

HUC12 070900050607 - CONSERVATION OPPORTUNITY

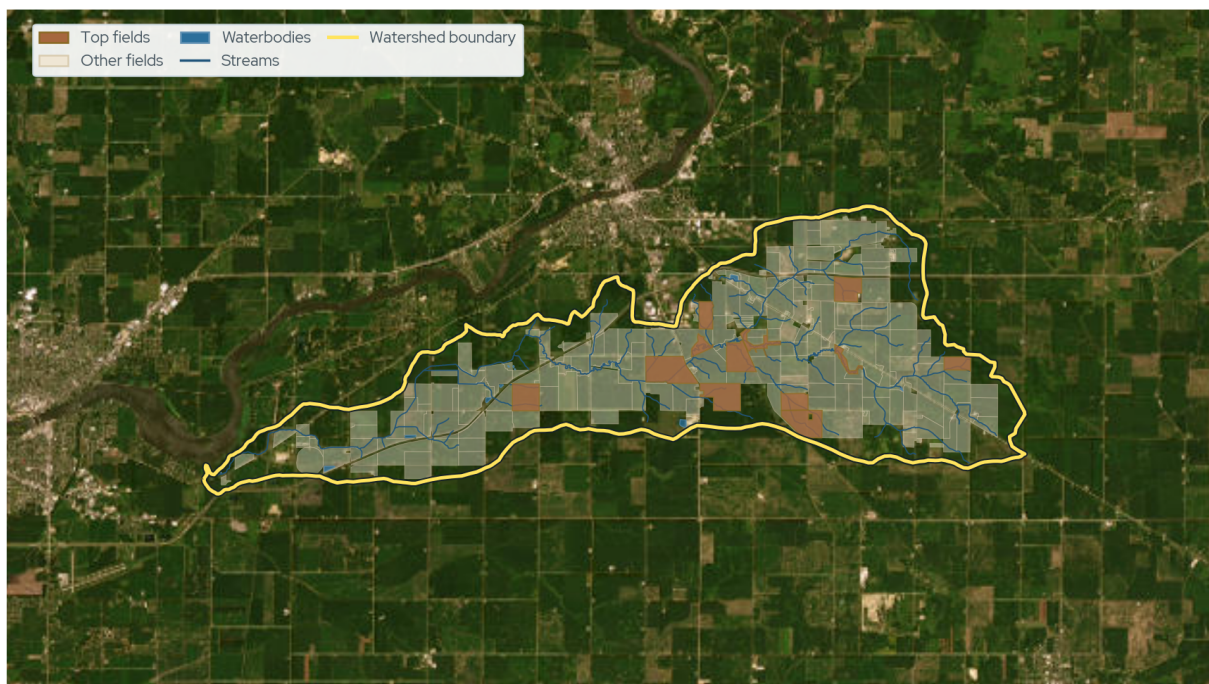
Threemile Branch Subwatershed

Conservation opportunity report

This report summarizes what could change if eligible riparian or agricultural opportunity acres are converted to perennial conservation cover. It estimates acres, modeled water outcomes, modeled carbon outcomes, potential value, and diligence items that must be resolved before funding or claims.

Highest-opportunity field clusters

Top Habitat Buffer fields highlighted spatially for site-visit and outreach planning.



Decision snapshot

Requires diligence before funding or claims

INCLUDED OPPORTUNITY ACRES

1,864.0

ESTIMATED ANNUAL GHG REDUCTION

17,871.3 tCO₂e/yr

GROSS WATERSHED-WIDE WATER VALUE

\$222,078/yr

RECOMMENDATION

Advance to diligence

MINIMUM CAPITAL NEEDED

\$4,962,572

How To Read The Opportunity

The base package is the near-term riparian conservation scenario. The broader watershed scenario is upside context, not the base capital ask.

