



Water Quality in St Aubin's Bay over the Summer of 2016 ~ A Study Summary by SOS Jersey, September 2016 ~

SOS Jersey (SOSJ) has spent the summer on the beaches testing outflows on the south and south east coasts and out to sea. We have come across high levels of nitrates, nitrites and ammonia, nearly all coming from the Bellozanne outflow at First Tower, which discharges 18 million gallons of effluent daily on to the shallow, sloping, south-facing beach.

In this short report we outline our findings and conclusions, not all of which agree with the official line. First, here is a summary:

For many years, the Department for Infrastructure (Dfi) has exceeded permitted discharge consent levels for Total Nitrogen (TN) into St Aubin's Bay and continues to do so.

Dfi have brushed aside two statutory cautions served on it by the Environmental Regulator and are backed by the Attorney General who has ruled that 'prosecuting the Department would not be in the public interest', allowing its continuance until the construction of a new sewage works which is planned to take approximately three years once agreed and approved.

WCA Consultants reported to the States of Jersey in July 2013, *'The primary point source of this nutrient enrichment is the Bellozanne sewage treatment works effluent, which discharges into the bay.'*

SOS Jersey have spent the summer testing Island outflows and seawater. We were shocked at the high levels of ammonia present in the Bellozanne outflow at First Tower, which discharges over 18 million gallons of nutrient-rich effluent onto the beach daily. In fact, we have found the TN values from the plant constantly exceed by 3-6 times the permitted 10mg/l limit.

Following repeated attempts over a six-week period to confirm our findings with the Dfi, we were eventually granted an audience with Dfi Minister Deputy Noel and his officers, who maintain the nitrates causing the sea lettuce problem originate from France. Having studied their 2013 Cascade report, consulted other experts, and validated our recent tests with the States Analyst, we do not agree.

We conclude the sea lettuce will continue to bloom when critical factors come together, the catalyst being the discharges at First Tower. A new sewage treatment plant will help alleviate the problem but, given our current population growth (for which the States have no policy) only for a few years.

We suggest that it is only by reducing nitrates at source and in the bay, using a range of strategies including those that we have previously advocated, that the problem will be alleviated. To divert blame on the French does nothing to solve the problem.

If Jersey is to remain a pleasant environment in which to live, for tourists to visit, and if our fragile ecosystem is not to be further eroded, urgent action must be taken.

Sea lettuce blooms

Sea lettuce (*Ulva lactuca*) is a flat, thin, green seaweed that resembles slimy lettuce leaves. Young leaves are bright green and older ones a deeper green. Dead leaves are usually white.

The fronds, attached without a stipe to rocks, other seaweeds and other substrates, can grow up to 45cm long and 30cm across. The sea lettuce can be easily torn from the substratum and can accumulate in large, drifting masses called blooms.



Sea lettuce blooms are particularly prolific in areas where nutrients are abundant. The blooms have been particularly bad in the last several years: they are unsightly, too slippery to walk on, and produce gases which not only smell bad enough to affect locals and businesses living in the vicinity but which can also be hazardous to health.

In addition, while sea lettuce provides a habitat to some small invertebrates such as amphipods, large amounts prevent sunlight reaching plant life below; when the plants cannot photosynthesise, they die. Bacteria feeding on decomposing dead sea lettuce use up a lot of oxygen in the water, depriving other species of oxygen, which also die or move elsewhere.

Nitrogen in St Aubin's Bay

To get a bloom of *Ulva*, three conditions must be present:

- Warm water
- Enough sunshine
- Plenty of available nitrogen

We cannot do anything about our warm waters and plentiful sunshine, so must look at the last parameter: excess nitrogen. Two of the main sources of nitrogen in St Aubin's Bay are ammonia (NH_3) and nitrates (NO_3) and we will look at these now.

Ammoniacal nitrogen ($\text{NH}_3\text{-N}$), is a measure for the amount of ammonia. Often found in sewage outflows, ammonia is toxic in excess and levels can be used as a measure of the health of water.

We were surprised and dismayed to discover extremely high levels of ammonia are entering St Aubin's Bay from the Bellozanne outflow.

Nitrates are also found in sewage outflows; where sewage is ineffectively treated, excess levels enter the water system: in this case, St Aubin's Bay.

Since at least 2006, high quantities of nitrates have been discharged onto the beach/into the sea (depending in the state of the tide) in St Aubin's Bay.

These discharges have been in contravention of the discharge permit.

The Environmental Regulator has confirmed to us that between 2006 and 2016 the Dfl exceeded their permitted daily discharge levels into St Aubin's Bay by at least three times and, on some occasions, as high as six times.

This means, for many years, the Department for Infrastructure (Dfl – formerly Technical and Transport Services or TTS) has exceeded the permitted discharge consent levels for Total Nitrogen (TN) into St Aubin's Bay. It continues to do so.

