Blow Lug (*Arenicola marina*) Survey Methodology

Equipment

Waterproofs + wellies
Life jackets
Handheld GPS (plus spare batteries)
0.5m^2 quadrat (3x3 gridded)
Weatherwriter clipboards
Gridded maps of intertidal zone
Co-ordinate sheet
Survey record sheets
Pencils
Mobile phone

Rationale

Blow lug (*Arenicola marina*) are an extremely important food source for birds and fish on the Severn Estuary, and are also popular as bait for sea anglers. We are currently assessing bait digging effort and potential environmental impacts throughout our district, and as part of this process we are quantifying and mapping lugworm beds.

The methodology for this survey is based around that used in a Wadden Sea study (Flach & Beuchema, 1994), although it was adapted slightly to fit the requirements of the IFCA and specific habitat. This research found that estimation of lugworm density from casts alone was most accurate to 7%, making it a time-efficient alternative to removing the worms from the sediment.

The data will be used to map the extents of the lugworm beds, assess and monitor stocks (ideally on a seasonal basis), and determine vertical zonation patterns in adults and juveniles.

Logistics and Practicalities

The timing of lugworm surveys will probably vary based on individual locations, although the best time will generally be at low spring tide. On the Severn the worm beds are still fully exposed at low neap tide, however this may not be the case elsewhere. Ideally you will work with the tides to survey the lower points at lowest tide, and then work upwards as the tide comes in.

If possible it's a good idea to survey specific beaches/locations within as short a space of time as possible (i.e. a few weeks), so that there are no discrepancies in the data due to seasonal variation in the population structure.

Mud can be a serious safety risk on this survey; always work in pairs, wear tight wellies and keep an eye on the tide. Also there is be a serious amount of walking involved, which is far more time consuming than the actual survey! The survey will progress much more quickly if you are able to use a vehicle such as a quad bike to move between transects on large beaches (check with relevant authorities).

The survey methodology is very straightforward, and could be carried out by volunteers with very little knowledge of marine biology.

Survey Methodology

1. The survey is based around a series of transect lines running perpendicular to the shoreline, with quadrat points at regular intervals along it. It is essential that you do a recce at each site to assess conditions and bed extents, then work out what you can feasibly manage.

For example: I started this survey at Berrow beach in Somerset, the beach is incredibly long and wide at low tide, however the lugworm only occur in a narrow belt fairly high on the shoreline before the serious mud

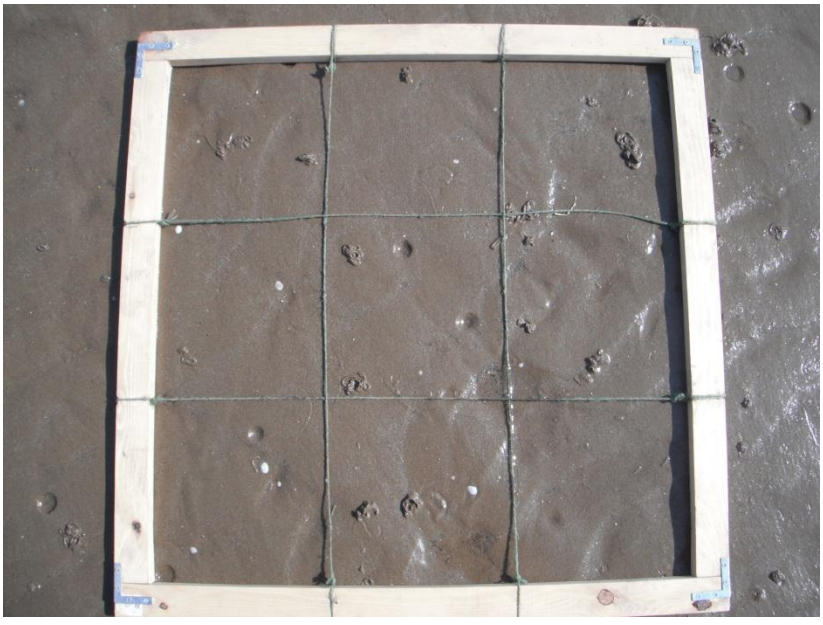
begins. Due to the size of the beach and the width of the worm beds we decided that transects 250m apart, with quadrats every 25m along them would provide sufficient data.

