



## 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 2008–2023 results for chemical and physical characteristics of streams at Kalaupapa National Historic Park (KALA), Haleakalā National Park (HALE), War in the Pacific National Historical Park (WAPA), and National Park of American Samoa (NPSA).

During the annual monitoring season crews hike up streams or nearby trails to locate fixed and random sampling sites where they measure the NPS core parameters temperature, pH, dissolved oxygen, and salinity/conductivity. In addition, turbidity and chlorophyll are measured and water samples are collected for nutrient analysis (nitrogen and phosphorus). These latter parameters are needed to evaluate water clarity and nutrification. Crews also take photographs, record habitat information, location, date, and time. The data they collect are for baseflow conditions, which are targeted for consistency in sampling and for safety concerns.

Field personnel collect and filter water samples before they are placed on ice and frozen for analysis in the lab. This protocol allows the NPS to meet its monitoring objectives: to characterize the water quality of entire watersheds 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.

## Highlights

- Stream waters were low in nutrients, high in oxygen, and visually clear.
- Although trends will be covered in future reports, at this time no conditions warranting concern are obvious.

Certified data from 2008 through 2023 are presented in the graphs below (Figures 1–6).

## 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.

## More Information

David Raikow, Aquatic Ecologist [david\\_raikow@nps.gov](mailto:david_raikow@nps.gov), 808-985-6325

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

Program reports, protocols, and data products: <https://irma.nps.gov/DataStore/Reference/Profile/2238112>



