Building A Sustainable Game

Rand Jerris, Ph.D.
Senior Managing Director, Public Services
rjerris@usga.org

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Fundamental Principles

The **United Nations** Brundtland Commission (1987) defined **sustainable development** as “meeting the needs of the present without compromising the ability of future generations to meet their own needs.”

Three Core Components

Social
Environmental
Economic

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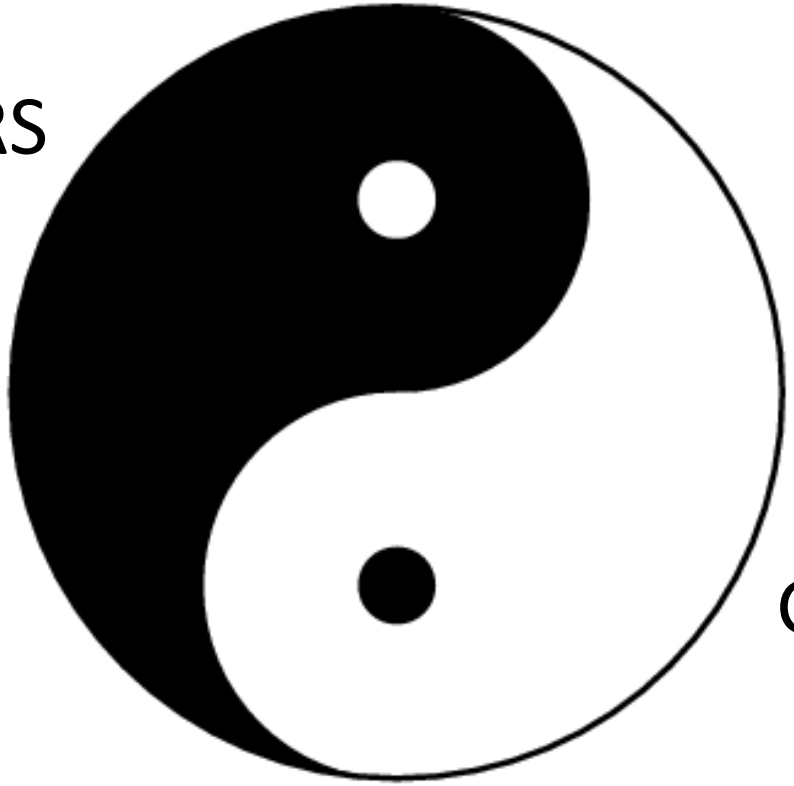
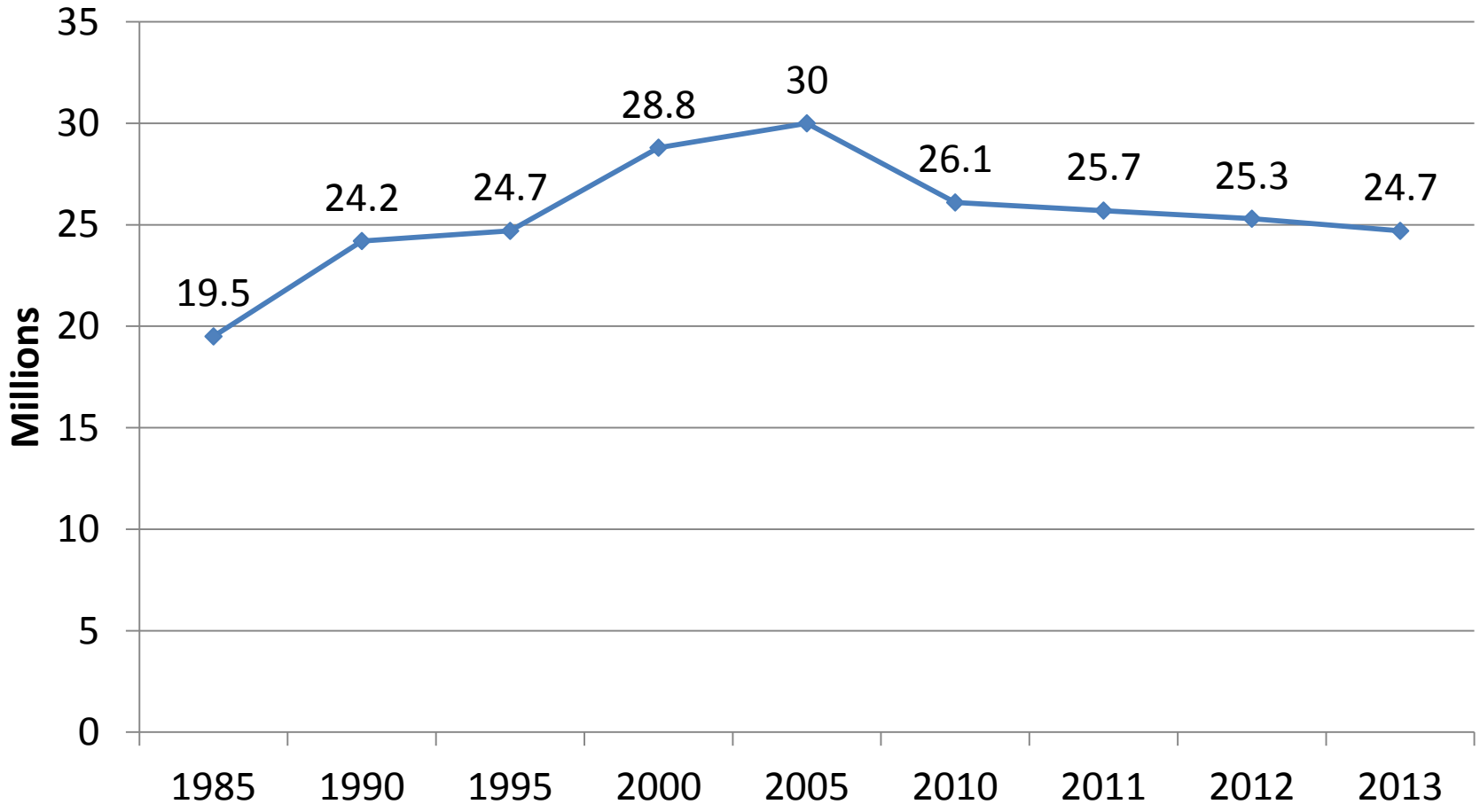
Golf's ecosystem

