USGA Resource Management Tool

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USGA®

The Challenge:

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Money

Water

P
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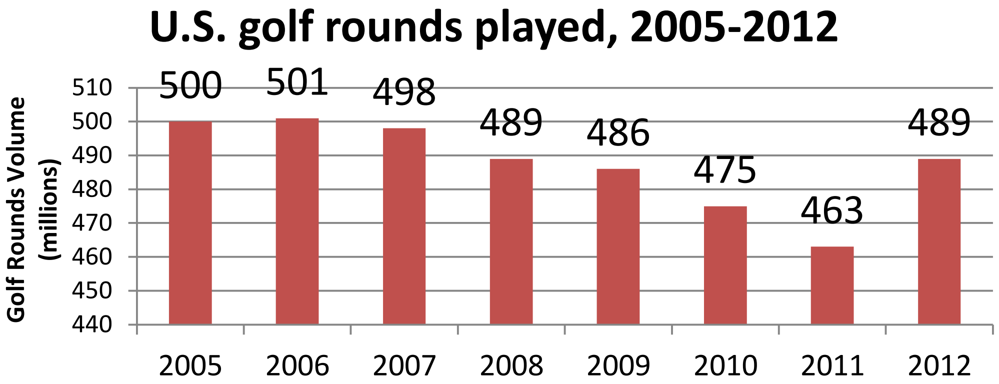
Pace of Play

Playing Quality

Two of the most commonly cited reasons for not playing more golf:

"It takes too long"

"It's too expensive"



The most serious environmental issue facing the game:

golf's consumption of water

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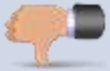
The Maintenance Dilemma

Many of the steps that can be initiated to improve pace of play

Result in a significant increase in the consumption of resources and ultimately the cost to play

Goals	Pace of Play	Cost to Play
Maintain uniform stand of grass		
Mow roughs lower		
Mow roughs more often		
Keep free of leaves and other debris		
Reduce density of trees and understory		
Players always have priority		
Do more in less time		
Perform maintenance in non-play hours		

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Solution to the Dilemma

- Identify course areas that result in slow play
  - Identify where players are going and NOT going
- Reduce maintenance and water use on areas of the course that seldom come into play
- Reallocate resources to areas that come into play most often
- Increase efficiency of maintenance tasks

How can we convince owners, managers and players that such changes can be made without this?

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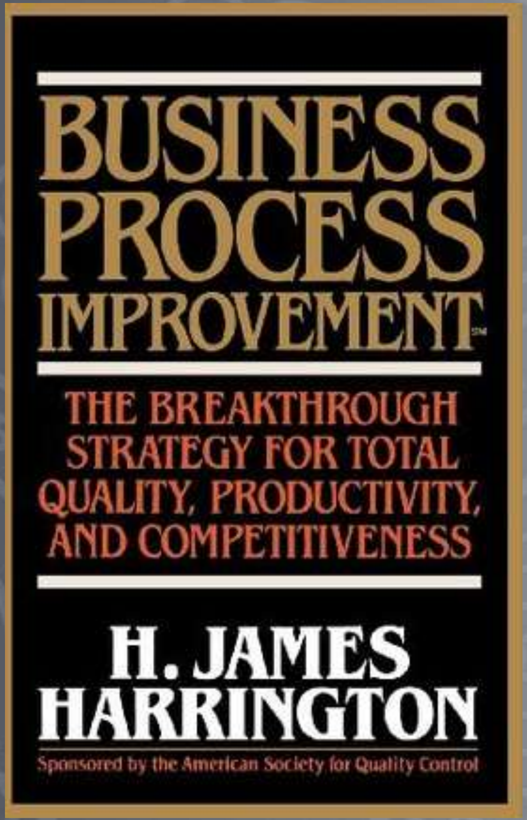
These “solutions” are not new concepts

31 years of frustration that began with rattlesnakes

"You don't know our course!"

"There is a good chance you don't know your own course as well as you think you do."

The understandable tendency is to err on the side of extreme safety to avoid driving off play and angering golfers.



"Measurement is the first step that leads to control and eventually to improvement. If you can't measure something, you can't understand it. If you can't understand it, you can't control it. If you can't control it, you can't improve it."

Taking out the guesswork with GPS/GIS Analysis

GPS Data Loggers

Track Players

Track Maintenance

By placing gps loggers on maintenance equipment we can determine:

- Accurate measurement of maintained areas
  - Which in turn allows the calculation of resources consumed (Labor, water, fuel, energy, fertilizer, chemicals, etc.)
- Interaction between golfers and maintenance staff
  - e.g. help identify when to “give up” on a task and reallocate the staff to another task
- More efficient mowing patterns
  - e.g. fairway mowing patterns
- Advantages of more efficient equipment
  - e.g. triplex versus hand mowing of greens

By placing gps loggers on golfers we can determine many aspects of course usage including:

- Where they are going and where they are NOT going
  - Roughs, bunkers, hazards, etc.
- Which course features result in a slowing of play
- Where they are getting “stuck” waiting on maintenance staff
- Where a restroom is most badly needed
- Traffic problems

