



Water Quality Monitoring: Standing Water 2008–2017

Background

Water quality is one of 12 vital signs in Pacific Island national parks. This brief summarizes 2008–2017 results for chemical and physical characteristics of standing waters at AMME (American Memorial Park), Kaloko-Honokōhau National Historical Park (KAHO), Puʻuhonua o Hōnaunau National Historic Park (PUHO), and Puʻukoholā Heiau National Historic Site (PUHE).

The objective of the Pacific Island Network's water quality monitoring protocol is to characterize the quality of groundwater, anchialine pools, and wetland waters within park boundaries, and to compare changes in the parks over space and time.

Highlights

- 1) **KAHO groundwater:** Nitrogen appears to have leveled-off in 2016-2017. Temperature and chlorophyll appear to vary seasonally.
- 2) **KAHO anchialine pools:** Previously reported increases in nutrients appear to have leveled off ~ 2013. This pattern is especially apparent in central pool total dissolved phosphorus (TDP).
- 3) **PUHO anchialine pools:** Nutrients vary within a fairly consistent range, which may reflect seasonal fluctuations in phytoplankton populations.
- 4) **Kahaluʻu Beach Park pool:** This pool continues to behave chemically like a tide pool rather than an anchialine pool, reflecting its demise following restoration efforts as described in previous briefings.
- 5) **PUHE:** The brackish water body displayed no patterns of concern.
- 6) **AMME:** Salinity may have decreased during the study period. Further analyses will be presented in a focused assessment report.

Certified data from 2008 to 2017 are presented in graphs on pages 2–10 (Figures 1–9).

Resource briefs provide regular updates to park superintendents and natural resource managers. The data will be analyzed and formally published in peer-reviewed reports or journals; the briefing allows for a more rapid transmission of data observations.

Management Applications

- Identify park waters in compliance with relevant water quality regulations.
- Document long-term trends in water quality parameters.
- Document effects of management actions on water quality.
- Provide warnings for management on deteriorating water conditions.



Biological Technician Amanda McCutcheon filters an anchialine pool water sample at Puʻuhonua O Honaunau National Historical Park. Photo by Anne Farahi.

More Information

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[Vital Signs: Pacific Island Inventory & Monitoring Network](#)

Program reports, protocols, and data products:
<https://irma.nps.gov/Datastore/Reference/Profile/2166407>