GOLFERS



GOLF COURSES

Golf participation



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Golf's Grand Challenges

Industry research* suggests four primary threats to the long-term sustainability of the game.

Time

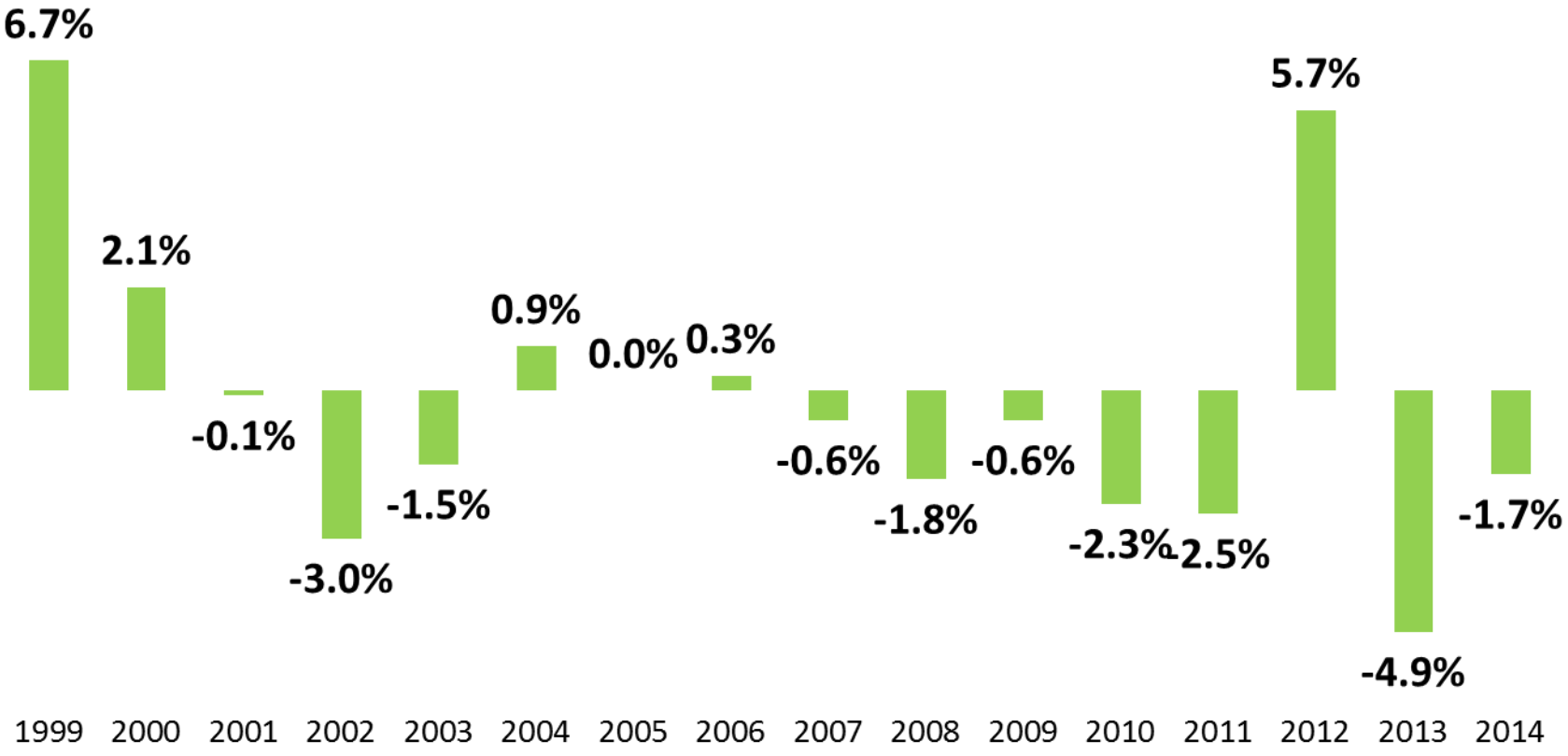
Expense

Resource Consumption

Perception

*Sources: National Golf Foundation, PGA of America

Rounds volume (year/year change)



Source: Coalition National Rounds Played Report in cooperation with PGA PerformanceTrak and the NGF; Based on a sample of approximately 4,000 reporting facilities