Three Quick Case Studies

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Google earth


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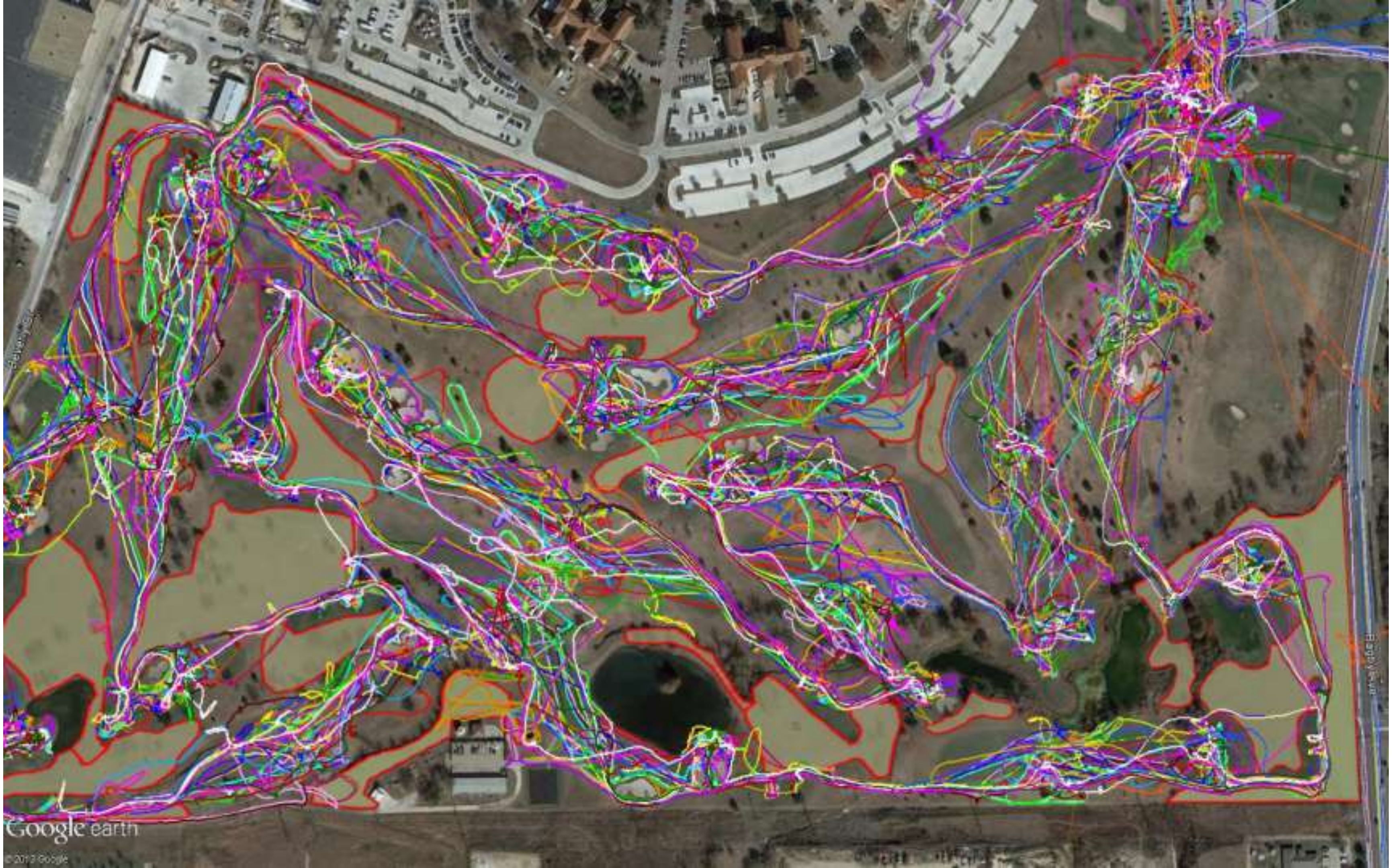
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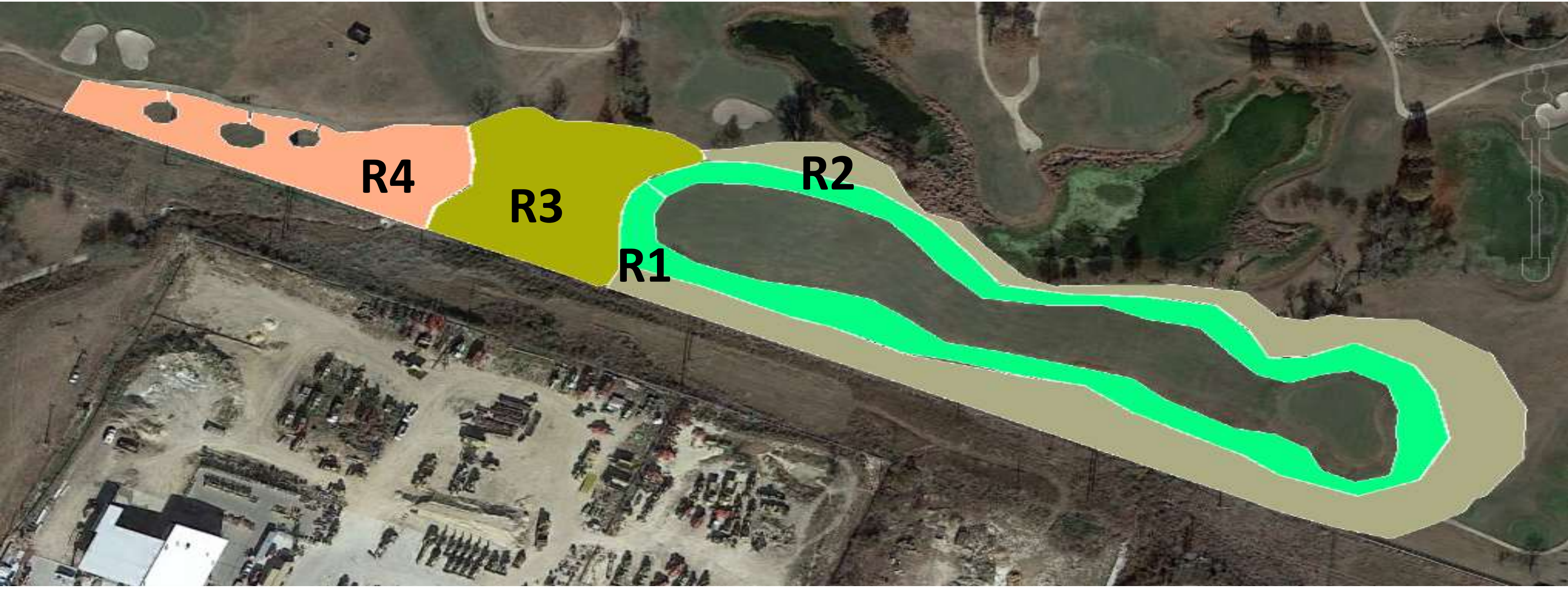
By converting this

