

Golf Course Water Use Survey

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Background

In early 2013, the Rocky Mountain Golf Course Superintendents Association undertook an online survey regarding water usage by its members. Results were provided in raw form to Timothy Gergeni (student) and Karen Panter (Horticulture Specialist) at the University of Wyoming for interpretation and analysis. One hundred fifteen golf course superintendents responded to the survey.

Results and Interpretation

Golf Course Descriptions

Most respondents reported golf courses in the Public, Daily Fee, and Municipal category with 18 regulation holes. A smaller number were private (24%) and a few reported 27 holes (12%). Par 3 and Executive courses represented a small proportion of respondents. Acreage covered totaled almost 20,000, with about 11,000 acres in fairways and roughs, plus another 422 acres in greens and tees.

Turfgrass Types

Fairways, roughs, and tees were largely planted in grass mixtures: 62% of fairways, 61% of roughs, and 65% of tees. Of the reported single species, the most predominant found in the fairways was perennial ryegrass (about 17%) followed by Kentucky bluegrass (15%). In roughs, if the grass was not a mixture (61%), it was likely to be Kentucky bluegrass (34%). On tees, the remaining 35% reported planting perennial ryegrass, Kentucky bluegrass, bentgrass, annual bluegrass, or other species.

It was not surprising that around clubhouses the predominant turf was Kentucky bluegrass (64%) or a mixture of grasses (29%). Driving ranges and practice areas are more often than not made up of grass mixes (44% and 46% respectively). Kentucky bluegrass appears to be a major component of driving range and practice area grasses, making up almost 38% of driving ranges and 34% of practice areas.

Water Usage

In 2011, the total amount of water used was reported in the survey to be 7.71 billion gallons; in 2012 the figure was 9.04 billion gallons. This was divided into surface, well, potable, and re-use/effluent water sources.

In 2011 and 2012, 48% of the water reportedly used on golf courses by respondents came from surface sources such as lakes or ditches. Percent well water used in the two years was similar, 20% in 2011 and 22% in 2012. In the case of potable (or municipal) water used, this was the source of 13% of the water in 2011 and 14% in 2012. And lastly, 19% of the water used in 2011 came from re-use or effluent sources while the number in 2012 was 16%.

Water sources varied by location. For example, golf courses in Boulder, Garfield, Larimer, Mesa, Routt, and Rio Grande counties (Colorado) did not use any well water either year. Respondents in Laramie County (Wyoming) used potable and re-use sources both years, but not well or surface water. Utah respondents reported using potable and well sources both years, but not surface or re-use water.

Water Costs

Water prices per 1,000 gallons varied tremendously by source, location, and year. For example, the highest cost potable water in 2011 was \$6.90 per in El Paso County, Colorado, while in 2012 the highest was \$9.61 in Arapahoe County, Colorado. Both of these counties are along the Front Range with El Paso County encompassing Colorado Springs and Arapahoe County being home to part of Aurora and south/southeastern Denver suburbs. Another example is surface water. In 2011, Arapahoe County, Colorado golf courses spent \$2.96 per 1,000 gallons of surface water. The next year courses in Denver reported paying almost \$14 for surface water.

Average Water Output in Acre Feet

The average amount of water applied in acre feet to the various golf course types varied from about 100 acre feet per year on 9 hole regulation courses to about 250 acre feet on 27 hole regulation courses. About 420 acre feet on average was applied to “regulation – other” courses but these were not defined in the survey results. (One acre foot equals 326,000 gallons or 34,560 cubic feet of water, and weighs 2.7 million pounds.)

Average Annual Precipitation and Evapotranspiration Rates

Precipitation in 2011 was higher than 2012 for all regions responding to the survey. Front Range Colorado averaged almost 15 inches in 2011 but only about 10 inches in 2012. Mountain counties in Colorado reported averages even less: 11 in 2011 and 9 in 2012. New Mexico courses received the least amount of precipitation of all areas surveyed: 6 inches in 2011 and 5 in 2012. Laramie County, Wyoming courses reported a very wet 2011, 26 inches, and a much drier 2012, 10 inches. Utah and Western Slope, Colorado courses were intermediate in precipitation each year.

Evapotranspiration (ET) was somewhat inversely correlated with annual precipitation rates. ET rates were equal to or lower than 2012 rates because precipitation levels were higher in 2011 than 2012.

Water Used by Region

Front Range golf courses used the most total water of all respondents. This was expected, mostly because the greatest concentration of golf courses of the respondents is along the eastern mountains of Colorado, from Larimer County south to Pueblo County.

Conclusions

Results of the survey undertaken by the Rocky Mountain Golf Course Superintendents group indicate that on a per-acre basis (about 20,000 reported by respondents in this survey), between about 385,000 (2011) and 452,000 (2012) gallons of water were applied to golf courses (1.2 acre feet in 2011, 1.4 acre feet in 2012). It is recommended that a follow-up survey be conducted in the near future to more accurately describe the nature of water use on golf courses in the Rocky Mountain region