



Water Quality Monitoring: Marine Waters 2008–2017

Background

Water quality is one of 12 vital signs in Pacific Island national parks, and its protocol integrates closely with several other aquatic vital signs to maximize the value of the data we collect. This brief summarizes 2008–2017 results for chemical and physical characteristics of marine waters at Kaloko-Honokōhau National Historical Park (KAHO), Kalaupapa National Historic Park (KALA), War in the Pacific National Historical Park (WAPA), and National Park of American Samoa (NPSA). A trend report covering 2008–2015 is near publication.

The Pacific Island Network's water quality monitoring

protocol allows the NPS to meet its monitoring objectives for marine waters: to characterize the water quality of coastal marine areas within park boundaries and to compare changes in the parks over space and time.

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.

Highlights

- 1) Marine waters were low in nitrogen and phosphorus, high in oxygen, and visually clear, and thus unremarkable and consistent with previous studies.
- 2) Temperature and chlorophyll appear to vary seasonally.
- 3) Surface and near-bottom measurements were highly correlated.
- 4) There were few patterns over space or time.
- 5) Spatial patterns were only detected at KAHO, where a plume with increased nitrogen and phosphorus and lower salinity and temperature emanating from Honokohau Small Boat Harbor was detected in the southern end of the park's marine area.
- 6) Salinity decreased over the last 10 years at KALA, WAPA, NPSA, and KAHO but these patterns could be explained by the El Niño Southern Oscillation (ENSO), and are not considered detrimental long-term trends at this time.

Certified data from 2008 to 2017 are presented in graphs on pages 2–8 (Figures 1–7).