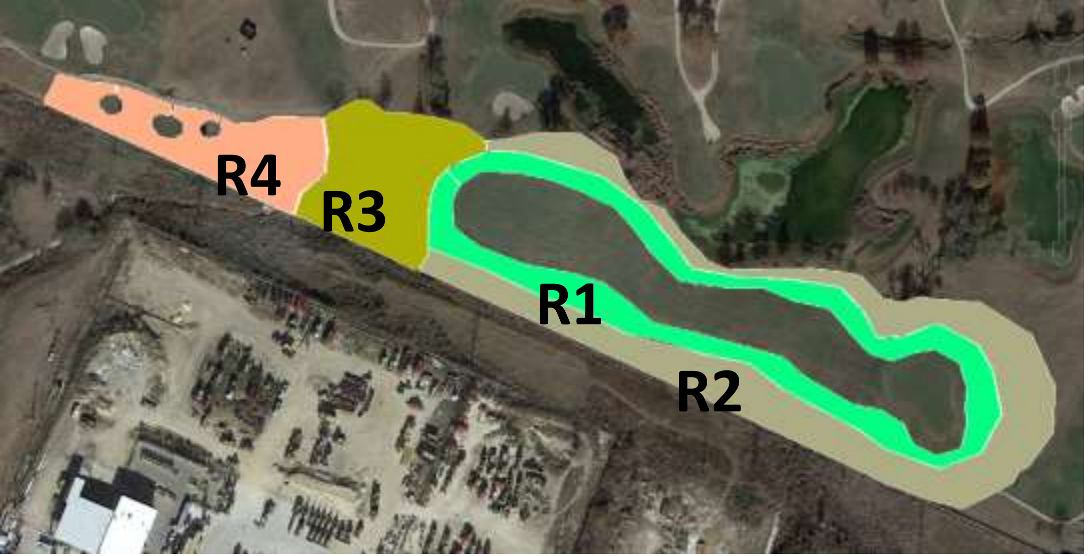
To this



Course-wide totals	Scenario 1	Scenario 2	Difference
Fuel Cost	5,979.75	3,160.73	2,819.03
Fuel Gallons	1,407.00	743.70	663.30
Labor Cost	7,875.00	4,162.50	3,712.50
Labor Hours	525.00	277.50	247.50
Water Cost	9,000.00	6,000.00	3,000.00
Water Ac/ft	60.00	40.00	20.00
Energy Cost	15,000.00	10,000.00	5,000.00
Fertilizer Cost	22,000.00	11,000.00	11,000.00
Pesticides Cost	14,000.00	12,000.00	2,000.00
			-
Total Cost	**73,854.75**	**46,323.23**	**27,531.53**
Water use (ac/ft)	**60.00**	**40.00**	**20.00**

Scenario 1					
Annual costs	R1	R2	R3	R4	R5
Acres	30	50	0	0	0
Mowings	30	24	6	2	0
Ac/ft of water/ac	2	0	0	0	0
Total ac/ft of water	60	0	0	0	0
Fertilizatons	2	1	0	0	1
Pest. Apps	3	1	1	1	1
Fuel	2,562.75	3,417.00	-	-	-
Labor	3,375.00	4,500.00	-	-	-
Water	9,000.00	-	-	-	-
Energy	15,000.00	-	-	-	-
Fertilizer	12,000.00	10,000.00	-	-	-

R1	Fine textured turfgrass, mowed weekly at 1.5 inches or less, green throughout growing season, find the ball quickly, no exposed soil, no more than 1/2 shot penalty
R2	Fine to coarse textured turfgrass, mowed four times monthly at 3.0 inches or less, dormant (brown) durin drought stress, find the ball quickly, no exposed soil, no more than 1 shot penalty
R3	Mixture of coarse textured grass plants, mowed monthly at 12 inches or less, wide variance in color during the year, finding the ball more difficult, exposed soil, minimum of 1 shot penalty
R4	Mixture of native grasses, wildflowers, and woody plants, mowed twice annually at 18 inches or less, wide variance in color during the year, finding the ball very difficult, Minimum 1 shot penalty



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Scenario 2					
Annual costs	R1	R2	R3	R4	R5
Acres	20	15	15	30	0
Mowings	30	24	6	2	0
Ac/ft of water/ac	2	0	0	0	0
Total ac/ft of water	40	0	0	0	0
Fertilizatons	2	1	0	0	1
Pest. Apps	3	1	1	1	1
Fuel	1,708.50	1,025.10	256.28	170.85	-
Labor	2,250.00	1,350.00	337.50	225.00	-
Water	6,000.00	-	-	-	-
Energy	10,000.00	-	-	-	-
Fertilizer	8,000.00	3,000.00	-	-	-
Pesticides	6,000.00	1,500.00	1,500.00	3,000.00	-
Total/yr	33,958.50	6,875.10	2,093.78	3,395.85	-
Total/acre/yr	1,697.93	458.34	139.59	113.20	#DIV/0!
Total ac/ft of water/yr	40	0	0	0	0

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Results - Case Study #1

By changing how roughs are maintained this course can save (annually)

- $3000 in fuel
- $4000 in labor
- Free up 250 labor hours for other tasks
- $5000 in electricity
- $13,000 in fertilizer and chemicals
- Over 20 acre feet of water (6.5 million gallons)
- Better manage areas that come into play most often

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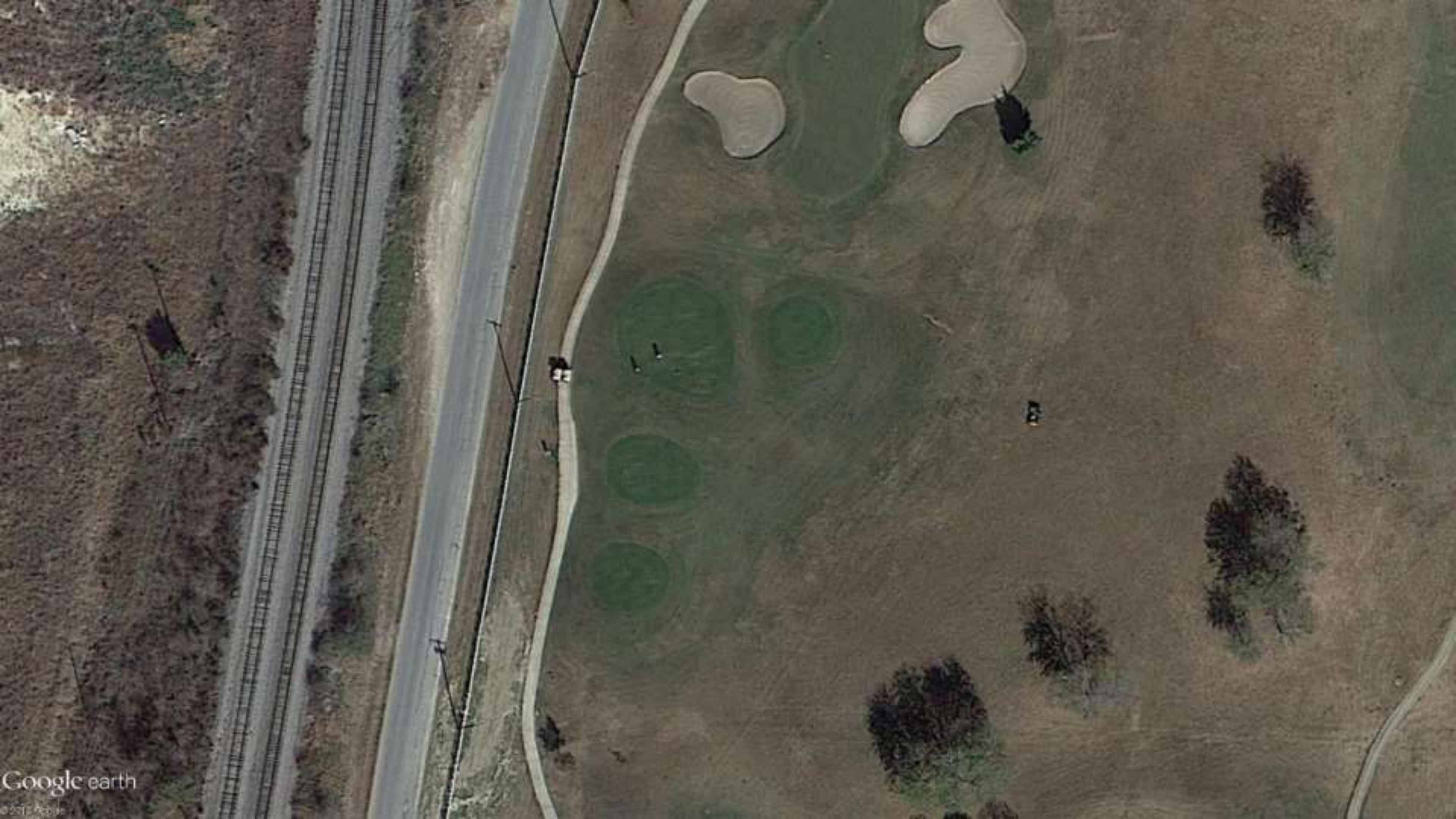
The current irrigation of the tee complexes at many courses is extremely inefficient

