

EVOLUTION OF SEDIMENT INACTIVATION IN FLORIDA LAKES—IMPACTS ON LONGEVITY

More than 45 sediment inactivation projects have been conducted in Florida since 1981 with lake surface areas ranging from 8 - >1,000 acres. The majority of applications were conducted using alum only, with approximately 40% requiring supplemental buffering agents such as sodium aluminate or lime. Dosage calculations for all projects have been based on concentrations of available sediment P (ASP), defined as the sum of saloid P (soluble + easily exchangeable) plus Fe-bound P. Molar Al:P (available sediment P) ratios have ranged from 2 in early projects to > 10 in recent years. Dosage calculations for recent projects have used a variable ratio based on ASP with higher Al:P ratios used at lower ASP concentrations. Monitoring data suggest that the use of sodium aluminate or sodium hydroxide as a pH buffer may reduce the application longevity, so current applications are divided into multiple treatments spaced 4-8 months apart to allow alkalinity to be restored naturally.

Long term pre- and post-treatment water quality data are available for 20 of the alum treated lakes with applications conducted from 1995-2018. Each of the treated lakes exhibited immediate improvements in water quality, but longevity has been variable. The applications resulted in stable water quality improvements for a minimum of 3-5 years before signs of decreasing effectiveness, while some lakes have maintained stable post treatment water quality for 10-25+ years. Significant factors regulating longevity include: (1) significance of internal recycling as a nutrient source; (2) molar Al:P ratios; (3), use of pH buffers; (4) sediment concentrations of available P; (5) areal alum application rate (g/m²); and (6) number of applications. The data suggest that properly conducted sediment inactivation applications can maintain improved water quality for a minimum of 10 years in most cases.