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>

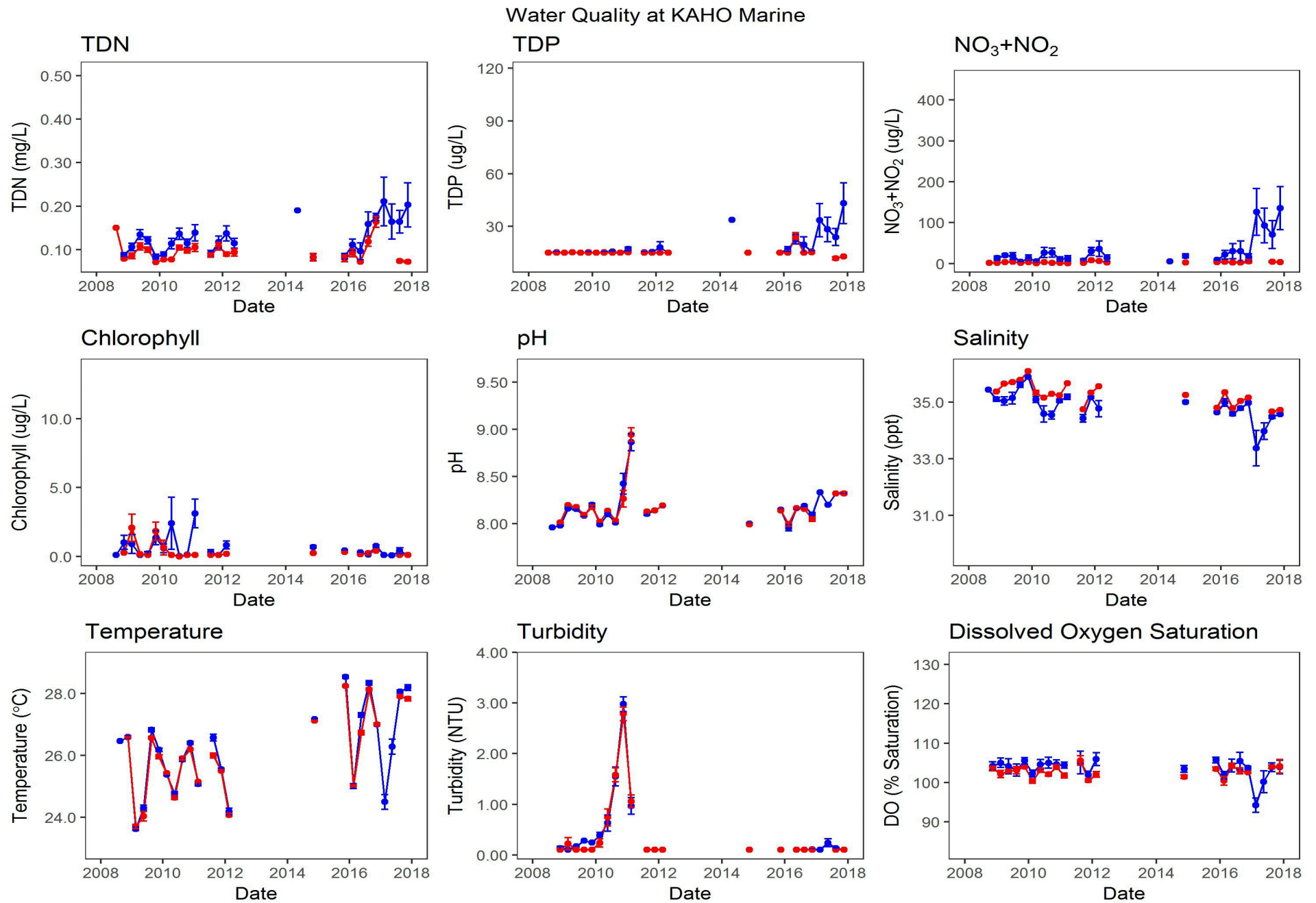


Figure 1. Quality of marine waters at Kaloko-Honokōhau National Historical Park (KAHO), 2008–2017. TDN is total dissolved nitrogen, TDP is total dissolved phosphorus, $\text{NO}_3 + \text{NO}_2$ is nitrate and nitrite. Blue lines and points represent surface samples and red lines and points represent near-bottom samples. Y-axis values are means of all sample sites. Error bars are the 95% confidence interval.

