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# Plastic ingestion by Pacific Sand Lance (*Ammodytes personatus*) in the Salish Sea.

D. Bertram, C. Robinson, M. Hennekes, M. Galbraith, N. Dangerfield,  
S. Gauthier, K. Woo



**Salish Sea Ecosystem  
Conference**  
**Vancouver, BC, Canada**  
**Douglas Bertram**  
**ECCC S&T Wildlife Research**  
**13 April 2016**

## Dawe and Morrison 1982

### “Sister” Migratory Bird Sanctuaries

Shoal Harbour  
Victoria  
Esquimalt Lagoon

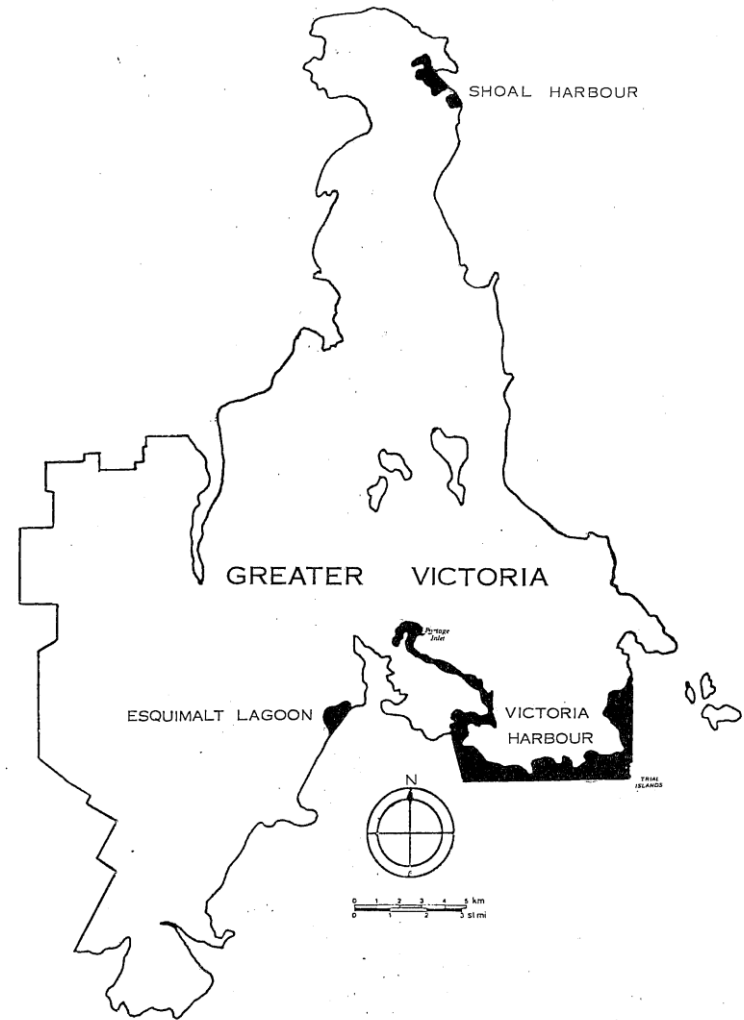
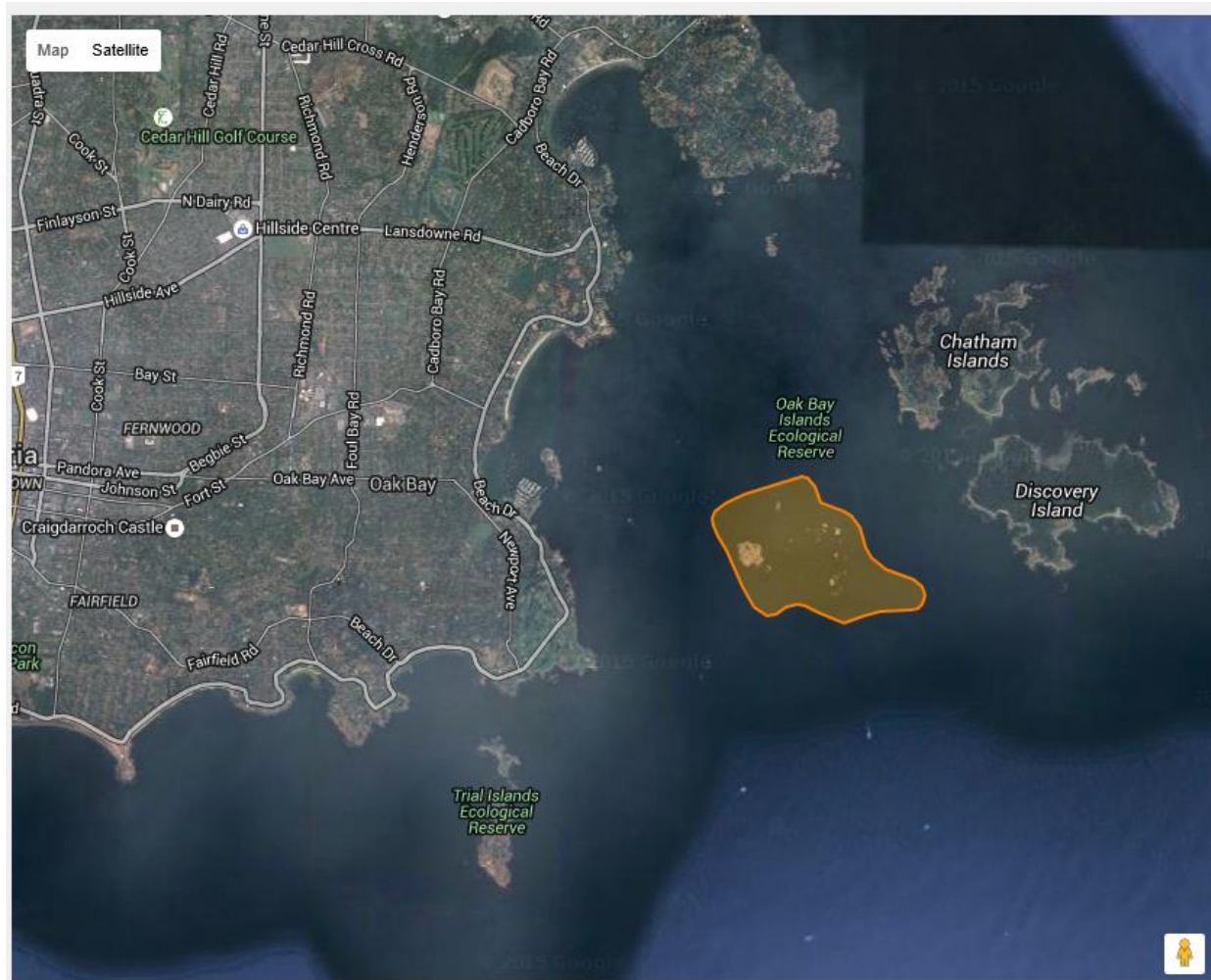


