

Tacumshin Lake

Part 2: Water level management.

Water budget

Water budget is the relationship between water



inputs to and water outputs from the lagoon. Water in the lagoon is brackish, that is, it is a mixture of seawater and freshwater. Water gets into the lagoon along

eight pathways. Seawater enters the lagoon via seepage springs, overwashing, sluicing, throughflow and spray. Freshwater enters the lagoon via rainfall, runoff and channel inflows. Water leaves the lagoon in three ways: via the tunnel, by outward seepage and by evapotranspiration. Each of these eleven pathways is described below^{1, 2 & 3}.

Seepage springs

At high water, especially during storm surges, seawater from the adjoining Celtic Sea runs up the beach in an attempt to overtop the fringing barrier and spill into the back-barrier lagoon. It normally fails to do so in places where the barrier is high (>6m). However, the run of seawater up the beach face - the swash - temporarily raises the beach water table causing its landward front to migrate inwards and the spring line on the back barrier to disgorge seawater via a series of seepage springs. It appears likely that springs more commonly occur at points where the barrier sediment is coarser and more permeable. The flow from the each spring saps the back of the barrier excavating an amphitheatre-like hollow. The running water washes away sediment, erodes a channel and forms a seepage fan extending from the spring to the lagoon.



Overwashing

In places where the barrier is of medium height (4-6m) the sea irregularly overwashes the barrier crest in stormy weather and forms discrete washover fans on the back-barrier slope. (Overwashing is the process; washovers are the products.) Washover fans may be small or big and consist of three parts: (1) a throat, that is, a gap or opening in the barrier crest where the swash penetrated the ridge, (2) a river-like sediment flow running down the back-barrier slope and (3) a terminal fan spreading out and spilling into the lagoon.

Apart from the water inputs, one of the consequences of overwashing is that sediment is being continually moved from the seaward side of the barrier to its

landward side. The seaward side is being eroded and the landward side is being nourished. The barrier is therefore transgressive; that is, it is transgressing or moving slowly landwards as beach and nearshore sediments are transferred from its front to its back. As a result, the shoreline is receding. Measured rates of shoreline recession on the



Top: Crestal throat where the swash on the beach penetrated the barrier ridge. Middle: A washover channel running down the back-barrier slope from the crestal throat to the lagoon. Bottom: The snouts of a series of washover fans protruding into the lagoon.

Tacumshin barrier in

metres per year are: 0.435m (1840-1925), 1.000m (1925-1953) and 0.875m (1953-1973)⁴ and 1.316m (1974-2012).

Sluicing

In places where the barrier is low (<3m), especially at the throats of large overwash fans, the sea occasionally sluices over the barrier unimpeded and raises water level in the lagoon significantly. In an attempt to prevent flooding due to sluicing following overwashing, lake-side landowners plug gaps and build walls of big round straw bales. The bales trap

wind-blown sand and increase barrier height in an attempt to reduce overwashing in places where barrier height is low. These measures have proved successful in the short term. However, in recent years, the sea has tossed many of these bales aside and the central portion of the barrier has



been subject to extensive damage due to ongoing overwashing followed by sluicing.

Text and photographs by Jim Hurley, SWC Promotions, Grange, Kilmore, Co Wexford Y35 YN35. E-mail <u>swc@eircom.net</u>. Telephone: (053) 912 9671. Mobile: (086) 163 7199. Copies available as a PDF file on request via e-mail from <u>swc@eircom.net</u>. Version: 201508. **SWC Promotions: promoting the natural heritage resource values of the South Wexford Coast.**



Throughflow

The barrier is porous and there is significant throughflow under the barrier especially in places where it is narrow and where it has a high proportion of coarse sediment. As a result of throughflow, water level in the lagoon rises and falls



twice each day in rhythm with the tidal cvcle in the sea. The extent of the rise

and fall varies 0.1-0.5m with lake level; the amount of rise and fall decreasing as lake level rises⁵. As a result, there is a strong salinity gradient from south to north⁶. The image above shows seawater issuing from springs on the lagoon bed as seen through shallow water.