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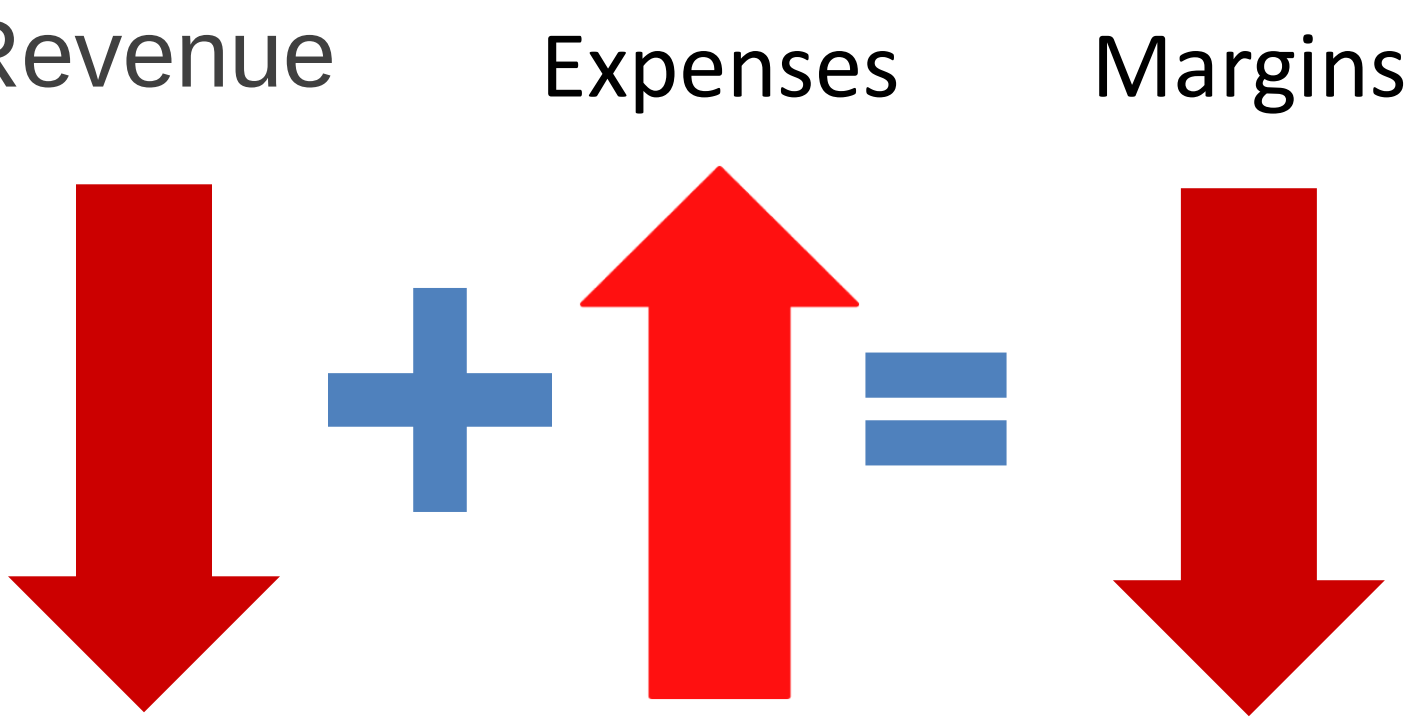
