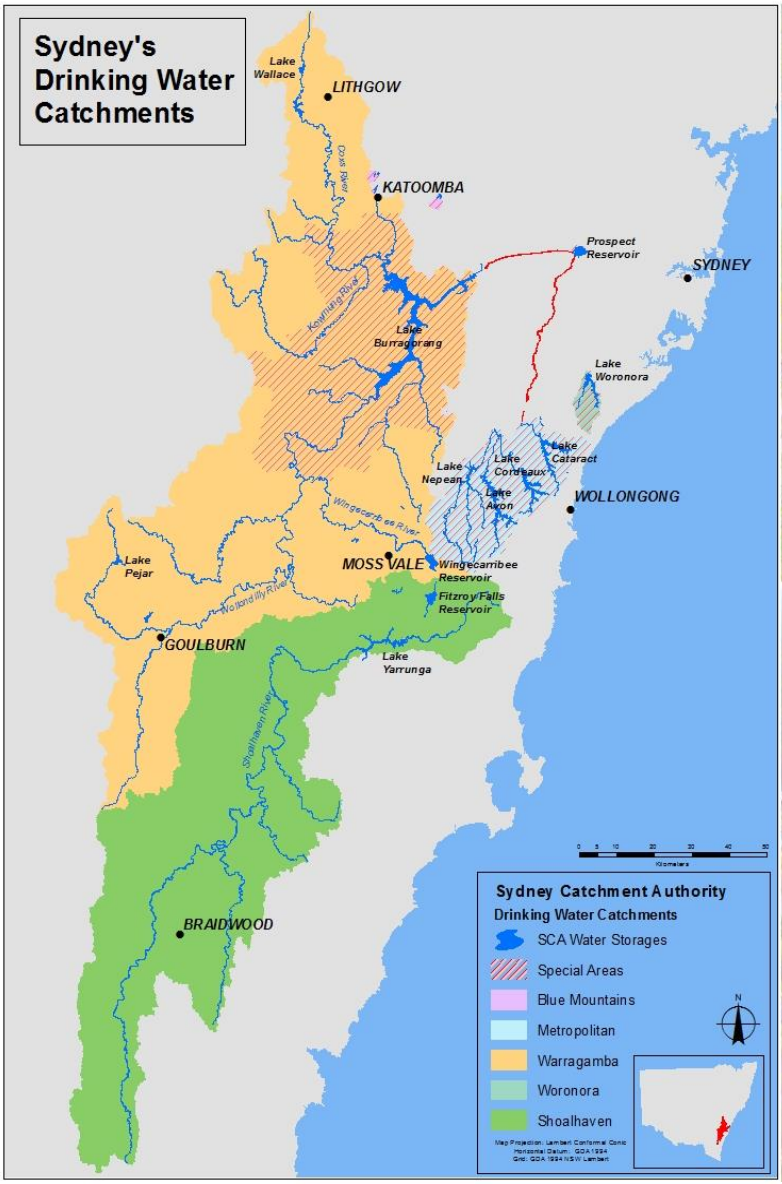


2013 Audit of the Sydney Drinking Water Catchment

Volume 2 - Appendices A - H

November 2013

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1. Appendix A: Roles and responsibilities of stakeholders

Sydney Catchment Authority

The roles and responsibilities of the Sydney Catchment Authority (SCA) are specified by the *Sydney Water Catchment Management Act 1998* (SWCM Act). Section 13 of the SWCM Act identifies the SCA's role to manage and protect the catchment areas and catchment infrastructure works, be it a supplier of bulk water, or to regulate certain activities within, or affecting, the outer catchment and inner catchment areas.

The principal objectives of the SCA, defined in the Act, are to ensure the catchment areas and infrastructure are managed and protected to promote water quality, the protection of public health and safety and the protection of the environment. The Act enables an Operating Licence to be issued to authorise the SCA to provide, construct, operate, manage and maintain systems and services, in order to achieve its objectives.

The Act also requires the SCA to make arrangements with Sydney Water Corporation on the standard of the quality of the water supplied from the Sydney Drinking Water Catchment to Sydney Water. This is achieved through Bulk Water Supply Agreements (BWSAs), which addresses the supply of raw water to customers (including Sydney Water and Goulburn City Council). These agreements specify the quality of raw water that is to be supplied to individual water filtration plants.

The SCA has a Water Management Licence, administered by the NSW Office of Water (NOW – formerly Department of Water and Energy), for its activities in relation to the abstraction and use of water from identified water sources and water management works. The licence also specifies the quantity of water that must be made available for environmental purposes.

The SCA regulates activities in the special and controlled areas likely to impact on its ability to supply high quality raw water to its customers through the *Sydney Water Catchment Management Regulation 2008*. The SCA jointly manages the Special Areas with the Office of Environment and Heritage (OEH, formerly, Department of Environment Climate Change and Water) under the Special Areas Strategic Plans of Management. The Plan sets the framework for a high level of protection of the natural and cultural heritage in these areas, and maintains the areas as intact buffers for the storages.

The *Sydney Water Catchment Management Regulation 2008* allows SCA to manage non-scheduled activities in the Special Areas, while under the *Protection of the Environment Operations Act 1997* the SCA has powers to regulate potential water pollution events in the outer catchment. These powers may be exercised when protecting catchment areas or protecting and enhancing the quality of water in catchment areas.

The SCA is also involved in the development and assessment processes in the Catchment under the *Environmental Planning and Assessment Act 1979* (EP&A Act) through a concurrence role of the State Environmental Planning Policy (SEPP) (2011).

Office of Environment and Heritage (OEH)

The Office of Environment and Heritage (OEH) is a separate office within the NSW Department of Premier and Cabinet. OEH was formed on 4 April 2011, and works to protect and conserve the NSW environment, including the natural environment, Aboriginal country, culture and heritage and our built heritage, and manages NSW national parks and reserves.

In 2011, the functions of the Department of Environment, Climate Change and Water (DECCW) were broken up with its responsibilities split between the newly formed OEH and the residual functions managed by the Industry, Innovation and Investment Division of the Department of Trade and Investment Regional Infrastructure and Services.

The DECCW had been formed following the merger of the Environment Protection Authority (EPA), the National Parks and Wildlife Service (NPWS), the Botanic Gardens Trust, and Resource NSW. This agency contained the Office of Water, which was formed from the NSW Department of Water and Energy (DWE), and was dissolved in 2009.

Other parts and responsibilities of DWE were transferred to the Division of Minerals and Energy in Industry & Investment New South Wales. At previous times, DECCW was known as the Department of Environment and Conservation (DEC) and the Department of Environment and Climate Change (DECC).

Environment Protection Authority (EPA)

The NSW Government re-established the EPA as an independent statutory authority in February 2012. Before this, the EPA was part of the Office of Environment and Heritage (OEH) within the Department of Premier and Cabinet. The EPA is responsible for environmental regulation and associated activities throughout NSW.

NSW Office of Water (NOW)

The NSW Office of Water (NOW) delivers the Government's policy and reform agenda for the water in NSW. It provides policy, legislative, regulatory and management advice in relation to surface water and groundwater to the Minister for Climate Change and the Environment, and the Minister for Water.

NOW works with water users, government agencies and other stakeholders towards achieving the secure and sustainable allocation of water between communities, industry, farmers and the environment; and reliable and sustainable urban water and energy supplies.

Key services provided by NOW that contributes to these results include:

- Preparing statutory plans to guide water sharing between users and the environment
- Administering water licences and approvals (including structures on designated floodplains), assessing resource availability, allocating available water to licensees, monitoring compliance and, where necessary taking appropriate enforcement action; and
- Developing and implementing water trading rules supporting effective market operation.

Department of Primary Industries NSW

The Department of Primary Industries is a division within NSW Trade & Investment and works to develop and sustain diverse, profitable food and fibre industries, and ensures best practice management of natural resources in NSW.

The DPI's responsibilities include developing profitable, sustainable and biosecure agriculture, and fisheries; ensuring best management of catchments, natural resources and water; and regulating the state's food sector. The Divisions that make up the DPI are:

- Agriculture NSW;
- Fisheries NSW;
- NSW Food Authority;
- Biosecurity NSW;

- NSW Office of Water (NOW);
- Catchments and Lands; and
- Business Services.

Agriculture NSW works with agricultural industries, other collaborators and stakeholders to improve the profitability, sustainability and skills of the agriculture and private forestry sectors. Staff delivers research, development, extension, education and industry development programs in the fields of agricultural productivity, food security, climate, water and soil. The Department's Agriculture Division conducts agricultural research and provides practical and sustainable farm production and environmental advice to commercial farmers, graziers, horticulturists, agribusiness and other groups. There are extensive areas of agriculture in the Catchment.

Fisheries NSW develops, shares and protects the State's fisheries resources through fisheries management, science and research, sustainable aquaculture development, habitat protection and regulation. It includes the Marine Parks Authority. This Division is responsible for the sustainable management of commercial and recreational fishing, the protection of aquatic threatened species, populations and ecological communities, the protection of key aquatic habitats and the conservation of aquatic biodiversity. It carries out scientific research and resource management compliance and also provides management and advisory services. In consultation with industry and the community, the Division develops policies and regulations on the sustainable use of the state's aquatic resources. The Division has undertaken substantial fish sampling in the Catchment.

NSW Food Authority ensures that food sold in the State is safe and correctly labelled and that consumers are able to make informed choices about the food they eat. It provides a single point of contact on food safety and regulation for industry, local government and consumers.

Biosecurity NSW manages the risks posed by pests, weeds, diseases and chemicals to the economy, community and the environment, responds to emergencies and disasters, and manages animal welfare.

NSW Office of Water leads policy and reform in sustainable water management for the State's surface and groundwater systems and assists water utilities to provide urban water and sewerage services that benefit all NSW.

Catchments & Lands manages NSW and Commonwealth natural resource management investment programs with 13 local Catchment Management Authorities ensuring that communities have a say on local issues. Crown Lands manage state-owned land, linking with other agencies, local government, the private sector and communities to provide social and economic outcomes for NSW. The Soil Conservation Service specialises in environmental protection, rehabilitation and land management services to both rural and urban clients.

Business Services works across all of DPI providing strategic coordination and development of policy, media and communications, science and research support, planning, reporting and governance requirements. Services include DPI's network of research and education facilities across NSW. The Office of the Chief Scientist supports DPI's science and research program through strategic alliances and collaboration with research partners, both domestic and international.

In addition the Office of Agricultural Sustainability and Food Security deliver independent, innovative and strategic advice to lead integrated projects to drive agricultural sustainability and food security in NSW.

Forestry Corporation of NSW

In 2012, the NSW Government created the Forestry Corporation of NSW to sustainably manage more than 2 million hectares of commercial, native and plantation forests in NSW for the economic, environmental and social benefit of the people of NSW and Australia. There are some areas of State Forest in the Catchment. The Forestry Corporation manages some of the most diverse forests in Australia. Ranging from the rainforest in the north-east to the alpine forests near Mt Kosciusko to the mallee woodlands on the western plains.

NSW State's forests cover over 2.2 million hectares of native and plantation forests. Sustainable forest management is the key to managing forests for the long term. Sustainable forest management is about finding a balance between all the different ways people use forests while maintaining the unique forest features the community values like biodiversity, clean air and water, habitat and cultural heritage. It is the key to managing forests for the long term.

The Forestry Corporation reports to the NSW Government and the key agencies – Department of Primary Industries (DPI), Environment Protection Agency (EPA) and the Office of Environment and Heritage (OEH) on its environmental performance

NSW Department of Planning and Infrastructure

The Department of Planning (DP&I) is involved in the planning, policy and regulation in relation to the natural and built environment, rural and urban management (including urban growth, renewal and consolidation) and the development of housing policies.

DP&I prepared the Drinking Water Catchments Regional Environmental Plan No. 1 (which from July 2009 is deemed a SEPP) in conjunction with the SCA. The SEPP is a regional plan for the environmental, social and economic future of the catchments that supply drinking water to Sydney, Blue Mountains and the Illawarra. SCA is working with local communities and landholders to implement the plan.

NSW Department of Health

The primary aim of the NSW Department of Health (NSW Health) is to ensure the public is provided with the best possible health care, and thus has a role in ensuring safe drinking water. NSW Health monitors the quality of drinking water through information provided by the agencies it regulates, and develops standards and guidelines for the treatment of waste water.

It reviews the monitoring program for pathogens undertaken by Sydney Water and the SCA. The Chief Health Officer of NSW Health has the power to restrict or prevent the use of water that is considered unfit for human consumption.

Catchment Management Authorities

Of the thirteen catchment management authorities (CMAs) in NSW, there are two CMAs within the Sydney Drinking Water Catchment, namely Hawkesbury– Nepean CMA (HNCMA) and Southern Rivers CMA (SRCMA). The Sydney Metropolitan CMA (SMCMA) was merged with HNCMA during the audit period.

The CMAs are locally driven organisations with a board that reports directly to the NSW Minister for Primary Industries. They were established as statutory authorities across the state under the *Catchment Management Authorities Act 2003* by the NSW Government to ensure that regional communities have a significant say in how natural resources are managed in their catchments.

The primary role of CMAs is to fund environmental projects on private land in areas of critical importance. The CMAs are responsible for involving regional communities in management of natural resources in their region, and are the primary means for the delivery of funding from the NSW and Australian Governments to help land managers improve and restore the natural resources of the State.

The CMAs achieve natural resource management at a catchment level, through the development of Catchment Action Plans. In developing and implementing the action plans, the CMAs work closely with landholders, Local Councils, Landcare groups and other government agencies, carrying out practical environmental improvements in their respective Catchments.

The NSW Government recently announced a major change to the way that NSW primary producers access services, information and advice with the creation of *Local Land Services*, a new regionally-based organisation that will replace the Catchment Management Authorities, Livestock Health & Pest Authorities and incorporate agricultural advisory services currently provided by Agriculture NSW. *Local Land Services* will be operational by January 2014 (For more information see: **www.dpi.nsw.gov.au/locallandservices**).

Natural Resources Commission

New South Wales's regional communities and economies depend on the health and resilience of our landscapes. Effective management of our natural resources is essential for ensuring productive primary industries and community well-being.

The Natural Resources Commission (NRC) was established under the *Natural Resources Commission Act 2003* to provide the NSW Government with independent advice on managing natural resources. The NRC advises the Government on what is working, what needs fixing and how it is tracking against its stated policies and targets. This helps the Government make better informed decisions that deliver triple bottom line outcomes. The agency:

- Recommends state-wide standards and targets for natural resource management and promotes improvements in performance, governance and accountability through the development of standards and targets,
- Reviews and recommends the approval of Catchment Action Plans prepared by 13 CMAs across NSW and oversees their implementation in regional planning;
- Audits the CMAs' implementation of these plans and their effectiveness in achieving state-wide standards and targets.

Other roles of the NRC include auditing Water Sharing Plans and other natural resource plans, and conducting inquiries into natural resource management issues, as directed by the Government.

Local Councils

Local Councils have many roles and responsibilities in the Catchment, including the following:

- Functioning as a regulator under the Protection of the Environment Operations Act 1997; and as a land-use planner using the Environmental Planning and Assessment Act 1979;
- Functioning as an operator responsible for the management of infrastructure, such as urban stormwater systems and sewerage services.

Independent Pricing and Regulatory Tribunal of NSW

The Independent Pricing and Regulatory Tribunal (IPART) has a range of roles, including setting maximum water prices and administering licences that authorise water utilities, including the Operating Licences issued to Sydney Water Corporation and the SCA.

NSW Rural Fire Service

The Rural Fire Service (RFS) is responsible for the coordination and planning of bushfire fighting and hazard reduction operations throughout NSW. At the local government scale, there are bushfire management committees included in the above role, including representatives from OEH and the SCA. The SCA has worked with the RFS on improving fire management practices.

Livestock health and pest authorities

There are 14 Livestock health and pest authorities (LHPAs) in the state which are involved in the control of pest animal species and livestock diseases. They also have an advisory role to landholders. The SCA and the OEH have worked with the LHPAs to ensure the coordination of pest control strategies in the Catchment.

NSW Rural Assistance Authority

The NSW Rural Assistance Authority administers assistance measures to rural producers and small businesses in regional NSW. For example, the Authority administers the Special Conservation Scheme to encourage improved and sustainable land management by farmers.

Heritage Council of NSW

The main role of the NSW Heritage Council is to implement the *NSW Heritage Act 1977*. This includes management design and implementation for heritage listings and an advisory role on matters affecting heritage sites. Heritage Council listings include both built and key natural environments. The Wingecarribee Swamp in the Catchment is a state listed natural site. There are many built sites of state and local heritage significance in the Catchment including Avon, Cataract and Cordeaux dams.

Dams Safety Committee (DSC)

The statutory function of the Dams Safety Committee is to ensure that all prescribed dams in NSW are safe and maintained. The Committee must also ensure that mining operations near dams do not affect the integrity of dams or create significant water loss from storages.

Universities

Universities are often involved in providing expertise and research support for the SCA. For example, the University of NSW and Macquarie University have been involved in research on pathogens in the catchment.

Industry

Industry in the Catchment is diverse and includes: mining and extractive industry, forestry and horticulture, livestock and commercial industries, and telecommunication and energy-based industry. The environmental performance of all industry is regulated by either council, the SCA or OEH under the *Protection of the Environment Operations Act 1997* (EP&A Act). New industry is subject to development assessment processes under the EP&A Act, including SEPP for developments with a high potential threat to water quality.

Residents

Individuals must seek council approval to conduct water supply work, draw water from a council water supply, conduct sewerage or storm-water works, or connection of a private drain or sewer to a public drain or sewer. Residents can have a role in community groups which are active in decision making. All residents have a basic responsibility to prevent pollution.

2. Appendix B: List of parties who responded to the audit

The following individuals and organisations provided a response to the 2013 Sydney Drinking Water Catchment Audit:

2.1 Individuals

- J. Harrington
- K. Morris
- T. L. Bevan

2.2 Organisations

- Sydney Catchment Authority (SCA);
- Southern Rivers Catchment Management Authority (SRCMA);
- Hawkesbury–Nepean Catchment Management Authority (HNCMA);
- Office of Environment and Heritage (OEH);
- NSW Office of Water (NOW);
- Sydney Water Corporation (SWC);
- NSW Department of Primary Industries (DPI);
- NSW Department of Health;
- NSW Environment Protection Authority (EPA);
- NSW Rural Fire Service (RFS);
- NSW Department of Planning and Infrastructure (DP&I);
- Dam Safety Committee (DSC);
- Darug Custodian Aboriginal Corporation;
- Deerubbin Local Aboriginal Land Council;
- NSW Aboriginal Land Council;
- Campbelltown Aboriginal Enterprise Pty Ltd.;
- Australian Water Association;
- NSW Department of Public Works;
- Rivers SOS Alliance;
- AGL Energy Pty Ltd;
- Nature Conservation Council and Save our Water Catchments Alliance;
- Blue Mountains City Council;
- Wingecarribee Shire Council;
- Kiama Municipal Council;
- Upper Lachlan Shire Council;

- Wollongong City Council;
- Goulburn Mulwaree Council;
- TriAusMin Limited;
- Apex Energy;
- BHPBilliton;
- Rocla;
- NSW Minerals Council.
- Move Bargo Sewerage Plant Action Committee;
- Leura Falls Creek Catchment Working Group.

3. Appendix C: Audit processes

3.1 Consultations with stakeholders

Consultations with stakeholders commenced in mid-to-late July with letters sent to stakeholders, requesting submissions by 23 August 2013. The letters were followed up with phone calls. Newspaper advertisements, calling for submissions for the audit, appeared in 20 newspapers, during the period 29 July - 9 August 2013.

The newspapers, given below (Table C 3-1), provided adequate coverage of the sub-catchments, which comprised the Drinking Water Catchment:

Table C 3-1 List of Newspapers used for advertising

1. Southern Highlands New	11. Wollondilly Advertiser
2. Shoalhaven and Nowra News	12. Lithgow Mercury
3. Blue Mountains Gazette	13. Oberon Review
4. Penrith Press	14. The Land
5. Penrith Star	15. South Coast Register
6. Tallaganda Times	16. Braidwood Times
7. Crookwell Gazette	17. Sydney Morning Herald
8. Goulburn Post	18. Daily Telegraph
9. Macarthur Chronicle	19. Koori Mail
10. Macarthur Advertiser	20. National Indigenous Times

The text used for the newspaper advertisement is shown in Figure C 3-1.

Call for Submissions

Catchment Audit 2013 - Sydney Water Catchments

In accordance with the Sydney Water Catchment Management Act, the Minister for Primary Industries and Small Business has appointed GHD as the Catchment Auditor to conduct the 2013 Audit of Sydney's Drinking Water Catchment. The Catchment Audit is undertaken once every three years to provide a snapshot of the health of the catchment.

This Audit will use a 'pressure-state-response' model that will examine the impacts of human pressures on the condition of the various sub-catchments that make up Sydney's Drinking Water Catchment. The Audit will assess the condition of the sub-catchments, using multiple indicators, relevant to monitoring changes in the quality of raw water supplies, management of water resources, waterways and land condition and ecosystem health.

GHD is now inviting interested parties, individuals, groups, or organisations, to make submissions, presenting any information, or data, that may assist in the conduct of the Audit. The submissions may also be on specific issues of concern.
Please send submissions to:

Sydney Drinking Water Catchment Audit

GHD Water Sciences Group

Level 6, Smith Street, Parramatta, NSW 2150

Or email them to:

sydmail@ghd.com;

The closing date for submissions is 23 August 2013.

Figure C 3-1 Text for newspaper advertisement

Several stakeholders requested additional time to make submissions, which was initially granted until 30 August 2013; this date was later extended further until 23 September 2013.

The Auditor is of the view that most stakeholders appear to require about 6-weeks to make their submissions, and this aspect requires management by the SCA in future audits. A recommendation in this regard has been provided in the Main Report.

3.2 Aboriginal Stakeholder Engagement Plan

A recommendation of the previous audit was for SCA to investigate ways to achieve effective Aboriginal community engagement prior to the commencement of the next Sydney Drinking Water Catchment Audit 2013. Several key stakeholders of local aboriginal organisations and groups were identified including:

- NSW Aboriginal Land Council;
- Batemans Bay Aboriginal Land Council;
- Coomaditchie United Aboriginal Corporation;
- Darug Custodian Aboriginal Corporation;
- Darug Tribal Aboriginal Corporation;
- Deerubbin Local Aboriginal Land Council;
- Gundungurra Tribal Council Aboriginal Corporation;
- Gundungurra Aboriginal Heritage Association Incorporated;

- Illawarra Local Aboriginal Land Council;
- Metropolitan Local Aboriginal Land Council;
- Mogo Aboriginal Land Council;
- Muru Mittigar Aboriginal Corporation;
- Ngambri Aboriginal Land Council;
- Northern Illawarra Aboriginal Collective;
- Nowra Aboriginal Land Council;
- Pejar Local Aboriginal Land Council;
- Tharawal Local Aboriginal Land Council;
- Ulladulla Aboriginal Land Council;
- Wodi Wodi Elders Corporation;
- Aboriginal Heritage Information Management System (AHIMS);
- Mingaan Aboriginal Corporation Traditional Owners Group;
- Gibbergunyah Aboriginal Association;
- Aboriginal Community and Cultural Centre;
- Kula N Gadu;
- Mirri Mirri Bunderra;
- Moyengully;
- Yamanda Aboriginal Association;
- Families Sharing Culture Aboriginal Corporation;
- Wingecarribee Culture Group; and
- Campbelltown Aboriginal Enterprise Pty Ltd.

Engagement Activities Outcomes

To ensure maximum opportunity for stakeholder engagement an initial letter was sent on 7 June 2013 by the SCA. A response template was sent to 20 NSW Local Aboriginal Land Council and Aboriginal Organisations.

Following on from the newspaper advertisements on the 27 July 2013 in the Koori Mail and the National Indigenous Times, GHD followed up with a second letter outlining the SCA's Catchment Health Indicators of interest.

On 13 August 2013, an email containing additional information on the requested submission, Catchment Health Indicators and Response Template was also sent to the NSW Local Aboriginal Land Councils and Aboriginal Organisations.

On 14 August 2013 follow up phone conversations were conducted to encourage engagement and following this several submissions were received. The SCA indicated that they have also undertaken the following actions:

- Communication with key stakeholders including the NSW Local Aboriginal Land Council and Aboriginal Organisations and broader community to notify them about the catchment audit and providing information on how to make a submission;
- Preparation of an Aboriginal Stakeholder Engagement Plan;
- Relevant follow-up with Aboriginal Organisations;
- Feedback to Aboriginal Organisations; and
- Identification of ways to improve engagement processes for subsequent Sydney Catchment Audits and ongoing consultation with Aboriginal communities.

3.3 Site inspections

Members of the audit Team undertook some site inspections on 11-12 September and on 20 September 2013 to ascertain progress made on specific catchment issues. Given below are summaries of sites visited, issues clarified and general assessments and findings.

3.3.1 Upper Nepean Catchment

Glen quarry cut - Erosion control works and revegetation.

Figure C 3-2 Glen quarry creek bank works

Figure C 3-3 Glen quarry cut revegetation

Impacts on water quality from clearing and grazing.

Nepean River upstream. Natural catchment and swamps seeps.

Figure C 3-4 Swamp seep Nepean River

Creek fencing to remove cattle access to the Wallaby Creek. Same spot visited in August 2003.

Figure C 3-5 Wallaby Creek fencing

3.3.2 Mount Murray Pine Plantation

Natural rehabilitation at Fire trail 1: 8 years since pine forest removed.

(source: Google Earth Pro imgery extracted 1/11/2013)

Figure C 3-6 Mount Murray pine plantation

Figure C 3-7 Pine forest rehabilitation

3.3.3 Renwick Estate

New Landcom housing estate in Mittagong. Example of best practice in stormwater management.

Figure C 3-8 Stormwater treatment Renwick estate

3.3.4 Bunnings at Mittagong

Figure C 3-9 Permeable pavement to harvest stormwater runoff at Bunnings

Figure C 3-10 Rain garden at Bunnings

3.3.5 Cordeaux Special Area - Mining Impacts

Documentation of conditions on subsidence and flows at Sandy Creek Falls.

(BHPBilliton provide regular reports on the Dendrobium Mine.)

Figure C 3-11 Mining impacts, Sandy Creek downstream of fire trail

Figure C 3-12 Sandy Creek pool

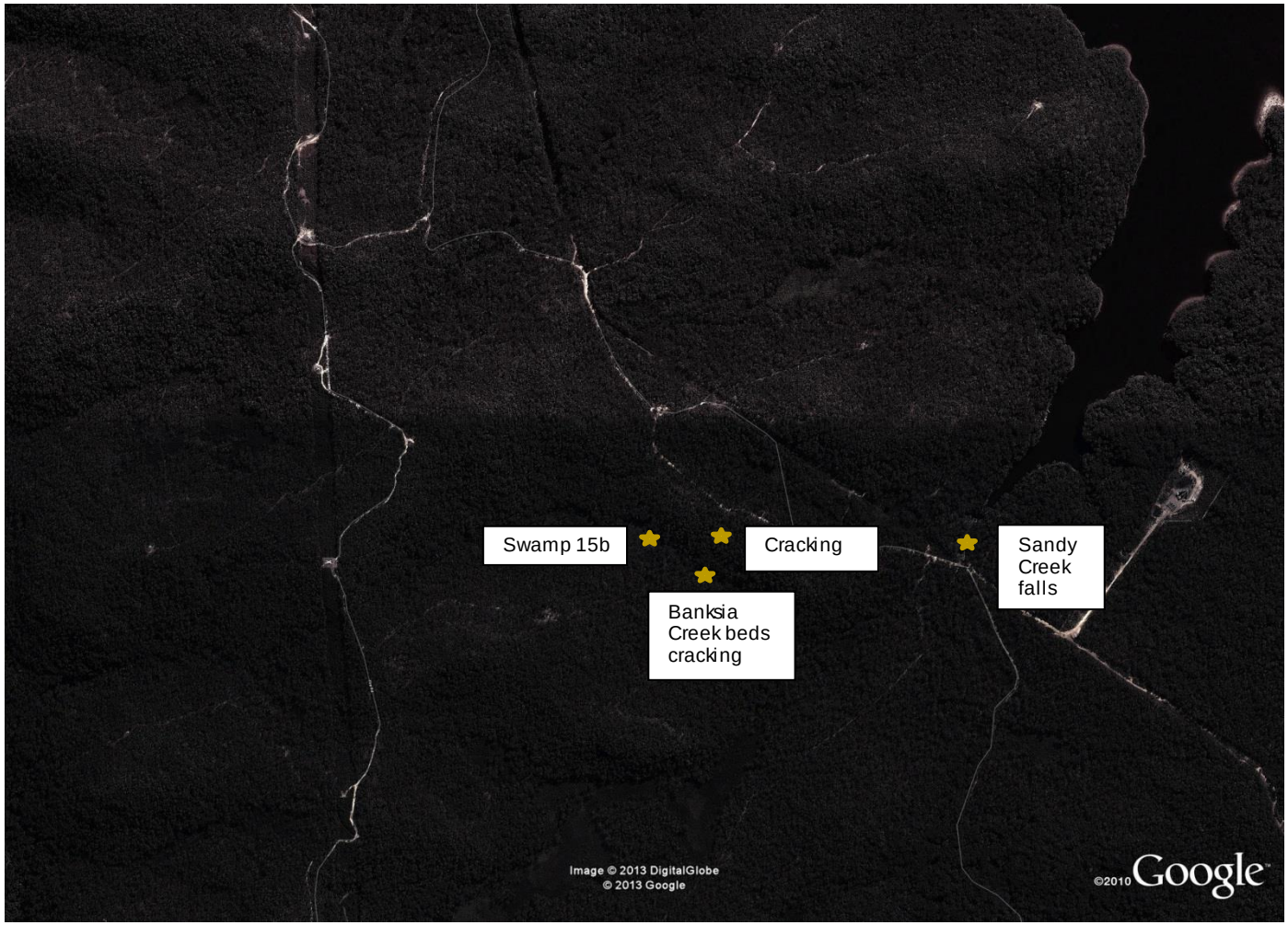
Figure C 3-13 Sandy Creek with Lake Cordeaux in the distance

Evidence of cracking between Firetrail 6C and Swamp 15b (as labelled in Krogh 2012). Cracking in creek (SC10C) that drains swamp 15b and flows to Sandy Creek.

Figure C 3-14 Sandy Creek with creek bed cracking

Cracking in the bedrock beneath Swamp 15b as a result of Dendrobium Mine Area 3A and Longwall 8 impacting on swamp vegetation.

Figure C 3-15 Swamp vegetation dieback



(Source: Google Earth Pro imagery extracted 1/11/2013)

Figure C 3-16 Cracking in Banksia Creek that drains swamp 15b and flows to Sandy Creek and Cracking in the bedrock beneath Swamp 15b as a result of Dendrobium Mine Area 3A and Longwall 8.

3.4 Audit interviews

As part of the audit, a series of interviews were held with major stakeholders, to clarify issues and also obtain updates on previous recommendations.

The interviews provided an opportunity to gauge certain constraints stakeholders had on catchment management issues, as well as discuss areas which present opportunities for improvement.

3.5 Review of draft report

The following list of stakeholders was provided with a draft of the report to comment on the accuracy of information and data provided to the audit:

- Sydney Catchment Authority (SCA);
- Southern Rivers Catchment Management Authority (SRCMA);
- Hawkesbury Nepean Catchment Management Authority (HNCMA);
- NSW Office of Environment & Heritage (OEH);
- NSW Office of Water (NOW);
- Environment Protection Authority (EPA);
- Department of Planning and Infrastructure (DP&I);
- Rural Fire Service (RFS);
- Department of Primary Industries (DPI-Division of Fisheries); and
- Sydney Water.

4. Appendix D: Audit submissions Synthesis

The audit received 39 submissions from the public and from various government departments.

The submissions revealed 235 topics, under which concerns had been raised. Figure D 4-1 shows the proportion of respondents that mentioned key specific issues in their submissions.

The individual issues were grouped under the broad themes of:

- Mining (CSG, sand and coal);
- Cultural (cultural burning, value to community, sacred sites and heritage);
- Social (government coordination, consultation, illegal access, community engagement);
- Pollution (sewage disposal, waste disposal);
- Land use (buffer zones, power stations, Land management database, housing developments);
- Sustainability (salinity, conservation, erosion);
- Water availability (water loss, water licences, water availability);
- Water quality (general, pathogens, metals, nutrients, sediment, groundwater contamination, algal blooms);
- Fauna impacts (general, crayfish, fish, macroinvertebrates);
- Flora impacts (native vegetation, wetlands and swamps, weed control); and
- Respondents who had no specific concerns.

The topics most frequently mentioned were:

- Impacts on native vegetation;
- Consultation with catchment stakeholders;
- Impacts on catchment fauna;
- Coal seam gas (CSG);
- Sewage disposal; and
- Water quality.

As shown in Figure D 4-1, the most frequently identified issues were the potential negative impact of catchment activities on native vegetation (41%) and water quality (31%). Other issues also ranked of high concern were impacts of CSG (31%), community consultation (31%) sewage disposal (28%), fauna conservation (28%) and coal mining (26%). This indicates that many stakeholders place a high value on the integrity and maintenance of native vegetation, water quality and fauna as key characteristics of the catchment and supports their continued use as key indicators of catchment health. While sewage disposal and mining activities are issues seen as potential threats to catchment health. Submissions concerning the negative impacts of mining and CSG were generally the most lengthy, and contained detailed information on catchment events and observed impacts.

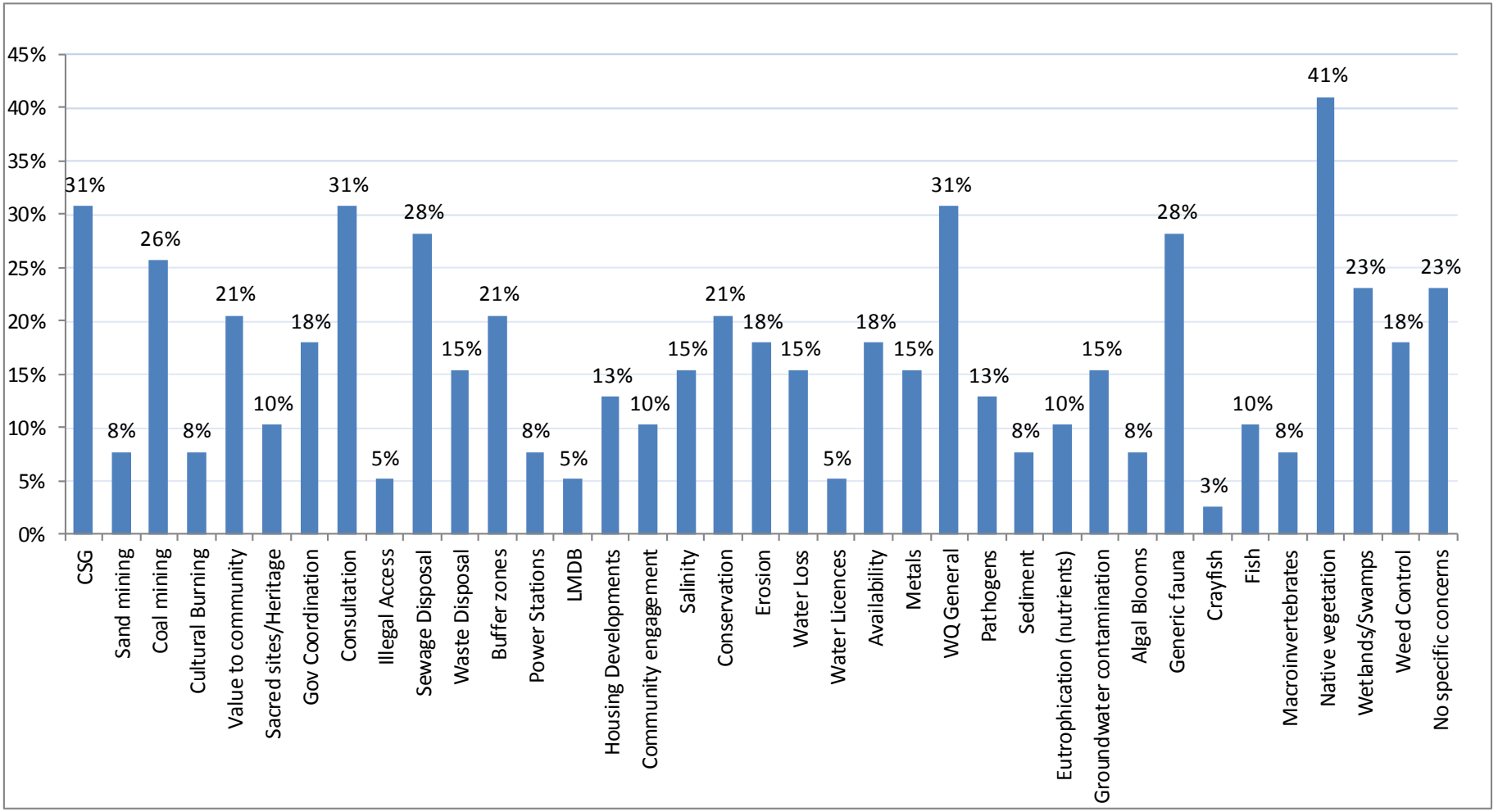


Figure D 4-1 Proportion of respondents (N=38) that mentioned specific issues/topics of concern

Another consistent theme of submissions was the desire of individuals and stakeholders to be consulted on catchment issues (31%) and a desire for government activities to be coordinated (18%), so that stakeholders could identify who they needed to be engaged with regarding catchment issues.

The protection of catchment buffer zones, value to community and conservation were all identified as an important issue by 21% of respondents and the integrity of wetlands and swamps was mentioned in 23% of submissions. Almost a quarter of the respondents (24%) stated that they had no specific concerns.

Water quality topics were also frequently identified by stakeholders as an issue of concern (17% of responses) (Figure D 4-2). Submissions discussing the impacts on flora and social issues were also frequently raised (14 and 11% of responses, respectively). The next highest proportion of responses related to mining activities and sustainability (11 and 9% respectively) and the mining submissions tended to be the most detailed and contained significant information regarding catchment conditions.

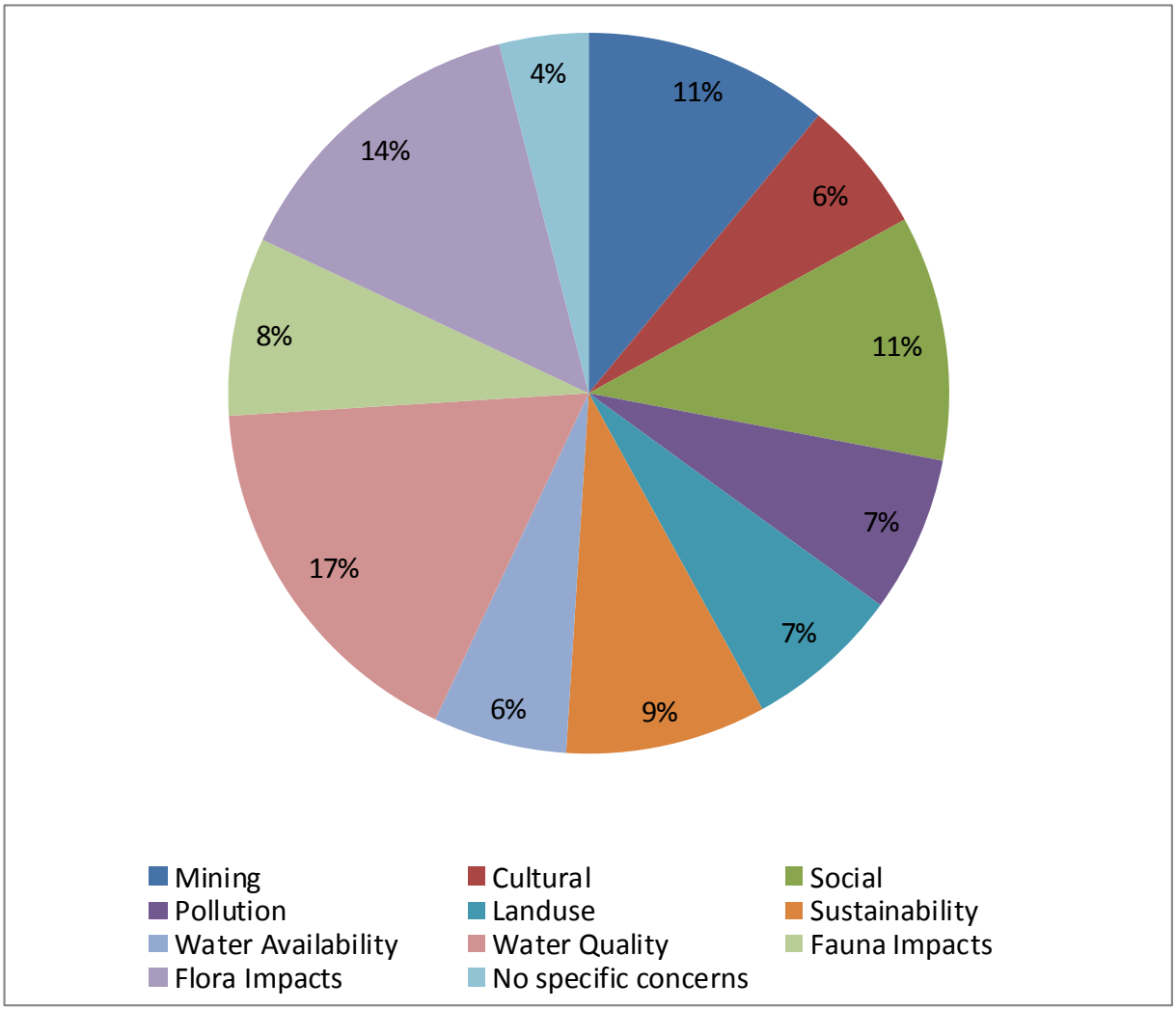


Figure D 4-2 Proportion of individual topic responses (N=226) grouped by broad category/topic of concern

Selected examples of specific concerns were:

Hawkesbury-Nepean CMA

The Hawkesbury-Nepean CMA provided input to the 2013 audit (30 August 2013). Relevant issues raised include:

- The effects of underground mining on river base-flows.
- The potential impacts on water storage impoundments and dam integrity.
- The risks to environmental assets (particularly water quality) due to increased coal seam gas (CSG) exploration in the Southern Highlands.

Southern Rivers CMA

The Southern Rivers CMA identified (30 August 2013) that it does not have relevant data available to assess mining impacts in relation to catchment management health. Measurement data relating to this item are as per the recommendations made in the 2010 Audit pertaining to cumulative impacts of mining and remediation of impacted sites.

Goulburn Mulwaree CMA

This CMA identified (23 August 2013) concerns regarding the current 'fragmented' management arrangements for water resources and related infrastructure, and suggested that one CMA could be responsible for managing these resources in the Sydney catchment area.

Rivers SOS Alliance

The Rivers SOS Alliance shared its views and concerns during this audit period, which related to the three major Special Areas identified within the catchment (Woronora, Warragamba and Metropolitan Special Areas). The Alliance suggested:

- That a ban on all new mines, mine expansions and CSG developments in the 'Special Areas' of the Sydney catchment area be implemented.
- That legislation changes are implemented to empower SCA to enact the above point.

These points relate specifically to threats to water supply, water quality and threatened species as well as impacts from land subsidence in the catchment area.

Overall, the topics of responses received indicated that there are a broad range of topics that are considered important to catchment stakeholders, illustrated in Figure D 4-2; which highlights the importance of ongoing stakeholder engagement and consultation.

Table D 4-1 SCA's response to 2010 Audit recommendations

2010 Audit Recommendation	Status as at 30 June 2013
Audit methodology	
2010/1 - The SCA investigate ways to achieve effective Aboriginal community engagement in the audit prior to the commencement of the next Sydney Drinking Water Catchment audit.	**Complete** - The SCA developed its Aboriginal Stakeholder Engagement Plan for the 2013 Catchment Audit. The Plan listed the key Indigenous stakeholders and the activities for the SCA to undertake to achieve effective engagement. As a result of this work, the SCA received a submission from the Darug Custodian Aboriginal Corporation which has been provided to the Catchment Auditor. The SCA has also drafted a broader plan to guide engagement with Indigenous communities within the catchments. Finalisation of the plan is contingent on the Indigenous Land Use Agreement (ILUA) with the Gundungurra people, which includes engagement responsibilities. The agreement is subject to ongoing negotiation. The SCA is committed to Indigenous engagement and consults with Indigenous groups on major projects and activities.
Land Use and Human Settlement	
2010/5 - The SCA, HNCMA and SRCMA develop a consistent baseline map of gully erosion for the catchment	**In progress** - Stage 1 of the Gully Erosion Trial Evaluation has been completed, the outcomes of which were presented at a recent Joint Operations Group meeting (SCA, HNCMA and SRCMA). A new project is being developed to roll out the Stage 1 baseline gully erosion mapping to 45 priority areas in the SCA, HNCMA and SRCMA area of operations. Stage 2 of this project, a gully erosion sediment export model, is substantially progressed and is expected to be complete by the end of 2013. The model will provide additional information that will be integrated into the risk tool. This will lead to the development of a semi-quantitative model for gully erosion prioritisation in the SCA's Pollution Source Assessment Tool.
Biodiversity & Habitats	
2010/6 - The SCA continue to undertake follow-up monitoring at macroinvertebrate monitoring locations that have scored an AusRivAS rating of significantly impaired, severely impaired or extremely impaired where there is no obvious driver for an impacted rating.	**Complete** -The SCA continued conducting its Macroinvertebrate Monitoring Program (MMP) spring sampling at all core sites in 2010, 2011 and 2012 including those which have recorded lower AusRivAS and/or SIGNAL ratings in previous years. The surveys conducted in 2010, 2011 and 2012 showed a slight net improvement at many of the monitoring sites. The results of each year's survey are reported in the SCA's Annual Water Quality Monitoring Report, which is publicly available on the SCA website (see www.sca.nsw.gov.au/water-quality/water-quality-monitoring-reports). The report for 2012-13 is currently being prepared. A review of the Macroinvertebrate Monitoring Program in 2012 concluded that the program in its present form does not produce a wholly reliable assessment of sub-catchment health, as its results primarily reflect the ecological condition of individual sites. The review recommended that the program be changed from its present form and the SCA is considering various options to improve the program.
2010/7 - OEH in collaboration with SCA, develop a consistent, uniform and integrated vegetation dataset that covers the entire Drinking Water Catchment.	**Complete** – The Office of Environment and Heritage (OEH) has supplied the SCA with the State-wide Land Cover and Trees Study dataset (SLATS), which is a consistent woody and non-woody vegetation dataset that covers the entire Sydney drinking water catchment. The SCA has prepared a broad vegetation type dataset based on a National Parks and Wildlife Service (NPWS) classification for the drinking water catchments.

Table D 4-1 (cont.) SCA's response to 2010 Audit recommendations

2010 Audit Recommendation	Status as at 30 June 2013
2010/8 - The Rural Fire Service, in cooperation with SCA and OEH, integrate their spatial datasets across all sub-catchments so that a single, consistent estimate for the area burnt by hazard reduction burns and bushfires can be reported.	**Complete** -The Rural Fire Service (RFS) collates spatial datasets on fire history annually from each agency when so supplied. The SCA continues to supply RFS with spatial extent for wildfires on an annual basis for collation into a state-wide dataset. The SCA also submits hazard reduction burn plans to RFS via the Bush Fire Reporting Information Management Systems.
2010/11 - OEH and the SCA should finalise their classifications of wetlands to produce a complete and consistent coverage of wetlands in the Catchment	**Complete** - A consistent classified wetland dataset for Sydney's drinking water catchments has been completed. A draft report Wetlands in Sydney's Drinking Water Catchments states that 3.1% (47,505 ha) of the catchments are permanent or periodically inundated by water and considered wetlands. Wetlands were classified using the RAMSAR Classification System for Wetland Types. The RAMSAR Classification System uses a broad framework to allow rapid identification of sites. The system is based on the form and relationships rather than intrinsic content or wetland processes. A number of other NRM agencies have chosen the RAMSAR classification system, including Queensland's Department of Environment and Resource Management, OEH, and the Australian Department of Sustainability.
2010/13 - The SCA reinstate the flow gauging station in the Little River at Fire Road W4I	**Complete** -The station was included in the SCA Hydrometric Renewals Program for the 2011/12 financial year and the site is now operational.
Water Availability	
2010/17 - NOW and SCA undertake research aimed at understanding the extent, connectivity and interaction between sub-surface aquifers (confined and unconfined), perched aquifers and surface waters within the Catchment	**Complete** -The SCA has completed research on the surface water-groundwater interaction in the mining impacted catchments of Special Areas. An application of environmental isotopes, tracers and modelling was used to better understand behaviour of surface water-groundwater interaction in sandstone terrains. The project report will be externally reviewed and is expected to be published by June 2014.
Water Quality	
2010/18 - The SCA undertake a targeted survey of pesticide usage and application in the catchments of Cascade Dam and Wingecarribee Reservoir	**Complete** -The SCA undertook a risk assessment of pesticides based on usage and chemical properties for all its catchments in 2009. The findings of the risk assessment informed the Water Monitoring Program 2010-2015, which has been endorsed by NSW Health. In response to the inclusion of guidelines values for additional pesticides in the Australian Drinking Water Guidelines 2011, the SCA undertook a review of pesticide use in the water supply catchments to assess the need for monitoring - in consultation with Department of Primary Industries. A risk assessment was undertaken based on usage, mobility and persistence of the pesticides, human health implications and environmental toxicity (continued overleaf)

Table D 4-1(cont.) SCA's response to 2010 Audit recommendations

2010 Audit Recommendation	Status as at 30 June 2013
(cont.)	All past SCA monitoring data (2000 – 2012) was compiled and assessed as part of the review. The review was completed in April 2013, which short-listed 26 pesticides and 10 synthetic organic compounds for inclusion in SCA's water monitoring program. An interagency stakeholder workshop attended by representatives from Sydney Water, Goulburn Mulwaree Council, NSW Health, (Hunter Water observer) and SCA in May 2013 provided clarity on how recommendations for ongoing monitoring of pesticides could be incorporated in the SCA's Water Quality Monitoring Program.
2010/19 - The SCA continue to investigate the cause of persistent detections of *Cryptosporidium* and *Giardia* oocysts/cysts in the catchment	In progress -SCA has done extensive research of *Cryptosporidium* and *Giardia* including a 10 year review, targeted investigations, and hazard assessments, and will continue to investigate the cause of persistent detections of *Cryptosporidium* and *Giardia* oocysts/cysts as necessary and undertake research to better understand viability. Recent sampling for *Cryptosporidium* and *Giardia* at storage inflow sites and within the storages themselves indicate that none of the oocytes/cysts detected are human infective. SCA continues to closely monitor water in the catchment for *Giardia* and *Cryptosporidium*, with approximately 570 water samples tested since July 2011. Additional sampling was undertaken during heavy rain events to assess the impact of STP overflows on the receiving waters. A number of projects are underway or nearing completion including: • Investigating the potential of on-site wastewater systems to impact on water quality in the catchment; • Investigating sources of *Giardia* and *Cryptosporidium* in the Upper Canal; • Investigating the in-stream reduction of *Cryptosporidium* oocysts; • Assessing *Giardia* and *Cryptosporidium* reduction, by removal and loss of viability, at STPs in the catchment; and, • The carriage by kangaroos of potentially human-infective Cryptosporidia.
2010/21 - Estimates of nutrient loads from diffuse sources should be included in future audits in order to understand the full context of nutrient loading in the Catchment.	**Complete** - Estimating nutrient loads from diffuse sources is a fundamental prerequisite for determining and evaluating catchment interventions. The requirement to estimate nutrient loads from diffuse sources in the catchment is included in the scope for the 2013 Catchment Audit.
2010/22 - The SCA should continue to investigate the risk of mixing of cyanobacteria between water bodies in the Shoalhaven system during periods of low flow	**Complete** -The SCA has previously investigated the potential impact of Shoalhaven transfers on blue-green algae blooms in Warragamba Dam which was assessed as part of the 2010 catchment audit. The SCA's Water Management Licence prohibits movement of water between impoundments if there is a potential to contaminate receiving water body with cyanobacteria. SCA and Eraring Energy have developed protocols for moving water during algal blooms.
2010/23 - The SCA should investigate trends and long-term patterns in the community composition of cyanobacteria and phytoplankton in the dams and reservoirs	**In progress** – The Warragamba Dam Blue-Green Action Plan was superseded in 2011 by the Cyanobacteria Management Strategy 2012-2015, which encompasses all storage reservoirs. The strategy was developed to guide ongoing assessment and management of cyanobacteria (blue-green algae) in SCA storages, and was prepared in consultation with Sydney Water and NSW Health. (continued overleaf)

Table D 4-1 (cont.) SCA's response to 2010 Audit recommendations

2010 Audit Recommendation	Status as at 30 June 2013
(cont.)	The strategy outlines actions to be undertaken over 2012-2015 to maintain the SCA's preparedness and response capability for cyanobacteria incidents, as well as longer-term actions to increase the SCA's understanding of cyanobacteria and their associated cyanotoxins within water storages. In order to set priorities for action, the Cyanobacteria Management Strategy incorporates a risk assessment for each SCA reservoir using a multiple criteria approach that is consistent with the SCA's organisational risk management framework. This risk assessment was also informed by the Cyanobacteria Risk Profile (2010), a comprehensive scientific report on the algal status of each reservoir and the available management controls. The Cyanobacteria Risk Profile was reviewed by NSW Health and Sydney Water and also by cyanobacteria experts at the NSW Office of Water and South Australia Water. The strategy contains the following strategic objectives for ongoing improvement in the management of cyanobacteria risks: • Maintain and improve monitoring that detects any changes in the nutrient and algal status of SCA reservoirs; • Improve scientific understanding of cyanobacteria, including the environmental conditions that favour biotic productivity and the growth of cyanobacteria; • Identify and manage interventions that improve the trophic condition of reservoirs and reduce the potential incidence of cyanobacteria blooms; • Ensure ongoing effective response capability when challenged by cyanobacteria events; • Ensure that the SCA's customers and stakeholders have a high degree of confidence in the SCA to appropriately and effectively manage the risks posed by cyanobacteria. • Under the Cyanobacteria Management Strategy 2012-2015, the SCA has embarked on further research, review and intervention activities, including: • Developing an annual forecasting method and tool; • Reviewing the list of potentially toxin-producing cyanobacteria, and the criteria for toxin analysis; • Trialling and adopting improved methodologies for estimating nutrient loads within both streams and reservoirs; • Establishing wet weather monitoring of nutrients in the key tributaries to high-risk reservoirs; • Trialling new on-line monitoring technologies, particularly for nitrogen, phosphorus and chlorophyll-a; • Targeting nutrient reduction initiatives under the Healthy Catchments Strategy in the Wollondilly River catchment, Kangaroo Valley and Fitzroy Falls Reservoir catchment and Calaang Creek (which flows into Wingecarribee Reservoir); • Modelling the hydrodynamic behaviour of storages preceding historical blooms to determine the significance of storage levels, wind generated circulation and inflow dynamics on bloom behaviour; • Reviewing, and where appropriate optimising, sampling frequency for algae and nutrients to better reflect temporal variations; • Improving methods of detecting and quantifying benthic algae in Prospect Reservoir; and • Investigating the influence of artificial aeration in Avon and Nepean reservoirs on trophic conditions and algal behaviour.

Table D 4-1 (cont.) SCA's response to 2010 Audit recommendations

2010 Audit Recommendation	Status as at 30 June 2013
2010/24 - The SCA should look very closely at including monitoring sites in sub-catchments that currently have no long-term water quality or flow gauging sites	**Complete** -The SCA has identified extra catchment sites as part of Water Monitoring Program review, with the focus on high risk pollutant sources. The new sites which include auto-sampling facility (triggered by river level) are progressively being installed.
2010/25 - The SCA collate all recent work undertaken on water quality trend assessments and provide a unifying summary of trends across the Catchment.	**Complete** -Trend analysis is undertaken as required under the Operating Licence and is included in the SCA's Annual Water Quality Monitoring Report every two years.
Integration of Water Quality and Ecosystem Health Indicator Monitoring	
2010/26 - The SCA in cooperation with other state and local government agencies explore ways to integrate individual monitoring programs into a broader ecosystem health monitoring program for the entire catchment	**In progress** - State and Local Government organisations have specific objectives and data requirements for their ecosystem monitoring programs, limiting the capacity to integrate individual monitoring to broader programs. However, the SCA works with agencies to share data and integrate monitoring programs where appropriate. In conjunction with NOW, the SCA is expanding its water quality monitoring program to include additional high risk sub-catchments. The SCA will also use NOW gauging stations as part of the SCA's Water Monitoring Program and has incorporated NOW data in the Wet Weather Risk Assessment Tool. The SCA works with the Bureau of Meteorology (BOM), who is leading a national water information program to integrate flow and rainfall stations into a single database which is likely to include water quality data in the future. The SCA also regularly provides catchment flow information to the BOM for communicating on the BOM website. The SCA works with the NPWS to meet shared objectives under the Special Area Strategic Plan of Management (SASPoM). The SASPoM is also adopting the State of the Parks methods and reporting to integrate ecosystem health data for the Special Areas. The SCA shares data and information related to pollution sources with Local Councils and the Environment Protection Authority (EPA). This has greatly assisted the SCA's science programs when assessing the water quality risks of Sewage Treatment Plants (STP), and to support programs to upgrade STPs in the catchment. The SCA also works with the Catchment Management Authorities (CMA) to implement on-ground works to meet shared objectives under CMA's Catchment Action Plans (CAP) and the SCA's Healthy Catchments Strategy 2012-2016. The CAPs provide a framework for natural resource management across a catchment and cover biodiversity, land and water management. Performance reporting on the CAPs provides an opportunity for greater integration of monitoring information. The SCA, HNCMA, SRCMA, Department of Primary Industries (DPI) and Crown Lands have adopted the Land Management Database (LMDB), administered by the Office of Environment and Heritage (OEH). The LMDB provides a central database for capturing information about catchment intervention projects/programs. The database stores input, output and outcome information for intervention programs, which can be viewed spatially by agencies.

Table D 4-1 (cont.) SCA's response to 2010 Audit recommendations

2010 Audit Recommendation	Status as at 30 June 2013
2010/27 The SCA in cooperation with other state and local government agencies investigate ways of integrating their respective ecosystem health databases so that a common comprehensive database on ecosystem health indicators is developed for the catchment	**In progress** - The SCA maintains a comprehensive suite of spatial data and satellite imagery which is used for vegetation condition mapping, and other ecosystem health denotations which it can make available to other agencies. Currently, there is no integrated ecosystem health database across state and local government, however, there have been a number of initiatives to improve ecosystem datasets and make them accessible for relevant agencies. The OEH managed LMDB is being used by the SCA, CMAs, DPI and Crown Lands to capture data on on-ground works from catchment intervention programs including: habitat protection and restoration; weed control and stock exclusion zones.
2010/28 The SCA ensure these combined databases are readily available to be used in future catchment audits and/or other programs relying on assessments of catchment health	**In progress** - The SCA maintains a comprehensive suite of spatial data and satellite imagery which can be readily displayed and analysed for catchment audits and other purposes. The LMDB also captures information about the SCA's on-ground works in the catchment which can be accessed for use in future catchment audits and/or other programs relying on assessments of catchment health.

5. Appendix E: Major Projects in the Catchment

Table E 5-1 Major projects in or adjacent to the Sydney Drinking Water Catchment by Local Government Area (LGA)

Application Type	Title	Proponent	Location	Status of Proposal
Group 1 Agriculture, timber food and related industries				
Group 2 Mining, petroleum production extractive industries and related industries				
SSD-5602	Angus Place Coal Project - Angus Place Mine Extension Centennial Coal Lidsdale Modification	Centennial Coal - Angus Place Mine Extension	Outer catchment - Lithgow	Assessment on-going
Part 3A 06-0021	Angus Place Coal Project - Centennial Coal Lidsdale Modification	Centennial Coal	Outer catchment - Lithgow	Project approved 2011
Part 3A 08-0256	Appin Colliery Coal Gas Drainage, Bulli Seam Operations Project - Mod. 2	BHP Billiton Illawarra Coal Holdings	Adjacent and underneath Upper Canal	Project approved 2012
Part 3A 09_0178	Baal Bone Coal Project	Baal Bone Mine, Wallerawang Collieries Pty Ltd, Cullen Bullen	Outer catchment - Lithgow	Project approved 2011
Part 3A - 10_0172	Berrima Coal Project	Boral Colliery, Berrima	Wingecarribee Special Area	Project approved 2012
Part 3A - 401-11-2002-i MOD 7	Boral Cement Works	Boral (formerly Blue Circle Southern) Cement Works	Wingecarribee Special Area	Project approved 2012
Part 3A 06_0292_	Camden Gas Project - Modification 1	AGL Gas Production P/L	Adjacent to Upper Canal	Project approved 2011
Part 3A 06_0291	Camden Gas Project - Modification 2	AGL Gas Production P/L	Adjacent to Upper Canal	Project approved 2012
Group 2 Mining, petroleum production extractive industries and related industries				
Part 3A 09_0048	Camden Gas Project - Stage 3 (Northern Expansion)	AGL Gas Production P/L	Adjacent to Upper Canal	Assessment on-hold
SSD-5164	Centennial Coal Washery Upgrade & Logistics Project	Centennial Western Mines Coal Processing Facility	Outer catchment - Lithgow	Assessment ongoing
Part 3A -10_0178	Coalpac Mine Consolidation Project - Expansion of mining operations at the Cullen Valley and Invincible coal mines	Coalpac Pty Ltd	Outer catchment - Lithgow	Assessment ongoing
Part 3A - 10-0054	Dargues Reef Gold Project, MOD 1 , Majors Creek	Dargues Reef Mine - Big Island Mining	Outer catchment - Majors Creek, Braidwood	Project approved 2012

Table E 5-1 (cont.) Major projects in or adjacent to the Sydney Drinking Water Catchment by Local Government Area (LGA)

Application Type	Title	Proponent	Location	Status of Proposal
Part 3A - 08_0230	Green Valley Sand Project	Green Valley Sand Quarry, Rocla Pty Ltd	Outer catchment Paddy's River - Marulan	Project approved 2013
Part 3A 07_0103	Illawarra Coal Seam Gas Exploration Drilling - Modification 2 - extension of time	Apex Energy NL	Woronora Special Area	Project Approved Mod. 1 Approved 2011, Mod. 2 Project refused 20/07/13
Part 3A 08_0150	Illawarra Coal's Bulli Seam Operations Project	BHP Billiton Illawarra Coal Holdings	Woronora Special Area	Project approved 2011
Part 3A 08_0223	Lidsdale Coal Loader Project	Lidsdale Siding	Outer catchment - Lidsdale	Project approved 2013 (PAC)
Part 3A 06_0074	Marulan South Hard Rock Quarry	Peppertree (Marulan South) Quarry	Outer catchment - Marulan	Mod. 2 Project approved 2012, Mod. 3 Project approved 2012
Part 3A 08-0149	Metropolitan Mine Coal Project	Helensburgh Coal Pty Ltd	Metropolitan Special Areas	Mod. 2 Approved 2011
Part 3A 08_0212	New Berrima Clay / Shale Quarry, The Austral Brick Company, Berrima	The Austral Brick Company, Berrima	Wingecarribee Special Area	Project approved 2012
Group 2 Mining, petroleum production extractive industries and related industries				
SSD-5598	Neubeck Coal	Neubeck Coal Project - Centennial, Angus Place Pty Ltd	Outer catchment - Lidsdale	DGRs Issued 2012
Part 3A - 09_0161	NRE Continued Operations Project Nebo Area - Wongawilli Mine	Gujarat NRE	Metropolitan Special Area	Project approved 2011
Part 3A - 10_0046	NRE No 1 Mine - Preliminary Works Project	Gujarat NRE	Metropolitan Special Area	Project approved 2011 Mod. 1 Approved 2012
Part 3A - 09_0013	NRE No 1 Mine - Underground Expansion project	Gujarat NRE	Metropolitan Special Area	Assessment on-going Application initially withdrawn, then re-submitted
Part 3A - 11_0018	NRE Wongawilli Ventilation Shaft	Gujarat NRE	Metropolitan Special Area	Proponent still planning project
Part 3A 10_0041	Pine Dale Coal Project - Enhance Place Pty Ltd, Castlereagh Highway , near Blackmans Flat	Pine Dale Mine	Outer catchment - Lidsdale	Project approved 2011
SSD-5086	Pine Dale Coal Project - Stage 2 Yarraboldy Extension, Enhance Place Pty Ltd, Castlereagh Highway , near Blackmans Flat	Pine Dale Mine	Outer catchment - Lidsdale	Assessment on-going

Table E 5-1 (cont.) Major projects in or adjacent to the Sydney Drinking Water Catchment by Local Government Area (LGA)

Application Type	Title	Proponent	Location	Status of Proposal
SSD-5579	Springvale Coal Services	Centennial Western Mines Coal Processing Facility	Outer catchment - Lithgow	Assessment on-going
SSD-5594	Springvale Colliery	Springvale Mine Extension Project - Springvale Colliery	Outer catchment - Lithgow	Assessment on-going
Part 3A 07_0143	Woodlawn Zinc-Copper Mine Project -	Tri Origin Minerals Ltd	Outer catchment - Woodlawn	Project approved 2013
Group 3 Chemical, manufacturing and related industries				
Group 4 Other manufacturing industries, distribution and storage facilities				
Part 3A - 10_0125	Western Sydney Employment Hub - Coca Cola Amatil Plastics Manufacturing Facility	Coca Cola Amatil P/L	Adjacent to Warragamba Pipeline	Project approved 2011
Part 3A - 10_0142	Western Sydney Employment Hub - Hewlett Packard Data Storage Project	Hewlett Packard	Adjacent to Warragamba Pipeline	Project approved 2010
Part 3A - 10_0129 & 10_0130	Western Sydney Employment Hub - Jacfin Horsley Park Project	Jacfin P/L	Adjacent to Warragamba Pipeline	Assessment on-going
Part 3A 10_0128	Western Sydney Employment Hub - Jacfin Ropes Creek Project - Concept Plan	Jacfin P/L	Adjacent to Warragamba Pipeline	Project approved 2011
Group 5 Residential, commercial or retail projects **Group 6 Tourism and recreational facilities**				
Part 3A - 039-09-2011	Eastern Creek Raceway Track extension	Australian Racing Drivers Club	Near Prospect Reservoir	Project approved 2012
Part 3A 06_0232	Southern Highlands Regional Shooting Complex, Hill Top (Modification 1/3)	NSW Department of Arts, Sport and Recreation	Outer catchment perifory - Warragamba	Project approved 2011/2012(Mod 4 refused 2012)
Part 3A - DA 219-7-2002	Western Sydney International Drag way (WSID), Mod 3 / 4	Western Sydney Drag way P/L	Adjacent to Warragamba Pipeline	Project approved 2012
Group 7 Health and public service facilities **Group 8 Transport, communications, energy and water infrastructure**				
SSD-4976	Bannaby Gas Fired Power Station	Snowy Hydro Limited	Outer catchment - Bannaby	Assessment on-going
Group 8 Transport, communications, energy and water infrastructure				
Part 3A - 10-0034	Crookwell 3 Windfarm	Gamesa Crookwell Development P/L (Union Fenosa)	Outer catchment - Crookwell	Assessment on-going
Part 3A - 09_0193	Highlands Source Project	Goulburn Mulwaree Council	Adjacent to Wingecarribee Reservoir & outer catchment	Project approved 2010

Table E 5-1 (cont.) Major projects in or adjacent to the Sydney Drinking Water Catchment by Local Government Area (LGA)

Application Type	Title	Proponent	Location	Status of Proposal
Part 3A 11_0020	Kerrawary Power Station - gas fired	Origin Energy Power Limited	Outer catchment - Marulan	DGR's requirements 2011 -Withdrawn 2011
SSI	Maldon to Dombarton Railway line	Transport Infrastructure Development Corporation	Metropolitan Special Area	Assessment on-going
Part 3A	Mount Piper Power Station Ash Placement Project	Delta Electricity	Outer catchment - Portland	Project approved 2012
Part 3A - 10_0053	Palings Yard Windfarm - revised proposal	Union Fenosa Wind Australia	Outer catchment - Oberon	Assessment on-going
Part 3A -10_0045	South West Rail Link, Glenfield to Leppington Station Stage	Transport Infrastructure Development Corporation	Adjacent to Upper Canal	Project approved 2010
Part 3A - 10_0151	Woodlawn Windfarm Modification 3	Infigen Energy	Outer catchment - Woodlawn	Project approved 2010
Group 9 Resource and waste related industries				
Part 3A 10_0012	Woodlawn Waste Expansion Project	Veolia Environmental Services P/L	Outer catchment - Woodlawn	Project approved 2012

6. Appendix F: Water sharing plan management zones

Table F 6-1 Water sharing plan management zones

SCA Sub-catchment	Area	Licences	Total Entitlement	Management Zone	Hydrological Stress*	In-stream Value*	Risk to In-stream Value*	Dependence on Extraction*	Main Purpose of Licence**
Hawkesbury-Nepean									
Upper Nepean and Upstream Warragamba									
Mulwaree River	788.112	26	2348	Mulwaree River	High	High	High	Medium	Irrigation is 40.93%
Upper Wollondilly River	740.7684	34	6080	Upper Wollondilly River	High	High	High	Medium	Town water supply is 68.37%
Wollondilly River	2701.226	73	4662	Upper/Lower Wollondilly River	High	High	High	Medium	Irrigation is 58.29%
Wingecarribee River	762.7041	71	3900	Lower Wingecarribee River	High	High	High	Medium	Irrigation is 65.02%
				Upper Wingecarribee River	High	High	High	Medium	merge
Nattai River	446.2872	13	392	Nattai River	High	Medium	Medium	Medium	Irrigation is 82.86%
Little River	184.2378	2	240	Little River	High	Medium	Medium	Medium	Irrigation is 100%
Lake Burragorang	804.4932	3	105	Lake Burragorang	High	Medium	Medium	Medium	Irrigation is 100%
Werriberri Creek	165.0793	39	1133	Werriberri Creek	***	***	Medium	High	Irrigation is 88.44%
Upper Nepean River	894.1394	22	1682	Upper Nepean Tributaries Headwaters	High	Medium	Low	Medium	Irrigation is 45.38%
				Pheasants Nest Weir to Nepean Dam	High	Medium	Low	Medium	
				Maguire's Crossing	High	Medium	Low	Medium	
				Mid Cataract River	High	Medium	Low	Medium	
				Avon River	High	Medium	Low	Medium	
				Cordeaux River	High	Medium	Low	Medium	
Upper Coxs River	382.4109	12	512	Wywandy	High	Medium	Medium	Low	Irrigation is

SCA Sub-catchment	Area	Licences	Total Entitlement	Management Zone	Hydrological Stress*	In-stream Value*	Risk to In-stream Value*	Dependence on Extraction*	Main Purpose of Licence**
									50.78%
Mid Coxs River	1069.759	21	1813	Jenolan River	High	Medium	High	Medium	Environment Rehabilitation is 54.22%
				Dharabuladh	High	Medium	High	Medium	
Kowmung River	769.7602	3	92	Kowmung River	Medium	High	Low	Low	Irrigation, Recreation - High Security is 54.35%
Lower Coxs River	246.2676	3	110	Kedumba River	High	Medium	Low	Medium	Irrigation is 100%
Hawkesbury and Lower Nepean Rivers									
Grose River	21.28596	0	0	Grose River	High	High	High	Medium	N/A
Southern Sydney Rivers									
Woronora River	74.37854	1	17	Upper Woronora River	High	Medium	Medium	Medium	Farming, Irrigation is 76.50%
Shoalhaven									
Upper Shoalhaven River	217.1608	3	8	Upper Shoalhaven River	High	Low	High	Medium	Irrigation, Stock is 77.78%
Jerrabattagulla Creek	358.4641	8	335	Upper Shoalhaven River	High	Low	High	Medium	Domestic, Irrigation, stock is 78.86%
Mid Shoalhaven River	498.5441	3	66	Mid Shoalhaven River	***	***	High	Medium	Irrigation is 39.53%
Back & Round Mountain Creeks	344.9505	6	481	Mid Shoalhaven River	***	***	High	Medium	Irrigation is 98.34%
Braidwood	373.4125	12	607	Mid Shoalhaven River	***	***	High	Medium	Town water supply is 73.77%
Reedy Creek	574.8589	8	209	Reedy Creek	***	***	Low	Low	Irrigation is 95.79%
Boro Creek	352.1132	0	0	Boro Creek	***	***	Low	Low	N/A
Mongarlowe River	429.4571	11	388	Mongarlowe River	***	***	Low	Low	Irrigation is 41.36%
Endrick River	339.4469	0	0	Corang and Endrick Rivers	Medium	High	Low	Low	Irrigation is 100%
Nerrimunga River	483.5347	11	409	Nerrimunga River	Low	High	Low	Low	Irrigation is 58.61%

SCA Sub-catchment	Area	Licences	Total Entitlement	Management Zone	Hydrological Stress*	In-stream Value*	Risk to In-stream Value*	Dependence on Extraction*	Main Purpose of Licence**
Parts of Mid Shoalhaven and Bungonia Creek				Shoalhaven River Gorge	Medium	High	Low	Low	
Bungonia Creek	802.9215	25	1983	Bungonia Creek	Low	Medium	Low	Low	Town water supply is 47.46%
				Barbers Creek	***	***	***	***	
Kangaroo River	865.7702	128	6004	Lower Kangaroo River	Medium	High	***	***	Irrigation is 60.33%
				Yarrunga Creek	Medium	High	***	***	
				Fitzroy Falls	Medium	High	***	***	

* Taken from Appendix 6 of the Water Sharing Plan for the Greater Metropolitan Region Unregulated River Water Sources – Background Document, NOW, July 2011 (WSPGMPU).

** Categories are based on those provided in the GIS files provided by NOW.

*** No classification provided in Appendix 6 of WSPGMPU, July 2011.

In a number of instances there is no direct correlation of the extent of SCA sub-catchment area as assessed under this audit and the Water Management Zones. These can be seen in the table above.

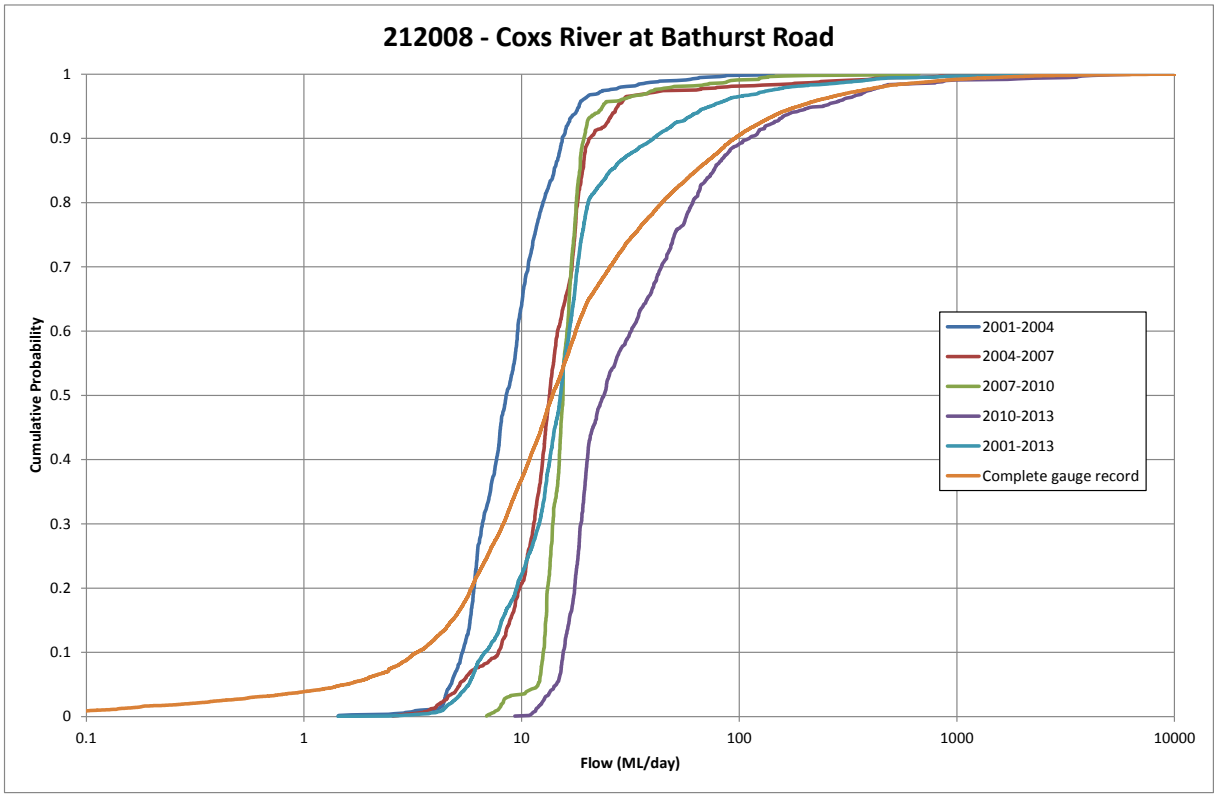
The columns reporting on Area, Licences and Total Entitlement are a summary of the data provided on Water Extraction Licences for the purposes of this audit. Further explanation on the licences and the breakdown across each sub-catchment is provided in Volume 1, Section 4.2 and Volume 3 (Appendix I). Within the current audit period (in 2011) the majority of licences were converted from the previous Water Act 1912 (WA) to the Water Management Act 2000 (WMA). The audit highlighted that due to the changes imposed by the Water Act and Water Management Act between 2010 and 2013, it is not appropriate to compare this audit period with the previous audit (that is, in terms of number of licenses and allocation volumes). Therefore the information provided in this audit is based on the assessment of the current position as at the time of audit.

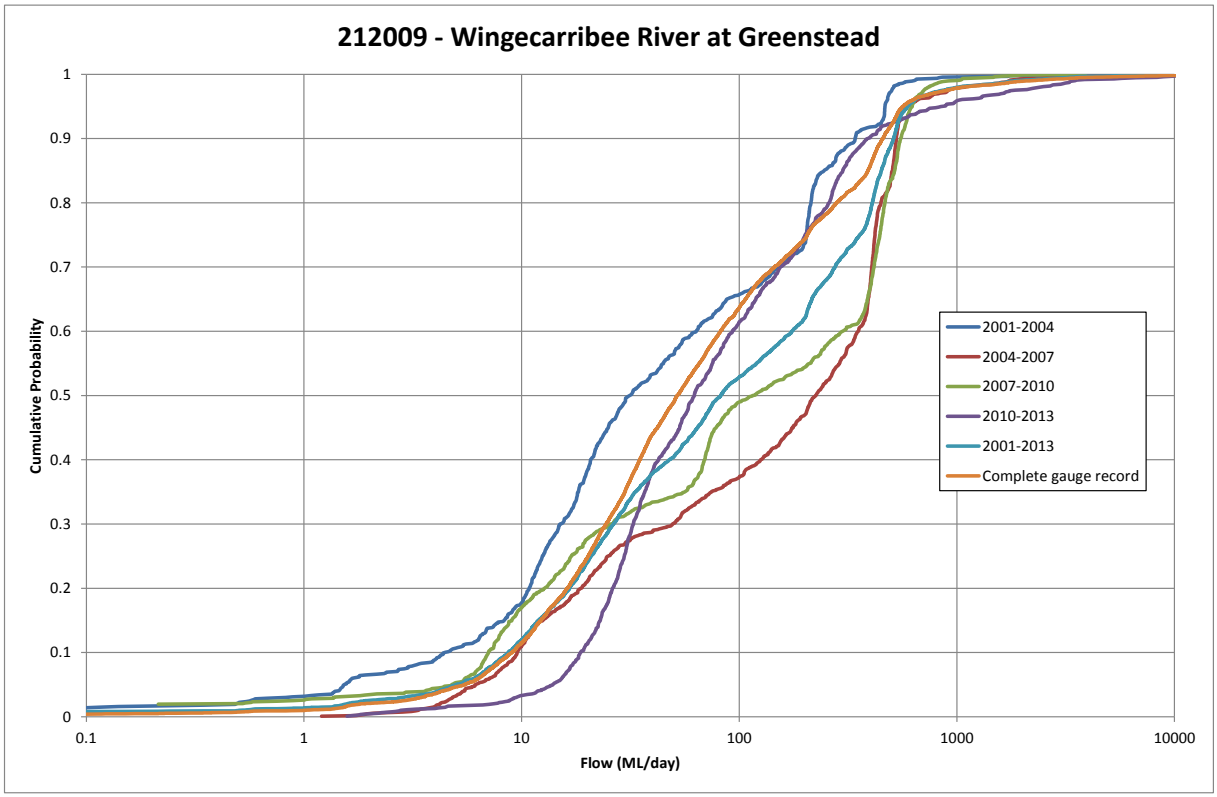
As identified in the notes for the table, the Hydrological Stress, Instream Value, Risk to Instream Value and Dependence on Extraction classifications were taken from Appendix 6 of the Water Sharing Plan for the Greater Metropolitan Region Unregulated River Water Sources – Background Document, NOW, July 2011 (WSPGMPU). Not all of the identified Management Zones had classifications for all the values presented in the WSPGMPU.

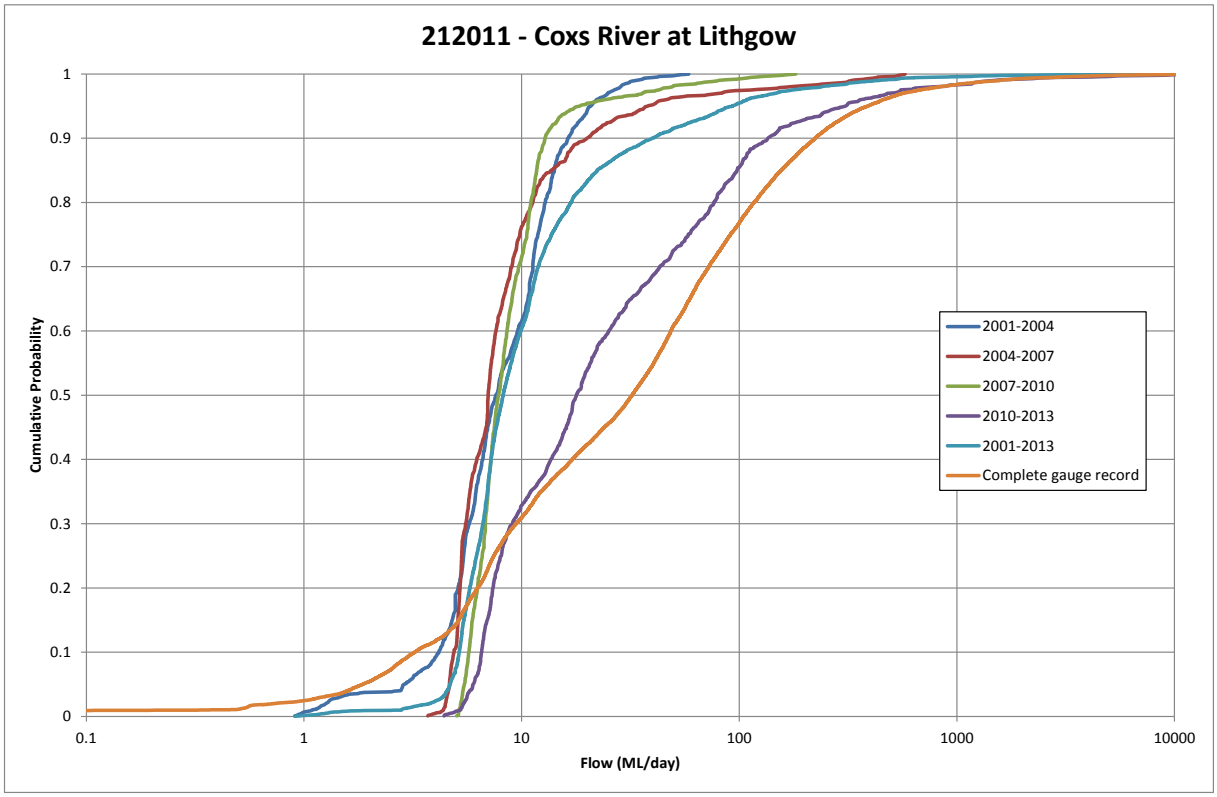
The Main Purpose of the Licence column has been calculated on the basis of the licence data provided by NOW for this audit. The data breaks the extraction licences into various use categories. The use category with the highest percentage of extraction volume for each sub-catchment area is provided.

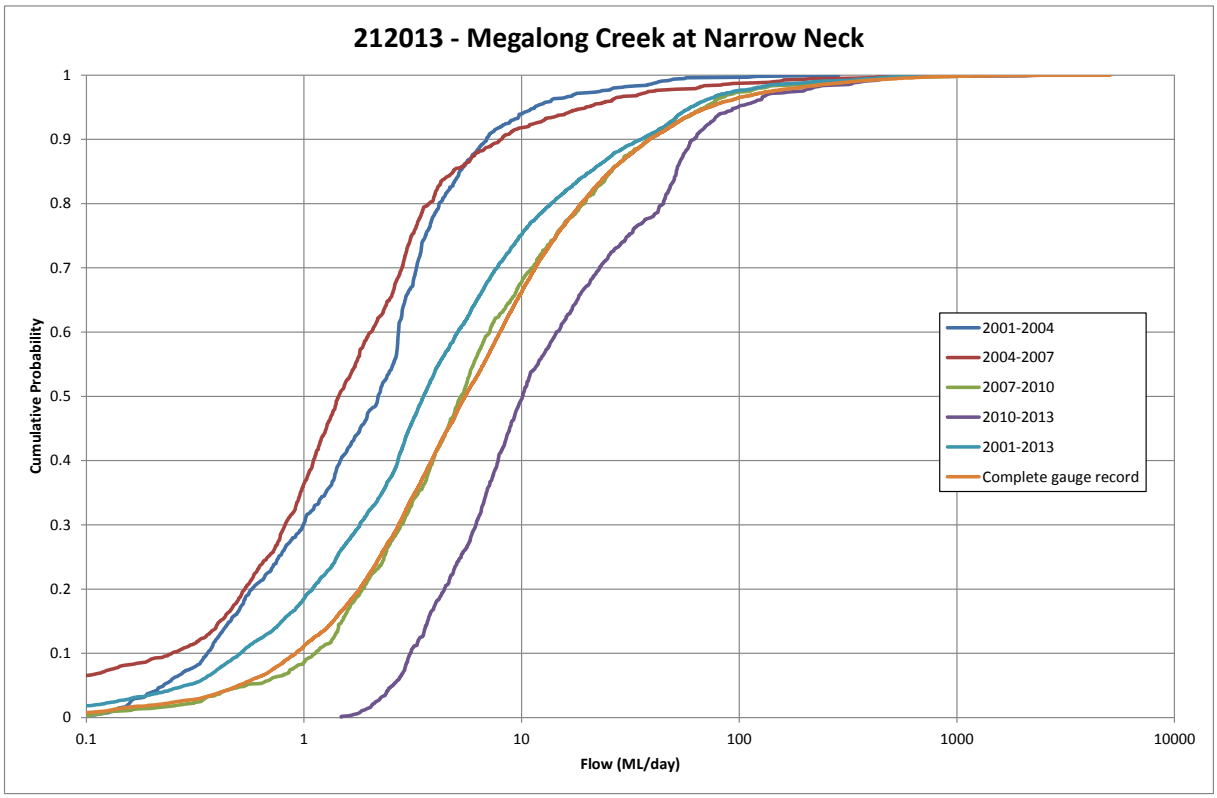
7. Appendix G: Water Availability

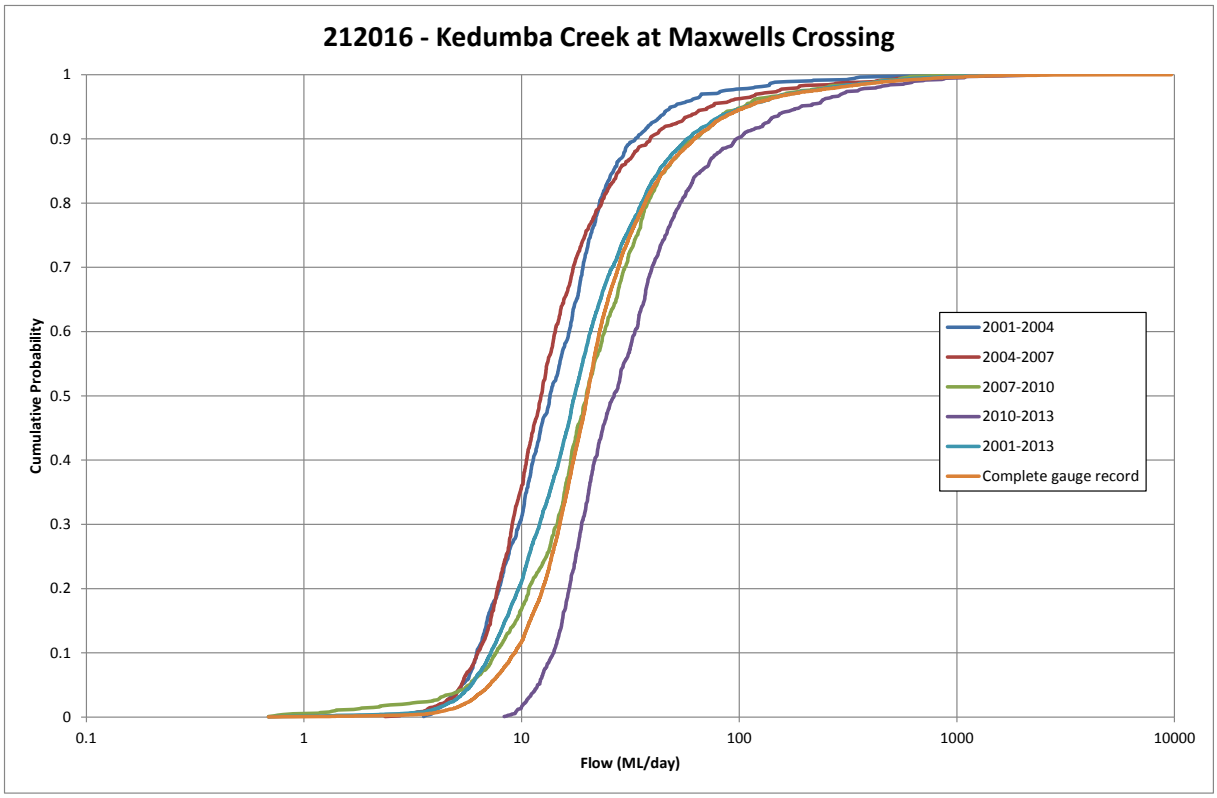
7.1 Flow Exceedance Curves

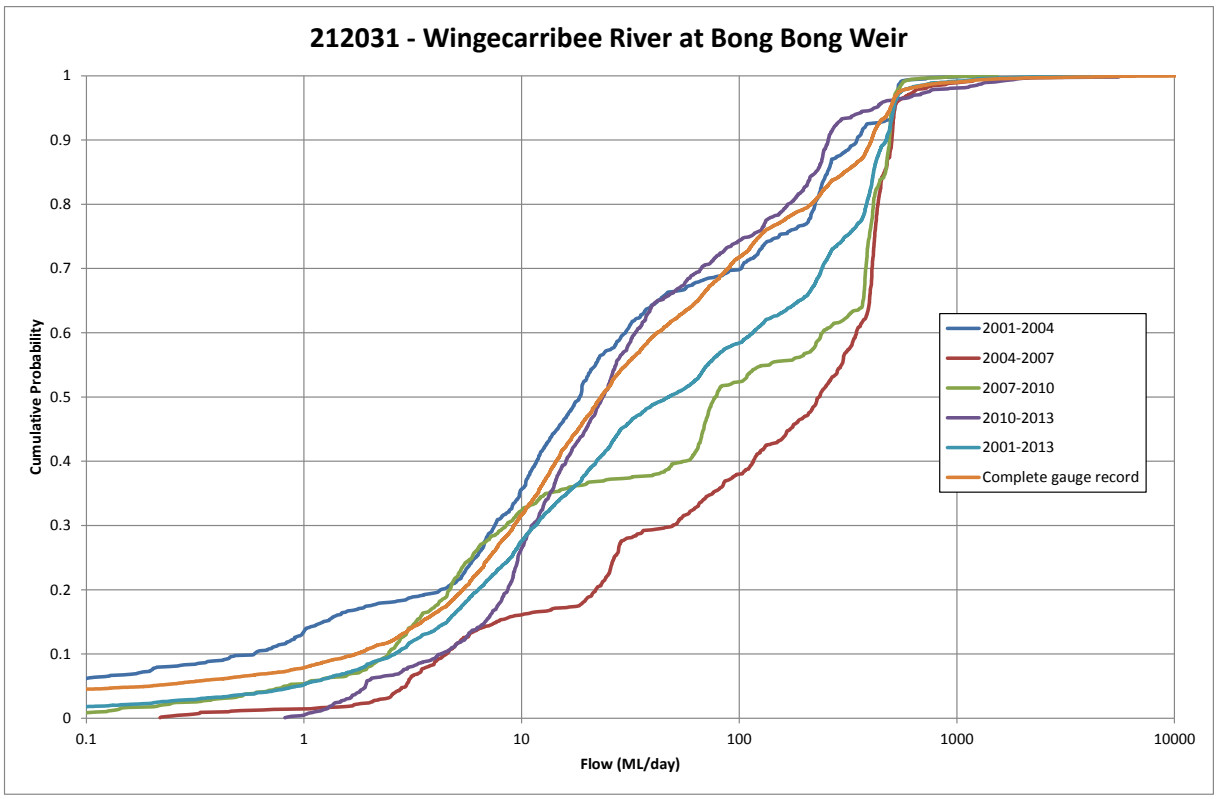


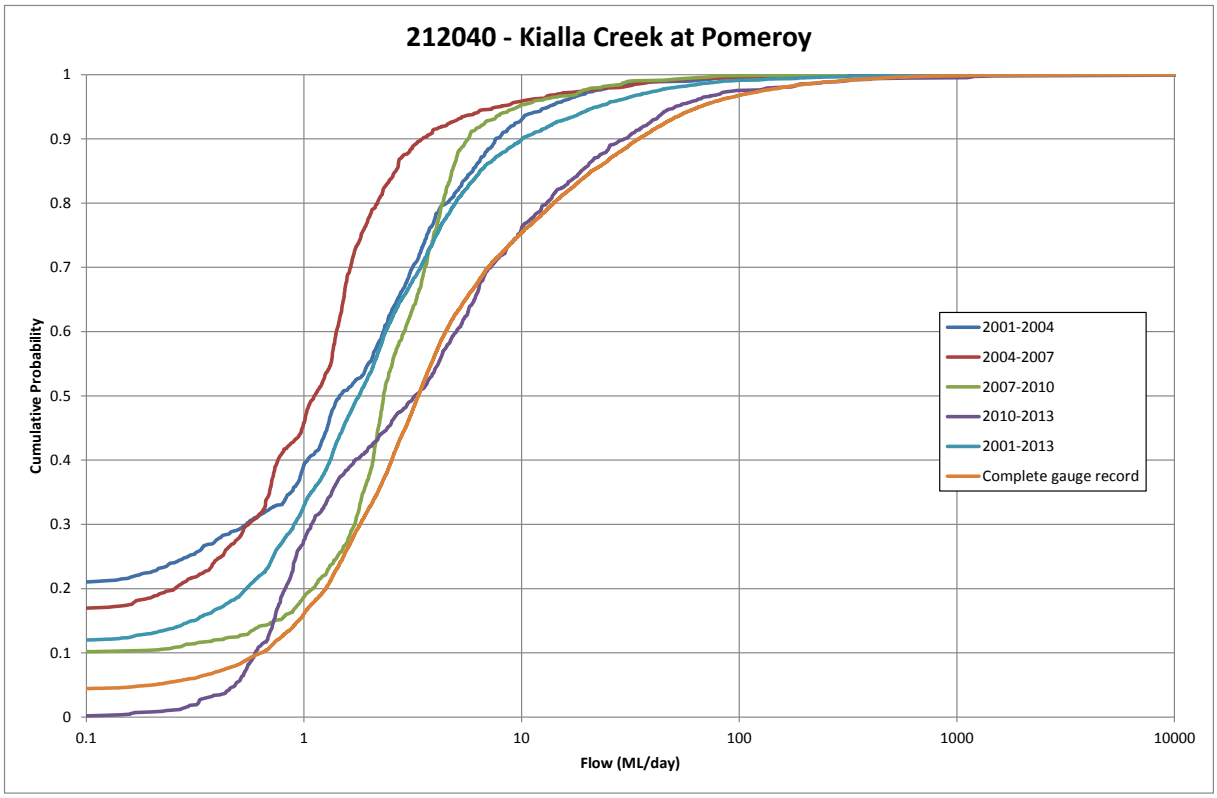


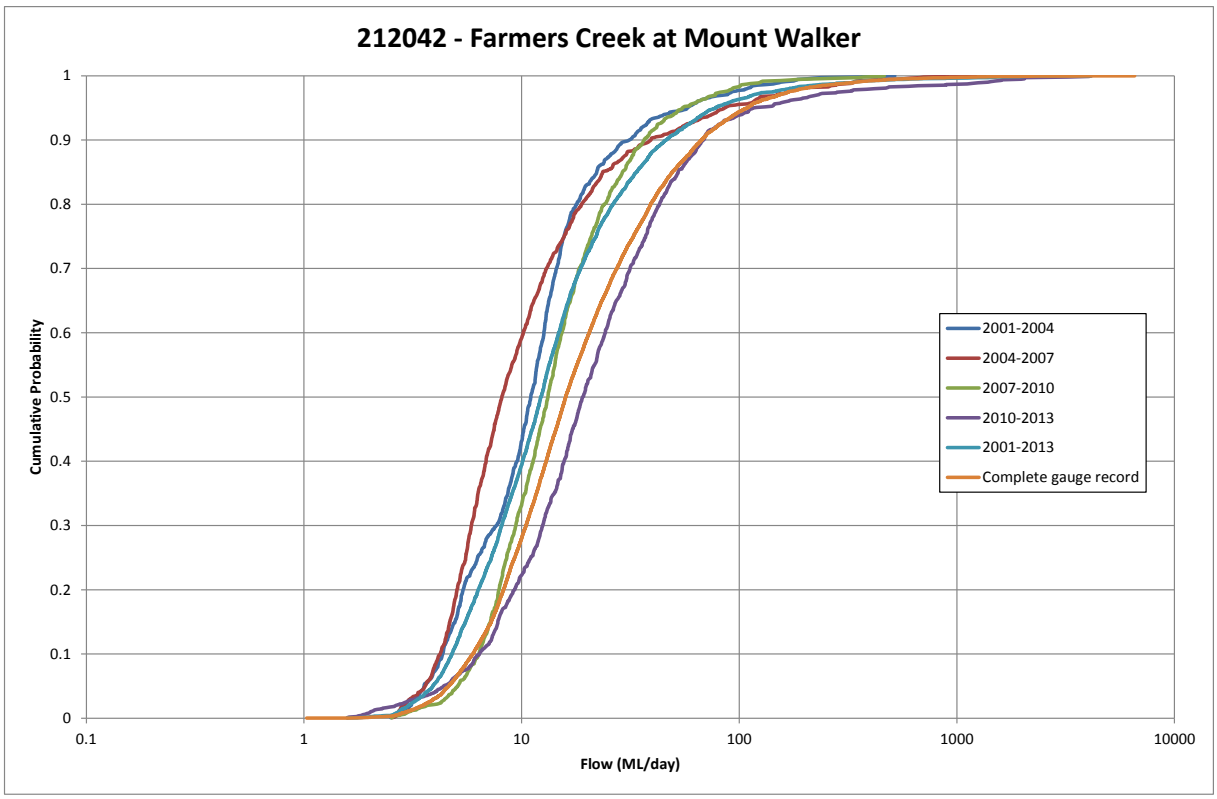

212011 - Coxs River at Lithgow
Cumulative Probability
Flow (ML/day)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0.1
1
10
100
1000
10000
2001-2004
2004-2007
2007-2010
2010-2013
2001-2013
Complete gauge record

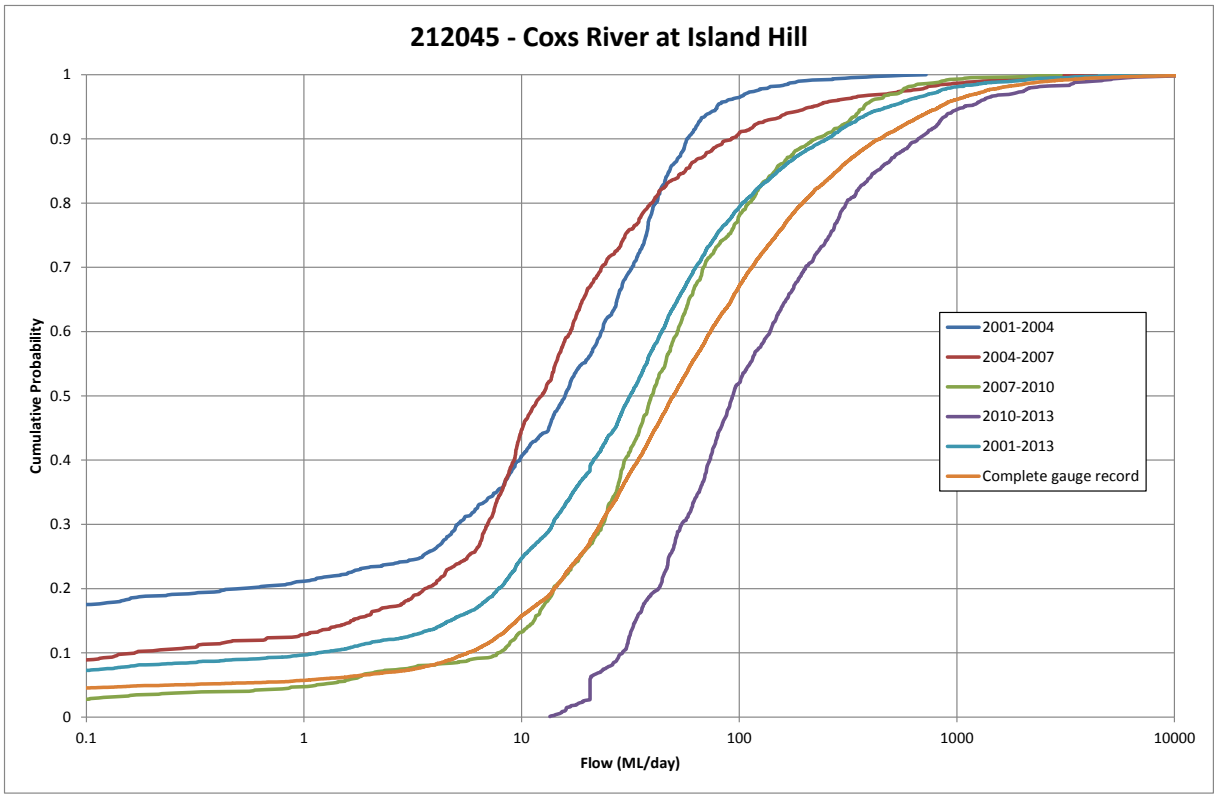

212013 - Megalong Creek at Narrow Neck
Cumulative Probability
Flow (ML/day)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0.1
1
10
100
1000
10000
2001-2004
2004-2007
2007-2010
2010-2013
2001-2013
Complete gauge record

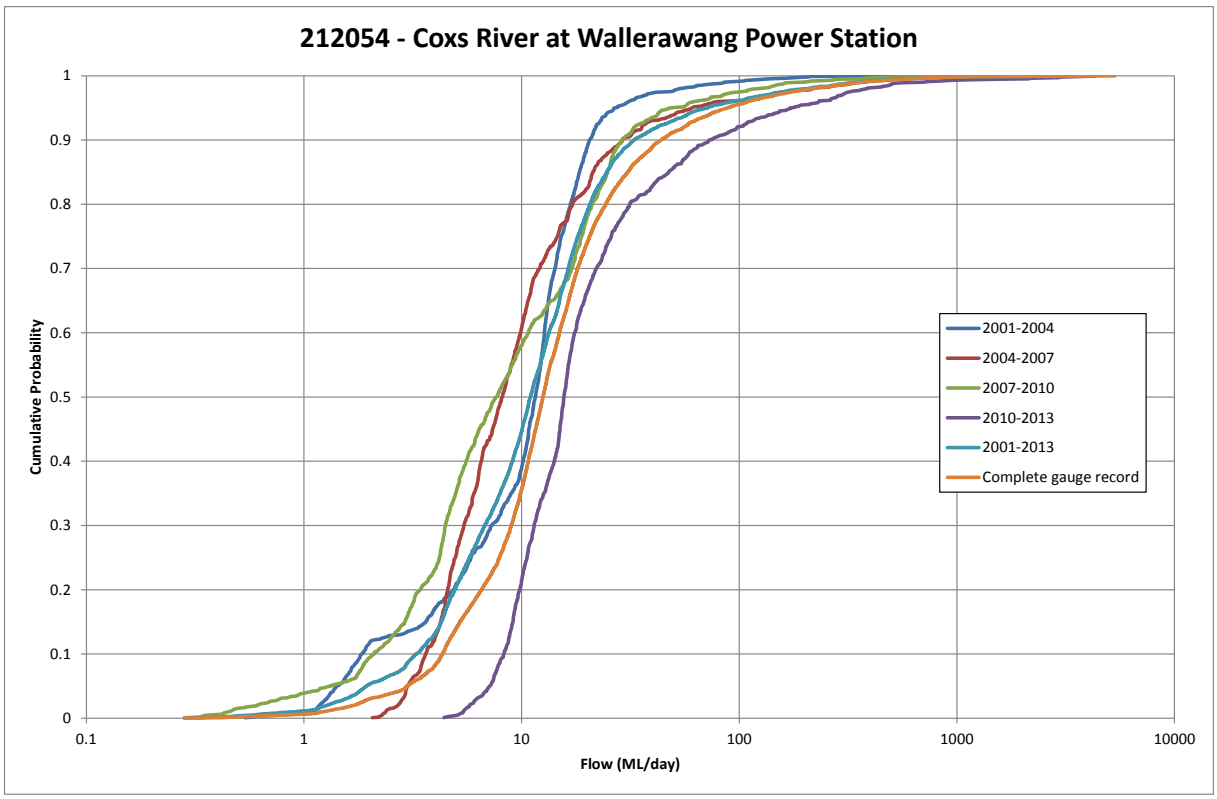

212016 - Kedumba Creek at Maxwells Crossing
Cumulative Probability
Flow (ML/day)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0.1
1
10
100
1000
10000
2001-2004
2004-2007
2007-2010
2010-2013
2001-2013
Complete gauge record

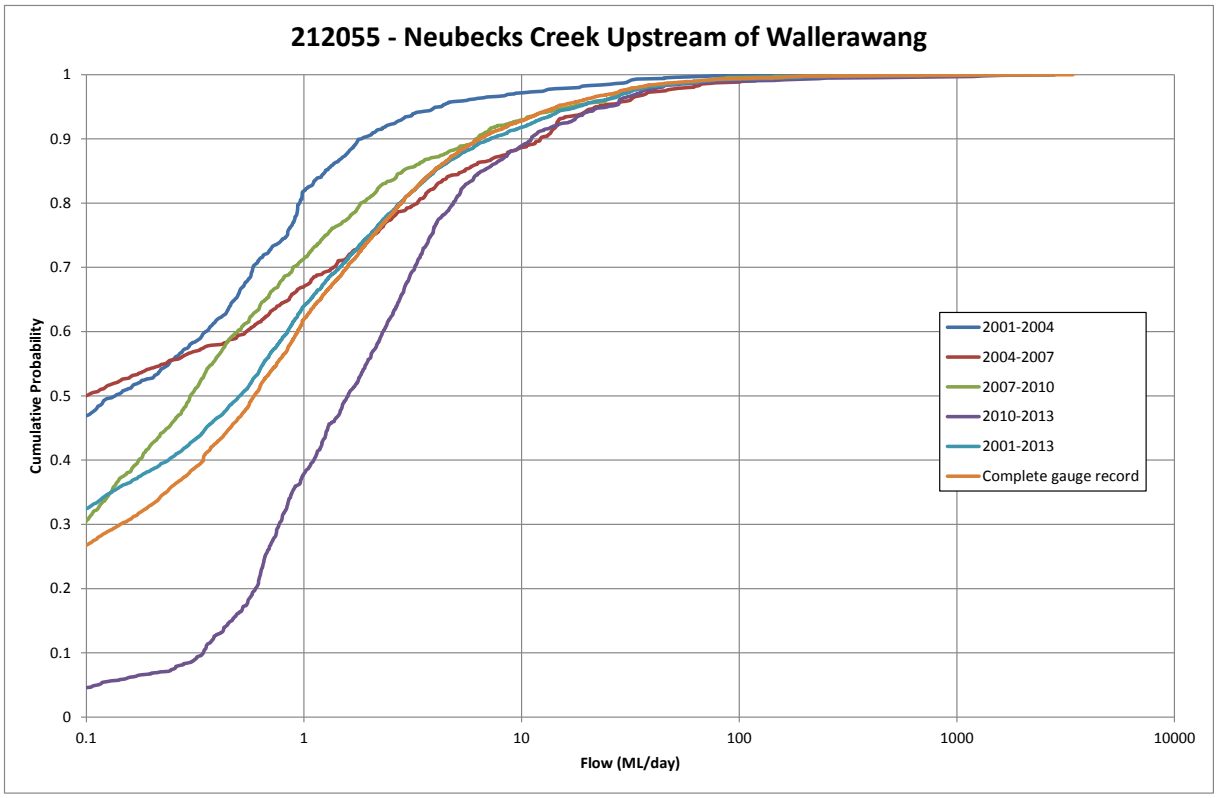

212031 - Wingecarribee River at Bong Bong Weir
Cumulative Probability
Flow (ML/day)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0.1
1
10
100
1000
10000
2001-2004
2004-2007
2007-2010
2010-2013
2001-2013
Complete gauge record

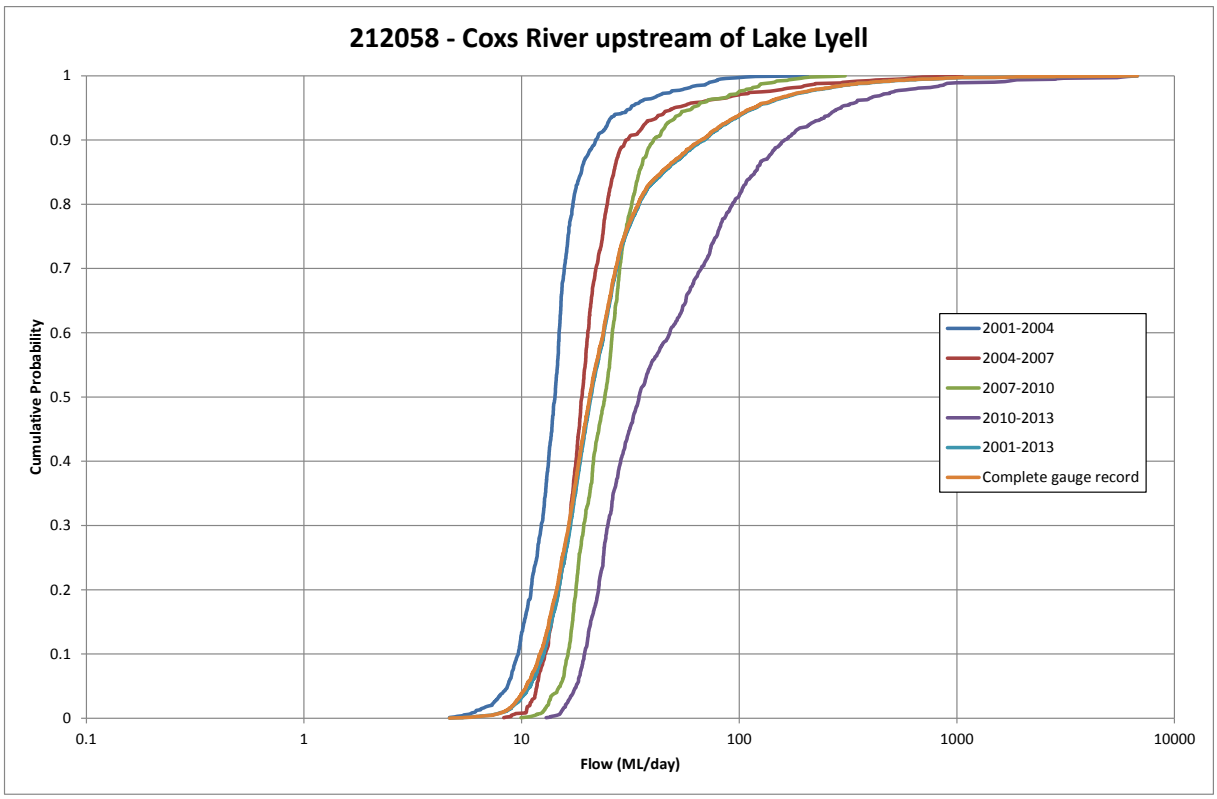

212040 - Kialla Creek at Pomeroy
Cumulative Probability
Flow (ML/day)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0.1
1
10
100
1000
10000
2001-2004
2004-2007
2007-2010
2010-2013
2001-2013
Complete gauge record

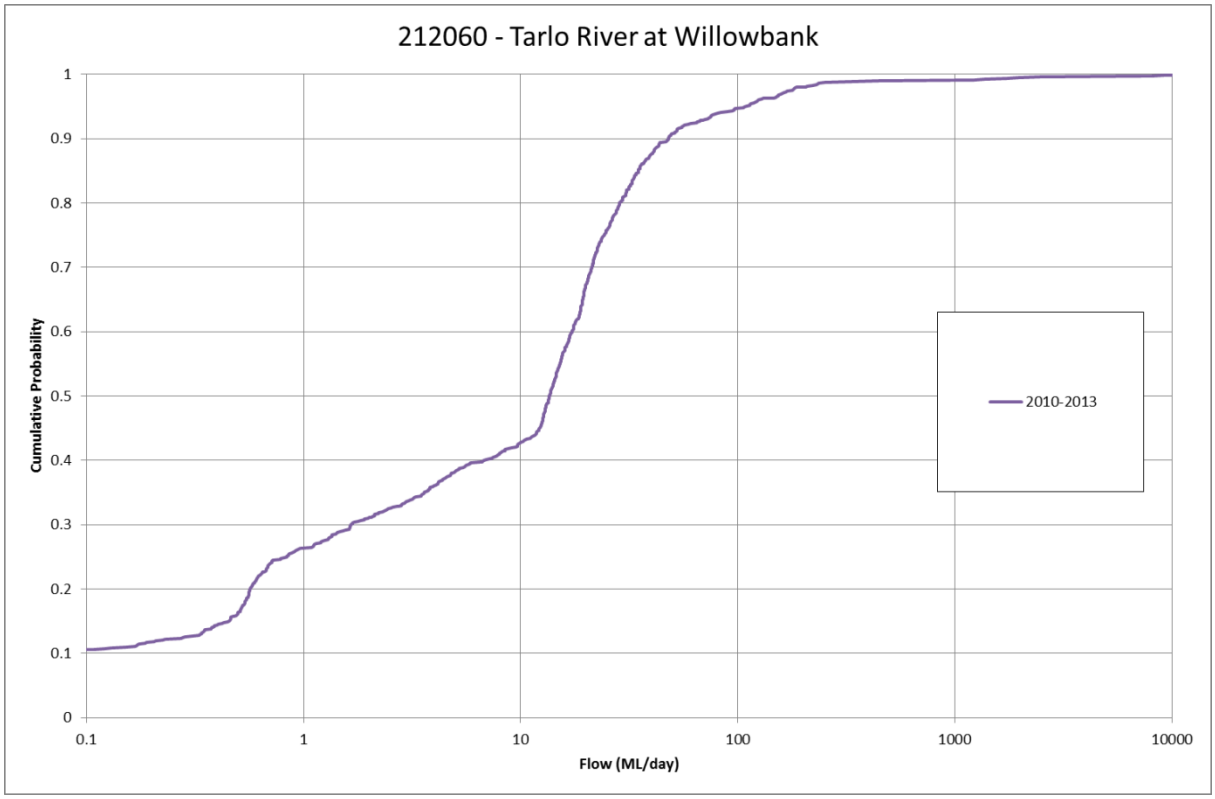

212042 - Farmers Creek at Mount Walker
Cumulative Probability
Flow (ML/day)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0.1
1
10
100
1000
10000
2001-2004
2004-2007
2007-2010
2010-2013
2001-2013
Complete gauge record

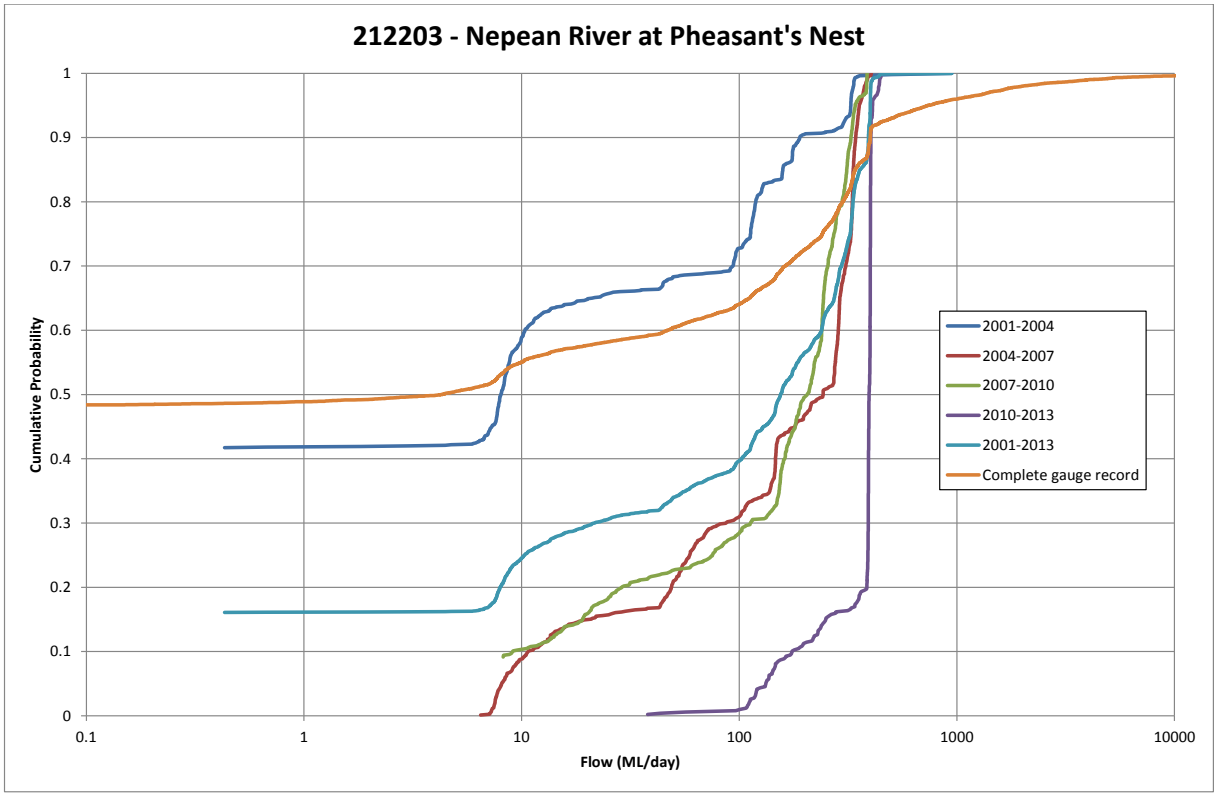

212045 - Coxs River at Island Hill
Cumulative Probability
Flow (ML/day)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0.1
1
10
100
1000
10000
2001-2004
2004-2007
2007-2010
2010-2013
2001-2013
Complete gauge record

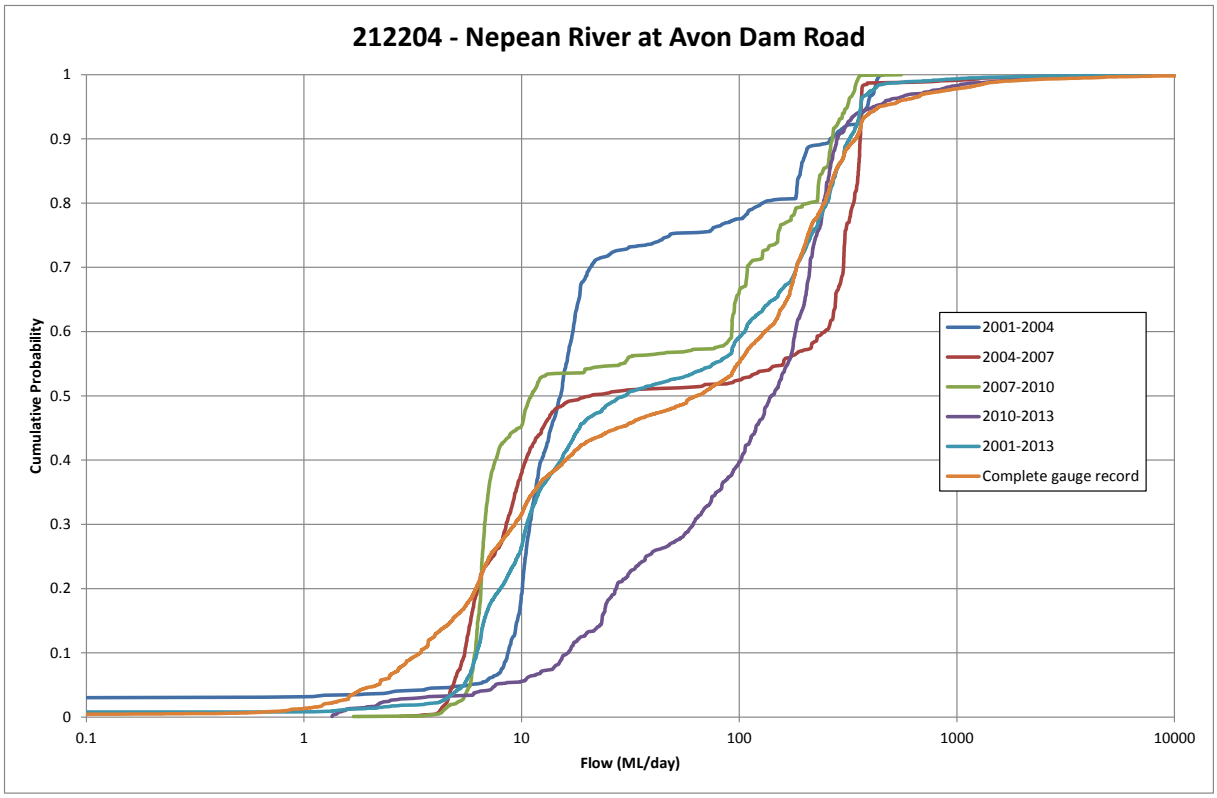

212054 - Coxs River at Wallerawang Power Station
Cumulative Probability
Flow (ML/day)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0.1
1
10
100
1000
10000
2001-2004
2004-2007
2007-2010
2010-2013
2001-2013
Complete gauge record

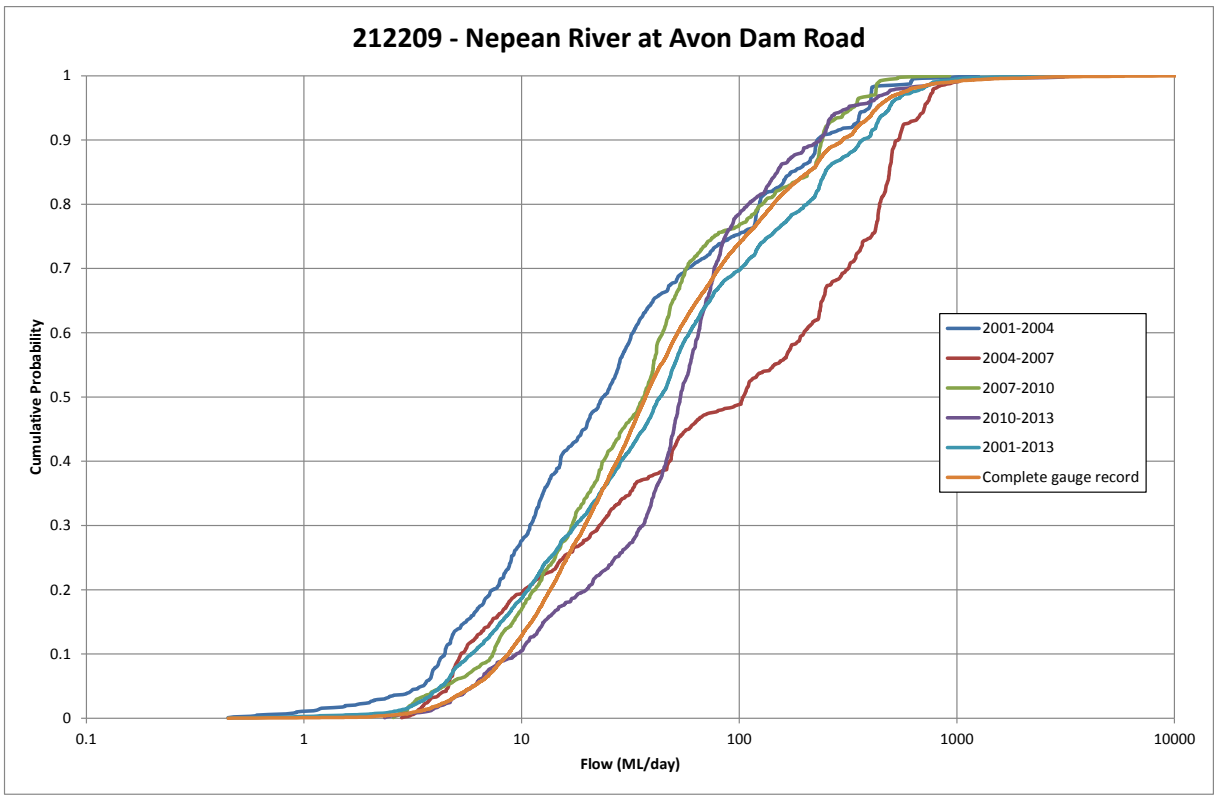

212055 - Neubecks Creek Upstream of Wallerawang
Cumulative Probability
Flow (ML/day)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0.1
1
10
100
1000
10000
2001-2004
2004-2007
2007-2010
2010-2013
2001-2013
Complete gauge record

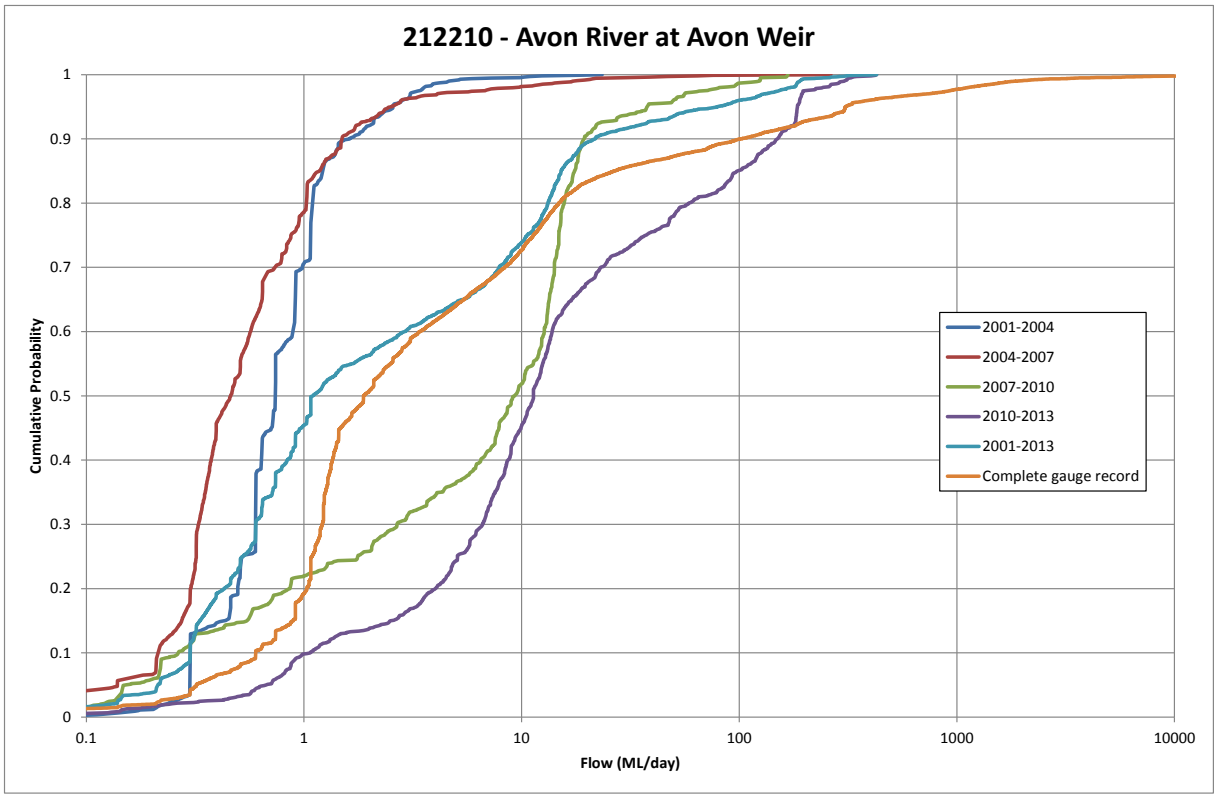

212058 - Coxs River upstream of Lake Lyell
Cumulative Probability
Flow (ML/day)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0.1
1
10
100
1000
10000
2001-2004
2004-2007
2007-2010
2010-2013
2001-2013
Complete gauge record

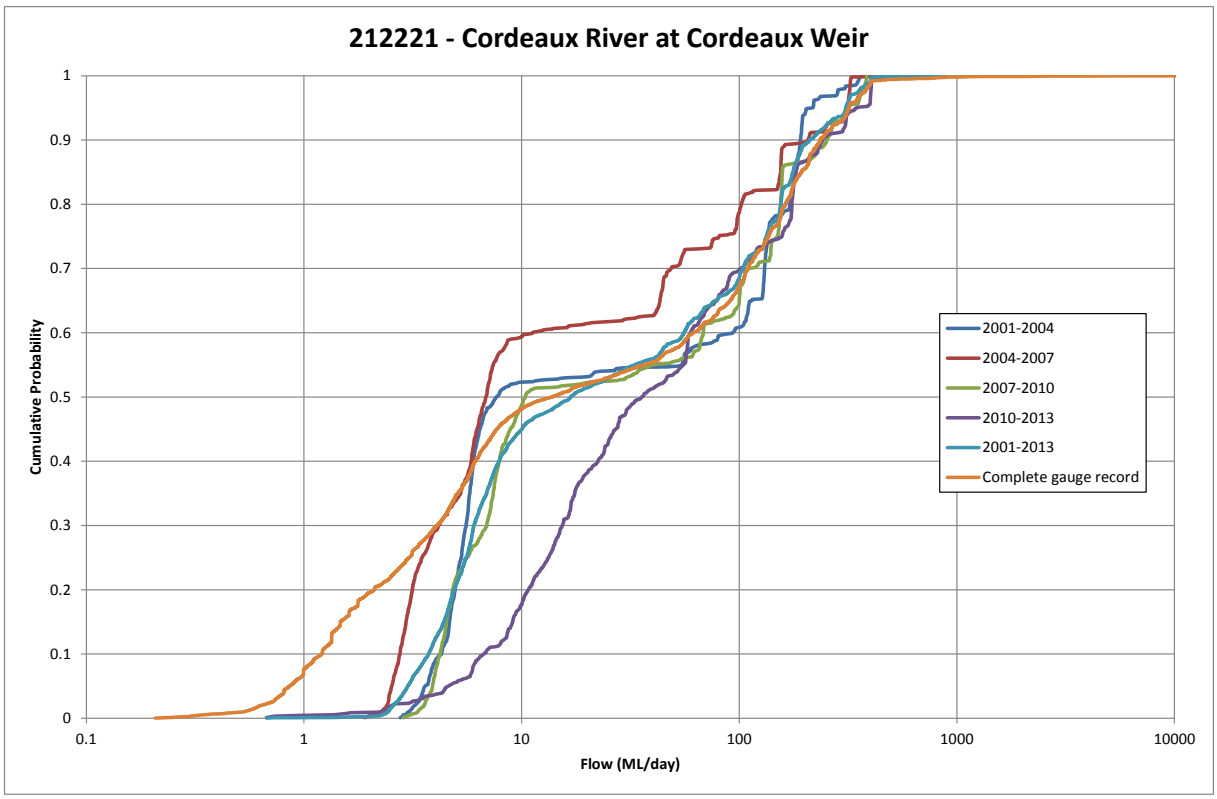

212060 - Tarlo River at Willowbank
Cumulative Probability
Flow (ML/day)
2010-2013

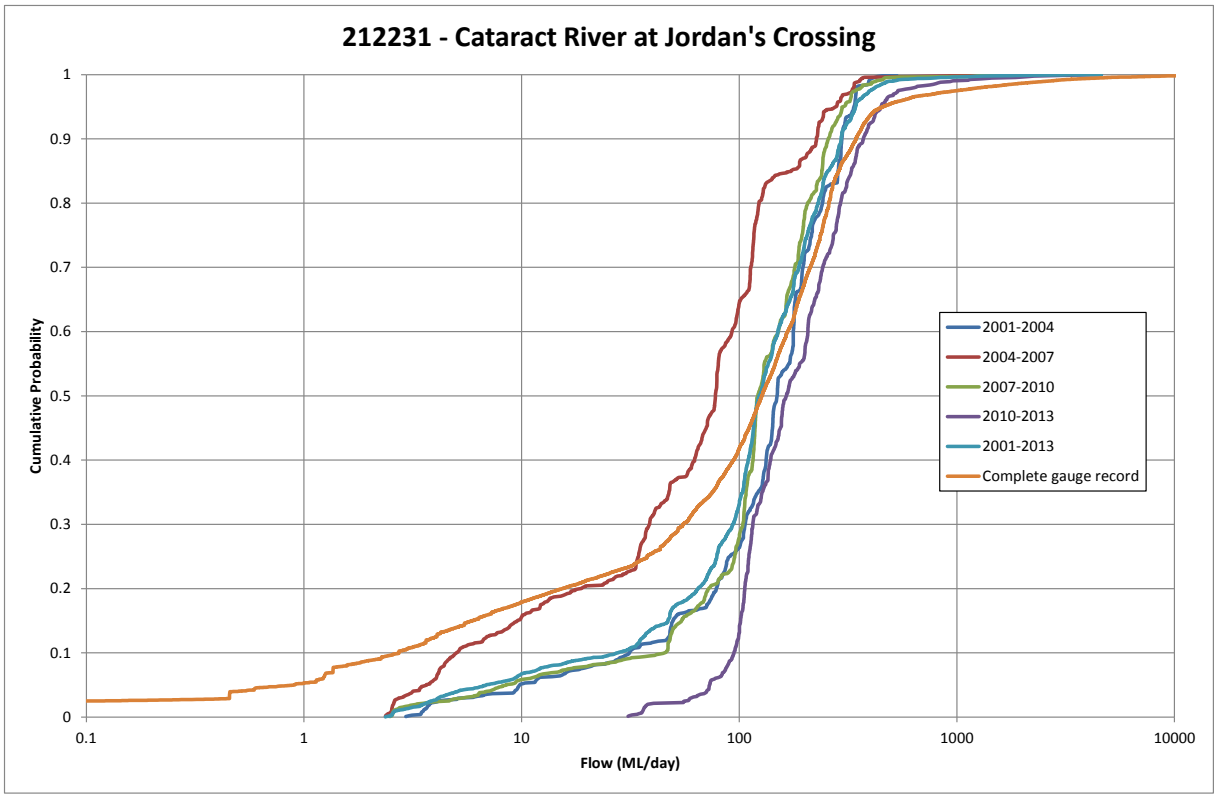

212203 - Nepean River at Pheasant's Nest
Cumulative Probability
Flow (ML/day)
2001-2004
2004-2007
2007-2010
2010-2013
2001-2013
Complete gauge record

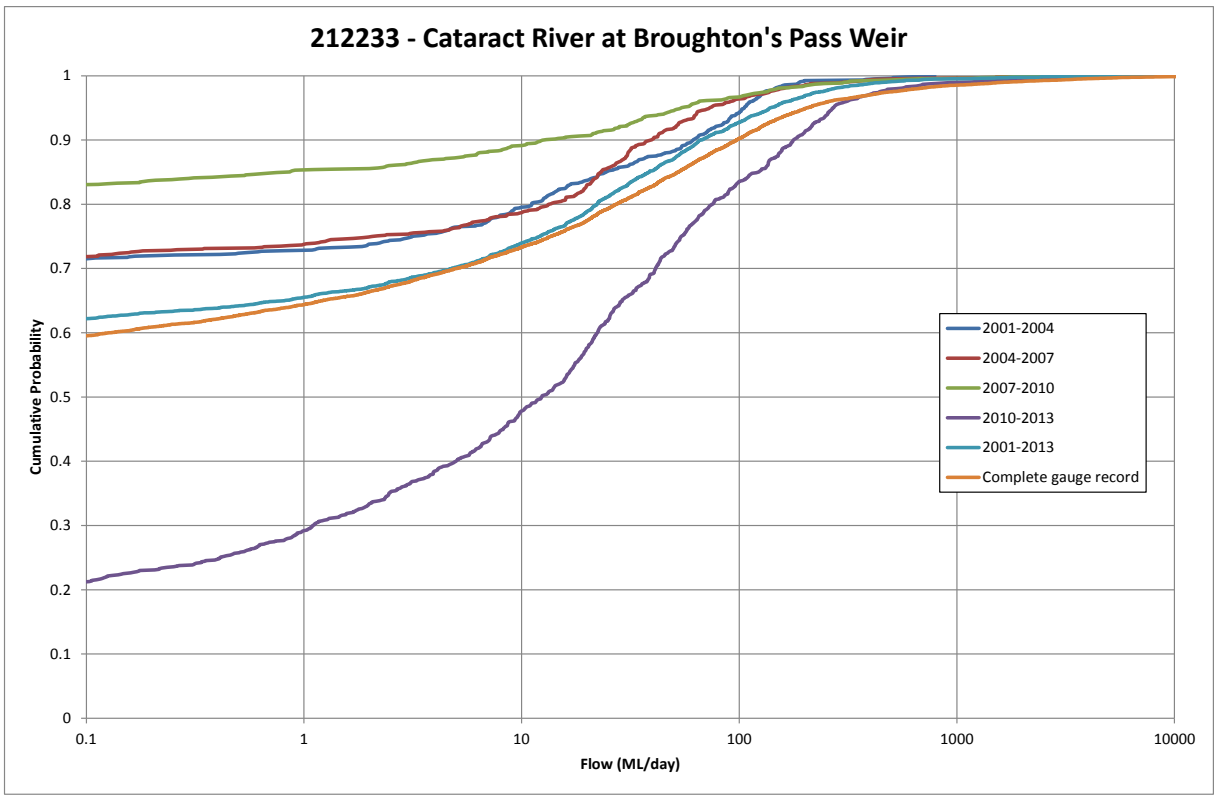

212204 - Nepean River at Avon Dam Road
Cumulative Probability
Flow (ML/day)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0.1
1
10
100
1000
10000
2001-2004
2004-2007
2007-2010
2010-2013
2001-2013
Complete gauge record

