

Study for the Ongoing Assessment of Water Quality in Jordan Lake 2016 Results.

Purpose:

The objective of this study is to evaluate progress in reducing nutrient and nutrient-related pollution in Jordan Lake, as required by the Jordan water supply nutrient strategy (15A NCAC 02B.0262) (i.e. the “Jordan Lake Rules”). This report summarizes results of samples collected in 2016.

Methods:

The detailed study plan can be found [here](#). A total of nine monitoring stations were sampled in Jordan Lake during 2016 that represent the three lake management areas: Upper New Hope, Lower New Hope, and Haw River. All stations were sampled at minimum once per month throughout the year. Chemical samples were collected from the photic zone and analyzed for total phosphorus (TP), total nitrogen (TN), ammonia (NH₃), nitrate + nitrite (NO₃+NO₂), total Kjeldahl nitrogen (TKN), turbidity, and chlorophyll *a* (Chla). Duplicate samples were collected at one station per sampling event on a rotating schedule for quality control. Physical measurements of dissolved oxygen (DO), temperature, pH, and conductivity were collected through the water column in one meter (m) increments with a multiparameter meter.

Results:

One year summary results are presented by station for each of the three management areas: Upper New Hope (Figure 1), Lower New Hope (Figure 2) and Haw River Arm (Figure 3). These figures show annual mean (average), minimum, and maximum concentrations for TP (mg/L), TN (mg/L), Chla (µg/L), and turbidity (NTU) from the photic zone; DO (mg/L) and pH (s.u.) from a depth of 0.15 m (surface sample). Data summaries are calculated from fourteen sampling events (n = 14), except sites CPF055D and CPF055E in which n = 13. Percent exceedance of state water quality standards are shown for each station. Exceedance is defined by Chla >40 µg/L; Turbidity >25 NTU; DO <4 mg/L; pH >9 or <6 s.u. All nitrate + nitrite and ammonia data below detection (< 0.02 mg/L) were quantified as 0.01 mg/L in order to calculate TN values.

Figure 1. Upper New Hope Section of Jordan Lake 2016 Results

| CPF086C | | | | | | | |
|---------------------|----|------|--------|-------|-----------|-------|-----|
| | n | TP | TN | Chla | Turbidity | DO | pH |
| Mean | 14 | 0.08 | 1.03 | 50.8 | 17.7 | 10.27 | 8.2 |
| Min | 14 | 0.05 | 0.86 | 12.0 | 7.9 | 4.94 | 7.0 |
| Max | 14 | 0.12 | 1.35 | 84.0 | 33.0 | 12.99 | 9.5 |
| <i>n</i> > Standard | | | 10 | 3 | 0 | 1 | |
| % Exceedance | | | 71.4% | 21.4% | 0.0% | 7.1% | |
| % Confidence | | | 100.0% | 84.2% | n/a | 22.9% | |

| CPF081A1C | | | | | | | |
|---------------------|----|------|--------|-------|-----------|-------|-----|
| | n | TP | TN | Chla | Turbidity | DO | pH |
| Mean | 14 | 0.09 | 1.02 | 50.1 | 21.4 | 10.19 | 7.9 |
| Min | 14 | 0.06 | 0.83 | 10.0 | 10.0 | 4.75 | 6.3 |
| Max | 14 | 0.12 | 1.34 | 95.0 | 40.0 | 12.77 | 9.3 |
| <i>n</i> > Standard | | | 10 | 4 | 0 | 1 | |
| % Exceedance | | | 71.4% | 28.6% | 0.0% | 7.1% | |
| % Confidence | | | 100.0% | 95.6% | n/a | 22.9% | |

| CPF086F | | | | | | | |
|---------------------|----|------|--------|-------|-----------|-------|-----|
| | n | TP | TN | Chla | Turbidity | DO | pH |
| Mean | 14 | 0.07 | 0.98 | 43.1 | 15.6 | 9.07 | 7.7 |
| Min | 14 | 0.05 | 0.83 | 14.0 | 8.7 | 5.94 | 7.1 |
| Max | 14 | 0.10 | 1.11 | 63.0 | 32.0 | 12.19 | 8.8 |
| <i>n</i> > Standard | | | 9 | 1 | 0 | 0 | |
| % Exceedance | | | 64.3% | 7.1% | 0.0% | 0.0% | |
| % Confidence | | | 100.0% | 22.9% | n/a | n/a | |

