Kristen Epp Sigma Xi (Fall ‘05) Grant Proposal Native vs. Non-native Predator Recognition in Eurycea nana: Learned or Inherited?

Determining the mechanisms by which prey recognize predators is essential to understanding the impacts that introduced predators have on prey populations. Eurycea nana, a threatened neotenic salamander, is endemic to and found only in the headwaters of the San Marcos River, where many predatory fish species have been introduced. Many salamanders rely on chemical cue recognition for predator detection. Generally, they respond by decreasing activity levels, which lowers their probability of detection by visually-oriented predators like fish. A previous study showed that recently collected E. nana decreased activity in response to the chemical cues of a native predator, but did not decrease activity in response to the chemical cues of an introduced predator, indicating a lack of recognition of the non-native predator. For management purposes, we need to determine if E. nana’s predator recognition is primarily learned or inherited. To do this, the previous study will be repeated with first-generation captive-born adult E. nana (n = 60) housed at the San Marcos National Fish Hatchery and Technology Center where a 12L:12D light cycle is maintained. Testing will be conducted at night when salamanders are most active. Subjects will be randomly divided into 4 treatment groups: native predator, non-native predator, native non-predator, and only water (control). Subjects will be tested once, individually, in 9.5 L aquaria. After 15 minutes of acclimation, time spent moving will be recorded for 10 minutes prior to stimulus introduction and 10 minutes post stimulus introduction. A stimulus introduction tube will be used to slowly inject 50 ml of water containing the chemical cues of one of the four treatments (blind to the observer) for each test. Pre-stimulus time will be subtracted from post-stimulus time to create an activity index. Activity indices will be compared between treatments and between studies using a one-way ANOVA. If response to treatments between wild and captive populations is not different, predator recognition is primarily inherited and a lack of co-evolution between E. nana and the non-native predator has resulted in a lack of recognition. Management techniques should then focus on controlling introduced predator populations. If captive E. nana do not alter activity levels in response to predators, recognition is learned and management techniques can then focus on predator-recognition training. This study will result in valuable insights into the mechanisms of predator recognition in aquatic salamanders and will help to guide future management techniques for this and other species.