

The wetlands in Nynäshamn and Oxelösund in brief

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Figures in this document come from the report "Treatment results, operational experiences and cost efficiency in constructed wetlands for waste water treatment in Sweden" by Linda Flyckt.

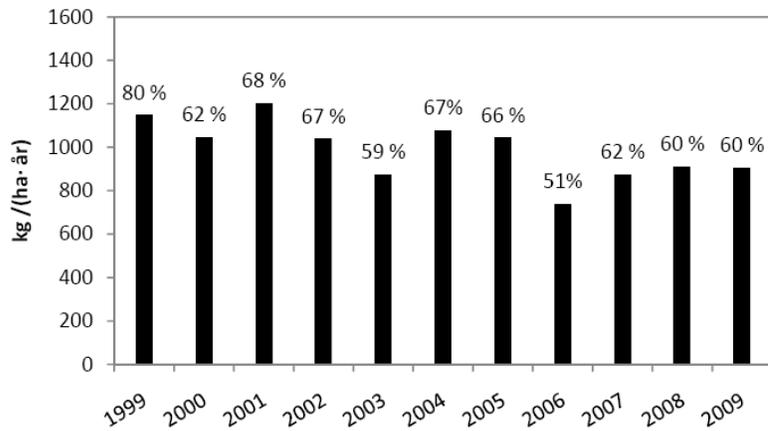
Comparison of the two wetlands:

Municipality Facility Time period		Nynäshamn Alhagen 1999-2001	Oxelösund Brannäs 1994-2001
Total wet area	(ha)	28	23
Inflow	($m^3 d^{-1}$)	4 700	4 800
Hydraulic load	($mm d^{-1}$)	17	21
Detention time	(d)	14	8
Concentrations			
Tot-N	In	37	23
($mg L^{-1}$)	Out	11	15
NH₄-N	In	37	17
($mg L^{-1}$)	Out	9	12
Tot-P	In	0,37	0,40
($mg L^{-1}$)	Out	0,12	0,04
BOD₇	In	38	22
($mg L^{-1}$)	Out	4,8	3,9

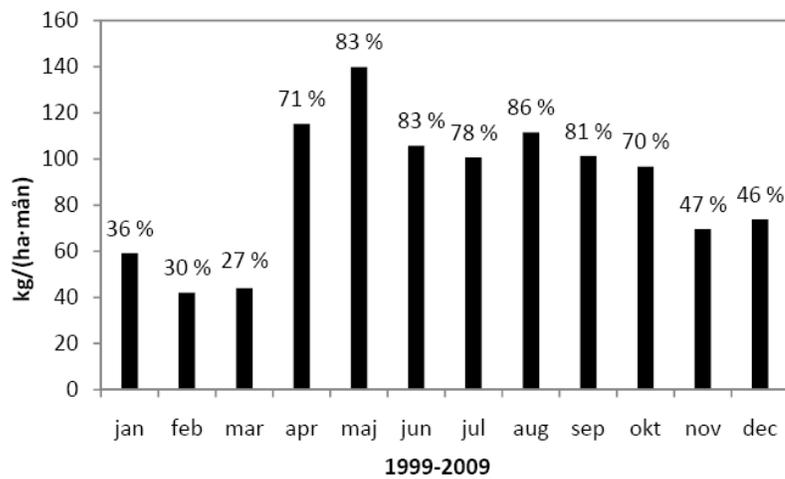
Wetland Alhagen (Nynäshamn)

Wetland Alhagen was constructed in 1997 and covers 28 ha including an overland flow area. From an inflow basin, the water is alternately fed to two parallel ponds with fluctuating water levels. After passing through two wetland basins in series, the water is intermittently (2 d intervals) distributed to a 2 ha overland flow area from which it is collected in a collection pond and passes through a channel to two shallow fens, where it is mixed with stormwater and flows to the Baltic Sea. During 1999 – 2001, the wetland received wastewater only in April – December each year. In the first part of the wetland, the plant community is dominated by emergent species such as *Phragmites australis*, *Typha sp.* and *Carex riparia*. Downstream the overland flow area, large stands of *Elodea canadensis* and *Ceratophyllum demersum* are observed. In the final wetland, various *Carex* species are predominant.

