Use of Atlantium UV Technology for Control of Macrofouling in Industrial Cooling Water Systems

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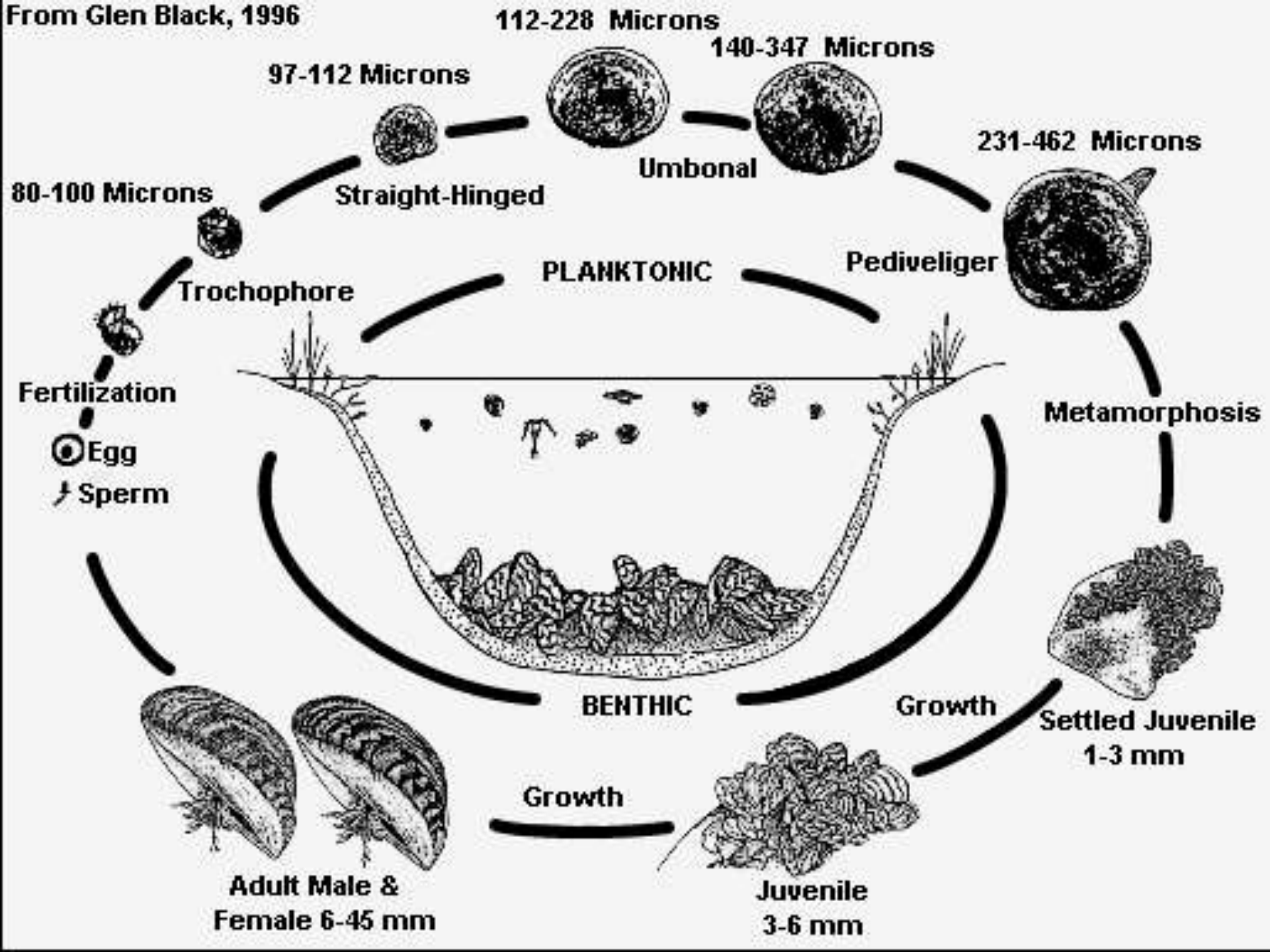
Atlantium
Illuminating Water Technologies

