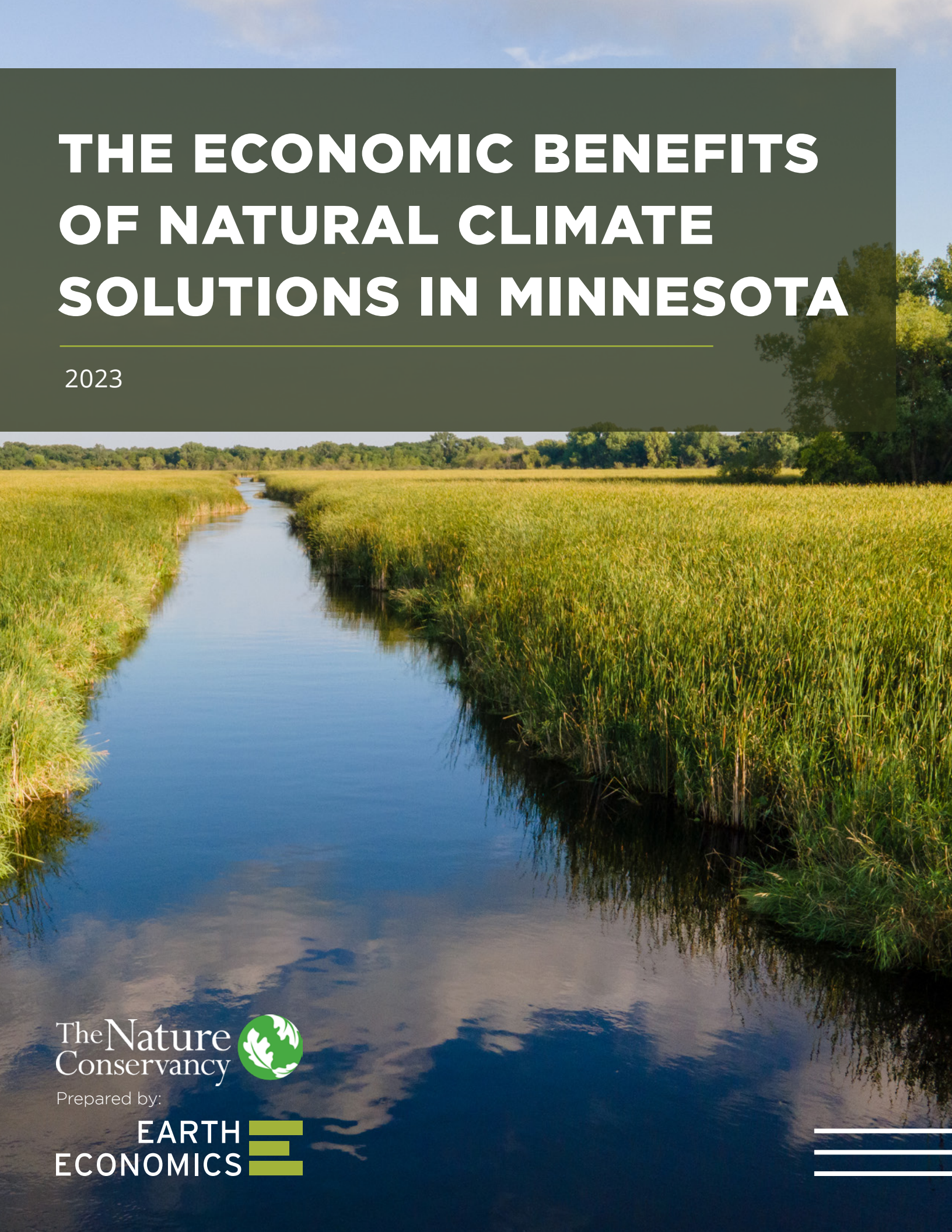
THE ECONOMIC BENEFITS OF NATURAL CLIMATE SOLUTIONS IN MINNESOTA

2023



The Nature Conservancy

Prepared by:

EARTH ECONOMICS

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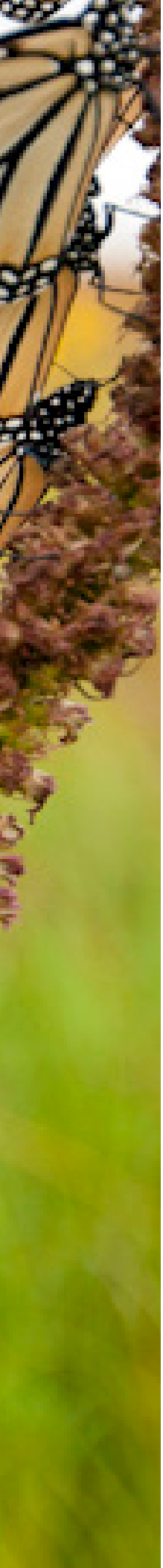

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Land Acknowledgment

The name Minnesota comes from the Dakota name for the region, Mni Sota Makoce—"the land where the waters reflect the clouds." We recognize the Native Nations of this region who have called this place home for thousands of years, including the Dakota, Anishinaabe (Ojibwe), Lakota, Nakota, Ho-Chunk, and Cheyenne. Today, the State of Minnesota shares geography with 11 Tribal Nations—the Ho-Chunk, Cheyenne, Oto, Iowa, Hidatsa, Arikara, A'aninin, Cree, Blackfeet, Assiniboine, and the Sac and Fox tribes—who also acknowledge Minnesota as important to their tribal histories.

EXECUTIVE SUMMARY

Climate change poses severe threats to human well-being, livelihoods, and economic health. Nature is resilient, but the pace and scale of climate change impacts are outpacing nature's ability to adapt. Natural Climate Solutions (NCS), such as reforestation, aim to mitigate these impacts by protecting, managing, and restoring natural lands while also avoiding degradation of natural systems.[1] NCS provide multiple economic benefits beyond climate change mitigation, including ecosystem services benefits such as clear water, clean air, and disaster mitigation. They also support the economy through project spending and job creation.

Understanding the economic value of nature's benefits is critical for decision-making around degradation and loss of natural areas, as well as their protection and renewal. Economists use a method called ecosystem services valuation to determine a monetary value for nature's benefits. Including ecosystem services benefits—in economic terms—in decision-making processes supports the business case for NCS, which are often less costly than built infrastructure (e.g., costs of restoring a wetland is typically less than the cost of building a new water treatment facility).

Earth Economics partnered with The Nature Conservancy in Minnesota to quantify the economic benefits of implementing 12 NCS practices in Minnesota. This report summarizes key findings of the ecosystem services valuation, benefit-cost analysis (BCA), and economic contribution analysis of three different implementation scenarios in Minnesota within different geographies.

We included economic estimates for three different implementation scenarios to help decision makers weigh costs and level of effort to reach climate mitigation targets against the benefits NCS could provide. Our results show that even **with the minimum level of implementation** (which is the least amount of acreage applied, consistent with current trends), **NCS practices would support an average of 2,700 local jobs every year until 2050.** Additional impacts of the minimum implementation scenario include over $110 million in annual wages for Minnesota workers, as well as $173 million in annual gross domestic product (GDP). Should decision makers opt for the maximum implementation scenario, it could support 5,200 jobs every year until 2050.

Photo by Stan Tekiela

100 percent implementation of all NCS practices would provide Minnesota residents with $37 billion in ecosystem services every year.

That total includes substantial co-benefits—totaling over $4 billion every year—that would be preserved by preventing any further loss of these natural systems. This does not include nearly $357 million worth of carbon that would be drawn down every year by extant forests, grasslands, wetlands, and peatlands.

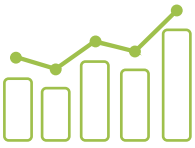
In addition to avoiding further loss, **restoration of the full potential extent of Minnesota ecosystems can generate net benefits of over $32 billion every year.** Soil quality practices on croplands (including no-till/low-till, improved nutrient management, and cover cropping) would provide over $600 million in ecosystem services, in addition to $278 million in net income to Minnesota farmers.

Minnesota's habitats already store $142 billion in carbon, which is the main focus of climate mitigation strategies like NCS practices, and restoration will increase that reserve of carbon storage.

NATURAL CLIMATE SOLUTIONS INVESTMENTS WOULD SUPPORT*:

2,700 to 5,200 jobs per year through 2050

$110 million to $148 million in wages per year for MN workers through 2050.



$173 million to $221 million in annual GDP through 2050.

*Sum of all NCS practices in the minimum to maximum implementation scenarios

Because these benefits have generally been unevenly distributed across communities, this report also explores the value of benefits on lands within historically disadvantaged communities. These communities include Tribal lands, where NCS practices would protect and provide $753 million in benefits, as well as "environmental justice areas"—where the majority of the population identify as people of color and face poverty—that would see $425 million in benefits from NCS.

The net present value (NPV)[i] of all NCS practices combined would range from $49 billion in net benefits with minimum implementation to $539 billion in the maximum scenario.[ii] Furthermore, **for every dollar invested in NCS practices, Minnesota would receive $8.55 in public benefits by 2050.**

[i] Net present value = A measure of the total value in today's dollars of all future benefits derived from an investment, minus the current costs of purchasing that investment, including future contributions which have been annually discounted (using a discount rate) over a pre-determined period of time (e.g., project period).

[ii] Using a 3.124% discount rate used by the Army Corps of Engineers for restoration projects in 2021.

Figure 1. *Ecosystem services values provided by NCS practices if implemented to their full extent.*

Figure 2. *Ecosystem services values, by land cover, provided by avoiding the conversion of natural ecosystems to other land uses, along with restoration, with maximum implementation.*

FORESTS

$4.5 BILLION per year
in ecosystem services preserved by avoided conversion

$32 BILLION per year
in ecosystem services generated by reforestation

GRASSLANDS

$3.8 MILLION per year
in ecosystem services preserved by avoided conversion

$65 MILLION per year
in ecosystem services generated by restoration

WETLANDS + PEATLANDS

$114 MILLION per year
in ecosystem services preserved by avoided conversion

$210 MILLION per year
in ecosystem services generated by restoration

INTRODUCTION

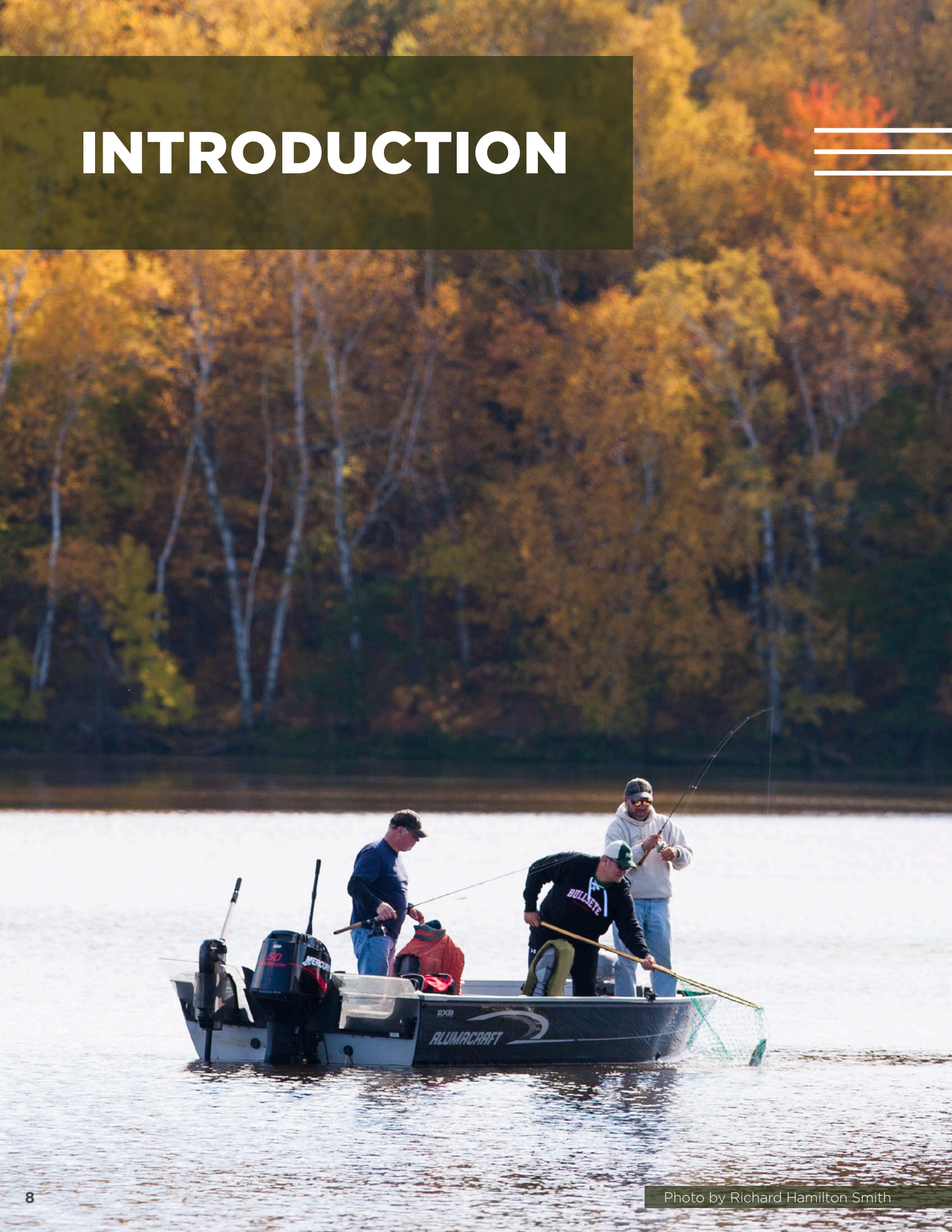


Photo by Richard Hamilton Smith

Land-use decisions are often framed around dollars and cents; however, the natural world also offers intangible benefits, such as the value of recreation or clean air. This report aims to support decision making by clarifying the benefits and costs of NCS practices at varying levels of implementation.

The 2022 Congressional Infrastructure Investment and Jobs Act sets aside $1.4 billion for the U.S. Department of the Interior to invest in ecosystem restoration, and the 2022 Inflation Reduction Act provides another $250 million toward these efforts.[2,3] These investments demonstrate not only the U.S. government's commitment to funding NCS projects, but also the importance of having economic benefit estimates ready for decision makers who are looking to fund NCS projects.

Earth Economics partnered with The Nature Conservancy (TNC) in Minnesota to quantify and value the economic benefits of 12 NCS practices, including economic activity and ecosystem services.

Investing in climate solutions such as those described in *Nature and Climate Solutions in Minnesota* (2021)[1] would support economic activity in the state. These projects have labor, equipment, and supply costs that have a ripple effect through the local and state economy via supply chains and workers spending their wages (i.e., *economic contribution*). Economic contributions include jobs, tax revenue, labor income, and GDP that can be estimated through an *economic contribution analysis.*

In addition to supporting Minnesota's economy, NCS can also help to preserve and generate other co-benefits—ecosystem services. Simply put, ecosystem services are the non-market benefits that nature provides to all of us. Natural systems produce water, clean air, food, and other vital goods and services that support human well-being and sustain communities.

Economic value can be assigned to these services by employing ecosystem services valuation, a method that economists use to ascribe monetary value to ecological benefits. Including ecosystem services in economic terms in the decision-making process can make the business case for NCS, which are often less costly than built infrastructure.

A 2021 comparison of the costs of nature-based solutions—which are similar to NCS—and built infrastructure revealed that nature-based approaches returned $10 for every dollar invested, compared with $3.6 for built infrastructure. On average, nature-based solutions are half as expensive as built infrastructure, but they provide 29 percent more value, largely as co-benefits (e.g., improvements to air and water quality, as well as fish and wildlife habitat).[4]

Ecosystem services are essential to the health and well-being of local, regional, and global communities. They are also essential to local, regional, and global economies. The role that ecosystem services play in an economy depends on whether the value of a service can be monetized. In other words, can a market be established around an ecosystem service so that dollars exchange hands?

Carbon sequestration is an ecosystem service that illustrates the difference between a service that provides value and a service that can be monetized. For example, forests sequester and store carbon all over the world. This valuable service, which helps offset the global impacts of human activity, is provided simply because forests exist. The value of carbon sequestration can be identified using ecosystem services valuation. In addition, carbon markets have been established to facilitate payment for the carbon sequestration services that forests provide, primarily through markets where participants can buy or sell carbon credits. Carbon markets "monetize" an ecosystem service and allow the owners of healthy forests to generate income and economic activity, relying on the services that nature provides.

Utilizing carbon markets can help fund NCS that do much more than mitigate the consequences of climate change. This report has demonstrated the tremendous value ($4.2 million per year) that existing forests provide to Minnesota residents in addition to carbon sequestration, but there is an opportunity for NCS to utilize financial instruments like carbon markets. Credits can be used to raise revenue for opportunities like land acquisition and easements and meet TNC's targets for NCS. NCS practices include avoided conversion, restoration, and soil quality practices for different ecosystems (Table 1).

Table 1. *Categorization and definitions of natural climate solutions (NCS) as defined in* Nature and Climate Solutions in Minnesota *(2021).*

Category	Practice	Definition
Avoided Conversion	Avoided Forest Conversion	Reduction of persistent forest clearing, through which forest land is converted to another land use such as row crops or housing developments, resulting in losses of carbon in biomass and soil
	Avoided Grassland Conversion	Maintenance of the significant carbon stocks available in native grasslands by storing carbon above and belowground
	Avoided Wetland Conversion	Reduction of carbon loss from wetlands, as stored in plant biomass, soil organic matter, and sediment
	Avoided Peatland Conversion	Retention of current carbon stocks in peatlands because organic matter decomposes more slowly in peatlands
Restoration	Reforestation	Stores carbon above and belowground by planting trees in historically forested areas, including degraded, converted, agricultural, and urban lands
	Riparian Forest Buffers	Protection of land adjacent to streams, lakes, or other water bodies that increases plant diversity, biomass, and soil carbon
	Grassland Restoration	Stores carbon in soil and plant biomass when land that had been converted to other uses is returned to a grassland ecosystem
	Wetland Restoration	Rebuilding carbon lost from plants, soils, and sediments by restoring wetlands that have been drained or altered for agricultural activity
	Peatland Restoration	Rewetting and restoration of former peatlands that have been drained or ditched
Soil Quality	Cover Cropping	Soil carbon sequestration by growing crops in fallow seasons between main crops, especially when the main crops are row crops like corn or soy
	Improved Nutrient Management	Reduction of N_2O emissions from nitrogen-based fertilizers by reducing nutrient application rates, transitioning from anhydrous ammonia to urea, improving fertilizer application timing, or using variable fertilizer applications
	No-Till / Low-Till	Reduction in soil aeration that accelerates decomposition rates and greenhouse gas releases

Photo by Stan Tekiela

KEY CONCEPTS & METHODS

Photo by Jason Whalen/Fauna Creative

IMPLEMENTATION SCENARIOS

We estimated benefits across three different implementation scenarios, each of which includes 12 NCS practices that represent varying levels of effort. The minimum level scenario is most commonly associated with 10 percent change[iii] over a 10-year lifespan, and the maximum scenario is often described as 100 percent change over 30 years. In this report, we highlight some of the results from the minimum and maximum scenarios, but the full results and medium scenario can be found in Appendix B.

ENVIRONMENTAL JUSTICE AND TRIBAL GROUPS

Economic and environmental benefits have been unevenly distributed among communities, historically. Environmental justice is a social movement that recognizes and seeks to address the unfair exposure of marginalized communities to the harms associated with resource extraction, hazardous waste, and other land uses. Climate change is already impacting human health and well-being and creating risks (such as urban heat, wildfires, and flooding) that harm communities and disproportionately affect those who are socially or economically disadvantaged. In Minnesota, these communities are defined by their racial make-up and income. In addition to estimating statewide benefits, we used environmental justice regions within the state as determined by 2016 U.S. Census Data to capture benefits to more diverse communities:[iv]

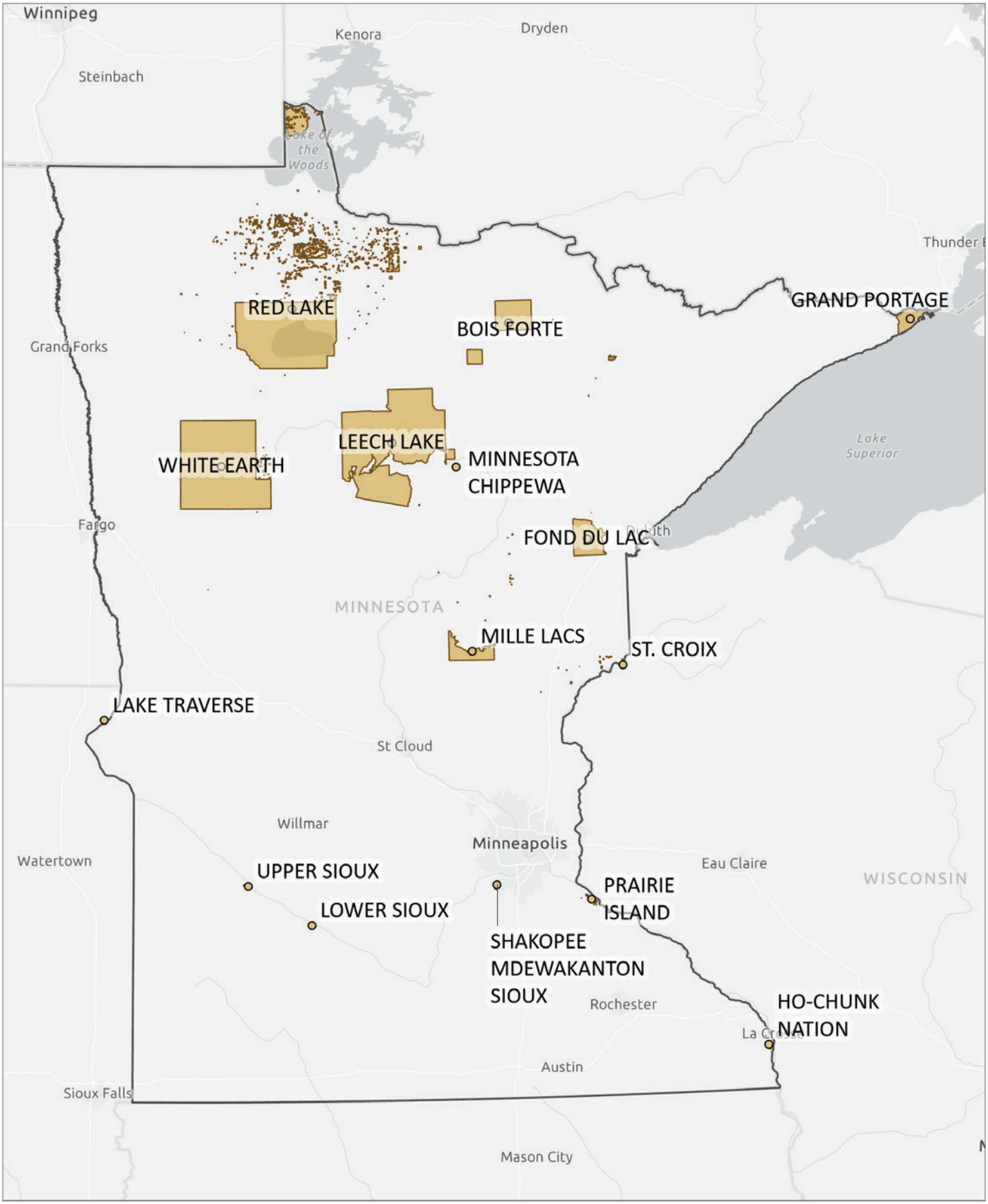
1. Federal- and state-recognized Native American reservations and Tribal lands (Tribal Areas; Figure 3)
2. "Environmental justice areas" that meet both of the following criteria:
    - 50 percent or more of residents identify as people of color
    - At least 40 percent of people reported income less than $21,978 (for a 1 person household).