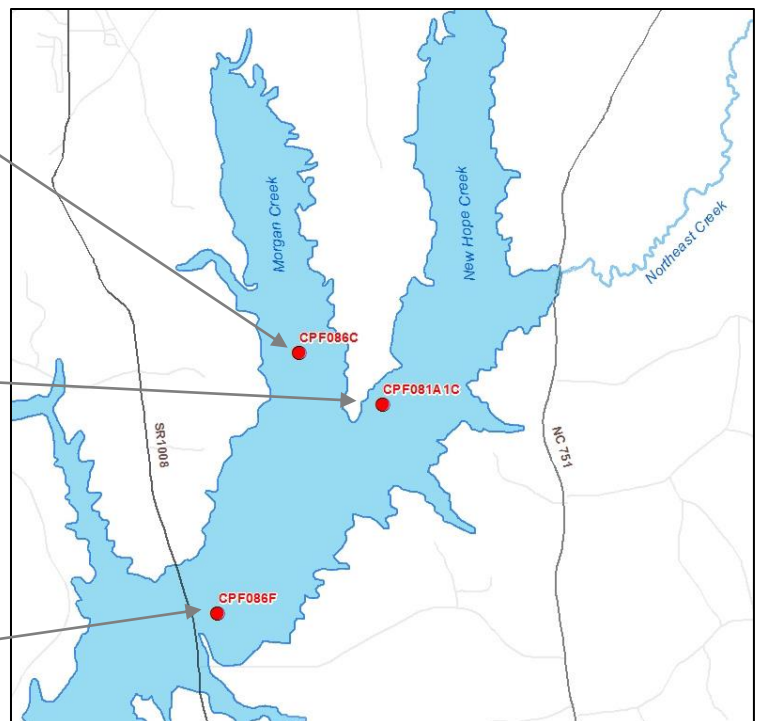
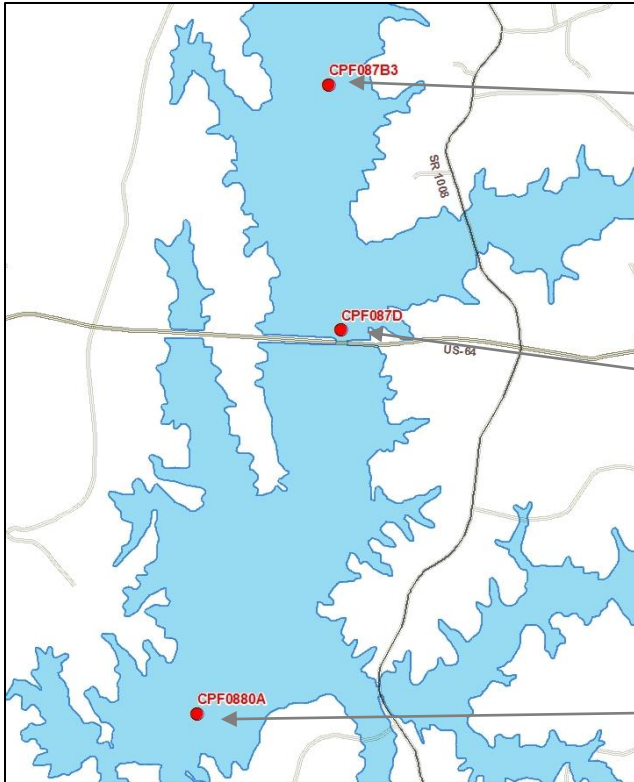