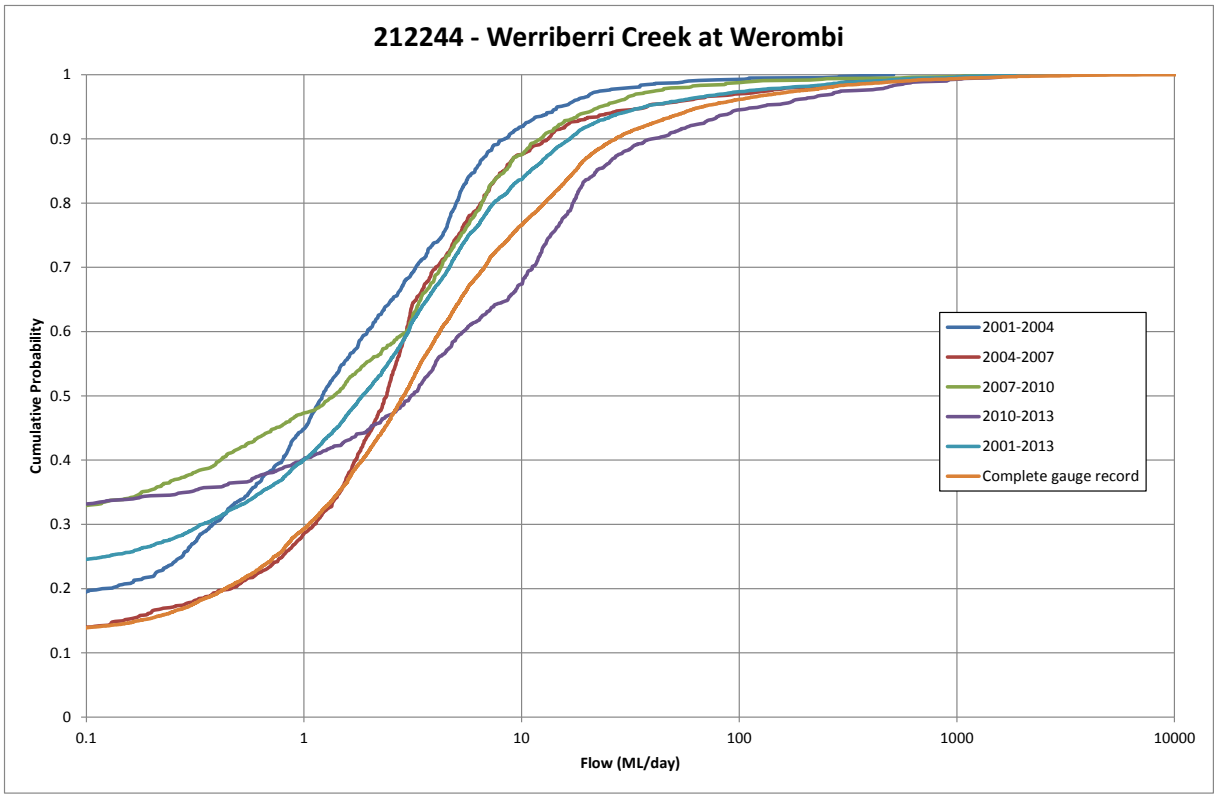

212209 - Nepean River at Avon Dam Road
Cumulative Probability
Flow (ML/day)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0.1
1
10
100
1000
10000
2001-2004
2004-2007
2007-2010
2010-2013
2001-2013
Complete gauge record

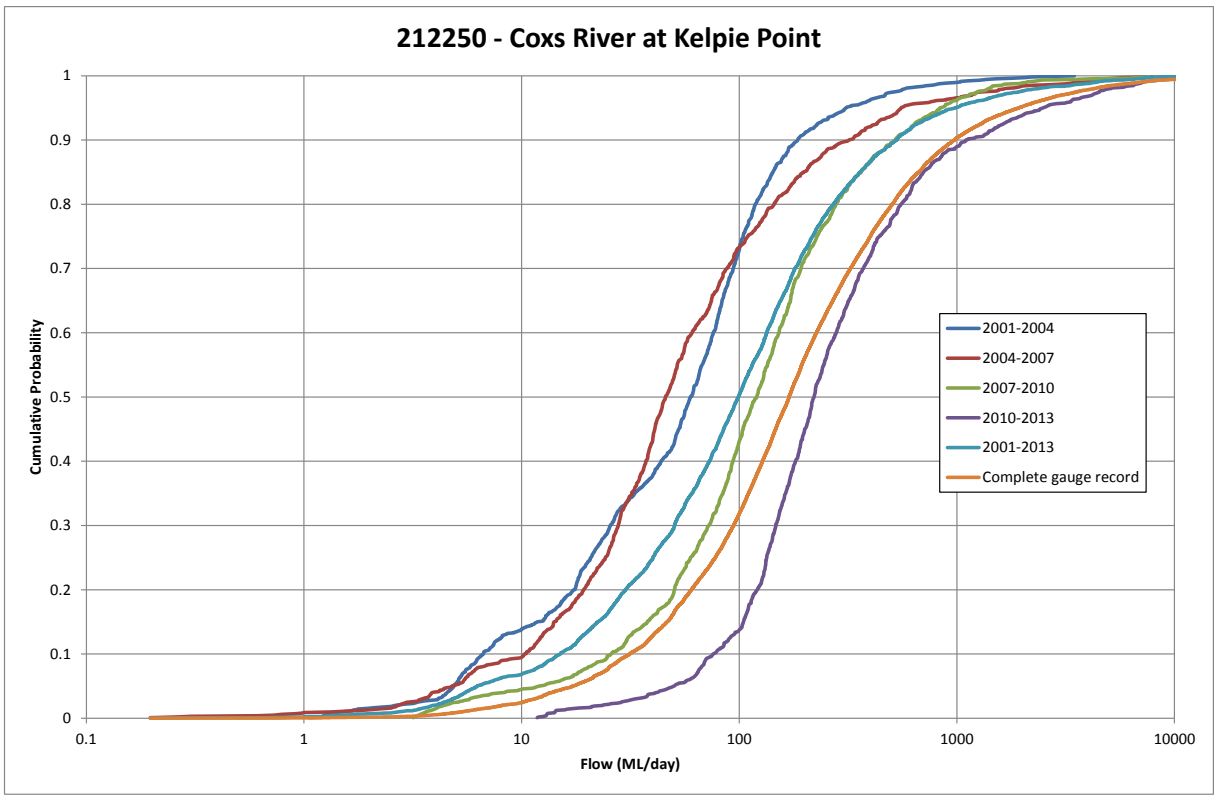

212210 - Avon River at Avon Weir
Cumulative Probability
Flow (ML/day)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0.1
1
10
100
1000
10000
2001-2004
2004-2007
2007-2010
2010-2013
2001-2013
Complete gauge record

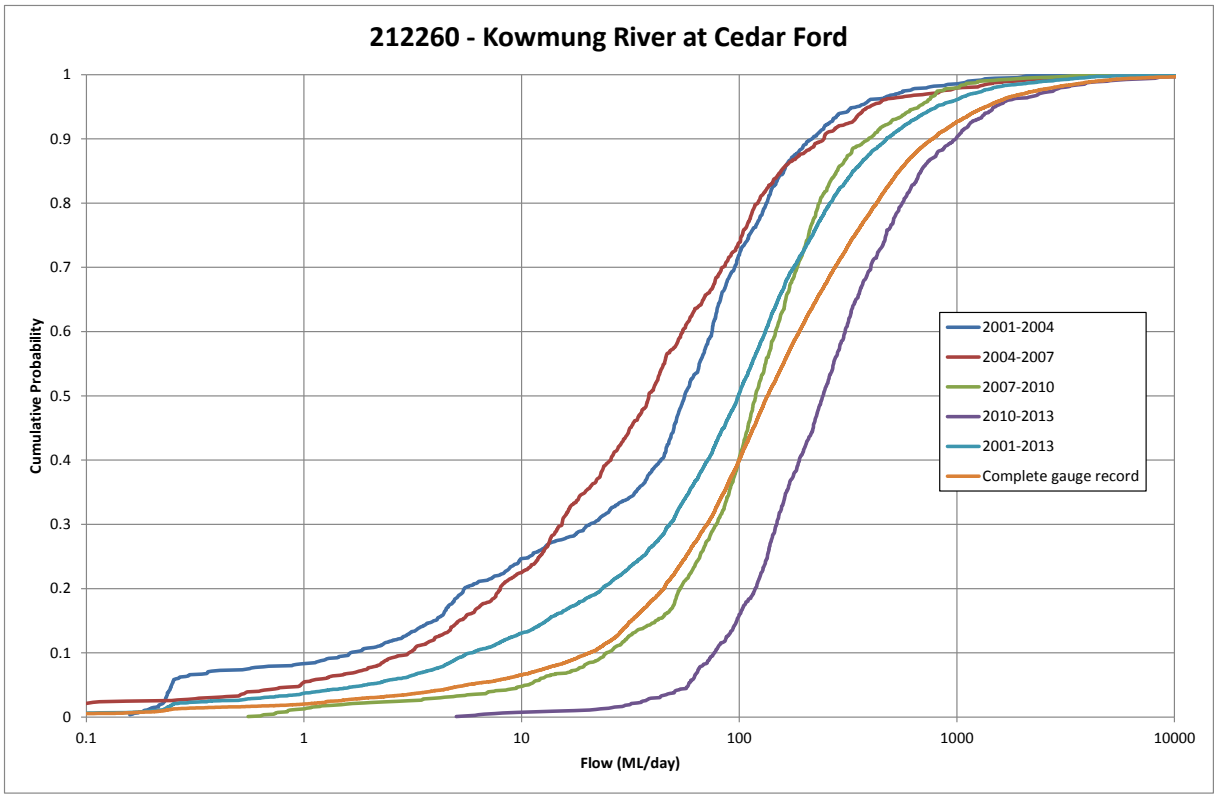

212221 - Cordeaux River at Cordeaux Weir
Cumulative Probability
Flow (ML/day)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0.1
1
10
100
1000
10000
2001-2004
2004-2007
2007-2010
2010-2013
2001-2013
Complete gauge record

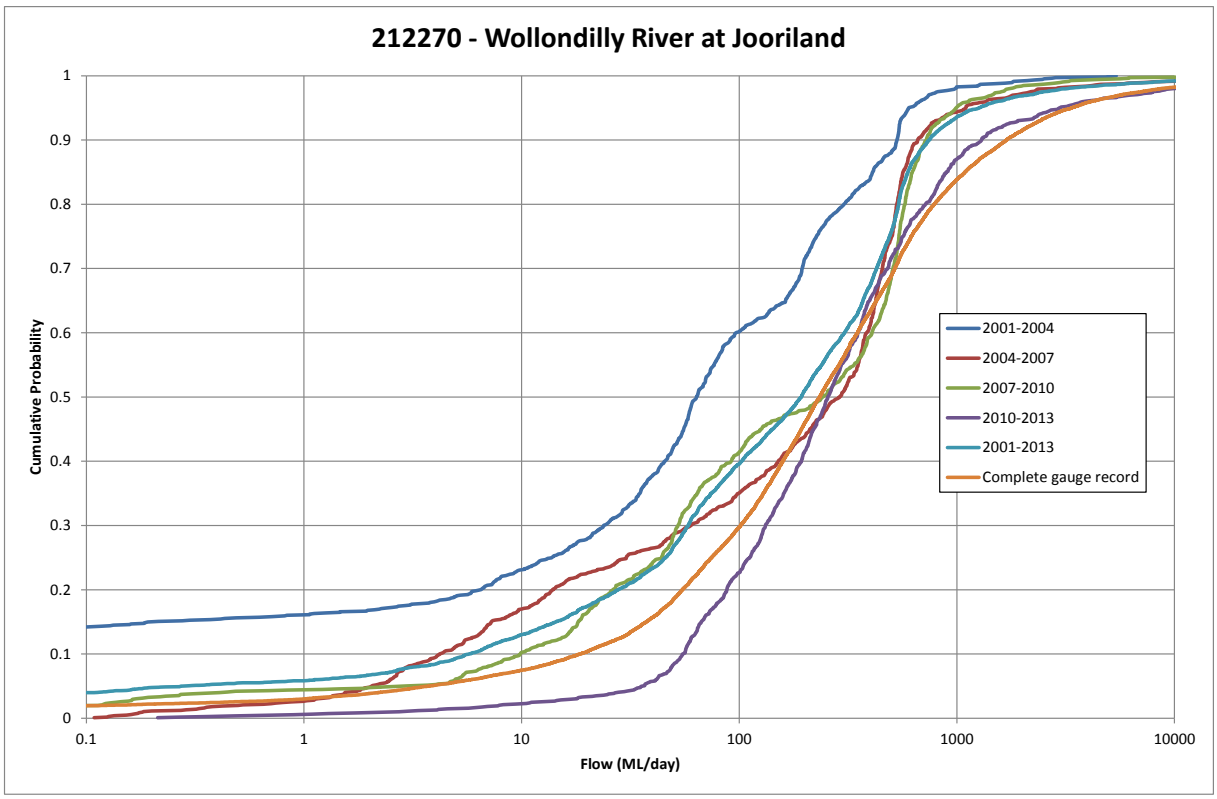

212231 - Cataract River at Jordan's Crossing
Cumulative Probability
Flow (ML/day)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0.1
1
10
100
1000
10000
2001-2004
2004-2007
2007-2010
2010-2013
2001-2013
Complete gauge record

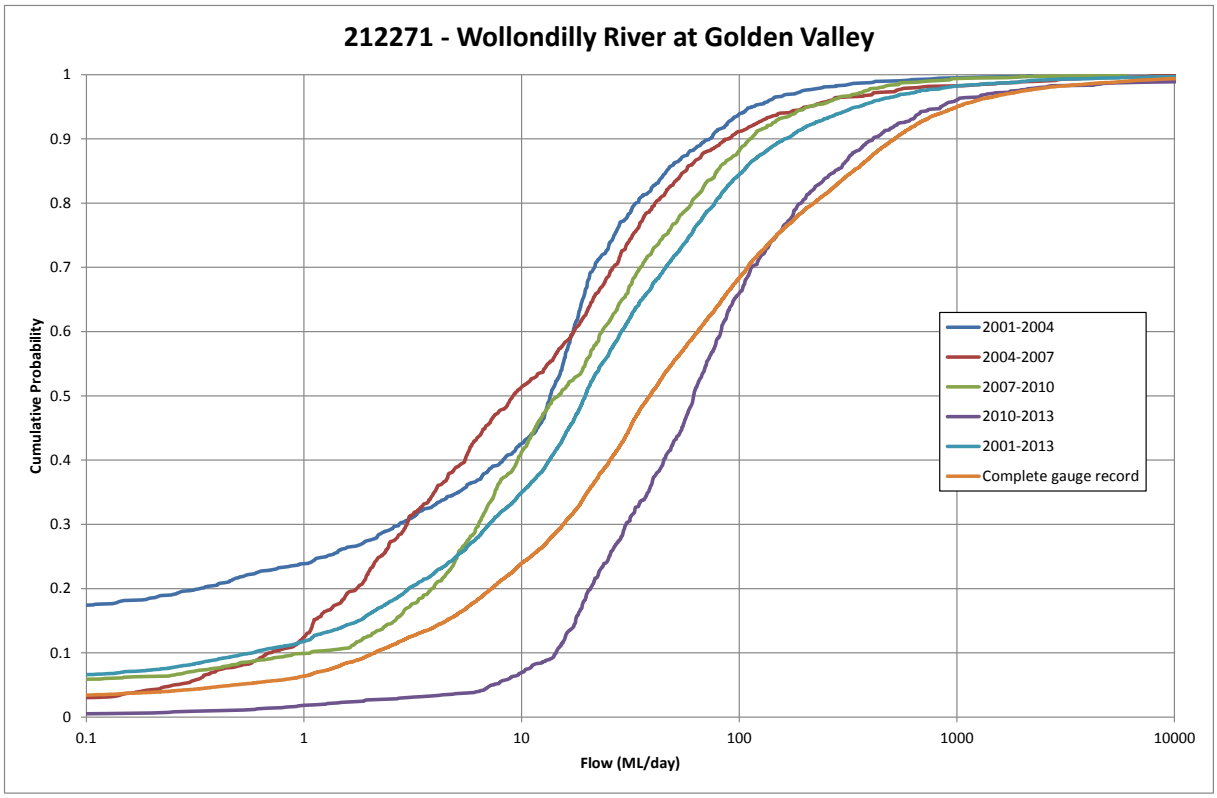

212233 - Cataract River at Broughton's Pass Weir
Cumulative Probability
Flow (ML/day)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0.1
1
10
100
1000
10000
2001-2004
2004-2007
2007-2010
2010-2013
2001-2013
Complete gauge record

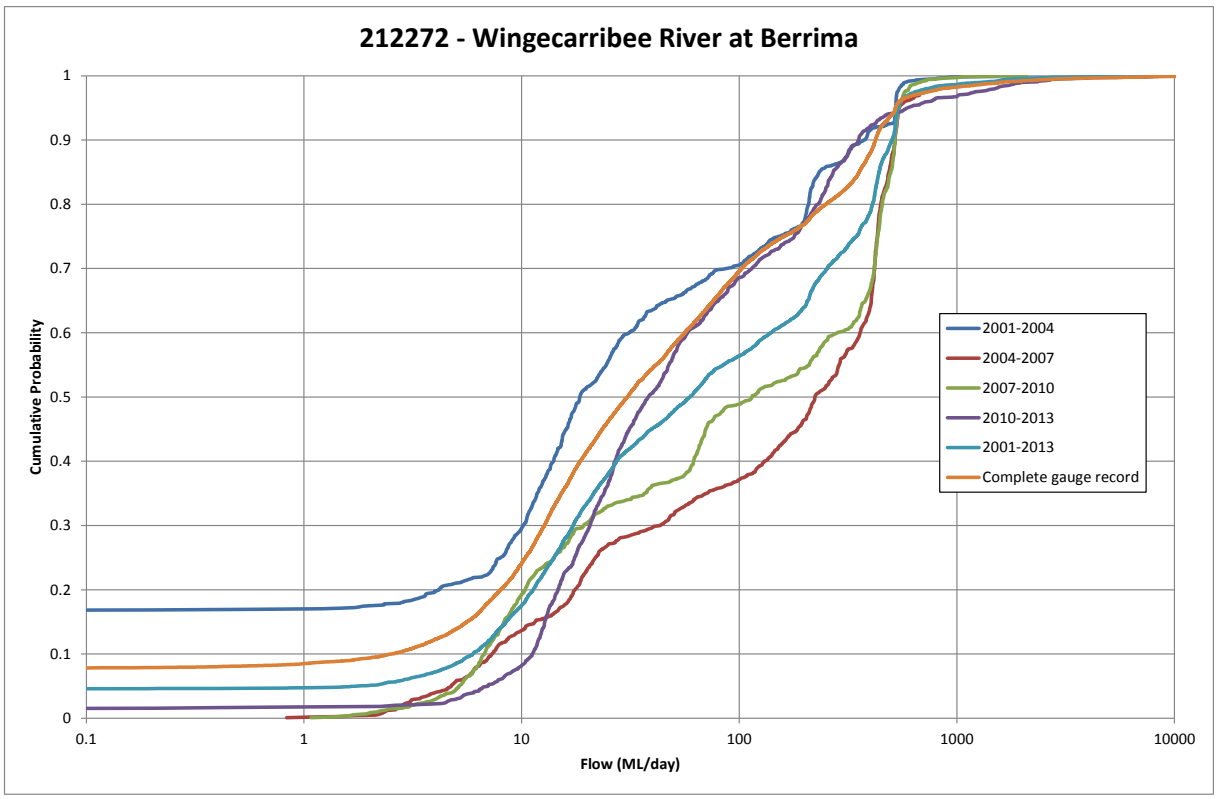

212244 - Werriberri Creek at Werombi
Cumulative Probability
Flow (ML/day)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0.1
1
10
100
1000
10000
2001-2004
2004-2007
2007-2010
2010-2013
2001-2013
Complete gauge record

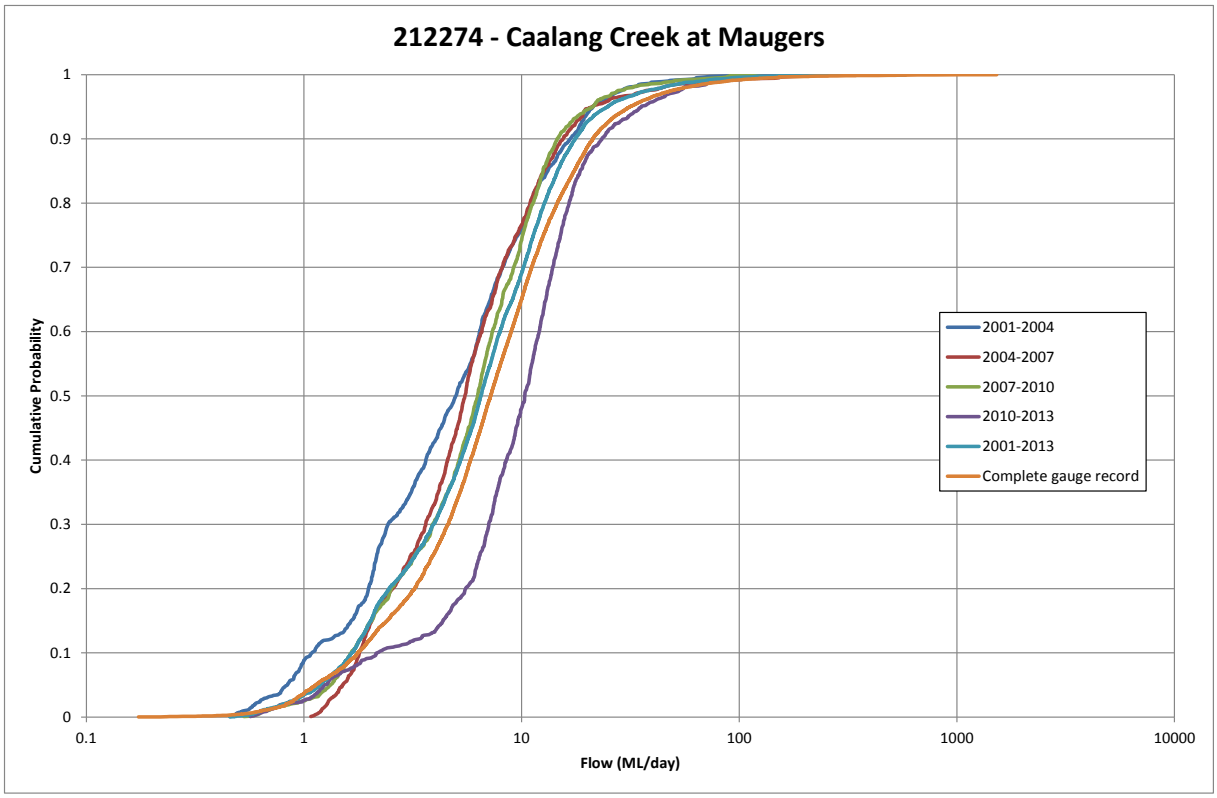

212250 - Coxs River at Kelpie Point
Cumulative Probability
Flow (ML/day)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0.1
1
10
100
1000
10000
2001-2004
2004-2007
2007-2010
2010-2013
2001-2013
Complete gauge record

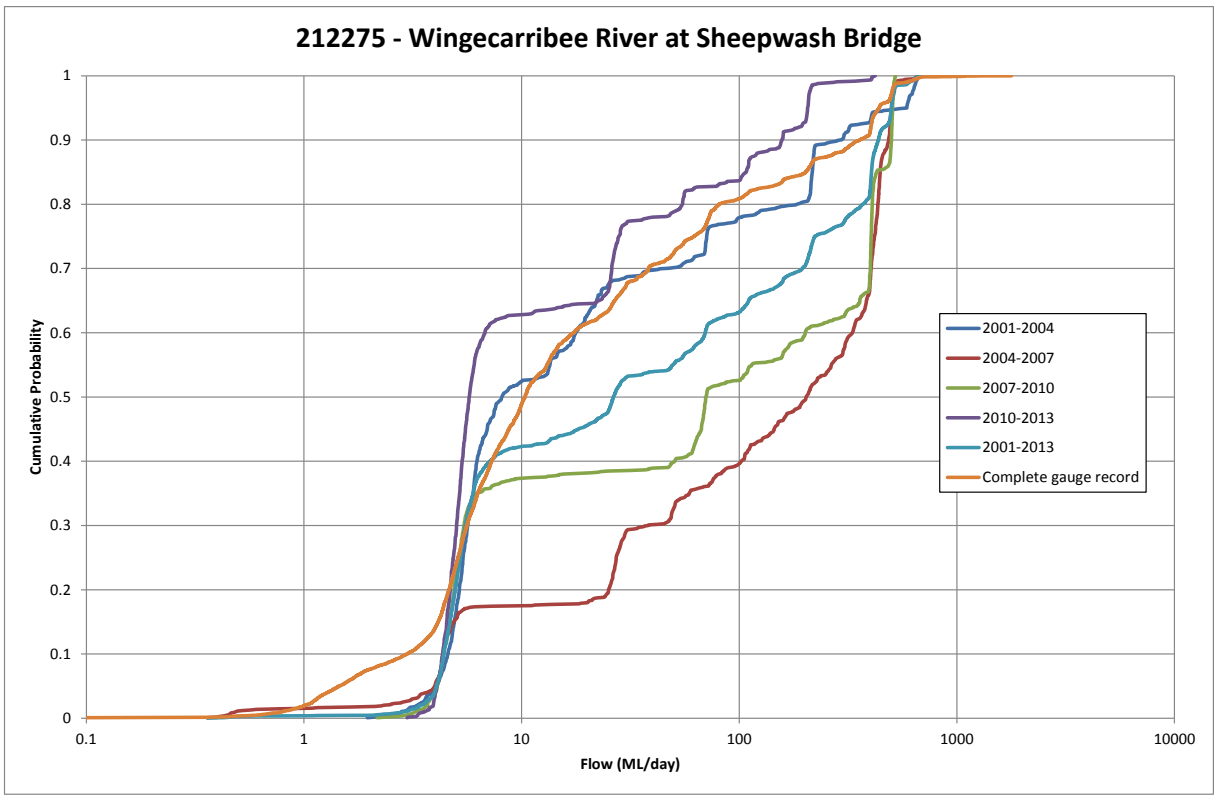

212260 - Kowmung River at Cedar Ford
Cumulative Probability
Flow (ML/day)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0.1
1
10
100
1000
10000
2001-2004
2004-2007
2007-2010
2010-2013
2001-2013
Complete gauge record

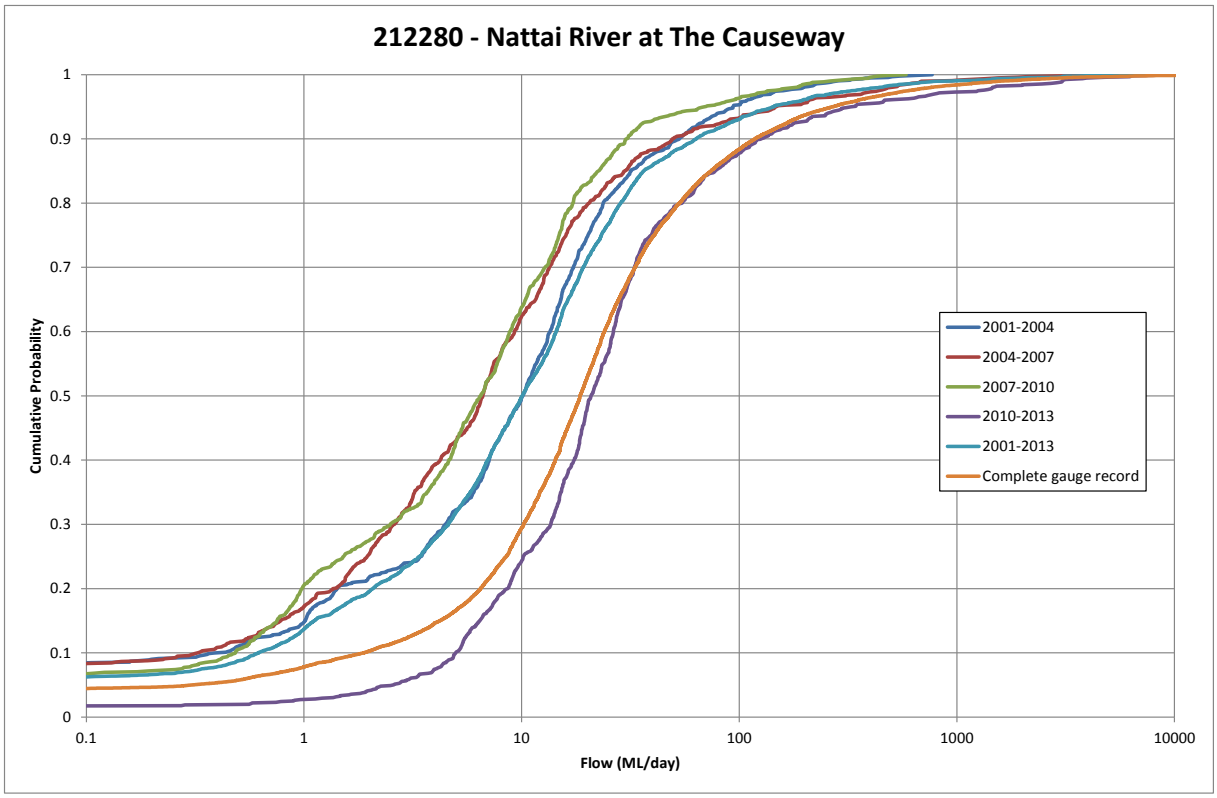

212270 - Wollondilly River at Jooriland
Cumulative Probability
Flow (ML/day)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0.1
1
10
100
1000
10000
2001-2004
2004-2007
2007-2010
2010-2013
2001-2013
Complete gauge record

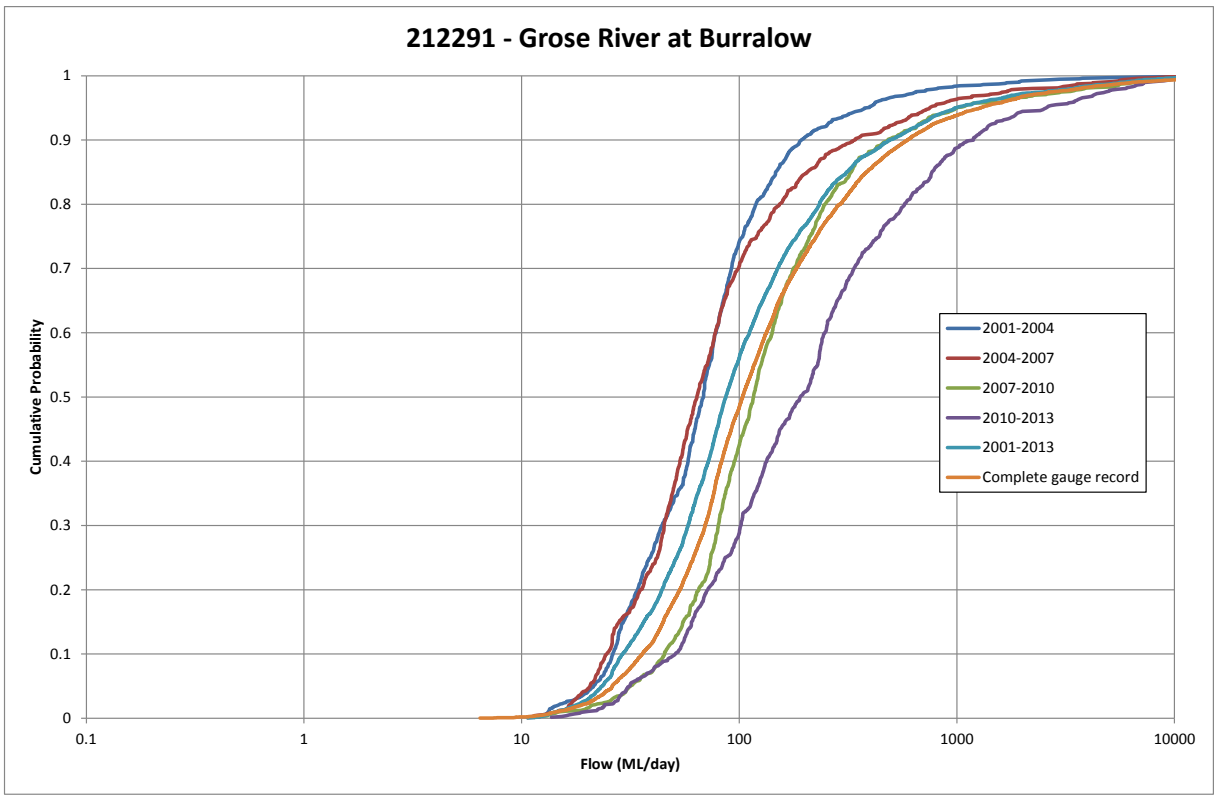

212271 - Wollondilly River at Golden Valley
Cumulative Probability
Flow (ML/day)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0.1
1
10
100
1000
10000
2001-2004
2004-2007
2007-2010
2010-2013
2001-2013
Complete gauge record

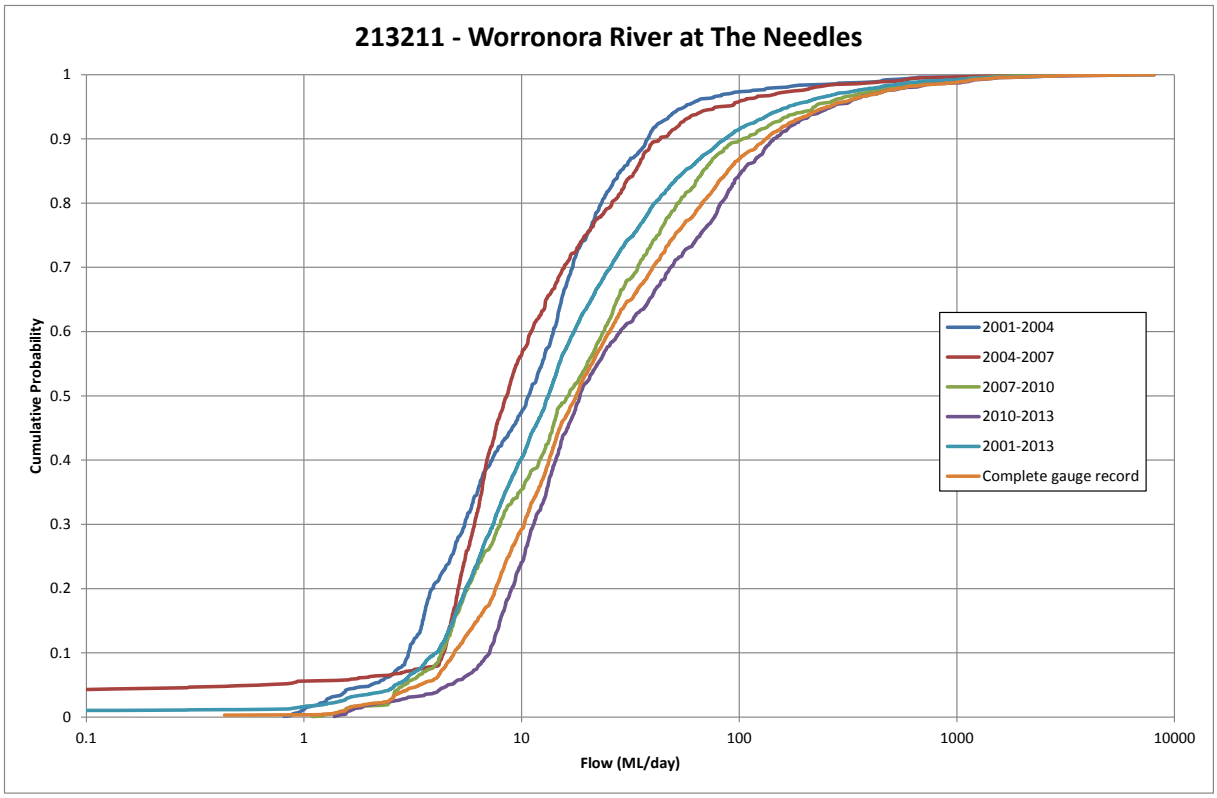

212272 - Wingecarribee River at Berrima
Cumulative Probability
Flow (ML/day)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0.1
1
10
100
1000
10000
2001-2004
2004-2007
2007-2010
2010-2013
2001-2013
Complete gauge record

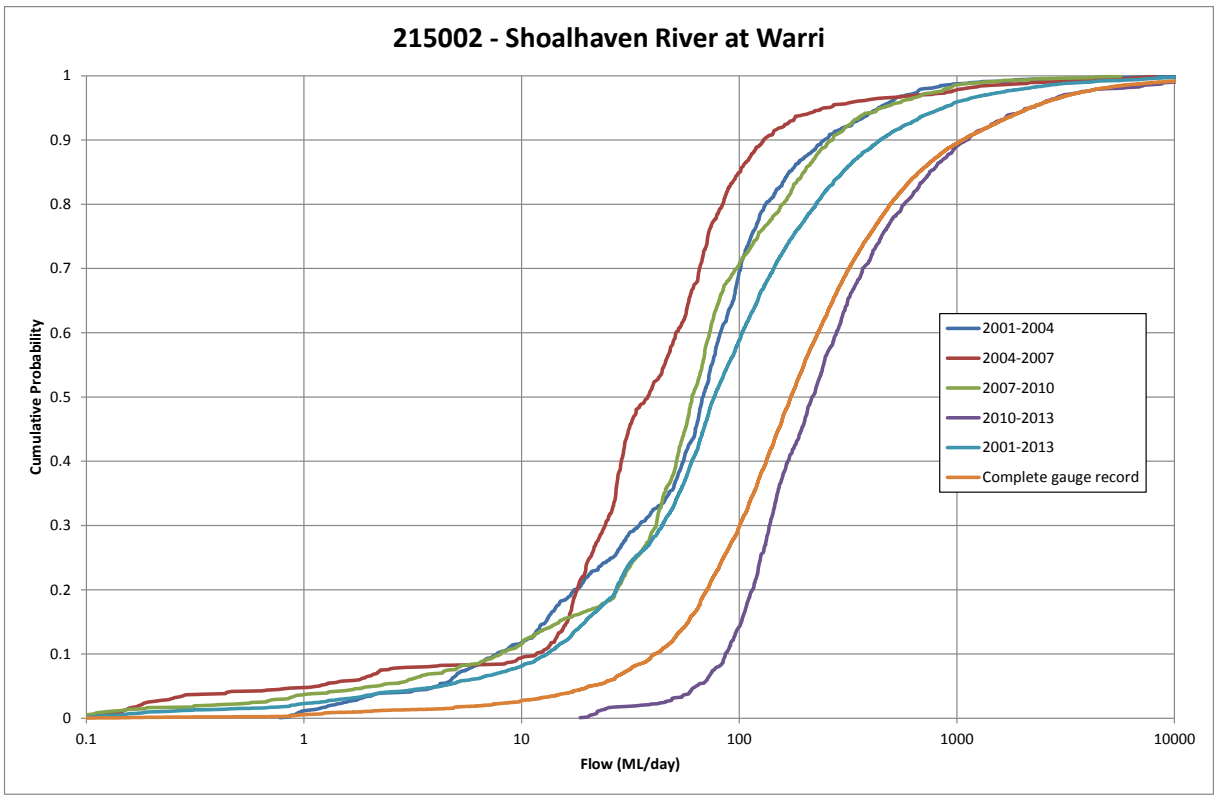

212274 - Caalang Creek at Maugers
Cumulative Probability
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0.1
1
10
100
1000
10000
Flow (ML/day)
2001-2004
2004-2007
2007-2010
2010-2013
2001-2013
Complete gauge record

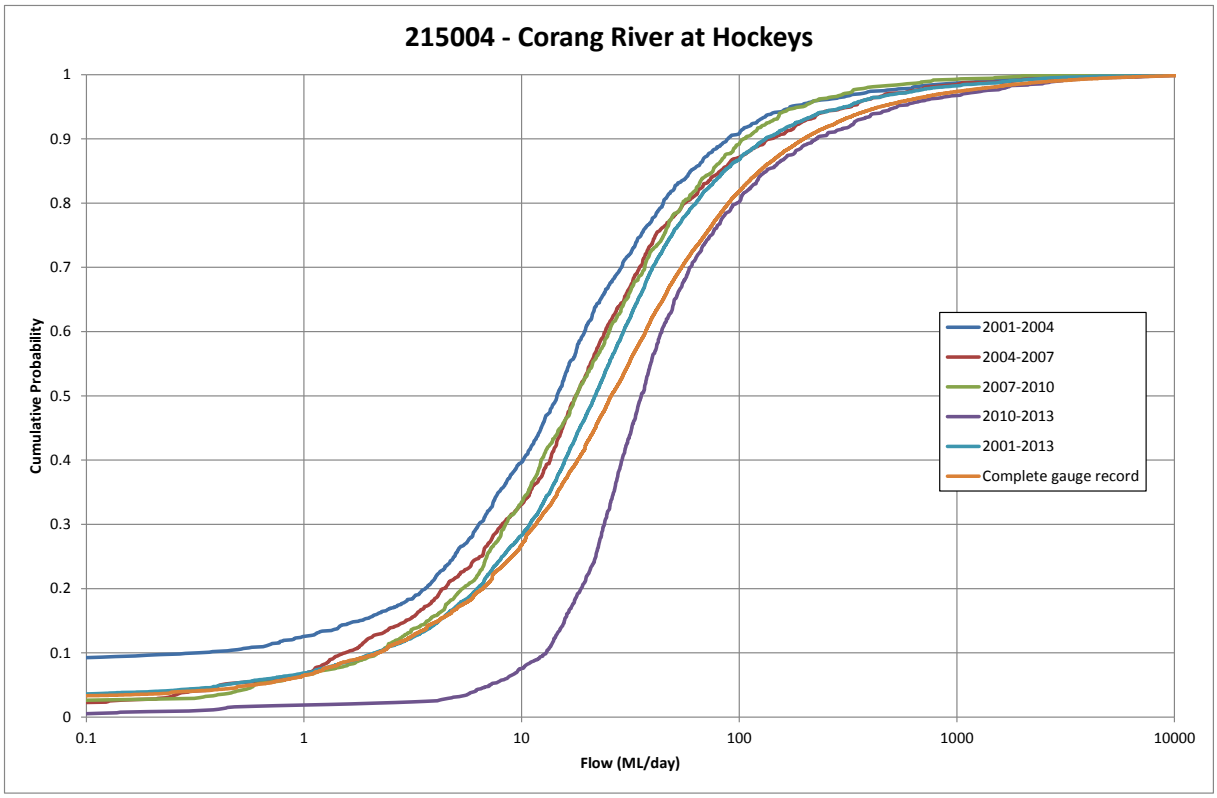

212275 - Wingecarribee River at Sheepwash Bridge
Cumulative Probability
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0.1
1
10
100
1000
10000
Flow (ML/day)
2001-2004
2004-2007
2007-2010
2010-2013
2001-2013
Complete gauge record

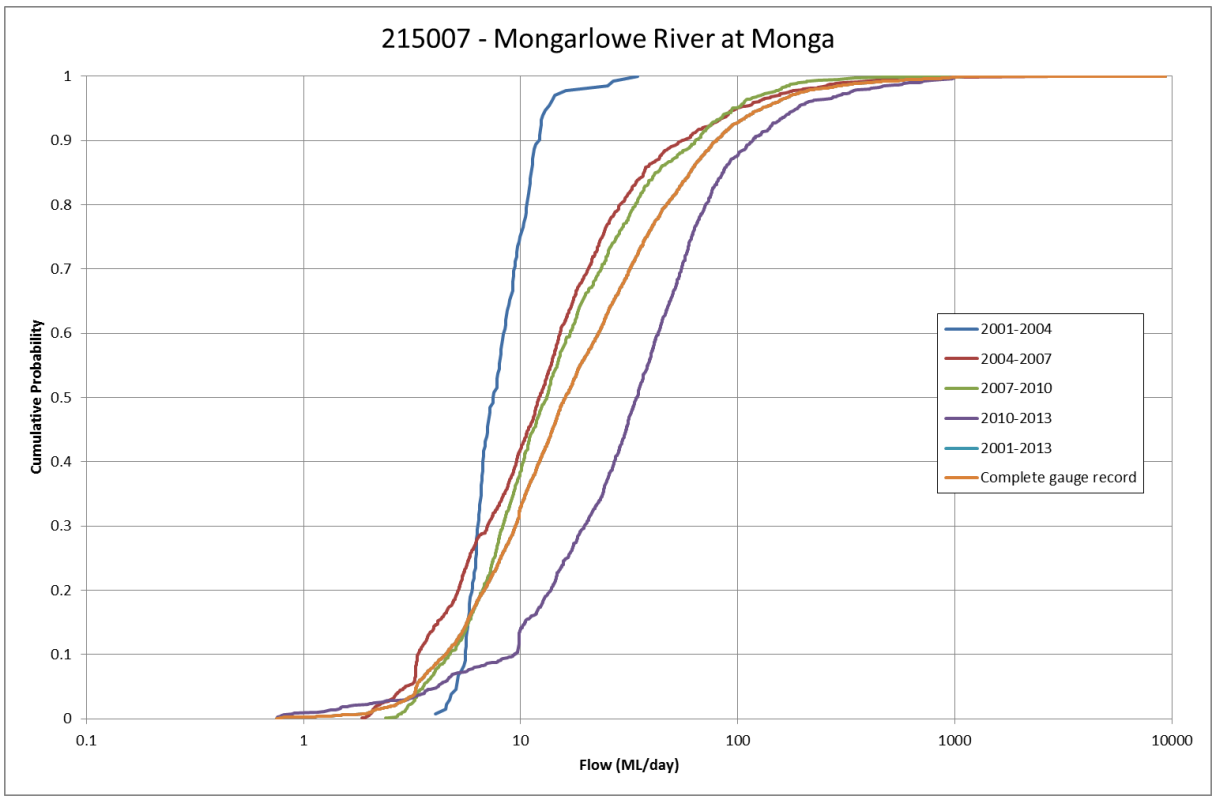

212280 - Nattai River at The Causeway
Cumulative Probability
Flow (ML/day)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0.1
1
10
100
1000
10000
2001-2004
2004-2007
2007-2010
2010-2013
2001-2013
Complete gauge record

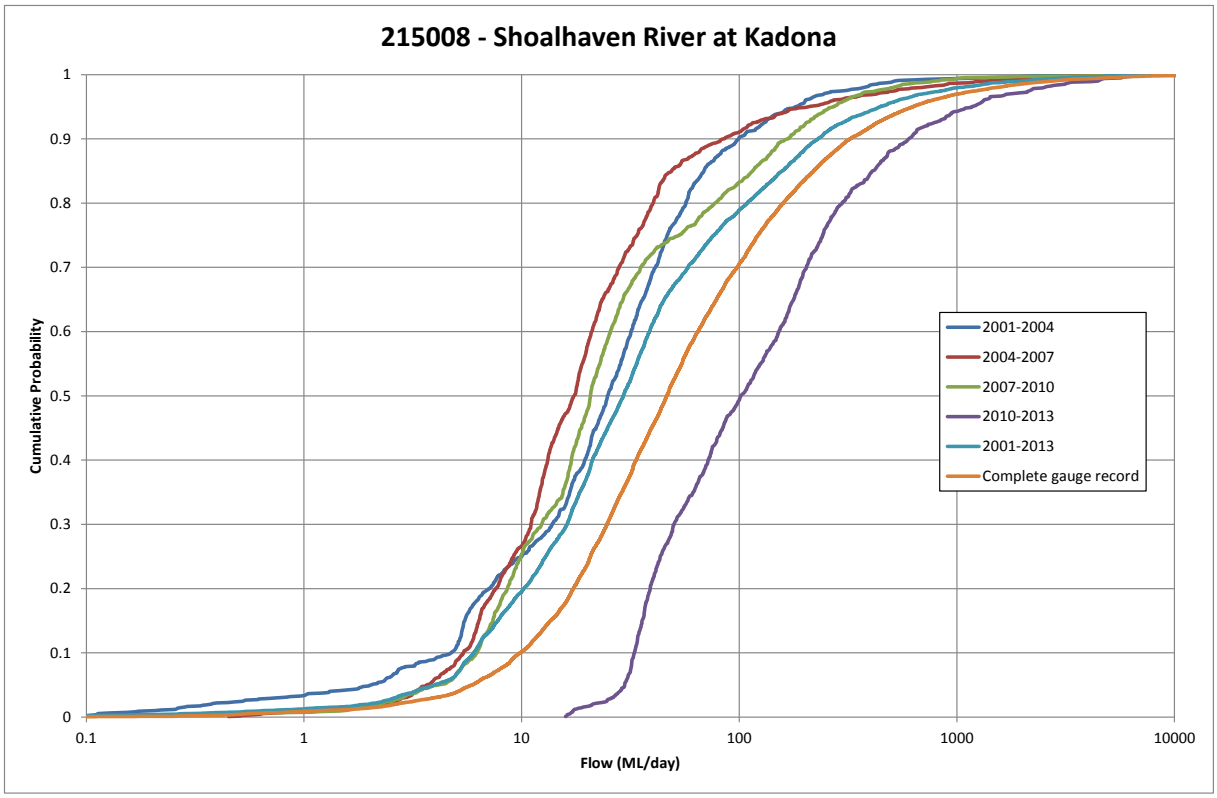

212291 - Grose River at Burralow
Cumulative Probability
Flow (ML/day)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0.1
1
10
100
1000
10000
2001-2004
2004-2007
2007-2010
2010-2013
2001-2013
Complete gauge record

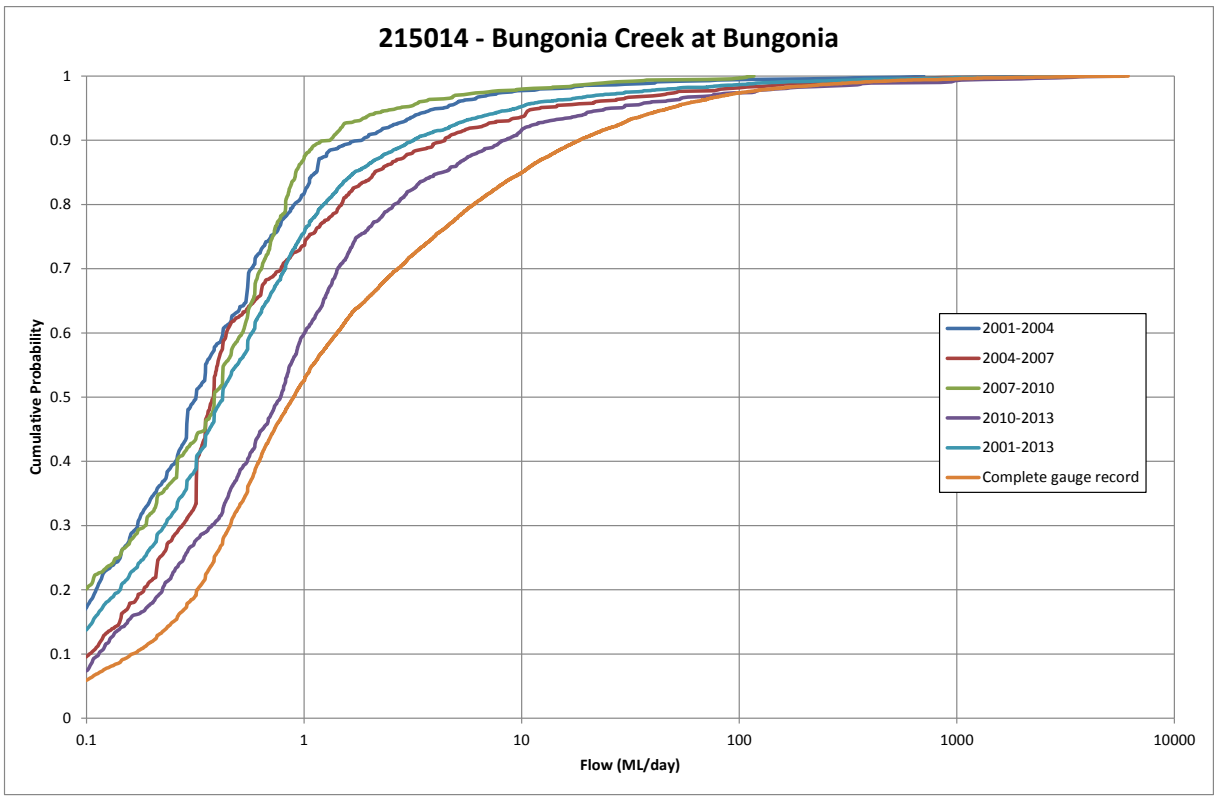

213211 - Worronora River at The Needles
Cumulative Probability
Flow (ML/day)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0.1
1
10
100
1000
10000
2001-2004
2004-2007
2007-2010
2010-2013
2001-2013
Complete gauge record

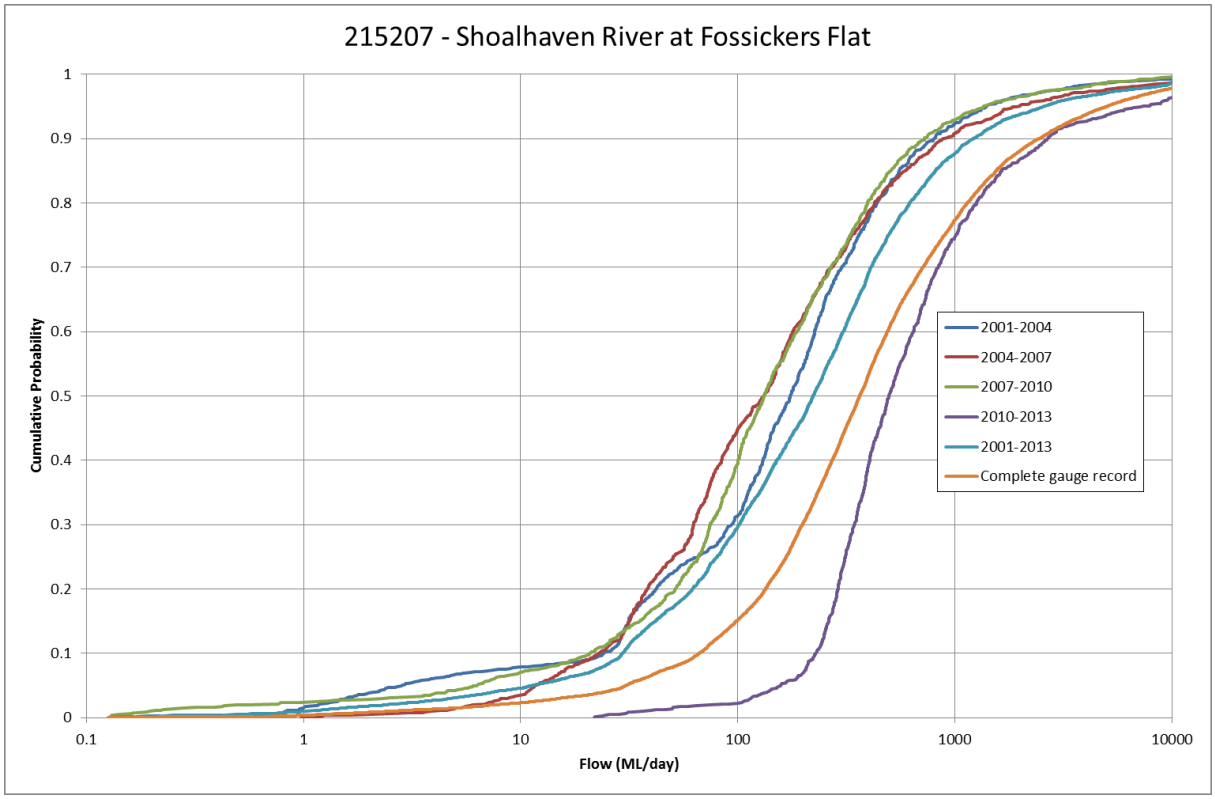

215002 - Shoalhaven River at Warri
Cumulative Probability
Flow (ML/day)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0.1
1
10
100
1000
10000
2001-2004
2004-2007
2007-2010
2010-2013
2001-2013
Complete gauge record

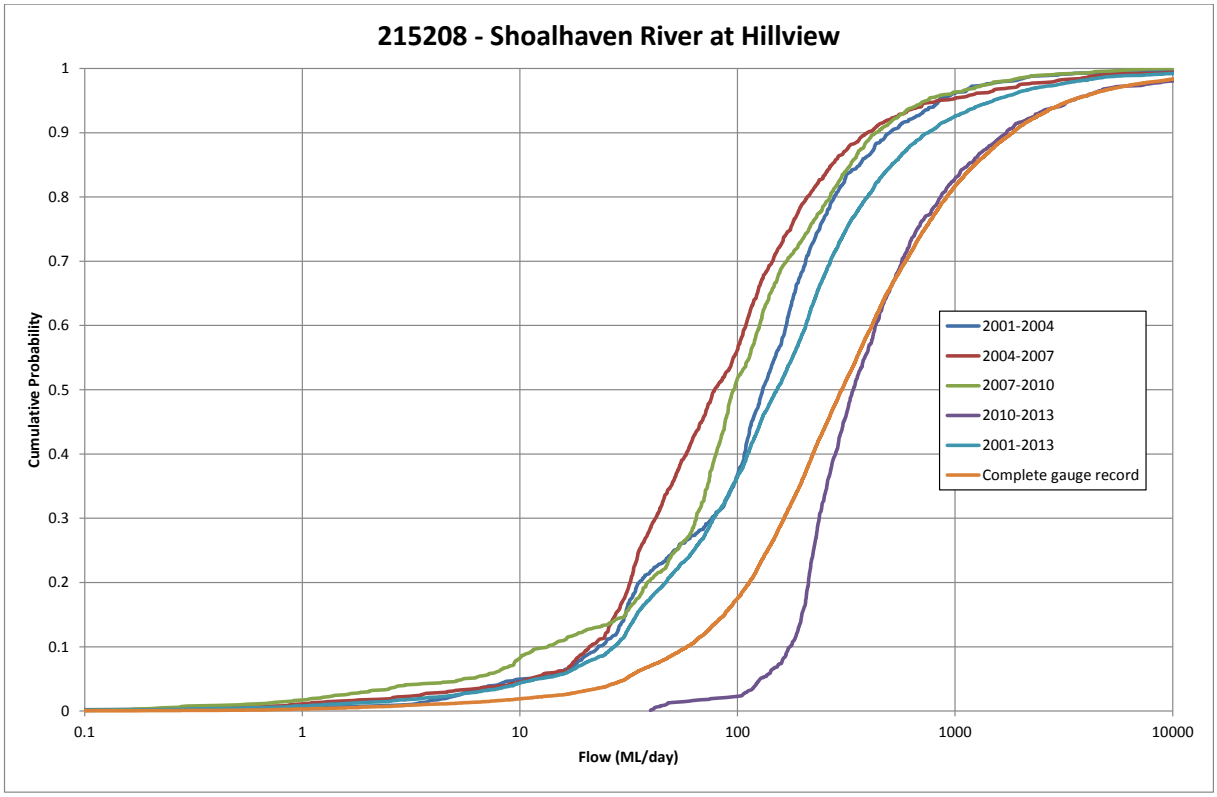

215004 - Corang River at Hockeys
Cumulative Probability
Flow (ML/day)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0.1
1
10
100
1000
10000
2001-2004
2004-2007
2007-2010
2010-2013
2001-2013
Complete gauge record

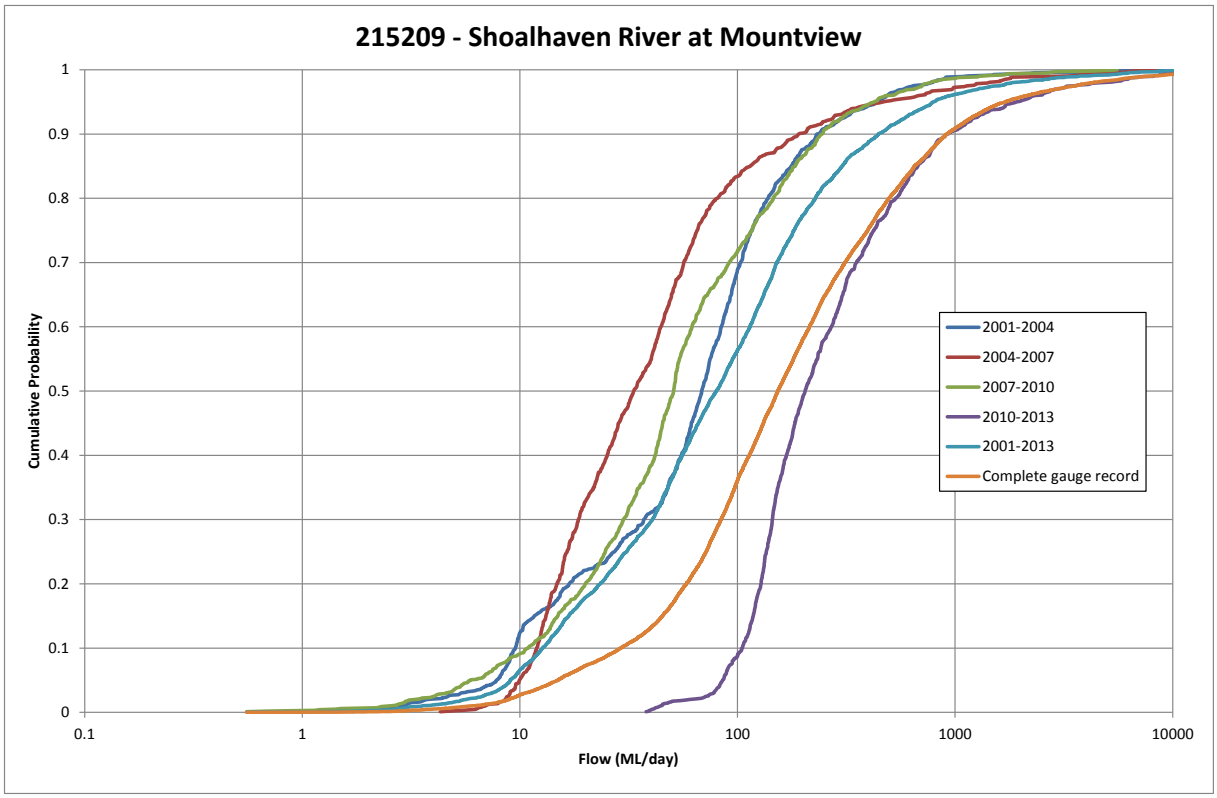

215007 - Mongarlowe River at Monga
Cumulative Probability
Flow (ML/day)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0.1
1
10
100
1000
10000
2001-2004
2004-2007
2007-2010
2010-2013
2001-2013
Complete gauge record

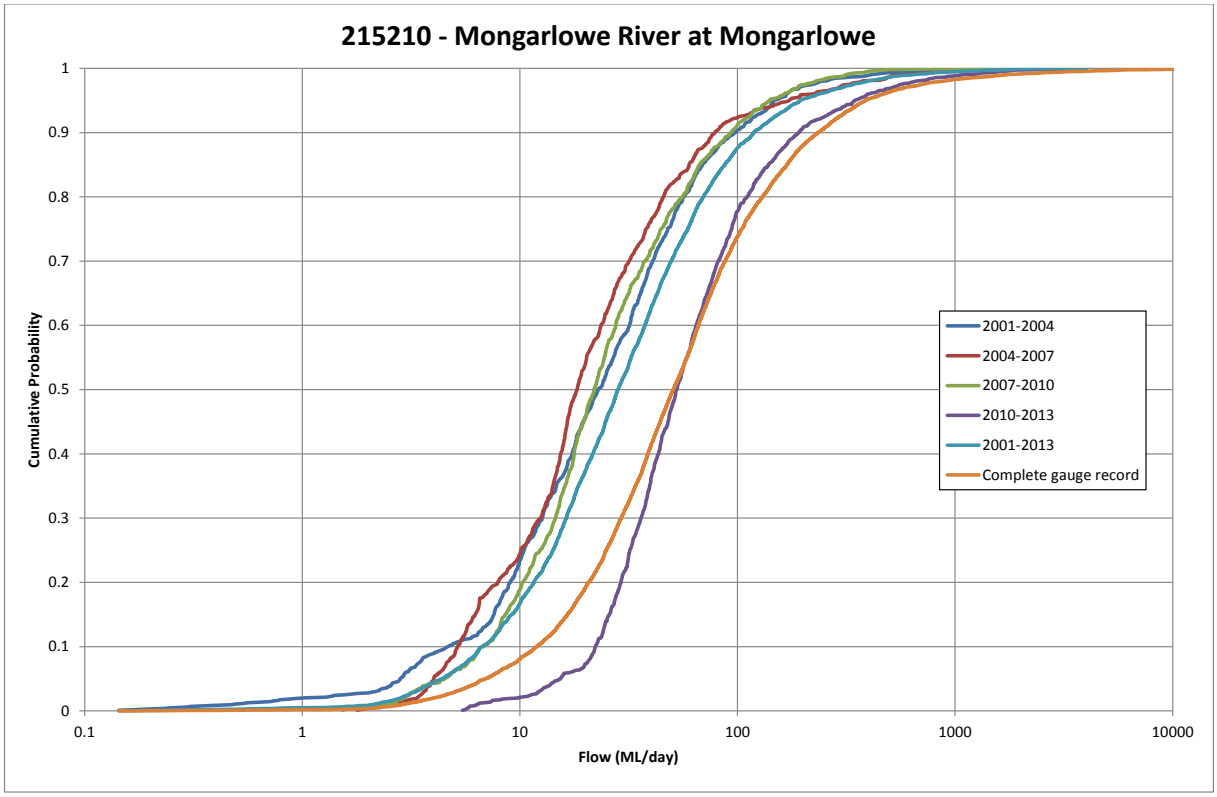

215008 - Shoalhaven River at Kadona
Cumulative Probability
Flow (ML/day)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0.1
1
10
100
1000
10000
2001-2004
2004-2007
2007-2010
2010-2013
2001-2013
Complete gauge record

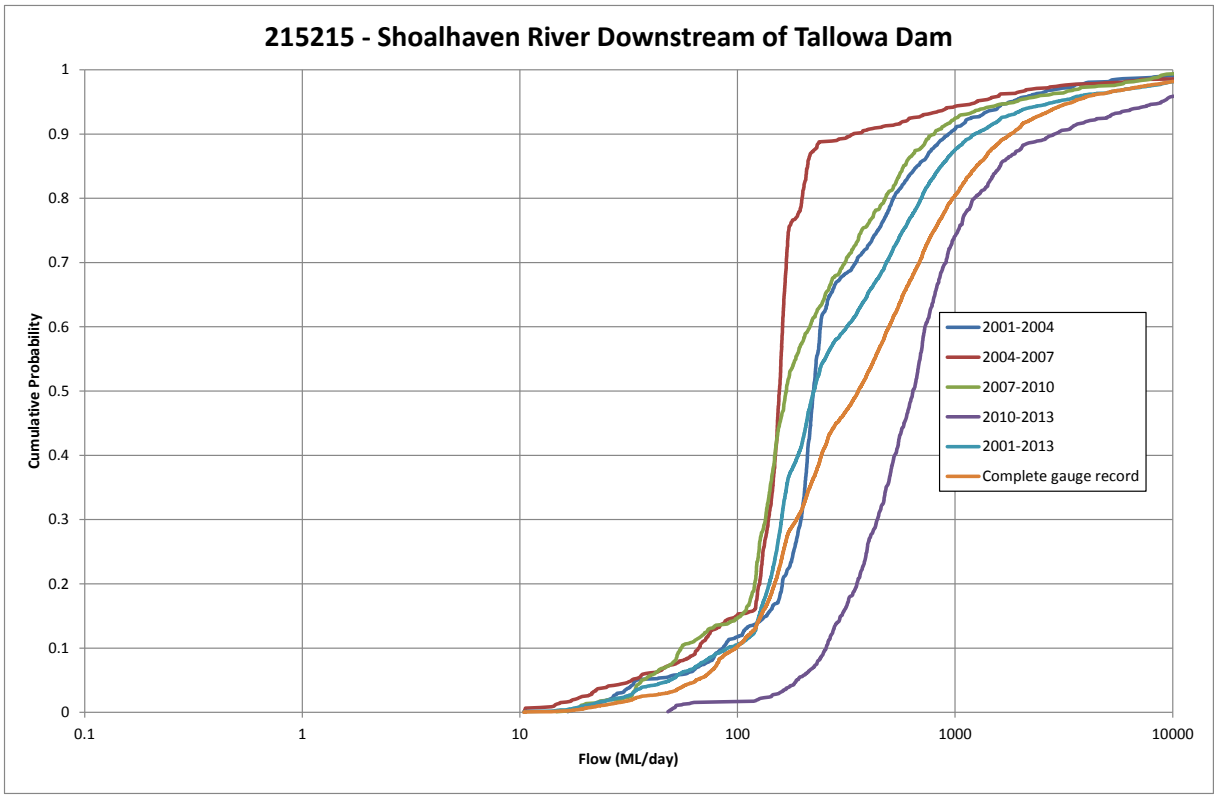

215014 - Bungonia Creek at Bungonia
Cumulative Probability
Flow (ML/day)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0.1
1
10
100
1000
10000
2001-2004
2004-2007
2007-2010
2010-2013
2001-2013
Complete gauge record

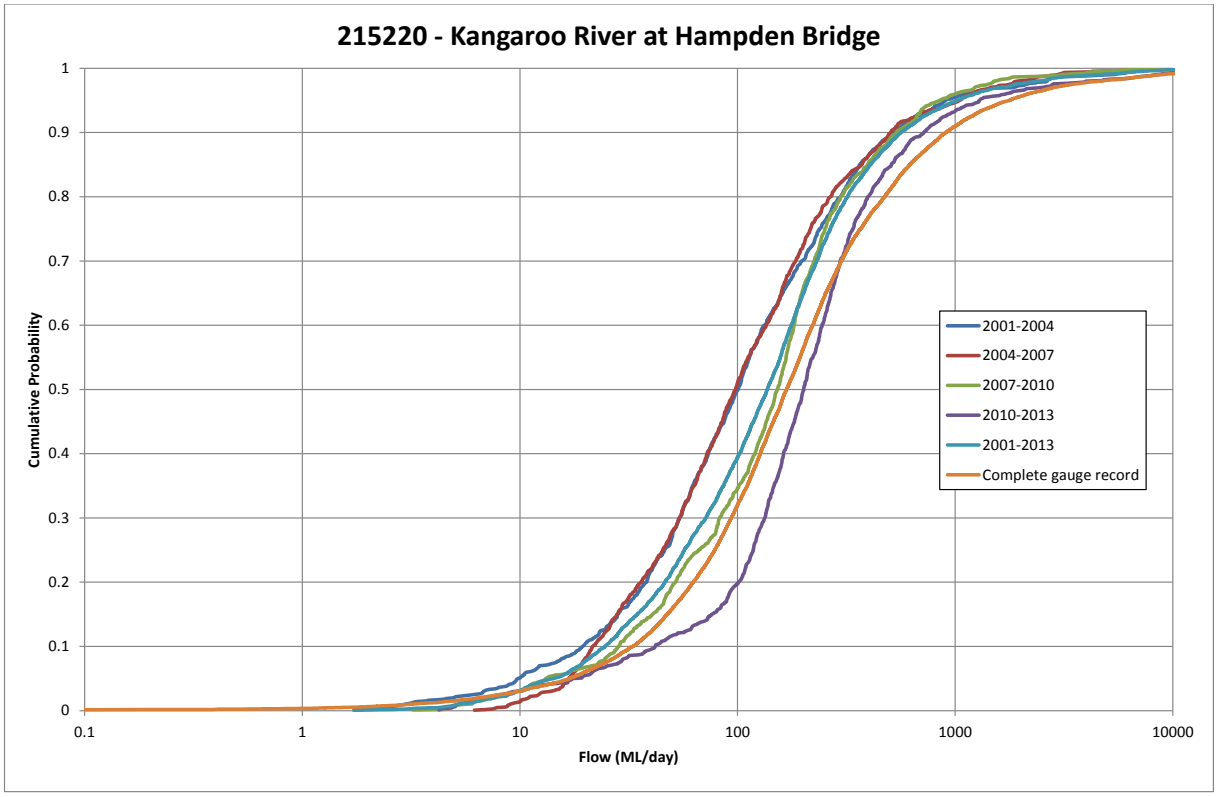

215207 - Shoalhaven River at Fossickers Flat
Cumulative Probability
Flow (ML/day)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0.1
1
10
100
1000
10000
2001-2004
2004-2007
2007-2010
2010-2013
2001-2013
Complete gauge record

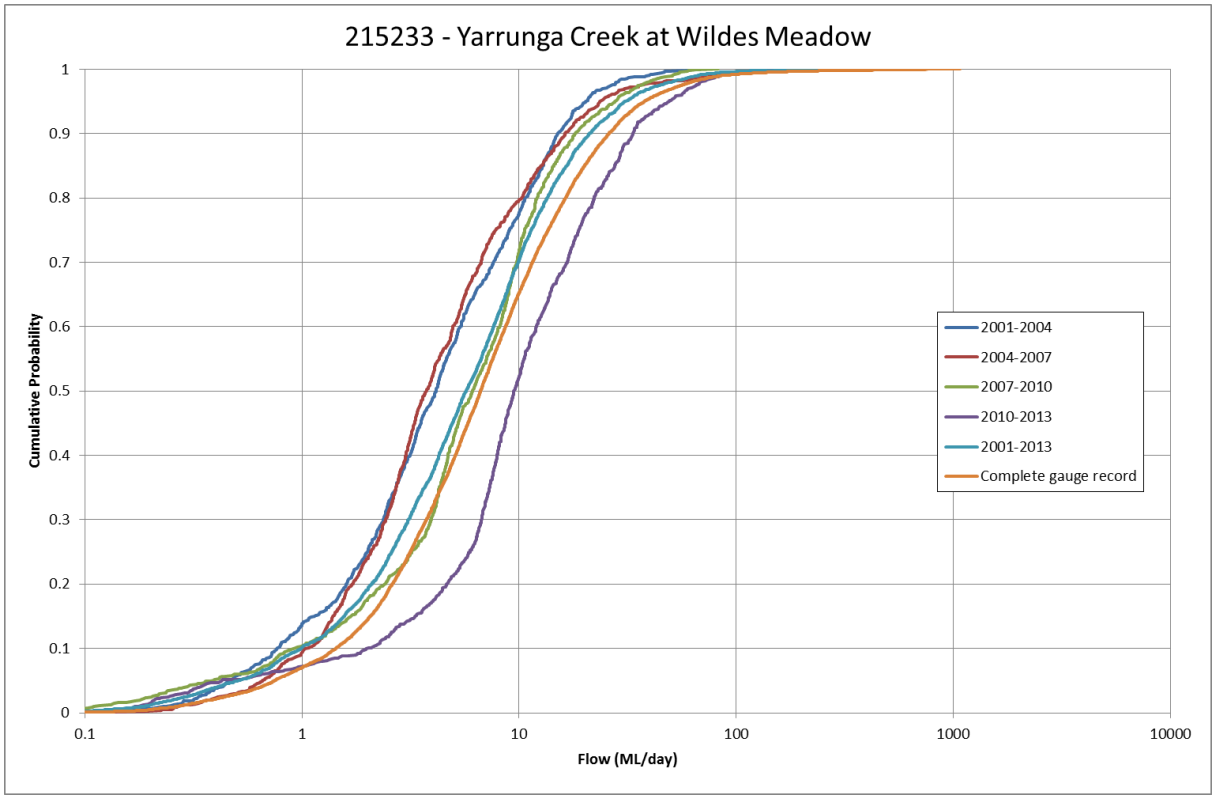

215208 - Shoalhaven River at Hillview
Cumulative Probability
Flow (ML/day)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0.1
1
10
100
1000
10000
2001-2004
2004-2007
2007-2010
2010-2013
2001-2013
Complete gauge record

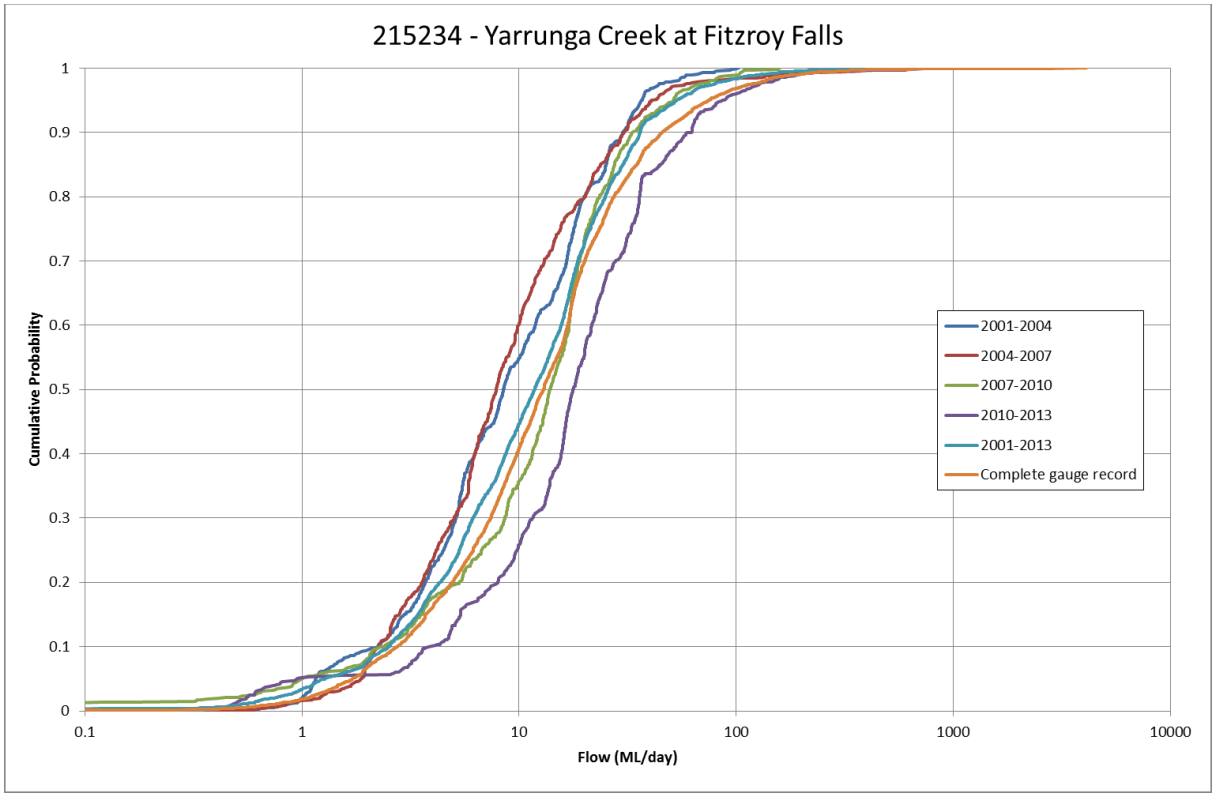

215209 - Shoalhaven River at Mountview
Cumulative Probability
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0.1
1
10
100
1000
10000
Flow (ML/day)
2001-2004
2004-2007
2007-2010
2010-2013
2001-2013
Complete gauge record

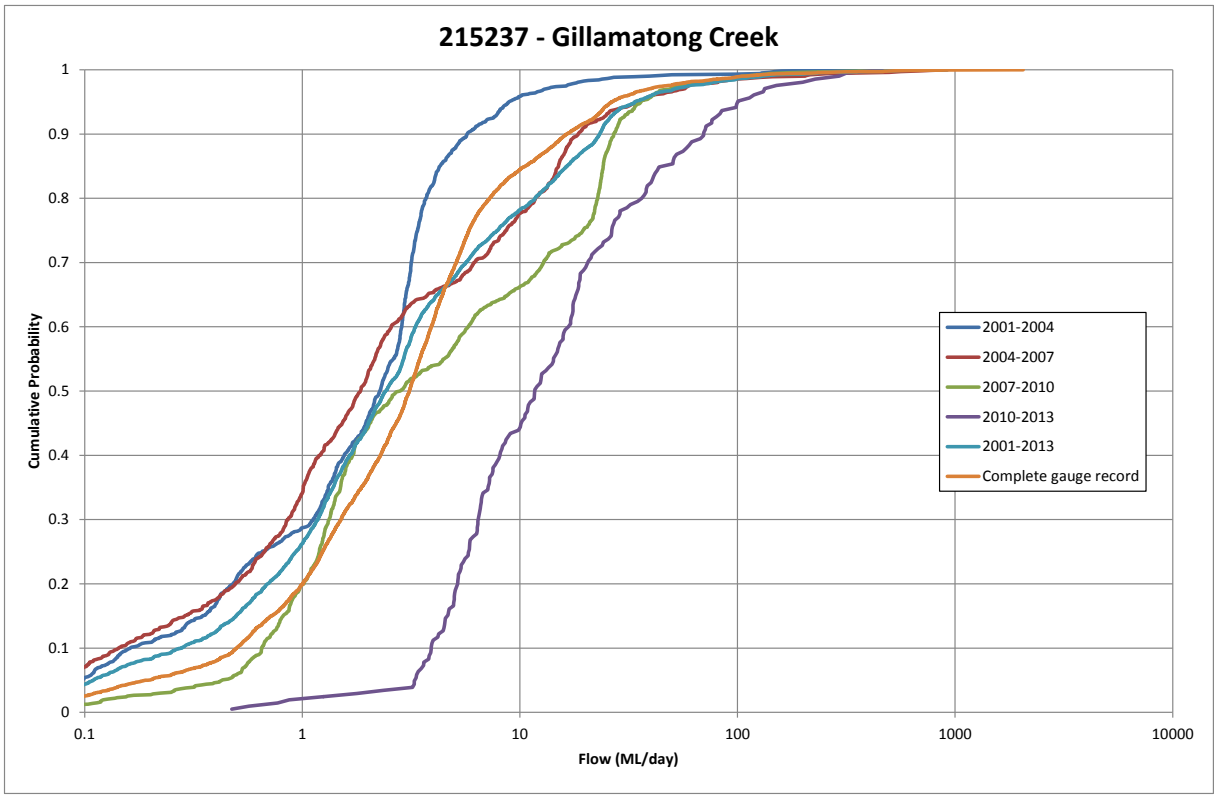

215210 - Mongarlowe River at Mongarlowe
Cumulative Probability
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0.1
1
10
100
1000
10000
Flow (ML/day)
2001-2004
2004-2007
2007-2010
2010-2013
2001-2013
Complete gauge record

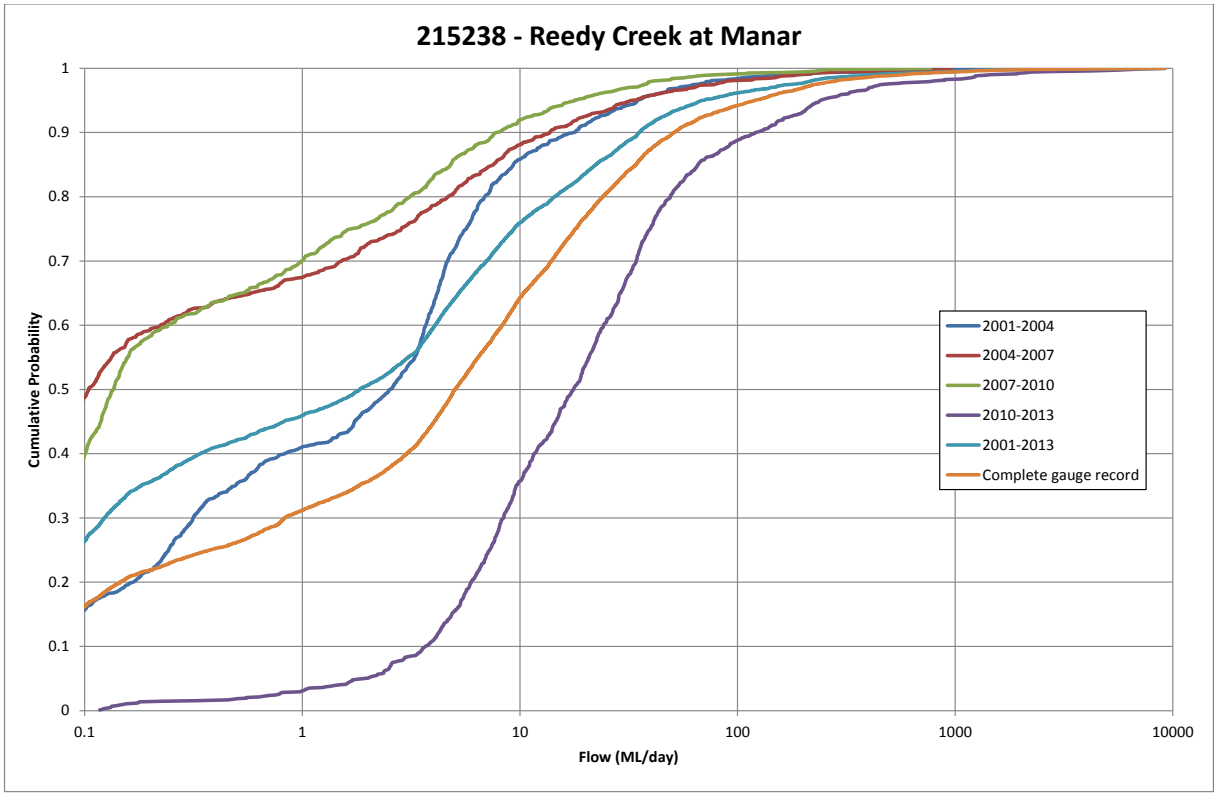

215215 - Shoalhaven River Downstream of Tallowa Dam
Cumulative Probability
Flow (ML/day)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0.1
1
10
100
1000
10000
2001-2004
2004-2007
2007-2010
2010-2013
2001-2013
Complete gauge record

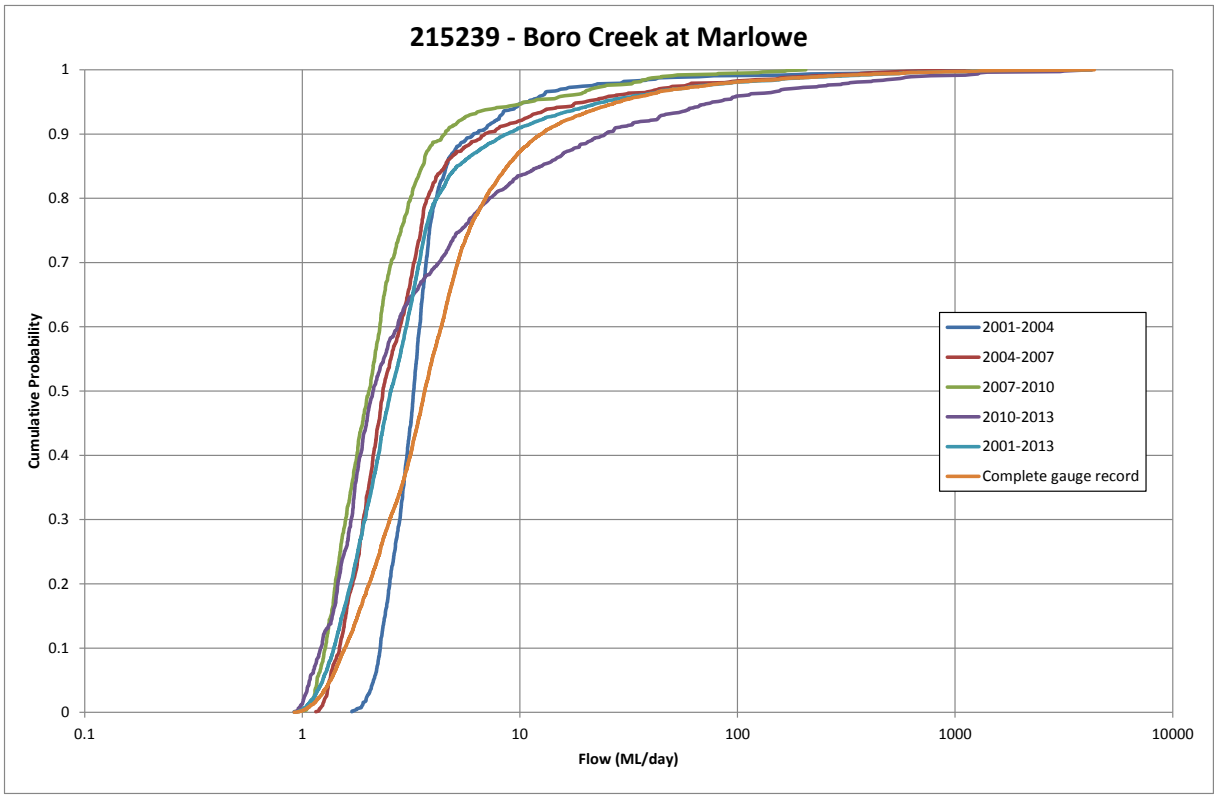

215220 - Kangaroo River at Hampden Bridge
Cumulative Probability
Flow (ML/day)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0.1
1
10
100
1000
10000
2001-2004
2004-2007
2007-2010
2010-2013
2001-2013
Complete gauge record

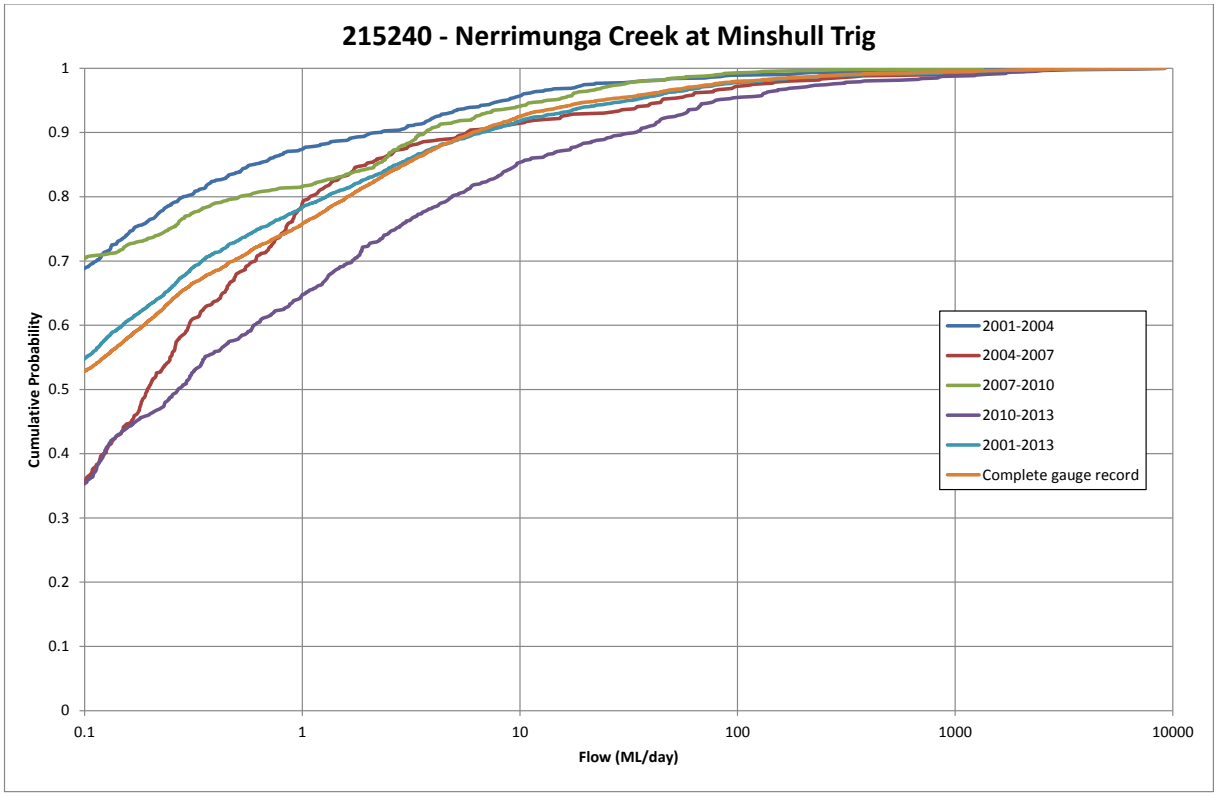

215233 - Yarrunga Creek at Wildes Meadow
Cumulative Probability
Flow (ML/day)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0.1
1
10
100
1000
10000
2001-2004
2004-2007
2007-2010
2010-2013
2001-2013
Complete gauge record

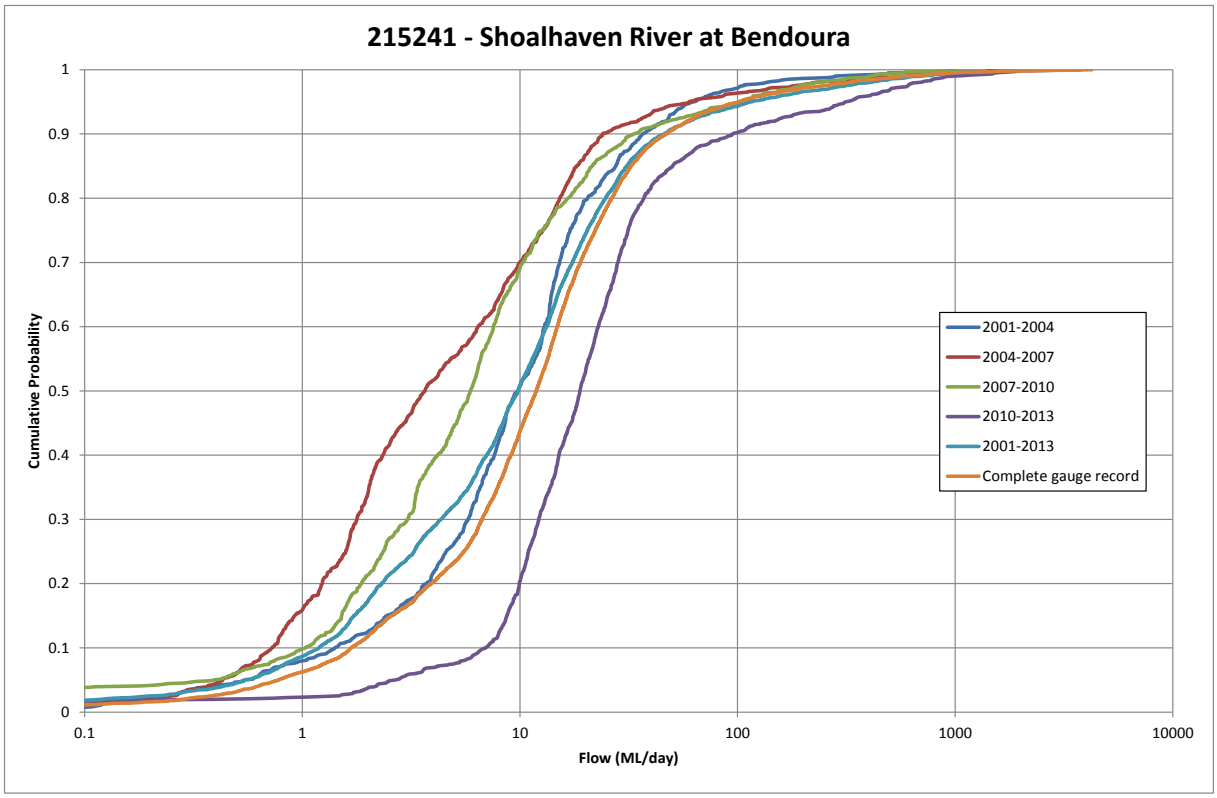

215234 - Yarrunga Creek at Fitzroy Falls
Cumulative Probability
Flow (ML/day)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0.1
1
10
100
1000
10000
2001-2004
2004-2007
2007-2010
2010-2013
2001-2013
Complete gauge record

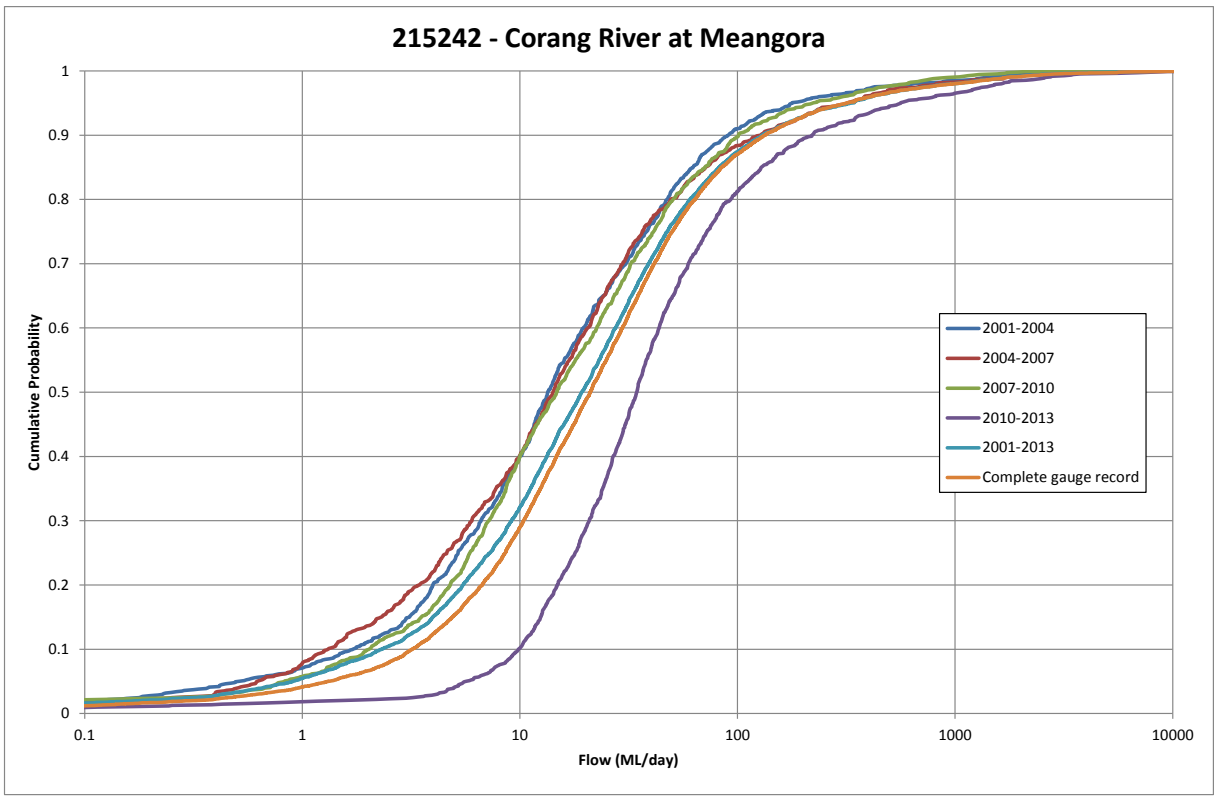

215237 - Gillamatong Creek
Cumulative Probability
Flow (ML/day)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0.1
1
10
100
1000
10000
2001-2004
2004-2007
2007-2010
2010-2013
2001-2013
Complete gauge record

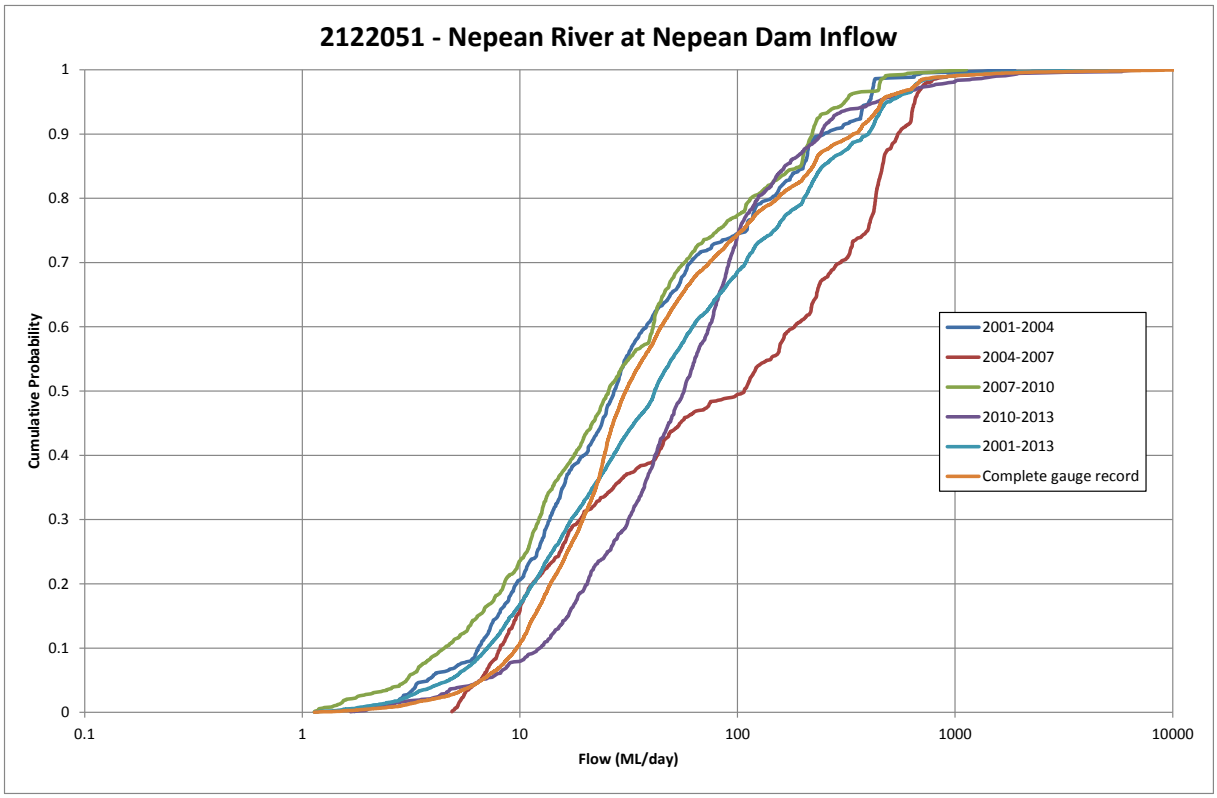

215238 - Reedy Creek at Manar
Cumulative Probability
Flow (ML/day)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0.1
1
10
100
1000
10000
2001-2004
2004-2007
2007-2010
2010-2013
2001-2013
Complete gauge record

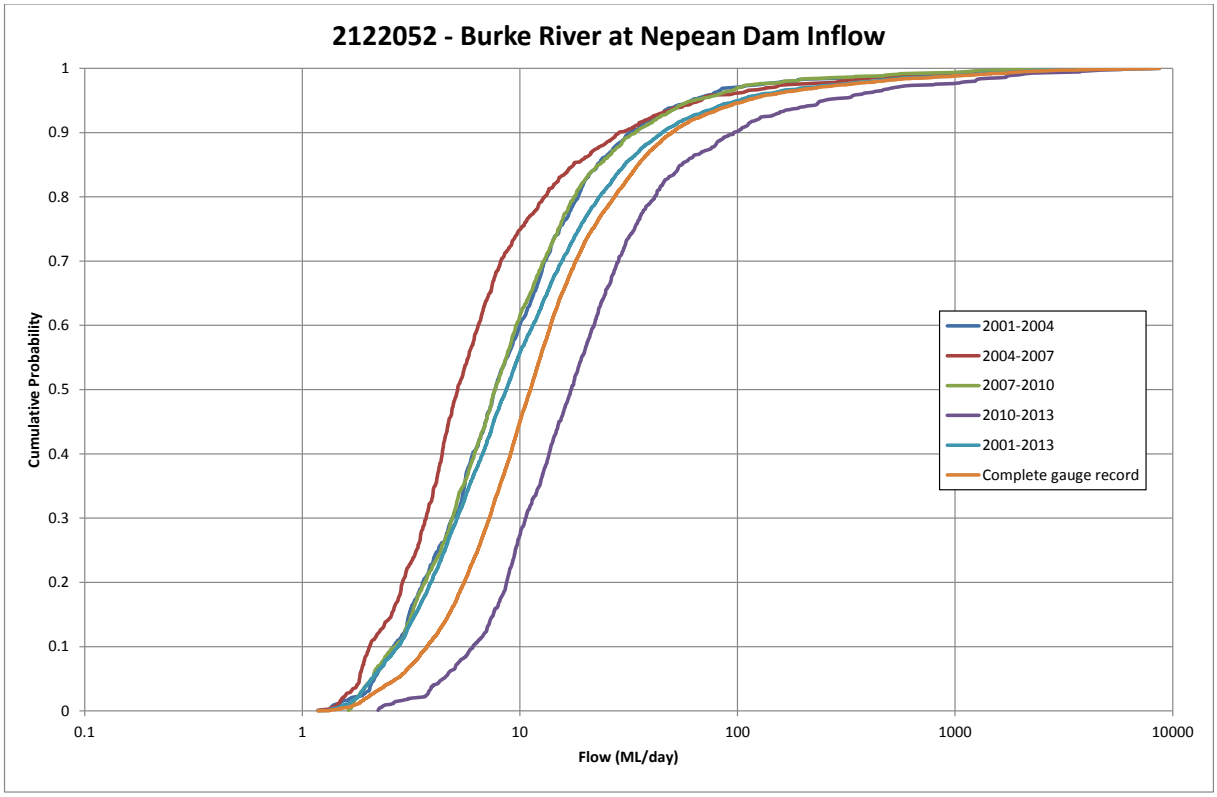

215239 - Boro Creek at Marlowe
Cumulative Probability
Flow (ML/day)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0.1
1
10
100
1000
10000
2001-2004
2004-2007
2007-2010
2010-2013
2001-2013
Complete gauge record

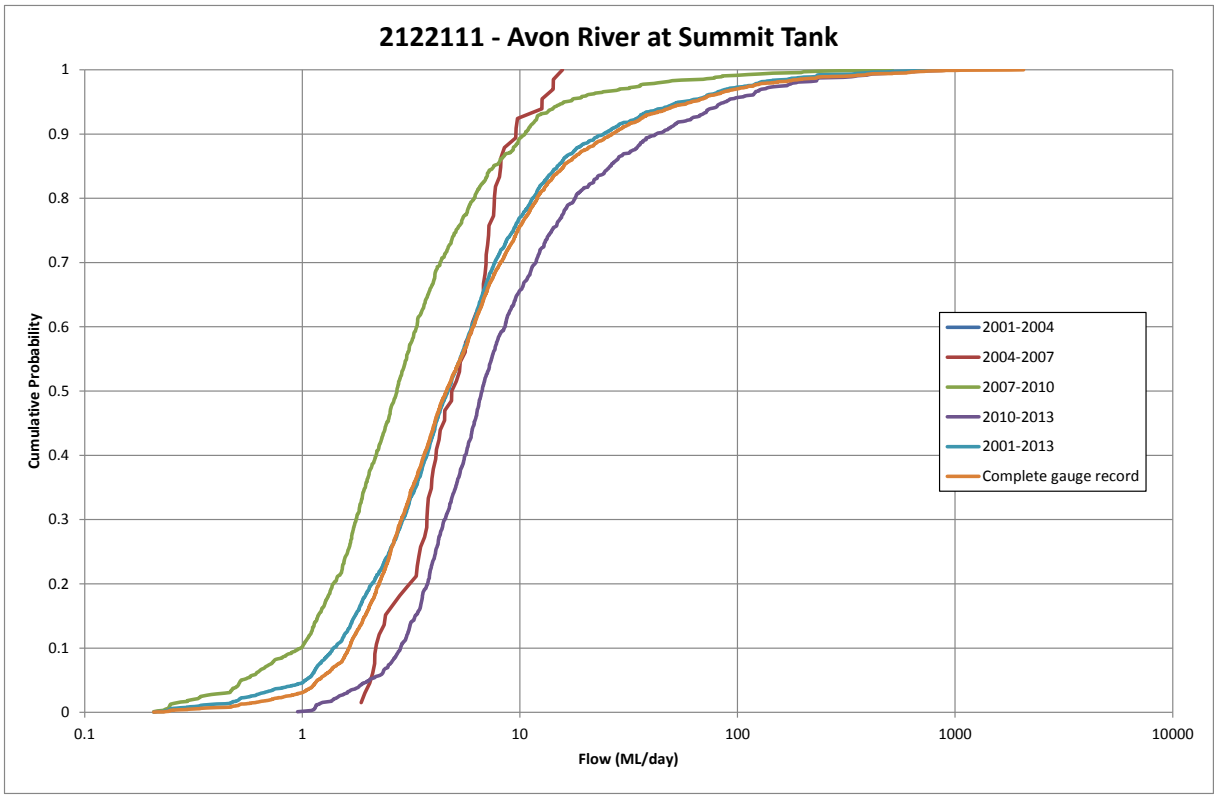

215240 - Nerrimunga Creek at Minshull Trig
Cumulative Probability
Flow (ML/day)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0.1
1
10
100
1000
10000
2001-2004
2004-2007
2007-2010
2010-2013
2001-2013
Complete gauge record

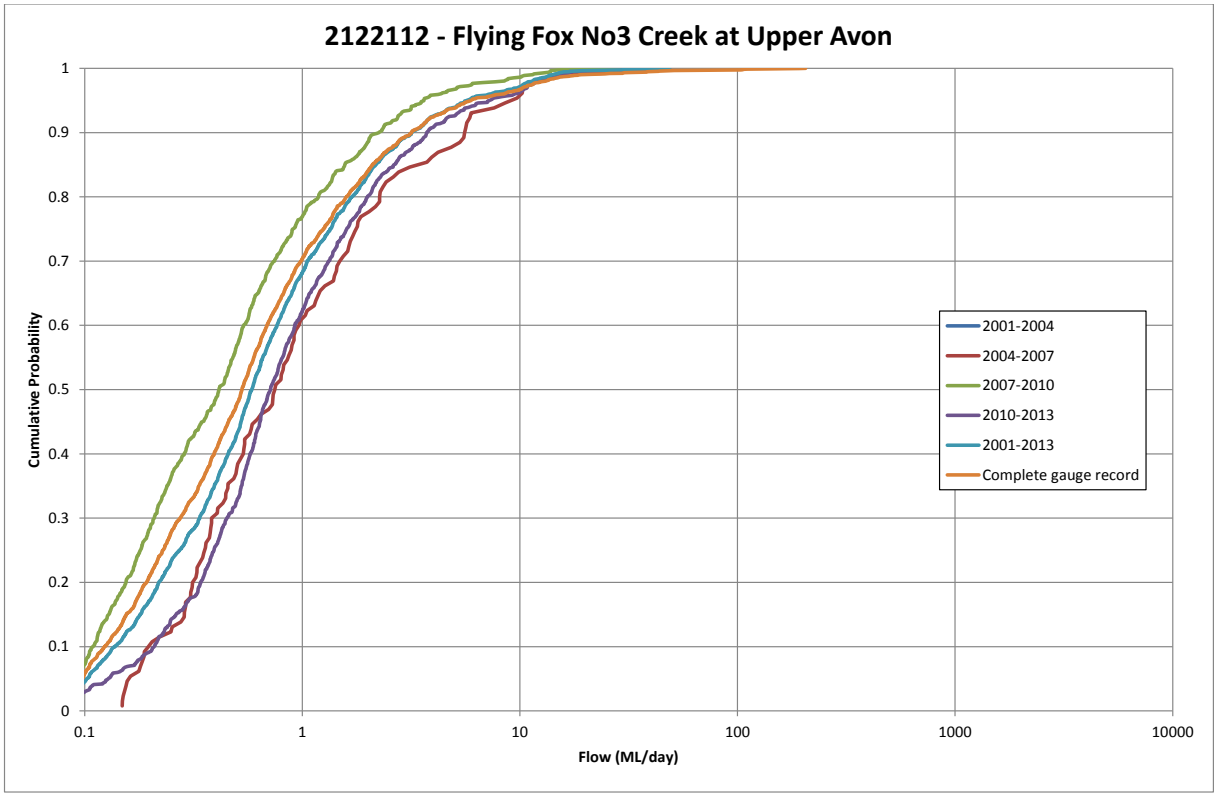

215241 - Shoalhaven River at Bendoura
Cumulative Probability
Flow (ML/day)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0.1
1
10
100
1000
10000
2001-2004
2004-2007
2007-2010
2010-2013
2001-2013
Complete gauge record

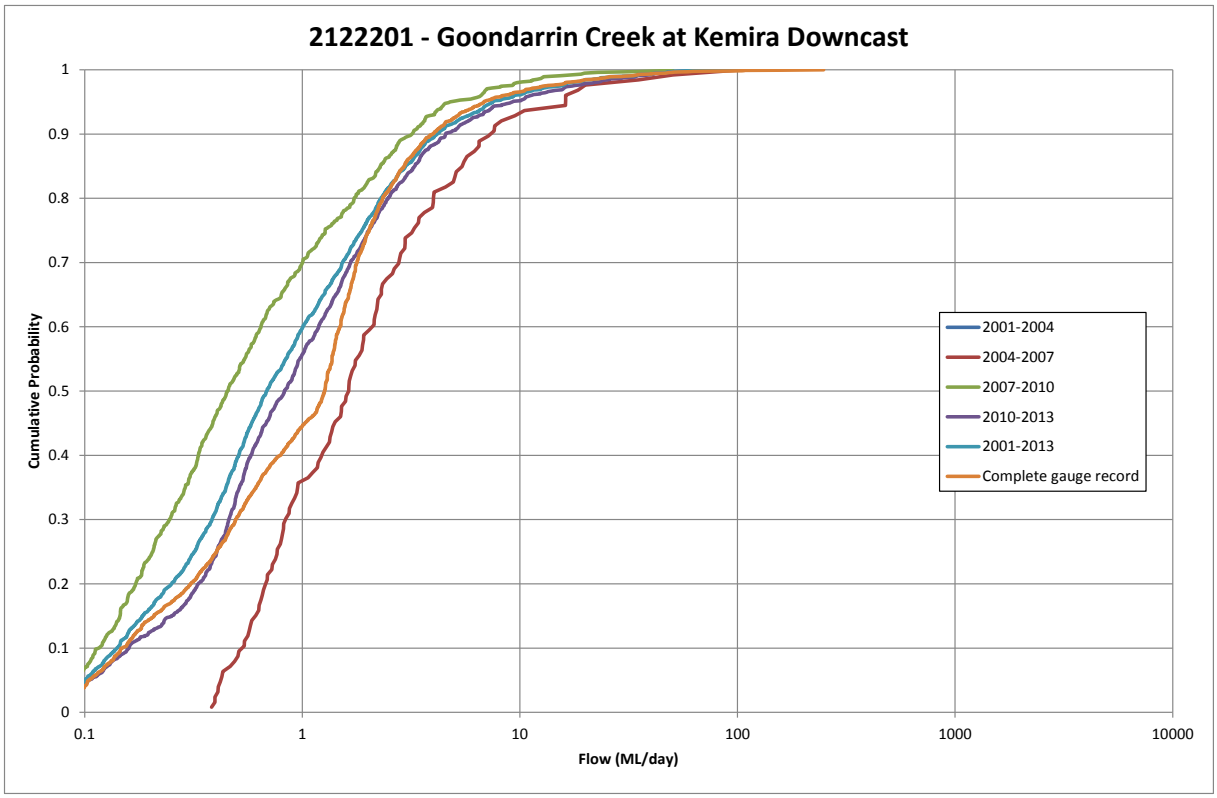

215242 - Corang River at Meangora
Cumulative Probability
Flow (ML/day)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0.1
1
10
100
1000
10000
2001-2004
2004-2007
2007-2010
2010-2013
2001-2013
Complete gauge record

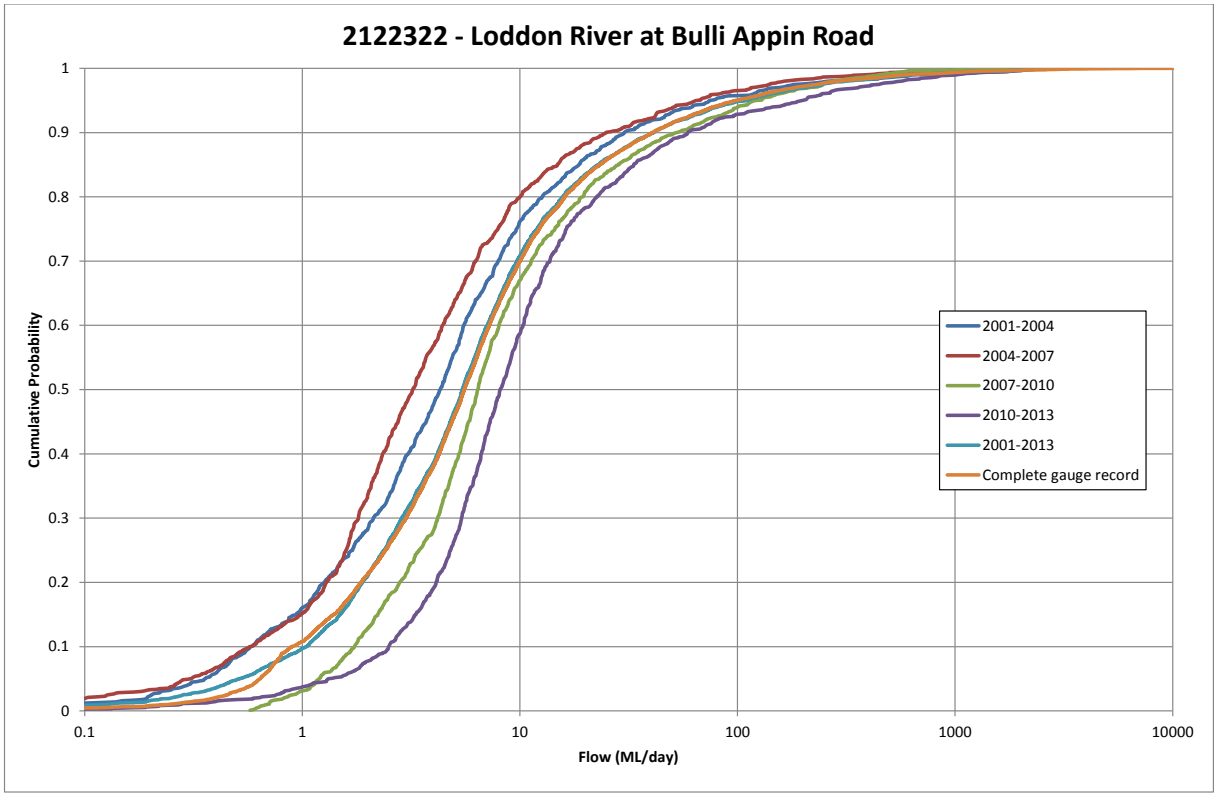

2122051 - Nepean River at Nepean Dam Inflow
Cumulative Probability
Flow (ML/day)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0.1
1
10
100
1000
10000
2001-2004
2004-2007
2007-2010
2010-2013
2001-2013
Complete gauge record

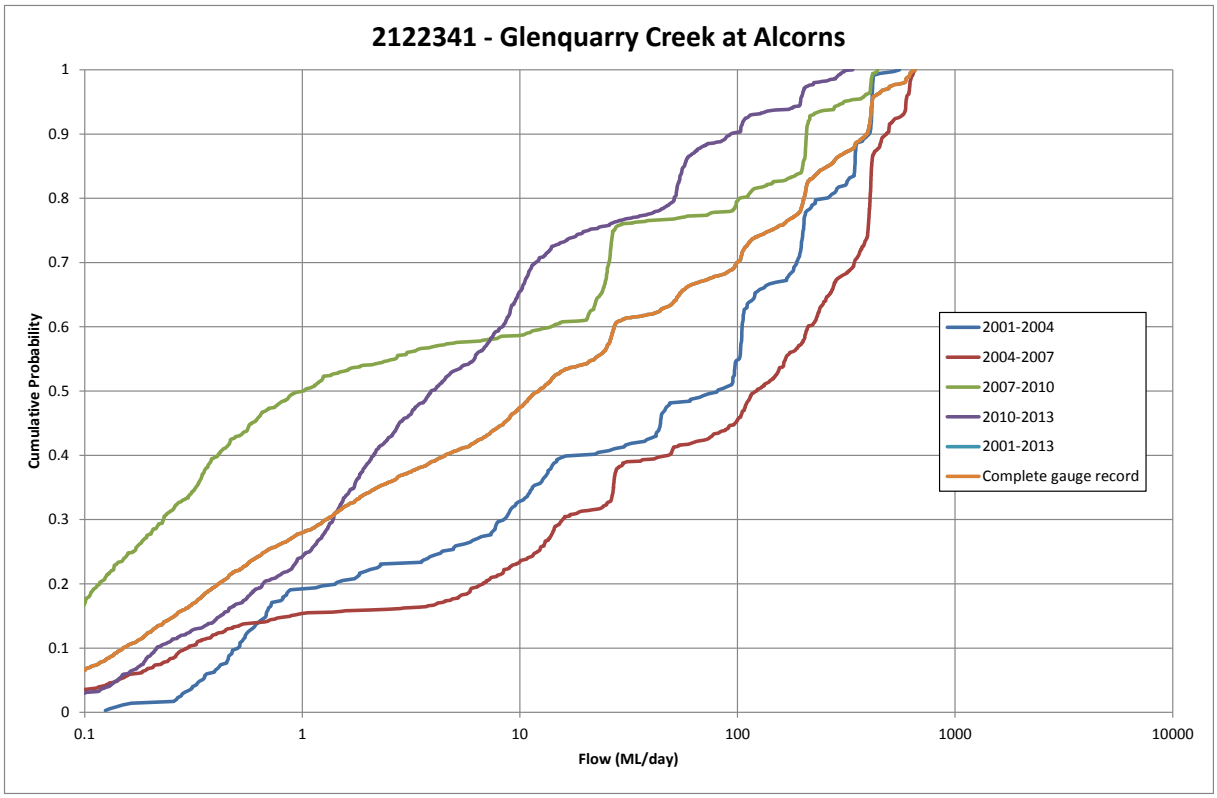

2122052 - Burke River at Nepean Dam Inflow
Cumulative Probability
Flow (ML/day)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0.1
1
10
100
1000
10000
2001-2004
2004-2007
2007-2010
2010-2013
2001-2013
Complete gauge record

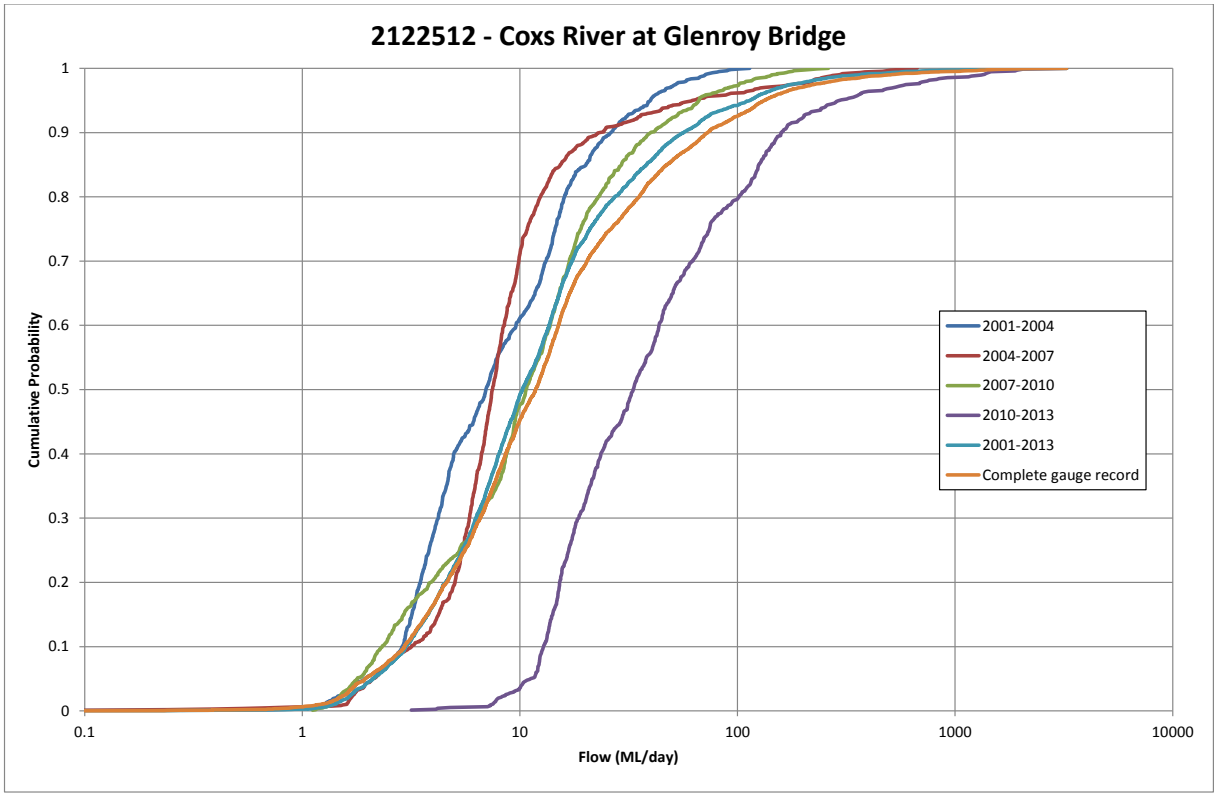

2122111 - Avon River at Summit Tank
Cumulative Probability
Flow (ML/day)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0.1
1
10
100
1000
10000
2001-2004
2004-2007
2007-2010
2010-2013
2001-2013
Complete gauge record

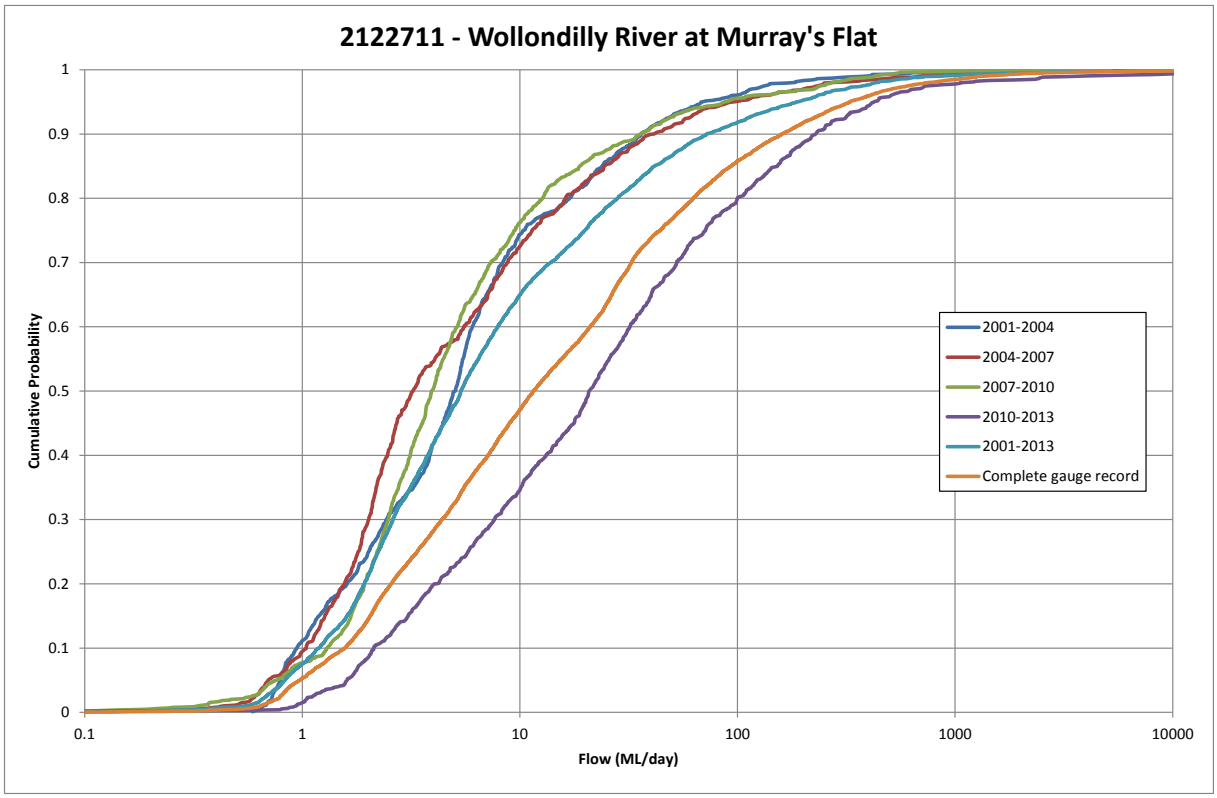

2122112 - Flying Fox No3 Creek at Upper Avon
Cumulative Probability
Flow (ML/day)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0.1
1
10
100
1000
10000
2001-2004
2004-2007
2007-2010
2010-2013
2001-2013
Complete gauge record


2122201 - Goondarrin Creek at Kemira Downcast
Cumulative Probability
Flow (ML/day)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0.1
1
10
100
1000
10000
2001-2004
2004-2007
2007-2010
2010-2013
2001-2013
Complete gauge record


2122322 - Loddon River at Bulli Appin Road
Cumulative Probability
Flow (ML/day)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0.1
1
10
100
1000
10000
2001-2004
2004-2007
2007-2010
2010-2013
2001-2013
Complete gauge record


2122341 - Glenquarry Creek at Alcorns
Cumulative Probability
Flow (ML/day)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0.1
1
10
100
1000
10000
2001-2004
2004-2007
2007-2010
2010-2013
2001-2013
Complete gauge record


2122512 - Coxs River at Glenroy Bridge
Cumulative Probability
Flow (ML/day)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0.1
1
10
100
1000
10000
2001-2004
2004-2007
2007-2010
2010-2013
2001-2013
Complete gauge record


2122711 - Wollondilly River at Murray's Flat
Cumulative Probability
Flow (ML/day)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0.1
1
10
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1000
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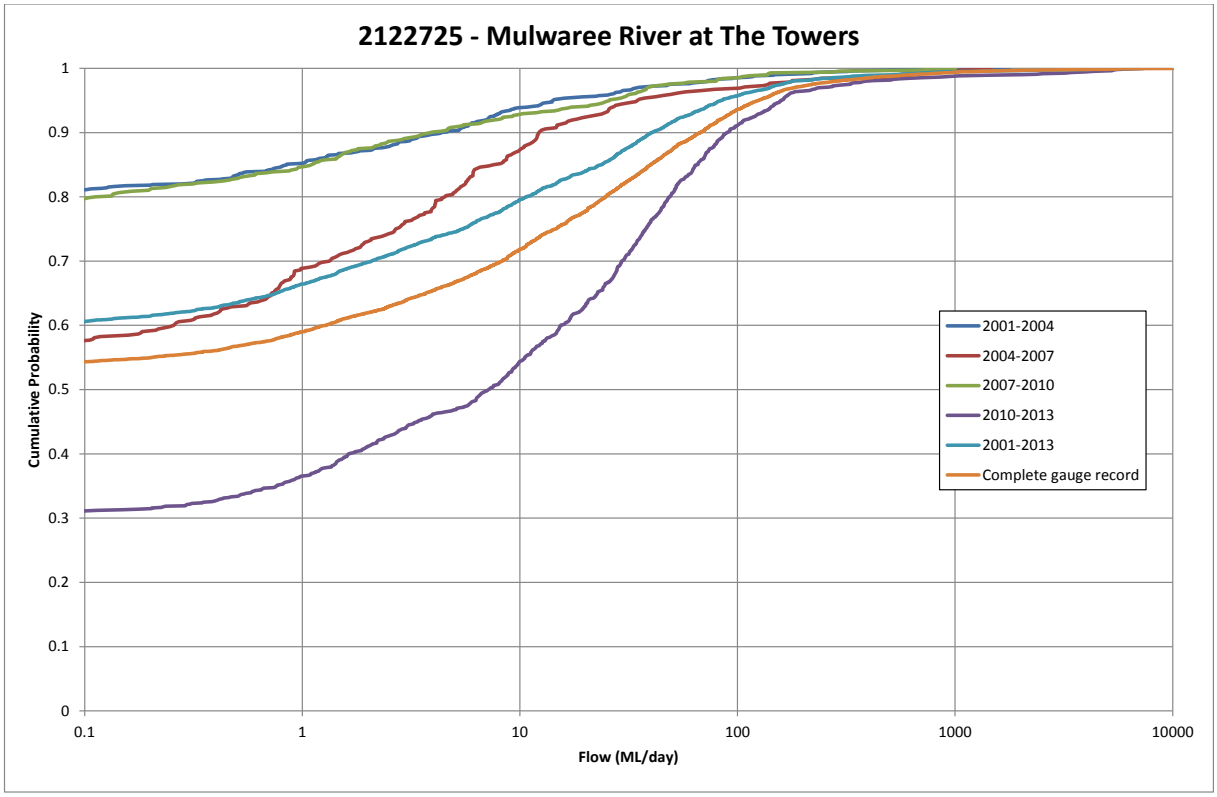
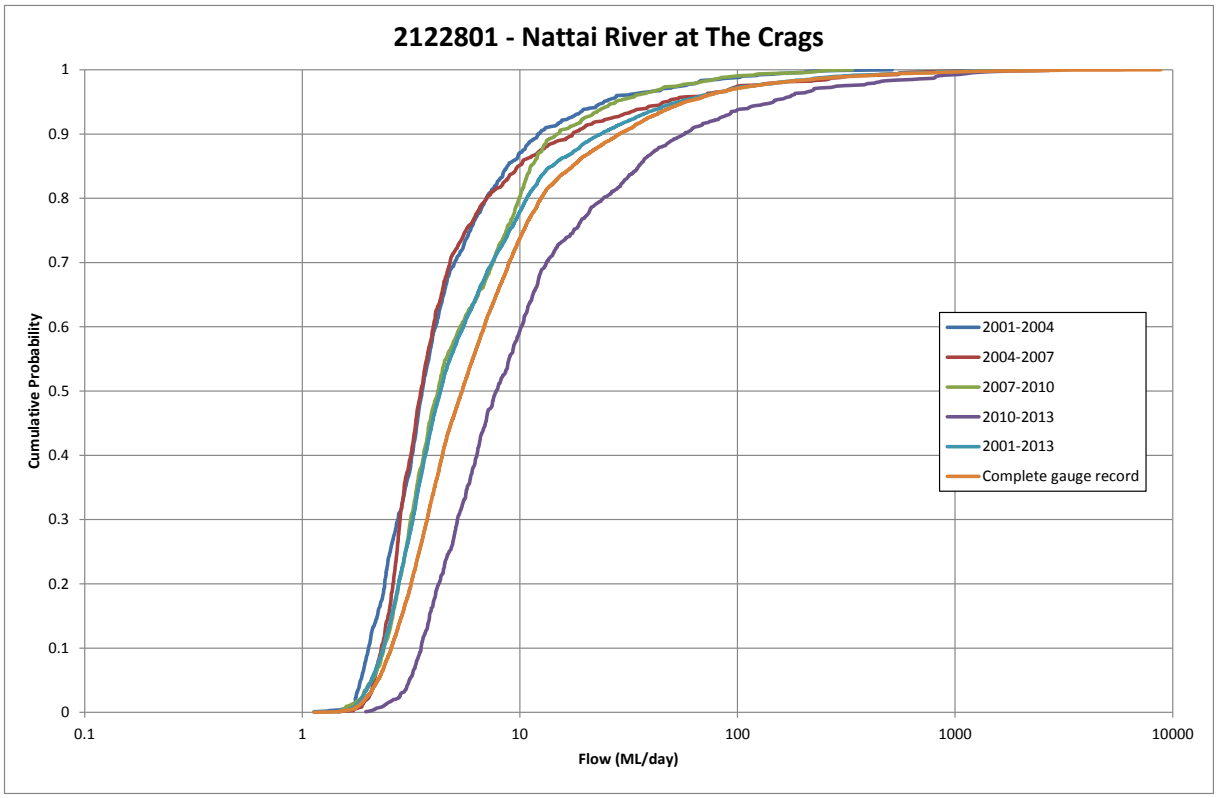
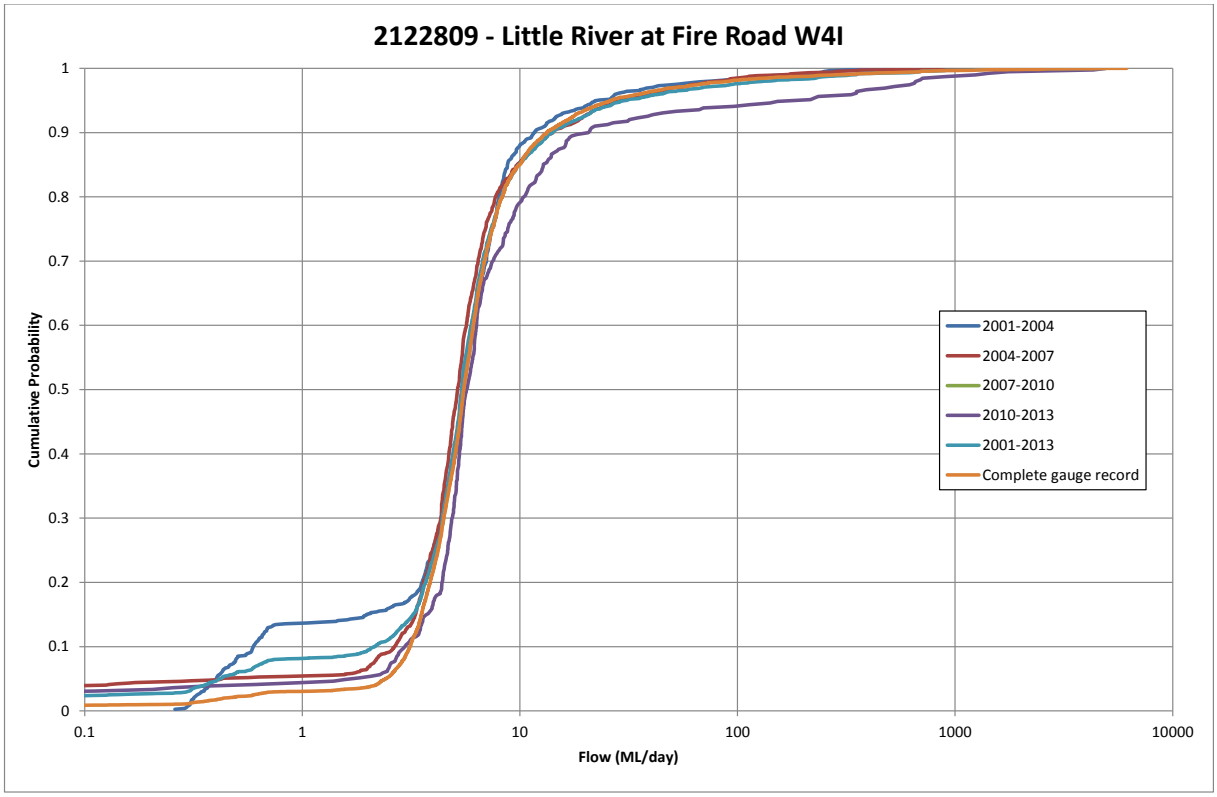
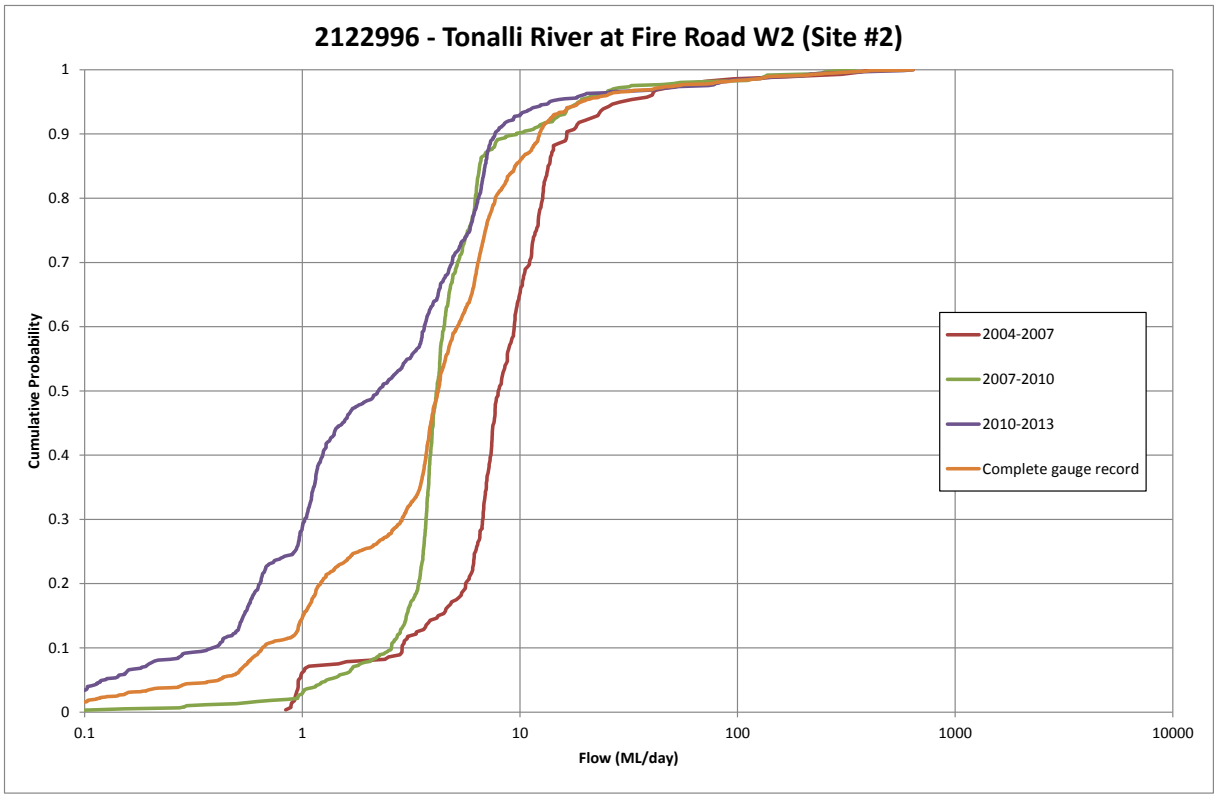
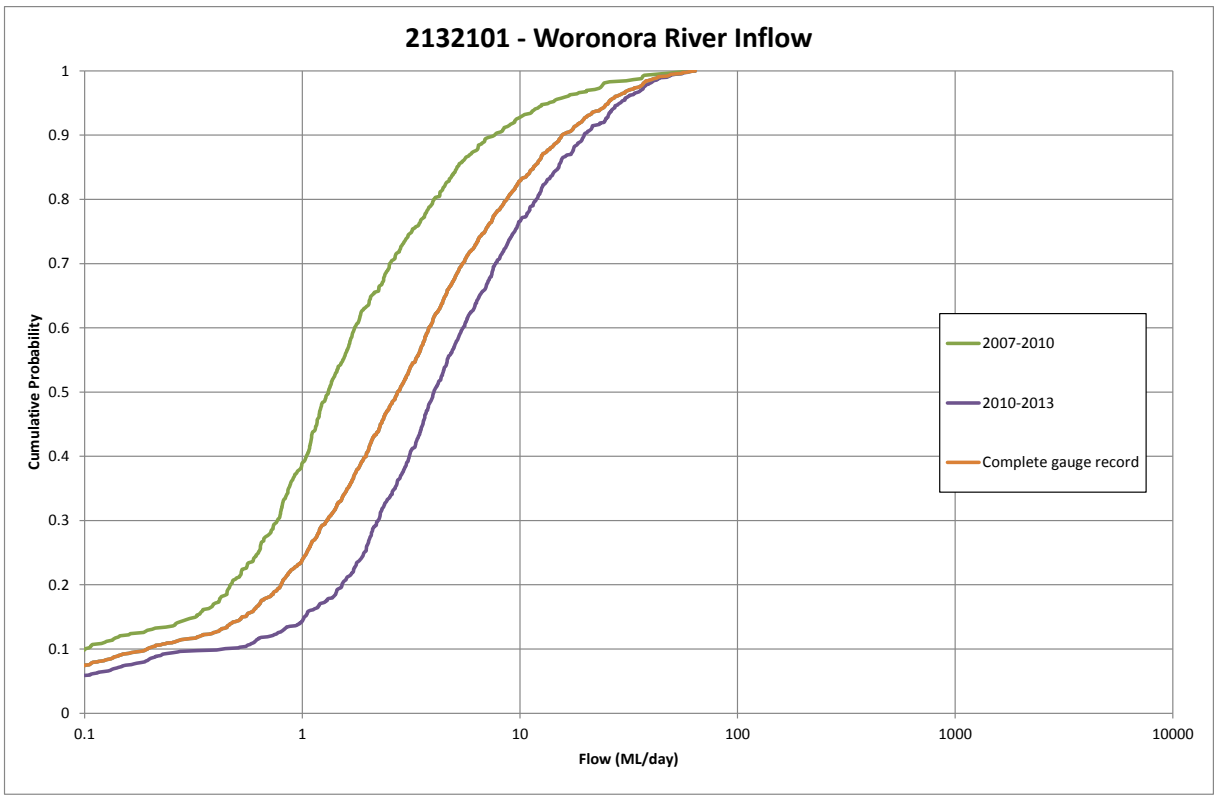
2001-2004
2004-2007
2007-2010
2010-2013
2001-2013
Complete gauge record