It's important that the costs and benefits of deploying NCS are recognized for these vulnerable groups and taken into account when making policy.

[iii] This change is often associated with less conversion for avoided conversion practices or potential acreage restored, by practice.

[iv] Environmental justice and Tribal areas overlap with the Minnesota state region, as well as with one another; thus the results of these regions should be considered separately.

Figure 3. *Map of Tribal areas included in the analysis.*



Sources: U.S. Census Bureau, Esri

MAPPING ASSUMPTIONS

Results in this report are highly dependent on the spatial extent (i.e., number of acres) of the practices that are implemented. Because one acre could be a good fit across multiple practices, we developed a prioritization structure to ensure that only one practice would be implemented on every potential acre. We prioritized avoided conversion over restoration practices, and prime agricultural lands[6] were prioritized over restoration practices (except riparian buffer reforestation, due to Minnesota law requiring riparian buffers—MINN. STAT. 103F.48 (2021)). We would expect restoration practices to occur only on non-prime farmland.

ECONOMIC CONTRIBUTION OF NATURAL CLIMATE SOLUTIONS

We estimated how much investment would be required to implement each NCS practice in all three implementation scenarios. This report includes the economic contributions of NCS investments and the anticipated losses in the agricultural sector from reduced cropland. Contributions include *jobs, labor income, value added* (i.e., GDP), and *tax revenue*, all of which are broken down into *direct* and *secondary effects* (including *indirect* and *induced effects*). See glossary for contribution definitions.

ECOSYSTEM SERVICES VALUATION

To estimate the value of ecosystem goods and services (Table 2), we applied the *benefit transfer method*.[v,7] This approach has the benefit of providing reasonable, broad-based estimates more easily than other methods, such as conducting primary research on community perceptions of multiple ecosystem services. In the simplest form of the benefit transfer method, non-market benefits are regularized to per-acre, per-year estimates, which are then scaled by the extent of each ecosystem to estimate the total annual value of nature within the region of analysis. In this analysis, we used the Social Cost of Carbon[8] to value carbon sequestration and carbon storage.

Each NCS category requires a different valuation approach using this method:

- **Avoided conversion:** a land cover–based approach multiplying per-acre, per-year value estimates of each ecosystem service provided by a given landcover type—and associated attributes (e.g., urban proximity).
- **Restoration:** a land cover change framework estimating the net difference in value between two land cover types. By comparing differences in the value of ecosystem services across land cover types (e.g., forest vs. agriculture, grasslands vs. developed areas), we approximate the gains and losses associated with land cover change. For example, the benefits associated with converting cropland to forest can be estimated as the benefits produced by the new land cover (forest) minus those produced by the former land cover (cropland).
- **Soil Quality:** valuing change to ecosystem services or added services for cropland management practices. This practice-based analysis uses values derived from literature for changes to ecosystem services that occur within the same land cover. For example, improved soil quality is provided by increased organic matter as a result of cover cropping.

[v] Benefit-transfer method = when primary valuation research on goods and services provided by similar ecosystems in similar contexts (e.g., location, climate, proximity to coasts) are "transferred" to similar settings in the study area.

Table 2. *Gap analysis of ecosystem goods and services included by land cover type. Source: Earth Economics, 2022. See Appendix A for definitions.*

Ecosystem Services	Land Cover Types				
	Forests	**Grasslands**	**Wetlands**	**Peatlands**	**Cropland***
Aesthetic Information	✓		✓	✓	
Air Quality	✓	✓	o		
Biological Control	o	o	o		✓
Carbon Sequestration	✓	✓	✓	✓	✓
Carbon Storage	✓	o	o	o	o
Climate Stability	✓	o	o	o	
Disaster Risk Reduction	✓	o	o	o	
Habitat	o	o	✓	✓	
Recreation & Tourism	✓	✓	✓	✓	
Soil Quality	o	o	o	o	✓
Soil Retention	o	o	✓	✓	o
Water Capture, Conveyance, Supply	✓	o	o	o	✓
Water Quality	✓	o	o	o	o

** Limited to the following NCS Practices: Cover Cropping, No-Till / Low-Till, Improved Nutrient Management*

KEY

✓ Ecosystem service provided by land cover and valued in this report

o Ecosystem service provided by land cover, but not valued in this report

ECONOMICS OF NATURAL CLIMATE SOLUTIONS

Photo by Dudley Edmondson

Although the primary goal of NCS is to mitigate climate change impacts, our results illustrate the considerable value that nature provides to Minnesotans beyond climate stability. Fully implementing NCS practices across Minnesota would add **$32 billion per year in ecosystem services with restoration practices, protect $4.3 billion per year with avoided conversion practices, and provide $600 million per year with soil quality practices.** An estimated $753 million in benefits would be realized on Tribal lands and $425 million within environmental justice areas.

AVOIDED CONVERSION

SUMMARY

- Preventing forest conversion would retain $3.2 billion to $81 billion in NPV of ecosystem services benefits for the minimum and maximum scenarios, respectively, returning $24 per dollar invested.
- Avoided conversion practices at 100 percent implementation (on an acreage basis) would provide over $146 million and $264 million in annual water quality benefits for environmental justice and Tribal areas, respectively.
- Protecting Minnesota's remaining 58,000 acres of prairie from conversion would retain $195,000 in ecosystem services benefits every year thereafter.
- For every dollar invested in avoided conversion, $10.67 in ecosystem services benefits would be protected across the practices' lifespans (up to 2050). Avoided conversion practices are thus the most cost-effective investments based on return.
- Avoided conversion practices only produce a positive contribution to Minnesota's economy per dollar spent in the statewide maximum scenario, adding to the case for this level of investment.
- $16 million to $442 million in state tax revenue would be supported by avoided conversion NCS due to spending on labor and supplies needed to protect these lands.

Table 3 details avoided conversion benefits per-acre, per-year, by practice.[vi]

Only one percent of Minnesota's historic 18 million acres of prairie remains.[9] However, protecting over 58,000 acres of remaining prairie from conversion to development or cropland would preserve at least $195,000 in benefits every year, and offer an additional $3.6 million in carbon sequestration value. Prairies (grasslands) have extensive root systems that are highly effective at sequestering carbon, but because the carbon sequestration value was not included in the NPV, prairie was undervalued in this analysis. This is why grasslands appear to be negative in Table 4. Should carbon benefits be included, NPV would increase dramatically. This same caveat—of not including carbon in the NPV—explains why wetlands appear to have a negative value, as well.

Forests also play a key role in sequestering and storing carbon, but Minnesota has lost almost half of its forests since European settlement.[10] Preventing additional losses to forests would protect $318 million and $142 billion every year in carbon sequestration and storage, respectively.

In addition to the value of carbon, another $4.2 billion per year in additional ecosystem services benefits, such as air quality and disaster risk reduction, would also be protected. By 2050, avoided forest conversion will return $24 in benefits per dollar invested.

These practices would support between 71 and 2,100 local jobs per year with $3.3 million to $95 million in wages in the minimum and maximum scenarios, respectively.

[vi] Because carbon sequestration can vary by ecosystem type and age, we separated the ecosystem services value from the carbon value for each practice.

Table 3. *Annual per-acre benefits of avoided conversion for various land types*

NCS Avoided Conversion Practice	Per-Acre, Per-Year Benefits
Minnesota	
Forest	$8,783
Grassland	$39
Wetland	$296
Peatland	$700
Environmental Justice Areas	
Forest	$8,944
Grassland	$43
Wetland	$290
Peatland	$701
Tribal Areas	
Forest	$8,976
Grassland	$43
Wetland	$316
Peatland	$699

Table 4. *Net present value of NCS avoided conversion in Minnesota, by implementation scenario (minimum and maximum), in thousands of dollars (2021 USD)*

NCS Avoided Conversion Practice	Discount Rate = 3.124%	
	Minimum	Maximum
Minnesota		
Forest	$3,243,401	$81,495,985
Grassland	$(16,914)	$(210,385)
Wetland	$(56,622)	$(434,361)
Peatland	$3,504	$96,520
Environmental Justice Areas		
Forest	$140,979	$3,540,348
Grassland	$(455)	$(5,592)
Wetland	$(2,652)	$(21,268)
Peatland	$0.5	$14
Tribal Areas		
Forest	$255,211	$6,408,329
Grassland	$(462)	$(5,672)
Wetland	$(4,469)	$(28,705)
Peatland	$0.1	$2.8

Photo by Dudley Edmondson

RESTORATION

SUMMARY

- NCS restoration practices would provide $32 billion per year in ecosystem services at maximum implementation.
- Every dollar spent on NCS restoration practices with minimum implementation would support $1.47 in economic activity in Minnesota while also generating $9.98 in ecosystem services by 2050.
- **NCS restoration practices combined would provide $9,000 in benefits per acre every year in the maximum scenario**, with most of that value in reforestation (Table 5).
- For Tribal areas, restoration practices would support $1.25 to $1.16 in additional economic activity per dollar spent on investments (minimum and maximum scenarios, respectively), with most of this driven by wetland restoration ($4.86 per dollar spent, maximum scenario).
- There would be seven-fold, six-fold, and five-fold increases in economic activity for every dollar spent on wetland restoration in Minnesota, environmental justice, and Tribal areas, respectively (maximum scenario).
- If 318,000 acres of Minnesota prairie are restored, at least $65 million in benefits would be generated annually.
- $364 million to $1.1 billion in state tax revenue would be generated by NCS restoration.

In addition to preventing more loss and degradation of Minnesota's ecosystems, NCS restoration efforts could add an additional 400,000 to 4 million acres of natural lands (minimum and maximum scenarios, respectively), including up to 60,000 in environmental justice areas and 84,000 in Tribal areas. Figure 4 illustrates reforestation and peatland ditch rewetting implemented in the Redeye River watershed.

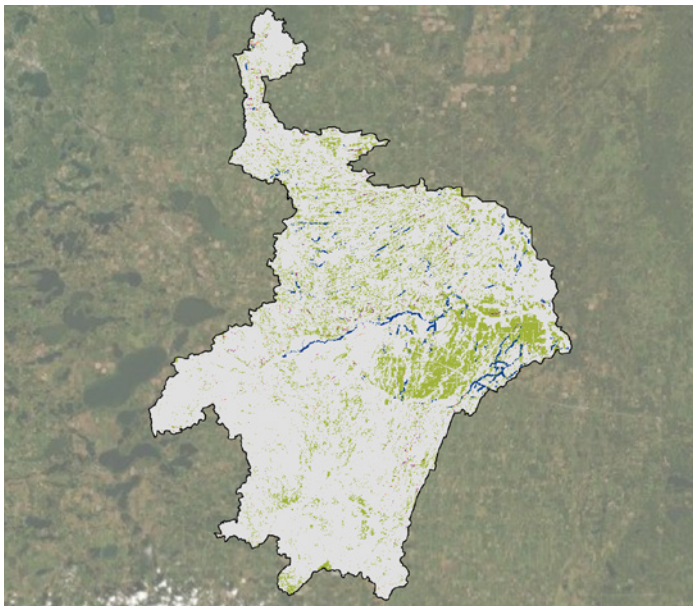
If minimum action is taken, reforesting 300,000 acres in Minnesota would generate significant return on investment in terms of ecosystem services benefits—over $21 for every dollar of investment. In terms of return on investment to Minnesota's economy, wetlands are the biggest driver, supporting $7.06 per dollar of investment in the minimum scenario of restoring 32,000 acres. This is mostly due to the more equipment-intensive activities and greater easement payments needed to accomplish wetland restoration projects.

Because reforestation activities are highly labor intensive and would take place across a larger area, they would support 2,300 total jobs every year—including both direct and secondary effects—in the minimum scenario across the project lifespan. Decreases in crop production are taken into account for economic activity effects; thus the maximum scenario supports about 2,000 fewer jobs, annually. As acreage increases in the maximum scenario, so do losses to (non-prime) agricultural lands replaced by restoration practices.

Table 5. *Annual per-acre benefits of restoration*

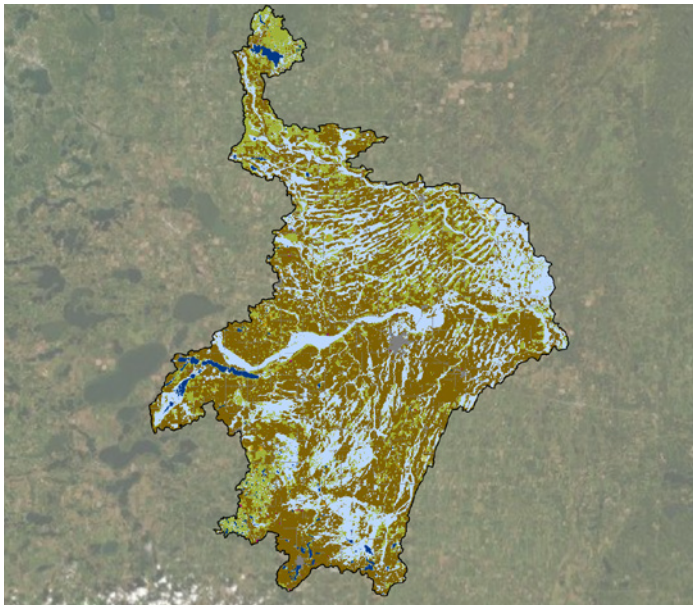
NCS Restoration Practice	Per-Acre, Per-Year Benefits
Minnesota	
Reforestation	$7,832
Grassland Restoration	$137
Wetland Restoration	$290
Riparian Buffer	$181
Riparian Buffer on Prime Ag Land	$280
Peatland Restoration	$185
Environmental Justice Areas	
Reforestation	$8,063
Grassland Restoration	$137
Wetland Restoration	$296
Riparian Buffer	$182
Riparian Buffer on Prime Ag Land	$348
Peatland Restoration	$184
Tribal Areas	
Reforestation	$8,155
Grassland Restoration	$137
Wetland Restoration	$292
Riparian Buffer	$168
Riparian Buffer on Prime Ag Land	$341
Peatland Restoration	$186

Figure 4. *Hypothetical restoration scenario in the Redeye River watershed, for illustrative purposes only.*



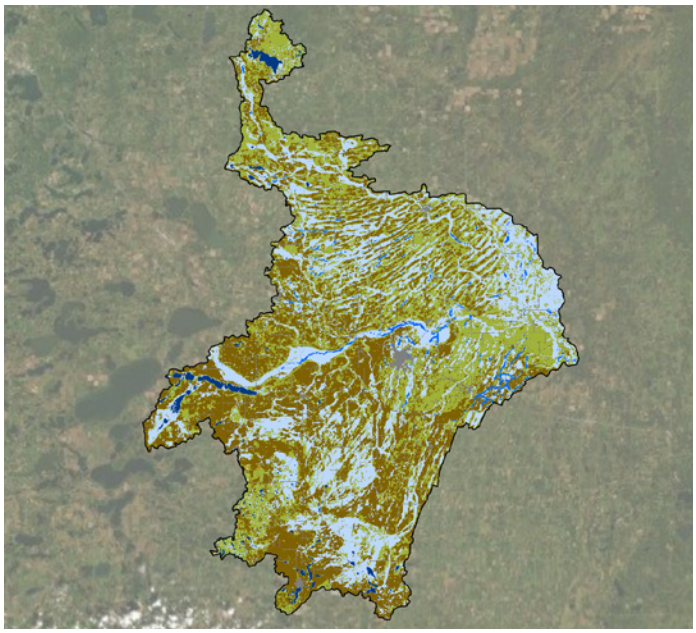
Restoration Practice Extent

- Peatland ditch rewetting
- Reforestation



Pre-Implementation Scenario Land Cover

- Agricultural land
- Barren land
- Developed
- Forest
- Herbaceous
- Open water
- Peatland ditches
- Shrub/scrub
- Wetlands



Post-Implementation Scenario Land Cover

- Agricultural land
- Developed
- Forest
- Herbaceous
- Open water
- Peatland ditches
- Shrub/scrub
- Wetlands

Sources: USGS, Esri, U.S. Census Bureau

Photo by Jason Whalen/Fauna Creative

SOIL QUALITY

SUMMARY

- Improved soil quality practices like cover cropping and no-till/low-till could lead to greater cost savings, **adding between $8.6 million and $278 million in net income for Minnesota farmers.**
- Net farm income across environmental justice and Tribal areas could reach over $2.9 million and $3 million, respectively.
- NCS agriculture practices combined would provide between $16 million and $384 million every year in ecosystem services benefits to Minnesota residents (in the minimum and maximum scenarios, respectively), with nearly three-quarters of that value in carbon sequestration.
- Farmers would save significant money by spending less, but this would result in negative economic activity in sectors where farmers currently spend money.

See Table 6 for the annual benefits of NCS soil quality practices.

Agriculture can play a role in mitigating climate change not only by reducing impact (e.g., reduced runoff) but also by encouraging the draw-down of carbon from the atmosphere. As crops grow, they sequester carbon into the soil, where it can be stored or used as food by plants. NCS best management practices for soil quality lead to more carbon stored in soil, reducing greenhouse gas emissions for agricultural supply chains and moving us closer to net zero. The value of carbon sequestration from NCS soil quality practices would be greater than $280 million across the state at maximum implementation.[8]

Cover cropping not only sequesters carbon,but also provides nutrients to plants—reducing the need for chemical nitrogen fertilizers and saving farmers money. If cover cropping was implemented on 232,000 acres of Minnesota cropland (the minimum scenario), it would save farmers $182,000 in fertilizer costs. Cover cropping also provides weed control benefits, reducing the need for herbicides, by $3.8 million to $92 million.

Overall, the economic contribution of cover cropping and no-till practices support economic activity, whereas improved nutrient management results in lower spending, thus net negative economic activity in terms of jobs, wages, and GDP. However, state tax revenue would increase from net negative in the minimum scenario (-$3.3 billion) to net positive in the maximum scenario ($120 million) due to decreased subsidies paid for products from non-prime farmland.

***Table 6**. Annual benefits of NCS soil quality practices (minimum and maximum scenarios)*

Benefits, by Region	Per-Year Benefits
Minnesota	
Farmer net income	$8.6M–$210M
Water storage and supply	$103K–$2.5M
Soil quality (fertilizer replacement)	$363K–$8.9M
Pest control (herbicide replacement)	$3.8M–$92M
Carbon sequestration	$11.5M–$280M
Environmental Justice Areas	
Farmer net income	$110K–$2.7M
Water storage and supply	$1.3K–$33K
Soil quality (fertilizer replacement)	$4.7K–$115K
Pest control (herbicide replacement)	$48K–$1.2M
Carbon sequestration	$148K–$3.6M
Tribal Areas	
Farmer net income	$120K–$2.9M
Water storage and supply	$1.4K–$35K
Soil quality (fertilizer replacement)	$5.1K–$125K
Pest control (herbicide replacement)	$53K–$1.3M
Carbon sequestration	$160K–$3.9M

CONCLUSION

Photo by Kristen Blann/TNC

This report quantifies the value of NCS in Minnesota so that stakeholders and policy makers can decide on the best approach to implement these practices. This is a complex analysis exploring multiple scenarios with different implementation thresholds for avoided conversion and restoration across four ecosystems—forest, grassland, wetland, and peatland—and three best management practices to improve soil quality on farmland. Minimum and maximum scenarios for implementation are presented for every practice. However, the alternative of taking zero action was not included, because allowing continued loss and degradation of Minnesota's ecosystems is not a viable option in the face of climate change consequences.

These implementation scenarios are expected to be deployed together, and this report should not be viewed as a tool to compare different practices. Some ecosystems have been more studied than others, and the value of NCS practices is largely dependent on ecosystem type. For example, wetlands are well researched, whereas grasslands have not been studied as extensively. This report presents the value of these practices as a whole and their potential impacts on Minnesota's economy.

Investments in NCS solutions would protect and restore $37 billion every year in ecosystem services benefits that humans rely on—like clean air, clean water, and flood mitigation. Compared with their costs, preventing further loss of ecosystems through avoided conversion practices would return ecosystem benefits tenfold.

NCS can also support Minnesota's economy. For example, every dollar invested in restoring the minimum of 32,000 acres of wetlands would support over $7 in spending. Investments across all 12 practices would also support between 2,700 to 5,200 jobs per year. By 2050, these investments would support at least $4.5 billion in GDP. Policy makers must take into account the impact of these scenarios on environmental justice and Tribal populations. We found that the value of avoided conversion and restoration per acre per year for each habitat in their areas varied only slightly from the statewide amount. For example, avoided conversion for forests statewide is $8,783, but it reaches $8,944 in environmental justice areas and $8,976 in Tribal areas. The total ecosystem services valued in the maximum scenario also includes preserving water quality benefits in Tribal areas, valued at $264 million per year. Water quality is culturally significant to Indigenous communities that rely on wild rice (a.k.a. manoomin) as a dietary staple. It's also important to note that nearly all NCS restoration practices provide substantial economic activity in Tribal areas across all scenarios, due to their impactful expenditures on sectors that

Photo by Bruce Leventhal

are highly present in Tribal areas. Coupled with significant returns in terms of ecosystem services benefits, the data make a strong case for partnering with Tribal nations that are interested in restoration investments.

This report includes the social value of carbon. Sequestering carbon can provide an additional stream of revenue for landowners, which we have not taken into account. The Voluntary Carbon Market is an established mechanism to credit for carbon sequestered in "Reducing Emissions from Deforestation and Forest Degradation (REDD+)" projects and best management practices that increase soil organic carbon. However, the carbon credit value generated by nature-based solutions is volatile and may be further affected by the development of carbon capture and storage technology. Furthermore, we have not provided annual values for carbon storage nor lifespan estimates for carbon sequestration because each ecosystem has a threshold at which it stops sequestering and storing additional carbon.

