



# 2023 Soil Organic Carbon Sequestration

Soil conservation practices go beyond preventing soil loss and can enrich soil with nutrients such as soil organic carbon (SOC). Some best management practices (BMPs) have been shown to sequester SOC in agricultural soils. The sequestration of SOC is not only important for the health of agricultural soils, but also can serve as a carbon sink to help reduce greenhouse gases (GHG), which are a main contributor to Global Climate Change.

The Indiana Conservation Partnership (ICP) aids landowners in implementing thousands of best management practices across the state that can sequester carbon in soil every year. Two key BMPs for aiding in SOC sequestration are planting cover crops and implementing a no-till agriculture system.

The amount of SOC sequestered from cover cropping and utilizing a no-till system will vary based on many factors. Research by C. Poeplau and A. Don has shown a mean annual SOC sequestration value of  $0.14 \pm 0.04$  t/ac/y from cover crops. This value was used to estimate the amount of SOC for all the ICP cover crop practices. This does not include the many cover crop BMPs implanted throughout the state without assistance from the ICP.

In 2023 the ICP assisted with implementation of 8,278 cover crop practices. This resulted in the sequestration of an estimated 22,654 tons of SOC, which is the equivalent of 83,016 tons of CO<sub>2</sub>, or about the yearly emissions of 16,277 cars.

22,654 tons of SOC sequestered from cover crops

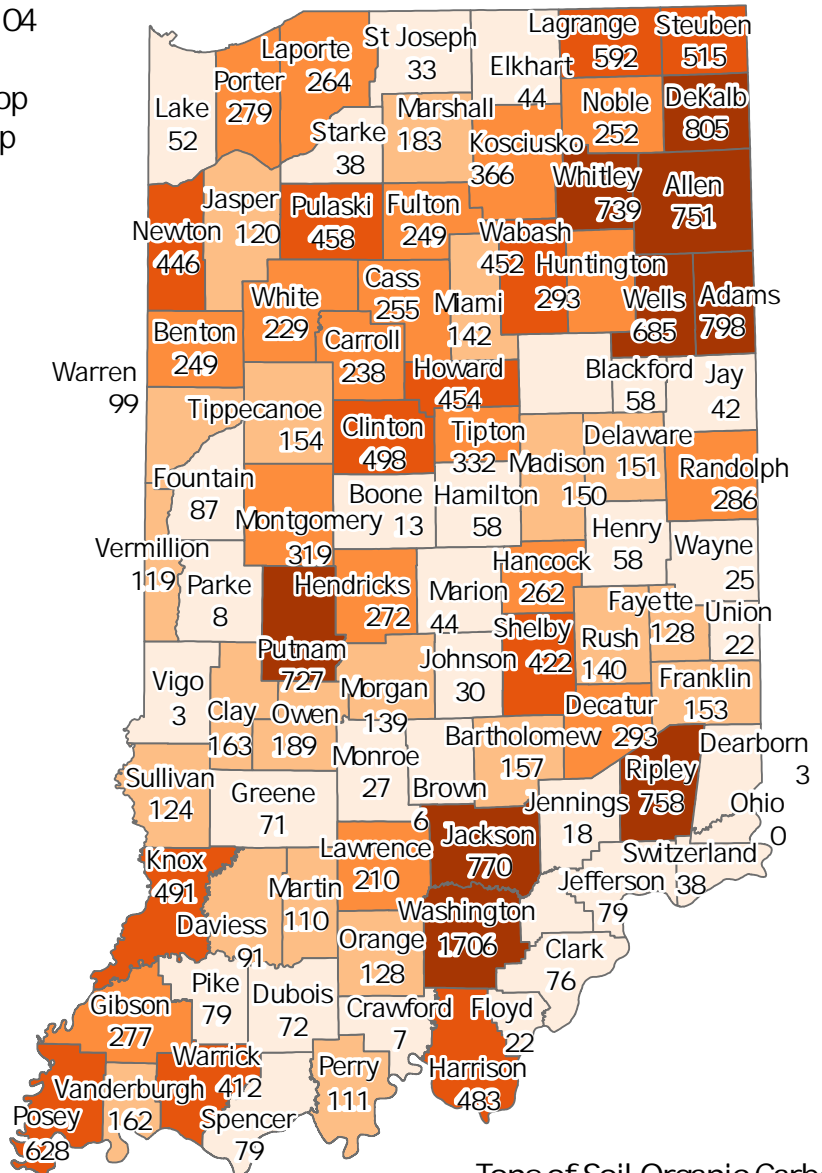
Which is the equivalent of 83,016 tons of CO<sub>2</sub>



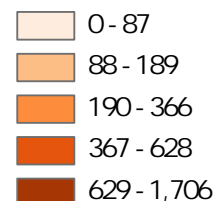
X 16,277

The approximate mass of carbon dioxide (CO<sub>2</sub>) removed from the atmosphere by the sequestration of SOC can be calculated based on the stoichiometric mass ratio of CO<sub>2</sub> to carbon. The U.S. EPA estimates that a typical passenger vehicle emits about 5.1 tons of CO<sub>2</sub> per year. This means approximately 10 acres of cover crops sequesters the yearly carbon emissions of a typical passenger vehicle.

