Conservation Opportunity Areas of Texas (v2026)

Variables and Categorization Methodology

Introduction

The Conservation Opportunity Areas (COA) of Texas model identifies potentially important conservation landscapes by integrating Species of Greatest Conservation Need habitats and occurrences, conservation threats, landcover connectivity, restoration feasibility, and fragmentation. As a decision-support tool, the model provides a consistent and transparent framework for prioritizing conservation planning, management actions, and funding opportunities across Texas.

The COA is intended to:

- Identify priority landscapes for potential conservation actions.
- Target restoration investments where ecological benefits are greatest.
- Support strategic acquisition and easement decisions.
- Guide funding toward projects with measurable conservation outcomes.

Methodology

Variables

COA categories are designed to make model outputs intuitive and actionable. In addition to the modeled ecological score, two supplemental variables are incorporated to determine the final category assigned to each habitat type within a COA planning unit (HUC12; U.S. Geological Survey, 2023).

Ecological Score: represents potential habitat quality and serves as the primary driver of conservation opportunity. Scores range from 0 to 100, with higher values indicating greater ecological importance.

Restoration Intensity: represents the relative effort and feasibility required to restore ecological condition. Each habitat type was ranked based on the expected cost and management effort required to restore the habitat from its most degraded condition.

Rank	Designation	Rank	Designation
1	Very Low Effort	4	High Effort
2	Low Effort	5	Maximum Effort
3	Moderate Effort		

Fragmentation Level: represents landscape-level habitat fragmentation and potential connectivity constraints within each COA planning unit. Fragmentation is calculated as the percentage of the planning unit affected by mapped threats and assigned to categorical ranks using predefined thresholds.

Rank	Designation	Threshold	Rank	Designation	Threshold
1	Negligible	0 – 2%	4	Moderately High	> 10 – 20%
2	Minimal	> 2 – 5%	5	High	> 20 – 40%
3	Moderate	> 5 – 10%	6	Very High	> 40%

Categorization

The three variables are combined to produce a composite category to provide actionable guidance. Categorization begins with the modeled ecological score for each habitat type and normalization of all variable values from 0 – 1.

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Restoration Effort Weight

Restoration effort functions as an adjustment that modifies conservation opportunity based on restoration feasibility. Its influence increases as ecological score decreases, allowing restoration feasibility to play a larger role in degraded habitats. Lower restoration effort rankings increase conservation opportunity because improvements are more achievable, whereas higher restoration effort rankings decrease conservation opportunity because restoration is more intensive and less feasible.

Rank	Weight	+/-	Rank	Weight	+/-
1	0.60	+	4	0.20	-
2	0.40	+	5	0.50	-
3	0.15	+			

The restoration adjustment is then scaled dependent on ecological score:

$$\boldsymbol{Effort\ Adjustment = Effort\ Weight * (0.1 + Ecological\ Score)}$$

Final COA Category

The categorization formula emphasizes habitat condition as the primary driver and restoration effort as the secondary influence through adjustment of the ecological score according to restoration feasibility. Fragmentation is intentionally limited since threats data are already reflected in the ecological score. COA Categories are calculated as:

$$\boldsymbol{COA\ Category = Ecological\ Score + Effort\ Adjustment + (0.10 * Fragmentation\ Rank)}$$

Final scores are assigned to one of six Conservation Opportunity Area categories using predefined thresholds:

Score	Category	Score	Category
0.00 – 0.10	Optimal Conservation Opportunity	> 0.40 – 0.60	High Restoration Potential
> 0.10 – 0.20	High Conservation Opportunity	> 0.60 – 0.85	Moderate Restoration Potential
> 0.20 –0.40	Mixed Management Opportunity	> 0.85 –1.00	Limited Restoration Potential

These categories represent a continuum from areas that are already in excellent ecological condition and may warrant conservation to areas that exhibit substantial modification from its natural state and would require increasingly intensive restoration to improve ecological function.

Limitations

This model is intended as a decision-support tool to inform conservation planning and management. It should not be interpreted as a definitive assessment of habitat quality, restoration feasibility, or conservation priority. Results should be considered alongside local expertise and site-specific evaluations, as outputs may not fully reflect current conditions, recent land use changes, restoration activities, or all ecological features and stressors. Consequently, habitat conditions, species occurrences, and threat distributions may be incompletely or unevenly represented, which may influence final categorization.

Citations:

U.S. Geological Survey. (2023). *Watershed Boundary Dataset (WBD) - Subwatershed (HUC-12) for Texas* [Data set]. Reston, VA: U.S. Geological Survey. Retrieved from usgs.gov.

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