Landowners might also eventually benefit from biodiversity credits. The biodiversity market is still emerging, but a credit system exists in Australia, and there is international cooperation on establishing a framework. The value of these habitats would be influenced by the restoration strategy followed, heterogenous native species having more value than homogenous nonnative species.

Both implementation scenarios would extend the coverage of habitats. In the maximum scenario, it is likely that a percentage of restoration would extend contiguous swathes of habitat. This may reverse the effects of habitat fragmentation, such as forest fragmentation, which creates "edge" habitat where the environment and micro-climate is different from intact forest and has reduced biodiversity.

This report is focused on net present value in present climate conditions, projected at a discount rate. Climate models forecast change to ambient temperatures, weather disruption, and an increased risk of natural disasters. The value placed on habitats and their associated ecosystem services values (especially disaster risk reduction) to mitigate the effects of climate change will likely increase beyond our projections. This is not something we are able to quantify in the face of such uncertainty, but if properly stewarded, investment in nature will return dividends.

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APPENDIX A: GLOSSARY OF TERMS

Aesthetic information: Information ecosystem service defined as enjoying and appreciating the scenery, sounds, and smells of nature.

Air quality: Regulating ecosystem service defined as providing clean, breathable air.

Benefit-cost analysis: A common tool that compares the present-day cost of a project with its long-term benefits, often used by decision makers to determine whether or not a project will be funded.

Benefit Transfer Methodology (BTM): BTM is an ecosystem service valuation method that uses values derived from published studies for application in similar ecosystems. It resembles a house or business appraisal that is based on comparable characteristics of similar houses or businesses.

Biological control: Regulating ecosystem service defined as providing pest, weed, and disease control.

Carbon sequestration: The process by which plants drawn down carbon dioxide from the atmosphere through photosynthesis.

Carbon storage: Carbon held in soils and biological materials (e.g., plant matter) that has been drawn down from the atmosphere through carbon sequestration.

Climate stability: Regulating ecosystem service defined as supporting a stable climate at global and local levels through carbon sequestration and other processes.

Direct contribution effects: Economic activity of industries where expenditures are made. For example, garden supply retailers where equipment and supplies are purchased for a restoration project.

Disaster risk reduction: Regulating ecosystem service defined as preventing and mitigating natural hazards such as floods, hurricanes, fires, and droughts.

Discount rate: The rate at which people value current consumption or income, compared with later consumption or income. It determines the present value of future cash, due to uncertainty, productivity, or time preference for the present.

Economic activity: The direct, indirect, and induced contributions to a region's economic activity (e.g. sales, production and consumption of goods and services, employment, tax payments, etc.). Gross domestic product (GDP) is a common measure of economic activity.

Economic contribution: The portion of an initial expenditure that circulates throughout the local economy. Total economic contribution consists of three key elements: direct contribution, indirect contribution and induced contribution.

Economic contribution analysis: Examines how spending in one industry translates to additional spending in related industries, and the cumulative effect of that spending on the regional economy using input-output modeling.

Ecosystem goods and services: Benefits obtained from ecosystems. Goods are tangible, and often traded in markets (e.g., potable water, fish, timber). Services provide less tangible, often nonmarket benefits (e.g., flood protection, water quality, climate stability).

Ecosystem services valuation (ESV): Assigning dollar values to goods and services provided by a given ecosystem, allowing proposed management policies to be considered in terms of their ability to improve ecological processes that produce the full diversity of valuable ecosystem goods and services. Commonly employed valuation methods include: avoided cost, replacement cost, hedonic pricing, contingent valuation, group valuation, marginal product estimation, travel cost and factor income.

Habitat: Supporting ecosystem service defined as providing shelter, promoting growth of species, and maintaining biological diversity.

Indirect contribution effects: Secondary economic activity from sales to industries where expenditures are made (e.g. intermediary inputs bought in the supply chain). A gas station buying gasoline refined in-state, or a grocery store buying produce grown in-state creates an indirect contribution to the state economy.

Induced contribution effects: Secondary economic activity from sales of goods and services purchased by employees of directly and indirectly affected businesses. An employee who buys locally-produced milk is creating an induced contribution for the local economy.

Jobs: Organization—or company—spending supports local employment beyond those who work directly for the organization. Restoration project spending, for example, spurs construction companies and retailers (among others) to expand their full- and part-time positions. Expenditures from these industries support jobs in industries that provide necessary services to these sectors, such as facilities maintenance, government services, real estate, and medicine. In this report, job numbers are not full-time equivalents.

Labor income: Input-output models estimate the wages paid to workers whose jobs are supported by spending. Investments in restoration projects, for example, directly support wages in construction, forestry, and landscaping, as well as retail. As these employees pay for necessities such as food and housing, workers in other industries are also supported. Finally, as firms use the income from project contracts to purchase the goods and services they need to function, the initial investment supports wages in other industries, such as wholesalers and business services.

Natural capital: Earth's stock of organic and inorganic materials and energies (renewable and nonrenewable) and living biological systems (ecosystems) which constitute the biophysical context for the human economy and human wellbeing.

Natural Climate Solutions: Conservation, restoration and improved land management actions that increase carbon storage or avoid greenhouse gas emissions in landscapes and wetlands across the globe.

Net present value: The measure of the total value in today's dollars of all future benefits derived from an investment minus the current costs of purchasing that investment, including future contributions which have been annually discounted (using a discount rate) over a pre-determined period of time (e.g., project period).

Recreation and tourism: Information ecosystem service defined as experiencing the natural world and enjoying outdoor activities

Riparian areas: Habitat which is immediately adjacent to freshwater areas (e.g. marshes, forests, etc.).

Social Cost of Carbon: A measure of the global impacts of every additional ton of atmospheric carbon, including damages to agriculture, public health, and property.

Soil quality: Regulating ecosystem service defined as maintaining soil fertility and capacity to process waste inputs (bioremediation).

Soil retention: Regulating ecosystem service defined as retaining arable land, slope stability, and coastal integrity.

Tax revenue: Spending supports additional state and local tax revenues, typically in the form of sales and property taxes paid by the contractors and their employees.

Value added: Also known as gross domestic product (GDP) – a subset of total economic output and is calculated by removing the value of intermediate inputs (e.g., raw materials, semi-finished goods, and business-to-business services) from the total economic output to better represent the value of final goods and services added to the regional economy.

Water capture, conveyance, and supply: Regulating ecosystem service defined as regulating the rate of water flow through an environment and ensuring adequate water availability for all water users.

Water quality: Regulating ecosystem service defined as removing water pollutants via soil filtration and transformation by vegetation and microbial communities.

APPENDIX B: DETAILED RESULTS

Dollar results are presented in 2021 US dollars unless stated otherwise. The three regions of analysis are Minnesota (**MN**), environmental justice areas (**EJ**) and federal and state recognized tribal lands (**TRIBAL AREAS**). Estimates for NCS practices are provided for three different scenarios representing minimum (**MIN**), medium (**MED**), and maximum (**MAX**) levels of acre-based implementation.

Avoided Conversion

Benefits vs. Costs

Table A-1. Per-Acre Benefits and Costs of Avoided Conversion Practices

Practice	Benefits ($/acre/year)			Costs	
	MN	EJ	TRIBAL AREAS	Capital (one-time, $/ac)	Ongoing ($/ac/year)
Avoided Forest Conversion	$8,944	$8,976	$8,944	$3,500	$250
Avoided Grassland Conversion	$43	$43	$43	$2,500	$100
Avoided Wetland Conversion	$290	$316	$290	$2,881	$250
Avoided Peat Conversion	$701	$699	$701	$1,000	$-

Table A-2. Benefit-cost ratios based on cumulative $/acre every 10 years across project lifespan.

	Benefit-Cost Ratios (based on cumulative $/acre)*								
Region	MN			EJ			TRIBAL AREAS		
Practice / Year	2030	2040	2050	2030	2040	2050	2030	2040	2050
Avoided Forest Conversion	14.37	20.86	24.26	14.64	21.24	24.70	14.69	21.32	24.79
Avoided Grassland Conversion	0.11	0.17	0.21	0.12	0.19	0.24	0.12	0.19	0.24
Avoided Wetland Conversion	0.55	0.76	0.87	0.53	0.75	0.85	0.58	0.81	0.93
Avoided Peat Conversion	6.30	13.30	20.31	6.31	13.31	20.32	6.29	13.28	20.26
TOTAL	**6.02**	**9.02**	**10.67**	**6.12**	**9.17**	**10.85**	**6.15**	**9.22**	**10.91**

* The social cost of carbon value for CO2e sequestration was not included for future projections due to variability in sequestration rates as trees and plants age and lack of geospatial data on existing tree age.

Table A-3. Estimated total costs across project lifespan of avoided conversion NCS practices, by implementation level - MN.

Practice	MIN	MED	MAX
Avoided Forest Conversion	$275,000,000	$2,625,000,000	$5,250,000,000
Avoided Grassland Conversion	$19,319,190	$155,138,950	$310,277,900
Avoided Wetland Conversion	$122,025,000	$1,235,125,000	$2,470,250,000
Avoided Peat Conversion	$763,500	$3,817,500	$7,635,000
TOTAL	**$417,107,690**	**$4,019,081,450**	**$8,038,162,900**

Table A-4. Estimated total costs across project lifespan of avoided conversion NCS practices, by implementation level - EJ.

Practice	MIN	MED	MAX
Avoided Forest Conversion	$11,720,649	$111,878,927	$223,757,854
Avoided Grassland Conversion	$527,016	$4,232,096	$8,464,193
Avoided Wetland Conversion	$8,460,435	$56,630,240	$113,260,481
Avoided Peat Conversion	$111	$556	$1,112
TOTAL	**$20,708,212**	**$172,741,820**	**$345,483,639**

Table A-5. Estimated total costs across project lifespan of avoided conversion NCS practices, by implementation level - TRIBAL AREAS.

Practice	MIN	MED	MAX
Avoided Forest Conversion	$21,135,286	$201,745,914	$403,491,829
Avoided Grassland Conversion	$534,575	$4,292,799	$8,585,598
Avoided Wetland Conversion	$20,953,080	$104,765,402	$209,530,805
Avoided Peat Conversion	$22	$111	$222
TOTAL	**$42,622,964**	**$310,804,227**	**$621,608,454**

Ecosystem Services Value

Table A-6. Ecosystem Services Value (ESV) and Carbon (CO_2-e) Value of Avoided Conversion Natural Climate Solutions at 100% implementation, by Practice (**MAX,** thousand $/year)– **MN**.

Practice	ESV ($/year)	CO2-e ($/year)	ESV+CO2-e sequestration ($/year)	CO2-e storage (total $)
Avoided Forest Conversion	$4,216,246,106	$318,237,546	$4,534,483,652	$142,371,761,611
Avoided Grassland Conversion	$194,562	$3,609,762	$3,804,324	
Avoided Wetland Conversion	$78,606,209	$26,753,357	$105,359,566	
Avoided Woody Wetland Conversion	$-	$3,988,100	$3,988,100	
Avoided Peat Conversion	$1,103,484	$3,988,100	$5,091,584	
TOTAL	**$4,296,150,361**	**$356,576,864**	**$4,652,727,225**	**$142,371,761,611**

Table A-7. Annual Ecosystem Services Value (ESV) and Carbon (CO_2-e) Value of Avoided Conversion Natural Climate Solutions at 100% implementation, by Practice (**MAX,** $/year)– **EJ**.

Practice	ESV ($/year)	CO2-e ($/year)	ESV+CO2-e sequestration ($/year)
Avoided Forest Conversion	$174,894,154	$13,555,886	$188,450,040
Avoided Grassland Conversion	$3,837	$98,472	$102,309
Avoided Wetland Conversion	$3,435,938	$1,225,401	$4,661,340
Avoided Woody Wetland Conversion	$-	$581	$581
Avoided Peat Conversion	$161	$581	$742
TOTAL	**$178,334,089**	**$14,880,921**	**$193,215,011**

Table A-8. Annual Ecosystem Services Value (ESV) and Carbon (CO_2-e) Value of Avoided Conversion Natural Climate Solutions at 100% implementation, by Practice (**MAX,** $/year)– **TRIBAL AREAS**.

Practice	ESV ($/year)	CO2-e ($/year)	ESV+CO2-e sequestration ($/year)
Avoided Forest Conversion	$314,288,127	$24,458,333	$338,746,460
Avoided Grassland Conversion	$3,895	$99,885	$103,780
Avoided Wetland Conversion	$6,222,952	$2,269,265	$8,492,217
Avoided Woody Wetland Conversion	$-	$116	$116
Avoided Peat Conversion	$32	$116	$148
TOTAL	**$320,515,006**	**$26,827,715**	**$347,342,722**

Table A-9. Avoided Conversion Ecosystem Services Value ($/year), by Service, at 100% Implementation (**MAX**).

Ecosystem Service	Annual Value ($/year)		
	MN	EJ*	TRIBAL AREAS*
Aesthetic Information	$7,395,832	$92,182	$34,527
Air Quality	$4,588,362	$37,588	$17,076
Climate Stability	$16,147,835	$132,088	$59,849
Disaster Risk Reduction	$291,385,876	$8,489,035	$14,301,014
Habitat	$73,118,512	$3,298,882	$6,108,785
Recreation & Tourism	$369,596,473	$15,750,280	$28,390,800
Soil Retention	$173,865	$7,844	$14,526
Water Capture, Conveyance, & Supply	$95,738,607	$4,078,339	$7,358,539
Water Quality	$3,438,005,000	$146,447,850	$264,229,890
CO2 sequestration	$356,576,864	$14,880,921	$26,827,715

Ecosystem Service	Annual Value ($/year)		
	MN	EJ*	TRIBAL AREAS*
CO2 storage	$142,371,761,611	n/a	n/a
TOTAL	$147,024,488,836	$193,215,011	$347,342,722

*Carbon storage could not be quantified for these regions due to data limitations.

Net Present Value

Minimum Scenario

Table A-10. Net Present Value (NPV) of Avoided Conversion NCS Practices in the MIN scenario across multiple discount rates – MN.

Practice	Net Present Value (thousand $)		
	1.625% Discount Rate	3.124% Discount Rate	7% Discount Rate
Avoided Forest Conversion	$3,440,596	$3,243,401	$2,811,720
Avoided Grassland Conversion	$(17,080)	$(16,914)	$(16,551)
Avoided Wetland Conversion	$(56,092)	$(56,622)	$(57,782)
Avoided Peat Conversion	$3,751	$3,504	$2,963
TOTAL	$3,371,176	$3,173,370	$2,740,351

Table A-11. Net Present Value (NPV) of Avoided Conversion NCS Practices in the MIN scenario across multiple discount rates – EJ.

Practice	Net Present Value (thousand $)		
	1.625% Discount Rate	3.124% Discount Rate	7% Discount Rate
Avoided Forest Conversion	$149,542	$140,979	$122,232
Avoided Grassland Conversion	$(460)	$(455)	$(446)
Avoided Wetland Conversion	$(2,630)	$(2,652)	$(2,698)

Practice	Net Present Value (thousand $)		
	1.625% Discount Rate	3.124% Discount Rate	7% Discount Rate
Avoided Peat Conversion	$1	$1	$0
TOTAL	**$146,453**	**$137,872**	**$119,089**

Table A-12. Net Present Value (**NPV**) of Avoided Conversion NCS Practices in the **MIN** scenario across multiple discount rates – **TRIBAL AREAS**.

Practice	Net Present Value (thousand $)		
	1.625% Discount Rate	3.124% Discount Rate	7% Discount Rate
Avoided Forest Conversion	$270,710	$255,211	$221,281
Avoided Grassland Conversion	$(466)	$(462)	$(453)
Avoided Wetland Conversion	$(4,405)	$(4,469)	$(4,610)
Avoided Peat Conversion	$0	$0	$0
TOTAL	**$265,839**	**$250,280**	**$216,219**

Medium Scenario

Table A-13. Net Present Value (**NPV**) of Avoided Conversion NCS Practices in the **MED** scenario across multiple discount rates – **MN**.

Practice	Net Present Value (thousand $)		
	1.625% Discount Rate	3.124% Discount Rate	7% Discount Rate
Avoided Forest Conversion	$49,002,720	$40,747,992	$27,211,451
Avoided Grassland Conversion	$(112,133)	$(105,193)	$(93,812)
Avoided Wetland Conversion	$(194,996)	$(217,180)	$(253,560)
Avoided Peat Conversion	$58,603	$48,260	$31,298

Practice	Net Present Value (thousand $)		
	1.625% Discount Rate	3.124% Discount Rate	7% Discount Rate
TOTAL	$48,754,195	$40,473,879	$26,895,377

Table A-14. Net Present Value (NPV) of Avoided Conversion NCS Practices in the MED scenario across multiple discount rates – EJ.

Practice	Net Present Value (thousand $)		
	1.625% Discount Rate	3.124% Discount Rate	7% Discount Rate
Avoided Forest Conversion	$2,128,643	$1,770,174	$1,182,337
Avoided Grassland Conversion	$(2,971)	$(2,796)	$(2,509)
Avoided Wetland Conversion	$(9,751)	$(10,634)	$(12,082)
Avoided Peat Conversion	$9	$7	$5
TOTAL	$2,115,930	$1,756,751	$1,167,750

Table A-15. Net Present Value (NPV) of Avoided Conversion NCS Practices in the MED scenario across multiple discount rates – TRIBAL AREAS.

Practice	Net Present Value (thousand $)		
	1.625% Discount Rate	3.124% Discount Rate	7% Discount Rate
Avoided Forest Conversion	$3,852,977	$3,204,165	$2,140,207
Avoided Grassland Conversion	$(3,013)	$(2,836)	$(2,546)
Avoided Wetland Conversion	$(11,662)	$(14,352)	$(18,763)
Avoided Peat Conversion	$2	$1	$1
TOTAL	$3,838,303	$3,186,977	$2,118,899

Maximum Scenario

Table A-16. Net Present Value (**NPV**) of Avoided Conversion NCS Practices in the **MAX** scenario across multiple discount rates – **MN**.

Practice	Net Present Value (thousand $)		
	1.625% Discount Rate	3.124% Discount Rate	7% Discount Rate
Avoided Forest Conversion	$98,005,439	$81,495,985	$54,422,902
Avoided Grassland Conversion	$(224,265)	$(210,385)	$(187,624)
Avoided Wetland Conversion	$(389,991)	$(434,361)	$(507,120)
Avoided Peat Conversion	$117,207	$96,520	$62,596
TOTAL	**$97,508,390**	**$80,947,759**	**$53,790,753**

Table A-17. Net Present Value (**NPV**) of Avoided Conversion NCS Practices in the **MAX** scenario across multiple discount rates – **EJ**.

Practice	Net Present Value (thousand $)		
	1.625% Discount Rate	3.124% Discount Rate	7% Discount Rate
Avoided Forest Conversion	$4,257,286	$3,540,348	$2,364,674
Avoided Grassland Conversion	$(5,941)	$(5,592)	$177,212
Avoided Wetland Conversion	$(19,502)	$(21,268)	$(24,163)
Avoided Peat Conversion	$17	$14	$9
TOTAL	**$4,231,860**	**$3,513,502**	**$2,517,731**

Table A-18. Net Present Value (**NPV**) of Avoided Conversion NCS Practices in the **MAX** scenario across multiple discount rates – **TRIBAL AREAS**.

Practice	Net Present Value (thousand $)		
	1.625% Discount Rate	3.124% Discount Rate	7% Discount Rate
Avoided Forest Conversion	$7,705,954	$6,408,329	$4,280,414
Avoided Grassland Conversion	$(6,027)	$(5,672)	$180,441
Avoided Wetland Conversion	$(23,325)	$(28,705)	$(37,527)
Avoided Peat Conversion	$3	$3	$2
TOTAL	**$7,676,606**	**$6,373,955**	**$4,423,330**

Economic Contribution Analysis

Economic Activity Supported for Every Dollar Spent

Table A-19. Economic Activity (in $) Supported by Every Dollar Spent on Avoided Conversion Natural Climate Solutions, by Practice and Region, in the **MIN** scenario.

Practice	MN	EJ	TRIBAL AREAS
Avoided Forest Conversion	$0.56	$0.44	$0.40
Avoided Grassland Conversion	$1.36	$1.03	$0.86
Avoided Wetland Conversion	$1.47	$0.72	$0.92
Avoided Peat Conversion	n/a	n/a	n/a
TOTAL	**$0.86**	**$0.57**	**$0.66**

Table A-20. Economic Activity Supported by Every Dollar Spent on Avoided Conversion Natural Climate Solutions, by Practice and Region, in the **MED** scenario.

Practice	MN	EJ	TRIBAL AREAS
Avoided Forest Conversion	$1.03	$0.81	$0.73
Avoided Grassland Conversion	$1.43	$1.07	$0.86
Avoided Wetland Conversion	$1.70	$0.72	$0.92

Practice	MN	EJ	TRIBAL AREAS
Avoided Peat Conversion	n/a	n/a	n/a
TOTAL	**$1.25**	**$0.79**	**$0.79**

Table A-21. Economic Activity Supported by Every Dollar Spent on Avoided Conversion Natural Climate Solutions, by Practice and Region, in the **MAX** scenario.

Practice	MN	EJ	TRIBAL AREAS
Avoided Forest Conversion	$1.03	$0.81	$0.73
Avoided Grassland Conversion	$1.43	$1.07	$0.86
Avoided Wetland Conversion	$1.70	$0.72	$0.92
Avoided Peat Conversion	n/a	n/a	n/a
TOTAL	**$1.25**	**$0.79**	**$0.79**

Economic Contribution Effects

Minimum Scenario

Table A-22. Economic Contribution Effects for Avoided Conversion Natural Climate Solutions, by Practice, in the **MIN** scenario - **MN**.