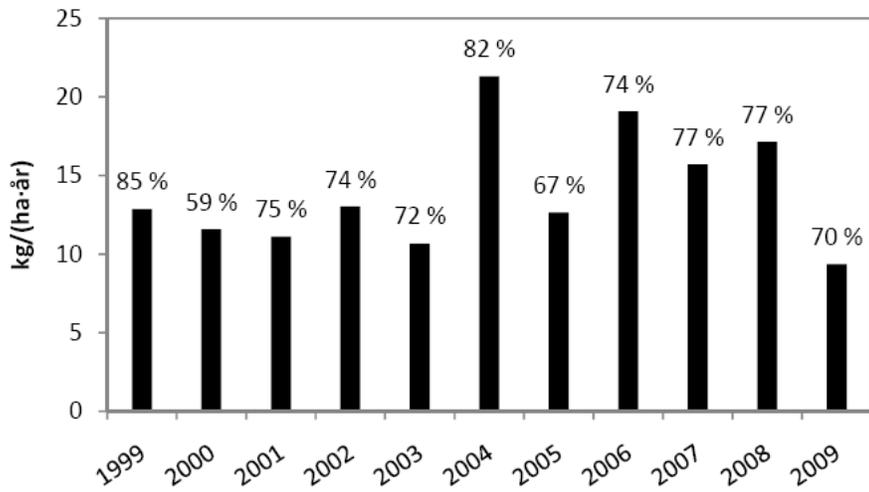
Treatment results for the period 1999-2009 are presented in the figures below.



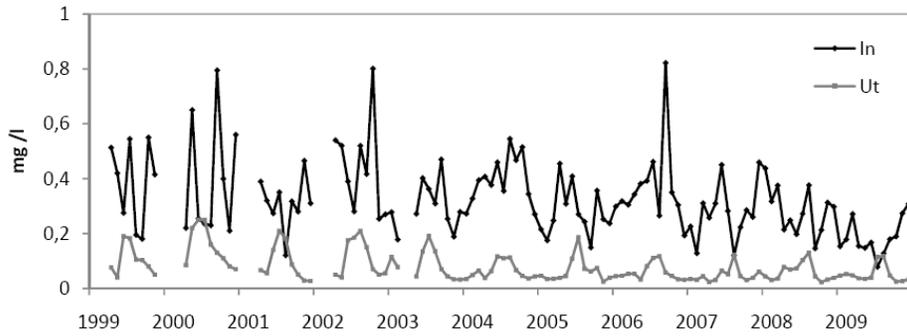
Removal of total-nitrogen in Wetland Alhagen (kg/ ha and year) and relative (%) removal of incoming total-nitrogen to the wetland during 1999-2009. In 1999-2002 the wetland was only used during April- December. In 2003 the WWTP (waste water treatment plant) was complemented with a SBR (Sequencing batch reactor).



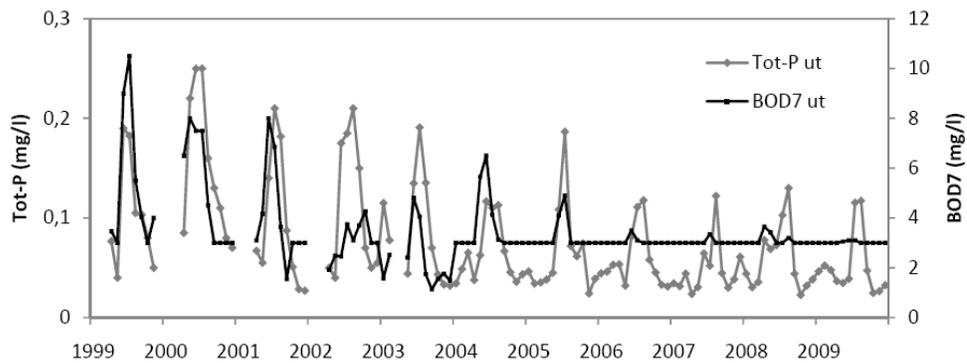
Average monthly removal of total-nitrogen in Wetland Alhagen (kg/ ha and month) and relative (%) monthly removal of incoming total-nitrogen to the wetland during 1999-2009. 1999-2002 are only represented by values for April- December.



Removal of total-phosphorus in Wetland Alhagen(kg/ ha and year) and relative (%) removal of incoming total- phosphorus in the wetland during 1999-2009.