CCGC has 73 tees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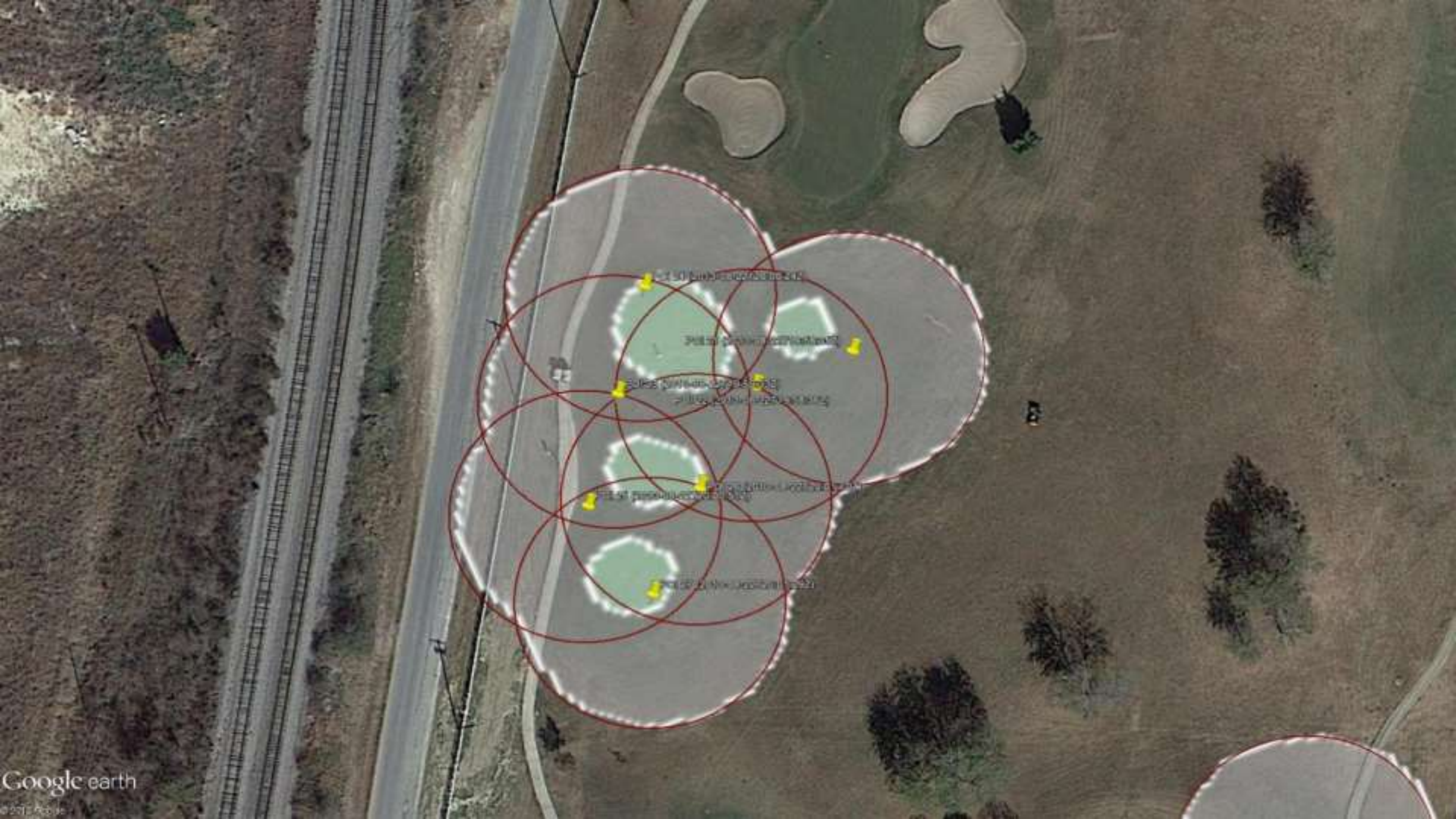
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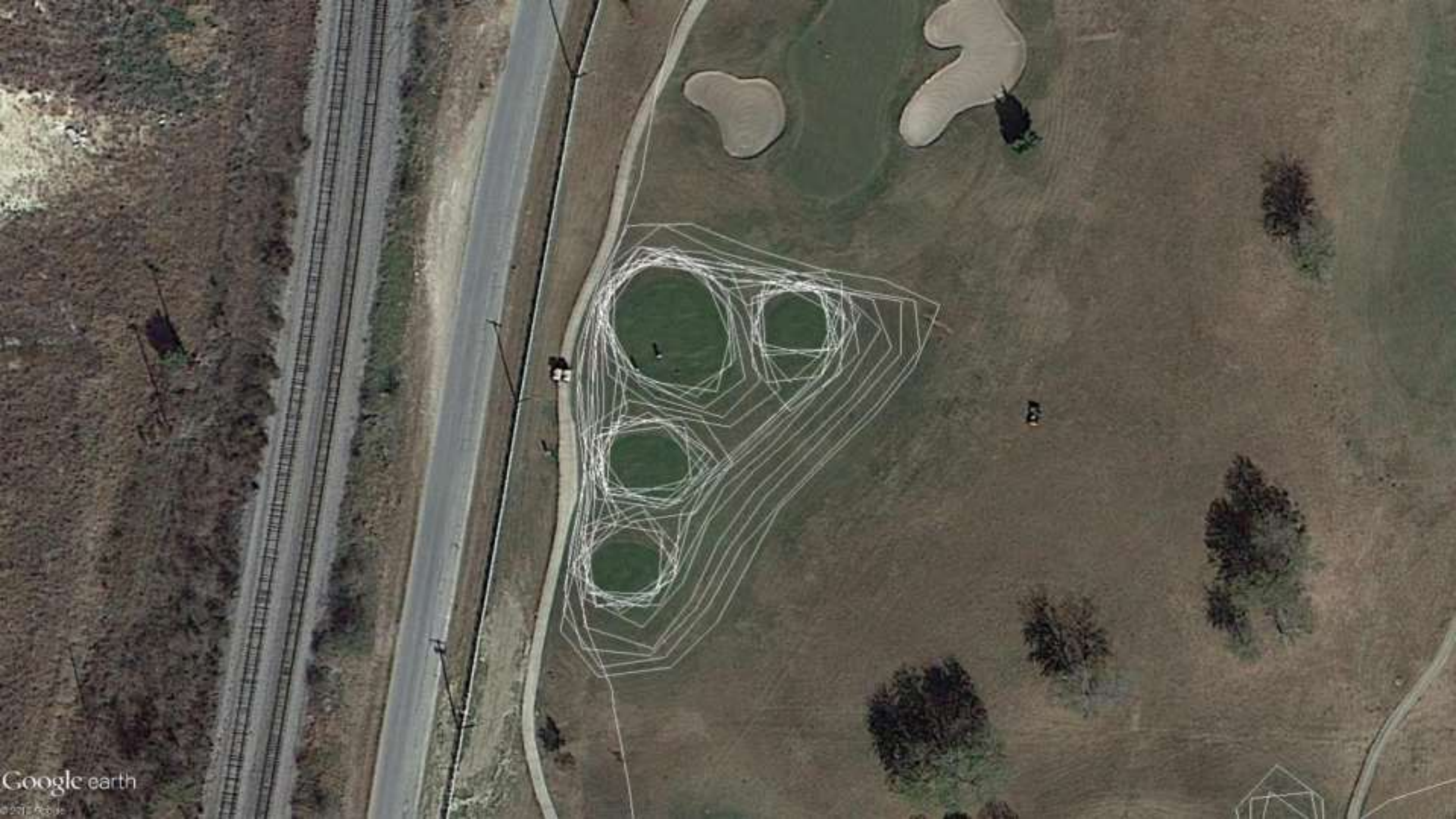
