

## Student Progress Reporting Form WAMSI Top-up Scholarship

<b>STUDENT:</b>	Thea Linke	<b>DATE:</b>	NOVEMBER 2009
<b>SUPERVISOR:</b>	Ian Potter, Luke Twomey		

<b>PROJECT TITLE:</b>	Trophic interactions and ecosystem modelling
<b>NODE LEADER:</b>	Rick Fletcher
<b>PROJECT NUMBER:</b>	4.3.2

REPORTING REQUIREMENTS	
1	<p>PROGRESS REPORT FROM SUPERVISOR</p> <p>Overall aims of research</p> <p><b>Trophic interactions in the Swan River Estuary and Wilson Inlet</b></p> <p>The following three approaches are being adopted to investigate the trophic dynamics in three “systems”, i.e. the two arms of the Upper Swan Estuary (Avon and Canning rivers) and Wilson Inlet, based on data for <i>Acanthopagrus butcheri</i>, <i>Leptatherina wallacei</i>, <i>Pseudogobius olorum</i> and <i>Papillogobius punctatus</i>. (1) Quantitative analysis of the volumetric contributions of the various dietary items (at the species level, where possible) to the gut contents of the above four species and the ways in which the dietary compositions of those species vary with body size, season and system. (2) Quantitative determination of stable isotope ratios of C<sup>13</sup>/C<sup>12</sup> and N<sup>15</sup>/N<sup>14</sup> for the four fish species and their prey to ascertain the trophic levels present in the food web of each of the three systems and to elucidate the sources of carbon. (3) Quantitative determination of the fatty acid biomarkers of fish and their dietary items in the Upper Swan Estuary and Wilson Inlet. The results of these three components of the study will provide the data required for the construction of the food web that supports these four fish species.</p>
	<p>Progress made on the project</p> <p>Solid progress has been made on each of the three components of the study, the details of which are given in the student’s report below.</p>
	<p>Any major risk issues</p> <p>No major risk issues.</p>
	<p> </p>
2	<p>PROGRESS REPORT FROM STUDENT</p> <p>Summary of progress</p> <p><i>Acanthopagrus butcheri</i>, <i>Leptatherina wallacei</i> and <i>Pseudogobius olorum</i> were sampled in</p>

REPORTING REQUIREMENTS	
	<p>the Upper Swan Estuary and Wilson Inlet in each season during 2007, while <i>A. butcheri</i>, <i>L. wallacei</i> and <i>Papillogobius punctatus</i> were sampled in the Canning River in four seasons, commencing in Autumn 2007. Fish were collected with a 21.5 m seine net. The potential prey of these species were collected during summer and winter using various types of sampling equipment. When insufficient prey items were obtained, additional sampling was undertaken in Autumn and Spring to fill gaps in the data. Preliminary data analysis revealed that terrestrial vegetation constituted an important component of the food web, at least in the Upper Swan River. Additional vegetation samples were therefore collected in early 2009 to ascertain the importance of terrestrial vegetation in these food webs. Preliminary stomach content and stable isotope analyses revealed that food resources were partitioned among the fish species in each system. In the case of <i>A. butcheri</i>, the diet underwent size-related changes in all regions and varied considerably between systems.</p> <p>During my recent trip to Germany (August-October 2009), I revisited the lab at the University of Hamburg, which specialises in fatty acid analysis. I processed terrestrial vegetation samples and analysed, using gas-chromatography, these samples and the 150 samples of fish and prey that were not analysed last year. Note that some samples could not be analysed last year due to time constraints and that others were too diluted or did not produce a usable chromatogram due to instrument faults. The data set for fatty acids is now complete.</p> <p>Currently, I am continuing my statistical analyses of the data for stomach contents, stable isotopes and fatty acids. The writing of the methods sections has been completed, while those of the introduction and results sections are ongoing.</p>
	<p>Summary of major findings to-date</p> <p>Gut content and stable isotope analyses demonstrate that the diets of the studied fish species change with body size and differ among systems, i.e. the Upper Swan and Canning Rivers and Wilson Inlet. The carbon sources fuelling the food web in the Upper Swan are derived, to a greater extent, from terrestrial sources than are those in the Canning, which, in turn, are greater than is the case in Wilson Inlet.</p> <p>The food web of the Upper Swan Estuary comprises three main trophic levels. These are 1) the primary producers, i.e. microphytobenthos, seston and detritus, at the lowest level. 2) The benthic macroinvertebrates, i.e. molluscs, polychaetes and small crustaceans, at an intermediate level and 3) the fish species, large crustaceans and fish larvae at the top level. The fatty acid analyses showed that <i>Acanthopagrus butcheri</i>, <i>Leptatherina wallacei</i> and <i>Pseudogobius olorum</i> fed in different parts of the water column, i.e. they were pelagic, benthopelagic and benthic, respectively.</p>
	<p>Presentations made at workshops &amp; conferences</p> <ul style="list-style-type: none"> <li>• AMSA student workshop on Rottnest Island, July 2007</li> <li>• South West Catchment Council (SWCC) South West Marine Conference, Busselton, March 2009</li> <li>• Indo-Pacific Fish Conference (IPFC), Fremantle, June 2009</li> <li>• AMSA 46<sup>th</sup> Annual Conference, Adelaide, July 2009</li> <li>• ICES Annual Conference, Berlin, September 2009</li> </ul>
	<p>Final report N/A</p>
3	OTHER REQUIREMENTS

**REPORTING REQUIREMENTS**

	Major findings to be reported immediately N/A
	Supervisor & student present at a minimum of one WAMSI organised event My findings to date were presented by Steeg Hoeksema on my behalf at the WAMSI node 4 symposium on the 2 <sup>nd</sup> of November at the Fisheries Department.
	Node Leader, supervisor and student to meet at a minimum of 2 times yearly N/A
	Final report to be placed on WAMSI website