Agricultural and Resource Policy Report

Colorado State University Cooperative Extension

Department of Agricultural and Resource Economics, Fort Collins, CO 80523-1172 April 2004-APR 04-01

Resource and Environmental Aspects of Golf in Colorado

By
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The Colorado golf industry contributed over $562 million in direct revenues to Colorado's economy during 2002, a number equivalent to $15,730 per acre of land in courses (including unmaintained land) and $11,667 per acre-foot of water used by courses.

In 2002, nearly every Colorado golf course in this study employed at least one water conservation technique.

There are 911 acres within Colorado's golf courses specifically dedicated to wildlife (2.6% of total).

Following national initiatives to assess the economic role of the golf industry (Golf 20/20 and World Golf Foundation), Colorado's golf industry funded a study in 2003 that also focused on the natural resource usage and environmental role of golf in the state. The primary objectives of the study were compare golf's economic impact relative to the national industry and other Colorado sectors that compete for the same natural resource inputs. The Colorado Golf Association, Rocky Mountain Golf Course Superintendent's Association, Colorado Women's Golf Association, Colorado Chapter of the Club Manager's Association of America, Colorado Section PGA, and the Colorado Chapter of the Golf Course Owner's Association collaborated with Colorado State University to complete the economic resource analysis presented in this publication.

In 2002, the Colorado Golf Industry contributed over $562 million in direct revenues to Colorado's economy. When considering indirect economic activity, and using similar methods to the Golf 20/20 study, this impact is over $1.68 billion. Yet, there are resource constraints in this growing economy, including land and water, two primary components of golf course enterprises. In this fact sheet, we will integrate findings reported in a previous report on The Economic Contribution of Colorado's Golf Industry into an analysis of natural resource usage and environmental impacts of the golf industry in Colorado.

Land in Golf Courses

There are 14,725 golf courses in the US as of the beginning of 2003, up from 13,528 in 1999. In comparison, Colorado had 264 golf courses, over half of the 466 total in the Mountain region (which also includes Wyoming, Utah, and the northern half of both Arizona and New Mexico).

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The total acres of land invested in Colorado golf course enterprises in 2002 was 35,600 acres, of which 19,837 acres were in irrigated turfgrass (Figure 1). A significant share (1/3) is actually unmaintained, thereby providing some potential for open space and wildlife habitat benefits to their surrounding communities (in addition to allowing for less intensive water consumption). Of the unmaintained acres, 34% were in grasslands, 14% were in ponds, 10% in forests, and 7% in wetlands. The remaining acres were classified as other unmaintained areas (Figure 2). In addition, there were 911 acres specifically dedicated to wildlife (2.6% of total).

Golf and Water Resources

In general, the golf industry has received a great deal of negative press over the past decade for their resource use and negative environmental impacts. The perception is that golf courses take up a great deal of land and habitat, pollute water and soil with turf chemicals, and use an inordinate amount of water, a particular concern in the western United States. For example, it has been proposed that the amount of water used on the average golf course is enough to support the daily needs of 2,000 people and this number rises to 11,000 people in arid courses in California.

According to the Golf Course Superintendents Association of America, on average, golf courses in the United States use 300,000 gallons of water per day. But, this number varies by region, with courses in Texas using under 197,000 gallons per course per day, on average, and courses in Florida using over 375,000 gallons per course per day. Florida's roughly 1000 golf courses used a total of 173 billion gallons of water in 2000, almost half of which came from recycled water sources. Water use per acre in 2000 totaled 844,000 gallons. In short, the absolute usage of water, and sources for the water being applied, are unique issues for each state and region.

Colorado, along with much of the Western region, experienced a drought in 2002. In response, water use did decline to 15.6 billion gallons across Colorado golf courses in 2002, although absolute usage only dropped by 1.5% from 2001 (Figure 3). When asked in a separate question "what was the course's percentage actual reduction in irrigation during drought in 2002", the average response was a reported 19% reduction. The actual reduction in water use may be clouded by the fact that, in 2002, true irrigation needs on the golf course increased by 25% because of the hot temperatures and low precipitation. In other words, courses would have needed to use 25% more water than in an average year to compensate for drought impacts. This, coupled with the fact that they actually cutback irrigation water use, represents a substantial net reduction in water use.

