



Habitat and Biodiversity – Habitat for various wildlife species, including pollinators, birds, and small mammals; increased biodiversity in agricultural landscapes.



Soil Health – Improved soil structure, increased organic matter, increased microbial diversity.



Climate Resilience – Carbon capture; resilience to drought conditions.



Social Benefits – Enhanced aesthetics, potential recreational or educational opportunities for communities (dependent on project location).

Additional Considerations



Design – Cover crop or native / resident vegetation planning to ensure long-term vitality and sustainability.



Maintenance – Pest management, invasive species, drought and climate change impacts.



Working Around Rewilded Areas – Orchard operations (e.g., pruning and harvesting) may need to be adjusted to avoid disturbance to rewilded swale areas.



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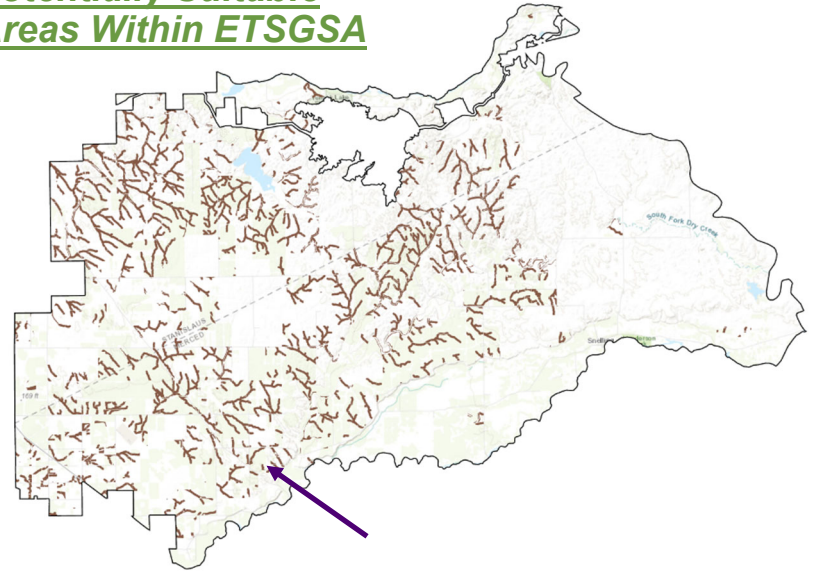
Multibenefit Land Repurposing Program

ORCHARD SWALE REWILDING

Implementation Steps

- 1) **Planning and Design** – Demarcate rewilding area and buffer strip, staging area, etc.
- 2) **Site Preparation** – Orchard tree and irrigation system removal from demarcated area, whole orchard recycling (optional), irrigation system removal or adjustment, and soil testing, as needed.
- 3) **Water Management Infrastructure Installation** – Install berms or small stormwater retention ponds (optional) to reduce stormflows and enhance recharge.
- 4) **Vegetation Establishment** – Plant or seed cover crop or native / resident vegetation. Cover cropping may aid in removing excess nutrients from soil.
- 5) **Maintenance & Monitoring** – Monitor and manage vegetation (pruning, thinning, etc.), implement pest control and invasive species management, maintain water management infrastructure, as needed.

Potentially Suitable Areas Within ETSGSA

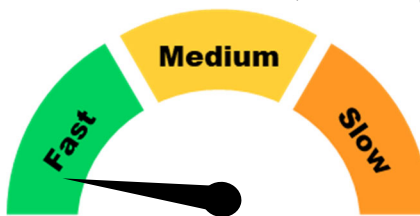


Priority Areas (11,382 acres identified): Swale areas with permanent crops like orchards that may exhibit decreased crop vitality and where long-term soil health, water conservation, and sustainable agricultural practices would be most beneficial.