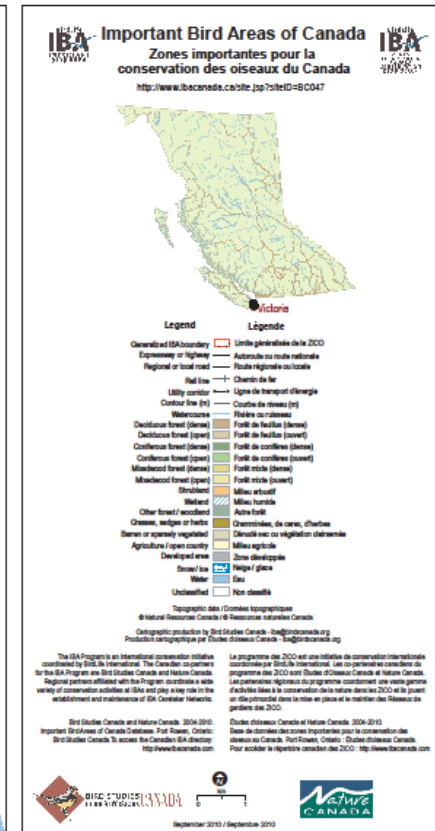
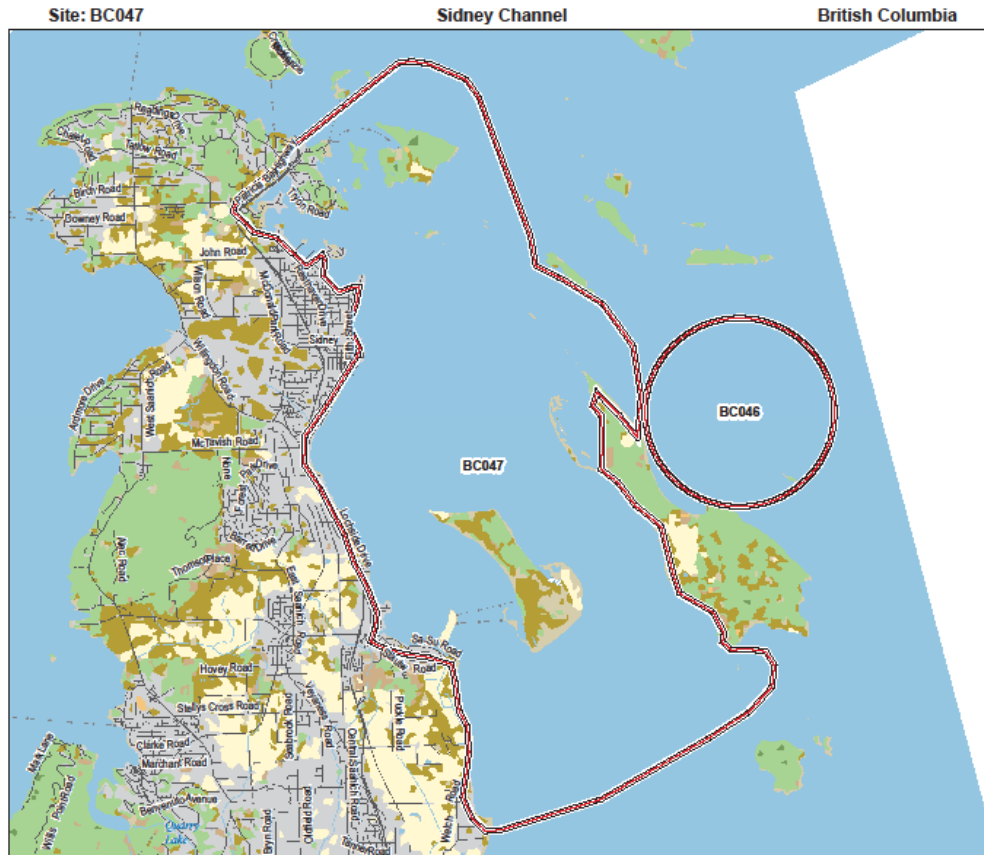
Figure 1. Federal migratory bird sanctuaries on Vancouver Island



