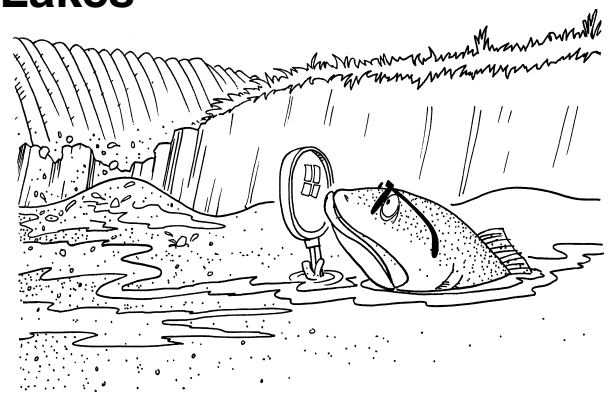
Managing Phosphorus Inputs Into Lakes

Introduction



The Phosphorus Diet

For the urban lake manager, managing phosphorus is a lot like trying to lose a few pounds. The first step is calculate an ideal weight based on our individual combination of height and body type, and determine the caloric intake needed to maintain that weight. Next, we get on the scales and find that, lo and behold, we slightly exceed this ideal weight. Well, to be honest, we really exceed it. Our next step is to add up our total daily calorie intake from meals, snacks, and the occasional indulgence in beer or chocolate. This rather dismal count almost invariably reveals why we are overweight: more calories are coming in than are being burned off. And, even more depressing, we realize that it is likely that we will get fatter and not slimmer in the future. If we want to shed the extra pounds, then, we need to discipline ourselves to consume fewer calories, and burn more off through exercise.

The diet analogy is particularly appropriate for urban lakes, given the essential similarity between phosphorus and calories. Most urban lakes are receiving more phosphorus than they need, and are projected to get even more in the future. Even worse, urban lakes tend to accumulate excess phosphorus over time in their bottom sediments. Thus, even if a manager is able to get the lake on a phosphorus diet, visible improvement may not be detected very soon, given the poor dietary habits of the past. Quite simply, the pounds are hard to take off without a major and sustained commitment to eat less and exercise more. In many cases, such discipline is beyond us, and we must simply accept the notion that we are pleasantly plump or a "plus-size." (It would be stretching this analogy well beyond the breaking point to note the similarity between dredging and liposuction).

At any rate, urban lake managers need to count phosphorus, and this series of articles provides mind-numbing detail on how to do so. In the first article, *Determining the Trophic State of Your Lake,* we present some simple methods to predict how your lake will respond to increased phosphorus loads. If your lake is unusual (i.e., is exceptionally deep or has a small drainage area to surface area ratio), it may be possible to maintain its trophic state, even when phosphorus loads increase (just like those annoying people that can eat cheesecake every day with no noticeable effect on their waistline). But in most urban lakes, increased phosphorus inputs signal a higher trophic state, so that a blue lake turns green and a green lake goes lime. In the second article, *Crafting an Accurate Phosphorus Budget for Your Lake,* we document the primary, secondary and internal phosphorus sources to urban lakes, and indicate how each can be rapidly counted to produce a phosphorus budget for your lake that will be reasonably accurate both now and the future.

In the third article, *Evaluating the Impact of Watershed Treatment,* we review the capability of various watershed treatment practices to reduce phosphorus inputs to lakes. Included is an examination of the influence of stormwater treatment practices, better site design, and other watershed practices in reducing phosphorus loads to urban lakes, based on the most recent performance research. The basic conclusion is that these practices can be very useful, as long as the increase in phosphorus inputs as a result of watershed development are rather modest. If watershed development is expected to be substantial, watershed treatment practices may not be able to achieve phosphorus reduction goals when used individually or even in combination. In these situations, lake managers can only deal with the symptoms of eutrophication, either through in-lake treatment (see Davenport and Kaynor, this issue) or by tempering expectations about achievable lake quality.

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Watershed managers need to accurately forecast current and future phosphorus inputs when they craft lake management plans. As a result, they often must deliver an unpopular message to their patients: if they want to be slim, they must embrace a strict regime of diet and exercise.

–TRS