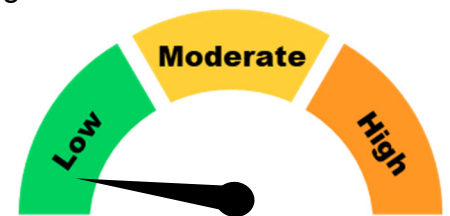
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Permitting / CEQA



Permitting / CEQA Complexity

Additional Information / Resources:

- [NRCS Conservation Practice Standard | 327 Conservation Cover](#) (USDA)
- [NRCS Conservation Practice Standard | 390 Riparian Herbaceous Cover](#) (USDA)
- [NRCS Conservation Practice Standard | 420 Wildlife Habitat Planting](#) (USDA)



East Turlock Subbasin Groundwater Sustainability Agency

Multibenefit Land Repurposing Program

FLOODPLAIN RECONNECTION AND RELATED SPREADING AND RECHARGE

How it Works

Floodplain reconnection involves modifying stream channels and repurposing agricultural lands on adjacent floodplains to restore natural flood hydrology by slowing down flows and encourage spreading of flood waters onto connected floodplain areas during regular and high flow events. This practice can provide water benefits including groundwater recharge and reduction in downstream flood risk. Additional benefits from establishing riparian vegetation on repurposed lands include improved habitat and soil quality.

+ Benefits



Water Storage – Increased floodplain surface area allows spreading and slowing of water flow; more soil becomes saturated, supporting vegetation during dry periods and enhancing the riparian area’s water retention.



Groundwater Recharge – Slower water movement through a channel and across a floodplain increases recharge.



Soil Health Improvements – Fertile soil in floodplains formed by historic flooding in channels, when high flows carry sediment and nutrients, then deposit them on the slow-flowing floodplain.



Habitat and Biodiversity – Riparian areas in arid climates supported by frequent flooding are refuge areas for many species; vegetation slows flow, improving sediment deposition; some plants are groundwater-dependent and their roots aid in recharge.



Additional Considerations



Maintenance – Ongoing and adaptive maintenance of constructed features is required.



Long-term Sustainability Planning – Consideration for future maintenance needs and changing climate conditions.



Potential for Weed Growth – Invasive species can compete with native plantings.



Flow Regimes from Water Releases – Flows from controlled water sources may impact the volume of flow and flooding patterns within the floodplain.



Stream Channel Migration and Erosion – Diversion and control of flood flows on fields may cause migration of the stream channel and erosion along the channel.



Implementation Incentive Payment

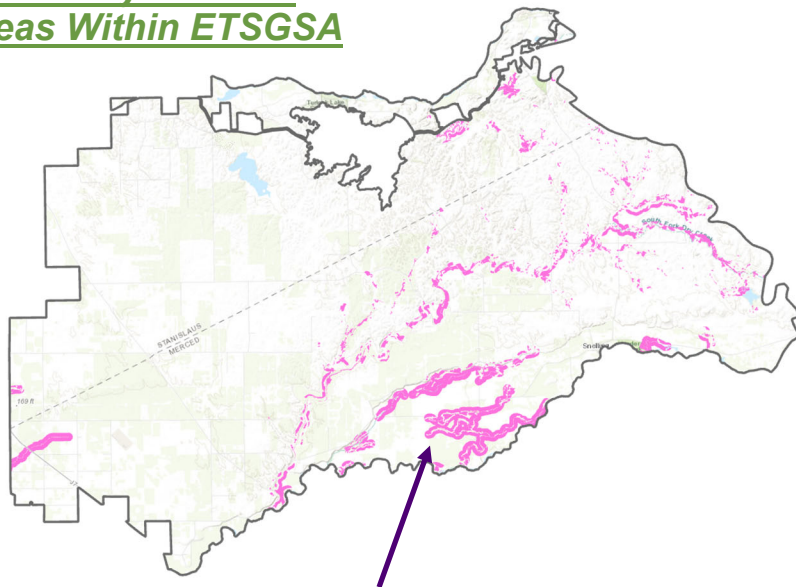
The ETSGSA will be able to provide incentive payments to growers to implement multibenefit land repurposing using funding from a grant awarded to the GSA by the CA Department of Conservation.

FLOODPLAIN RECONNECTION AND RELATED SPREADING AND RECHARGE

Implementation Steps

- 1) **Planning and Design** – Evaluate existing floodplain, demarcate areas, design beaver dam analogs, woody revetments (woody debris or willow walls), and other land modifications.
- 2) **Site Preparation** – Remove crops and existing irrigation infrastructure from floodplain.
- 3) **Construction** – Construct beaver dam analogs to slow flows and woody revetments against stream embankments to protect channels from erosion and stabilize the shoreline.
- 4) **Vegetation Establishment** – Plant or seed resident / native vegetation (riparian).
- 5) **Maintenance & Monitoring** – Maintain constructed features and monitor hydrologic and habitat conditions.
- 6) **Adaptive Management** – Continually adjust and modify project features, as needed, based on monitoring data.

