

Bright Ideas – Shining a  
Light on Selectivity



Dan Watson (UK)





SafetyNet  
TECHNOLOGIES



Scottish Government  
Riaghaltas na h-Alba  
gov.scot

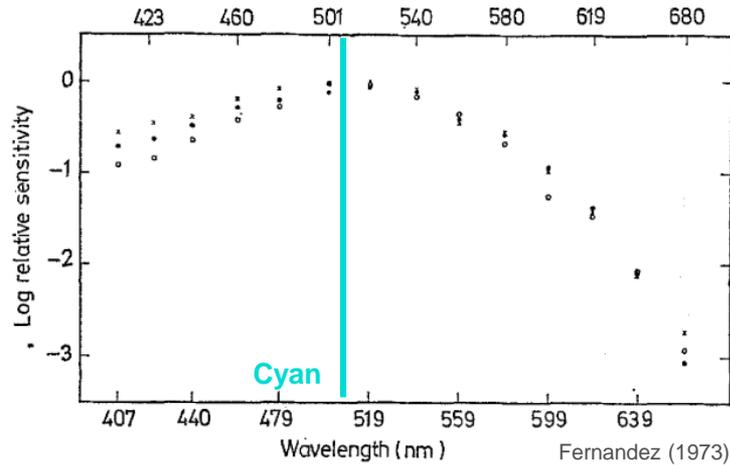
**marinescotland**



# FISH & LIGHT

# Munida

Model species *Pleuroncodes planipes*



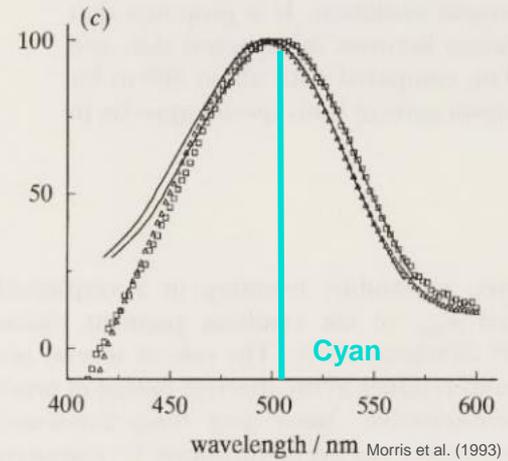
Peak sensitivity

523 & 503 nm  
(night) (day)