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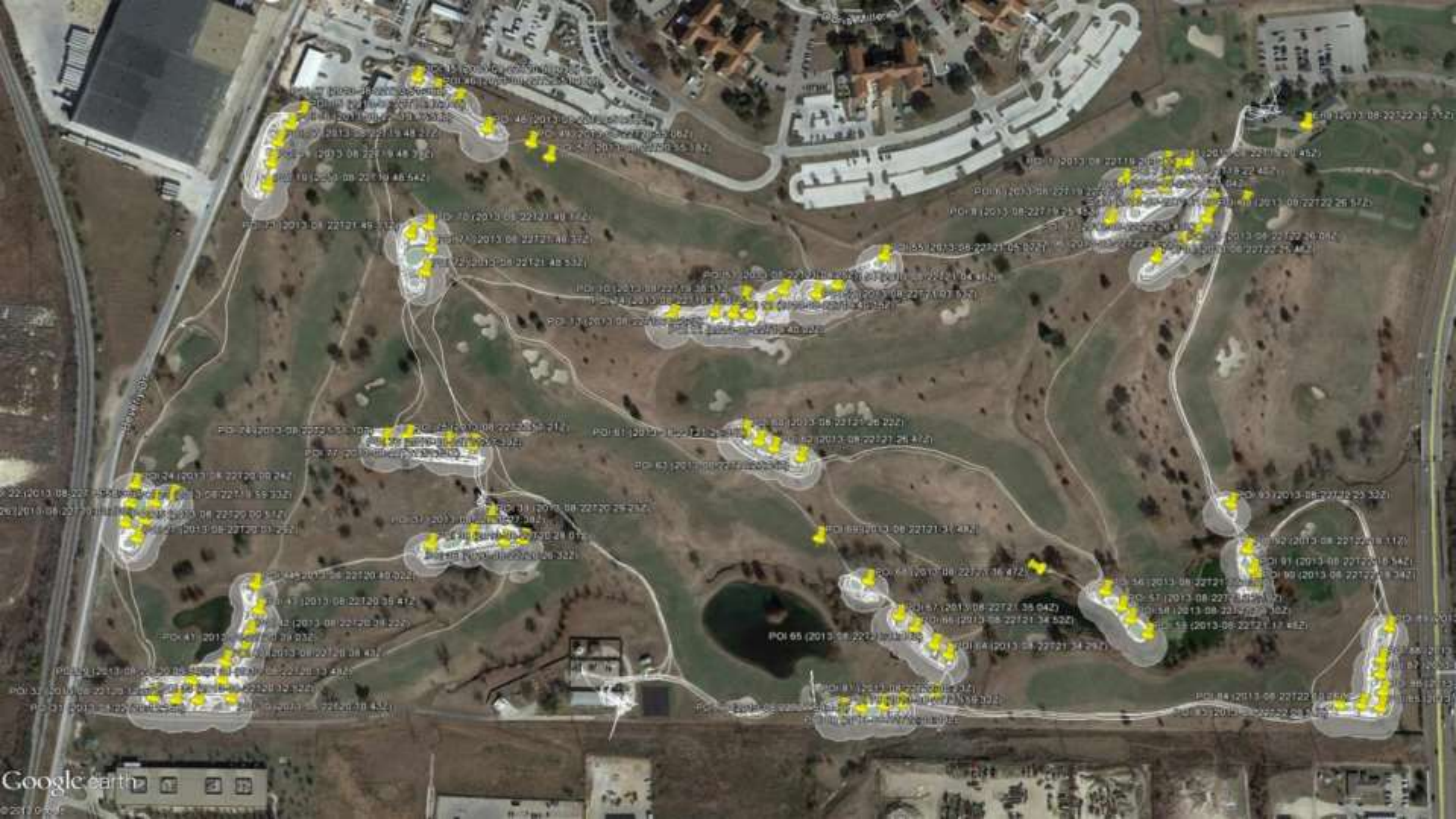
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Results - Case Study #2