Water Quality at KAHO Groundwater

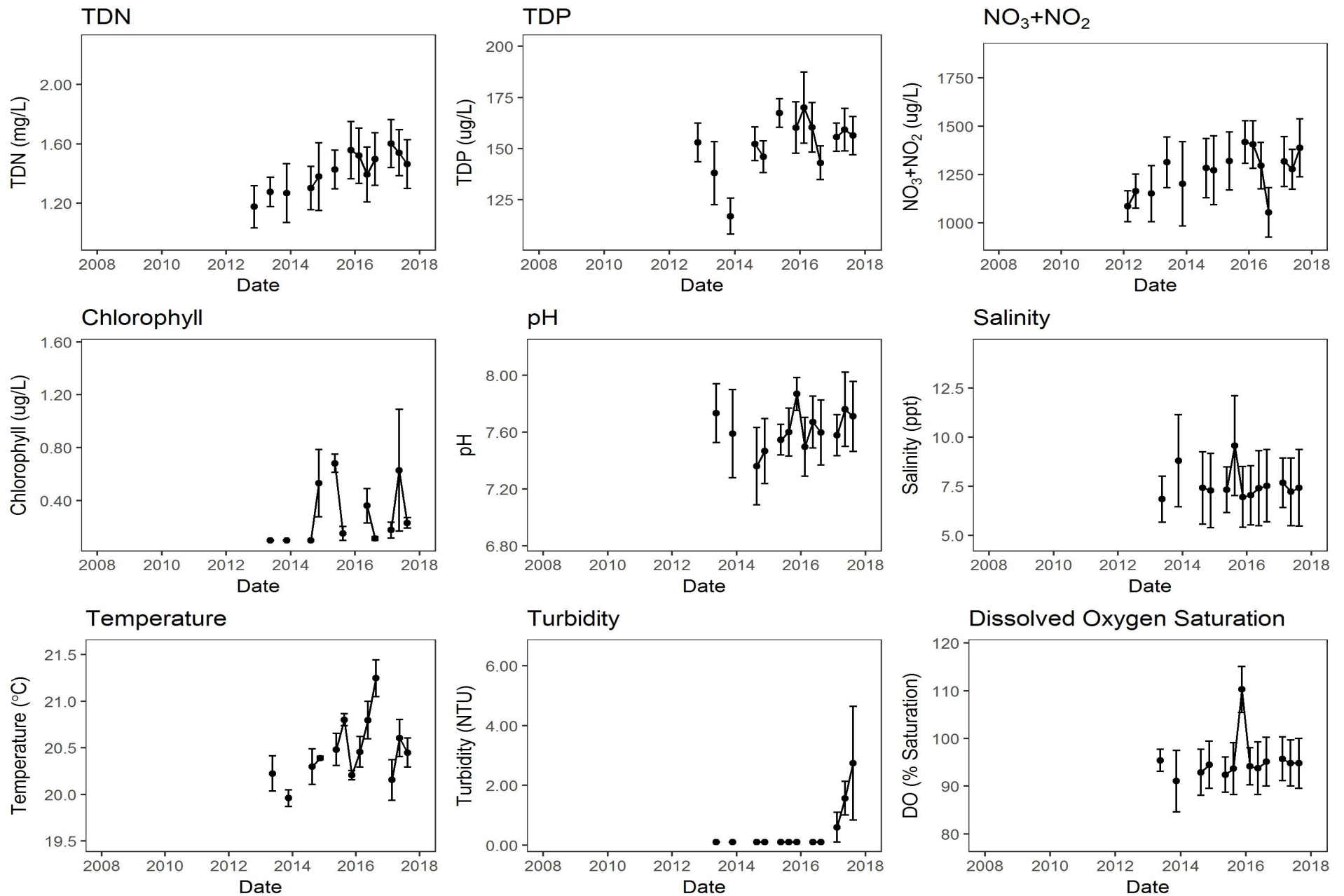


Figure 1. Groundwater quality at Kaloko-Honokōhau National Historical Park (KAHO), 2008–2017. TDN is total dissolved nitrogen, TDP is total dissolved phosphorus, NO₃ + NO₂ is nitrate and nitrite. Y-axis values are means of all sample sites. Error bars are the 95% confidence interval.

Water Quality at KAHO Central Anchialine Pools

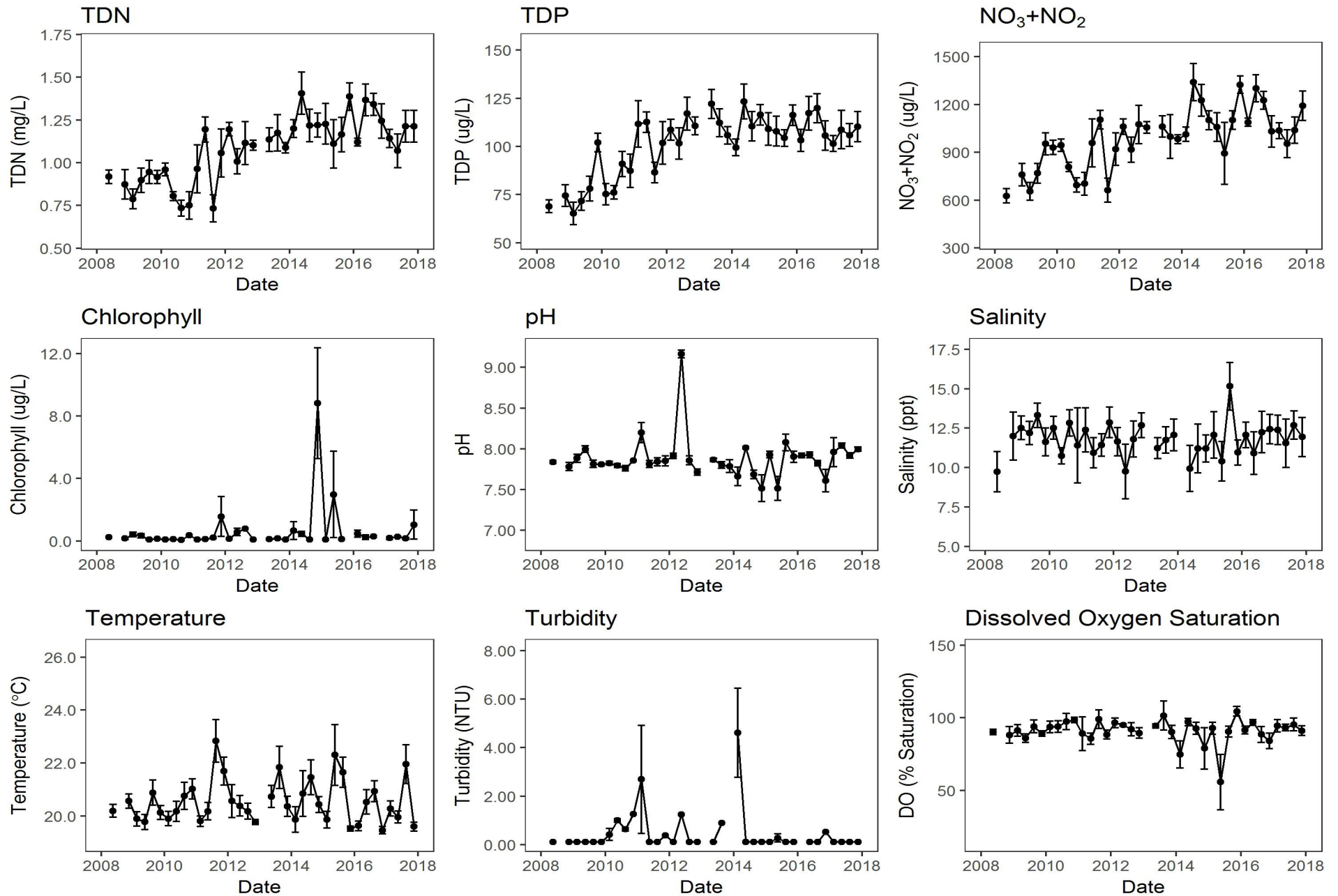


Figure 2. Water quality at Central Anchialine Pools, Kaloko-Honokōhau National Historical Park (KAHO), 2008–2017. TDN is total dissolved nitrogen, TDP is total dissolved phosphorus, NO₃ + NO₂ is nitrate and nitrite. Y-axis values are means of all sample sites. Error bars are the 95% confidence interval.