# Squid

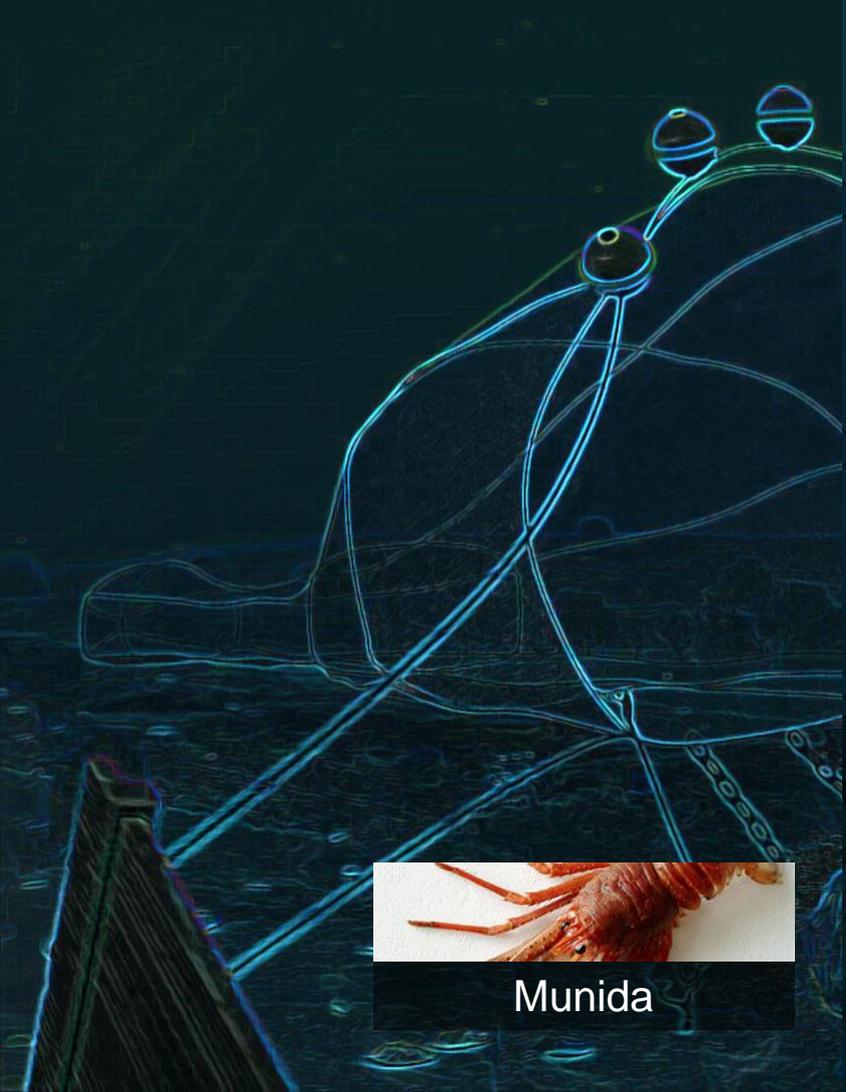
Model species *Loligo forbesi*



Peak sensitivity

494 nm

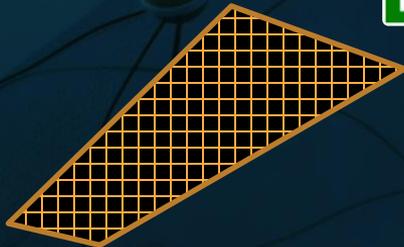




Munida



Squid



Munida



Squid

Attract or Repel?