RNT CONSULTING INC

Macrofouling Dreissenid Mussels Zebra and Quagga

Risks Posed by Dreissenid Mussel Fouling

- Decreased flow in raw water systems
- Potential plugging of essential components
- Increased corrosion


From Glen Black, 1996
112-228 Microns
140-347 Microns
97-112 Microns
Umbonal
231-462 Microns
80-100 Microns
Straight-Hinged
Pediveliger
PLANKTONIC
Trochophore
Fertilization
Egg
Sperm
Metamorphosis
BENTHIC
Growth
Settled Juvenile
1-3 mm
Growth
Adult Male &
Female 6-45 mm
Juvenile
3-6 mm

Minimizing mussel fouling

- **Proactive**

  Aimed at veligers

  Does not allow growth of mussels in the system or on the surface protected

- **Reactive**

  Aimed at Adults

  Does allow mussels to grow in the system or on the surface. Established populations have to be eliminated periodically

Proactive UV Treatment

Background

Various experimental studies carried out in the nineties have shown that a dose of approx. 100 mW-s/cm^2 delivered by medium pressure lamps would prevent downstream settlement of dreissenid larvae

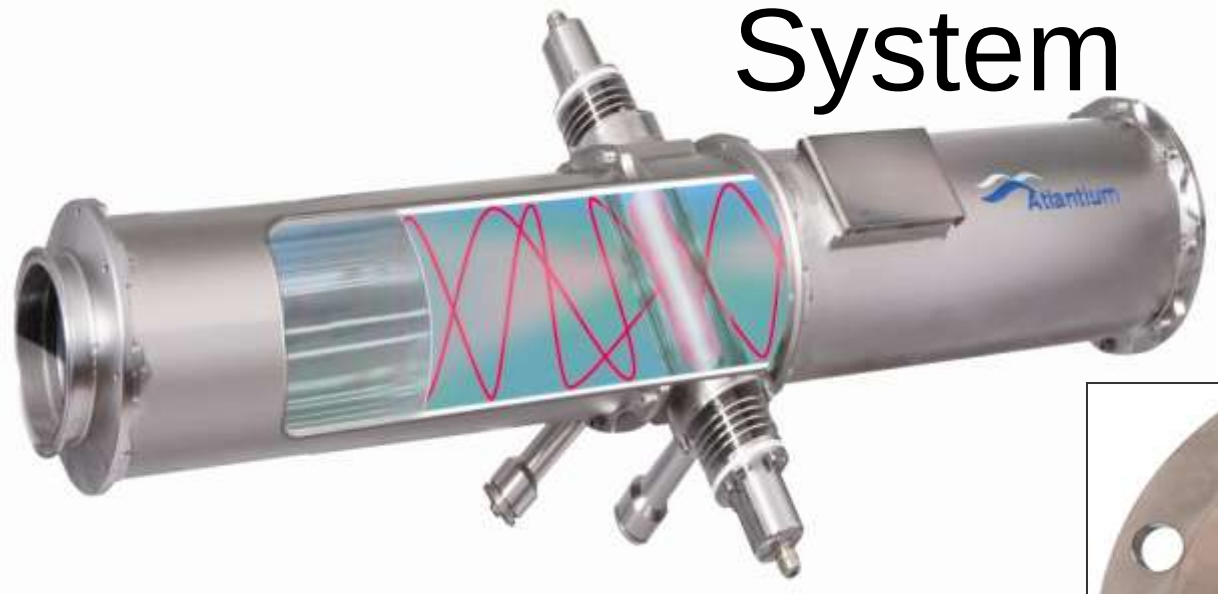
Lifestage Vulnerable to UV

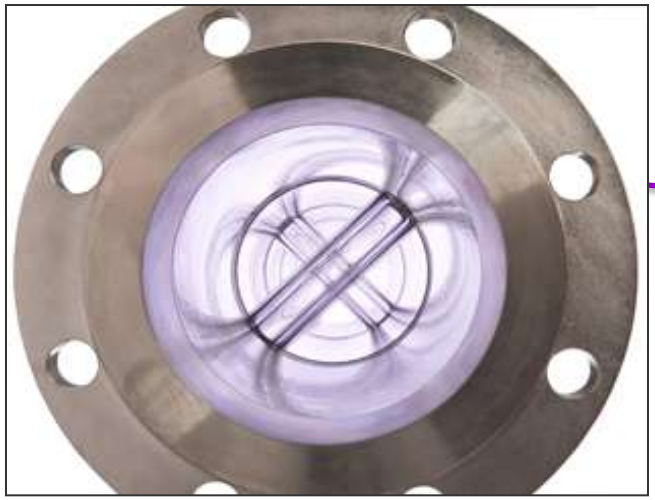
Quantification of minimum UV dose required for control of quagga mussel settlement – 2012 study

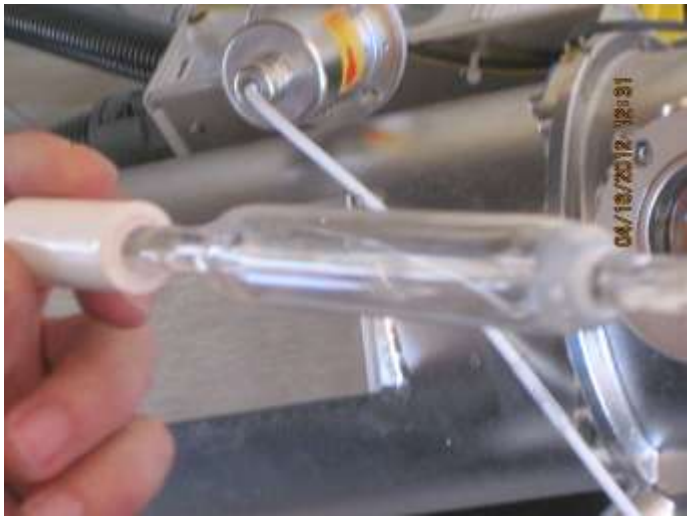
- Atlantium system with medium pressure lamps
- Raw Colorado River water with high density of live veligers; no in-line filter
- Volume treated - 7m^3/hr
- Comparison of settlement before and after UV light Treatment using different UV dose