Water Quality at KAHO Harbor North Anchialine Pools

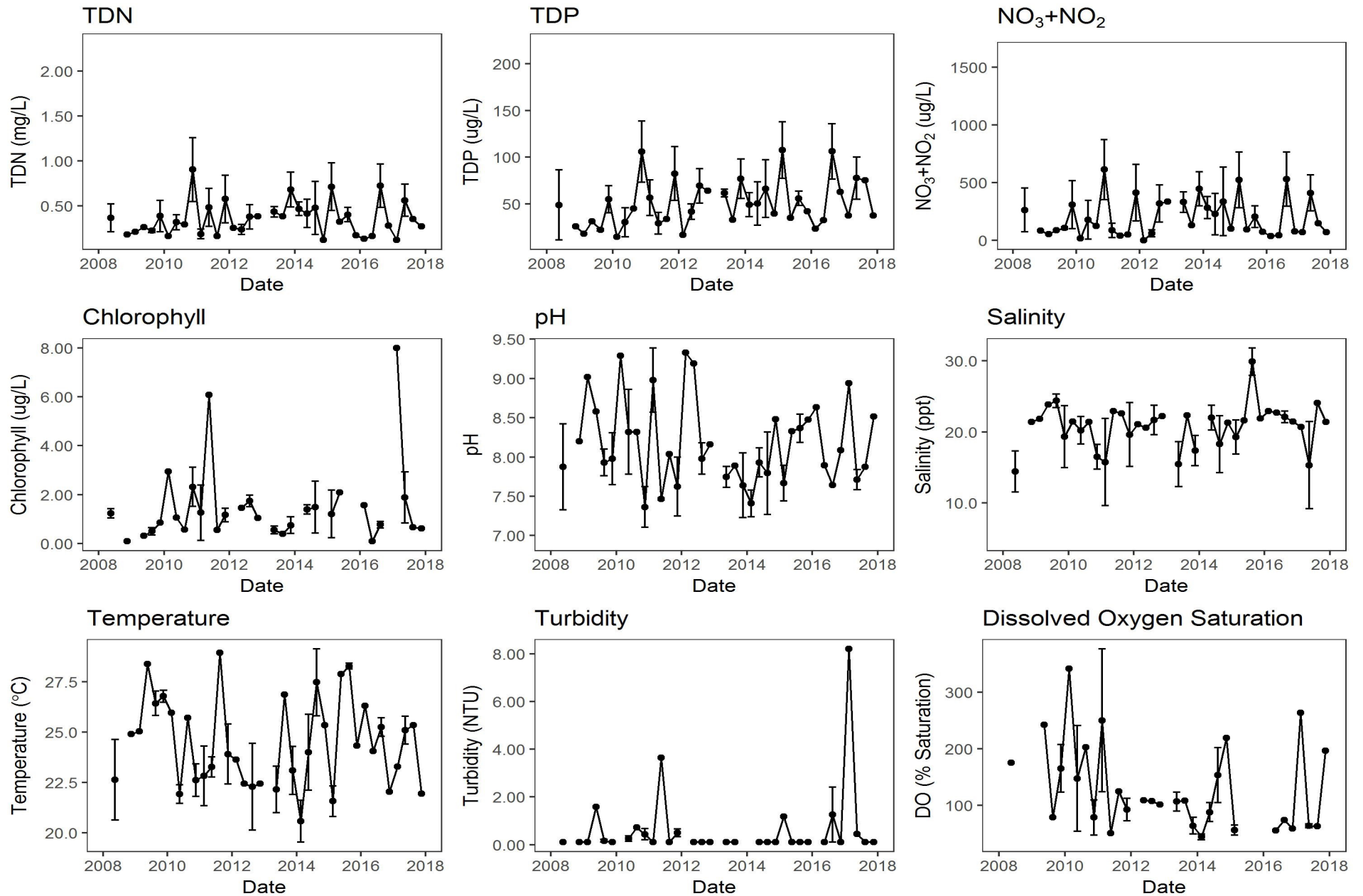


Figure 3. Water quality of Harbor North Anchialine Pools, Kaloko-Honokōhau National Historical Park (KAHO), 2008–2017. TDN is total dissolved nitrogen, TDP is total dissolved phosphorus, NO₃ + NO₂ is nitrate and nitrite. Y-axis values are means of all sample sites. Error bars are the 95% confidence interval.