Water Quality at KALA Marine

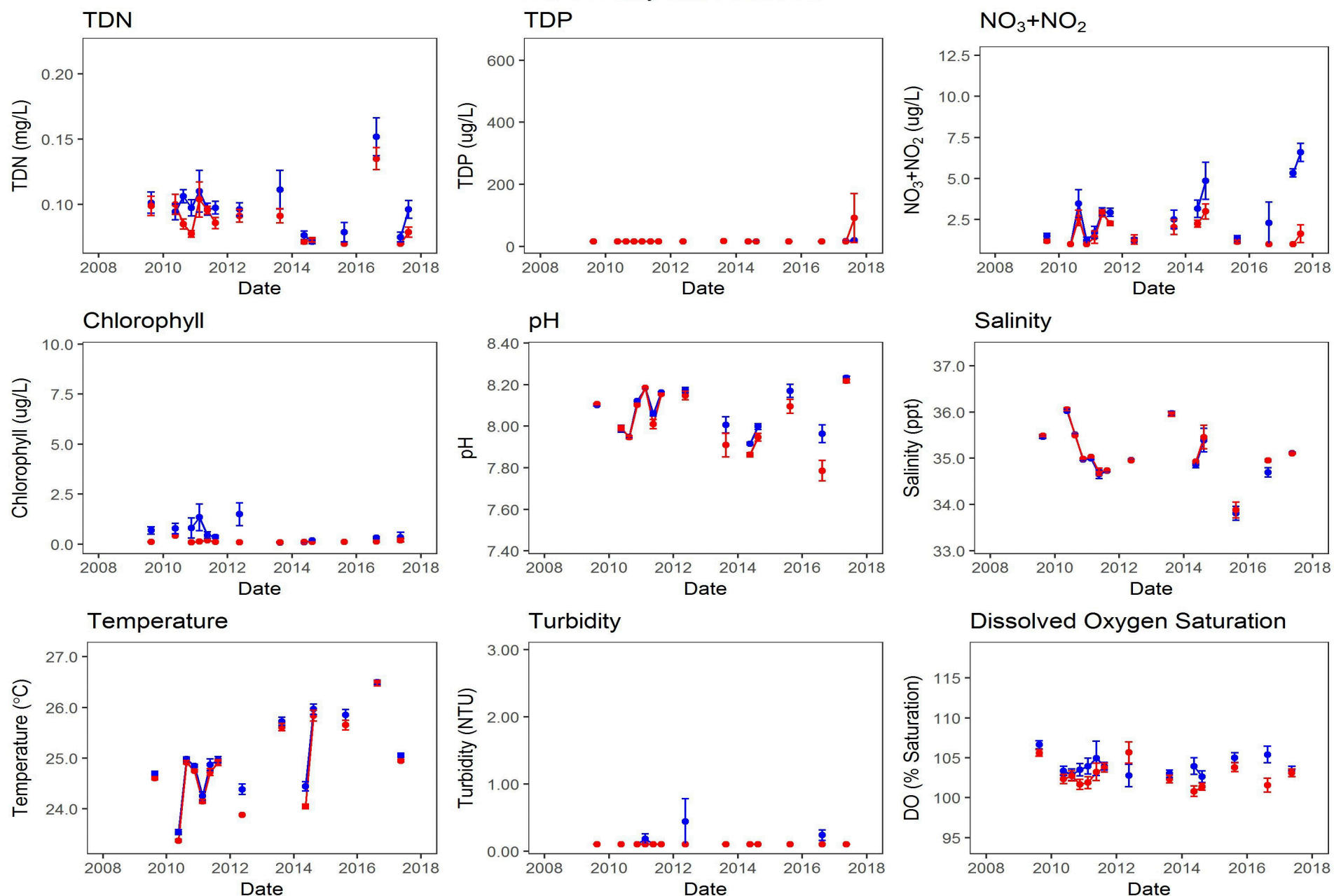


Figure 2. Quality of marine waters at Kalaupapa National Historic Park (KALA), 2008–2017. TDN is total dissolved nitrogen, TDP is total dissolved phosphorus, NO₃ + NO₂ is nitrate and nitrite. Blue lines and points represent surface samples and red lines and points represent near-bottom samples. Y-axis values are means of all sample sites. Error bars are the 95% confidence interval.