3-month fouling
Sep – Dec 2009

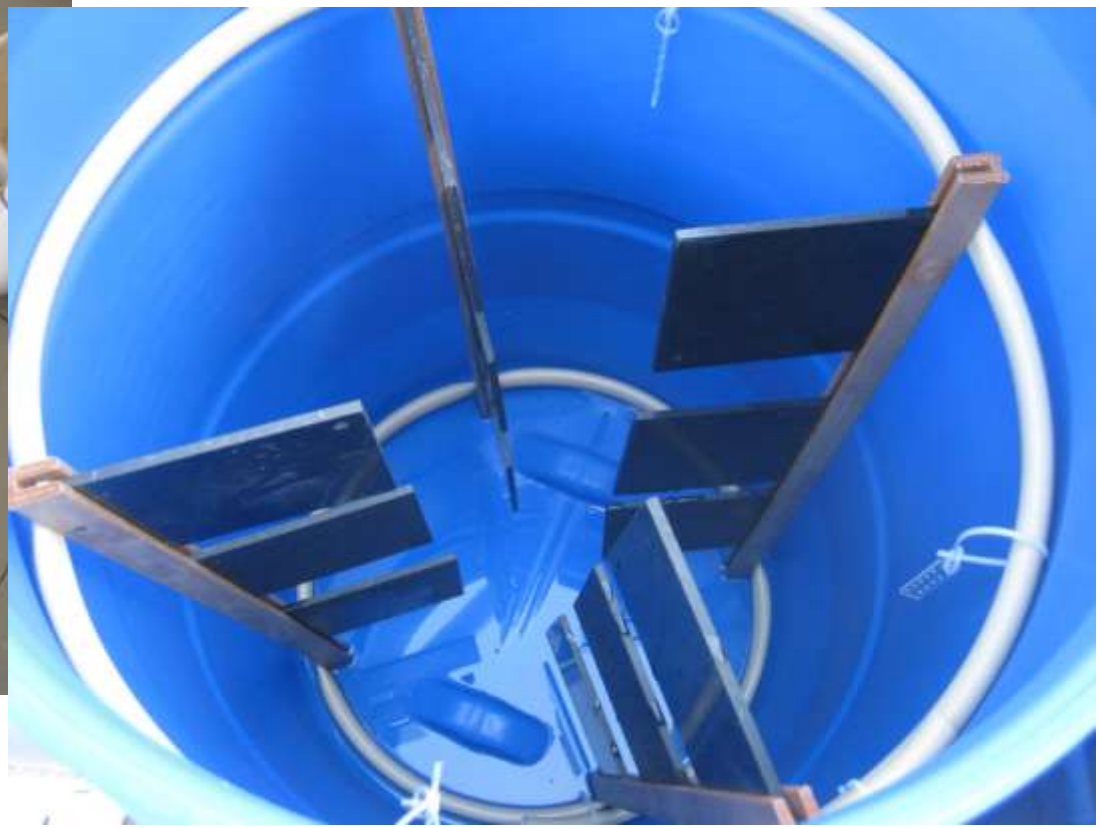
Atlantium Technologies UV System

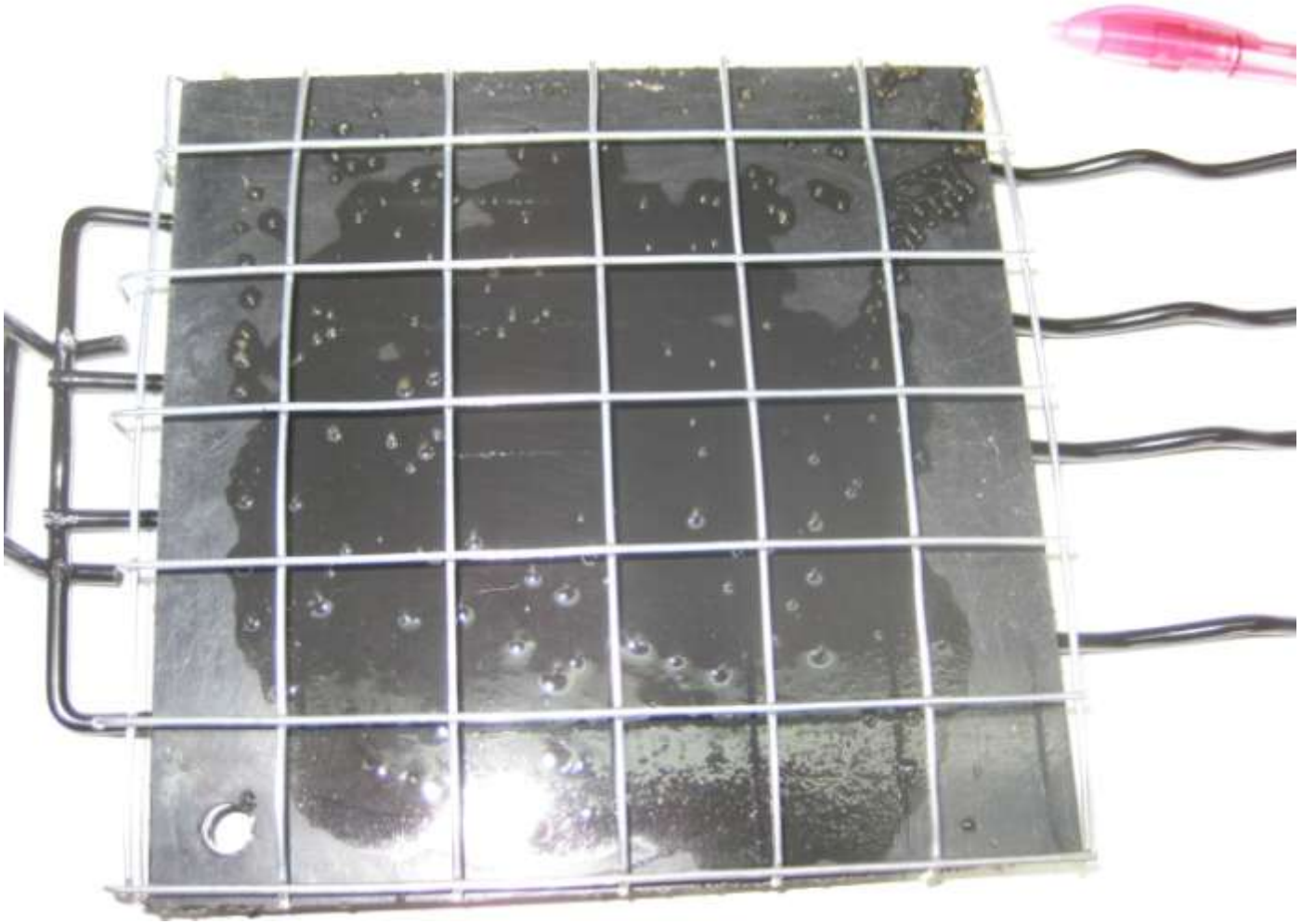


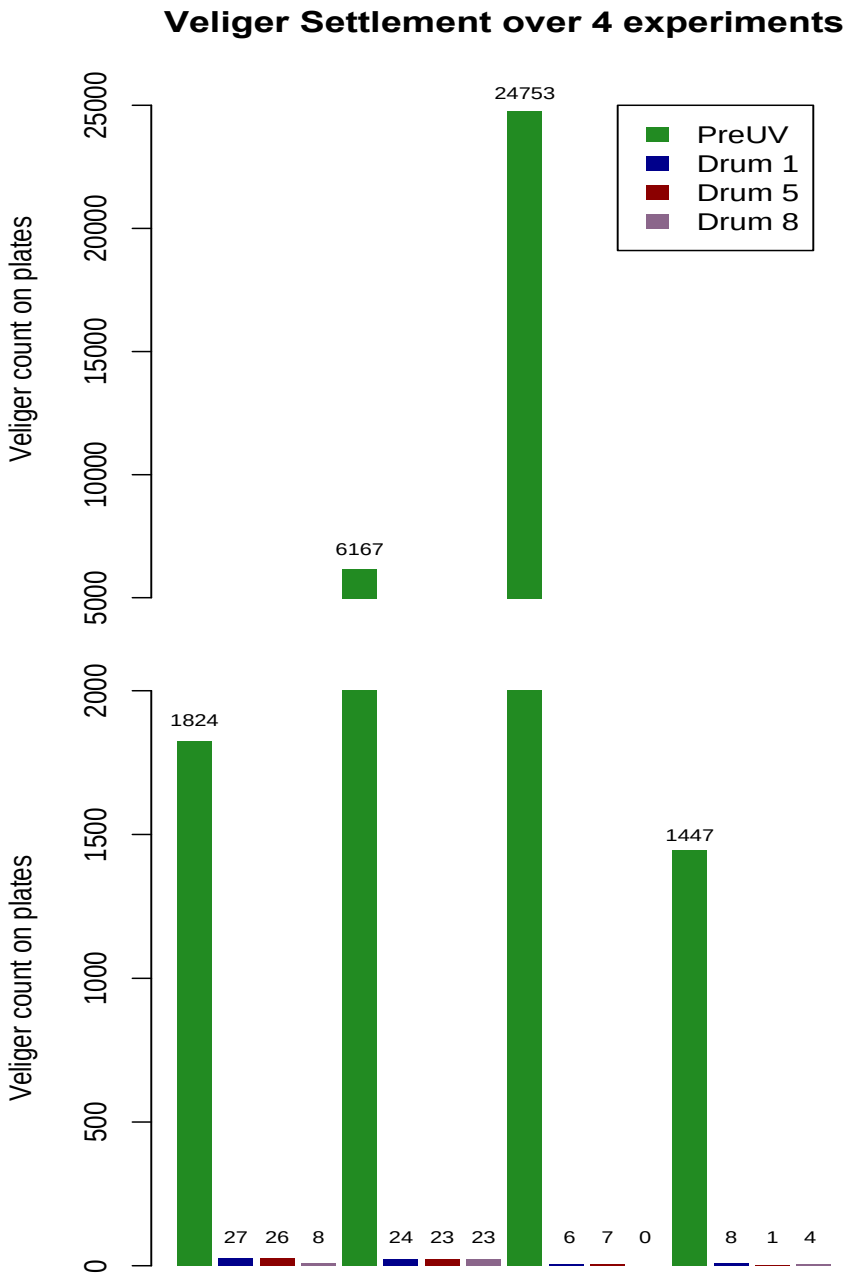


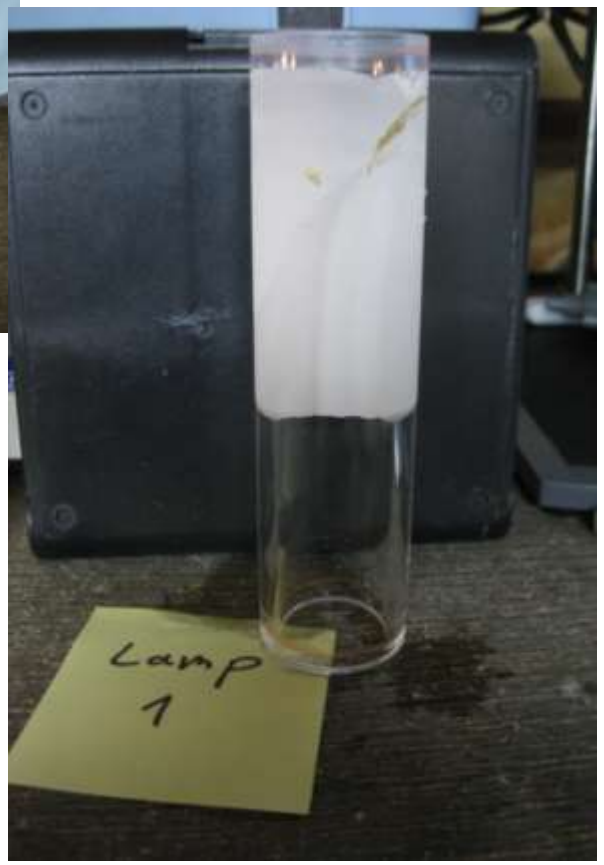


- UV dose can be changed through software, no hardware changes required
- Dose is maintained automatically even when UVT changes and when lamp performance declines
- Lower electrical consumption






Veliger Settlement over 4 experiments
Veliger count on plates
0
500
1000
1500
2000
5000
10000
15000
20000
25000
PreUV
Drum 1
Drum 5
Drum 8
1824
27
26
8
6167
24
23
23
24753
6
7
0
1447
8
1
4


Lamp
1

Assumed applicability to other macrofoulers – fresh water

- Asian clam larvae
- Snail larvae
- Larvae of colonial hydroids and bryozoans
- Golden mussel larvae

Environmental Criteria affecting the performance of UV

How well does your raw water transmit UV (various factors such as colour, hardness, presence of iron and total suspended solids)

Seasonal variation in above factors