## Tons of Soil Organic Carbon Sequestered From Cover Crops



### Tons of Soil Organic Carbon





SOC sequestration for no till was estimated with the DNDC (Denitrification-Decomposition) model. The DNDC model is a process based model for prediction of carbon and nitrogen biogeochemistry in agricultural ecosystems at site and regional scales. The model was developed by the Institute for the Study of Earth, Ocean, and Space at the University of New Hampshire. The model consists of a variety of sub-models for specific geochemical and biochemical reactions which together allow it to estimate the total change of nitrogen and carbon in soils.

In 2023 the ICP assisted with implementation of 1929 no till practices that were able to be modeled with DNDC. This resulted in the sequestration of 19,333 tons of SOC compared to if those acres used conventional tillage practices, which is the equivalent of 70,847 tons of CO<sub>2</sub>, or about the yearly emissions of 13,891 cars.

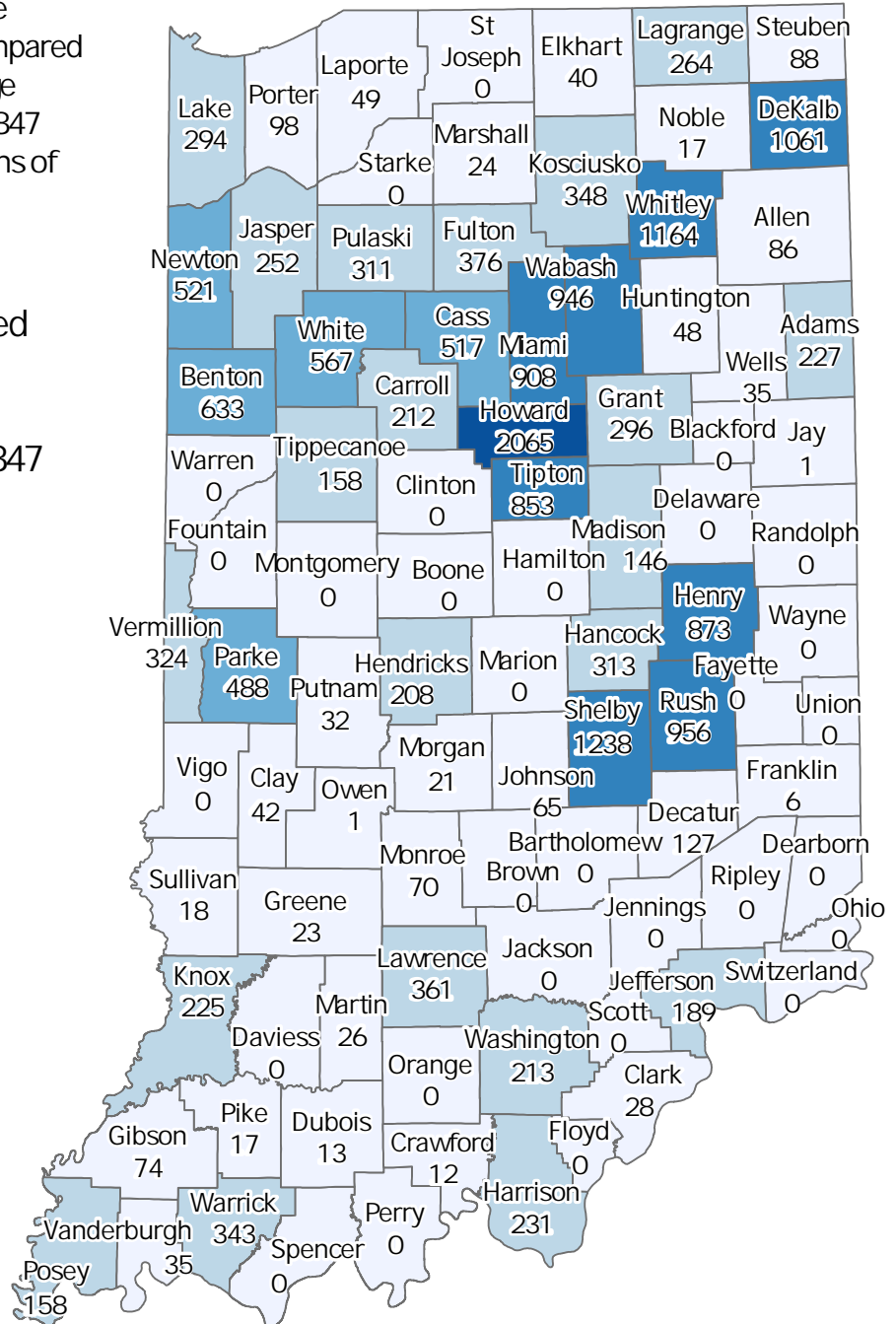
19,333 tons of SOC sequestered from no-till

Which is the equivalent of 70,847 tons of CO<sub>2</sub>



X 13,891

### Tons of Soil Organic Carbon Sequestered From No-Till Agriculture



#### Tons of Soil Organic Carbon

- 0 - 127
- 128 - 376
- 377 - 633
- 634 - 1,238
- 1,239 - 2,065