

**A DECADE OF MAPPING SUBMERGED AQUATIC VEGETATION USING COLOR INFRARED AERIAL
PHOTOGRAPHY: METHODS USED AND LESSONS LEARNED**

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Annual color infrared aerial photographs acquired annually between 1997 and 2007 were used to classify distributions of intertidal and shallow subtidal native eelgrass *Zostera marina* and non-indigenous dwarf eelgrass *Z. japonica* in lower Yaquina estuary, Oregon. The use of digitally orthorectified aerial photography acquired at extreme low tides enabled very high resolution imagery from 15 to 25 centimeter ground pixels. The use of false-color infrared film enabled a high contrast between submerged aquatic vegetation beds and bare substrate not visible in true color film. The initial success of this remote sensing method inspired similar efforts in nine other Pacific Northwest estuaries from Willapa Bay, WA to Humboldt Bay, CA. Innovative techniques developed during the course of the project included a flight planning tool and a hybrid image classification methodology. The decadal study enabled the mapping of spatio-temporal patterns in the distribution of intertidal vegetation which included an exponential expansion of the distribution of non-indigenous dwarf eelgrass *Z. japonica*. The methods developed in this study are applicable for use with four band digital aerial photography.