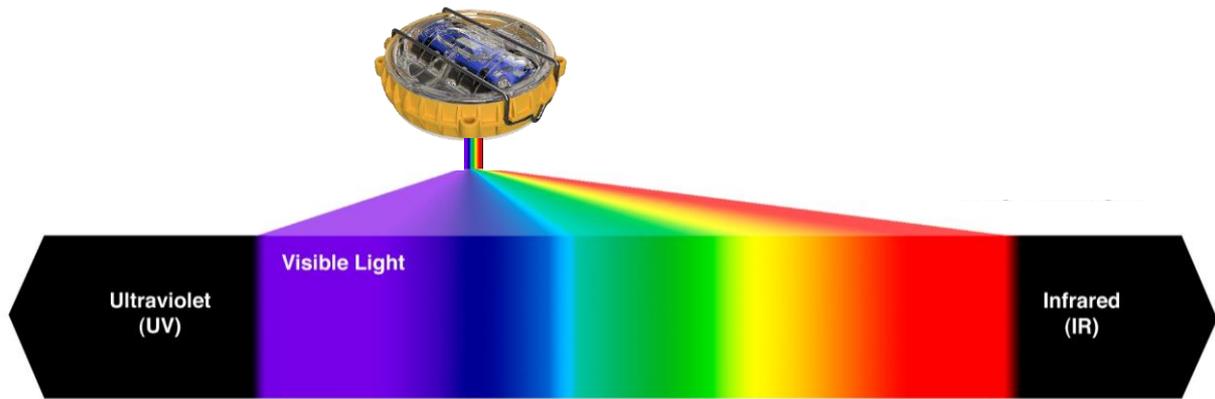
**PISCE**

**S**

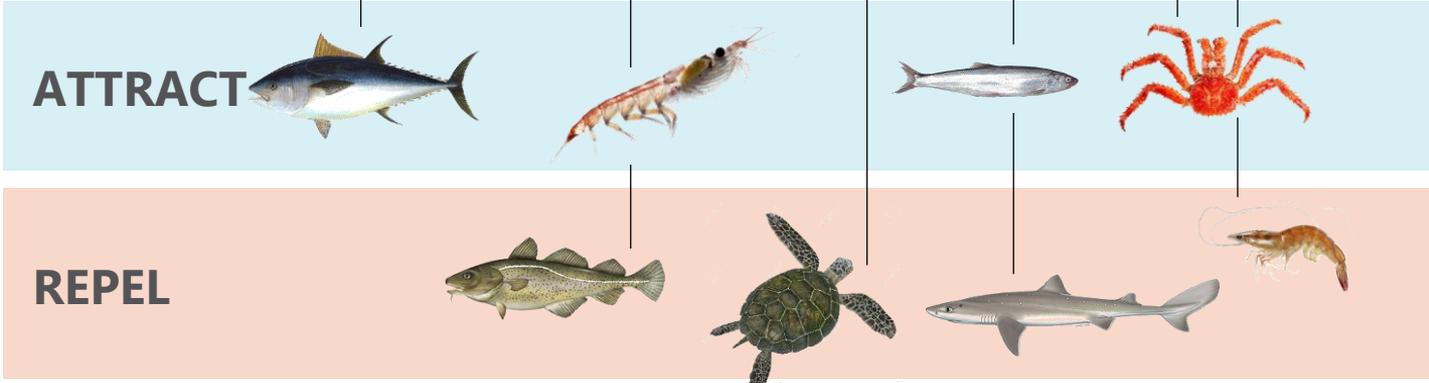


Patent filed June 2018

**Kit of 10x  
PISCES  
attached to net**



(White) 400 nanometers 500 nanometers 600 nanometers 700 nanometers





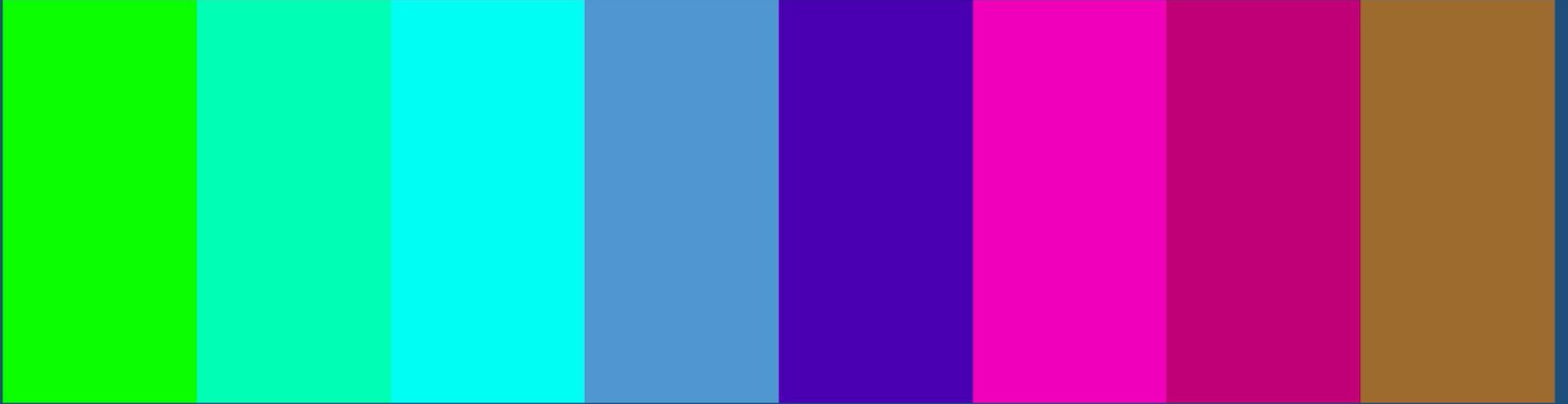
**BYCATCH...**

**REDUCTION**

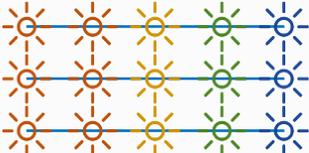
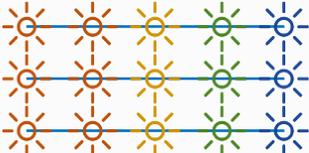
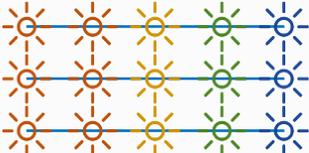
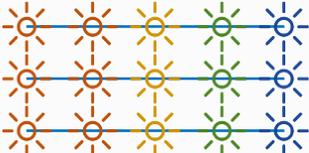
*Stephen Jones ODFW*