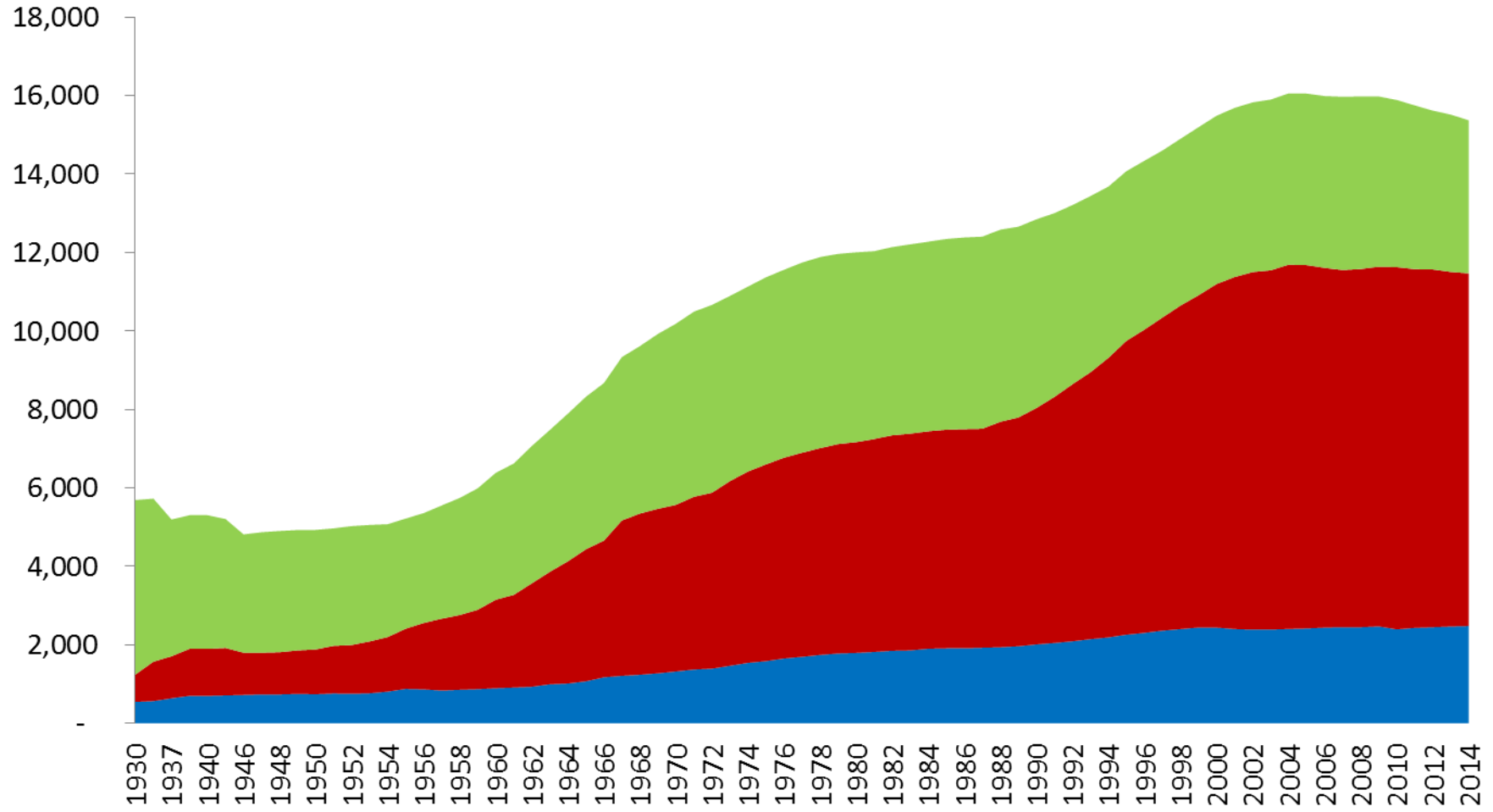
Macro trends



