



2006 Water Quality Study Shows Bay Area Golf Courses as Good Environmental Stewards



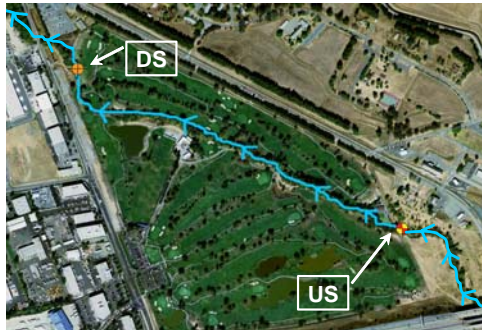
Background

Over 150 courses are in the greater San Francisco Bay area. Virtually all of these courses have a creek, stream, drainage, pond or lake on or near the course. Some are located in flood plains. Due to regulatory pressure from state and

federal water quality regulations, including National Pollutant Discharge Elimination System (NPDES) stormwater rules, local agencies like the Contra Costa Clean Water Program are placing particular emphasis on preventing eutrophication and depletion of dissolved oxygen and avoiding impacts from pesticides and nitrogen and phosphorous-containing fertilizers. Golf courses are widely perceived as contributing to these water quality problems.

Approach

From 2000 to 2004, 30 courses in Contra Costa County were carefully reviewed and 5 were selected. Starting in 2004, year-around sampling was done with focus on 17 storm events resulting in >1,000 water quality measurements. Upstream (US) and downstream (DS)



Locations upstream (US) and downstream (DS) were sampled for 2 years

analyses were done for dissolved oxygen, specific conductivity and turbidity, fertilizers such as ammonia, nitrate and phosphate, and toxicity to algae and

water flea. Data on agronomic practices such as fertilizer and irrigation water use, mowing frequency, etc were collected at each course.

Results: Golf is No to Low Impact

Toxicity to water flea was not seen in any sample, suggesting that insecticides were not leaving any of the courses studied at concentrations adverse to this species. Algae populations were slightly reduced (2%) downstream of organically fertilized courses, suggesting that these courses may be imparting some type of algae-limiting characteristic to surface water. Algae populations increased slightly (8%) downstream of traditionally fertilized courses, indicating that these courses maybe contributing small amounts of nitrogen (N) or phosphorus (P) to surfacewater. Neither N nor P was detected above regulatory levels. The overall

study-wide average magnitude of downstream algae growth was less than 3%, suggesting that golf courses in general maybe contributing a relatively small amount of nutrient load to local waterways.

Useful Tools: Buffer Strips

Courses showing downstream algal growth generally had managed turf immediately adjacent to surface-water with little or no buffer present. In contrast, courses showing the lowest frequency and magnitude of downstream

algal enhancement had comparatively little managed turf directly adjacent to surface water.

This finding supports the concept that Best Management Practices

(BMPs) that include vegetated buffers are effective at protecting surface water quality, regardless of the fertilizer type used.



Lack of buffer strips created measurable water quality problems

What is Next?

Results of this ground breaking work can be used by parties interested in better understanding turf management's relationship with water quality in adjacent streams and creeks. Armed with BMPs such as buffer strips and Integrated Pest

Management (IPM), not only golf course superintendents, but turf managers responsible for parks and athletic fields can proactively and effectively protect and enhance aquatic habitats and surface water quality.



Properly sized and maintained buffer strips protect water quality

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