Water Quality at Agat Marine

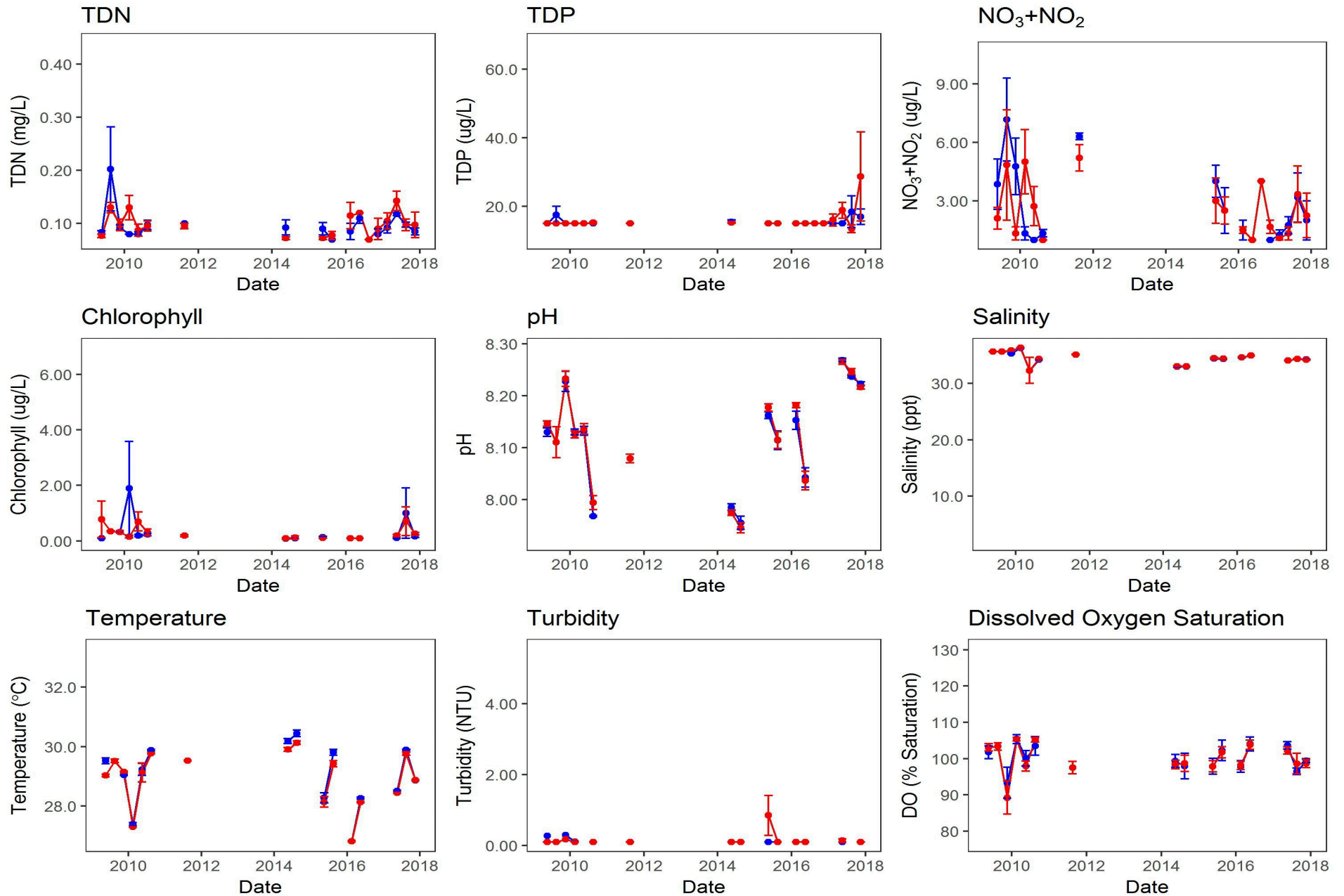


Figure 3. Water quality at Agat Marine Unit, War in the Pacific National Historical Park (WAPA), 2008–2017. TDN is total dissolved nitrogen, TDP is total dissolved phosphorus, NO₃ + NO₂ is nitrate and nitrite. Blue lines and points represent surface samples and red lines and points represent near-bottom samples. Y-axis values are means of all sample sites. Error bars are the 95% confidence interval.