Stream Water Quality Update

## Results

### Water Quality at Waikolu Stream (KALA)

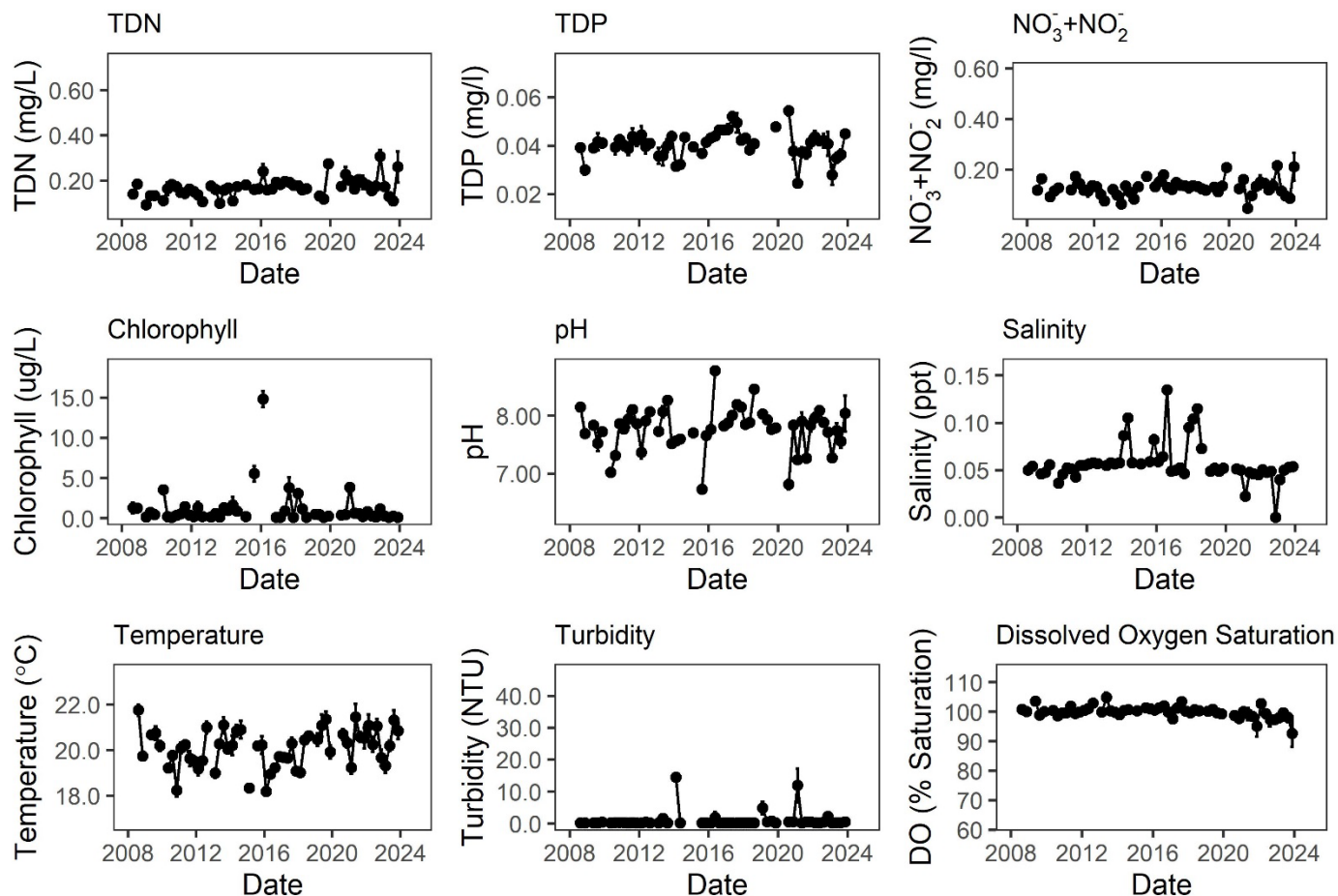


Figure 1. Water quality at Waikolu Stream at Kalaupapa National Historic Park (KALA), 2008–2023. TDN is total dissolved nitrogen, TDP is total dissolved phosphorus, NO<sub>3</sub> + NO<sub>2</sub> is nitrate and nitrite. Y-axis values are means of all sample sites. Error bars are ±1 standard error.