U.S. Golf Courses



Source: NGF

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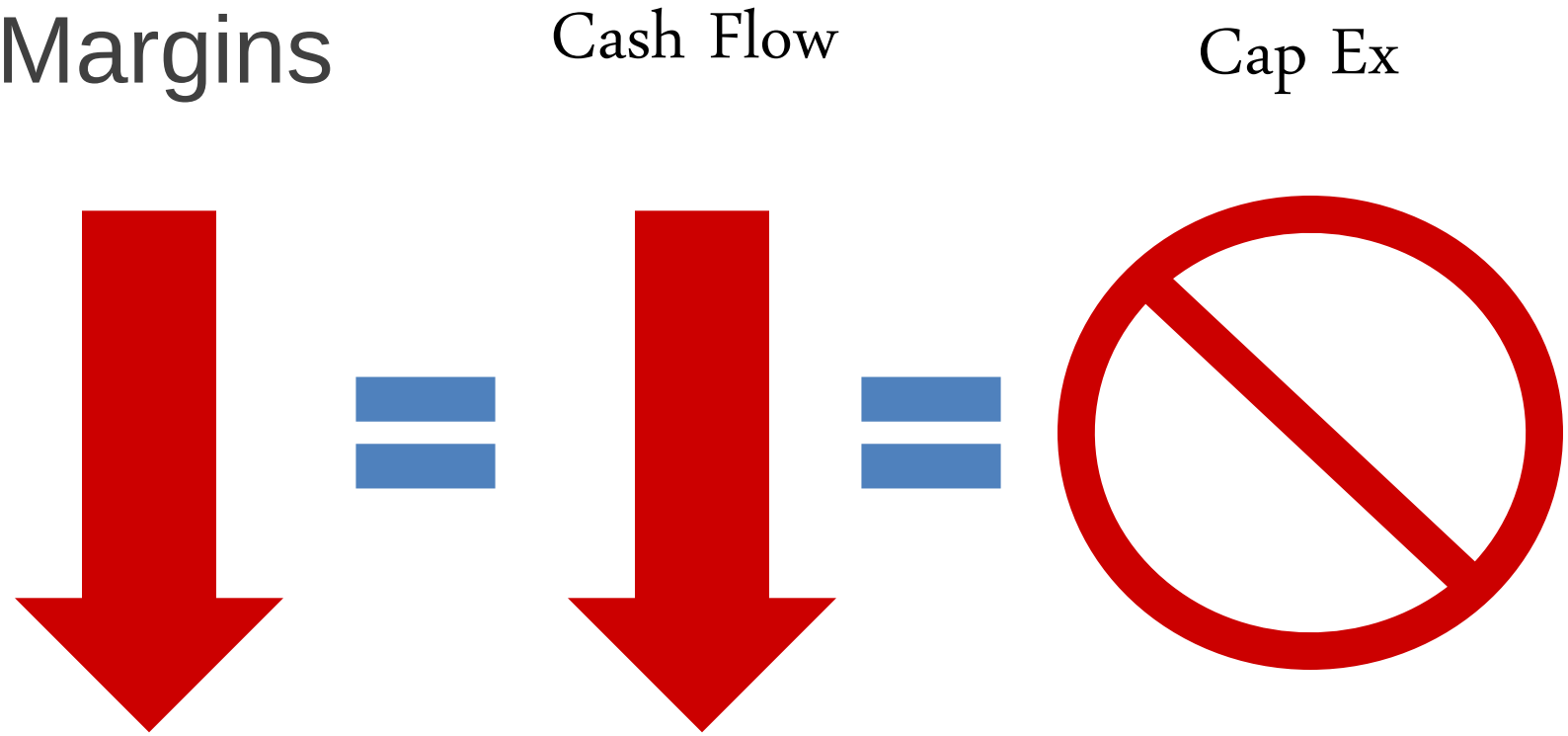