# Chain Islets IBA and Ecological Reserve



# Sidney Channel IBA, Site: BC047



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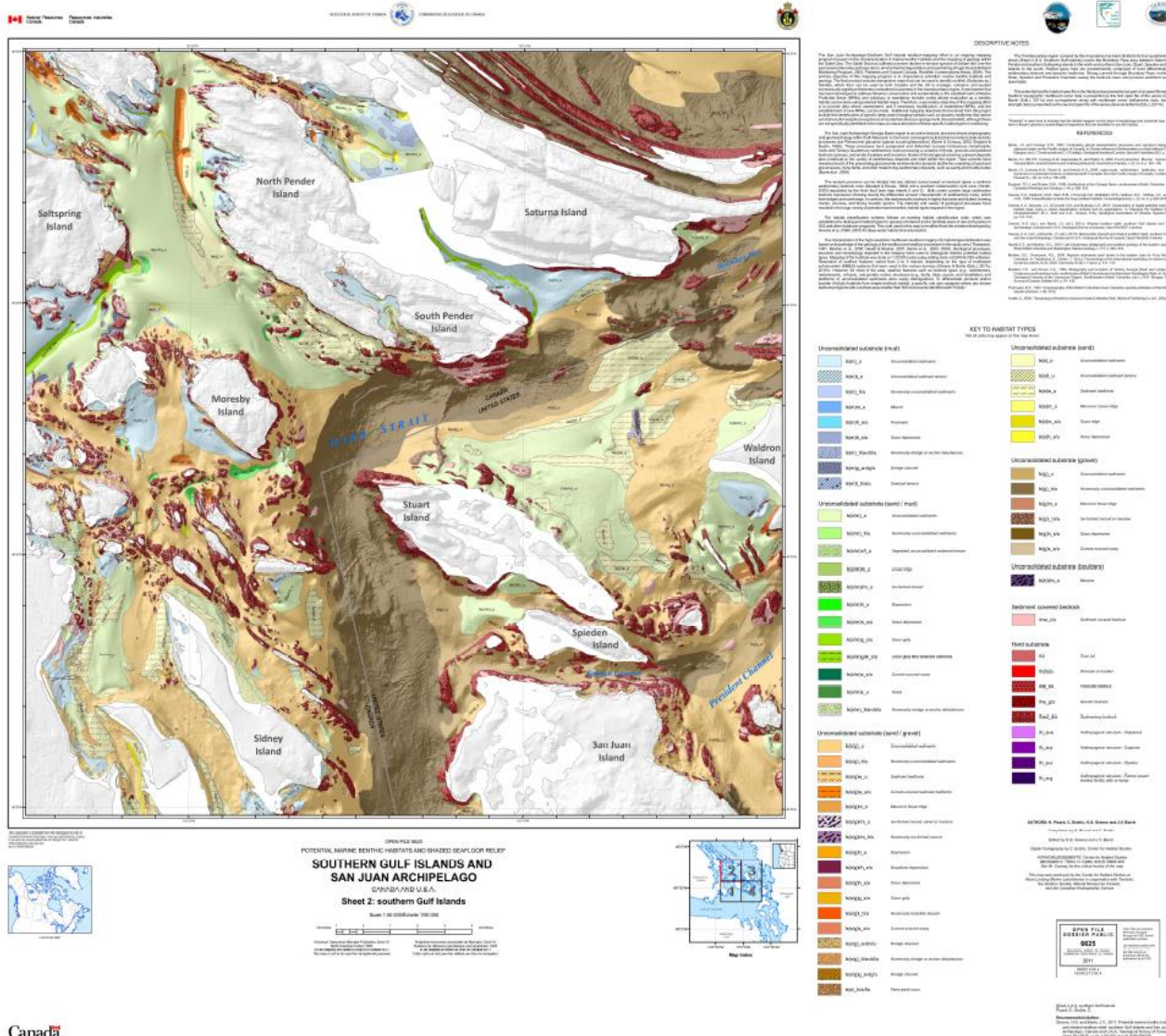
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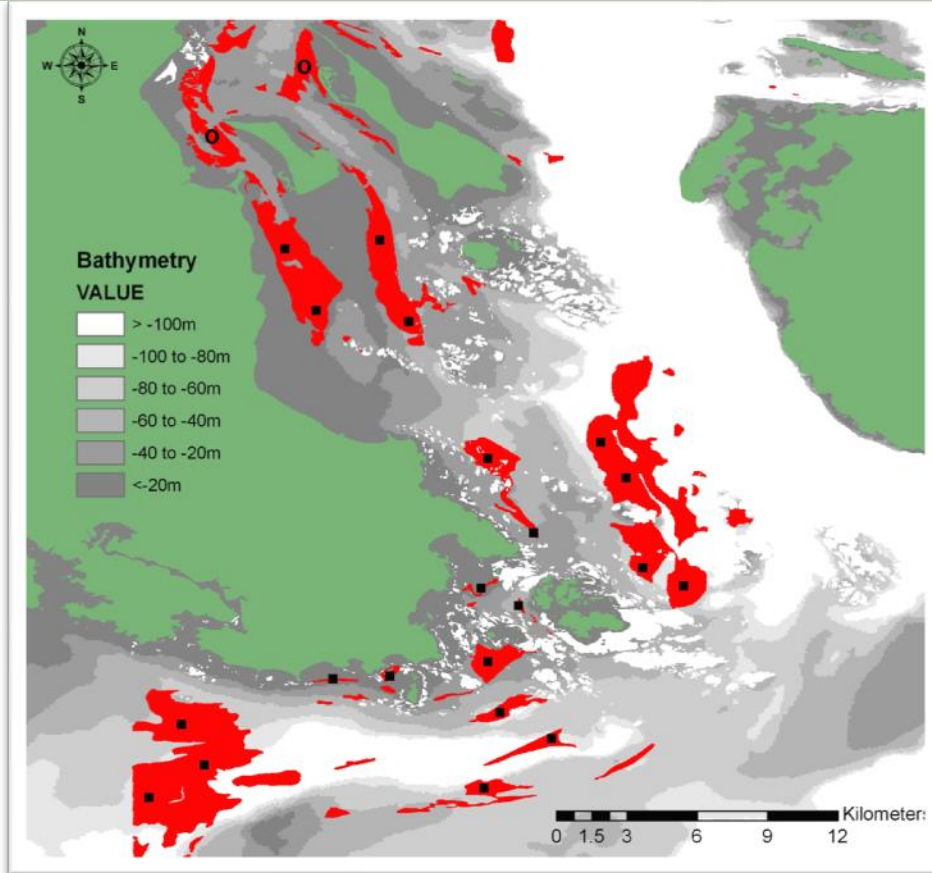
# Potential marine benthic habitats

## Sheet 2: Southern Gulf Islands



Greene & Barrie 2011. Geological Survey of Canada.

# Potential Pacific Sand Lance (PSL) benthic habitat



# Pacific Sand Lance prey and their habitats influence marine bird distributions

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Photo from Gary Kaiser's book "Lords of the British Columbia's Fjords"  
Mark Cunningham



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# Marbled Murrelet juvenile with PSL

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# Breeding Rhinoceros Auklets with PSL



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# Common Murre dad feeds his young a sand lance

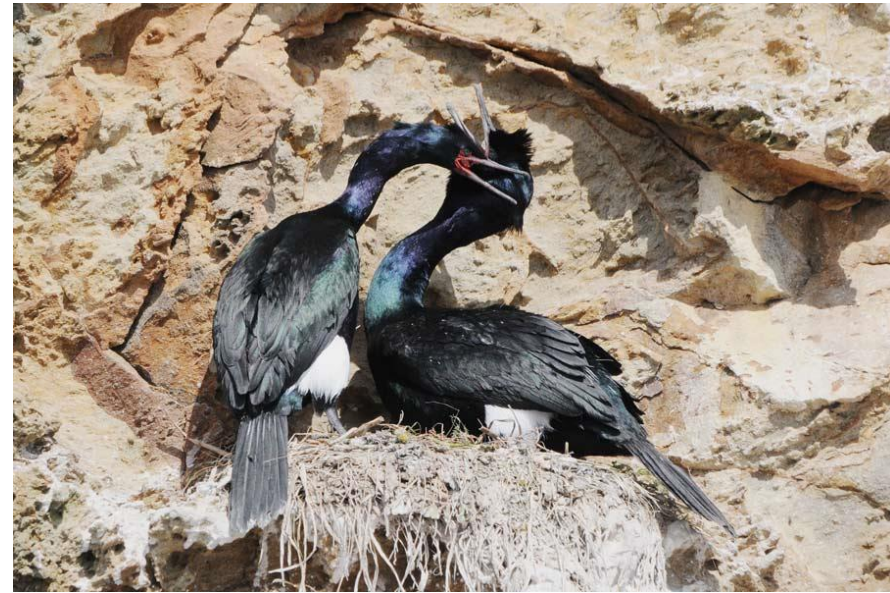
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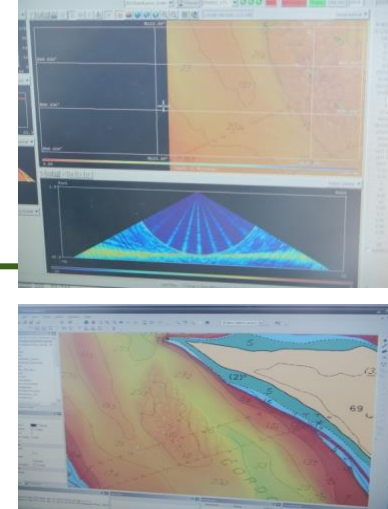
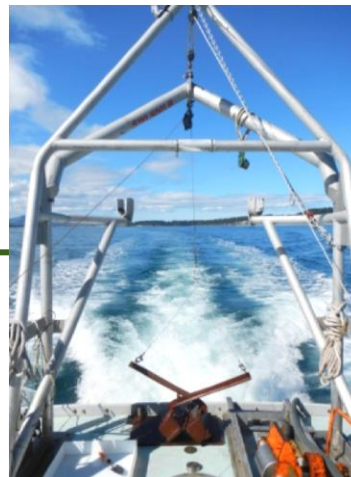
# Other locally breeding colonial seabirds which depend upon PSL