Reader guide

Question	Where this report answers it
What would be done?	Eligible opportunity acres would convert to perennial conservation cover.
Where is it?	The watershed ladder shows HUC acres, ag base, and conversion footprints.
What could change?	Water, carbon, habitat, and economics pages summarize modeled outcomes.
What is still unknown?	Recommendation, checklist, and data-quality pages list diligence items.

KEY POINTS

- Current conditions are compared with perennial conservation cover on eligible opportunity acres.
- Gross watershed-wide value estimates avoided-treatment or watershed-service value before capture factors.
- Potential captured value and payment need still require buyer, program, and landowner diligence.
- Carbon value is illustrative until method, monitoring, and verification are confirmed.

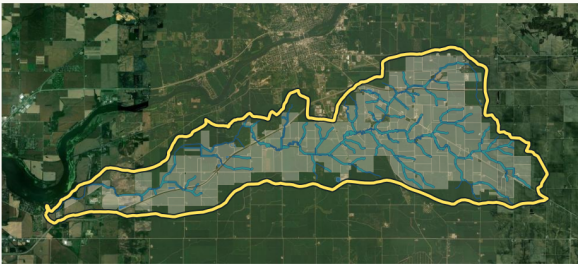
Opportunity And Field Footprint

Left to right: Scenario A (direct area of opportunity), Scenario B (buffer plus NCCPI-marginal cropland in the fields the buffer touches), and Scenario C (full field polygons that intersect that opportunity).

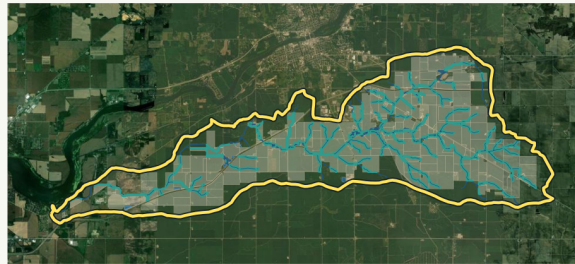
Opportunity, marginal acres, and full-field footprint

Left to right: Scenario A (riparian opportunity), Scenario B (buffer + NCCPI-marginal cropland in touched fields), and Scenario C (full fields intersecting opportunity).

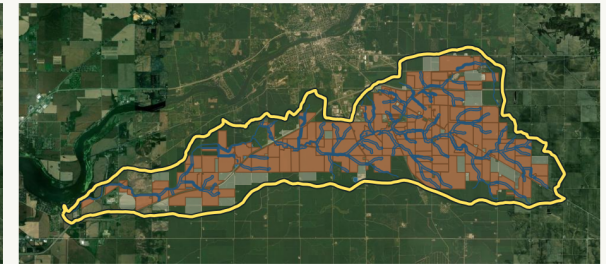
Scenario A: area of opportunity



Scenario B: buffer + marginal cropland



Scenario C: full fields intersecting opportunity



Area of opportunity Buffer + marginal cropland Intersected full fields Other fields

Watershed And Acreage Ladder

Start with the full watershed. Then the agricultural base inside it. Then the screened opportunity package and the three conversion footprints modeled in this report. Watershed and ag acres are supporting scale evidence – they are not the capital ask.

WATERSHED ACRES

23,061.7 acres

Full HUC boundary – the geographic frame for this report.

AGRICULTURAL ACRES

15,033.0 acres

Mapped agricultural fields inside the watershed.

SCENARIO A - INCLUDED PACKAGE

1,864.0 acres

Base screened conversion footprint after exclusions.

Watershed scale and conversion footprints

Scale	Acres	% of watershed	Meaning
Watershed	23,061.7 ac	100%	Full HUC boundary
Agricultural base	15,033.0 ac	65.2%	Mapped agricultural fields in the watershed
Gross opportunity	1,864.0 ac	8.1%	Mapped conservation candidate area
Excluded	0.0 ac	0.0%	Protected / enrolled overlap removed
Scenario A – included package	1,864.0 ac	8.1%	Base screened conversion footprint
Scenario B – buffer + marginal	1,952.4 ac	8.5%	Buffer + 88.8 ac marginal cropland in touched fields
Scenario C – full fields	12,772.1 ac	55.4%	Aspirational ceiling on fields intersecting opportunity

Watershed acres are the HUC boundary – the geographic frame for water modeling and diligence. Agricultural acres show how much of that watershed is farmed.