- 84049 square feet of tees
- 937430 square feet of turf being irrigated
- Less than 9% efficient
- Consuming approximately 35 acre feet (11.4 million gallons) of water per year to irrigate tee complexes
- Consuming approximately 120 gallons of diesel per year to mow complexes
- Consuming approximately 251 labor hours per year to mow complexes
- The consumption of these resources can be reduce by approximately 90% by changing the irrigation design.

Rancho Park GC
5 & 10 Tee Complex

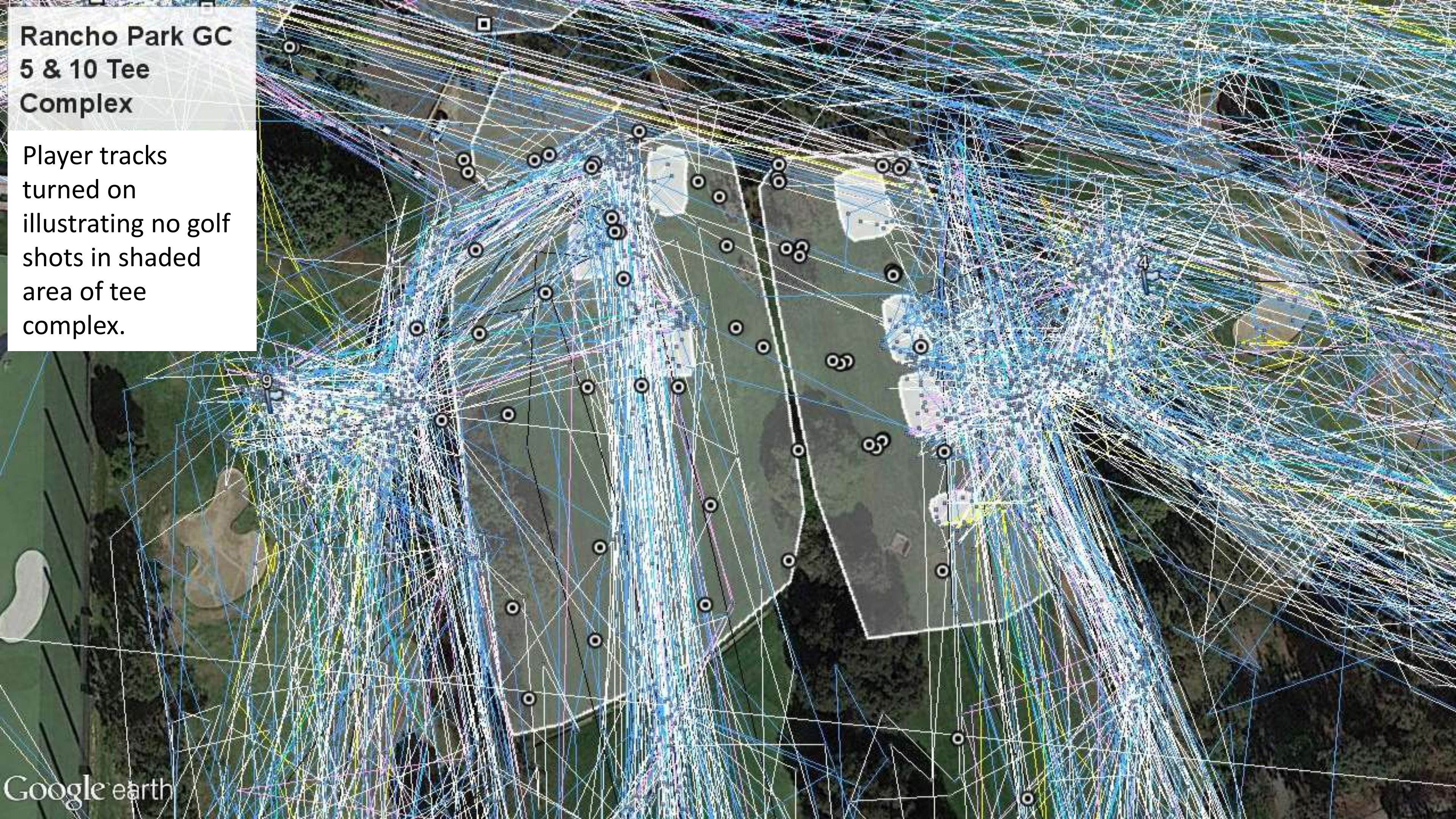
Tees outlined

Rancho Park GC 5 & 10 Tee Complex

Irrigation heads located. Outline of tee complex shows area that is irrigated with tees.

Rancho Park GC 5 & 10 Tee Complex

Player tracks turned on illustrating no golf shots in shaded area of tee complex.



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Results - Case Study #3

- Simple math just for #10 tee:
- Minimum of 12 heads that could be turned off
- Each head delivers approximately 30 gallons a minute
- Each head is set to run for 10 minutes per irrigation cycle
- Minimum of 6 irrigation cycles per week
- 12 heads x 30 gpm x 10 minutes per cycle x 6 cycles per week x 4 weeks per month x minimum of 8 months per year
- (12x30x10x6x4x8) = 691200 gallons (2.1 acre feet) per year for this one tee complex
- Conservative estimate a minimum of 15 acre feet per year could be save by simply turning off the unnecessary irrigation heads.
- Plus reduced turf acreage results in savings in labor, fuel, chemicals, fertilizers, energy, etc.

Current Method is Effective but Tedious and Time Consuming

- Excel
- Google Earth Pro
- GPS Editing (tracks and polygons)
- GPS data conversion tools
- Field measurements
- Out of reach of many of the courses that need this type of analysis to stay in business

USGA Resource Management Software Tool

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Purpose

To provide golf courses of all levels a tool, or model, to help them perform “what if” analysis regarding their utilization of resources.

“What if ...”