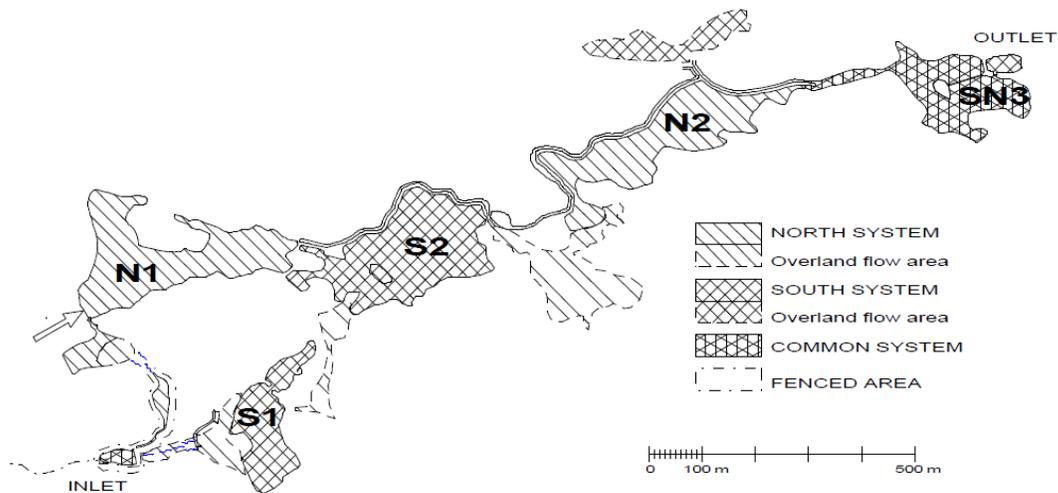
Incoming (In) and outgoing (Ut) concentrations of total-phosphorus in Wetland Alhagen during 1999-2009.



Outgoing concentrations of BOD₇ and total phosphorus in Wetland Alhagen during 1999-2009.

Oxelösund wetland (Brannäs)

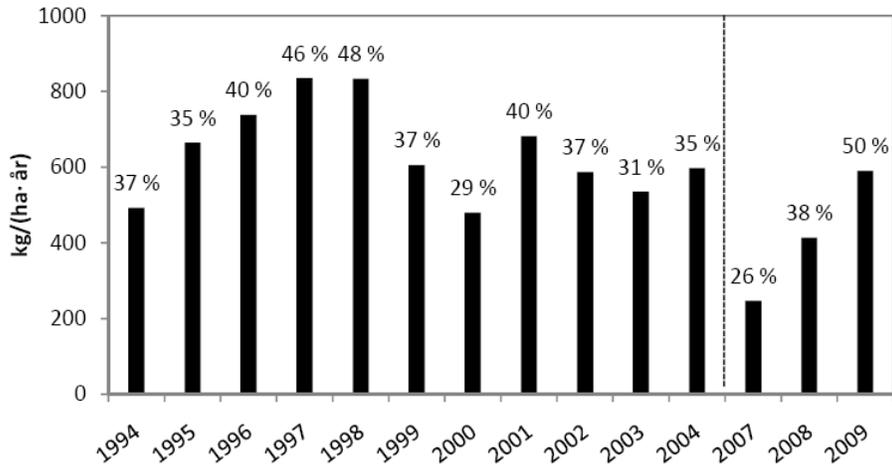
Oxelösund wetland was created in 1993. Briefly, it covers 23 ha and consists of two parallel systems (South and North) with two basins each, emptying to a joint final basin which is always flooded. Each system is currently filled up during 2 –3 days followed by draining during an equal time period to ensure utilization of the whole wetland area and to favor nitrification. The design flow is 6 000 m³/day of pretreated wastewater from the Oxelösund wastewater treatment plant. The water level amplitude between “empty” (the ponds are rarely completely emptied) and full ponds varies from 0.6 to 1.5 m between the different ponds. The hydraulic retention time in the wetland is approximately eight days.