In addition, the courses managed to shift some of their irrigation water from surface water to reclaimed wastewater. The use of reclaimed water has risen significantly from 2000 to 2002 (Figures 4a,b & c). In 2000, 61% of the irrigation water came from surface water while 10% was from reclaimed water. In 2001 the percentage of surface water declined to 59% and reclaimed water increased to 16%. By 2002, surface water use had declined to 52% and reclaimed wastewater had increased to 20%.

In response to the drought, courses adopted a variety of strategies to reduce water usage in 2002 in response to the drought. The most popular water reduction strategy was the use of wetting agents with 85% of the courses employing them. The elimination of irrigation in selected areas (76%), reducing rough irrigation (74%), hand watering tees (70%), and adjusting fertilization practices (71%) were all popular water conservation techniques (Figure 5). Nearly every course surveyed in this study employed at least one water conservation technique in 2002. Yet, the considerable effort that courses put into adopting these water conservation techniques ultimately did not save an appreciable amount of water.

Wildlife Implications

Habitat loss due to golf courses has also been a criticism levied against golf course development. According to the Maiistakis Institute for the Rockies' report on Golf Courses and Wildlife, golf course development has few long-term benefits to wildlife. The report, however, admits that in comparison to other development options, such as housing or commercial development, golf courses may be less destructive to wildlife.

The Audubon Society initiated the Audubon Cooperative Sanctuary Program (ACSP) in 1991. This program provides guidelines and principles for golf course environmental management, habitat protection and enhancement, chemical use reduction, water conservation, and water quality management. Currently over 2,300 golf courses are members of the ASCSP and the Audubon Society has the goal of registering 50% of all golf courses in the United States by 2007. In Colorado, 47% of golf courses claim to participate in Audubon International, but only 15% are registered

Golf courses employing ACSP principles and adhering to the guidelines of the program represent a powerful opportunity for golf courses to improve their environmental stewardship and public perceptions of golf's relationship to the local ecology.

Economic Activity tied to Resource Usage

One potential measure for how efficiently natural resources are being used by an industry is to examine the dollars in revenue created from the resources invested in an enterprise. In this industry, such calculations can be made for water and land, and compared to industries that compete for the same resources.

As mentioned previously, the Colorado golf industry contributed over $562 million in direct revenues to Colorado's economy during 2002. This is equivalent to $15,730 per acre of land in courses (including unmaintained land) and $11,667 per acre-foot of water. In the US, these numbers are much lower at $8701 per acre of land and $4134 per acre-foot of water, as a whole.

For more information please see the complete Environmental Aspects of Golf in Colorado Study at http://dare.agsci.colostate.edu/thilmany/golfresource.pdf

Figure 1

Total Golf Course Acreage by Type
(35,600 acres total)