Impact	Employment (no. of jobs)	Labor Income (thousand $)	Value Added (thousand $)	Output (thousand $)
Avoided Forest Conversion				
1 - Direct	1,664	$62,300	$100,451	$100,000
2 - Indirect	(1)	$(56)	$(93)	$(183)
3 - Induced	327	$19,188	$32,000	$54,194
4 - Total	1,990	$81,432	$132,358	$154,012
Avoided Grassland Conversion				
1 - Direct	175.35	$6,565	$10,585	$10,538
2 - Indirect	(0.11)	$(6)	$(10)	$(19)
3 - Induced	95	$5,554	$9,331	$15,792
4 - Total	270	$12,113	$19,907	$26,311
Avoided Wetland Conversion				
1 - Direct	529	$23,754	$26,761	$50,000

Impact	Employment (no. of jobs)	Labor Income (thousand $)	Value Added (thousand $)	Output (thousand $)
2 - Indirect	97	$7,008	$10,843	$19,958
3 - Induced	655	$38,400	$64,615	$109,343
4 - Total	1,281	$69,162	$102,219	$179,300
Avoided Peatland Conversion*				
1 - Direct	-	$-	$-	$-
2 - Indirect	-	$-	$-	$-
3 - Induced	-	$-	$-	$-
4 - Total	-	$-	$-	$-
GRAND TOTAL				
1 - Direct	2,368	$92,619	$137,798	$160,538
2 - Indirect	96	$6,946	$10,739	$19,756
3 - Induced	1,077	$63,142	$105,946	$179,329
4 - Total	3,541	$162,707	$254,483	$359,623

* Avoided peatland conversion does not have any economic contribution because there isn't any spending associated with it.

Table A-23. Economic Contribution Effects for Avoided Conversion Natural Climate Solutions, by Practice, in the **MIN** scenario - **EJ**.

Impact	Employment (no. of jobs)	Labor Income (thousand $)	Value Added (thousand $)	Output (thousand $)
Avoided Forest Conversion				
1 - Direct	z	$62,300	$100,451	$100,000
2 - Indirect	(1)	$(56)	$(93)	$(183)
3 - Induced	327	$19,188	$32,000	$54,194
4 - Total	1,990	$81,432	$132,358	$154,012
Avoided Grassland Conversion				
1 - Direct	175.35	$6,565	$10,585	$10,538
2 - Indirect	(0.11)	$(6)	$(10)	$(19)
3 - Induced	95	$5,554	$9,331	$15,792
4 - Total	270	$12,113	$19,907	$26,311
Avoided Wetland Conversion				
1 - Direct	529	$23,754	$26,761	$50,000
2 - Indirect	97	$7,008	$10,843	$19,958
3 - Induced	655	$38,400	$64,615	$109,343
4 - Total	1,281	$69,162	$102,219	$179,300
Avoided Peatland Conversion*				

Impact	Employment (no. of jobs)	Labor Income (thousand $)	Value Added (thousand $)	Output (thousand $)
1 - Direct	-	$-	$-	$-
2 - Indirect	-	$-	$-	$-
3 - Induced	-	$-	$-	$-
4 - Total	-	$-	$-	$-
GRAND TOTAL				
1 - Direct	2,368	$92,619	$137,798	$160,538
2 - Indirect	96	$6,946	$10,739	$19,756
3 - Induced	1,077	$63,142	$105,946	$179,329
4 - Total	3,541	$162,707	$254,483	$359,623

* Avoided peatland conversion does not have any economic contribution because there isn't any spending associated with it.

Table A-24. Economic Contribution Effects for Avoided Conversion Natural Climate Solutions, by Practice, in the MIN scenario - TRIBAL AREAS.

Impact	Employment (no. of jobs)	Labor Income (thousand $)	Value Added (thousand $)	Output (thousand $)
Avoided Forest Conversion				
1 - Direct	133	$4,788	$7,726	$7,686
2 - Indirect	-	$(1)	$(2)	$(5)
3 - Induced	5	$214	$375	$685
4 - Total	138	$5,001	$8,098	$8,365
Avoided Grassland Conversion				
1 - Direct	11	$384	$619	$616
2 - Indirect	-	$(0)	$(0)	$(0)
3 - Induced	1	$39	$68	$125
4 - Total	12	$422	$687	$740
Avoided Wetland Conversion				
1 - Direct	164	$6,867	$7,617	$14,844
2 - Indirect	11	$550	$857	$1,813
3 - Induced	18	$806	$1,404	$2,574
4 - Total	194	$8,223	$9,878	$19,231
Avoided Peatland Conversion*				
1 - Direct	-	$-	$-	$-
2 - Indirect	-	$-	$-	$-
3 - Induced	-	$-	$-	$-
4 - Total	-	$-	$-	$-

Impact	Employment (no. of jobs)	Labor Income (thousand $)	Value Added (thousand $)	Output (thousand $)
GRAND TOTAL				
1 - Direct	308	$12,039	$15,961	$23,145
2 - Indirect	11	$548	$854	$1,808
3 - Induced	24	$1,059	$1,847	$3,383
4 - Total	343	$13,646	$18,662	$28,336

* Avoided peatland conversion does not have any economic contribution because there isn't any spending associated with it.

Medium Scenario

Table A-25. Economic Contribution Effects for Avoided Conversion Natural Climate Solutions, by Practice, in the MED scenario - MN.

Impact	Employment (no. of jobs)	Labor Income (thousand $)	Value Added (thousand $)	Output (thousand $)
Avoided Forest Conversion				
1 - Direct	2,080	$77,875	$125,564	$125,000
2 - Indirect	(1)	$(70)	$(117)	$(228)
3 - Induced	409	$23,985	$40,000	$67,743
4 - Total	2,488	$101,790	$165,447	$192,515
Avoided Grassland Conversion				
1 - Direct	1,850.90	$69,297	$111,733	$111,232
2 - Indirect	(1.11)	$(62)	$(104)	$(203)
3 - Induced	665	$39,003	$65,389	$110,688
4 - Total	2,515	$108,238	$177,019	$221,717
Avoided Wetland Conversion				
1 - Direct	661	$29,693	$33,452	$62,500
2 - Indirect	121	$8,760	$13,553	$24,947
3 - Induced	2,675	$156,635	$264,053	$446,754
4 - Total	3,457	$195,087	$311,058	$534,201
Avoided Peatland Conversion*				
1 - Direct	-	$-	$-	$-
2 - Indirect	-	$-	$-	$-
3 - Induced	-	$-	$-	$-
4 - Total	-	$-	$-	$-
GRAND TOTAL				
1 - Direct	4,592	$176,865	$270,749	$298,732

Impact	Employment (no. of jobs)	Labor Income (thousand $)	Value Added (thousand $)	Output (thousand $)
2 - Indirect	119	$8,628	$13,333	$24,515
3 - Induced	3,749	$219,623	$369,443	$625,185
4 - Total	8,460	$405,116	$653,524	$948,432

* Avoided peatland conversion does not have any economic contribution because there isn't any spending associated with it.

Table A-26. Economic Contribution Effects for Avoided Conversion Natural Climate Solutions, by Practice, in the MED scenario - EJ.

Impact	Employment (no. of jobs)	Labor Income (thousand $)	Value Added (thousand $)	Output (thousand $)
Avoided Forest Conversion				
1 - Direct	87	$3,319	$5,350	$5,328
2 - Indirect	-	$(2)	$(3)	$(5)
3 - Induced	7	$430	$703	$1,134
4 - Total	94	$3,747	$6,051	$6,457
Avoided Grassland Conversion				
1 - Direct	50	$1,890	$3,047	$3,034
2 - Indirect	-	$(1)	$(2)	$(3)
3 - Induced	9	$555	$917	$1,477
4 - Total	58	$2,444	$3,962	$4,509
Avoided Wetland Conversion				
1 - Direct	17	$644	$1,904	$1,890
2 - Indirect	(0)	$(2)	$(4)	$(6)
3 - Induced	68	$4,352	$7,252	$11,678
4 - Total	85	$4,993	$9,152	$13,561
Avoided Peatland Conversion*				
1 - Direct	-	$-	$-	$-
2 - Indirect	-	$-	$-	$-
3 - Induced	-	$-	$-	$-
4 - Total	-	$-	$-	$-
GRAND TOTAL				
1 - Direct	153	$5,854	$10,302	$10,251
2 - Indirect	(0)	$(5)	$(8)	$(14)
3 - Induced	84	$5,337	$8,872	$14,289
4 - Total	237	$11,185	$19,165	$24,527

* Avoided peatland conversion does not have any economic contribution because there isn't any spending associated with it.

Table A-27. Economic Contribution Effects for Avoided Conversion Natural Climate Solutions, by Practice, in the MED scenario - TRIBAL AREAS.

Impact	Employment (no. of jobs)	Labor Income (thousand $)	Value Added (thousand $)	Output (thousand $)
Avoided Forest Conversion				
1 - Direct	2,329	$83,792	$135,200	$134,497
2 - Indirect	-	$(24)	$(41)	$(83)
3 - Induced	86	$3,749	$6,558	$11,980
4 - Total	2,416	$87,517	$141,717	$146,394
Avoided Grassland Conversion				
1 - Direct	53	$1,918	$3,094	$3,078
2 - Indirect	-	$(1)	$(1)	$(2)
3 - Induced	4	$195	$340	$624
4 - Total	58	$2,112	$3,433	$3,699
Avoided Wetland Conversion				
1 - Direct	822	$34,336	$38,083	$74,219
2 - Indirect	54	$2,748	$4,283	$9,064
3 - Induced	92	$4,031	$7,022	$12,871
4 - Total	969	$41,115	$49,388	$96,154
Avoided Peatland Conversion*				
1 - Direct	-	$-	$-	$-
2 - Indirect	-	$-	$-	$-
3 - Induced	-	$-	$-	$-
4 - Total	-	$-	$-	$-
GRAND TOTAL				
1 - Direct	3,205	$120,045	$176,377	$211,794
2 - Indirect	54	$2,723	$4,241	$8,979
3 - Induced	182	$7,975	$13,920	$25,474
4 - Total	3,442	$130,744	$194,539	$246,248

* Avoided peatland conversion does not have any economic contribution because there isn't any spending associated with it.

Maximum Scenario

Table A-28. Economic Contribution Effects for Avoided Conversion Natural Climate Solutions, by Practice, in the MAX scenario - MN.

Impact	Employment (no. of jobs)	Labor Income (thousand $)	Value Added (thousand $)	Output (thousand $)
Avoided Forest Conversion				
1 - Direct	$58,240	$2,180,500	$3,515,785	$3,500,000
2 - Indirect	$(35)	$(1,955)	$(3,268)	$(6,397)
3 - Induced	$11,445	$671,574	$1,120,003	$1,896,804
4 - Total	$69,650	$2,850,119	$4,632,519	$5,390,407
Avoided Grassland Conversion				
1 - Direct	$3,702	$138,595	$223,467	$222,463
2 - Indirect	$(2)	$(124)	$(208)	$(407)
3 - Induced	$1,331	$78,006	$130,779	$221,376
4 - Total	$5,030	$216,476	$354,038	$443,433
Avoided Wetland Conversion				
1 - Direct	$18,515	$831,398	$936,644	$1,750,000
2 - Indirect	$3,395	$245,276	$379,489	$698,519
3 - Induced	$10,566	$619,761	$1,039,628	$1,759,818
4 - Total	$32,476	$1,696,435	$2,355,761	$4,208,337
Avoided Peatland Conversion*				
1 - Direct	$-	$-	$-	$-
2 - Indirect	$-	$-	$-	$-
3 - Induced	$-	$-	$-	$-
4 - Total	$-	$-	$-	$-
GRAND TOTAL				
1 - Direct	80,457	$3,150,493	$4,675,895	$5,472,463
2 - Indirect	3,358	$243,197	$376,013	$691,715
3 - Induced	23,341	$1,369,340	$2,290,410	$3,877,999
4 - Total	107,156	$4,763,030	$7,342,318	$10,042,177

* Avoided peatland conversion does not have any economic contribution because there isn't any spending associated with it.

Table A-29. Economic Contribution Effects for Avoided Conversion Natural Climate Solutions, by Practice, in the **MAX** scenario - **EJ**.

Impact	Employment (no. of jobs)	Labor Income (thousand $)	Value Added (thousand $)	Output (thousand $)
Avoided Forest Conversion				
1 - Direct	$2,436	$92,934	$149,814	$149,172
2 - Indirect	$-	$(52)	$(81)	$(128)
3 - Induced	$188	$12,044	$19,689	$31,765

Impact	Employment (no. of jobs)	Labor Income (thousand $)	Value Added (thousand $)	Output (thousand $)
4 - Total	$2,624	$104,926	$169,422	$180,809
Avoided Grassland Conversion				
1 - Direct	$99	$3,781	$6,095	$6,069
2 - Indirect	$-	$(2)	$(3)	$(5)
3 - Induced	$17	$1,109	$1,833	$2,955
4 - Total	$116	$4,888	$7,925	$9,018
Avoided Wetland Conversion				
1 - Direct	$473	$18,038	$53,304	$52,906
2 - Indirect	$(1)	$(70)	$(104)	$(177)
3 - Induced	$170	$10,868	$18,043	$29,065
4 - Total	$642	$28,837	$71,243	$81,794
Avoided Peatland Conversion*				
1 - Direct	$-	$-	$-	$-
2 - Indirect	$-	$-	$-	$-
3 - Induced	$-	$-	$-	$-
4 - Total	$-	$-	$-	$-
GRAND TOTAL				
1 - Direct	3,008	$114,753	$209,213	$208,147
2 - Indirect	(1)	$(124)	$(188)	$(311)
3 - Induced	375	$24,021	$39,566	$63,785
4 - Total	3,383	$138,651	$248,590	$271,621

* Avoided peatland conversion does not have any economic contribution because there isn't any spending associated with it.

Table A-30. Economic Contribution Effects for Avoided Conversion Natural Climate Solutions, by Practice, in the **MAX** scenario - **TRIBAL AREAS**.

Impact	Employment (no. of jobs)	Labor Income (thousand $)	Value Added (thousand $)	Output (thousand $)
Avoided Forest Conversion				
1 - Direct	$4,659	$167,584	$270,401	$268,995
2 - Indirect	$-	$(48)	$(81)	$(166)
3 - Induced	$172	$7,498	$13,115	$23,960
4 - Total	$4,831	$175,033	$283,434	$292,789
Avoided Grassland Conversion				
1 - Direct	$107	$3,835	$6,188	$6,156
2 - Indirect	$-	$(1)	$(2)	$(4)

Impact	Employment (no. of jobs)	Labor Income (thousand $)	Value Added (thousand $)	Output (thousand $)
3 - Induced	$9	$390	$681	$1,247
4 - Total	$116	$4,224	$6,867	$7,399
Avoided Wetland Conversion				
1 - Direct	$1,645	$68,672	$76,165	$148,438
2 - Indirect	$108	$5,496	$8,566	$18,128
3 - Induced	$184	$8,062	$14,045	$25,742
4 - Total	$1,938	$82,230	$98,776	$192,307
Avoided Peatland Conversion*				
1 - Direct	$-	$-	$-	$-
2 - Indirect	$-	$-	$-	$-
3 - Induced	$-	$-	$-	$-
4 - Total	$-	$-	$-	$-
GRAND TOTAL				
1 - Direct	6,410	$240,091	$352,754	$423,588
2 - Indirect	108	$5,447	$8,482	$17,958
3 - Induced	365	$15,951	$27,841	$50,949
4 - Total	6,885	$261,488	$389,077	$492,495

* Avoided peatland conversion does not have any economic contribution because there isn't any spending associated with it.

Tax Revenue Contribution

Minimum Scenario

Table A-31. Tax Revenue Contribution Effects for Avoided Conversion Natural Climate Solutions, by Practice, in the MIN scenario - MN.

Impact	County (thousand $)	State (thousand $)	Federal (thousand $)	Total (thousand $)
Avoided Forest Conversion				
1 - Direct	$911	$5,969	$9,092	$17,597
2 - Indirect	$(2)	$(9)	$(6)	$(20)
3 - Induced	$545	$2,733	$2,295	$6,545
4 - Total	$1,453	$8,693	$11,382	$24,122
Avoided Grassland Conversion				
1 - Direct	$96	$629	$958	$1,854

Impact	County (thousand $)	State (thousand $)	Federal (thousand $)	Total (thousand $)
2 - Indirect	$(0)	$(1)	$(1)	$(2)
3 - Induced	$162	$807	$652	$1,911
4 - Total	$258	$1,435	$1,610	$3,763
Avoided Wetland Conversion				
1 - Direct	$(334)	$(304)	$5,661	$4,424
2 - Indirect	$196	$975	$807	$2,327
3 - Induced	$1,127	$5,607	$4,490	$13,236
4 - Total	$988	$6,277	$10,959	$19,987
Avoided Peatland Conversion*				
1 - Direct	$-	$-	$-	$-
2 - Indirect	$-	$-	$-	$-
3 - Induced	$-	$-	$-	$-
4 - Total	$-	$-	$-	$-
GRAND TOTAL				
1 - Direct	$673	$6,294	$15,711	$23,875
2 - Indirect	$193	$965	$801	$2,305
3 - Induced	$1,833	$9,147	$7,437	$21,692
4 - Total	$2,699	$16,406	$23,950	$47,872

* Avoided peatland conversion does not have any economic contribution because there isn't any spending associated with it.

Table A-32. Tax Revenue Contribution Effects for Avoided Conversion Natural Climate Solutions, by Practice, in the MIN scenario - EJ.

Impact	County (thousand $)	State (thousand $)	Federal (thousand $)	Total (thousand $)
Avoided Forest Conversion				
1 - Direct	$33	$212	$330	$646
2 - Indirect	$(0)	$(0)	$(0)	$(0)
3 - Induced	$7	$37	$32	$92
4 - Total	$41	$249	$363	$738
Avoided Grassland Conversion				
1 - Direct	$4	$22	$35	$68
2 - Indirect	$(0)	$(0)	$(0)	$(0)

Impact	County (thousand $)	State (thousand $)	Federal (thousand $)	Total (thousand $)
3 - Induced	$2	$11	$9	$27
4 - Total	$6	$33	$44	$95
Avoided Wetland Conversion				
1 - Direct	$(28)	$(58)	$484	$340
2 - Indirect	$11	$53	$47	$133
3 - Induced	$26	$129	$107	$317
4 - Total	$9	$124	$638	$790
Avoided Peatland Conversion*				
1 - Direct	$-	$-	$-	$-
2 - Indirect	$-	$-	$-	$-
3 - Induced	$-	$-	$-	$-
4 - Total	$-	$-	$-	$-
GRAND TOTAL				
1 - Direct	$9	$177	$849	$1,054
2 - Indirect	$11	$53	$47	$132
3 - Induced	$36	$177	$148	$436
4 - Total	$55	$406	$1,044	$1,622

* Avoided peatland conversion does not have any economic contribution because there isn't any spending associated with it.

Table A-33. Tax Revenue Contribution Effects for Avoided Conversion Natural Climate Solutions, by Practice, in the MIN scenario - TRIBAL AREAS.

Impact	County (thousand $)	State (thousand $)	Federal (thousand $)	Total (thousand $)
Avoided Forest Conversion				
1 - Direct	$98	$468	$561	$1,262
2 - Indirect	$(0)	$(0)	$0	$(0)
3 - Induced	$11	$40	$6	$71
4 - Total	$109	$507	$566	$1,333
Avoided Grassland Conversion				
1 - Direct	$8	$37	$45	$101
2 - Indirect	$(0)	$(0)	$0	$(0)
3 - Induced	$2	$7	$1	$13
4 - Total	$10	$45	$46	$114
Avoided Wetland Conversion				
1 - Direct	$(139)	$(289)	$1,581	$961

Impact	County (thousand $)	State (thousand $)	Federal (thousand $)	Total (thousand $)
2 - Indirect	$31	$109	$3	$185
3 - Induced	$41	$149	$20	$268
4 - Total	$(67)	$(31)	$1,604	$1,413
Avoided Peatland Conversion*				
1 - Direct	$-	$-	$-	$-
2 - Indirect	$-	$-	$-	$-
3 - Induced	$-	$-	$-	$-
4 - Total	$-	$-	$-	$-
GRAND TOTAL				
1 - Direct	$(33)	$216	$2,187	$2,324
2 - Indirect	$31	$109	$3	$184
3 - Induced	$54	$196	$27	$352
4 - Total	$52	$521	$2,217	$2,860

* Avoided peatland conversion does not have any economic contribution because there isn't any spending associated with it.

Medium Scenario

Table A-34. Tax Revenue Contribution Effects for Avoided Conversion Natural Climate Solutions, by Practice, in the MED scenario - MN.

Impact	County (thousand $)	State (thousand $)	Federal (thousand $)	Total (thousand $)
Avoided Forest Conversion				
1 - Direct	$15,938	$104,463	$159,114	$307,943
2 - Indirect	$(33)	$(157)	$(100)	$(348)
3 - Induced	$9,529	$47,824	$40,167	$114,535
4 - Total	$25,434	$152,131	$199,180	$422,130
Avoided Grassland Conversion				
1 - Direct	$1,013	$6,640	$10,113	$19,573
2 - Indirect	$(2)	$(10)	$(6)	$(22)
3 - Induced	$1,129	$5,637	$4,604	$13,386
4 - Total	$2,140	$12,267	$14,711	$32,937
Avoided Wetland Conversion				
1 - Direct	$(5,846)	$(5,327)	$99,069	$77,421
2 - Indirect	$3,422	$17,062	$14,128	$40,721
3 - Induced	$8,991	$44,868	$36,516	$106,431

Impact	County (thousand $)	State (thousand $)	Federal (thousand $)	Total (thousand $)
4 - Total	$6,567	$56,602	$149,714	$224,572
Avoided Peatland Conversion*				
1 - Direct	$-	$-	$-	$-
2 - Indirect	$-	$-	$-	$-
3 - Induced	$-	$-	$-	$-
4 - Total	$-	$-	$-	$-
GRAND TOTAL				
1 - Direct	$11,105	$105,776	$268,296	$404,937
2 - Indirect	$3,387	$16,895	$14,021	$40,350
3 - Induced	$19,649	$98,329	$81,288	$234,352
4 - Total	$34,141	$221,000	$363,605	$679,639

* Avoided peatland conversion does not have any economic contribution because there isn't any spending associated with it.

Table A-35. Tax Revenue Contribution Effects for Avoided Conversion Natural Climate Solutions, by Practice, in the MED scenario - EJ.

Impact	County (thousand $)	State (thousand $)	Federal (thousand $)	Total (thousand $)
Avoided Forest Conversion				
1 - Direct	$585	$3,716	$5,779	$11,311
2 - Indirect	$(1)	$(3)	$(2)	$(7)
3 - Induced	$130	$645	$567	$1,616
4 - Total	$714	$4,358	$6,344	$12,920
Avoided Grassland Conversion				
1 - Direct	$24	$151	$235	$460
2 - Indirect	$(0)	$(0)	$(0)	$(0)
3 - Induced	$12	$61	$51	$151
4 - Total	$36	$212	$286	$611
Avoided Wetland Conversion				
1 - Direct	$(217)	$(450)	$3,766	$2,642
2 - Indirect	$82	$411	$367	$1,033
3 - Induced	$149	$737	$612	$1,812
4 - Total	$15	$698	$4,745	$5,487
Avoided Peatland Conversion*				
1 - Direct	$-	$-	$-	$-
2 - Indirect	$-	$-	$-	$-

Impact	County (thousand $)	State (thousand $)	Federal (thousand $)	Total (thousand $)
3 - Induced	$-	$-	$-	$-
4 - Total	$-	$-	$-	$-
GRAND TOTAL				
1 - Direct	$392	$3,418	$9,780	$14,413
2 - Indirect	$82	$408	$365	$1,026
3 - Induced	$291	$1,443	$1,231	$3,578
4 - Total	$765	$5,269	$11,375	$19,018

* Avoided peatland conversion does not have any economic contribution because there isn't any spending associated with it.