# Heerman's Gulls: International visitors in the late summer and fall seek PSL

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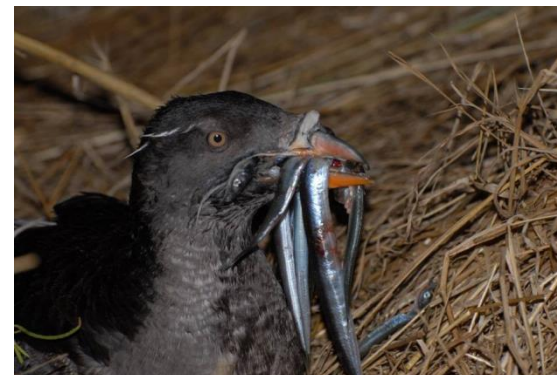


## CHS/CCG/EC/OSD/NRC Collaboration

Title: Validation of Pacific Sand Lance presence in sub tidal sand wave habitats.

Vessel: Otter Bay; Dates: 9-11 April 2013

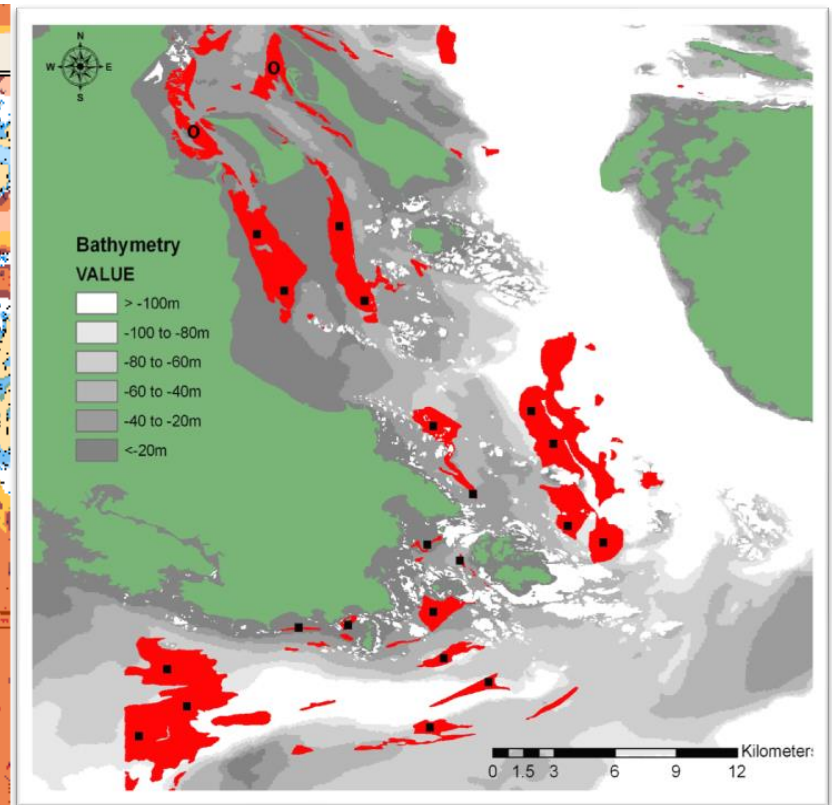
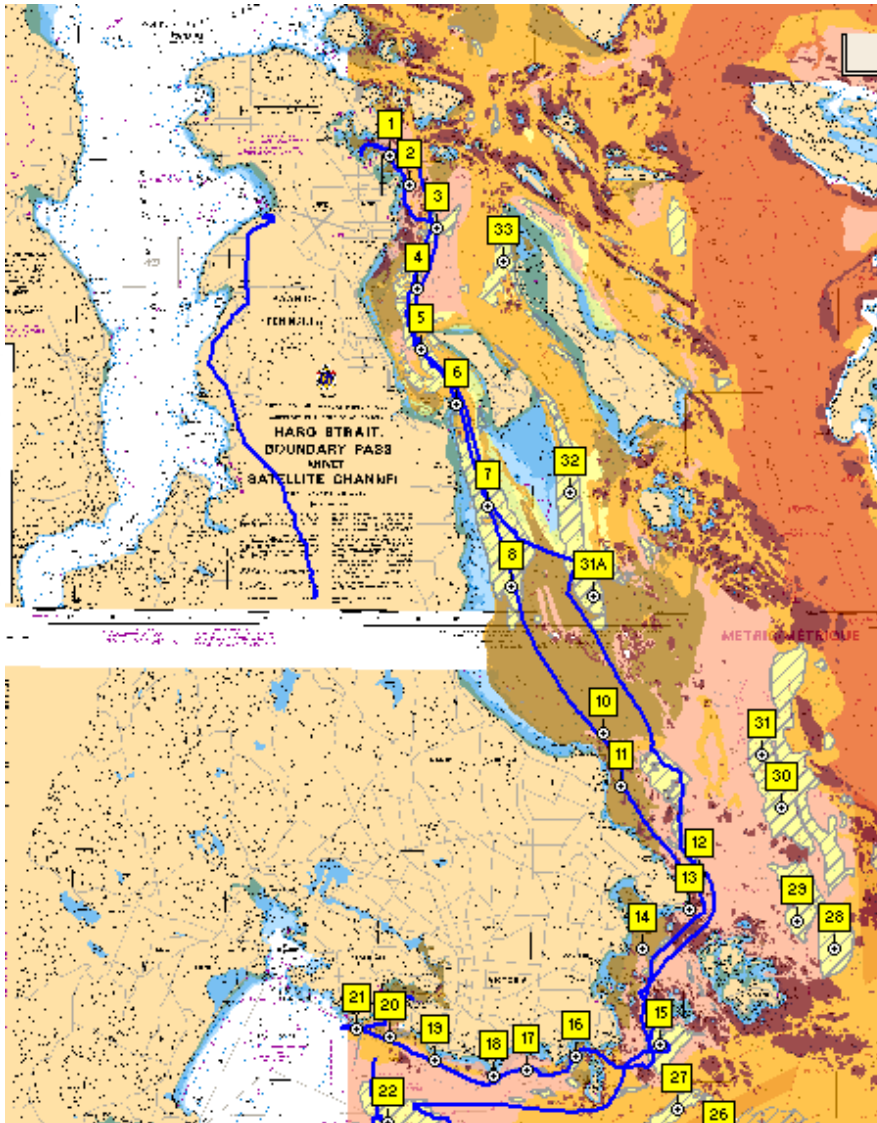
Location: Cordova Channel and Sidney Channel, British Columbia, Canada