*Stephen Jones ODFW*

# Light selection





<h2>Our Involvement</h2> <p>The DiscardLess project (WP 3 Task 3.4 – Development of Innovative Gear) has seen us building a range of light emitting devices across different geometries. We have been experimenting with material selection, light sources and how to deploy these devices in different gears.</p> <th><h3>• Nodal</h3><ul style="list-style-type: none"><li> Discreet nodal unit</li><li></li><li></li></ul><th><h3>Primary Focus</h3><ul style="list-style-type: none"><li><h4>• Linear</h4><ul style="list-style-type: none"><li> Assembly of nodal units</li><li> LED /Fibre string/chain</li><li> Programmable LED chain</li></ul></li></ul><th><h3>Stretch Goal</h3><ul style="list-style-type: none"><li><h4>• Area</h4><ul style="list-style-type: none"><li> Assembly of linear units</li><li> Discrete EL/OLED panel</li><li> Sophisticated EL/OLED panel</li></ul></li></ul></th></th></th>	<h3>• Nodal</h3> <ul style="list-style-type: none"><li> Discreet nodal unit</li><li></li><li></li></ul> <th><h3>Primary Focus</h3><ul style="list-style-type: none"><li><h4>• Linear</h4><ul style="list-style-type: none"><li> Assembly of nodal units</li><li> LED /Fibre string/chain</li><li> Programmable LED chain</li></ul></li></ul><th><h3>Stretch Goal</h3><ul style="list-style-type: none"><li><h4>• Area</h4><ul style="list-style-type: none"><li> Assembly of linear units</li><li> Discrete EL/OLED panel</li><li> Sophisticated EL/OLED panel</li></ul></li></ul></th></th>	<h3>Primary Focus</h3> <ul style="list-style-type: none"><li><h4>• Linear</h4><ul style="list-style-type: none"><li> Assembly of nodal units</li><li> LED /Fibre string/chain</li><li> Programmable LED chain</li></ul></li></ul> <th><h3>Stretch Goal</h3><ul style="list-style-type: none"><li><h4>• Area</h4><ul style="list-style-type: none"><li> Assembly of linear units</li><li> Discrete EL/OLED panel</li><li> Sophisticated EL/OLED panel</li></ul></li></ul></th>	<h3>Stretch Goal</h3> <ul style="list-style-type: none"><li><h4>• Area</h4><ul style="list-style-type: none"><li> Assembly of linear units</li><li> Discrete EL/OLED panel</li><li> Sophisticated EL/OLED panel</li></ul></li></ul>
<h3>Enables</h3>	Single point choice	Choice of orientation/ shape with length	Coordinate system/plane





## DiscardLess Matrix – Controllable Light Tentacles

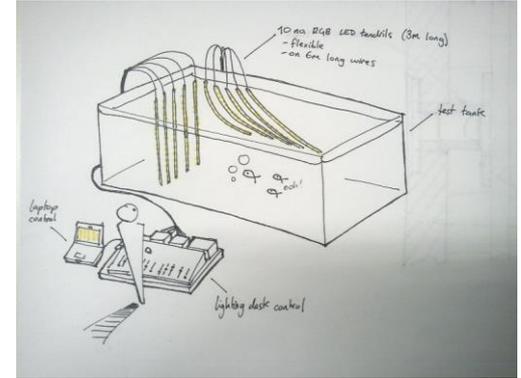


SNT built a controllable light setup for tank testing of fish response to light. Each tentacle can be controlled to produce different colours and intensities of light.

The current setup is controlled by a DMX light board, which uses sliders (similar to theatrical equipment). However, the unit can also be controlled via a laptop to programme in temporally-defined patterns.

There are 10 tentacles which are each 3m long, waterproofed with RGB LEDs spaced 10cm apart along the length.