Stream Water Quality Update

### Water Quality at Alelele Stream (HALE)

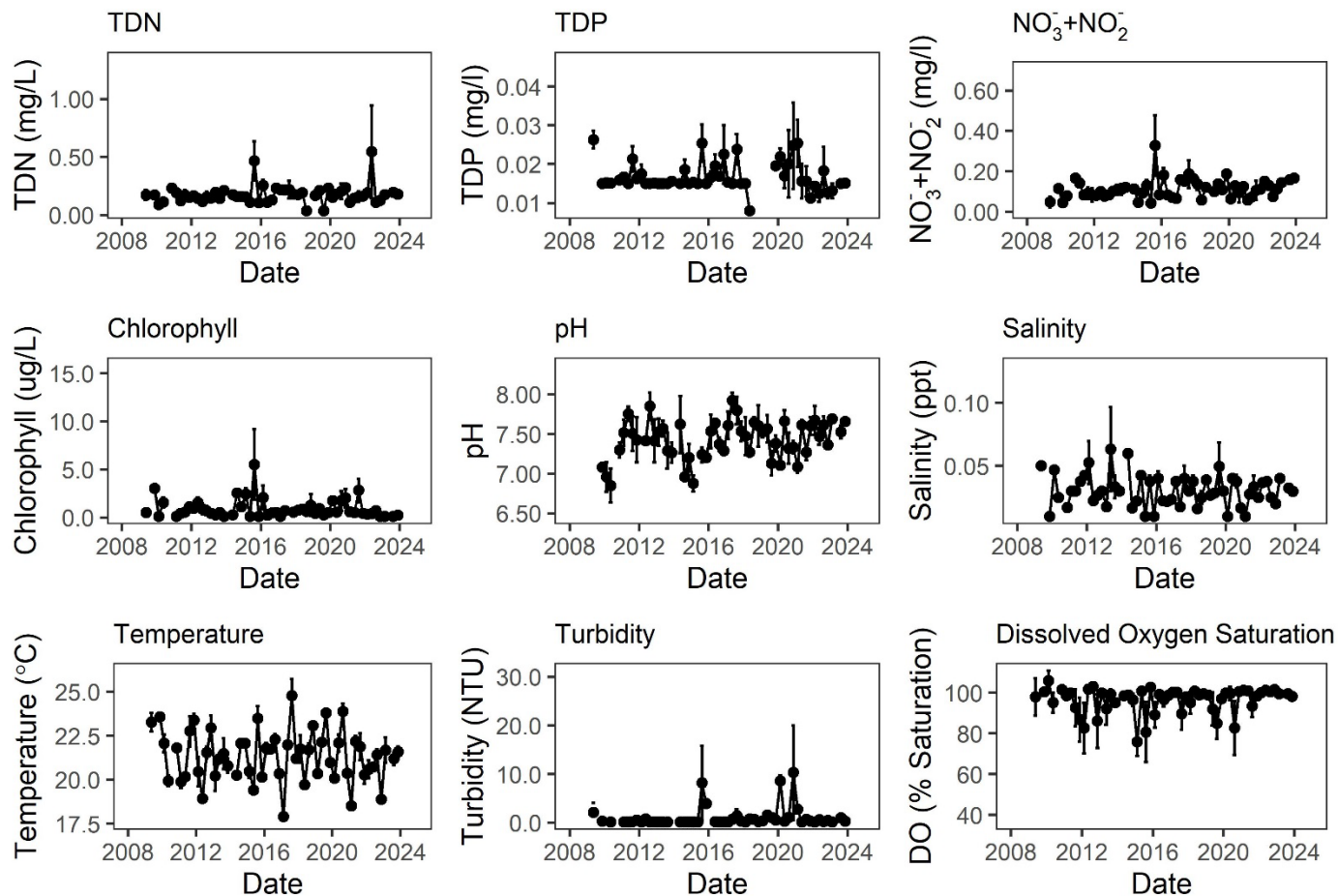


Figure 2. Water quality at Alelele Stream at Haleakalā National Park (HALE), 2008–2023. TDN is total dissolved nitrogen, TDP is total dissolved phosphorus, NO<sub>3</sub> + NO<sub>2</sub> is nitrate and nitrite. Y-axis values are means of all sample sites. Error bars are ±1 standard error.