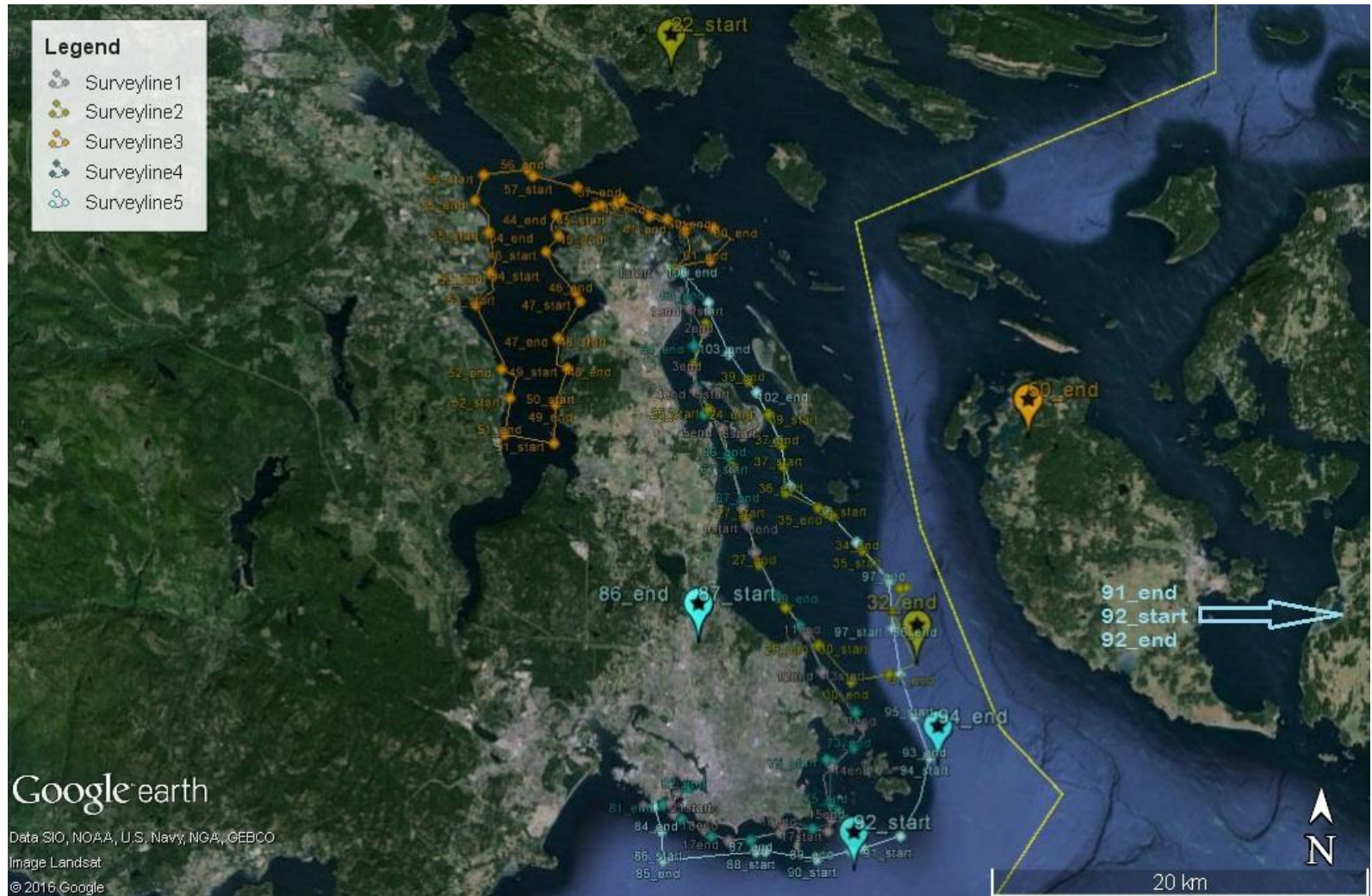
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# Marine bird survey and benthic grab sampling routes 2015-2016