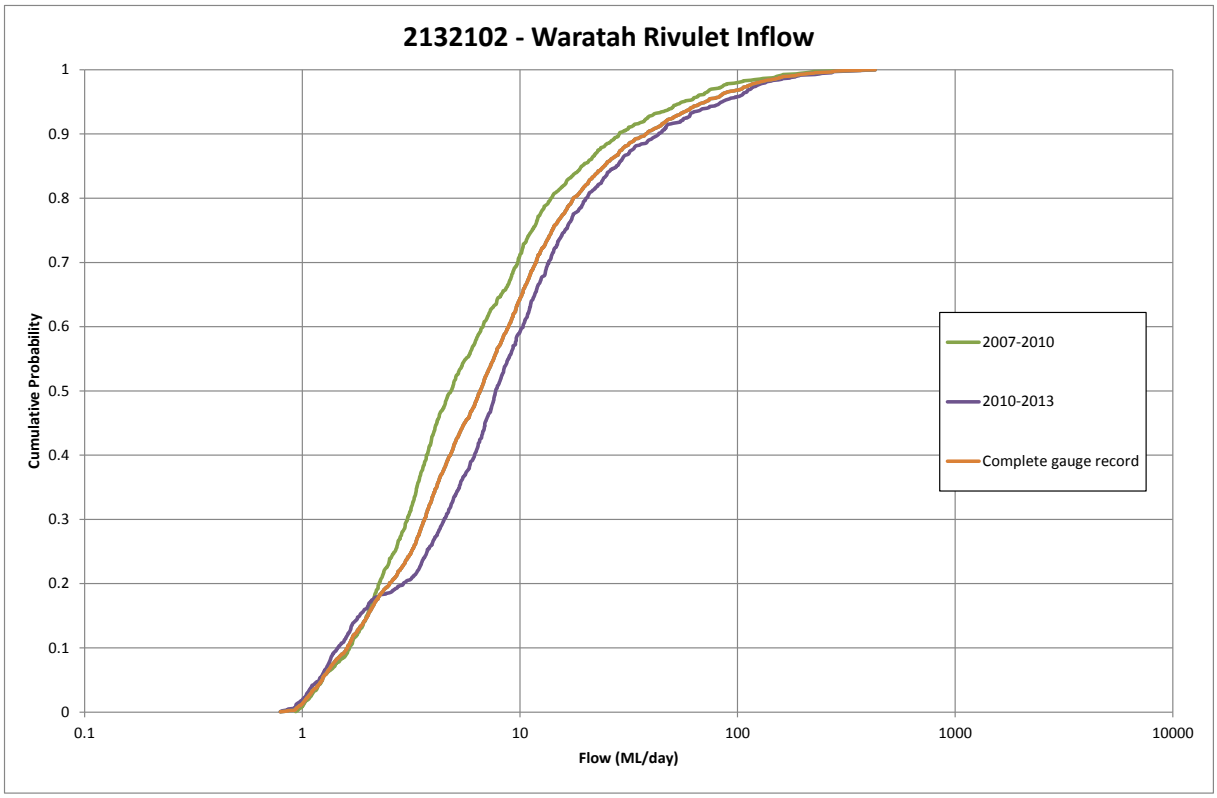

2122725 - Mulwaree River at The Towers
Cumulative Probability
Flow (ML/day)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0.1
1
10
100
1000
10000
2001-2004
2004-2007
2007-2010
2010-2013
2001-2013
Complete gauge record


2122801 - Nattai River at The Crags
Cumulative Probability
Flow (ML/day)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0.1
1
10
100
1000
10000
2001-2004
2004-2007
2007-2010
2010-2013
2001-2013
Complete gauge record


2122809 - Little River at Fire Road W4I
Cumulative Probability
Flow (ML/day)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0.1
1
10
100
1000
10000
2001-2004
2004-2007
2007-2010
2010-2013
2001-2013
Complete gauge record


2122996 - Tonalli River at Fire Road W2 (Site #2)
Cumulative Probability
Flow (ML/day)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0.1
1
10
100
1000
10000
2004-2007
2007-2010
2010-2013
Complete gauge record


2132101 - Woronora River Inflow
Cumulative Probability
Flow (ML/day)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0.1
1
10
100
1000
10000
2007-2010
2010-2013
Complete gauge record


2132102 - Waratah Rivulet Inflow
Cumulative Probability
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0.1
1
10
100
1000
10000
Flow (ML/day)
2007-2010
2010-2013
Complete gauge record

7.2 Bore Hydrographs

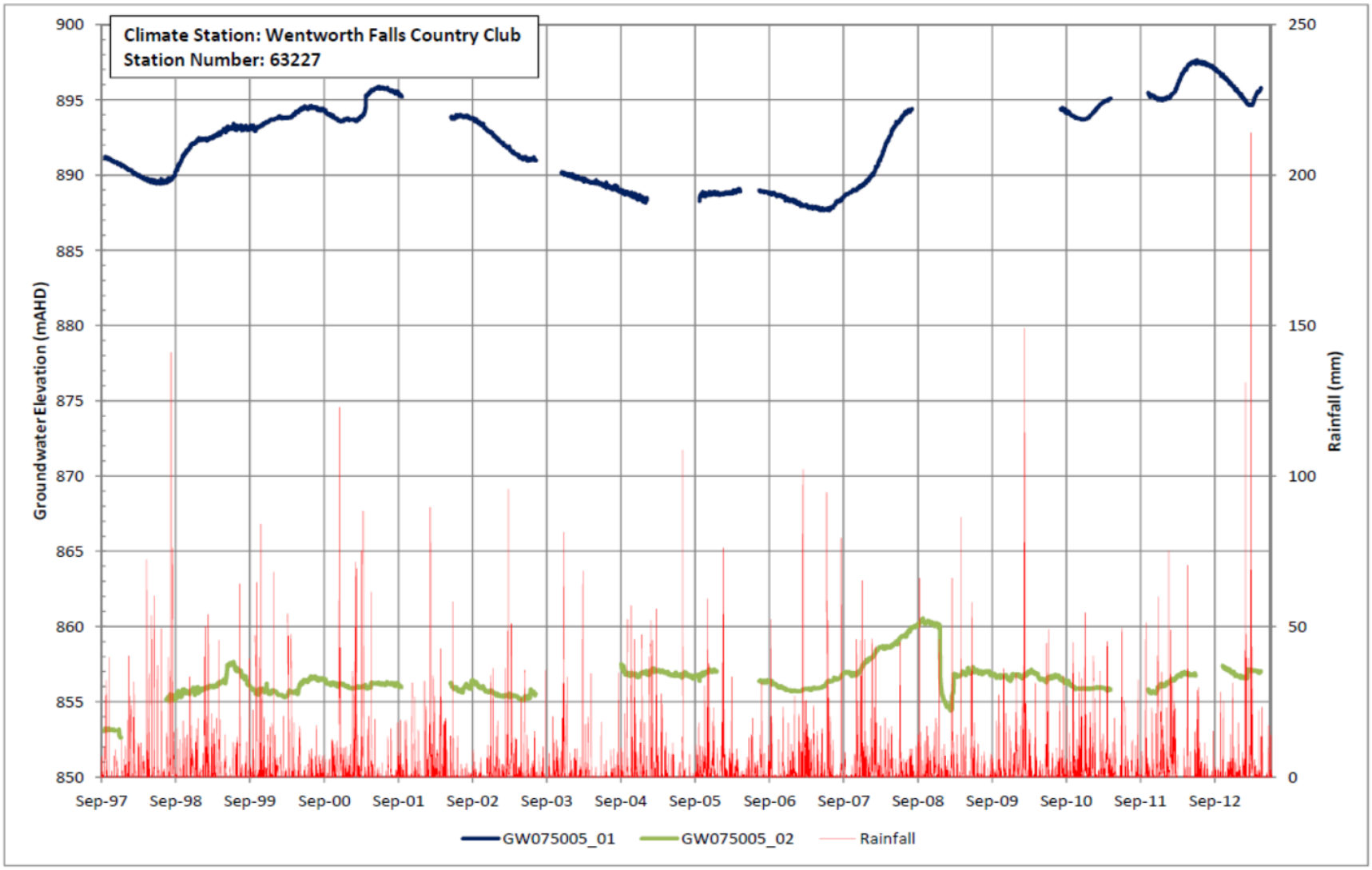


Figure G 7-1 Groundwater Elevation at GW075005_01 and GW075005_2 and Rainfall at Wentworth Falls Country Club (Station No.: 63227)

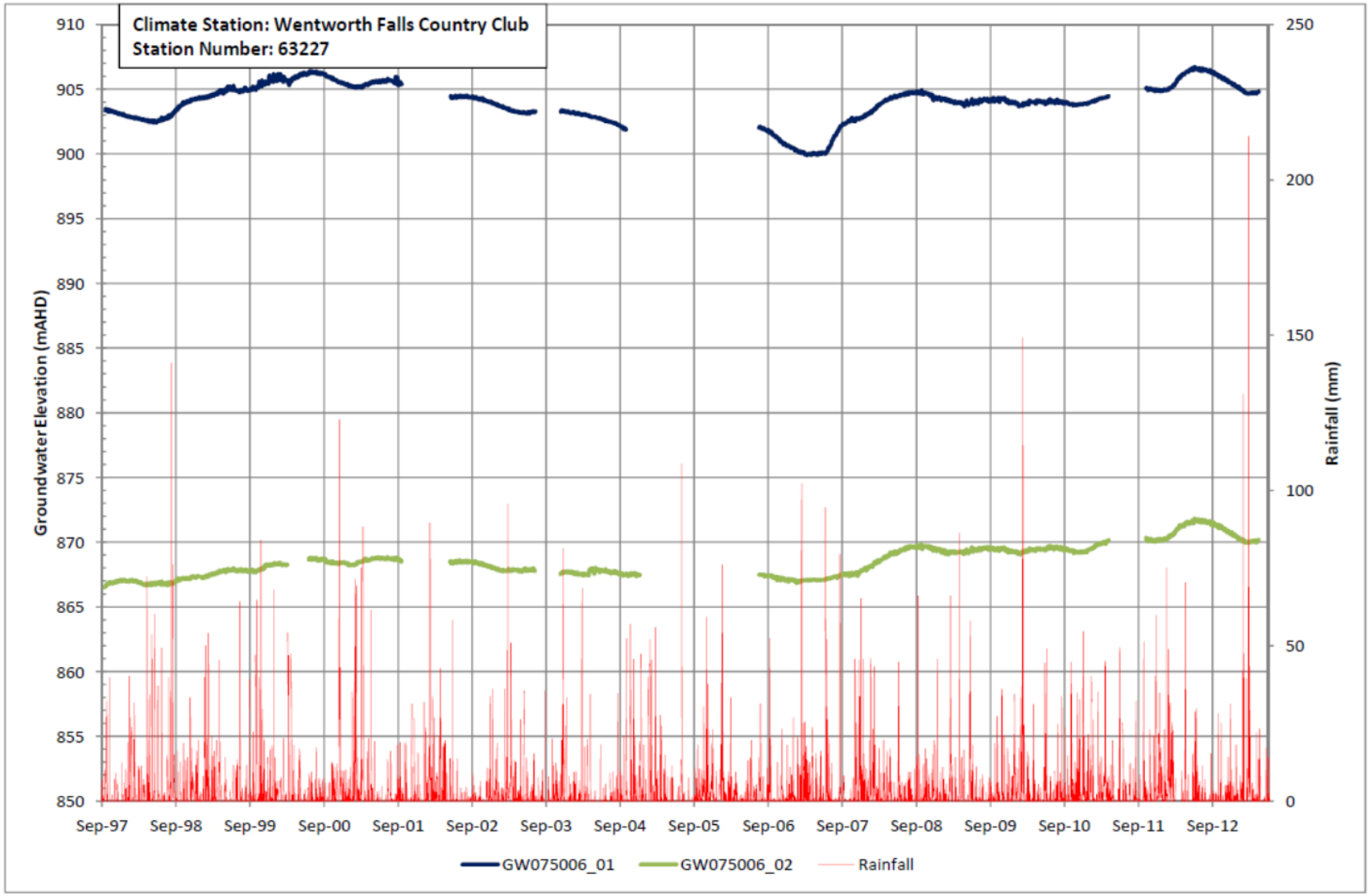


Figure G 7-2 Groundwater Elevation at GW075006_01 and GW075006_2 and Rainfall at Wentworth Falls Country Club (Station No.: 63227)

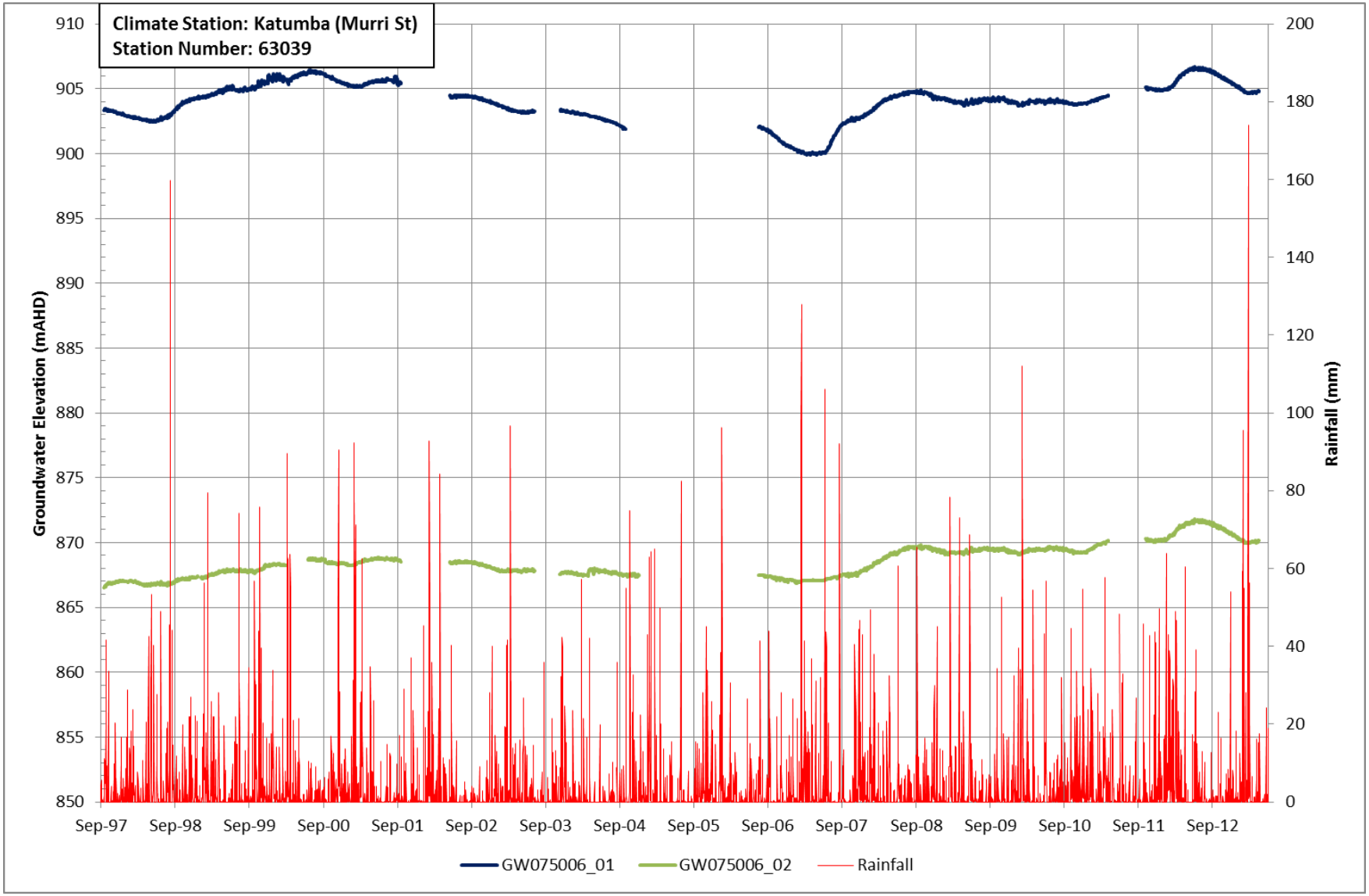


Figure G 7-3 Groundwater Elevation at GW075007_01 and GW075007_2 and Rainfall at Katumba (Station No.: 63039)

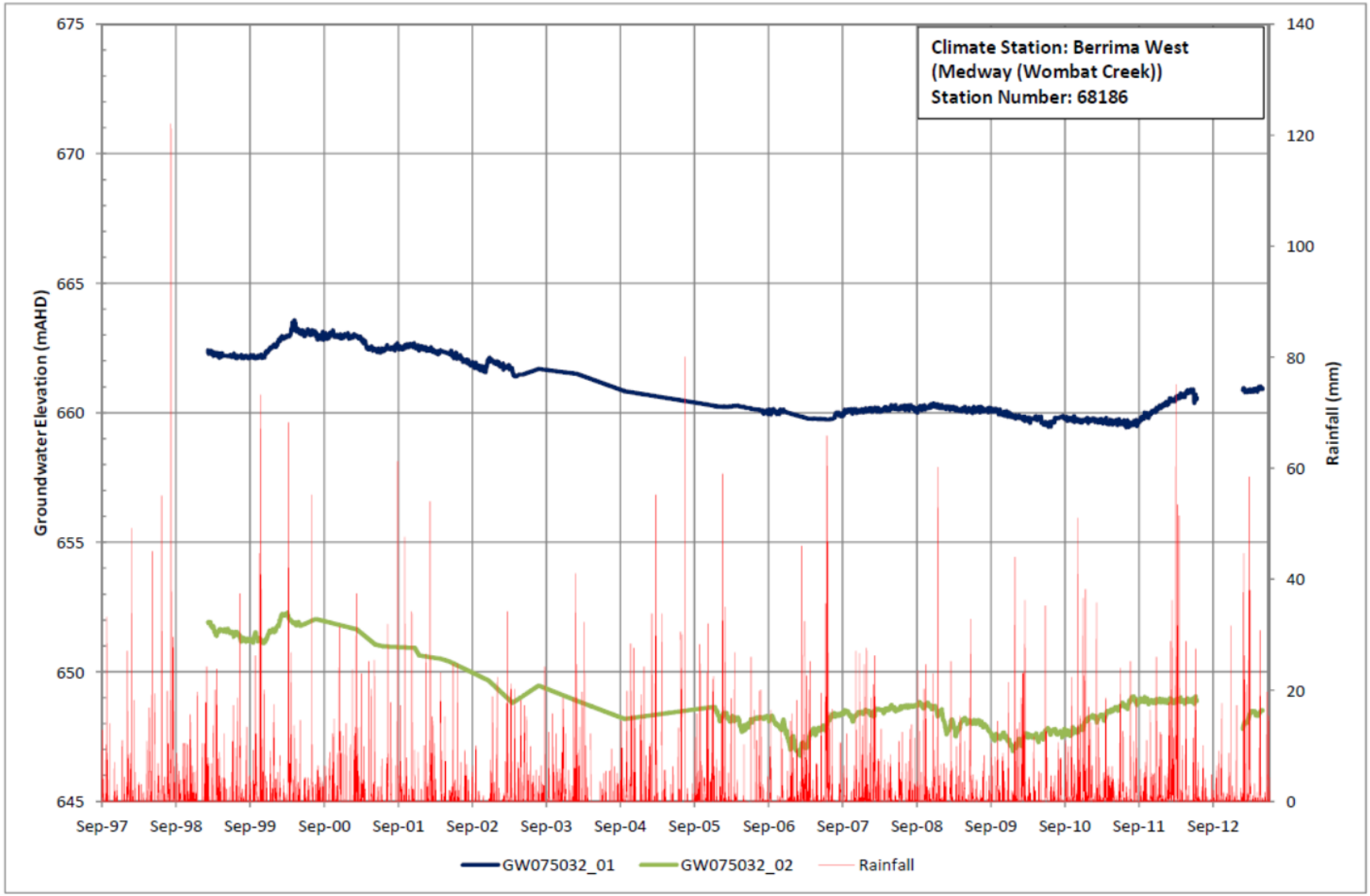


Figure G 7-4 Groundwater Elevation at GW075032_01 and GW075032_2 and Rainfall at Berrima West (Station No.: 68186)

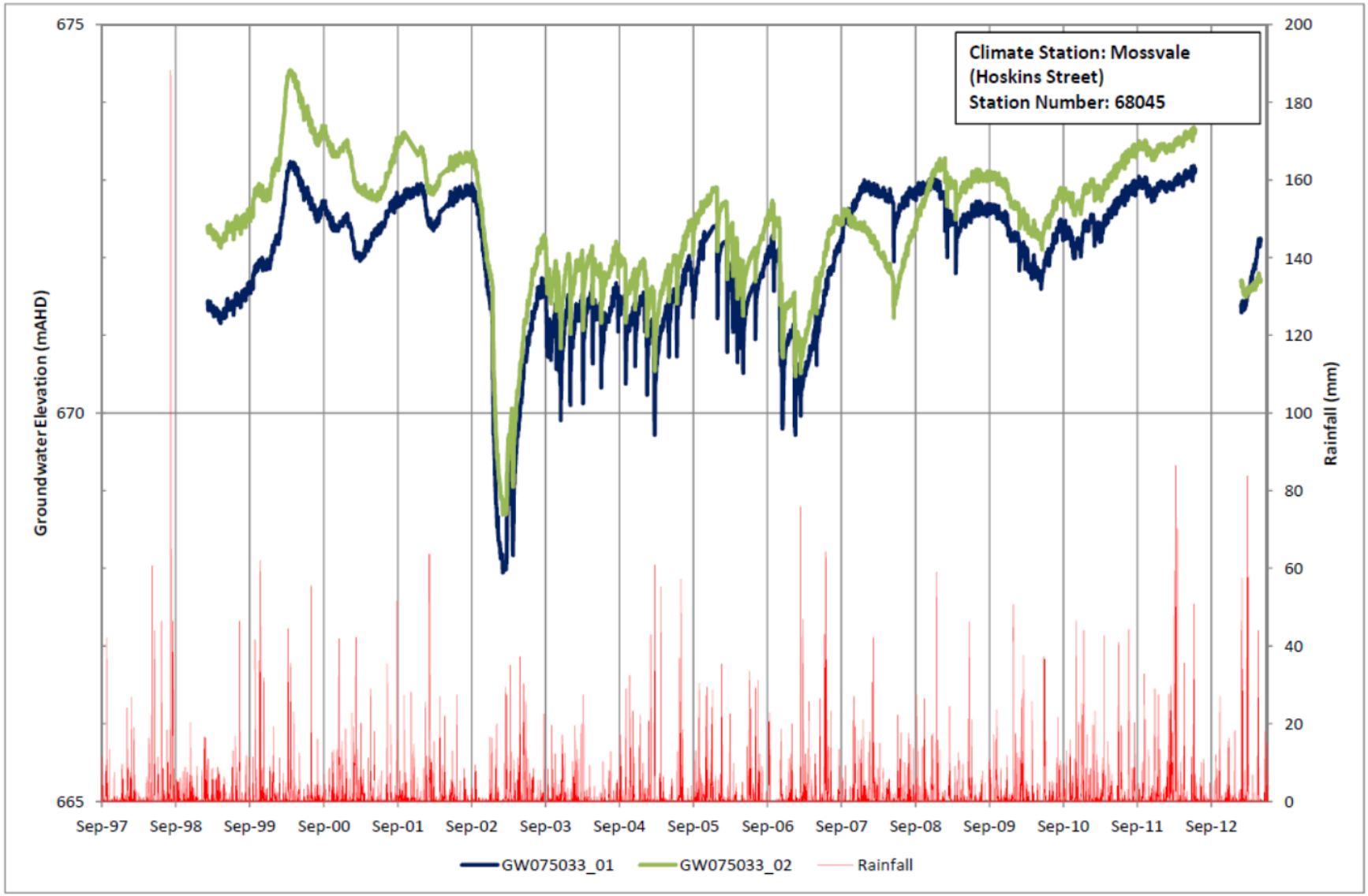


Figure G 7-5 Groundwater Elevation at GW075033_01 and GW075033_2 and Rainfall at Moss Vale (Station No.: 68045)

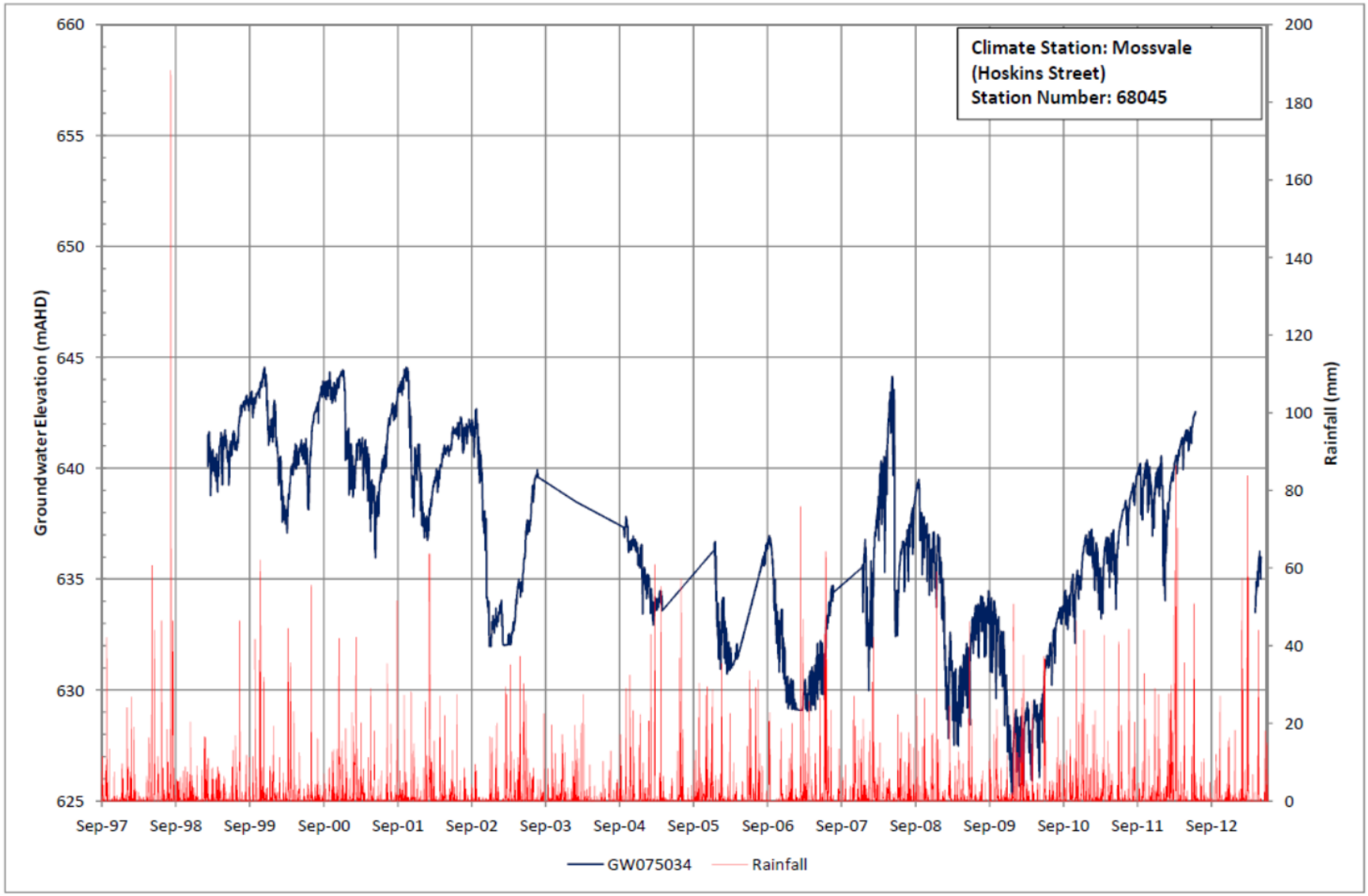


Figure G 7-6 Groundwater Elevation at GW075034 and Rainfall at Moss Vale (Station No.: 68045)

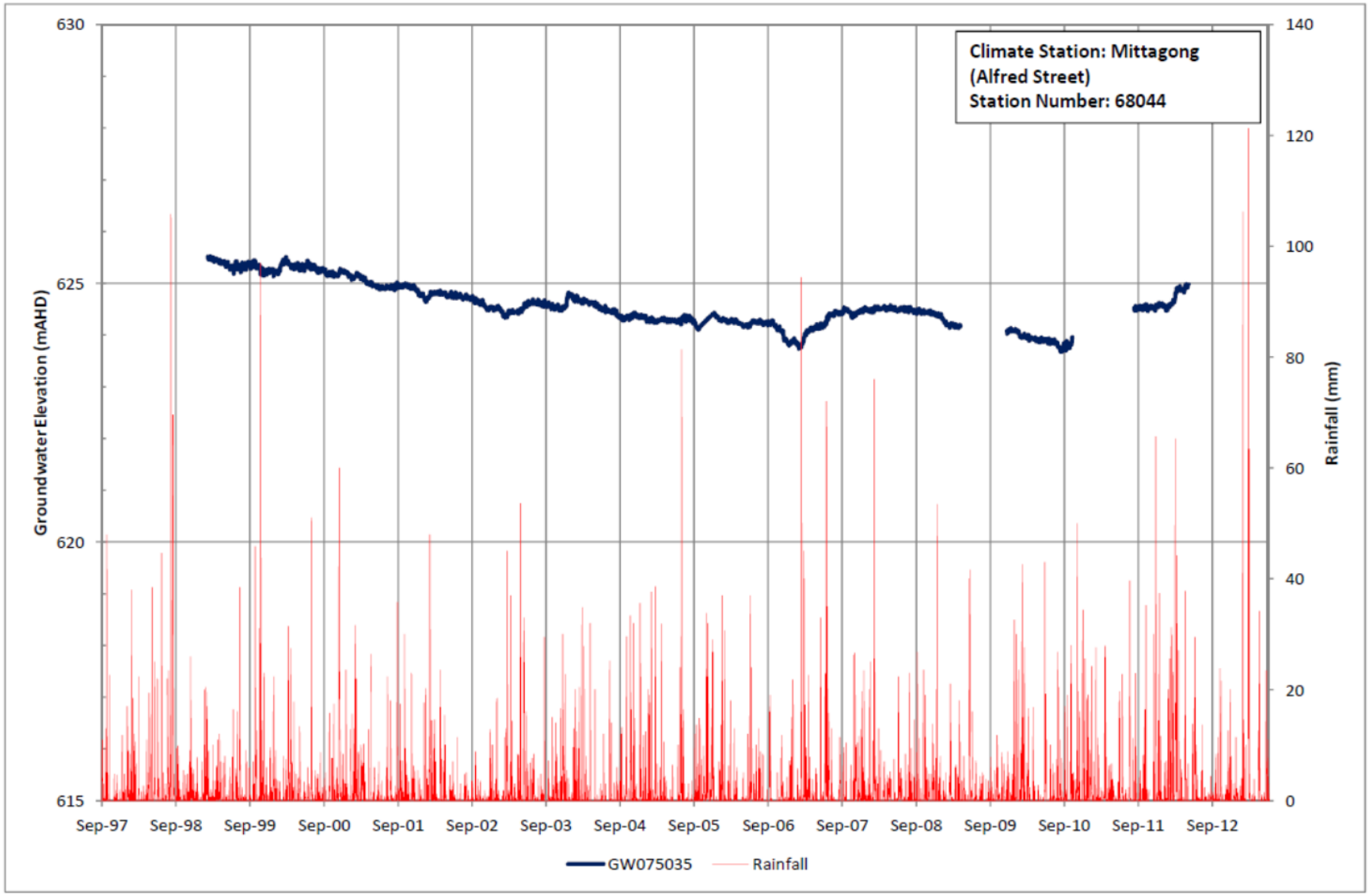


Figure G 7-7 Groundwater Elevation at GW075035 and Rainfall at Mittagong (Station No.: 68044)

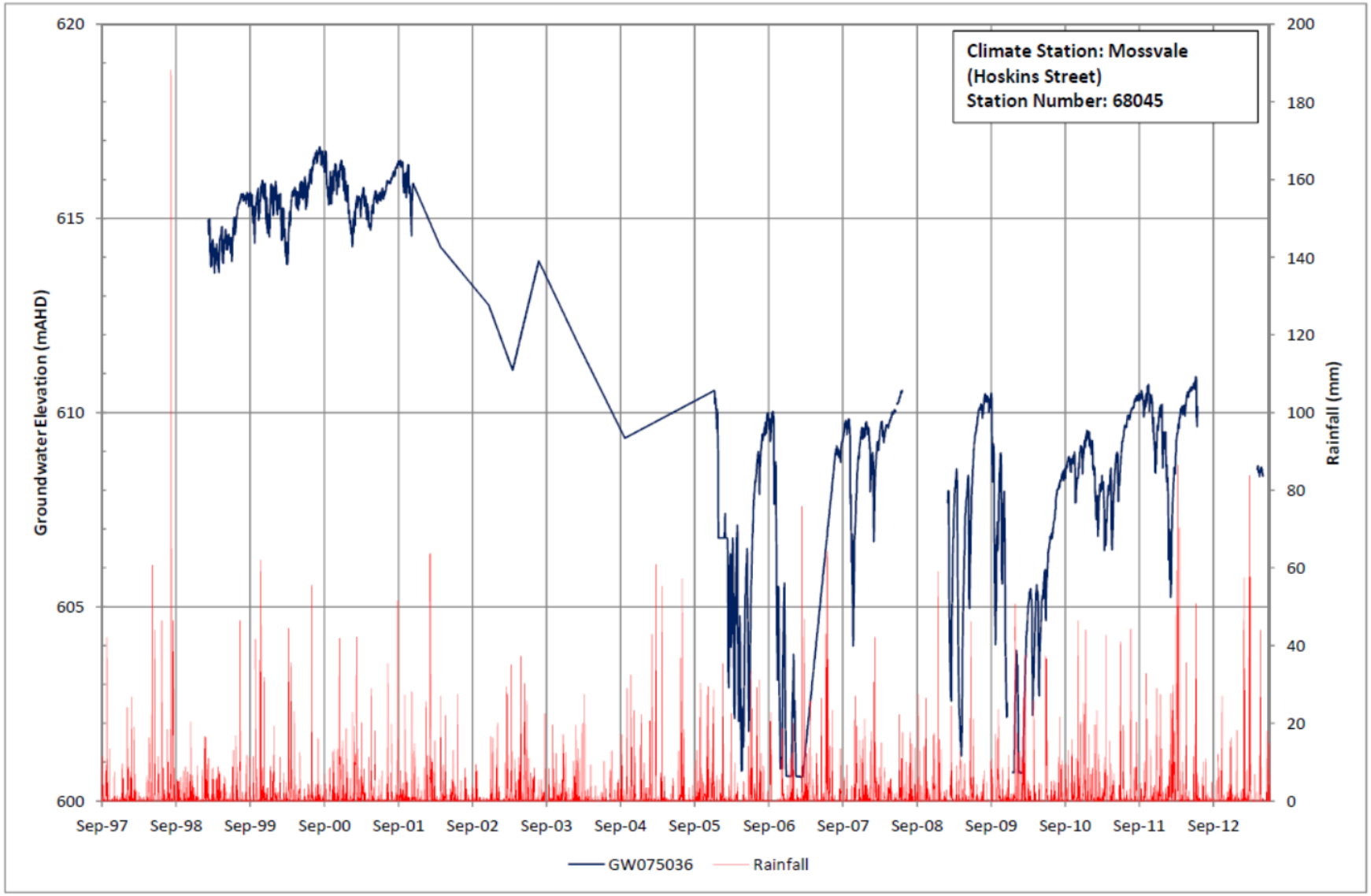


Figure G 7-8 Groundwater Elevation at GW075036 and Rainfall at Moss Vale (Station No.: 68045)

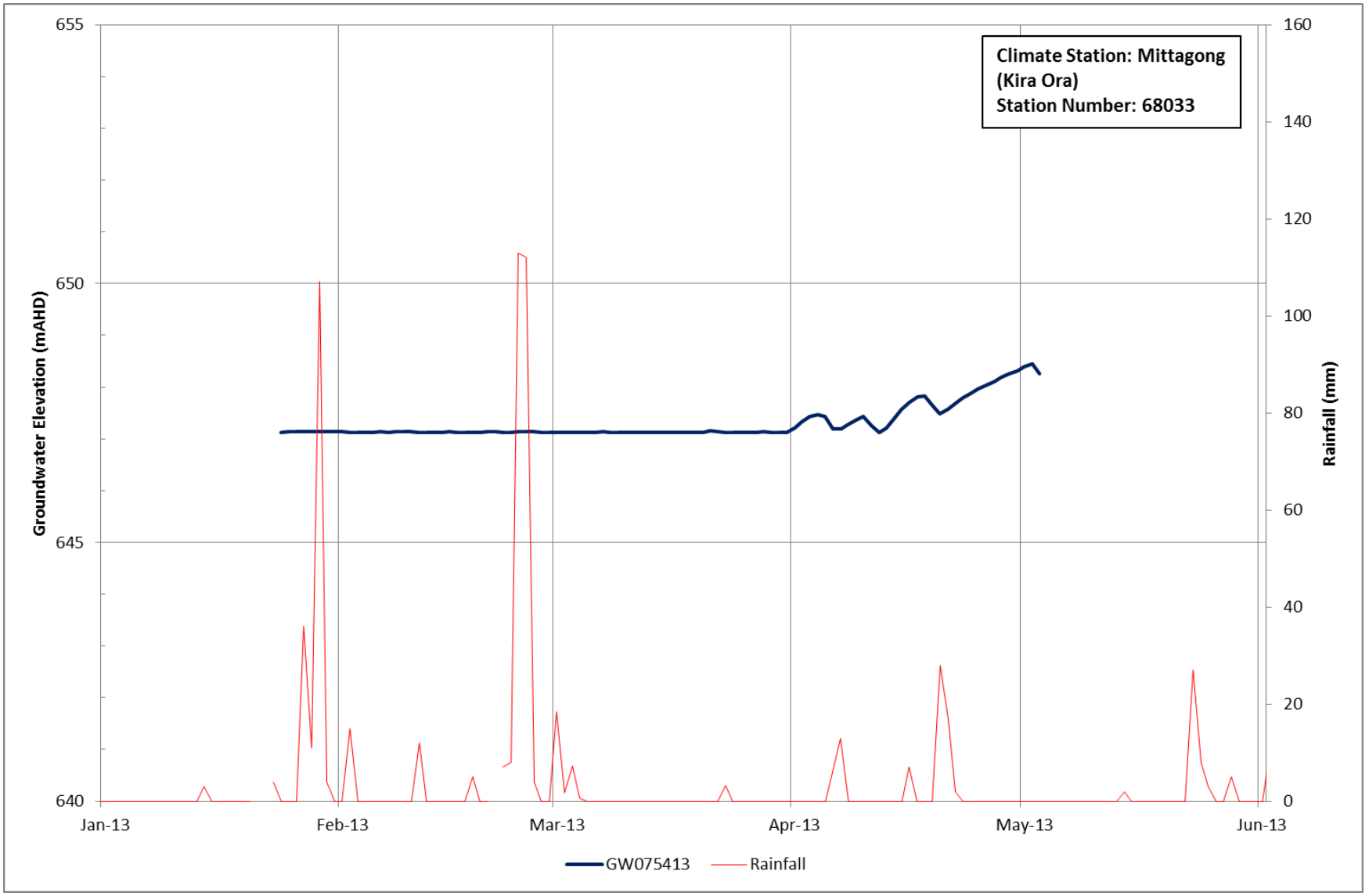


Figure G 7-9 Groundwater Elevation at GW075413 and Rainfall at Mittagong (Station No.: 68033)

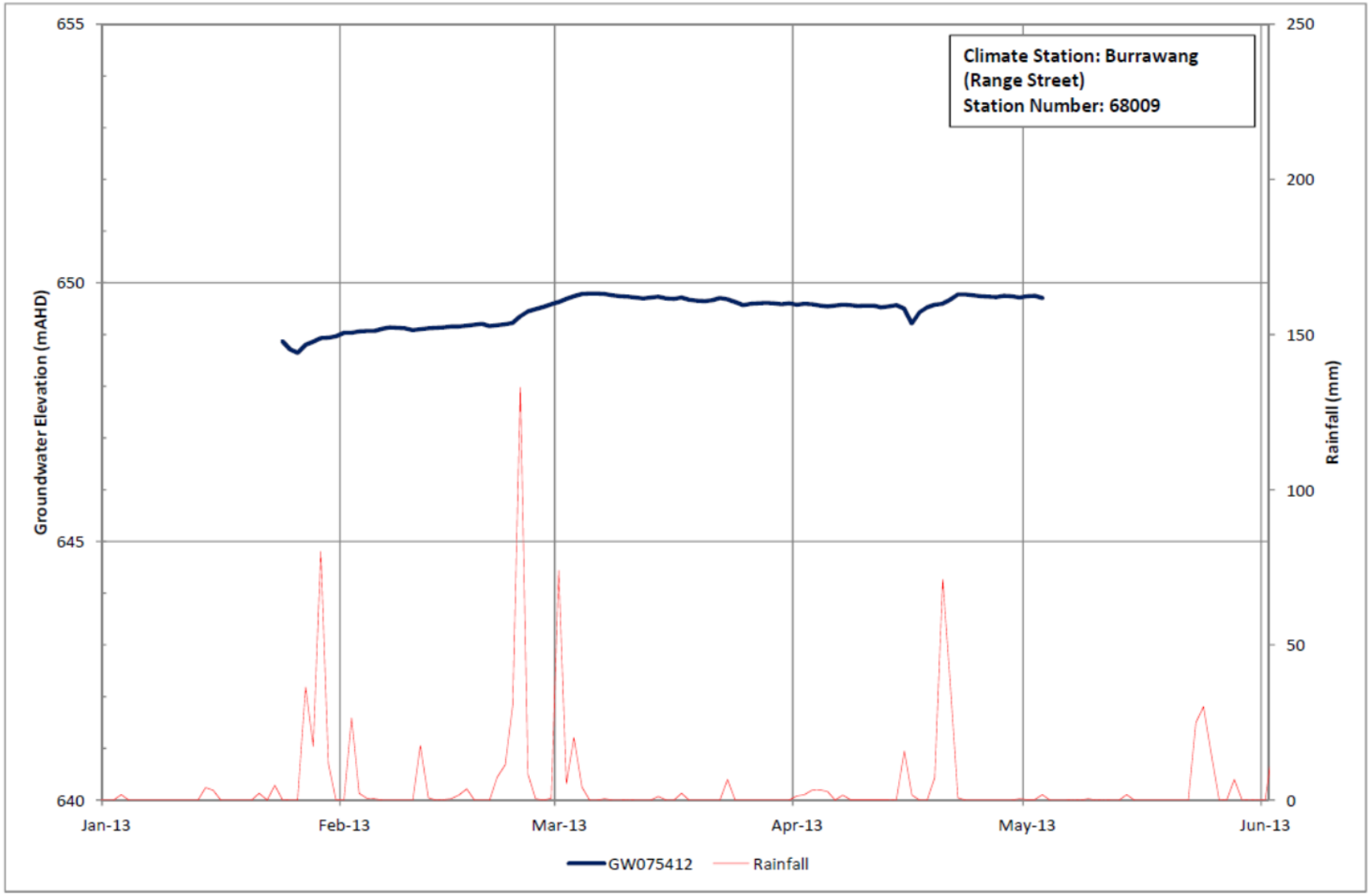


Figure G 7-10 Groundwater Elevation at GW075412 and Rainfall at Burrawang (Station No.: 68009)

7.3 Groundwater Hartt Outputs

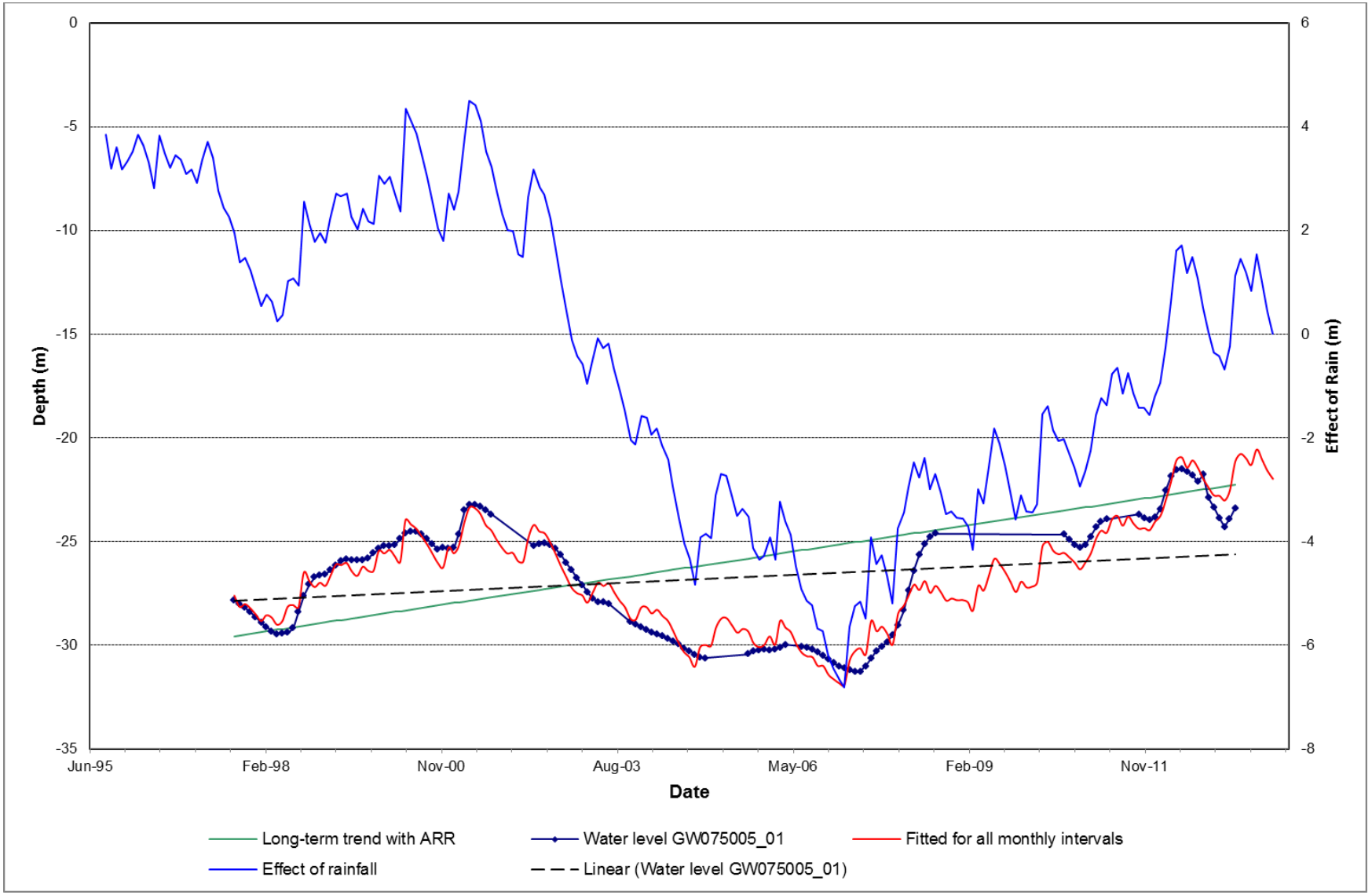


Figure G 7-11 Water levels with accumulative monthly residual rainfall for GW075005_01 (2 months delay)

Figure G 7-12 Water levels with accumulative monthly residual rainfall for GW075006_01 (2 months delay)

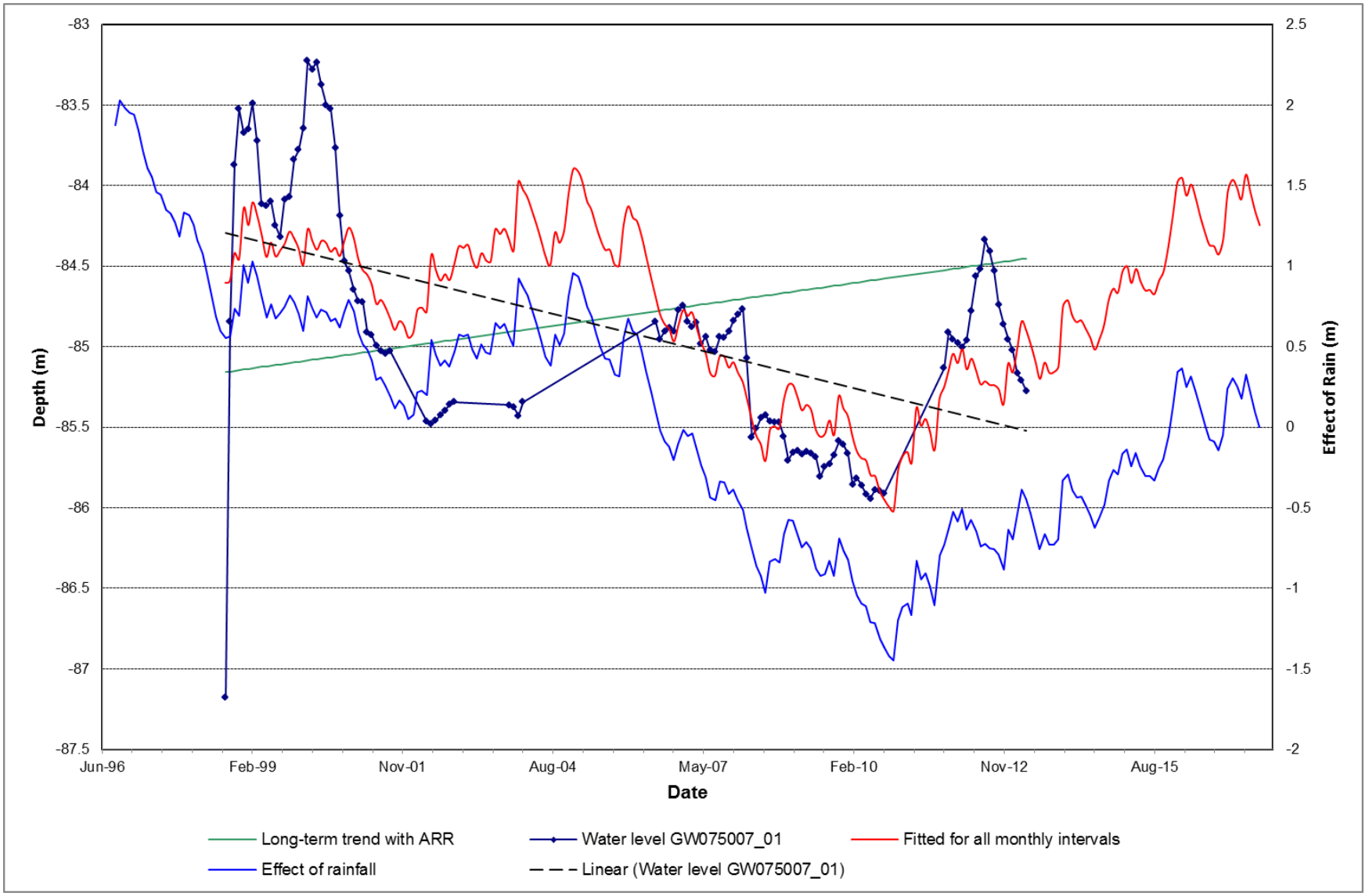


Figure G 7-13 Water levels with accumulative annual residual rainfall for GW075007_01 (46 months delay)

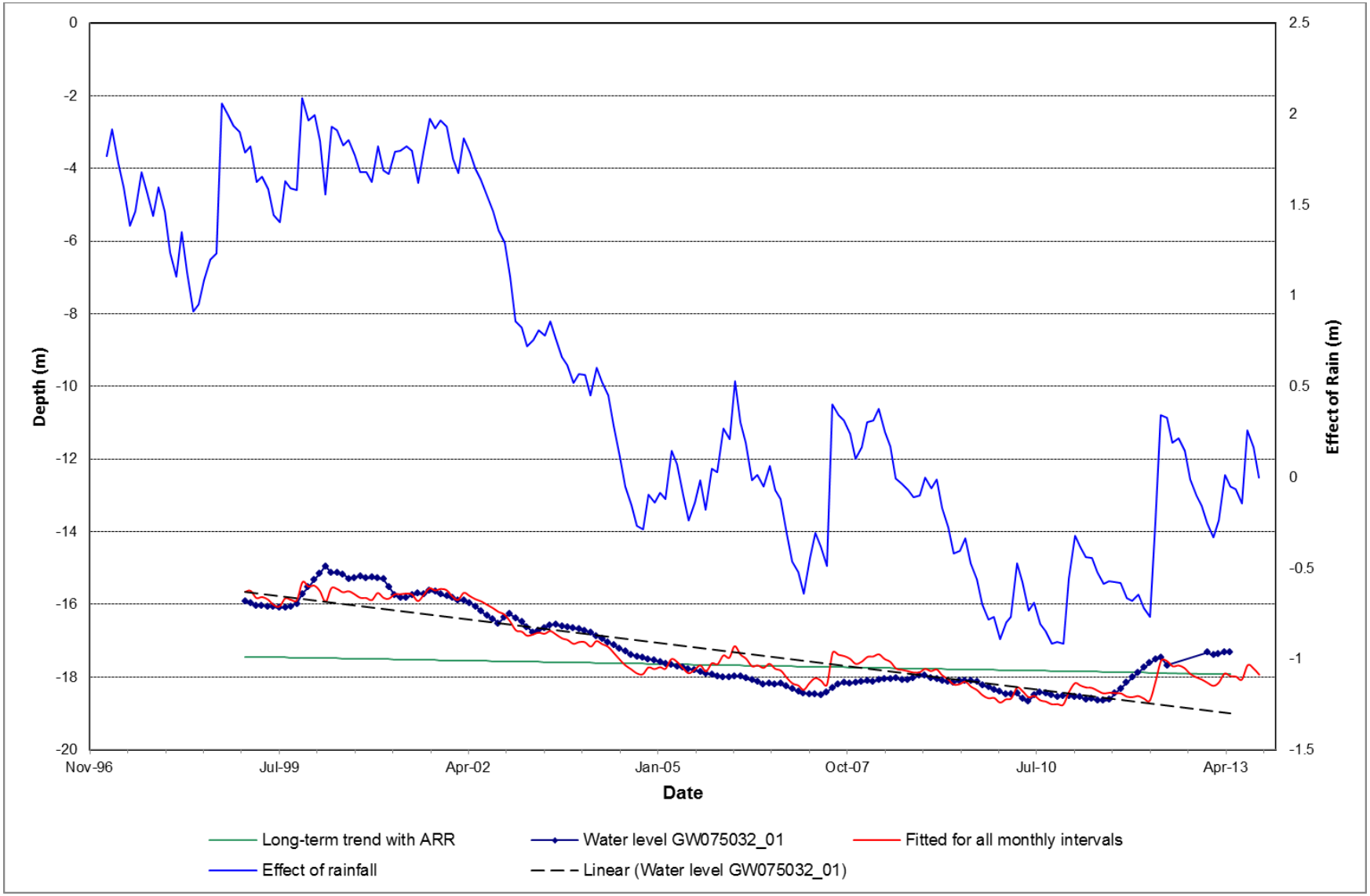


Figure G 7-14 Water levels with accumulative monthly residual rainfall for GW075032_01 (2 months delay)

Figure G 7-15 Water levels with accumulative annual residual rainfall for GW075033_01 (2 months delay)

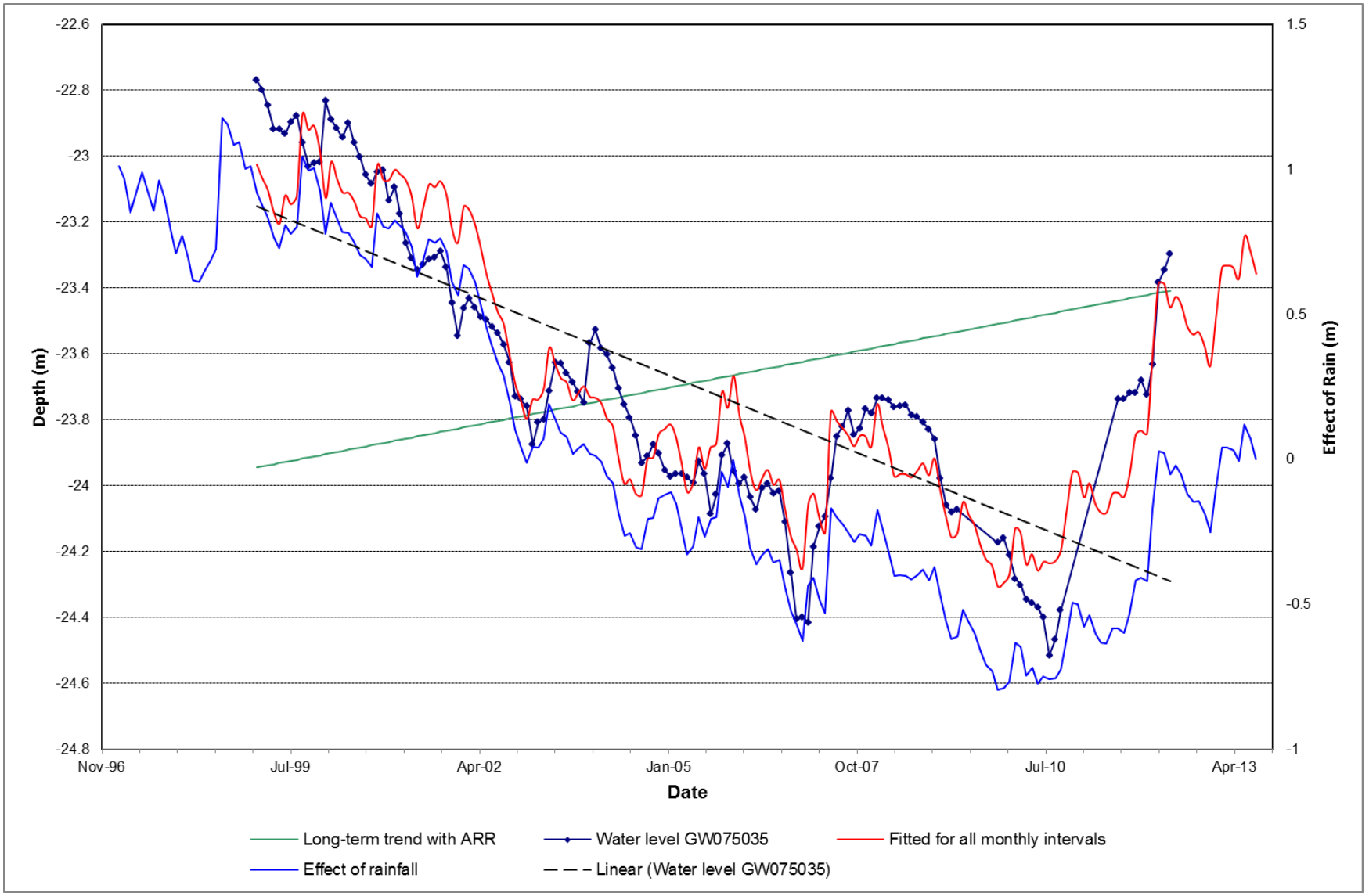


Figure G 7-16 Water levels with accumulative monthly residual rainfall for GW075035 (0 months delay)

7.4 Accumulative Annual Residual Rainfall

Figure G 7-17 Accumulative Annual Residual Rainfall: GW075005_01

Figure G 7-18 Accumulative Annual Residual Rainfall: GW075006_01

Figure G 7-19 Accumulative Annual Residual Rainfall: GW075007_01

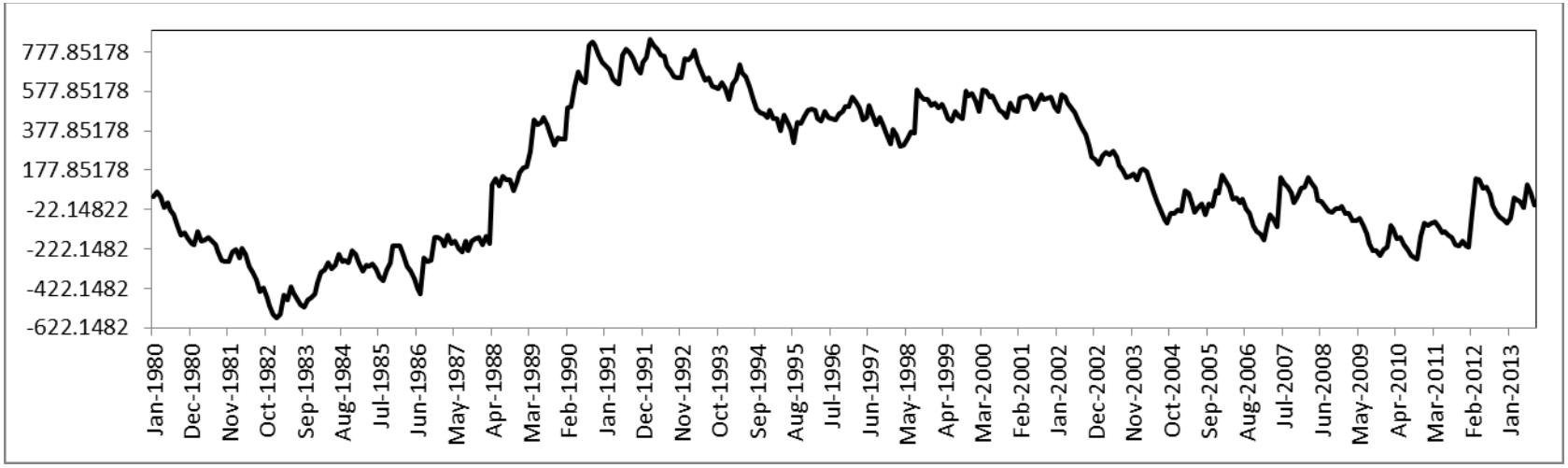


Figure G 7-20 Accumulative Annual Residual Rainfall: GW075032_01

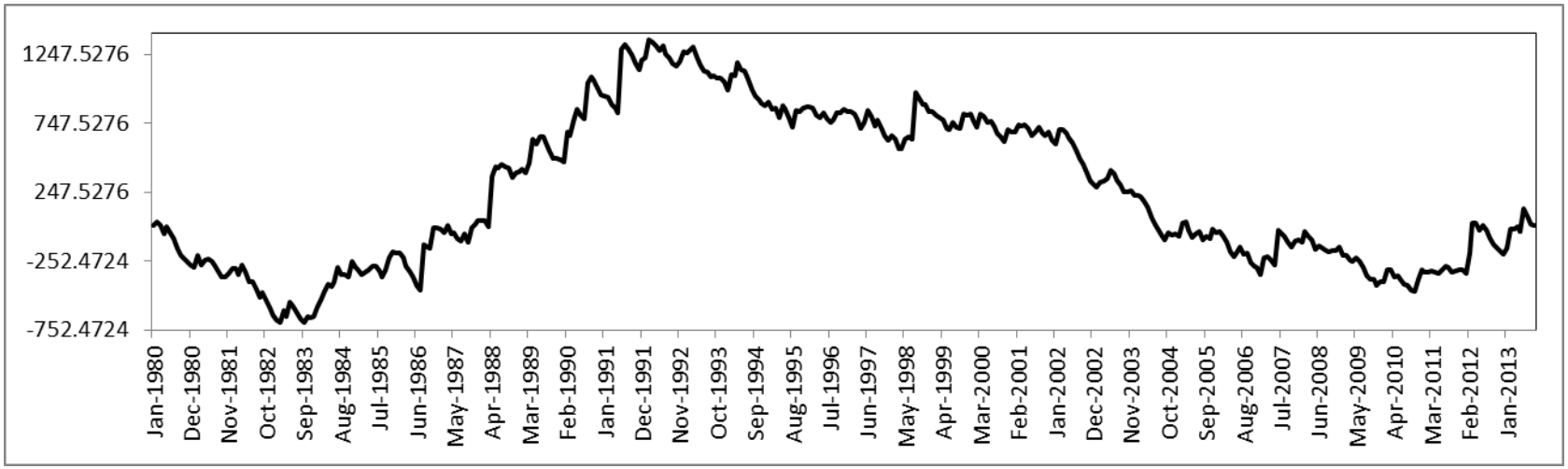


Figure G 7-21 Accumulative Annual Residual Rainfall: GW075033

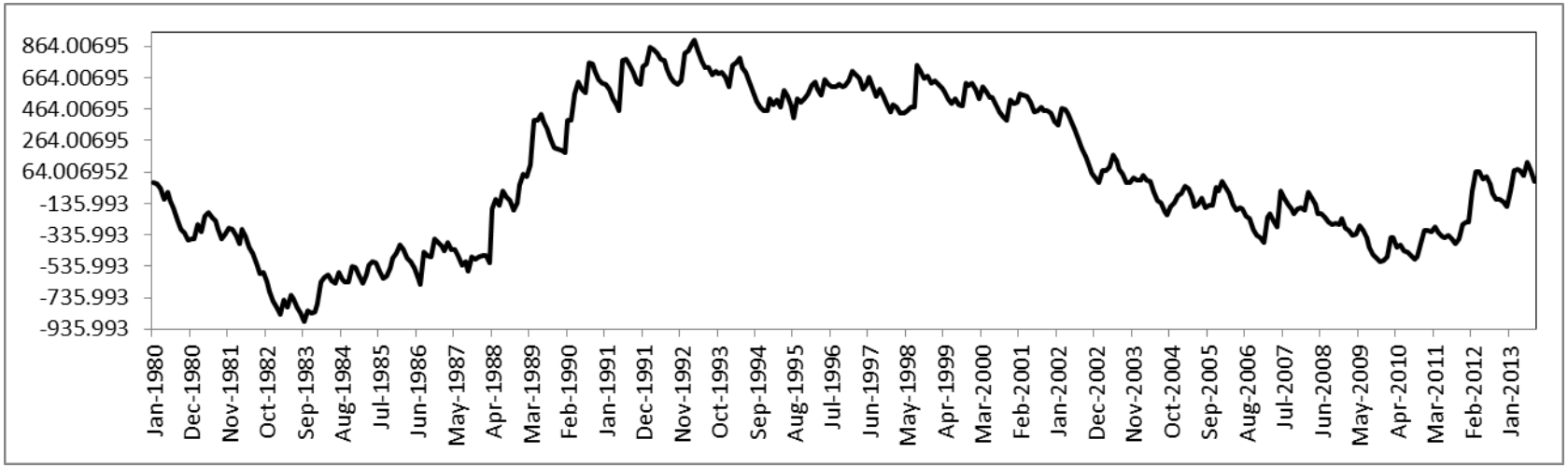


Figure G 7-22 Accumulative Annual Residual Rainfall: GW075035

8. Appendix H: River Water Quality

8.1 Guidelines

The current state of the water quality was assessed against the guideline values for ecosystem health, based on the Australian and New Zealand Environmental Conservation Council (ANZECC) Guidelines for Fresh and Marine Water Quality (ANZECC 2000). These guidelines are shown in Table H 8-1.

Table H 8-1 ANZECC Guideline Levels Used in Water Quality Assessment

Analyte	Upland Rivers	Lakes & Reservoirs
Total Nitrogen (mg/L)	0.250	0.350
Total Phosphorus (mg/L)	0.020	0.010
Conductivity (mS/cm)	0.350	0.350 [a]
Chlorophyll a (µg/L)	NA [b]	5.0
Dissolved Oxygen Saturation (%)	90 - 110	90 - 110
Filterable Reactive Phosphorus (mg/L)	0.015	0.005
Oxidised Nitrogen (mg/L)	0.015	0.010
pH	6.5 - 7.5	6.5 - 8.0
Total Aluminium (mg/L)	0.055 [c]	0.055 [c]
Total Iron (mg/L)	na	na
Ammonia (mg/L) [d]	0.013	0.010
Turbidity (NTU) [d]	2 - 25	1 - 20

NA = None Available

[a] Colour coding in the Lakes and Reservoir conductivity table has been based on the ANZECC conductivity guideline level for upland rivers, as the value provided in the ANZECC Guidelines for freshwater lakes and reservoirs (20-30 µS/cm equivalent to 0.02 - 0.03 mS/cm) is for Tasmanian lakes (ANZECC 2000).

The Auditor considers the colour coding used in the following conductivity tables serves as a useful representation of localised conductivity levels in these freshwater lake and reservoir systems and it enables a direct comparison with conductivity levels in the rivers that flow into these lakes and reservoirs.

[b] Colour coding in the chlorophyll a table has been based on ANZECC Guideline levels for chlorophyll a in freshwater lakes and reservoirs and lowland rivers (ANZECC trigger level = 5 µg/L). The ANZECC guidelines do not provide a chlorophyll a trigger level for upland rivers because they recommend monitoring of periphyton rather than phytoplankton. The Auditor notes the ANZECC recommendation regarding chlorophyll a levels in upland rivers, but considers the colour coding used in the chlorophyll a tables to still be informative, enabling a direct comparison with chlorophyll a levels in the freshwater lake and reservoir systems into which these rivers flow.

[c] Value is for protection of 95% of species in waters of pH>6.5 (see Table 3.4.1 ANZECC 2000).

[d] Turbidity and Ammonia data were analysed but the results not tabulated

The twelve water quality indicators assessed during the Audit were:

- Algal indicators – chlorophyll a (µg/L);
- Physico-chemical indicators – turbidity (NTU), pH, conductivity (mS/cm) and dissolved oxygen (%);
- Nutrient indicators – ammonia (mg/L); oxidised nitrogen, NOx (mg/L); total nitrogen, TN (mg/L); soluble, reactive phosphorus, SRP (µg/L); and total phosphorus, TP (mg/L); and
- Metal indicators – total aluminium (mg/L) and total iron (mg/L).

Ratings were applied to each indicator, with colour coding, based on the following categories:

Ratings	Descriptor
'Extremely Poor'	when all samples exceeded the ANZECC Guideline value for a parameter (i.e. the minimum value was greater than the ANZECC Guideline value);
Very poor	when more than 75% of samples exceeded the ANZECC Guideline value for a parameter;
Poor	when more than 50% of samples exceeded the ANZECC Guideline value for a parameter;
Fair	when more than 20% of samples exceeded the ANZECC Guideline value for a parameter
Good	when less than 20% of samples exceeded the ANZECC Guideline value for a parameter
Very good	when all samples were below the ANZECC Guideline value for a parameter (i.e. the maximum value was less than the ANZECC Guideline value)

8.2 Water quality parameters at catchment sites

8.2.1 Algal indicators

Table H 8-2 Chlorophyll-a (µg/L) - Catchment Sites

Site	Site name	Sub-catchment	Period						
			Historic	1995–1998	1998–2001	2001–2004	2004–2007	2007–2010	2010–2013
E046	Farmers Creek d/s Lithgow STP	Lower Coxs	NA	NA	NA	NA	NA	NA	3.2 (N=59)
E083	Coxs River @ Kelpie Point	Mid Coxs	0.9 (N=3)	0.4 (N=11)	0.3 (N=74)	0.5 (N=45)	0.9 (N=54)	0.9 (N=41)	2.0 (N=36)
E110	Hollander River	Kowmung	NA	NA	NA	0.4 (N=38)	NA	NA	NA
E120	Tuglow River	Kowmung	NA	NA	NA	2.4 (N=37)	NA	NA	NA
E130	Kowmung River	Kowmung	NA	1.3 (N=13)	0.2 (N=65)	0.7 (N=46)	0.6 (N=53)	0.7 (N=43)	1.1 (N=36)
E157	Kedumba River @ Maxwell's Crossing	Lower Coxs	0.5 (N=4)	1.1 (N=14)	0.5 (N=64)	0.7 (N=48)	0.8 (N=51)	0.4 (N=46)	0.5 (N=36)
E203	Gibbergunyah Creek @ Mittagong STP	Nattai	NA	NA	NA	2.0 (N=35)	2.2 (N=38)	3.1 (N=40)	3.1 (N=36)
E206	Nattai River @ The Crags	Nattai	NA	7.5 (N=12)	2.2 (N=48)	1.4 (N=51)	1.8 (N=54)	1.9 (N=41)	2.3 (N=36)
E210	Nattai River @ Smallwoods Crossing	Nattai	0.4 (N=1)	2.1 (N=6)	1.3 (N=48)	2.2 (N=31)	2.5 (N=28)	2.4 (N=38)	2.3 (N=36)
E243	Little River @ Fireroad W4I	Little	NA	0.3 (N=10)	0.1 (N=46)	0.7 (N=38)	0.7 (N=36)	0.6 (N=40)	0.5 (N=36)
E303	Wingecarribee River @ Sheepwash Bridge	Wingecarribee	4.1 (N=7)	NA	15.8 (N=2)	7.8 (N=17)	8.5 (N=16)	NA	NA
E332	Wingecarribee River @ Berrima	Wingecarribee	29.4 (N=50)	9.3 (N=4)	14.7 (N=50)	12.9 (N=57)	19.1 (N=52)	15.8 (N=41)	28.4 (N=36)
E409	Wollondilly River @ Murrays Flat	Wollondilly	152.5 (N=1)	8.3 (N=10)	4.8 (N=54)	6.9 (N=45)	7.6 (N=48)	4.5 (N=46)	7.0 (N=36)
E450	Wollondilly River @ Golden Valley	Wollondilly	3.0 (N=1)	1.8 (N=8)	1.5 (N=58)	2.2 (N=32)	5.9 (N=45)	3.3 (N=40)	2.8 (N=36)
E457	Mulwaree River @ Towers Weir	Mulwaree	NA	16.1 (N=6)	7.9 (N=22)	5.1 (N=10)	12.6 (N=12)	10.5 (N=14)	8.3 (N=36)
E488	Wollondilly River @ Jooriland	Wollondilly	NA	1.5 (N=7)	0.9 (N=69)	2.9 (N=64)	8.2 (N=72)	7.6 (N=43)	5.2 (N=36)
E531	Werriberri Creek @ Werombi	Werriberri	1.0 (N=1)	2.4 (N=13)	0.9 (N=61)	1.7 (N=43)	2.2 (N=47)	2.7 (N=47)	1.9 (N=36)
E550	Tonalli River @ Fire Road W1B	Lake Burragorang	NA	NA	NA	NA	NA	NA	NA
E551	Tonalli River @ Fire Road W2	Lake Burragorang	NA	NA	NA	NA	NA	NA	0.6 (N=26)
E552	Tonalli River @ Cemetery	Lake Burragorang	NA	NA	NA	NA	NA	NA	NA
E601	Nepean River @ Inflow to Lake Nepean	Upper Nepean	NA	4.3 (N=5)	0.5 (N=53)	0.6 (N=17)	NA	0.4 (N=14)	1.1 (N=36)
E602	Burke River @ Inflow to Lake Nepean	Upper Nepean	NA	0.3 (N=6)	0.1 (N=56)	0.3 (N=59)	0.4 (N=52)	0.3 (N=45)	0.4 (N=36)
E604	Flying Fox No.3 Creek at Upper Avon	Upper Nepean	NA	NA	NA	NA	NA	NA	0.4 (N=80)

Site	Site name	Sub-catchment	Period						
			Historic	1995–1998	1998–2001	2001–2004	2004–2007	2007–2010	2010–2013
E608	Avon River at Summit Tank	Upper Nepean	NA	NA	NA	NA	NA	NA	0.4 (N=154)
E609	Cordeaux River Crossing at Cordeaux No.1	Upper Nepean	NA	NA	NA	NA	NA	NA	0.4 (N=40)
E610	Goondarin Creek at Vent Shaft	Upper Nepean	NA	NA	NA	NA	NA	NA	0.3 (N=76)
E677	Woronora River Inflow	Woronora	NA	NA	NA	2.4 (N=1)	0.9 (N=8)	0.1 (N=45)	0.1 (N=43)
E678	Waratah Rivulet	Woronora	NA	NA	NA	0.4 (N=54)	NA	NA	NA
E680	Cataract River Corrimal No. 1	Upper Nepean	NA	NA	NA	NA	NA	NA	2.1 (N=78)
E697	Nepean River @ McGuire's Crossing	Upper Nepean	NA	NA	NA	2.8 (N=42)	5.8 (N=40)	1.9 (N=45)	2.5 (N=36)
E6006	Sandy Creek at Fire Road 6C	Upper Nepean	NA	NA	NA	NA	NA	NA	0.6 (N=26)
E6131	Waratah River at Flatrock Crossing	Woronora	NA	NA	NA	NA	NA	NA	0.3 (N=40)
E706	Kangaroo River @ Hampden Bridge	Kangaroo River	0.2 (N=1)	2.0 (N=15)	0.5 (N=66)	1.4 (N=75)	2.2 (N=86)	1.6 (N=41)	2.5 (N=80)
E809	Jembaicumbene Creek @ Bendoura	Upper Shoalhaven	NA	2.3 (N=10)	0.6 (N=51)	2.2 (N=9)	NA	NA	NA
E822	Mongarlowe River @ Mongarlowe	Mongarlowe	NA	0.3 (N=8)	0.3 (N=35)	0.7 (N=51)	0.9 (N=48)	1.1 (N=41)	NA
E847	Shoalhaven River @ Fossickers Flat	Bungonia	NA	0.5 (N=15)	0.7 (N=62)	1.6 (N=41)	3.7 (N=22)	2.7 (N=43)	2.1 (N=41)
E851	Shoalhaven River @ D/S Tallowa Dam		NA	1.0 (N=10)	1.6 (N=36)	2.0 (N=43)	2.8 (N=39)	3.3 (N=45)	NA
E860	Shoalhaven River @ Mount View	Braidwood Creek	NA	0.5 (N=10)	0.7 (N=62)	1.3 (N=51)	2.2 (N=59)	1.7 (N=39)	1.7 (N=42)
E861	Shoalhaven River @ Hillview	Mid Shoalhaven	NA	1.7 (N=16)	1.0 (N=49)	2.2 (N=58)	3.0 (N=55)	3.5 (N=41)	3.8 (N=39)
E889	Reedy Creek @ Manar	Reedy Creek	NA	0.5 (N=9)	0.5 (N=54)	1.0 (N=7)	NA	NA	NA
E890	Boro Creek @ Marlowe	Boro Creek	NA	1.4 (N=10)	1.3 (N=46)	1.0 (N=44)	2.4 (N=20)	3.0 (N=39)	4.0 (N=43)
E891	Gillamatong Creek @ Braidwood	Braidwood Creek	NA	0.9 (N=7)	0.9 (N=39)	1.6 (N=47)	1.9 (N=41)	2.6 (N=40)	NA
GO515	Woronora River @ The Needles	Woronora D/S Dam	NA	0.6 (N=15)	0.6 (N=43)	0.7 (N=49)	1.1 (N=54)	1.0 (N=50)	NA
E8311	Corang River	Mid Shoalhaven	NA	0.4 (N=11)	0.5 (N=43)	0.6 (N=44)	1.1 (N=19)	0.8 (N=41)	NA
E8361	Nerrimunga Creek @ Minshull Trig	Nerrimunga River	NA	3.4 (N=4)	2.0 (N=20)	4.9 (N=5)	NA	NA	NA

NA = Not available

8.2.2 Physico-chemical Indicators

Table H 8-3 Turbidity (NTU) - Catchment Sites

Site	Site name	Sub-catchment	Period						
			Historic	1995–1998	1998–2001	2001–2004	2004–2007	2007–2010	2010–2013
E046	Farmers Creek d/s Lithgow STP	Lower Cox	NA	NA	NA	NA	NA	NA	4.7 (N=56)
E083	Coxs River @ Kelpie Point	Mid Coxs	NA	NA	NA	NA	NA	NA	3.6 (N=36)
E110	Hollander River	Kowmung	NA	NA	NA	NA	NA	NA	NA
E120	Tuglow River	Kowmung	NA	NA	NA	NA	NA	NA	NA
E130	Kowmung River	Kowmung	NA	NA	NA	NA	NA	NA	3.1 (N=33)
E157	Kedumba River @ Maxwell's Crossing	Lower Coxs	NA	NA	NA	NA	NA	NA	2.4 (N=33)
E203	Gibbergunyah Creek @ Mittagong STP	Nattai	NA	NA	NA	NA	NA	NA	4.4 (N=33)
E206	Nattai River @ The Crags	Nattai	NA	NA	NA	NA	NA	NA	1.8 (N=34)
E210	Nattai River @ Smallwoods Crossing	Nattai	NA	NA	NA	NA	NA	NA	7.0 (N=33)
E243	Little River @ Fireroad W4I	Little	NA	NA	NA	NA	NA	NA	1.8 (N=33)
E303	Wingecarribee River @ Sheepwash Bridge	Wingecarribee	NA	NA	NA	NA	NA	NA	NA
E332	Wingecarribee River @ Berrima	Wingecarribee	NA	NA	NA	NA	NA	NA	13.1 (N=34)
E409	Wollondilly River @ Murrays Flat	Wollondilly	NA	NA	NA	NA	NA	NA	3.0 (N=34)
E450	Wollondilly River @ Golden Valley	Wollondilly	NA	NA	NA	NA	NA	NA	2.4 (N=34)
E457	Mulwaree River @ Towers Weir	Mulwaree	NA	NA	NA	NA	NA	NA	3.3 (N=34)
E488	Wollondilly River @ Jooriland	Wollondilly	NA	NA	NA	NA	NA	NA	10.1 (N=34)
E531	Werriberri Creek @ Werombi	Werriberri	NA	NA	NA	NA	NA	NA	4.4 (N=34)
E550	Tonalli River @ Fire Road W1B	Lake Burragorang	NA	NA	NA	NA	NA	NA	15.4 (N=44)
E551	Tonalli River @ Fire Road W2	Lake Burragorang	NA	NA	NA	NA	NA	NA	2.2 (N=127)
E552	Tonalli River @ Cemetery	Lake Burragorang	NA	NA	NA	NA	NA	NA	15.4 (N=44)
E601	Nepean River @ Inflow to Lake Nepean	Upper Nepean	NA	NA	NA	NA	NA	NA	2.6 (N=36)
E602	Burke River @ Inflow to Lake Nepean	Upper Nepean	NA	NA	NA	NA	NA	NA	1.5 (N=36)
E604	Flying Fox No.3 Creek at Upper Avon	Upper Nepean	NA	NA	NA	NA	NA	NA	0.5 (N=74)
E608	Avon River at Summit Tank	Upper Nepean	NA	NA	NA	NA	NA	NA	0.5 (N=175)
E609	Cordeaux River Crossing at Cordeaux No.1	Upper Nepean	NA	NA	NA	NA	NA	NA	1.8 (N=37)
E610	Goondarin Creek at Vent Shaft	Upper Nepean	NA	NA	NA	NA	NA	NA	0.5 (N=81)

Site	Site name	Sub-catchment	Period						
			Historic	1995–1998	1998–2001	2001–2004	2004–2007	2007–2010	2010–2013
E677	Woronora River Inflow	Woronora	NA	NA	NA	NA	NA	NA	1.0 (N=62)
E678	Waratah Rivulet	Woronora	NA	NA	NA	NA	NA	NA	NA
E680	Cataract River Corrimal No. 1	Upper Nepean	NA	NA	NA	NA	NA	NA	0.5 (N=74)
E697	Nepean River @ McGuires Crossing	Upper Nepean	NA	NA	NA	NA	NA	NA	4.4 (N=36)
E6006	Sandy Creek at Fire Road 6C	Upper Nepean	NA	NA	NA	NA	NA	NA	2.2 (N=127)
E6131	Waratah River at Flatrock Crossing	Woronora	NA	NA	NA	NA	NA	NA	2.0 (N=36)
E706	Kangaroo River @ Hampden Bridge	Kangaroo River	NA	NA	NA	NA	NA	NA	4.5 (N=97)
E809	Jembaicumbene Creek @ Bendoura	Upper Shoalhaven	NA	NA	NA	NA	NA	NA	NA
E822	Mongarlowe River @ Mongarlowe	Mongarlowe	NA	NA	NA	NA	NA	NA	NA
E847	Shoalhaven River @ Fossickers Flat	Bungonia	NA	NA	NA	NA	NA	NA	3.2 (N=43)
E851	Shoalhaven River @ D/S Tallowa Dam		NA	NA	NA	NA	NA	NA	NA
E860	Shoalhaven River @ Mount View	Braidwood Creek	NA	NA	NA	NA	NA	NA	4.6 (N=64)
E861	Shoalhaven River @ Hillview	Mid Shoalhaven	NA	NA	NA	NA	NA	NA	4.7 (N=52)
E889	Reedy Creek @ Manar	Reedy Creek	NA	NA	NA	NA	NA	NA	NA
E890	Boro Creek @ Marlowe	Boro Creek	NA	NA	NA	NA	NA	NA	5.5 (N=41)
E891	Gillamatong Creek @ Braidwood	Braidwood Creek	NA	NA	NA	NA	NA	NA	NA
GO515	Woronora River @ The Needles	Woronora D/S Dam	NA	NA	NA	NA	NA	NA	NA
E8311	Corang River	Mid Shoalhaven	NA	NA	NA	NA	NA	NA	NA
E8361	Nerrimunga Creek @ Minshull Trig	Nerrimunga River	NA	NA	NA	NA	NA	NA	NA

NA = not available

Table H 8-4 pH - Catchment Sites

Site	Site name	Sub-catchment	Period						
			Historic	1995–1998	1998–2001	2001–2004	2004–2007	2007–2010	2010–2013
E046	Farmers Creek d/s Lithgow STP	Lower Cox	NA	NA	NA	NA	NA	NA	7.4 (N=56)
E083	Coxs River @ Kelpie Point	Mid Coxs	7.9 (N=84)	7.5 (N=27)	7.6 (N=40)	7.5 (N=42)	7.5 (N=64)	7.4 (N=38)	7.5 (N=36)
E110	Hollander River	Kowmung	NA	NA	NA	7.4 (N=37)	NA	NA	NA
E120	Tuglow River	Kowmung	NA	NA	NA	7.3 (N=36)	NA	NA	NA
E130	Kowmung River	Kowmung	8.0 (N=76)	7.6 (N=27)	7.5 (N=39)	7.3 (N=39)	7.2 (N=41)	7.3 (N=43)	7.4 (N=36)
E157	Kedumba River @ Maxwell's Crossing	Lower Coxs	7.0 (N=82)	7.0 (N=26)	7.2 (N=39)	7.0 (N=41)	6.8 (N=40)	6.9 (N=42)	7.2 (N=36)
E203	Gibbergunyah Creek @ Mittagong STP	Nattai	NA	NA	7.2 (N=1)	7.2 (N=32)	7.1 (N=39)	7.2 (N=59)	7.5 (N=36)
E206	Nattai River @ The Crags	Nattai	7.6 (N=83)	7.5 (N=26)	7.7 (N=35)	7.3 (N=41)	7.3 (N=48)	7.6 (N=37)	7.7 (N=36)
E210	Nattai River @ Smallwoods Crossing	Nattai	7.6 (N=277)	7.3 (N=23)	7.4 (N=37)	7.2 (N=30)	7.2 (N=28)	7.2 (N=36)	7.2 (N=36)
E243	Little River @ Fireroad W4I	Little	7.0 (N=67)	7.2 (N=26)	6.9 (N=37)	6.7 (N=39)	6.7 (N=36)	6.7 (N=36)	6.8 (N=36)
E303	Wingecarribee River @ Sheepwash Bridge	Wingecarribee	7.5 (N=18)	NA	NA	6.9 (N=17)	6.9 (N=16)	NA	NA
E332	Wingecarribee River @ Berrima	Wingecarribee	8.3 (N=125)	7.3 (N=23)	7.3 (N=34)	7.2 (N=49)	7.0 (N=49)	7.2 (N=40)	7.5 (N=36)
E409	Wollondilly River @ Murrays Flat	Wollondilly	7.8 (N=92)	7.6 (N=26)	7.6 (N=35)	7.9 (N=39)	7.5 (N=39)	7.4 (N=39)	7.5 (N=36)
E450	Wollondilly River @ Golden Valley	Wollondilly	7.8 (N=88)	8.0 (N=25)	7.9 (N=35)	8.2 (N=25)	7.4 (N=39)	7.4 (N=38)	7.9 (N=36)
E457	Mulwaree River @ Towers Weir	Mulwaree	8.3 (N=88)	7.8 (N=20)	7.9 (N=11)	8.0 (N=4)	8.0 (N=10)	8.3 (N=13)	7.8 (N=36)
E488	Wollondilly River @ Jooriland	Wollondilly	8.3 (N=84)	8.2 (N=24)	8.0 (N=39)	7.7 (N=51)	7.4 (N=85)	7.6 (N=47)	7.8 (N=36)
E531	Werriberri Creek @ Werombi	Werriberri	7.6 (N=204)	7.1 (N=25)	7.0 (N=38)	6.8 (N=139)	6.6 (N=88)	6.7 (N=42)	7.1 (N=36)
E550	Tonalli River @ Fire Road W1B	Lake Burragorang	NA	NA	NA	NA	NA	NA	6.8 (N=45)
E551	Tonalli River @ Fire Road W2	Lake Burragorang	NA	NA	NA	NA	NA	NA	7.0 (N=129)
E552	Tonalli River @ Cemetery	Lake Burragorang	NA	NA	NA	NA	NA	NA	6.8 (N=45)
E601	Nepean River @ Inflow to Lake Nepean	Upper Nepean	7.2 (N=104)	7.3 (N=27)	7.1 (N=35)	7.2 (N=8)	NA	7.2 (N=10)	7.4 (N=36)
E602	Burke River @ Inflow to Lake Nepean	Upper Nepean	6.7 (N=122)	7.1 (N=26)	6.9 (N=35)	6.7 (N=39)	6.8 (N=40)	6.2 (N=130)	6.7 (N=36)
E604	Flying Fox No.3 Creek at Upper Avon	Upper Nepean	NA	NA	NA	NA	NA	NA	7.1 (N=74)
E608	Avon River at Summit Tank	Upper Nepean	NA	NA	NA	NA	NA	NA	7.0 (N=153)
E609	Cordeaux River Crossing at Cordeaux No.1	Upper Nepean	NA	NA	NA	NA	NA	NA	7.0 (N=37)
E610	Goondarin Creek at Vent Shaft	Upper Nepean	NA	NA	NA	NA	NA	NA	7.0 (N=81)
E677	Woronora River Inflow	Woronora	6.1 (N=51)	NA	NA	NA	6.5 (N=7)	5.8 (N=96)	6.0 (N=63)

Site	Site name	Sub-catchment	Period						
			Historic	1995–1998	1998–2001	2001–2004	2004–2007	2007–2010	2010–2013
E678	Waratah Rivulet	Woronora	7.0 (N=52)	NA	NA	7.2 (N=50)	6.6 (N=3)	NA	NA
E680	Cataract River Corrimal No. 1	Upper Nepean	NA	NA	NA	NA	NA	NA	7.1 (N=74)
E697	Nepean River @ McGuires Crossing	Upper Nepean	7.1 (N=35)	NA	NA	7.1 (N=33)	7.0 (N=40)	7.1 (N=41)	7.3 (N=36)
E6006	Sandy Creek at Fire Road 6C	Upper Nepean	NA	NA	NA	NA	NA	NA	7.0 (N=129)
E6131	Waratah River at Flatrock Crossing	Woronora	NA	NA	NA	NA	NA	NA	7.3 (N=36)
E706	Kangaroo River @ Hampden Bridge	Kangaroo River	7.3 (N=177)	7.4 (N=26)	7.3 (N=34)	7.1 (N=51)	7.0 (N=57)	6.8 (N=101)	7.2 (N=97)
E809	Jembaicumbene Creek @ Bendoura	Upper Shoalhaven	7.4 (N=9)	7.3 (N=24)	7.1 (N=34)	7.1 (N=3)	NA	NA	NA
E822	Mongarlowe River @ Mongarlowe	Mongarlowe	7.1 (N=35)	7.3 (N=26)	7.1 (N=34)	7.0 (N=40)	6.8 (N=41)	6.6 (N=91)	NA
E847	Shoalhaven River @ Fossickers Flat	Bungonia	7.6 (N=113)	7.4 (N=25)	7.5 (N=33)	7.4 (N=29)	7.1 (N=15)	7.0 (N=92)	7.5 (N=43)
E851	Shoalhaven River @ D/S Tallowa Dam		7.4 (N=41)	7.2 (N=25)	7.2 (N=33)	7.0 (N=39)	7.1 (N=38)	7.1 (N=41)	NA
E860	Shoalhaven River @ Mount View	Braidwood Creek	7.6 (N=15)	7.5 (N=26)	7.5 (N=35)	7.8 (N=40)	7.6 (N=71)	6.9 (N=115)	7.5 (N=64)
E861	Shoalhaven River @ Hillview	Mid Shoalhaven	7.5 (N=38)	7.7 (N=26)	7.4 (N=35)	7.7 (N=40)	7.6 (N=55)	7.2 (N=63)	7.5 (N=52)
E889	Reedy Creek @ Manar	Reedy Creek	6.9 (N=14)	7.5 (N=26)	7.2 (N=34)	7.1 (N=3)	NA	NA	NA
E890	Boro Creek @ Marlowe	Boro Creek	6.9 (N=15)	7.0 (N=26)	6.8 (N=34)	6.5 (N=39)	6.4 (N=20)	6.3 (N=35)	6.5 (N=41)
E891	Gillamatong Creek @ Braidwood	Braidwood Creek	7.2 (N=15)	7.4 (N=25)	7.3 (N=34)	7.3 (N=39)	7.2 (N=36)	7.4 (N=80)	NA
GO515	Woronora River @ The Needles	Woronora D/S Dam	NA	7.4 (N=18)	7.1 (N=34)	6.9 (N=41)	6.8 (N=53)	6.6 (N=60)	NA
E8311	Corang River	Mid Shoalhaven	7.0 (N=6)	7.3 (N=26)	6.7 (N=34)	6.7 (N=35)	6.2 (N=19)	6.3 (N=34)	NA
E8361	Nerrimunga Creek @ Minshull Trig	Nerrimunga River	7.8 (N=8)	7.3 (N=20)	7.2 (N=16)	7.1 (N=3)			NA

NA = not available

Table H 8-5 Conductivity (mS/cm) - Catchment Sites

Site	Site name	Sub-catchment	Period						
			Historic	1995–1998	1998–2001	2001–2004	2004–2007	2007–2010	2010–2013
E046	Farmers Creek d/s Lithgow STP	Lower Cox	NA	NA	NA	NA	NA	NA	0.210 (N=56)
E083	Coxs River @ Kelpie Point	Mid Coxs River	0.180 (N=80)	0.117 (N=134)	0.136 (N=246)	0.103 (N=201)	0.116 (N=277)	0.141 (N=66)	0.163 (N=36)
E110	Hollander River	Kowmung	NA	NA	NA	0.101 (N=37)	NA	NA	NA
E120	Tuglow River	Kowmung	NA	NA	NA	0.132 (N=36)	NA	NA	NA
E130	Kowmung River	Kowmung	0.092 (N=92)	0.073 (N=152)	0.066 (N=208)	0.078 (N=207)	0.078 (N=248)	0.072 (N=90)	0.077 (N=36)
E157	Kedumba River @ Maxwell's Crossing	Lower Coxs	0.100 (N=89)	0.073 (N=136)	0.067 (N=148)	0.063 (N=150)	0.065 (N=170)	0.075 (N=123)	0.084 (N=36)
E203	Gibbergunyah Creek @ Mittagong STP	Nattai	NA	NA	NA	0.474 (N=34)	0.484 (N=51)	0.363 (N=99)	0.390 (N=36)
E206	Nattai River @ The Crags	Nattai	0.246 (N=84)	0.220 (N=131)	0.185 (N=102)	0.356 (N=112)	0.244 (N=192)	0.354 (N=58)	0.333 (N=36)
E210	Nattai River @ Smallwoods Crossing	Nattai	0.234 (N=80)	0.183 (N=77)	0.187 (N=89)	0.273 (N=66)	0.306 (N=27)	0.303 (N=35)	0.289 (N=36)
E243	Little River @ Fireroad W4I	Little	0.142 (N=57)	0.086 (N=57)	0.078 (N=79)	0.146 (N=72)	0.136 (N=36)	0.136 (N=38)	0.134 (N=36)
E303	Wingecarribee River @ Sheepwash Bridge	Wingecarribee	NA	NA	NA	0.092 (N=16)	0.103 (N=16)	NA	NA
E332	Wingecarribee River @ Berrima	Wingecarribee	0.194 (N=72)	0.104 (N=78)	0.125 (N=99)	0.167 (N=138)	0.119 (N=97)	0.127 (N=50)	0.201 (N=36)
E409	Wollondilly River @ Murrays Flat	Wollondilly	0.677 (N=110)	0.476 (N=217)	0.405 (N=300)	0.963 (N=68)	0.431 (N=170)	0.693 (N=88)	0.728 (N=36)
E450	Wollondilly River @ Golden Valley	Wollondilly	0.431 (N=104)	0.353 (N=267)	0.442 (N=324)	0.452 (N=132)	0.577 (N=137)	0.300 (N=37)	0.499 (N=36)
E457	Mulwaree River @ Towers Weir	Mulwaree	0.747 (N=78)	0.300 (N=73)	0.553 (N=78)	0.598 (N=86)	0.353 (N=61)	0.778 (N=15)	0.871 (N=36)
E488	Wollondilly River @ Jooriland	Wollondilly	0.365 (N=89)	0.345 (N=145)	0.329 (N=199)	0.341 (N=363)	0.172 (N=288)	0.194 (N=87)	0.360 (N=36)
E531	Werriberri Creek @ Werombi	Werriberri	0.410 (N=99)	0.300 (N=209)	0.297 (N=216)	0.320 (N=379)	0.286 (N=401)	0.277 (N=124)	0.389 (N=36)
E550	Tonalli River @ Fire Road W1B	Lake Burragorang	NA	NA	NA	NA	NA	NA	0.110 (N=45)
E551	Tonalli River @ Fire Road W2	Lake Burragorang	NA	NA	NA	NA	NA	NA	0.240 (N=129)
E552	Tonalli River @ Cemetery	Lake Burragorang	NA	NA	NA	NA	NA	NA	0.108 (N=45)
E601	Nepean River @ Inflow to Lake Nepean	Upper Nepean	0.122 (N=3)	0.105 (N=203)	0.096 (N=187)	0.095 (N=124)	NA	0.105 (N=10)	0.107 (N=36)
E602	Burke River @ Inflow to Lake Nepean	Upper Nepean	0.069 (N=11)	0.057 (N=295)	0.064 (N=184)	0.070 (N=383)	0.075 (N=352)	0.073 (N=191)	0.077 (N=36)
E604	Flying Fox No.3 Creek at Upper Avon	Upper Nepean	NA	NA	NA	NA	NA	NA	0.139 (N=74)
E608	Avon River at Summit Tank	Upper Nepean	NA	NA	NA	NA	NA	NA	0.130 (N=175)
E609	Cordeaux River Crossing at Cordeaux No.1	Upper Nepean	NA	NA	NA	NA	NA	NA	0.139 (N=37)
E610	Goondarin Creek at Vent Shaft	Upper Nepean	NA	NA	NA	NA	NA	NA	0.094 (N=81)

Site	Site name	Sub-catchment	Period						
			Historic	1995–1998	1998–2001	2001–2004	2004–2007	2007–2010	2010–2013
E677	Woronora River Inflow	Woronora	NA	NA	NA	NA	0.219 (N=8)	0.143 (N=159)	0.180 (N=60)
E678	Waratah Rivulet	Woronora	NA	NA	NA	0.163 (N=54)	0.285 (N=3)	NA	NA
E680	Cataract River Corrimal No. 1	Upper Nepean	NA	NA	NA	NA	NA	NA	0.101 (N=74)
E697	Nepean River @ McGuires Crossing	Upper Nepean	NA	NA	NA	0.091 (N=33)	0.097 (N=40)	0.098 (N=41)	0.096 (N=36)
E6006	Sandy Creek at Fire Road 6C	Upper Nepean	NA	NA	NA	NA	NA	NA	0.243 (N=129)
E6131	Waratah River at Flatrock Crossing	Woronora	NA	NA	NA	NA	NA	NA	0.180 (N=36)
E706	Kangaroo River @ Hampden Bridge	Kangaroo River	0.081 (N=46)	0.075 (N=332)	0.088 (N=245)	0.075 (N=388)	0.082 (N=991)	0.082 (N=117)	0.097 (N=93)
E809	Jembaicumbene Creek @ Bendoura	Upper Shoalhaven	NA	0.109 (N=164)	0.073 (N=182)	0.096 (N=82)	NA	NA	NA
E822	Mongarlowe River @ Mongarlowe	Mongarlowe	0.058 (N=21)	0.051 (N=126)	0.041 (N=106)	0.046 (N=180)	0.049 (N=137)	0.050 (N=91)	NA
E847	Shoalhaven River @ Fossickers Flat	Bungonia	NA	0.134 (N=161)	0.098 (N=209)	0.087 (N=272)	0.104 (N=162)	0.111 (N=142)	0.104 (N=39)
E851	Shoalhaven River @ D/S Tallowa Dam		NA	NA	0.097 (N=12)	0.096 (N=39)	0.107 (N=38)	0.107 (N=40)	NA
E860	Shoalhaven River @ Mount View	Braidwood Creek	0.111 (N=1)	0.090 (N=225)	0.088 (N=354)	0.090 (N=199)	0.094 (N=394)	0.076 (N=153)	0.090 (N=61)
E861	Shoalhaven River @ Hillview	Mid Shoalhaven	0.106 (N=40)	0.115 (N=255)	0.103 (N=394)	0.094 (N=315)	0.104 (N=378)	0.096 (N=103)	0.113 (N=49)
E889	Reedy Creek @ Manar	Reedy Creek	NA	0.181 (N=184)	0.191 (N=216)	0.152 (N=55)	NA	NA	NA
E890	Boro Creek @ Marlowe	Boro Creek	NA	0.225 (N=162)	0.136 (N=138)	0.115 (N=89)	0.080 (N=20)	0.074 (N=37)	0.118 (N=38)
E891	Gillamatong Creek @ Braidwood	Braidwood Creek	NA	0.193 (N=31)	0.153 (N=67)	0.284 (N=121)	0.465 (N=155)	0.384 (N=79)	NA
GO515	Woronora River @ The Needles	Woronora D/S Dam	NA	0.182 (N=57)	0.105 (N=118)	0.150 (N=118)	0.140 (N=148)	0.143 (N=147)	NA
E8311	Corang River	Mid Shoalhaven	NA	0.065 (N=303)	0.046 (N=240)	0.052 (N=164)	0.050 (N=19)	0.054 (N=37)	NA
E8361	Nerrimunga Creek @ Minshull Trig	Nerrimunga River	NA	0.342 (N=215)	0.180 (N=77)	0.174 (N=17)	NA	NA	NA

NA = not available

Table H 8-6 Dissolved oxygen (% saturation) - Catchment Sites

Site	Site name	Sub-catchment	Period						
			Historic	1995–1998	1998–2001	2001–2004	2004–2007	2007–2010	2010–2013
E046	Farmers Creek d/s Lithgow STP	Lower Cox	NA	NA	NA	NA	NA	NA	94.1 (N=56)
E083	Coxs River @ Kelpie Point	Mid Coxs	96.9 (N=11)	92.3 (N=26)	98.6 (N=39)	96.2 (N=40)	94.0 (N=39)	95.6 (N=39)	98.9 (N=36)
E110	Hollander River	Kowmung	NA	NA	NA	82.0 (N=37)	NA	NA	NA
E120	Tuglow River	Kowmung	NA	NA	NA	81.3 (N=35)	NA	NA	NA
E130	Kowmung River	Kowmung	96.1 (N=11)	91.8 (N=25)	95.9 (N=39)	94.5 (N=37)	93.3 (N=40)	99.1 (N=44)	97.5 (N=36)
E157	Kedumba River @ Maxwell's Crossing	Lower Coxs	82.2 (N=11)	83.9 (N=26)	89.8 (N=39)	91.0 (N=39)	88.2 (N=40)	92.1 (N=42)	95.7 (N=36)
E203	Gibbergunyah Creek @ Mittagong STP	Nattai	NA	NA	NA	77.9 (N=31)	81.5 (N=39)	83.2 (N=59)	87.7 (N=36)
E206	Nattai River @ The Crags	Nattai	90.9 (N=9)	84.9 (N=26)	93.8 (N=35)	90.3 (N=41)	90.0 (N=41)	96.6 (N=40)	97.4 (N=36)
E210	Nattai River @ Smallwoods Crossing	Nattai	83.7 (N=11)	92.1 (N=23)	92.2 (N=36)	87.6 (N=28)	89.4 (N=28)	89.6 (N=36)	89.1 (N=36)
E243	Little River @ Fireroad W4I	Little	91.0 (N=9)	89.5 (N=26)	92.7 (N=37)	91.3 (N=37)	89.4 (N=36)	88.1 (N=38)	93.1 (N=36)
E303	Wingecarribee River @ Sheepwash Bridge	Wingecarribee	80.8 (N=17)	NA	NA	89.9 (N=17)	93.9 (N=21)	NA	NA
E332	Wingecarribee River @ Berrima	Wingecarribee	87.8 (N=47)	73.4 (N=23)	82.8 (N=33)	89.8 (N=49)	89.2 (N=49)	89.7 (N=40)	90.1 (N=36)
E409	Wollondilly River @ Murrays Flat	Wollondilly	81.8 (N=18)	69.2 (N=24)	81.0 (N=35)	92.3 (N=39)	82.7 (N=39)	71.8 (N=41)	83.5 (N=36)
E450	Wollondilly River @ Golden Valley	Wollondilly	88.5 (N=14)	89.9 (N=25)	98.0 (N=35)	101.9 (N=25)	89.6 (N=40)	89.7 (N=39)	92.3 (N=36)
E457	Mulwaree River @ Towers Weir	Mulwaree	93.9 (N=13)	88.7 (N=19)	78.0 (N=9)	94.3 (N=4)	101.7 (N=10)	80.0 (N=13)	82.7 (N=36)
E488	Wollondilly River @ Jooriland	Wollondilly	100.5 (N=11)	99.2 (N=23)	96.7 (N=38)	99.5 (N=50)	99.0 (N=56)	95.2 (N=46)	98.8 (N=36)
E531	Werriberri Creek @ Werombi	Werriberri	78.1 (N=9)	71.5 (N=25)	76.7 (N=37)	71.9 (N=35)	65.7 (N=37)	71.3 (N=42)	83.3 (N=36)
E550	Tonalli River @ Fire Road W1B	Lake Burragorang	NA	NA	NA	NA	NA	NA	96.8 (N=44)
E551	Tonalli River @ Fire Road W2	Lake Burragorang	NA	NA	NA	NA	NA	NA	92.2 (N=98)
E552	Tonalli River @ Cemetery	Lake Burragorang	NA	NA	NA	NA	NA	NA	96.8 (N=44)
E601	Nepean River @ Inflow to Lake Nepean	Upper Nepean	87.8 (N=10)	89.0 (N=27)	91.4 (N=35)	93.1 (N=8)	NA	97.9 (N=10)	103.3 (N=36)
E602	Burke River @ Inflow to Lake Nepean	Upper Nepean	90.0 (N=10)	88.5 (N=27)	92.5 (N=35)	91.4 (N=39)	89.5 (N=39)	97.7 (N=130)	103.7 (N=36)
E604	Flying Fox No.3 Creek at Upper Avon	Upper Nepean	NA	NA	NA	NA	NA	NA	99.0 (N=74)
E608	Avon River at Summit Tank	Upper Nepean	NA	NA	NA	NA	NA	NA	96.9 (N=153)
E609	Cordeaux River Crossing at Cordeaux No.1	Upper Nepean	NA	NA	NA	NA	NA	NA	98.3 (N=37)
E610	Goondarin Creek at Vent Shaft	Upper Nepean	NA	NA	NA	NA	NA	NA	98.5 (N=81)
E677	Woronora River Inflow	Woronora	NA	NA	NA	NA	89.7 (N=8)	99.3 (N=100)	100.1 (N=63)

Site	Site name	Sub-catchment	Period						
			Historic	1995–1998	1998–2001	2001–2004	2004–2007	2007–2010	2010–2013
E678	Waratah Rivulet	Woronora	NA	NA	NA	96.8 (N=50)	54.8 (N=3)	NA	NA
E680	Cataract River Corrimal No. 1	Upper Nepean	NA	NA	NA	NA	NA	NA	98.2 (N=74)
E697	Nepean River @ McGuires Crossing	Upper Nepean	87.7 (N=3)	NA	NA	92.5 (N=33)	91.6 (N=40)	90.6 (N=41)	99.4 (N=36)
E6006	Sandy Creek at Fire Road 6C	Upper Nepean	NA	NA	NA	NA	NA	NA	92.2 (N=98)
E6131	Waratah River at Flatrock Crossing	Woronora	NA	NA	NA	NA	NA	NA	99.0 (N=36)
E706	Kangaroo River @ Hampden Bridge	Kangaroo River	93.8 (N=4)	95.9 (N=26)	97.4 (N=31)	96.4 (N=51)	98.6 (N=39)	106.4 (N=101)	105.0 (N=96)
E809	Jembaicumbene Creek @ Bendoura	Upper Shoalhaven	75.3 (N=9)	73.6 (N=24)	85.8 (N=34)	82.0 (N=3)	NA	NA	NA
E822	Mongarlowe River @ Mongarlowe	Mongarlowe	82.5 (N=15)	83.9 (N=26)	88.7 (N=34)	91.0 (N=39)	87.4 (N=40)	97.3 (N=91)	NA
E847	Shoalhaven River @ Fossickers Flat	Bungonia	89.6 (N=4)	92.3 (N=25)	98.4 (N=32)	100.1 (N=29)	94.0 (N=15)	99.8 (N=92)	102.8 (N=43)
E851	Shoalhaven River @ D/S Tallowa Dam		88.4 (N=4)	92.2 (N=26)	97.0 (N=32)	98.9 (N=39)	98.6 (N=38)	99.0 (N=41)	NA
E860	Shoalhaven River @ Mount View	Braidwood Creek	89.5 (N=12)	84.2 (N=26)	91.1 (N=34)	93.9 (N=39)	96.4 (N=40)	98.9 (N=117)	100.3 (N=64)
E861	Shoalhaven River @ Hillview	Mid Shoalhaven	89.9 (N=15)	87.5 (N=26)	91.9 (N=34)	96.9 (N=39)	96.2 (N=36)	101.5 (N=65)	101.9 (N=52)
E889	Reedy Creek @ Manar	Reedy Creek	84.7 (N=14)	76.8 (N=26)	83.5 (N=34)	88.1 (N=3)	NA	NA	NA
E890	Boro Creek @ Marlowe	Boro Creek	72.8 (N=14)	66.8 (N=26)	72.7 (N=34)	74.7 (N=39)	66.8 (N=20)	58.5 (N=37)	64.8 (N=41)
E891	Gillamatong Creek @ Braidwood	Braidwood Creek	81.0 (N=14)	53.7 (N=25)	64.7 (N=34)	70.3 (N=38)	69.8 (N=36)	93.8 (N=80)	NA
GO515	Woronora River @ The Needles	Woronora DS Dam	NA	90.0 (N=19)	95.4 (N=31)	91.7 (N=40)	87.8 (N=36)	96.6 (N=62)	NA
E8311	Corang River	Mid Shoalhaven	81.7 (N=6)	83.3 (N=26)	88.8 (N=34)	89.5 (N=35)	83.6 (N=19)	90.9 (N=37)	NA
E8361	Nerrimunga Creek @ Minshull Trig	Nerrimunga River	87.6 (N=8)	74.6 (N=20)	74.7 (N=15)	86.9 (N=3)	NA	NA	NA

NA = not available

8.2.3 Nutrient Indicators

Table H 8-7 Ammonia (mg/L) - Catchment Sites

Site	Site name	Sub-catchment	Period						
			Historic	1995–1998	1998–2001	2001–2004	2004–2007	2007–2010	2010–2013
E046	Farmers Creek d/s Lithgow STP	Lower Cox	NA	NA	NA	NA	NA	NA	0.020 (N=59)
E083	Coxs River @ Kelpie Point	Mid Coxs	NA	NA	NA	NA	NA	NA	0.002 (N=36)
E110	Hollander River	Kowmung	NA	NA	NA	NA	NA	NA	NA
E120	Tuglow River	Kowmung	NA	NA	NA	NA	NA	NA	NA
E130	Kowmung River	Kowmung	NA	NA	NA	NA	NA	NA	0.002 (N=36)
E157	Kedumba River @ Maxwell's Crossing	Lower Coxs	NA	NA	NA	NA	NA	NA	0.002 (N=36)
E203	Gibbergunyah Creek @ Mittagong STP	Nattai	NA	NA	NA	NA	NA	NA	0.037 (N=36)
E206	Nattai River @ The Crags	Nattai	NA	NA	NA	NA	NA	NA	0.002 (N=36)
E210	Nattai River @ Smallwoods Crossing	Nattai	NA	NA	NA	NA	NA	NA	0.011 (N=36)
E243	Little River @ Fireroad W4I	Little	NA	NA	NA	NA	NA	NA	0.002 (N=36)
E303	Wingecarribee River @ Sheepwash Bridge	Wingecarribee	NA	NA	NA	NA	NA	NA	NA
E332	Wingecarribee River @ Berrima	Wingecarribee	NA	NA	NA	NA	NA	NA	0.011 (N=36)
E409	Wollondilly River @ Murrays Flat	Wollondilly	NA	NA	NA	NA	NA	NA	0.002 (N=35)
E450	Wollondilly River @ Golden Valley	Wollondilly	NA	NA	NA	NA	NA	NA	0.002 (N=35)
E457	Mulwaree River @ Towers Weir	Mulwaree	NA	NA	NA	NA	NA	NA	0.013 (N=35)
E488	Wollondilly River @ Jooriland	Wollondilly	NA	NA	NA	NA	NA	NA	0.002 (N=36)
E531	Werriberri Creek @ Werombi	Werriberri	NA	NA	NA	NA	NA	NA	0.007 (N=37)
E550	Tonalli River @ Fire Road W1B	Lake Burragorang	NA	NA	NA	NA	NA	NA	NA
E551	Tonalli River @Fire Road W2	Lake Burragorang	NA	NA	NA	NA	NA	NA	0.002 (N=26)
E552	Tonalli River @ Cemetery	Lake Burragorang	NA	NA	NA	NA	NA	NA	NA
E601	Nepean River @ Inflow to Lake Nepean	Upper Nepean	NA	NA	NA	NA	NA	NA	0.002 (N=36)
E602	Burke River @ Inflow to Lake Nepean	Upper Nepean	NA	NA	NA	NA	NA	NA	0.002 (N=36)
E604	Flying Fox No.3 Creek at Upper Avon	Upper Nepean	NA	NA	NA	NA	NA	NA	0.002 (N=77)
E608	Avon River at Summit Tank	Upper Nepean	NA	NA	NA	NA	NA	NA	0.002 (N=170)
E609	Cordeaux River Crossing at Cordeaux No.1	Upper Nepean	NA	NA	NA	NA	NA	NA	0.002 (N=40)
E610	Goondarin Creek at Vent Shaft	Upper Nepean	NA	NA	NA	NA	NA	NA	0.002 (N=76)

Site	Site name	Sub-catchment	Period						
			Historic	1995–1998	1998–2001	2001–2004	2004–2007	2007–2010	2010–2013
E677	Woronora River Inflow	Woronora	NA	NA	NA	NA	NA	NA	0.002 (N=43)
E678	Waratah Rivulet	Woronora	NA	NA	NA	NA	NA	NA	NA
E680	Cataract River Corrimal No. 1	Upper Nepean	NA	NA	NA	NA	NA	NA	0.008 (N=78)
E697	Nepean River @ McGuires Crossing	Upper Nepean	NA	NA	NA	NA	NA	NA	0.006 (N=36)
E6006	Sandy Creek at Fire Road 6C	Upper Nepean	NA	NA	NA	NA	NA	NA	0.002 (N=26)
E6131	Waratah River at Flatrock Crossing	Woronora	NA	NA	NA	NA	NA	NA	0.002 (N=40)
E706	Kangaroo River @ Hampden Bridge	Kangaroo River	NA	NA	NA	NA	NA	NA	0.016 (N=87)
E809	Jembaicumbene Creek @ Bendoura	Upper Shoalhaven	NA	NA	NA	NA	NA	NA	NA
E822	Mongarlowe River @ Mongarlowe	Mongarlowe	NA	NA	NA	NA	NA	NA	NA
E847	Shoalhaven River @ Fossickers Flat	Bungonia	NA	NA	NA	NA	NA	NA	0.002 (N=41)
E851	Shoalhaven River @ D/S Tallowa Dam		NA	NA	NA	NA	NA	NA	NA
E860	Shoalhaven River @ Mount View	Braidwood Creek	NA	NA	NA	NA	NA	NA	0.002 (N=42)
E861	Shoalhaven River @ Hillview	Mid Shoalhaven	NA	NA	NA	NA	NA	NA	0.002 (N=39)
E889	Reedy Creek @ Manar	Reedy Creek	NA	NA	NA	NA	NA	NA	NA
E890	Boro Creek @ Marlowe	Boro Creek	NA	NA	NA	NA	NA	NA	0.002 (N=43)
E891	Gillamatong Creek @ Braidwood	Braidwood Creek	NA	NA	NA	NA	NA	NA	NA
GO515	Woronora River @ The Needles	Woronora D/S Dam	NA	NA	NA	NA	NA	NA	NA

NA = not available

Table H 8-8 NOx (mg/L) - Catchment sites

Site	Site name	Sub-catchment	Period						
			Historic	1995–1998	1998–2001	2001–2004	2004–2007	2007–2010	2010-2013
E046	Farmers Creek d/s Lithgow STP	Lower Cox	NA	NA	NA	NA	NA	NA	1.11 (N=59)
E083	Coxs River @ Kelpie Point	Mid Coxs	0.005 (N=92)	0.020 (N=32)	0.010 (N=74)	0.010 (N=46)	0.018 (N=123)	0.010 (N=48)	0.012 (N=36)
E110	Hollander River	Kowmung	NA	NA	NA	0.020 (N=38)	NA	NA	NA
E120	Tuglow River	Kowmung	NA	NA	NA	0.020 (N=37)	NA	NA	NA
E130	Kowmung River	Kowmung	0.005 (N=96)	0.020 (N=35)	0.030 (N=65)	0.010 (N=47)	0.095 (N=101)	0.015 (N=51)	0.049 (N=36)
E157	Kedumba River @ Maxwell's Crossing	Lower Coxs	1.410 (N=108)	1.850 (N=35)	0.120 (N=64)	0.190 (N=52)	0.143 (N=97)	0.138 (N=77)	0.217 (N=36)
E203	Gibbergunyah Creek @ Mittagong STP	Nattai	NA	NA	NA	3.300 (N=36)	4.290 (N=42)	3.640 (N=39)	1.315 (N=36)
E206	Nattai River @ The Crags	Nattai	0.950 (N=247)	1.670 (N=17)	1.40 (N=49)	0.720 (N=52)	0.718 (N=92)	0.900 (N=43)	0.788 (N=36)
E210	Nattai River @ Smallwoods Crossing	Nattai	0.010 (N=333)	0.010 (N=29)	0.010 (N=48)	0.110 (N=57)	0.059 (N=28)	0.015 (N=37)	0.084 (N=36)
E243	Little River @ Fireroad W4I	Little River	0.005 (N=133)	0.005 (N=33)	0.005 (N=47)	0.050 (N=41)	0.020 (N=36)	0.005 (N=39)	0.005 (N=36)
E303	Wingecarribee River @ Sheepwash Bridge	Wingecarribee	0.270 (N=17)	NA	NA	0.100 (N=17)	0.065 (N=16)	NA	NA
E332	Wingecarribee River @ Berrima	Wingecarribee	0.075 (N=90)	0.500 (N=11)	0.410 (N=49)	0.300 (N=57)	0.170 (N=63)	0.104 (N=48)	0.106 (N=36)
E409	Wollondilly River @ Murrays Flat	Wollondilly	0.180 (N=423)	0.490 (N=17)	0.350 (N=55)	0.110 (N=45)	0.227 (N=120)	0.011 (N=74)	0.008 (N=35)
E450	Wollondilly River @ Golden Valley	Wollondilly	0.005 (N=304)	0.020 (N=15)	0.010 (N=59)	0.010 (N=33)	0.015 (N=57)	0.005 (N=38)	0.005 (N=35)
E457	Mulwaree River @ Towers Weir	Mulwaree	0.005 (N=264)	0.820 (N=9)	0.210 (N=22)	0.130 (N=10)	0.177 (N=39)	0.079 (N=16)	0.005 (N=35)
E488	Wollondilly River @ Jooriland	Wollondilly	0.005 (N=85)	0.170 (N=63)	0.020 (N=69)	0.015 (N=72)	0.178 (N=156)	0.018 (N=64)	0.008 (N=36)
E531	Werriberri Creek @ Werombi	Werriberri	0.130 (N=206)	0.040 (N=40)	0.070 (N=62)	0.075 (N=56)	0.145 (N=142)	0.081 (N=72)	0.062 (N=37)
E550	Tonalli River @ Fire Road W1B	Lake Burragorang	NA	NA	NA	NA	NA	NA	NA
E551	Tonalli River @Fire Road W2	Lake Burragorang	NA	NA	NA	NA	NA	NA	0.048 (N=26)
E552	Tonalli River @ Cemetery	Lake Burragorang	NA	NA	NA	NA	NA	NA	NA
E601	Nepean River @ Inflow to Lake Nepean	Upper Nepean	0.220 (N=97)	0.240 (N=16)	0.310 (N=55)	0.320 (N=18)	NA	0.144 (N=14)	0.308 (N=36)
E602	Burke River @ Inflow to Lake Nepean	Upper Nepean	0.010 (N=95)	0.010 (N=24)	0.010 (N=58)	0.010 (N=62)	0.010 (N=101)	0.005 (N=69)	0.004 (N=36)
E604	Flying Fox No.3 Creek at Upper Avon	Upper Nepean	NA	NA	NA	NA	NA	NA	0.138 (N=77)
E608	Avon River at Summit Tank	Upper Nepean	NA	NA	NA	NA	NA	NA	0.146 (N=170)
E609	Cordeaux River Crossing at Cordeaux No.1	Upper Nepean	NA	NA	NA	NA	NA	NA	0.087 (N=40)
E610	Goondarin Creek at Vent Shaft	Upper Nepean	NA	NA	NA	NA	NA	NA	0.003 (N=76)
E677	Woronora River Inflow	Woronora	0.005 (N=13)	NA	NA	0.005 (N=1)	0.005 (N=8)	0.005 (N=80)	0.002 (N=43)

Site	Site name	Sub-catchment	Period						
			Historic	1995–1998	1998–2001	2001–2004	2004–2007	2007–2010	2010-2013
E678	Waratah Rivulet	Woronora	0.010 (N=14)	NA	NA	0.030 (N=88)	0.010 (N=12)	NA	NA
E680	Cataract River Corrimal No. 1	Upper Nepean	NA	NA	NA	NA	NA	NA	0.019 (N=78)
E697	Nepean River @ McGuires Crossing	Upper Nepean	0.330 (N=29)	NA	NA	0.085 (N=42)	0.100 (N=40)	0.218 (N=42)	0.381 (N=36)
E6006	Sandy Creek at Fire Road 6C	Upper Nepean	NA	NA	NA	NA	NA	NA	0.048 (N=26)
E6131	Waratah River at Flatrock Crossing	Woronora	NA	NA	NA	NA	NA	NA	0.009 (N=40)
E706	Kangaroo River @ Hampden Bridge	Kangaroo River	0.120 (N=169)	0.140 (N=47)	0.100 (N=70)	0.110 (N=78)	0.140 (N=403)	0.135 (N=45)	0.167 (N=87)
E809	Jembaicumbene Creek @ Bendoura	Upper Shoalhaven	0.220 (N=27)	0.005 (N=31)	0.005 (N=51)	0.010 (N=9)	NA	NA	NA
E822	Mongarlowe River @ Mongarlowe	Mongarlowe	0.010 (N=46)	0.010 (N=27)	0.010 (N=45)	0.005 (N=51)	0.005 (N=48)	0.005 (N=41)	NA
E847	Shoalhaven River @ Fossickers Flat	Bungonia	0.020 (N=100)	0.010 (N=41)	0.010 (N=62)	0.010 (N=42)	0.130 (N=61)	0.016 (N=54)	0.022 (N=41)
E851	Shoalhaven River @ D/S Tallowa Dam		0.070 (N=23)	0.110 (N=27)	0.080 (N=36)	0.110 (N=43)	0.154 (N=38)	0.116 (N=44)	NA
E860	Shoalhaven River @ Mount View	Braidwood Creek	0.010 (N=26)	0.010 (N= 33)	0.005 (N=62)	0.005 (N=52)	0.005 (N=127)	0.005 (N=39)	0.005 (N=42)
E861	Shoalhaven River @ Hillview	Mid Shoalhaven	0.005 (N=25)	0.010 (N=43)	0.005 (N=57)	0.005 (N=58)	0.010 (N=138)	0.005 (N=49)	0.008 (N=39)
E889	Reedy Creek @ Manar	Reedy Creek	0.010 (N=23)	0.010 (N=36)	0.010 (N=54)	0.010 (N=7)	NA	NA	NA
E890	Boro Creek @ Marlowe	Boro Creek	0.010 (N=4)	0.010 (N=34)	0.008 (N=48)	0.005 (N=44)	0.005 (N=20)	0.005 (N=38)	0.007 (N=43)
E891	Gillamatong Creek @ Braidwood	Braidwood Creek	0.010 (N=27)	0.115 (N=40)	0.010 (N=43)	0.010 (N=47)	0.040 (N=63)	0.005 (N=40)	NA
GO515	Woronora River @ The Needles	Woronora DS Dam	NA	0.020 (N=26)	0.020 (N=44)	0.010 (N=49)	0.063 (N=91)	0.057 (N=120)	NA
E8311	Corang River	Mid Shoalhaven	0.005 (N=4)	0.005 (N=31)	0.005 (N=43)	0.005 (N=44)	0.005 (N=19)	0.005 (N=39)	NA
E8361	Nerrimunga Creek @ Minshull Trig	Nerrimunga River	0.008 (N=4)	0.010 (N=21)	0.005 (N=20)	0.010 (N=5)	NA	NA	NA

NA = not available

Table H 8-9 TN (mg/L) - Catchment sites

Site	Site name	Sub-catchment	Period						
			Historic	1995–1998	1998–2001	2001–2004	2004–2007	2007–2010	2010–2013
E046	Farmers Creek d/s Lithgow STP	Lower Cox	NA	NA	NA	NA	NA	NA	1.94 (N=59)
E083	Coxs River @ Kelpie Point	Mid Coxs River	0.170 (N=100)	0.180 (N=38)	0.225 (N=80)	0.155 (N=60)	0.400 (N=152)	0.280 (N=85)	0.200 (N=36)
E110	Hollander River	Kowmung	NA	NA	NA	0.135 (N=38)	NA	NA	NA
E120	Tuglow River	Kowmung	NA	NA	NA	0.300 (N=37)	NA	NA	NA
E130	Kowmung River	Kowmung	0.178 (N=106)	0.315 (N=72)	0.180 (N=68)	0.170 (N=53)	0.500 (N=120)	0.400 (N=172)	0.160 (N=36)
E157	Kedumba River @ Maxwell's Crossing	Lower Coxs	1.930 (N=118)	2.590 (N=47)	0.360 (N=72)	0.345 (N=58)	0.400 (N=107)	0.430 (N=150)	0.300 (N=36)
E203	Gibbergunyah Creek @ Mittagong STP	Nattai	NA	NA	NA	4.225 (N=38)	4.200 (N=51)	2.830 (N=98)	1.890 (N=36)
E206	Nattai River @ The Crags	Nattai	1.810 (N=261)	2.065 (N=48)	1.680 (N=62)	1.060 (N=53)	1.200 (N=102)	0.980 (N=99)	1.050 (N=36)
E210	Nattai River @ Smallwoods Crossing	Nattai	0.330 (N=251)	0.320 (N=35)	0.290 (N=52)	0.740 (N=88)	0.400 (N=28)	0.290 (N=37)	0.350 (N=36)
E243	Little River @ Fireroad W4I	Little	0.120 (N=144)	0.070 (N=37)	0.070 (N=48)	0.350 (N=73)	0.150 (N=36)	0.100 (N=39)	0.065 (N=36)
E303	Wingecarribee River @ Sheepwash Bridge	Wingecarribee	NA	NA	NA	0.480 (N=17)	0.440 (N=16)	NA	NA
E332	Wingecarribee River @ Berrima	Wingecarribee	0.850 (N=83)	1.165 (N=32)	1.040 (N=49)	0.840 (N=57)	0.700 (N=63)	0.520 (N=81)	0.725 (N=36)
E409	Wollondilly River @ Murrays Flat	Wollondilly	1.200 (N=435)	1.245 (N=60)	1.210 (N=56)	1.060 (N=45)	1.050 (N=122)	0.720 (N=159)	0.620 (N=35)
E450	Wollondilly River @ Golden Valley	Wollondilly	0.510 (N=319)	0.665 (N=56)	0.845 (N=94)	0.530 (N=33)	0.725 (N=60)	0.770 (N=77)	0.500 (N=35)
E457	Mulwaree River @ Towers Weir	Mulwaree	1.100 (N=278)	1.610 (N=31)	1.710 (N=23)	1.355 (N=10)	1.400 (N=39)	1.415 (N=20)	0.910 (N=35)
E488	Wollondilly River @ Jooriland	Wollondilly	0.380 (N=102)	0.875 (N=66)	0.575 (N=74)	0.480 (N=79)	0.900 (N=165)	0.600 (N=133)	0.460 (N=36)
E531	Werriberri Creek @ Werombi	Werriberri	0.370 (N=148)	0.330 (N=50)	0.440 (N=68)	0.870 (N=99)	0.600 (N=158)	0.415 (N=160)	0.250 (N=37)
E550	Tonalli River @ Fire Road W1B	Lake Burragorang	NA	NA	NA	NA	NA	NA	0.270 (N=46)
E551	Tonalli River @Fire Road W2	Lake Burragorang	NA	NA	NA	NA	NA	NA	0.330 (N=161)
E552	Tonalli River @ Cemetery	Lake Burragorang	NA	NA	NA	NA	NA	NA	0.265 (N=46)
E601	Nepean River @ Inflow to Lake Nepean	Upper Nepean	0.580 (N=91)	0.660 (N=41)	0.590 (N=55)	0.520 (N=42)	NA	0.240 (N=14)	0.475 (N=36)
E602	Burke River @ Inflow to Lake Nepean	Upper Nepean	0.200 (N=103)	0.155 (N=48)	0.140 (N=68)	0.180 (N=133)	0.200 (N=141)	0.200 (N=194)	0.075 (N=36)
E604	Flying Fox No.3 Creek at Upper Avon	Upper Nepean	NA	NA	NA	NA	NA	NA	0.260 (N=171)
E608	Avon River at Summit Tank	Upper Nepean	NA	NA	NA	NA	NA	NA	0.250 (N=278)