Since at least 2006, high quantities of nitrates have been discharged onto the beach in contravention of the discharge permit

Statutory cautions ignored

The Dfl have brushed aside two statutory cautions served on it by the Environmental Regulator. These actions have been backed by the Attorney General who ruled that 'prosecuting the Department would not be in the public interest', allowing the practice's continuance until the construction of a new sewage works.

The new sewage works

The new sewage works will undoubtedly help in terms of decreasing total nitrogen discharge into St Aubin's Bay. However, it will take approximately three years to construct once plans are agreed and approved and, if population policies are not in place, will cease to be effective enough in another 20-30 years.

What's being done currently

When the tide is low, the States move the piles of sea lettuce to the low water mark using diggers. The machinery damages the sand structure and disrupts sea grass beds and other sand-living organisms. The States are now considering using a costly and ineffective sea lettuce harvesting machine when it becomes available.

The States are also taking ongoing samples and commissioning reports on top: they are not, despite being offered it, asking for the help of SOSJ. Neither have they been forthcoming in sharing data so SOSJ have attained many of these through Freedom of Information requests.

Why we can't blame France for the sea lettuce problem

At our meeting with Minister Eddie Noel, officers and consultants on 20 September 2016, it became clear they were looking to deflect responsibility for the high nitrogen levels in St Aubin's Bay from the Bellozanne Sewage treatment works to the water coming in from France.

This was despite a report from WCA Consultants to the States of Jersey (Environmental Protection Section) in July 2013, which said:

The primary point source of this nutrient enrichment is the Bellozanne sewage treatment works effluent, which discharges into the bay.

John Rogers, CEO of Dfl said the WCA report was out of date, erroneous and 'cancelled' and said SOSJ should not have had sight of it.

Instead, Dfl now prefer to use the data from a 2013 study by Cascade Consultants which, although it agrees on the levels of nitrogen in the Bay, points to a different source, namely that of sea coming to us from France. Why the discrepancy? The conclusions are based on samples which were taken:

- On one day only (not over a period of time)
- Along a linear transect (not over a wider area)
- At one depth (not at different depths)

In addition, Cascade attached much importance to chlorophyll levels and did not look at the effects of the benthic boundary layer (BBL). Let's consider these last two points next.

Chlorophyll

Chlorophyll, the green substance used by plants to make sugar and starch, is present in phytoplankton: so far, so good... but Cascade's tests led them to conclude the results of chlorophyll testing helped show the problem emanates from France. We disagree.

The benthic boundary layer (BBL)

The BBL is the layer of water directly above the sediment at the bottom of the sea (or river or lake) and is generated by the friction of the water moving over the surface of the substrate.

Cascade appear not to have taken into account the, 'photo-bioreactor' effect of the very shallow (1-2mm) water that lays over most of the *Ulva* production zone for up to six hours on spring tides in summer.

The zone incorporates the diffusive boundary layer of the benthic boundary layer and amplifies nitrate, phosphorous and carbon concentrations in that non-turbulent condition.

It is hard to design a better environment for all stages of *Ulva* growth.

This boundary warms substantially above ambient, is heavily illuminated by day and contains a mix of blades and spores. *It is hard to design a better environment for all stages of Ulva growth.*

The mother lode

It is suggested that this fluid layer is a mix of nutrients and seawater and the sewage treatment works (STW) discharge at a much higher ratio than has been credited so far. It is also suggested that this constitutes the 'mother lode' that Cascade and the Dfl believe is located elsewhere.

Data from the Dfl

It should here be noted that we first wrote to CEO John Rogers to request data three times but our requests were 'not seen' 'because of summer holidays' and a backlog of 'unread emails'.

Getting no feedback, we sent in Freedom of Information (FOI) requests to access data that should have been readily available. We await the replies.

The cause of the sea lettuce problem

SOS Jersey conclude that whatever the other factors relating to the bloom of the sea lettuce (such as shape of the bay, lack of circulation on some tides, and fertiliser run-off), the over-riding catalyst for the problem is the heavy nitrogen releases into the bay from the Bellozanne sewage retirement works outflow at First Tower.

Over 18 million gallons of nitrogen-rich effluent pours onto the beach daily.

Over 18 million gallons of effluent pours onto the beach daily. During the course of the summer months we have measured outflows here and elsewhere in St Aubin's Bay, and around the coast to Gorey.

Whilst at times the nitrates are elevated from agricultural run offs, the much lesser volumes of these outflows (particularly in dry weather when many outflows dry up completely) do not overly contribute to the *Ulva* bloom problem. However, with regard to the Bellozanne outflow, we were alarmed to detect large concentrations ammonia, nitrites and nitrates.

Population growth

SOSJ have heard from John Rogers that the current sewage treatment plant 'will never be able to comply with their legal requirements'. Minister Eddie Noel, present during this conversation, did not aver otherwise. The Dfl say the planned works will be able to cope for a period of time up until the population reaches 135,000.

The Minister for Dfl recently stated there is nothing we can do about our growing population.