Stream Water Quality Update

### Water Quality at Pipiwai Stream (HALE)

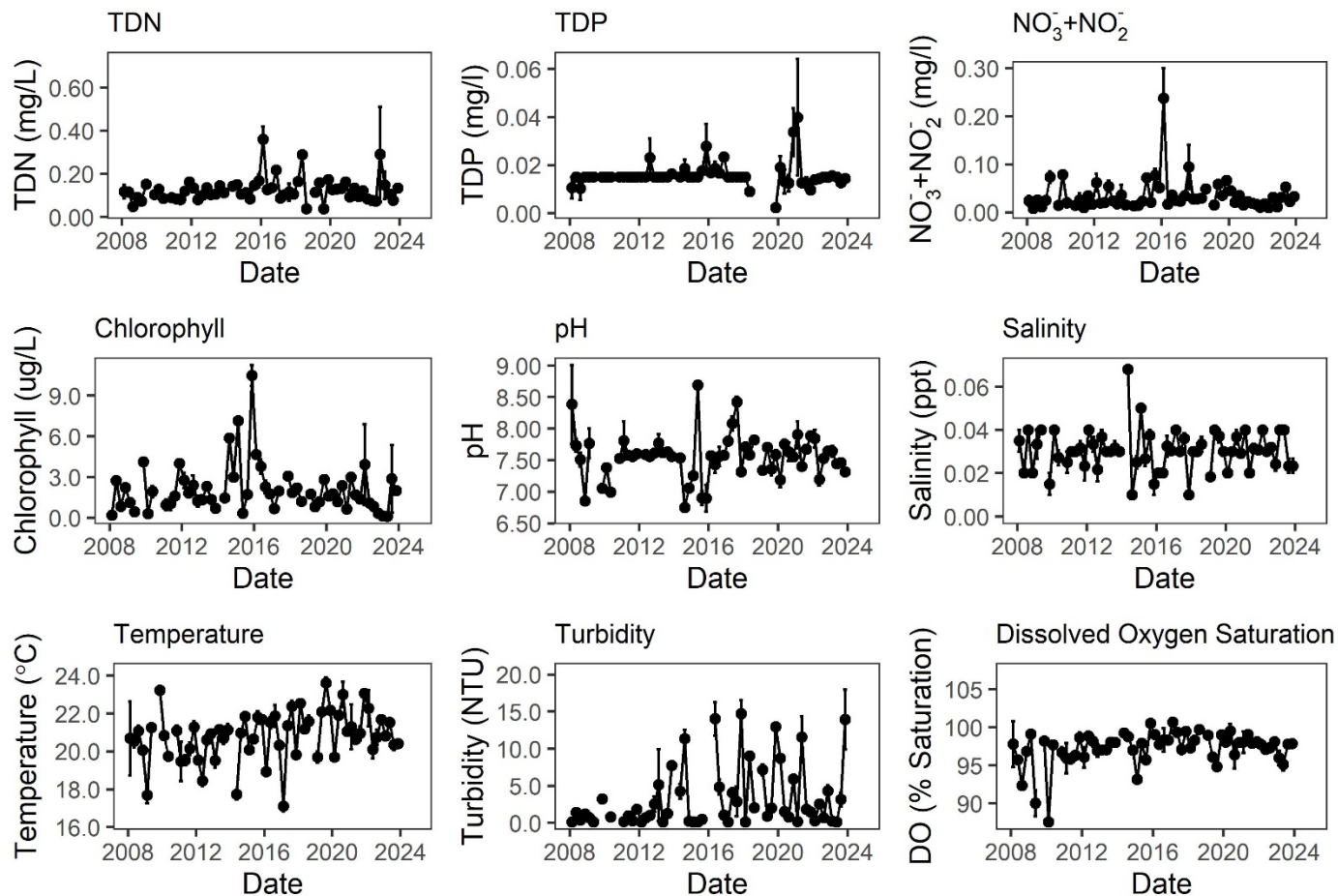


Figure 3. Water quality at Pipiwai Stream at Haleakalā National Park (HALE), 2008–2023. TDN is total dissolved nitrogen, TDP is total dissolved phosphorus, NO<sub>3</sub> + NO<sub>2</sub> is nitrate and nitrite. Y-axis values are means of all sample sites. Error bars are ±1 standard error.