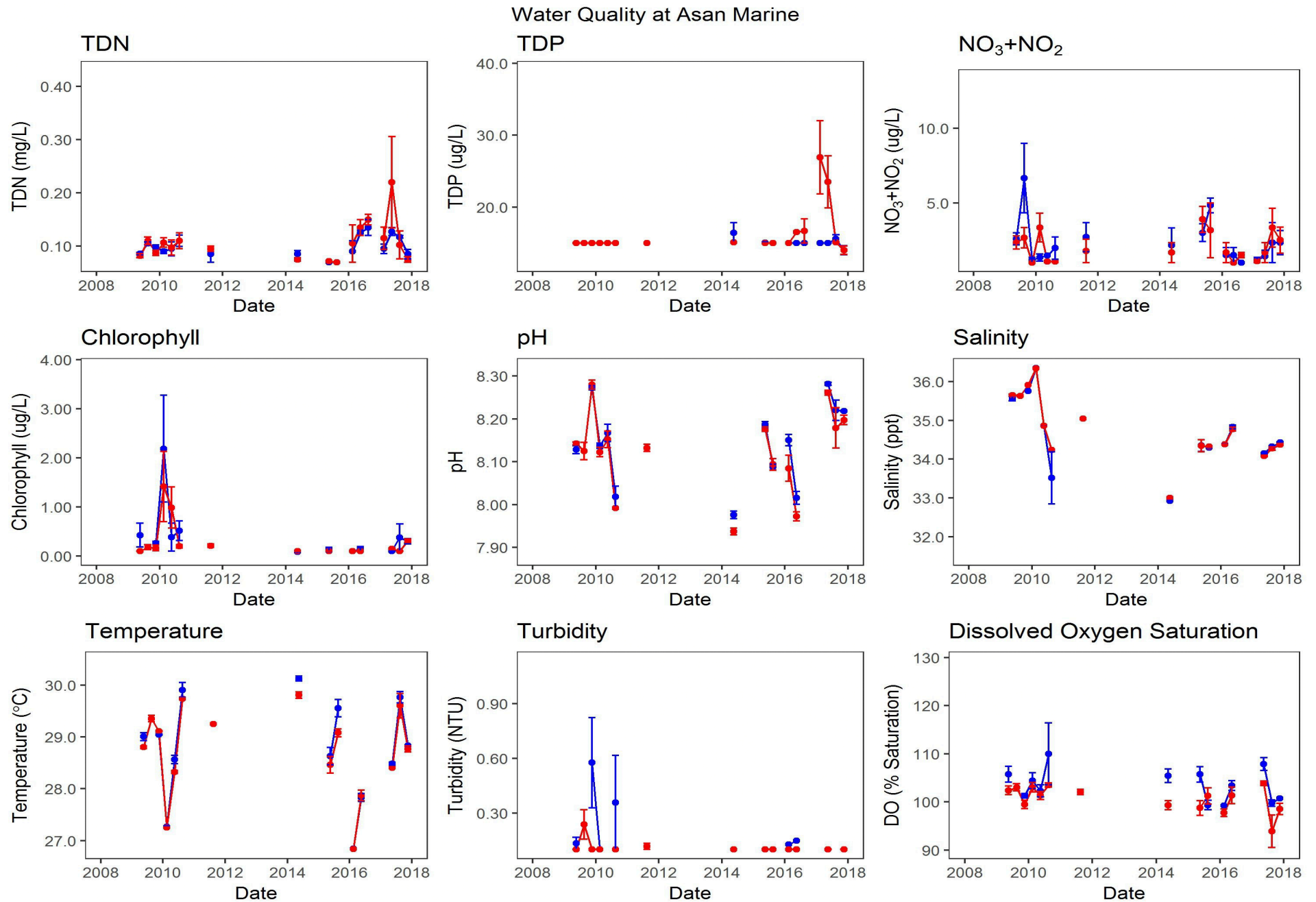


Figure 4. Water quality at Asan Marine Unit, War in the Pacific National Historical Park (WAPA), 2008–2017. TDN is total dissolved nitrogen, TDP is total dissolved phosphorus, NO₃ + NO₂ is nitrate and nitrite. Blue lines and points represent surface samples and red lines and points represent near-bottom samples. Y-axis values are means of all sample sites. Error bars are the 95% confidence interval.

