

# NORTH CAROLINA AGRICULTURAL WATER USE

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## 2024 Survey of Mid-Volume Farms



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# NORTH CAROLINA

## 2024 Agricultural Water Use Survey of Mid-Volume Farms

The tenth statewide survey was conducted to document water use for the agricultural sector during 2024. As directed in legislation enacted in 2008 (SL2008-0143), the North Carolina Department of Agriculture and Consumer Services, Agricultural Statistics Division, is required to collect annual information from farmers who withdraw 10,000 gallons or more in any one day. Individual responses remain confidential and are only used in combination with other reports to produce totals.

Farmers who use over 1,000,000 gallons in any one day are required to report their water usage directly to the Department of Environmental Quality (DEQ). DEQ's report can be found here: <https://www.ncwater.org/WUDC/app/WWATR/report>.

When looking at agricultural water use from a total volume withdrawn perspective, Table 1 is most representative of total water use. Because farms that withdraw the largest amounts of water do not make those withdrawals every day, the average daily use across all days of the year is most representative of relative volumes used. Field crop operations use water even less often than the average of all types of farms, primarily due to supplement rainfall. While there are other agricultural users of water, including livestock and poultry producers, aquaculture farms, and others, the largest volume of water use is from irrigators. The average North Carolina farm that uses water does so infrequently and in relatively small amounts. Another measure of agricultural water use is shown by Table 2 that displays "demand" use, which is calculated by dividing the total water withdrawn for the month by the days applied.

The results of this survey reflect water withdrawals from ground and surface sources. Many comparisons across sectors will incorporate an estimate of consumptive use of withdrawals. According to a 1990 USDA Economic Research Service Report, consumptive use is a measure of water lost to the immediate water environment through evaporation, plant transpiration, incorporation in products or crops, or consumption by humans, livestock and, in agriculture, is primarily crop evapotranspiration, which is heavily influenced by climate, crops, irrigated, and yield. Past USDA ERS irrigation consumptive use on farms estimates are around 60 percent of total withdrawals nationally.

Of the farms surveyed, 651 withdrew over 10,000 gallons of water in any one day. July was the largest water use month in 2024, averaging 74.6 million gallons daily, with a maximum daily withdrawal of 237.8 million gallons. The annual average daily water usage for 2024 was 33.0 million gallons. The daily withdrawal capacity for the 651 operations totaled 1.04 billion gallons in 2024.

In order to obtain the most survey responses possible, data collection was done over an extended period of time and operations which had potential for large water usage above the scope of the survey were sampled to capture any changes. Operations that did not respond by mail or the web were contacted by telephone follow-up. In addition, livestock and poultry contractors in the state were contacted by email, phone, or mail.



**Table 1: Total & Average Daily Water Withdrawn <sup>1</sup>  
2024 North Carolina Water Use by Month**

| Month                 | Operations | Monthly Total Ground | Monthly Total Surface | Average Across All Days-Ground | Average Across All Days-Surface |
|-----------------------|------------|----------------------|-----------------------|--------------------------------|---------------------------------|
|                       | Number     | Gallons              | Gallons               | Gallons                        | Gallons                         |
| January               | 385        | 172,891,537          | 212,993,855           | 5,577,146                      | 6,870,770                       |
| February              | 387        | 154,446,462          | 199,416,506           | 5,325,740                      | 6,876,431                       |
| March                 | 416        | 263,423,194          | 299,176,205           | 8,497,522                      | 9,650,845                       |
| April                 | 455        | 351,144,190          | 492,678,146           | 11,704,806                     | 16,422,605                      |
| May                   | 492        | 765,547,353          | 834,756,299           | 24,695,076                     | 26,927,623                      |
| June                  | 546        | 830,184,880          | 1,235,420,991         | 27,672,829                     | 41,180,700                      |
| July                  | 502        | 805,690,910          | 1,507,548,341         | 25,990,029                     | 48,630,592                      |
| August                | 456        | 594,049,476          | 1,060,344,998         | 19,162,886                     | 34,204,677                      |
| September             | 427        | 412,113,030          | 631,620,965           | 13,737,101                     | 21,054,032                      |
| October               | 405        | 273,965,279          | 308,754,700           | 8,837,590                      | 9,959,829                       |
| November              | 383        | 29,398,904           | 205,481,424           | 979,963                        | 6,849,381                       |
| December              | 387        | 182,693,846          | 215,671,146           | 5,893,350                      | 6,957,134                       |
| <b>Annual Average</b> |            |                      |                       | <b>13,248,080</b>              | <b>19,736,613</b>               |