Water Quality at KAHO North Anchialine Pools

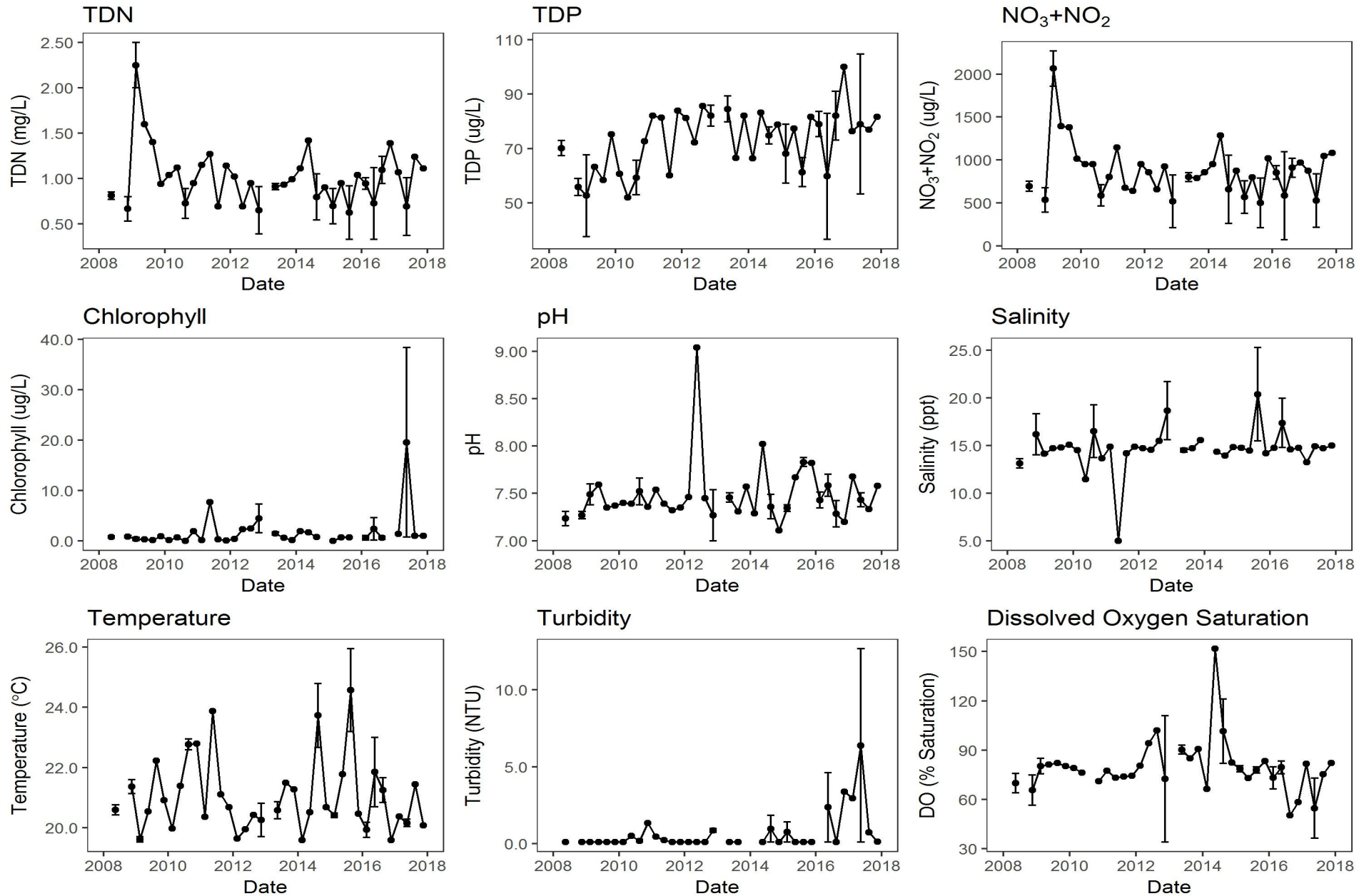


Figure 4. Water quality of North Anchialine Pools, Kaloko-Honokōhau National Historical Park (KAHO), 2008–2017. TDN is total dissolved nitrogen, TDP is total dissolved phosphorus, NO₃ + NO₂ is nitrate and nitrite. Y-axis values are means of all sample sites. Error bars are the 95% confidence interval.