Site	Site name	Sub-catchment	Period						
			Historic	1995–1998	1998–2001	2001–2004	2004–2007	2007–2010	2010–2013
E609	Cordeaux River Crossing at Cordeaux No.1	Upper Nepean	NA	NA	NA	NA	NA	NA	0.180 (N=71)
E610	Goondarin Creek at Vent Shaft	Upper Nepean	NA	NA	NA	NA	NA	NA	0.130 (N=187)
E677	Woronora River Inflow	Woronora	0.110 (N=4)	NA	NA	0.230 (N=1)	0.150 (N=8)	0.190 (N=157)	0.150 (N=180)
E678	Waratah Rivulet	Woronora	0.130 (N=5)	NA	NA	0.200 (N=96)	0.080 (N=12)	NA	NA
E680	Cataract River Corrimal No. 1	Upper Nepean	NA	NA	NA	NA	NA	NA	0.150 (N=251)
E697	Nepean River @ McGuires Crossing	Upper Nepean	0.805 (N=28)	NA	NA	0.375 (N=42)	0.400 (N=40)	0.4 (N=42)	0.530 (N=36)
E6006	Sandy Creek at Fire Road 6C	Upper Nepean	NA	NA	NA	NA	NA	NA	0.330 (N=161)
E6131	Waratah River at Flatrock Crossing	Woronora	NA	NA	NA	NA	NA	NA	0.210 (N=195)
E706	Kangaroo River @ Hampden Bridge	Kangaroo River	0.270 (N=163)	0.410 (N=53)	0.375 (N=70)	0.380 (N=92)	0.500 (N=423)	0.575 (N=118)	0.420 (N=193)
E809	Jembaicumbene Creek @ Bendoura	Upper Shoalhaven	0.890 (N=34)	0.530 (N=58)	0.340 (N=63)	0.650 (N=9)	NA	NA	NA
E822	Mongarlowe River @ Mongarlowe	Mongarlowe	0.235 (N=58)	0.310 (N=58)	0.320 (N=123)	0.160 (N=51)	0.200 (N=48)	0.345 (N=86)	NA
E847	Shoalhaven River @ Fossickers Flat	Bungonia	0.260 (N=38)	0.450 (N=72)	0.385 (N=72)	0.300 (N=43)	0.800 (N=66)	0.400 (N=128)	0.250 (N=44)
E851	Shoalhaven River @ D/S Tallowa Dam		0.380 (N=21)	0.440 (N=27)	0.420 (N=36)	0.380 (N=43)	0.405 (N=38)	0.380 (N=44)	NA
E860	Shoalhaven River @ Mount View	Braidwood Creek	0.770 (N=44)	0.300 (N=44)	0.370 (N=63)	0.275 (N=58)	0.400 (N=132)	0.540 (N=153)	0.550 (N=144)
E861	Shoalhaven River @ Hillview	Mid Shoalhaven	0.280 (N=48)	0.450 (N=55)	0.380 (N=157)	0.310 (N=58)	0.330 (N=137)	0.380 (N=97)	0.415 (N=106)
E889	Reedy Creek @ Manar	Reedy Creek	0.630 (N=36)	0.350 (N=38)	0.220 (N=55)	0.480 (N=7)	NA	NA	NA
E890	Boro Creek @ Marlowe	Boro Creek	0.210 (N=16)	0.415 (N=38)	0.235 (N=48)	0.170 (N=44)	0.300 (N=20)	0.200 (N=38)	0.300 (N=43)
E891	Gillamatong Creek @ Braidwood	Braidwood Creek	1.040 (N=39)	0.910 (N=49)	0.355 (N=44)	0.450 (N=47)	0.600 (N=78)	0.630 (N=80)	NA
GO515	Woronora River @ The Needles	Woronora D/S Dam	NA	0.230 (N=26)	0.200 (N=44)	0.180 (N=49)	0.300 (N=91)	0.300 (N=145)	NA
E8311	Corang River	Mid Shoalhaven	1.455 (N=32)	0.38 (N=161)	0.29 (N=170)	0.185 (N=44)	0.2 (N=19)	0.2 (N=38)	NA
E8361	Nerrimunga Creek @ Minshull Trig	Nerrimunga River	0.5 (N=8)	0.77 (N=79)	0.85 (N=64)	0.68 (N=17)	NA	NA	NA

NA = not available

Table H 8-10 Soluble Reactive Phosphorus (mg/L) - Catchment Sites

Site	Site name	Sub-catchment	Period						
			Historic	1995–1998	1998–2001	2001–2004	2004–2007	2007–2010	2010–2013
E046	Farmers Creek d/s Lithgow STP	Lower Cox	NA	NA	NA	NA	NA	NA	0.040 (N=59)
E083	Coxs River @ Kelpie Point	Mid Coxs	0.007 (N=22)	0.005 (N=33)	0.005 (N=74)	0.004 (N=45)	0.003 (N=129)	0.003 (N=51)	0.006 (N=36)
E110	Hollander River	Kowmung	NA	NA	NA	0.007 (N=38)	NA	NA	NA
E120	Tuglow River	Kowmung	NA	NA	NA	0.012 (N=37)	NA	NA	NA
E130	Kowmung River	Kowmung				0.005 (N=46)	0.003 (N=104)	0.003 (N=53)	0.006 (N=36)
E157	Kedumba River @ Maxwell's Crossing	Lower Coxs	0.075 (N=32)	0.430 (N=35)	0.010 (N=64)	0.007 (N=48)	0.003 (N=99)	0.003 (N=81)	0.004 (N=36)
E203	Gibbergunyah Creek @ Mittagong STP	Nattai				0.028 (N=36)	0.021 (N=46)	0.014 (N=79)	0.015 (N=36)
E206	Nattai River @ The Crags	Nattai	0.262 (N=200)	0.720 (N=17)	0.690 (N=49)	0.048 (N=52)	0.013 (N=92)	0.007 (N=43)	0.010 (N=36)
E210	Nattai River @ Smallwoods Crossing	Nattai	0.009 (N=215)	0.006 (N=29)	0.006 (N=48)	0.009 (N=57)	0.003 (N=28)	0.003 (N=37)	0.004 (N=36)
E243	Little River @ Fireroad W4I	Little River	0.002 (N=90)	0.002 (N=32)	0.003 (N=47)	0.004 (N=63)	0.003 (N=36)	0.003 (N=39)	0.004 (N=36)
E303	Wingecarribee River @ Sheepwash Bridge	Wingecarribee	0.010 (N=7)	NA	NA	0.006 (N=17)	0.006 (N=16)	NA	NA
E332	Wingecarribee River @ Berrima	Wingecarribee	0.031 (N=17)	0.020 (N=11)	0.010 (N=49)	0.014 (N=57)	0.007 (N=63)	0.003 (N=48)	0.003 (N=36)
E409	Wollondilly River @ Murrays Flat	Wollondilly	0.048 (N=365)	0.130 (N=17)	0.130 (N=55)	0.386 (N=45)	0.033 (N=120)	0.007 (N=74)	0.010 (N=35)
E450	Wollondilly River @ Golden Valley	Wollondilly	0.010 (N=245)	0.008 (N=15)	0.010 (N=59)	0.008 (N=33)	0.006 (N=58)	0.003 (N=38)	0.003 (N=35)
E457	Mulwaree River @ Towers Weir	Mulwaree	0.016 (N=229)	0.040 (N=9)	0.065 (N=22)	0.050 (N=10)	0.021 (N=39)	0.004 (N=16)	0.009 (N=35)
E488	Wollondilly River @ Jooriland	Wollondilly	0.005 (N=14)	0.006 (N=50)	0.007 (N=69)	0.006 (N=71)	0.003 (N=165)	0.003 (N=66)	0.004 (N=36)
E531	Werriberri Creek @ Werombi	Werriberri	0.006 (N=37)	0.003 (N=40)	0.008 (N=62)	0.007 (N=80)	0.003 (N=150)	0.003 (N=84)	0.004 (N=37)
E550	Tonalli River @ Fire Road W1B	Lake Burragorang	NA	NA	NA	NA	NA	NA	NA
E551	Tonalli River @Fire Road W2	Lake Burragorang	NA	NA	NA	NA	NA	NA	0.004 (N=26)
E552	Tonalli River @ Cemetery	Lake Burragorang	NA	NA	NA	NA	NA	NA	NA
E601	Nepean River @ Inflow to Lake Nepean	Upper Nepean	0.006 (N=18)	0.005 (N=16)	0.007 (N=55)	0.007 (N=42)		0.002 (N=14)	0.004 (N=36)
E602	Burke River @ Inflow to Lake Nepean	Upper Nepean	0.002 (N=16)	0.004 (N=24)	0.004 (N=58)	0.005 (N=128)	0.003 (N=102)	0.003 (N=69)	0.003 (N=36)
E604	Flying Fox No.3 Creek at Upper Avon	Upper Nepean	NA	NA	NA	NA	NA	NA	0.004 (N=77)
E608	Avon River at Summit Tank	Upper Nepean	NA	NA	NA	NA	NA	NA	0.002 (N=170)
E609	Cordeaux River Crossing at Cordeaux No.1	Upper Nepean	NA	NA	NA	NA	NA	NA	0.004 (N=40)
E610	Goondarin Creek at Vent Shaft	Upper Nepean	NA	NA	NA	NA	NA	NA	0.003 (N=76)

Site	Site name	Sub-catchment	Period						
			Historic	1995–1998	1998–2001	2001–2004	2004–2007	2007–2010	2010–2013
E677	Woronora River Inflow	Woronora	0.002 (N=2)	NA	NA	0.006 (N=1)	0.003 (N=8)	0.003 (N=80)	0.002 (N=43)
E678	Waratah Rivulet	Woronora	0.003 (N=2)	NA	NA	0.004 (N=88)	0.003 (N=1)	NA	NA
E680	Cataract River Corrimal No. 1	Upper Nepean	NA	NA	NA	NA	NA	NA	0.003 (N=78)
E697	Nepean River @ McGuires Crossing	Upper Nepean	0.010 (N=4)	NA	NA	0.006 (N=42)	0.004 (N=40)	0.003 (N=42)	0.005 (N=36)
E6006	Sandy Creek at Fire Road 6C	Upper Nepean	NA	NA	NA	NA	NA	NA	0.004 (N=26)
E6131	Waratah River at Flatrock Crossing	Woronora	NA	NA	NA	NA	NA	NA	0.003 (N=40)
E706	Kangaroo River @ Hampden Bridge	Kangaroo River	0.008 (N=81)	0.010 (N=44)	0.010 (N=70)	0.013 (N=78)	0.003 (N=404)	0.004 (N=57)	0.009 (N=82)
E809	Jembaicumbene Creek @ Bendoura	Upper Shoalhaven	0.010 (N=30)	0.010 (N=31)	0.008 (N=51)	0.024 (N=9)	NA	NA	NA
E822	Mongarlowe River @ Mongarlowe	Mongarlowe	0.020 (N=38)	0.006 (N=27)	0.007 (N=45)	0.007 (N=51)	0.005 (N=48)	0.003 (N=41)	NA
E847	Shoalhaven River @ Fossickers Flat	Bungonia	0.006 (N=55)	0.007 (N=41)	0.008 (N=61)	0.008 (N=42)	0.003 (N=61)	0.003 (N=54)	0.006 (N=44)
E851	Shoalhaven River @ D/S Tallowa Dam		0.007 (N=4)	0.010 (N=27)	0.007 (N=36)	0.006 (N=43)	0.003 (N=38)	0.003 (N=44)	NA
E860	Shoalhaven River @ Mount View	Braidwood Creek	0.010 (N=36)	0.008 (N=33)	0.010 (N=62)	0.009 (N=52)	0.003 (N=127)	0.003 (N=39)	0.010 (N=42)
E861	Shoalhaven River @ Hillview	Mid Shoalhaven	0.006 (N=21)	0.009 (N=43)	0.010 (N=57)	0.007 (N=58)	0.003 (N=138)	0.003 (N=49)	0.006 (N=39)
E889	Reedy Creek @ Manar	Reedy Creek	0.005 (N=34)	0.005 (N=36)	0.006 (N=54)	0.012 (N=7)	NA	NA	NA
E890	Boro Creek @ Marlowe	Boro Creek	0.006 (N=14)	0.009 (N=34)	0.008 (N=48)	0.007 (N=44)	0.003 (N=20)	0.004 (N=38)	0.006 (N=43)
E891	Gillamatong Creek @ Braidwood	Braidwood Creek	0.008 (N=37)	0.010 (N=40)	0.010 (N=42)	0.012 (N=47)	0.009 (N=63)	0.003 (N=40)	NA
GO515	Woronora River @ The Needles	Woronora DS Dam	NA	0.003 (N=26)	0.003 (N=44)	0.003 (N=49)	0.003 (N=91)	0.003 (N=120)	NA
E8311	Corang River	Mid Shoalhaven	0.009 (N=7)	0.004 (N=31)	0.004 (N=43)	0.004 (N=44)	0.003 (N=19)	0.003 (N=39)	NA
E8361	Nerrimunga Creek @ Minshull Trig	Nerrimunga River	0.007 (N=8)	0.006 (N=21)	0.008 (N=20)	0.011 (N=5)	NA	NA	NA

NA = not available

Table H 8-11 Total Phosphorus (mg/L) - Catchment Sites

Site	Site name	Sub-catchment	Period						
			Historic	1995–1998	1998–2001	2001–2004	2004–2007	2007–2010	2010–2013
E046	Farmers Creek d/s Lithgow STP	Lower Cox	NA	NA	NA	NA	NA	NA	0.080 (N=59)
E083	Coxs River @ Kelpie Point	Mid Coxs River	0.008 (N=102)	0.010 (N=38)	0.010 (N=80)	0.007 (N=60)	0.010 (N=146)	0.012 (N=82)	0.014 (N=36)
E110	Hollander River	Kowmung	NA	NA	NA	0.011 (N=38)	NA	NA	NA
E120	Tuglow River	Kowmung	NA	NA	NA	0.021 (N=37)	NA	NA	NA
E130	Kowmung River	Kowmung	0.008 (N=107)	0.010 (N=72)	0.009 (N=68)	0.009 (N=53)	0.010 (N=117)	0.013 (N=170)	0.014 (N=36)
E157	Kedumba River @ Maxwell's Crossing	Lower Coxs	0.425 (N=121)	0.500 (N=47)	0.020 (N=72)	0.013 (N=58)	0.010 (N=105)	0.027 (N=147)	0.009 (N=36)
E203	Gibbergunyah Creek @ Mittagong STP	Nattai	NA	NA	NA	0.100 (N=38)	0.100 (N=45)	0.090 (N=58)	0.078 (N=36)
E206	Nattai River @ The Crags	Nattai	0.495 (N=263)	0.550 (N=48)	0.545 (N=62)	0.062 (N=53)	0.040 (N=102)	0.050 (N=99)	0.022 (N=36)
E210	Nattai River @ Smallwoods Crossing	Nattai	0.018 (N=379)	0.010 (N=35)	0.010 (N=52)	0.046 (N=88)	0.010 (N=28)	0.005 (N=37)	0.011 (N=36)
E243	Little River @ Fireroad W4I	Little	0.004 (N=145)	0.004 (N=37)	0.005 (N=48)	0.012 (N=73)	0.005 (N=36)	0.005 (N=39)	0.009 (N=36)
E303	Wingecarribee River @ Sheepwash Bridge	Wingecarribee	0.019 (N=18)	NA	NA	0.021 (N=17)	0.023 (N=16)	NA	NA
E332	Wingecarribee River @ Berrima	Wingecarribee	0.081 (N=106)	0.060 (N=32)	0.040 (N=49)	0.051 (N=57)	0.040 (N=63)	0.036 (N=81)	0.038 (N=36)
E409	Wollondilly River @ Murrays Flat	Wollondilly	0.120 (N=452)	0.130 (N=60)	0.175 (N=56)	0.413 (N=45)	0.110 (N=122)	0.066 (N=159)	0.034 (N=35)
E450	Wollondilly River @ Golden Valley	Wollondilly	0.023 (N=330)	0.030 (N=56)	0.040 (N=94)	0.015 (N=33)	0.030 (N=60)	0.034 (N=77)	0.014 (N=35)
E457	Mulwaree River @ Towers Weir	Mulwaree	0.045 (N=279)	0.090 (N=31)	0.110 (N=23)	0.110 (N=10)	0.090 (N=39)	0.097 (N=20)	0.033 (N=35)
E488	Wollondilly River @ Jooriland	Wollondilly	0.014 (N=103)	0.030 (N=66)	0.012 (N=74)	0.019 (N=79)	0.065 (N=156)	0.030 (N=131)	0.016 (N=36)
E531	Werriberri Creek @ Werombi	Werriberri	0.010 (N=233)	0.010 (N=50)	0.010 (N=67)	0.019 (N=99)	0.020 (N=150)	0.018 (N=148)	0.012 (N=37)
E550	Tonalli River @ Fire Road W1B	Lake Burragorang	NA	NA	NA	NA	NA	NA	0.015 (N=46)
E551	Tonalli River @Fire Road W2	Lake Burragorang	NA	NA	NA	NA	NA	NA	0.014 (N=161)
E552	Tonalli River @ Cemetery	Lake Burragorang	NA	NA	NA	NA	NA	NA	0.015 (N=46)
E601	Nepean River @ Inflow to Lake Nepean	Upper Nepean	0.010 (N=122)	0.010 (N=41)	0.010 (N=55)	0.021 (N=42)	NA	0.003 (N=14)	0.012 (N=36)
E602	Burke River @ Inflow to Lake Nepean	Upper Nepean	0.007 (N=140)	0.009 (N=48)	0.008 (N=68)	0.009 (N=133)	0.005 (N=141)	0.009 (N=194)	0.010 (N=36)
E604	Flying Fox No.3 Creek at Upper Avon	Upper Nepean	NA	NA	NA	NA	NA	NA	0.015 (N=171)
E608	Avon River at Summit Tank	Upper Nepean	NA	NA	NA	NA	NA	NA	0.009 (N=278)
E609	Cordeaux River Crossing at Cordeaux No.1	Upper Nepean	NA	NA	NA	NA	NA	NA	0.014 (N=71)
E610	Goondarin Creek at Vent Shaft	Upper Nepean	NA	NA	NA	NA	NA	NA	0.009 (N=187)

Site	Site name	Sub-catchment	Period						
			Historic	1995–1998	1998–2001	2001–2004	2004–2007	2007–2010	2010–2013
E697	Nepean River @ McGuires Crossing	Upper Nepean	0.025 (N=34)	NA	NA	0.016 (N=42)	0.016 (N=40)	0.010 (N=42)	0.018 (N=36)
E677	Woronora River Inflow	Woronora	0.003 (N=48)	NA	NA	0.013 (N=1)	0.005 (N=8)	0.005 (N=157)	0.010 (N=180)
E678	Waratah Rivulet	Woronora	0.003 (N=46)	NA	NA	0.007 (N=96)	0.005 (N=12)	NA	NA
E680	Cataract River Corrimal No. 1	Upper Nepean	NA	NA	NA	NA	NA	NA	0.012 (N=251)
E697	Nepean River @ McGuires Crossing	Upper Nepean	NA	NA	NA	NA	NA	NA	0.018 (N=36)
E6006	Sandy Creek at Fire Road 6C	Upper Nepean	NA	NA	NA	NA	NA	NA	0.014 (N=161)
E6131	Waratah River at Flatrock Crossing	Woronora	NA	NA	NA	NA	NA	NA	0.012 (N=195)
E706	Kangaroo River @ Hampden Bridge	Kangaroo River	0.012 (N=171)	0.030 (N=53)	0.020 (N=70)	0.026 (N=92)	0.026 (N=423)	0.052 (N=106)	0.035 (N=193)
E809	Jembaicumbene Creek @ Bendoura	Upper Shoalhaven	0.040 (N=34)	0.040 (N=58)	0.010 (N=63)	0.043 (N=9)	NA	NA	NA
E822	Mongarlowe River @ Mongarlowe	Mongarlowe	0.010 (N=61)	0.020 (N=58)	0.040 (N=123)	0.011 (N=51)	0.010 (N=48)	0.037 (N=86)	NA
E847	Shoalhaven River @ Fossickers Flat	Bungonia	0.010 (N=104)	0.030 (N=72)	0.010 (N=72)	0.013 (N=43)	0.084 (N=66)	0.030 (N=128)	0.015 (N=44)
E851	Shoalhaven River @ D/S Tallowa Dam		0.010 (N=32)	0.010 (N=27)	0.010 (N=36)	0.013 (N=43)	0.010 (N=38)	0.005 (N=44)	NA
E860	Shoalhaven River @ Mount View	Braidwood Creek	0.030 (N=44)	0.010 (N=44)	0.020 (N=63)	0.016 (N=58)	0.020 (N=132)	0.036 (N=153)	0.061 (N=144)
E861	Shoalhaven River @ Hillview	Mid Shoalhaven	0.015 (N=102)	0.030 (N=55)	0.030 (N=157)	0.016 (N=58)	0.012 (N=137)	0.021 (N=97)	0.038 (N=106)
E889	Reedy Creek @ Manar	Reedy Creek	0.010 (N=36)	0.010 (N=38)	0.010 (N=55)	0.022 (N=7)	NA	NA	NA
E890	Boro Creek @ Marlowe	Boro Creek	0.010 (N=16)	0.010 (N=38)	0.010 (N=48)	0.012 (N=44)	0.008 (N=20)	0.020 (N=38)	0.030 (N=43)
E891	Gillamatong Creek @ Braidwood	Braidwood Creek	0.020 (N=39)	0.070 (N=49)	0.020 (N=44)	0.027 (N=47)	0.030 (N=78)	0.091 (N=80)	NA
GO515	Woronora River @ The Needles	Woronora D/S Dam	NA	0.006 (N=26)	0.008 (N=44)	0.005 (N=49)	0.005 (N=91)	0.007 (N=145)	NA
E8311	Corang River	Mid Shoalhaven	0.020 (N=32)	0.010 (N=161)	0.010 (N=170)	0.008 (N=44)	0.005 (N=19)	0.005 (N=38)	NA
E8361	Nerrimunga Creek @ Minshull Trig	Nerrimunga River	0.010 (N=8)	0.040 (N=79)	0.060 (N=64)	0.060 (N=17)	NA	NA	NA

NA = not available

8.2.4 Metals Indicators

Table H 8-12 Total Aluminium (mg/L) - Catchment Sites

Site	Site name	Sub-catchment	Period						
			Historic	1995-1998	1998–2001	2001–2004	2004-2007	2007-2010	2010–2013
E046	Farmers Creek d/s Lithgow STP	Lower Cox	NA	NA	NA	NA	NA	NA	0.100 (N=27)
E083	Coxs River @ Kelpie Point	Mid Coxs	0.025 (N=86)	0.019 (N=37)	0.080 (N=80)	0.010 (N=50)	0.160 (N=140)	0.070 (N=81)	0.065 (N=36)
E110	Hollander River	Kowmung	NA	NA	NA	0.062 (N=38)	NA	NA	NA
E120	Tuglow River	Kowmung	NA	NA	NA	0.159 (N=37)	NA	NA	NA
E130	Kowmung River	Kowmung	0.028 (N=92)	0.099 (N=62)	0.034 (N=68)	0.017 (N=48)	0.100 (N=114)	0.080 (N=164)	0.070 (N=36)
E157	Kedumba River @ Maxwell's Crossing	Lower Coxs	0.070 (N=103)	0.109 (N=41)	0.119 (N=72)	0.053 (N=53)	0.255 (N=98)	0.470 (N=138)	0.040 (N=36)
E203	Gibbergunyah Creek @ Mittagong STP	Nattai	NA	NA	NA	0.472 (N=35)	0.522 (N=40)	0.590 (N=39)	0.505 (N=36)
E206	Nattai River @ The Crags	Nattai	0.125 (N=40)	0.246 (N=26)	0.046 (N=49)	0.024 (N=51)	0.367 (N=104)	0.300 (N=98)	0.060 (N=36)
E210	Nattai River @ Smallwoods Crossing	Nattai	0.032 (N=144)	0.026 (N=35)	0.025 (N=52)	0.225 (N=63)	0.124 (N=28)	0.040 (N=37)	0.075 (N=36)
E243	Little River @ Fireroad W4I	Little	0.017 (N=68)	0.021 (N=37)	0.019 (N=47)	0.056 (N=41)	0.047 (N=36)	0.030 (N=39)	0.040 (N=36)
E303	Wingecarribee River @ Sheepwash Bridge	Wingecarribee	NA	NA	NA	0.067 (N=17)	0.116 (N=16)	NA	NA
E332	Wingecarribee River @ Berrima	Wingecarribee	0.098 (N=40)	0.169 (N=32)	0.203 (N=48)	0.183 (N=57)	0.418 (N=63)	0.460 (N=81)	0.285 (N=36)
E409	Wollondilly River @ Murrays Flat	Wollondilly	0.121 (N=52)	0.084 (N=17)	0.100 (N=56)	0.030 (N=45)	1.515 (N=118)	0.120 (N=159)	0.040 (N=35)
E450	Wollondilly River @ Golden Valley	Wollondilly	0.116 (N=49)	0.245 (N=21)	0.127 (N=74)	0.020 (N=33)	0.055 (N=60)	0.210 (N=77)	0.050 (N=35)
E457	Mulwaree River @ Towers Weir	Mulwaree	0.043 (N=34)	0.315 (N=9)	0.578 (N=23)	0.409 (N=10)	1.090 (N=39)	0.195 (N=20)	0.020 (N=35)
E488	Wollondilly River @ Jooriland	Wollondilly	0.097 (N=86)	0.601 (N=66)	0.195 (N=74)	0.130 (N=73)	0.930 (N=157)	0.490 (N=113)	0.240 (N=36)
E531	Werriberri Creek @ Werombi	Werriberri	0.095 (N=165)	0.116 (N=50)	0.193 (N=69)	0.071 (N=56)	0.370 (N=144)	0.260 (N=144)	0.090 (N=37)
E550	Tonalli River @ Fire Road W1B	Lake Burragorang	NA	NA	NA	NA	NA	NA	NA
E551	Tonalli River @Fire Road W2	Lake Burragorang	NA	NA	NA	NA	NA	NA	0.005 (N=12)
E552	Tonalli River @ Cemetery	Lake Burragorang	NA	NA	NA	NA	NA	NA	NA
E601	Nepean River @ Inflow to Lake Nepean	Upper Nepean	0.127 (N=105)	0.124 (N=41)	0.115 (N=55)	0.189 (N=18)	NA	0.040 (N=14)	0.110 (N=36)
E602	Burke River @ Inflow to Lake Nepean	Upper Nepean	0.063 (N=119)	0.094 (N=48)	0.143 (N=62)	0.070 (N=65)	0.115 (N=140)	0.180 (N=193)	0.090 (N=36)
E604	Flying Fox No.3 Creek at Upper Avon	Upper Nepean	NA	NA	NA	NA	NA	NA	NA
E608	Avon River at Summit Tank	Upper Nepean	NA	NA	NA	NA	NA	NA	NA
E609	Cordeaux River Crossing at Cordeaux No.1	Upper Nepean	NA	NA	NA	NA	NA	NA	NA
E610	Goondarin Creek at Vent Shaft	Upper Nepean	NA	NA	NA	NA	NA	NA	NA

Site	Site name	Sub-catchment	Period						
			Historic	1995-1998	1998–2001	2001–2004	2004-2007	2007-2010	2010–2013
E677	Woronora River Inflow	Woronora	0.077 (N=33)	NA	NA	0.138 (N=1)	0.055 (N=8)	0.310 (N=153)	NA
E678	Waratah Rivulet	Woronora	0.049 (N=37)	NA	NA	0.101 (N=95)	0.005 (N=12)	NA	NA
E680	Cataract River Corrimal No. 1	Upper Nepean	NA	NA	NA	NA	NA	NA	0.050 (N=36)
E697	Nepean River @ McGuires Crossing	Upper Nepean	0.359 (N=21)	NA	NA	0.054 (N=42)	0.120 (N=40)	0.090 (N=42)	0.180 (N=36)
E6006	Sandy Creek at Fire Road 6C	Upper Nepean	NA	NA	NA	NA	NA	NA	NA
E6131	Waratah River at Flatrock Crossing	Woronora	NA	NA	NA	NA	NA	NA	NA
E706	Kangaroo River @ Hampden Bridge	Kangaroo River	0.135 (N=106)	0.277 (N=53)	0.269 (N=70)	0.319 (N=81)	0.400 (N=422)	0.530 (N=105)	NA
E809	Jembaicumbene Creek @ Bendoura	Upper Shoalhaven	0.255 (N=34)	0.142 (N=33)	0.098 (N=51)	0.669 (N=9)	NA	NA	NA
E822	Mongarlowe River @ Mongarlowe	Mongarlowe	0.101 (N=61)	0.150 (N=42)	0.134 (N=60)	0.069 (N=51)	0.084 (N=48)	0.320 (N=86)	NA
E847	Shoalhaven River @ Fossickers Flat	Bungonia	0.150 (N=60)	0.286 (N=47)	0.439 (N=72)	0.171 (N=43)	2.415 (N=66)	0.785 (N=128)	NA
E851	Shoalhaven River @ D/S Tallowa Dam		0.435 (N=64)	0.374 (N=27)	0.293 (N=36)	0.163 (N=43)	0.124 (N=38)	0.080 (N=44)	NA
E860	Shoalhaven River @ Mount View	Braidwood Creek	0.259 (N=44)	0.323 (N=39)	0.356 (N=63)	0.107 (N=58)	0.145 (N=128)	0.470 (N=153)	NA
E861	Shoalhaven River @ Hillview	Mid Shoalhaven	0.328 (N=49)	0.696 (N=51)	0.675 (N=94)	0.150 (N=58)	0.174 (N=136)	0.200 (N=96)	NA
E889	Reedy Creek @ Manar	Reedy Creek	0.054 (N=36)	0.571 (N=38)	0.351 (N=55)	0.948 (N=7)	NA	NA	NA
E890	Boro Creek @ Marlowe	Boro Creek	0.302 (N=16)	0.527 (N=37)	0.387 (N=48)	0.226 (N=44)	0.160 (N=20)	0.180 (N=38)	NA
E891	Gillamatong Creek @ Braidwood	Braidwood Creek	0.013 (N=39)	0.010 (N=26)	0.010 (N=43)	0.005 (N=47)	0.056 (N=73)	0.280 (N=79)	NA
GO515	Woronora River @ The Needles	Woronora DS Dam	NA	0.121 (N=26)	0.096 (N=44)	0.045 (N=49)	0.393 (N=90)	0.570 (N=139)	NA
E8311	Corang River	Mid Shoalhaven	0.342 (N=32)	0.450 (N=60)	0.266 (N=53)	0.253 (N=44)	0.150 (N=19)	0.200 (N=39)	NA
E8361	Nerrimunga Creek @ Minshull Trig	Nerrimunga River	0.147 (N=8)	1.180 (N=25)	1.240 (N=21)	3.430 (N=17)	NA	NA	NA

NA = not available

Table H 8-13 Total Iron (mg/L) - Catchment Sites

Site	Site name	Sub-catchment	Period						
			Historic	1995-1998	1998–2001	2001–2004	2004-2007	2007-2010	2010-2013
E046	Farmers Creek d/s Lithgow STP	Lower Cox	NA	NA	NA	NA	NA	NA	0.330 (N=27)
E083	Coxs River @ Kelpie Point	Lower Coxs	NA	NA	NA	NA	NA	NA	0.220 (N=36)
E110	Hollander River	Kowmung	NA	NA	NA	0.148 (N=38)	NA	NA	NA
E120	Tuglow River	Kowmung	NA	NA	NA	0.387 (N=37)	NA	NA	NA
E130	Kowmung River	Kowmung	0.039 (N=93)	0.119 (N=62)	0.058 (N=68)	0.060 (N=47)	0.140 (N=114)	0.160 (N=164)	0.195 (N=36)
E157	Kedumba River @ Maxwell's Crossing	Lower Coxs	0.230 (N=101)	0.191 (N=41)	0.304 (N=72)	0.227 (N=52)	0.405 (N=98)	1.860 (N=138)	0.335 (N=36)
E203	Gibbergunyah Creek @ Mittagong STP	Nattai	NA	NA	NA	0.351 (N=35)	0.295 (N=40)	0.330 (N=39)	0.450 (N=36)
E206	Nattai River @ The Crags	Nattai	0.355 (N=40)	0.661 (N=26)	0.174 (N=49)	0.116 (N=51)	0.615 (N=104)	0.465 (N=98)	0.295 (N=36)
E210	Nattai River @ Smallwoods Crossing	Nattai	0.320 (N=245)	0.281 (N=35)	0.343 (N=52)	0.806 (N=62)	0.809 (N=28)	0.650 (N=37)	1.065 (N=36)
E243	Little River @ Fireroad W41	Little	0.075 (N=69)	0.115 (N=37)	0.129 (N=47)	0.421 (N=40)	0.360 (N=36)	0.330 (N=39)	0.435 (N=36)
E303	Wingecarribee River @ Sheepwash Bridge	Wingecarribee	0.420 (N=1)	NA	NA	0.268 (N=17)	0.398 (N=16)	NA	NA
E332	Wingecarribee River @ Berrima	Wingecarribee	0.370 (N=39)	0.673 (N=32)	0.399 (N=48)	0.430 (N=57)	0.661 (N=63)	0.700 (N=81)	0.605 (N=36)
E409	Wollondilly River @ Murrays Flat	Wollondilly	0.400 (N=52)	0.586 (N=17)	0.365 (N=56)	0.173 (N=45)	1.495 (N=118)	0.720 (N=159)	0.320 (N=35)
E450	Wollondilly River @ Golden Valley	Wollondilly	0.315 (N=49)	0.686 (N=21)	0.510 (N=74)	0.237 (N=33)	0.600 (N=60)	1.010 (N=77)	0.310 (N=35)
E457	Mulwaree River @ Towers Weir	Mulwaree	0.162 (N=35)	0.547 (N=9)	0.583 (N=23)	0.732 (N=10)	1.120 (N=39)	0.380 (N=20)	0.240 (N=35)
E488	Wollondilly River @ Jooriland	Wollondilly	0.204 (N=86)	0.513 (N=66)	0.321 (N=74)	0.288 (N=72)	1.340 (N=157)	0.780 (N=113)	0.470 (N=36)
E531	Werriberri Creek @ Werombi	Werriberri	0.979 (N=205)	1.107 (N=50)	1.280 (N=69)	0.737 (N=54)	2.065 (N=144)	1.100 (N=144)	1.070 (N=37)
E550	Tonalli River @ Fire Road W1B	Lake Burragorang	NA	NA	NA	NA	NA	NA	NA
E551	Tonalli River @Fire Road W2	Lake Burragorang	NA	NA	NA	NA	NA	NA	0.190 (N=36)
E552	Tonalli River @ Cemetery	Lake Burragorang	NA	NA	NA	NA	NA	NA	NA
E601	Nepean River @ Inflow to Lake Nepean	Upper Nepean	0.908 (N=124)	0.913 (N=41)	0.779 (N=55)	0.827 (N=18)	NA	0.735 (N=14)	0.855 (N=36)
E602	Burke River @ Inflow to Lake Nepean	Upper Nepean	0.704 (N=141)	0.800 (N=48)	0.732 (N=62)	0.764 (N=65)	0.700 (N=140)	0.640 (N=193)	0.855 (N=36)
E604	Flying Fox No.3 Creek at Upper Avon	Upper Nepean	NA	NA	NA	NA	NA	NA	NA
E608	Avon River at Summit Tank	Upper Nepean	NA	NA	NA	NA	NA	NA	NA
E609	Cordeaux River Crossing at Cordeaux No.1	Upper Nepean	NA	NA	NA	NA	NA	NA	NA
E610	Goondarin Creek at Vent Shaft	Upper Nepean	NA	NA	NA	NA	NA	NA	NA
E677	Woronora River Inflow	Woronora	0.355 (N=60)	NA	NA	1.520 (N=1)	0.215 (N=8)	0.390 (N=153)	NA

Site	Site name	Sub-catchment	Period						
			Historic	1995-1998	1998–2001	2001–2004	2004-2007	2007-2010	2010-2013
E678	Waratah Rivulet	Woronora	0.225 (N=60)	NA	NA	0.655 (N=95)	0.830 (N=12)	NA	NA
E680	Cataract River Corrimal No. 1	Upper Nepean	NA	NA	NA	NA	NA	NA	NA
E697	Nepean River @ McGuires Crossing	Upper Nepean	0.854 (N=34)	NA	NA	0.662 (N=42)	0.597 (N=40)	0.635 (N=42)	0.805 (N=36)
E6006	Sandy Creek at Fire Road 6C	Upper Nepean	NA	NA	NA	NA	NA	NA	NA
E6131	Waratah River at Flatrock Crossing	Woronora	NA	NA	NA	NA	NA	NA	NA
E706	Kangaroo River @ Hampden Bridge	Kangaroo River	0.430 (N=179)	0.450 (N=53)	0.473 (N=70)	0.556 (N=81)	0.610 (N=422)	0.760 (N=105)	NA
E809	Jembaicumbene Creek @ Bendoura	Upper Shoalhaven	0.980 (N=34)	1.191 (N=33)	0.810 (N=51)	1.190 (N=9)	NA	NA	NA
E822	Mongarlowe River @ Mongarlowe	Mongarlowe	0.457 (N=61)	0.429 (N=42)	0.395 (N=60)	0.347 (N=51)	0.392 (N=48)	0.525 (N=86)	NA
E847	Shoalhaven River @ Fossickers Flat	Bungonia	0.340 (N=111)	0.345 (N=47)	0.456 (N=72)	0.351 (N=43)	2.955 (N=66)	1.165 (N=128)	NA
E851	Shoalhaven River @ D/S Tallowa Dam		2.700 (N=49)	5.420 (N=27)	3.310 (N=36)	3.930 (N=43)	2.950 (N=38)	0.970 (N=44)	NA
E860	Shoalhaven River @ Mount View	Braidwood Creek	0.492 (N=44)	0.545 (N=39)	0.588 (N=63)	0.473 (N=58)	0.605 (N=128)	0.760 (N=153)	NA
E861	Shoalhaven River @ Hillview	Mid Shoalhaven	0.452 (N=49)	0.640 (N=51)	0.752 (N=94)	0.382 (N=58)	0.466 (N=136)	0.600 (N=96)	NA
E889	Reedy Creek @ Manar	Reedy Creek	0.293 (N=36)	0.790 (N=38)	0.715 (N=55)	1.550 (N=7)	NA	NA	NA
E890	Boro Creek @ Marlowe	Boro Creek	0.548 (N=16)	0.838 (N=37)	0.678 (N=48)	0.657 (N=44)	1.040 (N=20)	1.000 (N=38)	NA
E891	Gillamatong Creek @ Braidwood	Braidwood Creek	0.154 (N=39)	0.503 (N=26)	0.543 (N=43)	0.858 (N=47)	0.860 (N=73)	1.470 (N=79)	NA
GO515	Woronora River @ The Needles	Woronora DS Dam	0.310 (N=3)	0.299 (N=26)	0.295 (N=44)	0.250 (N=49)	0.339 (N=90)	0.520 (N=139)	NA
E8311	Corang River	Mid Shoalhaven	0.918 (N=32)	0.398 (N=60)	0.375 (N=53)	0.338 (N=44)	0.340 (N=19)	0.320 (N=39)	NA
E8361	Nerrimunga Creek @ Minshull Trig	Nerrimunga River	0.327 (N=8)	0.928 (N=25)	1.460 (N=21)	5.160 (N=17)	NA	NA	NA

NA = not available

8.3 Water quality parameters at storage sites

8.3.1 Algal indicators

Table H 8-14 Chlorophyll-a (µg/L) - Storage Sites

Site	Site name	Sub-catchment	Period						
			Historic	1995–1998	1998–2001	2001–2004	2004–2007	2007–2010	2010-2013
	Thompsons Creek Dam	Upper Coxs River	NA	NA	5.0 (N=10)	2.8 (N=33)	2.5 (N=30)	2.0 (N=12)	NA
	Lake Wallace	Upper Coxs River	NA	NA	5.0 (N=12)	6.0 (N=33)	3.5 (N=30)	2.0 (N=12)	NA
	Lake Lyell	Upper Coxs River	28.3 (N=2)	NA	5.0 (N=12)	5.0 (N=39)	7.8 (N=48)	3.6 (N=42)	NA
DLC1	Lower Cascade Dam	Grose	2.7 (N=255)	3.8 (N=39)	2.6 (N=33)	2.2 (N=37)	2.6 (N=79)	1.9 (N=104)	2.3 (N=62)
DTC1	Top Cascade Dam	Grose	2.7 (N=190)	6.3 (N=39)	6.8 (N=25)	4.4 (N=41)	3.8 (N=87)	2.0 (N=115)	2.9 (N=175)
DGC1	Greaves Creek Dam	Grose	2.7 (N=193)	3.1 (N=39)	3.3 (N=26)	3.3 (N=38)	4.7 (N=89)	1.9 (N=97)	2.1 (N=135)
DWC1	Woodford Creek Dam	Grose	3.0 (N=176)	4.2 (N=39)	2.7 (N=12)	NA	NA	NA	NA
DWA2	Lake Burragorang @ 500 m U/S Dam Wall	Burragorang	2.0 (N=881)	2.4 (N=153)	2.8 (N=236)	2.5 (N=250)	2.8 (N=261)	5.2 (N=273)	2.5 (N=447)
DWA9	Lake Burragorang @ 14 km U/S Dam Wall	Burragorang	1.6 (N=254)	2.3 (N=152)	2.8 (N=237)	2.2 (N=233)	3.0 (N=252)	4.0 (N=251)	2.6 (N=448)
DWA12	Lake Burragorang @ 9 km U/S Coxs River	Burragorang	1.8 (N=221)	2.3 (N=153)	2.8 (N=218)	2.4 (N=234)	3.1 (N=237)	3.9 (N=233)	2.9 (N=390)
DWA15	Lake Burragorang @ Coxs River Arm 4km u/s Butchers Creek	Lower Coxs	NA	NA	NA	NA	NA	NA	4.7 (N=130)
DWA19	Lake Burragorang @ Kedumba River Arm	Lower Coxs	10.1 (N=488)	19.5 (N=75)	5.8 (N=79)	4.4 (N=135)	NA	NA	7.4 (N=35)
DWA21	Lake Burragorang @ Coxs Arm 37 km U/S Dam	Lower Coxs	5.7 (N=282)	3.7 (N=74)	4.9 (N=77)	2.8 (N=154)	NA	NA	6.9 (N=35)
DWA27	Lake Burragorang @ Wollondilly Arm 23 km U/S Dam	Burragorang	1.6 (N=210)	2.1 (N=154)	2.7 (N=216)	2.2 (N=231)	2.7 (N=236)	4.1 (N=214)	2.8 (N=390)
DWA39	Lake Burragorang @ Wollondilly Arm 40 km U/S Dam	Burragorang	2.1 (N=62)	4.2 (N=125)	5.0 (N=215)	3.8 (N=269)	NA	NA	5.2 (N=43)
RPR1	Lake Prospect @ Midlake	Prospect	2.3 (N=94)	3.6 (N=187)	3.0 (N=265)	1.8 (N=82)	3.0 (N=201)	2.7 (N=224)	3.0 (N=203)
RPR6	Prospect Lake @ raw water pumping station	Prospect	NA	NA	NA	NA	NA	NA	3.2 (N=115)
DWO1	Lake Woronora @ Dam Wall	Woronora	1.7 (N=507)	1.5 (N=49)	1.4 (N=26)	1.3 (N=48)	0.8 (N=69)	0.8 (N=115)	0.8 (N=174)
DWO3	Woronora River 3 km U/S Dam Wall	Woronora	1.7 (N=144)	NA	NA	NA	NA	NA	NA
DWO4	Woronora Dam U/S Island Waratah R. 3 km U/S	Woronora	1.5 (N=142)	NA	NA	NA	NA	NA	NA
DCA1	Lake Cataract @ Dam Wall	Upper Nepean	3.1 (N=440)	2.8 (N=38)	3.7 (N=25)	3.9 (N=34)	4.4 (N=101)	4.8 (N=115)	3.0 (N=139)
DCA2	Lake Cataract @ Cataract Arm 5 km U/S	Upper Nepean	3.3 (N=167)	2.7 (N=14)	NA	NA	NA	NA	NA

Site	Site name	Sub-catchment	Period						
			Historic	1995–1998	1998–2001	2001–2004	2004–2007	2007–2010	2010-2013
DCA3	Lake Cataract @ Lodden Arm 4.5 km U/S	Upper Nepean	3.7 (N=165)	3.0 (N=14)	NA	NA	NA	NA	NA
DCO1	Lake Cordeaux @ Dam Wall	Upper Nepean	4.4 (N=396)	4.3 (N=38)	5.2 (N=24)	5.1 (N=35)	6.1 (N=85)	6.6 (N=108)	4.1 (N=142)
DCO3	Lake Cordeaux @ Junction of Kentish Creek & Cordeaux River	Upper Nepean	4.9 (N=131)	4.8 (N=13)	NA	NA	NA	NA	NA
DCO4	Lake Cordeaux @ Goondarin Creek	Upper Nepean	5.2 (N=133)	5.5 (N=13)	NA	NA	NA	NA	NA
DAV1	Lake Avon @ Dam Wall	Upper Nepean	2.7 (N=510)	1.6 (N=15)	NA	NA	3.0 (N=82)	2.8 (N=138)	2.3 (N=142)
DAV6	Lake Avon @ 7 km U/S Dam Wall	Upper Nepean	2.2 (N=139)	NA	NA	NA	3.0 (N=27)	4.1 (N=15)	NA
DAV7	Lake Avon @ Upper Avon Valve Chamber	Upper Nepean	3.8 (N=572)	4.5 (N=50)	4.7 (N=25)	4.4 (N=52)	5.0 (N=98)	5.8 (N=106)	3.1 (N=197)
DNE2	Lake Nepean @ 300 m U/S Dam Wall	Upper Nepean	3.1 (N=495)	3.8 (N=38)	3.2 (N=26)	3.2 (N=38)	4.4 (N=32)	3.7 (N=78)	2.6 (N=134)
DNE5	Lake Nepean @ Aerator 1	Upper Nepean	3.6 (N=184)	4.5 (N=15)	14.0 (N=2)	NA	NA	NA	NA
DNE7	Lake Nepean @ Aerator 2	Upper Nepean	4.3 (N=181)	5.2 (N=15)	16.1 (N=2)	3.3 (N=8)	4.9 (N=9)	NA	NA
DWI1	Wingecarribee lake @ Outlet	Wingecarribee	7.2 (N=254)	8.1 (N=35)	7.2 (N=19)	7.7 (N=50)	11.0 (N=106)	10.2 (N=137)	11.7 (N=18)
DWA311	Lake Burragorang @ Wollondilly Arm 300m u/s Nattai River	Burragorang	NA	NA	NA	NA	NA	NA	4.7 (N=139)
DFF6	Lake Fitzroy Falls @ Dam Wall	Kangaroo	6.1 (N=165)	4.3 (N=39)	5.9 (N=27)	10.7 (N=36)	13.5 (N=55)	11.1 (N=81)	13.2 (N=117)
DBP1	Kangaroo Valley WFP Raw Water	Kangaroo	NA	NA	NA	NA	NA	NA	14.6 (N=60)
DTA1	Lake Yarrunga @ 100 m from Dam Wall	Bungonia	3.0 (N=249)	3.2 (N=39)	3.5 (N=38)	3.6 (N=44)	4.0 (N=82)	4.9 (N=107)	2.9 (N=125)
DTA3	Lake Yarrunga @ Kangaroo and Yarrunga Jn.	Kangaroo	4.0 (N=150)	4.5 (N=38)	4.9 (N=27)	4.6 (N=44)	5.4 (N=44)	5.7 (N=81)	5.4 (N=41)
DTA5	Lake Yarrunga @ Shoalhaven River	Bungonia	1.9 (N=119)	2.3 (N=39)	2.3 (N=34)	2.7 (N=39)	5.7 (N=76)	4.9 (N=105)	2.5 (N=137)
DTA8	Lake Yarrunga @ Kangaroo River at Bendeela PS	Kangaroo	1.9 (N=114)	6.2 (N=1)	8.7 (N=1)	6.5 (N=11)	11.8 (N=50)	9.6 (N=78)	5.0 (N=183)
DTA10	Lake Yarrunga @ Kangaroo Arm Reed Island	Kangaroo	7.4 (N=128)	10.7 (N=33)	10.7 (N=24)	8.8 (N=39)	9.1 (N=58)	10.2 (N=108)	NA
Pejar	Pejar Dam	Upper Wollondilly	NA	NA	NA	NA	NA	NA	NA
Sooley	Sooley Dam	Upper Wollondilly	NA	NA	NA	NA	NA	NA	NA

NA = not available

8.3.2 Physico-chemical Indicators

Table H 8-15 Turbidity (NTU) - Storage Sites

Site	Site name	Sub-catchment	Period						
			Historic	1995–1998	1998–2001	2001–2004	2004–2007	2007–2010	2010-2013
	Thompsons Creek Dam	Upper Coxs River	NA	NA	NA	NA	NA	NA	NA
	Lake Wallace	Upper Coxs River	NA	NA	NA	NA	NA	NA	NA
	Lake Lyell	Upper Coxs River	NA	NA	NA	NA	NA	NA	NA
DLC1	Lower Cascade Dam	Grose	NA	NA	NA	NA	NA	NA	1.5 (N=223)
DTC1	Top Cascade Dam	Grose	NA	NA	NA	NA	NA	NA	1.0 (N=607)
DGC1	Greaves Creek Dam	Grose	NA	NA	NA	NA	NA	NA	2.6 (N=313)
DWC1	Woodford Creek Dam	Grose	NA	NA	NA	NA	NA	NA	NA
DWA2	Lake Burragorang @ 500 m U/S Dam Wall	Burragorang	NA	NA	NA	NA	NA	NA	4.3 (N=12259)
DWA9	Lake Burragorang @ 14 km U/S Dam Wall	Burragorang	NA	NA	NA	NA	NA	NA	4.2 (N=7512)
DWA12	Lake Burragorang @ 9 km U/S Coxs River	Burragorang	NA	NA	NA	NA	NA	NA	3.3 (N=3348)
DWA15	Lake Burragorang @ Coxs River Arm 4km u/s Butchers Creek	Lower Coxs	NA	NA	NA	NA	NA	NA	3.4 (N=1154)
DWA19	Lake Burragorang @ Kedumba River Arm	Lower Coxs	NA	NA	NA	NA	NA	NA	4.2 (N=122)
DWA21	Lake Burragorang @ Coxs Arm 37 km U/S Dam	Lower Coxs	NA	NA	NA	NA	NA	NA	3.0 (N=129)
DWA27	Lake Burragorang @ Wollondilly Arm 23 km U/S Dam	Burragorang	NA	NA	NA	NA	NA	NA	4.2 (N=3965)
DWA39	Lake Burragorang @ Wollondilly Arm 40 km U/S Dam	Burragorang	NA	NA	NA	NA	NA	NA	4.6 (N=140)
RPR1	Lake Prospect @ Midlake	Prospect	NA	NA	NA	NA	NA	NA	0.5 (N=704)
RPR6	Prospect Lake @ raw water pumping station	Prospect	NA	NA	NA	NA	NA	NA	0.5 (N=199)
DWO1	Lake Woronora @ Dam Wall	Woronora	NA	NA	NA	NA	NA	NA	0.5 (N=1681)
DWO3	Woronora River 3 km U/S Dam Wall	Woronora	NA	NA	NA	NA	NA	NA	NA
DWO4	Woronora Dam U/S Island Waratah R. 3 km U/S	Woronora	NA	NA	NA	NA	NA	NA	NA
DCA1	Lake Cataract @ Dam Wall	Upper Nepean	NA	NA	NA	NA	NA	NA	2.6 (N=313)
DCA2	Lake Cataract @ Cataract Arm 5 km U/S	Upper Nepean	NA	NA	NA	NA	NA	NA	NA
DCA3	Lake Cataract @ Lodden Arm 4.5 km U/S	Upper Nepean	NA	NA	NA	NA	NA	NA	NA
DCO1	Lake Cordeaux @ Dam Wall	Upper Nepean	NA	NA	NA	NA	NA	NA	0.5 (N=1423)

Site	Site name	Sub-catchment	Period						
			Historic	1995–1998	1998–2001	2001–2004	2004–2007	2007–2010	2010-2013
DCO3	Lake Cordeaux @ Junction of Kentish Creek. & Cordeaux River	Upper Nepean	NA	NA	NA	NA	NA	NA	NA
DCO4	Lake Cordeaux @ Goondarin Creek	Upper Nepean	NA	NA	NA	NA	NA	NA	NA
DAV1	Lake Avon @ Dam Wall	Upper Nepean	NA	NA	NA	NA	NA	NA	0.5 (N=1902)
DAV6	Lake Avon @ 7 km U/S Dam Wall	Upper Nepean	NA	NA	NA	NA	NA	NA	NA
DAV7	Lake Avon @ Upper Avon Valve Chamber	Upper Nepean	NA	NA	NA	NA	NA	NA	0.5 (N=607)
DNE2	Lake Nepean @ 300 m U/S Dam Wall	Upper Nepean	NA	NA	NA	NA	NA	NA	0.5 (N=1598)
DNE5	Lake Nepean @ Aerator 1	Upper Nepean	NA	NA	NA	NA	NA	NA	NA
DNE7	Lake Nepean @ Aerator 2	Upper Nepean	NA	NA	NA	NA	NA	NA	NA
DWI1	Wingecarribee lake @ Outlet	Wingecarribee	NA	NA	NA	NA	NA	NA	7.3 (N=412)
DWA311	Lake Burragorang @ Wollondilly Arm 300m u/s Nattai River	Burragorang	NA	NA	NA	NA	NA	NA	4.4 (N=1151)
DFF6	Lake Fitzroy Falls @ Dam Wall	Kangaroo	NA	NA	NA	NA	NA	NA	4.2 (N=269)
DBP1	Kangaroo Valley WFP Raw Water	Kangaroo	NA	NA	NA	NA	NA	NA	5.1 (N=55)
DTA1	Lake Yarrunga @ 100 m from Dam Wall	Bungonia	NA	NA	NA	NA	NA	NA	4.5 (N=872)
DTA3	Lake Yarrunga @ Kangaroo and Yarrunga Jn.	Kangaroo	NA	NA	NA	NA	NA	NA	3.4 (N=520)
DTA5	Lake Yarrunga @ Shoalhaven River	Bungonia	NA	NA	NA	NA	NA	NA	5.3 (N=539)
DTA8	Lake Yarrunga @ Kangaroo River at Bendeela PS	Kangaroo	NA	NA	NA	NA	NA	NA	5.5 (N=277)
DTA10	Lake Yarrunga @ Kangaroo Arm Reed Island	Kangaroo	NA	NA	NA	NA	NA	NA	NA
Pejar	Pejar Dam	Upper Wollondilly	NA	NA	NA	NA	NA	NA	NA
Sooley	Sooley Dam	Upper Wollondilly	NA	NA	NA	NA	NA	NA	NA

NA = not available

Table H 8-16 Conductivity (mS/cm) - Storage Sites

Site	Site name	Sub-catchment	Period						
			Historic	1995–1998	1998–2001	2001–2004	2004–2007	2007–2010	2010-2013
TC1	Thompsons Creek Dam	Upper Coxs River	NA	NA	0.27 (N=10)	0.32 (N=35)	0.51 (N=46)	0.59 (N=12)	NA
	Lake Wallace	Upper Coxs River	0.47 (N=23)	NA	0.61 (N=10)	0.80 (N=36)	0.77 (N=35)	0.80 (N=12)	NA
	Lake Lyell	Upper Coxs River	0.19 (N=114)	NA	0.30 (N=10)	0.42 (N=37)	0.65 (N=-60)	0.52 (N=63)	NA
DLC1	Lower Cascade Dam	Grose	NA	NA	0.07 (N=111)	0.07 (N=102)	0.07 (N=117)	0.07 (N=107)	0.072 (N=224)
DTC1	Top Cascade Dam	Grose	NA	NA	0.05 (N=111)	0.07 (N=100)	0.06 (N=111)	0.05 (N=114)	0.040 (N=609)
DGC1	Greaves Creek Dam	Grose	NA	NA	0.02 (N=111)	0.04 (N=100)	0.02 (N=156)	0.02 (N=105)	0.018 (N=159)
DWC1	Woodford Creek Dam	Grose	NA	NA	NA	NA	NA	NA	NA
DWA2	Lake Burragorang @ 500 m U/S Dam Wall	Burragorang	NA	0.20 (N=10)	0.18 (N=42)	0.17 (N=621)	0.18 (N=300)	0.16 (N=682)	0.163 (N=12434)
DWA9	Lake Burragorang @ 14 km U/S Dam Wall	Burragorang	NA	0.19 (N=10)	0.17 (N=66)	0.18 (N=233)	0.18 (N=246)	0.16 (N=278)	0.164 (N=7732)
DWA12	Lake Burragorang @ 9 km U/S Coxs River	Burragorang	NA	0.19 (N=10)	0.17 (N=66)	0.18 (N=175)	0.18 (N=222)	0.16 (N=243)	0.161 (N=3549)
DWA19	Lake Burragorang @ Kedumba River Arm	Lower Coxs	NA	0.12 (N=7)	0.14 (N=66)	0.14 (N=79)	NA	NA	0.152 (N=122)
DWA15	Lake Burragorang @ Coxs River Arm 4km u/s Butchers Creek	Lower Coxs	NA	NA	NA	NA	NA	NA	0.146 (N=1154)
DWA21	Lake Burragorang @ Coxs Arm 37 km U/S Dam	Lower Coxs	NA	0.11 (N=9)	0.14 (N=66)	0.14 (N=77)	NA	NA	0.157 (N=129)
DWA27	Lake Burragorang @ Wollondilly Arm 23 km U/S Dam	Burragorang	NA	0.21 (N=10)	0.18 (N=66)	0.19 (N=176)	0.19 (N=228)	0.17 (N=267)	0.173 (N=4082)
DWA39	Lake Burragorang @ Wollondilly Arm 40 km U/S Dam	Burragorang	NA	0.23 (N=9)	0.20 (N=63)	0.19 (N=155)	0.18 (N=58)	0.18 (N=12)	0.194 (N=140)
RPR1	Lake Prospect @ Midlake	Prospect	NA	NA	0.20 (N=22)	0.20 (N=1765)	0.26 (N=927)	0.26 (N=2278)	0.244 (N=704)
RPR6	Prospect Lake @ raw water pumping station	Prospect	NA	NA	NA	NA	NA	NA	0.250 (N=199)
DWO1	Lake Woronora @ Dam Wall	Woronora	NA	NA	0.09 (N=36)	0.10 (N=99)	0.11 (N=180)	0.11 (N=183)	0.108 (N=1638)
DWO3	Woronora River 3 km U/S Dam Wall	Woronora	NA	NA	NA	0.09 (N=6)	NA	NA	NA
DWO4	Woronora Dam U/S Island Waratah R. 3 km U/S	Woronora	NA	NA	NA	0.09 (N=6)	NA	NA	NA
DCA1	Lake Cataract @ Dam Wall	Upper Nepean	NA	NA	0.07 (N=37)	0.08 (N=84)	0.09 (N=177)	0.08 (N=202)	0.022 (N=313)
DCA2	Lake Cataract @ Cataract Arm 5 km U/S	Upper Nepean	NA	NA	NA	NA	NA	NA	NA
DCA3	Lake Cataract @ Lodden Arm 4.5 km U/S	Upper Nepean	NA	NA	NA	NA	NA	NA	NA
DCO1	Lake Cordeaux @ Dam Wall	Upper Nepean	NA	NA	0.07 (N=32)	0.08 (N=93)	0.09 (N=177)	0.09 (N=192)	0.100 (N=1424)

Site	Site name	Sub-catchment	Period						
			Historic	1995–1998	1998–2001	2001–2004	2004–2007	2007–2010	2010-2013
DCO3	Lake Cordeaux @ Junction of Kentish Creek. & Cordeaux River	Upper Nepean	NA	NA	NA	NA	NA	NA	NA
DCO4	Lake Cordeaux @ Goondarin Creek	Upper Nepean	NA	NA	NA	NA	NA	NA	NA
DAV1	Lake Avon @ Dam Wall	Upper Nepean	NA	NA	NA	0.07 (N=36)	0.07 (N=241)	0.07 (N=214)	0.079 (N=1902)
DAV6	Lake Avon @ 7 km U/S Dam Wall	Upper Nepean	NA	NA	NA	NA	0.07 (N=28)	0.07 (N=18)	NA
DAV7	Lake Avon @ Upper Avon Valve Chamber	Upper Nepean	NA	NA	0.05 (N=36)	0.07 (N=132)	0.07 (N=247)	0.07 (N=174)	0.080 (N=607)
DNE2	Lake Nepean @ 300 m U/S Dam Wall	Upper Nepean	NA	NA	0.07 (N=30)	0.08 (N=105)	0.09 (N=102)	0.08 (N=129)	0.092 (N=1598)
DNE5	Lake Nepean @ Aerator 1	Upper Nepean	NA	NA	0.05 (N=3)	NA	NA	NA	NA
DNE7	Lake Nepean @ Aerator 2	Upper Nepean	NA	NA	NA	NA	0.09 (N=27)	0.09 (N=131)	NA
DWI1	Wingecarribee lake @ Outlet	Wingecarribee	NA	NA	NA	0.08 (N=102)	0.09 (N=112)	0.09 (N=132)	0.076 (N=412)
DWA311	Lake Burragorang @ Wollondilly Arm 300m u/s Nattai River	Burragorang	NA	NA	NA	NA	NA	NA	0.179 (N=1151)
DFF6	Lake Fitzroy Falls @ Dam Wall	Kangaroo	NA	NA	0.07 (N=84)	0.08 (N=89)	0.09 (N=105)	0.09 (N=147)	0.078 (N=269)
DBP1	Kangaroo Valley WFP Raw Water	Kangaroo	NA	NA	0.06 (N=16)	NA	0.10 (N=1)	NA	0.094 (N=55)
DTA1	Lake Yarrunga @ 100 m from Dam Wall	Bungonia	NA	NA	0.09 (N=39)	0.10 (N=80)	0.10 (N=102)	0.10 (N=110)	0.097 (N=872)
DTA3	Lake Yarrunga @ Kangaroo and Yarrunga Jn.	Kangaroo	NA	NA	0.08 (N=39)	0.09 (N=81)	0.10 (N=84)	0.10 (N=117)	0.092 (N=520)
DTA5	Lake Yarrunga @ Shoalhaven River	Bungonia	NA	NA	0.10 (N=39)	0.10 (N=81)	0.11 (N=102)	0.10 (N=111)	0.102 (N=539)
DTA8	Lake Yarrunga @ Kangaroo River at Bendeela PS	Kangaroo	NA	NA	0.08 (N=116)	0.09 (N=75)	0.09 (N=83)	0.10 (N=113)	0.099 (N=277)
DTA10	Lake Yarrunga @ Kangaroo Arm Reed Island	Kangaroo	NA	NA	0.073 (N=39)	0.088 (N=83)	0.098 (N=84)	0.094 (N=117)	NA
Pejar	Pejar Dam	Upper Wollondilly	NA	NA	NA	NA	NA	NA	NA
Sooley	Sooley Dam	Upper Wollondilly	NA	NA	NA	NA	NA	NA	NA

NA = not available

8.3.3 Nutrient Indicators

Table H 8-17 TN (mg/L) - Storage Sites

Site	Site name	Sub-catchment	Period						
			Historic	1995–1998	1998–2001	2001–2004	2004–2007	2007–2010	2010-2013
TC1	Thompsons Creek Dam	Upper Coxs River	NA	NA	0.33 (N=11)	0.39 (N=36)	0.41 (N=47)	0.65 (N=12)	NA
	Lake Wallace	Upper Coxs River	0.66 (N=51)	NA	0.74 (N=11)	0.76 (N=42)	0.93 (N=56)	1.89 (N=42)	NA
	Lake Lyell	Upper Coxs River	NA	NA	0.70 (N=11)	0.72 (N=36)	0.70 (N=36)	0.70 (N=12)	NA
DLC1	Lower Cascade Dam	Grose	0.19 (N=66)	0.26 (N=39)	0.25 (N=33)	0.27 (N=39)	0.20 (N=60)	0.20 (N=77)	0.160 (N=51)
DTC1	Top Cascade Dam	Grose	0.25 (N=66)	0.36 (N=39)	0.36 (N=25)	0.36 (N=54)	0.30 (N=63)	0.18 (N=88)	0.140 (N=148)
DGC1	Greaves Creek Dam	Grose	0.15 (N=68)	0.22 (N=39)	0.21 (N=26)	0.23 (N=42)	0.20 (N=65)	0.13 (N=74)	0.130 (N=82)
DWC1	Woodford Creek Dam	Grose	0.24 (N=68)	0.30 (N=39)	0.29 (N=12)	NA	NA	NA	NA
DWA2	Lake Burragorang @ 500 m U/S Dam Wall	Burragorang	0.30 (N=61)	0.26 (N=157)	0.30 (N=204)	0.26 (N=252)	0.23 (N=262)	0.27 (N=263)	0.380 (N=653)
DWA9	Lake Burragorang @ 14 km U/S Dam Wall	Burragorang	0.31 (N=63)	0.25 (N=158)	0.30 (N=205)	0.23 (N=233)	0.24 (N=250)	0.28 (N=237)	0.420 (N=673)
DWA12	Lake Burragorang @ 9 km U/S Coxs River	Burragorang	0.30 (N=68)	0.26 (N=157)	0.30 (N=223)	0.24 (N=233)	0.26 (N=230)	0.29 (N=231)	0.390 (N=502)
DWA15	Lake Burragorang @ Coxs River Arm 4km u/s Butchers Creek	Lower Coxs	NA	NA	NA	NA	NA	NA	0.320 (N=130)
DWA19	Lake Burragorang @ Kedumba River Arm	Lower Coxs	0.78 (N=58)	0.56 (N=74)	0.29 (N=78)	0.28 (N=97)	NA	NA	0.390 (N=502)
DWA21	Lake Burragorang @ Coxs Arm 37 km U/S Dam	Lower Coxs	0.28 (N=76)	0.23 (N=72)	0.28 (N=78)	0.25 (N=114)	NA	NA	0.380 (N=26)
DWA27	Lake Burragorang @ Wollondilly Arm 23 km U/S Dam	Burragorang	0.30 (N=69)	0.26 (N=160)	0.31 (N=219)	0.24 (N=231)	0.25 (N=236)	0.30 (N=201)	0.440 (N=522)
DWA39	Lake Burragorang @ Wollondilly Arm 40 km U/S Dam	Burragorang	0.31 (N=63)	0.32 (N=128)	0.340 (N=216)	0.29 (N=225)	NA	0.30 (N=6)	0.580 (N=34)
RPR1	Lake Prospect @ Midlake	Prospect	0.44 (N=65)	0.26 (N=180)	0.29 (N=266)	0.27 (N=133)	0.28 (N=234)	0.20 (N=207)	0.210 (N=153)
RPR6	Prospect Lake @ raw water pumping station	Prospect	NA	NA	NA	NA	NA	NA	0.205 (N=64)
DWO1	Lake Woronora @ Dam Wall	Woronora	0.19 (N=80)	0.23 (N=51)	0.22 (N=26)	0.19 (N=58)	0.20 (N=47)	0.20 (N=87)	0.200 (N=284)
DWO3	Woronora River 3 km U/S Dam Wall	Woronora	0.20 (N=31)	NA	NA	NA	NA	NA	NA
DWO4	Woronora Dam U/S Island Waratah R. 3 km U/S	Woronora	0.20 (N=30)	NA	NA	NA	NA	NA	NA
DCA1	Lake Cataract @ Dam Wall	Upper Nepean	0.17 (N=57)	0.23 (N=38)	0.22 (N=25)	0.24 (N=34)	0.21 (N=89)	0.20 (N=115)	0.190 (N=189)
DCA2	Lake Cataract @ Cataract Arm 5 km U/S	Upper Nepean	0.17 (N=42)	0.22 (N=14)	NA	NA	NA	NA	NA
DCA3	Lake Cataract @ Lodden Arm 4.5 km U/S	Upper Nepean	0.17 (N=40)	0.21 (N=14)	NA	NA	NA	NA	NA

Site	Site name	Sub-catchment	Period						
			Historic	1995–1998	1998–2001	2001–2004	2004–2007	2007–2010	2010-2013
DCO1	Lake Cordeaux @ Dam Wall	Upper Nepean	0.20 (N=47)	0.25 (N=38)	0.26 (N=24)	0.31 (N=33)	0.30 (N=88)	0.305 (N=108)	0.240 (N=196)
DCO3	Lake Cordeaux @ Junction of Kentish Creek. & Cordeaux River	Upper Nepean	0.20 (N=31)	0.29 (N=13)	NA	NA	NA	NA	NA
DCO4	Lake Cordeaux @ Goondarin Creek	Upper Nepean	0.21 (N=30)	0.28 (N=13)	NA	NA	NA	NA	NA
DAV1	Lake Avon @ Dam Wall	Upper Nepean	0.16 (N=52)	0.25 (N=15)	NA	NA	0.20 (N=62)	0.20 (N=138)	0.160 (N=224)
DAV6	Lake Avon @ 7 km U/S Dam Wall	Upper Nepean	0.14 (N=36)	NA	NA	NA	0.20 (N=27)	0.20 (N=15)	NA
DAV7	Lake Avon @ Upper Avon Valve Chamber	Upper Nepean	0.17 (N=97)	0.22 (N=51)	0.21 (N=25)	0.19 (N=49)	0.20 (N=96)	0.20 (N=109)	0.160 (N=209)
DNE2	Lake Nepean @ 300 m U/S Dam Wall	Upper Nepean	0.36 (N=82)	0.41 (N=37)	0.38 (N=25)	0.33 (N=36)	0.38 (N=35)	0.31 (N=77)	0.380 (N=233)
DNE5	Lake Nepean @ Aerator 1	Upper Nepean	0.35 (N=74)	0.40 (N=9)	NA	NA	NA	NA	NA
DNE7	Lake Nepean @ Aerator 2	Upper Nepean	0.36 (N=73)	0.48 (N=9)	NA	0.30 (N=9)	0.32 (N=9)	NA	NA
DWI1	Wingecarribee lake @ Outlet	Wingecarribee	0.47 (N=52)	0.5 (N=28)	0.61 (N=29)	0.46 (N=66)	0.40 (N=103)	0.30 (N=108)	0.310 (N=119)
DWA311	Lake Burragorang @ Wollondilly Arm 300m u/s Nattai River	Burragorang	NA	NA	NA	NA	NA	NA	0.410 (N=135)
DFF6	Lake Fitzroy Falls @ Dam Wall	Kangaroo	0.38 (N=53)	0.35 (N=39)	0.37 (N=28)	0.52 (N=55)	0.40 (N=79)	0.30 (N=181)	0.310 (N=94)
DBP1	Kangaroo Valley WFP Raw Water	Kangaroo	0.35 (N=15)	NA	NA	0.37 (N=1)	NA	NA	0.320 (N=3)
DTA1	Lake Yarrunga @ 100 m from Dam Wall	Bungonia	0.35 (N=43)	0.36 (N=39)	0.37 (N=37)	0.37 (N=35)	0.40 (N=83)	0.31 (N=104)	0.400 (N=134)
DTA3	Lake Yarrunga @ Kangaroo and Yarrunga Jn.	Kangaroo	0.35 (N=43)	0.37 (N=39)	0.37 (N=26)	0.36 (N=36)	0.40 (N=45)	0.30 (N=77)	0.370 (N=53)
DTA5	Lake Yarrunga @ Shoalhaven River	Bungonia	0.35 (N=43)	0.36 (N=39)	0.35 (N=33)	0.38 (N=16)	0.40 (N=41)	0.30 (N=78)	0.430 (N=130)
DTA8	Lake Yarrunga @ Kangaroo River at Bendeela PS	Kangaroo	0.38 (N=14)	0.32 (N=14)	NA	0.31 (N=20)	0.40 (N=35)	0.30 (N=60)	0.370 (N=113)
DTA10	Lake Yarrunga @ Kangaroo Arm Reed Island	Kangaroo	0.34 (N=43)	0.36 (N=32)	0.37 (N=23)	0.38 (N=19)	0.40 (N=33)	0.30 (N=78)	NA
Pejar	Pejar Dam	Upper Wollondilly	NA	NA	NA	NA	NA	NA	NA
Sooley	Sooley Dam	Upper Wollondilly	NA	NA	NA	NA	NA	NA	NA

NA = not available

Table H 8-18 TP (mg/L) - Storage Sites

Site	Site name	Sub-catchment	Period						
			Historic	1995–1998	1998–2001	2001–2004	2004–2007	2007–2010	2010-2013
TC1	Thompsons Creek Dam	Upper Coxs River	NA	NA	0.01 (N=12)	0.02 (N=36)	0.02 (N=41)	0.02 (N=12)	NA
	Lake Wallace	Upper Coxs River	0.03 (N=23)	NA	0.06 (N=12)	0.15 (N=36)	0.16 (N=34)	0.08 (N=12)	NA
	Lake Lyell	Upper Coxs River	0.43 (N=90)	NA	0.14 (N=12)	0.24 (N=42)	0.24 (N=53)	0.10 (N=41)	NA
DLC1	Lower Cascade Dam	Grose	0.01 (N=218)	0.01 (N=39)	0.01 (N=33)	0.01 (N=39)	0.01 (N=60)	0.01 (N=81)	0.006 (N=55)
DTC1	Top Cascade Dam	Grose	0.01 (N=163)	0.01 (N=39)	0.01 (N=25)	0.01 (N=54)	0.01 (N=63)	0.003 (N=88)	0.006 (N=148)
DGC1	Greaves Creek Dam	Grose	0.01 (N=170)	0.01 (N=39)	0.01 (N=26)	0.01 (N=42)	0.01 (N=65)	0.01 (N=74)	0.009 (N=82)
DWC1	Woodford Creek Dam	Grose	0.01 (N=189)	0.01 (N=39)	0.01 (N=12)	NA	NA	NA	NA
DWA2	Lake Burragorang @ 500 m U/S Dam Wall	Burragorang	0.0 (N=521)	0.01 (N=158)	0.01 (N=204)	0.004 (N=252)	0.01 (N=262)	0.01 (N=263)	0.007 (N=654)
DWA9	Lake Burragorang @ 14 km U/S Dam Wall	Burragorang	0.01 (N=207)	0.01 (N=158)	0.01 (N=205)	0.004 (N=233)	0.01 (N=250)	0.01 (N=237)	0.009 (N=673)
DWA12	Lake Burragorang @ 9 km U/S Coxs River	Burragorang	0.01 (N=177)	0.01 (N=158)	0.01 (N=223)	0.01 (N=235)	0.01 (N=230)	0.01 (N=231)	0.010 (N=502)
DWA15	Lake Burragorang @ Coxs River Arm 4km u/s Butchers Creek	Lower Coxs	NA	NA	NA	NA	NA	NA	0.009 (N=130)
DWA19	Lake Burragorang @ Kedumba River Arm	Lower Coxs	0.03 (N=330)	0.06 (N=74)	0.01 (N=78)	0.01 (N=97)	NA	NA	0.014 (N=26)
DWA21	Lake Burragorang @ Coxs Arm 37 km U/S Dam	Lower Coxs	0.01 (N=289)	0.010 (N=72)	0.01 (N=78)	0.01 (N=114)	NA	NA	0.015 (N=26)
DWA27	Lake Burragorang @ Wollondilly Arm 23 km U/S Dam	Burragorang	0.01 (N=174)	0.01 (N=160)	0.01 (N=219)	0.01 (N=231)	0.01 (N=236)	0.01 (N=201)	0.010 (N=522)
DWA39	Lake Burragorang @ Wollondilly Arm 40 km U/S Dam	Burragorang	0.01 (N=65)	0.01 (N=134)	0.01 (N=216)	0.01 (N=225)	NA	0.03 (N=6)	0.018 (N=34)
RPR1	Lake Prospect @ Midlake	Prospect	0.004 (N=69)	0.01 (N=168)	0.01 (N=266)	0.01 (N=133)	0.01 (N=234)	0.01 (N=207)	0.002 (N=153)
RPR6	Prospect Lake @ raw water pumping station	Prospect	NA	NA	NA	NA	NA	NA	0.002 (N=64)
DWO1	Lake Woronora @ Dam Wall	Woronora	0.003 (N=533)	0.003 (N=51)	0.004 (N=26)	0.003 (N=58)	0.01 (N=47)	0.01 (N=87)	0.006 (N=284)
DWO3	Woronora River 3 km U/S Dam Wall	Woronora	0.003 (N=134)	NA	NA	NA	NA	NA	NA
DWO4	Woronora Dam U/S Island Waratah R. 3 km U/S	Woronora	0.003 (N=127)	NA	NA	NA	NA	NA	NA
DCA1	Lake Cataract @ Dam Wall	Upper Nepean	0.004 (N=528)	0.01 (N=38)	0.01 (N=25)	0.01 (N=34)	0.01 (N=89)	0.01 (N=115)	0.006 (N=189)
DCA2	Lake Cataract @ Cataract Arm 5 km U/S	Upper Nepean	0.01 (N=142)	0.01 (N=14)	NA	NA	NA	NA	NA
DCA3	Lake Cataract @ Lodden Arm 4.5 km U/S	Upper Nepean	0.004 (N=138)	0.01 (N=14)	NA	NA	NA	NA	NA
DCO1	Lake Cordeaux @ Dam Wall	Upper Nepean	0.01 (N=462)	0.01 (N=38)	0.01 (N=24)	0.01 (N=33)	0.01 (N=88)	0.01 (N=108)	0.009 (N=196)
DCO3	Lake Cordeaux @ Junction of Kentish Creek.	Upper Nepean	0.01 (N=116)	0.01 (N=13)	NA	NA	NA	NA	NA

Site	Site name	Sub-catchment	Period						
			Historic	1995–1998	1998–2001	2001–2004	2004–2007	2007–2010	2010-2013
	& Cordeaux River								
DCO4	Lake Cordeaux @ Goondarin Creek	Upper Nepean	0.01 (N=118)	0.01 (N=13)	NA	NA	NA	NA	NA
DAV1	Lake Avon @ Dam Wall	Upper Nepean	0.003 (N=555)	0.004 (N=15)	NA	NA	0.01 (N=62)	0.01 (N=138)	0.002 (N=224)
DAV6	Lake Avon @ 7 km U/S Dam Wall	Upper Nepean	0.003 (N=136)	NA	NA	NA	0.004 (N=27)	0.01 (N=15)	NA
DAV7	Lake Avon @ Upper Avon Valve Chamber	Upper Nepean	0.01 (N=627)	0.01 (N=51)	0.006 (N=25)	0.005 (N=49)	0.01 (N=96)	0.01 (N=109)	0.006 (N=209)
DNE2	Lake Nepean @ 300 m U/S Dam Wall	Upper Nepean	0.01 (N=450)	0.01 (N=37)	0.01 (N=25)	0.01 (N=36)	0.01 (N=35)	0.01 (N=77)	0.011 (N=233)
DNE5	Lake Nepean @ Aerator 1	Upper Nepean	0.01 (N=187)	0.01 (N=9)	NA	NA	NA	NA	NA
DNE7	Lake Nepean @ Aerator 2	Upper Nepean	0.01 (N=181)	0.01 (N=9)	NA	0.01 (N=9)	0.01 (N=9)	NA	NA
DWI1	Wingecarribee lake @ Outlet	Wingecarribee	0.01 (N=237)	0.02 (N=28)	0.03 (N=29)	0.02 (N=66)	0.02 (N=103)	0.01 (N=108)	0.020 (N=119)
DWA311	Lake Burragorang @ Wollondilly Arm 300m u/s Nattai River	Burragorang	NA	NA	NA	NA	NA	NA	0.008 (N=135)
DFF6	Lake Fitzroy Falls @ Dam Wall	Kangaroo	0.01 (N=148)	0.01 (N=39)	0.01 (N=28)	0.02 (N=55)	0.01 (N=79)	0.01 (N=181)	0.013 (N=94)
DBP1	Kangaroo Valley WFP Raw Water	Kangaroo	0.01 (N=63)	NA	NA	0.02 (N=1)	NA	NA	0.031 (N=3)
DTA1	Lake Yarrunga @ 100 m from Dam Wall	Bungonia	0.01 (N=270)	0.01 (N=39)	0.01 (N=37)	0.01 (N=35)	0.01 (N=83)	0.01 (N=104)	0.025 (N=134)
DTA3	Lake Yarrunga @ Kangaroo and Yarrunga Jn.	Kangaroo	0.01 (N=123)	0.01 (N=39)	0.01 (N=26)	0.01 (N=36)	0.01 (N=45)	0.01 (N=77)	0.018 (N=53)
DTA5	Lake Yarrunga @ Shoalhaven River	Bungonia	0.01 (N=90)	0.01 (N=39)	0.01 (N=33)	0.02 (N=16)	0.01 (N=41)	0.01 (N=78)	0.030 (N=130)
DTA8	Lake Yarrunga @ Kangaroo River at Bendeela PS	Kangaroo	0.01 (N=123)	0.02 (N=14)	NA	0.02 (N=20)	0.02 (N=35)	0.013 (N=60)	0.031 (N=113)
DTA10	Lake Yarrunga @ Kangaroo Arm Reed Island	Kangaroo	0.01 (N=89)	0.02 (N=32)	0.02 (N=23)	0.02 (N=19)	0.01 (N=33)	0.01 (N=78)	NA
Pejar	Pejar Dam	Upper Wollondilly	NA	NA	NA	NA	NA	0.04 (N=13)	NA
Sooley	Sooley Dam	Upper Wollondilly	NA	NA	NA	NA	NA	0.04 (N=26)	NA

NA = not available

8.4 Box Plots - Catchment Sites

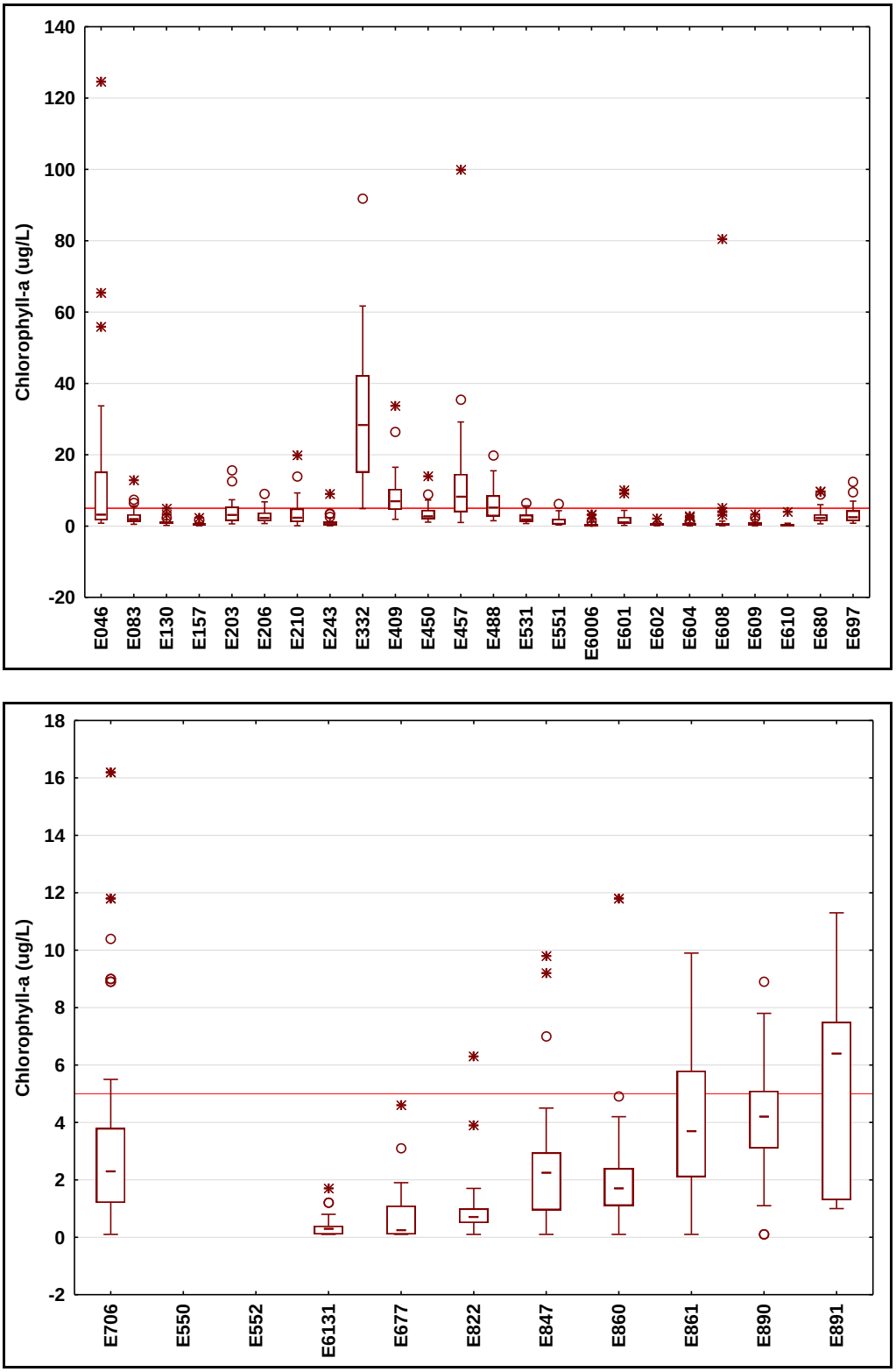


Figure H 8-1 Variation in chlorophyll-a across catchment sites

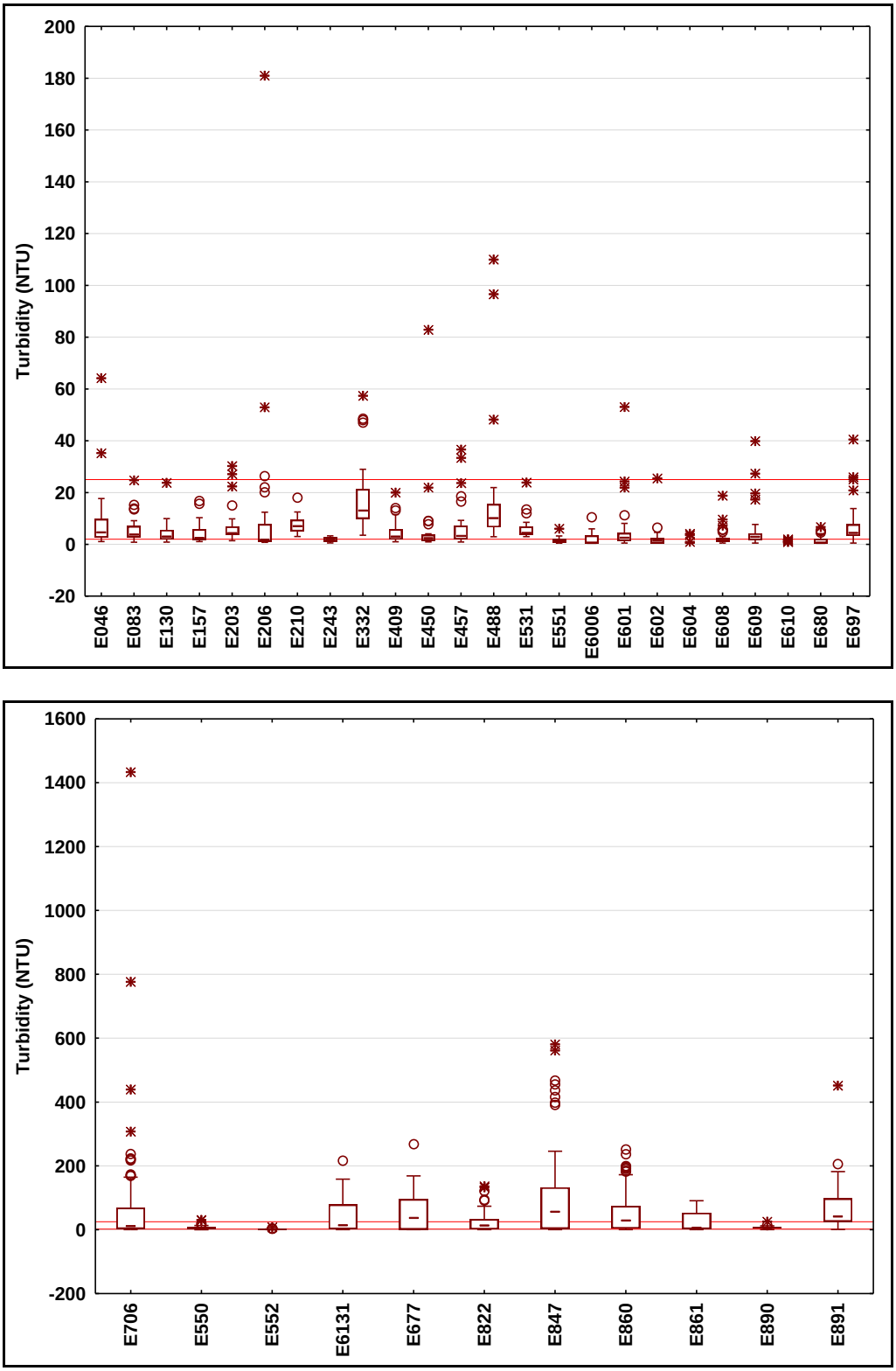


Figure H 8-2 Variation in turbidity across catchment sites

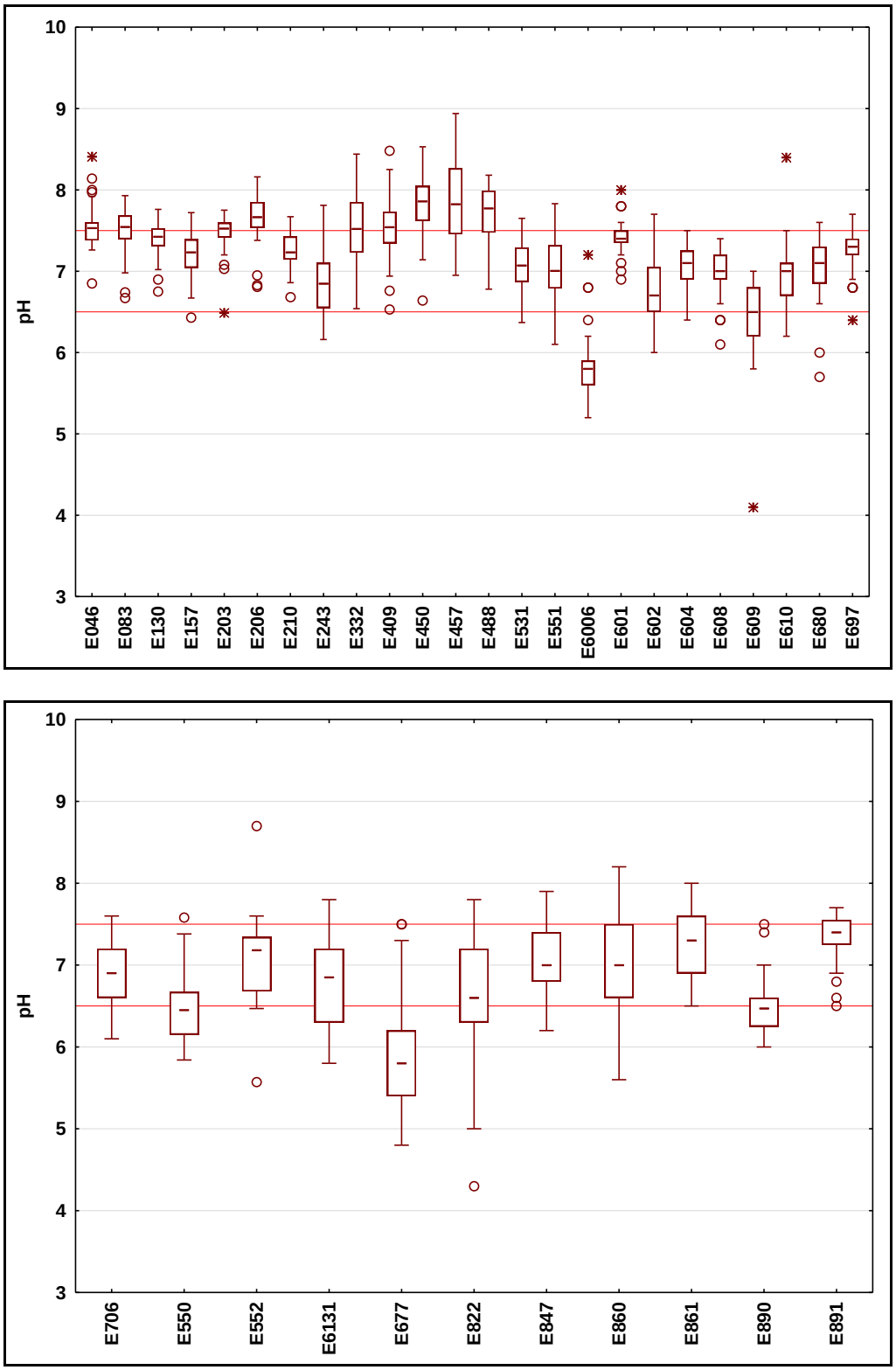


Figure H 8-3 Variation in pH across catchment sites

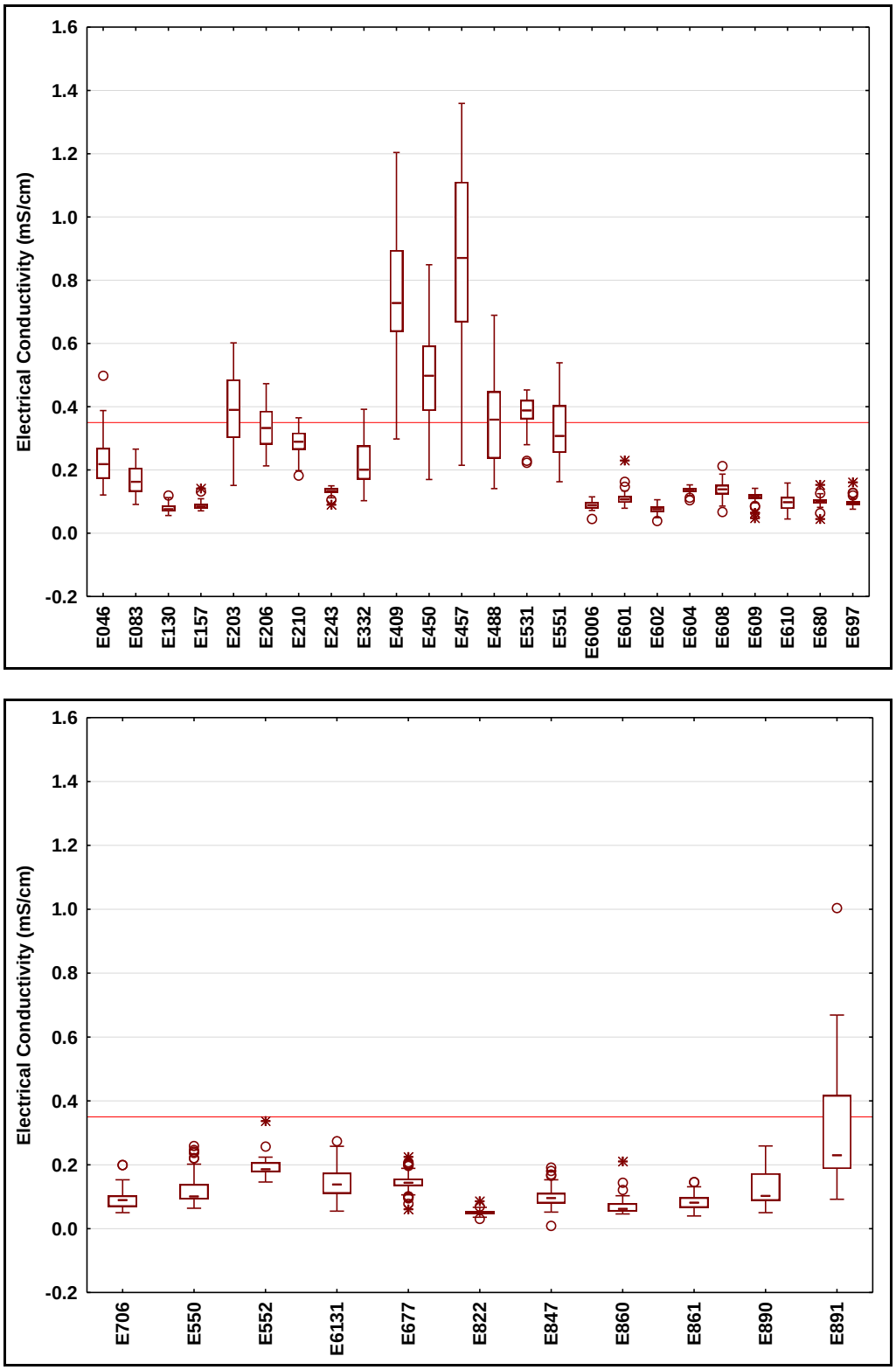


Figure H 8-4 Variation in conductivity across catchment sites

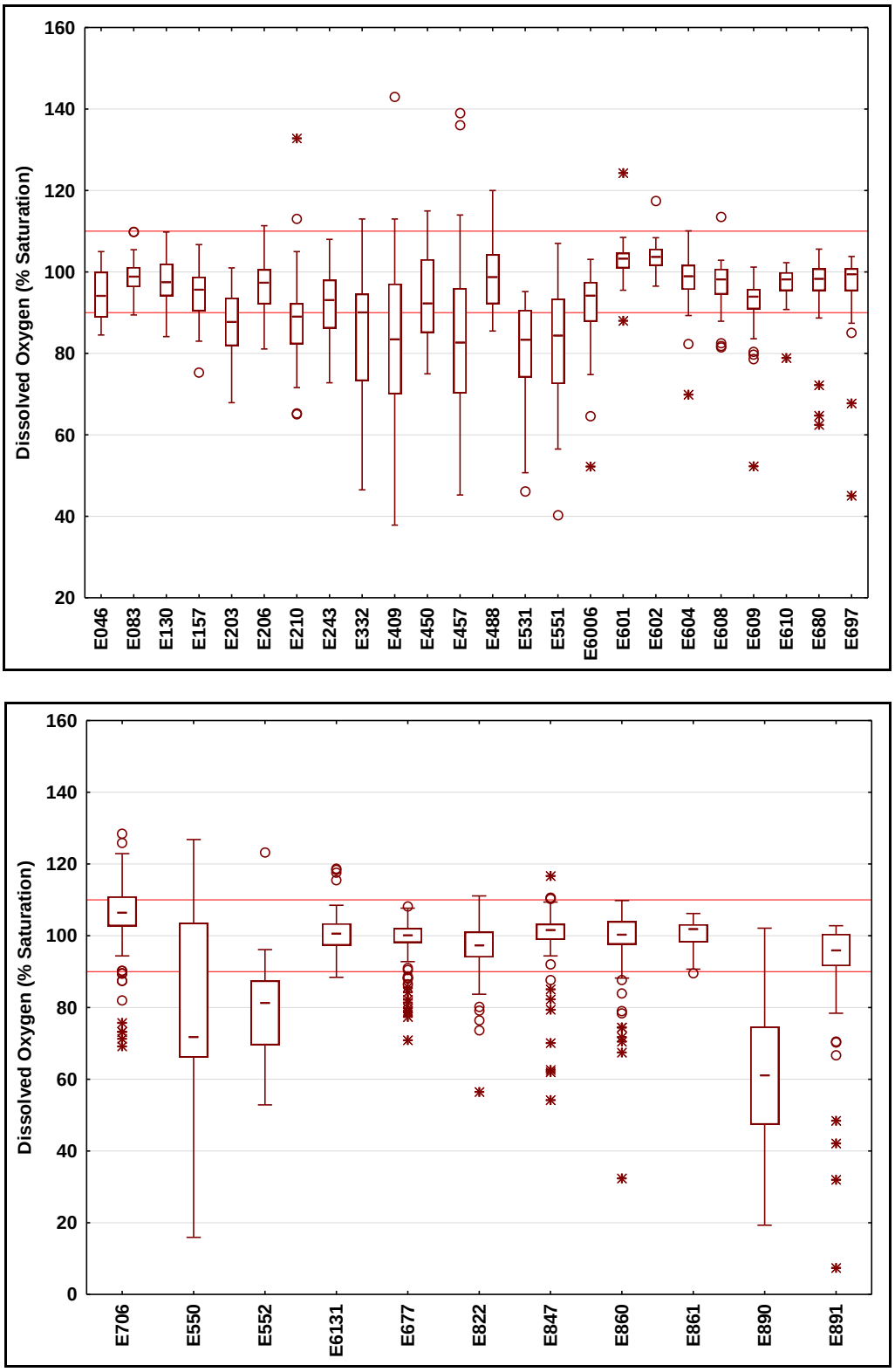


Figure H 8-5 Variation in dissolved oxygen across catchment sites

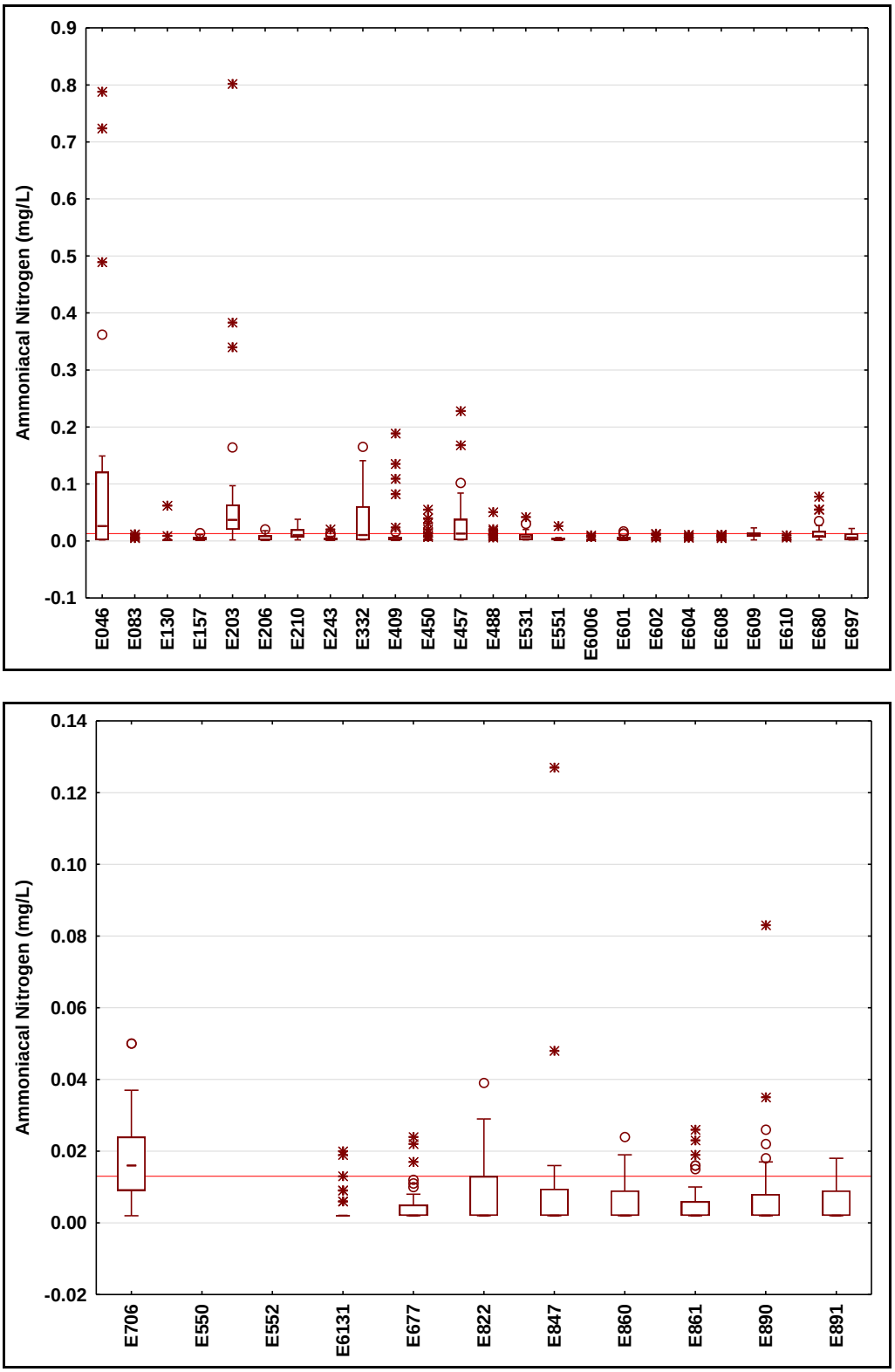


Figure H 8-6 Variation in ammonium-N across catchment sites

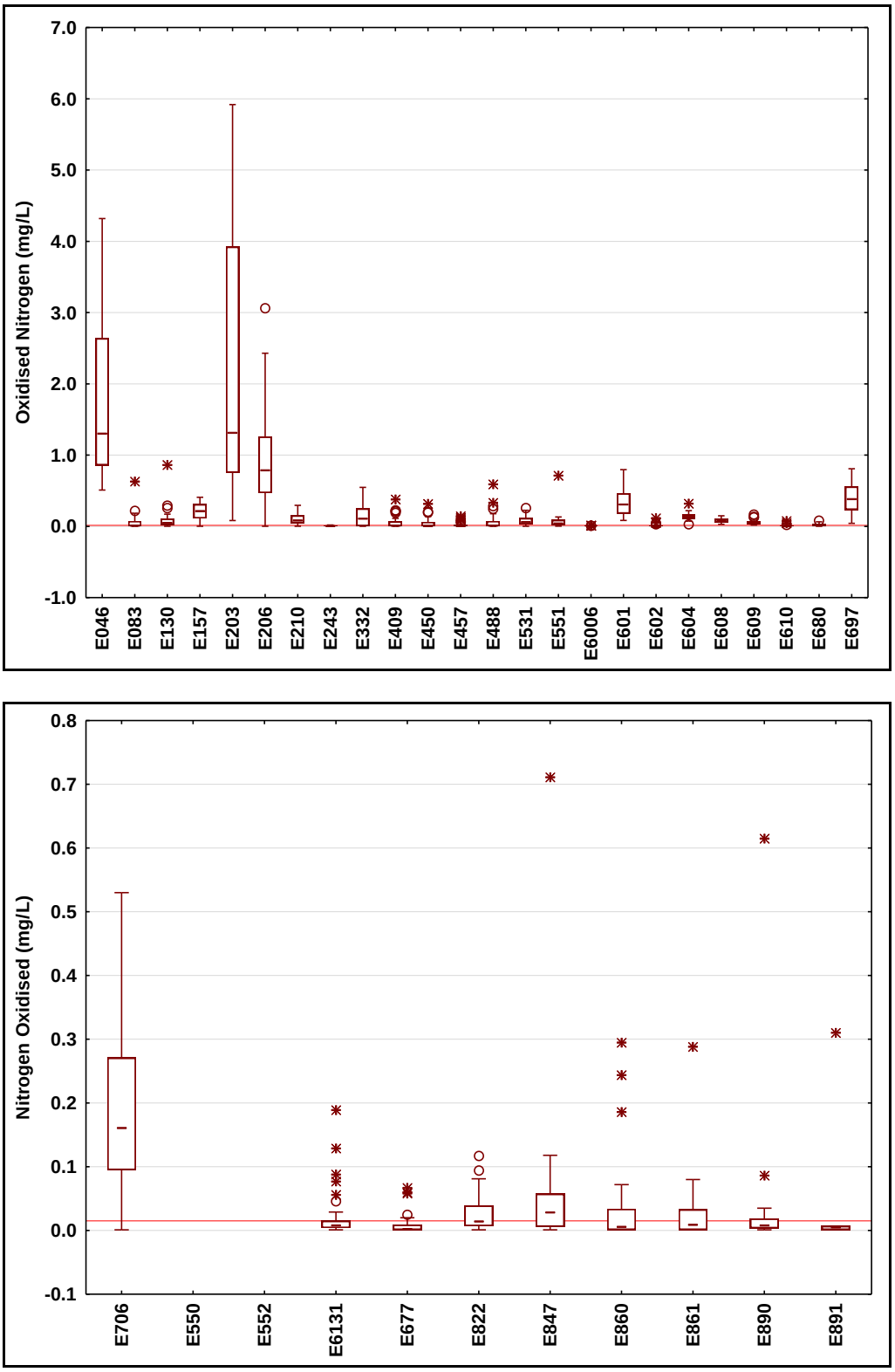


Figure H 8-7 Variation in oxides of N across catchment sites

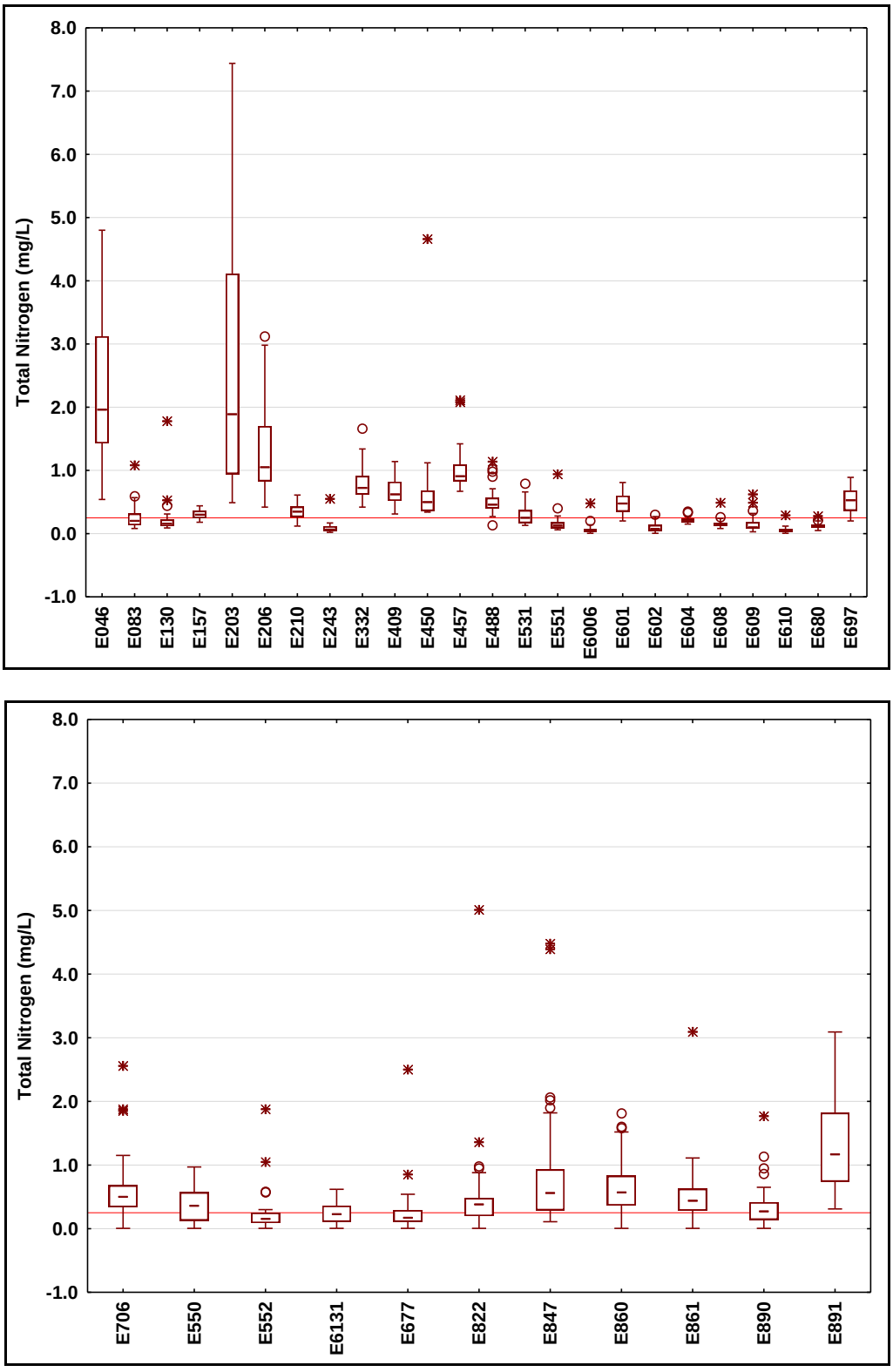


Figure H 8-8 Variation in total N across catchment sites

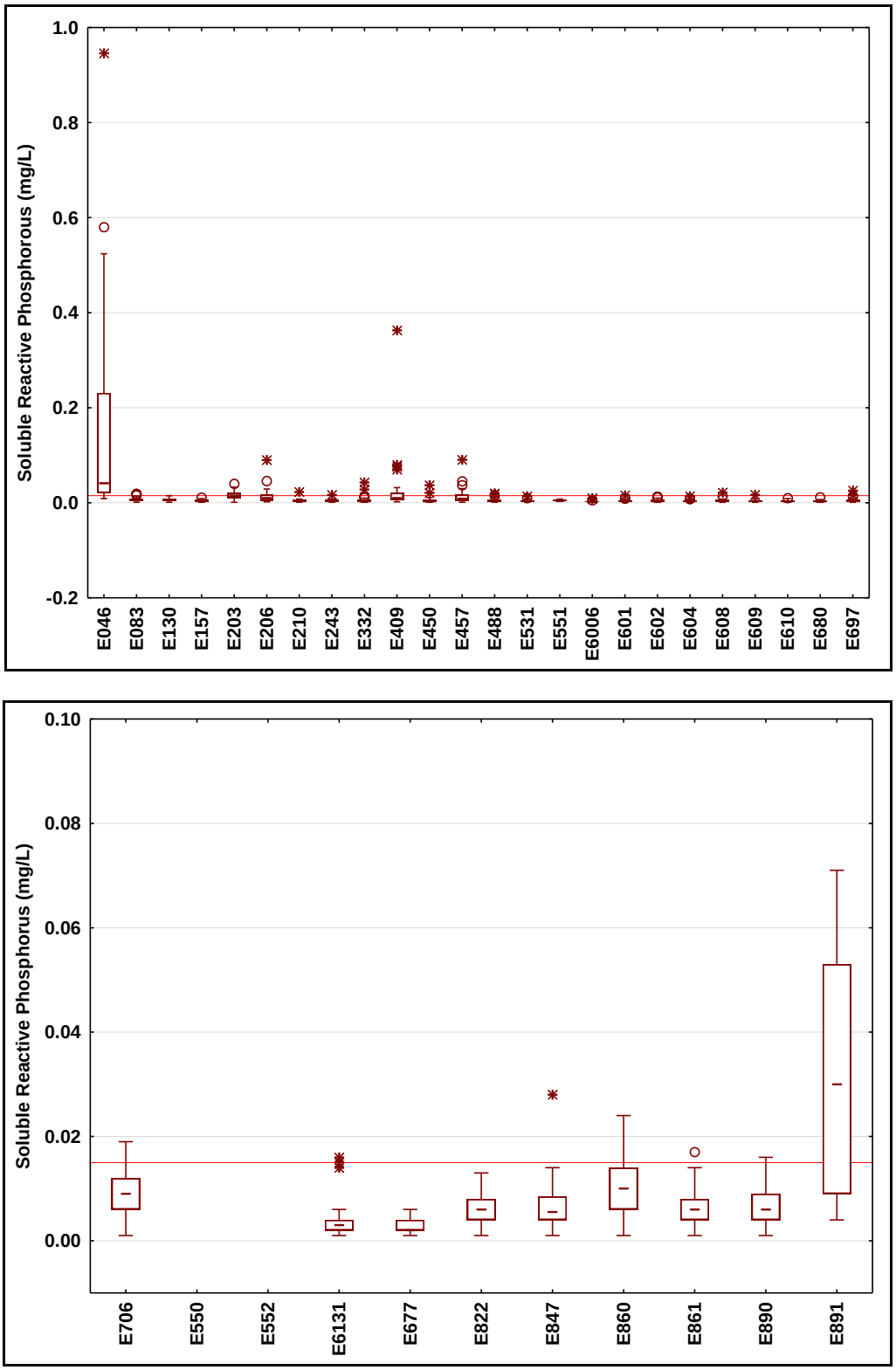
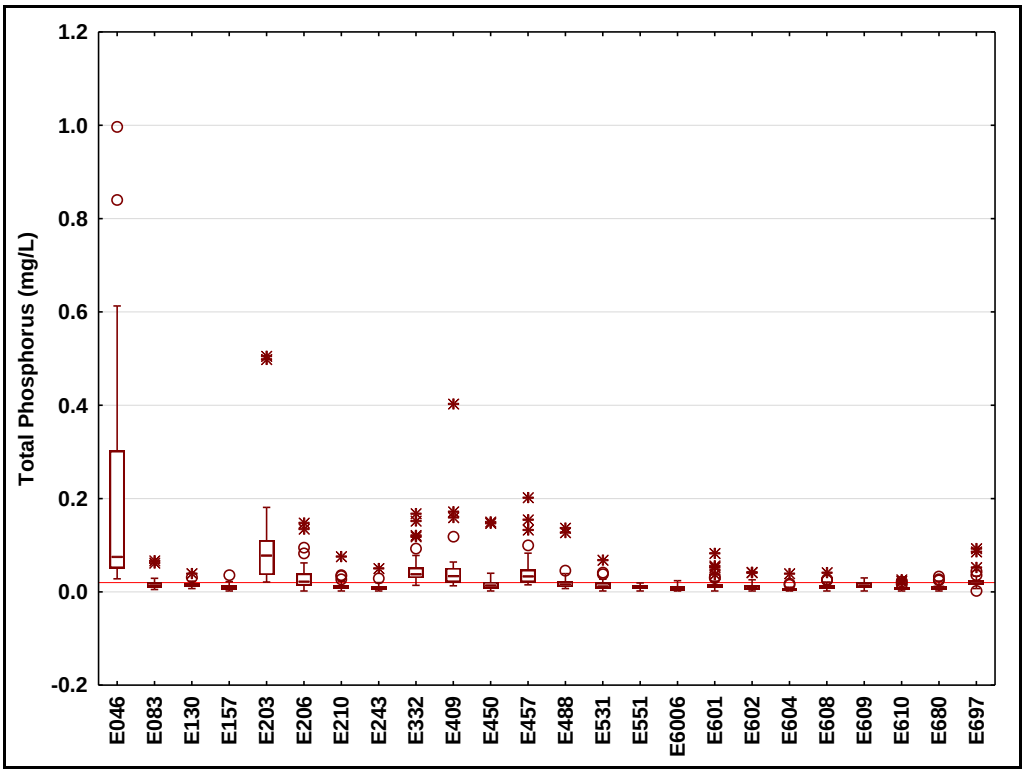


