

USING SATELLITE IMAGERY TO COUNT ANIMAL FEEDING OPERATIONS

The Environmental Law & Policy Center partnered with the Environmental Working Group to examine large-scale animal feeding operations in the Maumee River watershed. Researchers used satellite imagery to measure facility scale and growth, creating the most comprehensive dataset yet available for animal agriculture in the region.

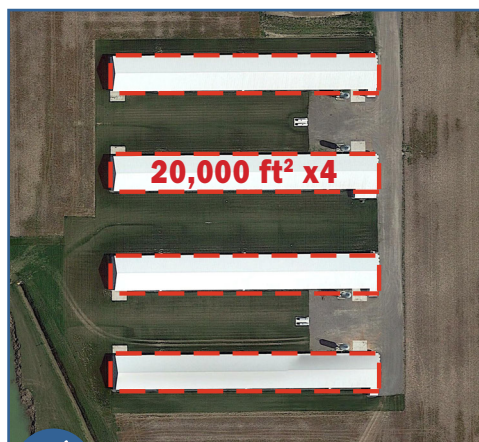
Toxic algal blooms plague western Lake Erie every year now, caused by excess phosphorus from agricultural runoff like fertilizer and manure. Poultry factory farms, swine operations, and massive dairies have all expanded dramatically since the early 1990s, but they are inadequately permitted and their growth is poorly documented.

With this new methodology, we can track the quantity, size, and location of livestock facilities, and estimate the number of animals, manure, and phosphorus generated at each site. The results reveal rapid, massive growth in animal feeding operations over the past few decades (see factsheet 2). These data can begin to shed light on how animal confinement at this scale negatively affects water quality (see factsheet 3).



Identifying Facilities & Calculating Manure Output

The industry has standardized large livestock facilities, so they can be easily recognized and measured from space. We began analysis by identifying architectural patterns, animal types, and occupancy rates at permitted facilities. By applying these standards to unpermitted operations, we were able to inventory animal counts, manure volume, and nutrient output. These factors introduce a degree of estimation into our results, but they nevertheless represent the most complete accounting of confined livestock within the Maumee River basin. One facility can produce millions of gallons of manure per year.



POULTRY

Per Animal Estimates		Typical Facility Totals
.465 ft ² (per chicken)	→	100,000 chickens
9.49 gal/yr manure	→	1,000,000 gal/yr manure
.4015 lb/yr phosphorus	→	40,000 lb/yr phosphorus



SWINE

Per Animal Estimates		Typical Facility Totals
7.4 ft ² (per pig)	→	4,800 pigs
448.95 gal/yr manure	→	2,150,000 gal/yr manure
6.862 lb/yr phosphorus	→	33,000 lb/yr phosphorus



DAIRY

Per Animal Estimates		Typical Facility Totals
70 ft ² (per 1000lb cow)	→	375 cows
2,503.9 gal/yr manure	→	850,000 gal/yr manure
18.323 lb/yr phosphorus	→	13,000 lb/yr phosphorus