When you have settled on your resolution, make a grid on MapInfo/ArcGIS with the points running perpendicular to the shore. Map your survey points and extract the co-ordinates.

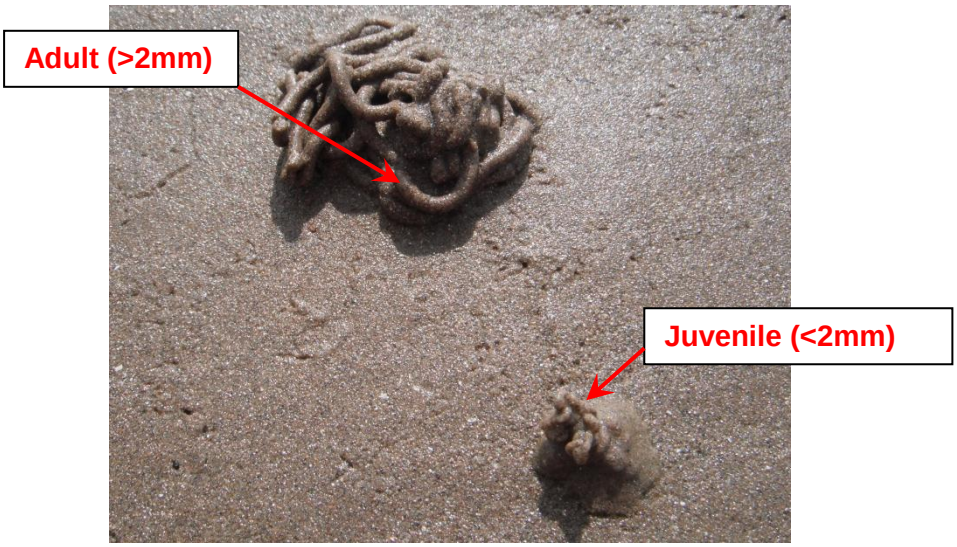
Map of 250m spaced transects – each red dot is a quadrat point spaced 25m apart.

2. Start the survey at the end of your transect closest to the beach, and walk towards the sea. Lugworm will not be present right at the top of the shore, however you will soon notice casts in the intertidal zone. Take a GPS reading when you first see casts, as your upper limit for mapping the bed. Find the co-ordinates for the next quadrat point down the shoreline.

3. When you reach the quadrat point throw down the quadrat randomly and record 1) the co-ordinates, 2) quadrat number, 3) sediment type, 4) number of adult and juvenile casts in each of the nine squares of your quadrat. I also record presence/absence of *Hydrobia* as an extra, but not *Macoma* as this would involve digging!



Determining adults from juveniles can be a bit subjective without lab analysis, but according to Zipperle & Reise (2005) juveniles are generally classified as having a faecal string with a width of <2mm, whilst adults are ≥2mm. If you use 2mm twine to grid your quadrat then you have a very simple way of measuring the faecal string width!



4. Continue along the transect towards the sea, completing the quadrats until a) you reach the limit of the lugworm bed, b) the sediment is too soft to continue safely. Take a GPS reading when you reach the edge of the bed, and continue across the beach to the next transect.

References

Flach, E.C. & Beuchema, J.J. (1994) Density governing mechanisms in populations of the lugworm *Arenicola marina* on tidal flats. *Marine Ecology Progress Series* 115: 139-149

Zipperle, A & Reise, K. (2005) Freshwater springs on intertidal sand flats cause a switch in dominance among polychaete worms. *Journal of Sea Research* 54: 143-150