Stream Water Quality Update

### Water Quality at Lower Palikea (HALE)

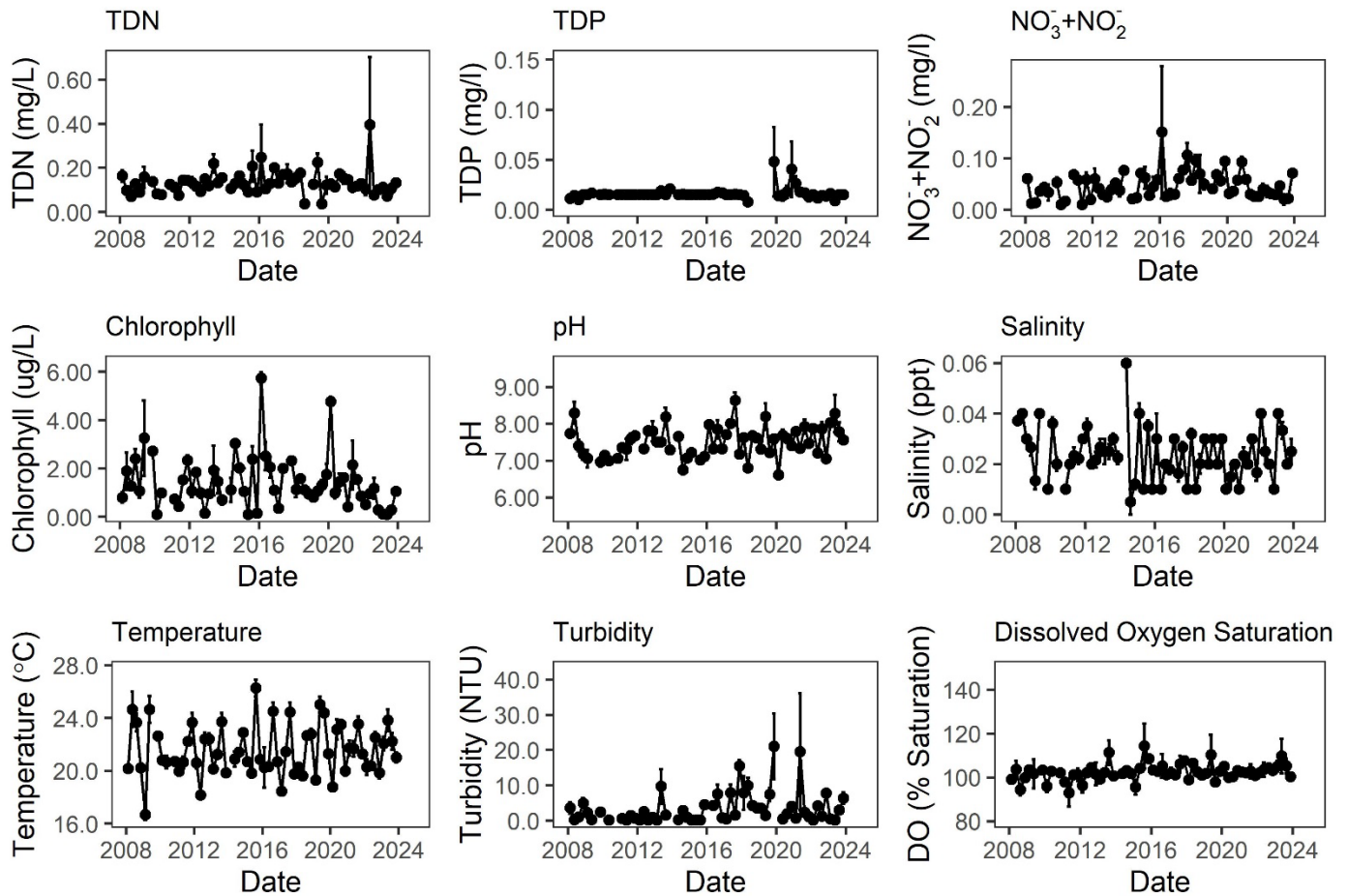


Figure 4. Water quality at Lower Palikea Stream at Haleakalā National Park (HALE), 2008–2023. TDN is total dissolved nitrogen, TDP is total dissolved phosphorus, NO<sub>3</sub> + NO<sub>2</sub> is nitrate and nitrite. Y-axis values are means of all sample sites. Error bars are ±1 standard error.