Potentially Suitable Areas Within ETSGSA

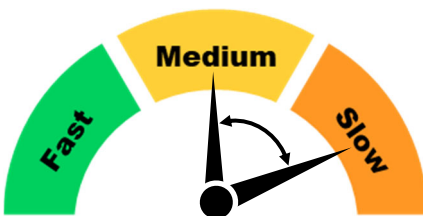


Priority Areas (5,712 acres identified): Low-lying areas prone to seasonal flooding, where there is a need to enhance groundwater recharge and improve soil health.

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Potential Permitting and CEQA Process

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Permitting / CEQA
Timeframe



Permitting / CEQA
Complexity

Additional Information / Resources:

- [NRCS Conservation Practice Standard | 395 Stream Habitat Improvement and Management](#) (USDA)
- [NRCS Conservation Practice Standard | 412 Grassed Waterway](#) (USDA)
- [National Engineering Handbook | Stream Restoration Design Process](#) (USDA)



East Turlock Subbasin Groundwater Sustainability Agency

Multibenefit Land Repurposing Program

FLOODFLOW SPREADING ON NON-FLOODPLAIN LANDS

How it Works

Floodflow spreading involves modification of drainage ways or canals to promote spreading of floodflows onto repurposed agricultural lands, allowing the water to infiltrate the soil and percolate down to recharge the groundwater system. This practice takes advantage of the natural capacity of agricultural fields to absorb large volumes of water, and can help capture stormwater that would otherwise flow unused to the ocean. Planting of beneficial cover crops provides additional benefits to soils and habitat.



+ Benefits



Groundwater Recharge and Water Conservation – Enhanced aquifer replenishment by capturing and infiltrating excess stormwater that would otherwise be lost to the ocean.



Flood Risk Mitigation – Flood peak attenuation and reduced downstream flooding impacts.



Improved Soil Moisture – Increased soil moisture can allow postponement of start of seasonal irrigation.



Habitat and Biodiversity – Habitat for various wildlife species, including pollinators, birds, and small mammals; increased biodiversity in agricultural landscapes.

Additional Considerations



Land Suitability Variability – Land surface slope and soil characteristics affect suitability for floodflow spreading.



Water Quality Concerns – Diverted floodwaters may contain pollutants, sediments, or pathogens that could impact soil or underlying groundwater.



Infrastructure Requirements – New infrastructure to divert and control flood flows on fields may be needed.



Regulatory Compliance and Permitting – Complex water rights and regulatory frameworks govern water diversions, land use changes and Flood-MAR activities.



Coordination with Water Management Agencies – Align floodflow spreading with broader regional flood management strategies.



Climate Change Adaptation – Consideration for future climate change impacts, such as increased frequency or intensity of storm events.



Implementation Incentive Payment

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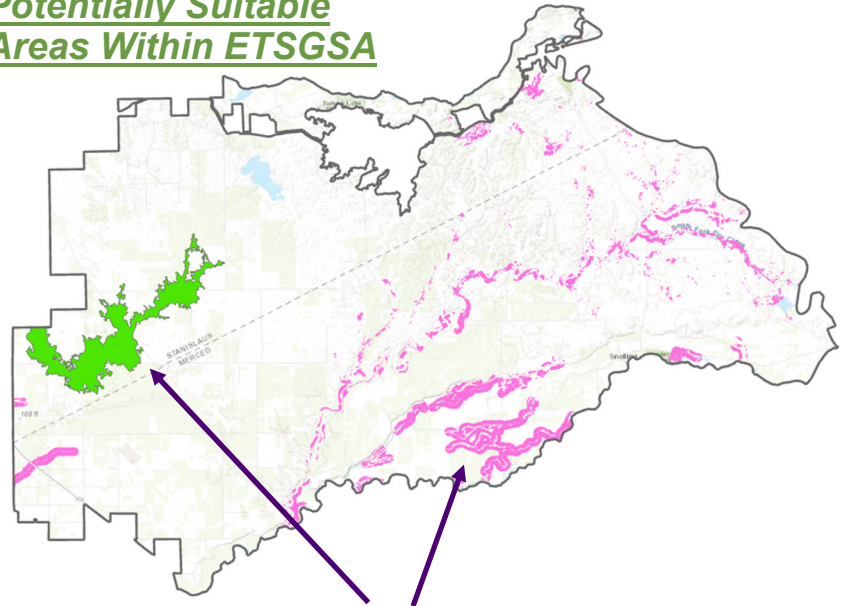
FLOODFLOW SPREADING ON NON-FLOODPLAIN LANDS



