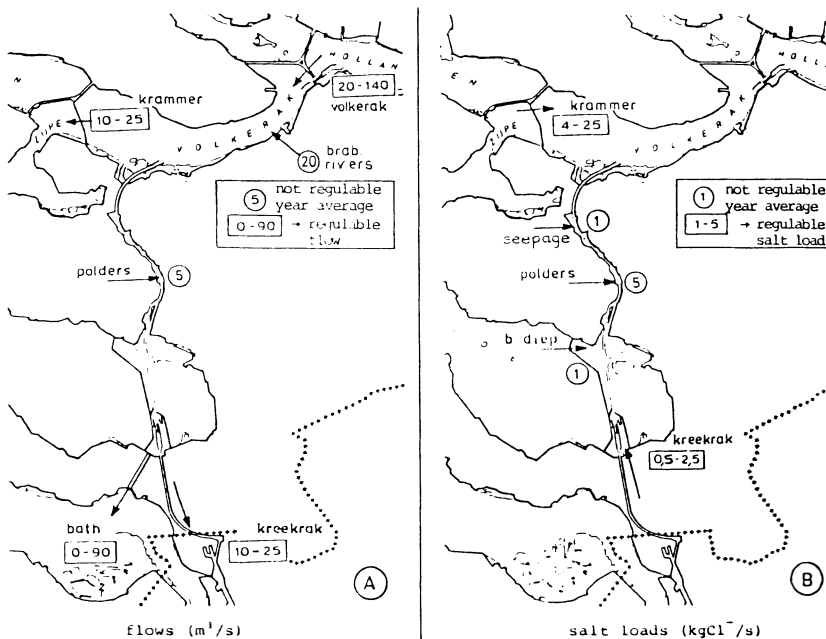


PREDICTION OF CHLORIDE IN THE FUTURE FRESHWATER BASIN VOLKERAKMEER/ZOOMMEER, THE NETHERLANDS

J. P. G. Bakker

*RWS, Waterhuishouding en Waterbeweging, District Zuidwest,
 P.O. Box 510, 3300 AM Dordrecht, The Netherlands*

In 1987 a new freshwater basin Volkerakmeer/Zoommeer will be created as part of the Deltaworks, involving the closure of some estuaries in the southwest part of the Netherlands. The developed infrastructure has the possibility to flush the freshwater basin and to influence the water quality. Inflows take place through the Volkeraksluices (with water from the rivers Rhine and Meuse), from the little rivers Mark, Vliet and Zoom and from discharge of polders. Discharge of water takes place through the discharge sluice at Bath and through the Kramer- and Kreekraklocks.



These locks have the possibility to reduce the discharge to save water in dry periods (both locks) or to reduce the freshwater flow to the Eastern Scheldt (Kramerlocks). With respect to chloride the problem is to realise a sufficiently freshwater basin. This is necessary to realise all its functions. The Volkerakmeer/Zoommeer however is surrounded by saltwater basins which must stay sufficiently salt in order not to do damage to the saltwater ecosystems while navigation causes a large amount of water exchange between them. Other problems are the high chloride concentrations in the drainage water. This leads, with respect to the functions of the basins involved, to the following preferred situations and the sometimes conflicting means to achieve these situations.

basin involved	preferred situation	means
Volkerakmeer/ Zoommeer	low Cl ⁻ -concentration	- great discharge through Krammer- and Kreekraklocks - much flushing
Eastern Scheldt	high Cl ⁻ -concentration	- small discharge through Krammerlocks
Western Scheldt	high Cl ⁻ -concentration	- no flushing
Northern Delta Estuary	low Cl ⁻ -concentration	- no flushing small discharge through the locks

All this means that certain rules have to be drawn up at the boundaries of the Volkerakmeer/
Zoommeer.

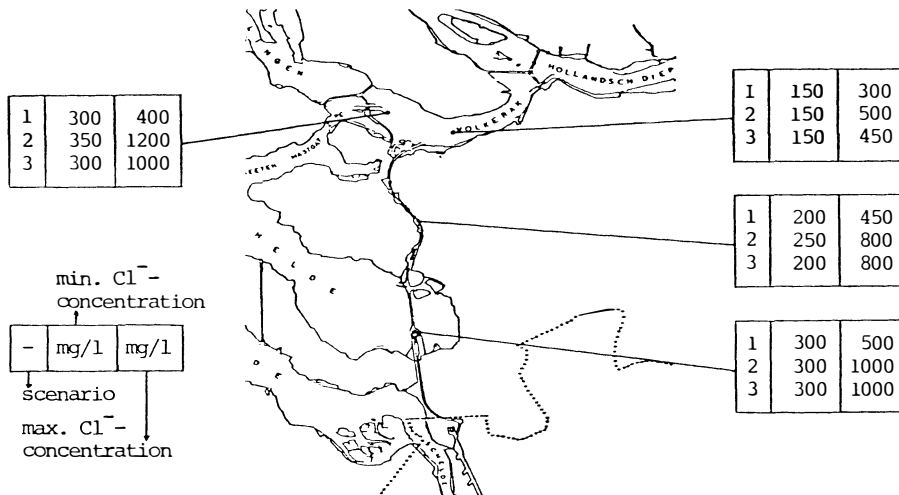
The rules are established from criteria in the surrounding estuaries. These criteria are either the exceedance or non-exceedance of critical values of the chlorosity on a certain point in the estuary in question.

The rules result in maximum inflows at the Vokeraksluices (Northern Delta Estuary-criteria), maximum outflows at the discharge sluice at Bath (Western Scheldt-criteria) and periods in which the facility of reducing the freshwater flows at the Krammerlocks must be used (Eastern Scheldt-criteria). A combination of these rules is called a managing scenario.

After the mathematical formulation of the above mentioned rules the chloride concentrations have been calculated for a period of seven years and the following three extreme scenarios:

1. no concessions of the surrounding basins to the Volkerakmeer/Zoommeer;
2. no concessions of the Volkerakmeer/Zoommeer to the surrounding basins;
3. a compromise between all the concerning lakes and estuaries.

The calculations have been carried out with a non-stationary one-dimensional advection-diffusion model, called ZWENDL.



Increasing the inflow rate from the Hollandsch Diep/Haringvliet mainly influences the concentrations in the connecting canal and Zoommeer while the Vokerakmeer is hardly influenced. Uncertainty analysis show that the calculated concentrations are not sensitive for the values of the diffusion coefficients in the Zoommeer. The calculated values are on the other hand sensitive for the operational management of the shipping locks in the dams at the boundaries of the salt and freshwater basins.

Further studies, based on policy analysis, will have to yield the optimal water management for the region.