Spray

In addition to seepage springs, overwashing, sluicing and throughflow, the fifth way in which seawater has an input to the lagoon is via spray. The prevailing wind on the barrier is onshore, mainly south-westerly. When the sea is rough in stormy weather, and when the wind is strong, the air is filled with spindrift being carried landward.

Rainfall

Freshwater enters the lagoon via direct rainfall. The current (1978-2007) 30-year annual mean rainfall in the area is 905.5 mm⁷. Estimates based on flood studies suggest the use of 1,000mm as a working yearly total⁵.

Runoff

The catchment of Tacumshin Lake has an area of $36-40 \text{km}^2$ and is generally flat^{5 & 8}. The catchment extends to the villages of Kilmore (west) and Ballycogley (north). To the east, it extends almost to Broadway. The land is relatively low-lying (<15m; green colour below) and is predominantly utilised for agricultural enterprises and dispersed residential settlement.



Base map: OSi 1:63360 Sheets 169 & 180, 3rd ed., 1911 Ordnance Survey Ireland Permit No MP 004615 © Ordnance Survey Ireland/Government of Ireland.

Channel inflows

Tacumshin Lake is a brackish or transitional water, that is, it contains a mixture of freshwater and seawater. Its catchment comprises five small to very small river subbasins (Kilmore, Tomhaggard, Linziestown, Paradise and Tacumshane) each of which drains into the lagoon⁹. Seven small streams disgorge from these five sub-basins. The Bargy Stream is the largest stream and it enters



the lagoon at its north-western extremity. Flow rates in all of the streams are low.

The tunnel

The lagoon is very shallow (about 1m deep) but varies widely in both depth and area depending on seawater and freshwater inputs, drainage and the season of the year. In general, the lagoon is slowly shrinking due to silting, sand blowing off the barrier, floor rise, barrier transgression and natural vegetation succession from open water to swamp, marsh and Grey Willow scrub. The lagoon is therefore essentially a transitory habitat type that will ultimately cease to exist.

It is assumed that, in the past, the lagoon occasionally filled to capacity and that the barrier was breached by local farmers to relieve flooding of low-lying agricultural lands. When the barrier was breached the breach, known locally as 'the bar', tended to remain open. Local folk memory and lore holds that successful breaches stayed open and the lagoon remained tidal for about 30 years (known range 26-32 years) and the breach normally migrated westward. The most recent breaches were opened in 1811, 1840, 1910, 1937 and 1940^{10 & 11}.

The Tacumshin barrier is the most dynamic barrier on the South Wexford Coast. While it was breached both naturally and artificially on several occasions in the past it repaired itself naturally by generating both eastwards-moving and westwards-moving spits depending on the dominant wave direction.

Since the lagoon is shallow, attempts were also made in the past to drain it and to bring its bed into agricultural production¹². Drainage was partially achieved by installing a sub-barrier outlet known locally as 'the tunnel'.

The first tunnel, a wooden structure, was installed in 1860 by Standish Motte, an English barrister and entrepreneur. Using cast iron pipes, Motte' original tunnel was upgraded in 1894 by Arthur Guinness, grandson of the famous brewer of the same name. Local farmers and landowners upgraded again in 1974 using concrete pipes¹⁰ However, in the late 1990s the farmers' tunnel ceased to function and the Department of Arts Heritage and the Gaeltacht was granted planning permission (Planning Authority Register No 982011) to install two new pipelines each fitted with flow control structures, one to replace the failed farmers' tunnel and one of their own. The new drainage structures had a much greater discharge capacity than the 1974 tunnel and have drained the lagoon to a low level since June 2001, so much so that an analysis of water levels in the period June 2001 to 2005 showed that lagoon level was above sea level for only 15% of the time during that period⁵.

Outward seepage

Outward seepage of water from the lagoon to the sea can often be seen on the lower beach when the tide has ebbed. Sink holes on the lagoon bed can also be seen. Seepage is most pronounced when the gradient between the levels inside and outside the barrier is steepest,



Outward seepage of water from the lagoon on the lower beach at low tide.

that is, when water level in the lagoon is high at low water of spring tides.