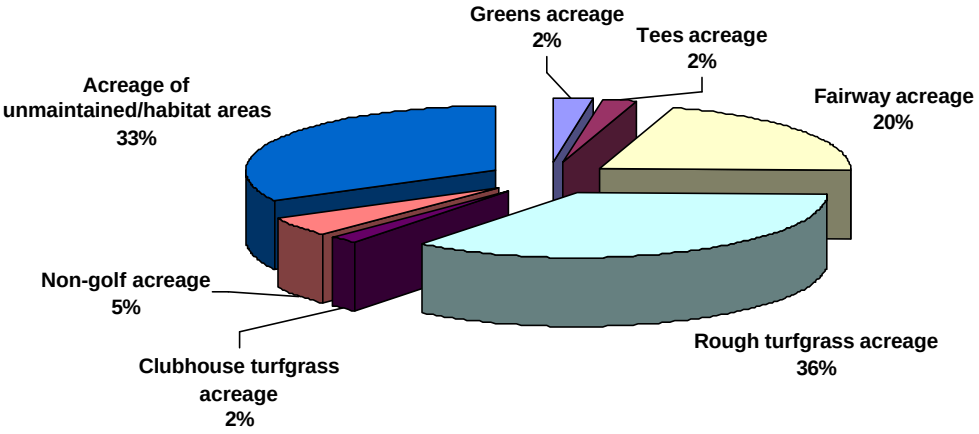
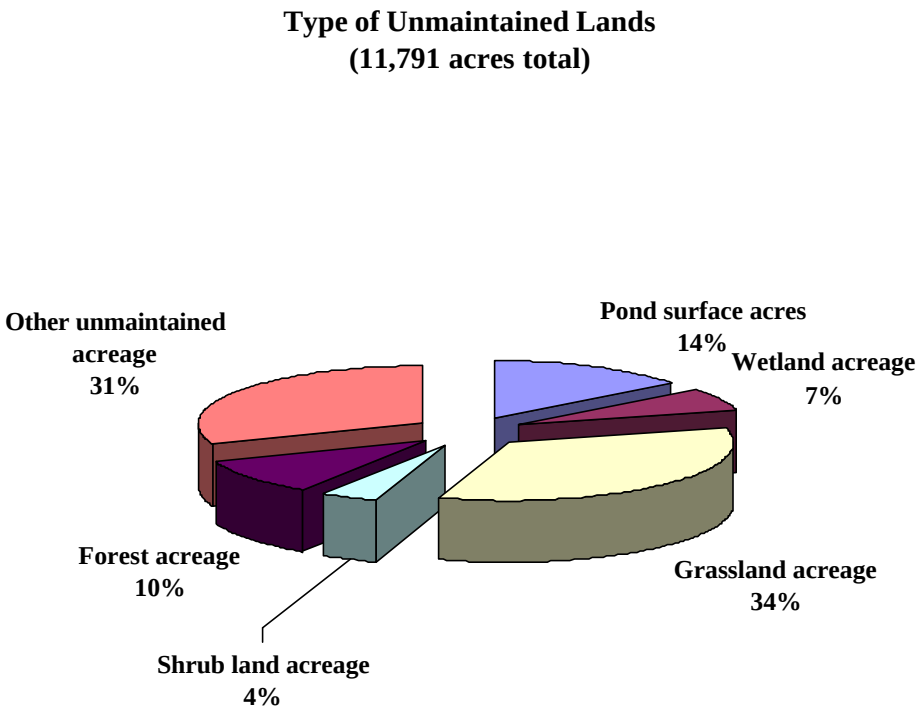