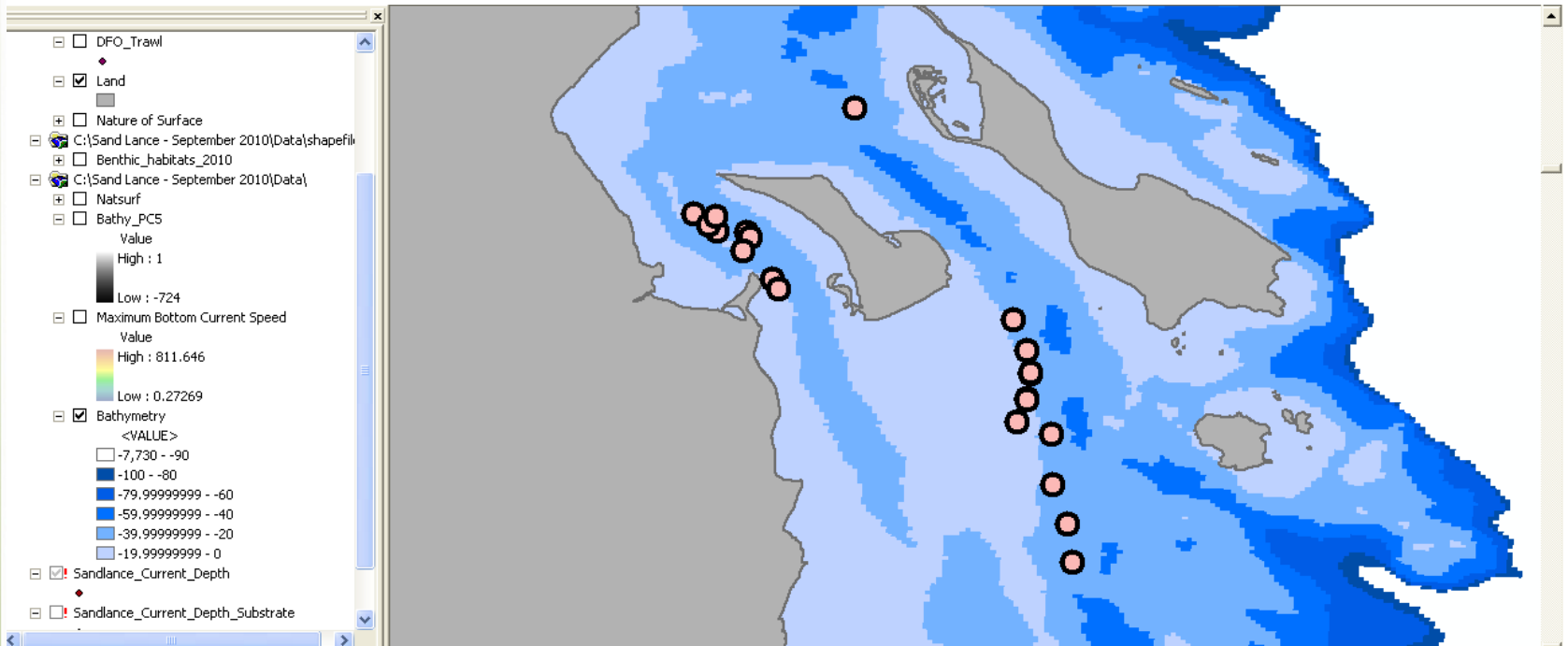


# Marine bird survey and benthic grab sampling 'control' and 'experimental' routes 2015-2016.

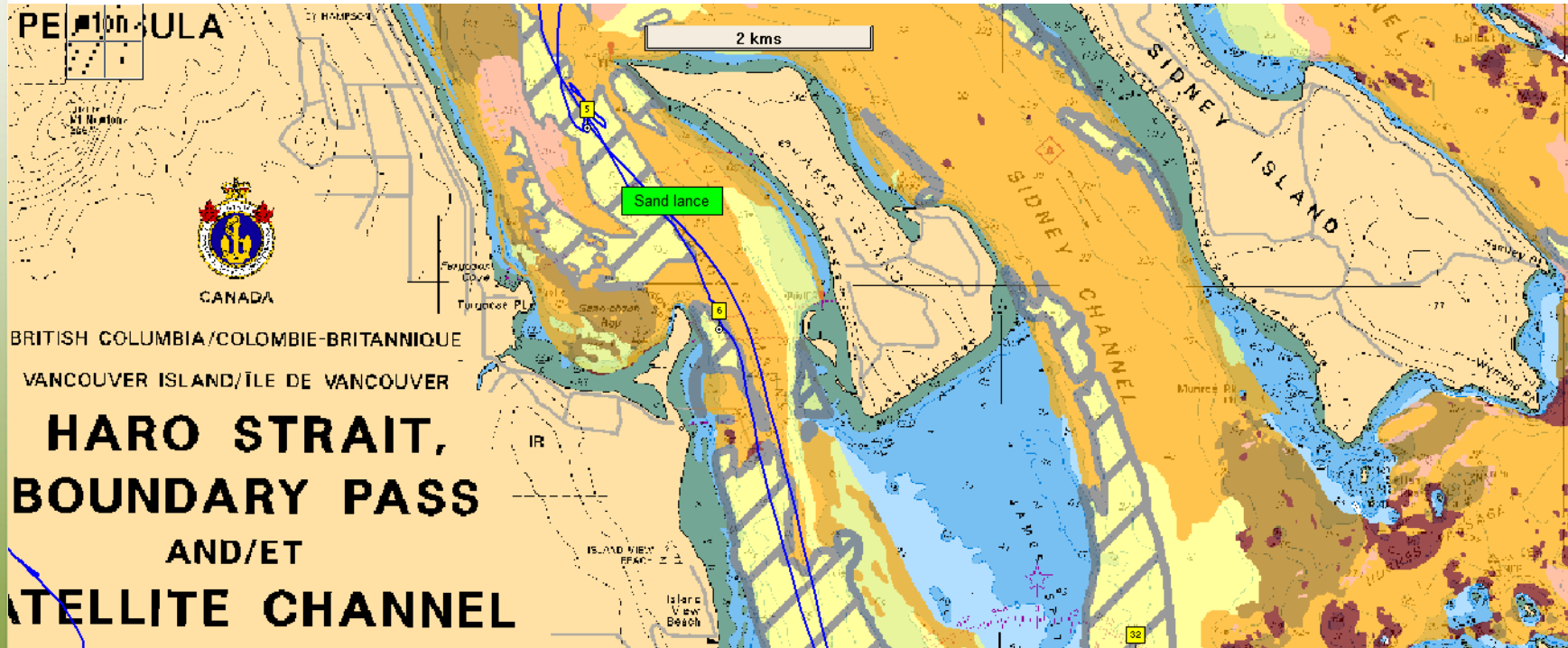




# Positive locations for PSL: All in Sidney Channel IBA



# PSL near James Island 4 Nov 2015



# PSL near James Island 4 Nov 2015



# PSL diet: copepods, Cirreped cyprids...

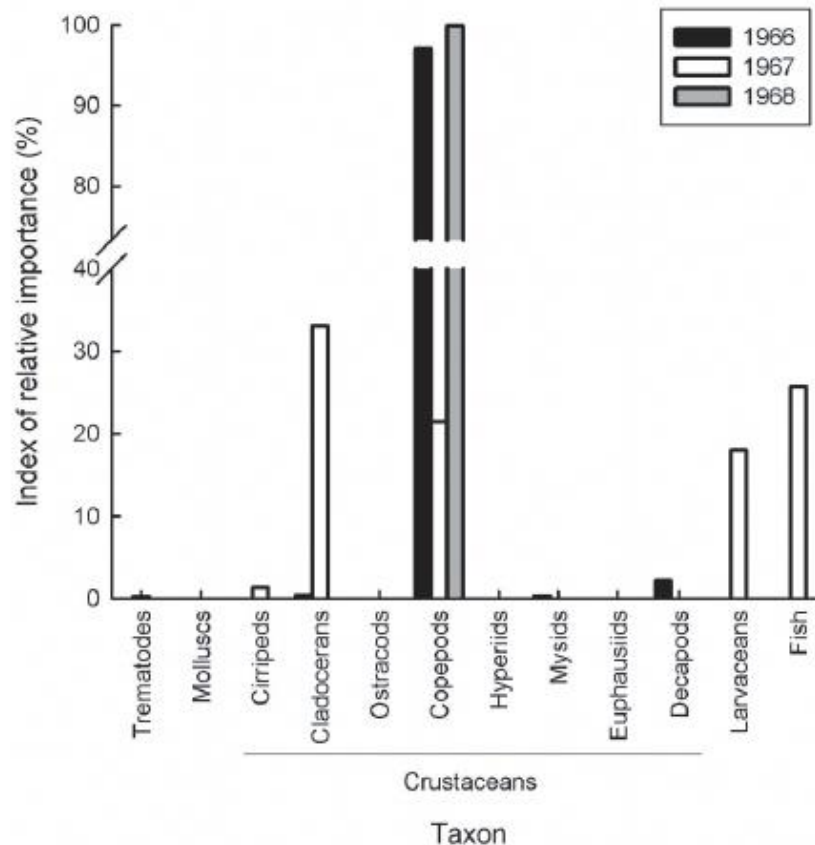


size range 0.3mm – 3.8mm