Evapotranspiration

Evapotranspiration is the total loss of water from the lagoon as a result of both evaporation and transpiration (sweating by plants). The yearly total is 588mm⁵.

Recent flooding

The barrier was breached by the sea in four places during storms in late January and early February 2014 and the lagoon flooded. Both inlets at the tunnel were overwashed and were buried under sediment during high water of the morning tide on Wednesday 5 February. The Office of



Works data logger that monitors water level in the lagoon

was knocked out of action. Before it failed, the last water level recording transmitted by the logger was 3.61m (= 1.875m ODM) at 9.15am¹³. The lake and surrounding area flooded extensively with hundreds of hectares under water. To protect their lands, local landowners located the buried inlets and freed them to relieve the flooding.

Present water level

The maximum area of the former lake was 450ha and that was maintained for most of the year. In 2007 the area of open water "only exceeded 95ha on average for only 6% of the year "¹⁴. Nature conservationists would like to see a higher water level to maximise the extent of the lagoor habitat and to provide feeding for wintering wildfowl. Wildfowlers would also like to have a higher water level to attract more birds. On the other hand, landowners and farmers around the lagoon would like the water level lower to dry out marginal wetlands, to accelerate land drainage and as a protection against the risk of flooding. Horse trainers and owners who exercise their

animals at the lagoon also need low water levels to maintain their gallops both on the lagoon floor and on the barrier.

Water level modelling

In 2006, to meet legal obligations under EU Directives the Irish authorities commissioned a



Above: The inlet to the tunnel was buried under tonnes of sediment on 5 February 2014 when the barrier was overwashed at that location. Below: The sediment was removed to relieve flooding and to free the tunnel to continue draining the lagoon.



report to advice regarding water levels in the lagoon. Two years later the Commission was told: "At present a water level modelling project is underway to determine optimal winter and summer water levels which will allow the lagoon to function in a more natural way, yet will protect the surrounding farmland



Overview of the Tacumshin barrier on 24 October 2014 at Grogan Burrow showing the lagoon and the intake of The Tunnel.

from exceptionally high water levels in winter."^{15 & 5}. Five years later the Commission was informed "the findings have not been implemented to date No progress has been made at Tacumshin."¹⁶.

Management and monitoring

Water level at Tacumshin Lake is managed by the National Parks and Wildlife Service (NPWS) in association with lakeside landowners. Water level has been monitored by the Office of Public Works (OPW) since 19985 Measurements are taken every fifteen minutes by a data logger on the lagoon bed. These measurements are transmitted to

the OPW and are posted online¹³ Measurements can also be read on a staff gauge erected on the side wall of the eastern intake at the tunnel. Conversion: (staff reading) -1.735m = ODM. Water level in the image above



is 2.1 = 0.365 m ODM, that is, 36.5cm above sea level.

Sources and references

- Carter, R. W. G. 1988. Coastal 1 Environments - An Introduction to the Physical, Ecological and Cultural Systems of Coastlines. London: Ácademic Press.
- Orford, J. D. and Carter, R. W. G. 2. 1982. Geomorphological changes on the barrier coasts of south Wexford. Irish Geography, Volume 15, pages 70-84.
- Ruz, M-H. 1989. Recent evolution of

the southeast barrier coast of Ireland. Journal of Coastal Research, Volume 5, Number 3, pages 523-539. Orford, J. 1989. The proposed Fish