**Operations :**

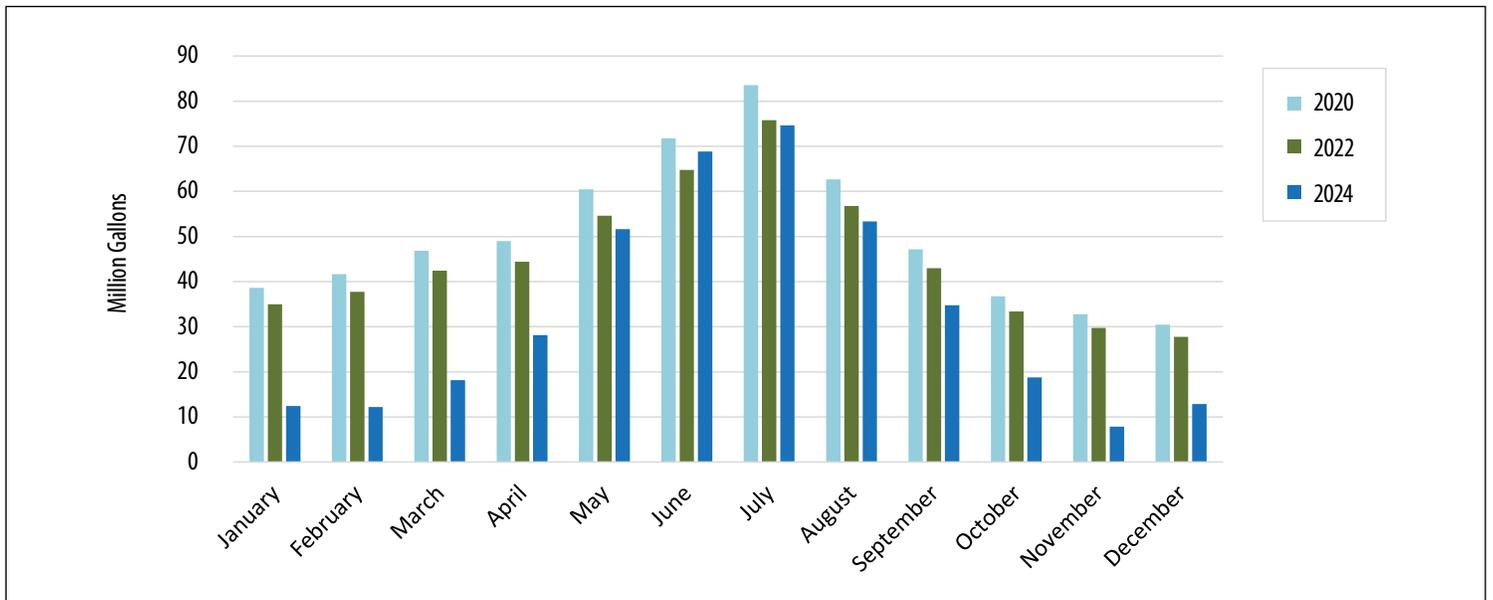
**651** Total Operations

**Daily Withdrawal Capacity (incl. ground & surface):**

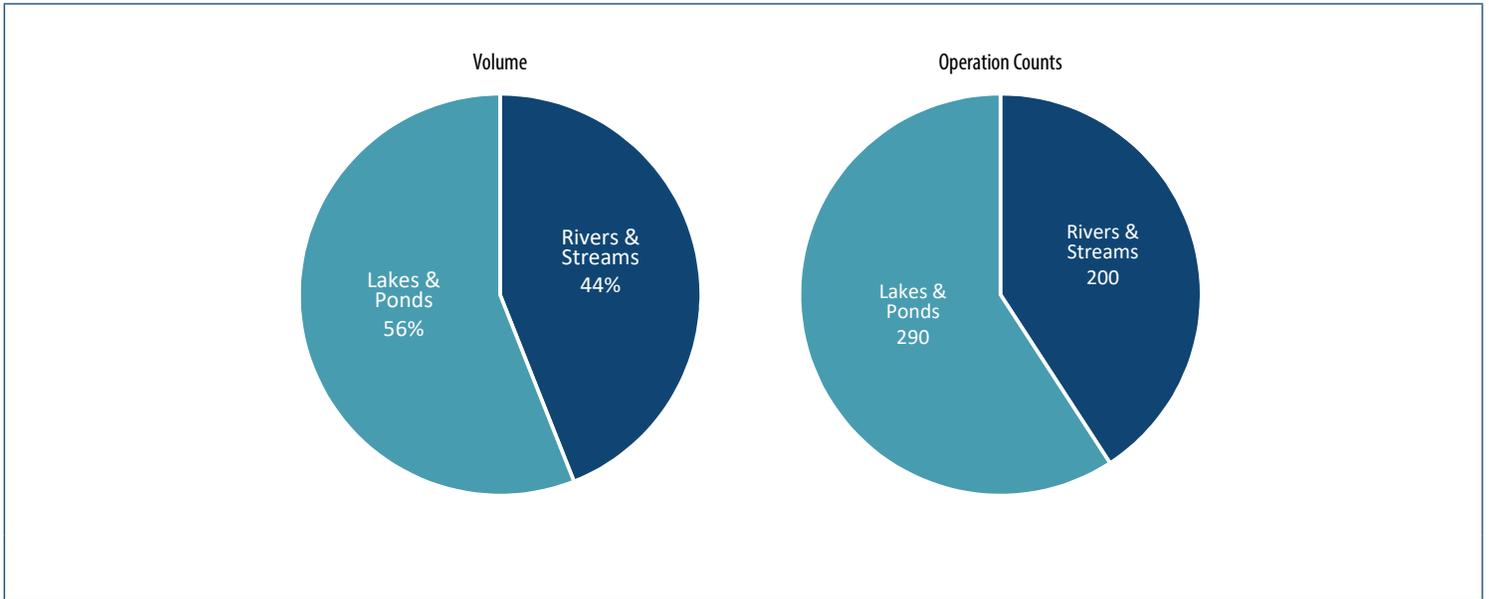
**1,036,811,705** Gallons

<sup>1</sup> Users of 10,000 gallons or more per day. Averages reported in this table reflect the average water withdrawn across all days of the month. Farms that reported their withdrawals directly to DEQ by August 1, 2025 have been excluded. The monthly number of operations will not add to the total. Some operations reported both surface and ground water withdrawals, which are counted twice in the monthly number of operations. However, the total number of operations represents operations that withdrew water at any time during the year, regardless if withdrawn from multiple sources.

**Average Across All Days  
Ground & Surface Water Withdrawals  
2020–2024**



## 2024 Annual Surface Water Withdrawals



**Table 2: Demand Use for Days Applied <sup>1</sup>**  
**2024 North Carolina Water Use by Month**

| Month                 | Average Days Applied Ground | Average Days Applied Surface | Total Average Daily-Ground | Total Average Daily-Surface | Total Max Daily-Ground | Total Max Daily-Surface |
|-----------------------|-----------------------------|------------------------------|----------------------------|-----------------------------|------------------------|-------------------------|
|                       | Days                        | Days                         | Gallons                    | Gallons                     | Gallons                | Gallons                 |
| January               | 29                          | 16                           | 6,053,145                  | 13,723,831                  | 11,737,636             | 12,847,995              |
| February              | 27                          | 15                           | 5,807,067                  | 13,519,763                  | 9,968,980              | 12,719,803              |
| March                 | 28                          | 17                           | 9,276,875                  | 17,831,694                  | 17,273,395             | 23,653,187              |