Water Quality at Tutuila Marine

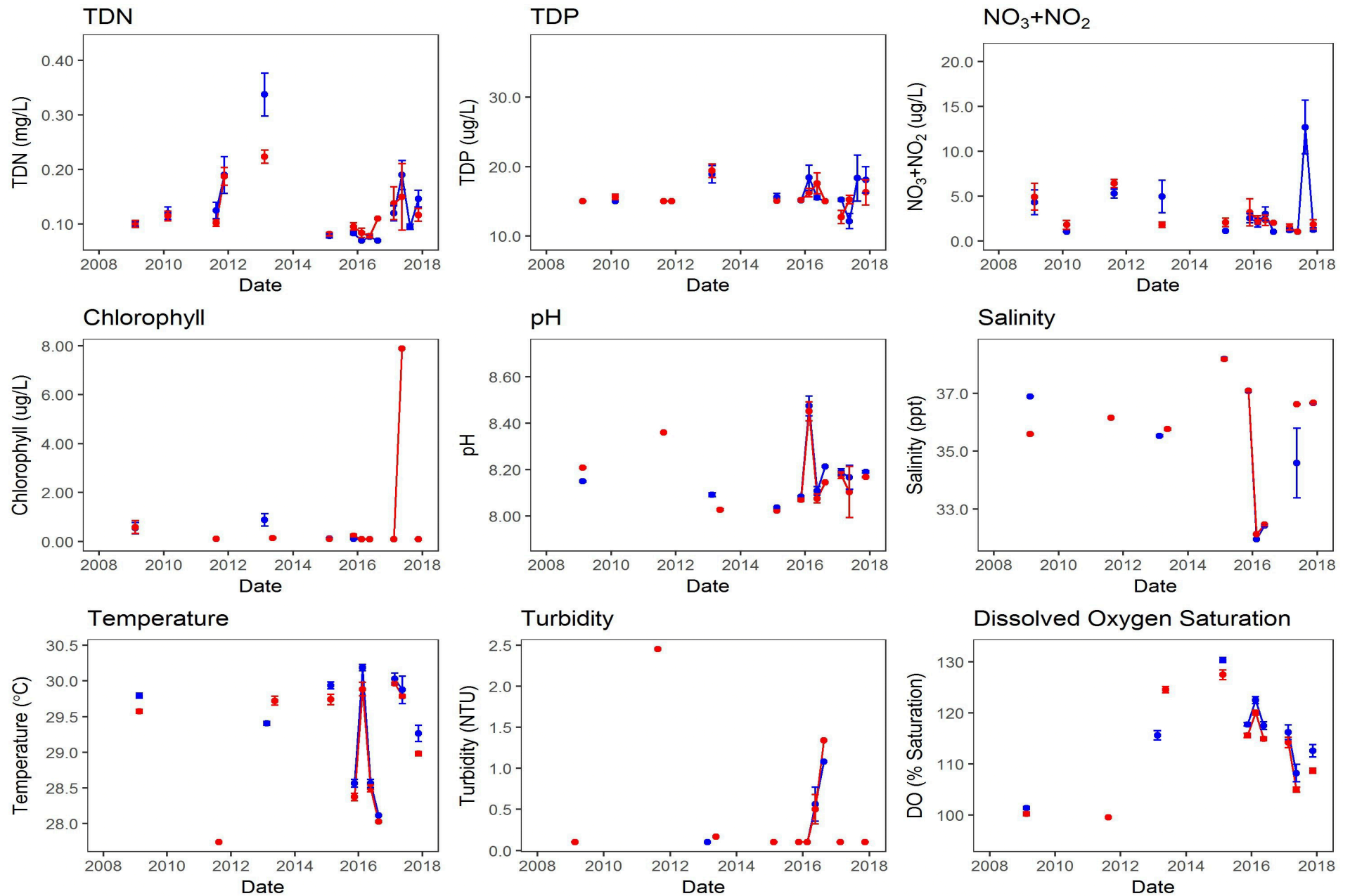


Figure 5. Water quality at Island of Tutuila, National Park of American Samoa (NPSA), 2008–2017. TDN is total dissolved nitrogen, TDP is total dissolved phosphorus, $\text{NO}_3 + \text{NO}_2$ is nitrate and nitrite. Blue lines and points represent surface samples and red lines and points represent near-bottom samples. Y-axis values are means of all sample sites. Error bars are the 95% confidence interval.