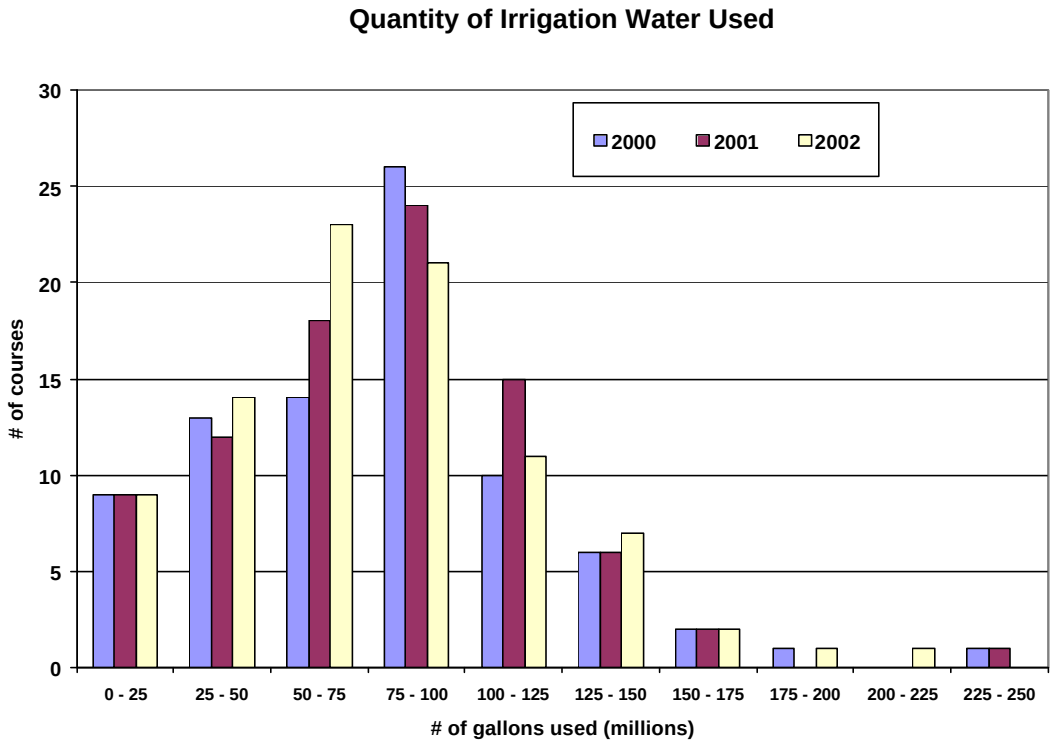
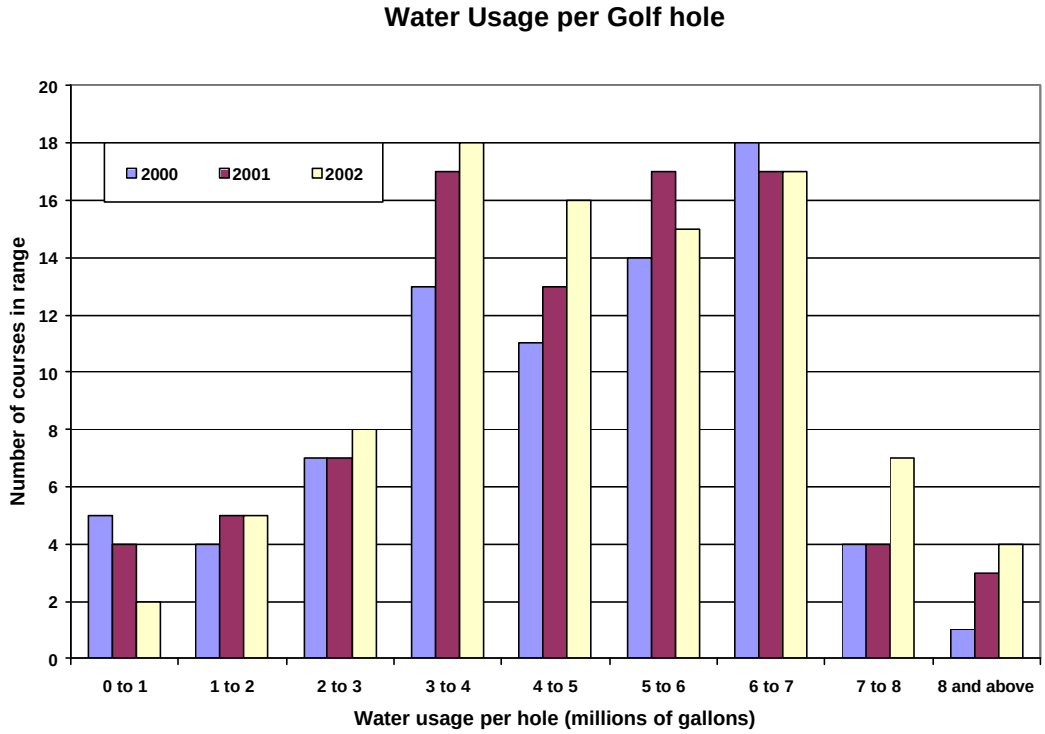