Table A-36. Tax Revenue Contribution Effects for Avoided Conversion Natural Climate Solutions, by Practice, in the MED scenario - TRIBAL AREAS.

Impact	County (thousand $)	State (thousand $)	Federal (thousand $)	Total (thousand $)
Avoided Forest Conversion				
1 - Direct	$1,720	$8,184	$9,812	$22,084
2 - Indirect	$(1)	$(5)	$0	$(8)
3 - Induced	$191	$693	$98	$1,245
4 - Total	$1,909	$8,873	$9,910	$23,321
Avoided Grassland Conversion				
1 - Direct	$39	$187	$225	$505
2 - Indirect	$(0)	$(0)	$0	$(0)
3 - Induced	$10	$36	$5	$65
4 - Total	$49	$223	$230	$570
Avoided Wetland Conversion				
1 - Direct	$(695)	$(1,446)	$7,905	$4,804
2 - Indirect	$153	$545	$15	$924
3 - Induced	$206	$747	$102	$1,339
4 - Total	$(336)	$(154)	$8,022	$7,067
Avoided Peatland Conversion*				
1 - Direct	$-	$-	$-	$-
2 - Indirect	$-	$-	$-	$-
3 - Induced	$-	$-	$-	$-
4 - Total	$-	$-	$-	$-
GRAND TOTAL				
1 - Direct	$1,064	$6,925	$17,942	$27,393

Impact	County (thousand $)	State (thousand $)	Federal (thousand $)	Total (thousand $)
2 - Indirect	$151	$540	$15	$916
3 - Induced	$407	$1,477	$205	$2,649
4 - Total	$1,622	$8,943	$18,162	$30,958

* Avoided peatland conversion does not have any economic contribution because there isn't any spending associated with it.

Maximum Scenario

Table A-37. Tax Revenue Contribution Effects for Avoided Conversion Natural Climate Solutions, by Practice, in the MAX scenario - MN.

Impact	County (thousand $)	State (thousand $)	Federal (thousand $)	Total (thousand $)
Avoided Forest Conversion				
1 - Direct	$31,875	$208,927	$318,227	$615,886
2 - Indirect	$(66)	$(313)	$(201)	$(697)
3 - Induced	$19,058	$95,648	$80,334	$229,070
4 - Total	$50,868	$304,261	$398,361	$844,259
Avoided Grassland Conversion				
1 - Direct	$2,026	$13,280	$20,227	$39,146
2 - Indirect	$(4)	$(20)	$(13)	$(44)
3 - Induced	$2,258	$11,274	$9,209	$26,771
4 - Total	$4,280	$24,533	$29,423	$65,873
Avoided Wetland Conversion				
1 - Direct	$(11,692)	$(10,654)	$198,139	$154,841
2 - Indirect	$6,843	$34,123	$28,256	$81,441
3 - Induced	$17,983	$89,736	$73,033	$212,862
4 - Total	$13,134	$113,205	$299,428	$449,145
Avoided Peatland Conversion*				
1 - Direct	$-	$-	$-	$-
2 - Indirect	$-	$-	$-	$-
3 - Induced	$-	$-	$-	$-
4 - Total	$-	$-	$-	$-
GRAND TOTAL				
1 - Direct	$22,210	$211,552	$536,593	$809,874
2 - Indirect	$6,773	$33,790	$28,042	$80,700
3 - Induced	$39,298	$196,657	$162,576	$468,703

Impact	County (thousand $)	State (thousand $)	Federal (thousand $)	Total (thousand $)
4 - Total	$68,281	$441,999	$727,211	$1,359,278

* Avoided peatland conversion does not have any economic contribution because there isn't any spending associated with it.

Table A-38. Tax Revenue Contribution Effects for Avoided Conversion Natural Climate Solutions, by Practice, in the MAX scenario - EJ.

Impact	County (thousand $)	State (thousand $)	Federal (thousand $)	Total (thousand $)
Avoided Forest Conversion				
1 - Direct	$1,170	$7,433	$11,557	$22,622
2 - Indirect	$(1)	$(6)	$(4)	$(14)
3 - Induced	$260	$1,290	$1,135	$3,231
4 - Total	$1,428	$8,717	$12,688	$25,839
Avoided Grassland Conversion				
1 - Direct	$48	$302	$470	$920
2 - Indirect	$(0)	$(0)	$(0)	$(1)
3 - Induced	$25	$123	$103	$302
4 - Total	$72	$425	$573	$1,222
Avoided Wetland Conversion				
1 - Direct	$(434)	$(899)	$7,533	$5,284
2 - Indirect	$165	$822	$734	$2,067
3 - Induced	$298	$1,474	$1,223	$3,623
4 - Total	$29	$1,396	$9,490	$10,974
Avoided Peatland Conversion*				
1 - Direct	$-	$-	$-	$-
2 - Indirect	$-	$-	$-	$-
3 - Induced	$-	$-	$-	$-
4 - Total	$-	$-	$-	$-
GRAND TOTAL				
1 - Direct	$784	$6,836	$19,560	$28,827
2 - Indirect	$163	$815	$729	$2,052
3 - Induced	$582	$2,886	$2,461	$7,157
4 - Total	$1,530	$10,538	$22,751	$38,035

* Avoided peatland conversion does not have any economic contribution because there isn't any spending associated with it.

Table A-39. Tax Revenue Contribution Effects for Avoided Conversion Natural Climate Solutions, by Practice, in the MAX scenario - TRIBAL AREAS.

Impact	County (thousand $)	State (thousand $)	Federal (thousand $)	Total (thousand $)
Avoided Forest Conversion				
1 - Direct	$3,439	$16,369	$19,624	$44,168
2 - Indirect	$(3)	$(10)	$0	$(17)
3 - Induced	$381	$1,387	$196	$2,490
4 - Total	$3,818	$17,746	$19,820	$46,641
Avoided Grassland Conversion				
1 - Direct	$79	$375	$449	$1,011
2 - Indirect	$(0)	$(0)	$0	$(0)
3 - Induced	$20	$72	$10	$130
4 - Total	$99	$447	$459	$1,140
Avoided Wetland Conversion				
1 - Direct	$(1,390)	$(2,893)	$15,810	$9,608
2 - Indirect	$306	$1,091	$30	$1,849
3 - Induced	$412	$1,495	$204	$2,678
4 - Total	$(673)	$(307)	$16,044	$14,135
Avoided Peatland Conversion*				
1 - Direct	$-	$-	$-	$-
2 - Indirect	$-	$-	$-	$-
3 - Induced	$-	$-	$-	$-
4 - Total	$-	$-	$-	$-
GRAND TOTAL				
1 - Direct	$2,128	$13,850	$35,883	$54,787
2 - Indirect	$303	$1,080	$30	$1,831
3 - Induced	$813	$2,954	$410	$5,298
4 - Total	$3,244	$17,885	$36,324	$61,916

* Avoided peatland conversion does not have any economic contribution because there isn't any spending associated with it.

RESTORATION

Benefits vs. Costs

Table A-40. Per-Acre Benefits and Costs of Restoration Practices

Practice	Benefits ($/acre/year)			Costs	
	MN	EJ	TRIBAL AREAS	Capital (one-time, $/ac)	Ongoing ($/ac/year)
Reforestation	$7,832	$8,063	$8,155	$855	$345
Grassland Restoration	$137	$137	$137	$2,500	$100
Wetland Restoration	$290	$296	$292	$1,500	$50
Riparian Buffer	$181	$182	$168	$2,050	$165
Riparian Buffer on Prime Ag Land	$280	$348	$341	$2,050	$165
Peatland Restoration	$185	$184	$186	$500	$-

Table A-41. Benefit-cost ratios based on cumulative $/acre every 10 years across project lifespan.

	Benefit-Cost Ratios (based on cumulative $/acre)								
Region	MN			EJ			TRIBAL AREAS		
Practice / Year	2030	2040	2050	2030	2040	2050	2030	2040	2050
Reforestation	19.5	21.1	21.6	20.1	21.7	22.2	20.3	21.9	22.5
Grassland Restoration	0.4	0.6	0.7	0.4	0.6	0.7	0.4	0.6	0.7
Wetland Restoration	1.4	2.3	2.9	1.4	2.3	3.0	1.4	2.3	2.9
Riparian Buffer	0.5	0.7	0.8	0.5	0.7	0.8	0.4	0.6	0.7
Riparian Buffer on Prime Ag Land	0.7	1.1	1.2	0.9	1.3	1.5	0.9	1.3	1.5
Peatland Restoration	3.3	7.0	10.7	3.3	7.0	10.7	3.3	7.1	10.8
TOTAL	**6.3**	**8.8**	**10.0**	**6.5**	**9.1**	**10.3**	**6.6**	**9.1**	**10.4**

Table A-42. Estimated total costs across project lifespan of Restoration NCS practices, by implementation level - **MN**.

Practice	MIN	MED	MAX

Reforestation	$3,173,333,417	$15,866,667,083	$31,733,334,165
Grassland Restoration	$68,800,000	$180,600,000	$1,366,724,900
Wetland Restoration	$93,459,648	$186,919,297	$373,838,594
Riparian Buffer	$149,780,853	$748,904,265	$1,497,808,530
Riparian Buffer on Prime Ag Land	$48,358,125	$96,716,250	$193,432,500
Peatland Restoration	$3,533,732,043	$17,079,806,894	$35,165,138,689
TOTAL	**$3,173,333,417**	**$15,866,667,083**	**$31,733,334,165**

Table A-43. Estimated total costs across project lifespan of Restoration NCS practices, by implementation level - **EJ**.

Practice	MIN	MED	MAX
Reforestation	$19,203,117	$96,015,584	$192,031,168
Grassland Restoration	$6,916,466	$18,155,722	$137,396,885
Wetland Restoration	$1,381,148	$2,762,295	$5,524,591
Riparian Buffer	$517,255	$2,586,276	$5,172,553
Riparian Buffer on Prime Ag Land	$841,402	$1,682,804	$3,365,609
Peatland Restoration	$28,859,388	$121,202,683	$343,490,806
TOTAL	**$19,203,117**	**$96,015,584**	**$192,031,168**

Table A-44. Estimated total costs across project lifespan of Restoration NCS practices, by implementation level - **TRIBAL AREAS**.

Practice	MIN	MED	MAX
Reforestation	$32,013,301	$160,066,507	$320,133,015
Grassland Restoration	$6,969,082	$18,293,840	$138,442,117
Wetland Restoration	$1,284,245	$2,568,490	$5,136,979
Riparian Buffer	$455,570	$2,277,851	$4,555,702

Riparian Buffer on Prime Ag Land	$2,346,208	$4,692,415	$9,384,830
Peatland Restoration	$43,068,406	$187,899,103	$477,652,643
TOTAL	**$32,013,301**	**$160,066,507**	**$320,133,015**

Ecosystem Services Value

Annual Value

Table A-45. Ecosystem Services Value (ESV) and Carbon (CO_2-e) Value of Restoration Natural Climate Solutions at 100% implementation, by Practice (**MAX,** thousand $/year)– **All Regions**.

Practice	MN	EJ	TRIBAL AREAS
Reforestation	$32,053,235,535	$216,074,980	$386,992,960
Grassland Restoration	$65,343,134	$6,076,199	$6,118,512
Wetland Restoration	$127,640,004	$1,766,962	$1,610,789
Riparian Buffer	$58,893,446	$153,790	$290,060
Peatland Restoration	$82,301,785	$1,433,831	$3,826,039
TOTAL	**$32,387,413,904**	**$225,505,761**	**$398,838,360**

Net Present Value

Minimum Scenario

Table A-46. Net Present Value (**NPV**) of Restoration NCS Practices in the **MIN** scenario across multiple discount rates – **MN**.

Practice	Net Present Value (thousand $)		
	1.625% Discount Rate	3.124% Discount Rate	7% Discount Rate
Reforestation	$52,614,196	$43,870,155	$29,531,209

Practice	Net Present Value (thousand $)		
	1.625% Discount Rate	3.124% Discount Rate	7% Discount Rate
Grassland Restoration	$(28,619)	$(29,738)	$(31,844)
Wetland Restoration	$133,909	$103,976	$54,890
Riparian Buffer	$(33,986)	$(35,368)	$(37,636)
Peatland Restoration	$147,393	$119,764	$74,456
TOTAL	**$52,832,894**	**$44,028,788**	**$29,591,076**

Table A-47. Net Present Value (NPV) of Restoration NCS Practices in the MIN scenario across multiple discount rates – EJ.

Practice	Net Present Value (thousand $)		
	1.625% Discount Rate	3.124% Discount Rate	7% Discount Rate
Reforestation	$328,234	$273,689	$184,243
Grassland Restoration	$(2,883)	$(2,995)	$(3,205)
Wetland Restoration	$2,040	$1,588	$846
Riparian Buffer	$(116)	$(121)	$(129.1)
Peatland Restoration	$2,554	$2,075	$1,290
TOTAL	**$329,830**	**$274,236**	**$183,044**

Table A-48. Net Present Value (NPV) of Restoration NCS Practices in the MIN scenario across multiple discount rates – TRIBAL AREAS.

Practice	Net Present Value (thousand $)		
	1.625% Discount Rate	3.124% Discount Rate	7% Discount Rate
Reforestation	$553,684	$273,689	$184,243

Practice	Net Present Value (thousand $)		
	1.625% Discount Rate	3.124% Discount Rate	7% Discount Rate
Grassland Restoration	$(2,905)	$461,677	$310,800
Wetland Restoration	$1,862	$(3,018)	$(3,230)
Riparian Buffer	$(124)	$1,447	$767
Peatland Restoration	$7,203	$(125)	$(126)
TOTAL	**$559,719**	**$5,854**	**$3,641**

Medium Scenario

Table A-49. Net Present Value (**NPV**) of Restoration NCS Practices in the **MED** scenario across multiple discount rates – **MN**.

Practice	Net Present Value (thousand $)		
	1.625% Discount Rate	3.124% Discount Rate	7% Discount Rate
Reforestation	$263,070,982	$219,350,774	$147,656,047
Grassland Restoration	$(75,125)	$(78,063)	$(83,590)
Wetland Restoration	$267,818	$207,952	$109,780
Riparian Buffer	$(169,928)	$(176,841)	$(188,178)
Peatland Restoration	$736,967	$598,820	$372,279
TOTAL	**$263,830,714**	**$219,902,641**	**$147,866,339**

Table A-50. Net Present Value (**NPV**) of Restoration NCS Practices in the **MED** scenario across multiple discount rates – **EJ**.

Practice	Net Present Value (thousand $)		
	1.625% Discount Rate	3.124% Discount Rate	7% Discount Rate
Reforestation	$1,641,170	$1,368,445	$921,216
Grassland Restoration	$(7,568)	$(7,862)	$(8,414)
Wetland Restoration	$4,081	$3,176	$1,691
Riparian Buffer	$(579)	$(604)	$(645)
Peatland Restoration	$12,771	$10,376	$6,448
TOTAL	**$1,649,875**	**$1,373,531**	**$920,297**

Table A-51. Net Present Value (**NPV**) of Restoration NCS Practices in the **MED** scenario across multiple discount rates – **TRIBAL AREAS**.

Practice	Net Present Value (thousand $)		
	1.625% Discount Rate	3.124% Discount Rate	7% Discount Rate
Reforestation	$2,768,418	$2,308,386	$1,554,000
Grassland Restoration	$(7,626)	$(7,921)	$(8,478)
Wetland Restoration	$3,725	$2,895	$1,534
Riparian Buffer	$(621)	$(625)	$(631)
Peatland Restoration	$36,013	$29,268	$18,207
TOTAL	**$2,799,908**	**$2,332,001**	**$1,564,631**

Maximum Scenario

Table A-52. Net Present Value (**NPV**) of Restoration NCS Practices in the **MAX** scenario across multiple discount rates – **MN**.

Practice	Net Present Value (thousand $)		
	1.625% Discount Rate	3.124% Discount Rate	7% Discount Rate
Reforestation	$526,141,964	$438,701,548	$295,312,094
Grassland Restoration	$(568,523)	$(590,757)	$(632,581)
Wetland Restoration	$535,637	$415,904	$219,560
Riparian Buffer	$(339,857)	$(353,683)	$(376,356)
Peatland Restoration	$1,473,934	$1,197,640	$744,558
TOTAL	**$527,243,155**	**$439,370,652**	**$295,267,276**

Table A-53. Net Present Value (**NPV**) of Restoration NCS Practices in the **MAX** scenario across multiple discount rates – **EJ**.

Practice	Net Present Value (thousand $)		
	1.625% Discount Rate	3.124% Discount Rate	7% Discount Rate
Reforestation	$3,282,341	$2,736,891	$1,842,433
Grassland Restoration	$(57,272)	$(59,494)	$(63,673)
Wetland Restoration	$8,161	$6,351	$3,383
Riparian Buffer	$(1,158)	$(1,208)	$(1,291)
Peatland Restoration	$25,541	$20,751	$12,896
TOTAL	**$3,257,613**	**$2,703,291**	**$1,793,748**

Table A-54. Net Present Value (**NPV**) of Restoration NCS Practices in the **MAX** scenario across multiple discount rates – **TRIBAL AREAS**.

Practice	Net Present Value (thousand $)		
	1.625% Discount Rate	3.124% Discount Rate	7% Discount Rate
Reforestation	$5,536,836	$4,616,771	$3,107,999
Grassland Restoration	$(57,709)	$(59,947)	$(64,158)
Wetland Restoration	$7,450	$5,790	$3,067
Riparian Buffer	$(1,243)	$(1,250)	$(1,262)
Peatland Restoration	$72,025	$58,535	$36,413
TOTAL	**$5,557,360**	**$4,619,898**	**$3,082,060**

Economic Contribution Analysis

Economic Activity Supported for Every Dollar Spent

Table A-55. Economic Activity (in $) Supported by Every Dollar Spent on Restoration Natural Climate Solutions, by Practice and Region, in the **MIN** scenario.

Practice	MN	EJ	TRIBAL AREAS
Reforestation	$1.40	$1.21	$1.09
Grassland Restoration	$0.78	$0.95	$0.70
Wetland Restoration	$7.06	$5.53	$4.86
Riparian Buffer	$0.04	$0.28	$0.19
Peatland Restoration	$1.85	$0.87	$1.15
TOTAL	**$1.47**	**$1.32**	**$1.00**

Table A-56. Economic Activity Supported by Every Dollar Spent on Restoration Natural Climate Solutions, by Practice and Region, in the **MED** scenario.

Practice	MN	EJ	TRIBAL AREAS
Reforestation	$1.40	$1.21	$1.09

Practice	MN	EJ	TRIBAL AREAS
Grassland Restoration	$0.78	$0.95	$0.70
Wetland Restoration	$7.06	$5.53	$4.86
Riparian Buffer	$0.04	$0.28	$0.19
Peatland Restoration	$1.85	$0.87	$1.15
TOTAL	**$1.38**	**$1.24**	**$1.02**

Table A-57. Economic Activity Supported by Every Dollar Spent on Restoration Natural Climate Solutions, by Practice and Region, in the **MAX** scenario.

Practice	MN	EJ	TRIBAL AREAS
Avoided Forest Conversion	$0.03	$0.13	$1.09
Avoided Grassland Conversion	$0.17	$0.47	$0.70
Avoided Wetland Conversion	$3.55	$2.94	$4.86
Avoided Peat Conversion	$(0.11)	$0.16	$0.19
TOTAL	**$1.85**	**$0.87**	**$1.15**

Economic Contribution Effects

Minimum Scenario

Table A-58. Economic Contribution Effects for Restoration Natural Climate Solutions, by Practice, in the **MIN** scenario - **MN**.

Impact	Employment (no. of jobs)	Labor Income (thousand $)	Value Added (thousand $)	Output (thousand $)
Wetland Restoration				
1 - Direct	3,908	$191,547	$217,350	$376,535
2 - Indirect	405	$33,654	$49,353	$87,881
3 - Induced	1,179	$69,196	$115,455	$195,541
4 - Total	5,492	$294,396	$382,157	$659,957

Impact	Employment (no. of jobs)	Labor Income (thousand $)	Value Added (thousand $)	Output (thousand $)
Peatland Restoration				
1 - Direct	1,186	$45,196	$45,243	$47,881
2 - Indirect	8	$664	$974	$1,716
3 - Induced	241	$14,135	$23,574	$39,924
4 - Total	1,435	$59,996	$69,791	$89,521
Grassland Restoration				
1 - Direct	584	$19,667	$33,444	$16,112
2 - Indirect	(69)	$(3,652)	$(6,064)	$(11,661)
3 - Induced	293	$17,188	$28,903	$48,920
4 - Total	808	$33,203	$56,283	$53,371
Reforestation				
1 - Direct	53,744	$1,985,896	$3,126,286	$2,909,793
2 - Indirect	(845)	$(45,146)	$(74,398)	$(142,363)
3 - Induced	10,208	$598,558	$998,235	$1,690,664
4 - Total	63,107	$2,539,308	$4,050,124	$4,458,094
Riparian Buffer				
1 - Direct	283	$11,977	$27,525	$18,502
2 - Indirect	(48)	$(1,580)	$(3,132)	$(6,638)
3 - Induced	55	$3,222	$5,377	$9,115
4 - Total	289	$13,619	$29,770	$20,978
Riparian Buffer on Prime Ag Land				
1 - Direct	(17)	$(1,349)	$(1,626)	$(7,066)
2 - Indirect	(22)	$(1,151)	$(1,911)	$(3,675)
3 - Induced	(13)	$(763)	$(1,273)	$(2,153)
4 - Total	(52)	$(3,264)	$(4,810)	$(12,894)
GRAND TOTAL				
1 - Direct	59,687	$2,252,934	$3,448,222	$3,361,757
2 - Indirect	(571)	$(17,211)	$(35,178)	$(74,740)
3 - Induced	11,963	$701,536	$1,170,272	$1,982,011
4 - Total	71,079	$2,937,258	$4,583,315	$5,269,027

Table A-59. Economic Contribution Effects for Restoration Natural Climate Solutions, by Practice, in the **MIN** scenario - **EJ**.

