Phosphorus in Whangamarino

Objective 2: Maintain and enhance the water level and water quality to support wetland values



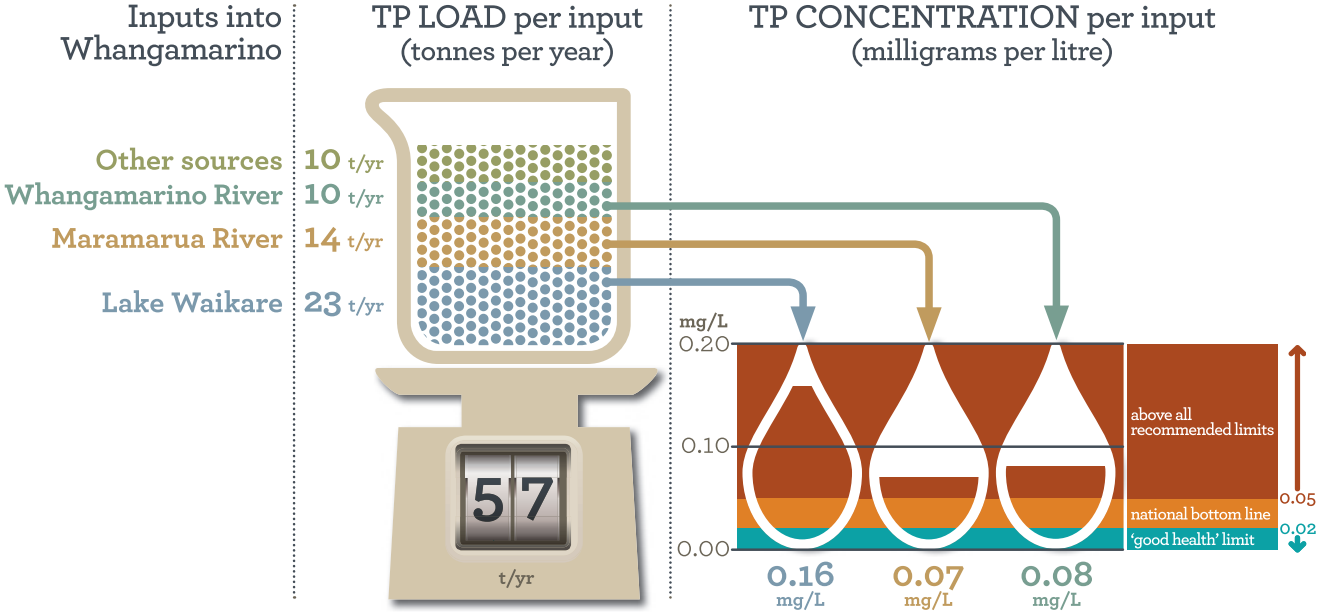
Changes in water quality and water levels can have long lasting effects on wetlands. Water quality can be degraded by high inputs of nutrients (nitrogen and phosphorus) and sediment from surrounding land.

At Whangamarino Wetland the operation of the Lower Waikato Waipa flood control scheme has altered water quality. Our monitoring is assessing the impact on the wetland.

Phosphorus in Whangamarino

Water flows into Whangamarino Wetland from three major catchments, as well as runoff from the surrounding land. Historically the natural water sources were the Whangamarino, Maramarua and Waikato rivers. Development of the lower Waikato flood scheme in the 1960s replaced the Waikato River source with an input from Lake Waikare.

Catchment modelling[1] indicates Whangamarino receives a very high phosphorus load – approximately 57 tonnes per year. The greatest load and concentration of phosphorus enters the wetland from Lake Waikare. This lake has 8 times the concentration of phosphorus than is expected from a shallow lake considered to be in good health (~0.02 mg/L)[2] and 3 times that of the National bottom line for total phosphorus (TP) in lakes (0.05 mg/L).