Intervention Plan And Agricultural Context

EcoStack models a before/after land-cover change: current agricultural or open land in the opportunity footprint is changed to perennial conservation cover, then the models estimate how runoff, sediment, nutrients, carbon, and habitat signals change.

What changes in each modeled scenario

Scenario	Footprint	Intervention	What the model compares	Why it matters
Scenario A - minimum riparian package	1,864.0 ac	Eligible riparian opportunity acres become perennial conservation cover.	Current LULC vs. riparian conservation-cover scenario.	Base funding package and direct landowner implementation scope.
Scenario B - buffer + marginal cropland	1,952.4 ac	Riparian buffer plus the touched fields' least-productive (NCCPI $\leq$ 0.40) cropland becomes perennial conservation cover.	Current LULC vs. buffer + marginal-cropland conservation-cover scenario.	Targets the farm's chronically marginal ground (+88.8 ac beyond the buffer); the defensible "more acres" story.
Scenario C - broader watershed scenario	12,772.1 ac	Broader agricultural context is screened as conservation cover for water-impact sensitivity.	Current modeled LULC domain vs. broader conservation-cover scenario.	Shows watershed-scale upside ceiling; not the base capital ask unless separately underwritten.

KEY POINTS

- Step 1 - identify the Area of Opportunity from the mapped riparian and field geometry.
- Step 2 - remove protected, enrolled, or already-conserved acres when those data are available.
- Step 3 - convert the remaining eligible riparian footprint to perennial grass or conservation cover in the scenario LULC.
- Step 4 - run InVEST SDR/NDR and biodiversity lanes, then area-weight exact COMET-Planner CPS 327 carbon rates by county.
- Step 5 - report the modeled change as screening evidence, not as measured post-project performance.

The base scenario converts eligible riparian opportunity acres into perennial conservation cover. The model compares current land cover against this conservation scenario in the same watershed footprint.

Water Outcomes And Value

Water value is a gross watershed-wide avoided-treatment or service-value estimate. It is not guaranteed payment to a township, utility, landowner, or buyer.

SCENARIO A - RIPARIAN BUFFER ONLY

1,864.0 acres

\$222,078/yr gross water value.

SCENARIO B - BUFFER + MARGINAL CROPLAND

1,952.4 acres

\$237,168/yr gross water value; +88.8 ac of the farm's marginal ground.

BROADER WATERSHED SCENARIO

12,772.1 acres

\$617,759/yr gross water value.

MODELED

OBSERVED CROPLAND ET (OPENET)

701.0 mm/yr

Satellite-measured actual ET (OpenET Ensemble, 5-yr normal) – observed consumptive water...

Modeled water outcomes by scenario

Scenario	Footprint	N + P reduced	Sediment reduced	Gross annual water value
Scenario A - Riparian buffer only	1,864.0 ac	13,617 kg/year	262,152 kg/year	\$222,078
Scenario B - buffer + marginal cropland	1,952.4 ac	14,566 kg/year	269,735 kg/year	\$237,168
Broader watershed scenario	12,772.1 ac	36,997 kg/year	860,649 kg/year	\$617,759
Difference (C - A)	10,908.1 ac	23,380 kg/year	598,497 kg/year	\$395,681

Gross watershed-wide value is not guaranteed revenue. It estimates avoided-treatment or watershed-service value across the service area. Potential captured value is the portion that might realistically support payments after buyer relevance, contracting, monitoring, capture assumptions, and implementation costs are reviewed.