- Bespoke Electronics & Assembly
- User Interface controller design
- Waterproofing
- Component sourcing
- Specification-led design

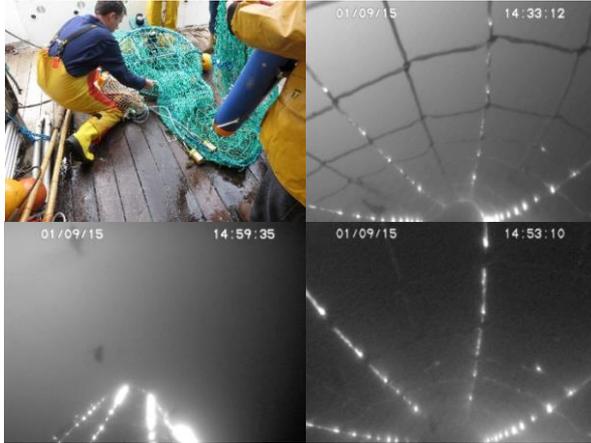


Assembly of LED tentacles (individually colour/intensity configurable)





## DiscardLess Fibre-Threaded SMP & LED Light Lines



### Fibre-Threaded SMP

SNT hand-wove 1.5mm optical, side-emitting fibres into a section of SMP (vertical and horizontal grid), which was then illuminated using a high powered light owned by Marine Scotland, before being mounted in the extension of the trawl.

Some interesting points became apparent concerning the directionality of the light versus its visibility to the camera.



Fibre-optic  
(LED lit)

### LED Light Lines

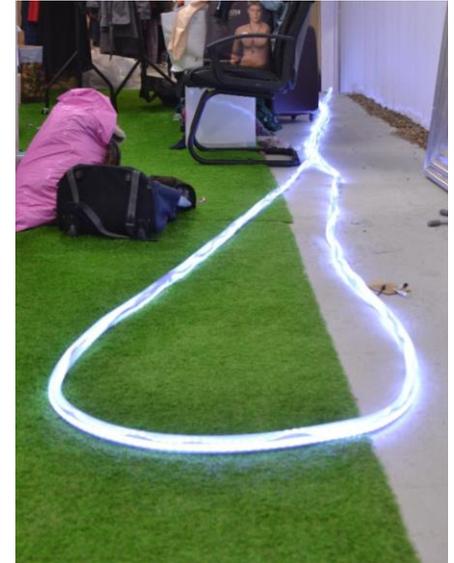
As well as the fibre-optic light line, SNT built a 30m length of LED-illuminated “rope” that could be woven into the trawl.

We have now built a fully programmable shorter length of “rope”, which is around 4m in length, as a proof of concept (pictured below). We can build lengths from 0.5-30m .

The “rope” lights can be programmed for colour, patterns and intensity, and are powered by a Marine-Scotland-supplied battery unit.



Programmable LED chain





## DiscardLess Fibre-Optic Light Lines



A pressure vessel was built with a window for a camera unit on one side and two smaller windows to enable the broadcasting of light into two, large diameter (8mm) solid, side-emitting fibre-optics.

The internal electronics comprised batteries, high power LEDs, a programmable camera unit and control circuitry. The light was focused with built-in plastic optics and heat was managed through heatsinks cooled by external water temperature.

The pressure vessel is designed to be submerged to 1000m, but has so far been tested to 300m.

- Bespoke Electronics
- Pressure vessel design & manufacture
- Material Selection & Machining
- LED selection
- Light fibre selection & sourcing
- Batch production