| April                 | 27                          | 17                           | 13,116,282                 | 29,659,554                  | 29,238,786             | 47,971,670              |
| May                   | 28                          | 18                           | 27,390,216                 | 45,759,066                  | 64,951,270             | 106,625,897             |
| June                  | 27                          | 18                           | 30,327,305                 | 68,727,626                  | 62,437,462             | 168,059,953             |
| July                  | 28                          | 18                           | 28,757,558                 | 81,541,572                  | 64,249,821             | 173,548,296             |
| August                | 28                          | 18                           | 21,034,018                 | 59,614,599                  | 46,613,610             | 141,239,605             |
| September             | 28                          | 19                           | 14,870,594                 | 32,954,137                  | 35,869,662             | 48,786,709              |
| October               | 29                          | 19                           | 9,567,370                  | 16,009,503                  | 22,195,415             | 29,398,904              |
| November              | 28                          | 15                           | 1,050,934                  | 13,293,623                  | 12,075,552             | 13,253,791              |
| December              | 28                          | 15                           | 6,526,546                  | 14,539,628                  | 11,599,075             | 12,276,366              |
| <b>Annual Average</b> |                             |                              | <b>14,481,492</b>          | <b>33,931,216</b>           |                        |                         |

<sup>1</sup> Users of 10,000 gallons or more per day. Averages reported in this table reflect the average water withdrawn during the days of application. Farms that reported their withdrawals directly to DEQ by August 1, 2025 have been excluded.