Water Quality at Royal Grounds Anchialine Pools

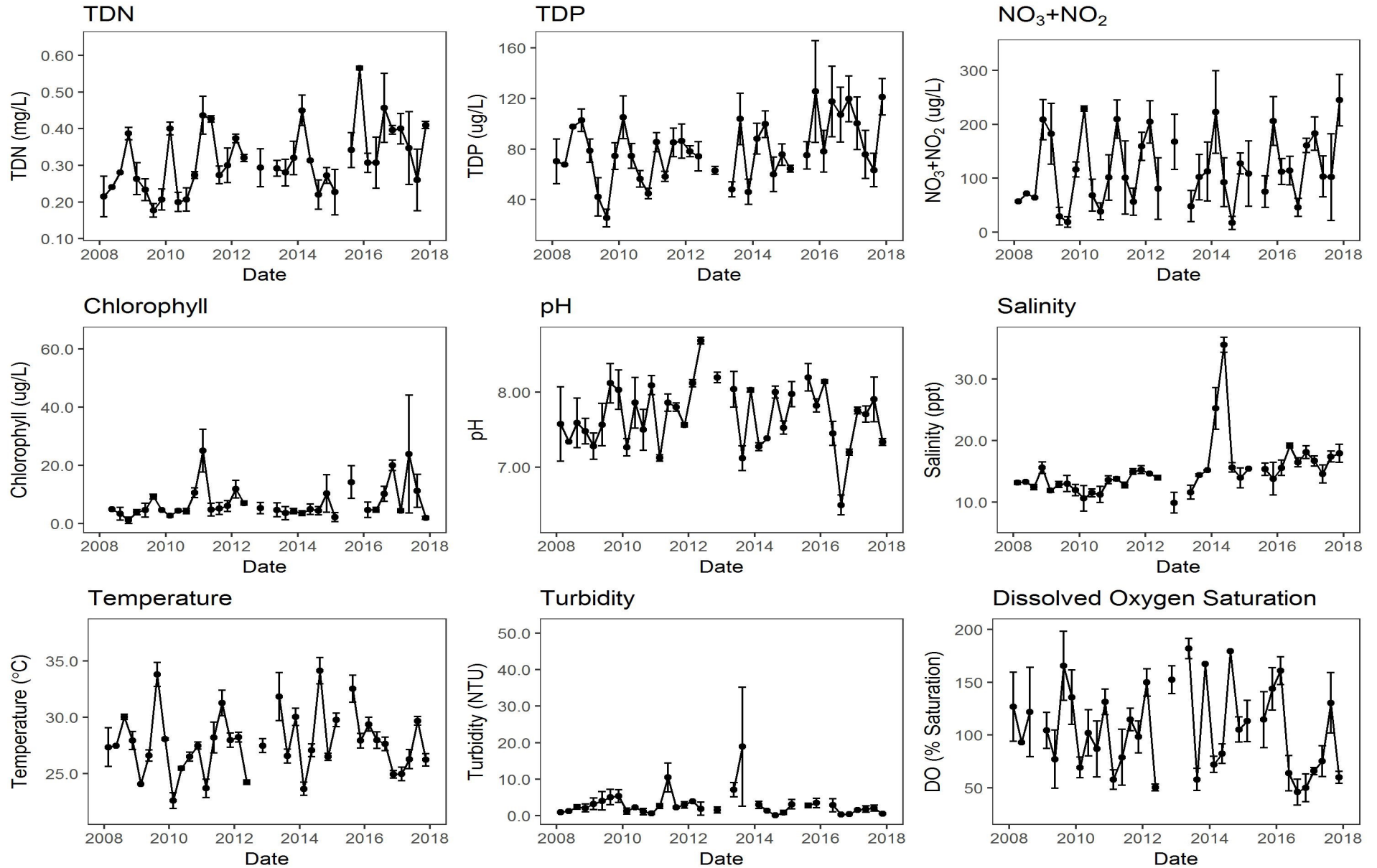


Figure 5. Water quality at Pu'uhonua o Hōnaunau National Historic Park (PUHO), 2008–2017. TDN is total dissolved nitrogen, TDP is total dissolved phosphorus, NO₃ + NO₂ is nitrate and nitrite. Y-axis values are means of all sample sites. Error bars are the 95% confidence interval.