Figure 2

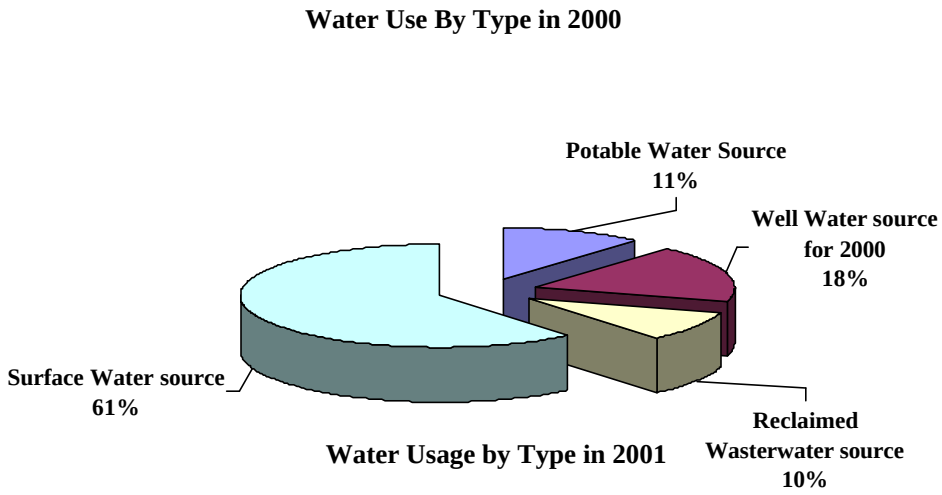

Type of Unmaintained Lands
(11,791 acres total)
Other unmaintained acreage 31%
Pond surface acres 14%
Wetland acreage 7%
Forest acreage 10%
Grassland acreage 34%
Shrub land acreage 4%

Figures 3a & b

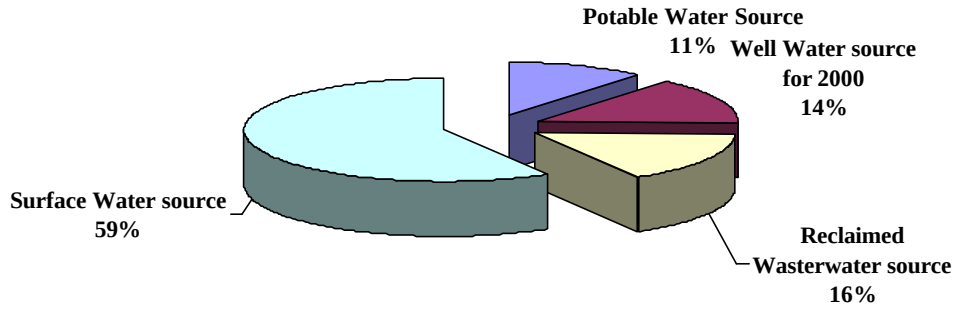

Quantity of Irrigation Water Used
2000
2001
2002
# of courses
30
25
20
15
10
5
0
0 - 25
25 - 50
50 - 75
75 - 100
100 - 125
125 - 150
150 - 175
175 - 200
200 - 225
225 - 250
# of gallons used (millions)


Water Usage per Golf hole
2000
2001
2002
Number of courses in range
20
18
16
14
12
10
8
6
4
2
0
0 to 1
1 to 2
2 to 3
3 to 4
4 to 5
5 to 6
6 to 7
7 to 8
8 and above
Water usage per hole (millions of gallons)

