Rationale for the Formation of an Ohio Phosphorus Task Force

Current Conditions in Lake Erie

The recovery of Lake Erie from its degraded conditions of the 1960s and 1970s represents a major environmental success story, demonstrating that efforts to reverse cultural eutrophication can be successful, even in lakes the size of Lake Erie. Excessive phosphorus loading to Lake Erie was identified as a principal cause of many of the Lake's problems. Studies of the Lake in the 1980s indicated that a reduction of annual phosphorus loading to 11,000 metric tons should be sufficient to allow substantial recovery of the Lake. Programs were implemented to reach that target load, initially through point source reductions, and subsequently through nonpoint reductions. The target load was first achieved in 1981. Since that time, annual loading has slowly decreased, averaging about 10,300 through 2002 and exceeding the target load only in years with above average nonpoint source loads associated with above normal rainfall. This contrasts with a load of 28,000 metric tons in 1968. Lake Erie responded largely as expected to the reduced phosphorus loading, and conditions improved substantially through the early 1990's.

Since the mid-1990s, conditions in Lake Erie again appear to be deteriorating. Blue-green algal blooms have returned, and the extent and duration of anoxia appears to be increasing. These changes have occurred in the absence of any increases in total phosphorus loading to the Lake, as measured by tributary loading studies and point source discharge data. Scientists have postulated that the changing relationships between external phosphorus loading and algal growth in the lake may be a consequence of increasing release of phosphorus from bottom sediments, mediated by zebra and/or quagga mussels. Others have suggested that phosphorus loading from unmonitored tributaries may be larger than estimated. Most recently, it has been suggested that increased dissolved phosphorus loading from nonpoint sources may be involved. Until the causes of current trends in Lake Erie are determined, the directions for additional management programs remain uncertain.

A Closer Look at Tributary Phosphorus Loading

The relationship between external phosphorus loading to Lake Erie and in-lake conditions determined in the 1980s was based on total phosphorus loading to the lake, even though substantial portions of the nonpoint load were not considered to be bioavailable to Lake Erie algae. Most nonpoint-derived phosphorus is attached to suspended sediments and only about 25-30% of this particulate phosphorus is available for supporting algal growth. Furthermore, portions of this particulate phosphorus may be physically removed from possible transfer to algae as sediments settle to the bottoms of river mouths, bays and the Lake itself. In contrast, the dissolved reactive phosphorus component of nonpoint runoff is 100% bioavailable and is delivered directly into Lake or bay water during storm runoff events.

Recent reviews of phosphorus loading to Lake Erie from Ohio tributaries have shown that trends in soluble reactive phosphorus loading differ greatly from trends in particulate phosphorus loading. Nonpoint phosphorus control programs focused on reducing particulate phosphorus loading through erosion control measures and use of buffer strips to trap sediments. The tributary loading data illustrate the success of these programs in reducing particulate phosphorus. The reviews show that dissolved reactive phosphorus loading decreased even more rapidly than particulate phosphorus up through the mid-1990s. Since that time, however, dissolved reactive phosphorus loading has increased dramatically to the point where it now is approaching the same loads as in the late 1970s and early 1980s. Algal trends in Lake Erie appear to match the trends in dissolved reactive phosphorus loading much more closely than they match the trends in either total phosphorus or particulate phosphorus loading.

In view of the above information, the Ohio EPA is proposing to form a Phosphorus Task Force to more formally review the phosphorus loading data from Ohio tributaries to Lake Erie, to consider possible relationships between trends in dissolved reactive phosphorus loading and in-lake conditions, to determine possible causes for increased soluble phosphorus loading, and to evaluate possible management options for reducing soluble phosphorus loading.