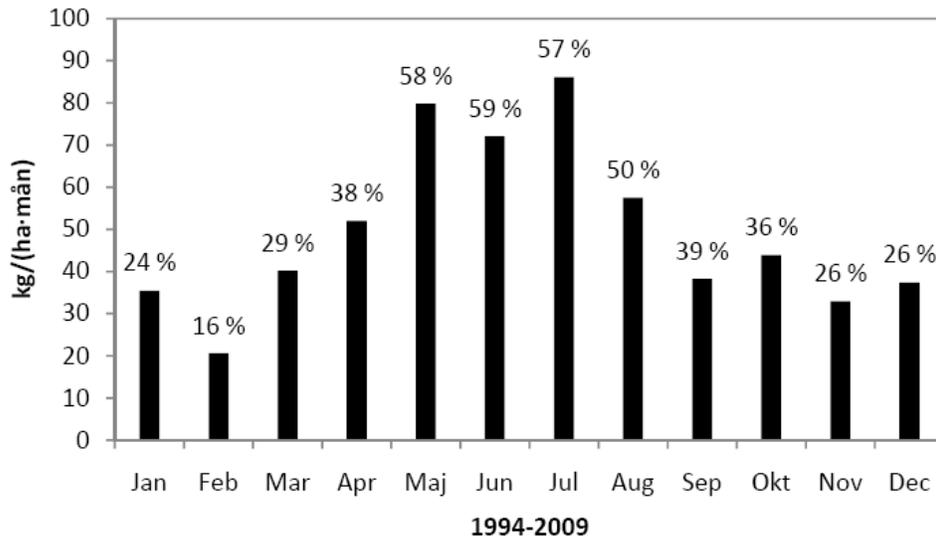
Map of the wetland system in Oxelösund.

The wetland is loaded with pretreated wastewater, which is pumped 2 km through underground piping from the wastewater treatment plant (WWTP). Pretreatment consisted of mechanical treatment and chemical precipitation with aluminum sulfate in the WWTP until 2005 when the treatment plant was complemented with an SBR reactor.

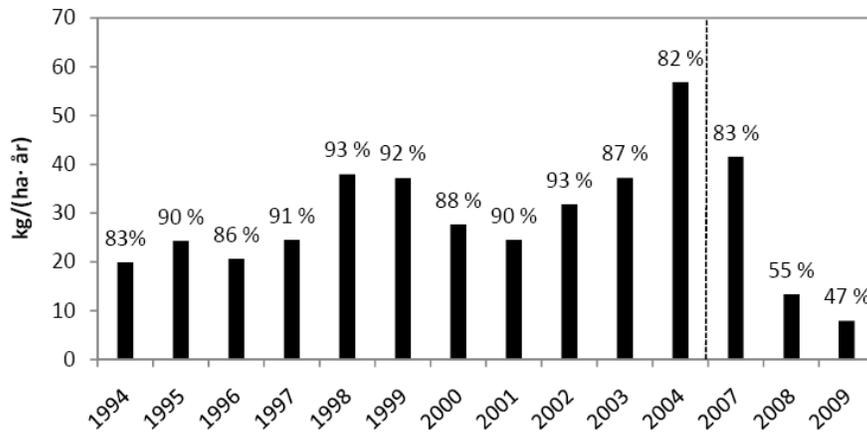
Treatment results for the period 1994-2009 are presented in the figures below.



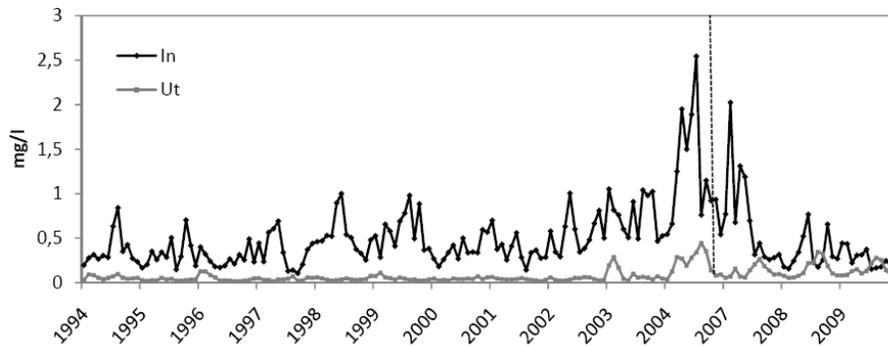
Removal of total-nitrogen in Oxelösund wetland (kg/ ha and year) and relative (%) removal of incoming total-nitrogen to the wetland during 1994-2009. Dotted line represents the years 2005 and 2006 which have been excluded due to the installation of an SBR at the WWTP, resulting in non-representative data for those years.



Average monthly removal of total-nitrogen in Oxelösund wetland (kg/ ha and month) and relative (%) monthly removal of incoming total-nitrogen to the wetland during 1994-2009.



Removal of total-phosphorus in Oxelösund wetland (kg/ ha and year) and relative (%) removal of incoming total- phosphorus to the wetland during 1994-2009. Dotted line represents the years 2005 and 2006 which have been excluded due to the installation of an SBR at the WWTP, resulting in non-representative data for those years.



Incoming (In) and outgoing (Ut) concentrations of total phosphorus in Oxelösund wetland during 1994-2009.