Carbon Outcomes And Value

Carbon values are modeled estimates, not issued credits or contracted revenue.

MODELED	MODELED	MODELED
RIPARIAN BUFFER ONLY	BUFFER + MARGINAL CROPLAND	FULL FIELD CONVERSION
17,871.3 tCO₂e/yr	18,722.6 tCO₂e/yr	122,452.2 tCO₂e/yr
1,864.0 ac 9.587 t/ac/yr \$893,566/yr potential	1,952.4 ac 9.590 t/ac/yr \$936,130/yr potential	12,772.1 ac 9.587 t/ac/yr \$6,122,612/yr potential

Carbon quantities

Carbon item	Value / status
Carbon method	COMET-Planner v4 · Woody Plantings (CPS 391) · Replace a Strip of Cropland Near Watercourses or Water Bodies with Woody Plants (Mixed Hardwoods)
Estimated annual GHG reduction (base package)	17,871.3 tCO ₂ e/yr
Estimated annual GHG reduction (buffer + marginal cropland)	18,722.6 tCO ₂ e/yr
Estimated annual GHG reduction (broader scenario)	122,452.2 tCO ₂ e/yr

KEY POINTS

- COMET-Planner results are county-area-weighted mean annual GHG reductions over its 10-year screening period, including soil carbon and direct and indirect N₂O. Potential Carbon Market Value is a screening estimate; eligibility, verification, buyer terms, permanence, issuance, and actual price remain unconfirmed.

+ 4 more rows in the appendix workbook.

COMET-Planner results are county-area-weighted mean annual GHG reductions over its 10-year screening period, including soil carbon and direct and indirect N₂O. Potential Carbon Market Value is a screening estimate; eligibility, verification, buyer terms, permanence, issuance, and actual price remain unconfirmed.

Biodiversity And Habitat Context

Biodiversity context around the opportunity footprint, with public species observations and official conservation overlays kept separate from modeled water, carbon, and economics.

WHO LIVES HERE · featured taxa by group

Plants



velvetleaf blueberry



Downy Painted-cup



common milkweed



Carolina horsenettle



purple prairie clover



partridge pea



bluntleaf sandwort



Glade Mallow



Louisiana broomrape



Great Blue Heron



Borage



poison hemlock

IDENTIFIED SPECIES

200 taxa/species

EXCLUDED PROTECTED OVERLAP

No overlap found

INCLUDED AFTER EXCLUSIONS

1,864.0 ac

CRITICAL HABITAT OVERLAP

No overlap found

Species photos via iNaturalist contributors (CC-licensed). © respective observers.

Bringing Biodiversity Back

A snapshot of what public records show living around the opportunity footprint today, and the characteristic species that restored conservation cover could help bring back.

TAXA OBSERVED NEARBY

200 taxa

From iNaturalist public...

PUBLIC OBSERVATIONS

260

Research-grade record...

MOST-RECORDED GROUP

Plants

Taxon group with the...

RESTORATION COULD SUPPORT

39 target species

Curated region-match...

MODELED

POLLINATOR SUPPLY UPLIFT

+81.0%

InVEST Pollination...

MODELED

GAP HABITAT SPECIES

148+ species

USGS GAP 30 m habit...

Notable species recorded nearby

Group	Species	Records
Plants	velvetleaf blueberry (Vaccinium myrtilloides)	4
Plants	Downy Painted-cup (Castilleja sessiliflora)	4
Plants	common milkweed (Asclepias syriaca)	3
Plants	Carolina horsenettle (Solanum carolinense)	3
Plants	purple prairie clover (Dalea purpurea)	3
Plants	partridge pea (Chamaecrista fasciculata)	3
Plants	bluntleaf sandwort (Moehringia lateriflora)	3
Plants	Glade Mallow (Napaea dioica)	3