Implementation Steps

- 1) **Site Assessment and Planning** – Assess land suitability for Flood-MAR; identify stormwater sources and necessary infrastructure; conduct floodwater management planning.
- 2) **Design and Engineering** – Design necessary infrastructure (diversion channels, gates, and berms, etc.).
- 3) **Regulatory Compliance and Permitting**
- 4) **Infrastructure Construction** – Install or modify diversion structures, conveyance and water control systems, irrigation systems, etc.
- 5) **Water Monitoring** – Install systems to track water flows, infiltration and recharge rates, soil moisture levels, groundwater levels, etc.
- 6) **Crop Monitoring** – Monitor crop health regularly and adaptive management as necessary.
- 7) **Infrastructure Maintenance** – Maintain water conveyance equipment in operable condition (e.g., clear debris).

Potentially Suitable Areas Within ETSGSA

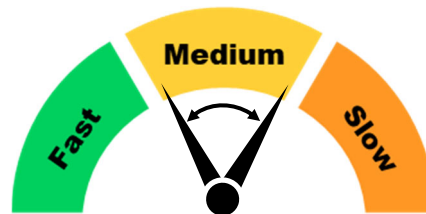


Priority Areas (8,774 acres identified): Low-lying areas prone to seasonal flooding, where there is a need to enhance groundwater recharge and improve soil health.

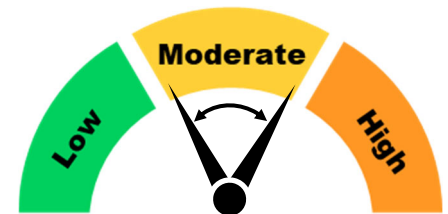
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Permitting / CEQA
Timeframe



Permitting / CEQA
Complexity

Additional Information / Resources:

- [NRCS Conservation Practice Standard | 817 On Farm Recharge](#) (USDA)
- [National Engineering Handbook | On Farm Recharge](#) (USDA)
- [On-Farm Recharge Methods Manual and Case Studies](#) (Sustainable Conservation)



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Multibenefit Land Repurposing Program

EXTENDED FALLOWING IN DESIGNATED BUFFER ZONES

How it Works

Buffer zones are designated areas that act to separate actively cultivated agricultural lands from sensitive areas such as schools or communities. Repurposing agricultural lands within buffer zones to land uses such as native habitat or open space can help reduce the impacts on those communities of agricultural activities, such as air pollution, pesticide drift, and groundwater depletion. Extended Fallowing involves lengthening the interval between replanting of permanent crops such as orchards to at least three years, with multiple benefits achieved through planting of beneficial cover crops that improve soil health and habitat.

+ Benefits



Community Health – Reduced exposure to health-related impacts of agricultural activities.



Environmental Protection – Reduced runoff; flood attenuation; improved water quality; increased habitat.



Social Benefits – Enhanced aesthetic value of the landscape; improved quality of life for nearby residents.



Economic Opportunities – Potential economic benefits to local communities.



Additional Considerations



Regulatory Complexity – Compliance with zoning and land use regulations.



Design – Vegetation planning to ensure vitality and sustainability.



Maintenance – Pest management, invasive species, drought and climate change impacts.



Access Enforcement – Preventing unauthorized activities or encroachment.



Community Engagement – Land use planning decisions around communities should reflect input from community members; engaged partners can provide for sustainable alternatives.