Water Quality at Kahalu'u Beach Park Anchialine Pool

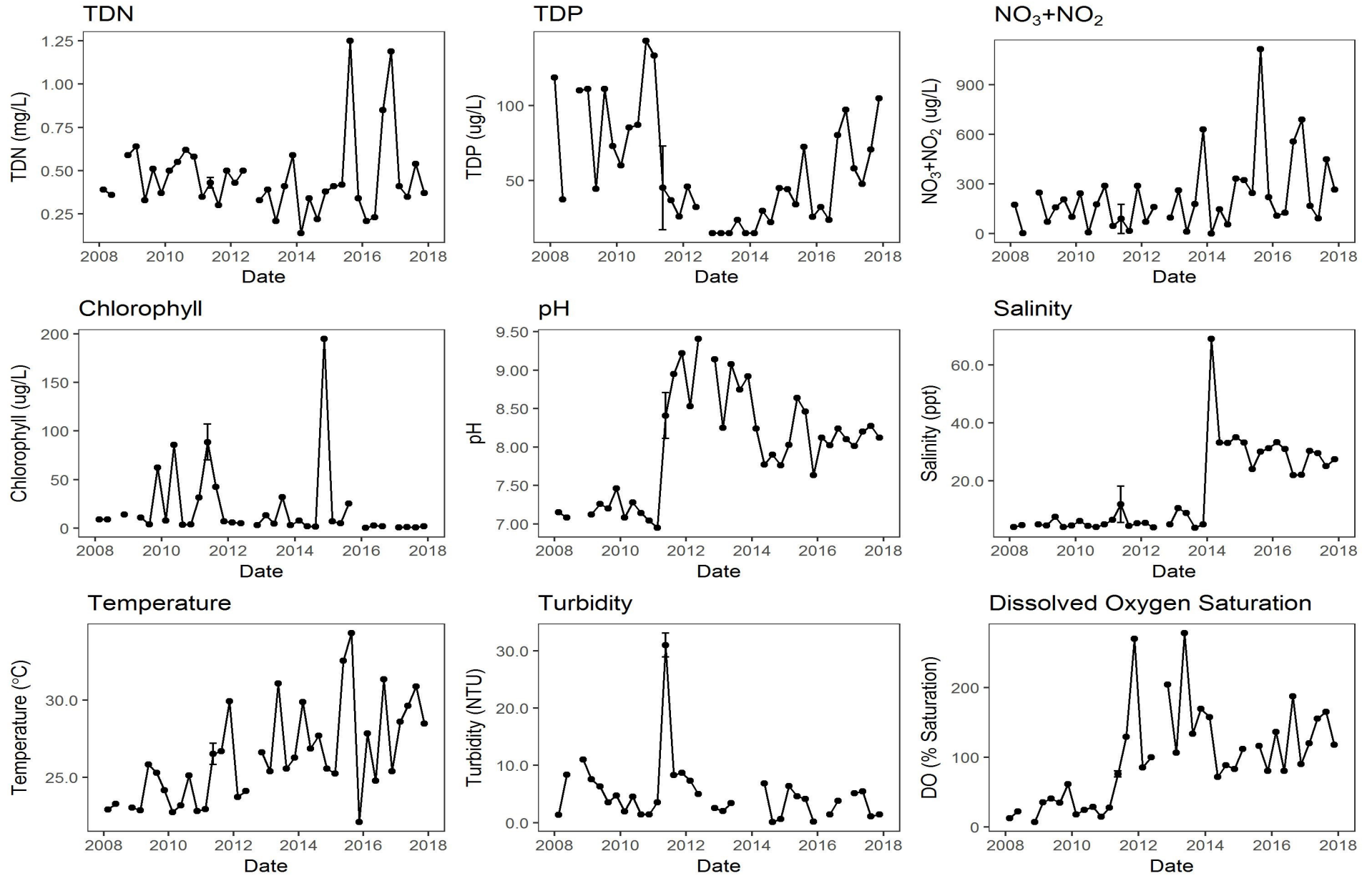


Figure 6. Water quality at Kahalu'u Beach Park anchialine pool, 2008–2017. TDN is total dissolved nitrogen, TDP is total dissolved phosphorus, NO₃ + NO₂ is nitrate and nitrite. Y-axis values are means of all sample sites. Error bars are the 95% confidence interval.