Water Quality at Ofu Marine

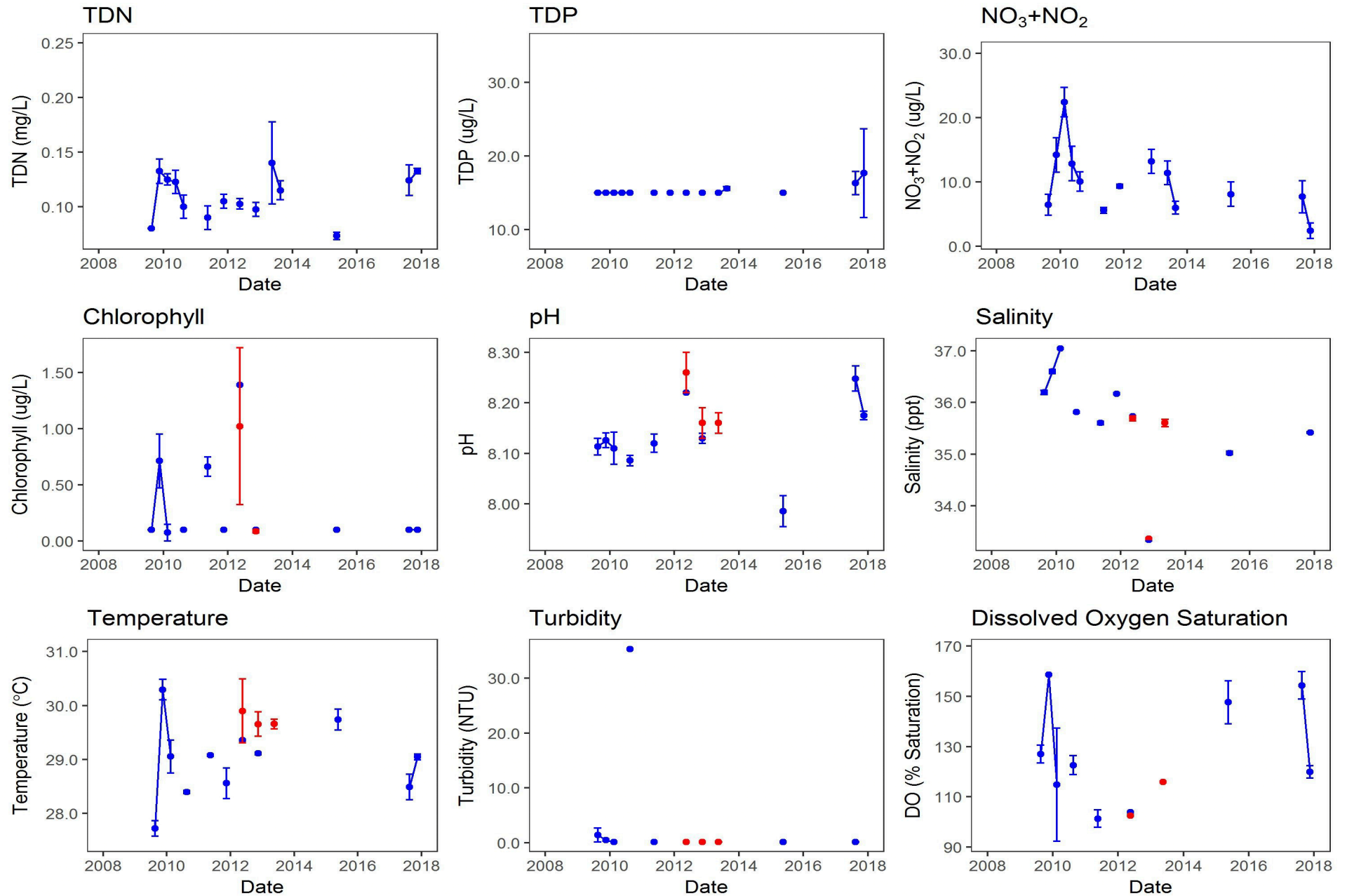


Figure 6. Water quality at Island of Ofu, National Park of American Samoa (NPSA), 2008–2017. TDN is total dissolved nitrogen, TDP is total dissolved phosphorus, $\text{NO}_3 + \text{NO}_2$ is nitrate and nitrite. Blue lines and points represent surface samples and red lines and points represent near-bottom samples. Y-axis values are means of all sample sites. Error bars are the 95% confidence interval.