Stream Water Quality Update

### Water Quality at All Streams (NPSA)

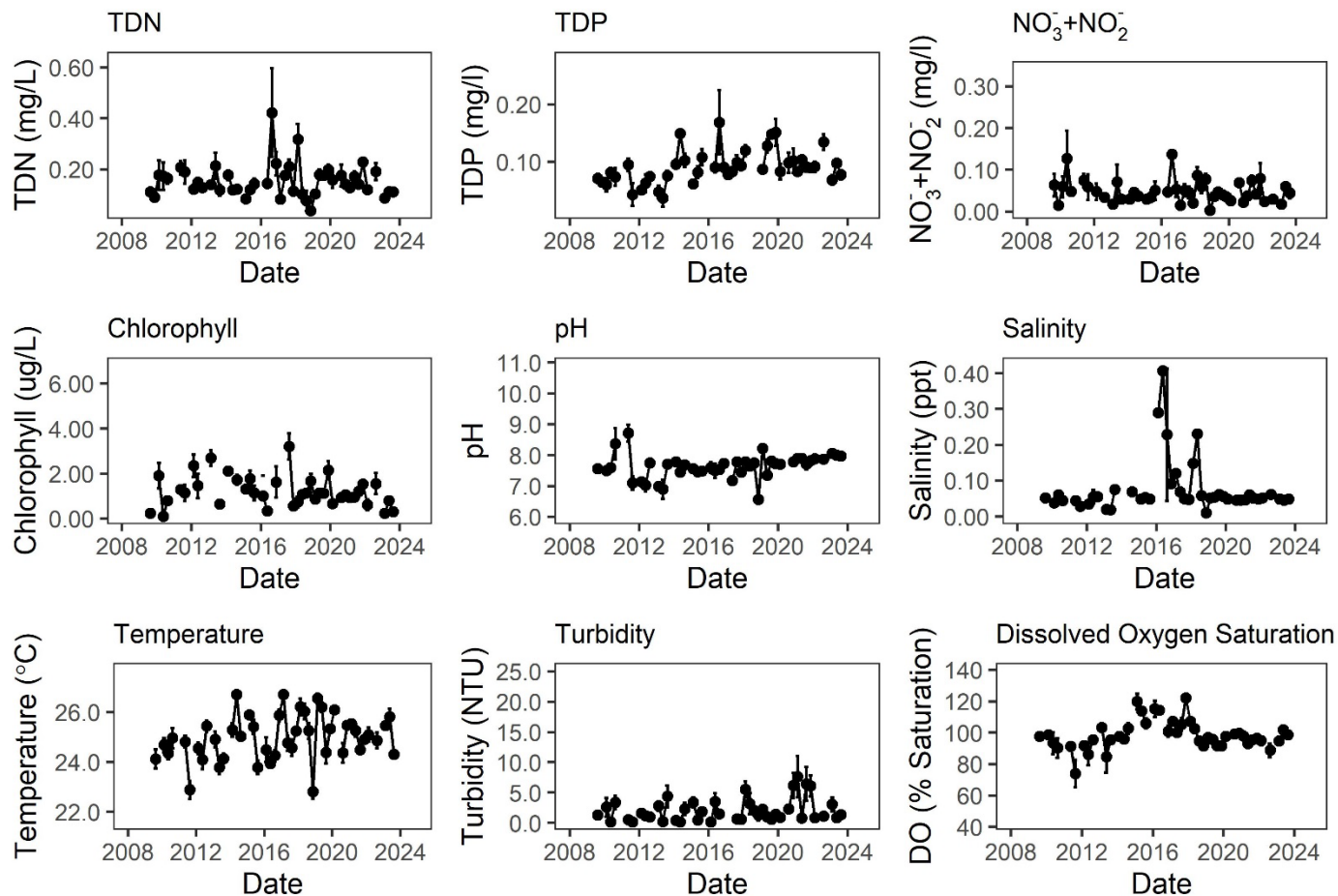


Figure 5. Water quality of streams at National Park of American Samoa (NPSA), 2008–2023. TDN is total dissolved nitrogen, TDP is total dissolved phosphorus, NO<sub>3</sub> + NO<sub>2</sub> is nitrate and nitrite. Y-axis values are means of all sample sites. Error bars are ±1 standard error.