Impact	Employment (no. of jobs)	Labor Income (thousand $)	Value Added (thousand $)	Output (thousand $)
Wetland Restoration				
1 - Direct	55.1	$2,904	$3,329	$5,912

Impact	Employment (no. of jobs)	Labor Income (thousand $)	Value Added (thousand $)	Output (thousand $)
2 - Indirect	3.9	$348	$501	$783
3 - Induced	5.6	$359	$588	$949
4 - Total	64.6	$3,611	$4,418	$7,644
Peatland Restoration				
1 - Direct	5.3	$220	$592	$639
2 - Indirect	0.1	$7	$10	$16
3 - Induced	0.4	$29	$47	$76
4 - Total	5.9	$256	$649	$731
Grassland Restoration				
1 - Direct	62.6	$2,384	$3,843	$3,716
2 - Indirect	(0.3)	$(18)	$(33)	$(58)
3 - Induced	17.2	$1,096	$1,818	$2,929
4 - Total	79.5	$3,462	$5,629	$6,587
Reforestation				
1 - Direct	322.8	$12,313	$19,267	$19,142
2 - Indirect	(0.1)	$(13)	$(22)	$(39)
3 - Induced	24.9	$1,595	$2,607	$4,206
4 - Total	347.6	$13,894	$21,852	$23,309
Riparian Buffer				
1 - Direct	1.1	$59	$117	$156
2 - Indirect	0.1	$6	$8	$12
3 - Induced	0.1	$8	$13	$20
4 - Total	1.3	$73	$137	$188
Riparian Buffer on Prime Ag Land				
1 - Direct	(0.0)	$(0)	$(0)	$(2)
2 - Indirect	(0.0)	$(0)	$(0)	$(1)
3 - Induced	(0.0)	$(0)	$(0)	$(0)
4 - Total	(0.0)	$(0)	$(1)	$(2)
GRAND TOTAL				
1 - Direct	447.0	$17,881	$27,148	$29,564
2 - Indirect	3.6	$329	$464	$713
3 - Induced	48.3	$3,087	$5,072	$8,180
4 - Total	498.9	$21,296	$32,684	$38,457

Table A-60. Economic Contribution Effects for Restoration Natural Climate Solutions, by Practice, in the **MIN** scenario - **TRIBAL AREAS**.

Impact	Employment (no. of jobs)	Labor Income (thousand $)	Value Added (thousand $)	Output (thousand $)
Wetland Restoration				
1 - Direct	67.7	$2,698	$3,094	$5,483
2 - Indirect	2.5	$160	$228	$416
3 - Induced	2.4	$106	$185	$338
4 - Total	72.6	$2,964	$3,507	$6,237
Peatland Restoration				
1 - Direct	60.1	$2,197	$2,199	$2,346
2 - Indirect	0.2	$12	$17	$31
3 - Induced	2.2	$98	$172	$314
4 - Total	62.5	$2,307	$2,387	$2,691
Grassland Restoration				
1 - Direct	66.8	$2,393	$3,858	$3,685
2 - Indirect	(0.3)	$(11)	$(16)	$(39)
3 - Induced	8.8	$384	$668	$1,225
4 - Total	75.3	$2,766	$4,510	$4,871
Reforestation				
1 - Direct	570.8	$20,527	$32,147	$31,913
2 - Indirect	(0.5)	$(13)	$(20)	$(42)
3 - Induced	21.1	$918	$1,606	$2,933
4 - Total	591.5	$21,432	$33,733	$34,804
Riparian Buffer				
1 - Direct	1.2	$51	$101	$133
2 - Indirect	0.0	$2	$4	$6
3 - Induced	0.1	$2	$4	$7
4 - Total	1.3	$56	$108	$146
Riparian Buffer on Prime Ag Land				
1 - Direct	(0.0)	$(1)	$(1)	$(4)
2 - Indirect	(0.0)	$(0)	$(0)	$(1)
3 - Induced	(0.0)	$(0)	$(0)	$(0)
4 - Total	(0.0)	$(1)	$(2)	$(5)
GRAND TOTAL				
1 - Direct	766.6	$27,867	$41,397	$43,556
2 - Indirect	1.9	$150	$211	$371
3 - Induced	34.6	$1,508	$2,635	$4,817
4 - Total	803.1	$29,524	$44,243	$48,744

Medium Scenario

Table A-61. Economic Contribution Effects for Restoration Natural Climate Solutions, by Practice, in the **MED** scenario - **MN**.

Impact	Employment (no. of jobs)	Labor Income (thousand $)	Value Added (thousand $)	Output (thousand $)
Wetland Restoration				
1 - Direct	7,816	$383,094	$434,699	$753,069
2 - Indirect	811	$67,308	$98,705	$175,762
3 - Induced	2,357	$138,391	$230,910	$391,082
4 - Total	10,984	$588,793	$764,315	$1,319,913
Peatland Restoration				
1 - Direct	2,372	$90,393	$90,486	$95,762
2 - Indirect	16	$1,329	$1,948	$3,433
3 - Induced	482	$28,270	$47,148	$79,848
4 - Total	2,870	$119,991	$139,582	$179,043
Grassland Restoration				
1 - Direct	1,534	$51,626	$87,790	$42,295
2 - Indirect	(182)	$(9,587)	$(15,918)	$(30,611)
3 - Induced	770	$45,119	$75,871	$128,415
4 - Total	2,122	$87,159	$147,744	$140,098
Reforestation				
1 - Direct	268,718	$9,929,482	$15,631,431	$14,548,965
2 - Indirect	(4,227)	$(225,732)	$(371,989)	$(711,813)
3 - Induced	51,042	$2,992,788	$4,991,176	$8,453,320
4 - Total	315,534	$12,696,538	$20,250,618	$22,290,472
Riparian Buffer				
1 - Direct	1,413	$59,883	$137,627	$92,509
2 - Indirect	(241)	$(7,898)	$(15,660)	$(33,191)
3 - Induced	273	$16,111	$26,884	$45,574
4 - Total	1,446	$68,096	$148,851	$104,892
Riparian Buffer on Prime Ag Land				
1 - Direct	(87)	$(6,747)	$(8,131)	$(35,331)
2 - Indirect	(109)	$(5,755)	$(9,556)	$(18,375)
3 - Induced	(65)	$(3,816)	$(6,363)	$(10,765)
4 - Total	(261)	$(16,318)	$(24,050)	$(64,471)
GRAND TOTAL				
1 - Direct	281,765	$10,507,730	$16,373,903	$15,497,269
2 - Indirect	(3,932)	$(180,336)	$(312,470)	$(614,795)
3 - Induced	54,860	$3,216,865	$5,365,626	$9,087,473

Impact	Employment (no. of jobs)	Labor Income (thousand $)	Value Added (thousand $)	Output (thousand $)
4 - Total	332,695	$13,544,259	$21,427,059	$23,969,947

Table A-62. Economic Contribution Effects for Restoration Natural Climate Solutions, by Practice, in the MED scenario - EJ.

Impact	Employment (no. of jobs)	Labor Income (thousand $)	Value Added (thousand $)	Output (thousand $)
Wetland Restoration				
1 - Direct	110	$5,809	$6,659	$11,825
2 - Indirect	8	$696	$1,001	$1,566
3 - Induced	11	$718	$1,176	$1,897
4 - Total	129	$7,223	$8,836	$15,288
Peatland Restoration				
1 - Direct	11	$440	$1,183	$1,278
2 - Indirect	0	$14	$21	$32
3 - Induced	1	$58	$94	$152
4 - Total	12	$512	$1,298	$1,461
Grassland Restoration				
1 - Direct	164	$6,258	$10,089	$9,755
2 - Indirect	(1)	$(48)	$(85)	$(153)
3 - Induced	45	$2,878	$4,772	$7,688
4 - Total	209	$9,089	$14,775	$17,291
Reforestation				
1 - Direct	1,614	$61,566	$96,337	$95,712
2 - Indirect	(1)	$(67)	$(112)	$(195)
3 - Induced	125	$7,973	$13,035	$21,030
4 - Total	1,738	$69,472	$109,261	$116,547
Riparian Buffer				
1 - Direct	6	$295	$583	$778
2 - Indirect	0	$29	$40	$62
3 - Induced	1	$39	$63	$102
4 - Total	7	$363	$687	$942
Riparian Buffer on Prime Ag Land				
1 - Direct	(0)	$(1)	$(2)	$(8)
2 - Indirect	(0)	$(1)	$(2)	$(3)
3 - Induced	(0)	$(0)	$(0)	$(1)
4 - Total	(0)	$(2)	$(4)	$(12)
GRAND TOTAL				

Impact	Employment (no. of jobs)	Labor Income (thousand $)	Value Added (thousand $)	Output (thousand $)
1 - Direct	1,905	$74,367	$114,849	$119,340
2 - Indirect	7	$623	$864	$1,309
3 - Induced	182	$11,666	$19,140	$30,868
4 - Total	2,094	$86,656	$134,852	$151,517

Table A-63. Economic Contribution Effects for Restoration Natural Climate Solutions, by Practice, in the MED scenario - TRIBAL AREAS.

Impact	Employment (no. of jobs)	Labor Income (thousand $)	Value Added (thousand $)	Output (thousand $)
Wetland Restoration				
1 - Direct	135.40	$5,397	$6,189	$10,966
2 - Indirect	4.92	$319	$455	$832
3 - Induced	4.88	$212	$370	$676
4 - Total	145.16	$5,928	$7,014	$12,475
Peatland Restoration				
1 - Direct	120.18	$4,394	$4,397	$4,692
2 - Indirect	0.37	$23	$33	$61
3 - Induced	4.49	$196	$344	$628
4 - Total	125.08	$4,614	$4,774	$5,381
Grassland Restoration				
1 - Direct	175.31	$6,282	$10,126	$9,673
2 - Indirect	(0.71)	$(29)	$(43)	$(102)
3 - Induced	23.05	$1,007	$1,754	$3,215
4 - Total	197.65	$7,260	$11,838	$12,787
Reforestation				
1 - Direct	2,854.16	$102,636	$160,734	$159,566
2 - Indirect	(2.26)	$(65)	$(99)	$(211)
3 - Induced	105.52	$4,590	$8,028	$14,667
4 - Total	2,957.41	$107,160	$168,663	$174,022
Riparian Buffer				
1 - Direct	5.87	$257	$504	$663
2 - Indirect	0.17	$12	$18	$31
3 - Induced	0.25	$11	$19	$35
4 - Total	6.29	$280	$541	$729
Riparian Buffer on Prime Ag Land				
1 - Direct	(0.06)	$(3)	$(6)	$(22)
2 - Indirect	(0.03)	$(1)	$(2)	$(4)

Impact	Employment (no. of jobs)	Labor Income (thousand $)	Value Added (thousand $)	Output (thousand $)
3 - Induced	(0.01)	$(0)	$(0)	$(1)
4 - Total	(0.10)	$(5)	$(8)	$(26)
GRAND TOTAL				
1 - Direct	3,290.86	$118,963	$181,945	$185,539
2 - Indirect	2.46	$260	$362	$608
3 - Induced	138.19	$6,015	$10,515	$19,220
4 - Total	3,431.49	$125,238	$192,822	$205,367

Maximum Scenario

Table A-64. Economic Contribution Effects for Restoration Natural Climate Solutions, by Practice, in the **MAX** scenario - **MN**.

Impact	Employment (no. of jobs)	Labor Income (thousand $)	Value Added (thousand $)	Output (thousand $)
Wetland Restoration				
1 - Direct	8,249	$399,509	$449,518	$756,223
2 - Indirect	734	$64,988	$93,960	$165,642
3 - Induced	2,432	$142,757	$238,200	$403,444
4 - Total	11,415	$607,254	$781,677	$1,325,309
Peatland Restoration				
1 - Direct	4,744	$180,785	$180,972	$191,524
2 - Indirect	32	$2,657	$3,897	$6,866
3 - Induced	964	$56,540	$94,295	$159,696
4 - Total	5,739	$239,982	$279,164	$358,086
Grassland Restoration				
1 - Direct	2,615	$54,063	$121,601	$(220,260)
2 - Indirect	(1,369)	$(72,246)	$(119,958)	$(230,668)
3 - Induced	4,060	$237,772	$401,265	$678,971
4 - Total	5,306	$219,589	$402,907	$228,043
Reforestation				
1 - Direct	55,599	$1,820,532	$3,030,515	$986,090
2 - Indirect	(8,172)	$(431,826)	$(716,354)	$(1,376,648)
3 - Induced	7,348	$430,956	$718,756	$1,218,080
4 - Total	54,774	$1,819,662	$3,032,917	$827,521
Riparian Buffer				
1 - Direct	1,348	$46,996	$132,441	$(9,907)
2 - Indirect	(641)	$(28,211)	$(49,789)	$(99,302)

Impact	Employment (no. of jobs)	Labor Income (thousand $)	Value Added (thousand $)	Output (thousand $)
3 - Induced	101	$6,018	$10,055	$17,115
4 - Total	810	$24,804	$92,707	$(92,094)
Riparian Buffer on Prime Ag Land				
1 - Direct	(174)	$(13,494)	$(16,262)	$(70,662)
2 - Indirect	(218)	$(11,511)	$(19,112)	$(36,749)
3 - Induced	(130)	$(7,631)	$(12,726)	$(21,530)
4 - Total	(522)	$(32,636)	$(48,100)	$(128,942)
GRAND TOTAL				
1 - Direct	72,382	$2,488,392	$3,898,784	$1,633,007
2 - Indirect	(9,634)	$(476,148)	$(807,357)	$(1,570,860)
3 - Induced	14,774	$866,410	$1,449,845	$2,455,776
4 - Total	77,524	$2,878,654	$4,541,272	$2,517,923

Table A-65. Economic Contribution Effects for Restoration Natural Climate Solutions, by Practice, in the **MAX** scenario - **EJ**.

Impact	Employment (no. of jobs)	Labor Income (thousand $)	Value Added (thousand $)	Output (thousand $)
Wetland Restoration				
1 - Direct	118	$6,199	$7,101	$12,568
2 - Indirect	8	$735	$1,055	$1,646
3 - Induced	12	$765	$1,253	$2,021
4 - Total	138	$7,699	$9,409	$16,235
Peatland Restoration				
1 - Direct	21	$879	$2,366	$2,556
2 - Indirect	0	$29	$41	$63
3 - Induced	2	$115	$188	$303
4 - Total	23	$1,023	$2,595	$2,923
Grassland Restoration				
1 - Direct	357	$13,521	$21,794	$19,505
2 - Indirect	(6)	$(343)	$(617)	$(1,108)
3 - Induced	272	$17,396	$28,945	$46,616
4 - Total	624	$30,574	$50,122	$65,014
Reforestation				
1 - Direct	367	$13,974	$21,863	$21,308
2 - Indirect	(1)	$(78)	$(139)	$(249)
3 - Induced	28	$1,800	$2,943	$4,748
4 - Total	394	$15,696	$24,667	$25,808

Impact	Employment (no. of jobs)	Labor Income (thousand $)	Value Added (thousand $)	Output (thousand $)
Riparian Buffer				
1 - Direct	7	$339	$671	$882
2 - Indirect	0	$31	$43	$65
3 - Induced	1	$44	$72	$116
4 - Total	8	$414	$786	$1,063
Riparian Buffer on Prime Ag Land				
1 - Direct	(0)	$(2)	$(4)	$(16)
2 - Indirect	(0)	$(2)	$(3)	$(6)
3 - Induced	(0)	$(1)	$(1)	$(2)
4 - Total	(0)	$(5)	$(8)	$(24)
GRAND TOTAL				
1 - Direct	870	$34,911	$53,791	$56,803
2 - Indirect	1	$372	$380	$412
3 - Induced	315	$20,120	$33,400	$53,804
4 - Total	1,186	$55,402	$87,571	$111,019

Table A-66. Economic Contribution Effects for Restoration Natural Climate Solutions, by Practice, in the **MAX** scenario - **TRIBAL AREAS**.

Impact	Employment (no. of jobs)	Labor Income (thousand $)	Value Added (thousand $)	Output (thousand $)
Wetland Restoration				
1 - Direct	270.81	$10,794	$12,378	$21,933
2 - Indirect	9.85	$639	$910	$1,665
3 - Induced	9.76	$424	$740	$1,352
4 - Total	290.31	$11,856	$14,028	$24,950
Peatland Restoration				
1 - Direct	240.36	$8,789	$8,794	$9,385
2 - Indirect	0.73	$46	$66	$122
3 - Induced	8.98	$393	$687	$1,256
4 - Total	250.16	$9,228	$9,548	$10,763
Grassland Restoration				
1 - Direct	1,326.69	$47,541	$76,633	$73,202
2 - Indirect	(5.40)	$(217)	$(325)	$(769)
3 - Induced	174.46	$7,618	$13,275	$24,333
4 - Total	1,495.75	$54,943	$89,583	$96,766
Reforestation				
1 - Direct	5,708.31	$205,272	$321,468	$319,132

Impact	Employment (no. of jobs)	Labor Income (thousand $)	Value Added (thousand $)	Output (thousand $)
2 - Indirect	(4.53)	$(130)	$(199)	$(421)
3 - Induced	211.04	$9,180	$16,056	$29,333
4 - Total	5,914.82	$214,321	$337,325	$348,044
Riparian Buffer				
1 - Direct	11.73	$514	$1,008	$1,326
2 - Indirect	0.35	$25	$35	$61
3 - Induced	0.51	$22	$38	$70
4 - Total	12.58	$560	$1,082	$1,458
Riparian Buffer on Prime Ag Land				
1 - Direct	(0.12)	$(6)	$(11)	$(44)
2 - Indirect	(0.06)	$(2)	$(3)	$(8)
3 - Induced	(0.01)	$(0)	$(1)	$(2)
4 - Total	(0.19)	$(9)	$(15)	$(53)
GRAND TOTAL				
1 - Direct	7,557.78	$272,903	$420,270	$424,934
2 - Indirect	0.94	$360	$485	$651
3 - Induced	404.73	$17,636	$30,797	$56,342
4 - Total	7,963.43	$290,899	$451,551	$481,927

Tax Revenue Contribution

Minimum Scenario

Table A-67. Tax Revenue Contribution Effects for Restoration Natural Climate Solutions, by Practice, in the MIN scenario - MN.

Impact	County (thousand $)	State (thousand $)	Federal (thousand $)	Total (thousand $)
Wetland Restoration				
1 - Direct	$(1,063)	$3,384	$39,267	$39,676
2 - Indirect	$764	$4,035	$4,320	$10,484
3 - Induced	$1,967	$9,869	$8,266	$23,616
4 - Total	$1,669	$17,289	$51,853	$73,777
Peatland Restoration				
1 - Direct	$(14)	$1,559	$7,971	$9,488
2 - Indirect	$15	$78	$87	$205
3 - Induced	$401	$2,013	$1,691	$4,821
4 - Total	$402	$3,650	$9,749	$14,515

Impact	County (thousand $)	State (thousand $)	Federal (thousand $)	Total (thousand $)
Grassland Restoration				
1 - Direct	$1,852	$7,340	$(2,106)	$10,394
2 - Indirect	$(108)	$(538)	$(398)	$(1,237)
3 - Induced	$502	$2,503	$2,016	$5,918
4 - Total	$2,246	$9,304	$(488)	$15,075
Reforestation				
1 - Direct	$45,270	$245,463	$235,440	$606,989
2 - Indirect	$(1,301)	$(6,521)	$(5,021)	$(15,165)
3 - Induced	$16,978	$85,223	$71,623	$204,141
4 - Total	$60,948	$324,165	$302,042	$795,964
Riparian Buffer				
1 - Direct	$2,020	$7,675	$(3,889)	$9,418
2 - Indirect	$(66)	$(310)	$(116)	$(611)
3 - Induced	$91	$457	$387	$1,097
4 - Total	$2,045	$7,822	$(3,618)	$9,904
Riparian Buffer on Prime Ag Land				
1 - Direct	$476	$1,600	$(1,775)	$1,153
2 - Indirect	$(34)	$(170)	$(125)	$(390)
3 - Induced	$(22)	$(109)	$(91)	$(261)
4 - Total	$420	$1,321	$(1,991)	$502
GRAND TOTAL				
1 - Direct	$48,542	$267,021	$274,908	$677,119
2 - Indirect	$(731)	$(3,426)	$(1,253)	$(6,714)
3 - Induced	$19,918	$99,956	$83,892	$239,333
4 - Total	$67,729	$363,550	$357,548	$909,737

Table A-68. Tax Revenue Contribution Effects for Restoration Natural Climate Solutions, by Practice, in the MIN scenario - EJ.

Impact	County (thousand $)	State (thousand $)	Federal (thousand $)	Total (thousand $)
Wetland Restoration				
1 - Direct	$(30)	$(52)	$543	$397
2 - Indirect	$6	$32	$36	$86
3 - Induced	$8	$39	$34	$97
4 - Total	$(16)	$18	$613	$580
Peatland Restoration				
1 - Direct	$(1)	$15	$119	$132

Impact	County (thousand $)	State (thousand $)	Federal (thousand $)	Total (thousand $)
2 - Indirect	$0.1	$0.7	$0.8	$1.9
3 - Induced	$2	$11	$10	$27
4 - Total	$2	$27	$130	$161
Grassland Restoration				
1 - Direct	$30	$191	$296	$580
2 - Indirect	$(0.2)	$(1.0)	$(0.8)	$(2.4)
3 - Induced	$25	$122	$101	$301
4 - Total	$55	$312	$396	$878
Reforestation				
1 - Direct	$143	$931	$1,553	$2,929
2 - Indirect	$(0.2)	$(0.9)	$(0.9)	$(2.4)
3 - Induced	$34	$171	$150	$428
4 - Total	$177	$1,101	$1,702	$3,354
Riparian Buffer				
1 - Direct	$0.4	$3.8	$9.0	$14.1
2 - Indirect	$0.1	$0.5	$0.6	$1.5
3 - Induced	$0.2	$0.8	$0.7	$2.1
4 - Total	$0.7	$5.2	$10.3	$17.7
Riparian Buffer on Prime Ag Land				
1 - Direct	$(0)	$(0)	$(0)	$(0)
2 - Indirect	$(0)	$(0)	$(0)	$(0)
3 - Induced	$(0)	$(0)	$(0)	$(0)
4 - Total	$(0)	$(0)	$(0)	$(0)
GRAND TOTAL				
1 - Direct	$143	$1,089	$2,520	$4,052
2 - Indirect	$6	$31	$35	$85
3 - Induced	$69	$344	$296	$855
4 - Total	$218	$1,463	$2,852	$4,991

Table A-69. Tax Revenue Contribution Effects for Restoration Natural Climate Solutions, by Practice, in the MIN scenario – TRIBAL AREAS.