Figure H 8-9 Variation in soluble reactive P across catchment sites



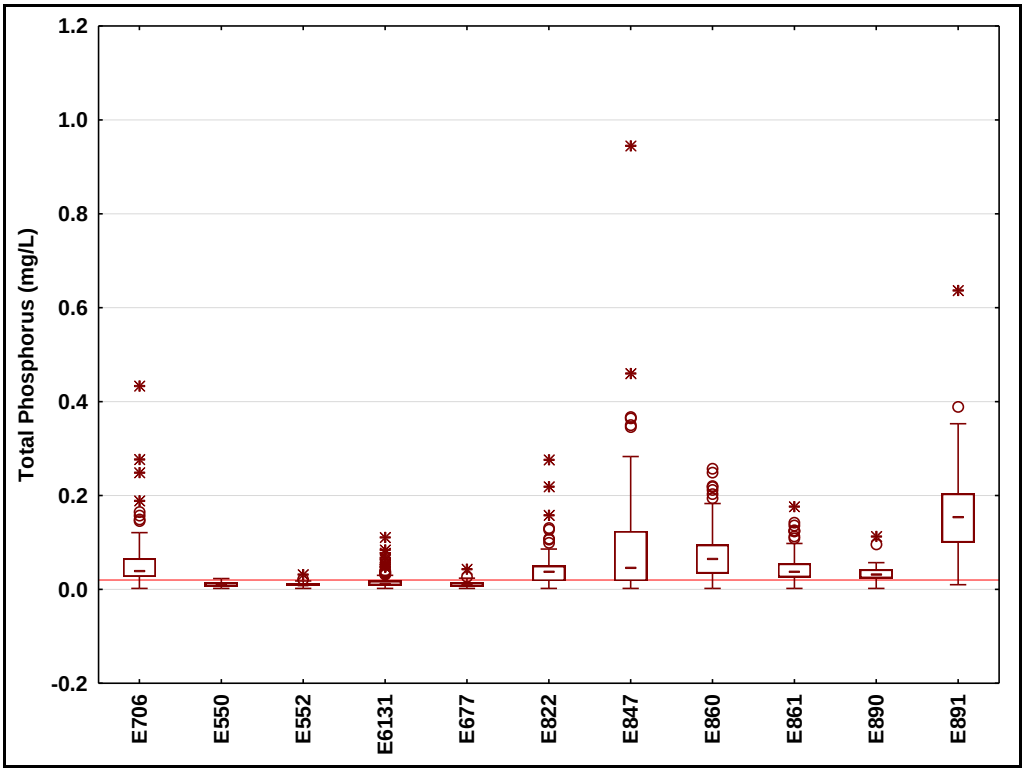


Figure H 8-10 Variation in total P across catchment sites

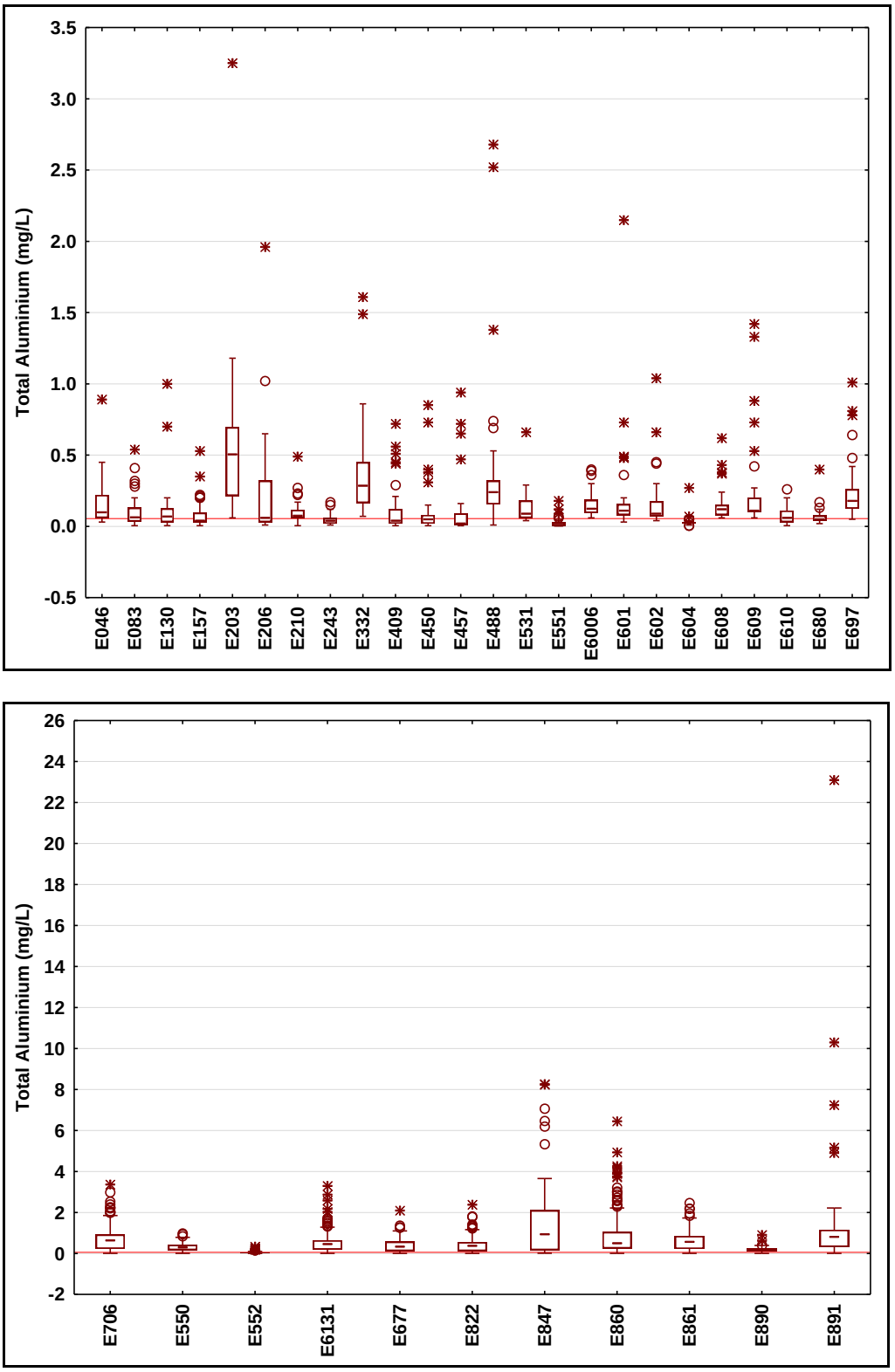


Figure H 8-11 Variation in total aluminium across catchment sites

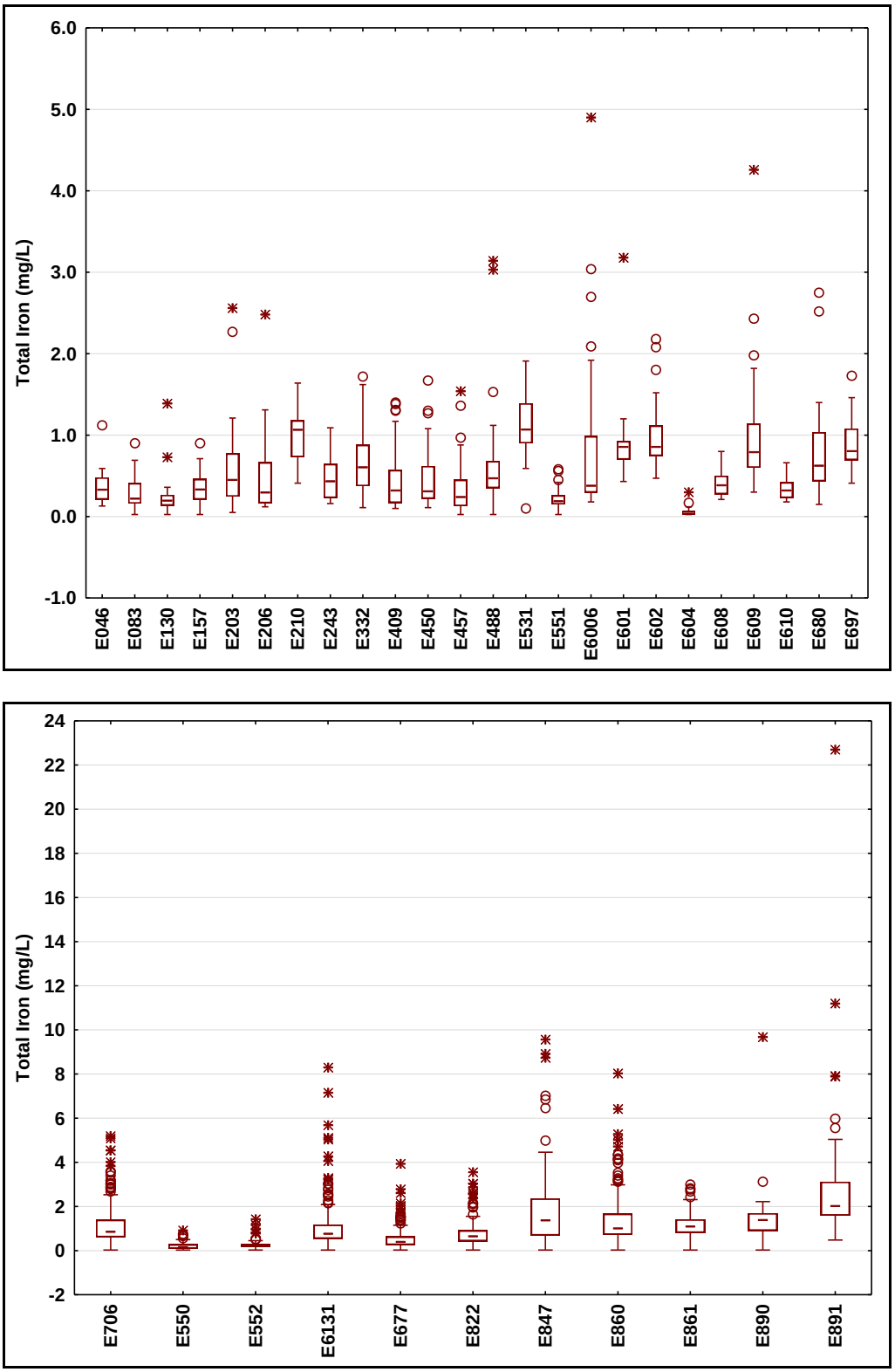


Figure H 8-12 Variation in total iron across catchment sites

8.5 Box Plots - Storage Sites

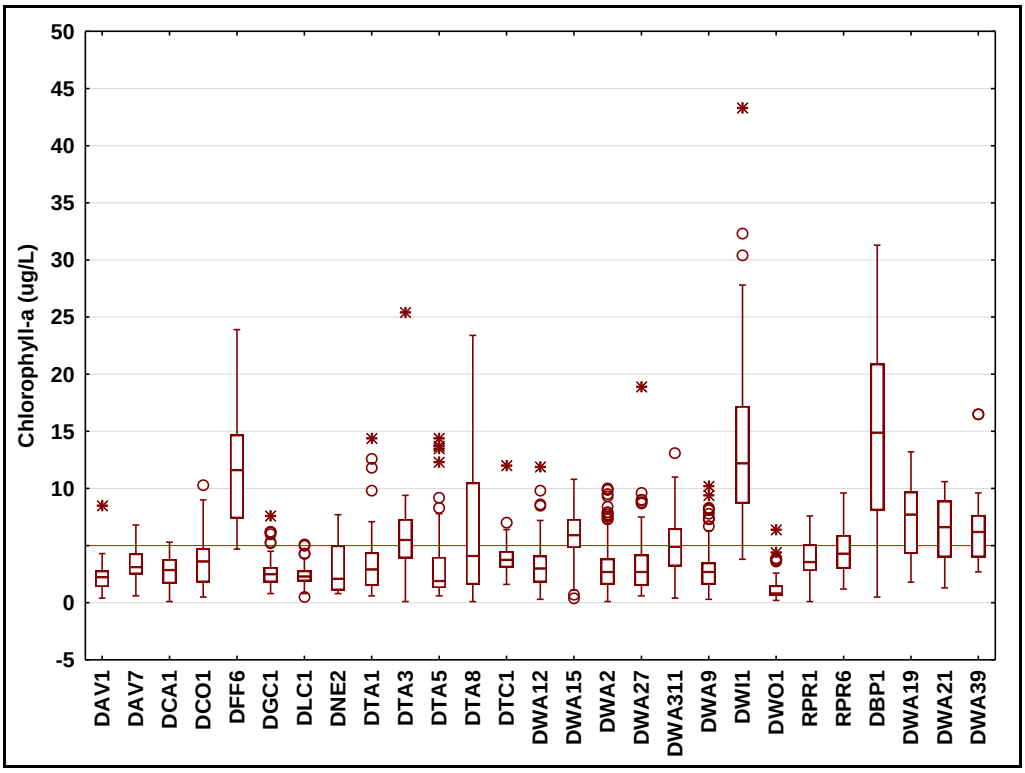


Figure H 8-13 Variation in chlorophyll-a across storage sites

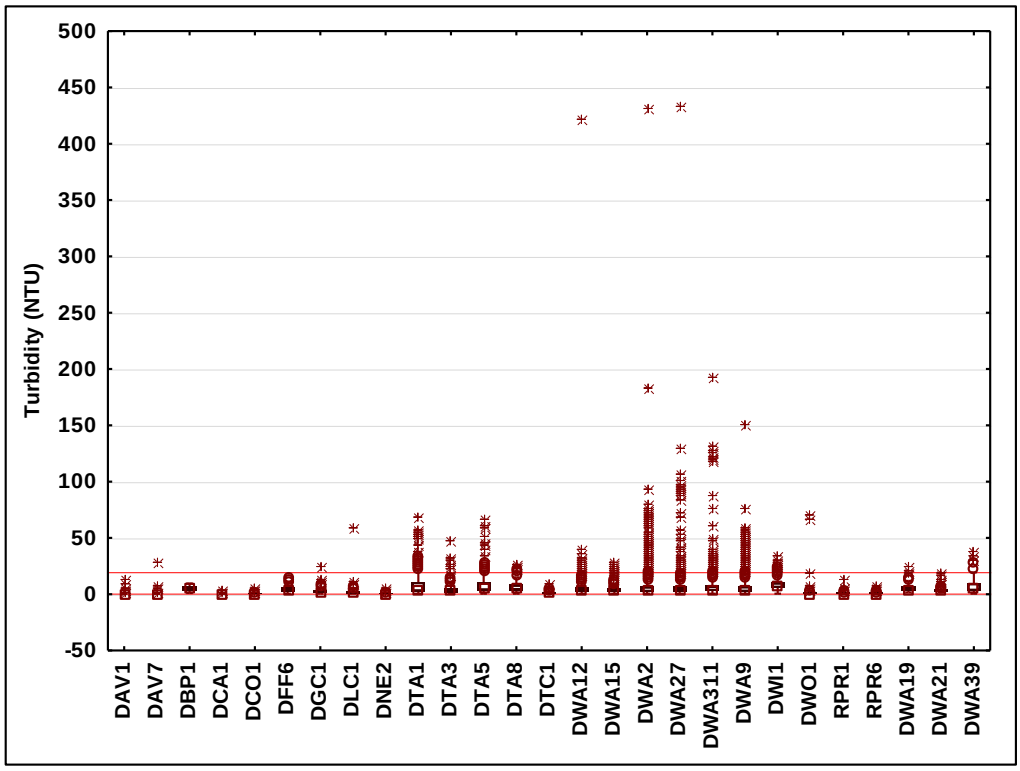


Figure H 8-14 Variation in turbidity across storage sites

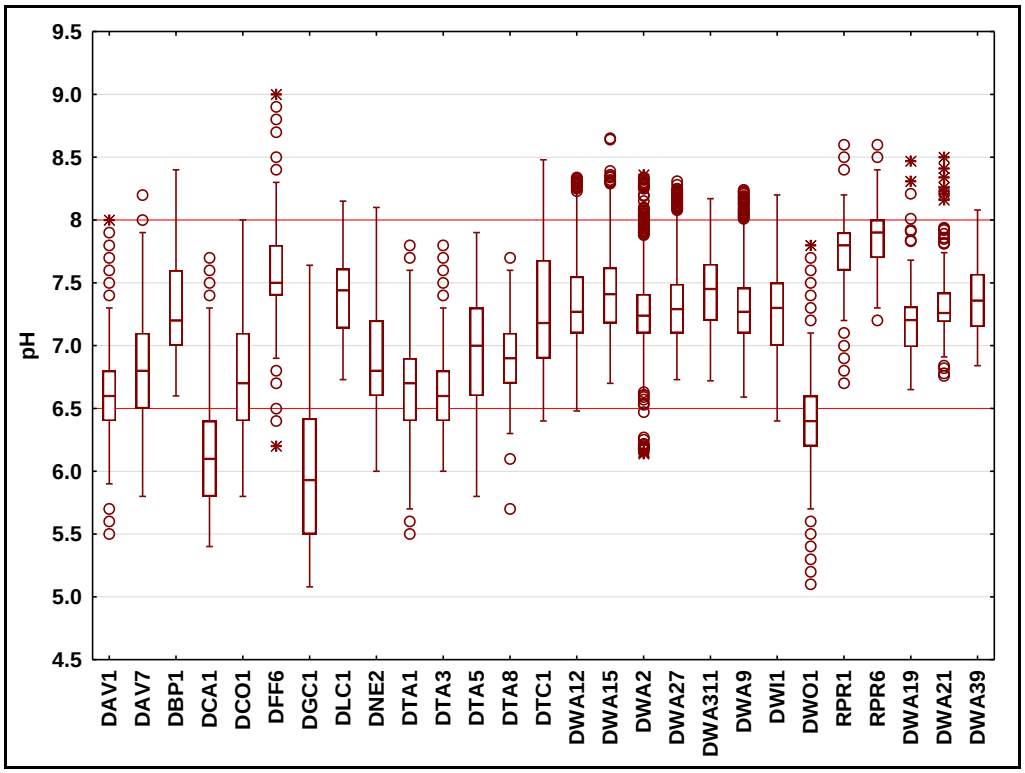


Figure H 8-15 Variation in pH across storage sites

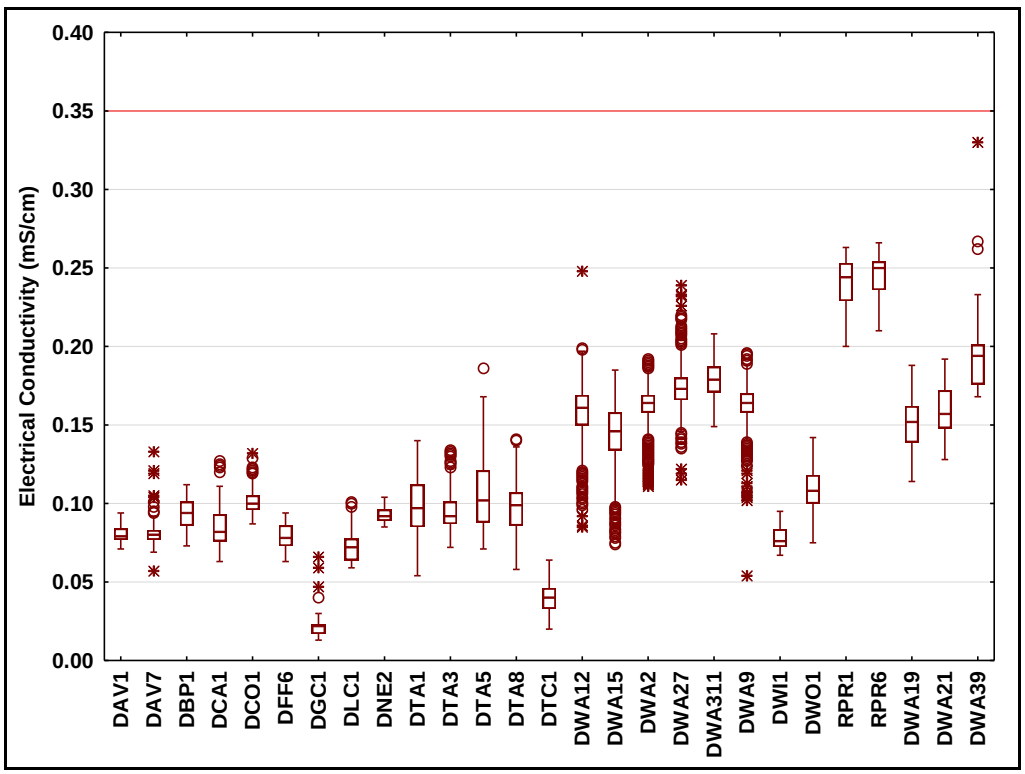


Figure H 8-16 Variation in conductivity across storage sites

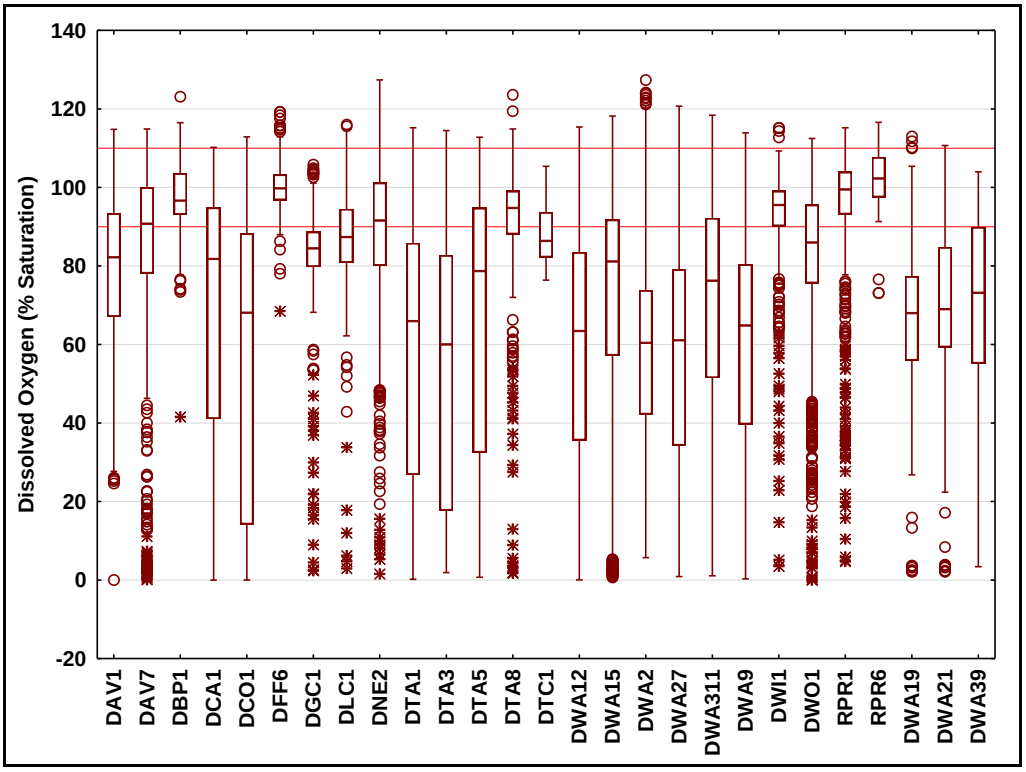


Figure H 8-17 Variation in dissolved oxygen across storage sites

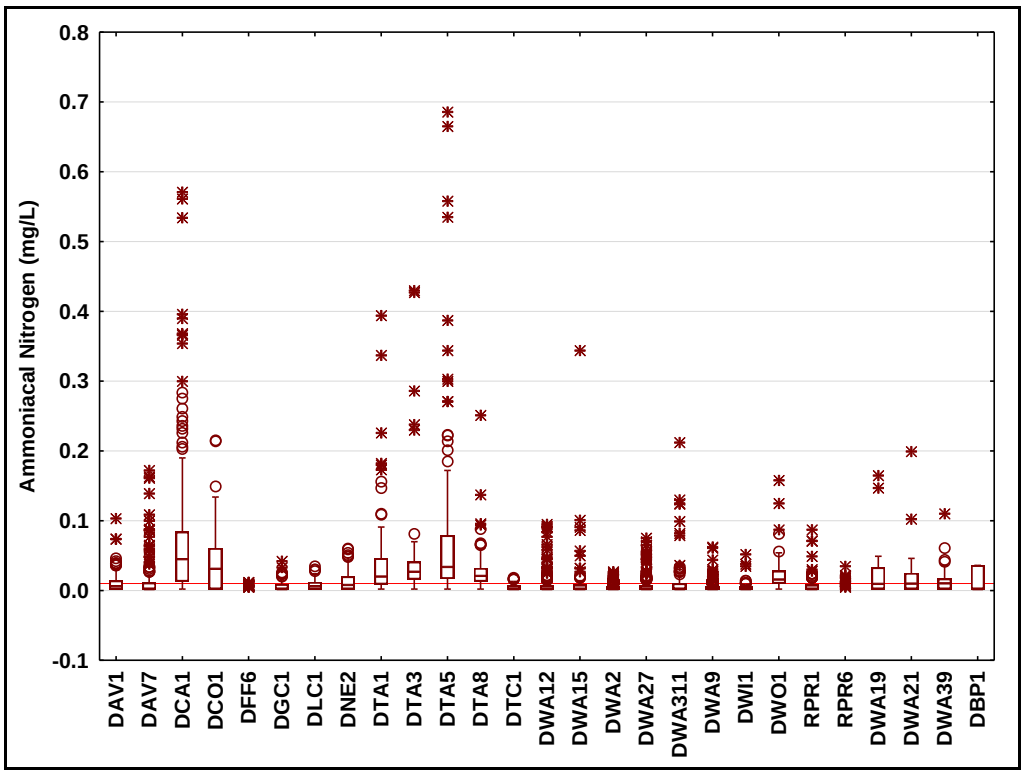


Figure H 8-18 Variation in ammonium-N iron across storage sites

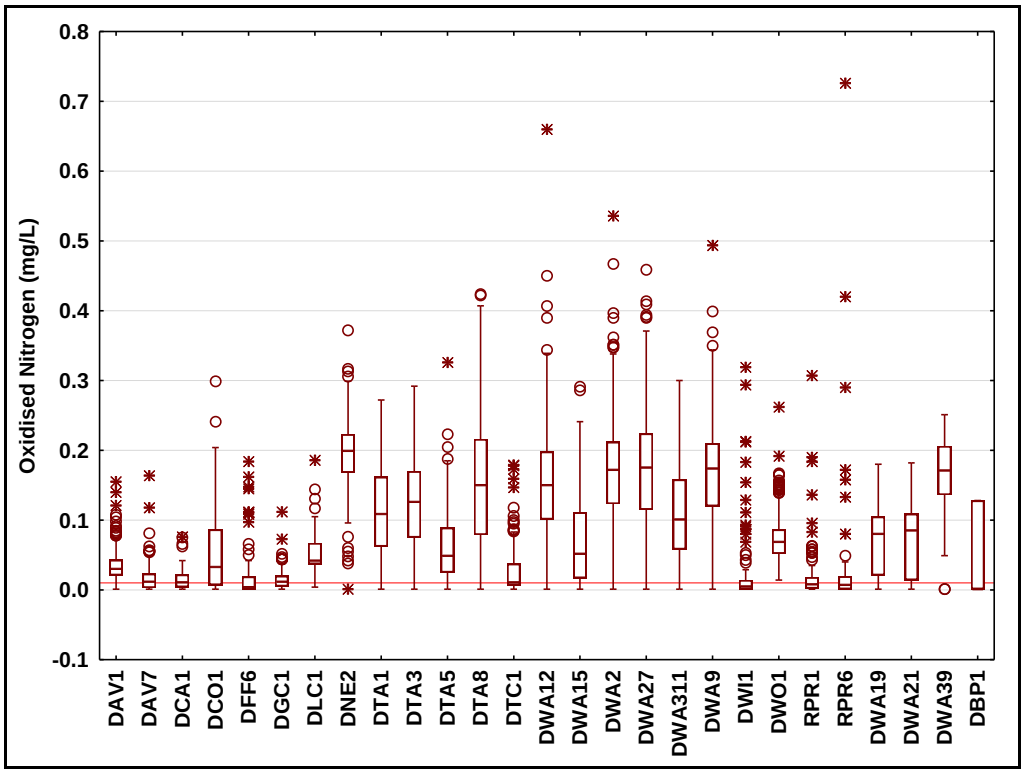


Figure H 8-19 Variation in oxidised N across storage sites

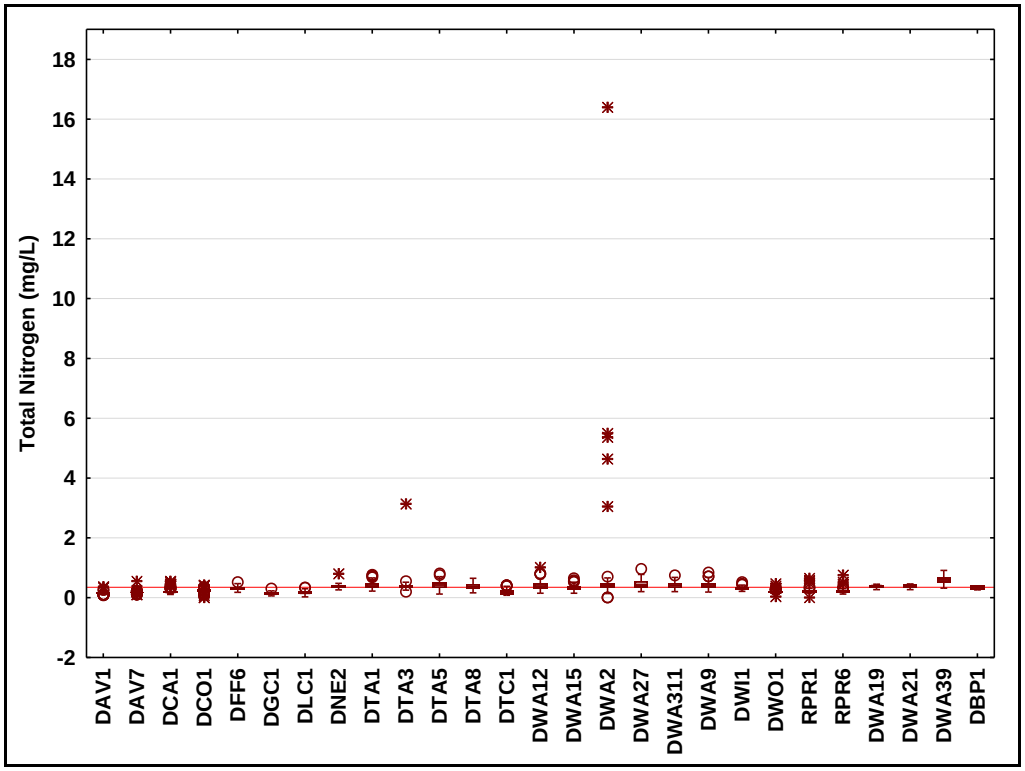


Figure H 8-20 Variation in total N across storage sites

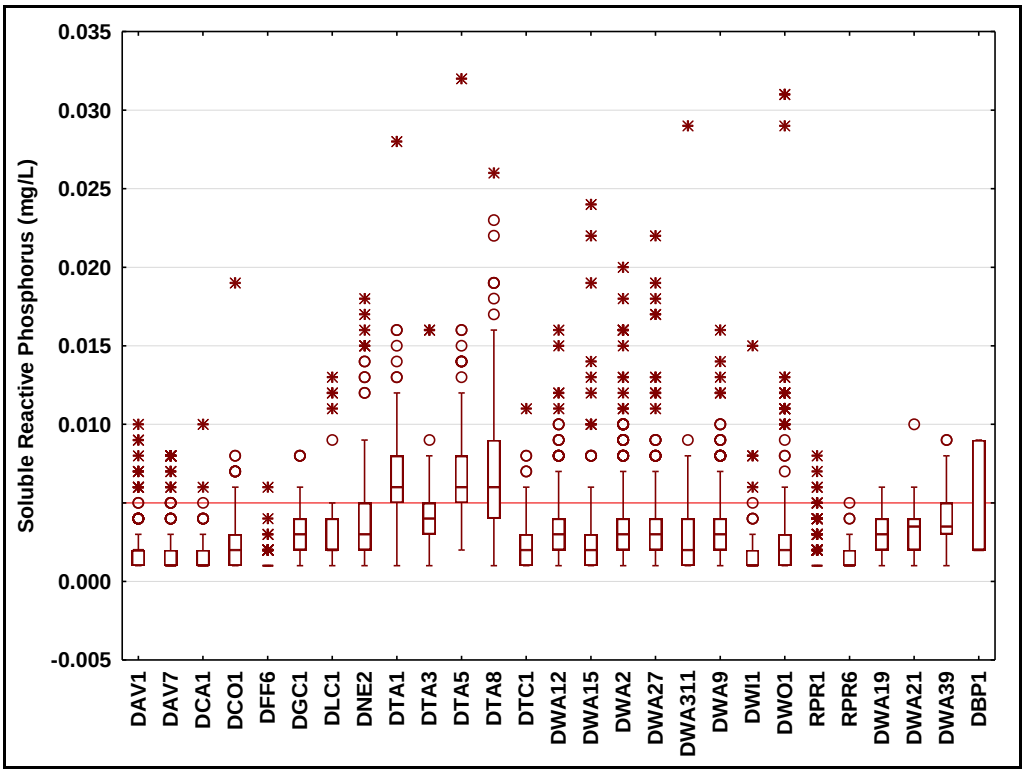


Figure H 8-21 Variation in soluble reactive P across storage sites

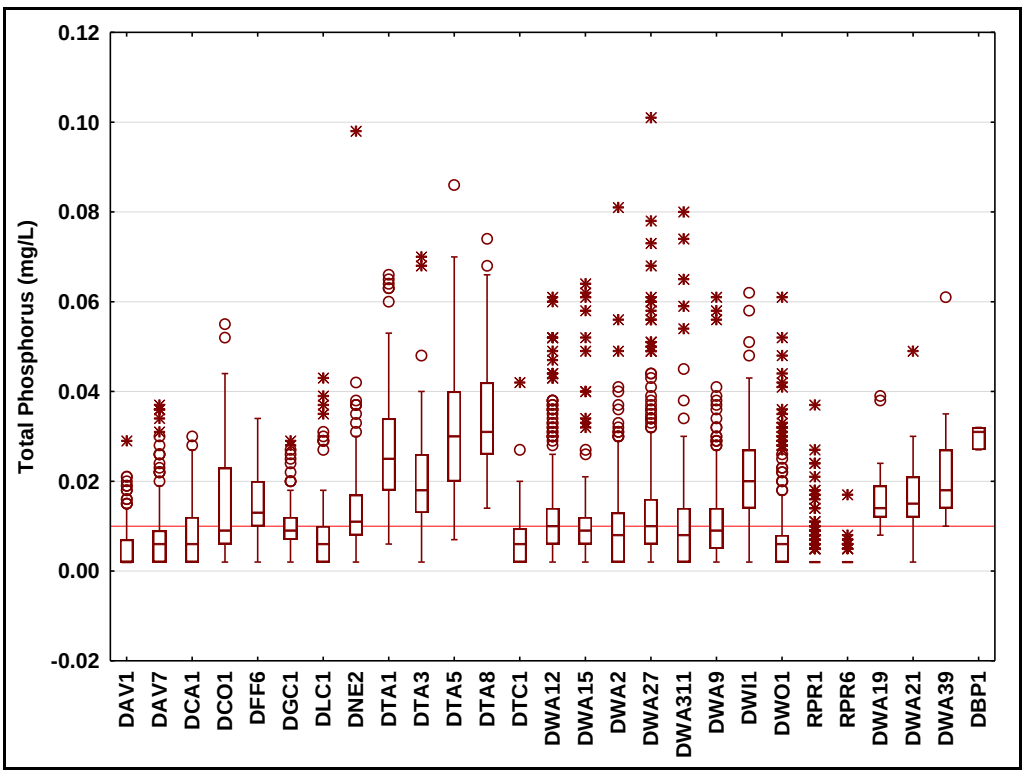


Figure H 8-22 Variation in total P across storage sites

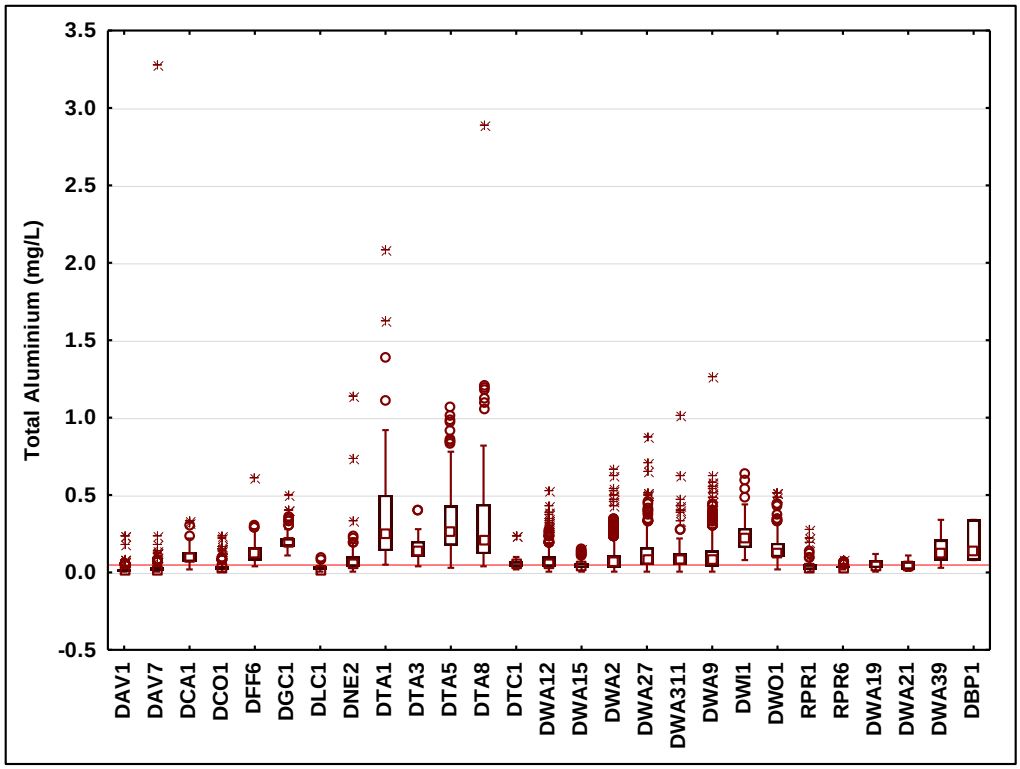


Figure H 8-23 Variation in total aluminium across storage sites

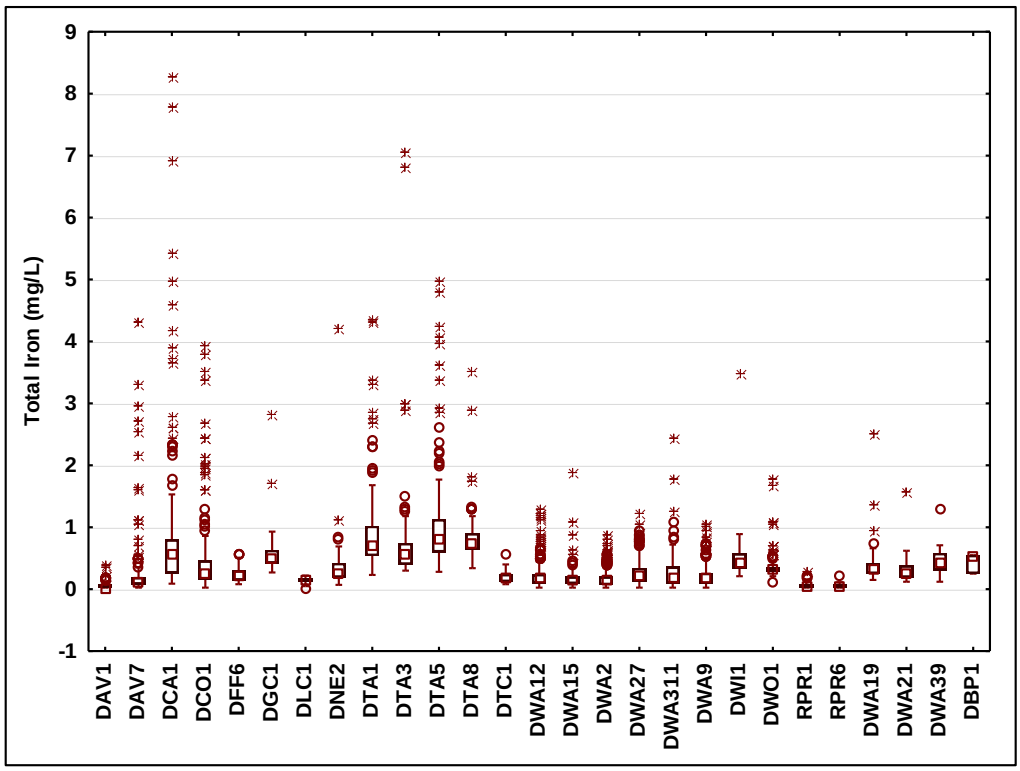


Figure H 8-24 Variation in total iron across storage sites

8.6 Trend Assessments

8.6.1 Catchment Sites

Table H 8-19 Catchment Sites – Results from Seasonal Kendall Trend Analyses for the 12 indicator water quality parameters

Note: Values represent the slope of the trend line, based on all available data. The percentage values in subscript are the level of statistical significance that a trend was associated with the data. NS = No significant trend. Colour coding: Red indicates an increasing trend; Yellow no trend; and Blue a decreasing trend.

	Chl à (µg/L)	Turbidity (NTU)	pH (units)	EC (µS/cm)	DO (% Saturation)	TN (mg/L)	NH_3 (mg/L)	NOx (mg/L)	TP (mg/L)	SRP (mg/L)	Al (mg/L)	Fe (mg/L)
E046	-0.47 95%	0.2 90%	0.0 95%	-0.027 95%	1.2 95%	-0.122 95%	NS	-0.173 95%	-0.017%	-0.032 95%	0.008 95%	NS
E083	0.09 95%	NS	NS	0.002 95%	NS	0.004 95%	-0.001 95%	NS	0.000 95%	0.000 95%	0.003 95%	0.011 95%
E157	NS	-0.1 90%	NS	0.001 95%	0.4 95%	-0.011 95%	-0.001 95%	0.005 90%	-0.001 95%	NS	0.001 80%	0.019 95%
E130	0.05 95%	0.0 90%	0.0 95%	NS	NS	NS	-0.001 95%	0.001 95%	0.000 95%	0.000 90%	0.002 95%	0.010 95%
E550	NA	0.0 80%	0.0 95%	-0.007 95%	2.0 90%	NS	-0.001 95%	-0.001 95%	NS	0.000 95%	NS	NS
E551	-0.13 80%	NS	0.1 95%	-0.007 80%	1.4 95%	NS	-0.001 95%	0.003 95%	0.001 95%	0.000 80%	0.000 90%	0.016 95%
E552	NA	NS	0.1 95%	NS	3.2 95%	-0.006 95%	-0.002 95%	0.003 95%	NS	0.000 95%	0.000 95%	NS
E531	0.08 95%	-0.1 95%	-0.0 95%	NS	0.4 95%	NS	-0.001 95%	NS	0.000 95%	NS	0.002 95%	0.018 95%
E243	-0.02 90%	0.0 95%	0.0 95%	-0.001 95%	0.4 80%	-0.011 95%	-0.002 95%	-0.003 95%	NS	NS	0.000 90%	NS
E203	0.12 90%	0.4 90%	0.0 95%	-0.017 95%	1.1 95%	-0.298 95%	-0.009 95%	-0.205 95%	-0.003 80%	-0.001 95%	NS	0.016 80%
E206	NS	-0.1 95%	0.0 95%	NS	0.7 95%	-0.022 95%	-0.001 95%	-0.033 95%	0.002 95%	-0.001 95%	0.021 95%	0.064 95%
E210	0.06 95%	0.1 90%	0.0 90%	0.006 95%	-0.3 95%	NS	-0.001 95%	NS	0.000 95%	NS	0.001 80%	0.041 95%
E601	0.02 95%	-0.3 95%	NS	NS	0.9 95%	-0.011 95%	NS	NS	NS	NS	NS	NS
E602	0.01 95%	0.0 80%	0.0 95%	-0.001 95%	1.0 95%	-0.002 90%	-0.001 95%	0.000 95%	0.000 95%	0.000 90%	0.004 95%	0.010 95%
E697	-0.29 95%	NS	0.0 95%	NS	1.0 95%	0.014 95%	-0.001 95%	0.030 95%	0.000 80%	0.000 80%	0.009 95%	0.033 95%
E6006	NS	-0.1 95%	NS	-0.003 95%	1.0 95%	-0.006 95%	-0.001 95%	-0.001 95%	0.001 95%	NS	0.009 95%	0.017 90%
E604	0.00 90%	-0.1 95%	0.0 95%	0.002 95%	2.5 95%	NS	-0.001 95%	-0.004 80%	NS	0.000 95%	NS	0.000 95%
E608	0.02 95%	-0.3 95%	0.0 80%	-0.005 95%	2.6 95%	NS	-0.001 95%	NS	0.001 95%	0.000 95%	0.007 95%	0.020 95%
E609	NS	-0.2 95%	0.0 95%	-0.003 95%	2.6 95%	NS	-0.001 80%	NS	0.002 95%	0.000 95%	0.014 95%	0.032 90%
E610	NS	-0.2 95%	0.0 90%	-0.003 95%	2.2 95%	-0.005 80%	-0.001 95%	-0.000 95%	0.000 80%	0.000 95%	0.012 95%	NS
E680	0.10 80%	-0.1 80%	0.0 90%	-0.001 95%	1.9 95%	-0.008 95%	NS	NS	0.001 95%	0.000 95%	0.010 95%	0.085 95%

	Chl à (µg/L)	Turbidity (NTU)	pH (units)	EC (µS/cm)	DO (% Saturation)	TN (mg/L)	NH_3 (mg/L)	NOx (mg/L)	TP (mg/L)	SRP (mg/L)	Al (mg/L)	Fe (mg/L)
E409	-0.27 90%	-0.2 95%	0.0 95%	NS	NS	-0.019 95%	-0.001 95%	-0.001 95%	-0.007 95%	-0.007 95%	0.003 95%	0.028 95%
E450	-0.22 95%	NS	NS	-0.021 95%	NS	NS	-0.001 95%	0.000 80%	0.001 80%	0.000 95%	0.008 95%	0.040 95%
E488	0.52 95%	0.5 95%	0.0 95%	-0.009 95%	NS	NS	-0.001 95%	-0.001 95%	0.001 95%	0.000 95%	0.014 95%	0.026 95%
E457	-0.81 95%	-0.4 95%	NS	0.066 95%	NS	-0.046 95%	NS	-0.004 95%	-0.003 90%	NS	-0.015 95%	NS
E332	0.55 95%	-0.3 80%	NS	0.002 95%	0.4 95%	-0.021 95%	-0.003 95%	-0.014 95%	NS	-0.001 95%	0.016 95%	0.023 95%
E677	0.00 80%	-0.1 90%	-0.1 90%	-0.005 95%	1.3 95%	NS	-0.001 95%	-0.001 95%	0.000 90%	0.000 95%	0.013 95%	0.029 95%
E6131	0.00 95%	NS	NS	-0.013 95%	2.0 95%	NS	-0.001 95%	NS	0.001 95%	0.000 95%	0.032 95%	0.102 95%
G0515	0.04 95%	0.0 80%	-0.1 95%	NS	NS	NS	NS	NS	0.000 95%	NS	-0.003 95%	NS
E706	0.10 95%	-0.1 95%	0.0 95%	0.001 95%	0.7 95%	NS	NS	0.010 95%	0.001 95%	NS	NS	0.017 95%
E847	0.13 95%	-0.2 90%	0.0 90%	NS	0.4 95%	-0.004 90%	-0.001 95%	-0.001 90%	NS	0.000 95%	NS	0.017 95%
E890	0.35 95%	0.3 95%	NS	0.004 95%	-0.9 95%	0.007 90%	-0.001 95%	NS	0.003 95%	0.000 95%	NS	0.063 95%
E851	0.18 95%	-0.4 95%	0.0 95%	0.002 95%	0.2 90%	-0.005 95%	NS	NS	-0.001 95%	-0.001 90%	-0.021 95%	-0.034 95%
E861	NS	-0.4 95%	0.0 80%	-0.002 95%	0.6 95%	NS	-0.001 95%	0.000 80%	0.001 95%	NS	NS	0.055 95%
E822	NS	-0.1 95%	0.0 95%	0.000 95%	0.7 95%	NS	-0.000 95%	NS	0.001 95%	NS	0.003 95%	0.020 95%
E891	NS	0.5 95%	0.0 80%	-0.023 95%	1.8 95%	0.016 95%	0.000 95%	NS	0.003 95%	0.000 80%	0.000 95%	0.073 95%
E860	-0.07 95%	-0.4 95%	0.0 95%	-0.003 95%	0.9 95%	-0.006 80%	-0.001 95%	NS	0.002 95%	NS	0.007 95%	0.056 95%