Figures 4a, b & c



Water Usage by Type in 2001



Water Use by Type in 2002

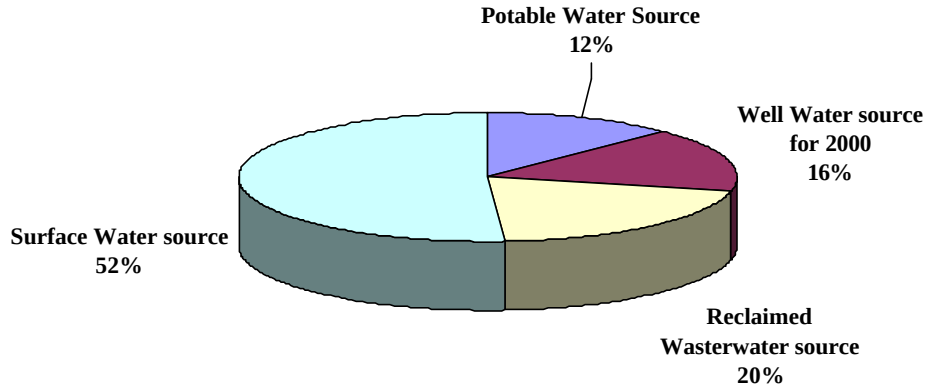
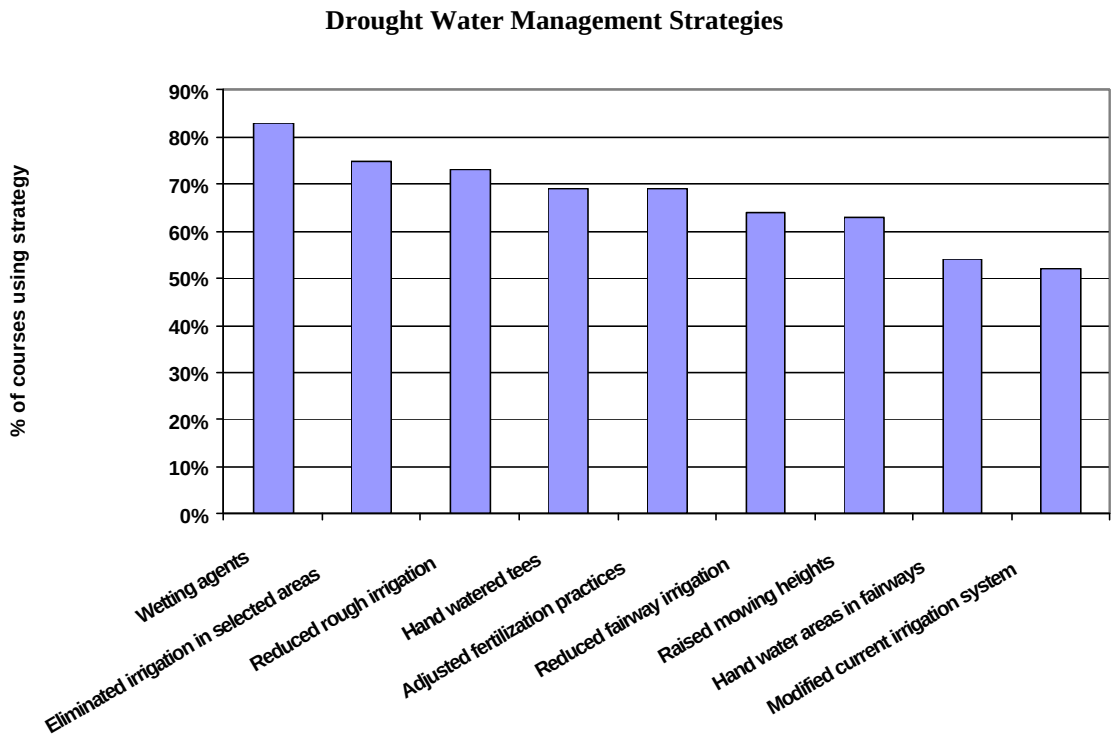


Figure 5


Drought Water Management Strategies
% of courses using strategy
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Wetting agents
Eliminated irrigation in selected areas
Reduced rough irrigation
Hand watered tees
Adjusted fertilization practices
Reduced fairway irrigation
Raised mowing heights
Hand water areas in fairways
Modified current irrigation system