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- Farm development at Ballyhealy, Co. Wexford: some comments on the littoral implications of this development with specific reference to the beach siting of an effluent outfall. Unpublished report prepared for the Ballyhealy Action Group with regard to an oral hearing of appeals to An Bord Pleanála against a decision by Wexford County Council to grant water pollution licence (SS/ W066/88) subject to conditions (An Bord Pleanála Ref. WP 26/19/186 and Wexford County Council Planning Register Reference Number: 88/3340).
- MW&Ps. 2007. Tacumshin Lake Level Management Study Report. Unpublished report (Document No 11309/6001 Rev A) commissioned by the Office of Public Works; prepared by Malachy Walsh and Partners, Consulting Engineers, Park House, Mahon Technology Park, Bessboro Road, Blackrock, Cork.
- Goodwillie, R. 2004. Description of the vegetation at Tacumshin Lake. 6. Unpublished report prepared for the National Parks and Wildlife Service. Data for Rosslare Harbour for the
- period 1978-2007 at http:// www.met.ie/climate-ireland/1981-
- 2010/rosslare.html. MW&Ps. 1998. Study of Drainage Options for Lady's Island Lake and 8 Tacumshin Lake. Unpublished report commissioned by the Department of Arts, Heritage, Gaeltacht and the Islands; prepared by Malachy Walsh & Partners, Boreenmanna Road, Cork, in association with Posford Duvivier, Rightwell House, Bretton, Peterborough PE3 8DW, UK. Environmental Protection Agency at
- http://gis.epa.ie/Envision. Murphy, H. 1974-2014. Series of 10. articles in the Kilmore Parish Journal as follows: No 3 (1974/75) pages 30-31; No 4 (1975/76) page 13; No 16 (1987/88) pages 8-9; No 21 (1992/93) pages 30-33; No 23 (1994/95) pages 59-60; No 41 (2012/13) pages 49-50
- and No 43 (2014/2015) pages 38-39. Kilmore: Parish Journal Committee Hurley, J. 1990. The White Hole. 11. *Kilmore Parish Journal 1990-91*, pages 30-31. Tomhaggard-Mulrankin: Muintir na Tire Council.
- Vetch, J. 1846. On the advantage of 12 Enclosing certain Lakes in the County of Wexford: Lady's Island Lake and *Tacumshin Lake*. Report by Captain James Vetch, Royal Engineers, following a field visit on 1 December

1840. In Anon, 1846, Appendix B, No 40, pages 68-69 of the Appendix; equivalent to pages 184-185 of the scan of the report. Available online at http://www.dippam.ac.uk/eppi/ documents/12068/page/288046

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- OPW data for Station 13071 at http:// waterlevel.ie/0000013071/. NPWS. 2007. The Status of EU Protected Habitats and Species in Ireland: Backing Documents, Article 14. 17 forms, Maps. Volume 1. Dublin: National Parks and Wildlife Service. Department of the Environment, Heritage and Local Government. Available online at http:// www.npws.ie/sites/default/files/ publications/pdf/ NPWS_2007_Cons_Ass_Backing_V
- 1.pdf 15. NPWS. 2008. The Status of EU protected Habitats and Species in Ireland. Synopsis of the Article 17 reporting to the European Commission. Dublin: National Parks and Wildlife Service of the Department of the Environment, Heritage and Local Government. Posted online in four parts at http:// www.npws.ie/publications/
- euconservationstatus/. NPWS. 2013. The Status of EU Protected Habitats and Species in 16 Ireland: Habitat Assessments Volume 2. Version 1.0. Dublin: National Parks and Wildlife Service of the Department of Arts, Heritage and the Gaeltacht. Available online at http:// www.npws.ie/publications/ article17assessments/ article172013assessmentdocuments/ Article_17_Web_report_habitats_v1.
- 17. National Parks and Wildlife Service at www.npws.ie/.

Nature conservation

The National Parks and Wildlife Service (NPWS)¹⁷, one of the technical services of the Department of Arts, Heritage and the Gaeltacht, is the central government body responsible for nature conservation in the Republic of Ireland.

Concerns regarding nature conservation should be addressed to Tony Murray, the local NPWS Conservation Ranger, e-mail Tony.Murray@ahg.gov.ie, telephone (076) 100 2662.



Transgression/shoreline recession/erosion. The sluice box (right) built in the middle of the dunes in 1974 is now located low on the beach face. In the late 1960s the former dunes were almost as tall as the sluice box. The gabion mattresses (foreground) installed by the OPW on the dune crest in 2000 now lie on the foreshore. A rider on horseback on the barrier gallop can be seen on the distant skyline