Species restoration could bring back

Group	Species	Why it could return
Plants	Eastern prairie fringed orchid (Platanthera leucophaea)	Federally threatened tallgrass-prairie orchid
Birds	Acadian Flycatcher (Empidonax virescens)	Riparian corridor species supported by restored conservation cover.
Plants	Prairie bush clover (Lespedeza leptostachya)	Federally threatened upland-prairie legume
Mammals	American Badger (Taxidea taxus)	Grassland & prairie species supported by restored conservation cover.
Plants	Mead's milkweed (Asclepias meadii)	Federally threatened remnant-prairie milkweed

Observation records show recent biodiversity context; they are not proof of current on-site presence.
 Restoration targets are characteristic species for this conservation region, not a guarantee of recolonization.

Economics And Payment Design

Modeled water and carbon value across the riparian base package, the buffer + marginal option, and the full-field ceiling – not a final offer until landowner payments, implementation, MRV, transaction costs, and buyer capture are priced.

Payment design readout

Item	A · Base package	B · Buffer + marginal	C · Full-field	How to read it
Acres	1,864.0 ac	1,952.4 ac (+88.8 ac marginal)	12,772.1 ac	A = riparian minimum; B adds marginal cropland in touched fields; C = full-field ceiling
Gross water value	\$222,078/yr (\$119.14/ac/yr)	\$237,168/yr (\$121.48/ac/yr)	\$617,759/yr (\$48.37/ac/yr)	Watershed-wide avoided-treatment value before any buyer capture assumption
Capturable water value	\$77,727/yr (\$41.70/ac/yr)	\$83,009/yr (\$42.52/ac/yr)	\$216,216/yr (\$16.93/ac/yr)	Water value after applying the base capture assumption to each scenario's gross water
Potential Carbon Market Value	\$893,566/yr (\$479.37/ac/yr, \$50/tCO ₂ e)	\$936,130/yr (\$479.48/ac/yr)	\$6,122,612/yr (\$479.37/ac/yr)	Screening estimate; not issued credits or guaranteed revenue
Combined annual modeled value	\$971,293/yr (\$521.07/ac/yr)	\$1,019,138/yr (\$522.00/ac/yr)	\$6,338,828/yr (\$496.30/ac/yr)	Capturable water plus potential carbon market value for each scenario
Value horizon	\$1,859,387 over 10 years; \$12,052,821 30-year option context	–	–	Present-value estimate for the base package before implementation costs and buyer conversion risk
Base capital and support gap	\$4,962,572 base capital; \$0/yr support gap	–	–	Landowner payment, implementation, MRV, and transaction costs still need underwriting

Pricing: \$50/tCO₂e; capturable water = 35% of each scenario's gross. Still to underwrite: landowner payment, implementation, MRV, legal/transaction costs, and buyer conversion risk. Modeled value is not revenue until a payer, procurement route, contract terms, and delivery obligations are confirmed.

Scenario Options

Use this table to compare the base package, the targeted buffer + marginal-cropland option, and the broader watershed ceiling.

Scenario options

Option	Acres	What changes	Water outcome	Carbon outcome	Capital / cost	Diligence
Minimum riparian package	1,864.0 ac	Included AOO / riparian conversion	\$77,727/yr captured (base)	17,871.3 tCO ₂ e/yr reduction	\$4,962,572	First funding decision
Buffer + marginal cropland	1,952.4 ac	Riparian buffer plus the touched fields' least-productive (NCCPI <= 0.40) cropland (+88.8 ac of the farm's marginal ground)	\$237,168/yr gross	18,722.6 tCO ₂ e/yr reduction	Incremental ask beyond the base package	Targeted enrollment: buffer + the farm's marginal acres
Broader full-field option	12,772.1 ac	Modeled full-field context within LULC domain	\$617,759/yr gross context	122,452.2 tCO ₂ e/yr reduction	Not included in base capital ask	Requires landowner, exclusion, and implementation diligence

Recommendation And Next Steps

Recommendation: Advance to diligence

KEY POINTS

- Advance to diligence. Key reasons: Source-water data supports further review; The base acreage is mapped and bounded.
- Do not claim verified credits, guaranteed buyer revenue, or measured post-project outcomes.