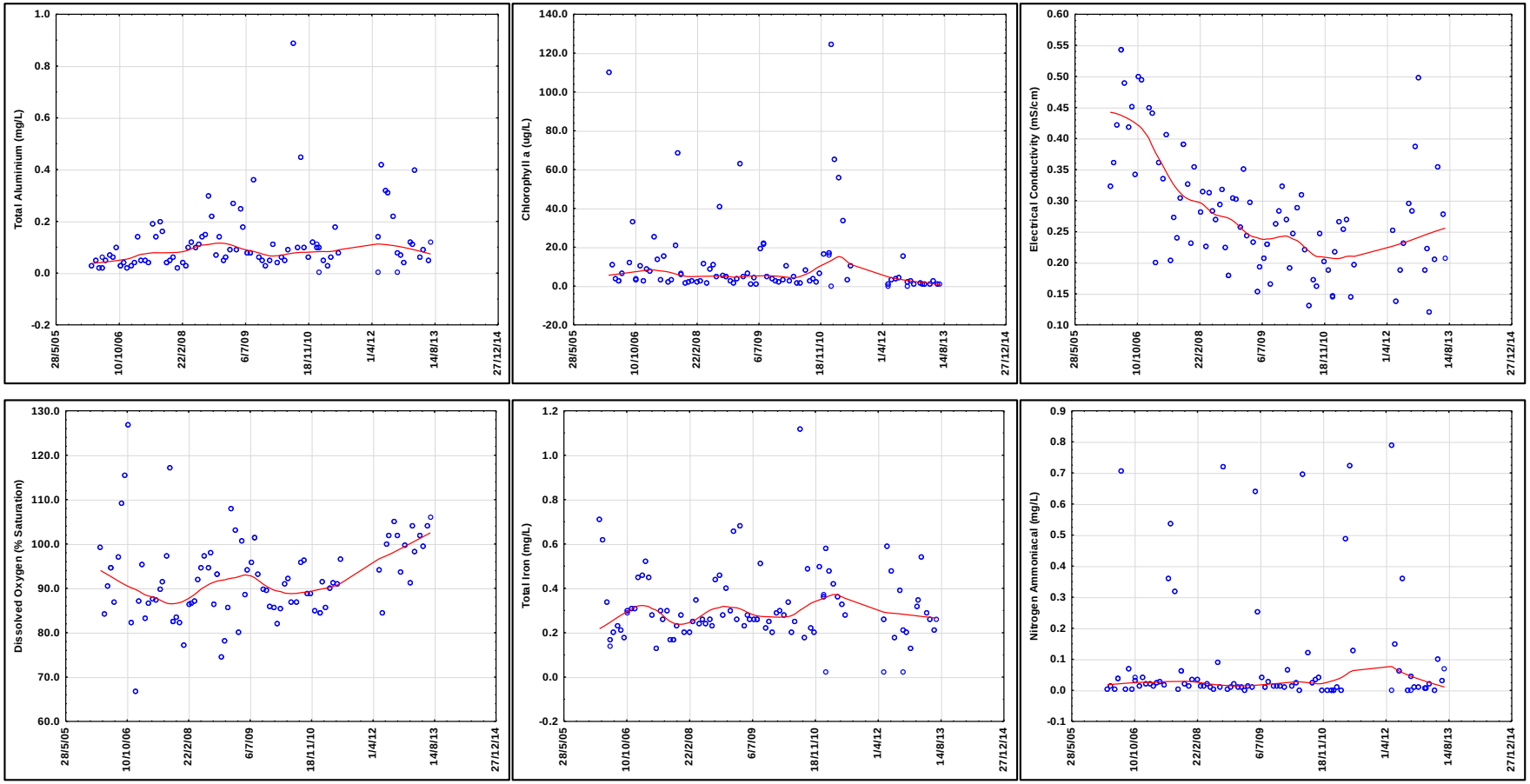


Figure H 8-25 Time-series plots of water quality parameters at E046

Note: The red line of best fit is based on the LOWESS smoothing method

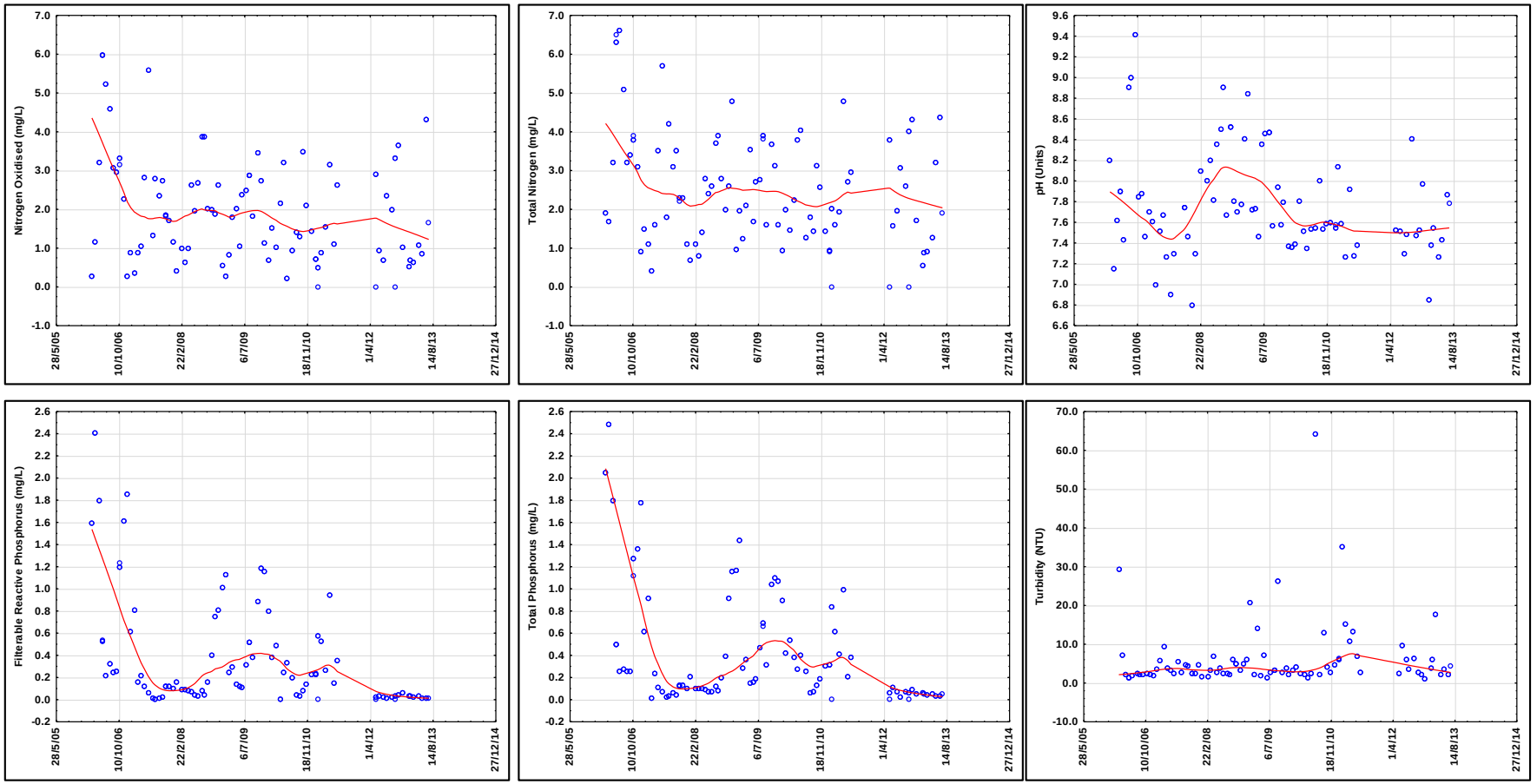


Figure H 8-25 (cont.) Time-series plots of water quality parameters at E046

Note: The red line of best fit is based on the LOWESS smoothing method

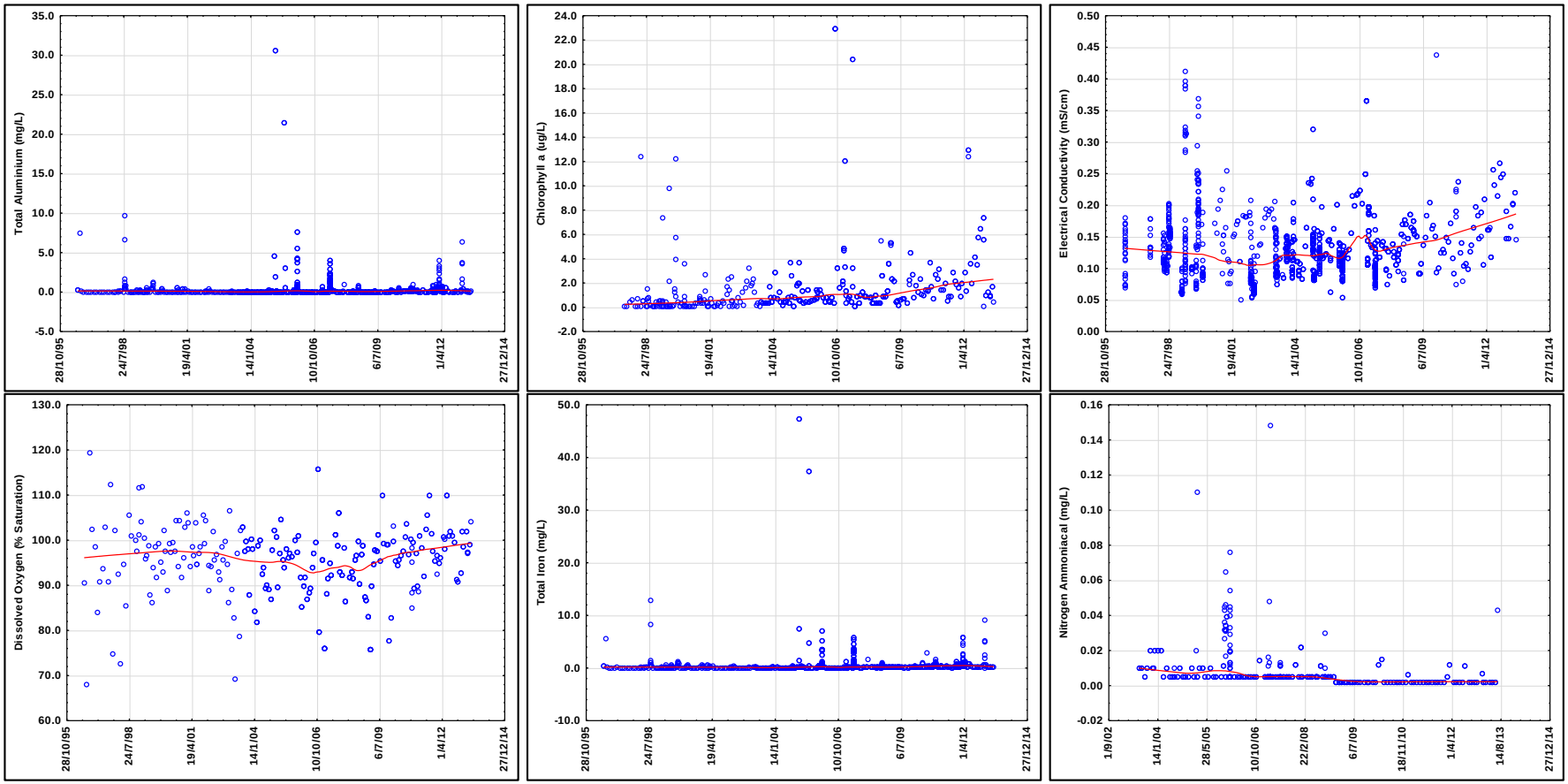


Figure H 8-26 Time-series plots of water quality parameters at E083

Note: The red line of best fit is based on the LOWESS smoothing method

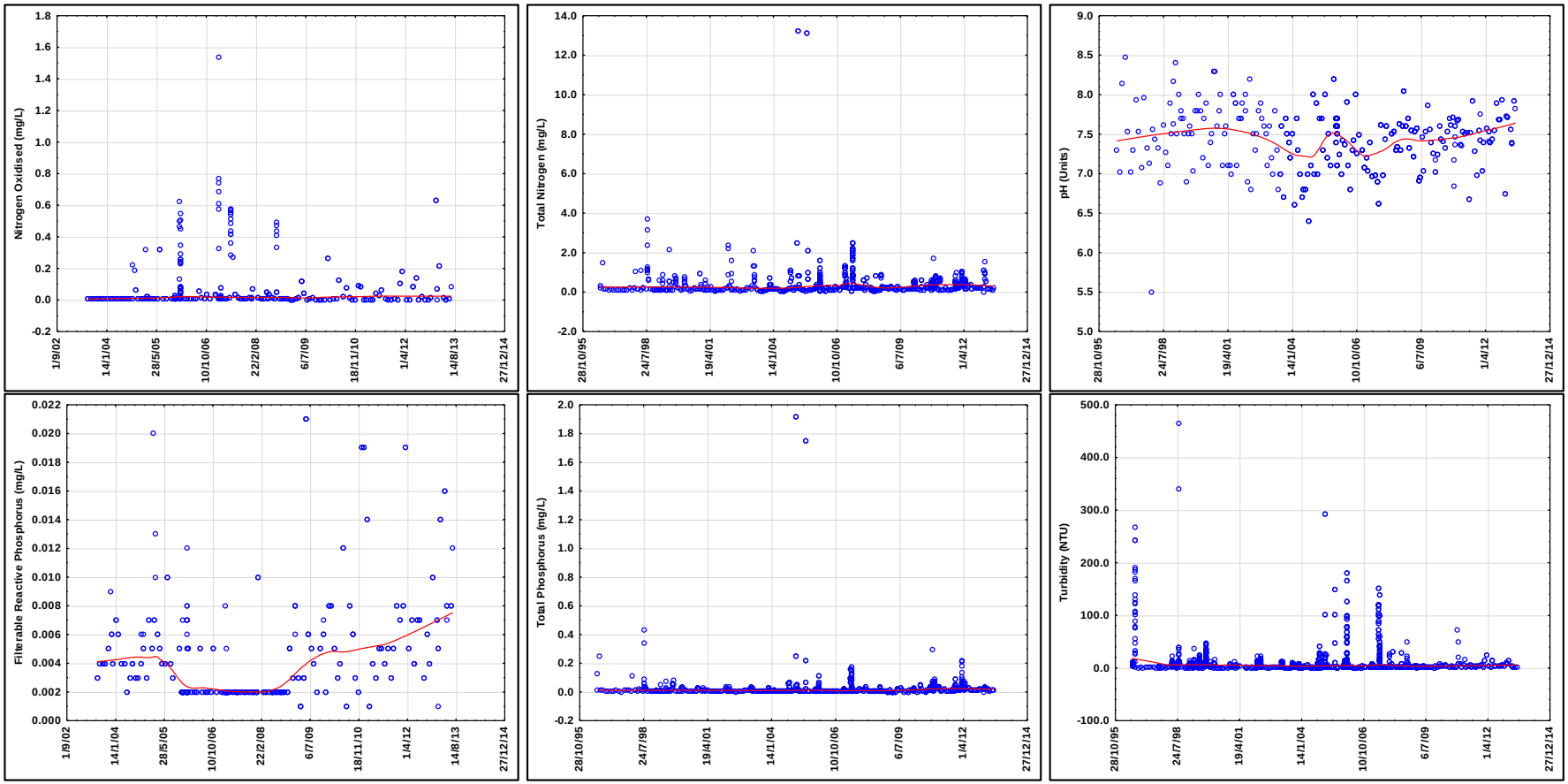


Figure H 8-26 (cont.) Time-series plots of water quality parameters at E083

Note: The red line of best fit is based on the LOWESS smoothing method

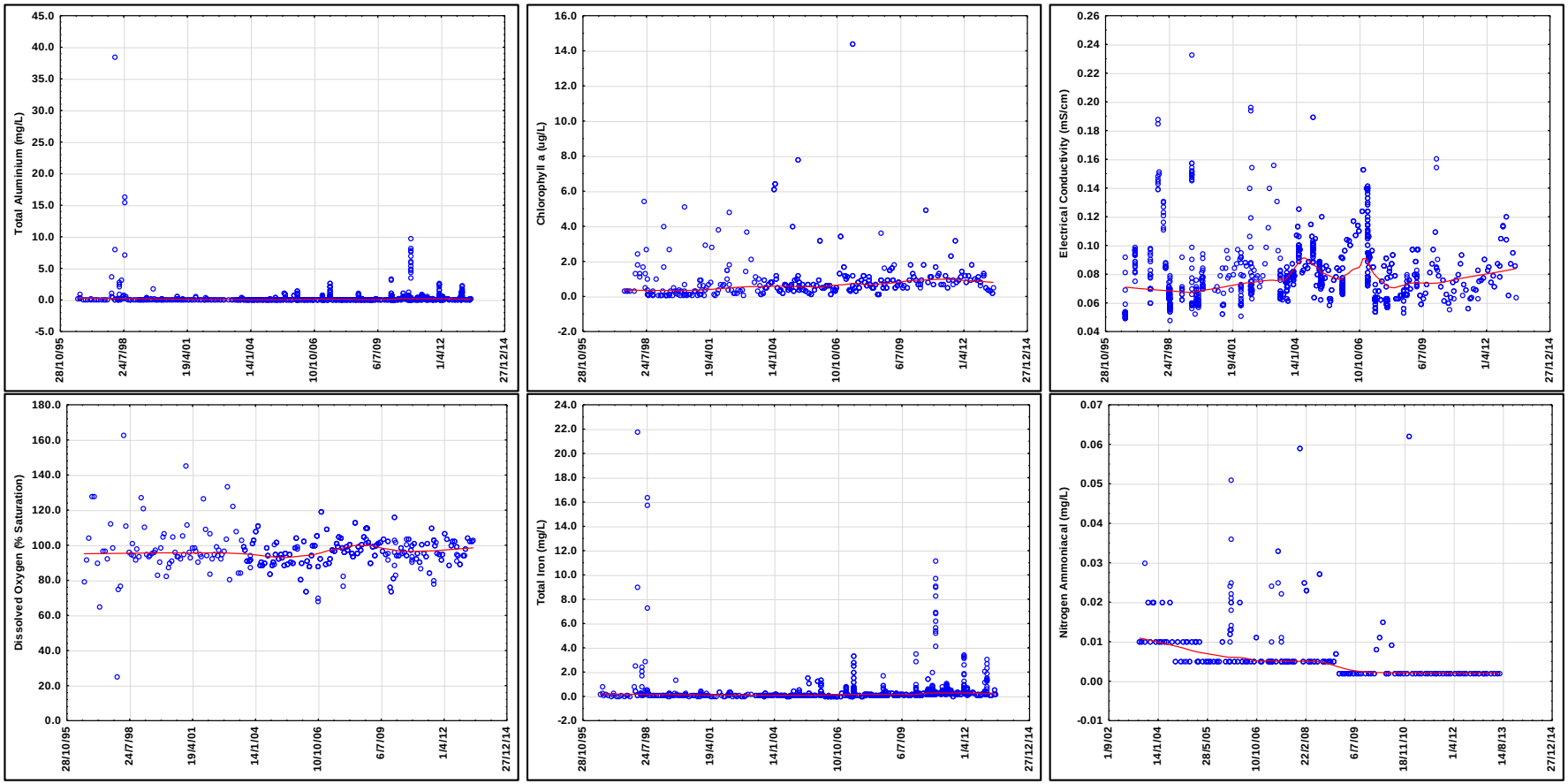


Figure H 8-27 Time-series plots of water quality parameters at E130

Note: The red line of best fit is based on the LOWESS smoothing method

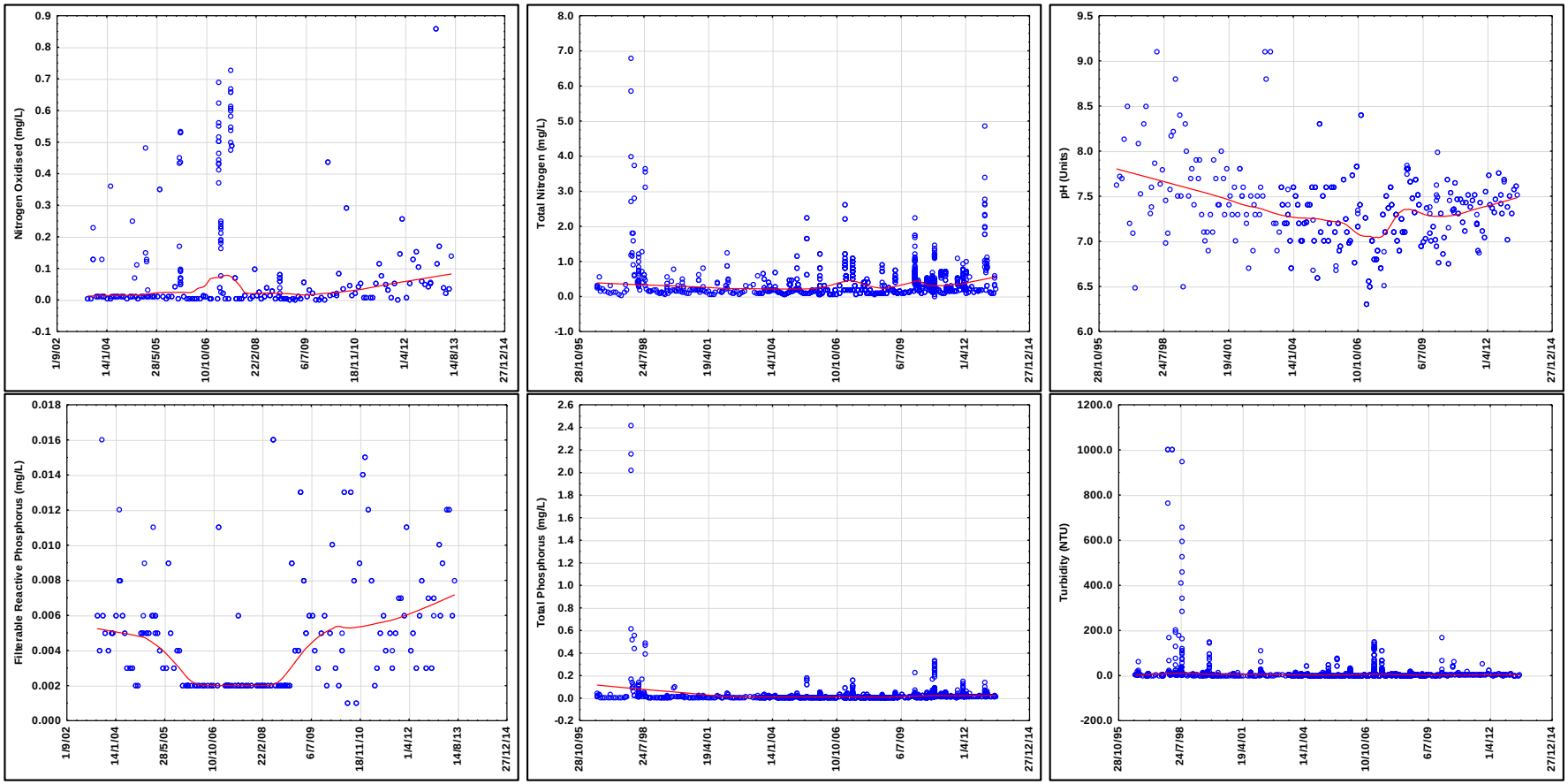


Figure H 8-27 (cont.) Time-series plots of water quality parameters at E130

Note: The red line of best fit is based on the LOWESS smoothing method

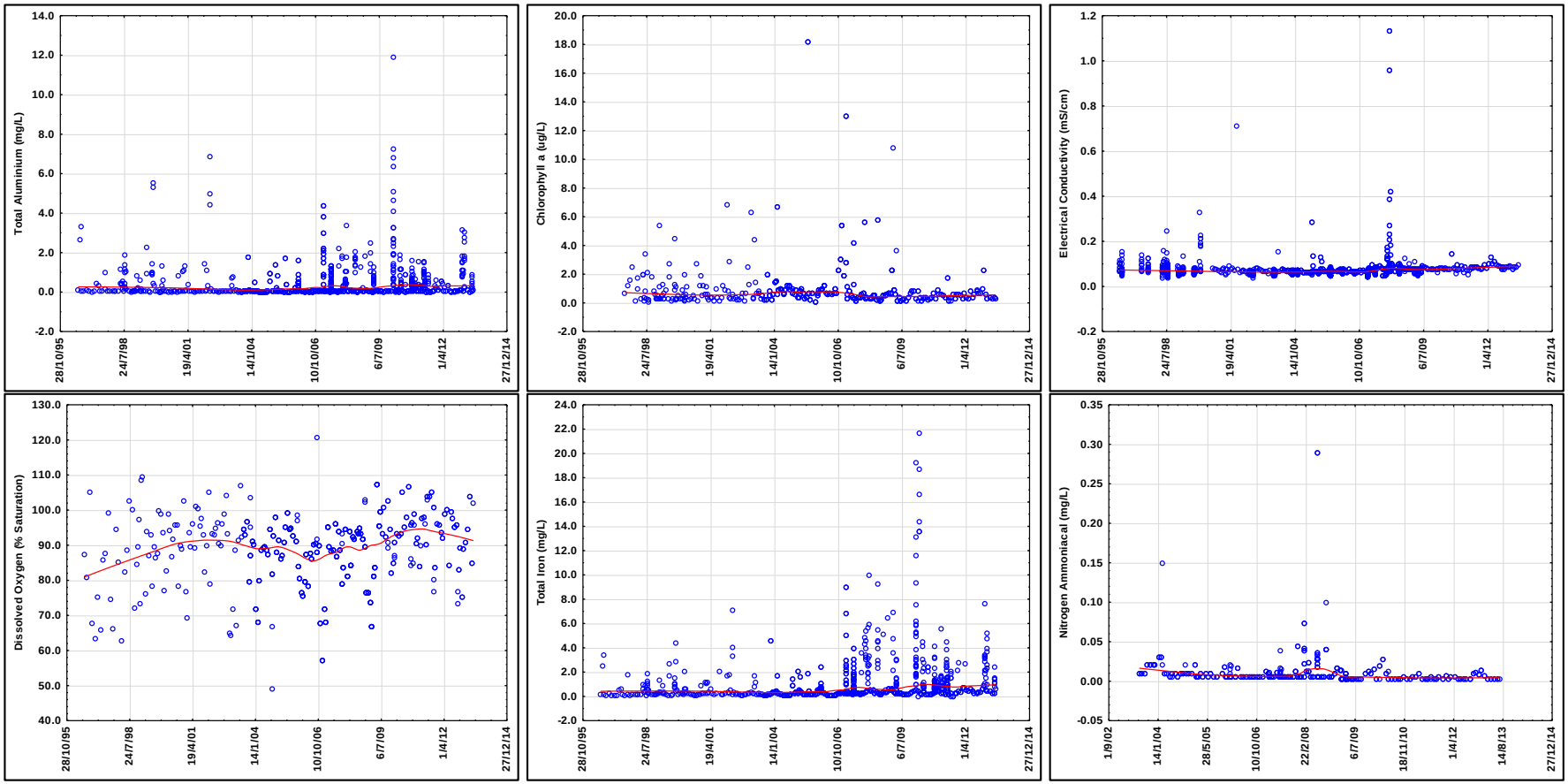


Figure H 8-28 Time-series plots of water quality parameters at E157

Note: The red line of best fit is based on the LOWESS smoothing method

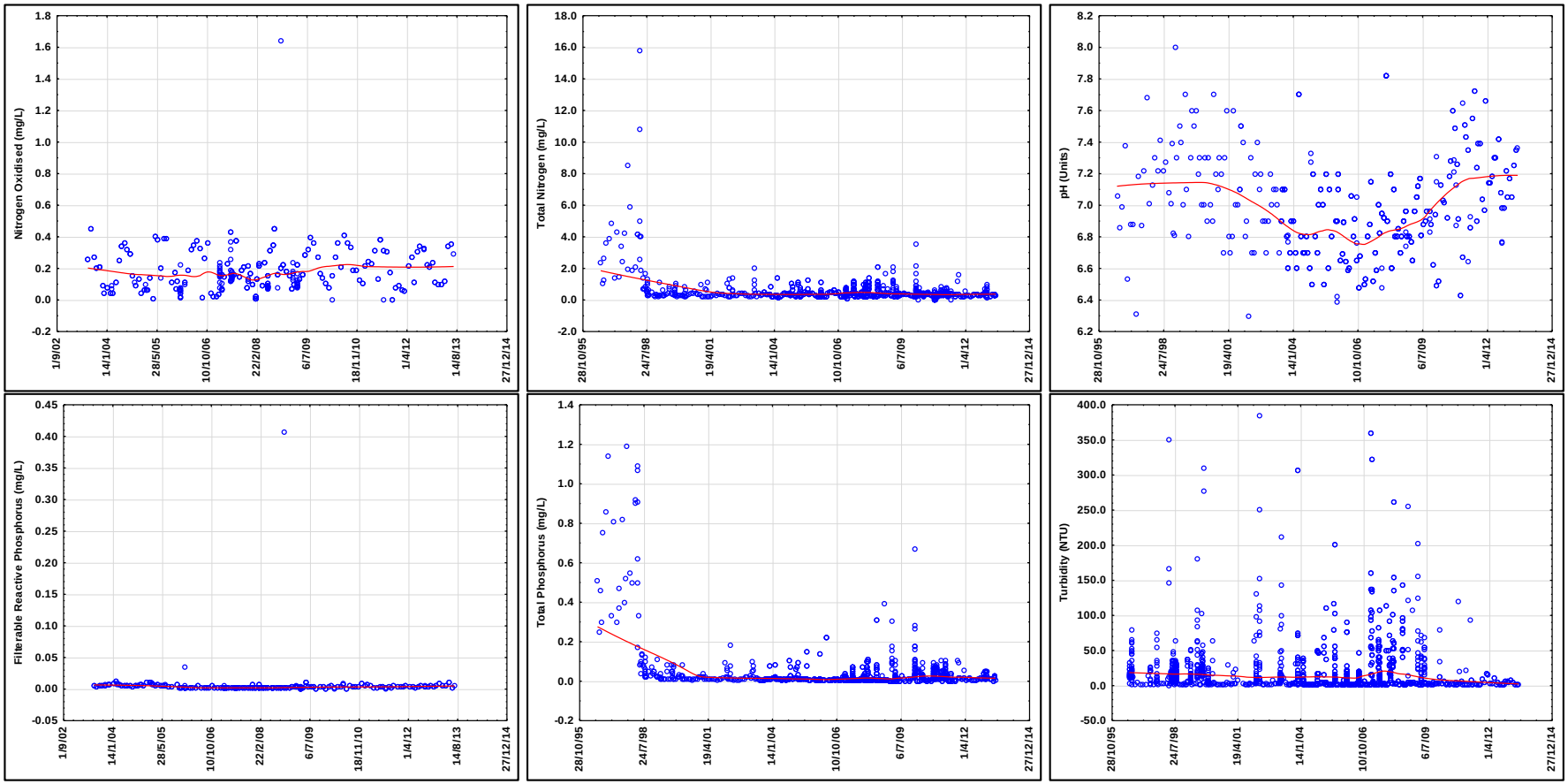


Figure H 8-28 (cont.) Time-series plots of water quality parameters at E157

Note: The red line of best fit is based on the LOWESS smoothing method

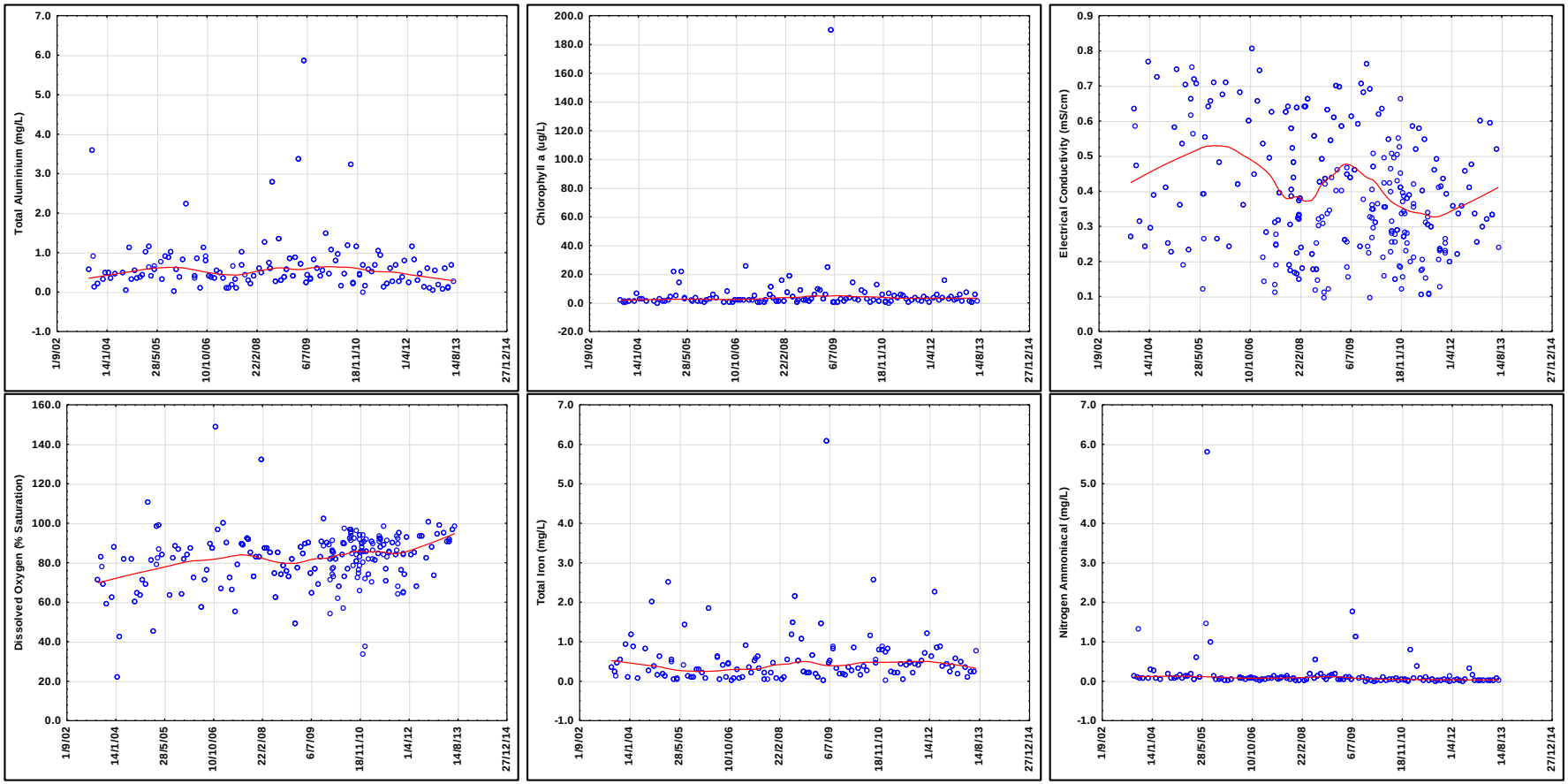


Figure H 8-29 Time-series plots of water quality parameters at E203

Note: The red line of best fit is based on the LOWESS smoothing method

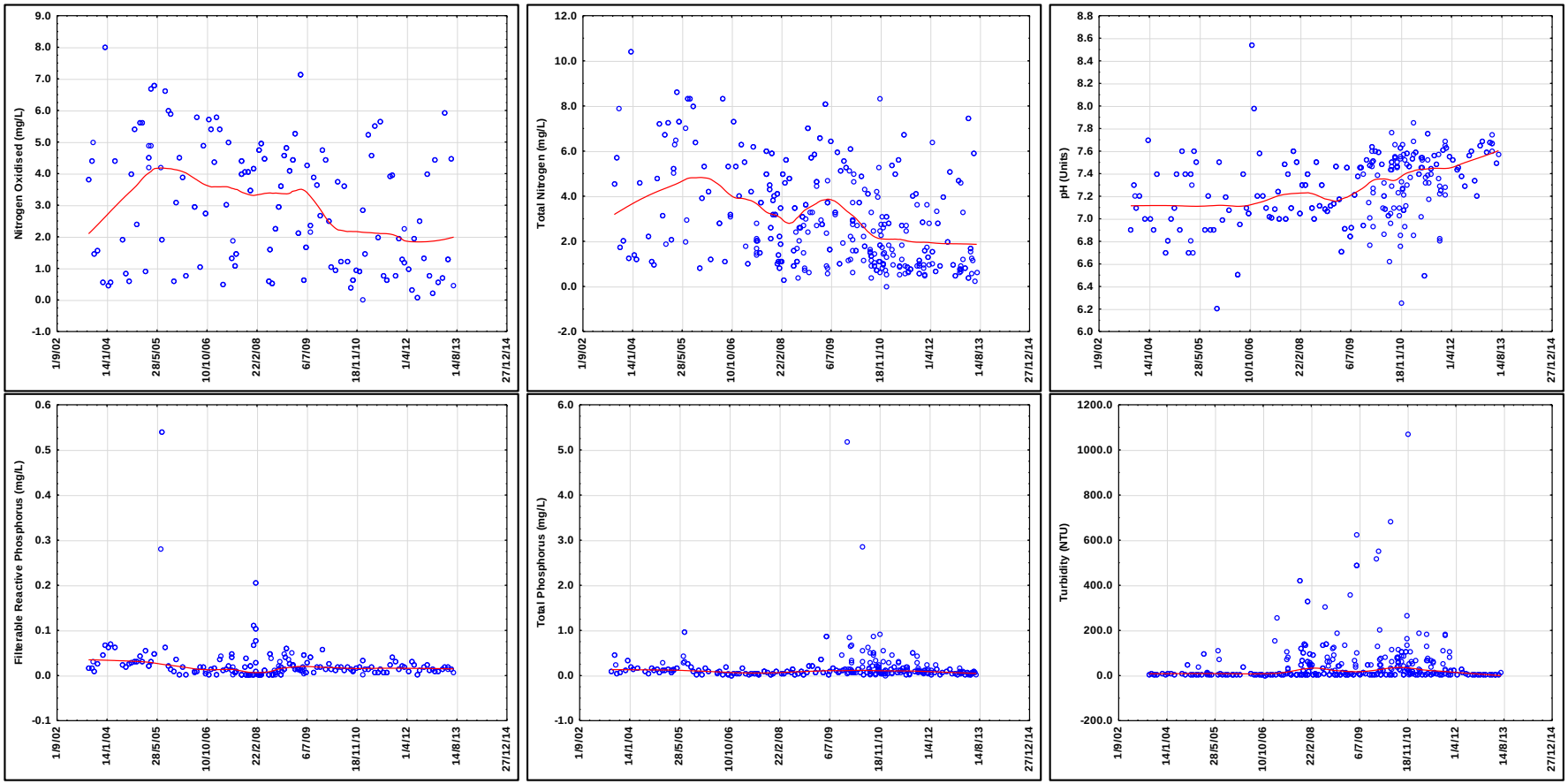


Figure H 8-29 (cont.) Time-series plots of water quality parameters at E203

Note: The red line of best fit is based on the LOWESS smoothing method

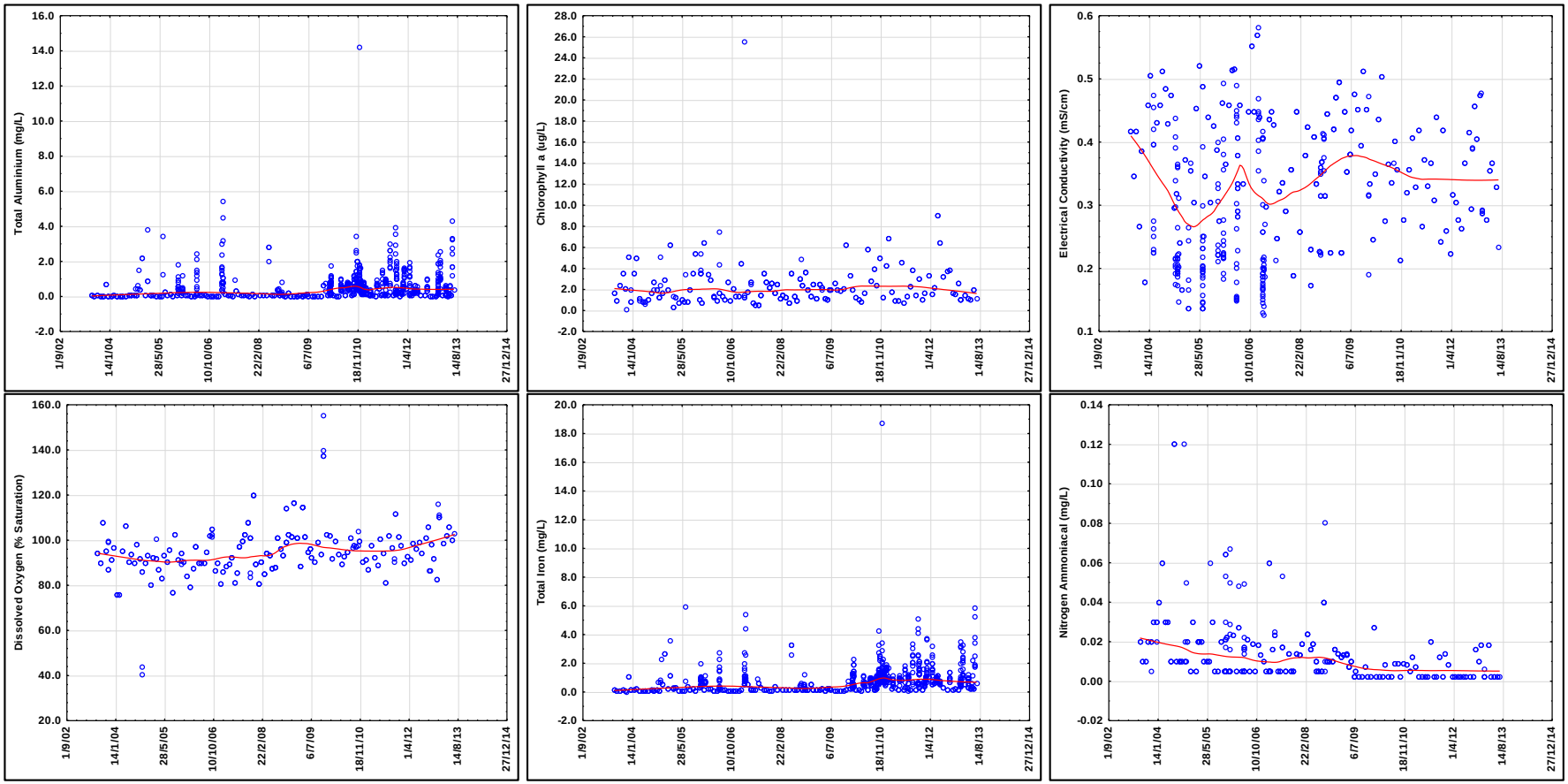


Figure H 8-30 Time-series plots of water quality parameters at E206

Note: The red line of best fit is based on the LOWESS smoothing method

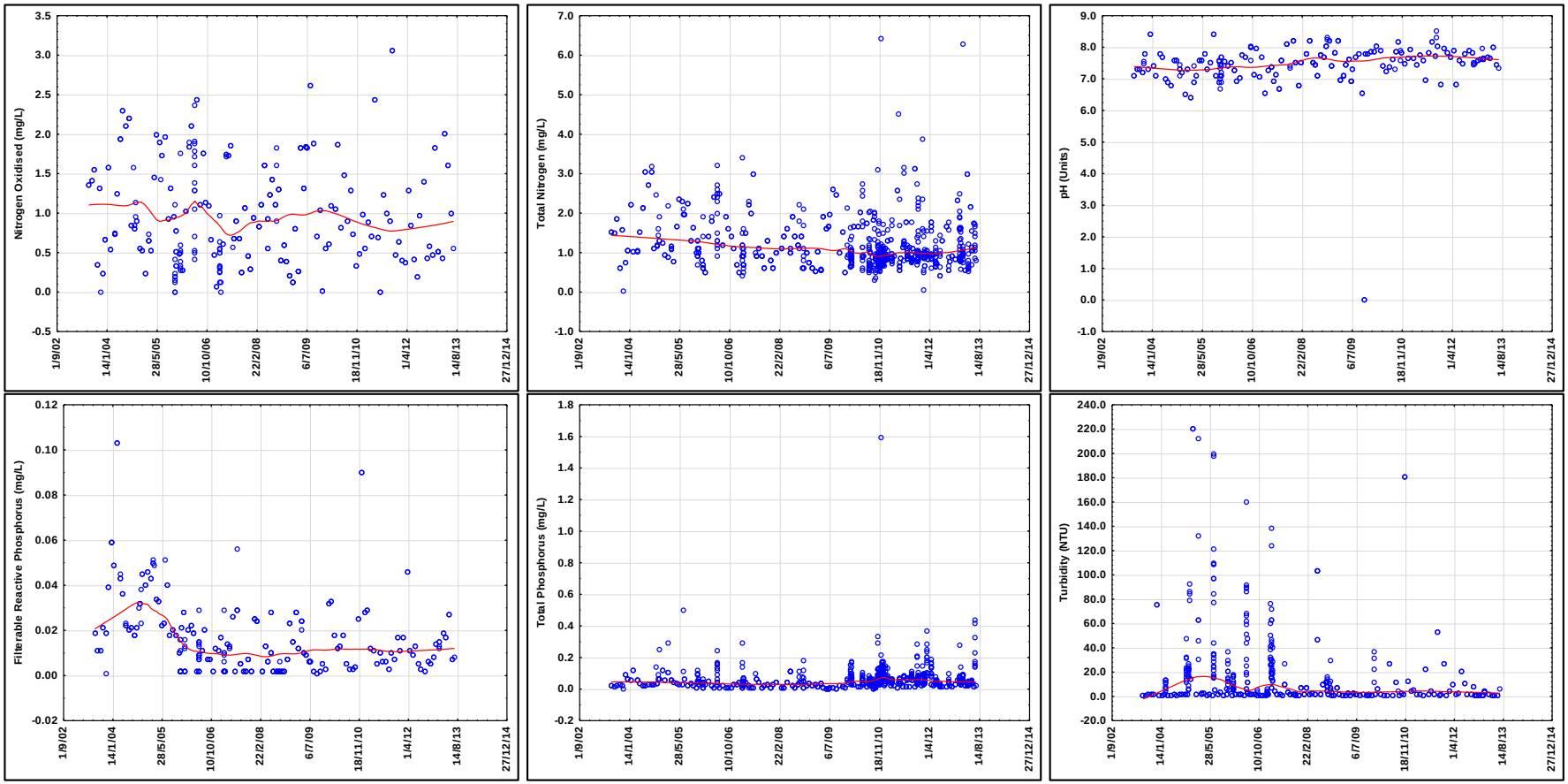


Figure H 8-30 (cont.) Time-series plots of water quality parameters at E206

Note: The red line of best fit is based on the LOWESS smoothing method

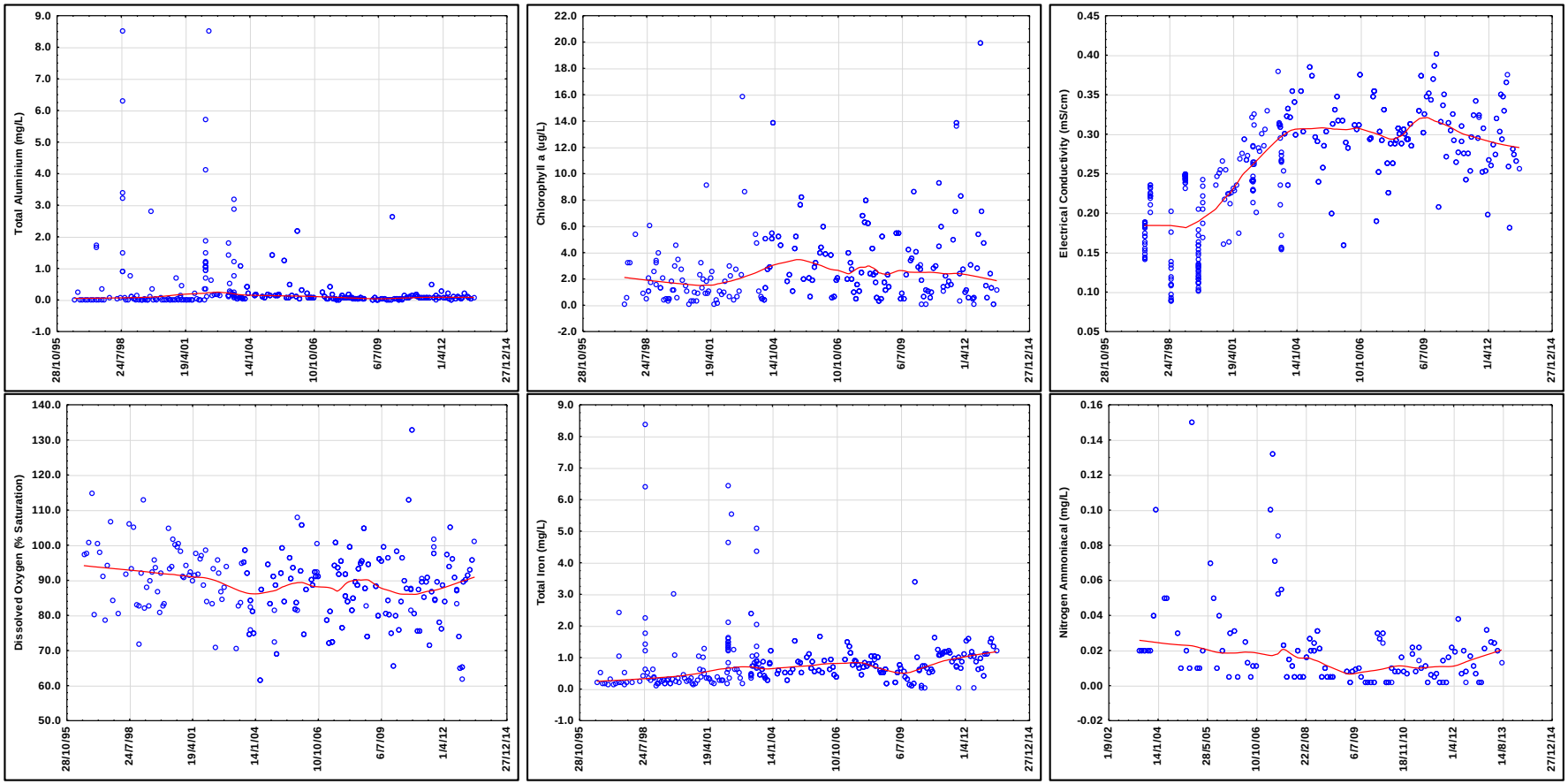


Figure H 8-31 Time-series plots of water quality parameters at E210

Note: The red line of best fit is based on the LOWESS smoothing method

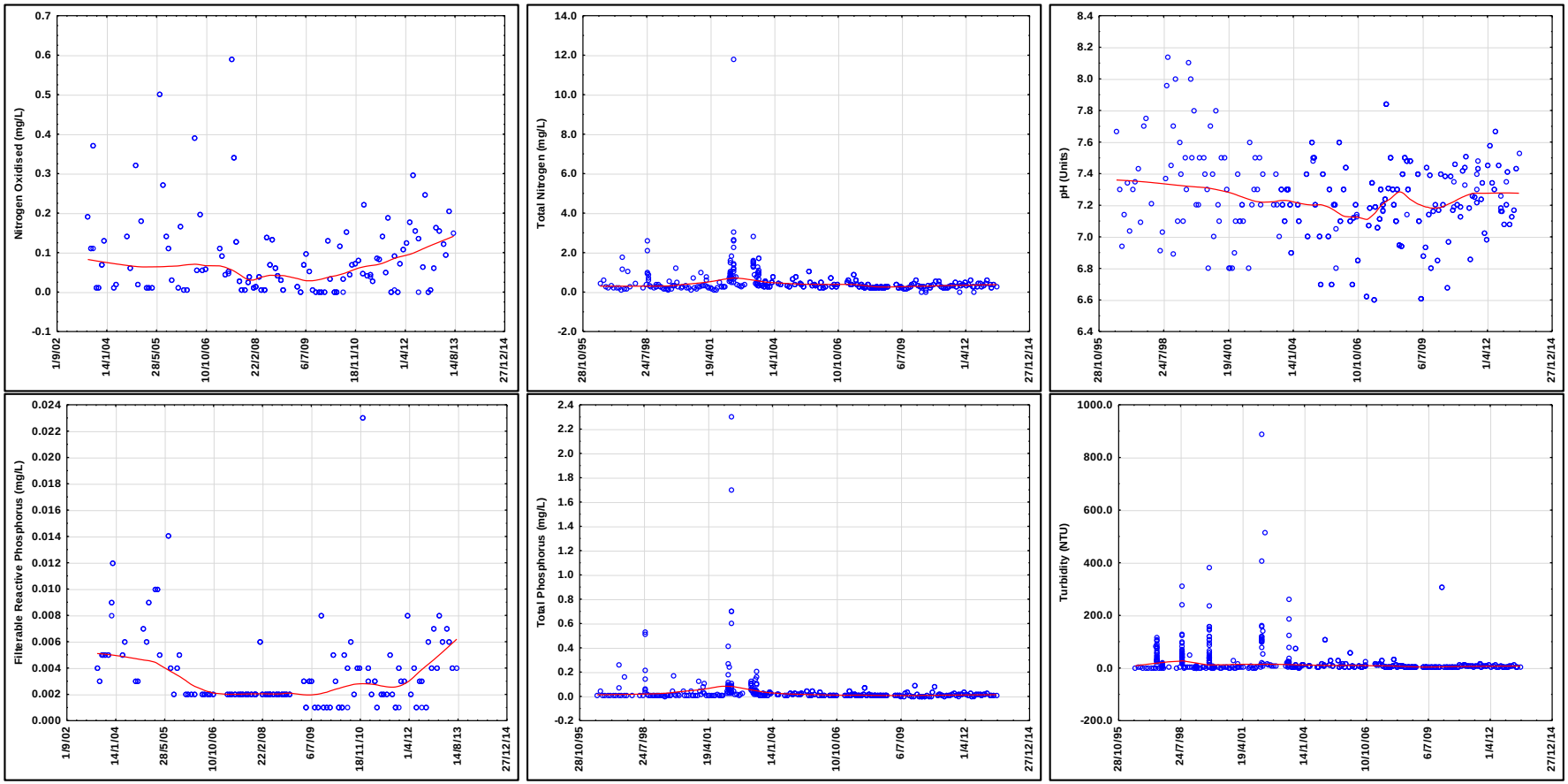


Figure H 8-31 (cont.) Time-series plots of water quality parameters at E210

Note: The red line of best fit is based on the LOWESS smoothing method

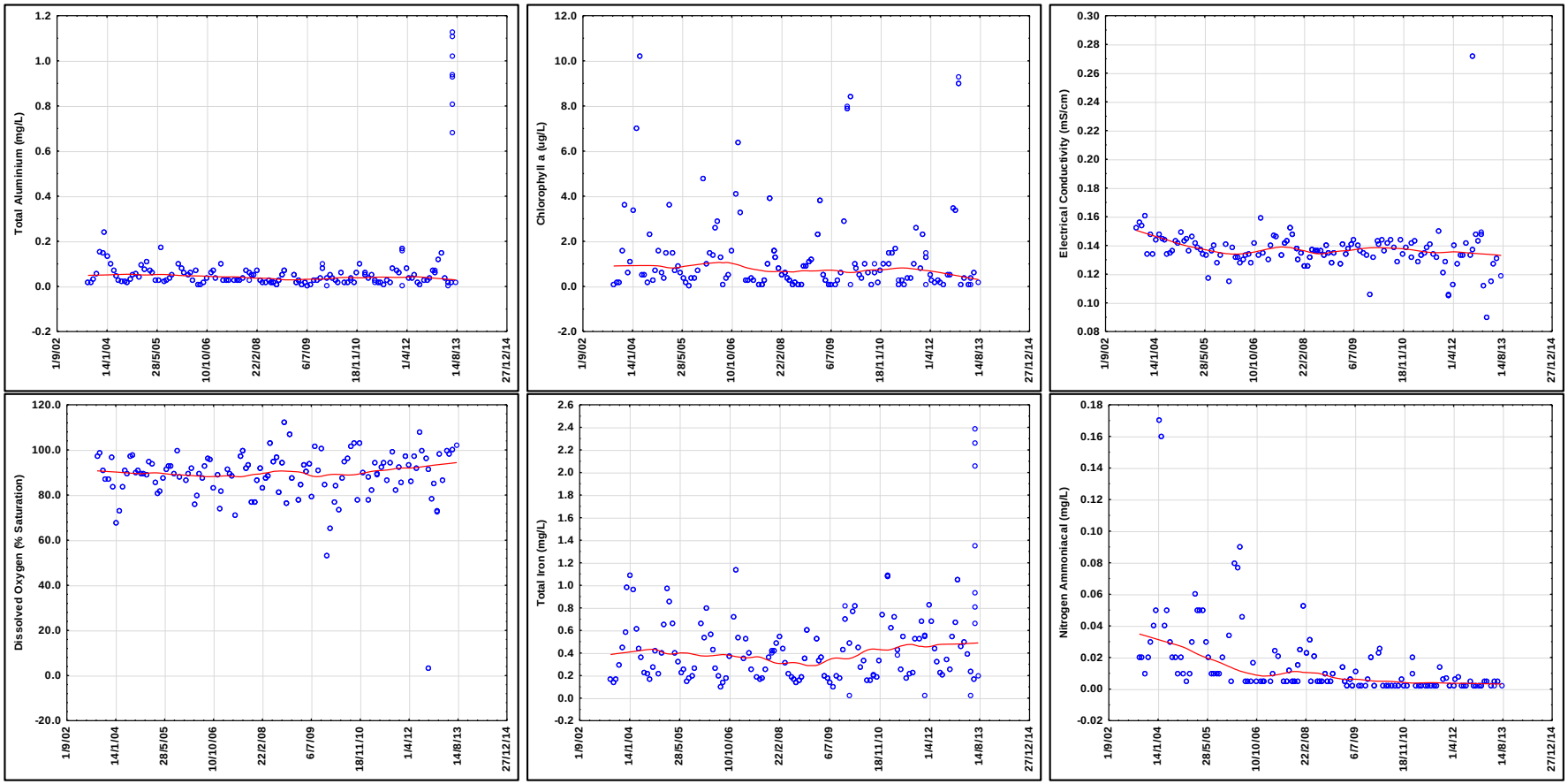


Figure H 8-32 Time-series plots of water quality parameters at E243

Note: The red line of best fit is based on the LOWESS smoothing method

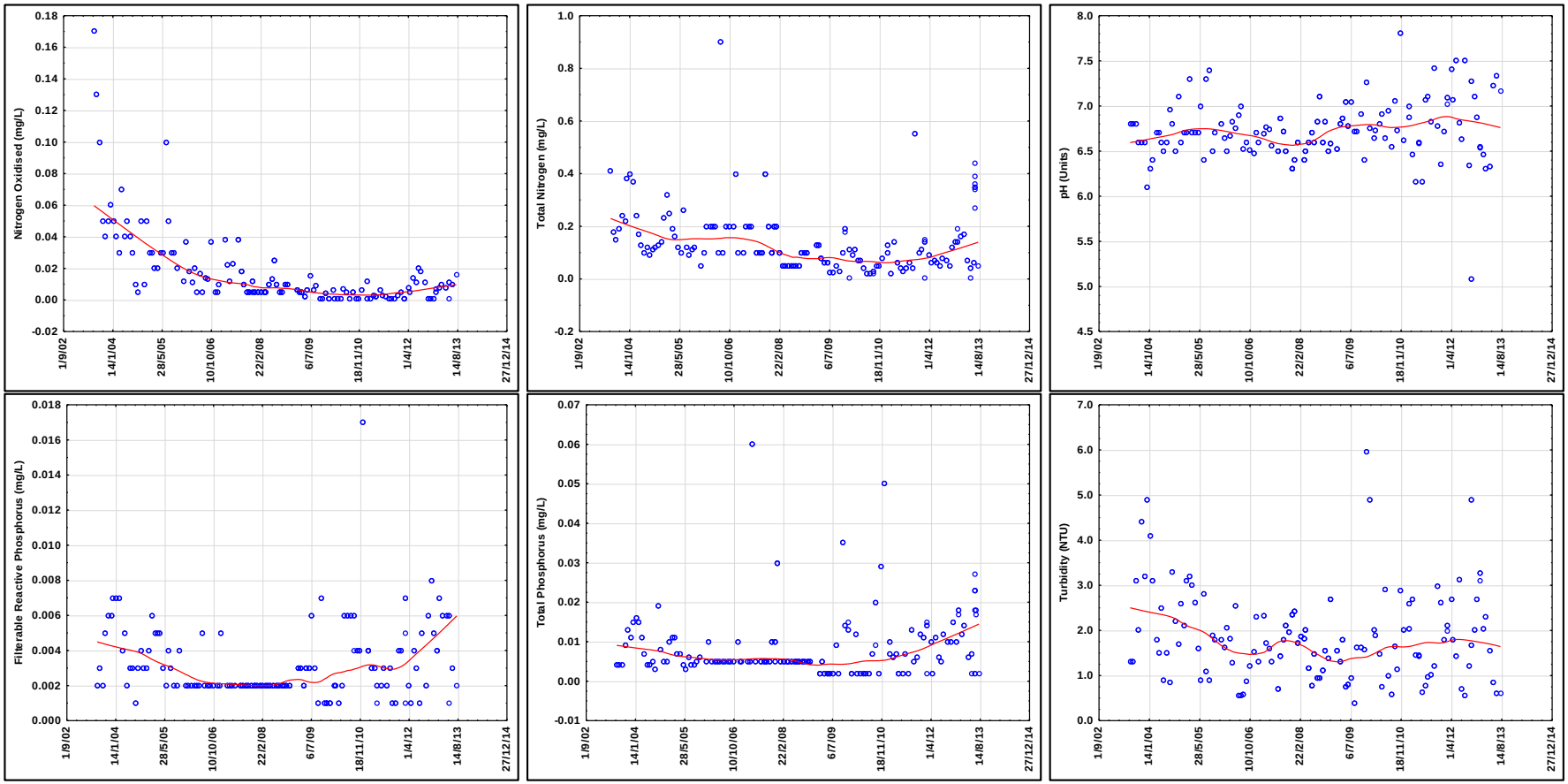


Figure H 8-32 (cont.) Time-series plots of water quality parameters at E243

Note: The red line of best fit is based on the LOWESS smoothing method

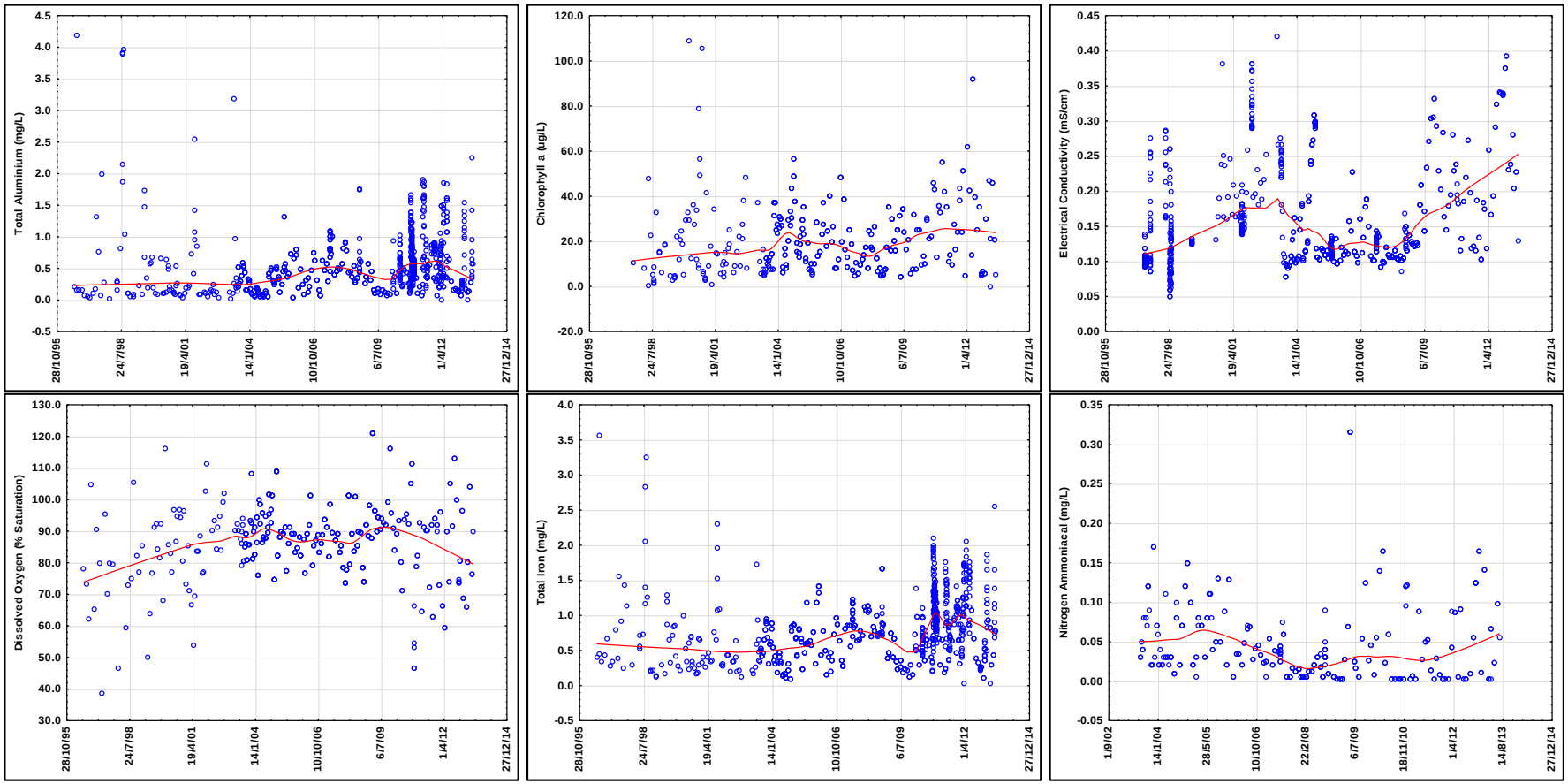


Figure H 8-33 Time-series plots of water quality parameters at E332

Note: The red line of best fit is based on the LOWESS smoothing method

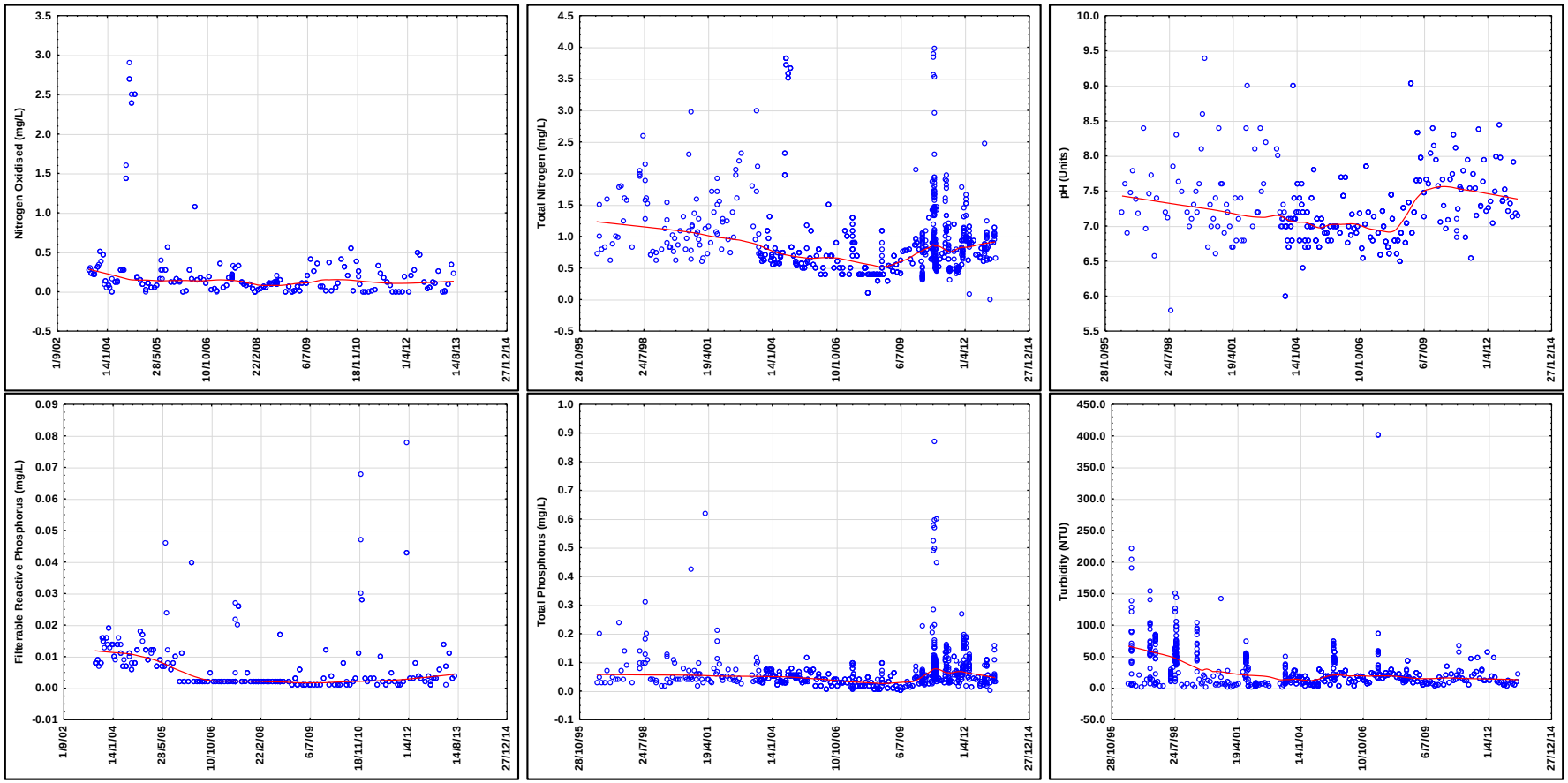


Figure H 8-33 (cont.) Time-series plots of water quality parameters at E332

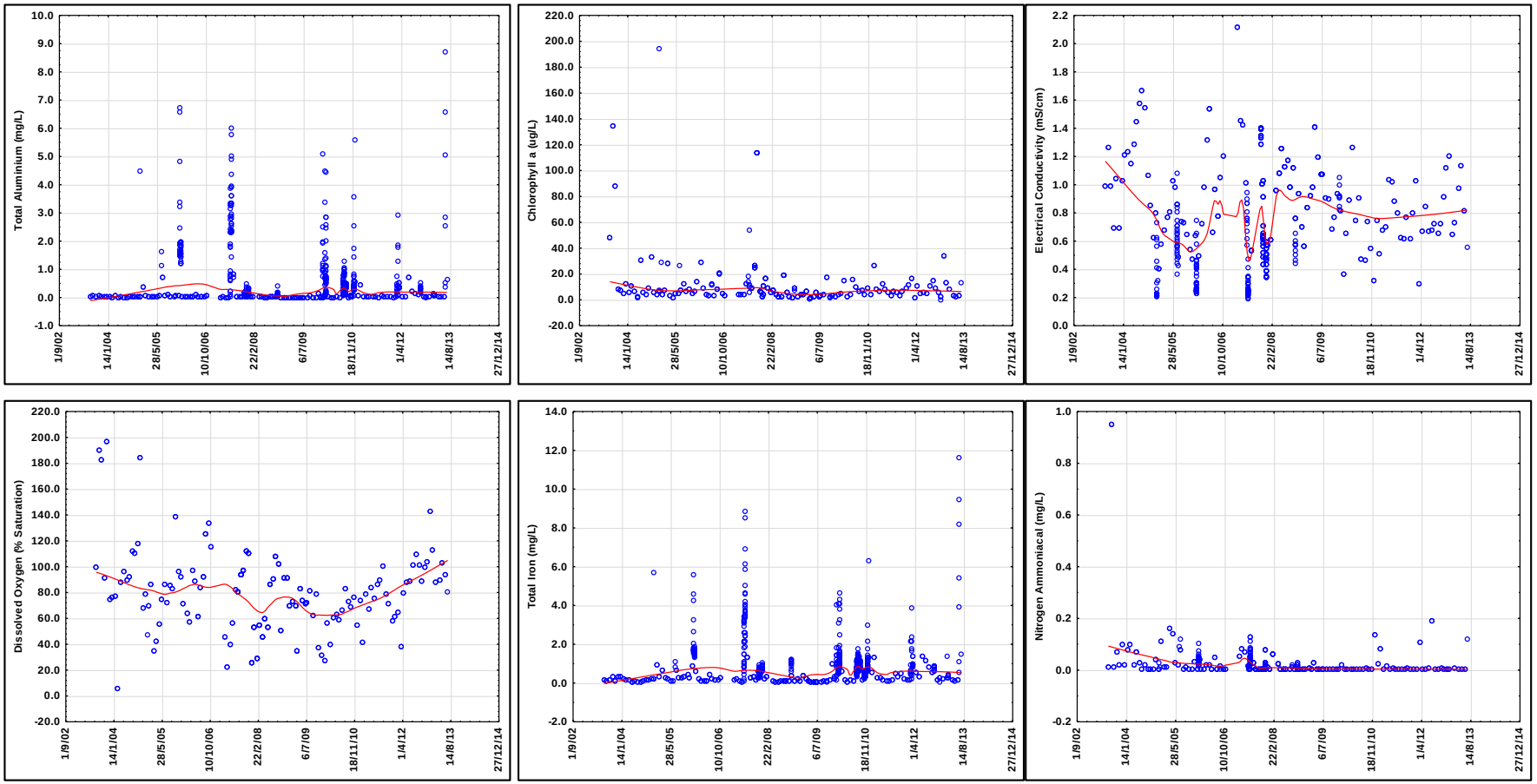


Figure H 8-34 Time-series plots of water quality parameters at E409

Note: The red line of best fit is based on the LOWESS smoothing method

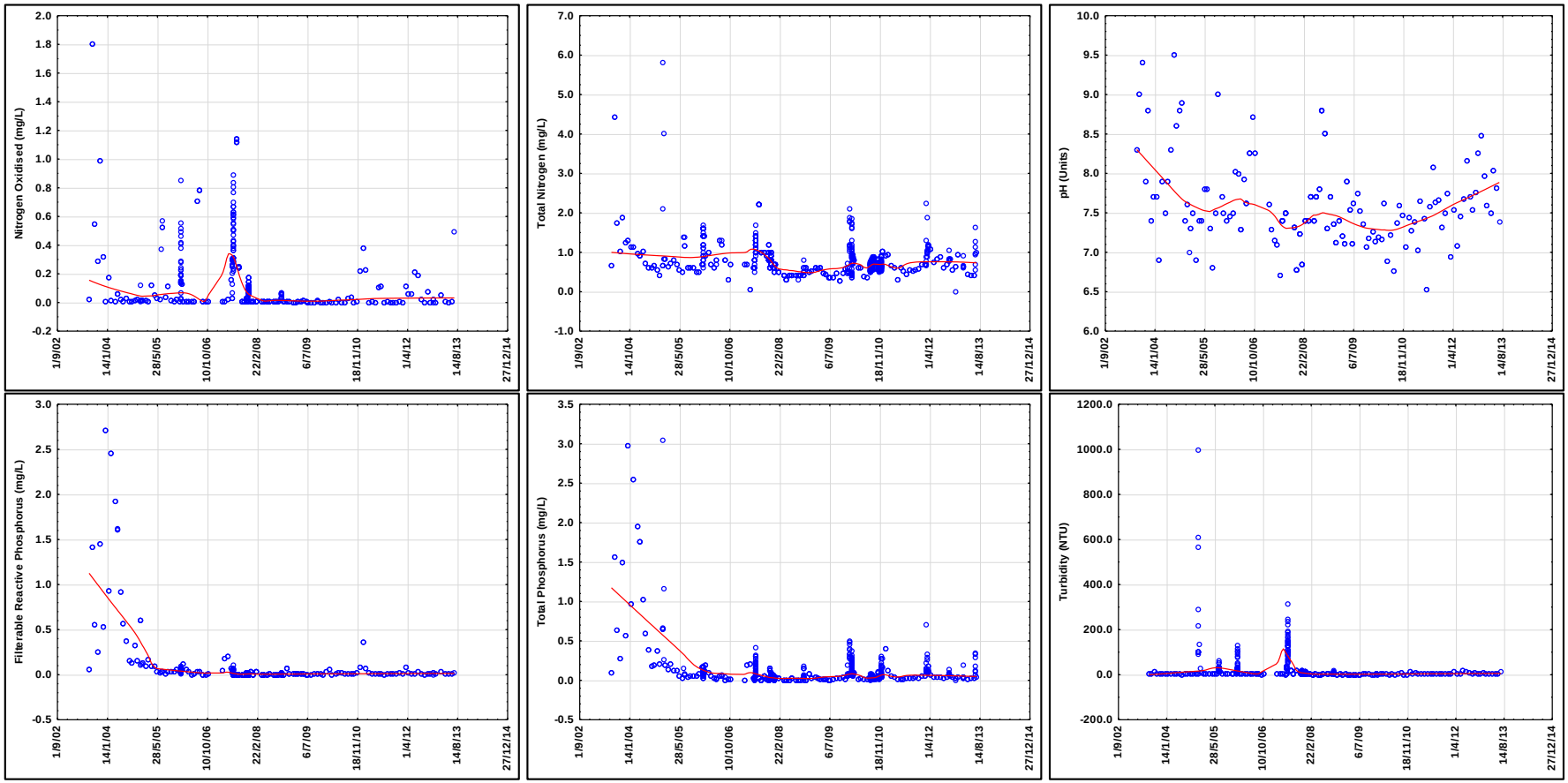


Figure H 8-34 (cont.) Time-series plots of water quality parameters at E409

Note: The red line of best fit is based on the LOWESS smoothing method

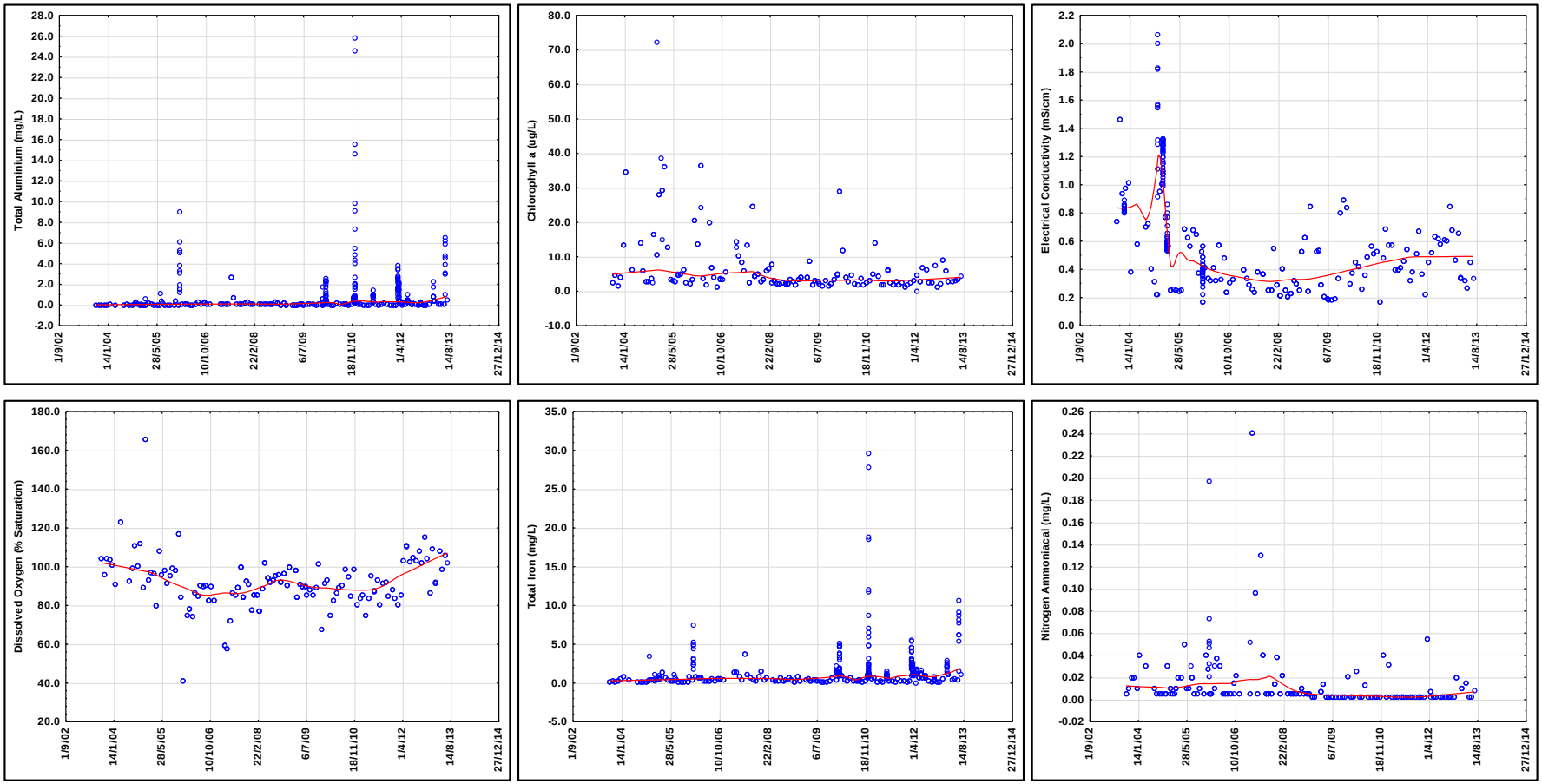


Figure H 8-35 Time-series plots of water quality parameters at E450

Note: The red line of best fit is based on the LOWESS smoothing method

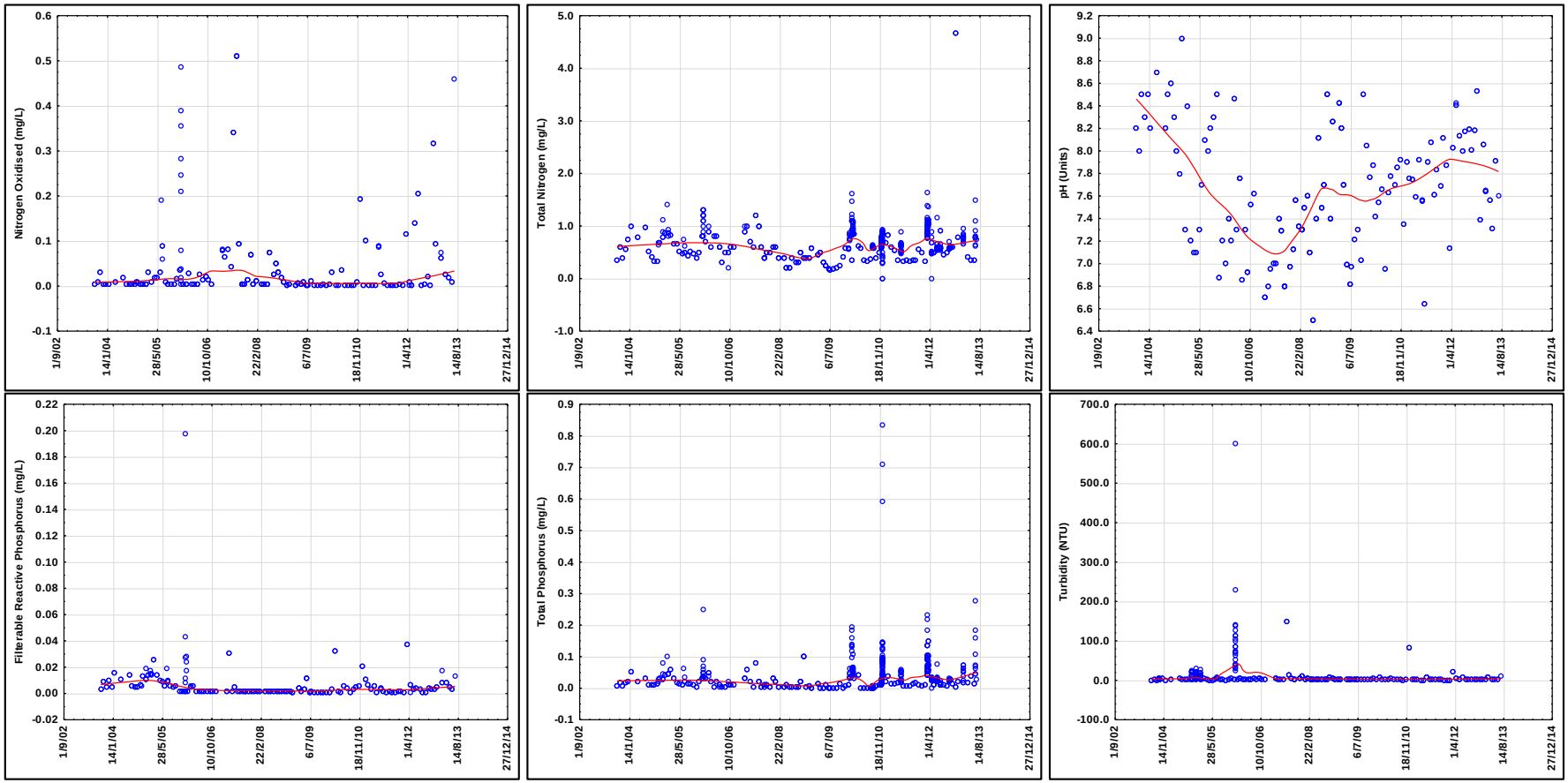


Figure H 8-35 (cont.) Time-series plots of water quality parameters at E450

Note: The red line of best fit is based on the LOWESS smoothing method

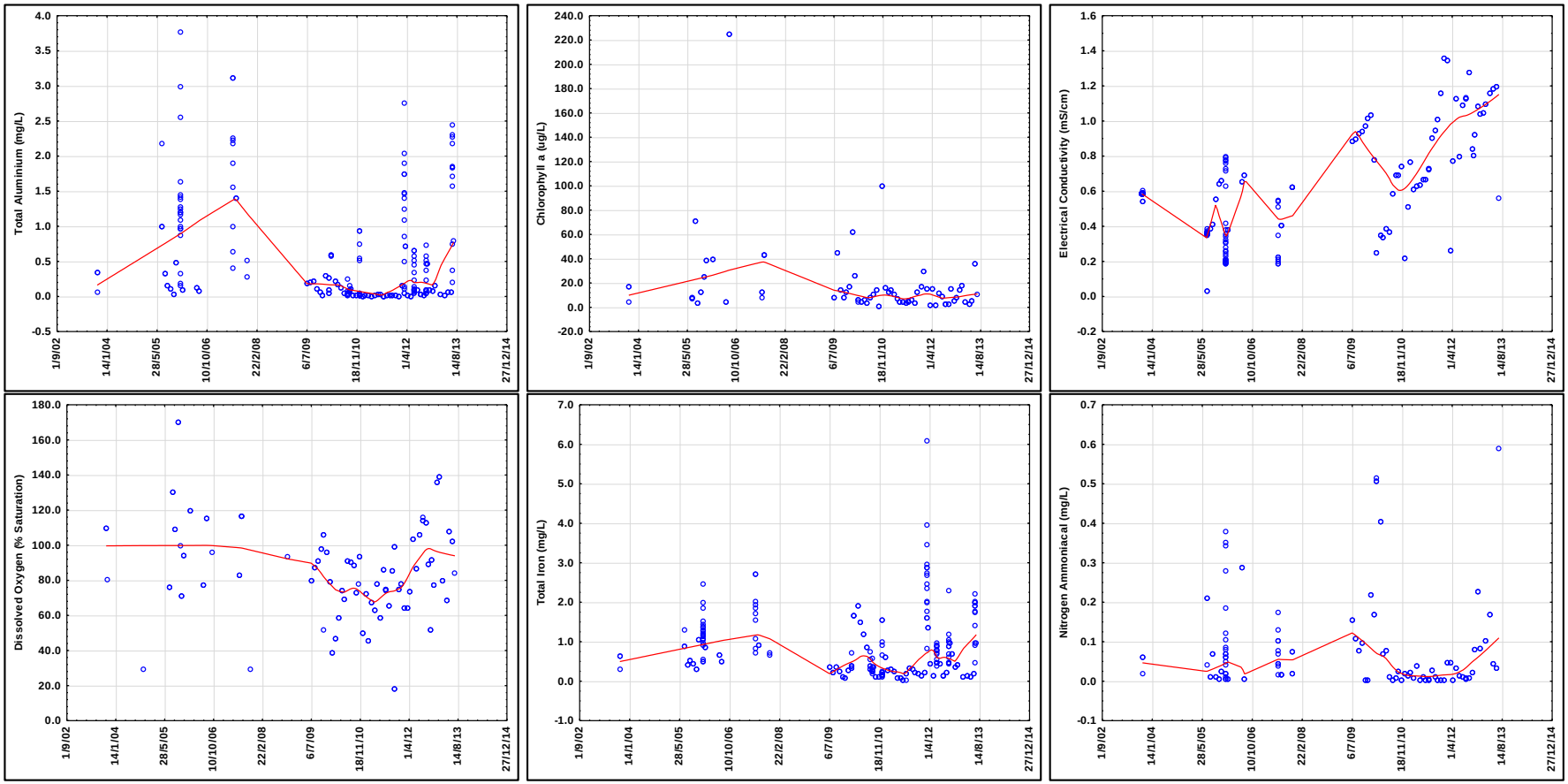


Figure H 8-36 Time-series plots of water quality parameters at E457

Note: The red line of best fit is based on the LOWESS smoothing method

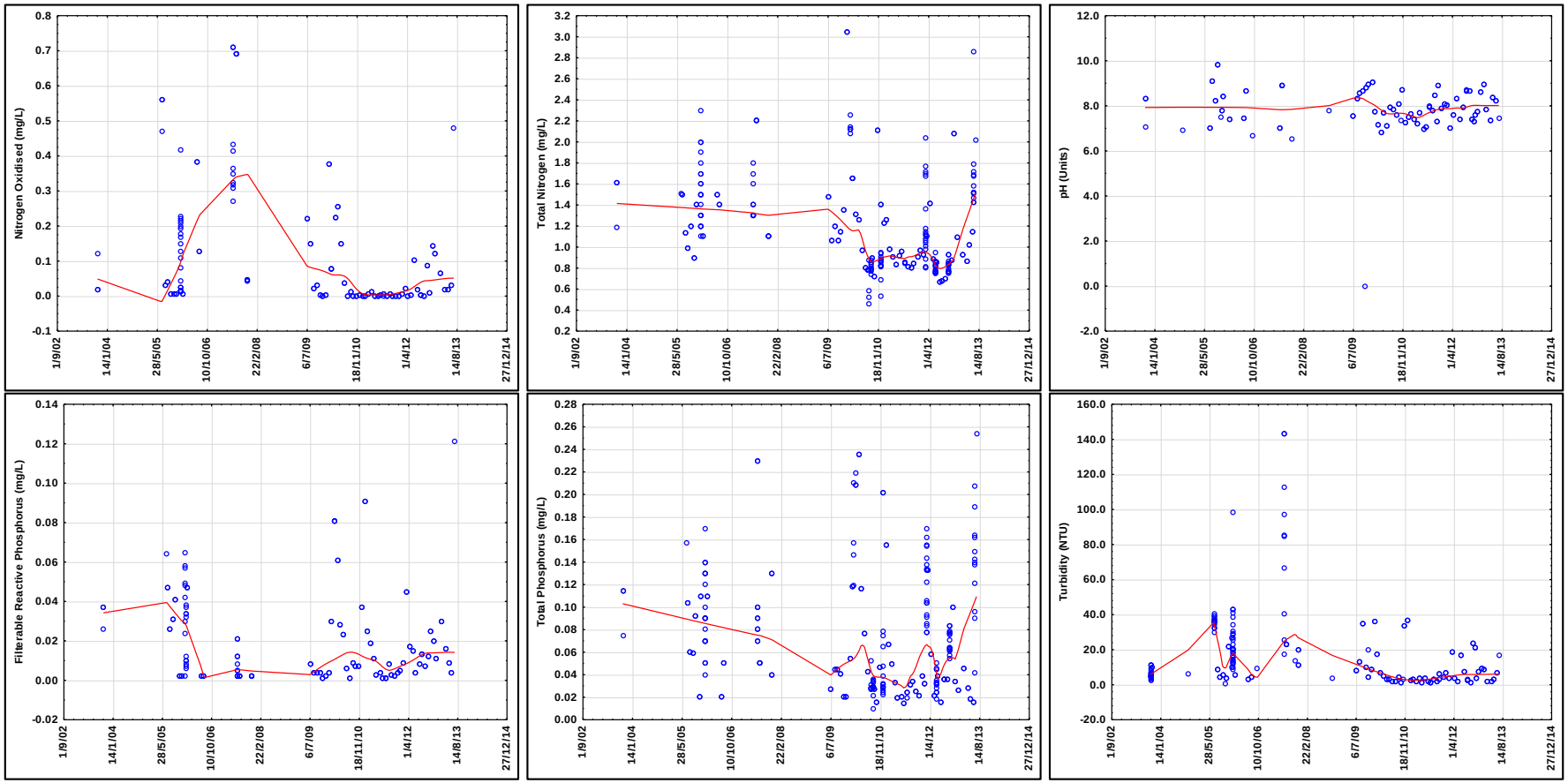


Figure H 8-36 (cont.) Time-series plots of water quality parameters at E457

Note: The red line of best fit is based on the LOWESS smoothing method

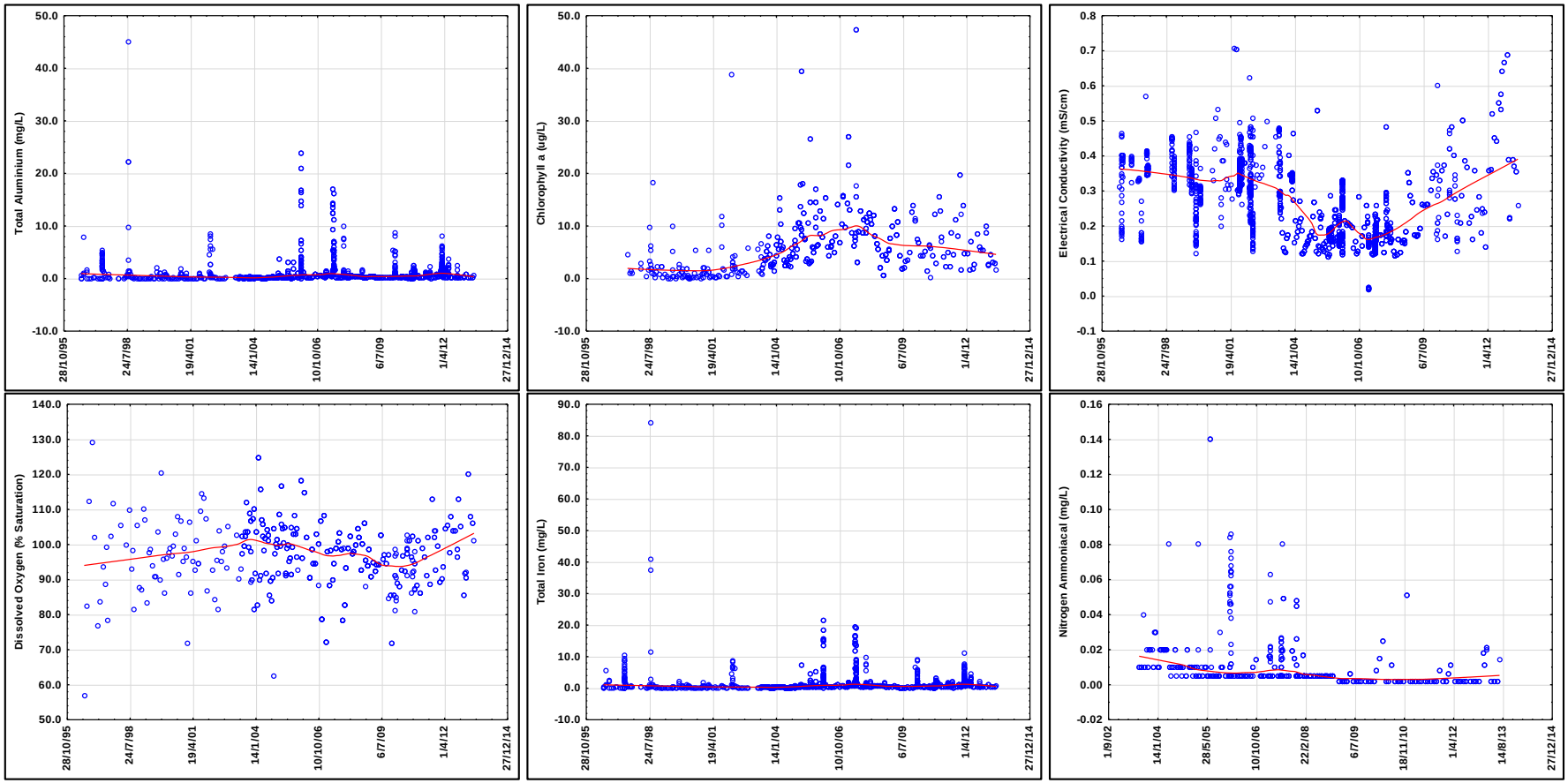


Figure H 8-37 Time-series plots of water quality parameters at E488

Note: The red line of best fit is based on the LOWESS smoothing method

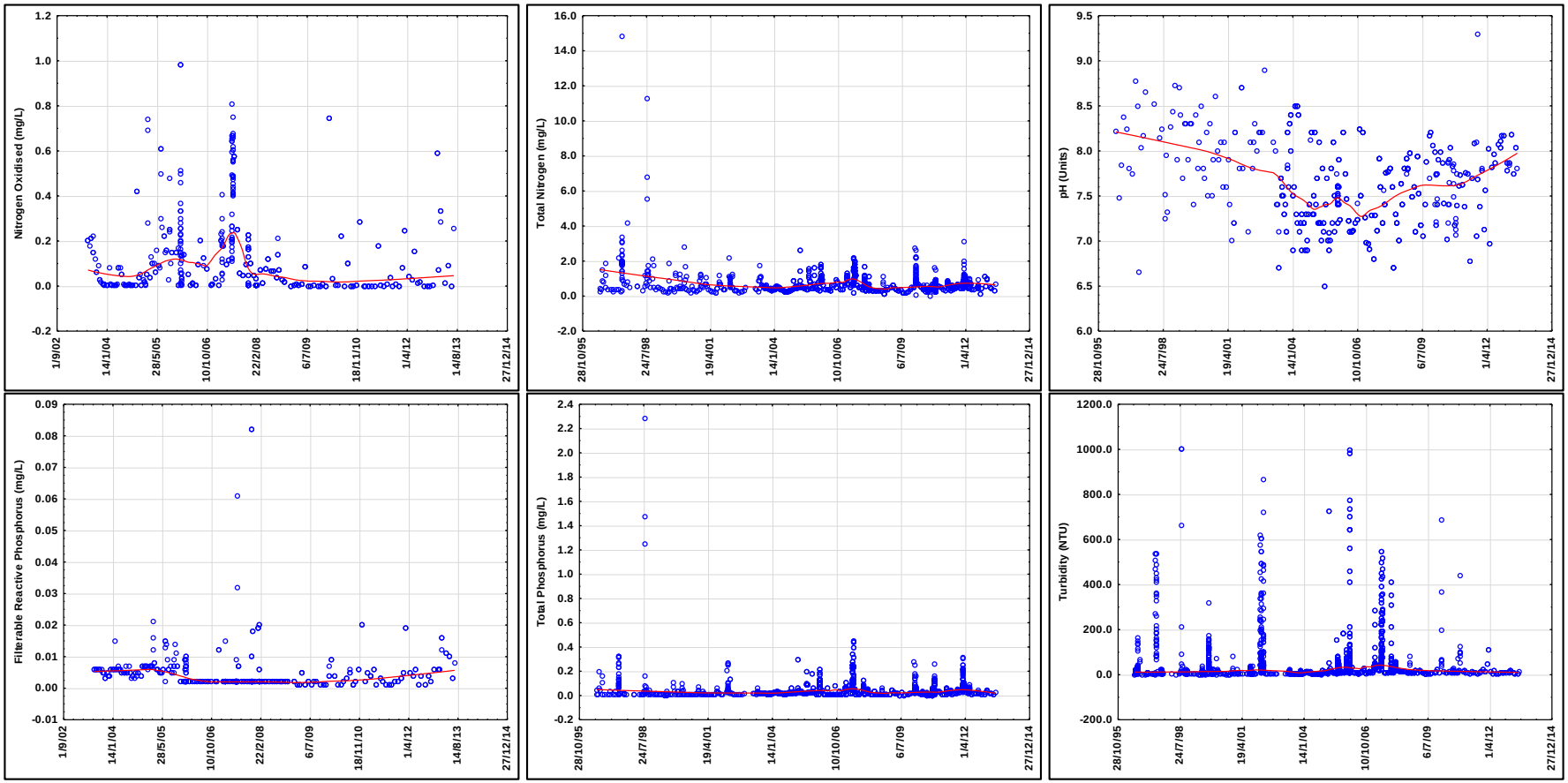


Figure H 8-37 (cont.) Time-series plots of water quality parameters at E488

Note: The red line of best fit is based on the LOWESS smoothing method

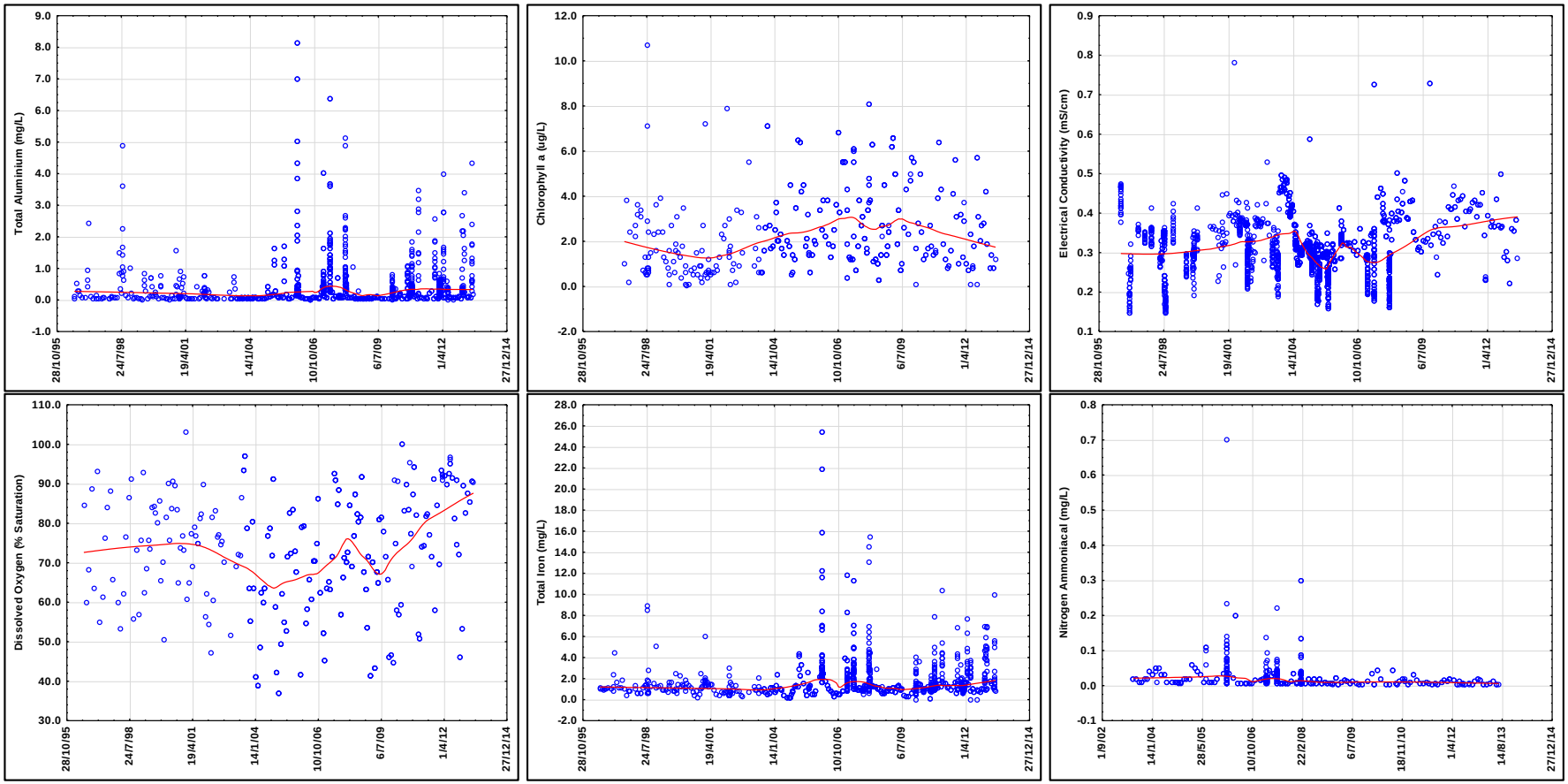


Figure H 8-38 Time-series plots of water quality parameters at E531

Note: The red line of best fit is based on the LOWESS smoothing method

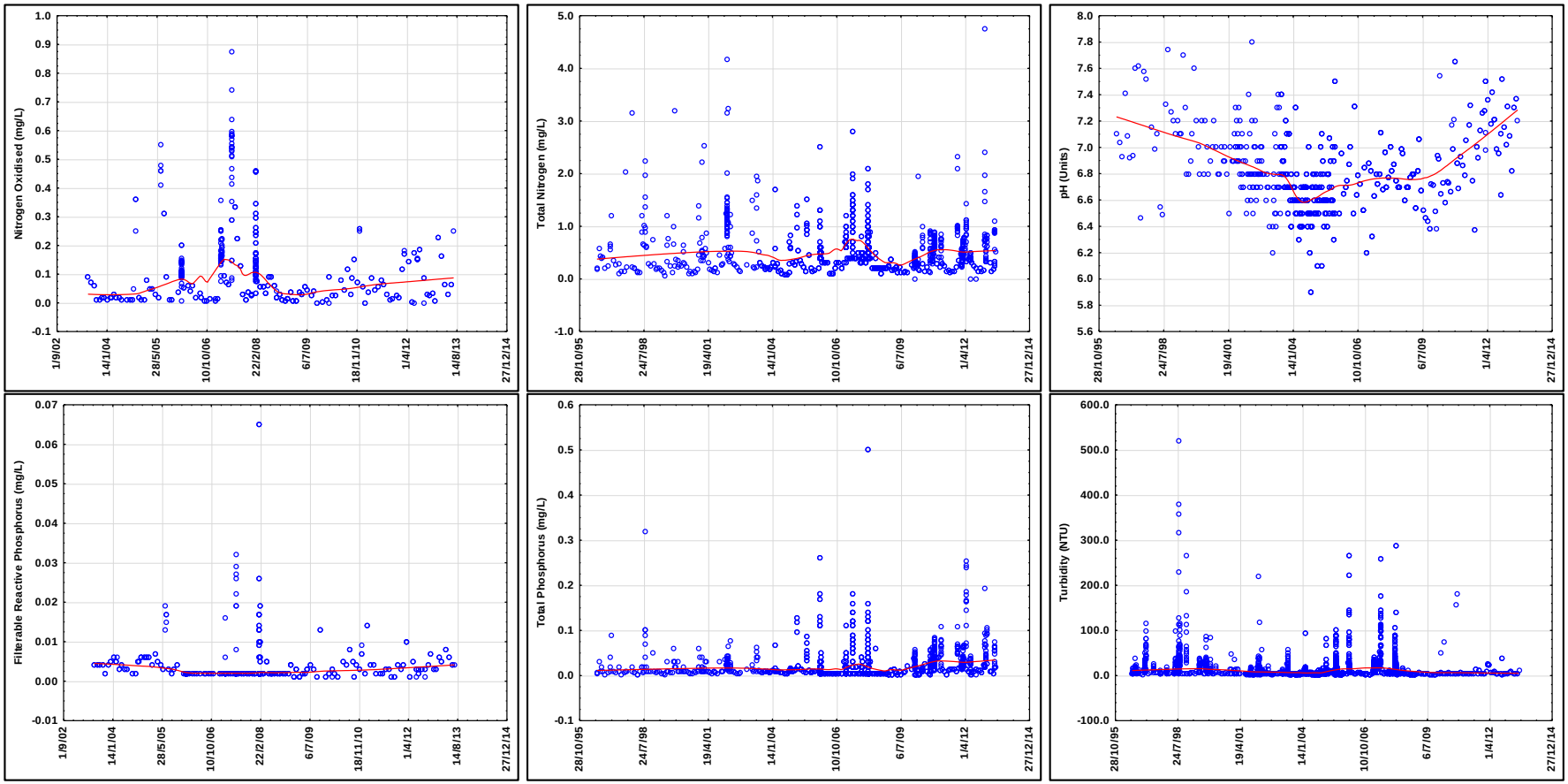


Figure H 8-38 (cont.) Time-series plots of water quality parameters at E531

Note: The red line of best fit is based on the LOWESS smoothing method

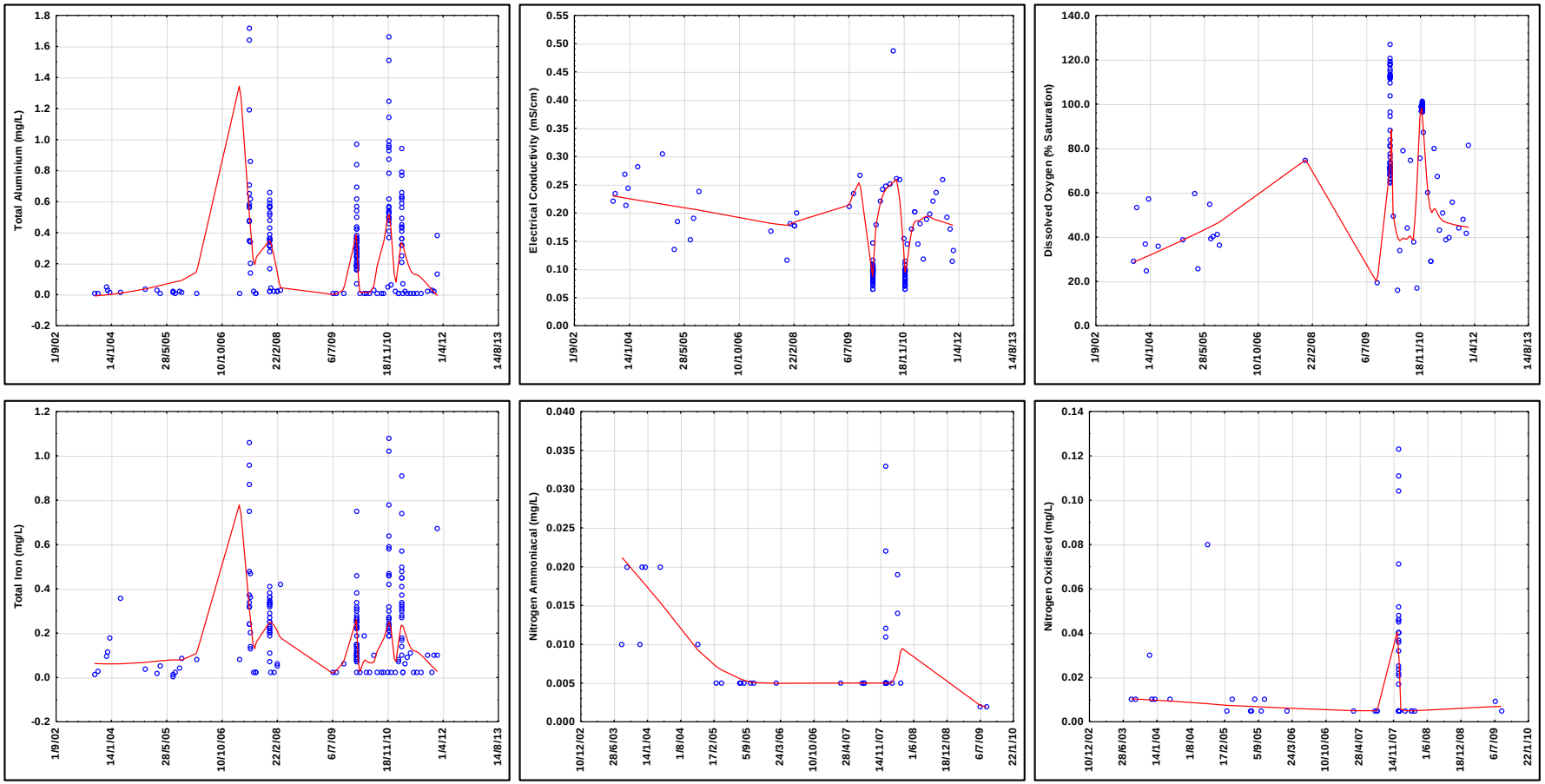


Figure H 8-39 Time-series plots of water quality parameters at E550

Note: The red line of best fit is based on the LOWESS smoothing method

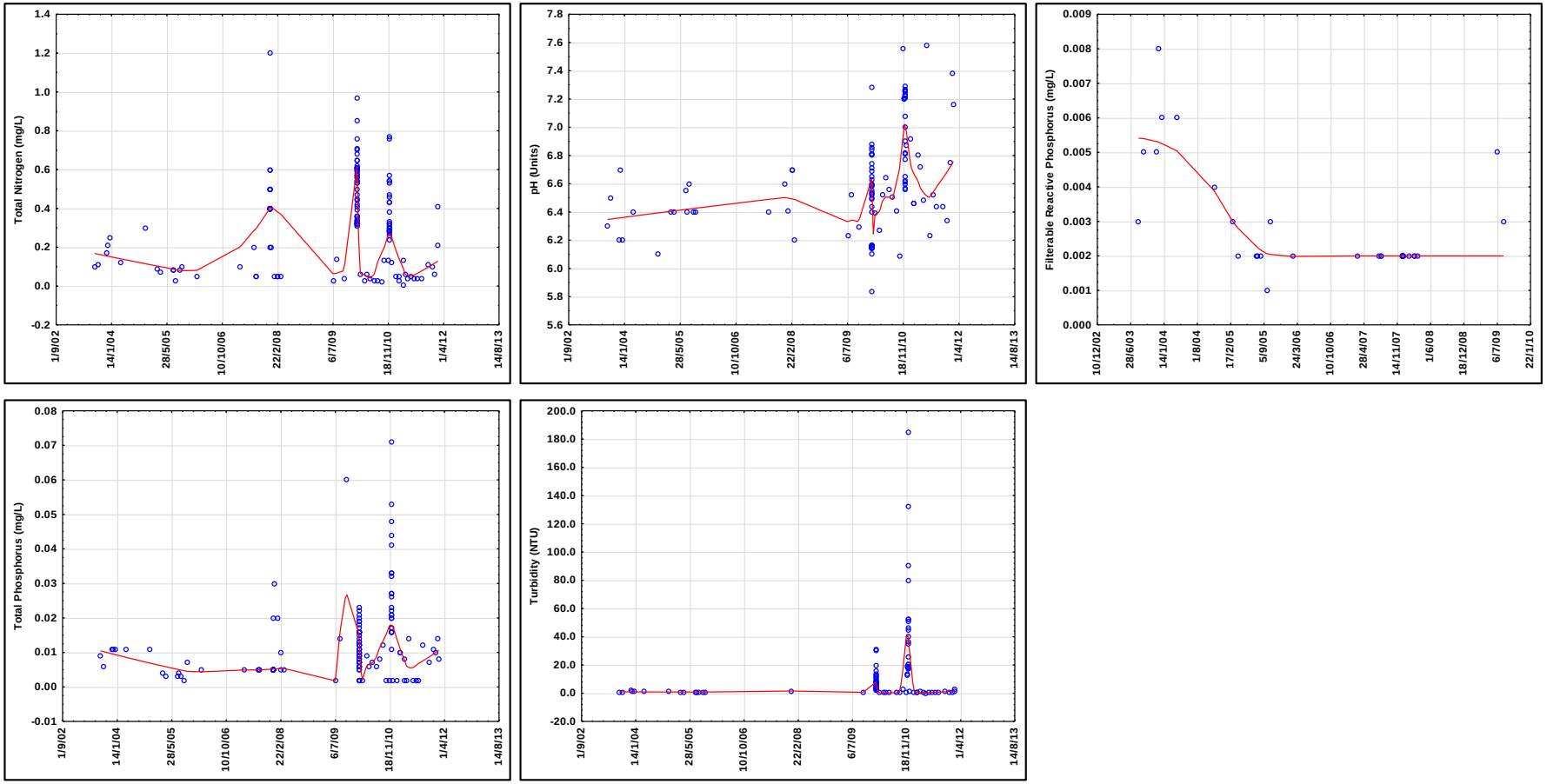


Figure H 8-39 (cont.) Time-series plots of water quality parameters at E550

Note: The red line of best fit is based on the LOWESS smoothing method

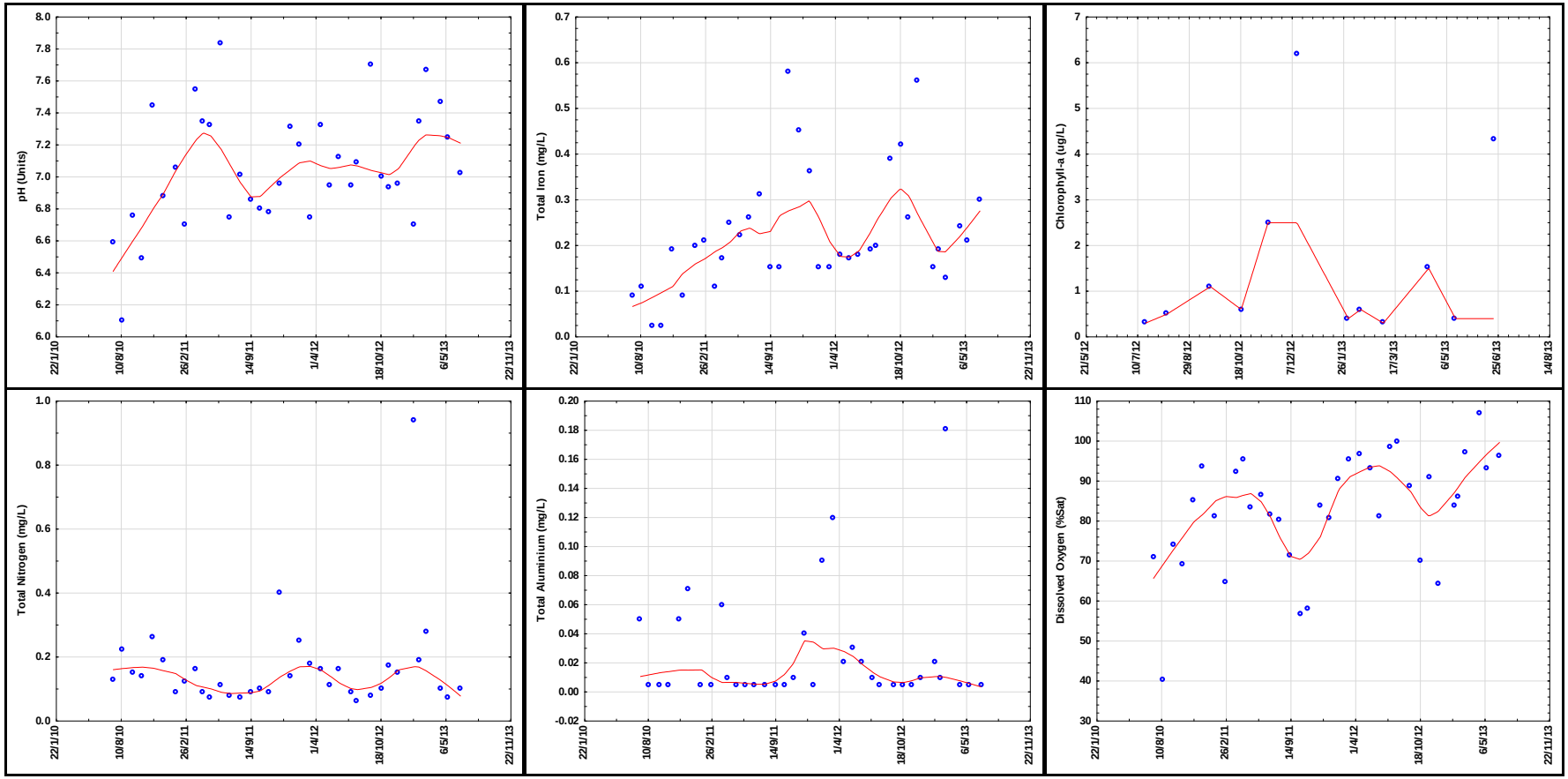


Figure H 8-40 Time-series plots of water quality parameters at E551

Note: The red line of best fit is based on the LOWESS smoothing method

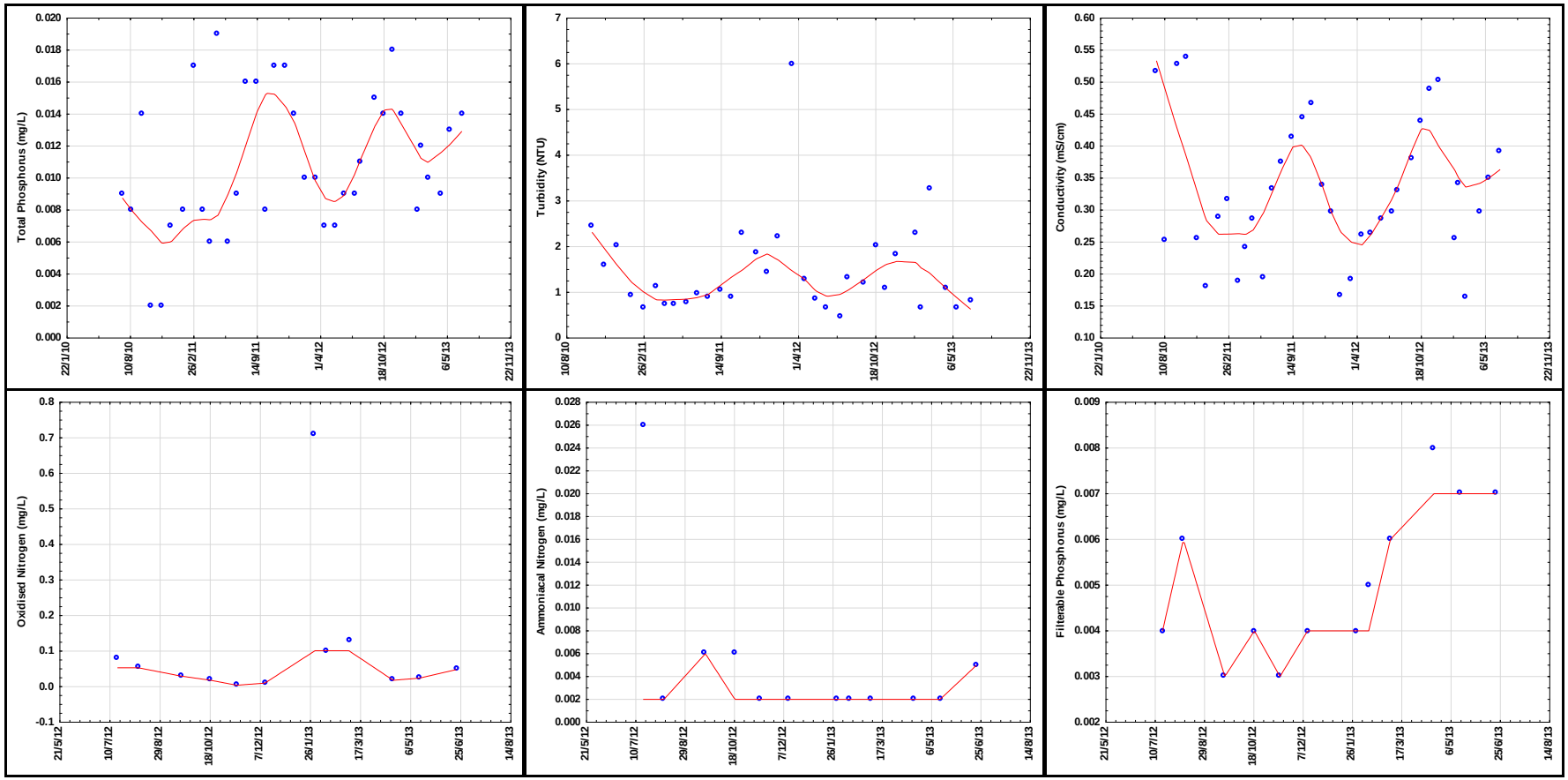


Figure H 8-40 (cont.) Time-series plots of water quality parameters at E551

Note: The red line of best fit is based on the LOWESS smoothing method

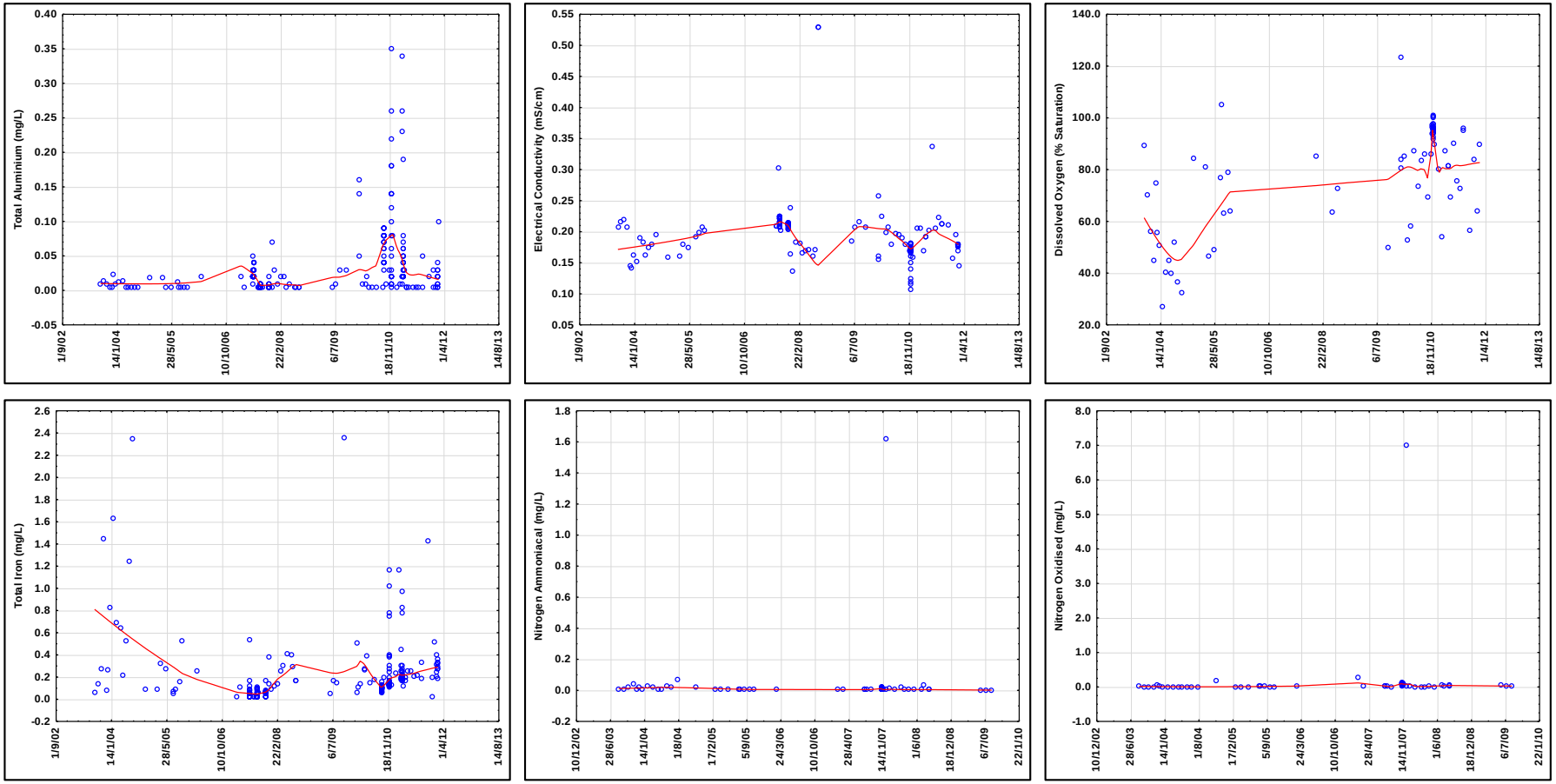


Figure H 8-41 Time-series plots of water quality parameters at E552

Note: The red line of best fit is based on the LOWESS smoothing method

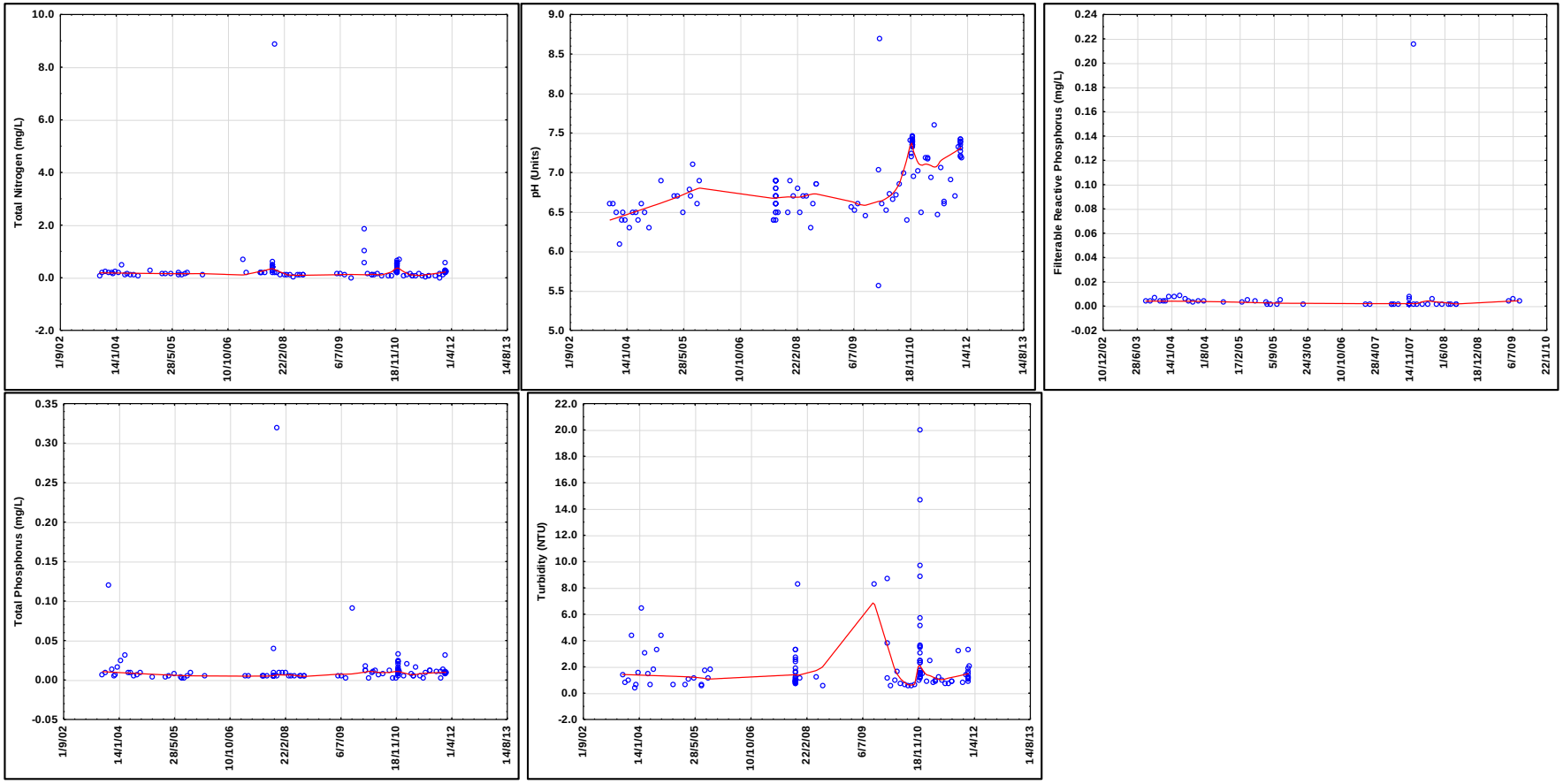


Figure H 8-41 (cont.) Time-series plots of water quality parameters at E552

Note: The red line of best fit is based on the LOWESS smoothing method

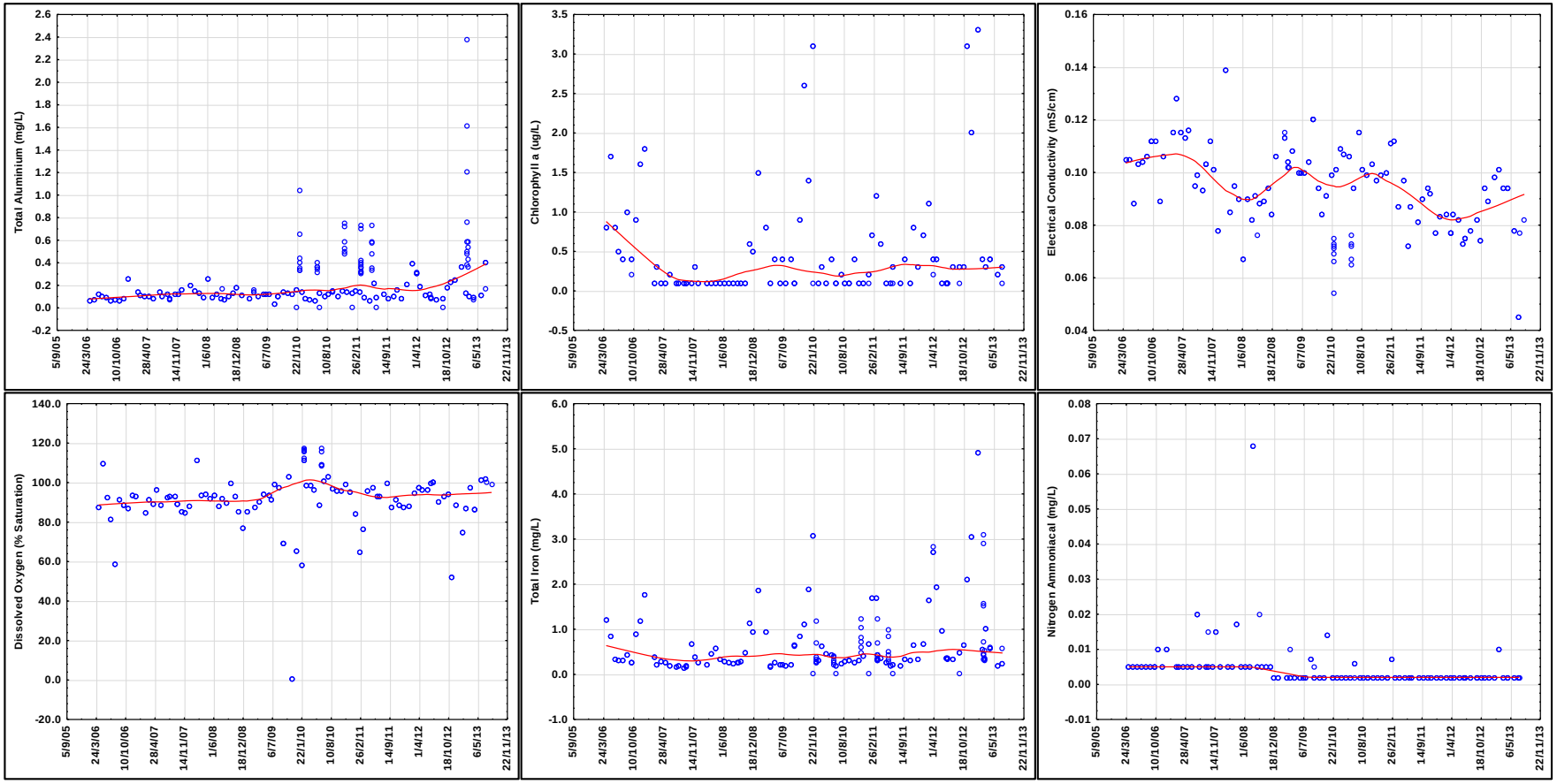


Figure H 8-42 Time-series plots of water quality parameters at E6006

Note: The red line of best fit is based on the LOWESS smoothing method

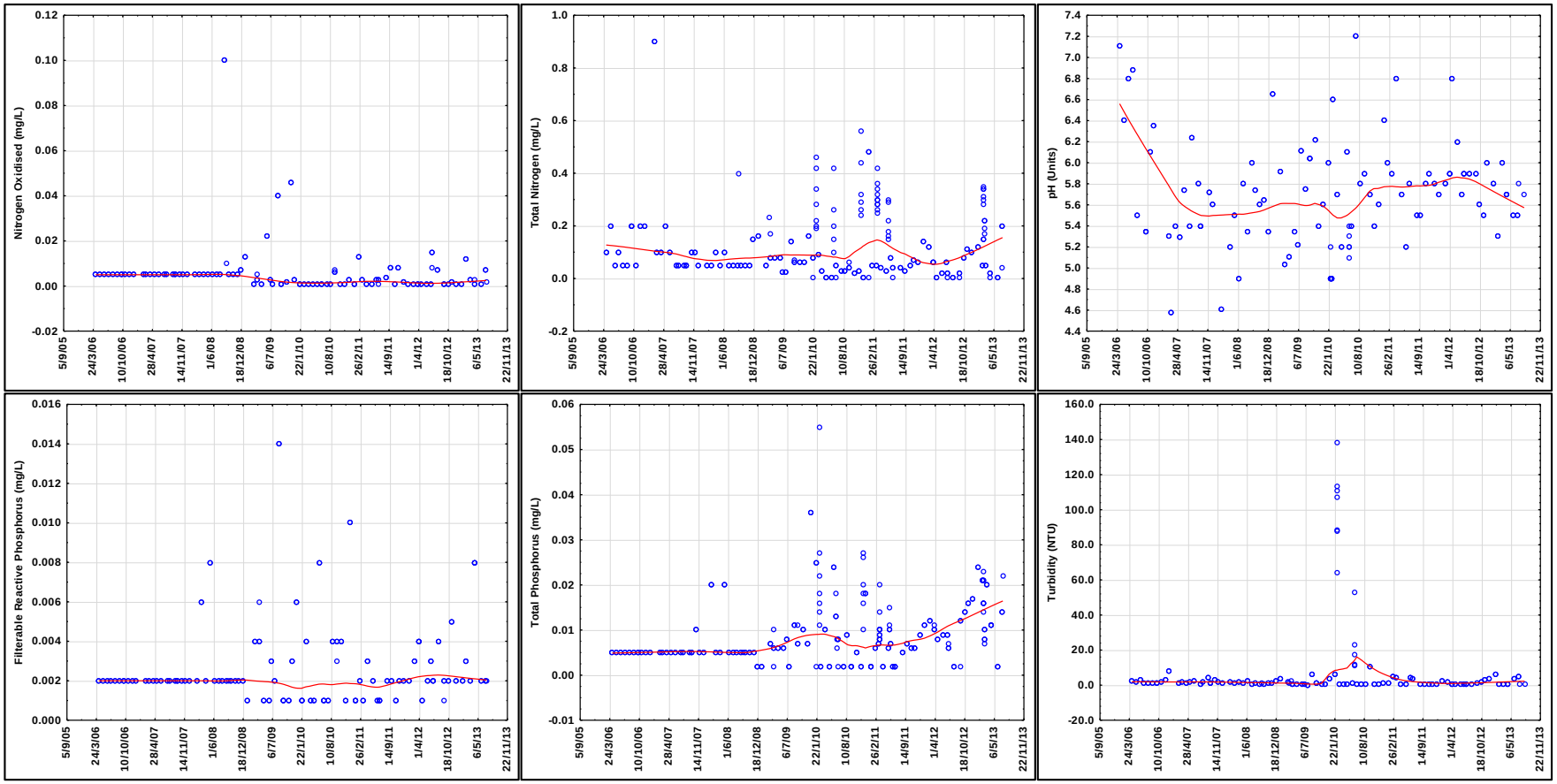


Figure H 8-42 (cont.) Time-series plots of water quality parameters at E6006

Note: The red line of best fit is based on the LOWESS smoothing method

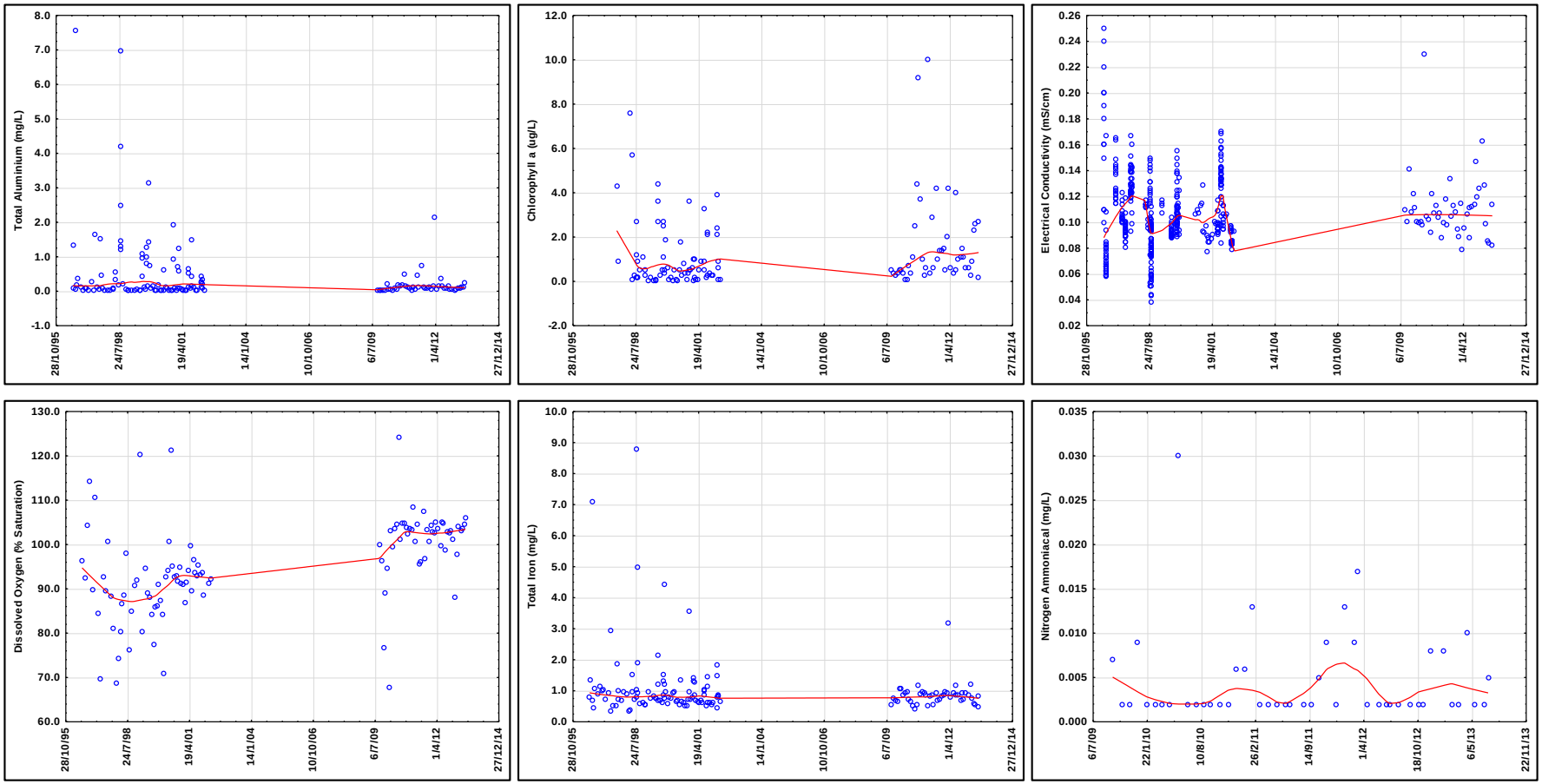


Figure H 8-43 Time-series plots of water quality parameters at E601

Note: The red line of best fit is based on the LOWESS smoothing method

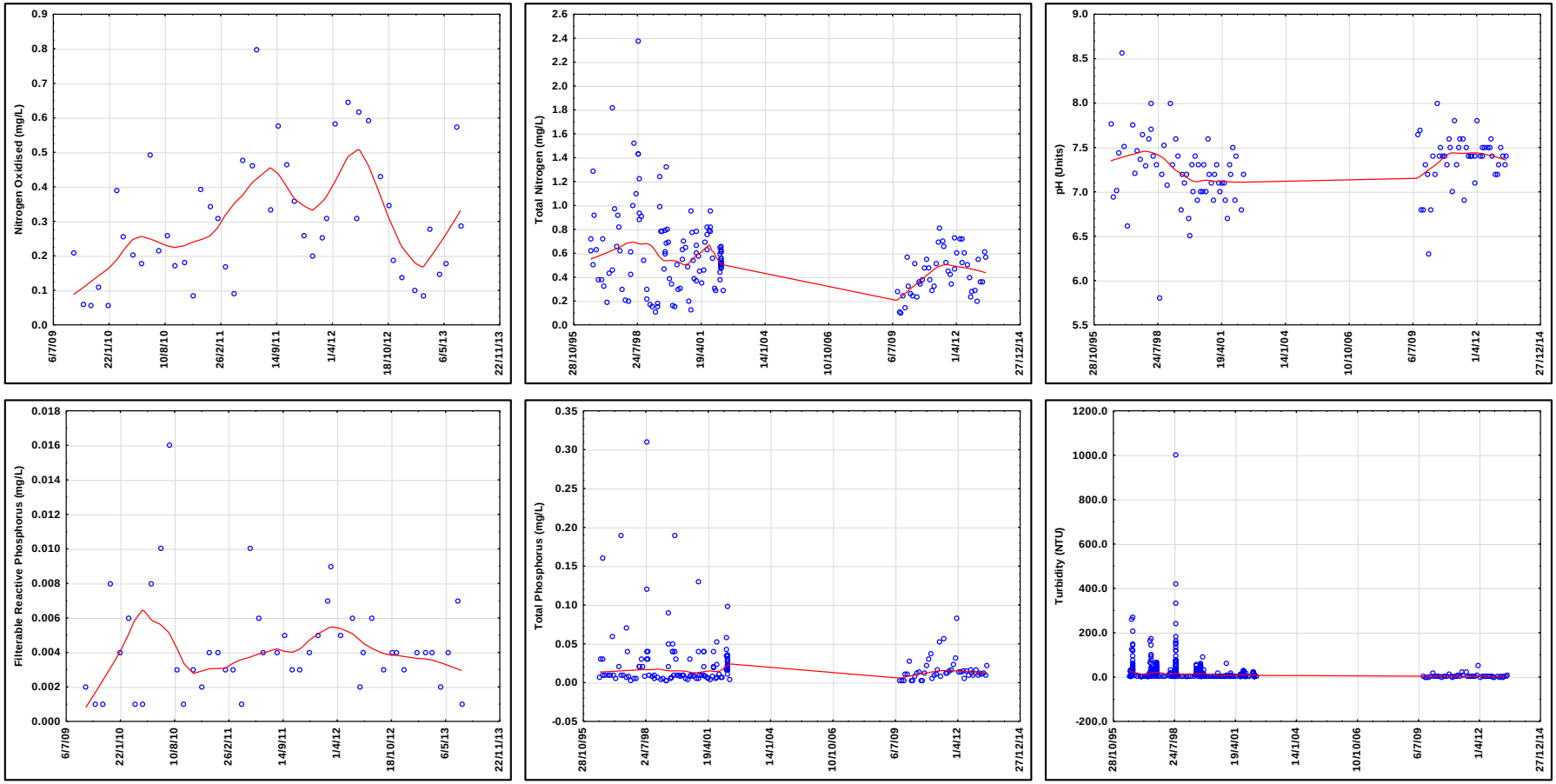


Figure H 8-43 (cont.) Time-series plots of water quality parameters at E601

Note: The red line of best fit is based on the LOWESS smoothing method

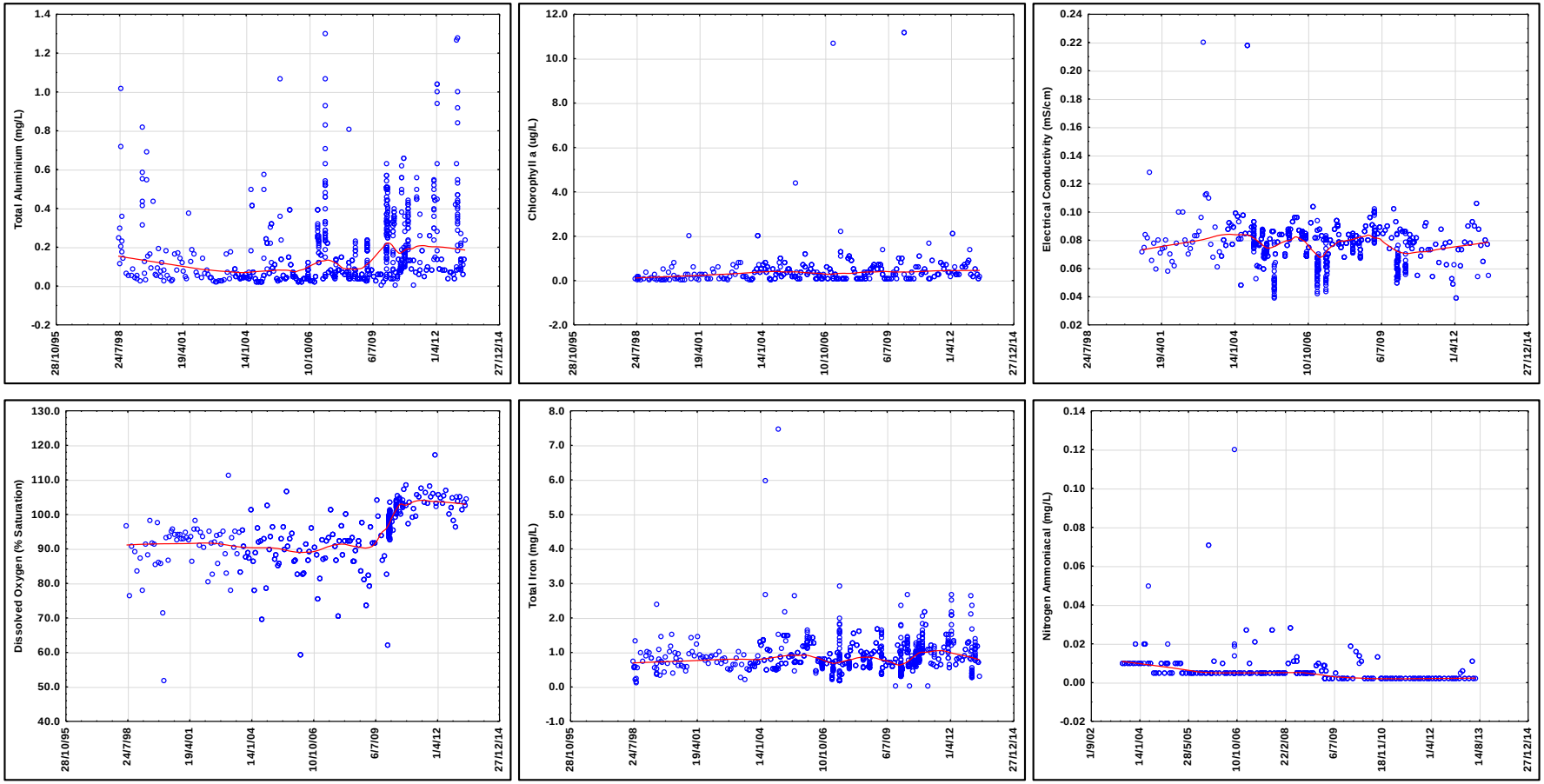


Figure H 8-44 Time-series plots of water quality parameters at E602

Note: The red line of best fit is based on the LOWESS smoothing method

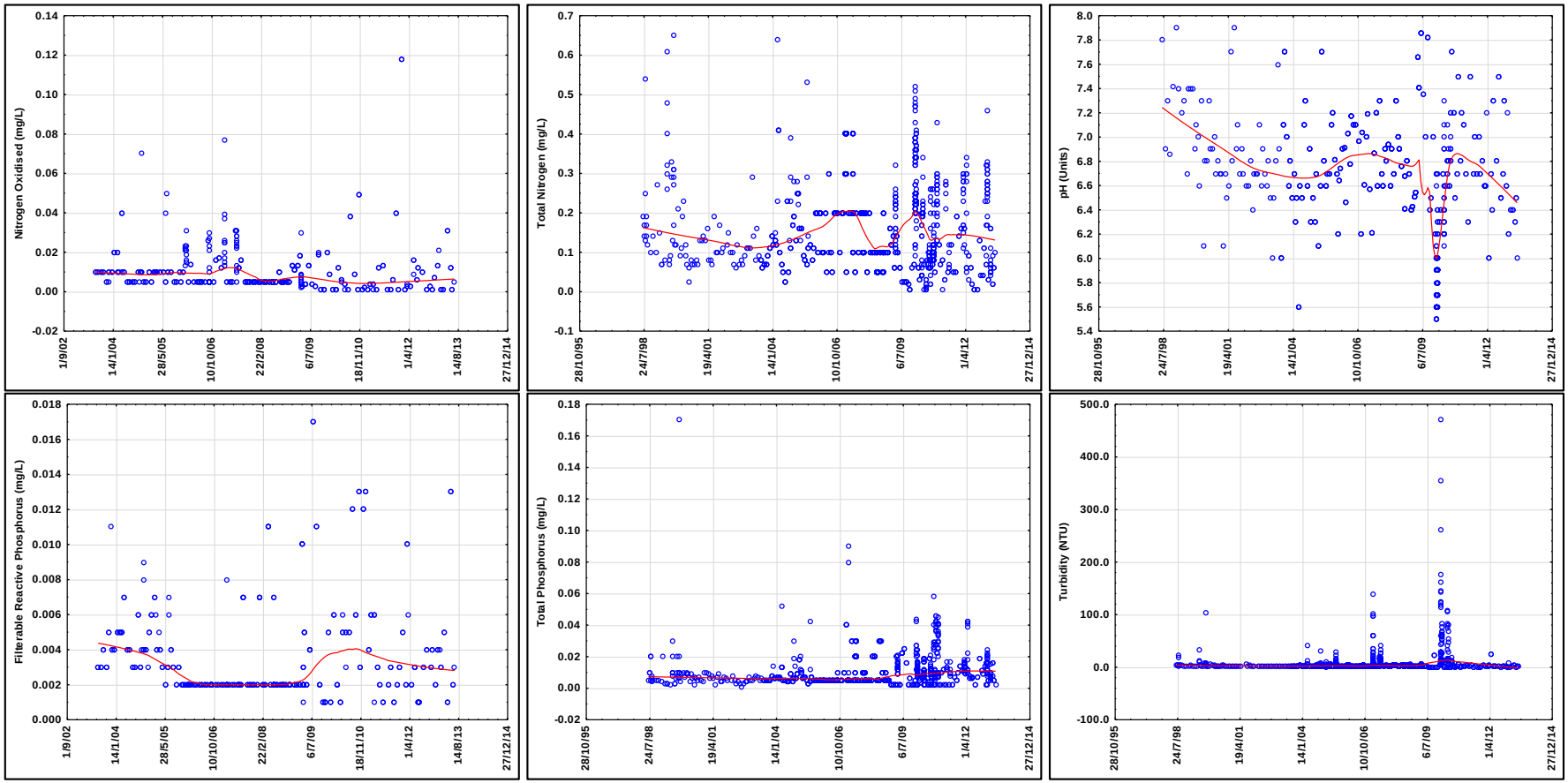


Figure H 8-44 (cont.) Time-series plots of water quality parameters at E602

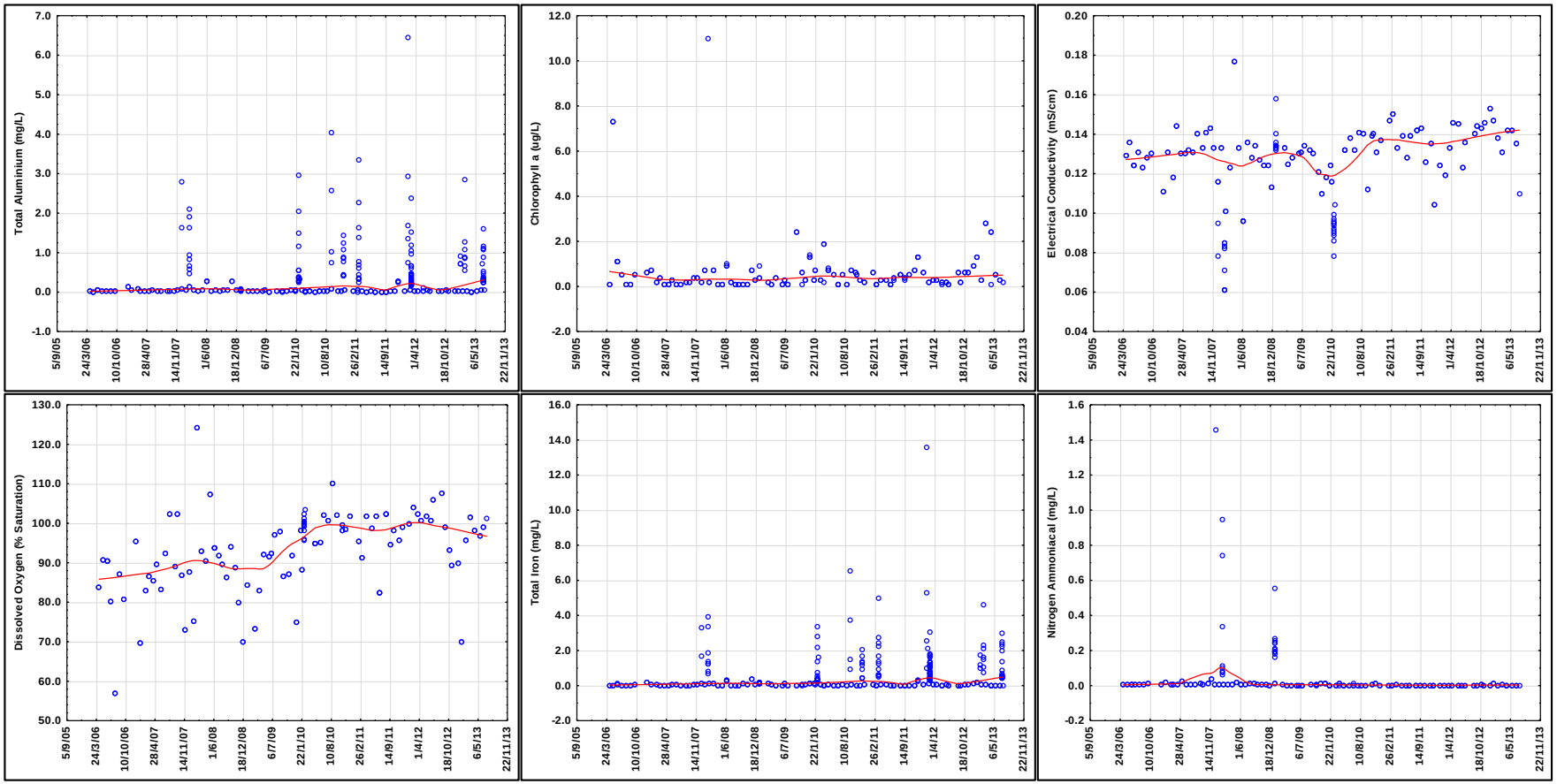


Figure H 8-45 Time-series plots of water quality parameters at E604

Note: The red line of best fit is based on the LOWESS smoothing method

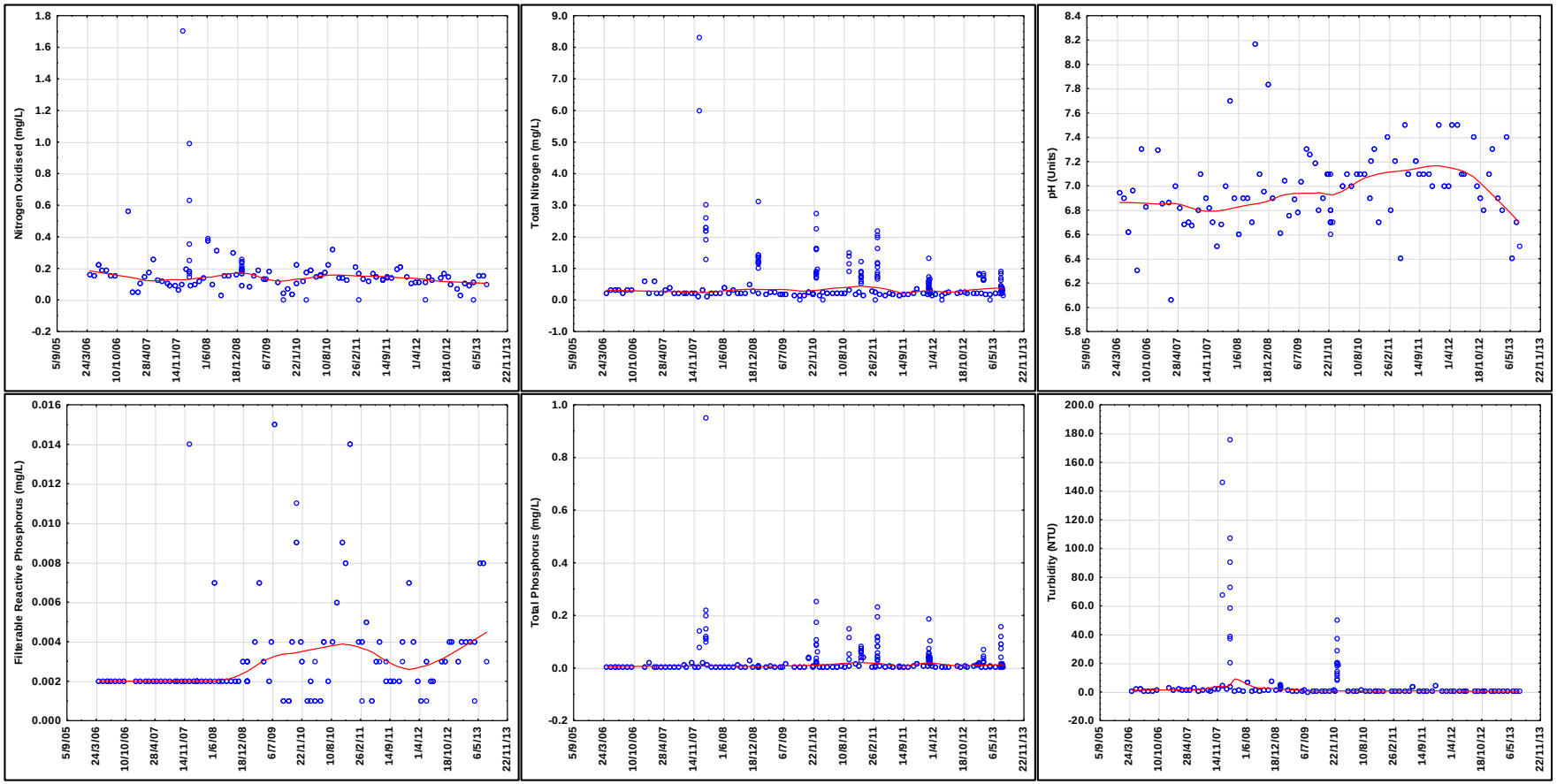


Figure H 8-45 (cont.) Time-series plots of water quality parameters at E604

Note: The red line of best fit is based on the LOWESS smoothing method

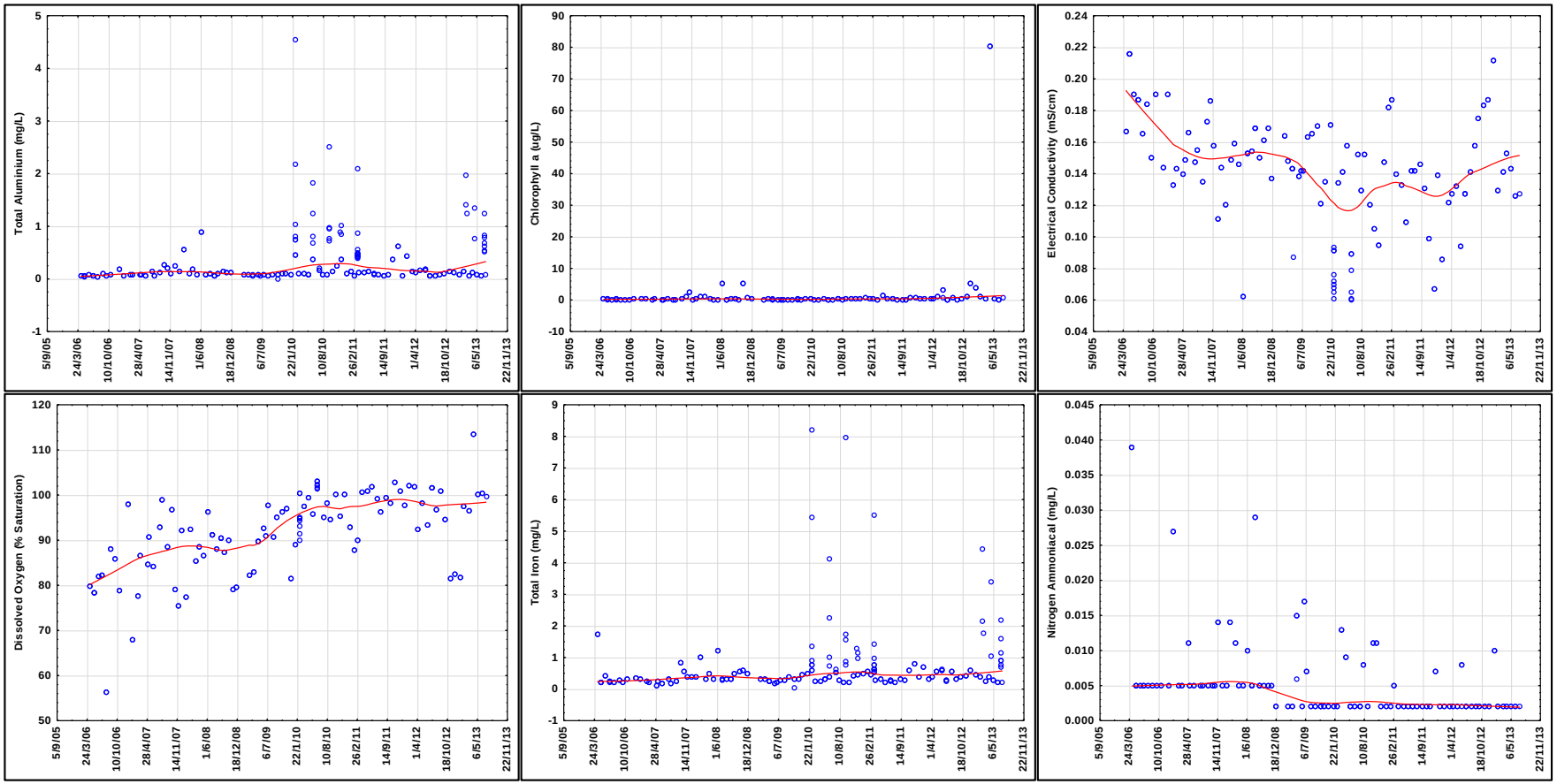


Figure H 8-46 Time-series plots of water quality parameters at E608

Note: The red line of best fit is based on the LOWESS smoothing method

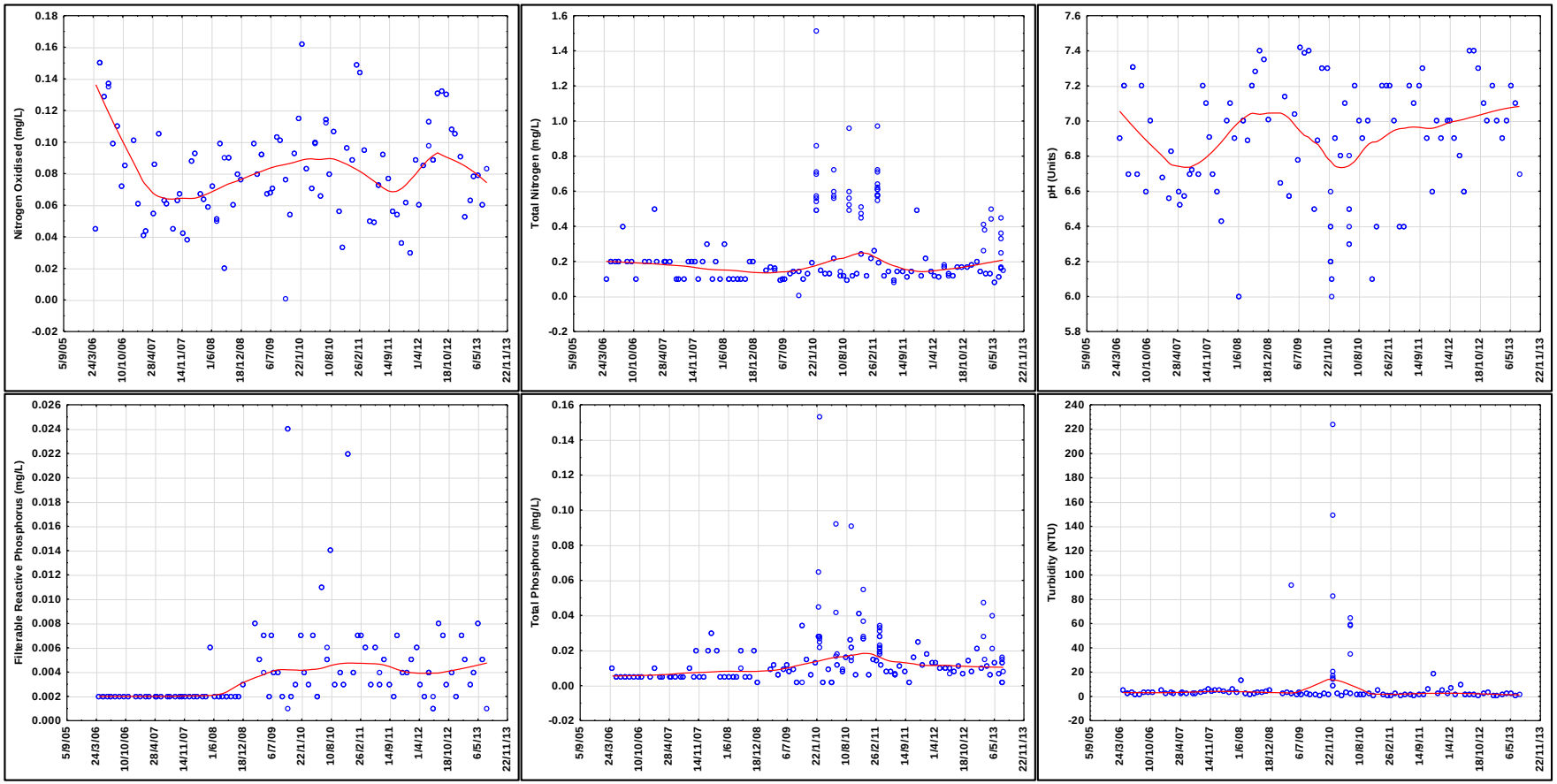


Figure H 8-46 (cont.) Time-series plots of water quality parameters at E608

Note: The red line of best fit is based on the LOWESS smoothing method

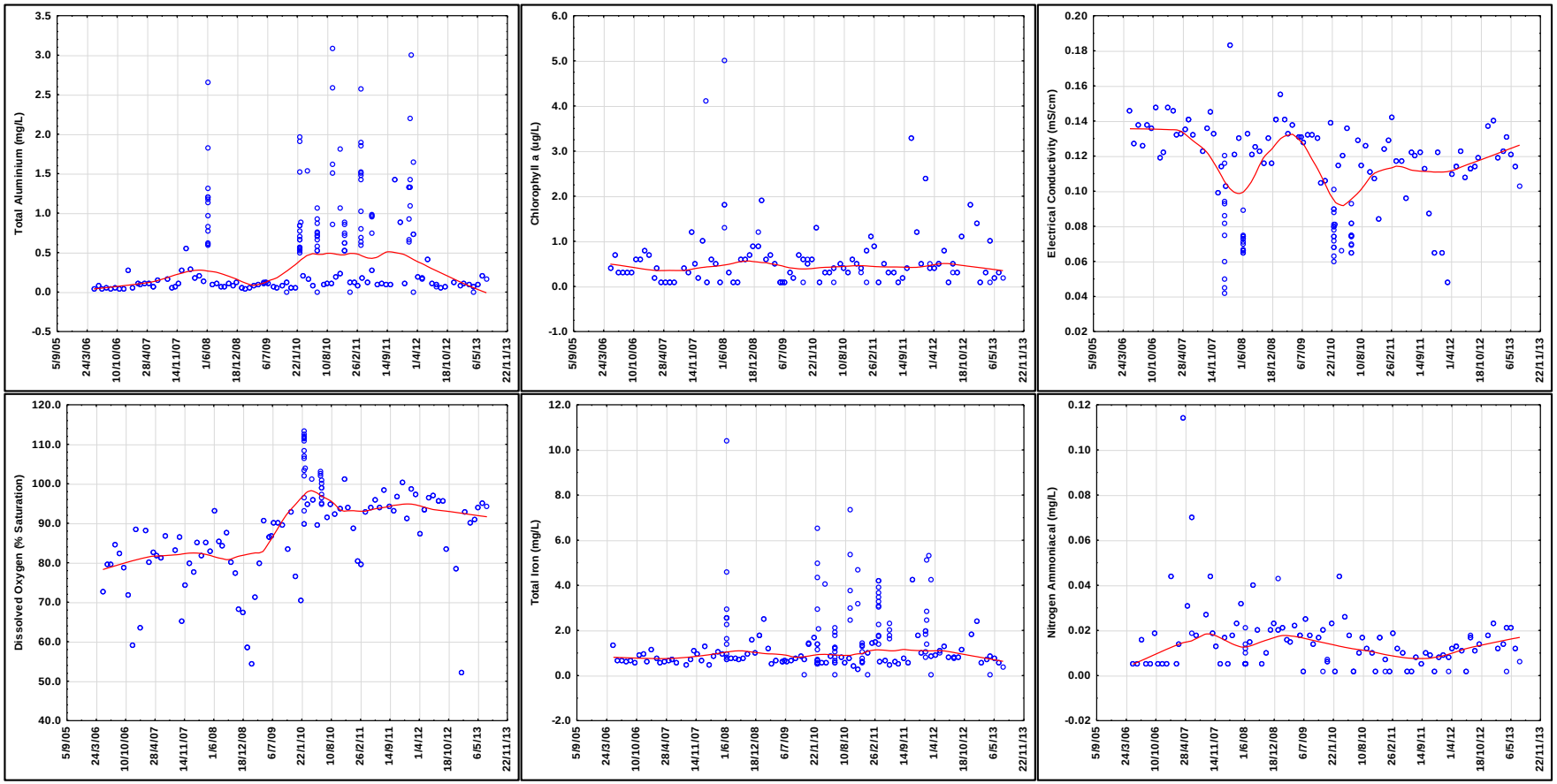


Figure H 8-47 Time-series plots of water quality parameters at E609

Note: The red line of best fit is based on the LOWESS smoothing method