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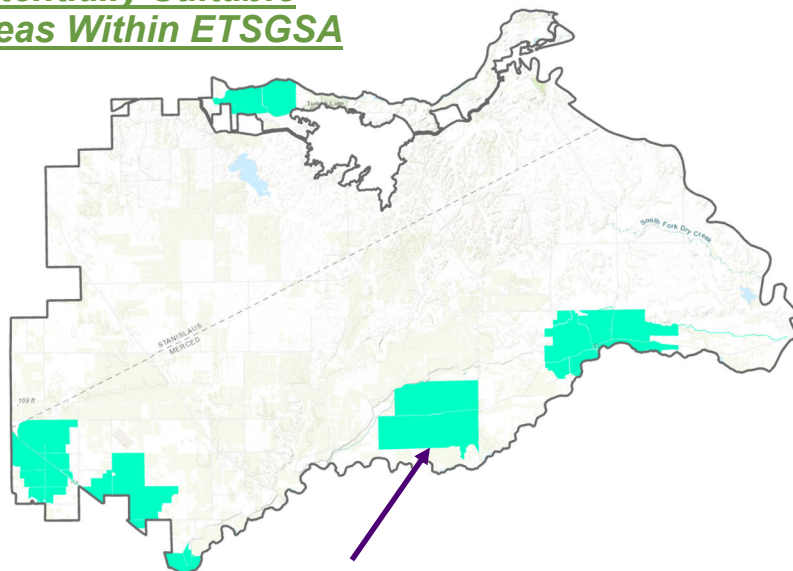
Multibenefit Land Repurposing Program

EXTENDED FOLLOWING IN DESIGNATED BUFFER ZONES

Implementation Steps

- 1) **Planning and Design** – Demarcate buffer zone and plan land use/vegetation, with community input.
- 2) **Regulatory Approvals and Permitting** – Obtain necessary permits and approvals.
- 3) **Site Preparation** – Remove crop and irrigation system from demarcated area; soil amendments, as needed.
- 4) **Vegetation Establishment** – Plant or seed resident vegetation, possibly using a cover crop first to remove excess nutrients.
- 5) **Other Infrastructure Installation** – Install fencing, pathways, drainage, erosion control, etc., as needed.
- 6) **Monitoring & Maintenance** – Replant desired vegetation, manage invasive species, maintain infrastructure, as needed.
- 7) **Adaptive Management** - Adjust and modify project features, as needed, based on monitoring data.

Potentially Suitable Areas Within ETSGSA

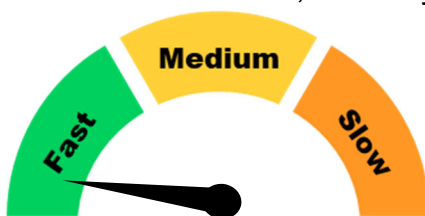


Priority Areas (13,618 acres identified): Areas surrounding residential neighborhoods, schools, healthcare facilities, ecological reserves, water bodies, and other areas sensitive to impacts from agricultural activities.

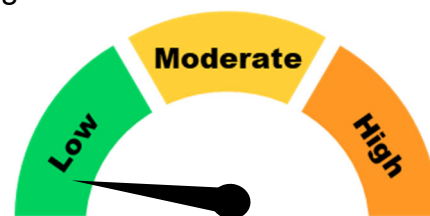
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Permitting / CEQA
Timeframe



Permitting / CEQA
Complexity

Additional Information / Resources:

- [NRCS Conservation Practice Standard | 327 Conservation Cover](#) (USDA)
- [NRCS Conservation Practice Standard | 422 Hedgerow Planting](#) (USDA)
- [Buffer Planning Workbook](#) (UC Cooperative Extension)



East Turlock Subbasin Groundwater Sustainability Agency

Multibenefit Land Repurposing Program

RECHARGE AND RETENTION BASINS

How it Works

Recharge and Retention Basins refers to the repurposing of an area of irrigated agricultural land into artificial basins designed to store water temporarily, serving two primary purposes: recharge basins allow water to percolate into the groundwater to replenish aquifers, while retention basins store water for future use, such as irrigation during dry periods. Both types of basins help manage water resources sustainably by facilitating the beneficial use of water, while providing additional benefits that may include improved water quality, flood risk reduction, and habitat opportunities.

+ Benefits



Water Security – Stored water for irrigation during dry periods leads to reduced dependency on external water supplies.



Groundwater Recharge – Enhanced groundwater replenishment helps restore depleted aquifers and maintain sustainable water tables.



Flood Mitigation – Reduced downstream flooding and erosion.



Improved Water Quality – Allows for sedimentation and natural filtration of water, reducing sediment and nutrient loads in downstream water bodies.



Biodiversity and Habitat – New aquatic habitats that can support a range of wildlife are supported, including birds, amphibians, and beneficial insects.



Additional Considerations



Water Losses – Evaporation from ponds can lead to water losses.



Regulatory and Permitting Complexity – Multiple permits may be required.