The real factor in the *Ulva* problem is the population growth and Jersey's inability to cope with the concomitant rise in sewage production and treatment.

The Minister for Dfl, Eddie Noel, stated at a meeting with SOSJ (on 20 September 2016) that there is nothing we can do about our population growth. We disagree: the Council of Ministers urgently need to put in place a workable strategy. So far, they have been unwilling to do so even though it has been part of their remit.

If Jersey wished to retain and increase its tourist industry, have decent clean beaches, and not have the annual swathe of green sludge and noxious gases hit St Aubin's Bay, the States need to act *now* on population and not rely on a new plant which can only deliver short term if Jersey's population continues to increase without check.

What we would like to happen

In addition to more sharing of already collated data and the emergence of a population policy, SOSJ would like Dfl and Environment be proactive in trialling the interim approaches currently lodged with Environment in the form of a preliminary Environmental Impact Assessment (EIA).

Tony Legg, Aquaculture farmer and marine biologist, has offered to help the Dfl with a method involving ploughing narrow furrows at specific areas in the photo-bioreactive areas of the Bay: it is hoped this will prevent the sea lettuce taking hold on the beach, thus helping prevent blooms.

Eel grass beds

This would be a short-term remedy to keep the *Ulva* blooms at bay while other strategies are implemented. The details have been published and can be found on our website. One concern mooted was the damage such furrowing would do to our protected eel grass beds. We say:

- The damage already being done by the regular practice of tractors dragging sea lettuce out to the low tide mark is far worse than what would be done by the furrows
- The sea grass is already showing 'bald patches': this is because *Ulva* competes with it... and 'wins': to prevent the blooms will have a greater benefit for the sea grass than the damage done by infrequent, narrow furrowing

The scoping for the EIA is now with the Director of the Environment, Willie Peggie, and we hope that DFI will get a licence to undertake the project.

Native oysters

Tony Legg of Jersey Sea Farms has a long term plan to put native flat oysters in cages below the low water mark on either side of the Bay; these oysters are particularly good at filtering and may take enough nitrogen out of the water to stop *Ulva* blooms.

Jersey native oysters
are excellent for
filtering nitrates
from the sea water

Of course, we are aware we need other strategies to take place too, such as encouraging the use of vrac by farmers once more, and a planned decrease in artificial fertilisers used on our crops.

The ecologically-friendly and low-cost approach of using native oysters has been advocated for three years by SOS Jersey, but is one that has met with considerable opposition, so has not yet even started or been given the go-ahead for a trial.

Nonetheless, Environment Minister Steve Luce has recently expressed interest in the idea, so we hope to see it taking shape.

The report on our struggle to get the idea even acknowledged can be found here:

<http://sosjersey.co.uk/wp-content/uploads/2016/08/Sea-Lettuce-Report-1-1-Save-Our-Shoreline-Jersey-09-August-2016.pdf>.

So far, support seems to be along the lines of, a) we'll let Tony Legg go ahead if he can get the necessary permissions, and b) if it turns out to be commercially viable, we are happy to let him carry on.

SOSJ say if it is not commercially viable, then it would still be a relatively cheap project for the States to adopt and one which would also have good ecological benefits to St Aubin's Bay. We hope the ideas behind this project will be considered comprehensively by the States, and a full trial undertaken.

Supporting Documents

Extract from 'The Environmental Status of St Aubin's Bay, Jersey, according to the Water Framework Directive (Final Report to States of Jersey Environmental Section) July 2013

WCA Consultants' report to the States of Jersey Environmental Protection Section July 2013 (extract) confirming a) excessive discharges, b) two cautions sent by and c) a case file was being prepared at the time for the Attorney General.

Email received on 20 September 2016 from Environmental Regulator Dr Tim de Feu, confirming this and also attaching the figures from 2006-August 2016 as an Excel spread sheet (Item 3).

Environmental Protection spreadsheet 2006/2016 showing constant illegal discharge levels of Total Nitrogen.

Screen shot from one recent section of above (of August and Sept) showing the high TN values (in pink).

States Analyst report on an independent sample of discharged effluent taken by Jules Barons, proprietor of the Outlook Cafe, First Tower, on 9 September 2016.

Tony Legg of Sea Farm Fisheries' notes on why the high nitrate levels causing the sea lettuce problem is not emanating from France.

In addition to our own sampling, we have had samples independently collected by Jules Baron, proprietor of the Outlook Café and analysed by the States Analyst and he has confirmed this to be the case.

The Attorney General has decided not to prosecute as 'it is not in the public interest' (Attached)

The part of the WCA Consultants' report to the States of Jersey Environmental Protection Section, July 2013, which shows them confirming, 'The primary point source of this nutrient enrichment is the Bellozanne sewage retirement works effluent, which discharges into the bay.' (Attached)

These documents will also be uploaded to our website: <http://sosjersey.co.uk>.

NOTE: SOSJ have found that nutrients in the seas around the Island are constant in nitrogen levels and conform to the North Atlantic Standard in our latitude.