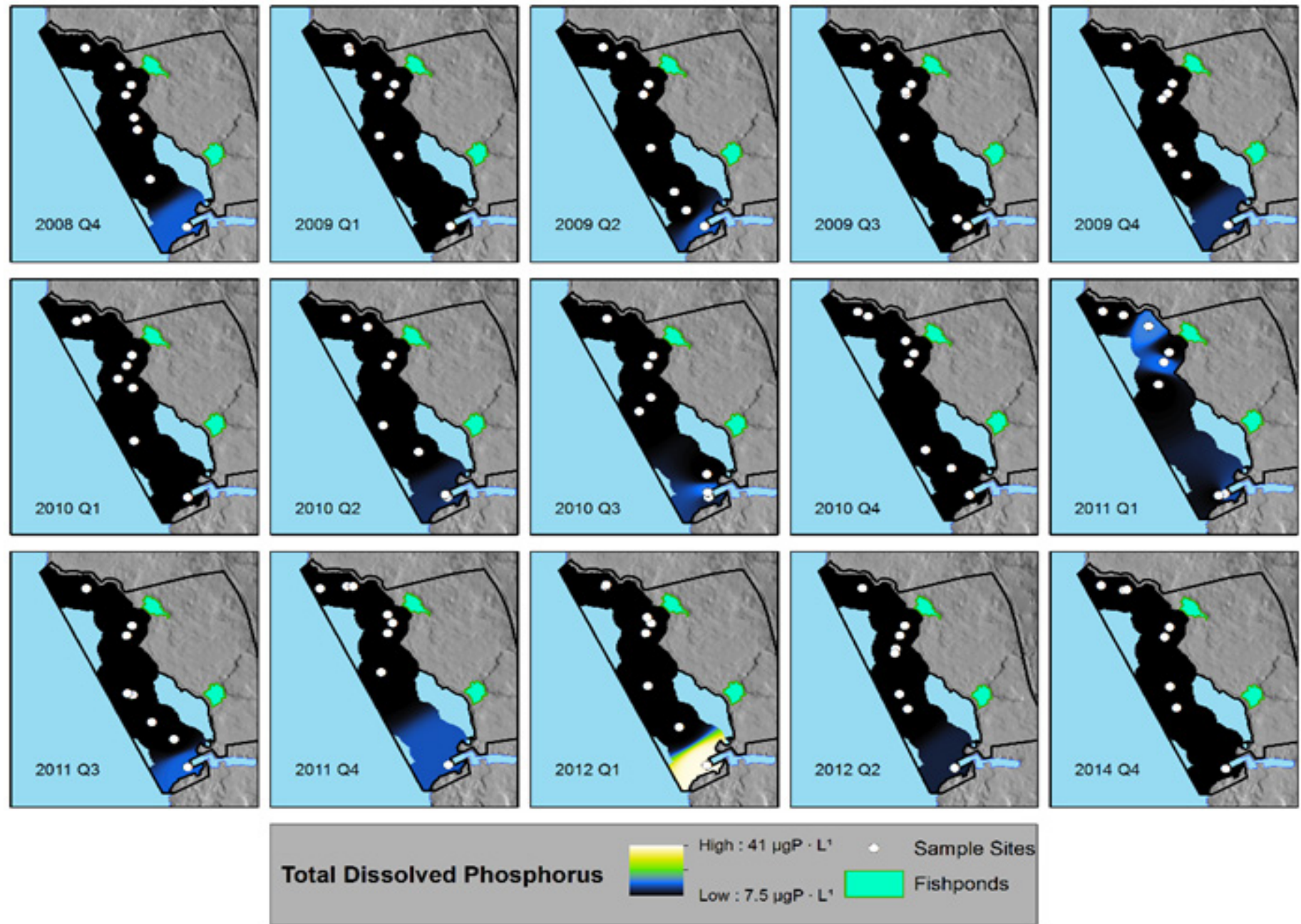


Figure 7. Spatial distribution of surface total dissolved phosphorus in marine waters of Kaloko-Honokōhau National Historical Park (KAHO) illustrating multiple observations of increased nutrient concentrations near the Honokohau Harbor mouth.