Impact	County (thousand $)	State (thousand $)	Federal (thousand $)	Total (thousand $)
Wetland Restoration				
1 - Direct	$(38)	$(55)	$571	$427
2 - Indirect	$5	$21	$11	$45
3 - Induced	$5	$20	$3	$35

Impact	County (thousand $)	State (thousand $)	Federal (thousand $)	Total (thousand $)
4 - Total	$(27)	$(15)	$585	$506
Peatland Restoration				
1 - Direct	$(3)	$43	$369	$405
2 - Indirect	$0.4	$1.5	$0.8	$3.2
3 - Induced	$5	$18	$3	$33
4 - Total	$2	$63	$373	$441
Grassland Restoration				
1 - Direct	$66	$287	$226	$671
2 - Indirect	$(0.4)	$(1.4)	$(0.8)	$(3.1)
3 - Induced	$20	$71	$10	$127
4 - Total	$86	$357	$235	$796
Reforestation				
1 - Direct	$398	$1,916	$2,450	$5,311
2 - Indirect	$(0.4)	$(1.7)	$(1.0)	$(3.7)
3 - Induced	$47	$170	$24	$305
4 - Total	$444	$2,084	$2,473	$5,612
Riparian Buffer				
1 - Direct	$1.3	$6.1	$5.6	$15.0
2 - Indirect	$0.1	$0.3	$0.2	$0.7
3 - Induced	$0.1	$0.4	$0.1	$0.7
4 - Total	$1.5	$6.9	$5.9	$16.4
Riparian Buffer on Prime Ag Land				
1 - Direct	$0.4	$1.1	$(1.2)	$0.7
2 - Indirect	$(0.0)	$(0.0)	$(0.0)	$(0.1)
3 - Induced	$(0.0)	$(0.0)	$(0.0)	$(0.0)
4 - Total	$0.3	$1.0	$(1.2)	$0.6
GRAND TOTAL				
1 - Direct	$425	$2,199	$3,621	$6,829
2 - Indirect	$5	$19	$11	$42
3 - Induced	$77	$279	$39	$501
4 - Total	$506	$2,497	$3,670	$7,371

Medium Scenario

Table A-70. Tax Revenue Contribution Effects for Restoration Natural Climate Solutions, by Practice, in the MED scenario - MN.

Impact	County (thousand $)	State (thousand $)	Federal (thousand $)	Total (thousand $)
Wetland Restoration				
1 - Direct	$(2,126)	$6,768	$78,533	$79,353
2 - Indirect	$1,528	$8,071	$8,641	$20,968
3 - Induced	$3,935	$19,739	$16,532	$47,232
4 - Total	$3,337	$34,578	$103,707	$147,553
Peatland Restoration				
1 - Direct	$(28)	$3,117	$15,942	$18,977
2 - Indirect	$29	$156	$174	$410
3 - Induced	$802	$4,027	$3,381	$9,643
4 - Total	$804	$7,299	$19,497	$29,030
Grassland Restoration				
1 - Direct	$4,860	$19,266	$(5,527)	$27,285
2 - Indirect	$(284)	$(1,413)	$(1,044)	$(3,247)
3 - Induced	$1,319	$6,569	$5,291	$15,534
4 - Total	$5,895	$24,422	$(1,280)	$39,571
Reforestation				
1 - Direct	$226,351	$1,227,315	$1,177,202	$3,034,945
2 - Indirect	$(6,503)	$(32,605)	$(25,106)	$(75,827)
3 - Induced	$84,892	$426,115	$358,115	$1,020,704
4 - Total	$304,739	$1,620,824	$1,510,211	$3,979,821
Riparian Buffer				
1 - Direct	$10,102	$38,377	$(19,447)	$47,088
2 - Indirect	$(332)	$(1,552)	$(579)	$(3,056)
3 - Induced	$454	$2,285	$1,936	$5,487
4 - Total	$10,225	$39,110	$(18,090)	$49,519
Riparian Buffer on Prime Ag Land				
1 - Direct	$2,381	$8,001	$(8,873)	$5,766
2 - Indirect	$(170)	$(848)	$(627)	$(1,949)
3 - Induced	$(109)	$(547)	$(453)	$(1,305)
4 - Total	$2,101	$6,606	$(9,953)	$2,512
GRAND TOTAL				
1 - Direct	$241,540	$1,302,844	$1,237,830	$3,213,413
2 - Indirect	$(5,732)	$(28,192)	$(18,541)	$(62,701)
3 - Induced	$91,293	$458,187	$384,803	$1,097,295
4 - Total	$327,101	$1,732,840	$1,604,092	$4,248,008

Table A-71. Tax Revenue Contribution Effects for Restoration Natural Climate Solutions, by Practice, in the MED scenario - EJ.

Impact	County (thousand $)	State (thousand $)	Federal (thousand $)	Total (thousand $)
Wetland Restoration				
1 - Direct	$(61)	$(104)	$1,087	$793
2 - Indirect	$12	$63	$71	$173
3 - Induced	$16	$77	$68	$193
4 - Total	$(33)	$36	$1,226	$1,160
Peatland Restoration				
1 - Direct	$(1.5)	$30	$239	$264
2 - Indirect	$0.3	$1.4	$1.6	$3.8
3 - Induced	$4.4	$22	$19	$55
4 - Total	$3.2	$53	$260	$323
Grassland Restoration				
1 - Direct	$79	$501	$776	$1,523
2 - Indirect	$(0.5)	$(2.7)	$(2.0)	$(6.3)
3 - Induced	$65	$321	$266	$789
4 - Total	$144	$820	$1,040	$2,306
Reforestation				
1 - Direct	$716	$4,655	$7,765	$14,644
2 - Indirect	$(0.9)	$(4.7)	$(4.7)	$(12.2)
3 - Induced	$172	$854	$752	$2,140
4 - Total	$887	$5,504	$8,512	$16,772
Riparian Buffer				
1 - Direct	$2.2	$19	$45	$71
2 - Indirect	$0.5	$2.6	$3.1	$7
3 - Induced	$0.8	$4.2	$3.6	$10
4 - Total	$3.5	$26	$52	$88
Riparian Buffer on Prime Ag Land				
1 - Direct	$(0.0)	$(0.1)	$(0.2)	$(0.3)
2 - Indirect	$(0.0)	$(0.0)	$(0.0)	$(0.1)
3 - Induced	$(0.0)	$(0.0)	$(0.0)	$(0.1)
4 - Total	$(0.0)	$(0.2)	$(0.2)	$(0.5)
GRAND TOTAL				
1 - Direct	$735	$5,101	$9,912	$17,295
2 - Indirect	$12	$60	$70	$165
3 - Induced	$258	$1,279	$1,108	$3,187
4 - Total	$1,005	$6,439	$11,090	$20,648

Table A-72. Tax Revenue Contribution Effects for Restoration Natural Climate Solutions, by Practice, in the MED scenario – TRIBAL AREAS.

Impact	County (thousand $)	State (thousand $)	Federal (thousand $)	Total (thousand $)
Wetland Restoration				
1 - Direct	$(75)	$(110)	$1,142	$853
2 - Indirect	$11	$41	$23	$89
3 - Induced	$11	$39	$5.6	$70
4 - Total	$(54)	$(30)	$1,171	$1,012
Peatland Restoration				
1 - Direct	$(7)	$87	$739	$809
2 - Indirect	$0.8	$3.0	$1.6	$6.5
3 - Induced	$10	$36	$5	$65
4 - Total	$4.1	$126	$745	$881
Grassland Restoration				
1 - Direct	$174	$754	$594	$1,762
2 - Indirect	$(1.0)	$(3.8)	$(2.1)	$(8.2)
3 - Induced	$51	$187	$25	$335
4 - Total	$225	$937	$617	$2,088
Reforestation				
1 - Direct	$1,988	$9,581	$12,248	$26,553
2 - Indirect	$(2.2)	$(8.4)	$(4.8)	$(18.4)
3 - Induced	$234	$849	$120	$1,524
4 - Total	$2,219	$10,421	$12,363	$28,059
Riparian Buffer				
1 - Direct	$7	$31	$28	$75
2 - Indirect	$0.4	$1.6	$0.9	$3.5
3 - Induced	$0.6	$2.0	$0.3	$3.6
4 - Total	$8	$34	$29	$82
Riparian Buffer on Prime Ag Land				
1 - Direct	$1.8	$5.4	$(6.1)	$3.5
2 - Indirect	$(0.0)	$(0.1)	$(0.1)	$(0.3)
3 - Induced	$(0.0)	$(0.0)	$(0.0)	$(0.1)
4 - Total	$1.7	$5.2	$(6.2)	$3.1
GRAND TOTAL				
1 - Direct	$2,088	$10,347	$14,745	$30,056
2 - Indirect	$9	$33	$18	$72
3 - Induced	$306	$1,113	$156	$1,998
4 - Total	$2,403	$11,494	$14,920	$32,126

Maximum Scenario

Table A-73. Tax Revenue Contribution Effects for Restoration Natural Climate Solutions, by Practice, in the MAX scenario - MN.

Impact	County (thousand $)	State (thousand $)	Federal (thousand $)	Total (thousand $)
Wetland Restoration				
1 - Direct	$103	$15,055	$74,364	$89,682
2 - Indirect	$1,430	$7,608	$8,473	$20,063
3 - Induced	$4,058	$20,358	$17,057	$48,719
4 - Total	$5,591	$43,021	$99,894	$158,464
Peatland Restoration				
1 - Direct	$(55)	$6,234	$31,884	$37,954
2 - Indirect	$58	$311	$347	$821
3 - Induced	$1,605	$8,053	$6,763	$19,286
4 - Total	$1,607	$14,599	$38,995	$58,060
Grassland Restoration				
1 - Direct	$31,860	$113,547	$(90,958)	$111,404
2 - Indirect	$(2,137)	$(10,646)	$(7,868)	$(24,468)
3 - Induced	$7,038	$34,947	$27,638	$82,191
4 - Total	$36,761	$137,848	$(71,187)	$169,127
Reforestation				
1 - Direct	$208,979	$808,835	$(317,604)	$1,073,706
2 - Indirect	$(12,733)	$(63,475)	$(47,149)	$(146,095)
3 - Induced	$12,155	$61,121	$51,781	$146,761
4 - Total	$208,401	$806,482	$(312,972)	$1,074,372
Riparian Buffer				
1 - Direct	$19,585	$70,945	$(51,911)	$73,628
2 - Indirect	$(948)	$(4,606)	$(2,747)	$(9,994)
3 - Induced	$164	$835	$740	$2,032
4 - Total	$18,800	$67,174	$(53,918)	$65,665
Riparian Buffer on Prime Ag Land				
1 - Direct	$4,761	$16,002	$(17,745)	$11,531
2 - Indirect	$(340)	$(1,696)	$(1,254)	$(3,898)
3 - Induced	$(219)	$(1,094)	$(907)	$(2,609)
4 - Total	$4,202	$13,213	$(19,906)	$5,024
GRAND TOTAL				
1 - Direct	$265,233	$1,030,618	$(371,970)	$1,397,905
2 - Indirect	$(14,672)	$(72,503)	$(50,197)	$(163,572)
3 - Induced	$24,801	$124,221	$103,073	$296,380

Impact	County (thousand $)	State (thousand $)	Federal (thousand $)	Total (thousand $)
4 - Total	$275,363	$1,082,336	$(319,094)	$1,530,714

Table A-74. Tax Revenue Contribution Effects for Restoration Natural Climate Solutions, by Practice, in the MAX scenario - EJ.

Impact	County (thousand $)	State (thousand $)	Federal (thousand $)	Total (thousand $)
Wetland Restoration				
1 - Direct	$(65)	$(112)	$1,160	$846
2 - Indirect	$13	$67	$76	$184
3 - Induced	$17	$82	$72	$206
4 - Total	$(35)	$37	$1,308	$1,235
Peatland Restoration				
1 - Direct	$(3)	$60	$477	$528
2 - Indirect	$1	$3	$3	$8
3 - Induced	$9	$44	$39	$110
4 - Total	$6	$107	$519	$646
Grassland Restoration				
1 - Direct	$173	$1,085	$1,666	$3,287
2 - Indirect	$(4)	$(18)	$(14)	$(43)
3 - Induced	$397	$1,961	$1,601	$4,795
4 - Total	$566	$3,028	$3,253	$8,039
Reforestation				
1 - Direct	$163	$1,057	$1,760	$3,323
2 - Indirect	$(1)	$(4)	$(4)	$(10)
3 - Induced	$39	$193	$170	$484
4 - Total	$201	$1,246	$1,926	$3,796
Riparian Buffer				
1 - Direct	$3	$22	$52	$81
2 - Indirect	$1	$3	$4	$8
3 - Induced	$1	$5	$4	$12
4 - Total	$4	$30	$59	$101
Riparian Buffer on Prime Ag Land				
1 - Direct	$(0)	$(0)	$(0)	$(1)
2 - Indirect	$(0)	$(0)	$(0)	$(0)
3 - Induced	$(0)	$(0)	$(0)	$(0)
4 - Total	$(0)	$(0)	$(0)	$(1)
GRAND TOTAL				

Impact	County (thousand $)	State (thousand $)	Federal (thousand $)	Total (thousand $)
1 - Direct	$270	$2,112	$5,115	$8,064
2 - Indirect	$10	$50	$66	$146
3 - Induced	$462	$2,285	$1,885	$5,607
4 - Total	$742	$4,448	$7,065	$13,817

Table A-75. Tax Revenue Contribution Effects for Restoration Natural Climate Solutions, by Practice, in the MAX scenario – TRIBAL AREAS.

Impact	County (thousand $)	State (thousand $)	Federal (thousand $)	Total (thousand $)
Wetland Restoration				
1 - Direct	$(150)	$(221)	$2,285	$1,706
2 - Indirect	$21	$82	$45	$178
3 - Induced	$22	$78	$11	$141
4 - Total	$(108)	$(60)	$2,341	$2,025
Peatland Restoration				
1 - Direct	$(13)	$173	$1,477	$1,619
2 - Indirect	$2	$6	$3	$13
3 - Induced	$20	$73	$10	$131
4 - Total	$8	$252	$1,491	$1,762
Grassland Restoration				
1 - Direct	$1,319	$5,704	$4,495	$13,335
2 - Indirect	$(7)	$(29)	$(16)	$(62)
3 - Induced	$389	$1,414	$192	$2,532
4 - Total	$1,701	$7,089	$4,672	$15,805
Reforestation				
1 - Direct	$3,975	$19,162	$24,496	$53,106
2 - Indirect	$(4)	$(17)	$(10)	$(37)
3 - Induced	$467	$1,698	$240	$3,049
4 - Total	$4,438	$20,843	$24,726	$56,118
Riparian Buffer				
1 - Direct	$13	$61	$56	$150
2 - Indirect	$1	$3	$2	$7
3 - Induced	$1	$4	$1	$7
4 - Total	$15	$69	$59	$164
Riparian Buffer on Prime Ag Land				
1 - Direct	$4	$11	$(12)	$7
2 - Indirect	$(0)	$(0)	$(0)	$(1)

Impact	County (thousand $)	State (thousand $)	Federal (thousand $)	Total (thousand $)
3 - Induced	$(0)	$(0)	$(0)	$(0)
4 - Total	$3	$10	$(12)	$6
GRAND TOTAL				
1 - Direct	$5,147	$24,890	$32,798	$69,923
2 - Indirect	$12	$45	$25	$99
3 - Induced	$899	$3,267	$454	$5,859
4 - Total	$6,058	$28,203	$33,277	$75,880

SOIL QUALITY

All soil quality values are based on corn and soybeans as representative crops for Minnesota farmland.

Benefits vs. Costs

Table A-76. Per-Acre Benefits and Costs of Soil Quality Practices

Practice	Benefits ($/acre/year)				Costs	
	MN	EJ	TRIBAL AREAS	Revenue Increase*	Capital (one-time, $/ac)	Ongoing† ($/ac/year)
Cover cropping	$41.16	$41.16	$41.16	$8.67	$34.90	$(19.59)
Improved Nutrient Management	$8.66	$8.66	$8.66		$-	$5.21
No-Till/ Low-Till	$17.82	$17.82	$17.82	$8.67	$11.38	$(19.59)

* Revenue increases associated with improved yields for corn and soybeans due to each practice.
† Negative ongoing costs represent the net cost savings to farmers due to each practice.

Table A-77. Benefit-cost ratios based on cumulative $/acre every 10 years across project lifespan in the **MAX** scenario.

Practice / Year	Benefit-Cost Ratios (based on cumulative $/acre)*		
	2030	2040	2050
Cover cropping	4.38	4.11	4.04
Improved Nutrient Management	16.75	15.72	15.42
No-Till/ Low-Till	2.92	2.82	2.79
TOTAL	**4.78**	**4.54**	**4.48**

* Ratios were the same across all three areas of study (**MN**, **EJ**, and **TRIBAL AREAS**).

Ecosystem Services Value

Table A-78. Ecosystem Services Value (ESV) and Marginal Market Value of Soil Quality Natural Climate Solutions at 100% Implementation, by Practice (**MAX,** thousand $/year)– **MN**.

Practice	ESV (thousand $/year)	Marginal Market Value (thousand $/year)*
Cover cropping	$466,997	$209,518
Improved Nutrient Management	$98,292	$259,827
No-Till/ Low-Till	$66,403	$68,792

* Marginal market value describes the change in net annual farm income as a result of each practice.

Table A-79. Ecosystem Services Value (ESV) and Marginal Market Value of Soil Quality Natural Climate Solutions at 100% Implementation, by Practice (**MAX,** thousand $/year)– **EJ**.

Practice	ESV (thousand $/year)	Marginal Market Value (thousand $/year)*
Cover cropping	$4,923	$2,209
Improved Nutrient Management	$700	$725
No-Till/ Low-Till	$1,036	$2,739

* Marginal market value describes the change in net annual farm income as a result of each practice.

Table A-80. Ecosystem Services Value (ESV) and Marginal Market Value of Soil Quality Natural Climate Solutions at 100% Implementation, by Practice (**MAX,** thousand $/year)– **EJ**.

Practice	ESV (thousand $/year)	Marginal Market Value (thousand $/year)*
Cover cropping	$5,071	$2,275
Improved Nutrient Management	$721	$747
No-Till/ Low-Till	$1,067	$2,821

* Marginal market value describes the change in net annual farm income as a result of each practice.

Table A-81. Soil Quality Practices Benefits including Ecosystem Services Values and Marginal Market Value ($/year) in all scenarios - **MN**.

Benefit	Annual Value ($/year)		
	MIN	MED	MAX
Marginal Market Value	$8,555,623	$85,556,228	$209,518,191
Water Capture, Conveyance, & Supply	$103,498	$1,034,977	$2,534,550
Soil Quality	$363,704	$3,637,043	$8,906,736
Biological Control	$3,752,873	$37,528,726	$91,903,896
CO2 sequestration	$11,450,897	$114,508,971	$280,420,407
TOTAL	**$15,670,972**	**$156,709,717**	**$383,765,590**

*Carbon storage could not be quantified for these regions due to data limitations.

Table A-82. Soil Quality Practices Benefits including Ecosystem Services Values and Marginal Market Value ($/year) in all scenarios - **EJ**.

Benefit	Annual Value ($/year)		
	MIN	MED	MAX
Marginal Market Value	$8,555,623	$85,556,228	$209,518,191
Water Capture, Conveyance, & Supply	$103,498	$1,034,977	$2,534,550
Soil Quality	$363,704	$3,637,043	$8,906,736
Biological Control	$3,752,873	$37,528,726	$91,903,896
CO2 sequestration	$11,450,897	$114,508,971	$280,420,407
TOTAL	**$15,670,972**	**$156,709,717**	**$383,765,590**

*Carbon storage could not be quantified for these regions due to data limitations.

Table A-83. Soil Quality Practices Benefits including Ecosystem Services Values and Marginal Market Value ($/year) in all scenarios - **EJ**.

Benefit	Annual Value ($/year)		
	MIN	MED	MAX
Marginal Market Value	$110,225	$1,102,249	$2,699,292
Water Capture, Conveyance, & Supply	$1,333	$13,334	$32,653
Soil Quality	$4,686	$46,857	$114,748
Biological Control	$48,350	$483,495	$1,184,028
CO2 sequestration	$147,526	$1,475,257	$3,612,749
TOTAL	**$201,894**	**$2,018,943**	**$4,944,180**

*Carbon storage could not be quantified for these regions due to data limitations.

Table A-84. Soil Quality Practices Benefits including Ecosystem Services Values and Marginal Market Value ($/year) in all scenarios - **TRIBAL AREAS**.

Benefit	Annual Value ($/year)		
	MIN	MED	MAX
Marginal Market Value	$119,803	$1,198,033	$2,933,857
Water Capture, Conveyance, & Supply	$1,449	$14,493	$35,491
Soil Quality	$5,093	$50,929	$124,720
Biological Control	$52,551	$525,510	$1,286,919
CO2 sequestration	$160,345	$1,603,455	$3,926,692
TOTAL	$219,439	$2,194,386	$5,373,821

*Carbon storage could not be quantified for these regions due to data limitations.

Net Present Value

Table A-85. Net present value of the Total Fertilizer Cost Savings for Farmer's from Improved Nutrient Management by 2050 in **all scenarios** at a **1.625% discount rate**– **MN**.

Year	NPV (total $)* at 1.625% Discount		
	MIN	MED	MAX
2030	$22,424,773	$20,071,556	$136,417,370
2040	$19,086,332	$38,437,752	$116,108,519
2050	$16,244,894	$50,890,641	$98,823,106

* These estimates are based on fertilization rate reductions for each scenario (MIN = 20% lbs N/ac reduction on half of potential cropland, MED = 25% lbs N/ac reduction on all potential cropland, MAX = 40% lbs N/ac reduction on all potential cropland). This value also includes the net value of switching from anhydrous ammonia ($0.88/lb N) to urea ($0.98/lb N) multiplied by the rate reduction.

Table A-86. Net present value of the Total Fertilizer Cost Savings for Farmer's from Improved Nutrient Management by 2050 in all scenarios at a 3.124% discount rate– MN.

Year	NPV (total $)* at 3.124% Discount		
	MIN	MED	MAX
2030	$19,656,009	$17,593,341	$119,574,053
2040	$14,450,998	$29,102,704	$87,910,236
2050	$10,624,300	$33,282,916	$64,631,159

* These estimates are based on fertilization rate reductions for each scenario (MIN = 20% lbs N/ac reduction on half of potential cropland, MED = 25% lbs N/ac reduction on all potential cropland, MAX = 40% lbs N/ac reduction on all potential cropland). This value also includes the net value of switching from anhydrous ammonia ($0.88/lb N) to urea ($0.98/lb N) multiplied by the rate reduction.