Figure 2. Lower New Hope Area of Jordan Lake 2016 Results



| CPF087B3 | | | | | | | |
|---------------------|----|------|------|-------|-----------|-------|------|
| | n | TP | TN | Chla | Turbidity | DO | pH |
| Mean | 14 | 0.05 | 0.88 | 32.9 | 9.4 | 8.93 | 7.7 |
| Min | 14 | 0.03 | 0.70 | 14.0 | 5.3 | 5.21 | 7.0 |
| Max | 14 | 0.07 | 1.05 | 43.0 | 17.0 | 12.20 | 8.7 |
| <i>n</i> > Standard | | | | 2 | 0 | 0 | 0 |
| % Exceedance | | | | 14.3% | 0.0% | 0.0% | 0.0% |
| % Confidence | | | | 58.5% | n/a | n/a | n/a |

| CPF087D | | | | | | | |
|---------------------|----|------|------|-------|-----------|-------|------|
| | n | TP | TN | Chla | Turbidity | DO | pH |
| Mean | 14 | 0.04 | 0.88 | 29.4 | 8.2 | 8.57 | 7.6 |
| Min | 14 | 0.03 | 0.73 | 17.0 | 4.8 | 5.18 | 6.9 |
| Max | 14 | 0.05 | 0.99 | 46.0 | 13.0 | 12.11 | 8.6 |
| <i>n</i> > Standard | | | | 2 | 0 | 0 | 0 |
| % Exceedance | | | | 14.3% | 0.0% | 0.0% | 0.0% |
| % Confidence | | | | 58.5% | n/a | n/a | n/a |

| CPF0880A | | | | | | | |
|---------------------|----|------|------|-------|-----------|-------|-------|
| | n | TP | TN | Chla | Turbidity | DO | pH |
| Mean | 14 | 0.04 | 0.92 | 24.3 | 9.1 | 8.98 | 7.8 |
| Min | 14 | 0.03 | 0.64 | 6.3 | 5.0 | 5.26 | 7.1 |
| Max | 14 | 0.10 | 1.22 | 41.0 | 29.0 | 12.81 | 9.2 |
| <i>n</i> > Standard | | | | 1 | 1 | 0 | 1 |
| % Exceedance | | | | 7.1% | 7.1% | 0.0% | 7.1% |
| % Confidence | | | | 22.9% | 22.9% | n/a | 22.9% |

Figure 3. Haw River Arm of Jordan Lake 2016 Results

| CPF055C | | | | | | | |
|---------------------|----|------|------|-------|-----------|-------|-------|
| | n | TP | TN | Chla | Turbidity | DO | pH |
| Mean | 14 | 0.09 | 1.29 | 30.1 | 23.8 | 10.42 | 8.0 |
| Min | 14 | 0.05 | 1.04 | 3.2 | 6.3 | 4.53 | 7.1 |
| Max | 14 | 0.24 | 1.70 | 63.0 | 160.0 | 12.95 | 9.4 |
| <i>n</i> > Standard | | | | 3 | 2 | 0 | 4 |
| % Exceedance | | | | 21.4% | 14.3% | 0% | 28.6% |
| % Confidence | | | | 84.2% | 58.5% | n/a | 95.6% |

| CPF055D | | | | | | | |
|---------------------|----|------|------|-------|-----------|-------|-------|
| | n | TP | TN | Chla | Turbidity | DO | pH |
| Mean | 14 | 0.08 | 1.19 | 26.2 | 21.3 | 9.55 | 7.8 |
| Min | 14 | 0.04 | 0.81 | 6.0 | 5.1 | 3.69 | 7.0 |
| Max | 14 | 0.24 | 1.77 | 63.0 | 150.0 | 14.24 | 9.3 |
| <i>n</i> > Standard | | | | 3 | 2 | 1 | 2 |
| % Exceedance | | | | 21.4% | 14.3% | 7.7% | 15.4% |
| % Confidence | | | | 84.2% | 58.5% | 25.4% | 62.1% |

| CPF055E | | | | | | | |
|---------------------|----|------|------|-------|-----------|-------|-------|
| | n | TP | TN | Chla | Turbidity | DO | pH |
| Mean | 14 | 0.06 | 1.06 | 24.6 | 11.9 | 9.18 | 7.8 |
| Min | 14 | 0.04 | 0.74 | 5.0 | 5.0 | 5.14 | 6.8 |
| Max | 14 | 0.10 | 1.67 | 50.0 | 34.0 | 13.21 | 9.2 |
| <i>n</i> > Standard | | | | 3 | 2 | 0 | 2 |
| % Exceedance | | | | 21.4% | 14.3% | 0.0% | 15.4% |
| % Confidence | | | | 84.2% | 58.5% | n/a | 62.1% |