We have less water

Water is more expensive

We cannot apply chemicals

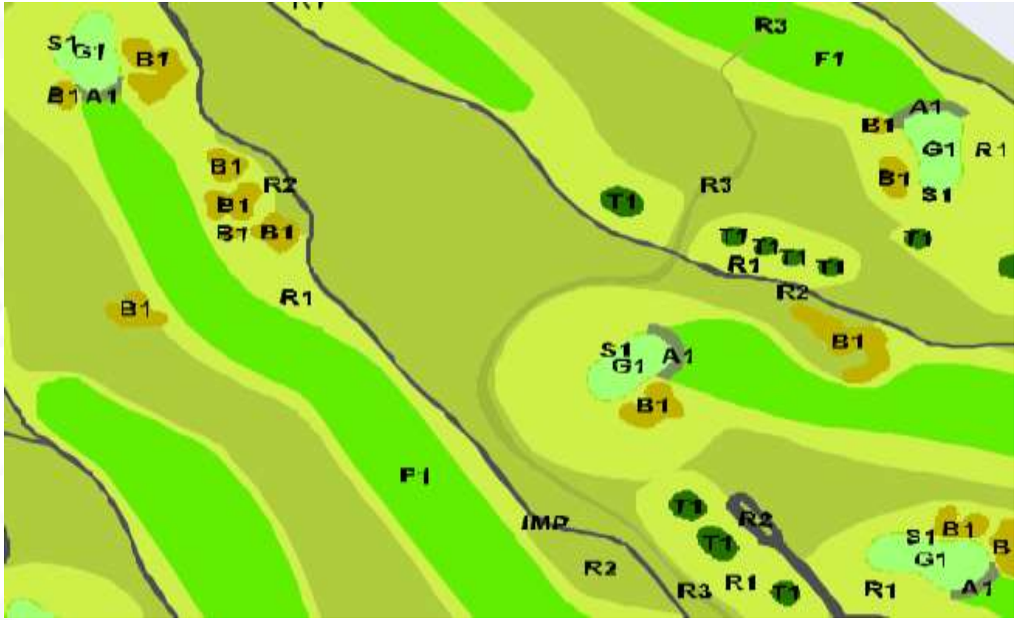
We want to build a new course

We want to improve our greens

We want to be more competitive

Concept

- **Every area of the course can be identified as polygons**
- Every polygon consumes resources
- The consumption of those resources can be measured



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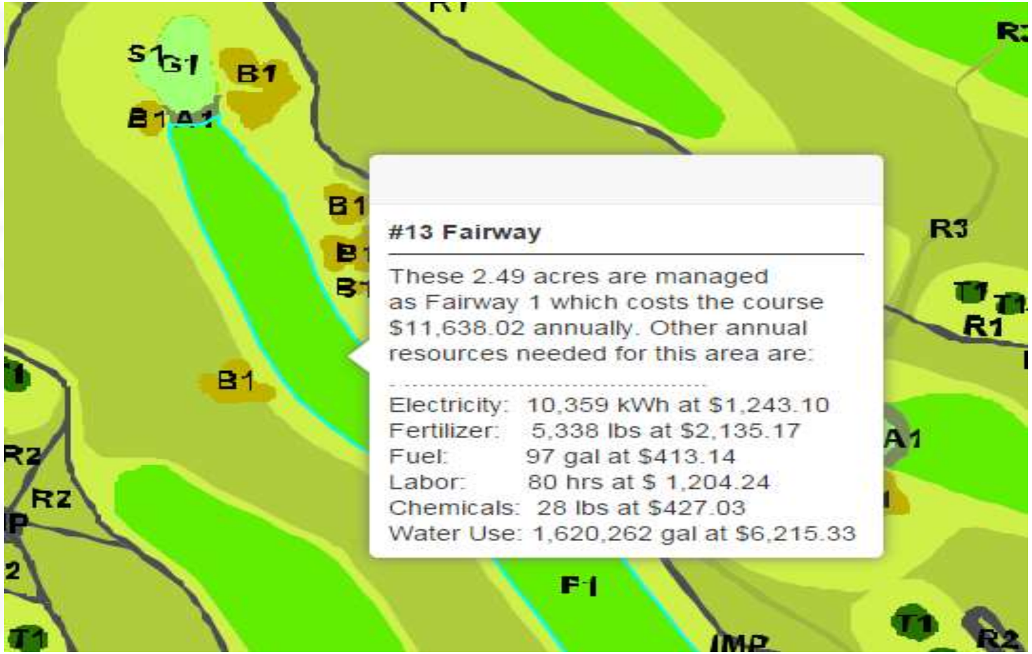

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- Every area of the course can be identified as polygons
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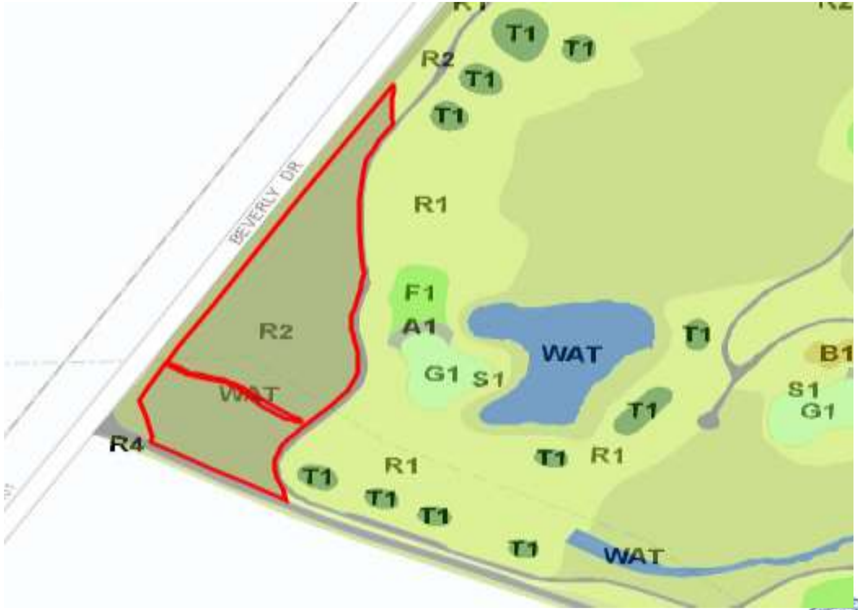
- Resource consumption can be managed by changing:
  - Polygon level of maintenance (B1, B2, B3, etc.)



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- Resource consumption can be managed by changing:
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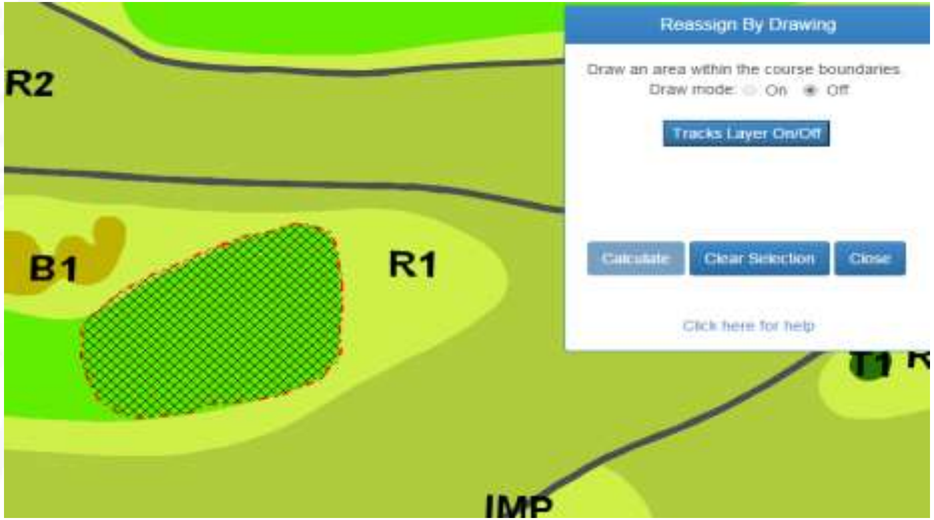
  - Polygon area



