

## Water Levels in Pukepuke Lagoon

Some miscellaneous points:

1. Water level fluctuations are normal for all dune lakes, as a result of seasonal and year-to-year weather patterns.
2. The indigenous species of dune lakes are adapted to fluctuating water levels. As examples:
  - a) during low water levels, wading birds feed on exposed shores (a very important feature of Pukepuke Lagoon); many aquatic plant species that are “normally” submerged can only flower and fruit when they are out of water;
  - b) high water levels allow diving waterbirds (e.g. scaup, dabchick, coot) to use lakes for feeding; many waterbirds make semi-floating nests of aquatic vegetation, giving them a degree of protection from nest predators; inundated reed-beds are the habitat of birds such as crakes which also nest in sedges surrounded by water (when the substrate is exposed by dropping water levels, crakes move to other places where water remains among the reeds);
  - c) high water levels suppress the growth of edge plants - they prevent the encroachment of edge vegetation into lakes - in terms of Pukepuke Lagoon this is most important for:
    - i) raupo management
    - ii) weed management

High water levels do not need to be maintained all year to achieve suppression of edge plants - but under natural water regimes it would be high winter levels that are the most significant. If high water levels were to be artificially lowered at Pukepuke, then we would either have to put more effort into control of raupo, tall fescue and other exotic plants, or accept a shortened life for the lagoon as a whole. Control of unwanted aquatic plants by chemical means is increasingly questioned by some people, so the use of natural water regimes is environmentally more acceptable.

3. Pukepuke Lagoon has been reduced in area from about 162 ha in about 1840 (prior to European draining and farming), to 49 ha by 1910-30, to 15 ha by about 1940 (Ogden and Caithness 1982). Farming needs have led to the 10-fold reduction in area of this lake. The perceived problems of flooding in adjacent farms arise during recent wet winters - but during the 1980s a long period of dry winters allowed farmers to graze what had been wetlands.
4. The conservation of the few remaining lakes and wetlands in the district is of increasing concern to DoC, recreationalists (esp. waterfowl hunters), iwi (for eels, raupo, kakaho and other traditional resources) and some farmers who realise that high water tables recharge ground water supplies as a buffer against drought times.

### **Some questions**

1. What is the existing knowledge on the lagoon levels, including the average length of time that the water is greater than 125 mm above the sill?
2. Who would manage the sill levels - if not DoC, then how would we be sure the sill is restored when the Council's desired water level is achieved?
3. Can we quantify my general points about rainfall and relate these to water table and/or lake levels?
4. For control of specific unwanted aquatic plants, what is the critical minimum length of time of inundation and at what depths? (A long-term research project - answers not currently available.)
5. Have we more detailed information on the bird use of Pukepuke Lagoon relating to their needs for seasonally high water levels? (List of species with knowledge from literature of their specific requirements for high water levels for some part(s) of their life histories)

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