Maintenance Requirements – Ponds require regular maintenance to prevent sediment buildup, manage vegetation, and ensure the structural integrity of embankments.



Climate Considerations – Design ponds to accommodate changing weather patterns and potential climate impacts, such as increased frequency of extreme weather events.



Long-term Sustainability – Develop a sustainable management plan that includes funding for ongoing maintenance and monitoring activities to ensure the long-term success of the ponds.



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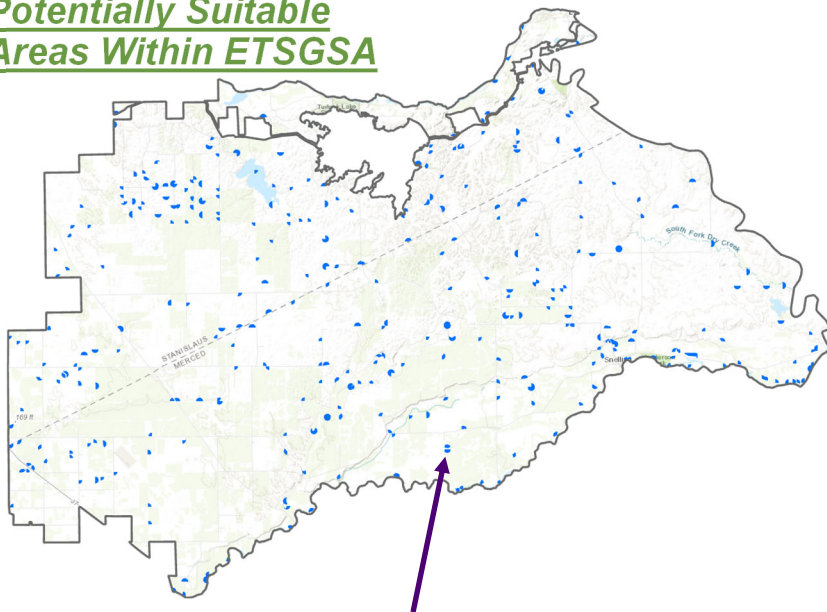
Multibenefit Land Repurposing Program

RECHARGE AND RETENTION BASINS

Implementation Steps

- 1) **Site Assessment and Planning** – Conduct hydrogeological assessment.
- 2) **Design and Engineering** – Develop design plans for pond construction, including inlet and outlet structures, overflow spillways, etc.
- 3) **Land Preparation and Construction** – Remove crop and irrigation system, construct pond.
- 4) **Water Management Systems Installation** – Install inflow/outflow systems, monitoring wells, pond liner, etc. per design.
- 5) **Vegetation Establishment** – Plant vegetation around pond edges for bank stabilization and inflow water quality improvement.
- 6) **Monitoring** – Monitor pond functioning (water levels, water quality, groundwater recharge rates, etc.).
- 7) **Maintenance** – Perform vegetation and sediment management/removal.
- 8) **Structural Inspections** – Conduct routine inspections of embankments, and perform as-needed repairs.
- 9) **Pest Control** – Monitor and manage pests.

Potentially Suitable Areas Within ETSGSA

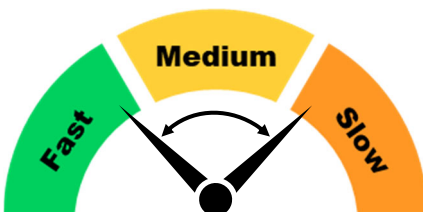


Priority Areas (2,302 acres identified): Areas with high seasonal water availability, frequent irrigation needs, and declining groundwater levels where enhancing water storage and groundwater recharge can improve water security and agricultural sustainability.

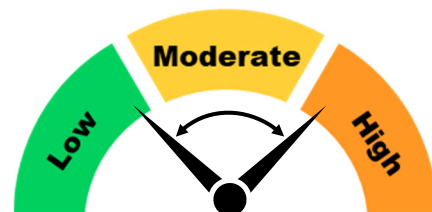
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Permitting / CEQA



Permitting / CEQA

Additional Information / Resources:

- [NRCS Conservation Practice Standard | 815 Groundwater Recharge Basin or Trench](#) (USDA)
- [NRCS Conservation Practice Standard | 638 Water and Sediment Control Basin](#) (USDA)
- [Building Multibenefit Recharge Basins](#) (Sustainable Conservation)



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