## 2024 North Carolina Water Use - Hydrologic Unit Code Summary

| Hydrologic Unit Code    | Unique Operations <sup>1</sup> | Annual Average Daily <sup>2</sup> Ground | Annual Average Daily <sup>2</sup> Surface | Daily Withdrawal Capacity <sup>3</sup> |
|-------------------------|--------------------------------|--|---|--|
|                         | Number                         | Gallons                                  | Gallons                                   | Gallons                                |
| 3010107                 | 10                             | *  | *   | 5,356,488                              |
| 3010203                 | 12                             | 259,316                                  | *   | 27,095,024                             |
| 3020102                 | 7                              | 71,772                                   | 458,335                                   | 11,480,701                             |
| 3020201                 | 29                             | 1,391,204                                | 1,405,511                                 | 55,695,409                             |
| 3020202                 | 7                              | *  | *   | 12,683,646                             |
| 3020203                 | 18                             | 557,059                                  | 595,108                                   | 45,308,228                             |
| 3030002                 | 22                             | *  | 679,100                                   | 34,281,525                             |
| 3030004                 | 14                             | 168,027                                  | *   | 8,371,597                              |
| 3030006                 | 29                             | 1,393,500                                | *   | 47,139,843                             |
| 3030007                 | 60                             | 2,055,963                                | *   | 119,233,118                            |
| 3040103                 | 130                            | 886,650                                  | *   | 156,239,179                            |
| 3040203                 | 30                             | 2,023,280                                | *   | 34,767,665                             |
| 3040206                 | 22                             | *  | 260,833                                   | 12,887,739                             |
| 3050105                 | 7                              | 261,980                                  | *   | *                                      |
| Other Hucs <sup>4</sup> | 253                            | 4,179,328                                | 16,337,725                                | 466,271,543                            |
| <b>State</b>            | <b>651</b>                     | <b>13,248,080</b>                        | <b>19,736,613</b>                         | <b>1,036,811,705</b>                   |

<sup>1</sup> represents the unique # of operations which withdrew surface and or ground water

<sup>2</sup> represents the average across all days of the year

<sup>3</sup> includes ground and surface

<sup>4</sup> includes nondisclosed data from the table above and all data for HUCS not listed in the above table



## Statistical Defensibility

The North Carolina Department of Agriculture and Consumer Services' Agricultural Statistics Division conducted a census of all known farm operations in North Carolina which had farming types that could potentially use more than 10,000 gallons of water in one day. Over 2,000 such operations were contacted and included farms with a history of withdrawing more than 10,000 gallons on any one day from surface or ground sources. Also included were operations with large numbers of poultry, hogs, cattle, aquaculture, fruits, vegetables, nursery/ greenhouse crops, tobacco, or other field crops which are often irrigated. Response rates were attained with an extended data collection period using mail, phone, and web or email methods. Historical data for all respondents was reviewed to ensure comparability with previous surveys. Operations were provided work sheets which assisted them, if necessary, in reporting their withdrawals.

The Census of Agriculture List, the most comprehensive source of farms, was used as the basis for this survey. Although no under-coverage estimator has been applied, the list of NC farmers is expanded daily as new operations are discovered through routine list building activities. Since agricultural operations that withdraw at least 10,000 gallons of water per day tend to be larger, more intensive farms, under-coverage for this survey is minimal based on historic surveys with similar operations. When reasonable, non-respondents' usage was estimated based on their own historical reports.

Taking the above steps, including conducting a census of all known farm operations that use at least 10,000 gallons of water on any one day, results in zero sampling error around the estimates and minimal non-sampling and coverage error. A nonresponse adjustment expansion factor was applied. It was derived by dividing the universe count by the count of records with usable data.

Prior to the 2008 NC Agricultural Water Use Survey, there was no official statistically defensible data set to represent agricultural water use in North Carolina.