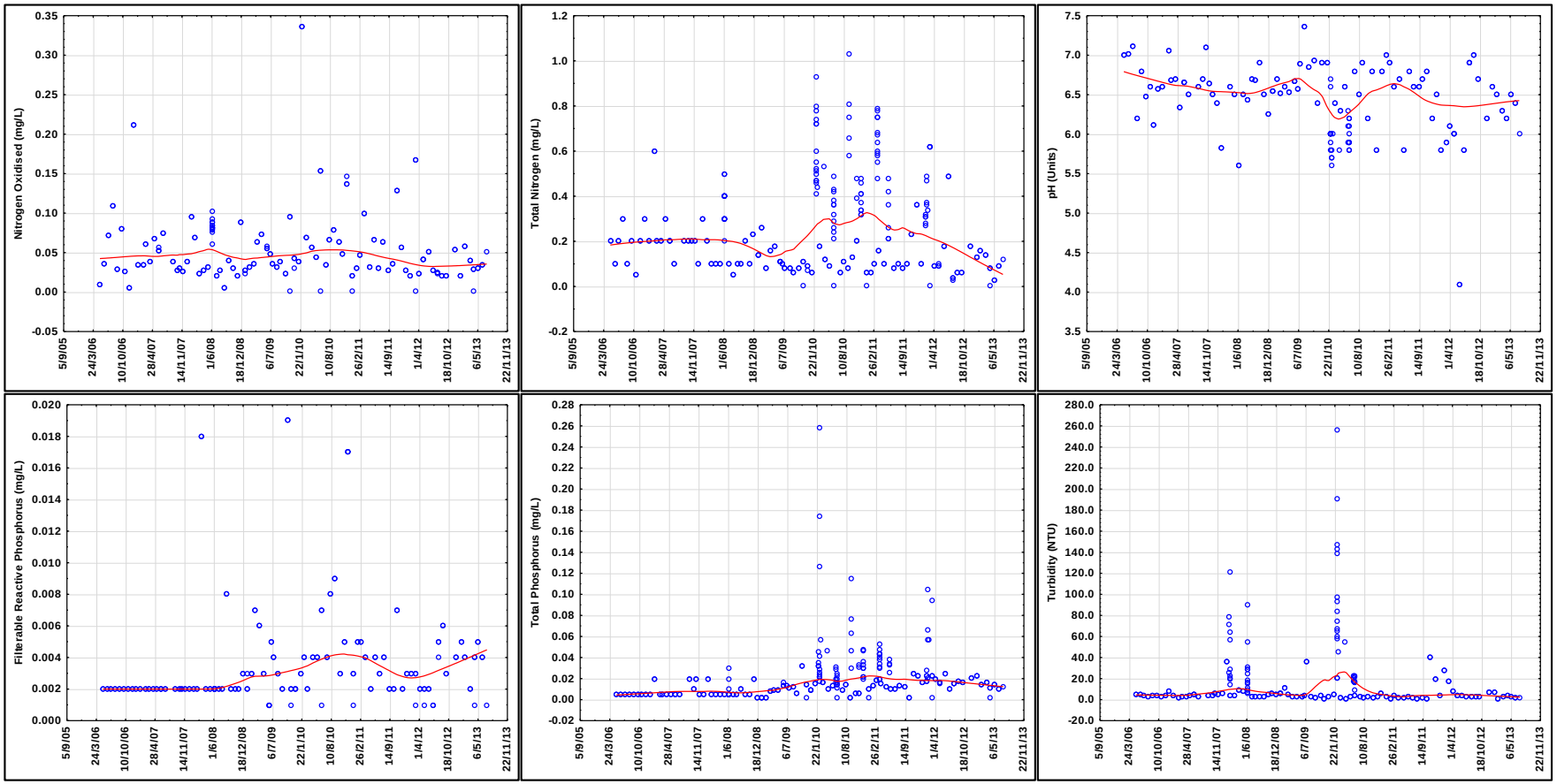


Figure H 8-47 (cont.) Time-series plots of water quality parameters at E609

Note: The red line of best fit is based on the LOWESS smoothing method

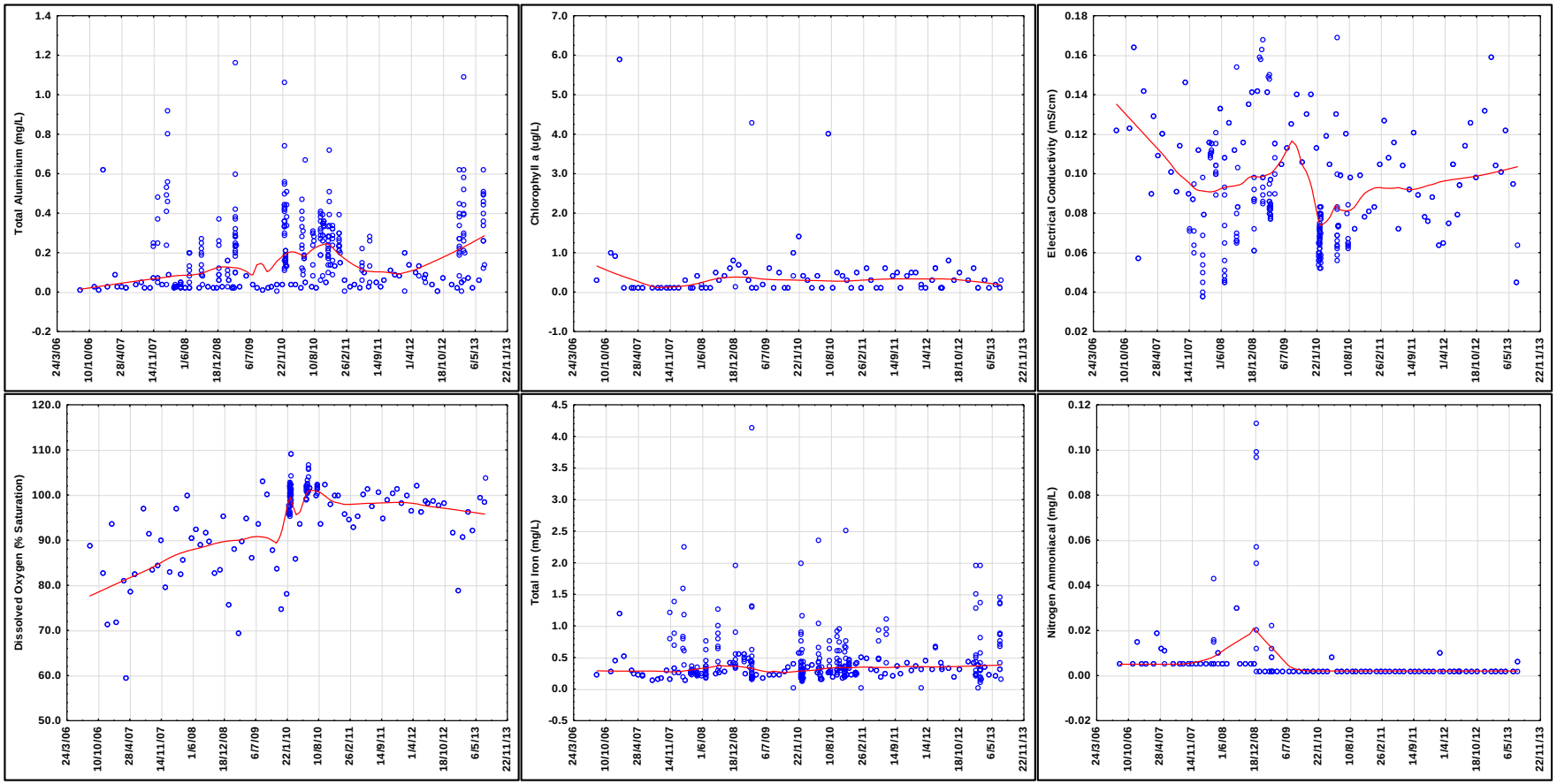


Figure H 8-48 Time-series plots of water quality parameters at E610

Note: The red line of best fit is based on the LOWESS smoothing method

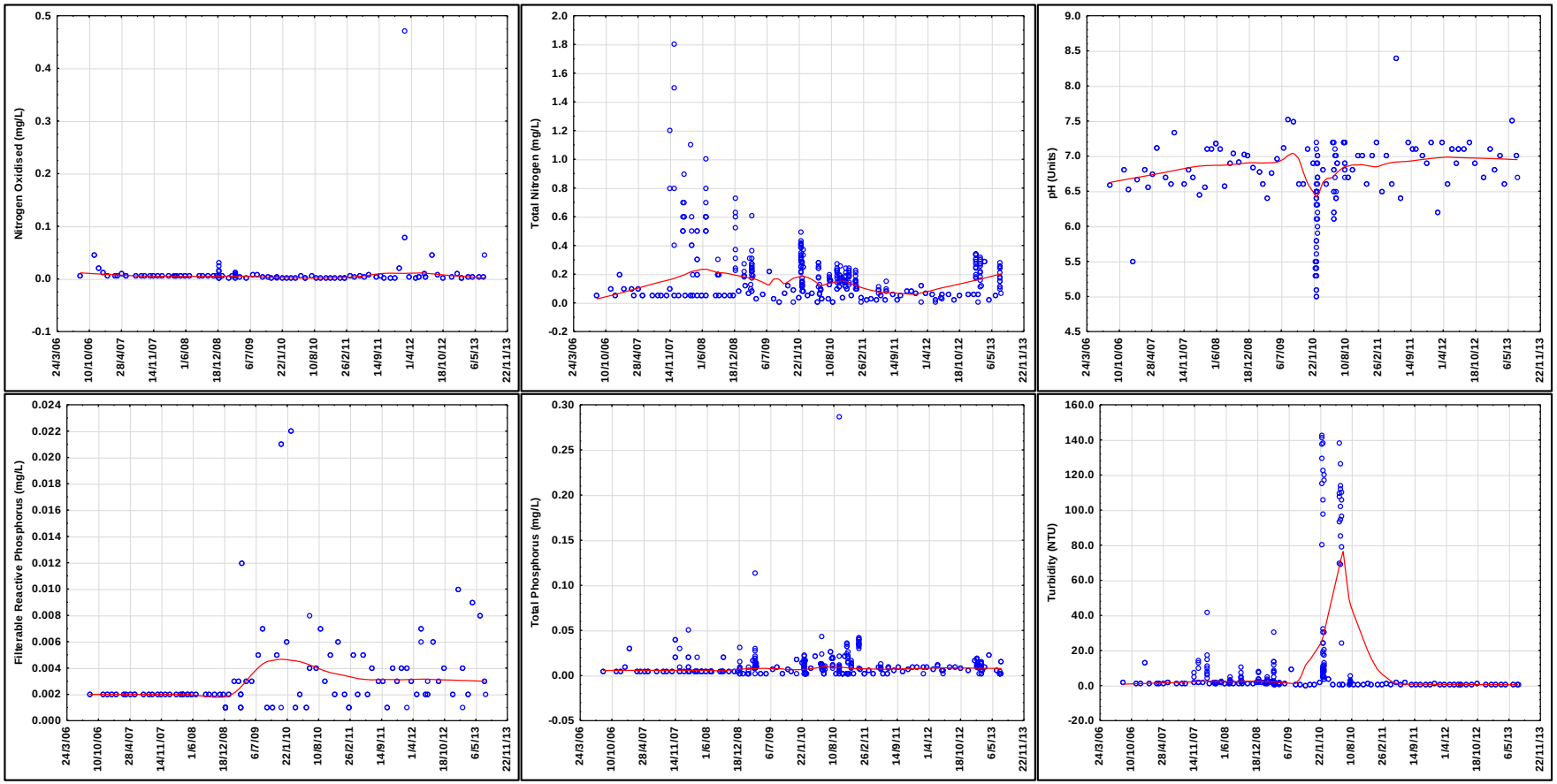


Figure H 8-48 (cont.) Time-series plots of water quality parameters at E610

Note: The red line of best fit is based on the LOWESS smoothing method

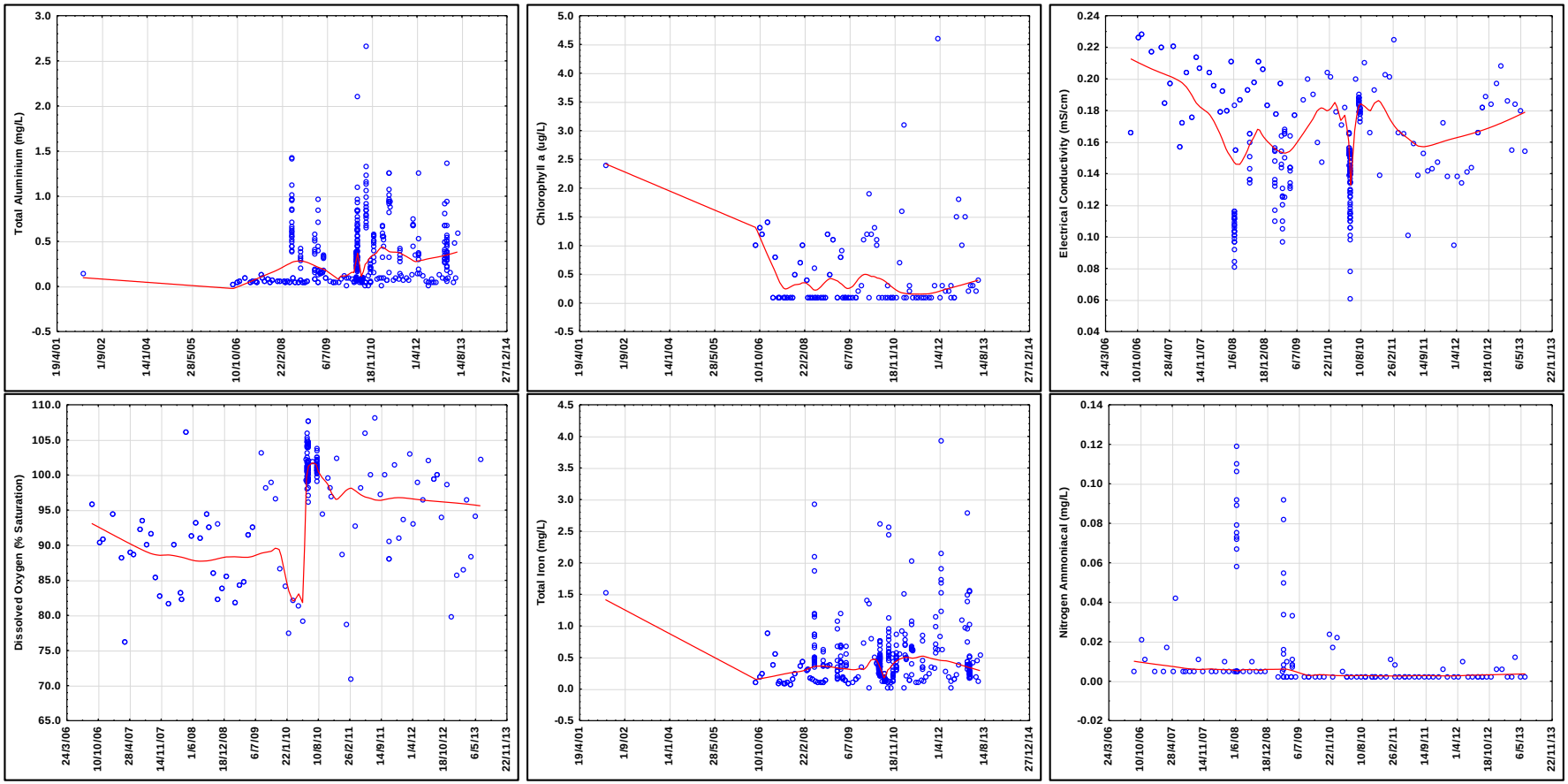


Figure H 8-49 Time-series plots of water quality parameters at E677

Note: The red line of best fit is based on the LOWESS smoothing method

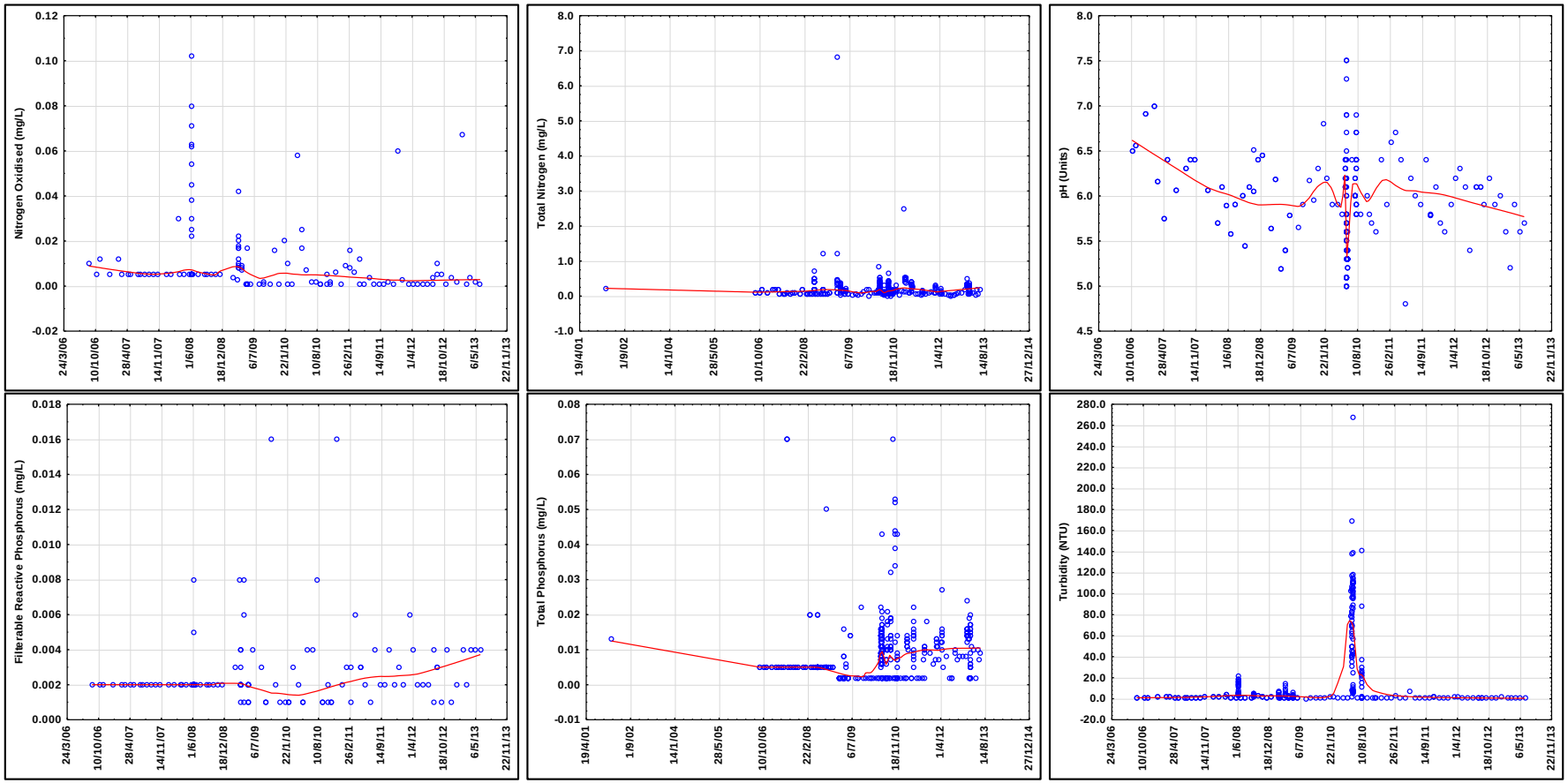


Figure H 8-49 (cont.) Time-series plots of water quality parameters at E677

Note: The red line of best fit is based on the LOWESS smoothing method

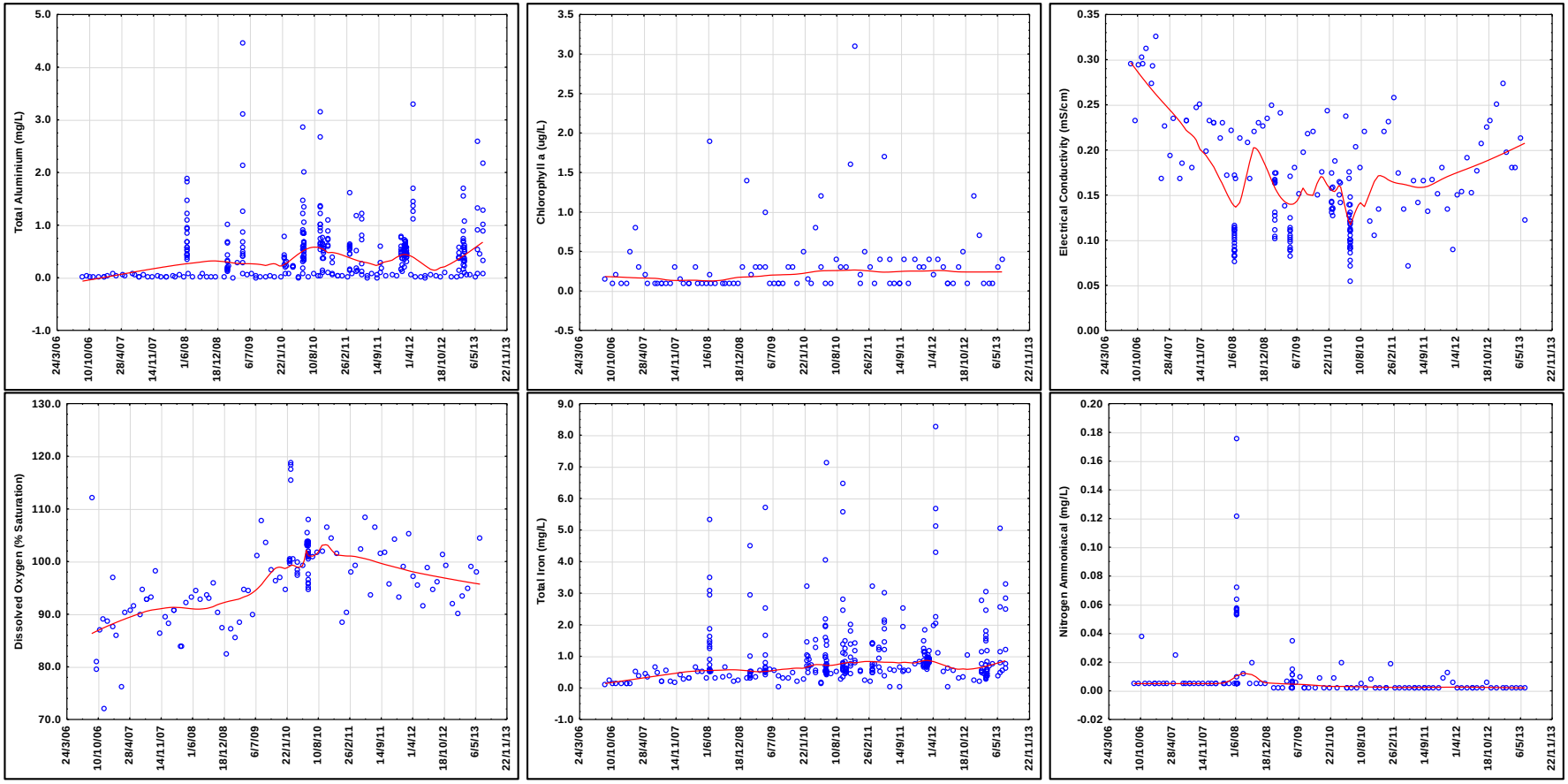


Figure H 8-50 Time-series plots of water quality parameters at E6131

Note: The red line of best fit is based on the LOWESS smoothing method

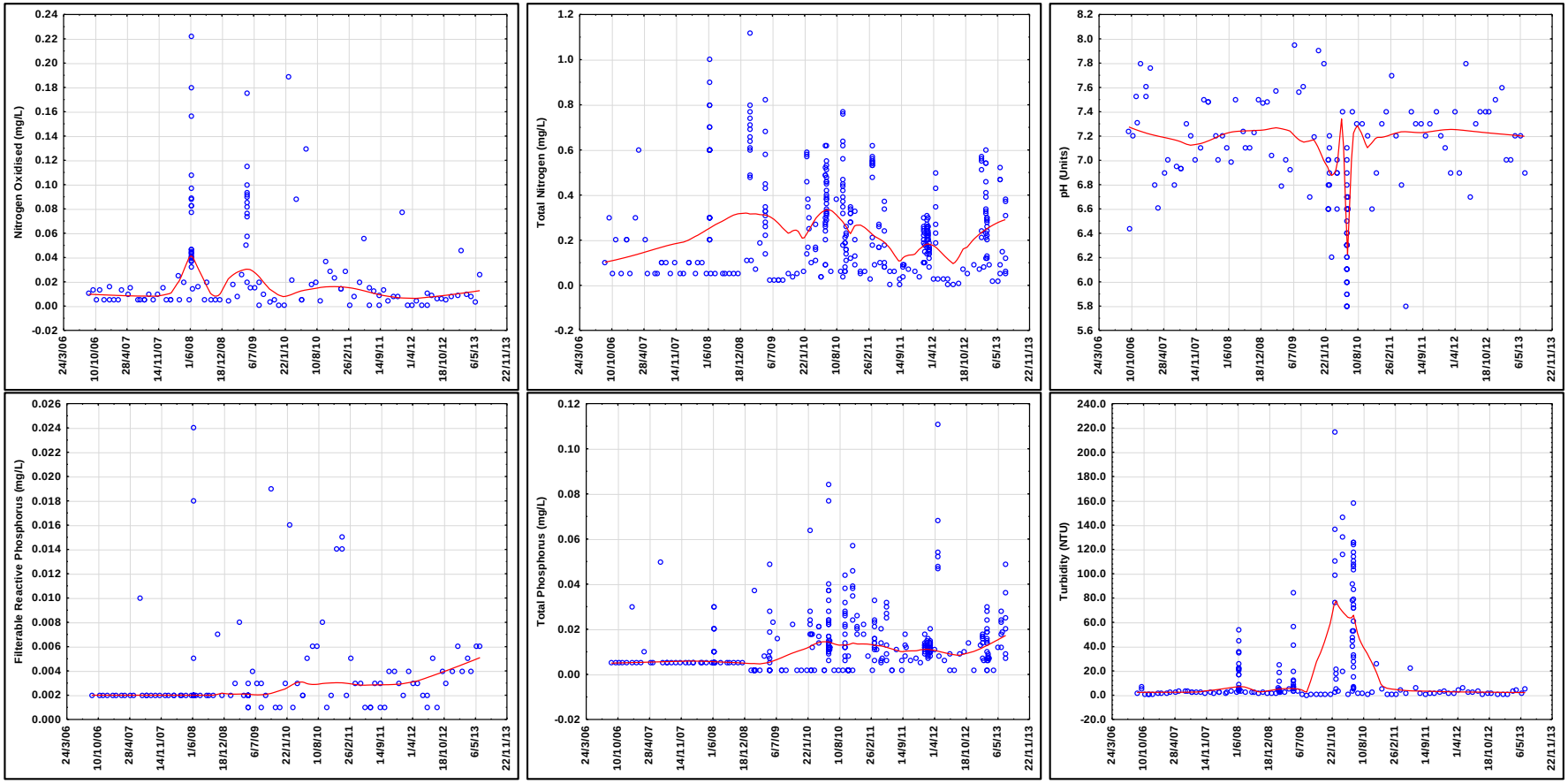


Figure H 8-50 (cont.) Time-series plots of water quality parameters at E6131

Note: The red line of best fit is based on the LOWESS smoothing method

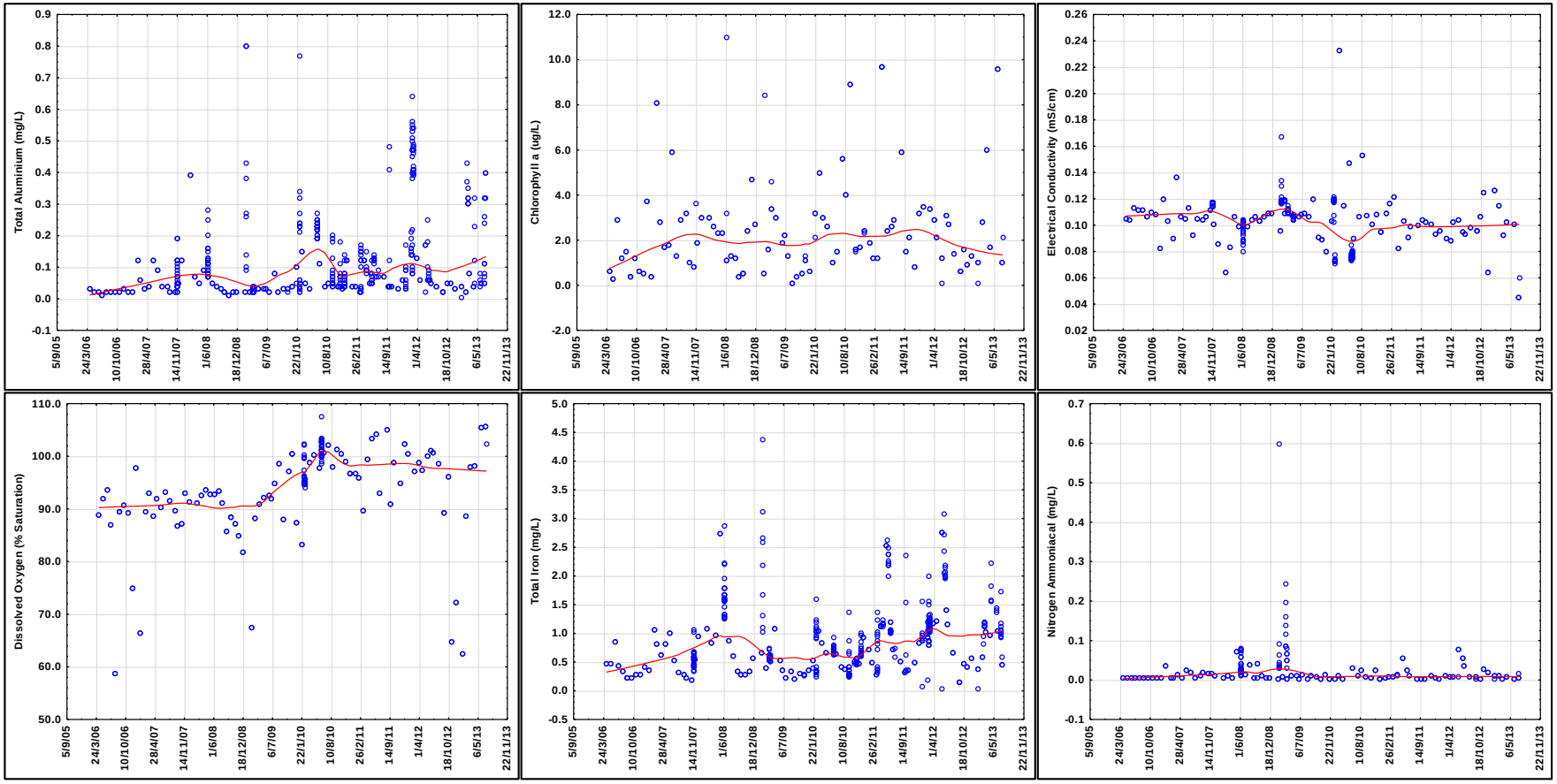


Figure H 8-51 Time-series plots of water quality parameters at E680

Note: The red line of best fit is based on the LOWESS smoothing method

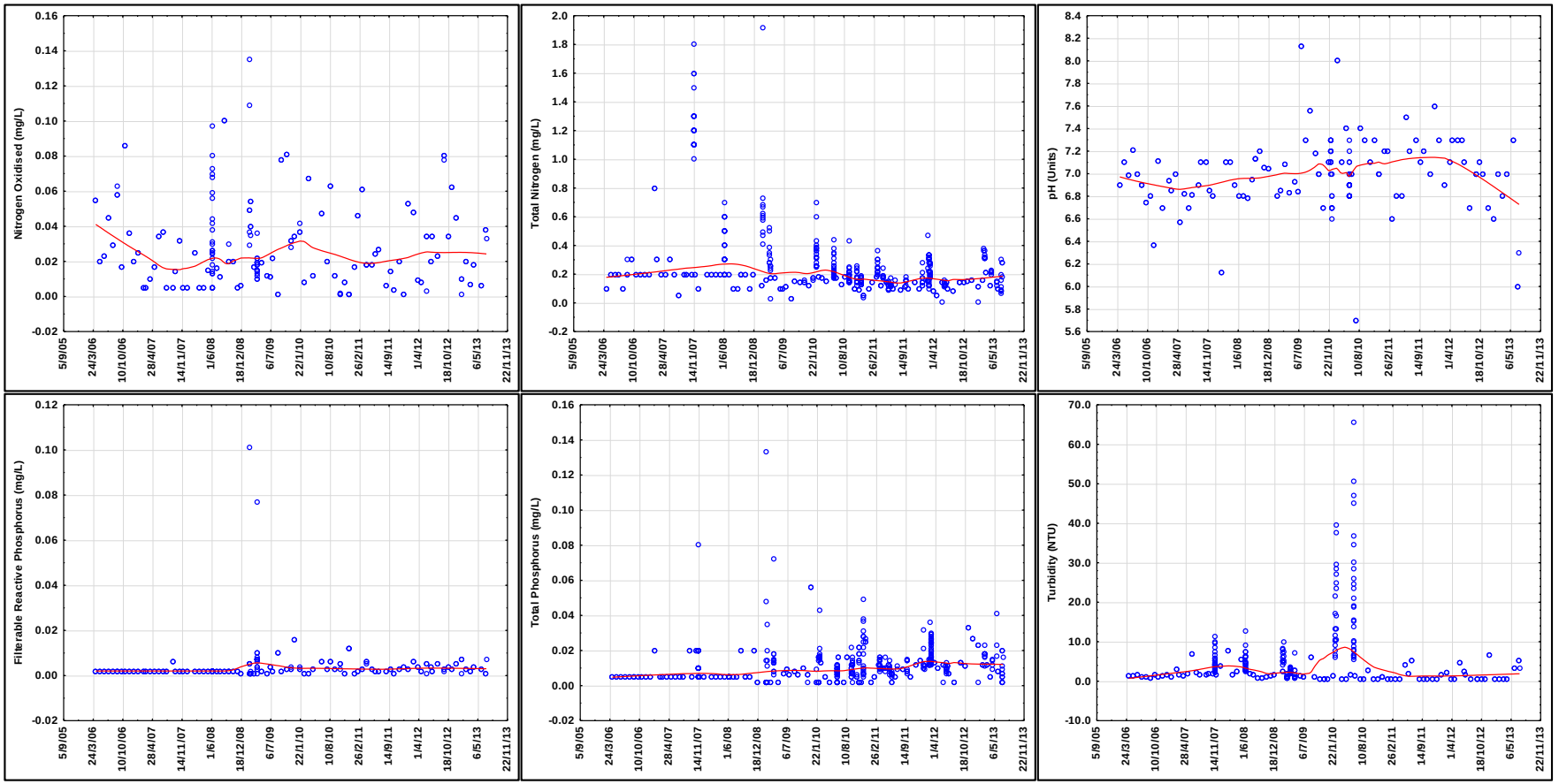


Figure H 8-51 (cont.) Time-series plots of water quality parameters at E680

Note: The red line of best fit is based on the LOWESS smoothing method

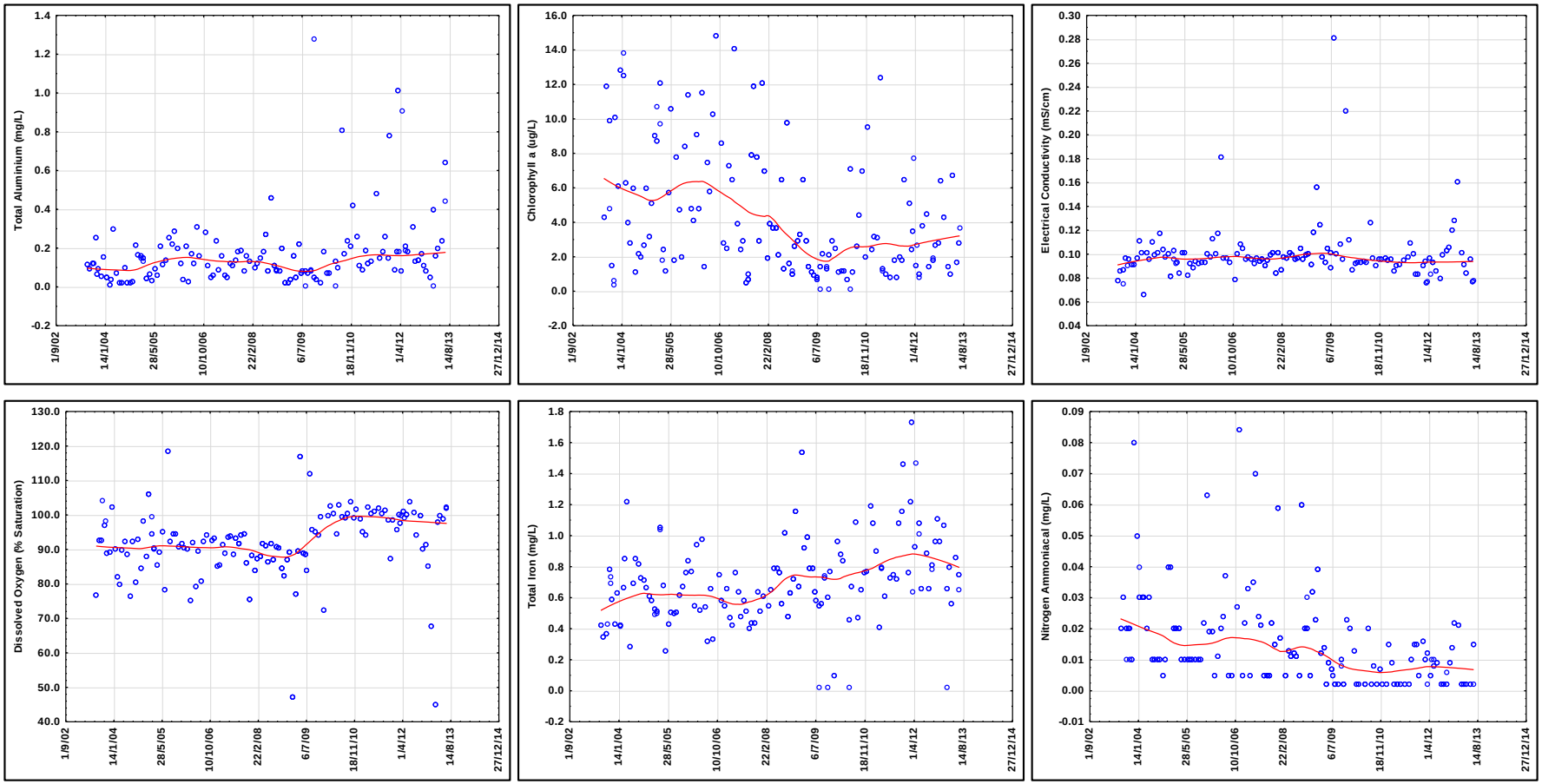


Figure H 8-52 Time-series plots of water quality parameters at E697

Note: The red line of best fit is based on the LOWESS smoothing method

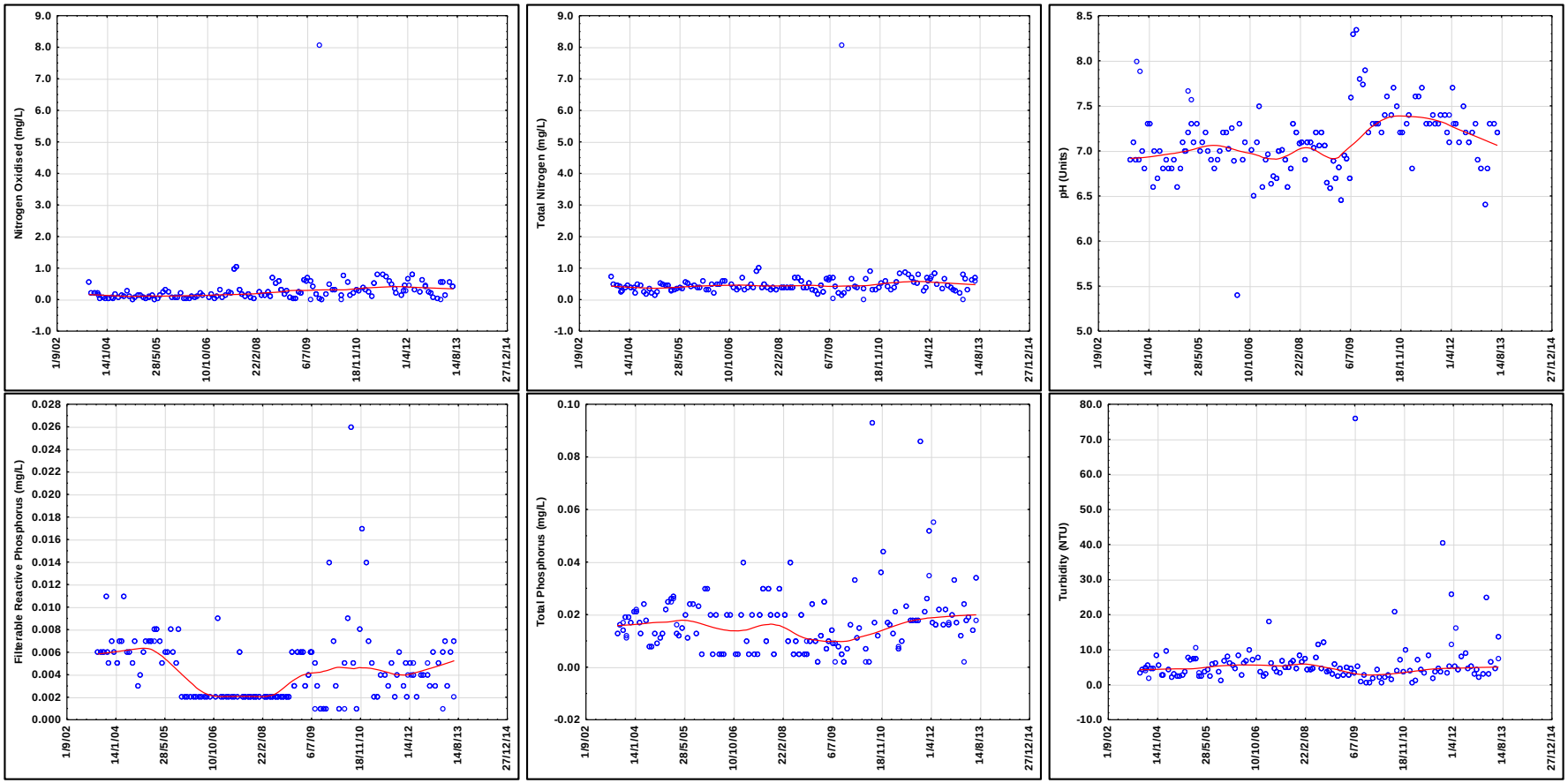


Figure H 8-52 (cont.) Time-series plots of water quality parameters at E697

Note: The red line of best fit is based on the LOWESS smoothing method

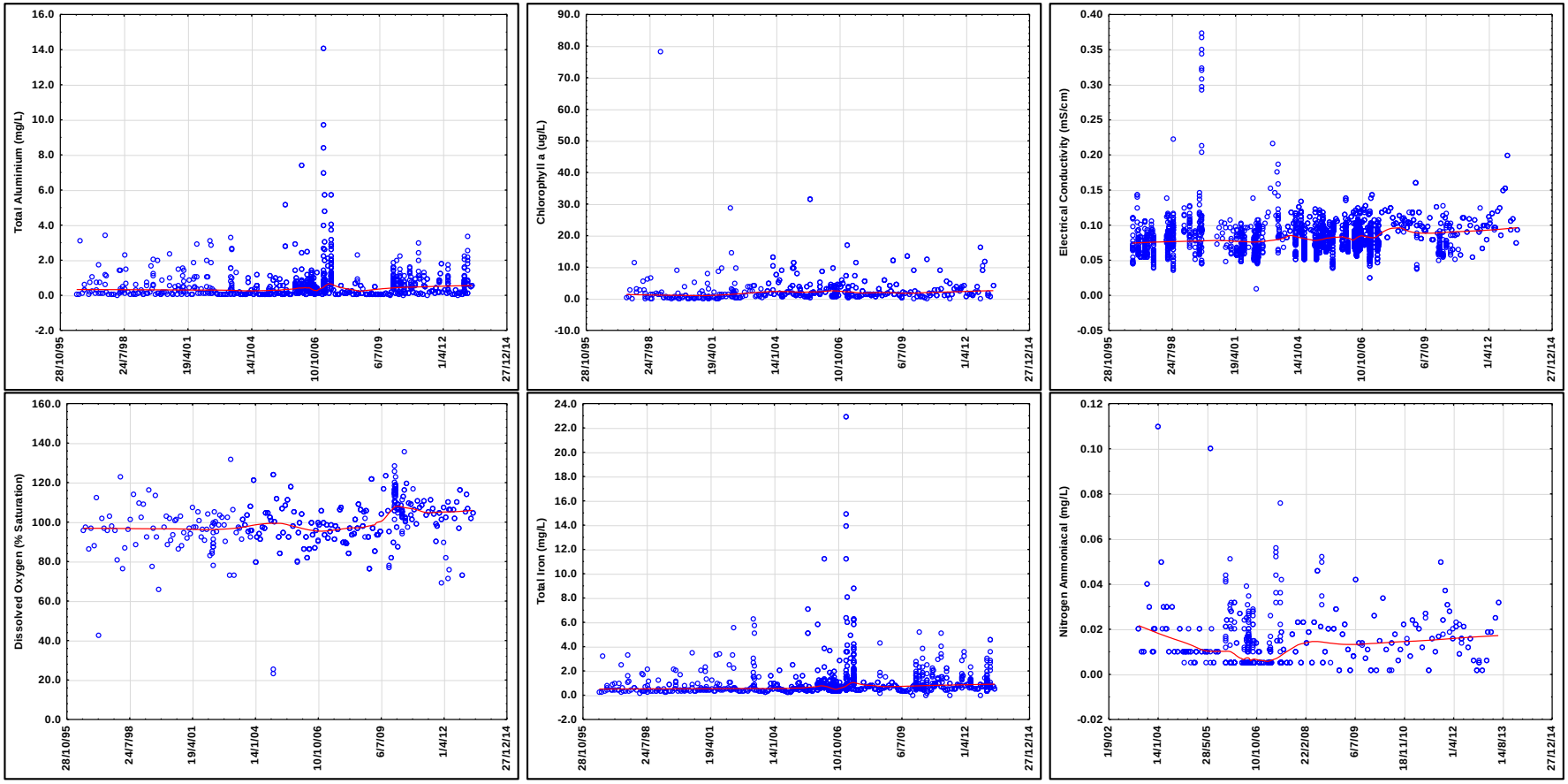


Figure H 8-53 Time-series plots of water quality parameters at E706

Note: The red line of best fit is based on the LOWESS smoothing method

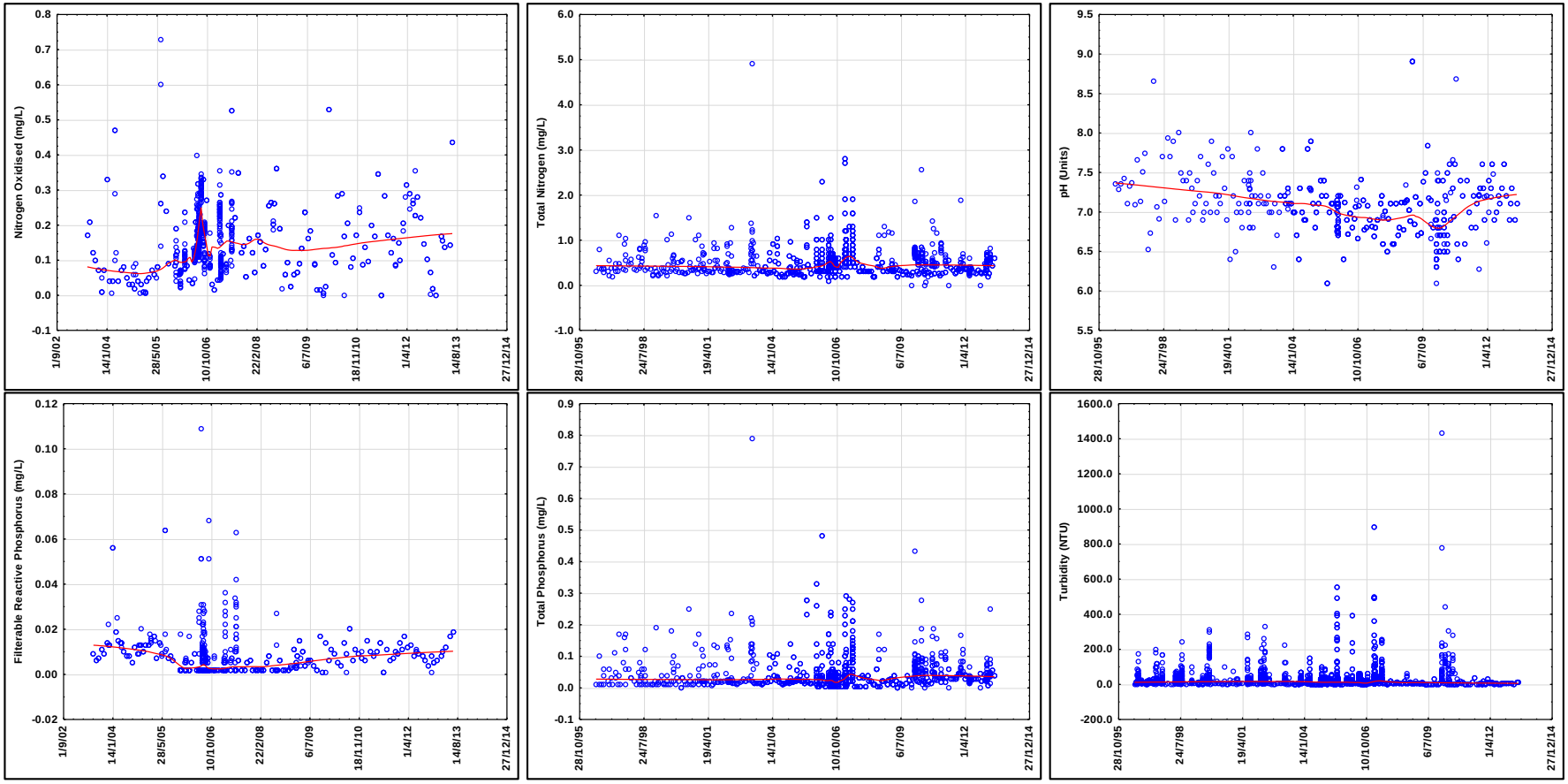


Figure H 8-53 (cont.) Time-series plots of water quality parameters at E706

Note: The red line of best fit is based on the LOWESS smoothing method

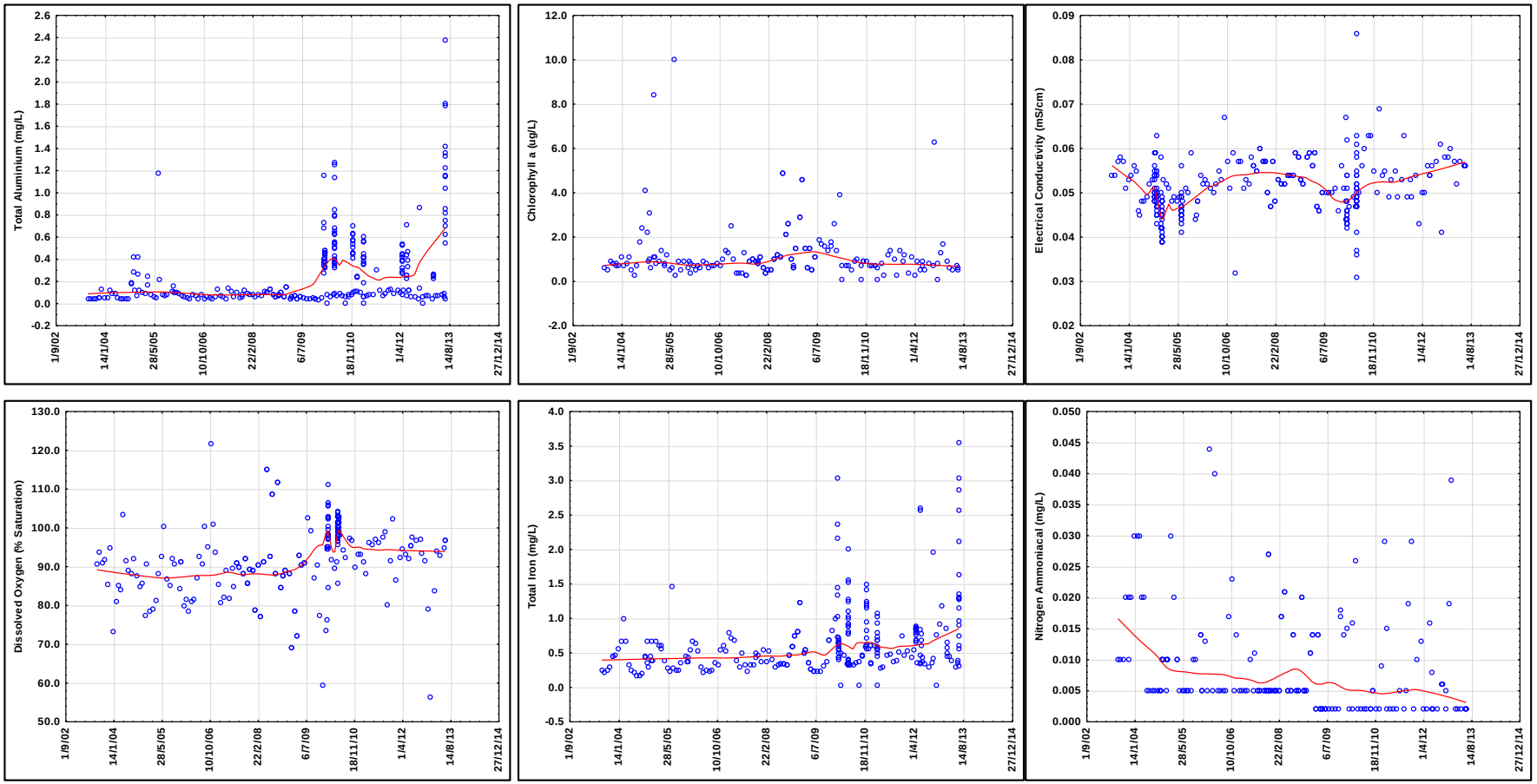


Figure H 8-54 Time-series plots of water quality parameters at E822

Note: The red line of best fit is based on the LOWESS smoothing method

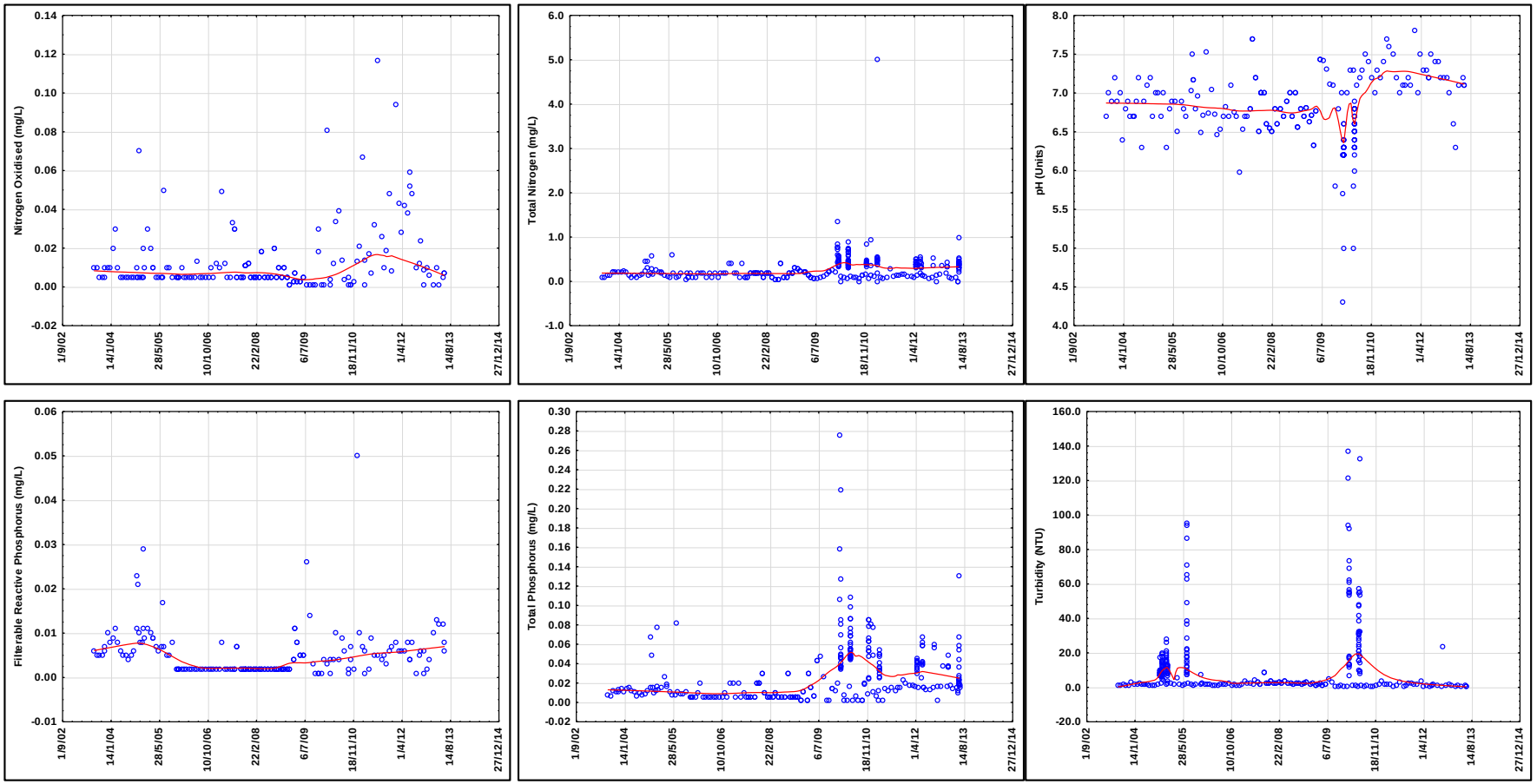


Figure H 8-54 (cont.) Time-series plots of water quality parameters at E822

Note: The red line of best fit is based on the LOWESS smoothing method

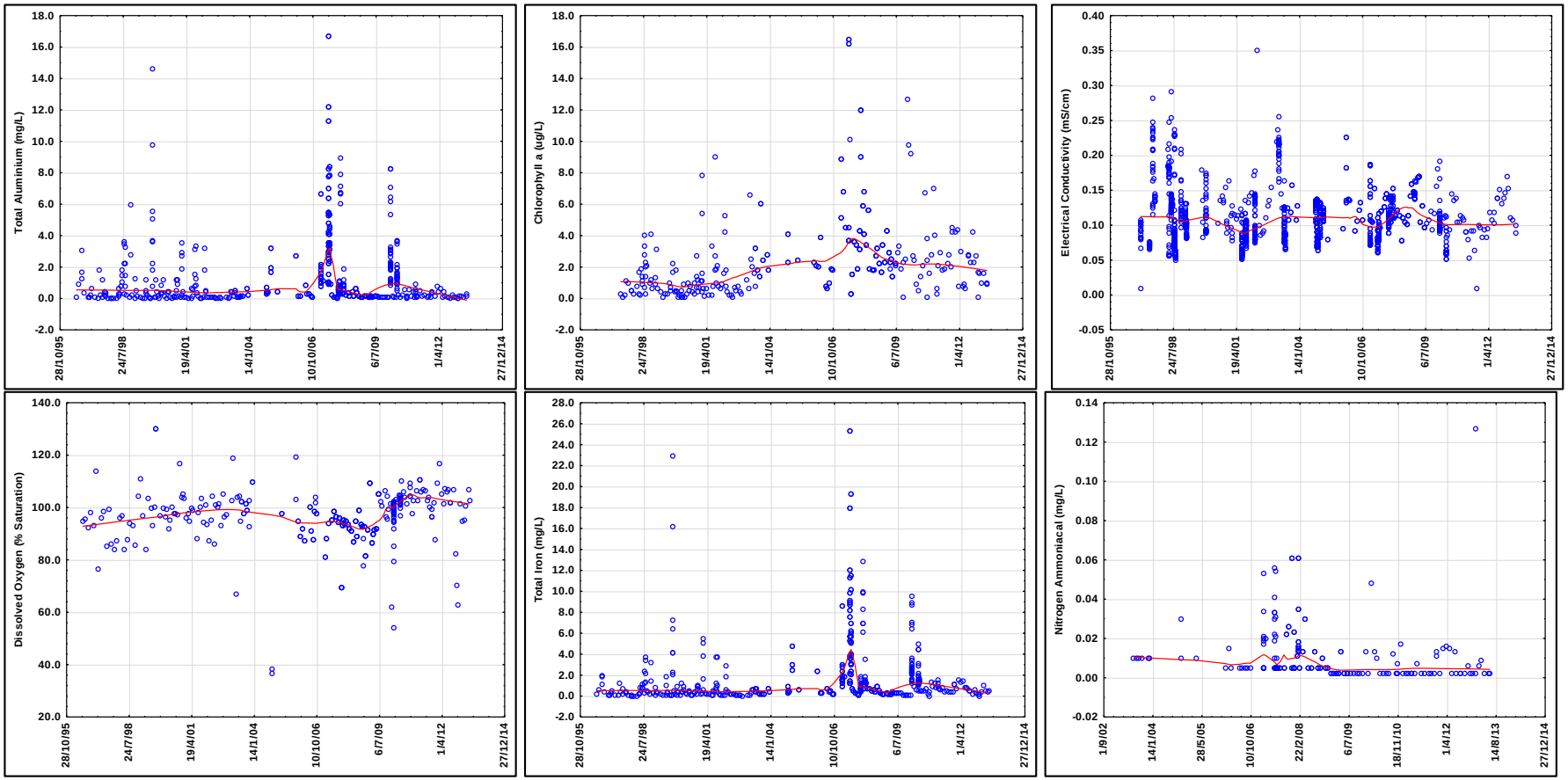


Figure H 8-55 Time-series plots of water quality parameters at E847

Note: The red line of best fit is based on the LOWESS smoothing method

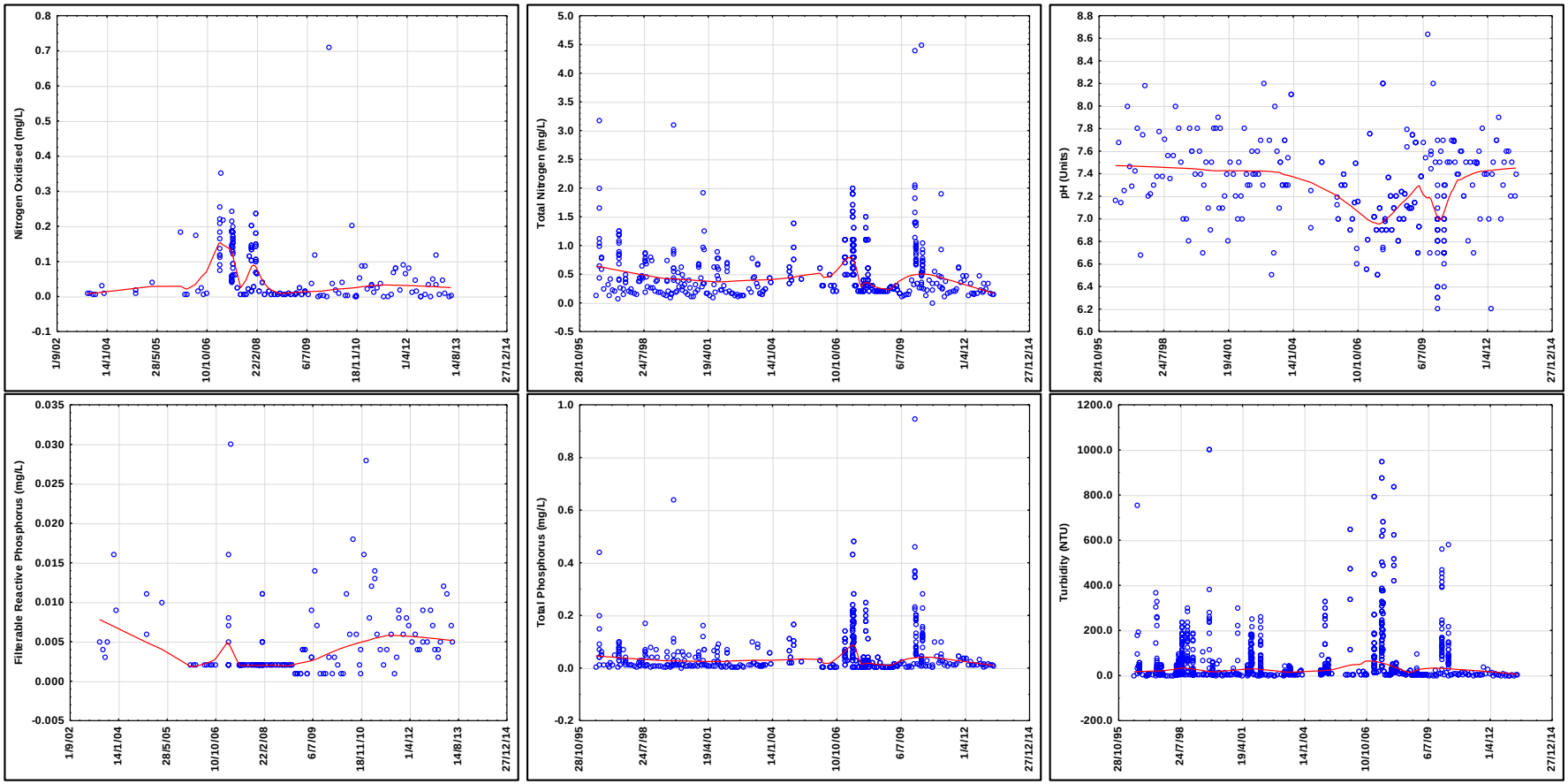


Figure H 8-54 (cont.) Time-series plots of water quality parameters at E847

Note: The red line of best fit is based on the LOWESS smoothing method

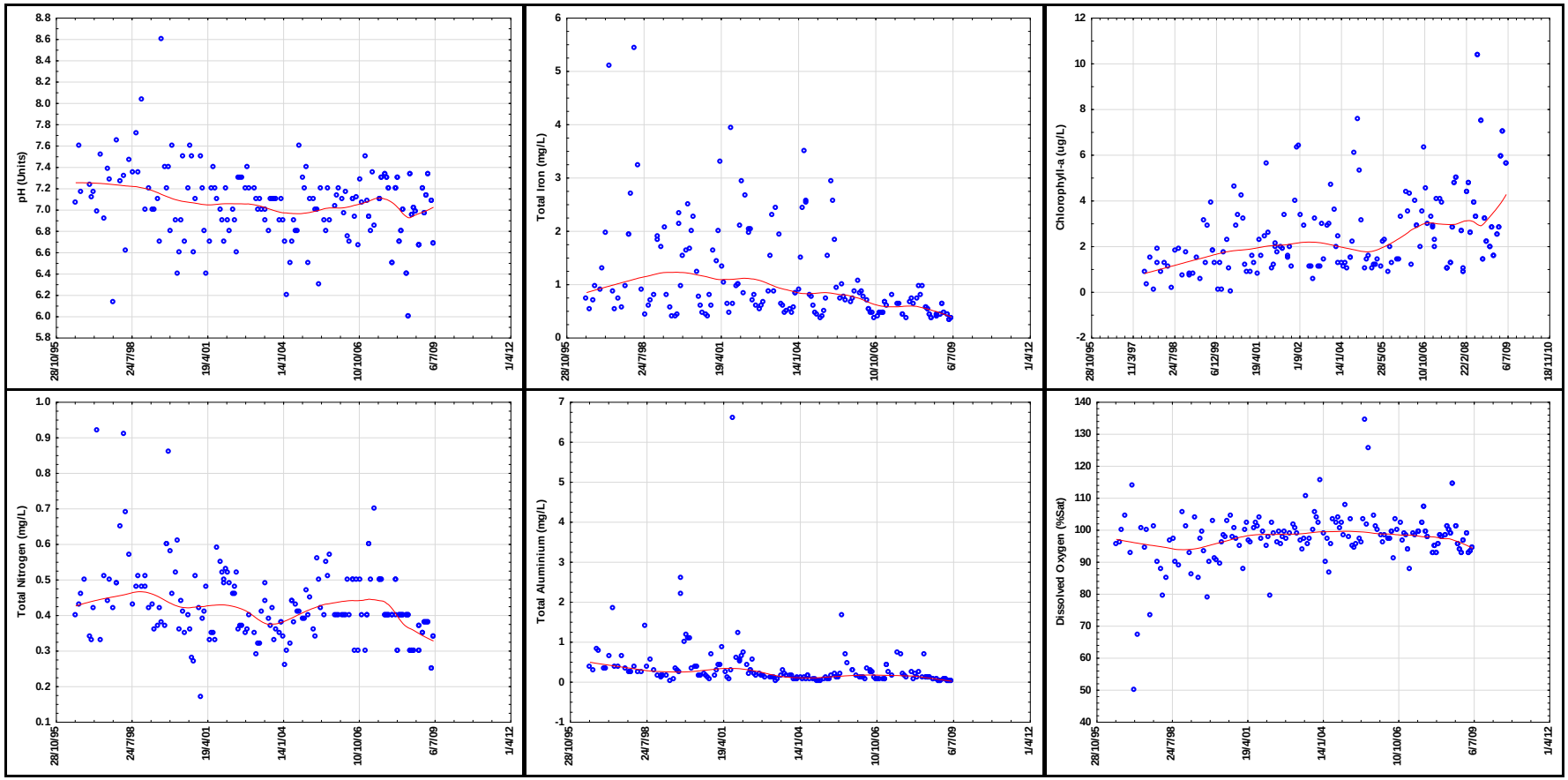


Figure H 8-56 Time-series plots of water quality parameters at E851

Note: The red line of best fit is based on the LOWESS smoothing method

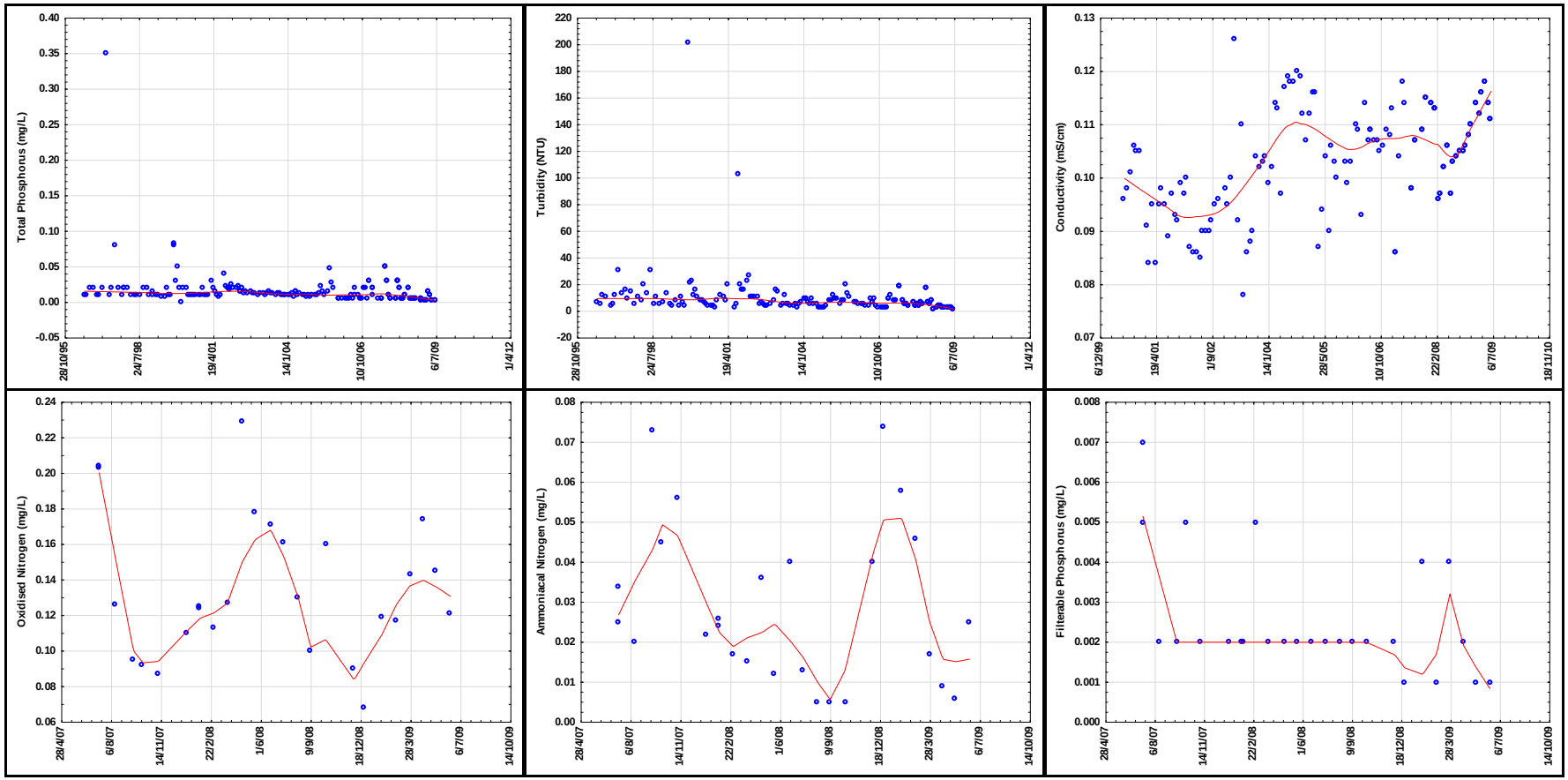


Figure H 8-56 (cont.) Time-series plots of water quality parameters at E851

Note: The red line of best fit is based on the LOWESS smoothing method

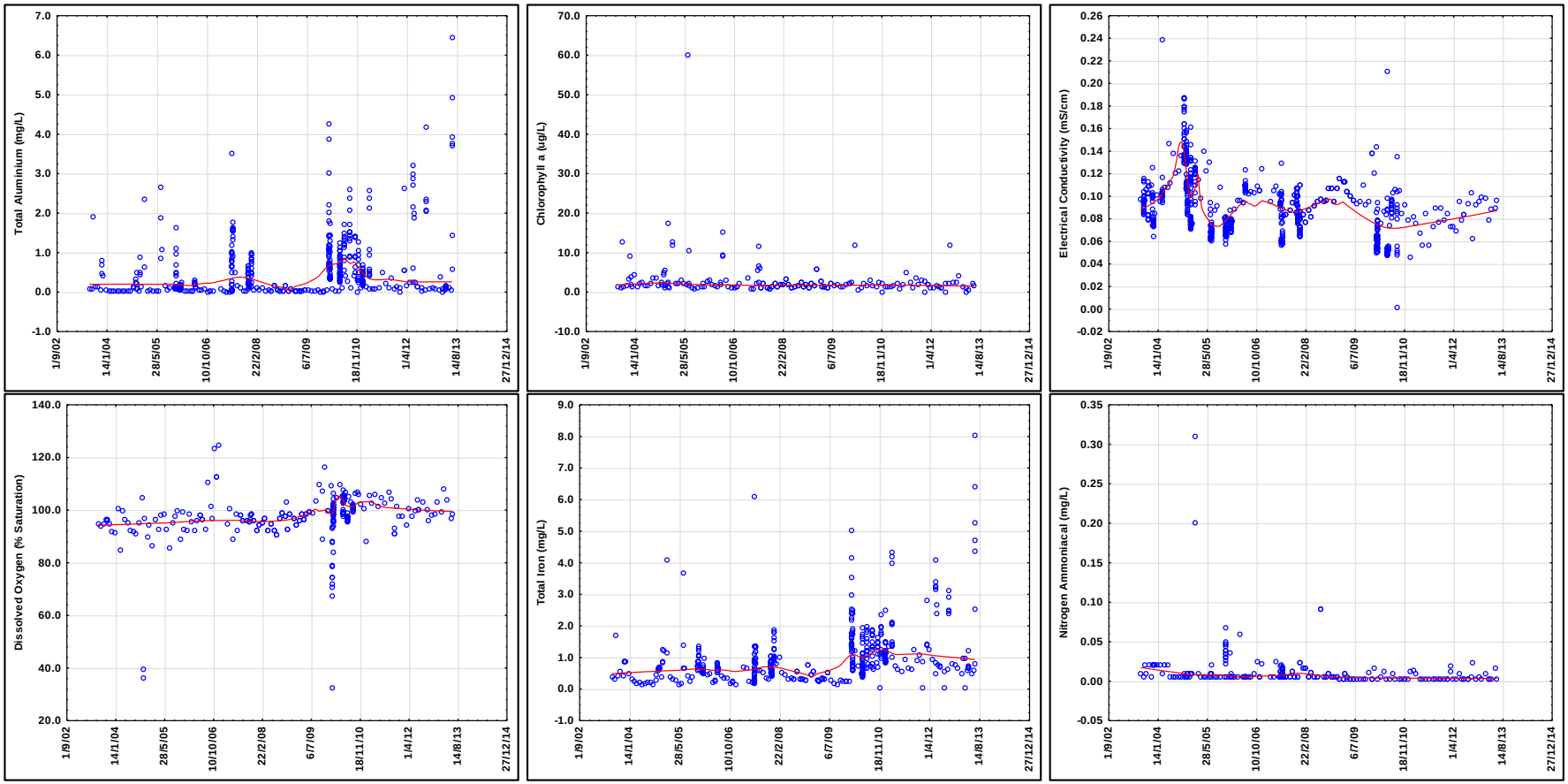


Figure H 8-57 Time-series plots of water quality parameters at E860

Note: The red line of best fit is based on the LOWESS smoothing method

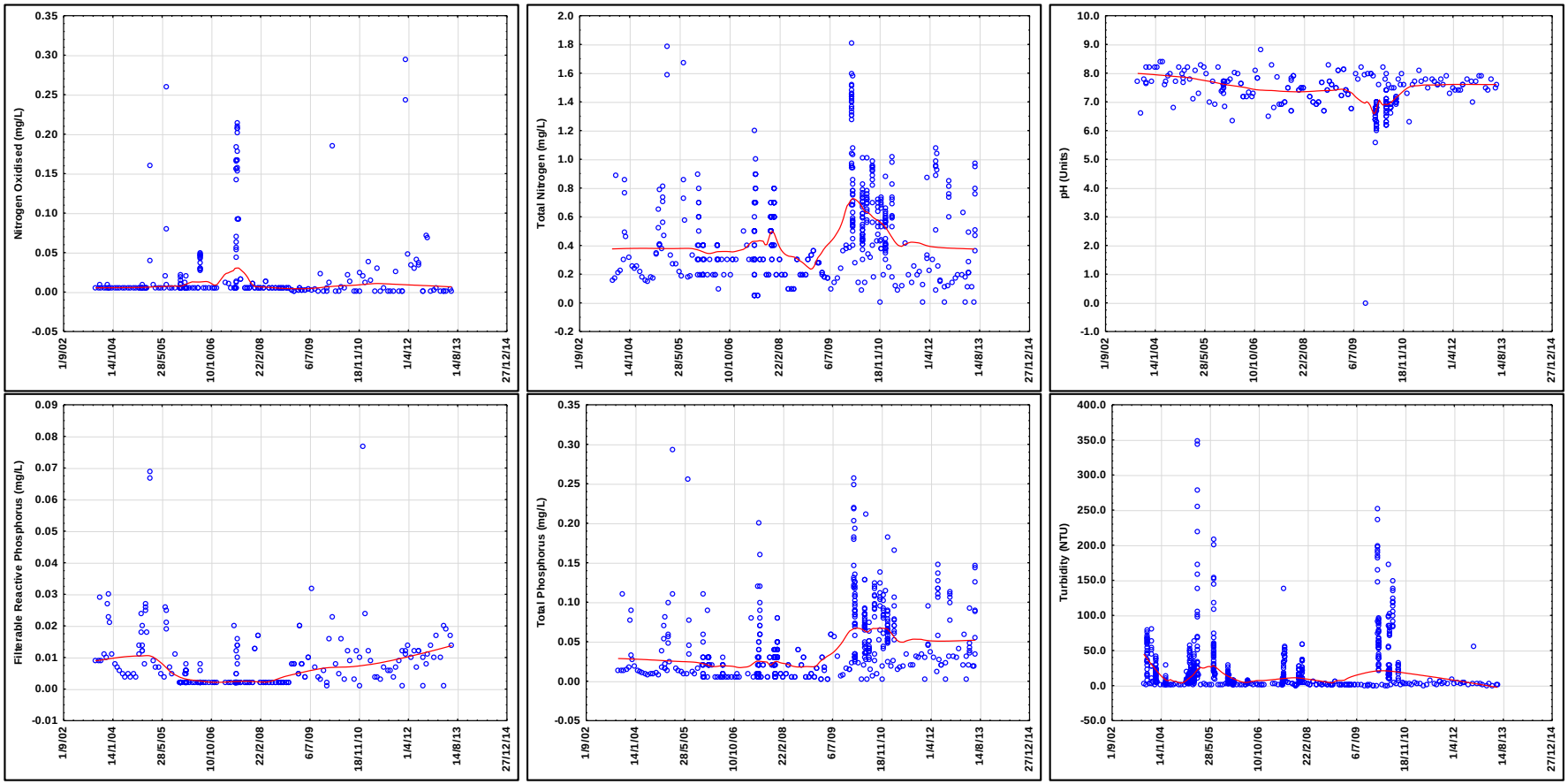


Figure H 8-57 (cont.) Time-series plots of water quality parameters at E860

Note: The red line of best fit is based on the LOWESS smoothing method

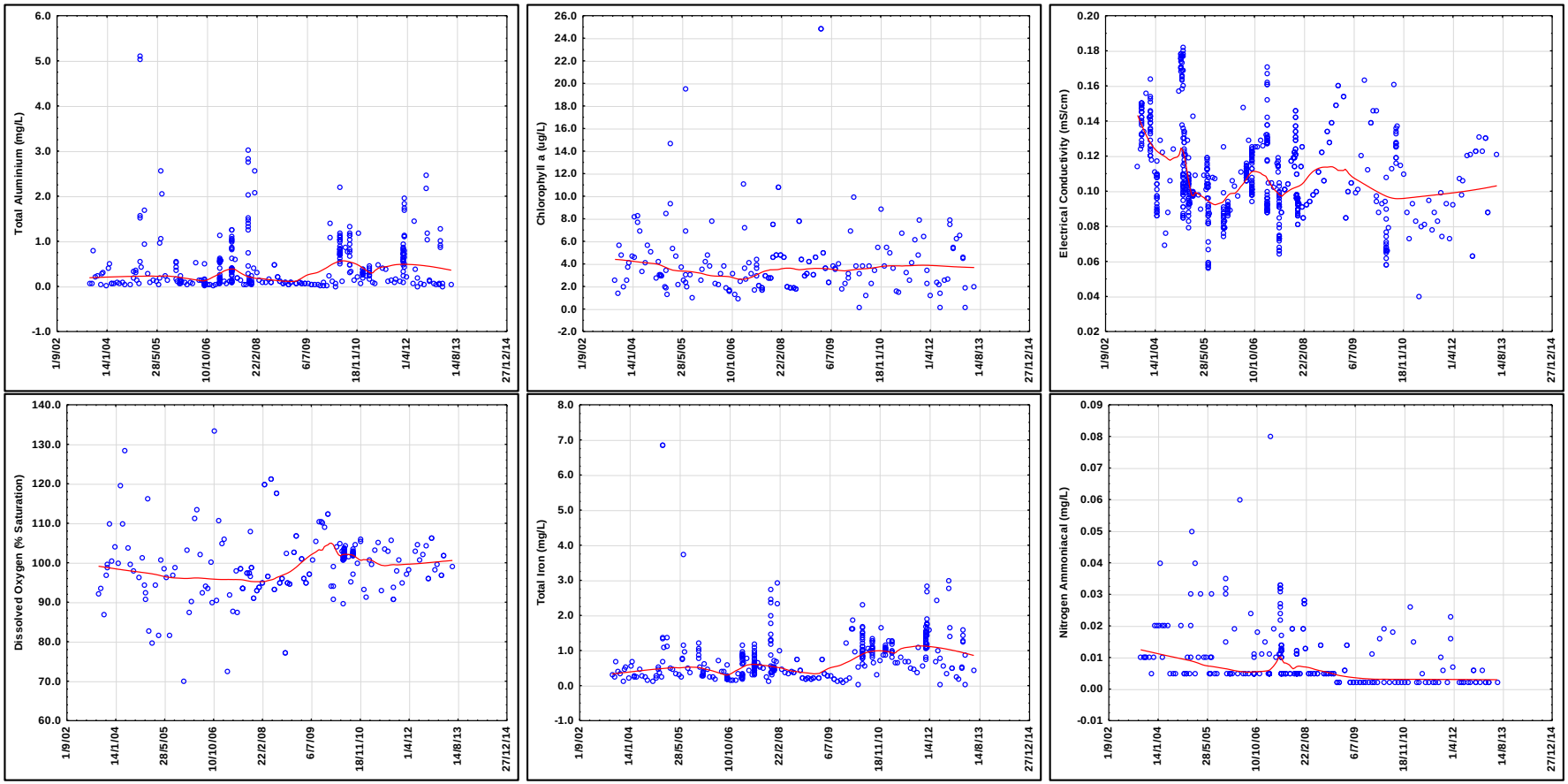


Figure H 8-58 Time-series plots of water quality parameters at E861

Note: The red line of best fit is based on the LOWESS smoothing method

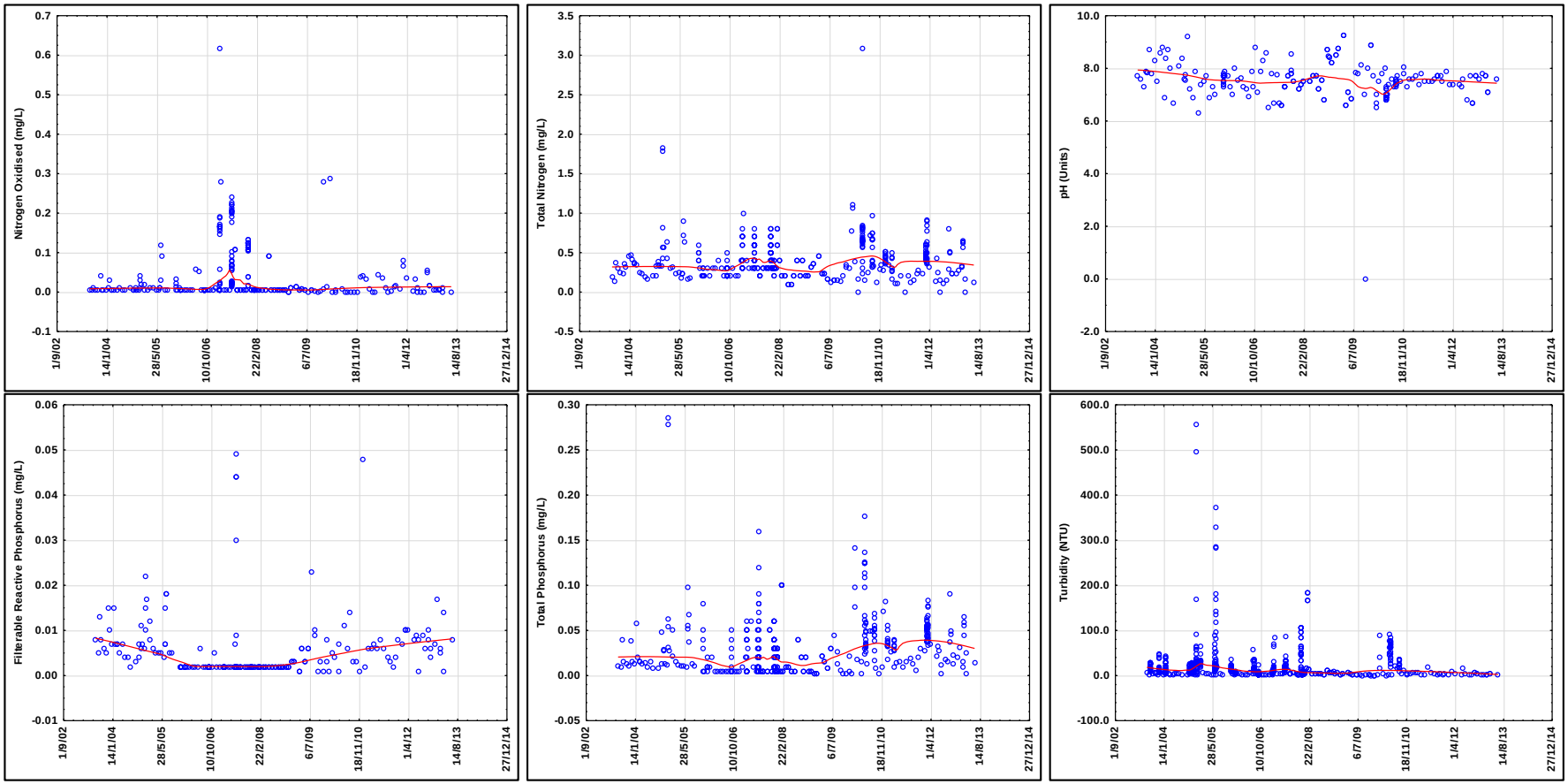


Figure H 8-58 (cont.) Time-series plots of water quality parameters at E861

Note: The red line of best fit is based on the LOWESS smoothing method

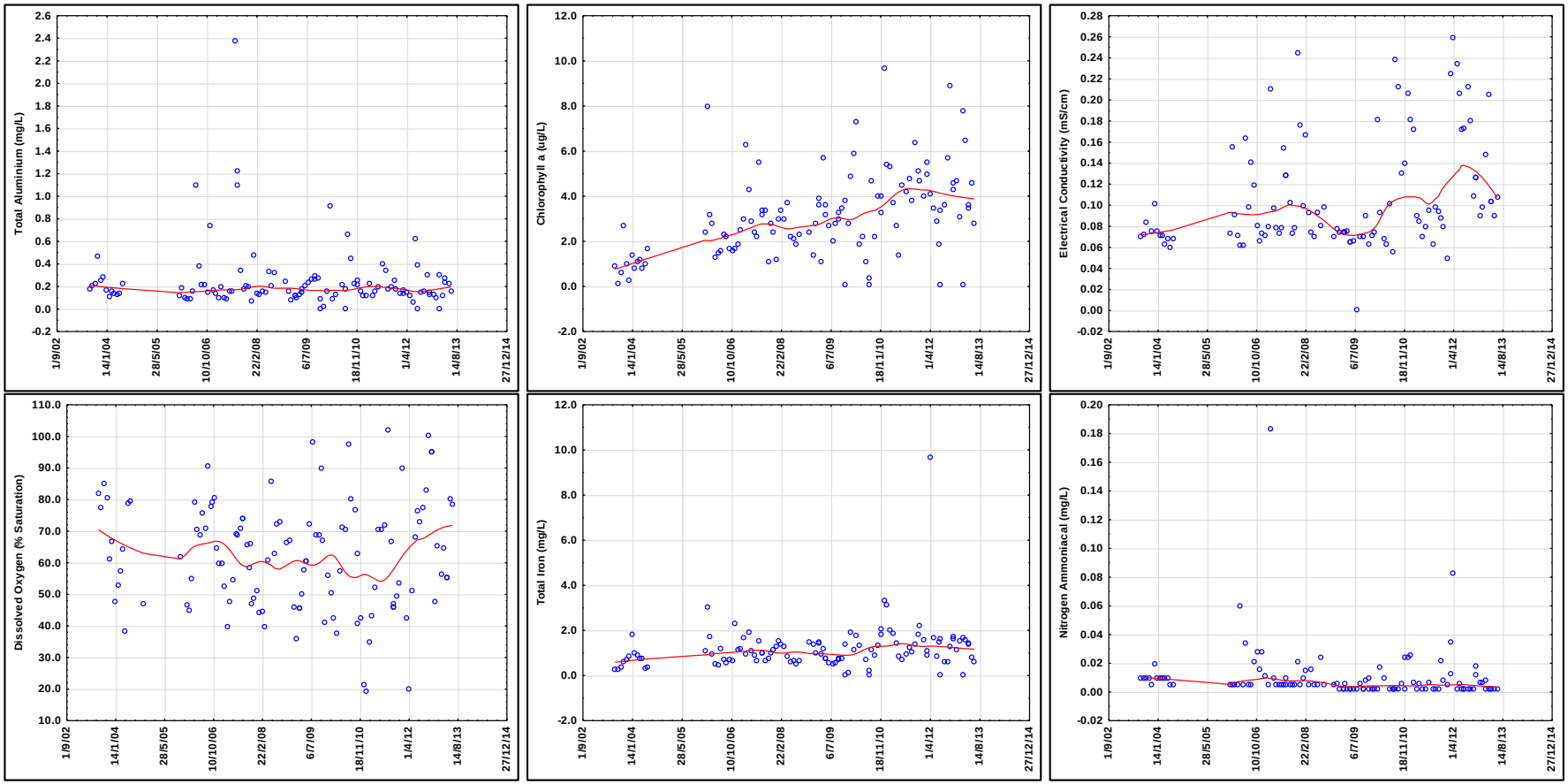


Figure H 8-59 Time-series plots of water quality parameters at E890

Note: The red line of best fit is based on the LOWESS smoothing method

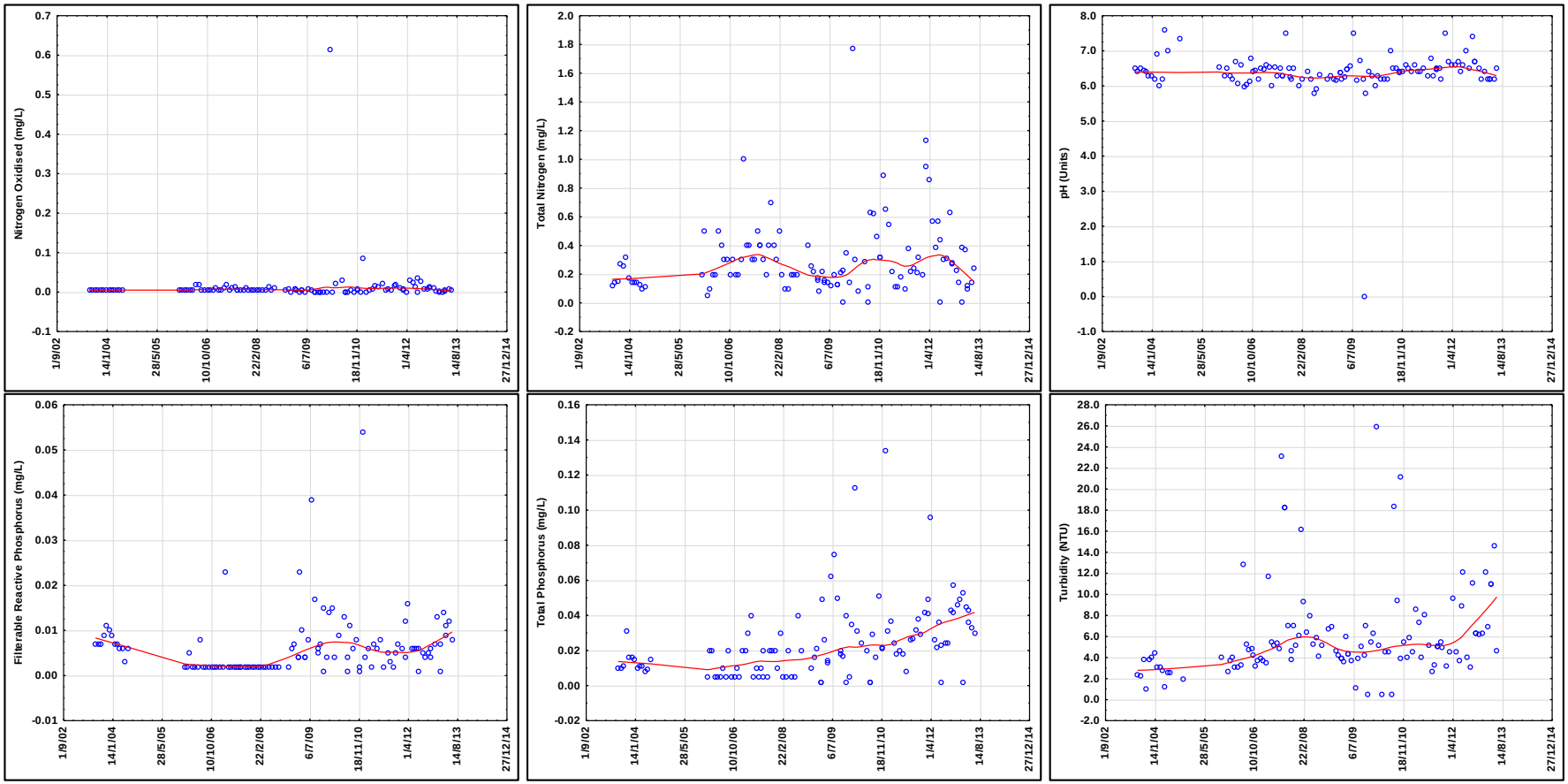


Figure H 8-59 (cont.) Time-series plots of water quality parameters at E890

Note: The red line of best fit is based on the LOWESS smoothing method

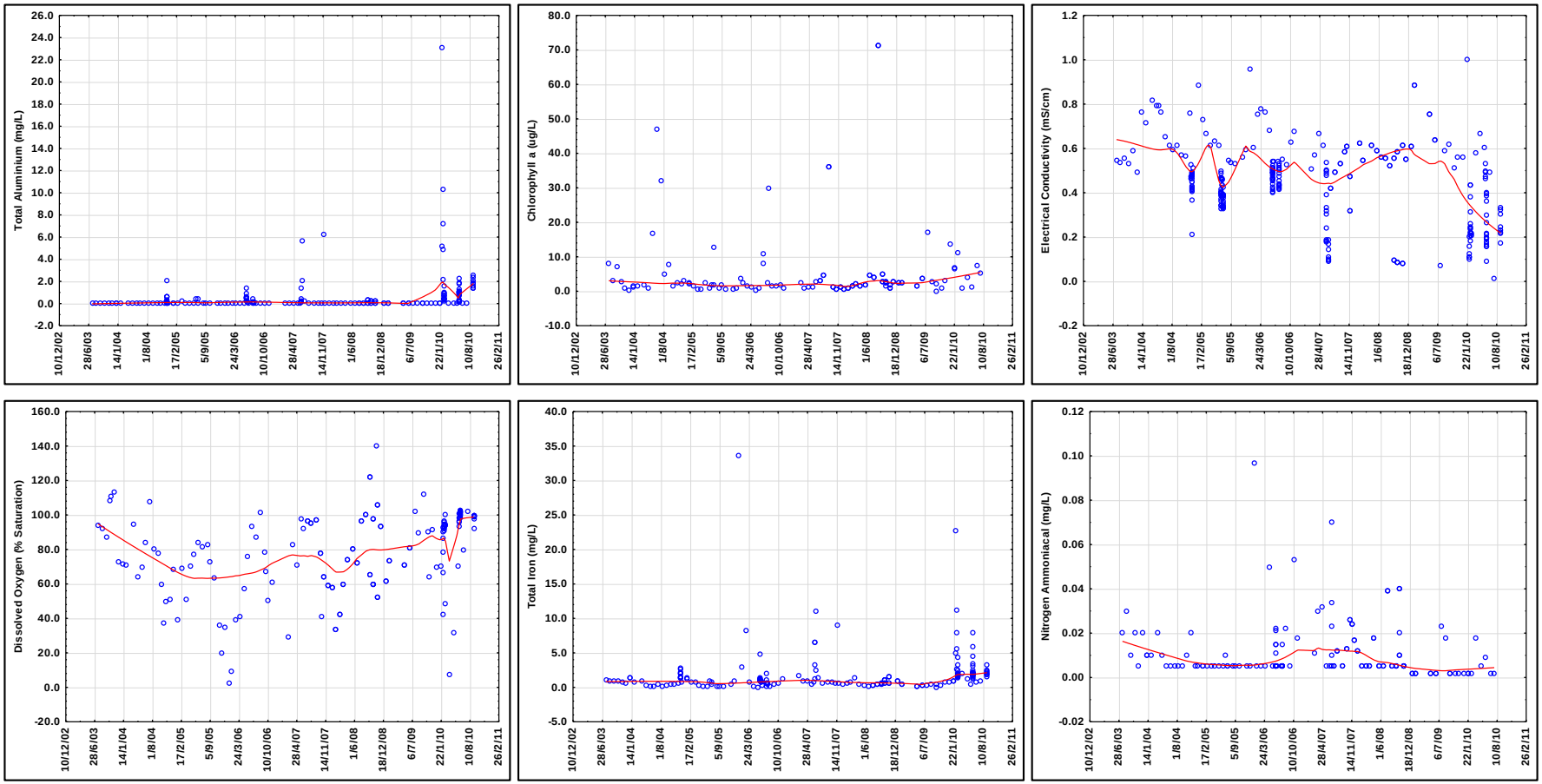


Figure H 8-60 Time-series plots of water quality parameters at E891

Note: The red line of best fit is based on the LOWESS smoothing method

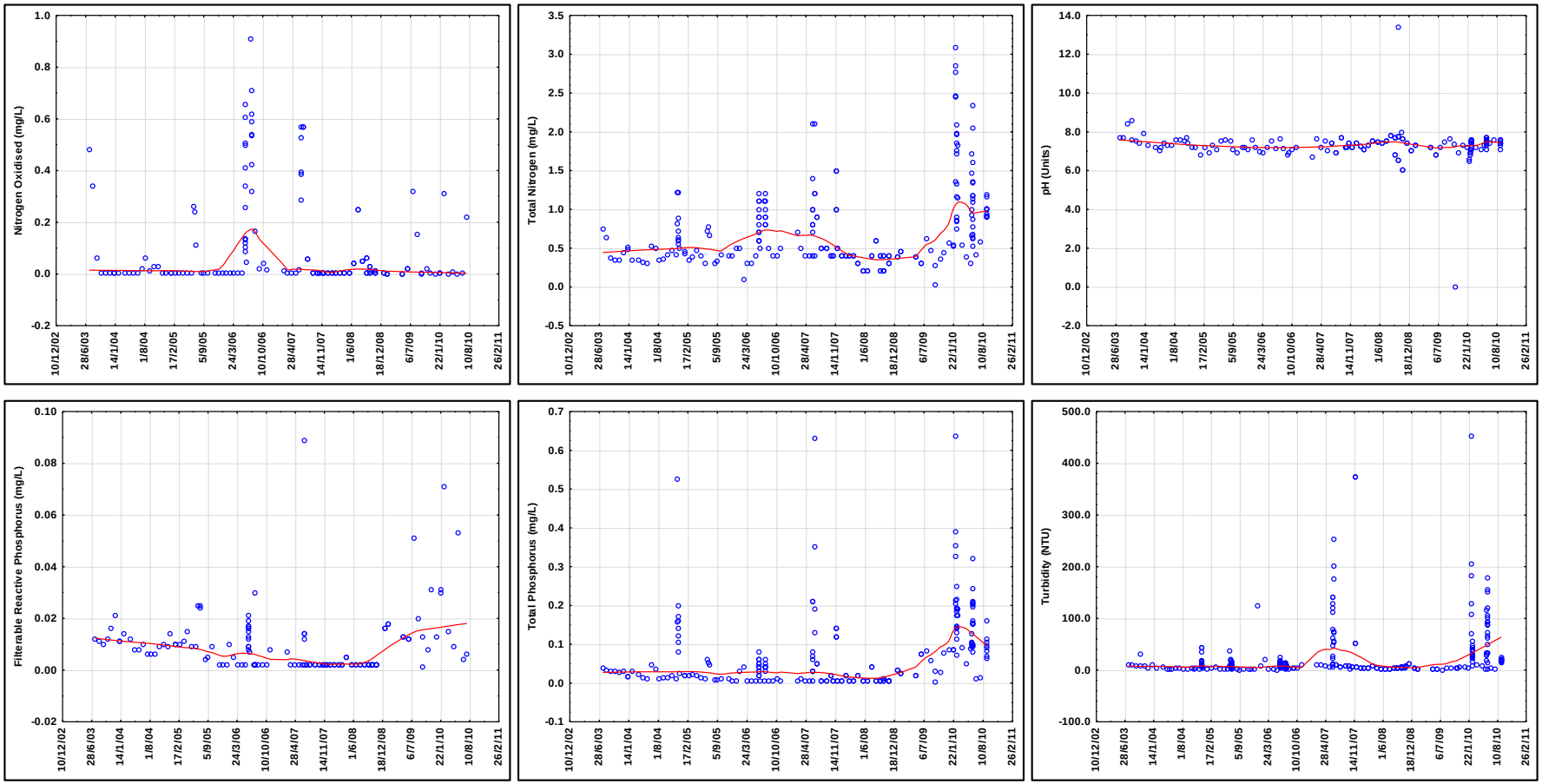


Figure H 8-60 (cont.) Time-series plots of water quality parameters at E891

Note: The red line of best fit is based on the LOWESS smoothing method

8.6.2 Storage Sites

Table H 8-20 Storage Sites – Results from Seasonal Kendall Trend Analyses for the 12 indicator water quality parameters

Note: Values represent the slope of the trend line, based on all available data. The percentage values in subscript are the level of statistical significance that a trend was associated with the data. NS = No significant trend. Colour coding: Red indicates an increasing trend; Yellow no trend; and Blue a decreasing trend.

	Chl à (µg/L)	Turbidity (NTU)	pH (units)	EC (µS/cm)	DO (% Saturation)	TN (mg/L)	NH_3 (mg/L)	NOx (mg/L)	TP (mg/L)	SRP (mg/L)	Al (mg/L)	Fe (mg/L)
DAV1	-0.09 95%	-0.1 95%	-0.0 95%	0.001 95%	-1.7 95%	-0.006 95%	0.004 95%	NS	NS	NS	NS	NS
DAV7	NS	NS	-0.2 95%	-0.003 95%	NS	-0.006 95%	NS	NS	NS	0.000 80%	NS	NS
DBP1	NS	NS	-0.3 80%	NS	-5.8 90%	NA	NA	NA	NA	NA	NA	NA
DCA1	-0.10 95%	-0.1 95%	-0.0 95%	0.001 95%	-0.5 80%	-0.003 95%	0.041 95%	NS	0.000 95%	0.000 95%	0.006 90%	0.011 95%
DCO1	-0.15 95%	-0.1 95%	NS	0.002 95%	-0.5 80%	-0.002 90%	NS	NS	NS	NS	NS	NS
DGC1	-0.05 80%	NS	NS	-0.001 95%	-0.9 95%	-0.005 95%	0.005 95%	0.006 80%	0.000 95%	NS	NS	NS
DLC1	0.05 90%	-0.0 95%	0.1 95%	0.001 95%	-0.6 95%	-0.008 95%	0.005 95%	NS	NS	NS	NS	-0.002 95%
DNE2	NS	-0.1 95%	0.0 95%	0.001 95%	0.7 95%	-0.003 95%	NS	0.030 95%	0.000 90%	NS	0.005 80%	-0.004 80%
DTA1	NS	4.1 95%	NS	0.004 80%	-5.2 80%	0.041 90%	0.009 80%	NS	0.007 95%	NS	0.067 95%	0.299 95%
DTA3	NS	-0.3 95%	0.0 95%	0.001 95%	NS	-0.010 95%	NS	0.076 80%	-0.001 95%	NS	NS	-0.023 95%
DTC1	NS	-0.1 95%	0.0 95%	-0.002 95%	-0.7 95%	-0.019 95%	0.002 95%	0.009 95%	0.000 95%	NS	0.005 95%	0.003 95%
DTA5	-0.59 80%	1.8 95%	-0.1 80%	0.005 80%	-4.7 NS	NS	0.015 90%	-0.013 80%	NS	NS	NS	0.197 95%
DTA8	1.48 95%	NS	NS	NS	NS	NS	-0.004 80%	NS	NS	NS	NS	NS
DWA12	NS	NS	-0.2 95%	0.008 95%	-16.8 95%	0.094 95%	0.001 95%	0.048 95%	0.005 95%	0.001 95%	0.010 95%	0.080 95%
DFF6	0.56 95%	0.2 95%	0.0 95%	0.002 95%	NS	-0.009 95%	0.000 95%	-0.004 90%	NS	NS	NS	0.014 95%
DWA15	NS	0.4 80%	-0.2 95%	0.014 95%	-18.2 95%	0.100 95%	0.003 95%	0.022 95%	0.004 95%	0.000 80%	NS	0.067 95%
DWA19	NS	NS	NS	0.017 80%	NS	NS	NS	NS	NS	NS	NS	NS
DWA21	NS	NS	NS	NS	NS	NS	0.010 80%	NS	NS	NS	NS	NS
DWA2	0.07 95%	0.2 95%	-0.0 95%	-0.001 95%	-2.4 95%	0.002 95%	NS	0.054 95%	0.000 95%	0.001 95%	NS	0.005 95%
DWA27	NS	0.3 80%	-0.2 95%	0.006 95%	-15.5 95%	0.094 95%	NS	0.058 95%	0.004 95%	0.001 95%	0.020 95%	0.089 95%
DWA311	NS	NS	-0.2 95%	0.004 95%	-14.2 95%	0.111 95%	0.001 80%	0.046 95%	0.004 95%	0.001 90%	0.022 90%	0.139 95%
DWA39	NS	NS	NS	NS	NS	NS	0.017 90%	NS	NS	NS	NS	NS
DWA9	NS	NS	-0.2 95%	0.006 95%	-15.5 95%	0.087 95%	-0.001 95%	0.053 95%	0.002 95%	0.001 95%	NS	0.046 95%
DWI1	0.29 95%	0.1 95%	0.1 95%	NS	NS	-0.015 95%	-0.001 95%	-0.004 80%	0.000 95%	NS	0.016 95%	0.018 95%

	Chl à (µg/L)	Turbidity (NTU)	pH (units)	EC (µS/cm)	DO (% Saturation)	TN (mg/L)	NH_3 (mg/L)	NOx (mg/L)	TP (mg/L)	SRP (mg/L)	Al (mg/L)	Fe (mg/L)
DWO1	NS	-0.0 95%	0.0 95%	0.002 95%	NS	-0.001 90%	0.008 95%	-0.026 95%	0.000 95%	NS	0.008 90%	0.010 95%
RPR1	0.08 95%	-0.1 95%	0.0 95%	0.006 95%	NS	-0.007 95%	0.001 95%	NS	0.000 95%	0.000 80%	0.001 90%	-0.001 95%
RPR6	1.85 95%	0.3 95%	-0.1 90%	-0.016 95%	-5.4 95%	NS	NS	NS	0.000 90%	NS	0.012 95%	0.025 95%