Diligence Checklist

Group these open items before funding, claims, or landowner commitments.

Diligence workstreams

Workstream	Next check
Land and eligibility	Verify protected, enrolled, non-private, and already-conserved exclusions.
Model artifacts	Confirm model mode, InVEST artifacts, and acreage basis used for this run.
Carbon	Confirm method path, sign convention, monitoring, and crediting assumptions.
Water buyers	Validate utility, watershed-program, or agency relevance and capture assumptions.
Implementation	Underwrite landowner feasibility, costs, maintenance, and monitoring plan.
Broader scenario	Confirm scope, acreage basis, contracting path, and whether it is a real option.

Data Quality And Warnings

Run honesty summary – review before funding.

Confidence and warnings

Area	Open item	Action
Water	Full-field water scenario InVEST response is unexpectedly close to the base package despite 6.85x changed LULC acres. Review mask alignment, changed-acre accounting, and InVEST workspaces before relying on: n_reduced_kg_yr, p_reduced_kg_yr, sediment_reduced_kg_yr.	Review before claims or funding.
Gap Richness	GAP mammals richness uses the checksum-verified official 60 m overview because the cataloged 30 m parent object was unavailable; other staged taxa remain native 30 m.	Review before claims or funding.
Gap Richness	No GAP per-species habitat stack configured (--gap-species-stack); the rarity-weighted index is omitted. Richness means + intersected-species lower bound are reported.	Review before claims or funding.
Water Consumption	No perennial-ET reference was configured (openet_perennial_mm_yr); reporting the observed cropland actual ET without a cropland-vs-perennial delta.	Review before claims or funding.

KEY POINTS

- Run mode: modeled.
- Fallback used: False
- Habitat Quality: modeled for both scenarios; retained as supporting diligence evidence.

Data And Model Sources

What data and models feed this report.

Source summary

Question	Source / model	What it tells us	Confidence impact
Where is the opportunity?	AOO / ACPF outputs	Candidate riparian and field geography	Source-dependent
Which acres are excluded?	PAD-US / protected lands / enrolled lands if staged	Protected or already-conserved overlap	Verified if processed
What changes in water quality?	InVEST SDR/NDR, SPARROW, StreamCat, export coefficients	Sediment, nitrogen, phosphorus	Modeled or estimated
Who might care?	ATTAINS, source-water, downstream population	Buyer-fit screen	Screening only
What changes in carbon?	COMET-Planner v4 CPS 327 workbook and Census county boundaries	Annual GHG reduction including soil carbon and N2O components	Modeled screening
What could it be worth?	Carbon price cases, treatment costs, finance assumptions	Dollar screening	Estimated / screening

This appendix page supports traceability; it is intentionally after the investment and outcome pages.

What This Report Is And Is Not

This report is a diligence tool. It is not a verified credit issuance document, buyer contract, landowner agreement, regulatory approval, or proof of measured post-project performance.

Data confidence legend

Label	Plain-English meaning
VERIFIED	Supported by source data or processed inputs.
MODELED	Produced by a documented model workflow.
ESTIMATED	Derived from documented assumptions.
PROXY	Screening signal only – not a measured outcome.
UNAVAILABLE	Not computed or not enough data for this run.

KEY POINTS

- Identifies eligible conservation opportunity acres.
- Models before/after outcomes for a documented conservation scenario.
- Estimates possible water and carbon value using transparent assumptions.
- Highlights missing diligence items before funding decisions.
- Does not verify carbon credits or guarantee buyer revenue.
- Does not prove measured post-project water-quality improvement.
- Does not prove measured farm emissions, guarantee regulatory eligibility, or replace field and landowner verification.

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