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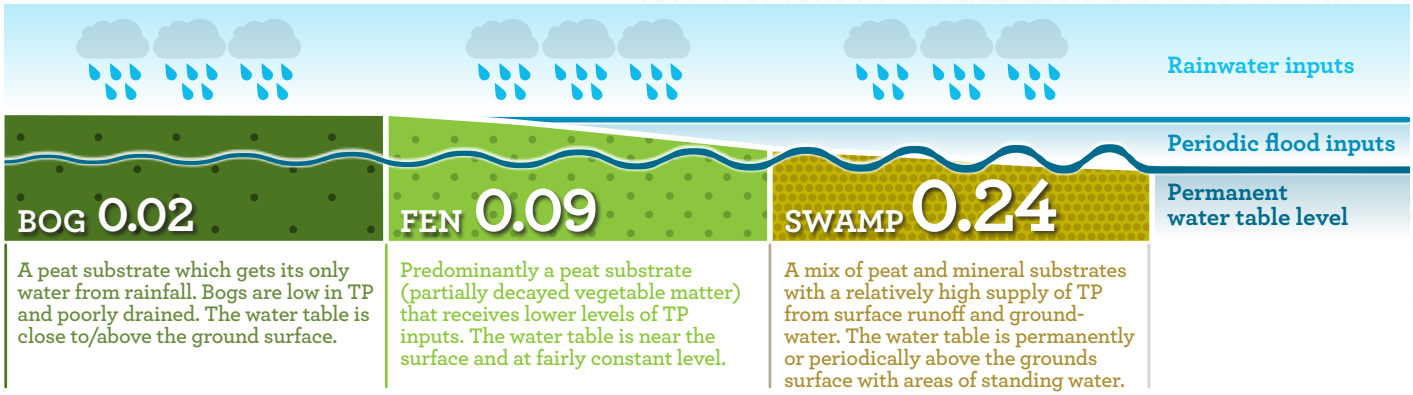
Soil phosphorus levels by wetland type

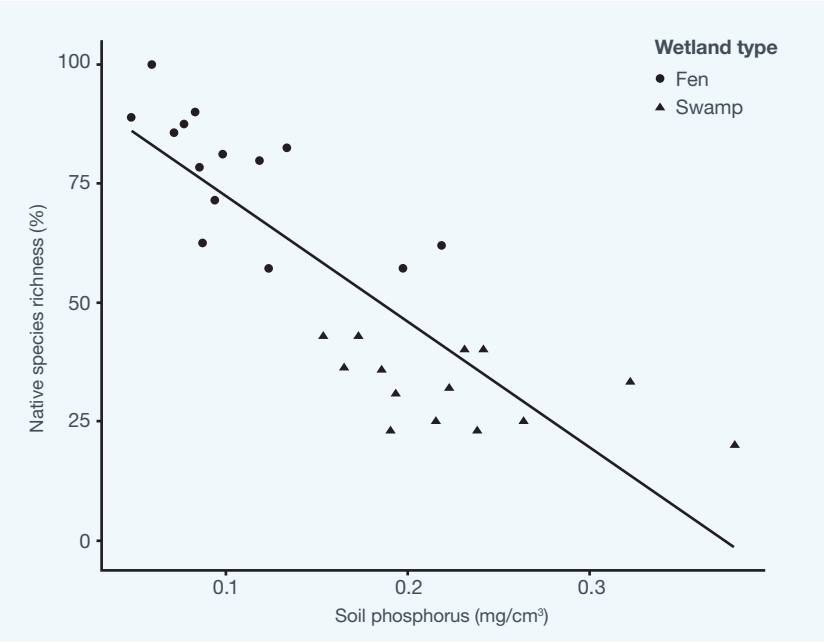
Monitoring of the Whangamarino wetland soils is used to assess long term changes in water quality as soil nutrient status is related to wetland inundation. Each wetland type (bog, fen, swamp) receives a different share of the incoming phosphorus due to its position in the wetland and whether it is flood or rain fed. Bogs are found near the centre of the wetland and the natural source of water is predominantly rainwater, which is low in nutrients and sediment free. Fens and swamps receive water from the surrounding landscape and have higher inputs of nutrients and sediment. Our results show differences in TP between wetland types with a consistent pattern across years.

TP levels by wetland type (mg/cm³)



Phosphorus and vegetation

Increased concentrations of nutrients in wetlands can lead to shifts in plant dominance and species composition.[3] In the Whangamarino wetland, high phosphorus levels are correlated with a reduced dominance of indigenous species, possibly reflecting a greater tolerance of some exotic species to increases in phosphorus levels.



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2. Schallenberg, M. 2019: Determining the reference conditions for New Zealand lakes. Science for Conservation.
3. Vernhoeven, J.T.A.; Arheimer, B.; Chengqing, Y.; Hefting, M.M. 2006: Regional and global concerns over wetlands and water quality. Trends in Ecology & Evolution 21: and the role of the European market.

Next actions...

Mitigate soil and nutrient issues within the wetland over the long-term and with a catchment-wide focus.

Continue to work with stakeholders to identify management solutions for improving the water quality.

Continue to monitor the vegetation structure to detect potential shifts in wetland types due to nutrient and hydrological changes.

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