Water Quality at PUHE Brackish Waterbody

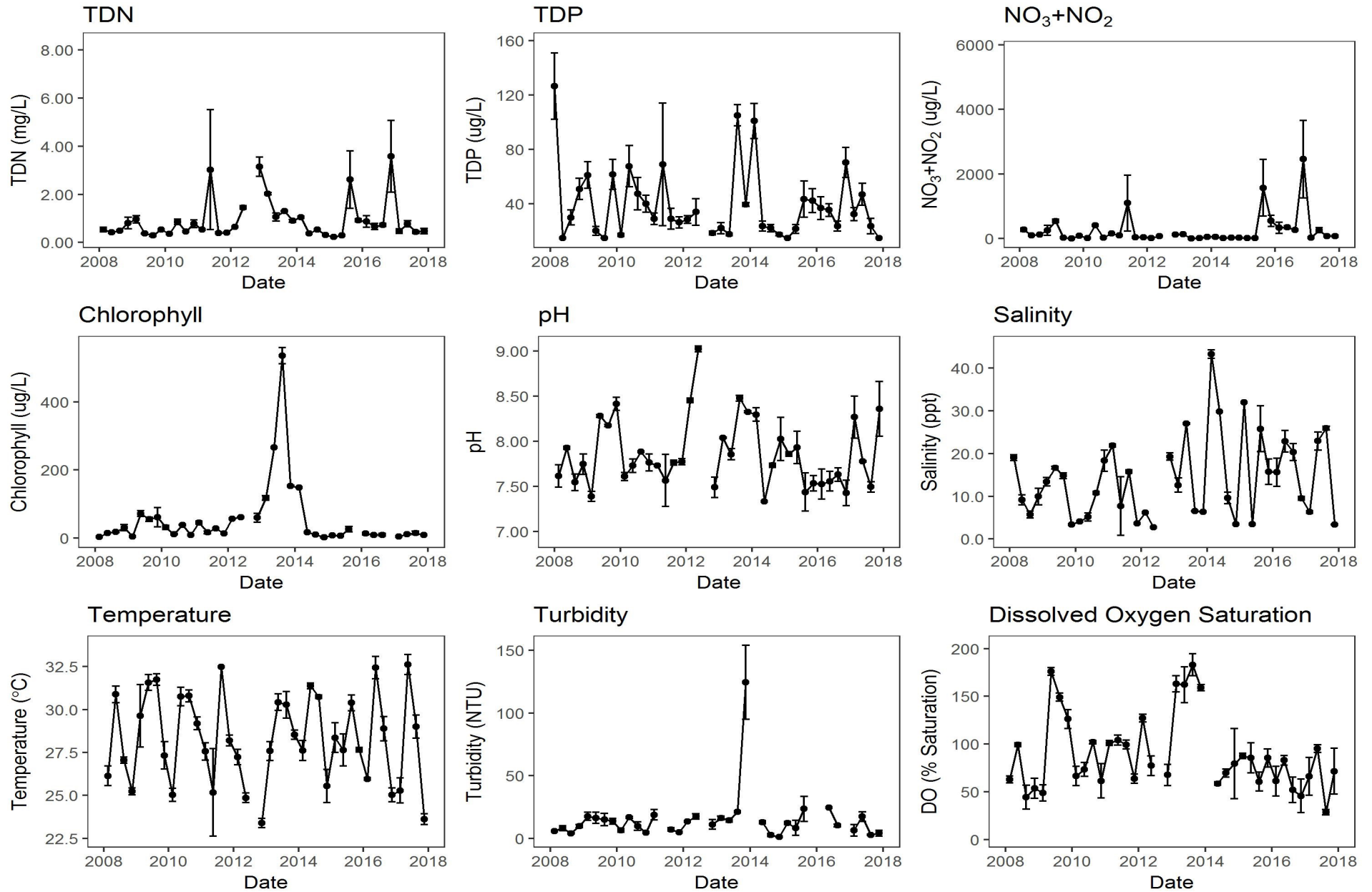


Figure 7. Quality of brackish waters at Pu'ukoholā Heiau National Historic Site (PUHE), 2008–2017. TDN is total dissolved nitrogen, TDP is total dissolved phosphorus, NO₃ + NO₂ is nitrate and nitrite. Y-axis values are means of all sample sites. Error bars are the 95% confidence interval.