# Diet of the Pacific Sand Lance (*Ammodytes hexapterus*) in the Salish Sea, British Columbia, in the 1960s

J. MARK HIPFNER<sup>1, 3</sup> and MOIRA GALBRAITH<sup>2</sup>



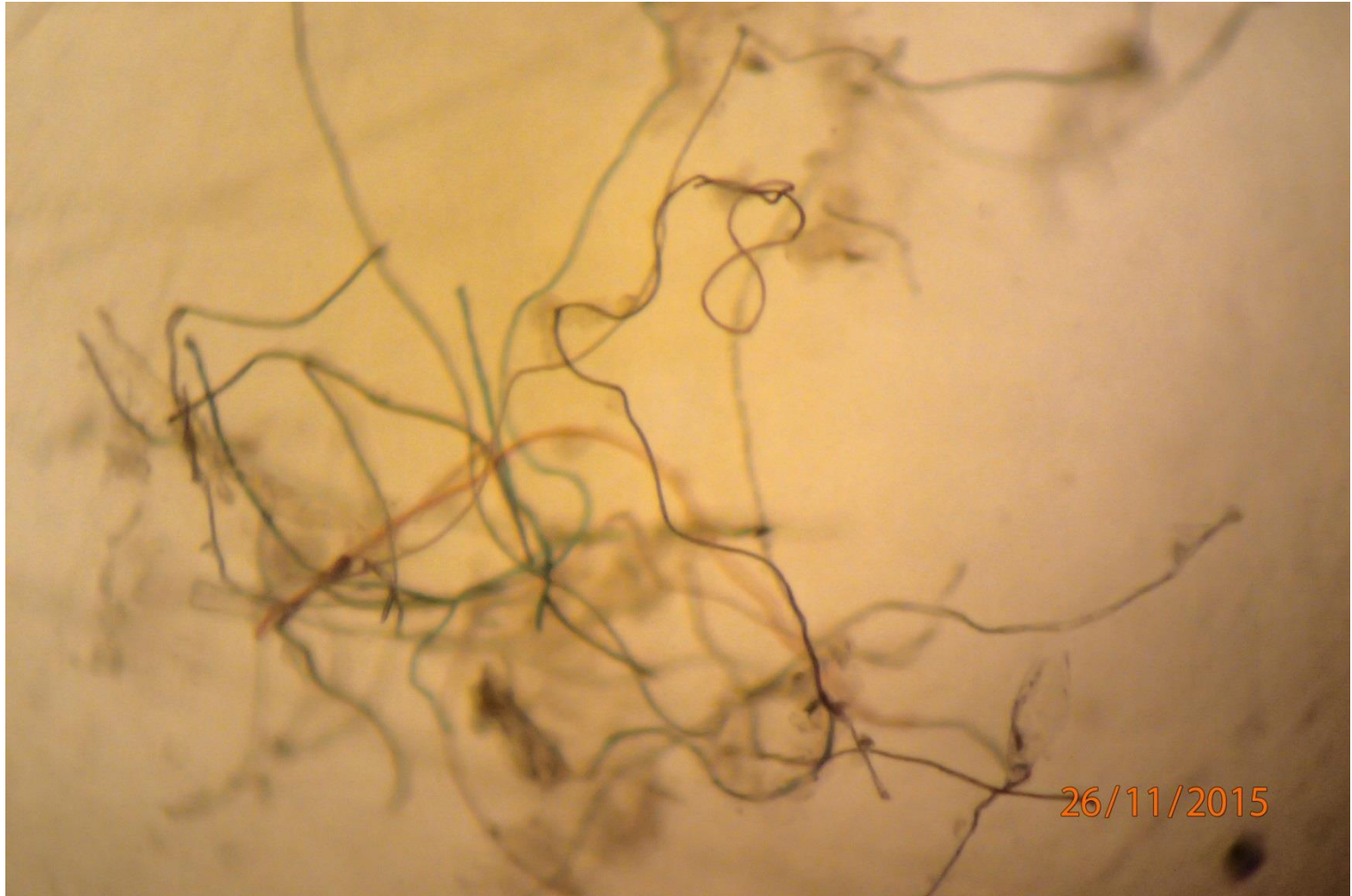
**Similar  
current and  
historical  
PSL diets**



# Microplastics in PSL stomachs

## Example: 4 Nov 2015 near James Island, BC

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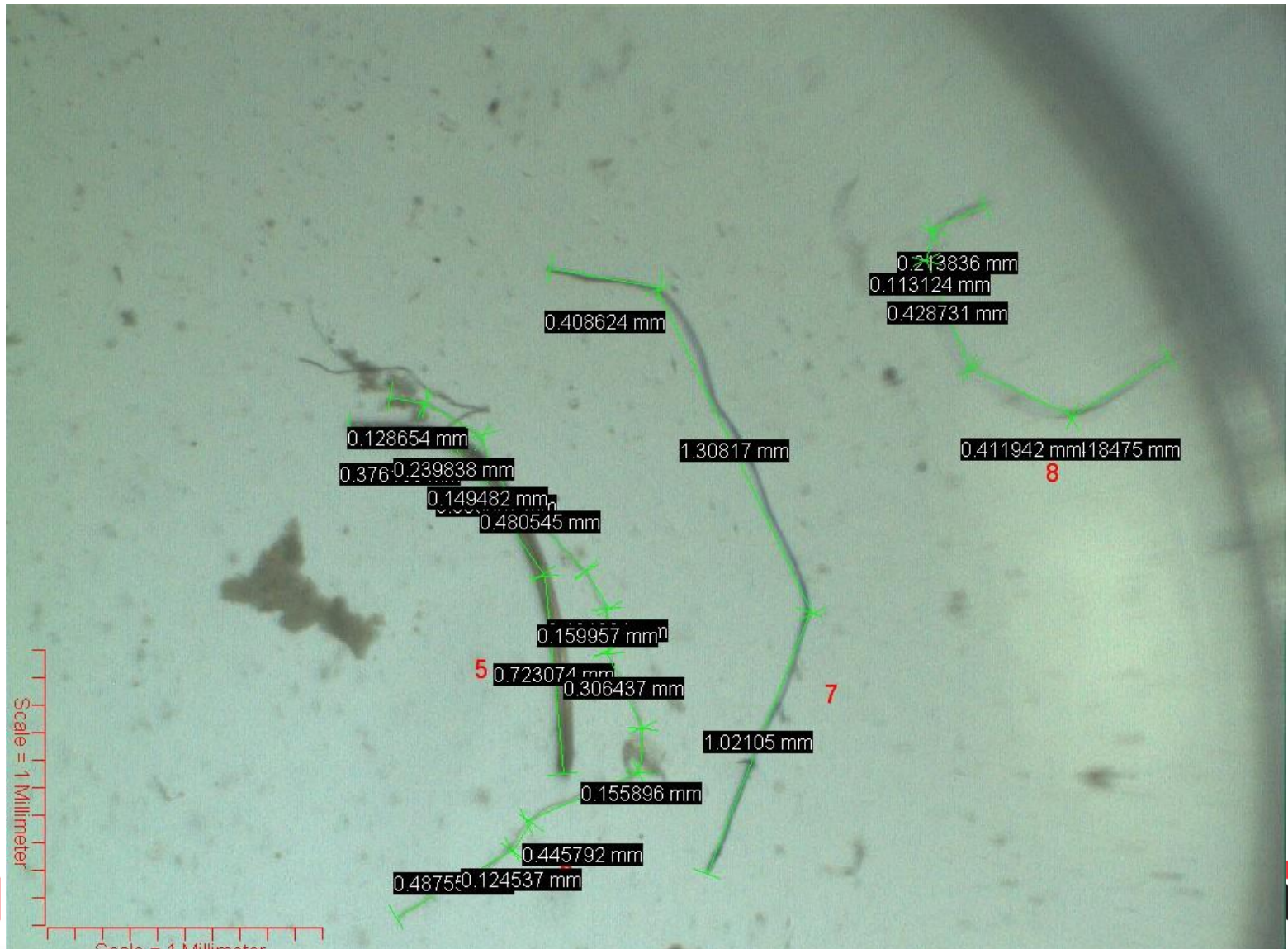
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# Measurements of plastic filaments