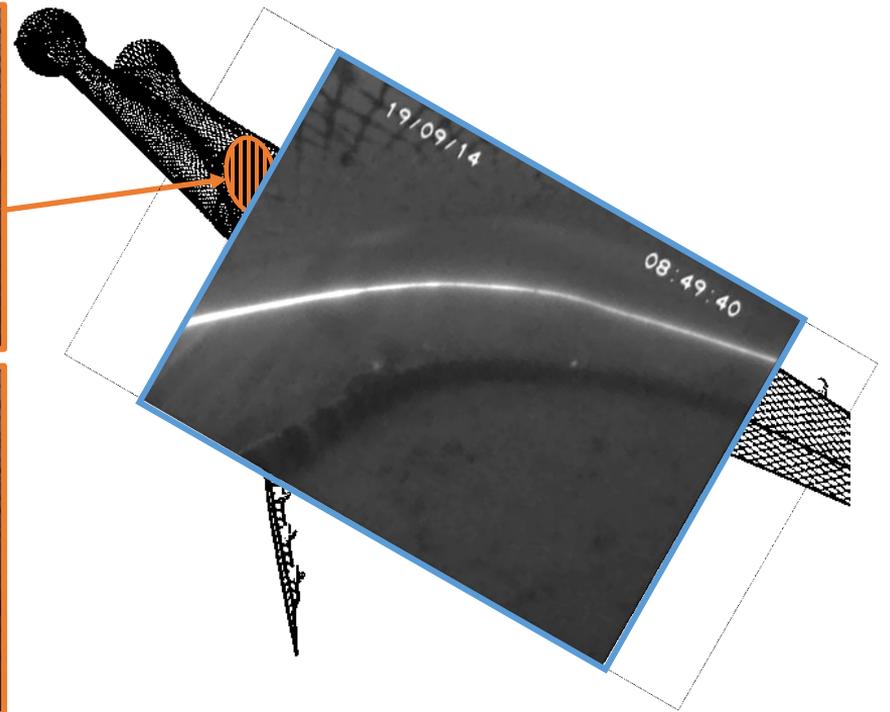
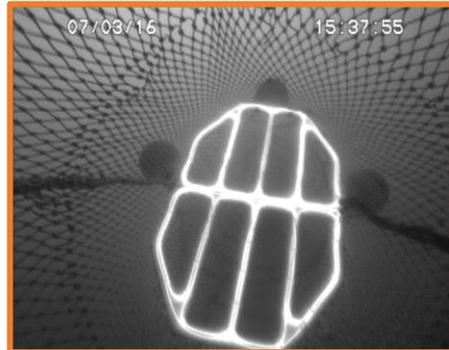
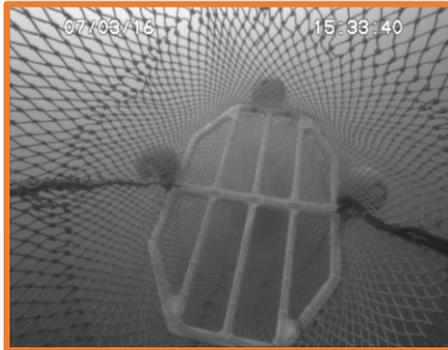
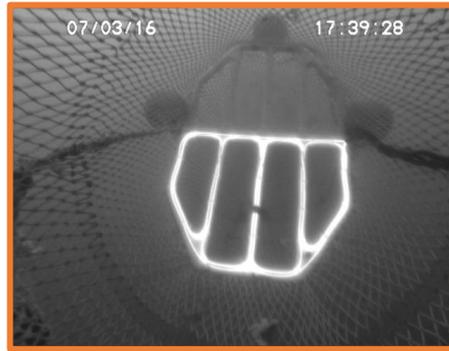
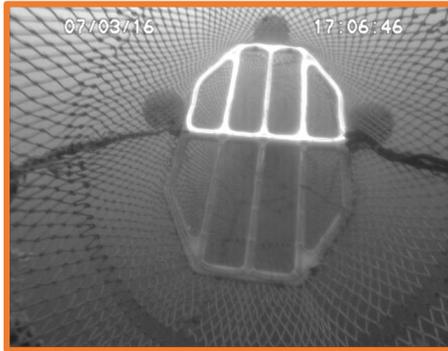
The goal was to test side-emitting fibres with programmable light-sources.

 Fibre-optic  
(LED lit)





# DiscardLess Illuminated Fishing Gears



A large school of barramundi fish is shown swimming in clear, bright blue water. The fish are densely packed and oriented in various directions, creating a sense of movement. The lighting is bright, highlighting the scales and fins of the fish. In the center of the image, the text "What's next?" is written in a bold, white, sans-serif font.

**What's next?**

Thanks for  
listening