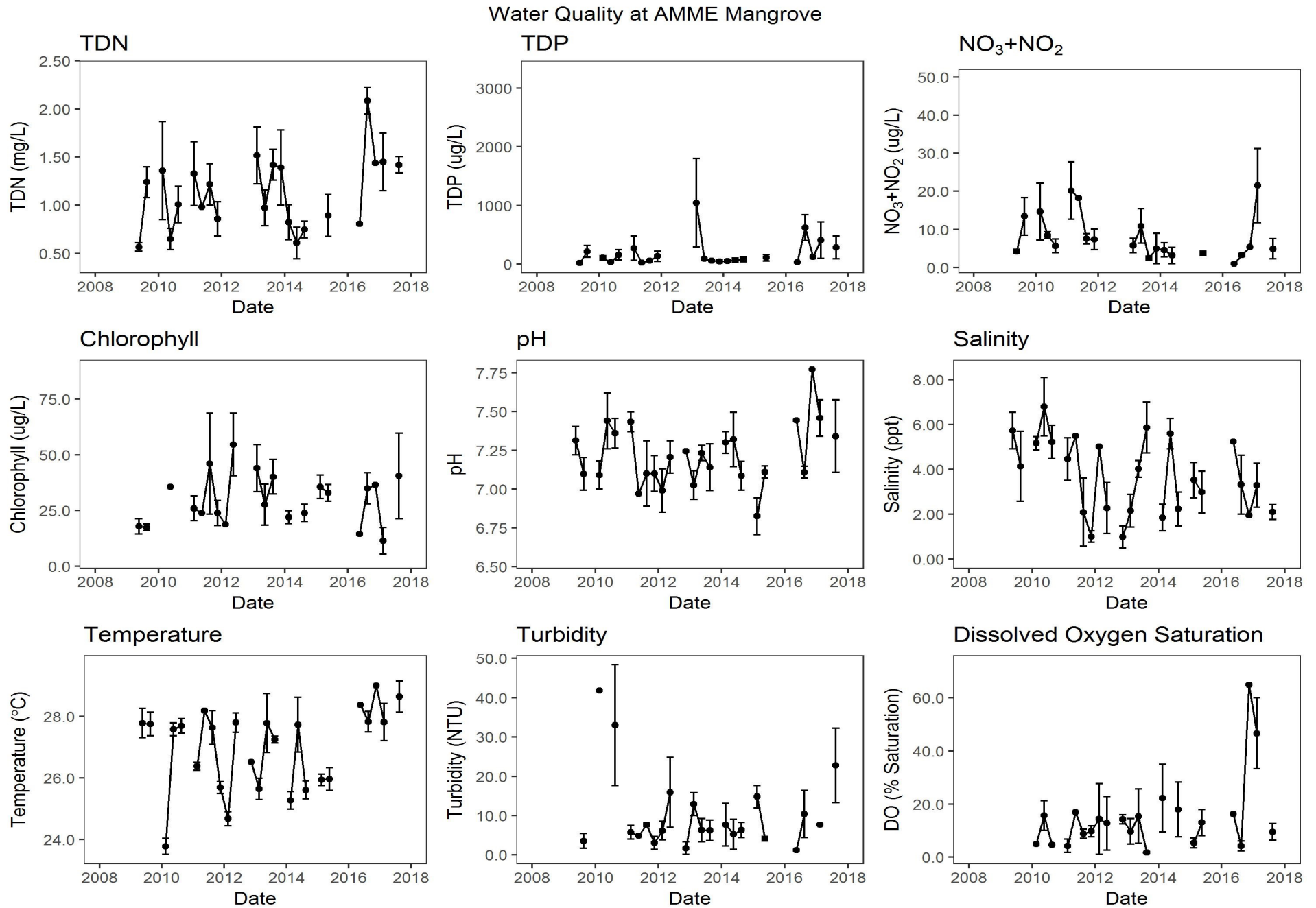


Figure 8. Water quality at mangroves, American Memorial Park (AMME), 2008–2017. TDN is total dissolved nitrogen, TDP is total dissolved phosphorus, NO₃ + NO₂ is nitrate and nitrite. Y-axis values are means of all sample sites. Error bars are the 95% confidence interval.

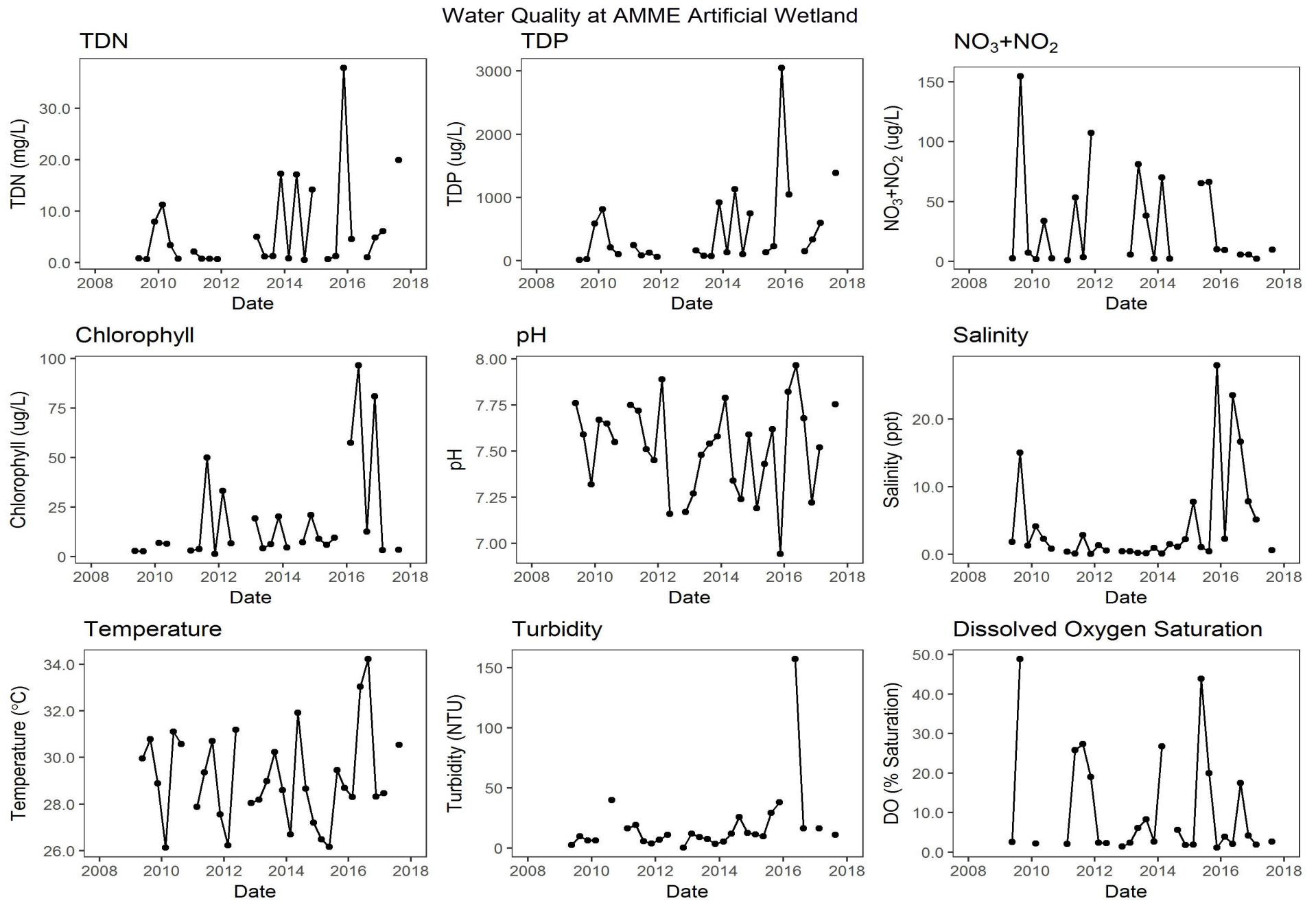


Figure 9. Water quality of an artificial wetland, American Memorial Park (AMME), 2008–2017. TDN is total dissolved nitrogen, TDP is total dissolved phosphorus, NO₃ + NO₂ is nitrate and nitrite. Y-axis values are means of all sample sites. Error bars are the 95% confidence interval.