Stream Water Quality Update

### Water Quality at Asan River (WAPA)

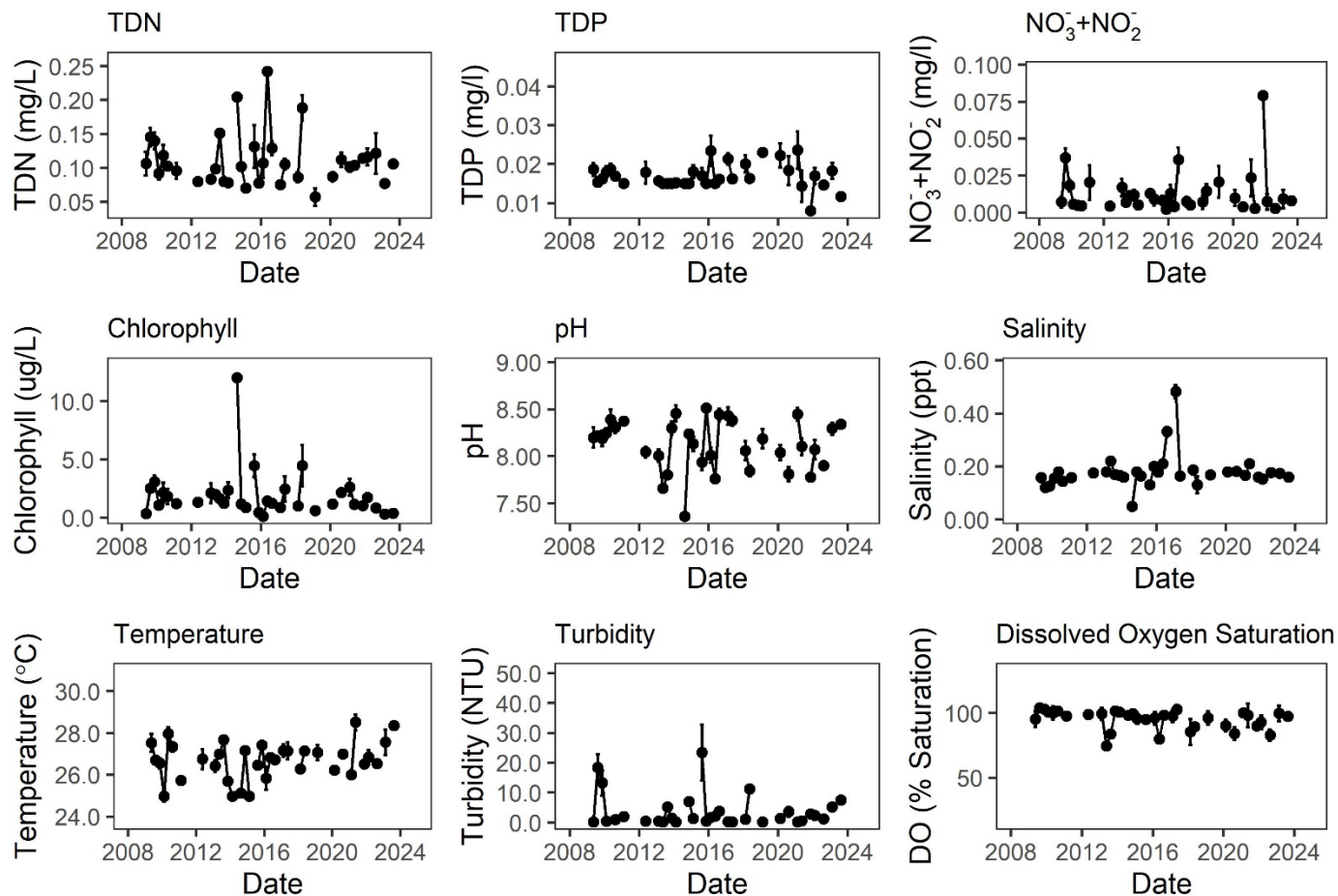


Figure 5. Water quality in the Asan River (WAPA), 2008–2023. TDN is total dissolved nitrogen, TDP is total dissolved phosphorus, NO<sub>3</sub> + NO<sub>2</sub> is nitrate and nitrite. Y-axis values are means of all sample sites. Error bars are ±1 standard error.