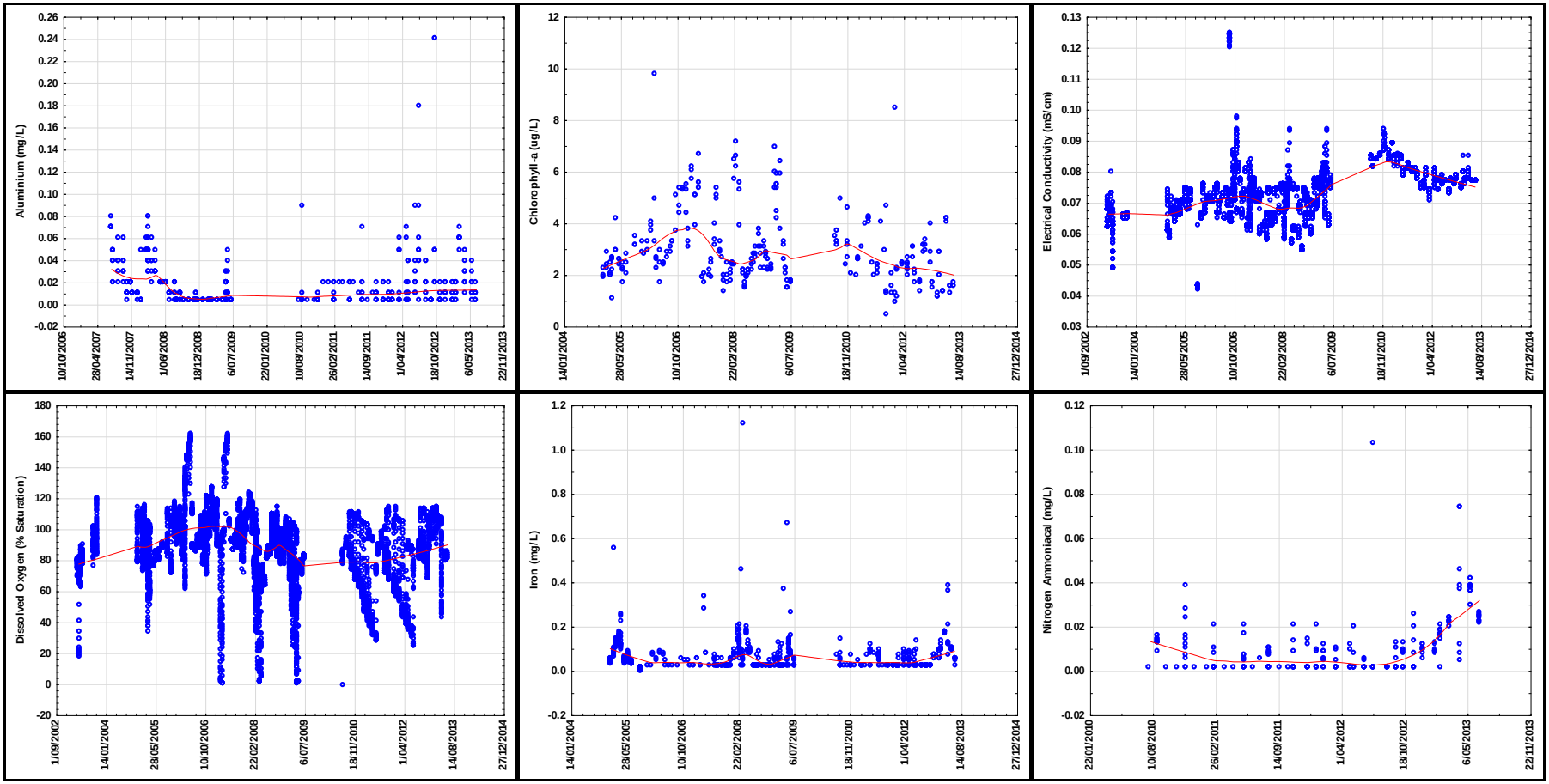


Figure H 8-61 Time-series plots of water quality parameters at DAV1

Note: The red line of best fit is based on the LOWESS smoothing method

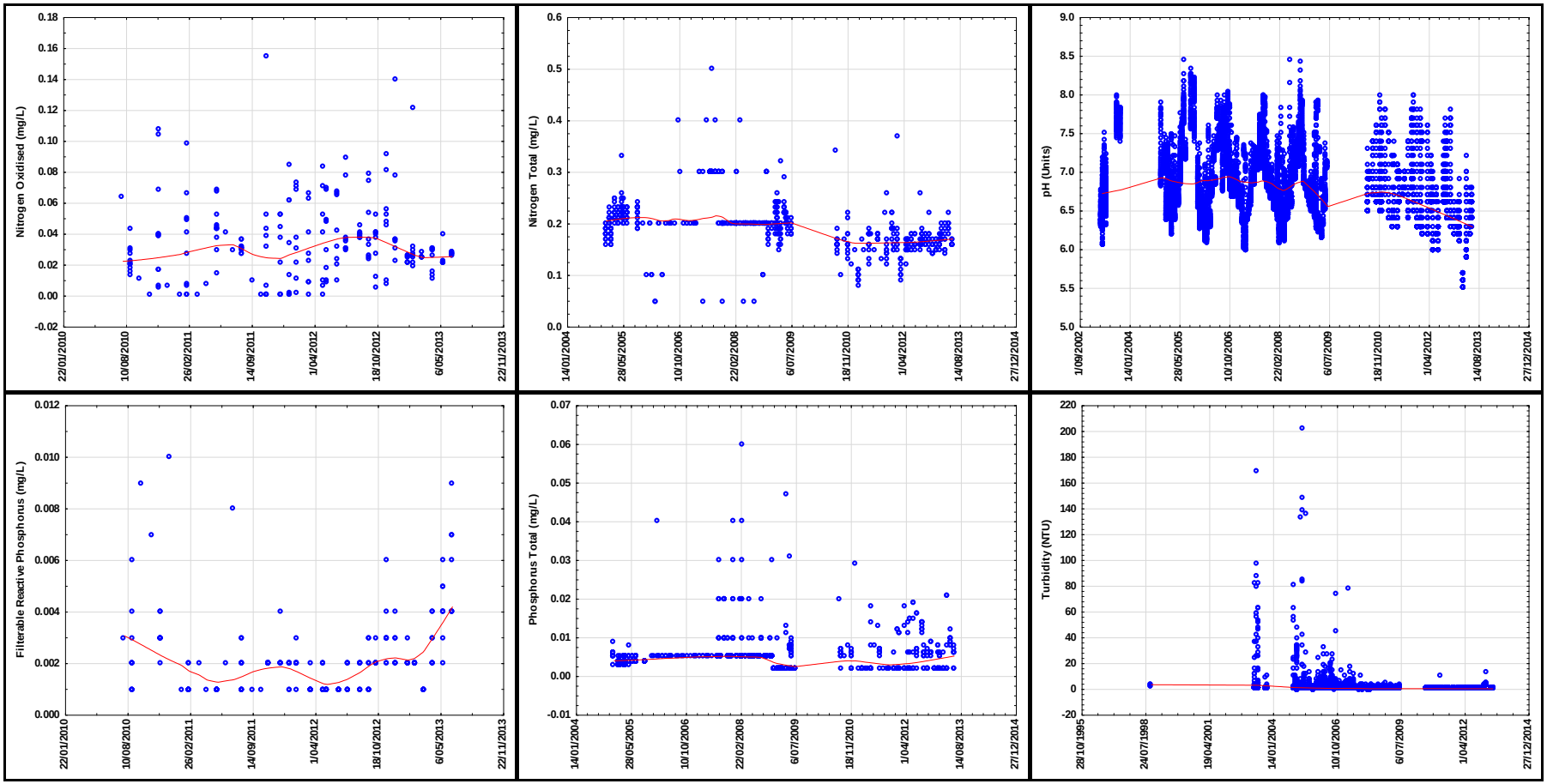


Figure H 8-61 (cont.) Time-series plots of water quality parameters at DAV1

Note: The red line of best fit is based on the LOWESS smoothing method

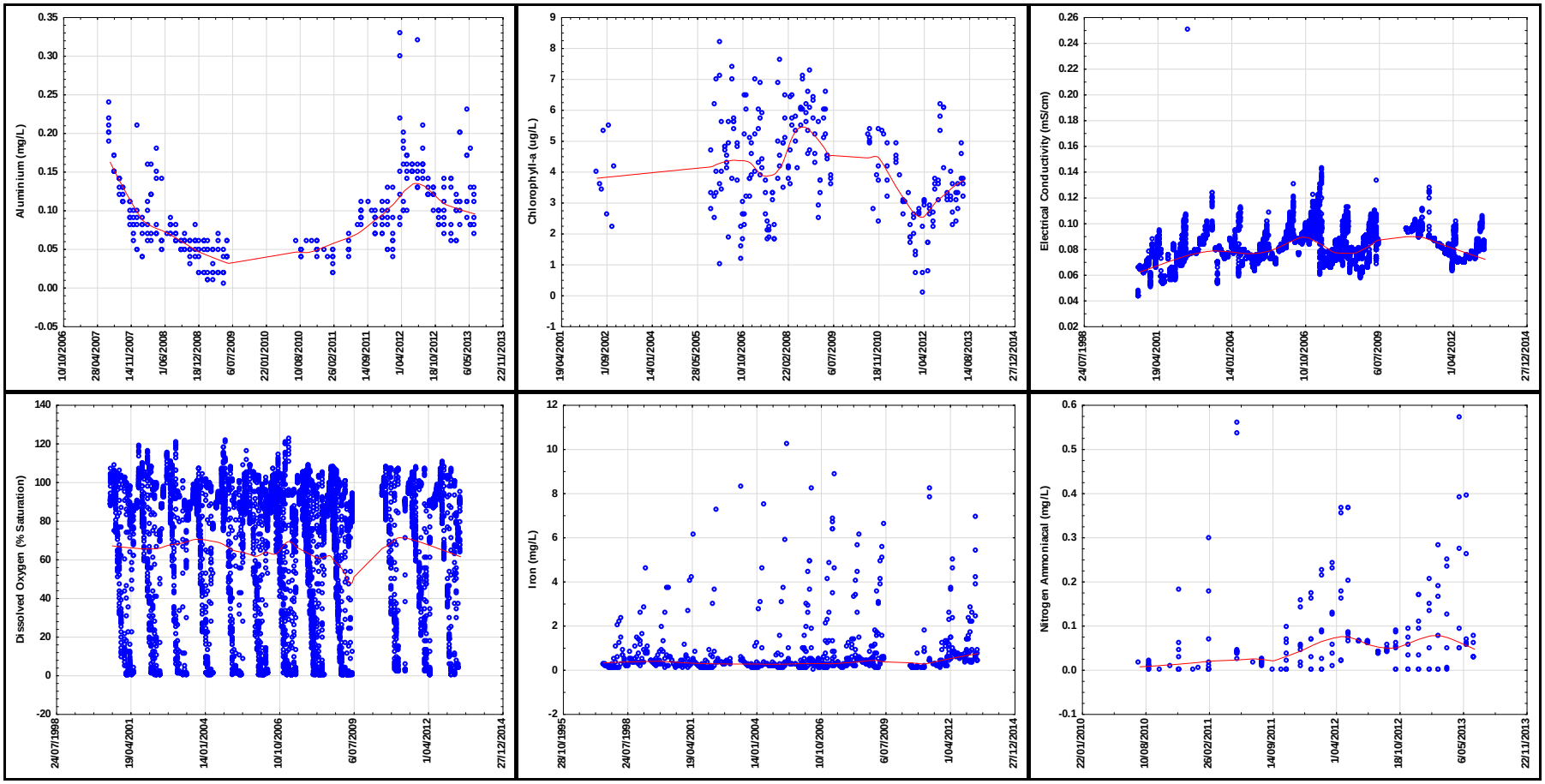


Figure H 8-62 Time-series plots of water quality parameters at DCA1

Note: The red line of best fit is based on the LOWESS smoothing method

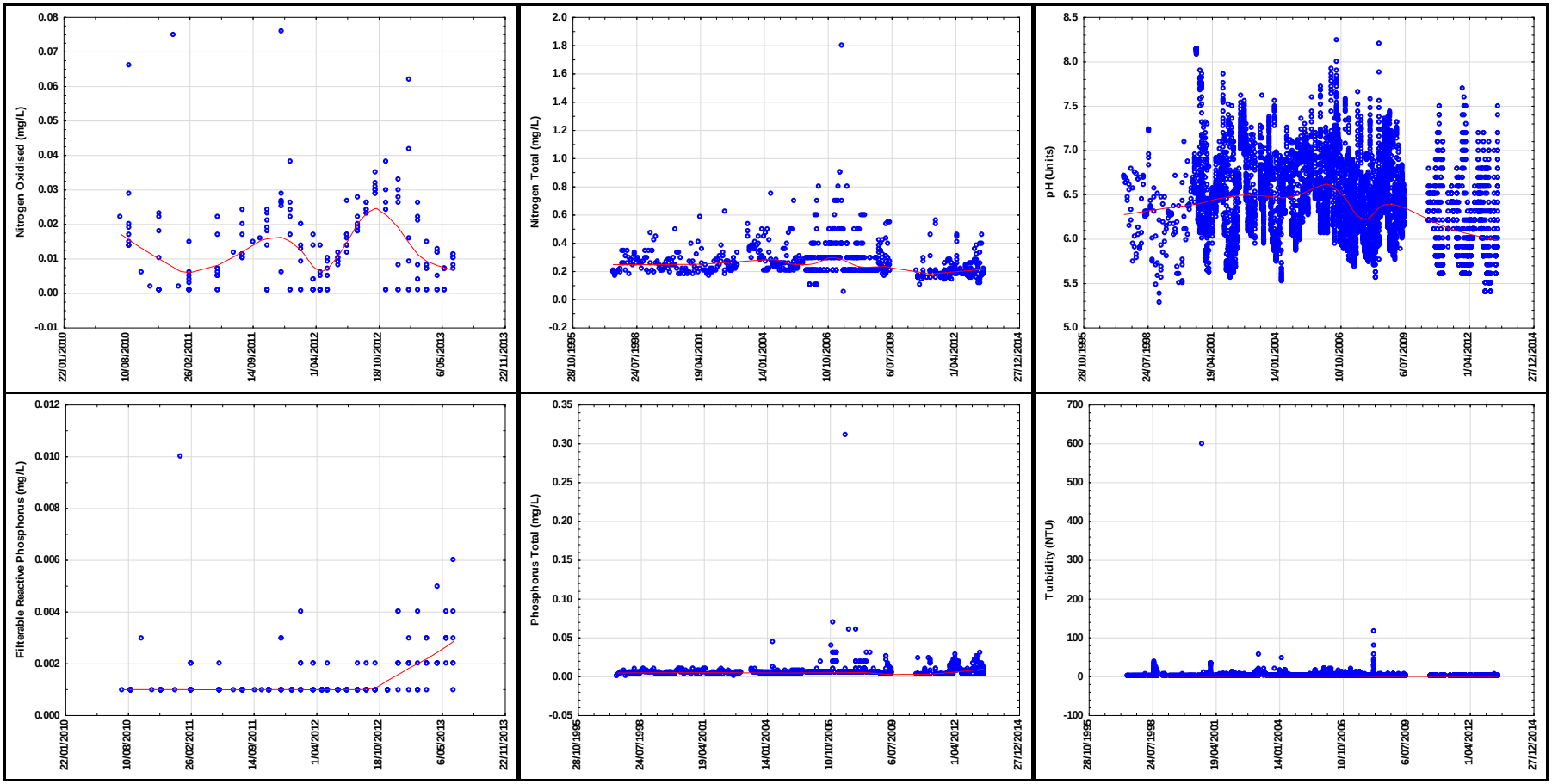


Figure H 8-62 (cont.) Time-series plots of water quality parameters at DCA1

Note: The red line of best fit is based on the LOWESS smoothing method

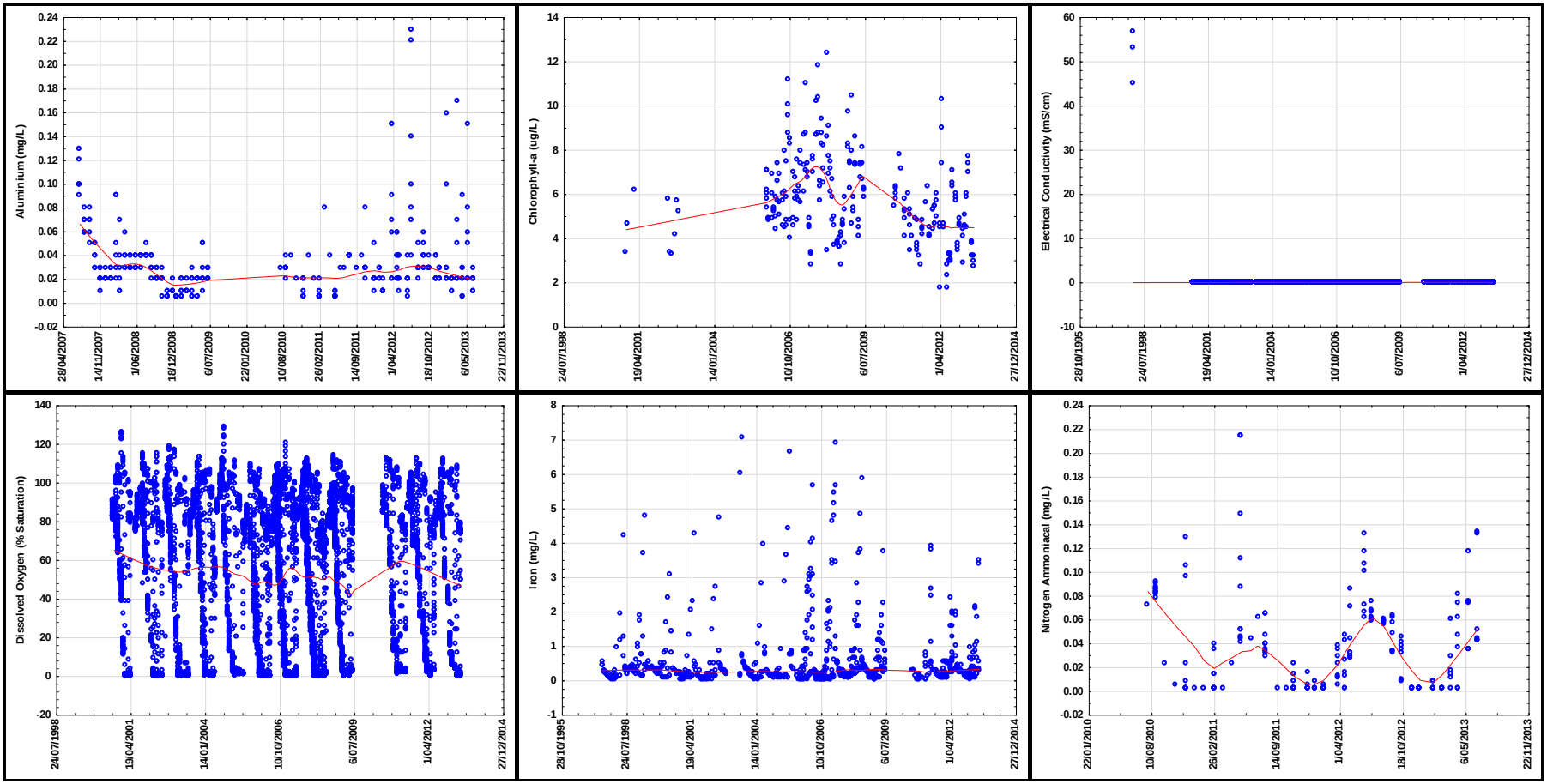


Figure H 8-63 Time-series plots of water quality parameters at DCO1

Note: The red line of best fit is based on the LOWESS smoothing method

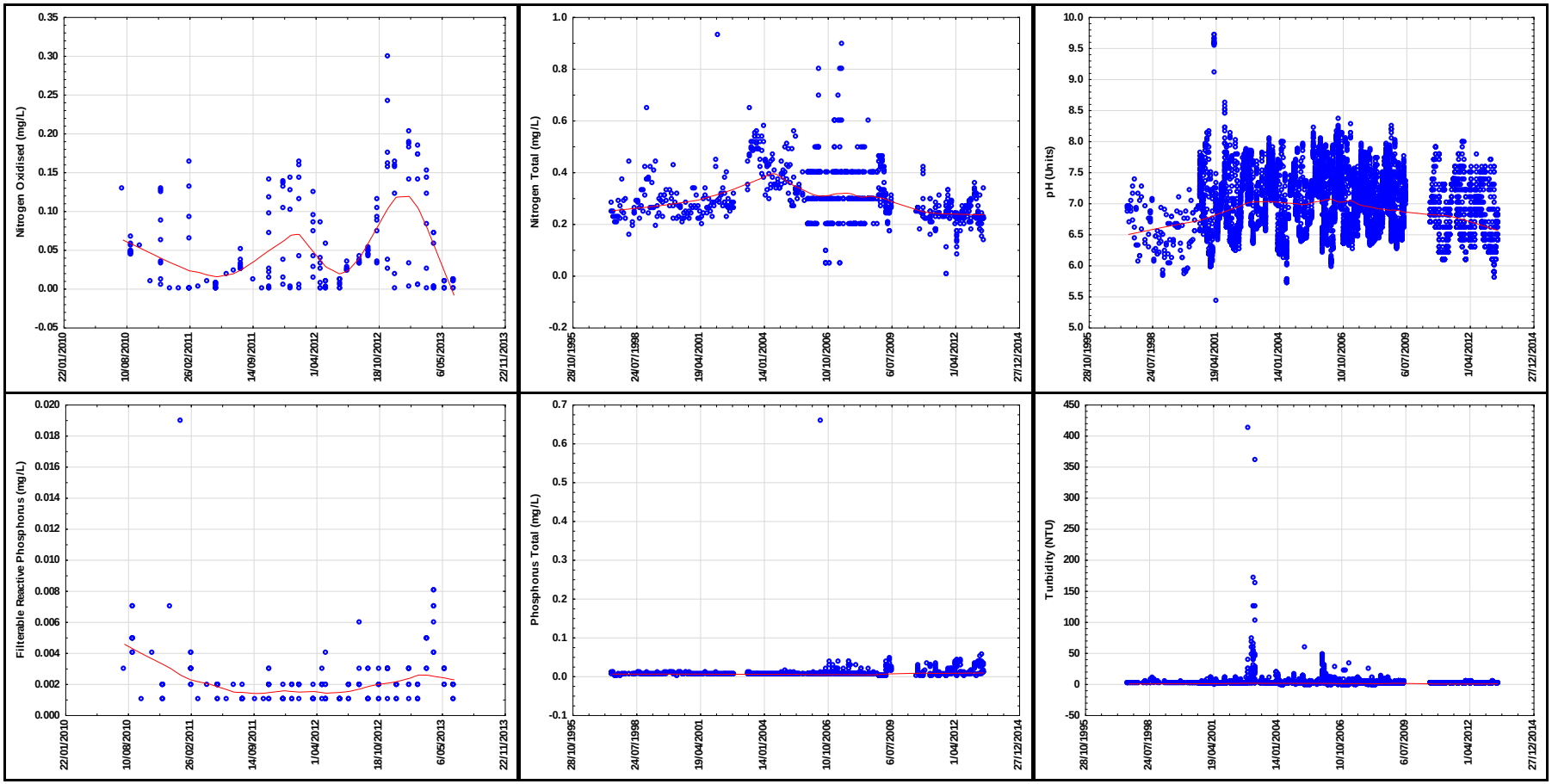


Figure H 8-63 (cont.) Time-series plots of water quality parameters at DCO1

Note: The red line of best fit is based on the LOWESS smoothing method

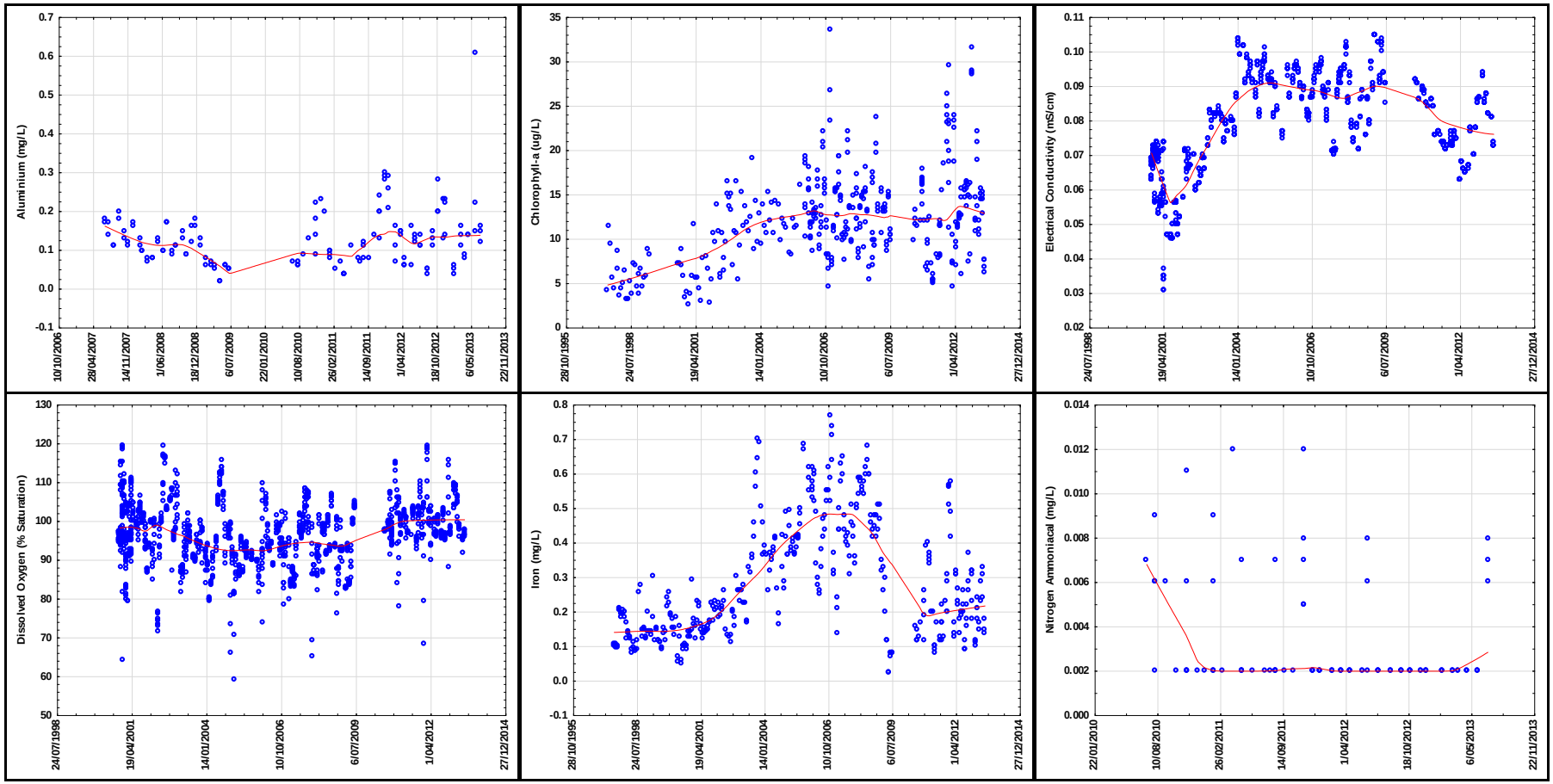


Figure H 8-64 Time-series plots of water quality parameters at DFF6

Note: The red line of best fit is based on the LOWESS smoothing method

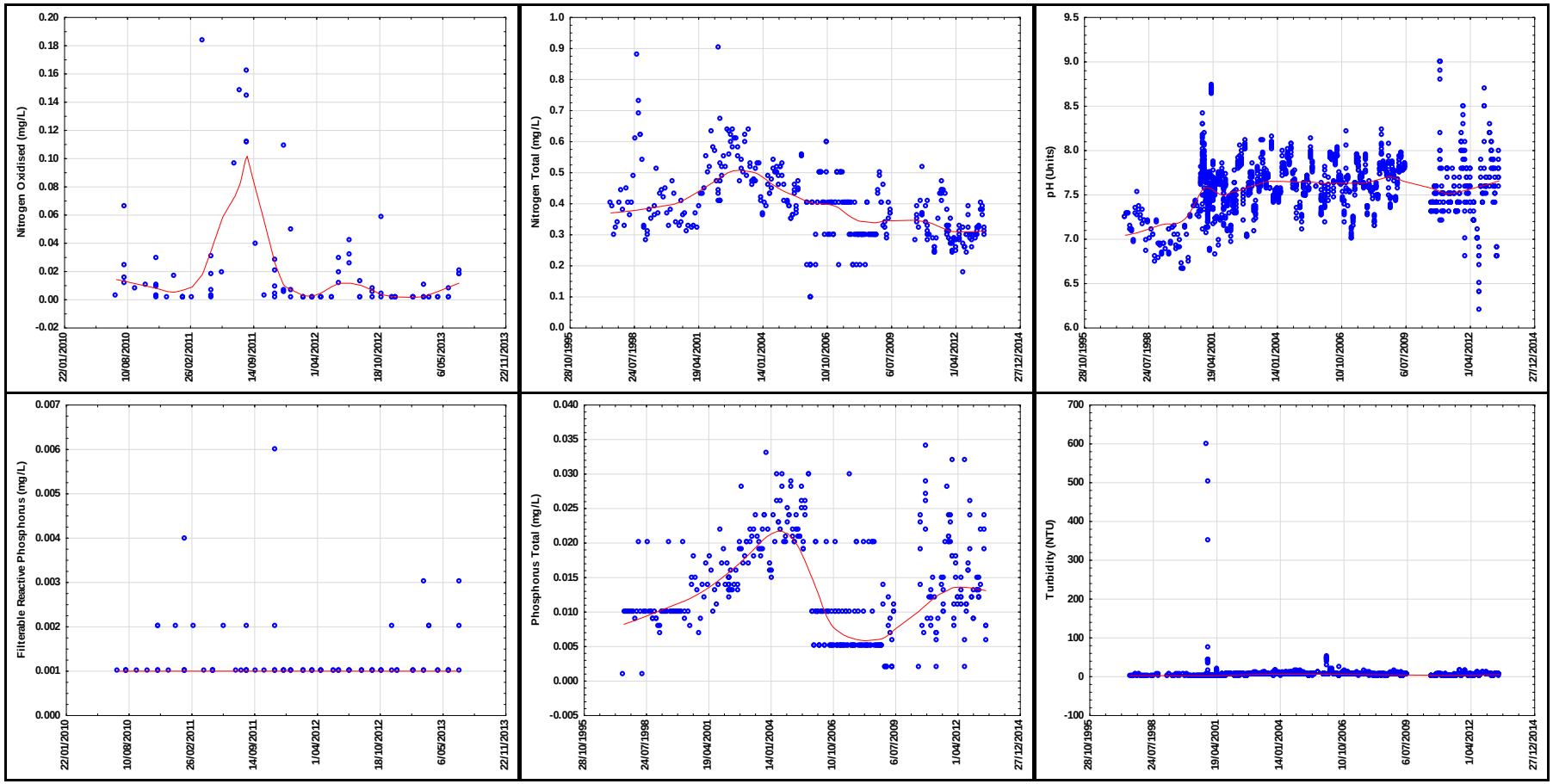


Figure H 8-64 (cont.) Time-series plots of water quality parameters at DFF6

Note: The red line of best fit is based on the LOWESS smoothing method

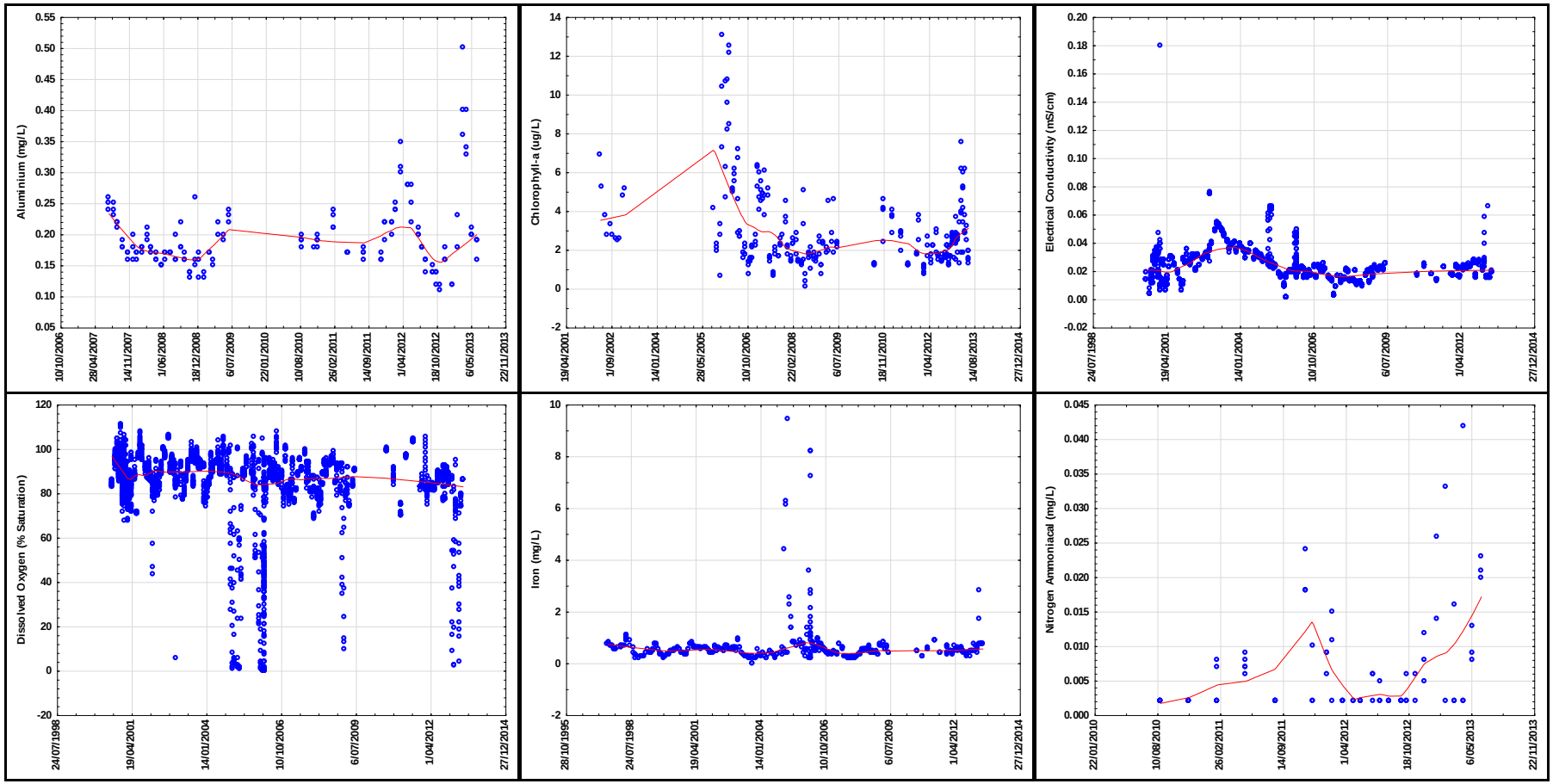


Figure H 8-65 Time-series plots of water quality parameters at DGC1

Note: The red line of best fit is based on the LOWESS smoothing method

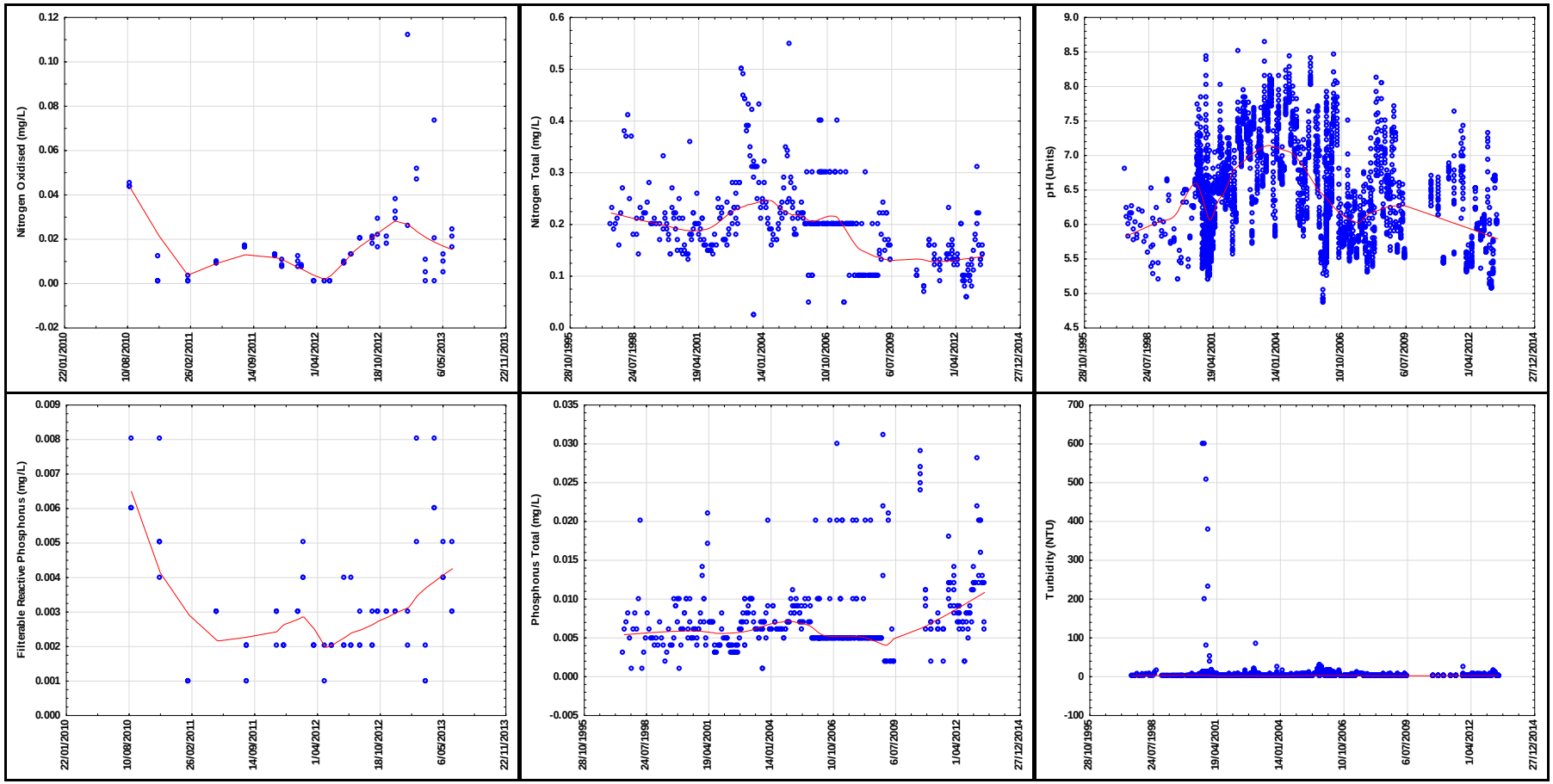


Figure H 8-65 (cont.) Time-series plots of water quality parameters at DGC1

Note: The red line of best fit is based on the LOWESS smoothing method

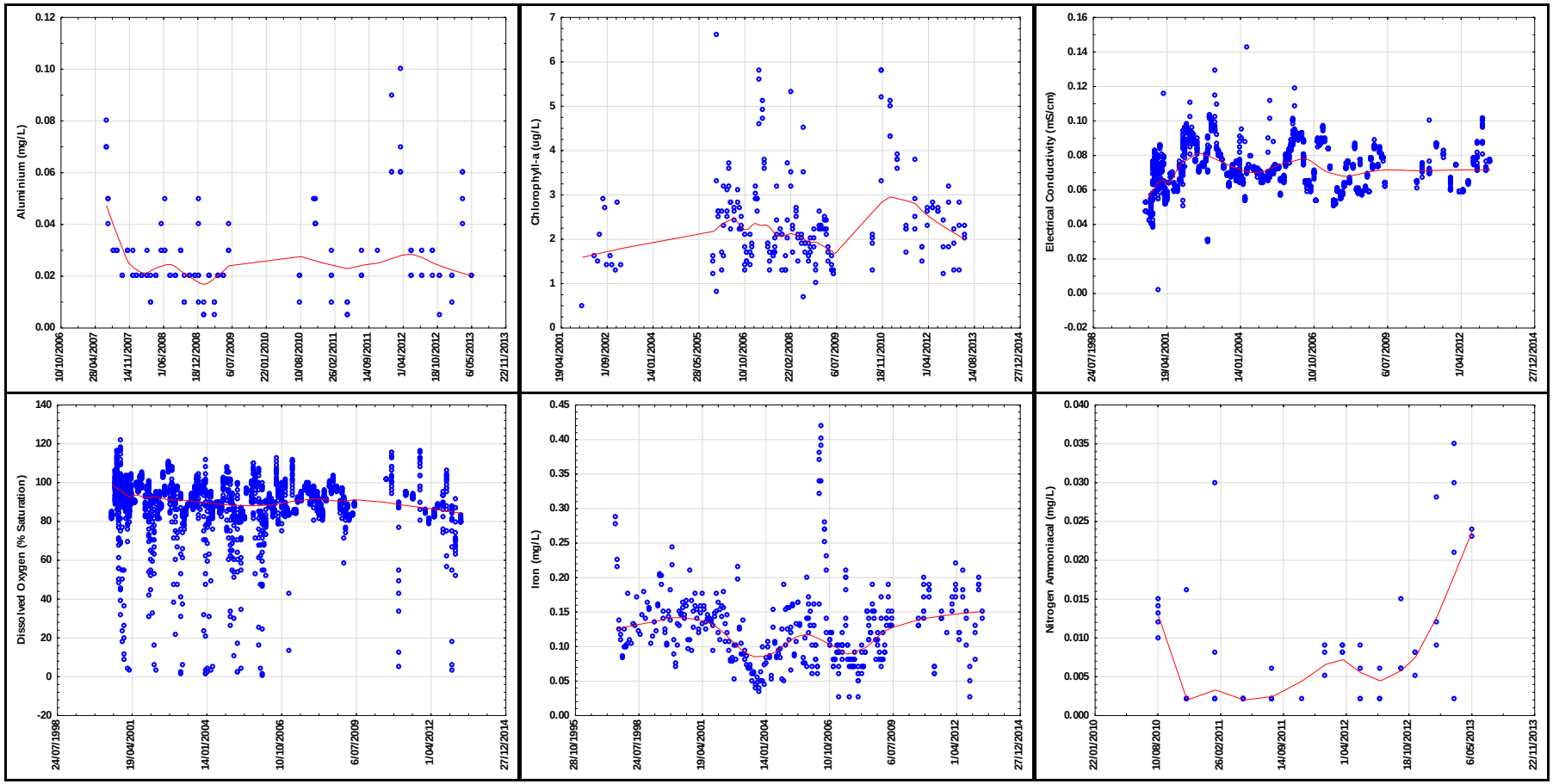


Figure H 8-66 Time-series plots of water quality parameters at DLC1

Note: The red line of best fit is based on the LOWESS smoothing method

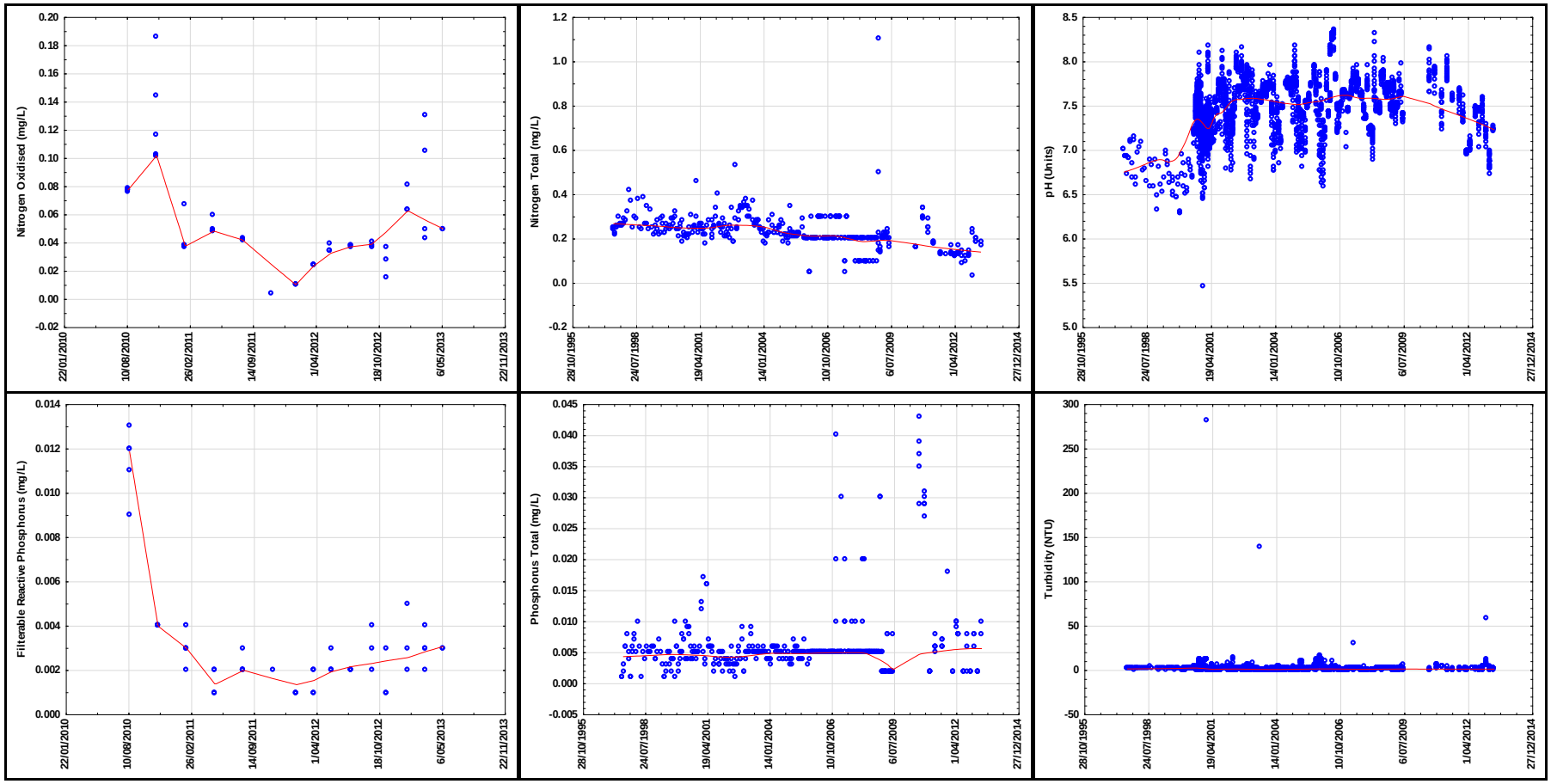


Figure H 8-66 (cont.) Time-series plots of water quality parameters at DLC1

Note: The red line of best fit is based on the LOWESS smoothing method

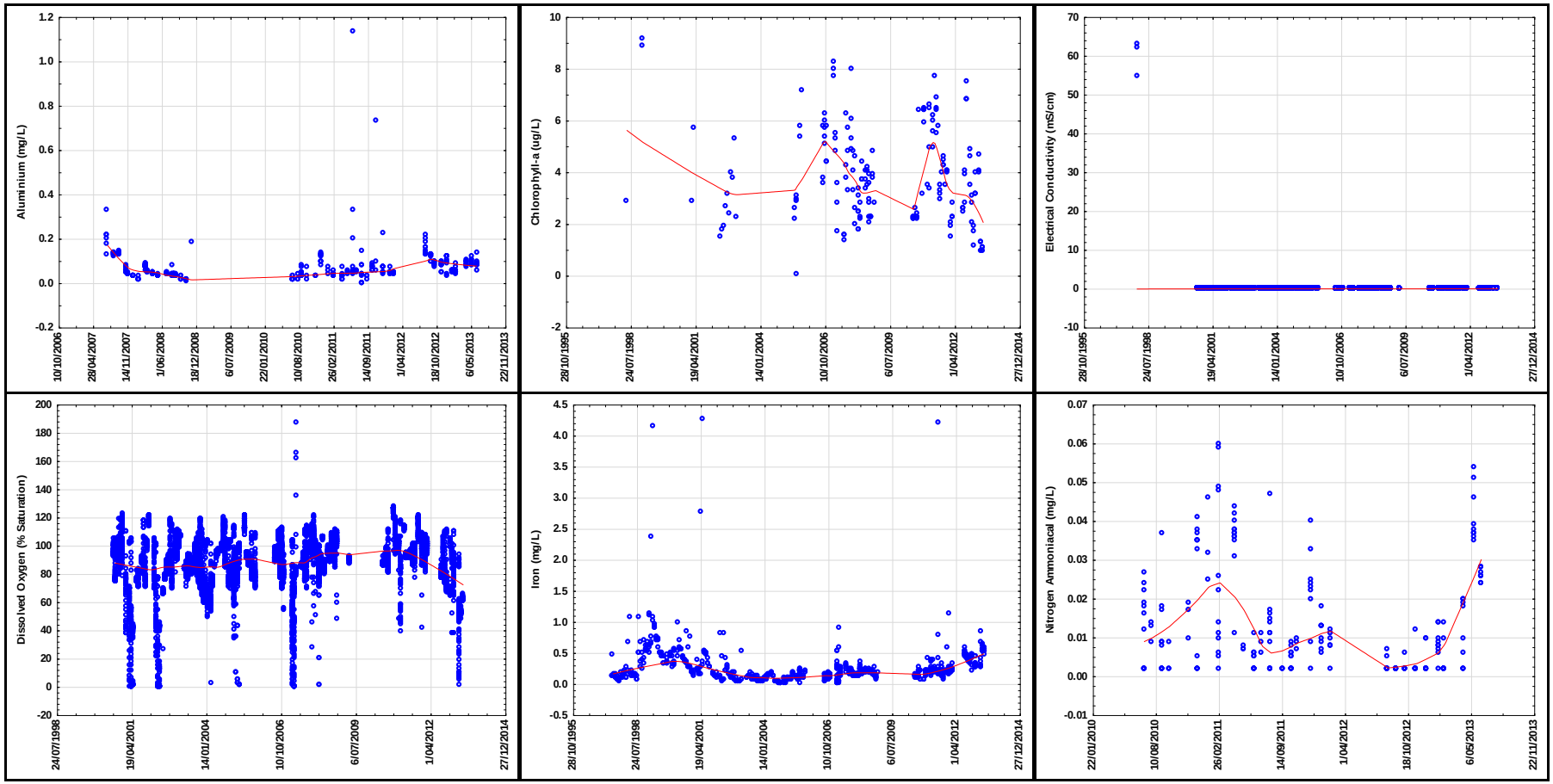


Figure H 8-67 Time-series plots of water quality parameters at DNE2

Note: The red line of best fit is based on the LOWESS smoothing method

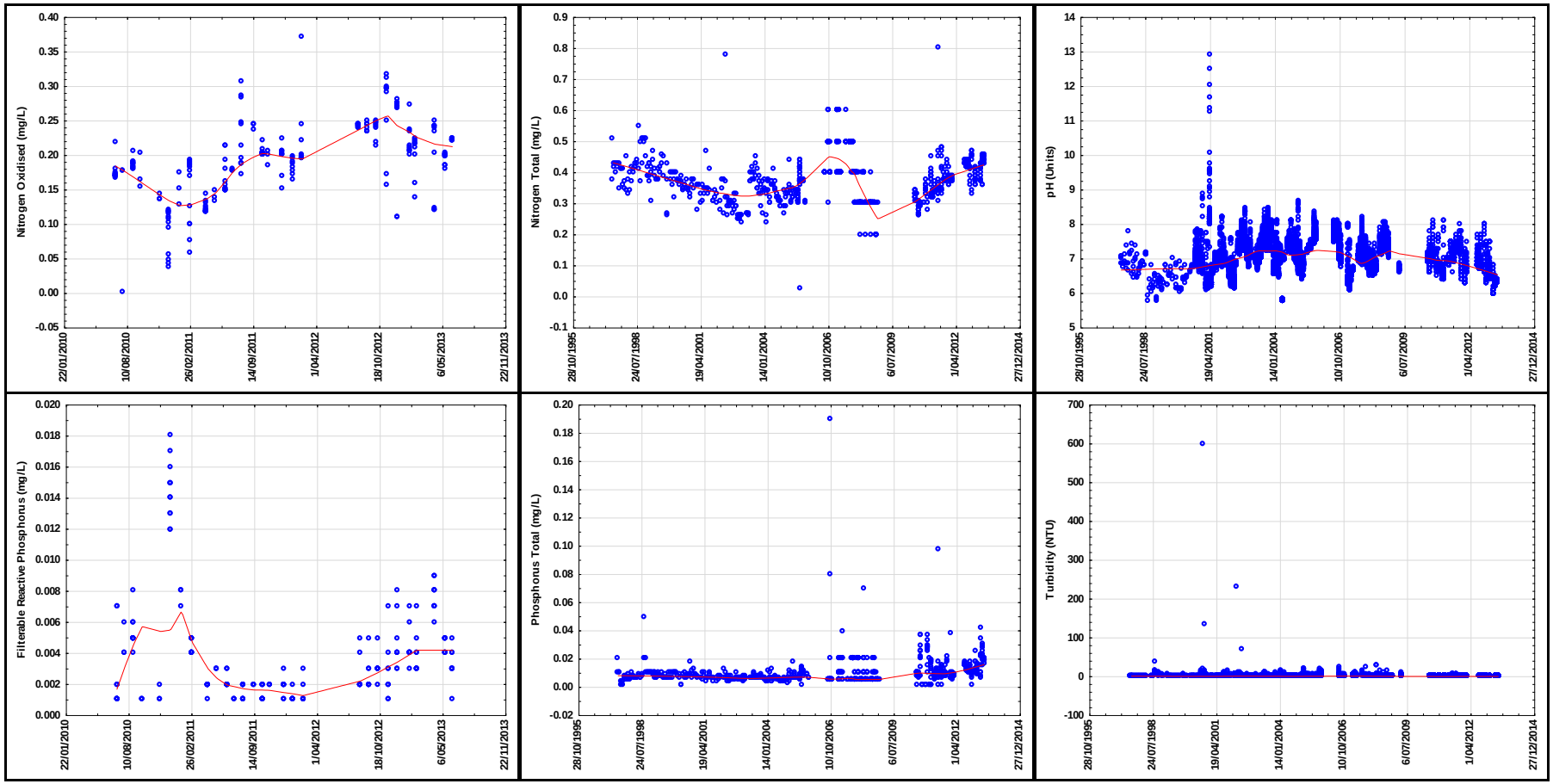


Figure H 8-67 (cont.) Time-series plots of water quality parameters at DNE2

Note: The red line of best fit is based on the LOWESS smoothing method

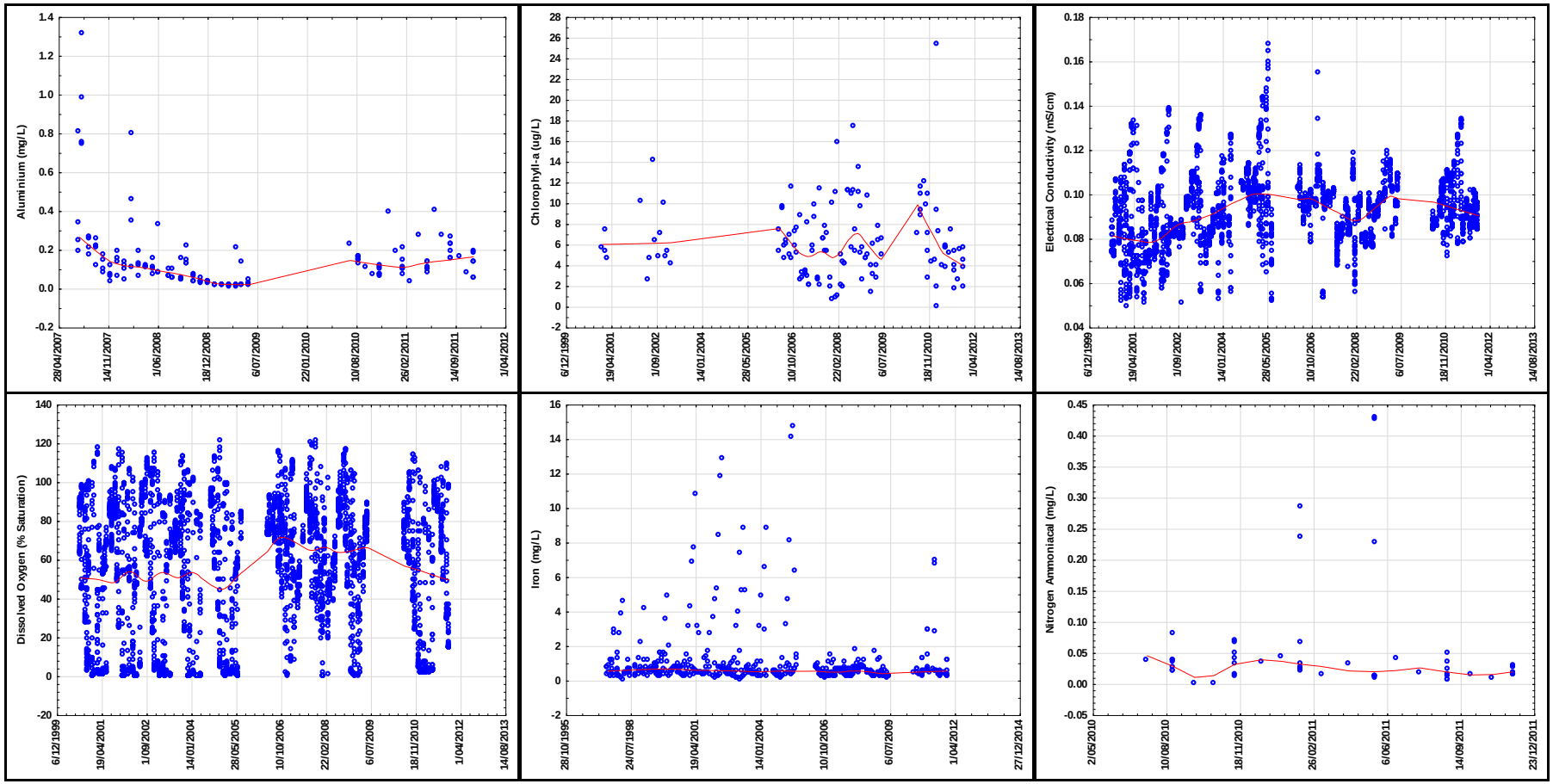


Figure H 8-68 Time-series plots of water quality parameters at DTA3

Note: The red line of best fit is based on the LOWESS smoothing method

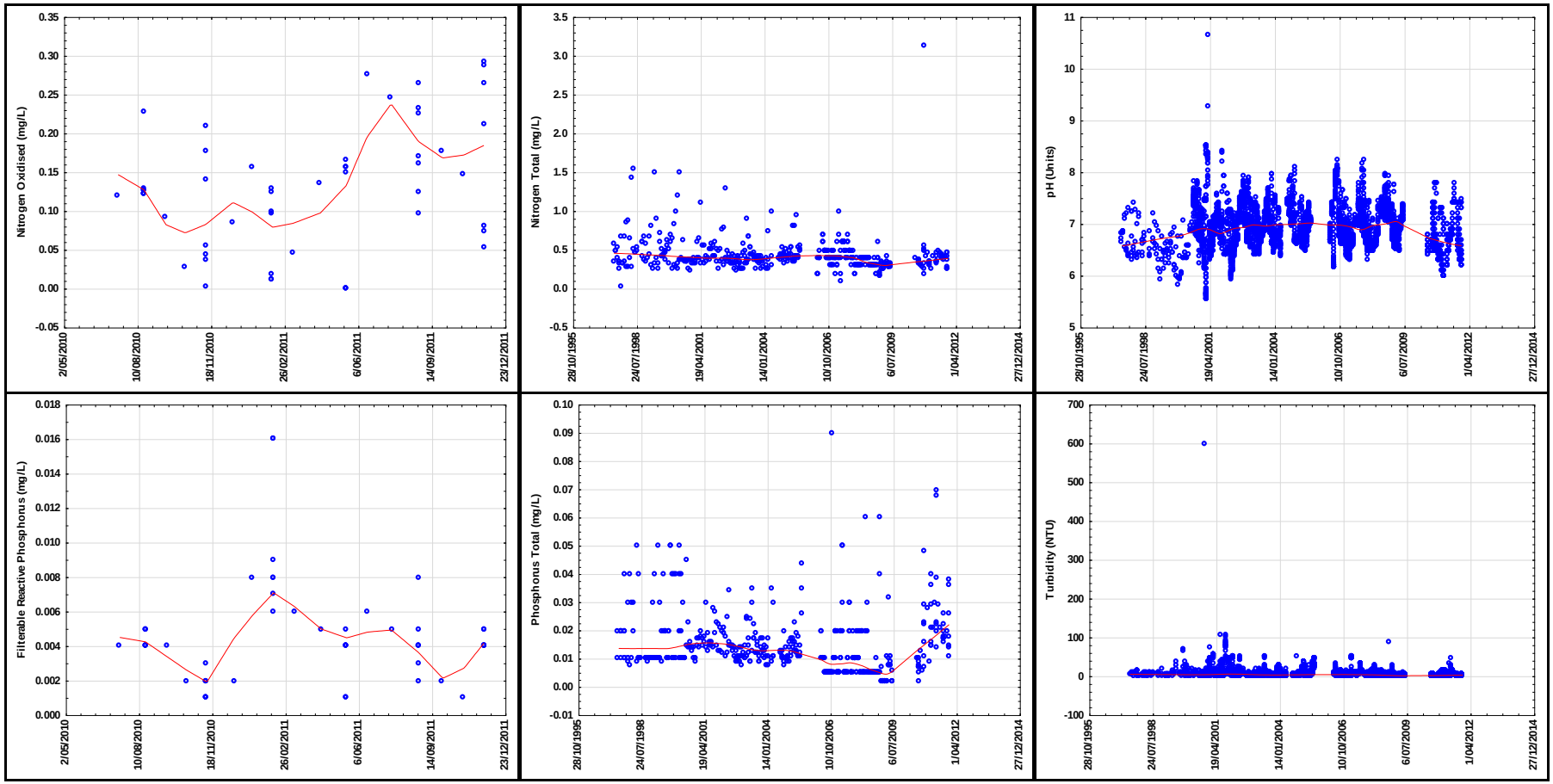


Figure H 8-68 (cont.) Time-series plots of water quality parameters at DTA3

Note: The red line of best fit is based on the LOWESS smoothing method

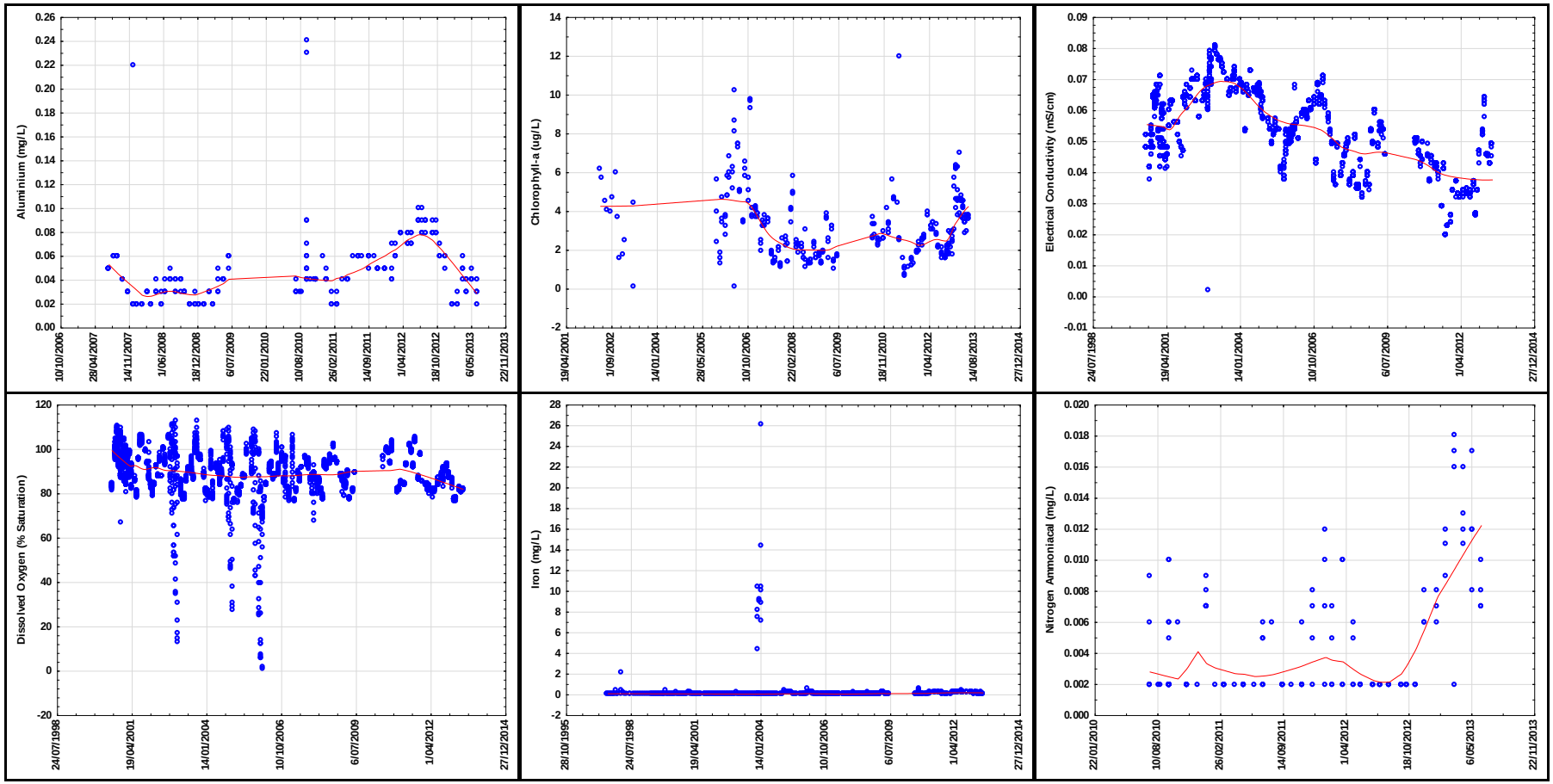


Figure H 8-69 Time-series plots of water quality parameters at DTC1

Note: The red line of best fit is based on the LOWESS smoothing method

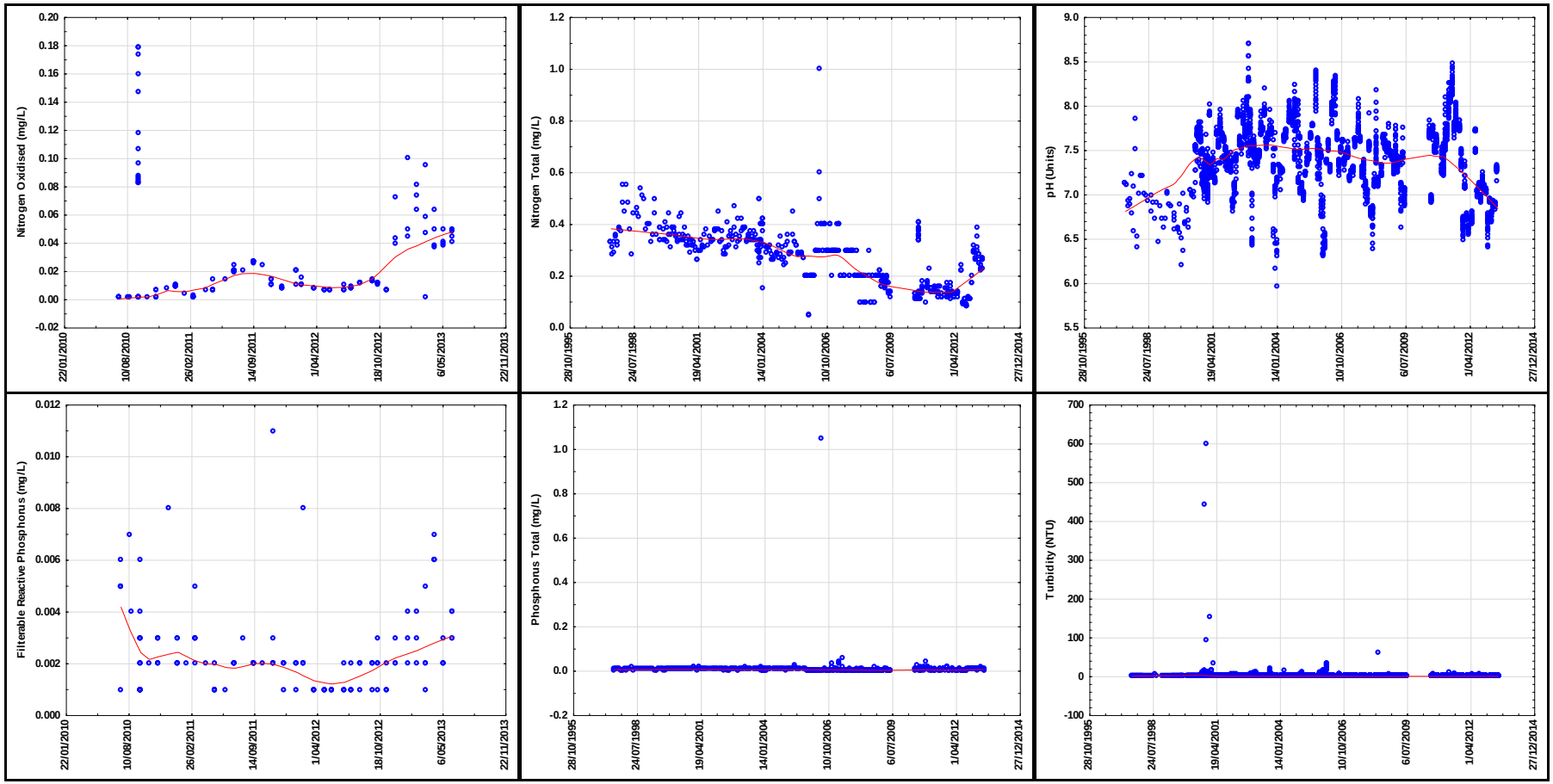


Figure H 8-69 (cont.) Time-series plots of water quality parameters at DTC1

Note: The red line of best fit is based on the LOWESS smoothing method

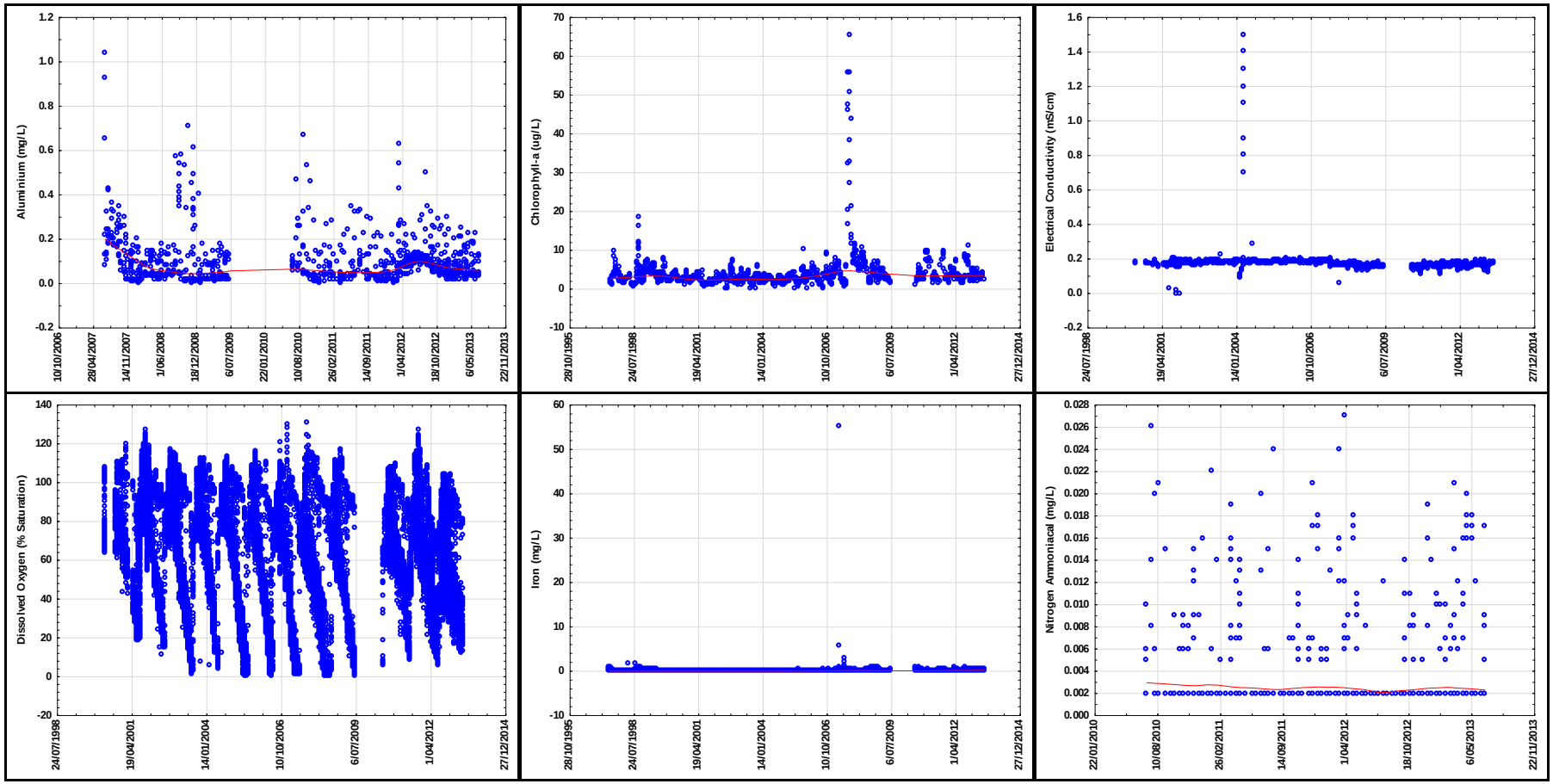


Figure H 8-70 Time-series plots of water quality parameters at DWA2

Note: The red line of best fit is based on the LOWESS smoothing method

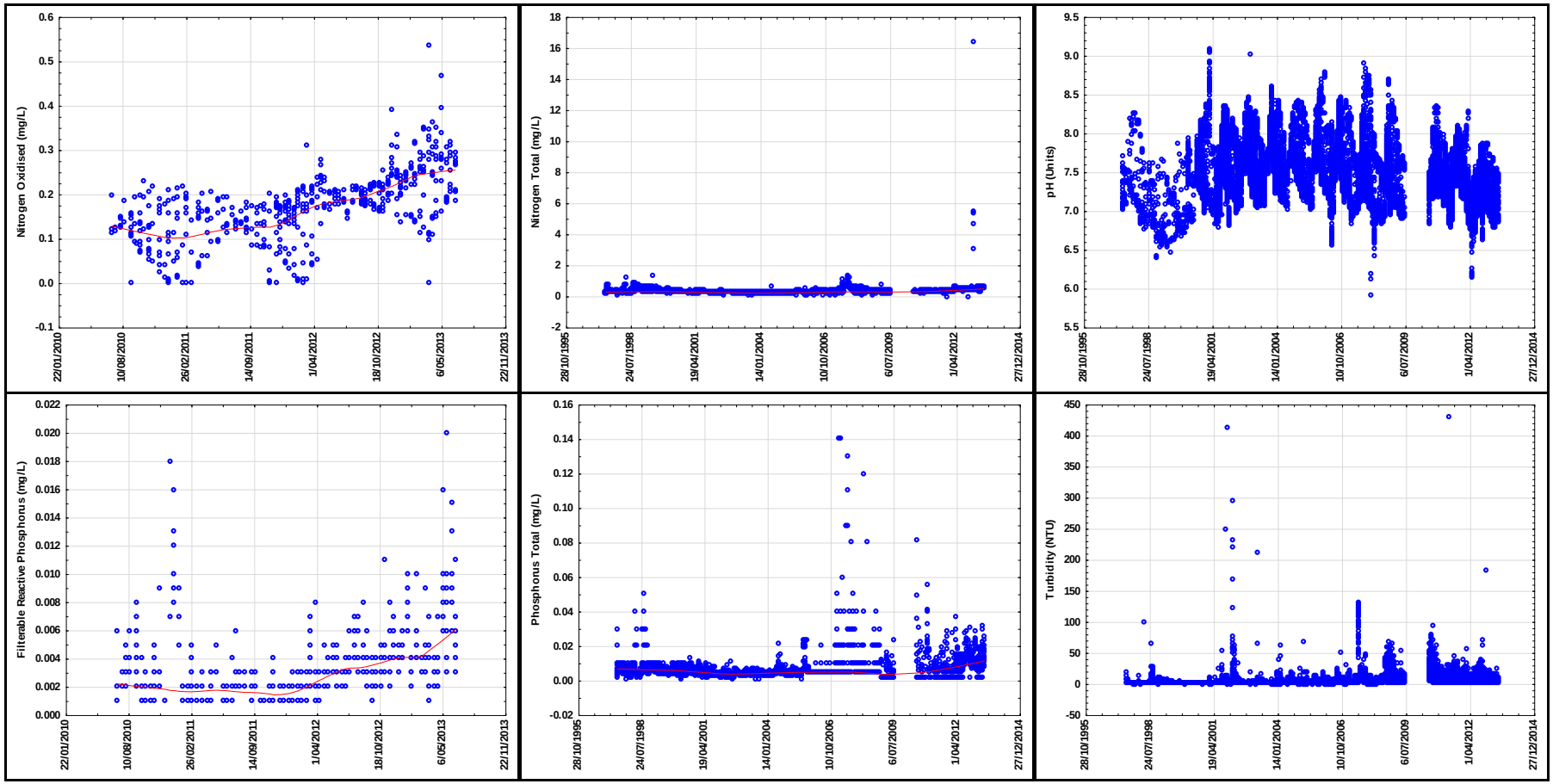


Figure H 8-70 (cont.) Time-series plots of water quality parameters at DWA2

Note: The red line of best fit is based on the LOWESS smoothing method

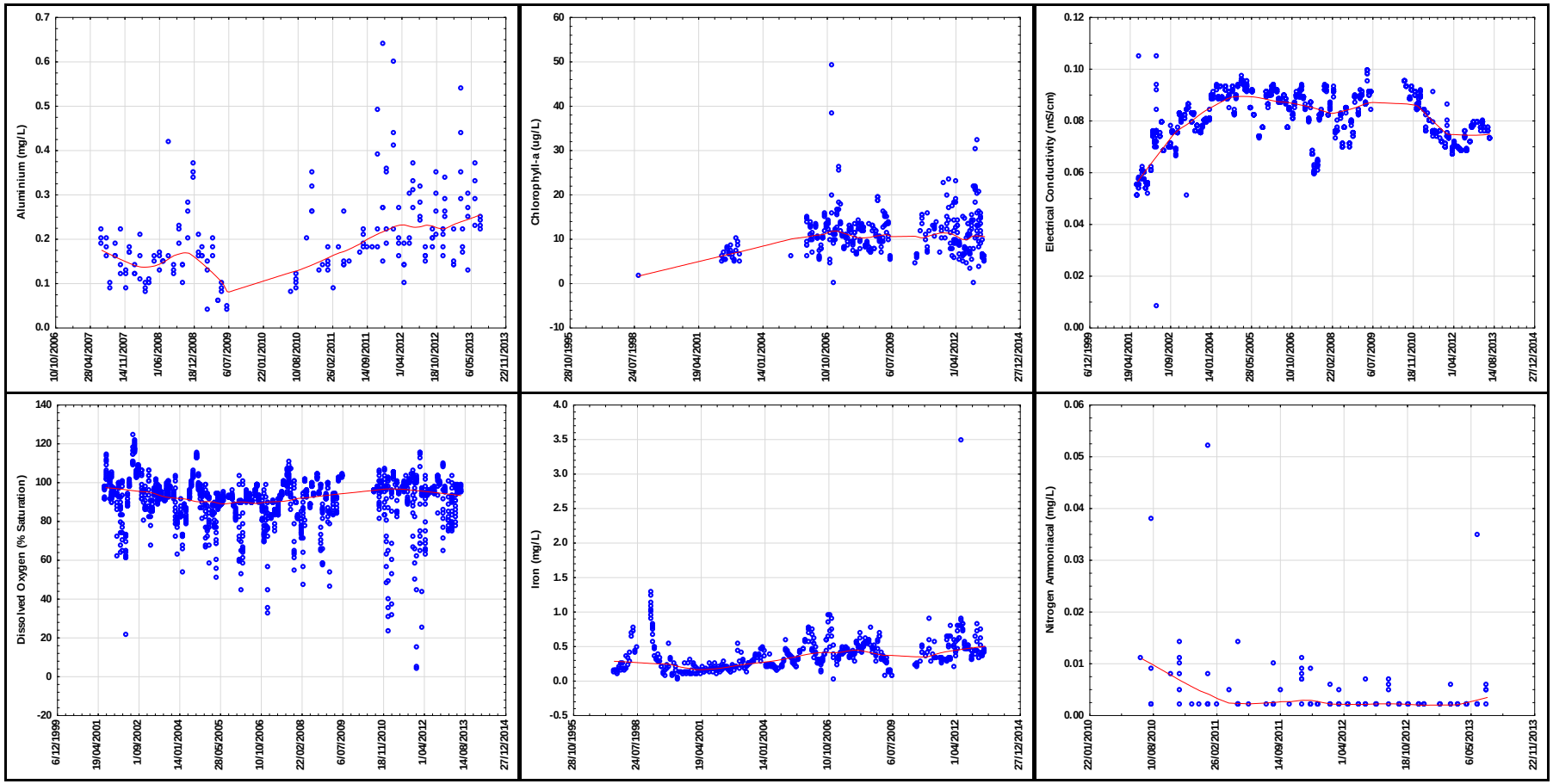


Figure H 8-71 Time-series plots of water quality parameters at DWI1

Note: The red line of best fit is based on the LOWESS smoothing method

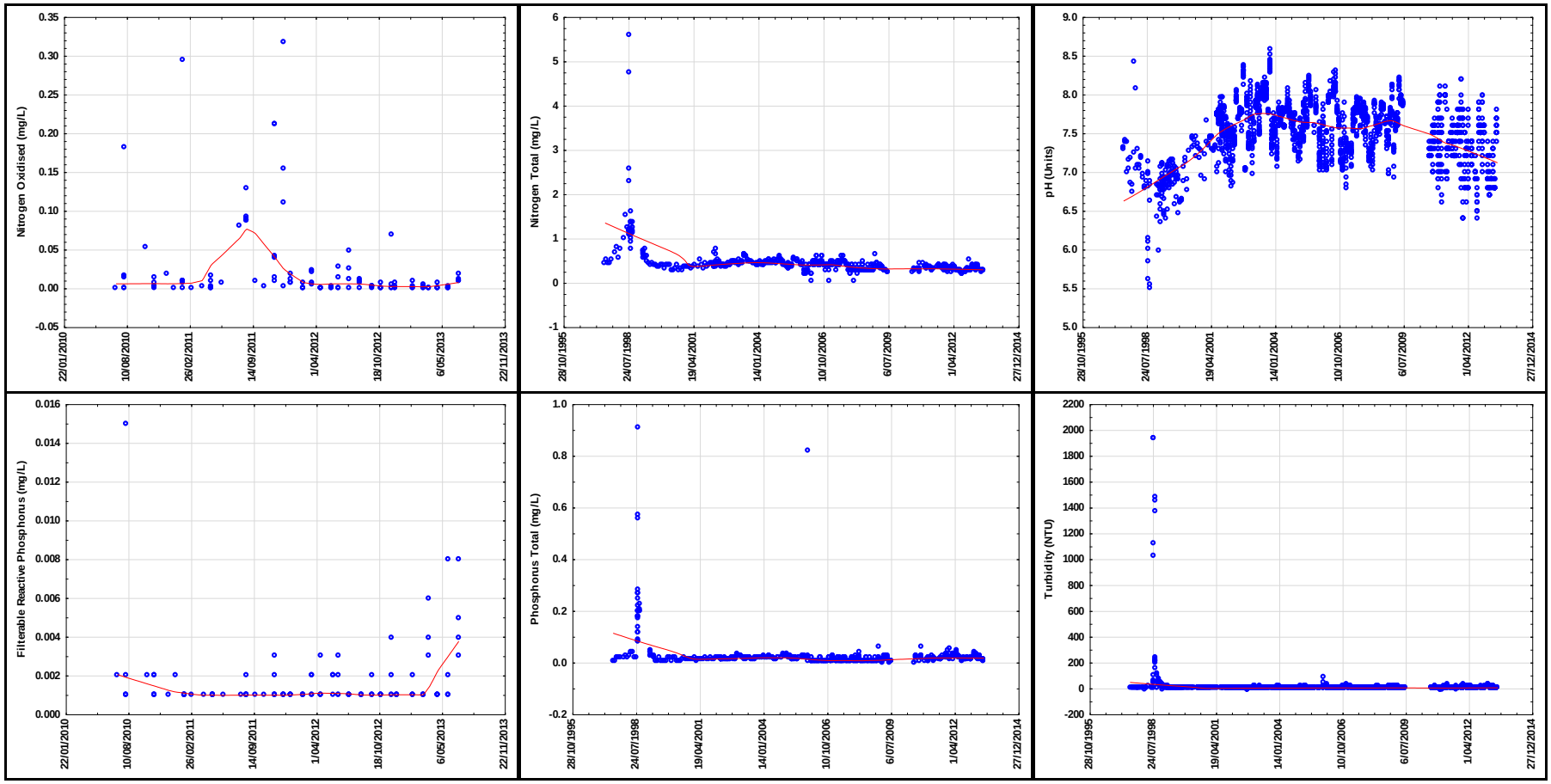


Figure H 8-71 (cont.) Time-series plots of water quality parameters at DWI1

Note: The red line of best fit is based on the LOWESS smoothing method

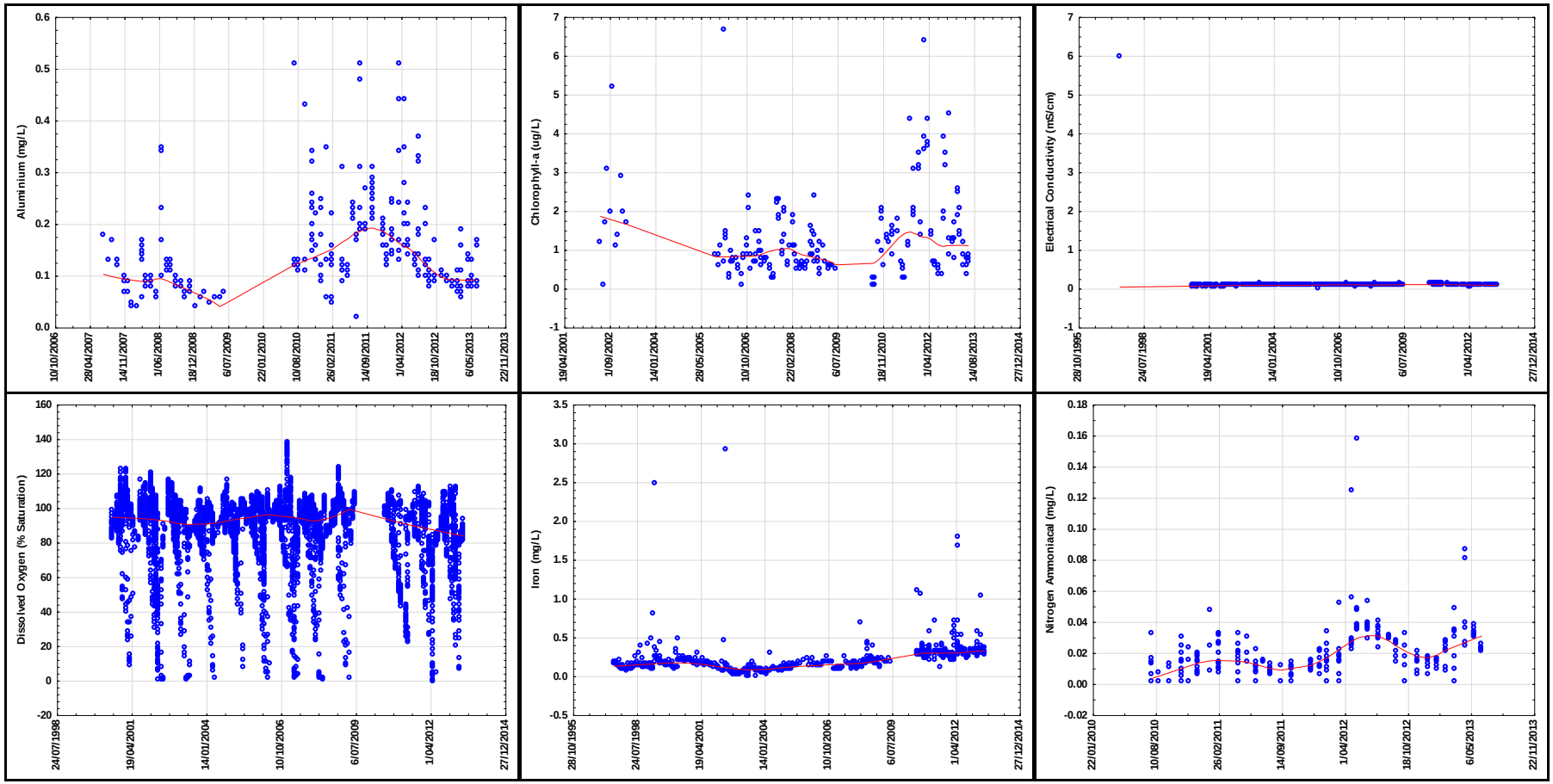


Figure H 8-72 Time-series plots of water quality parameters at DWO1

Note: The red line of best fit is based on the LOWESS smoothing method

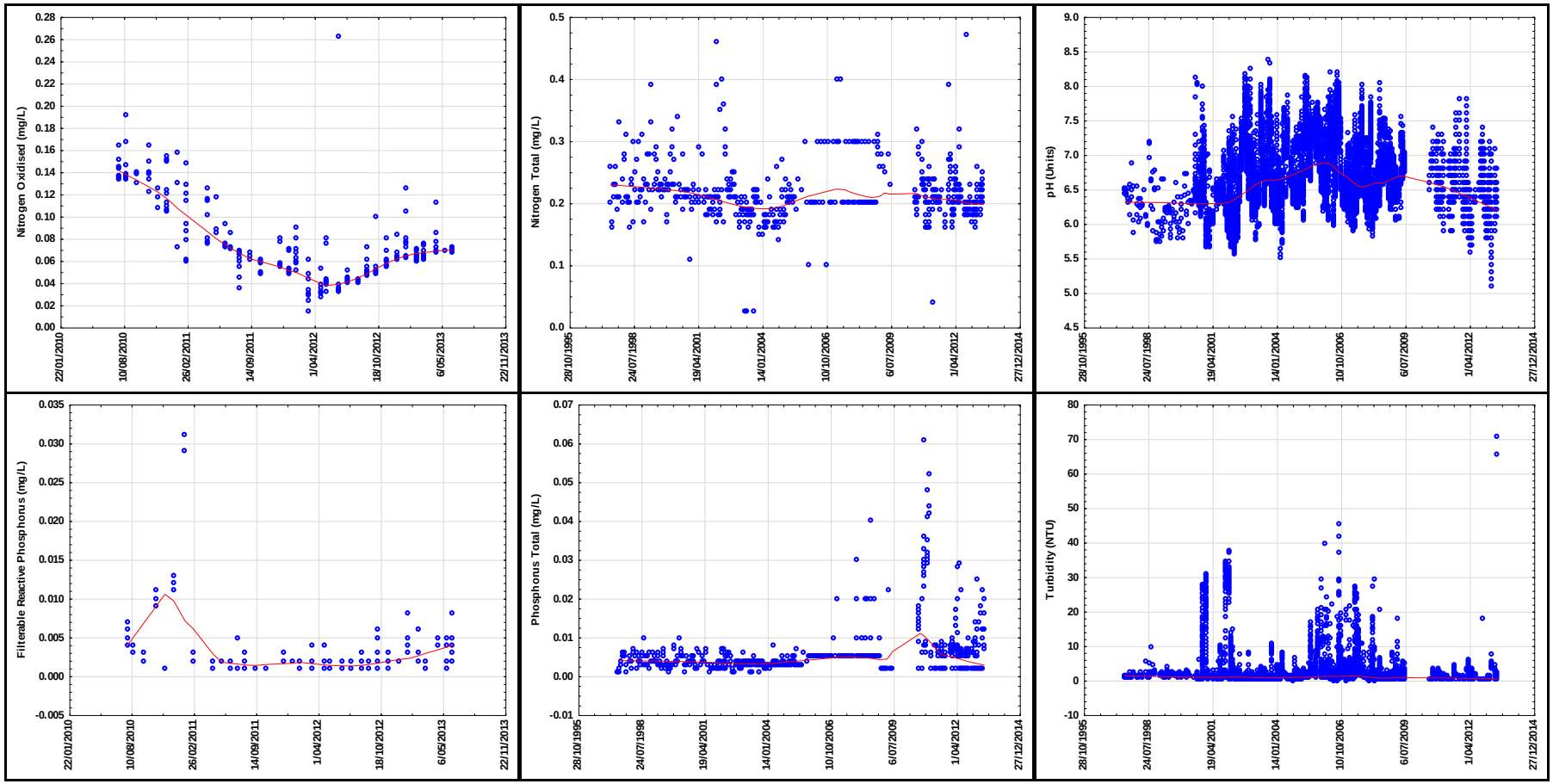


Figure H 8-72 (cont.) Time-series plots of water quality parameters at DWO1

Note: The red line of best fit is based on the LOWESS smoothing method

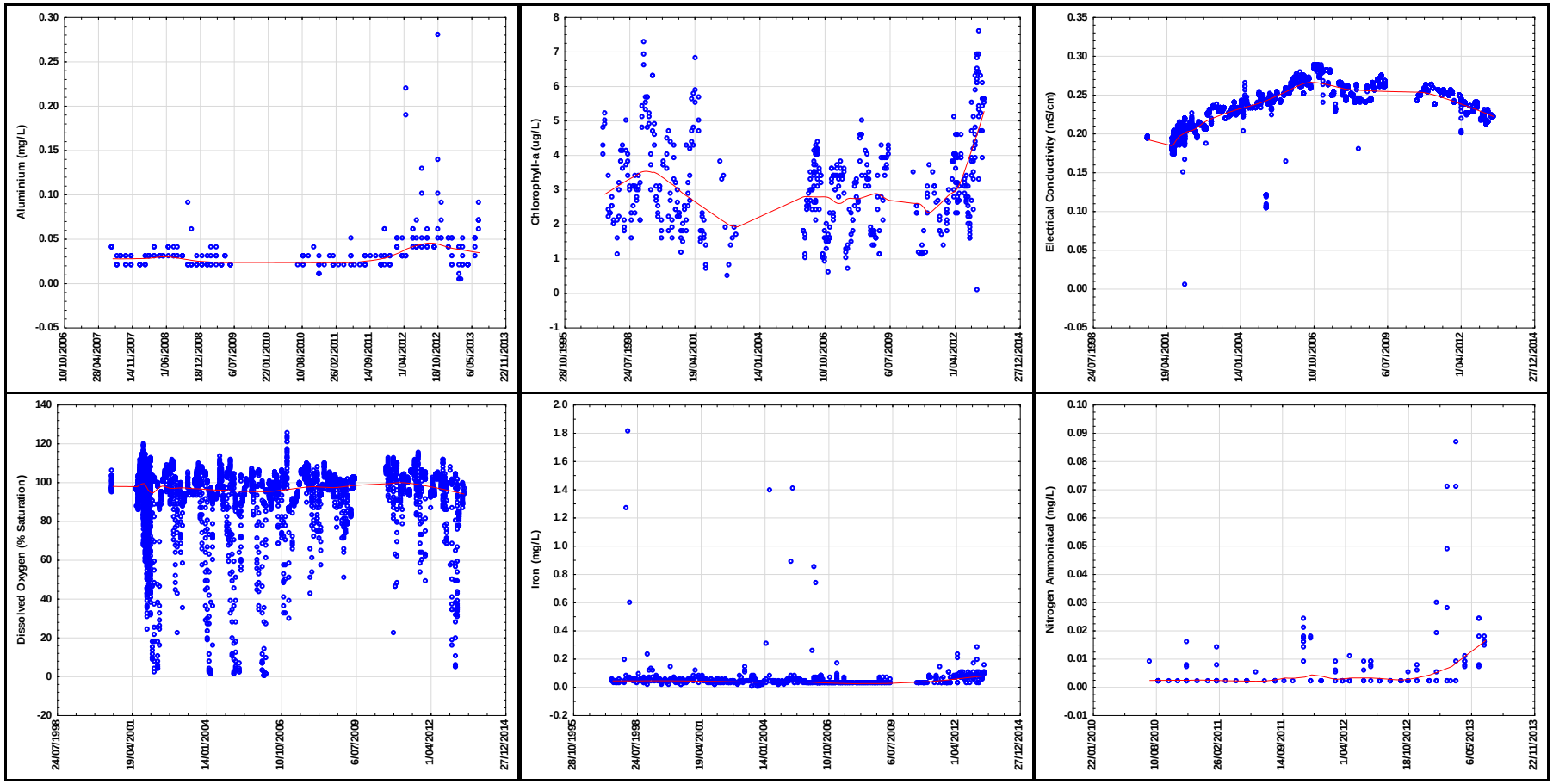


Figure H 8-73 Time-series plots of water quality parameters at RPR1

Note: The red line of best fit is based on the LOWESS smoothing method

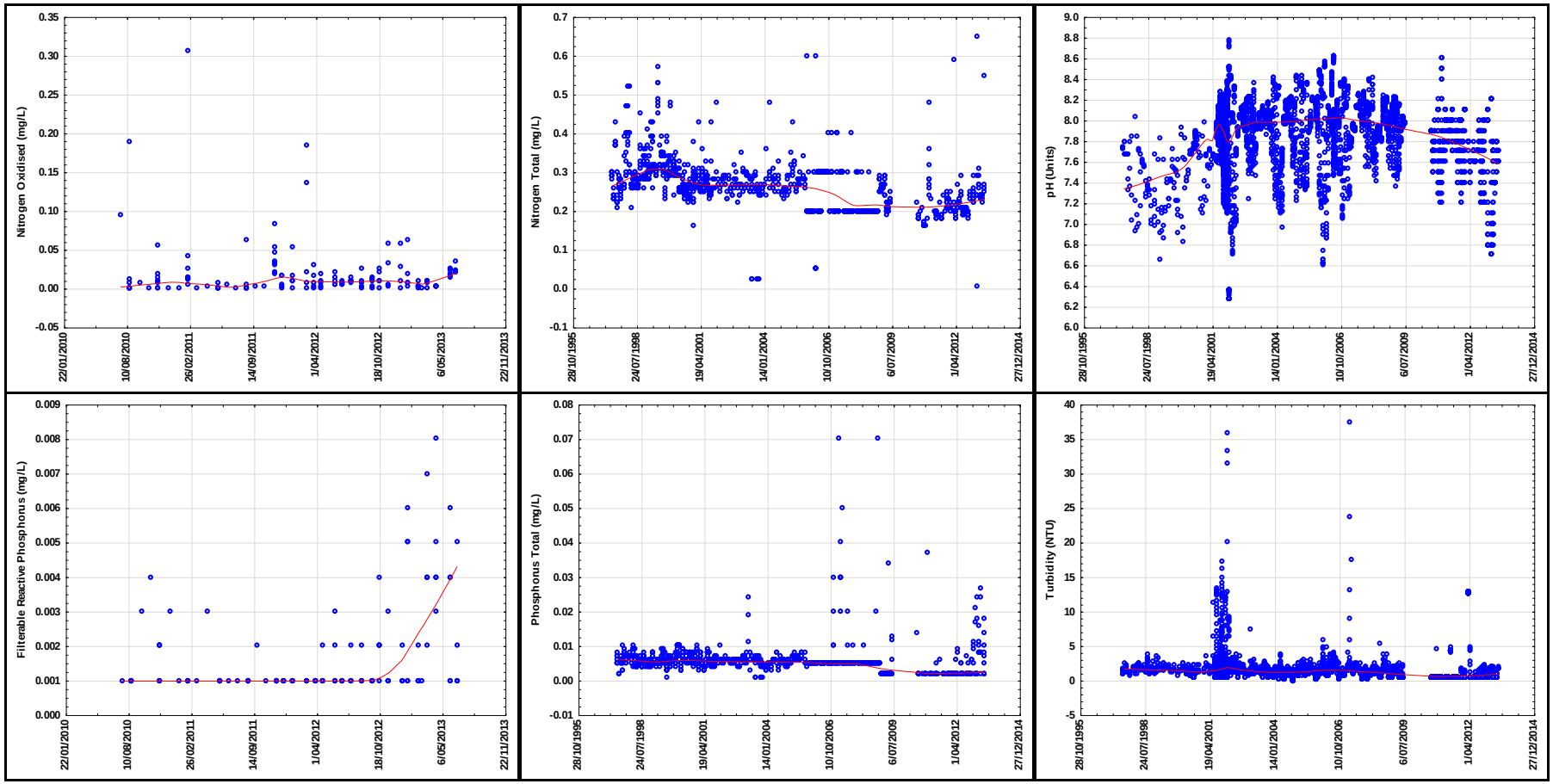


Figure H 8-73 (cont.) Time-series plots of water quality parameters at RPR1

Note: The red line of best fit is based on the LOWESS smoothing method

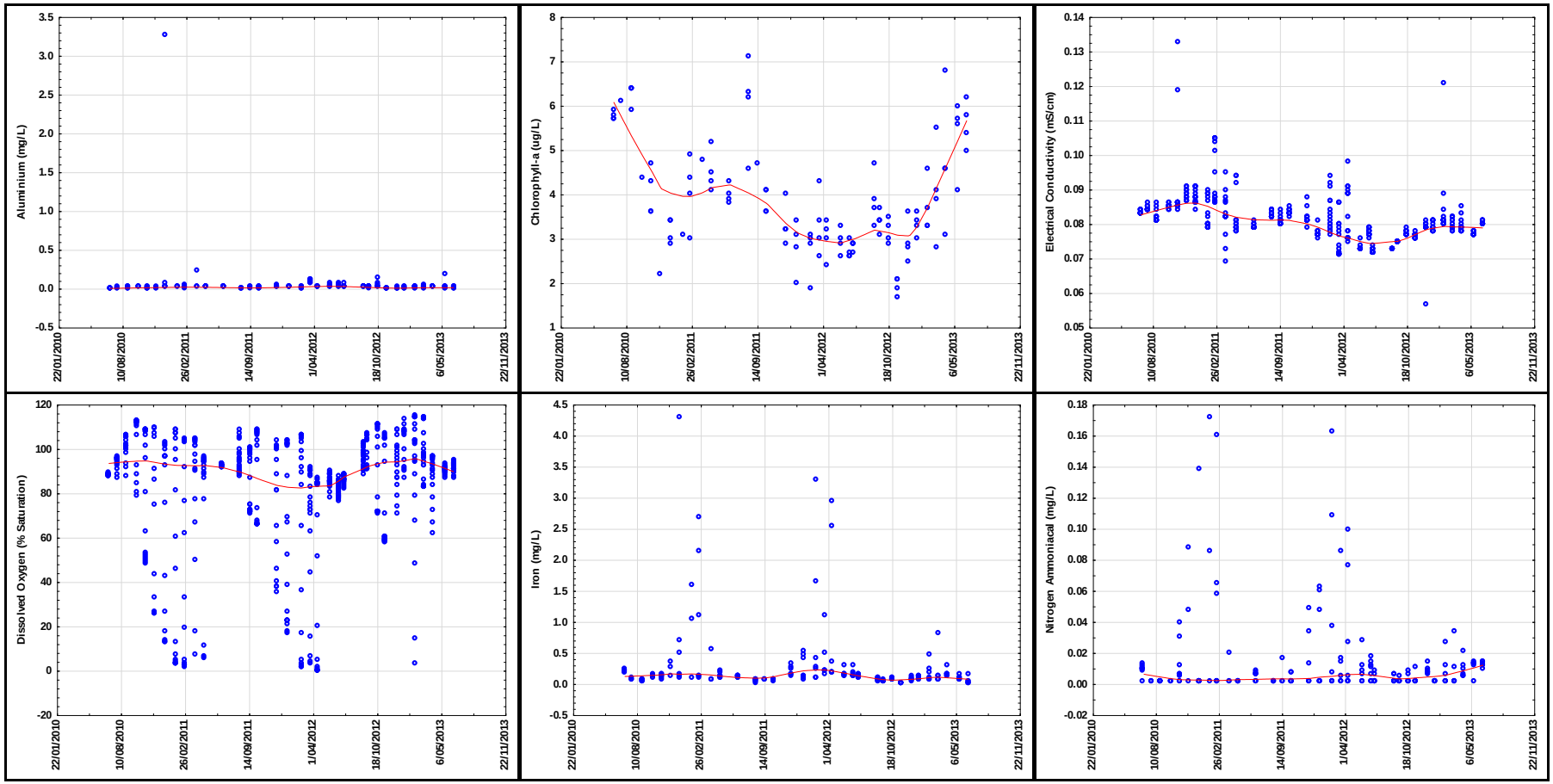


Figure H 8-74 Time-series plots of water quality parameters at DAV7

Note: The red line of best fit is based on the LOWESS smoothing method

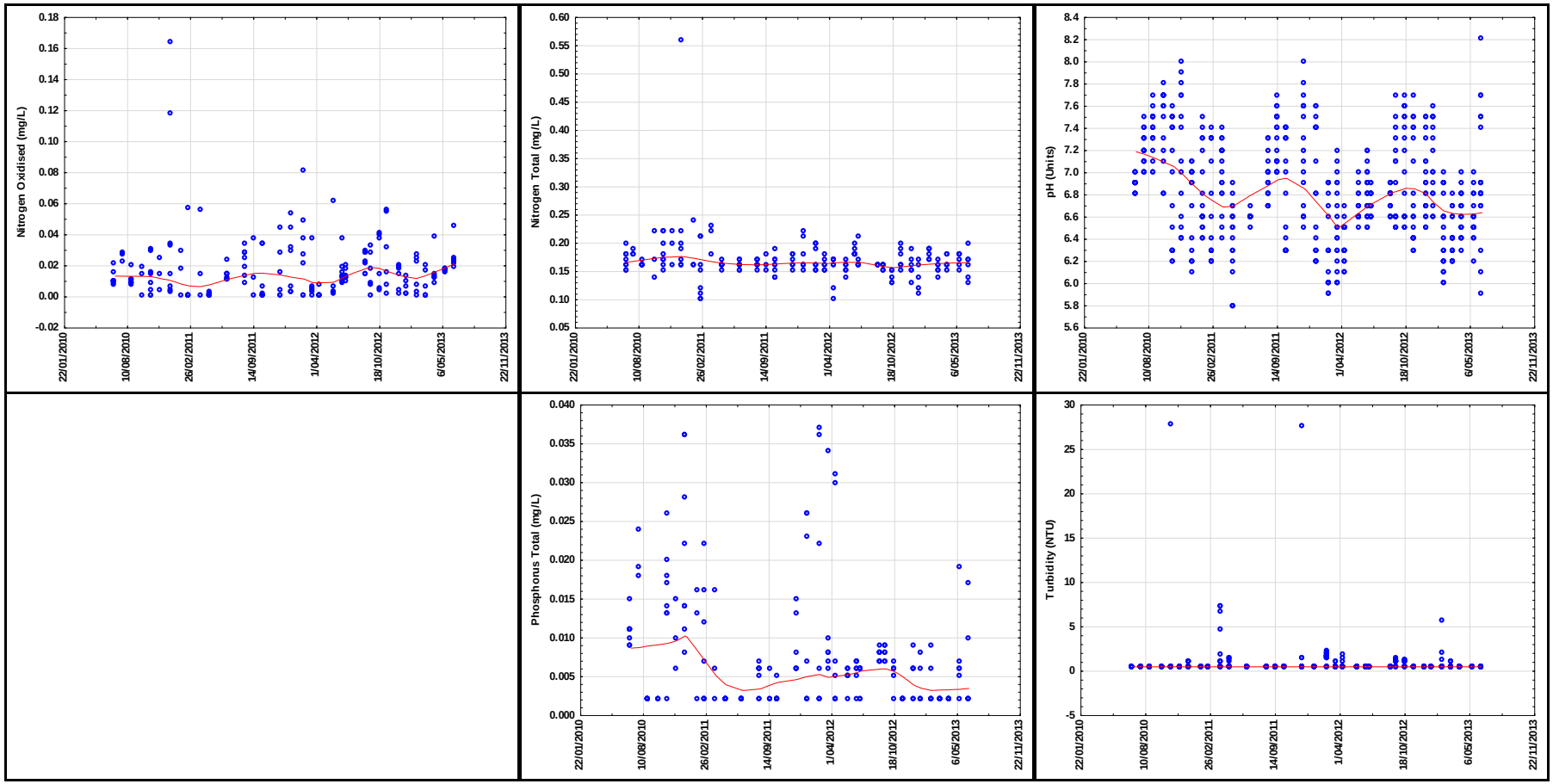


Figure H 8-74 (cont.) Time-series plots of water quality parameters at DAV7

Note: The red line of best fit is based on the LOWESS smoothing method

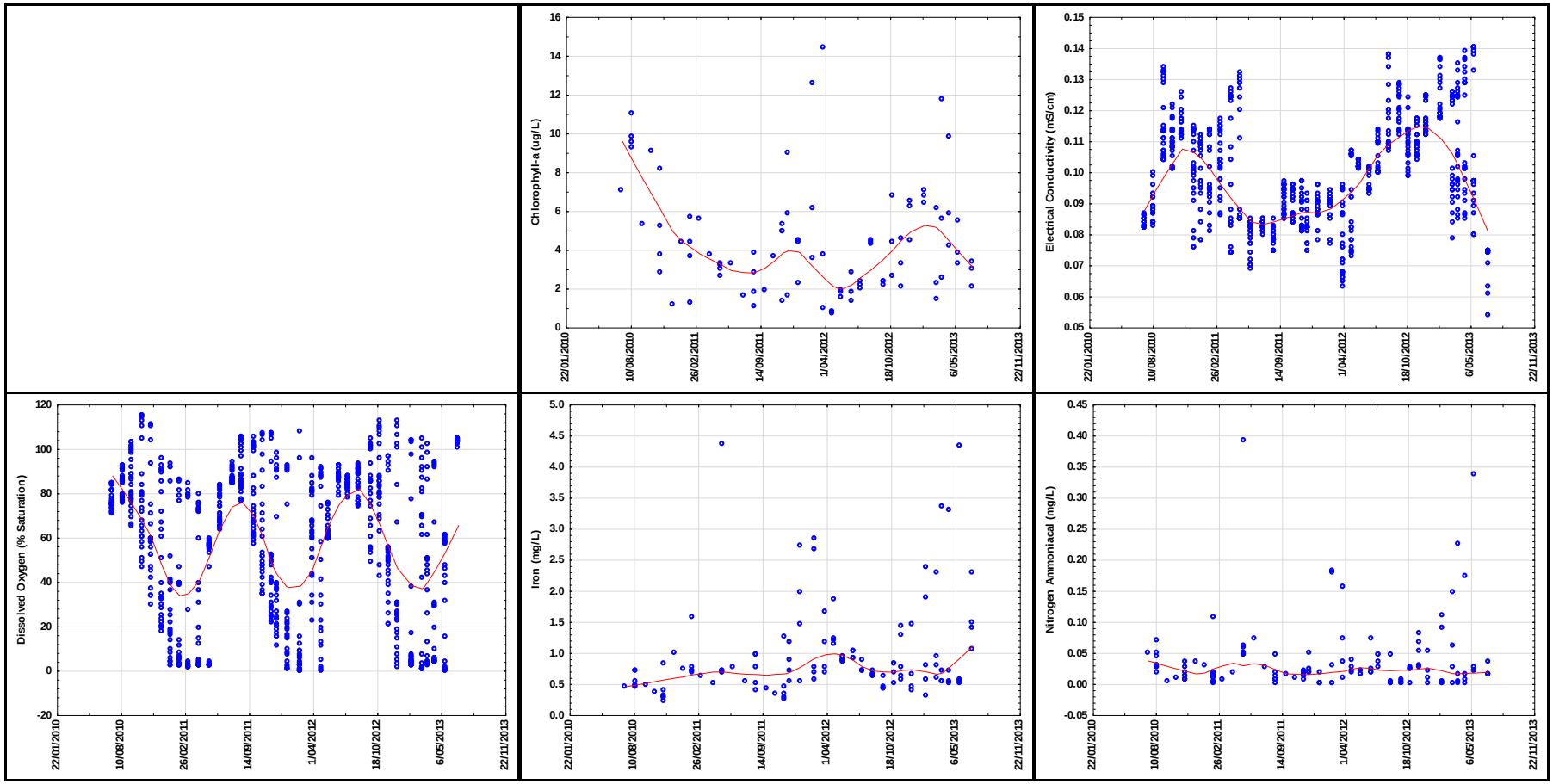


Figure H 8-75 Time-series plots of water quality parameters at DTA1

Note: The red line of best fit is based on the LOWESS smoothing method

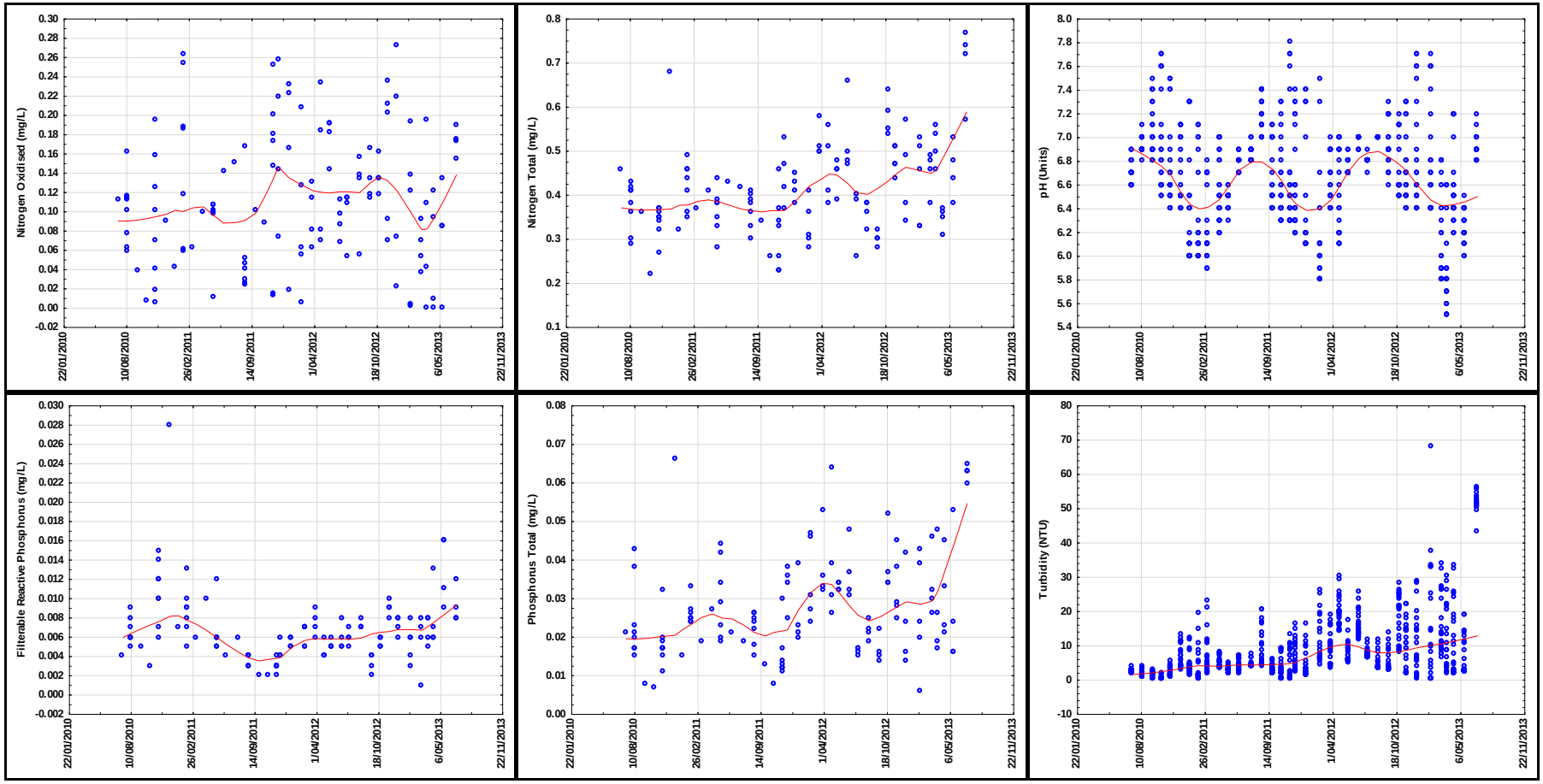


Figure H 8-75 (cont.) Time-series plots of water quality parameters at DTA1

Note: The red line of best fit is based on the LOWESS smoothing method

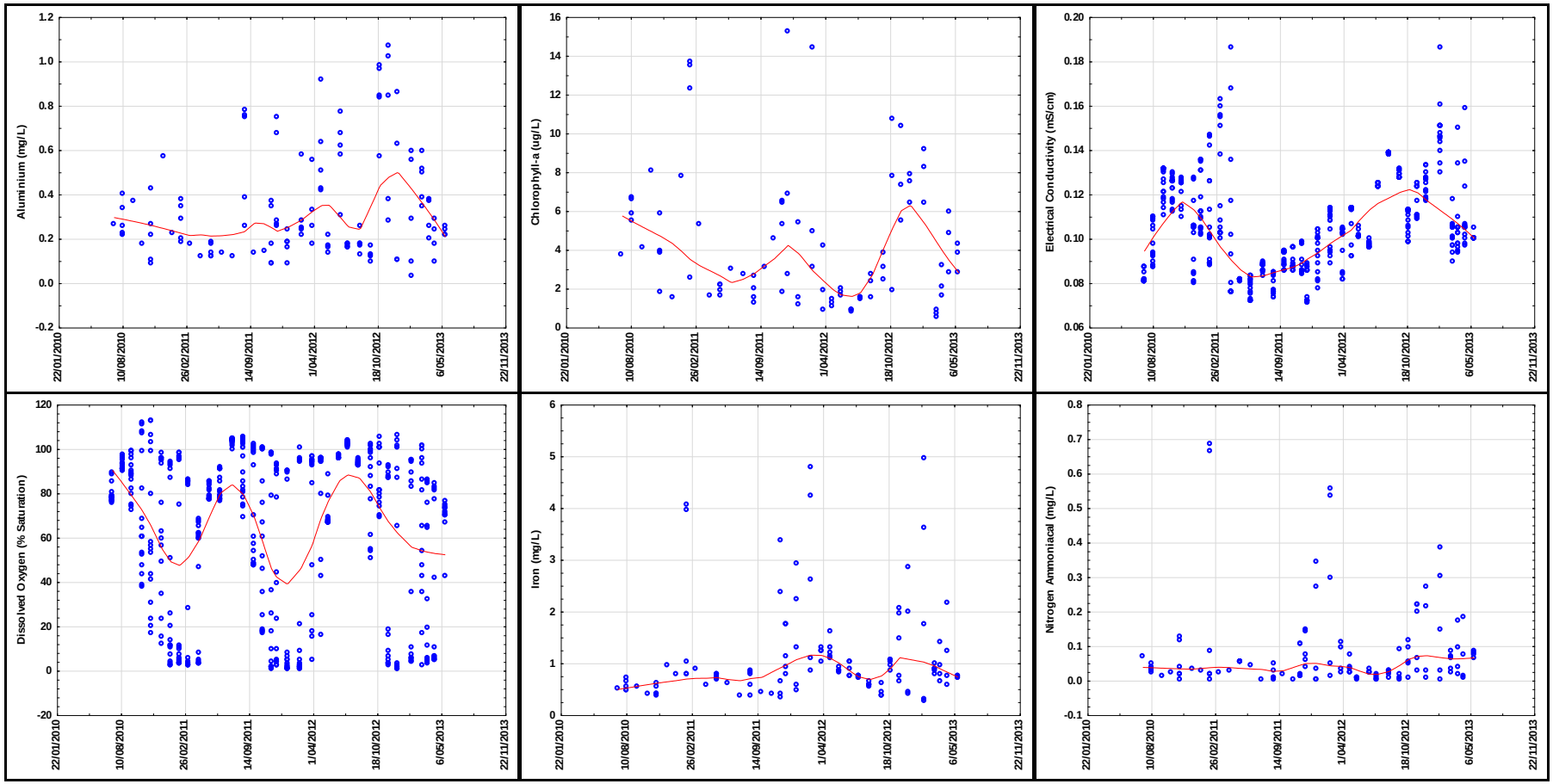


Figure H 8-76 Time-series plots of water quality parameters at DTA5

Note: The red line of best fit is based on the LOWESS smoothing method

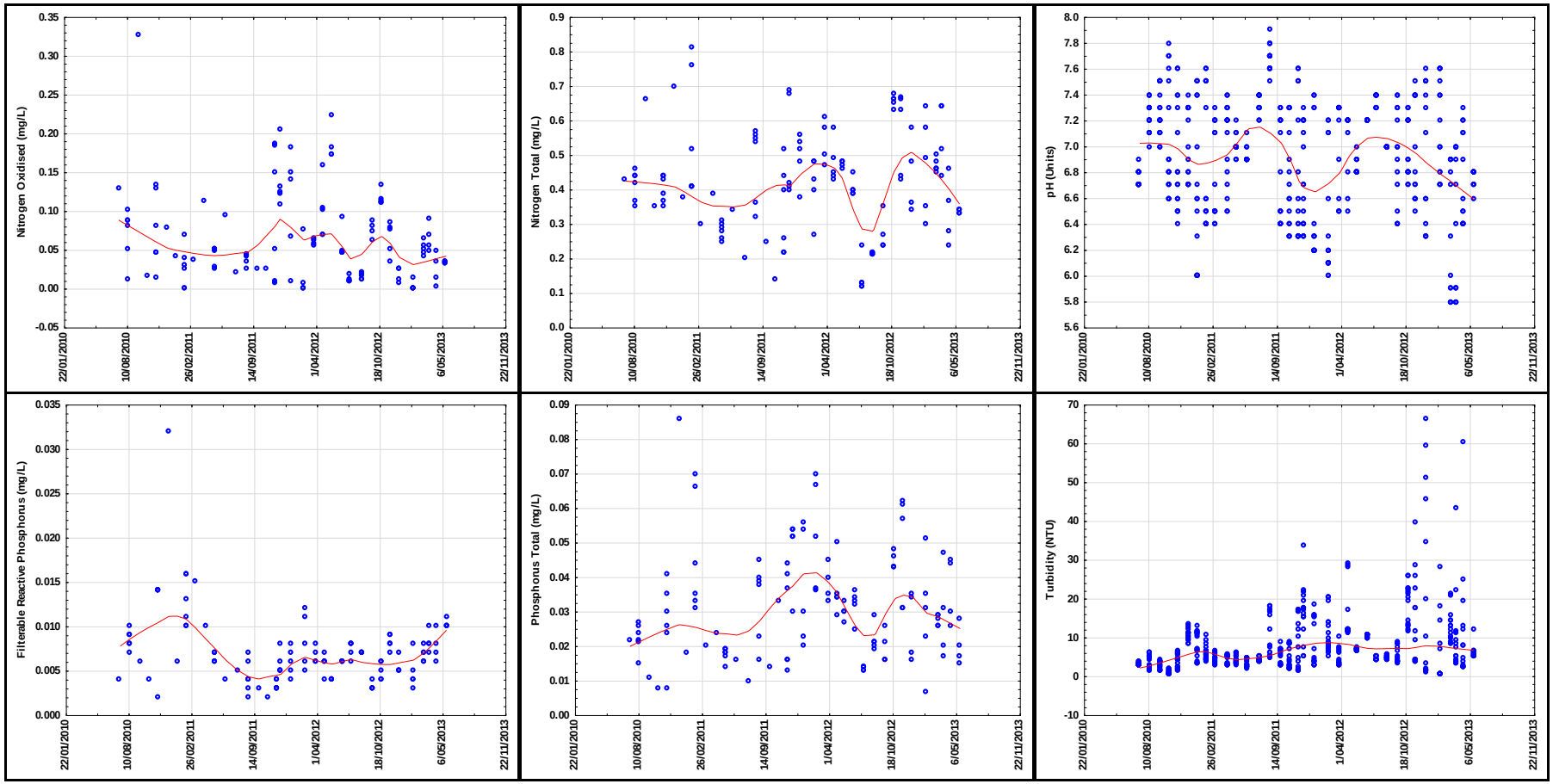


Figure H 8-76 (cont.) Time-series plots of water quality parameters at DTA5

Note: The red line of best fit is based on the LOWESS smoothing method

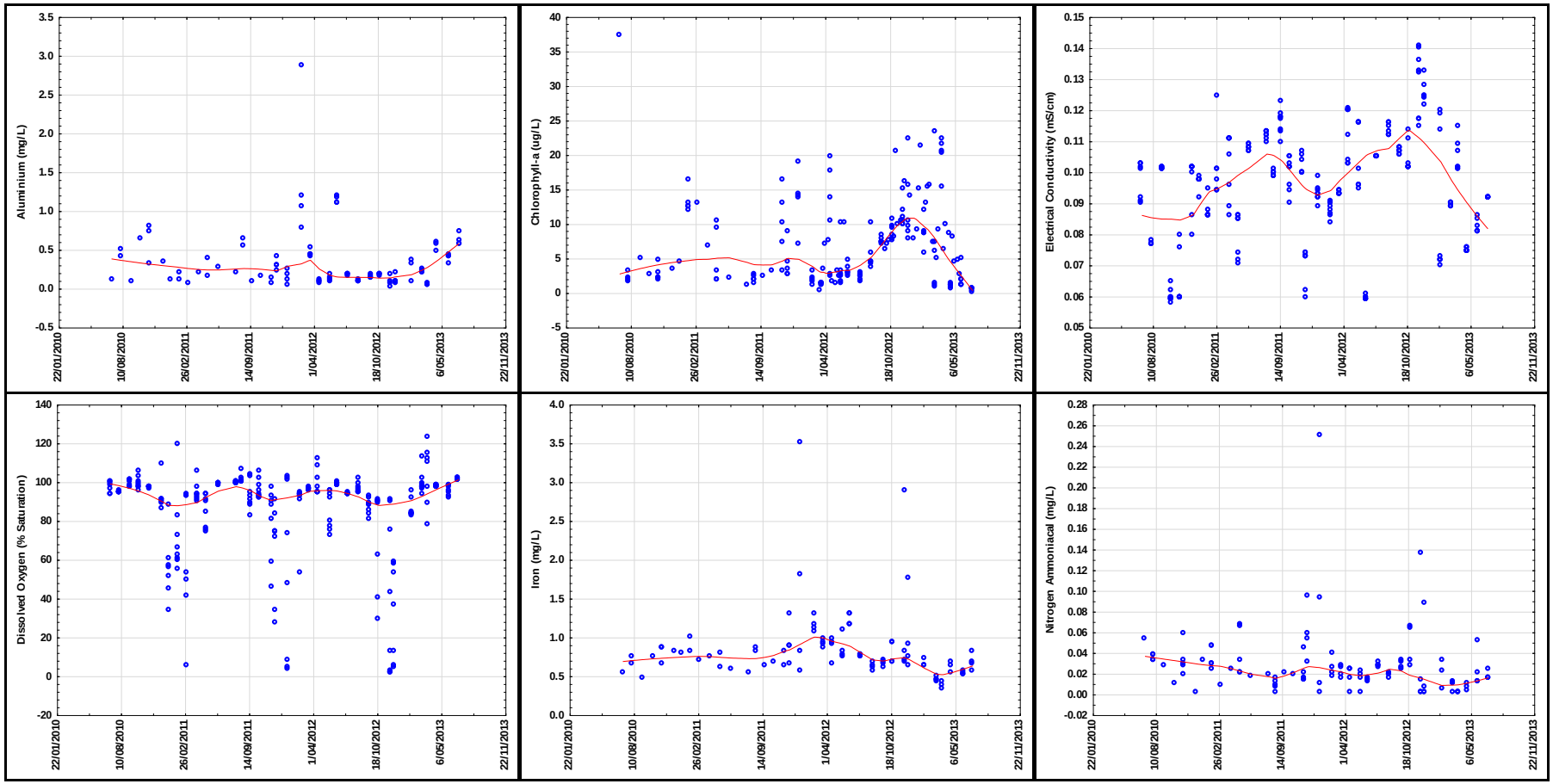


Figure H 8-77 Time-series plots of water quality parameters at DTA8

Note: The red line of best fit is based on the LOWESS smoothing method

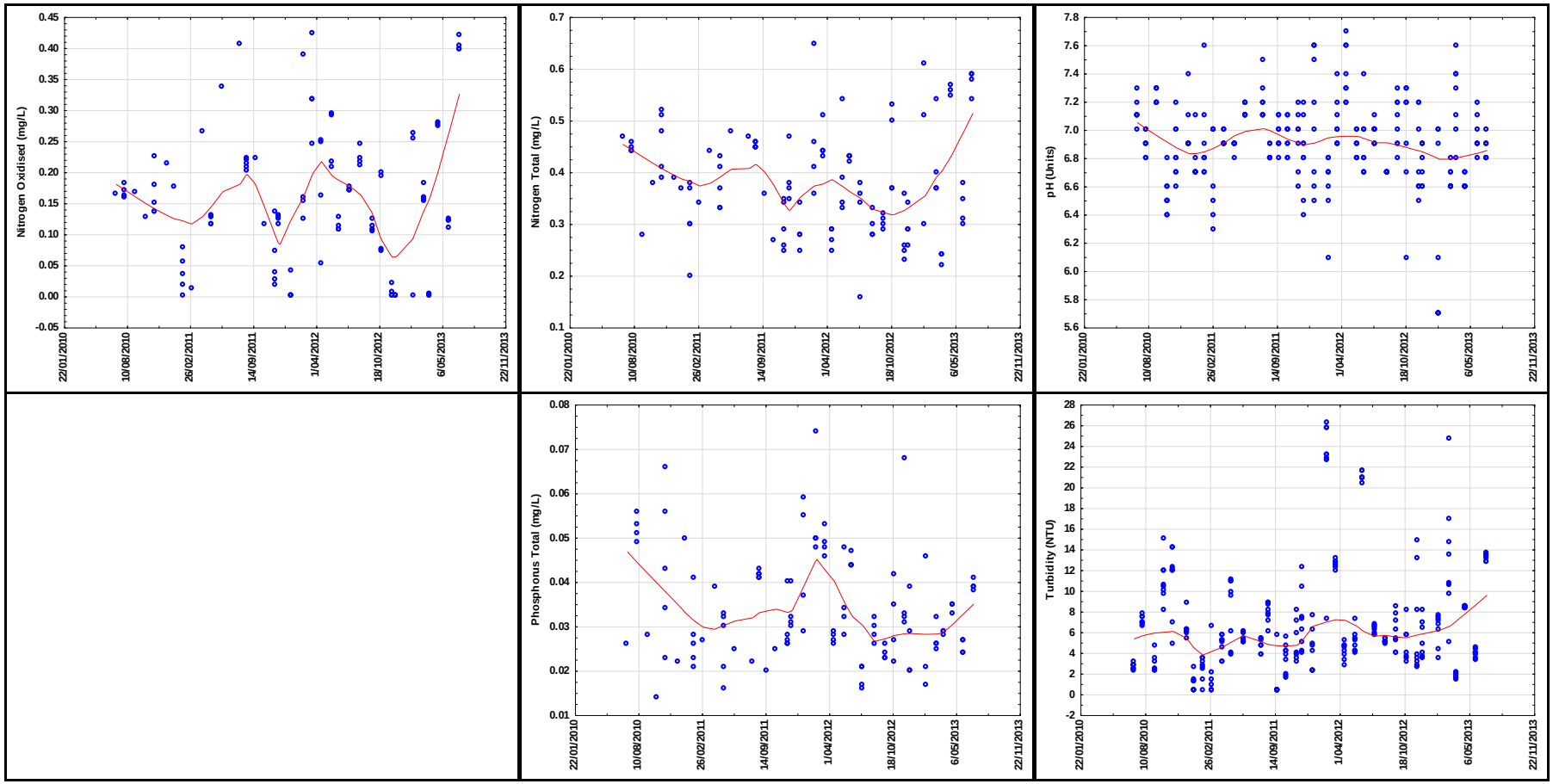


Figure H 8-77 (cont.) Time-series plots of water quality parameters at DTA8

Note: The red line of best fit is based on the LOWESS smoothing method

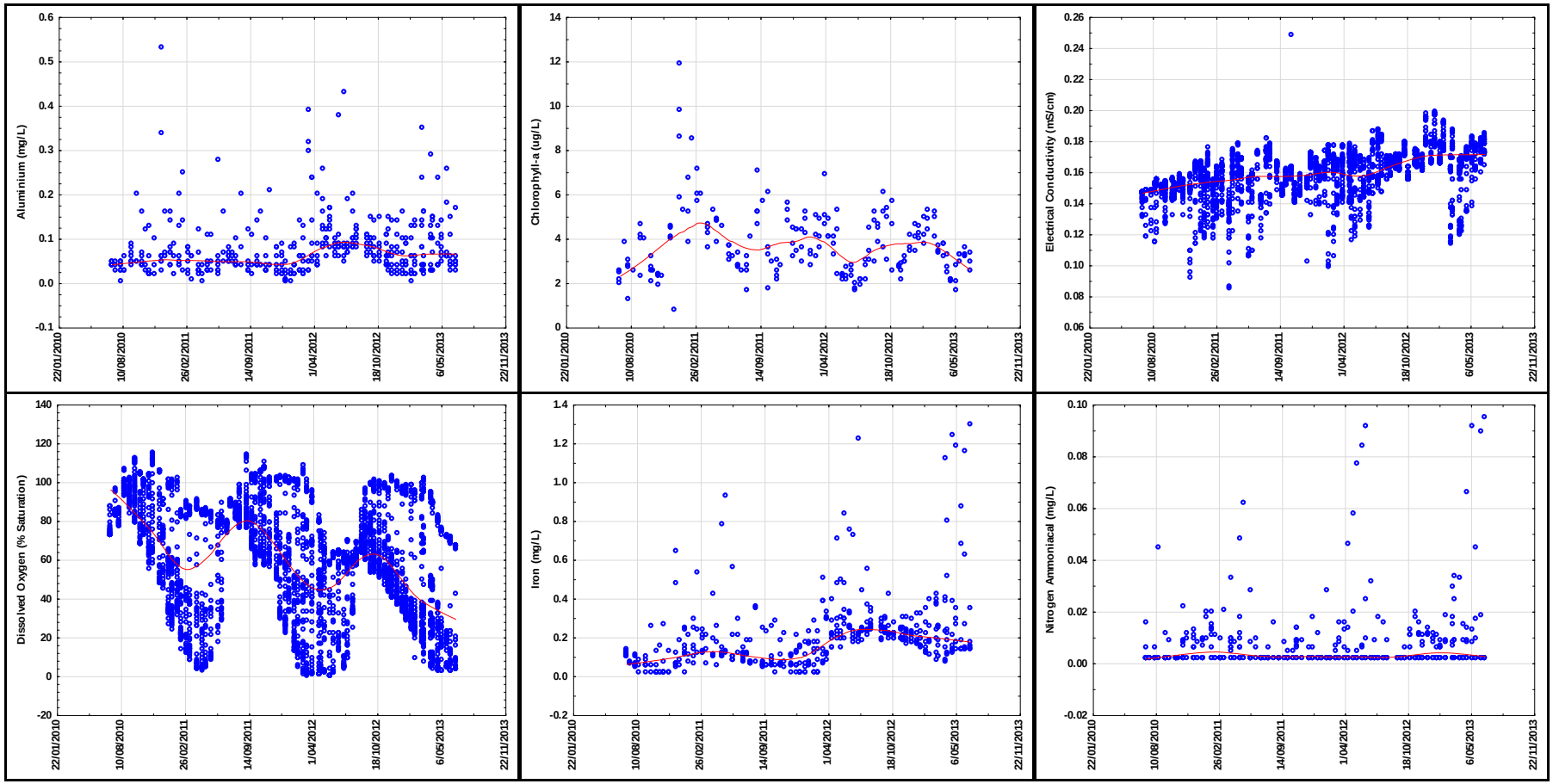


Figure H 8-78 Time-series plots of water quality parameters at DWA12

Note: The red line of best fit is based on the LOWESS smoothing method

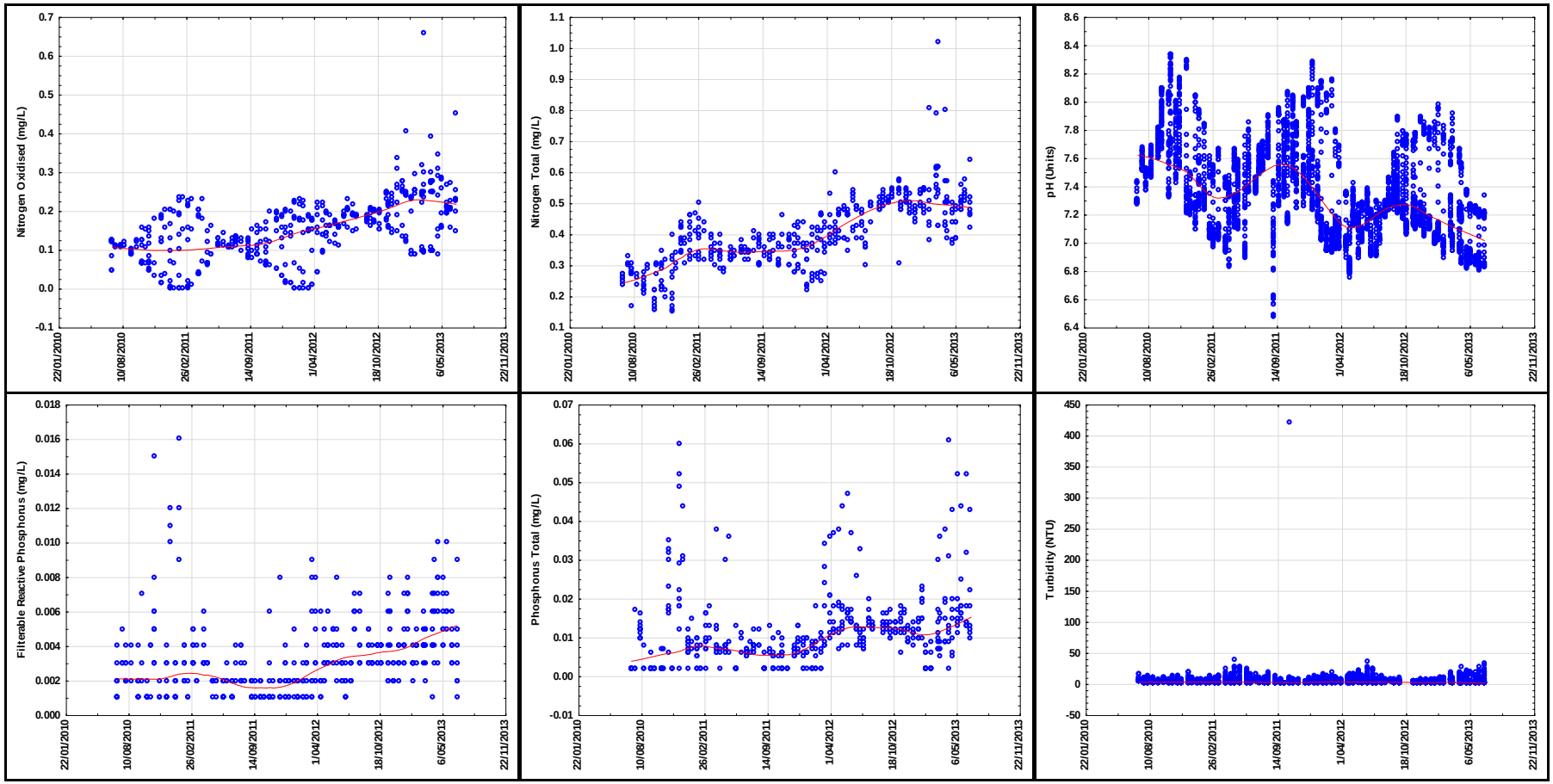


Figure H 8-78 (cont.) Time-series plots of water quality parameters at DWA12

Note: The red line of best fit is based on the LOWESS smoothing method

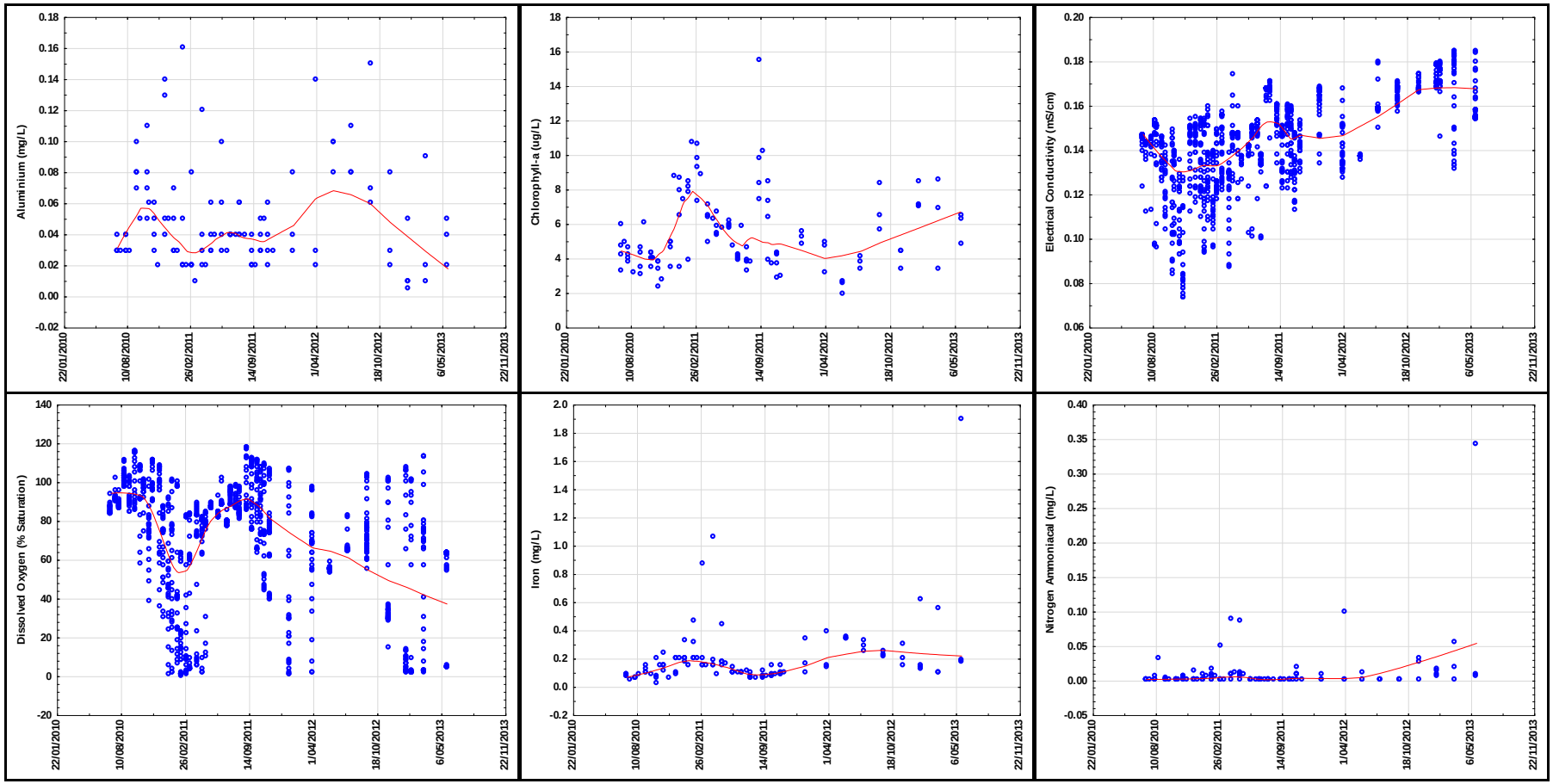


Figure H 8-79 Time-series plots of water quality parameters at DWA15

Note: The red line of best fit is based on the LOWESS smoothing method

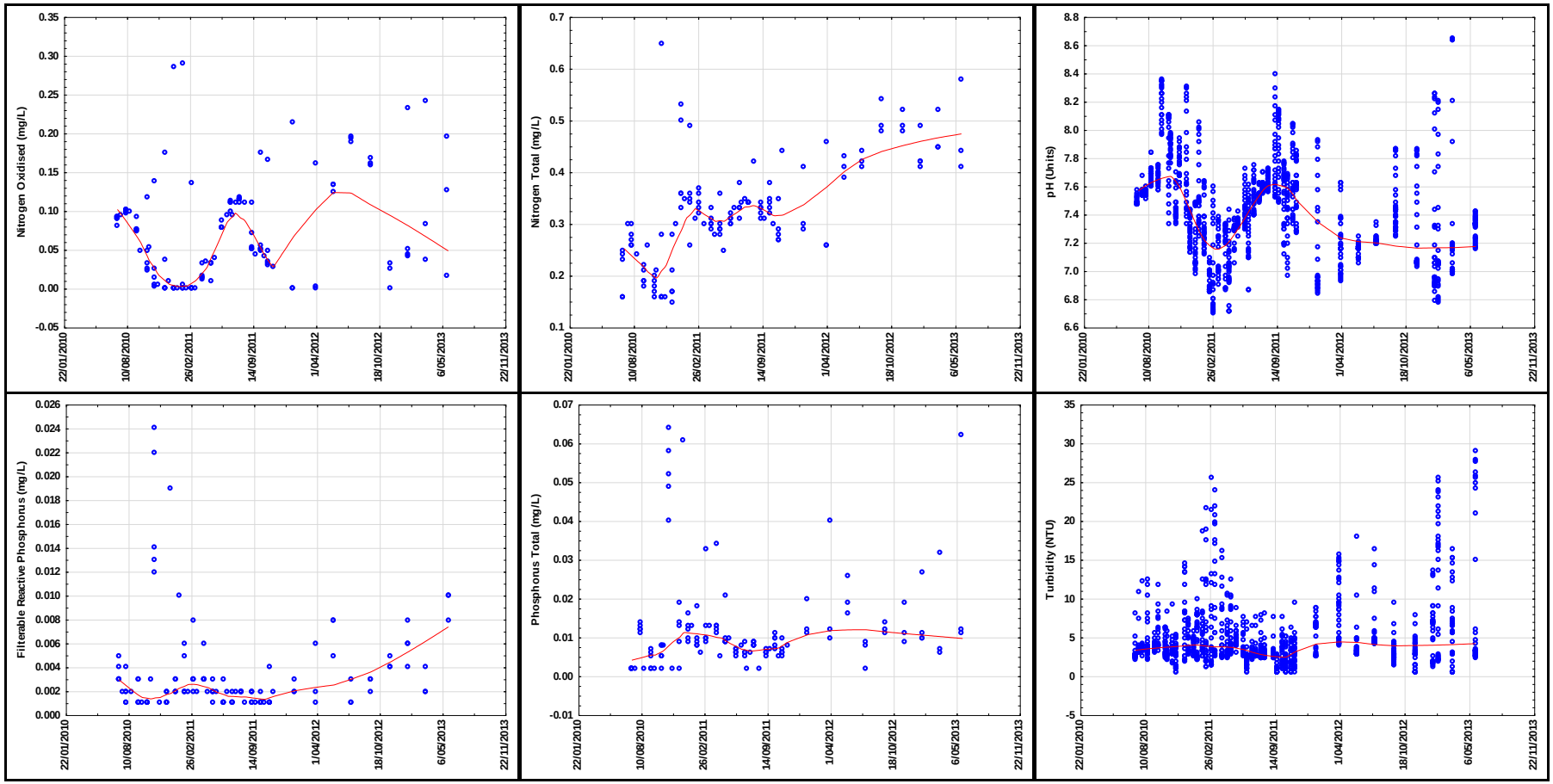


Figure H 8-79 (cont.) Time-series plots of water quality parameters at DWA15

Note: The red line of best fit is based on the LOWESS smoothing method

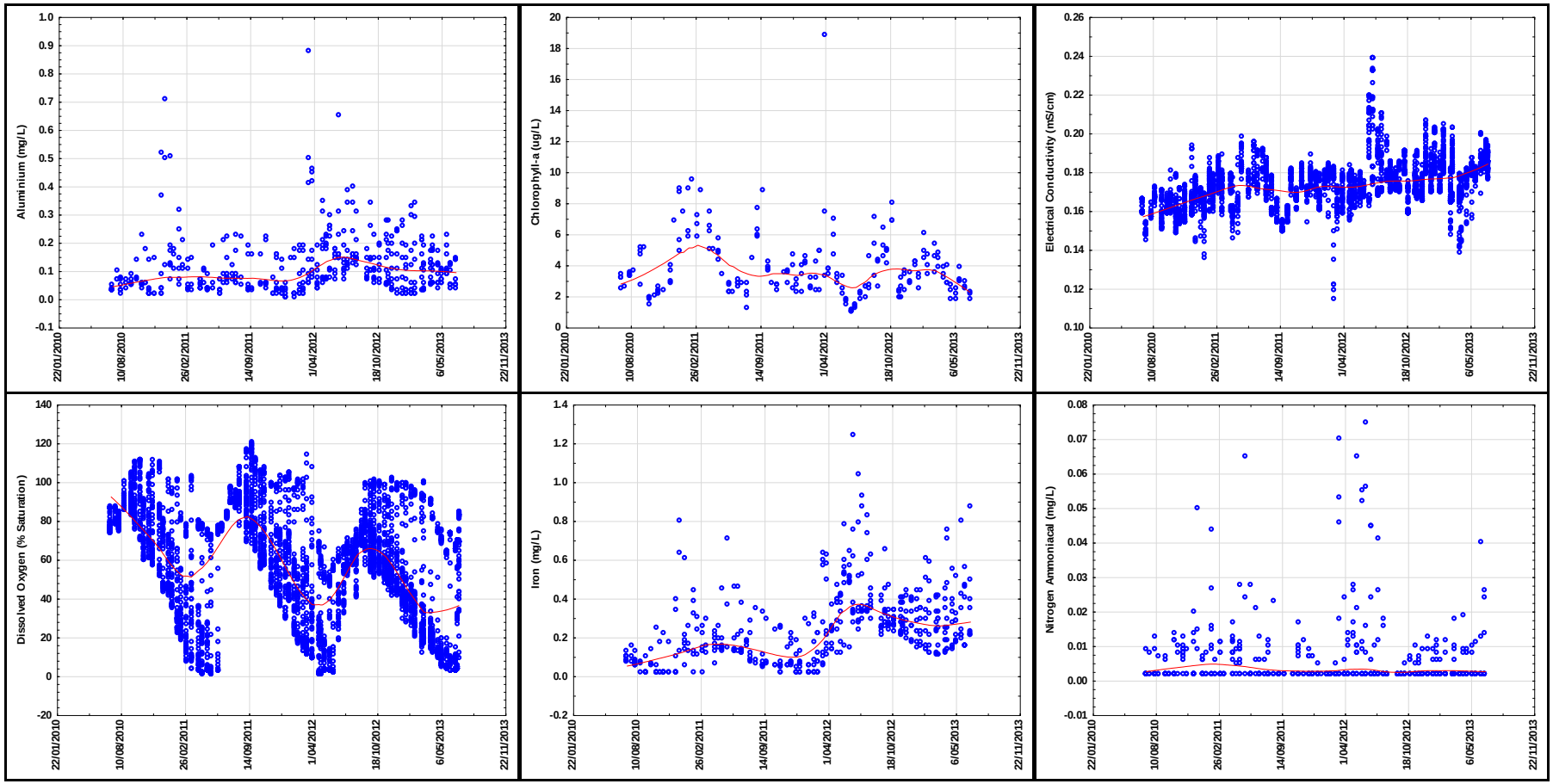


Figure H 8-80 Time-series plots of water quality parameters at DWA27

Note: The red line of best fit is based on the LOWESS smoothing method

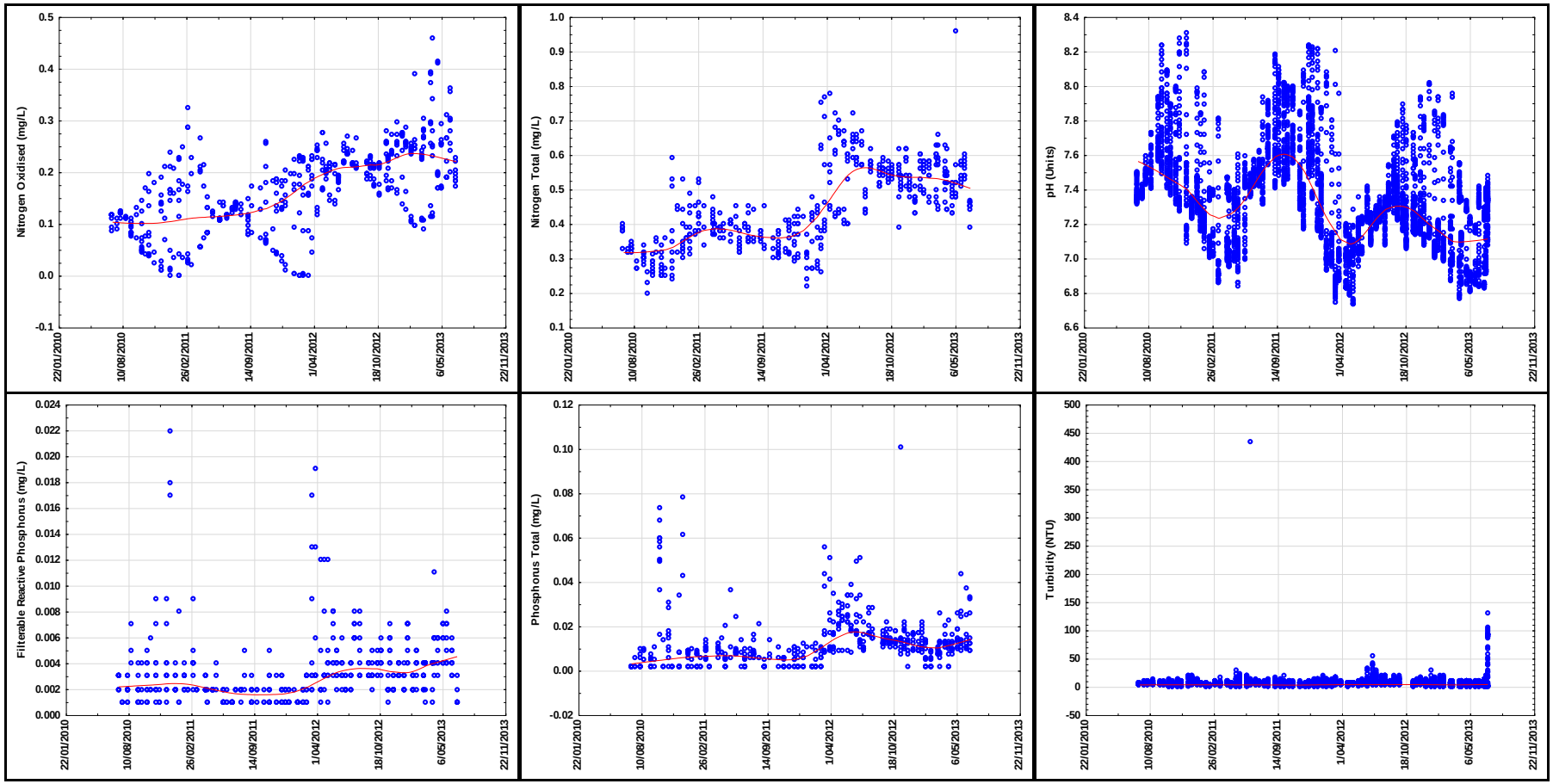


Figure H 8-80 (cont.) Time-series plots of water quality parameters at DWA27

Note: The red line of best fit is based on the LOWESS smoothing method

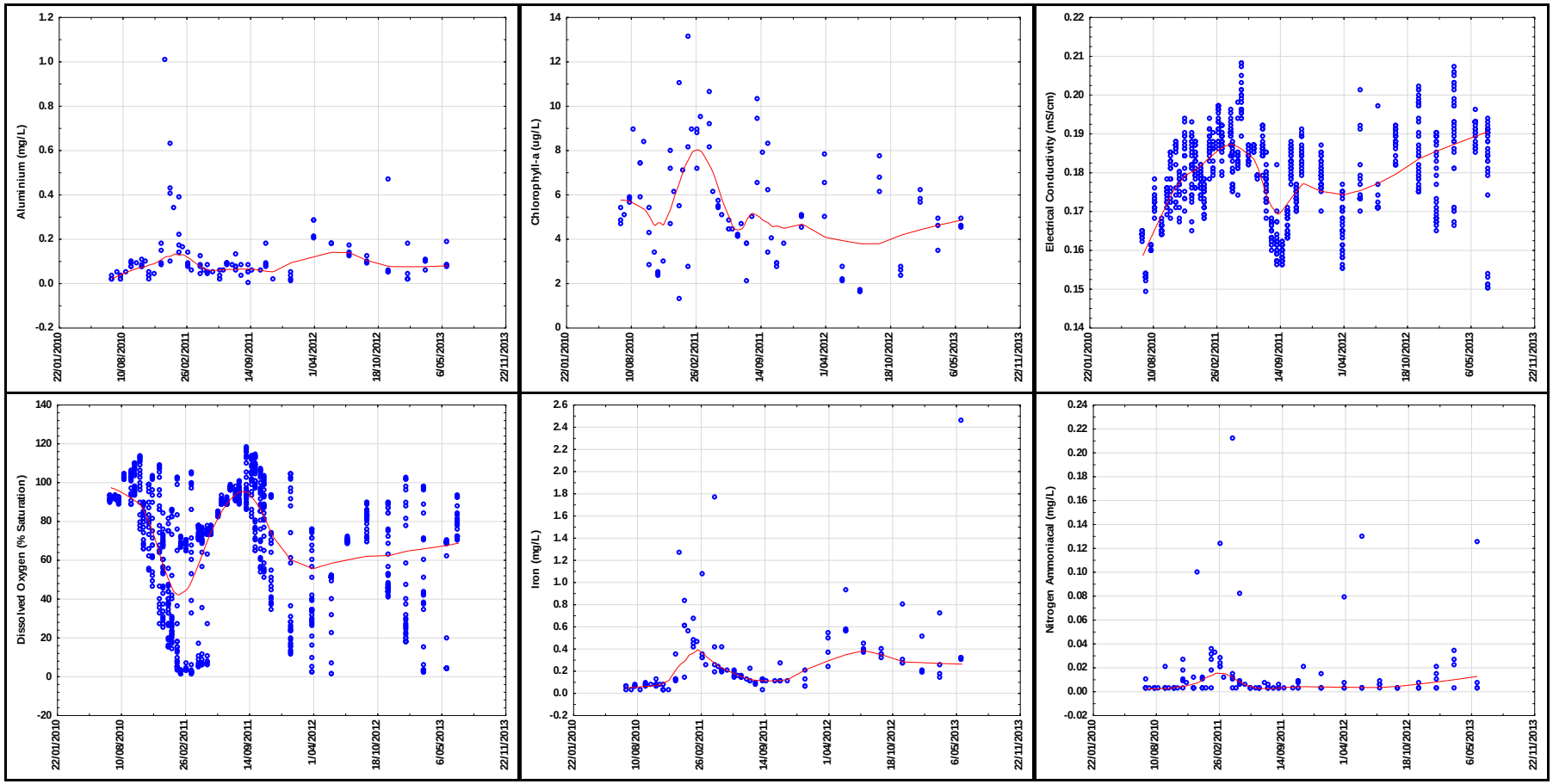


Figure H 8-81 Time-series plots of water quality parameters at DWA311

Note: The red line of best fit is based on the LOWESS smoothing method

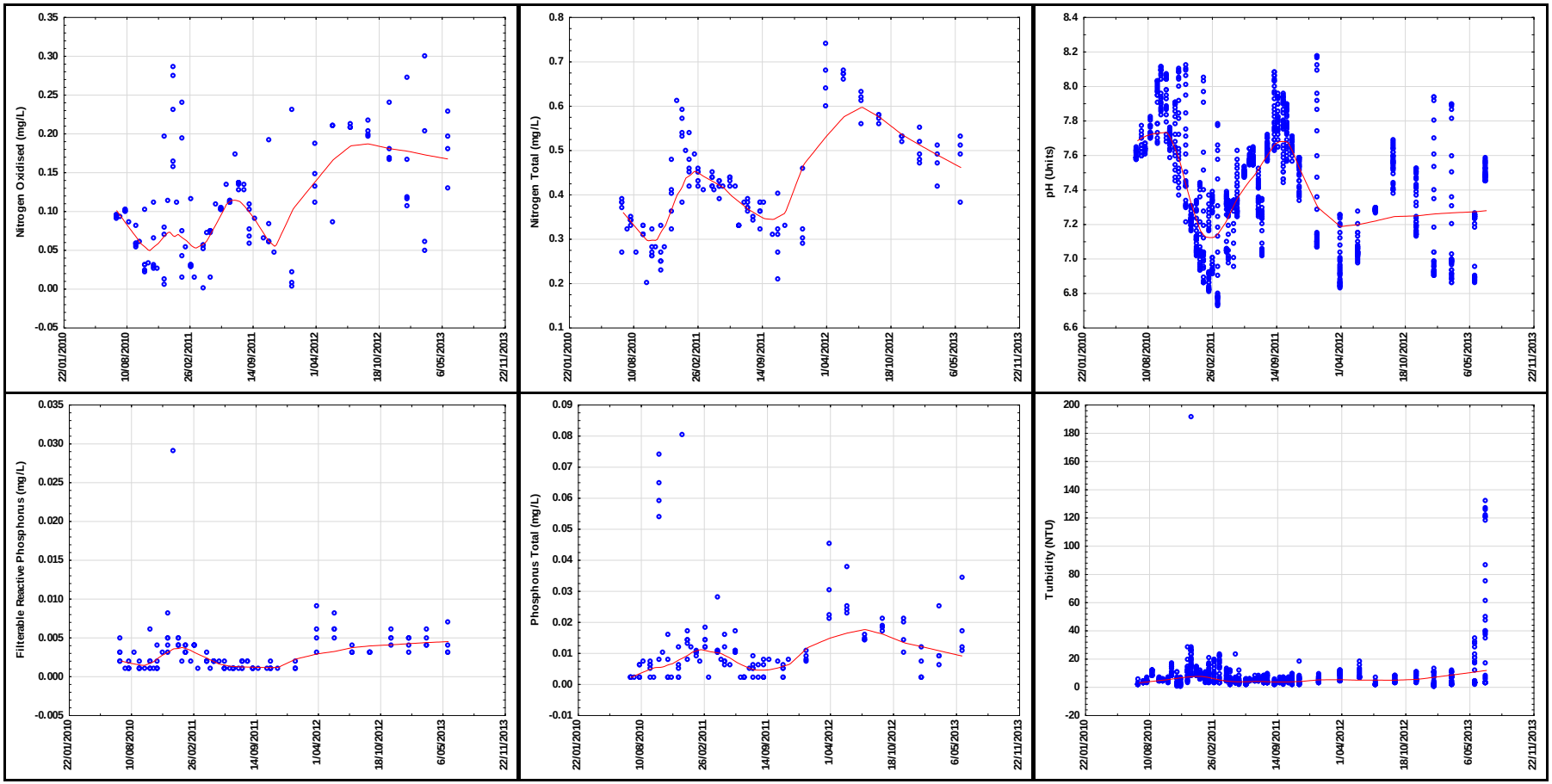


Figure H 8-81 (cont.) Time-series plots of water quality parameters at DWA311

Note: The red line of best fit is based on the LOWESS smoothing method

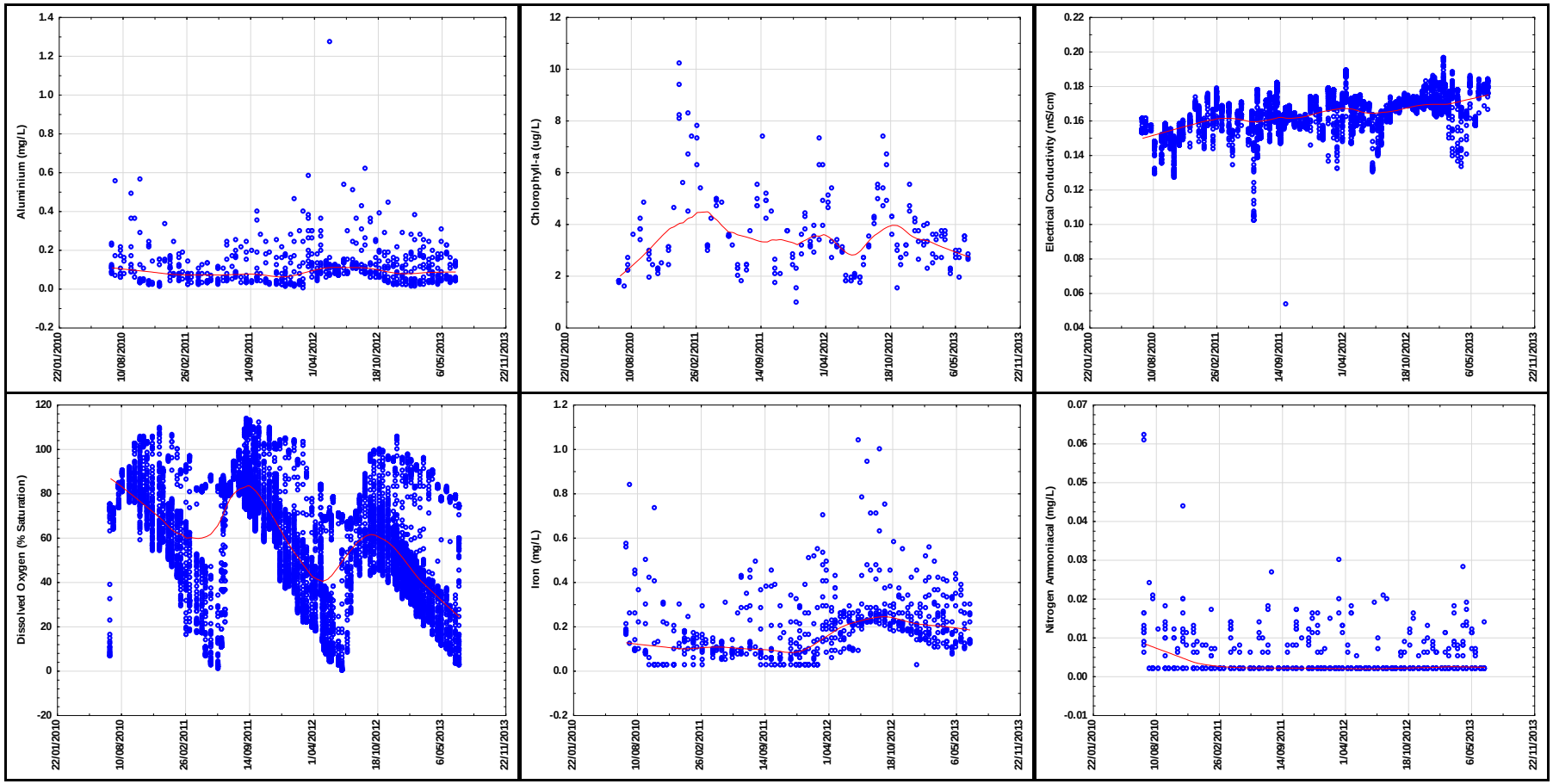


Figure H 8-82 Time-series plots of water quality parameters at DWA9

Note: The red line of best fit is based on the LOWESS smoothing method

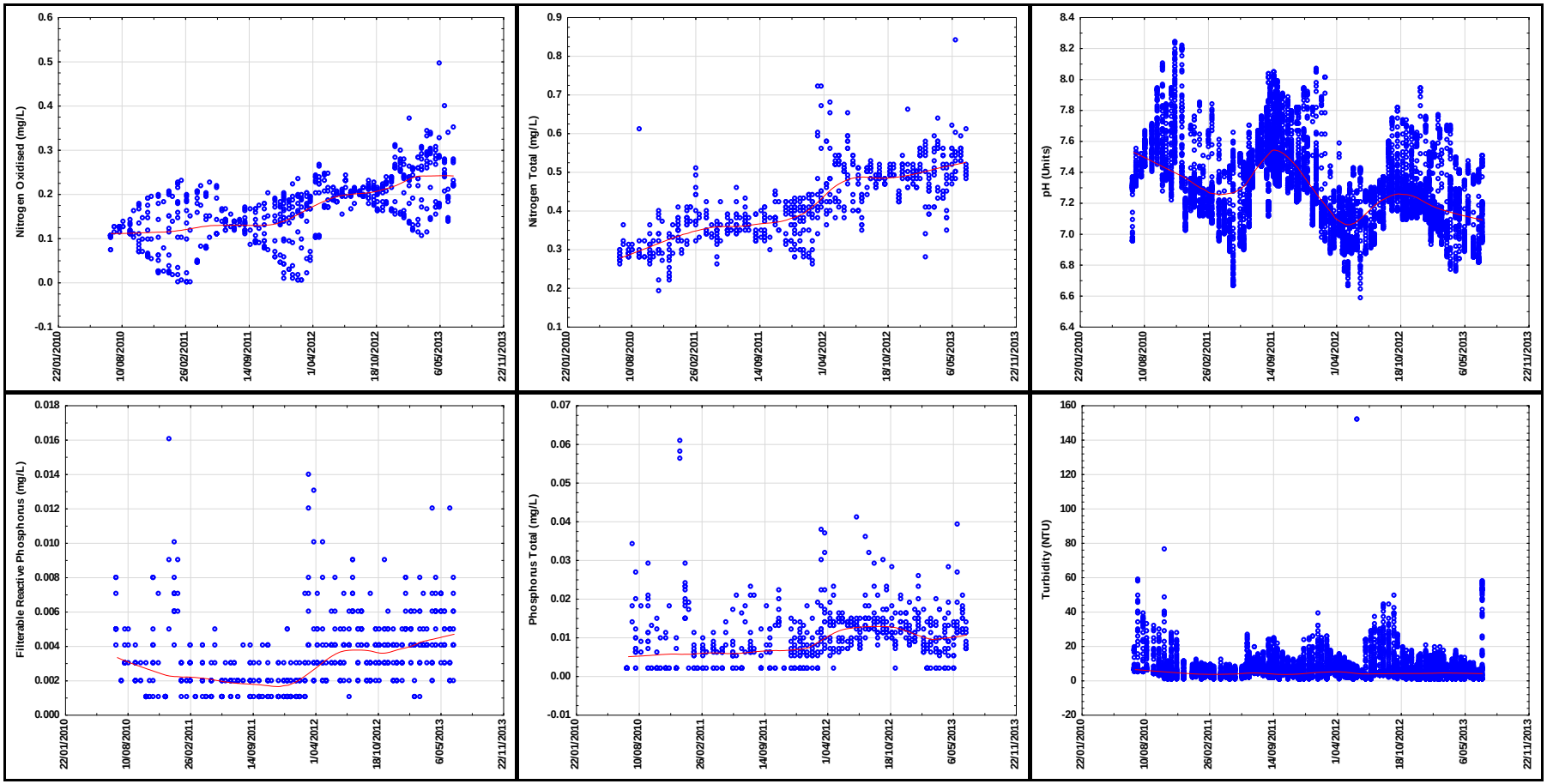


Figure H 8-82 (cont.) **Time-series plots of water quality parameters at DWA9**

Note: The red line of best fit is based on the LOWESS smoothing method

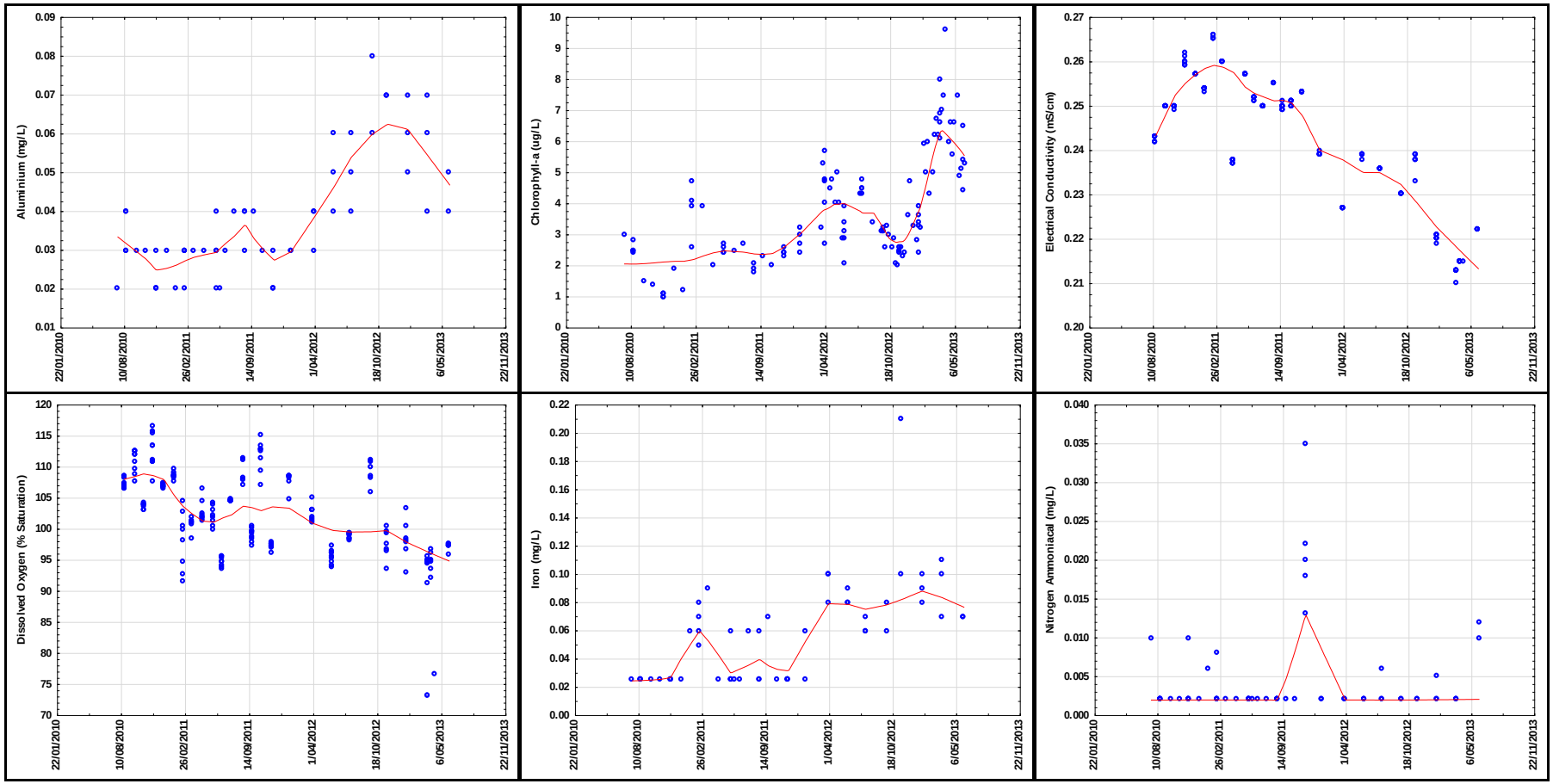


Figure H 8-83 Time-series plots of water quality parameters at RPR6

Note: The red line of best fit is based on the LOWESS smoothing method

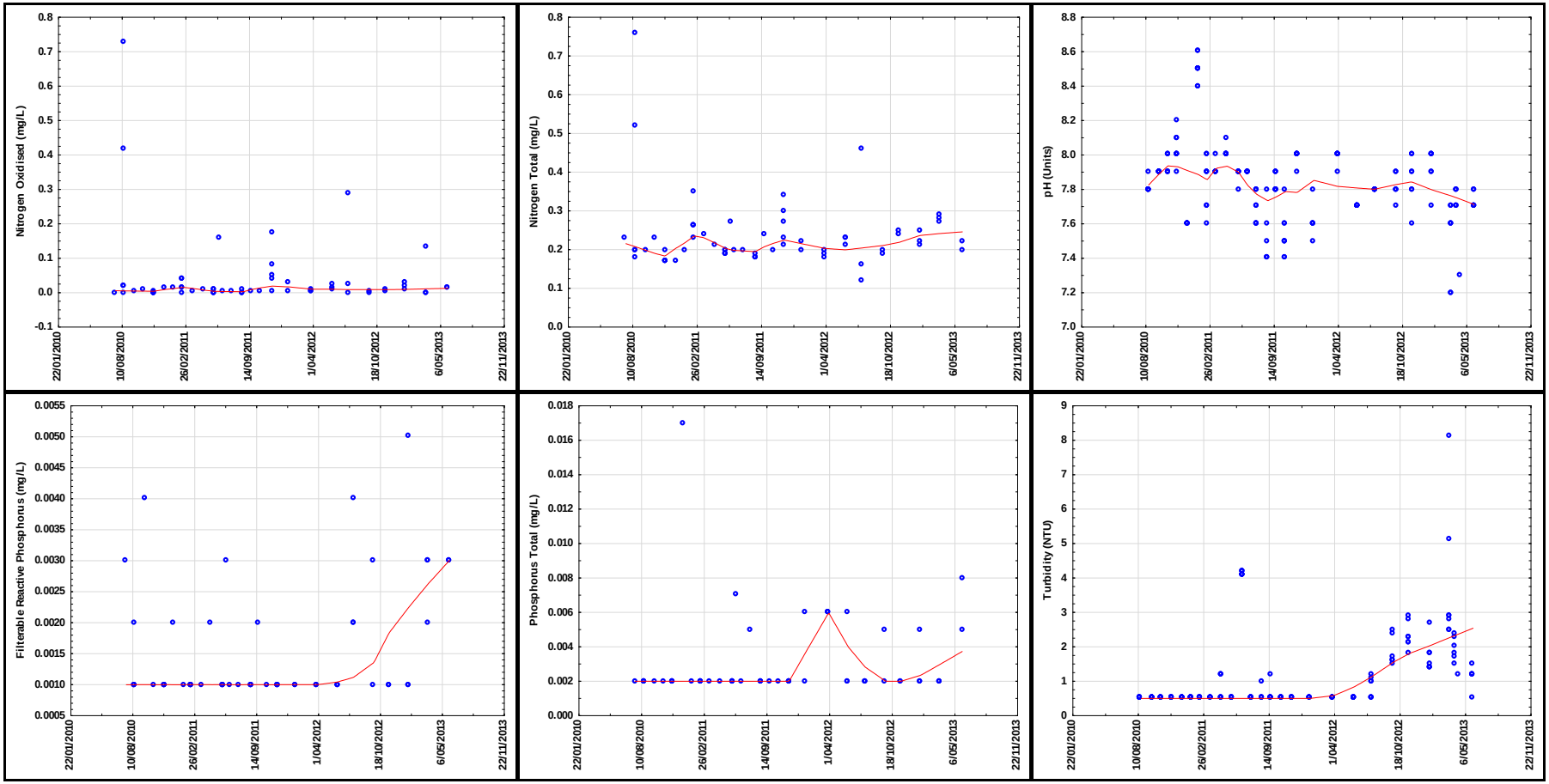


Figure H 8-83 (cont.) Time-series plots of water quality parameters at RPR6

Note: The red line of best fit is based on the LOWESS smoothing method

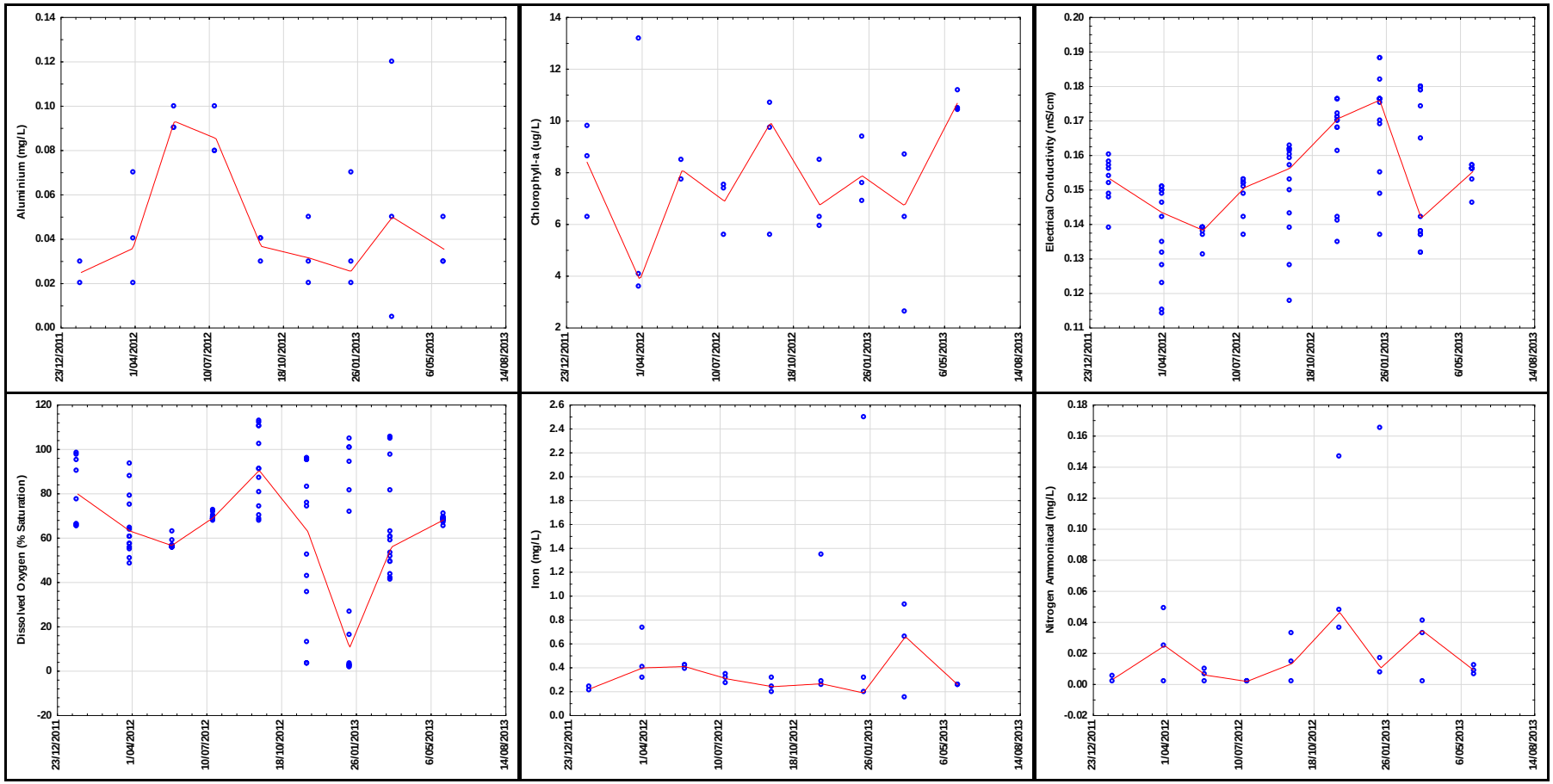


Figure H 8-84 Time-series plots of water quality parameters at DWA19

Note: The red line of best fit is based on the LOWESS smoothing method

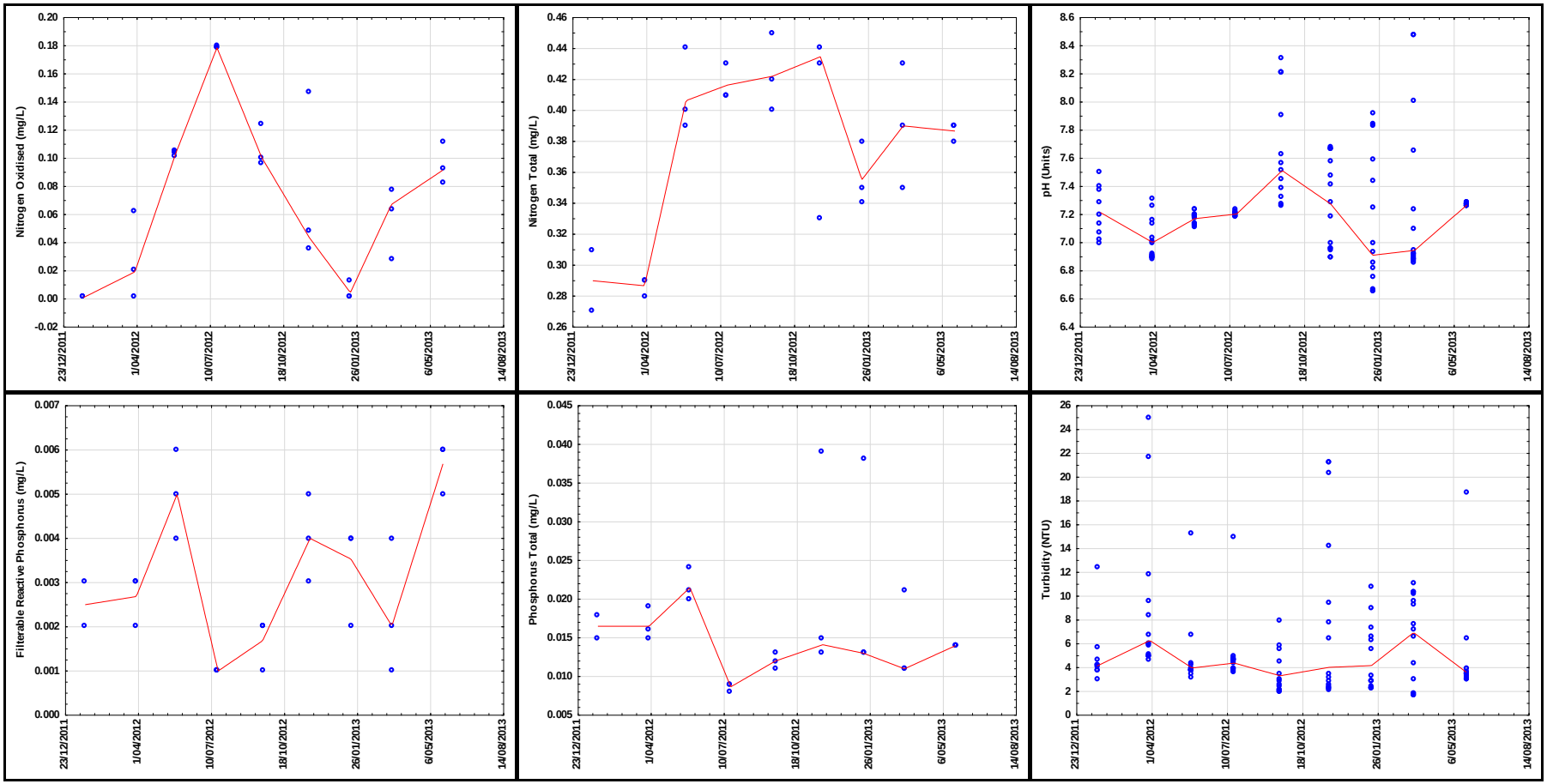


Figure H 8-84 (cont.) **Time-series plots of water quality parameters at DWA19**

Note: The red line of best fit is based on the LOWESS smoothing method

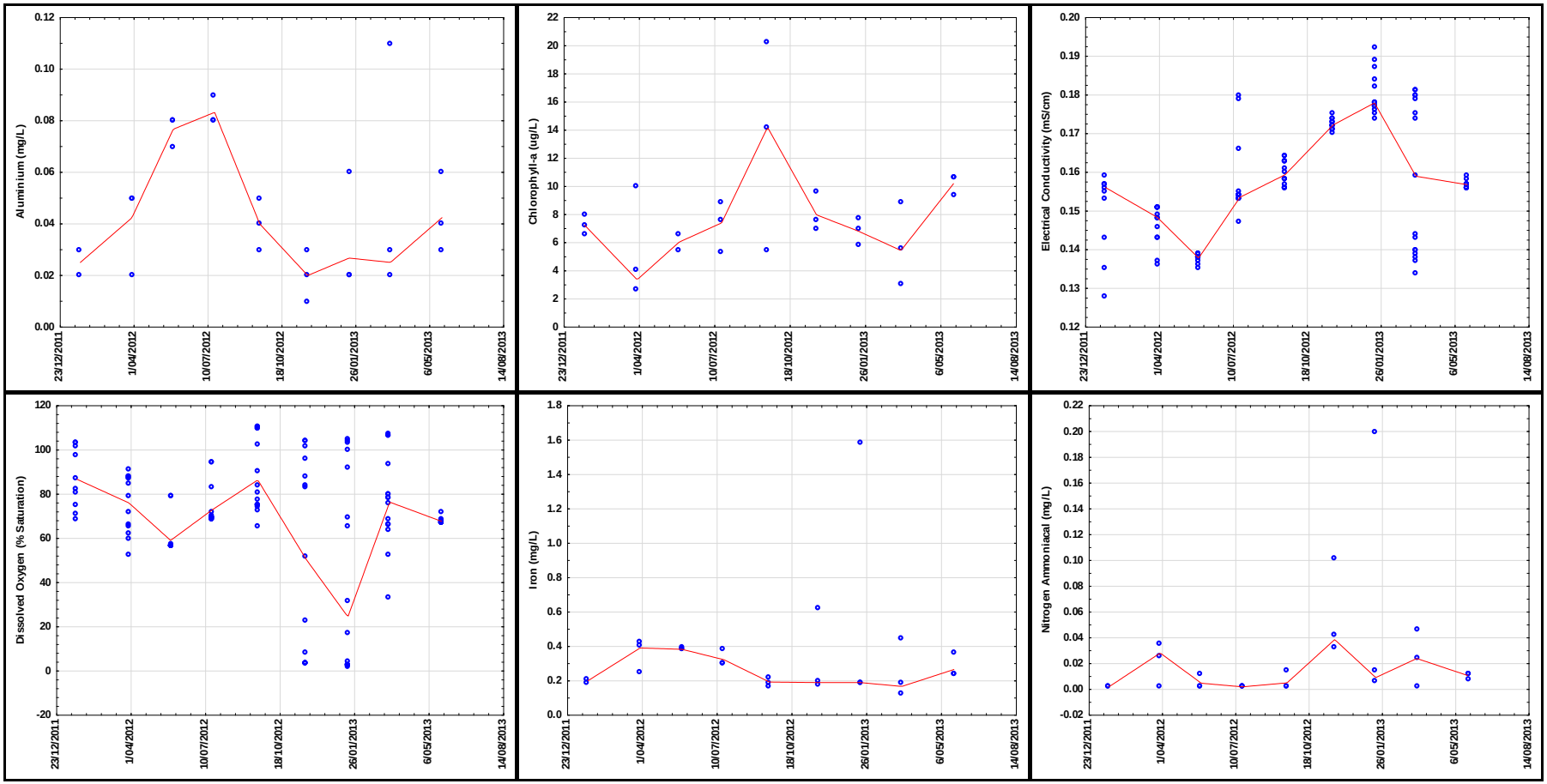


Figure H 8-85 Time-series plots of water quality parameters at DWA21

Note: The red line of best fit is based on the LOWESS smoothing method

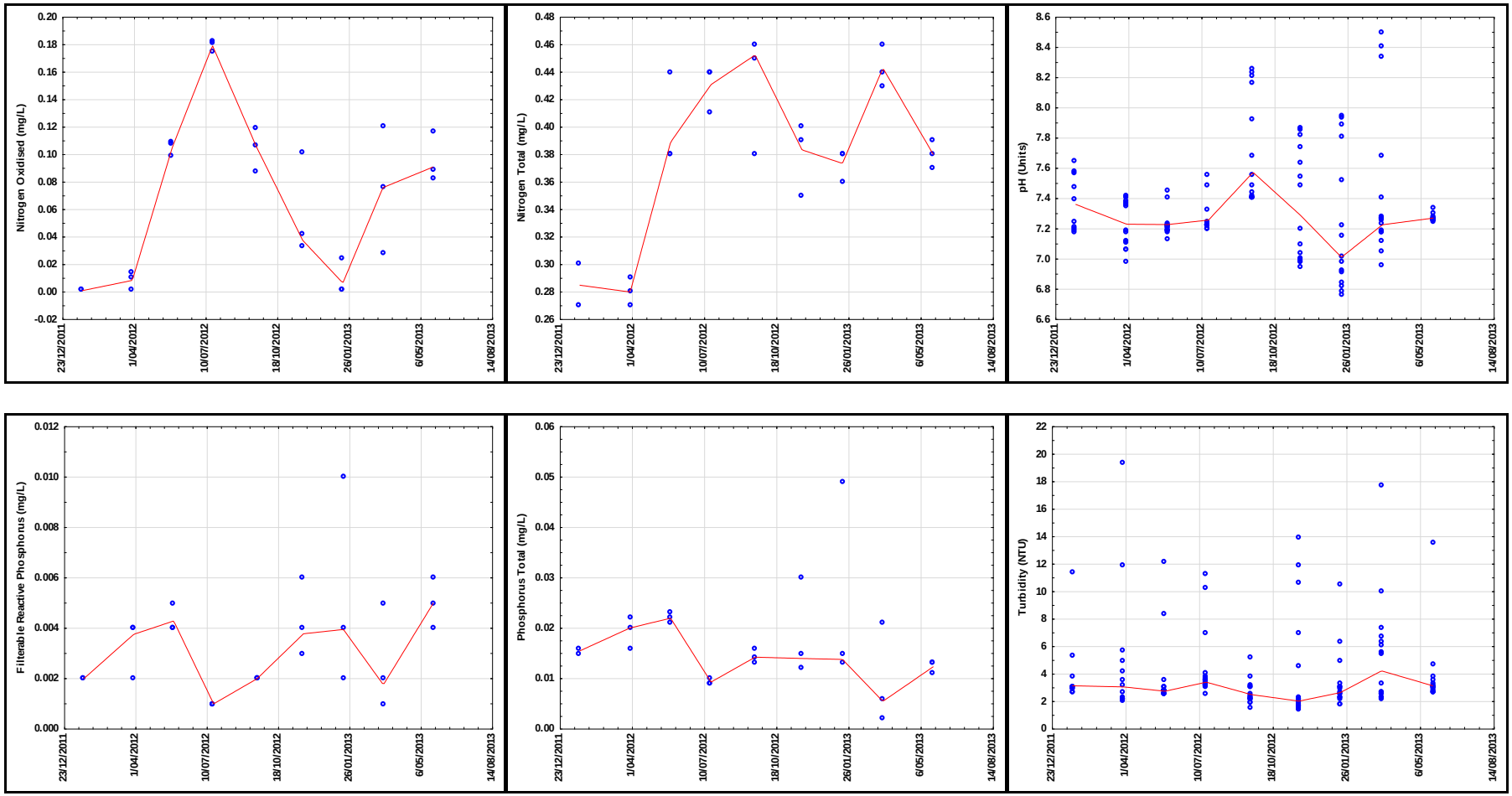


Figure H 8-85 (cont.) Time-series plots of water quality parameters at DWA21

Note: The red line of best fit is based on the LOWESS smoothing method

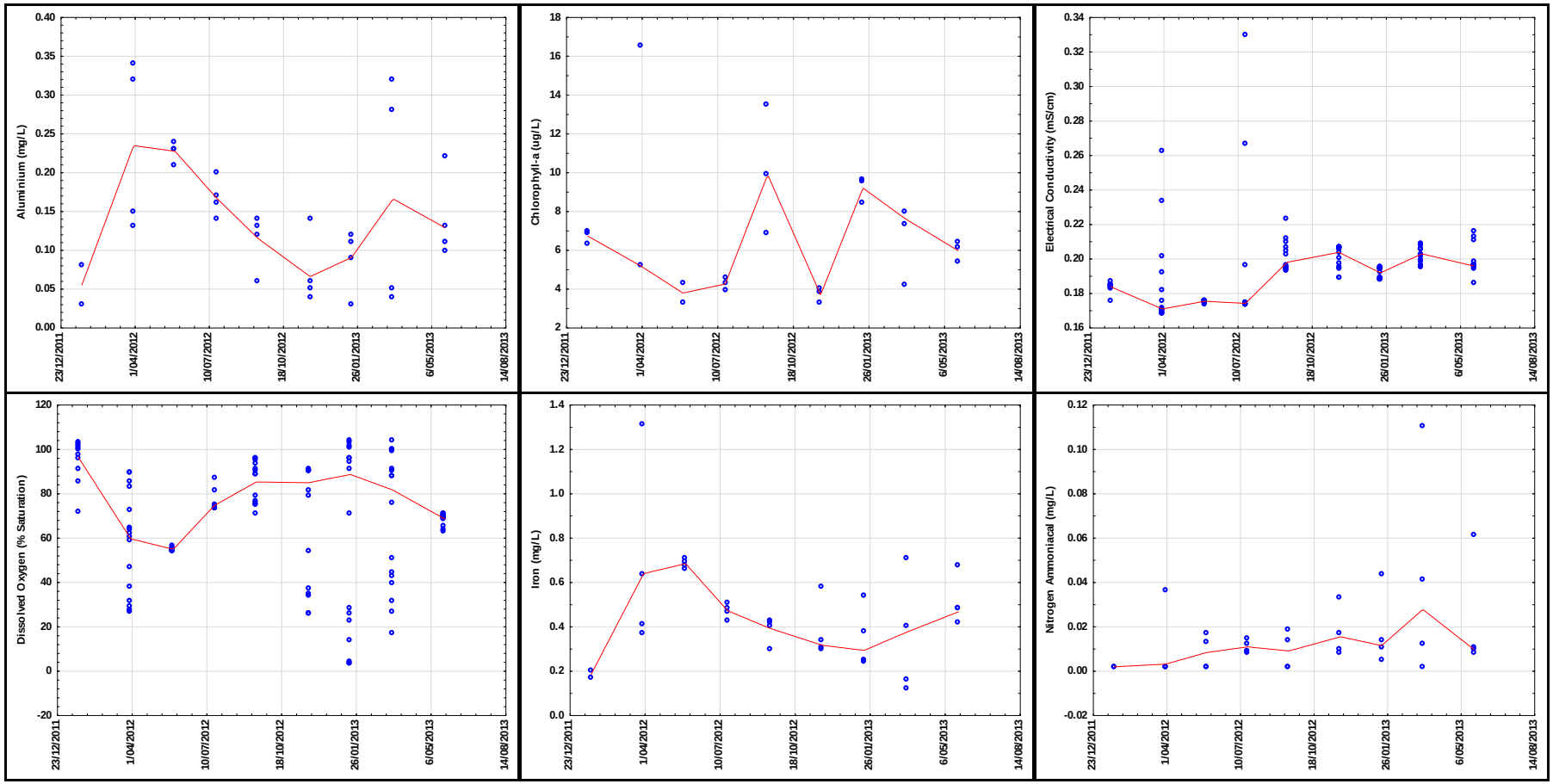


Figure H 8-86 Time-series plots of water quality parameters at DWA39

Note: The red line of best fit is based on the LOWESS smoothing method

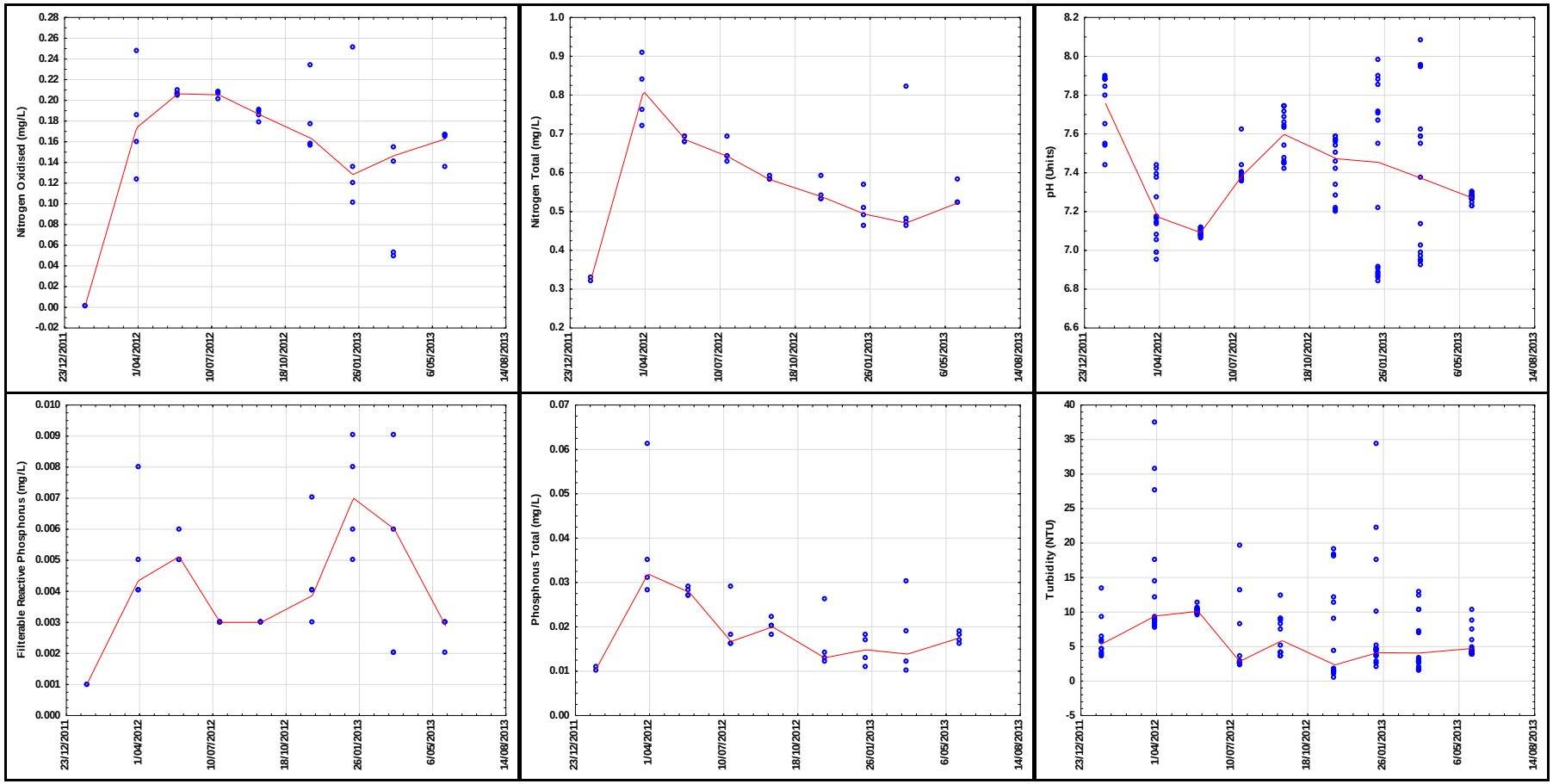


Figure H 8-86 (cont.) Time-series plots of water quality parameters at DWA39

Note: The red line of best fit is based on the LOWESS smoothing method

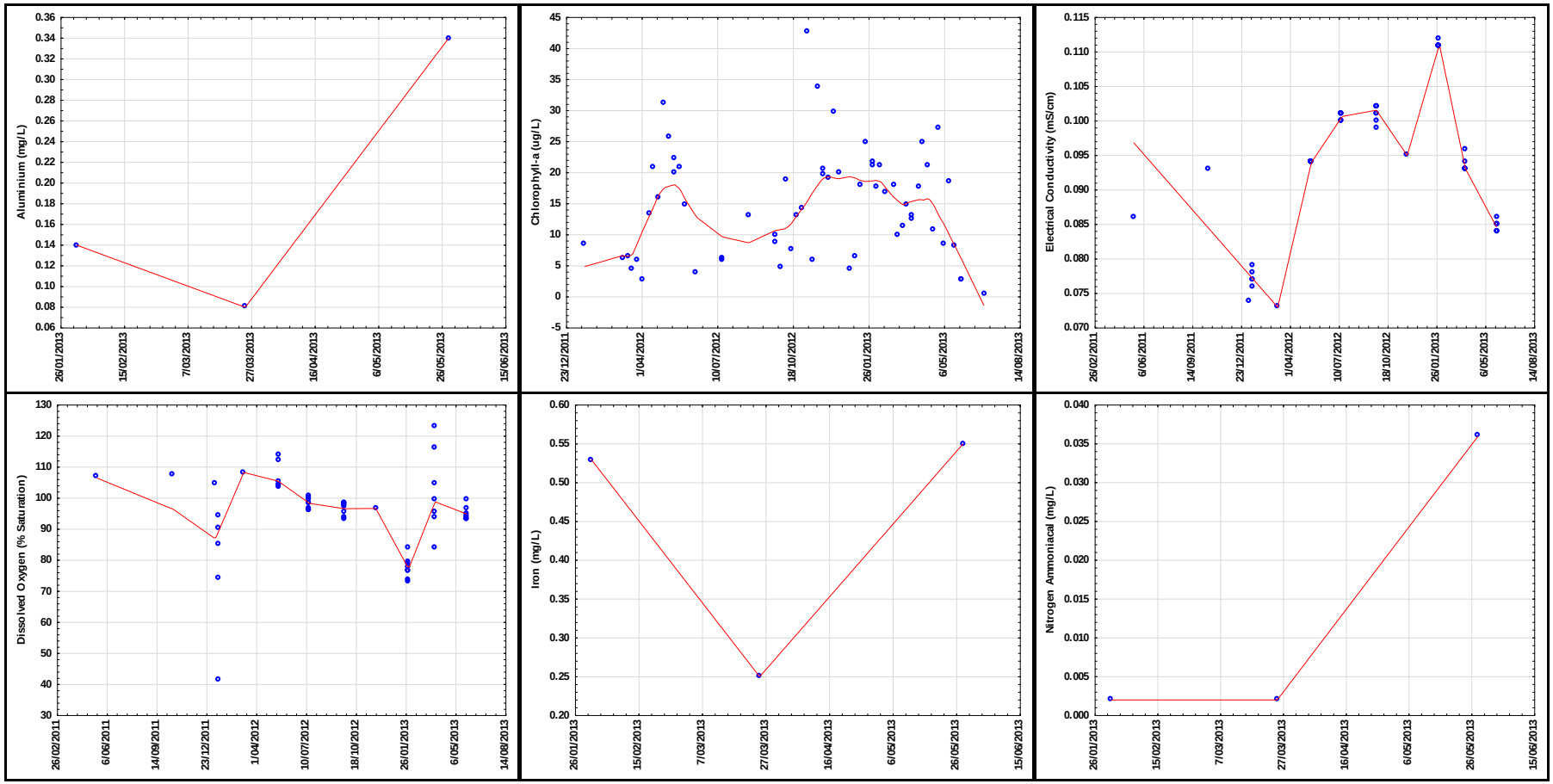


Figure H 8-87 Time-series plots of water quality parameters at DBP1

Note: The red line of best fit is based on the LOWESS smoothing method

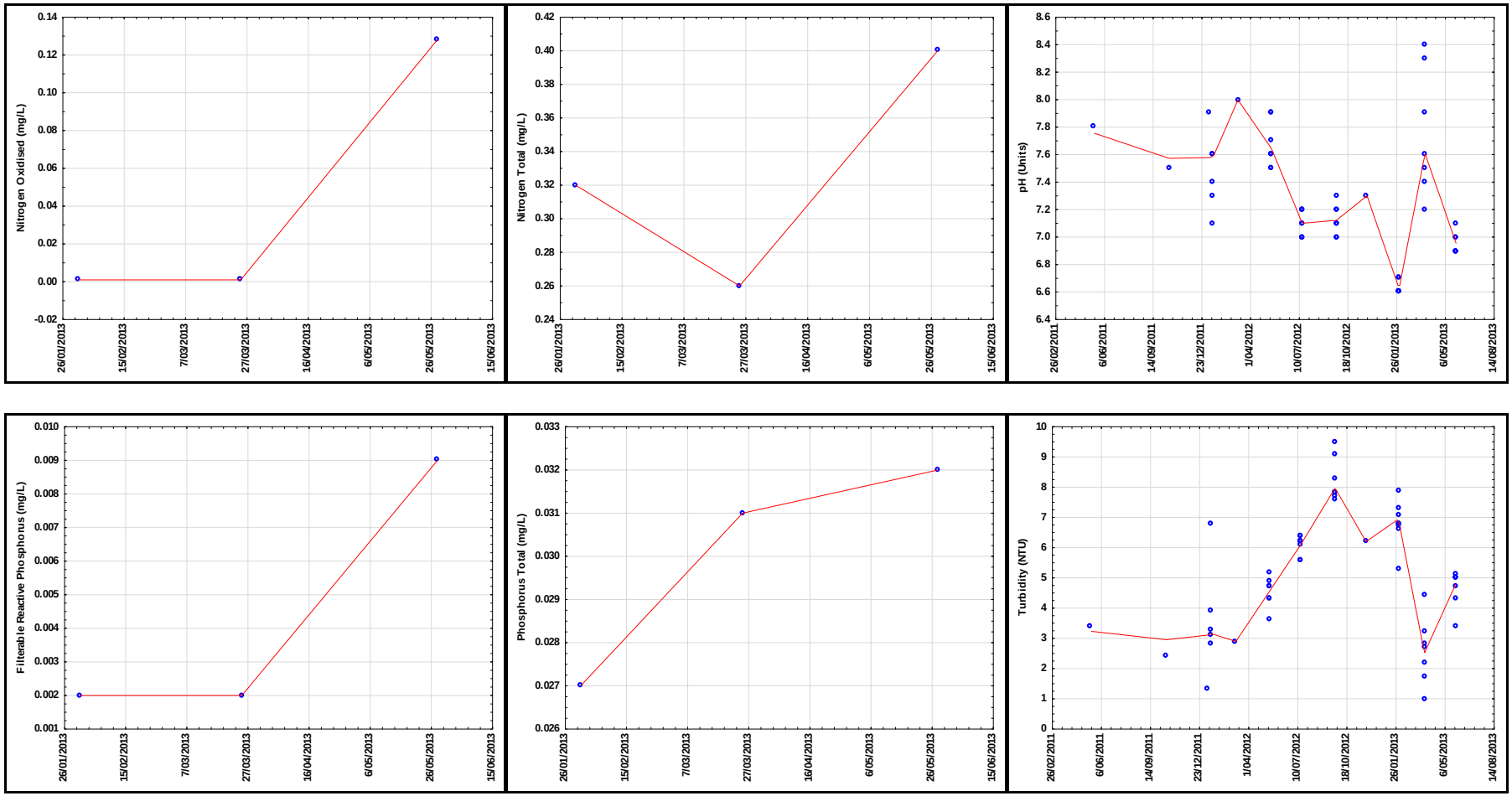


Figure H 8-87 (cont.) Time-series plots of water quality parameters at DBP1

Note: The red line of best fit is based on the LOWESS smoothing method

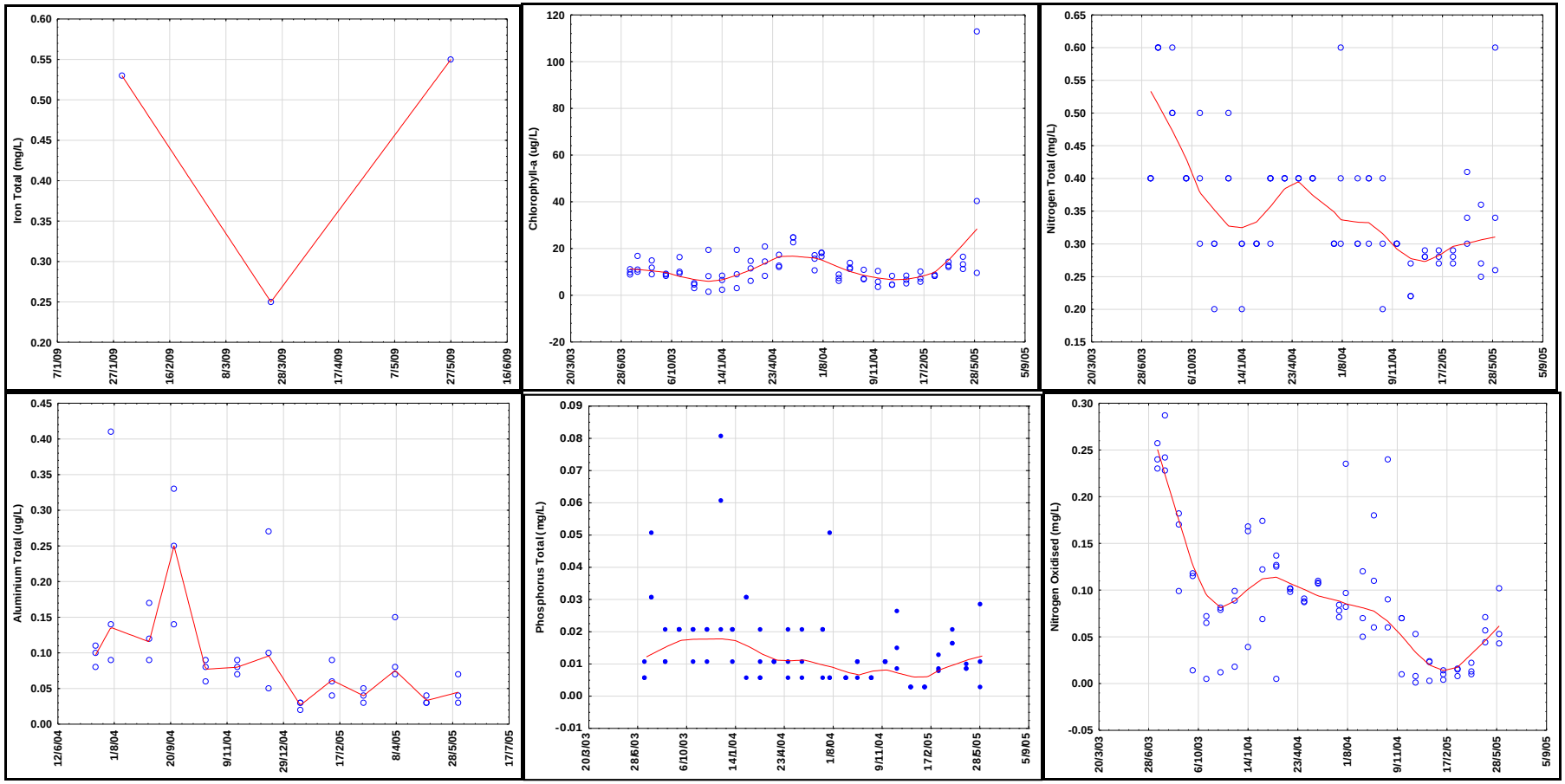


Figure H 8-88 Time-series plots of water quality parameters at DTA10

Note: The red line of best fit is based on the LOWESS smoothing method

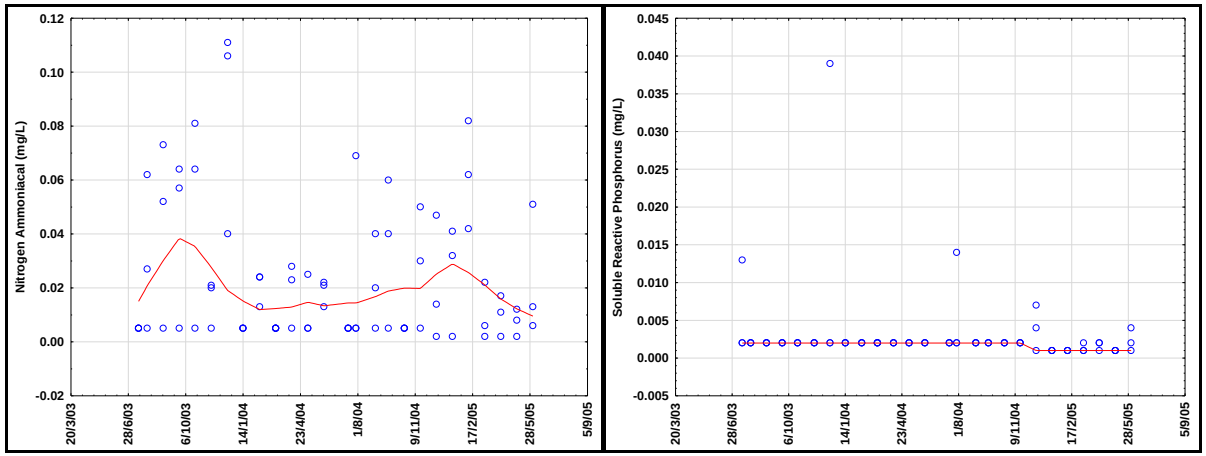


Figure H 8-88 (cont.) Time-series plots of water quality parameters at DTA10

Note: The red line of best fit is based on the LOWESS smoothing method

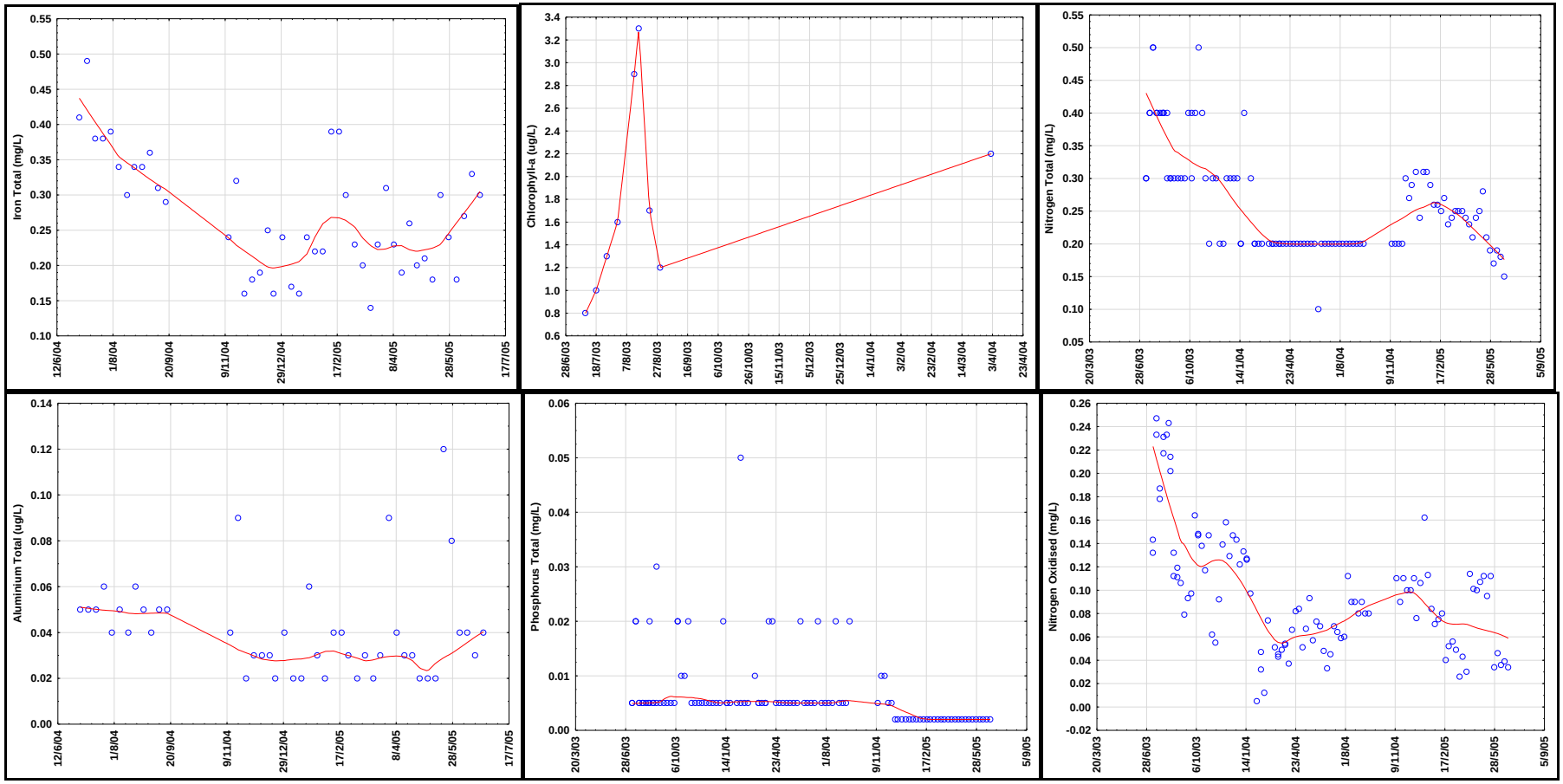


Figure H 8-89 Time-series plots of water quality parameters at HPR1

Note: The red line of best fit is based on the LOWESS smoothing method

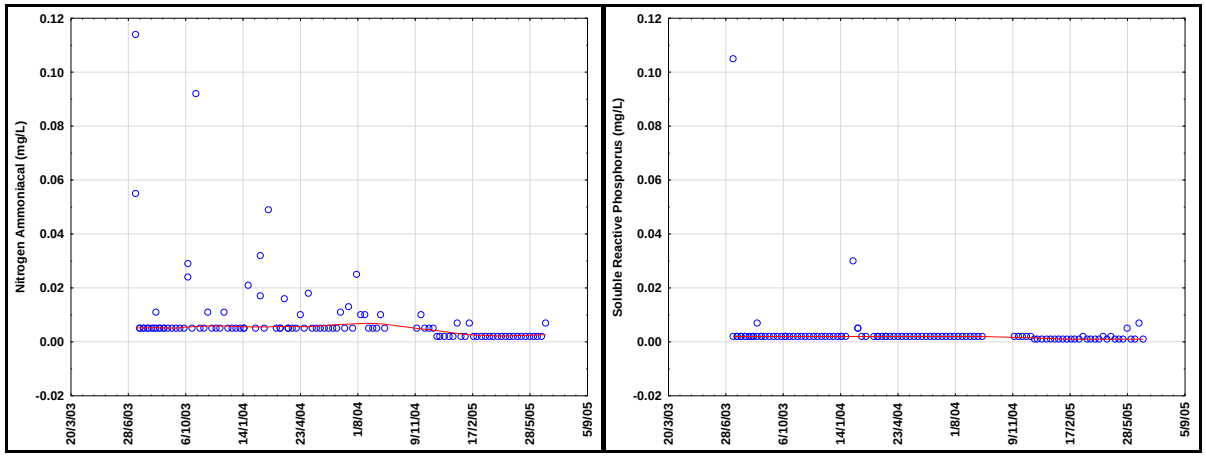


Figure H 8-89 (cont.) Time-series plots of water quality parameters at HPR1

Note: The red line of best fit is based on the LOWESS smoothing method

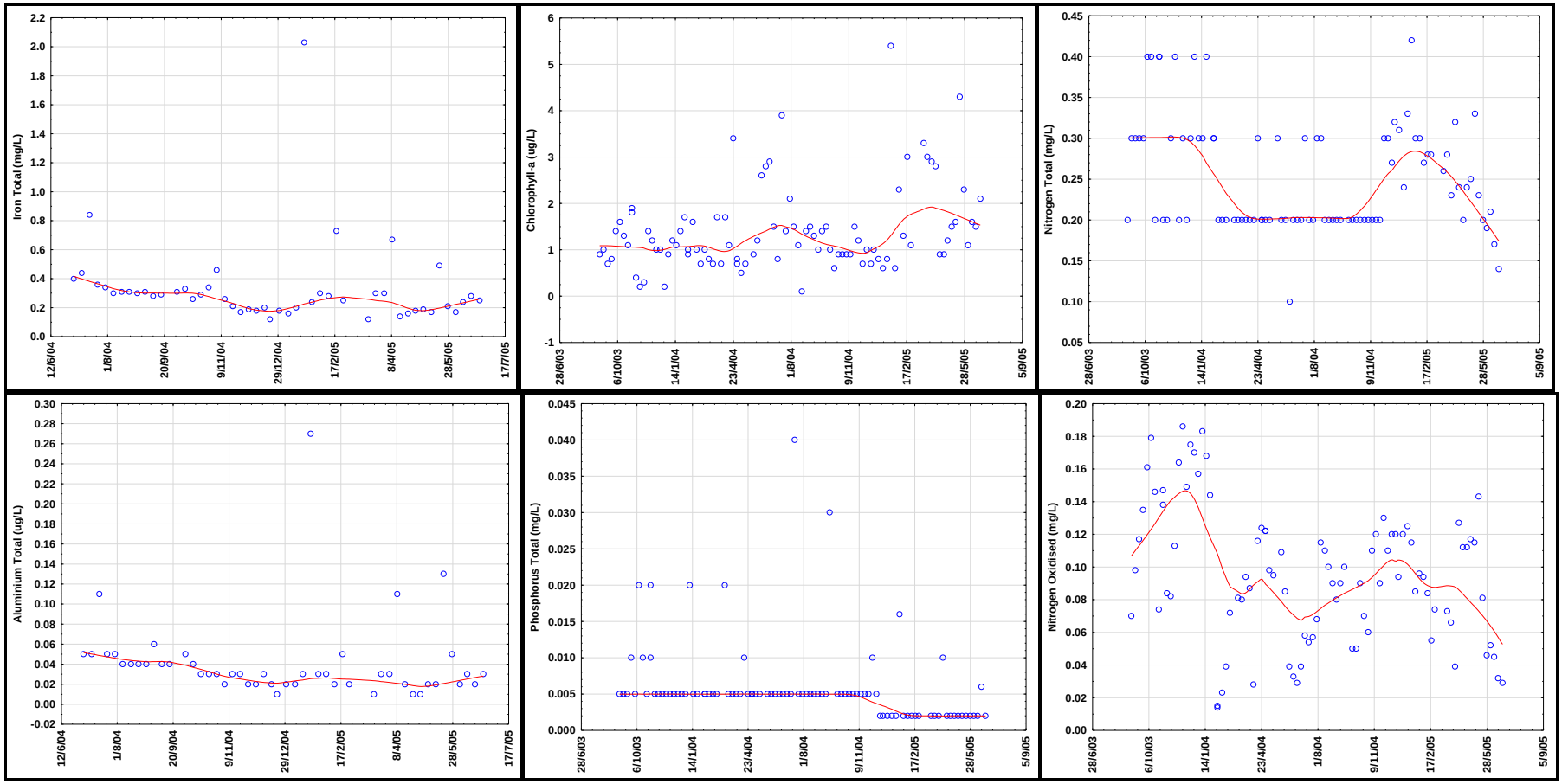


Figure H 8-90 Time-series plots of water quality parameters at HUC1

Note: The red line of best fit is based on the LOWESS smoothing method

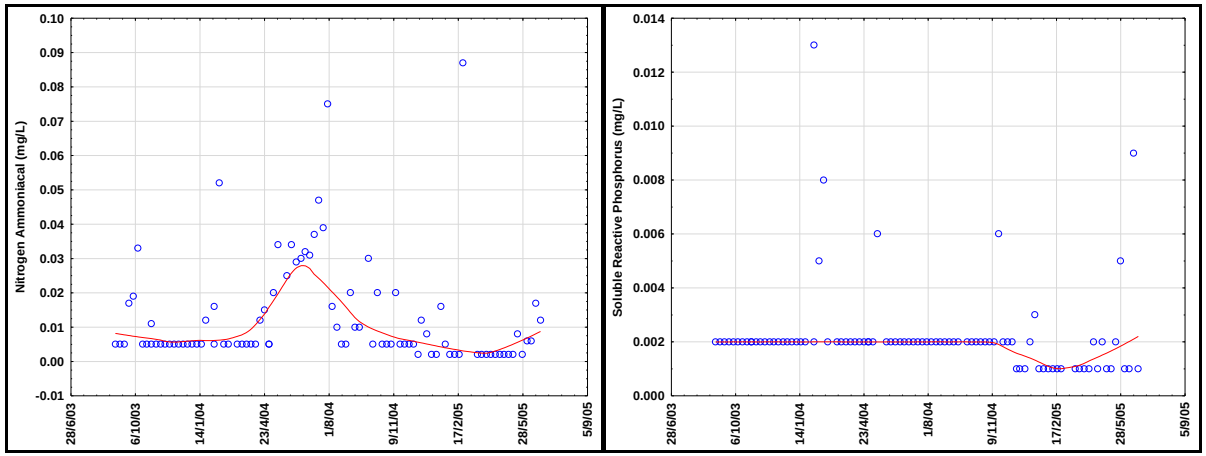


Figure H 8-90 (cont.) Time-series plots of water quality parameters at HUC1

Note: The red line of best fit is based on the LOWESS smoothing method

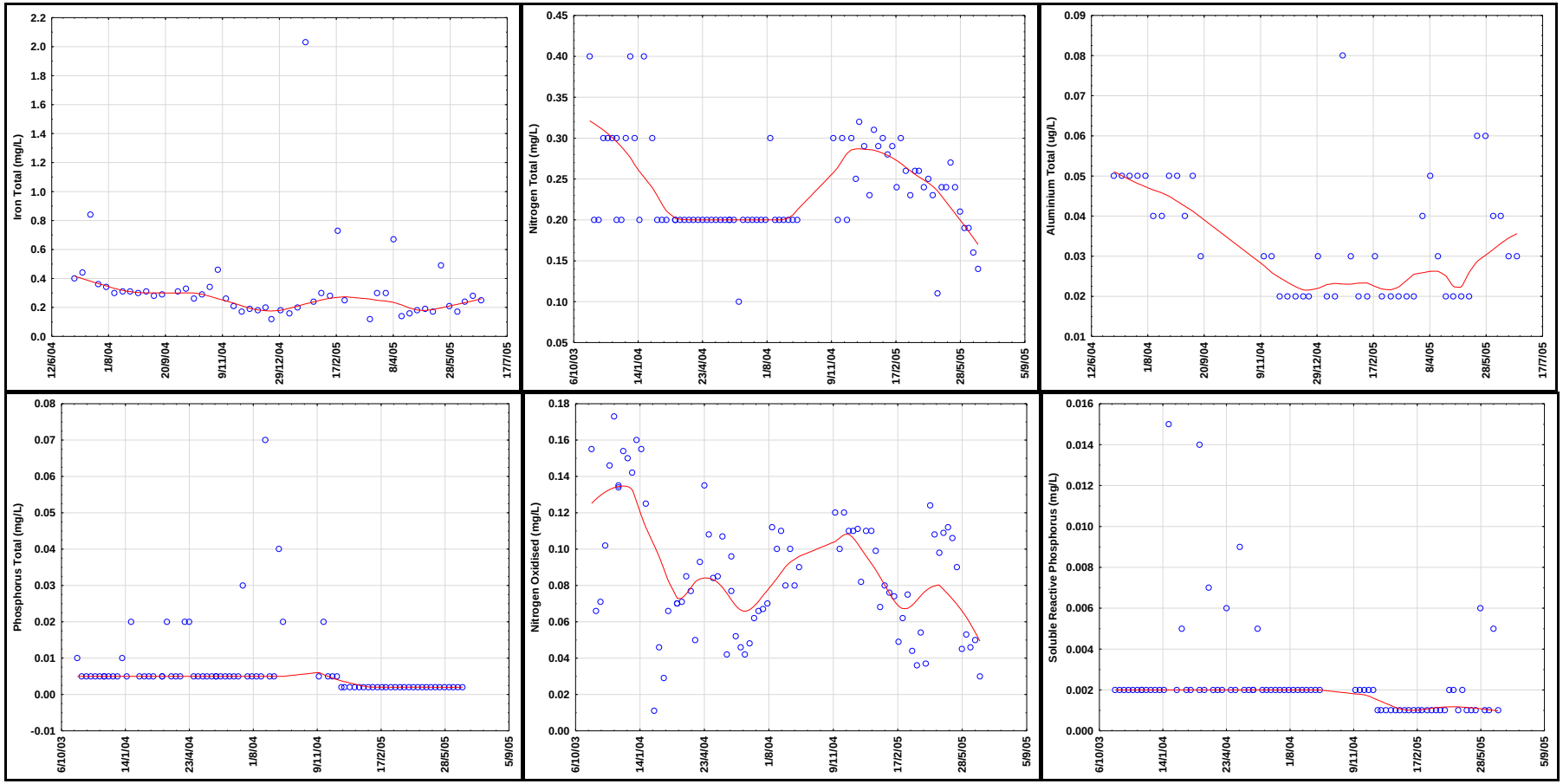


Figure H 8-91 Time-series plots of water quality parameters at HUC3

Note: The red line of best fit is based on the LOWESS smoothing method

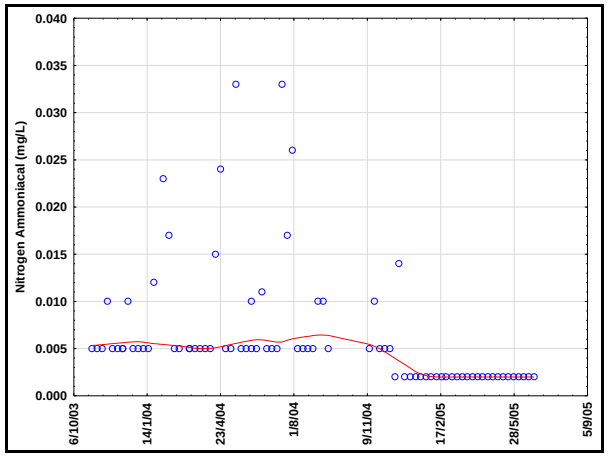


Figure H 8-91 (cont.) Time-series plots of water quality parameters at HUC3

Note: The red line of best fit is based on the LOWESS smoothing method

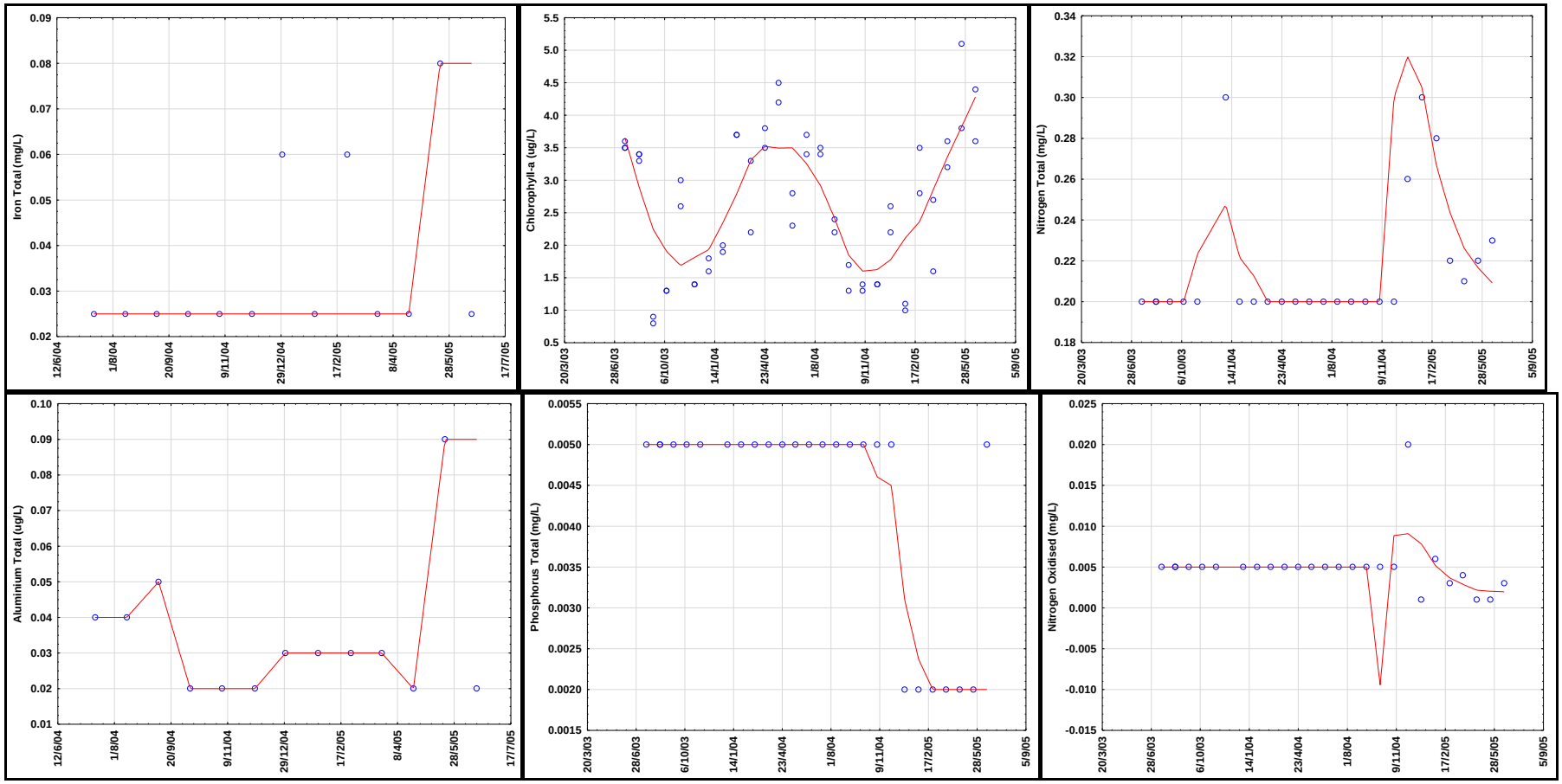


Figure H 8-92 Time-series plots of water quality parameters at RPR3

Note: The red line of best fit is based on the LOWESS smoothing method

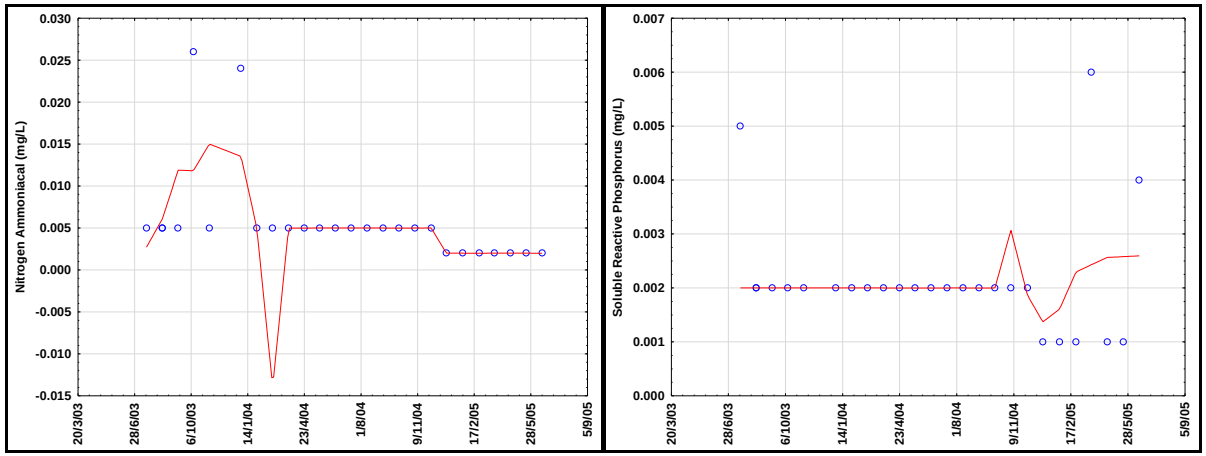


Figure H 8-92 (cont.) Time-series plots of water quality parameters at RPR3

Note: The red line of best fit is based on the LOWESS smoothing method

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