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- Resource consumption can be managed by changing:
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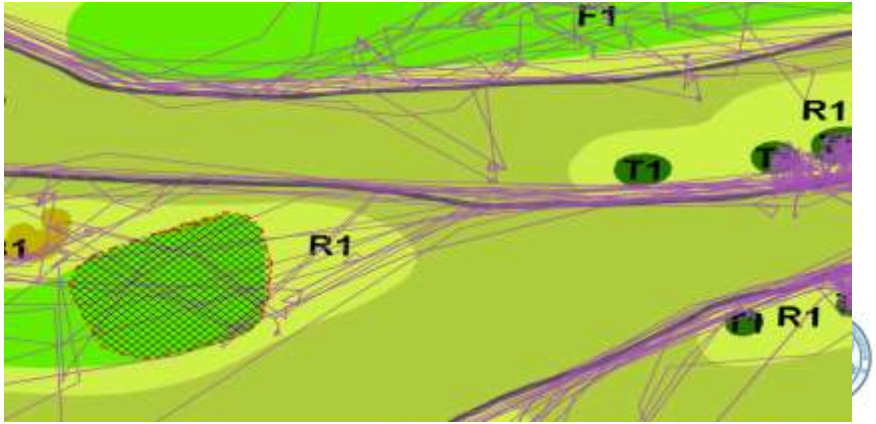
  - Polygon area
- Player tracks help ensure changes are appropriate



Goal

Develop an online tool that allows course management to create and save various maintenance scenarios or models

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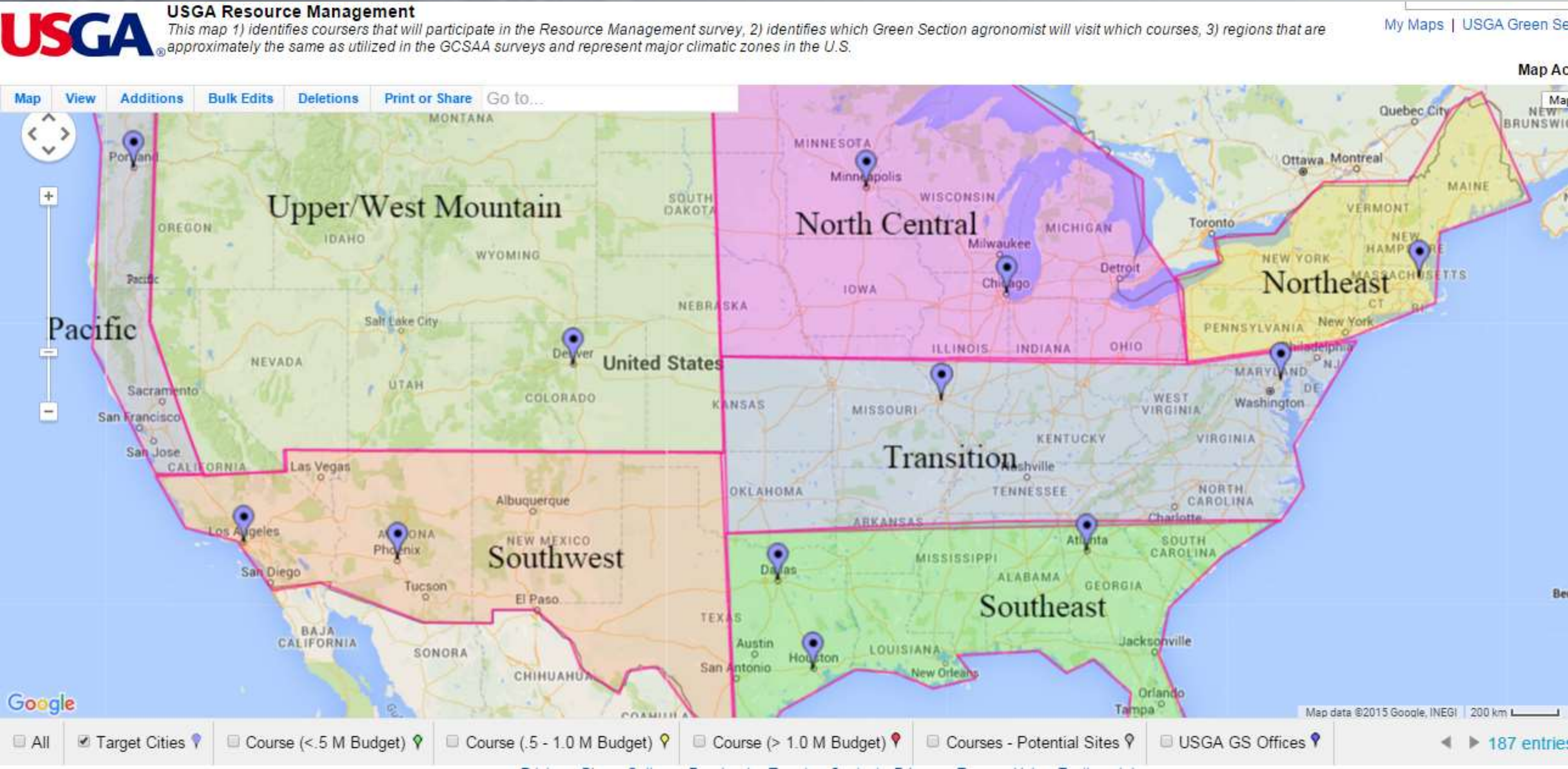
Major Features of the Tool

- Initially populate the model with values typical of courses in the user's locale and budget range
- Provide base map of polygons for the user's course
- Allow users to easily input their own data to personalize the model
- Allow users to add or remove line items customizing the model to their specific needs
- Allow users to create and save multiple maintenance scenarios

Collection of “seed” data



Software Development

- Future leveraging of platform
  - Design tool
  - Pace of play modeling
  - Flagstick/championship pace dashboard
  - Player tracks
  - Shotlink data
  - ET databases
  - Plant water use coefficients

Schedule

- Beta testing of software begins in December, 2015
- Goal is to publish software to the USGA website by mid-year 2016
- Integration of other databases and measurement tools (e.g. USGA flagstick technology) will be an ongoing process

Thank You

Questions

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2016 USGA Pace and Innovation Symposium

The next presentation will start at
11 a.m. PST