Table A-87. Net present value of the Total Fertilizer Cost Savings for Farmer's from Improved Nutrient Management by 2050 in all scenarios at a 7% discount rate– MN.

Year	NPV (total $)* at 7% Discount		
	MIN	MED	MAX
2030	$14,101,947	$12,622,113	$85,786,846
2040	$7,168,715	$14,436,995	$43,609,682
2050	$3,644,211	$11,416,279	$22,168,951

* These estimates are based on fertilization rate reductions for each scenario (MIN = 20% lbs N/ac reduction on half of potential cropland, MED = 25% lbs N/ac reduction on all potential cropland, MAX = 40% lbs N/ac reduction on all potential cropland). This value also includes the net value of switching from anhydrous ammonia ($0.88/lb N) to urea ($0.98/lb N) multiplied by the rate reduction.

Minimum Scenario

Table A-88. Net Present Value (**NPV**) of Soil Quality NCS Practices in the **MIN** scenario across multiple discount rates – **MN**.

Practice	Net Present Value (thousand $)		
	1.625% Discount Rate	3.124% Discount Rate	7% Discount Rate
Cover cropping	$156,281	$148,063	$130,075
Improved Nutrient Management	$2,122,940	$2,007,735	$1,755,539
No-Till/ Low-Till	$27,014	$25,591	$22,476
TOTAL	**$2,306,235**	**$2,181,389**	**$1,908,090**

Table A-89. Net Present Value (**NPV**) of Soil Quality NCS Practices in the **MIN** scenario across multiple discount rates – **EJ**.

Practice	Net Present Value (thousand $)		
	1.625% Discount Rate	3.124% Discount Rate	7% Discount Rate
Cover cropping	$2,013	$1,908	$1,676
Improved Nutrient Management	$27,351	$25,866	$22,617
No-Till/ Low-Till	$348	$330	$290
TOTAL	**$29,712**	**$28,104**	**$24,583**

Table A-90. Net Present Value (**NPV**) of Soil Quality NCS Practices in the **MIN** scenario across multiple discount rates – **TRIBAL AREAS**.

Practice	Net Present Value (thousand $)		
	1.625% Discount Rate	3.124% Discount Rate	7% Discount Rate
Cover cropping	$2,188	$2,073	$1,821
Improved Nutrient Management	$29,727	$28,114	$24,583
No-Till/ Low-Till	$378	$358	$315
TOTAL	**$32,294**	**$30,546**	**$26,719**

Medium Scenario

Table A-91. Net Present Value (**NPV**) of Soil Quality NCS Practices in the **MED** scenario across multiple discount rates – **MN**.

Practice	Net Present Value (thousand $)		
	1.625% Discount Rate	3.124% Discount Rate	7% Discount Rate
Cover cropping	$4,213,031	$3,525,073	$2,396,923
Improved Nutrient Management	$11,677,085	$9,748,058	$6,584,736
No-Till/ Low-Till	$364,540	$304,973	$207,292
TOTAL	**$16,254,656**	**$13,578,104**	**$9,188,951**

Table A-92. Net Present Value (**NPV**) of Soil Quality NCS Practices in the **MED** scenario across multiple discount rates – **EJ**.

Practice	Net Present Value (thousand $)		
	1.625% Discount Rate	3.124% Discount Rate	7% Discount Rate
Cover cropping	$54,278	$45,415	$30,880

Practice	Net Present Value (thousand $)		
	1.625% Discount Rate	3.124% Discount Rate	7% Discount Rate
Improved Nutrient Management	$150,440	$125,587	$84,833
No-Till/ Low-Till	$4,696	$3,929	$2,671
TOTAL	**$209,414**	**$174,931**	**$118,384**

Table A-93. Net Present Value (**NPV**) of Soil Quality NCS Practices in the **MED** scenario across multiple discount rates – **TRIBAL AREAS**.

Practice	Net Present Value (thousand $)		
	1.625% Discount Rate	3.124% Discount Rate	7% Discount Rate
Cover cropping	$58,995	$49,361	$33,564
Improved Nutrient Management	$163,513	$136,501	$92,205
No-Till/ Low-Till	$5,105	$4,270	$2,903
TOTAL	$227,612	$190,132	$128,672

Maximum Scenario

Table A-94. Net Present Value (**NPV**) of Soil Quality NCS Practices in the **MAX** scenario across multiple discount rates – **MN**.

Practice	Net Present Value (thousand $)		
	1.625% Discount Rate	3.124% Discount Rate	7% Discount Rate
Cover cropping	$10,317,268	$8,632,533	$5,869,813
Improved Nutrient Management	$11,677,085	$9,748,058	$6,584,736

Practice	Net Present Value (thousand $)		
	1.625% Discount Rate	3.124% Discount Rate	7% Discount Rate
No-Till/ Low-Till	$3,807,418	$3,185,273	$2,165,047
TOTAL	**$25,801,772**	**$21,565,864**	**$14,619,596**

Table A-95. Net Present Value (**NPV**) of Soil Quality NCS Practices in the **MAX** scenario across multiple discount rates – **EJ**.

Practice	Net Present Value (thousand $)		
	1.625% Discount Rate	3.124% Discount Rate	7% Discount Rate
Cover cropping	$132,921	$111,216	$75,623
Improved Nutrient Management	$150,440	$125,587	$84,833
No-Till/ Low-Till	$49,052	$41,037	$27,893
TOTAL	**$332,413**	**$277,840**	**$188,349**

Table A-96. Net Present Value (**NPV**) of Soil Quality NCS Practices in the **MAX** scenario across multiple discount rates – **TRIBAL AREAS**.

Practice	Net Present Value (thousand $)		
	1.625% Discount Rate	3.124% Discount Rate	7% Discount Rate
Cover cropping	$144,471	$120,880	$82,194
Improved Nutrient Management	$163,513	$136,501	$92,205
No-Till/ Low-Till	$53,315	$44,603	$30,317
TOTAL	**$361,299**	**$301,984**	**$204,716**

Economic Contribution Effects

Cost data were transcribed from sources that combined no-till and cover cropping as a single system, thus they've also been combined in the economic contribution analysis. With all three practices, farmers would spend less on inputs, resulting in less spending through supply chains and consequently negative economic contributions.

Minimum Scenario

Table A-97. Economic Contribution Effects for Soil Quality Natural Climate Solutions, by Practice, in the **MIN** scenario - **MN**.

Impact	Employment (no. of jobs)	Labor Income (thousand $)	Value Added (thousand $)	Output (thousand $)
Cover Cropping + No-Till				
1 - Direct	(34)	$(1,581)	$(3,329)	$(6,357)
2 - Indirect	(60)	$(3,685)	$(5,574)	$(15,123)
3 - Induced	3	$198	$332	$562
4 - Total	22	$844	$744	$(2,222)
Improved Nutrient Management				
1 - Direct	(402)	$(57,007)	$(91,617)	$(467,311)
2 - Indirect	(1,108)	$(100,251)	$(160,615)	$(323,398)
3 - Induced	(818)	$(47,858)	$(79,879)	$(135,146)
4 - Total	(2,323)	$(205,116)	$(332,111)	$(925,855)

Table A-98. Economic Contribution Effects for Soil Quality Natural Climate Solutions, by Practice, in the **MIN** scenario - **EJ**.

Impact	Employment (no. of jobs)	Labor Income (thousand $)	Value Added (thousand $)	Output (thousand $)
Cover Cropping + No-Till				
1 - Direct	(2.0)	$(100)	$(164)	$(315)
2 - Indirect	1.2	$60	$106	$166
3 - Induced	(0.1)	$(9)	$(15)	$(25)
4 - Total	(1.0)	$(49)	$(74)	$(174)
Improved Nutrient Management*				
1 - Direct	-	$-	$-	$-
2 - Indirect	-	$-	$-	$-
3 - Induced	-	$-	$-	$-

Impact	Employment (no. of jobs)	Labor Income (thousand $)	Value Added (thousand $)	Output (thousand $)
4 - Total	-	$-	$-	$-

* Because there are no nitrogen fertilizer manufacturers in this region, economic contributions would be zero.

Table A-99. Economic Contribution Effects for Soil Quality Natural Climate Solutions, by Practice, in the MIN scenario - TRIBAL AREAS.

Impact	Employment (no. of jobs)	Labor Income (thousand $)	Value Added (thousand $)	Output (thousand $)
Cover Cropping + No-Till				
1 - Direct	(3.7)	$(178)	$(293)	$(595)
2 - Indirect	1.0	$35	$47	$73
3 - Induced	(0.2)	$(9)	$(16)	$(29)
4 - Total	(2.9)	$(152)	$(262)	$(551)
Improved Nutrient Management				
1 - Direct	(22.4)	$(3,176)	$(5,105)	$(26,038)
2 - Indirect	(25.5)	$(1,946)	$(3,017)	$(7,549)
3 - Induced	(4.4)	$(195)	$(340)	$(621)
4 - Total	(52.3)	$(5,317)	$(8,461)	$(34,208)

Medium Scenario

Table A-100. Economic Contribution Effects for Soil Quality Natural Climate Solutions, by Practice, in the MED scenario - MN.

Impact	Employment (no. of jobs)	Labor Income (thousand $)	Value Added (thousand $)	Output (thousand $)
Cover Cropping + No-Till				
1 - Direct	(629)	$(35,635)	$(63,450)	$(159,254)
2 - Indirect	429	$15,341	$26,983	$3,002
3 - Induced	(109)	$(6,289)	$(10,466)	$(17,725)
4 - Total	(310)	$(26,583)	$(46,933)	$(173,977)
Improved Nutrient Management				
1 - Direct	(4,190)	$(594,388)	$(955,251)	$(4,872,465)
2 - Indirect	(11,548)	$(1,045,275)	$(1,674,670)	$(3,371,946)
3 - Induced	(8,527)	$(498,994)	$(832,870)	$(1,409,109)
4 - Total	(24,216)	$(2,138,657)	$(3,462,790)	$(9,653,520)

Table A-101. Economic Contribution Effects for Soil Quality Natural Climate Solutions, by Practice, in the MED scenario - EJ.

Impact	Employment (no. of jobs)	Labor Income (thousand $)	Value Added (thousand $)	Output (thousand $)
Cover Cropping + No-Till				
1 - Direct	472.8	$16,776	$4,619	$131,209
2 - Indirect	402.2	$21,688	$37,466	$67,112
3 - Induced	75.0	$4,818	$7,879	$12,711
4 - Total	949.9	$43,282	$49,963	$211,032
Improved Nutrient Management*				
1 - Direct	-	$-	$-	$-
2 - Indirect	-	$-	$-	$-
3 - Induced	-	$-	$-	$-
4 - Total	-	$-	$-	$-

* Because there are no nitrogen fertilizer manufacturers in this region, economic contributions would be zero.

Table A-102. Economic Contribution Effects for Soil Quality Natural Climate Solutions, by Practice, in the MED scenario - TRIBAL AREAS.

Impact	Employment (no. of jobs)	Labor Income (thousand $)	Value Added (thousand $)	Output (thousand $)
Cover Cropping + No-Till				
1 - Direct	503.8	$17,248	$4,529	$130,879
2 - Indirect	260.8	$10,109	$14,297	$34,595
3 - Induced	29.8	$1,291	$2,258	$4,126
4 - Total	794.5	$28,648	$21,085	$169,600
Improved Nutrient Management				
1 - Direct	(56.5)	$(8,017)	$(12,885)	$(65,721)
2 - Indirect	(64.4)	$(4,912)	$(7,614)	$(19,054)
3 - Induced	(11.2)	$(491)	$(858)	$(1,568)
4 - Total	(132.1)	$(13,420)	$(21,357)	$(86,343)

Maximum Scenario

Table A-103. Economic Contribution Effects for Soil Quality Natural Climate Solutions, by Practice, in the MAX scenario - MN.

Impact	Employment (no. of jobs)	Labor Income (thousand $)	Value Added (thousand $)	Output (thousand $)
Cover Cropping + No-Till				
1 - Direct	(3,898)	$(220,833)	$(393,205)	$(986,903)
2 - Indirect	2,656	$95,066	$167,217	$18,602
3 - Induced	(672)	$(38,971)	$(64,860)	$(109,842)
4 - Total	(1,923)	$(164,738)	$(290,849)	$(1,078,143)
Improved Nutrient Management				
1 - Direct	(6,550)	$(929,174)	$(1,493,292)	$(7,616,860)
2 - Indirect	(18,052)	$(1,634,022)	$(2,617,921)	$(5,271,180)
3 - Induced	(13,330)	$(780,051)	$(1,301,980)	$(2,202,784)
4 - Total	(37,856)	$(3,343,247)	$(5,413,192)	$(15,090,823)

Table A-104. Economic Contribution Effects for Soil Quality Natural Climate Solutions, by Practice, in the MAX scenario - EJ.

Impact	Employment (no. of jobs)	Labor Income (thousand $)	Value Added (thousand $)	Output (thousand $)
Cover Cropping + No-Till				
1 - Direct	(76.1)	$(3,817)	$(6,297)	$(12,715)
2 - Indirect	39.7	$2,015	$3,537	$5,475
3 - Induced	(6.2)	$(393)	$(640)	$(1,032)
4 - Total	(42.7)	$(2,195)	$(3,400)	$(8,271)
Improved Nutrient Management*				
1 - Direct	-	$-	$-	$-
2 - Indirect	-	$-	$-	$-
3 - Induced	-	$-	$-	$-
4 - Total	-	$-	$-	$-

* Because there are no nitrogen fertilizer manufacturers in this region, economic contributions would be zero.

Table A-105. Economic Contribution Effects for Soil Quality Natural Climate Solutions, by Practice, in the MAX scenario - TRIBAL AREAS.

Impact	Employment (no. of jobs)	Labor Income (thousand $)	Value Added (thousand $)	Output (thousand $)
Cover Cropping + No-Till				
1 - Direct	(87.0)	$(4,132)	$(6,810)	$(13,819)
2 - Indirect	24.4	$813	$1,086	$1,693
3 - Induced	(4.8)	$(210)	$(367)	$(671)

Impact	Employment (no. of jobs)	Labor Income (thousand $)	Value Added (thousand $)	Output (thousand $)
4 - Total	(67.2)	$(3,528)	$(6,092)	$(12,797)
Improved Nutrient Management				
1 - Direct	(84.4)	$(11,971)	$(19,239)	$(98,131)
2 - Indirect	(96.2)	$(7,334)	$(11,369)	$(28,450)
3 - Induced	(16.7)	$(733)	$(1,282)	$(2,341)
4 - Total	(197.2)	$(20,039)	$(31,890)	$(128,922)

Tax Revenue Contribution

Minimum Scenario

Table A-106. Tax Revenue Contribution Effects for Soil Quality Natural Climate Solutions, by Practice, in the MIN scenario - MN.

Impact	County (thousand $)	State (thousand $)	Federal (thousand $)	Total (thousand $)
Cover Cropping + No-Till				
1 - Direct	$(5,326)	$(17,564)	$19,970	$(12,441)
2 - Indirect	$211	$1,493	$2,761	$4,842
3 - Induced	$322	$1,617	$1,363	$3,876
4 - Total	$(4,792)	$(14,454)	$24,094	$(3,723)
Improved Nutrient Management				
1 - Direct	$(7)	$(929,174)	$(1,493,292)	$(7,616,860)
2 - Indirect	$(18)	$(1,634,022)	$(2,617,921)	$(5,271,180)
3 - Induced	$(13)	$(780,051)	$(1,301,980)	$(2,202,784)
4 - Total	$(38)	$(3,343,247)	$(5,413,192)	$(15,090,823)

Table A-107. Tax Revenue Contribution Effects for Soil Quality Natural Climate Solutions, by Practice, in the MIN scenario - EJ.

Impact	County (thousand $)	State (thousand $)	Federal (thousand $)	Total (thousand $)
Cover Cropping + No-Till				
1 - Direct	$(136)	$(491)	$527	$(389)
2 - Indirect	$7	$36	$35	$92
3 - Induced	$2	$12	$10	$29
4 - Total	$(127)	$(444)	$573	$(267)

Impact	County (thousand $)	State (thousand $)	Federal (thousand $)	Total (thousand $)
Improved Nutrient Management*				
1 - Direct	$-	$-	$-	$-
2 - Indirect	$-	$-	$-	$-
3 - Induced	$-	$-	$-	$-
4 - Total	$-	$-	$-	$-

* Because there are no nitrogen fertilizer manufacturers in this region, economic contributions would be zero.

Table A-108. Tax Revenue Contribution Effects for Soil Quality Natural Climate Solutions, by Practice, in the MIN scenario - TRIBAL AREAS.

Impact	County (thousand $)	State (thousand $)	Federal (thousand $)	Total (thousand $)
Cover Cropping + No-Till				
1 - Direct	$(225)	$(668)	$789	$(415)
2 - Indirect	$1	$9	$27	$39
3 - Induced	$2	$7	$1	$12
4 - Total	$(222)	$(652)	$817	$(363)
Improved Nutrient Management				
1 - Direct	$(0)	$(11,971)	$(19,239)	$(98,131)
2 - Indirect	$(0)	$(7,334)	$(11,369)	$(28,450)
3 - Induced	$(0)	$(733)	$(1,282)	$(2,341)
4 - Total	$(0)	$(20,039)	$(31,890)	$(128,922)

Medium Scenario

Table A-109. Tax Revenue Contribution Effects for Soil Quality Natural Climate Solutions, by Practice, in the MED scenario - MN.

Impact	County (thousand $)	State (thousand $)	Federal (thousand $)	Total (thousand $)
Cover Cropping + No-Till				
1 - Direct	$4,418	$13,541	$(20,365)	$5,493
2 - Indirect	$3,652	$13,350	$(8,271)	$15,260
3 - Induced	$(177)	$(889)	$(757)	$(2,139)
4 - Total	$7,893	$26,002	$(29,393)	$18,614
Improved Nutrient Management				

Impact	County (thousand $)	State (thousand $)	Federal (thousand $)	Total (thousand $)
1 - Direct	$(7)	$(929,174)	$(1,493,292)	$(7,616,860)
2 - Indirect	$(18)	$(1,634,022)	$(2,617,921)	$(5,271,180)
3 - Induced	$(13)	$(780,051)	$(1,301,980)	$(2,202,784)
4 - Total	$(38)	$(3,343,247)	$(5,413,192)	$(15,090,823)

Table A-110. Tax Revenue Contribution Effects for Soil Quality Natural Climate Solutions, by Practice, in the MED scenario - EJ.

Impact	County (thousand $)	State (thousand $)	Federal (thousand $)	Total (thousand $)
Cover Cropping + No-Till				
1 - Direct	$43	$136	$(245)	$25
2 - Indirect	$12	$54	$17	$106
3 - Induced	$(1)	$(7)	$(6)	$(17)
4 - Total	$53	$183	$(234)	$114
Improved Nutrient Management*				
1 - Direct	$-	$-	$-	$-
2 - Indirect	$-	$-	$-	$-
3 - Induced	$-	$-	$-	$-
4 - Total	$-	$-	$-	$-

* Because there are no nitrogen fertilizer manufacturers in this region, economic contributions would be zero.

Table A-111. Tax Revenue Contribution Effects for Soil Quality Natural Climate Solutions, by Practice, in the MED scenario - TRIBAL AREAS.

Impact	County (thousand $)	State (thousand $)	Federal (thousand $)	Total (thousand $)
Cover Cropping + No-Till				
1 - Direct	$1	$17,248	$4,529	$130,879
2 - Indirect	$0	$10,109	$14,297	$34,595
3 - Induced	$0	$1,291	$2,258	$4,126
4 - Total	$1	$28,648	$21,085	$169,600
Improved Nutrient Management				
1 - Direct	$(0)	$(8,017)	$(12,885)	$(65,721)
2 - Indirect	$(0)	$(4,912)	$(7,614)	$(19,054)
3 - Induced	$(0)	$(491)	$(858)	$(1,568)
4 - Total	$(0)	$(13,420)	$(21,357)	$(86,343)

Maximum Scenario

Table A-112. Tax Revenue Contribution Effects for Soil Quality Natural Climate Solutions, by Practice, in the MAX scenario - MN.

Impact	County (thousand $)	State (thousand $)	Federal (thousand $)	Total (thousand $)
Cover Cropping + No-Till				
1 - Direct	$210,813	$693,218	$(800,931)	$480,024
2 - Indirect	$16,202	$35,928	$(141,604)	$(60,482)
3 - Induced	$(11,188)	$(56,196)	$(47,403)	$(134,764)
4 - Total	$215,827	$672,950	$(989,938)	$284,778
Improved Nutrient Management				
1 - Direct	$(26,524)	$(132,732)	$(93,804)	$(300,426)
2 - Indirect	$(67,594)	$(306,348)	$(126,685)	$(621,367)
3 - Induced	$(22,642)	$(113,566)	$(95,071)	$(271,710)
4 - Total	$(116,761)	$(552,647)	$(315,560)	$(1,193,504)

Table A-113. Tax Revenue Contribution Effects for Soil Quality Natural Climate Solutions, by Practice, in the MAX scenario - EJ.

Impact	County (thousand $)	State (thousand $)	Federal (thousand $)	Total (thousand $)
Cover Cropping + No-Till				
1 - Direct	$2,324	$8,305	$(9,325)	$6,208
2 - Indirect	$(22)	$(171)	$(400)	$(640)
3 - Induced	$(41)	$(202)	$(180)	$(508)
4 - Total	$2,262	$7,932	$(9,905)	$5,060
Improved Nutrient Management*				
1 - Direct	$-	$-	$-	$-
2 - Indirect	$-	$-	$-	$-
3 - Induced	$-	$-	$-	$-
4 - Total	$-	$-	$-	$-

* Because there are no nitrogen fertilizer manufacturers in this region, economic contributions would be zero.

Table A-114. Tax Revenue Contribution Effects for Soil Quality Natural Climate Solutions, by Practice, in the MAX scenario - TRIBAL AREAS.

Impact	County (thousand $)	State (thousand $)	Federal (thousand $)	Total (thousand $)
Cover Cropping + No-Till				
1 - Direct	$3,846	$11,342	$(13,895)	$6,596
2 - Indirect	$122	$320	$(676)	$(67)
3 - Induced	$(36)	$(129)	$(18)	$(232)
4 - Total	$3,932	$11,533	$(14,589)	$6,298
Improved Nutrient Management				
1 - Direct	$(450)	$(1,764)	$(725)	$(3,559)
2 - Indirect	$(268)	$(1,021)	$(503)	$(2,160)
3 - Induced	$(38)	$(138)	$(20)	$(248)
4 - Total	$(755)	$(2,923)	$(1,248)	$(5,967)

The Nature Conservancy

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