

Using Wetland Morphology to Classify Hydrologic Permanency and Habitat Suitability of Isolated Wetlands at St. Marks National Wildlife Refuge in Northwest Florida, USA

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Abstract. Pond breeding amphibians require wetlands of various hydrologic permanency depending upon individual breeding phenologies. The reason is two-fold; water must be present long enough for larvae to mature and secondly, in many species, intermittent drying needs to occur to reduce or eliminate predators. The U.S. Geological Survey in cooperation with the U.S. Fish and Wildlife Service investigated the feasibility of a repatriation effort of the Striped Newt (*Notophthalmus perstriatus*), a candidate species for federal listing, within the St. Marks National Wildlife Refuge in northwest Florida. Potential breeding habitats for repatriation were delineated using a Light Detection and Ranging (LiDAR) derived digital elevation model and a topographic position index (TPI) classification to identify and classify isolated depressions. Determining threshold classification values was an iterative process that was informed by a calibration dataset of forty-five field-identified ponds, the perimeters of which were surveyed with a high precision Global Positioning System. Twenty-two of these ponds were instrumented with water-level recorders to investigate inundation dynamics across a wide range of hydrologic conditions. Relations between pond TPI characteristics and hydroperiod (HP) were then explored to extend hydrologic characterization to the unmonitored locations. The TPI procedure provided a reasonable means to extend hydrologic classifications. While results varied by hydrologic class, the permanent/long HP were more often classified correctly (80%) than short HP (43%). However, classification results were improved to 100% and 75% for permanent/long and short HP, respectively, by removing ponds occurring on an abrupt marine terrace that erroneously inflated pond topographic characteristics.