# Microplastic filaments in PSL

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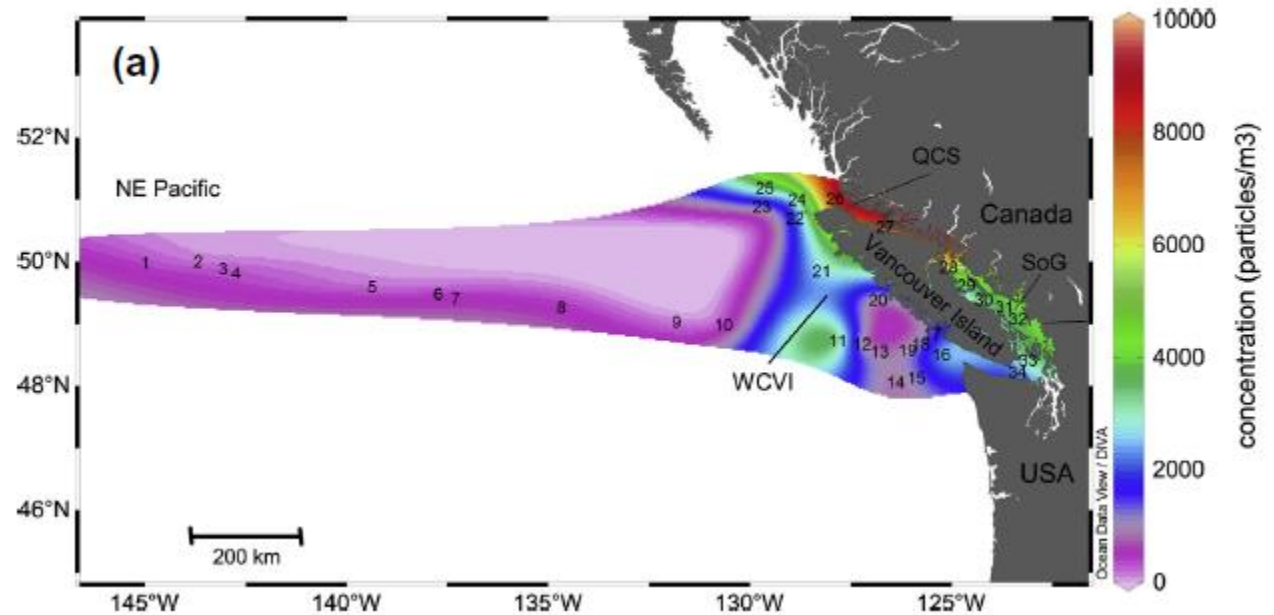
- PSL 65mm - 117mm
- 85 % (17/20) of PSL contained colored plastic filaments
- Mean filament length 2.14 mm (0.59 mm to >10mm, subsample n = 38 pieces).
- 1 - 63 pieces per fish (grand total of 211 filaments)





# High microplastics in the Salish Sea

J.-P.W. Desforges et al./Marine Pollution Bulletin 79 (2014) 94–99



- large concentrations of plastic filaments (2877/m<sup>3</sup>)
- 0.1mm - 0.5mm (42%) 0.5mm - 1mm (27%) >1mm (31%)



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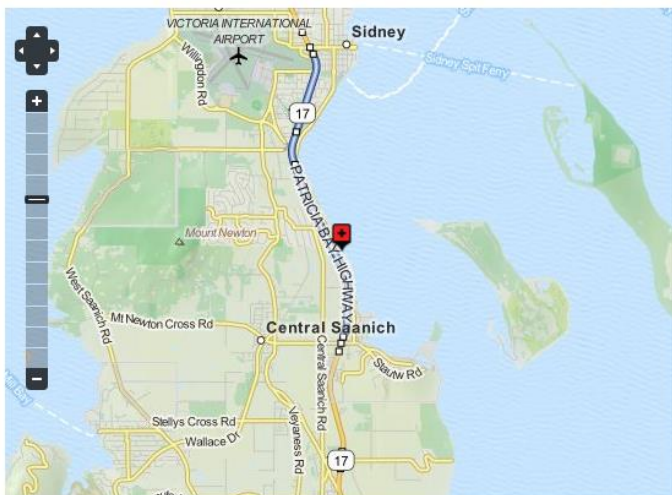
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# BAZAN BAY Wastewater outfall is in the IBA

<http://crdcommunitygreenmap.ca/location/saanich-peninsula-wastewater-treatment-plant>

## Saanich Peninsula Wastewater Treatment Plant

The Saanich Peninsula Treatment Plant serves North Saanich, Central Saanich and the Town of Sidney as well as the Victoria International Airport, the Institute of Ocean Sciences and the Tseycum and Pauquachin First Nations communities. The plant discharges secondary treated wastewater through a multi-port outfall into Bazan Bay about 25 metres below sea level and almost 1.6 kilometres offshore. Monitoring includes testing for priority substances every three months and for nutrients every month, checking surface water quality monthly, studying the seafloor and the health of organisms living near the outfall every four years, and regular analysis of wastewater to ensure compliance with performance parameters. The quality of the biosolids produced at this treatment plant is monitored on a monthly basis. For more information please see the Saanich Peninsula Treatment Plant 2011 Annual Report.



### Region:

- Central Saanich

### Location type:

- Waste Water Treatment Plant

### Address:

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# Conclusion

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- High densities of plastic in the guts of a key forage fish in an Important Bird Area indicates the large potential for transfer of microplastics into the food web to upper trophic levels.



J.Ferwick Lansdowne, Birds of the West Coast, Vol. 1, 1976, M.F.Fehey Pub. Ltd., Toronto



# Acknowledgements

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- CCG 'Otter Bay' Captain Al Keene
- CHS Craig Lessels, Dave Jackson
- EC Greg Jones
- NRCan Greg Middleton
- 'Misty Lady' Captain Bruce Evans
- EC CWS & WRD \$