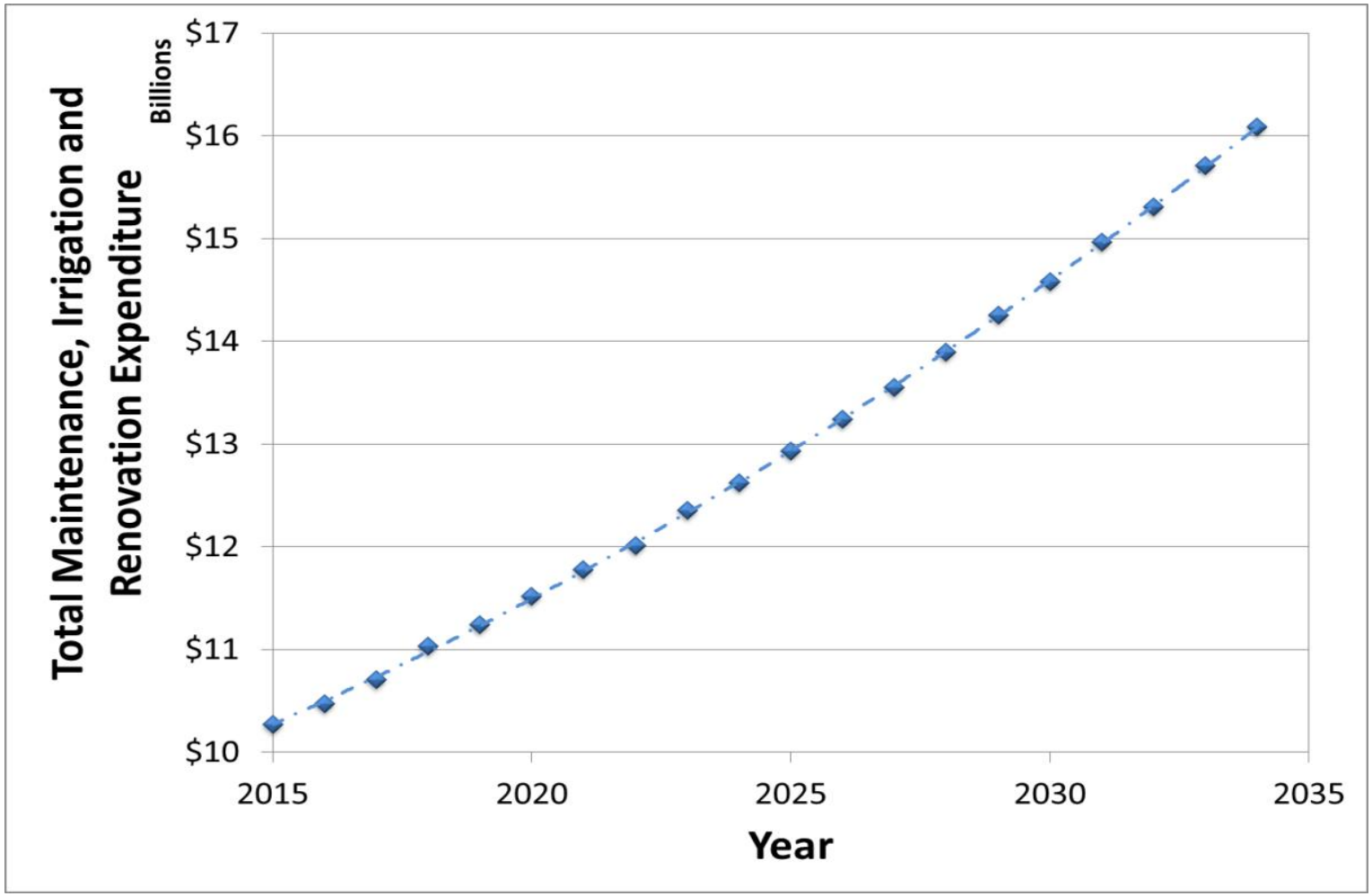
Macro trends



Golf course maintenance expense



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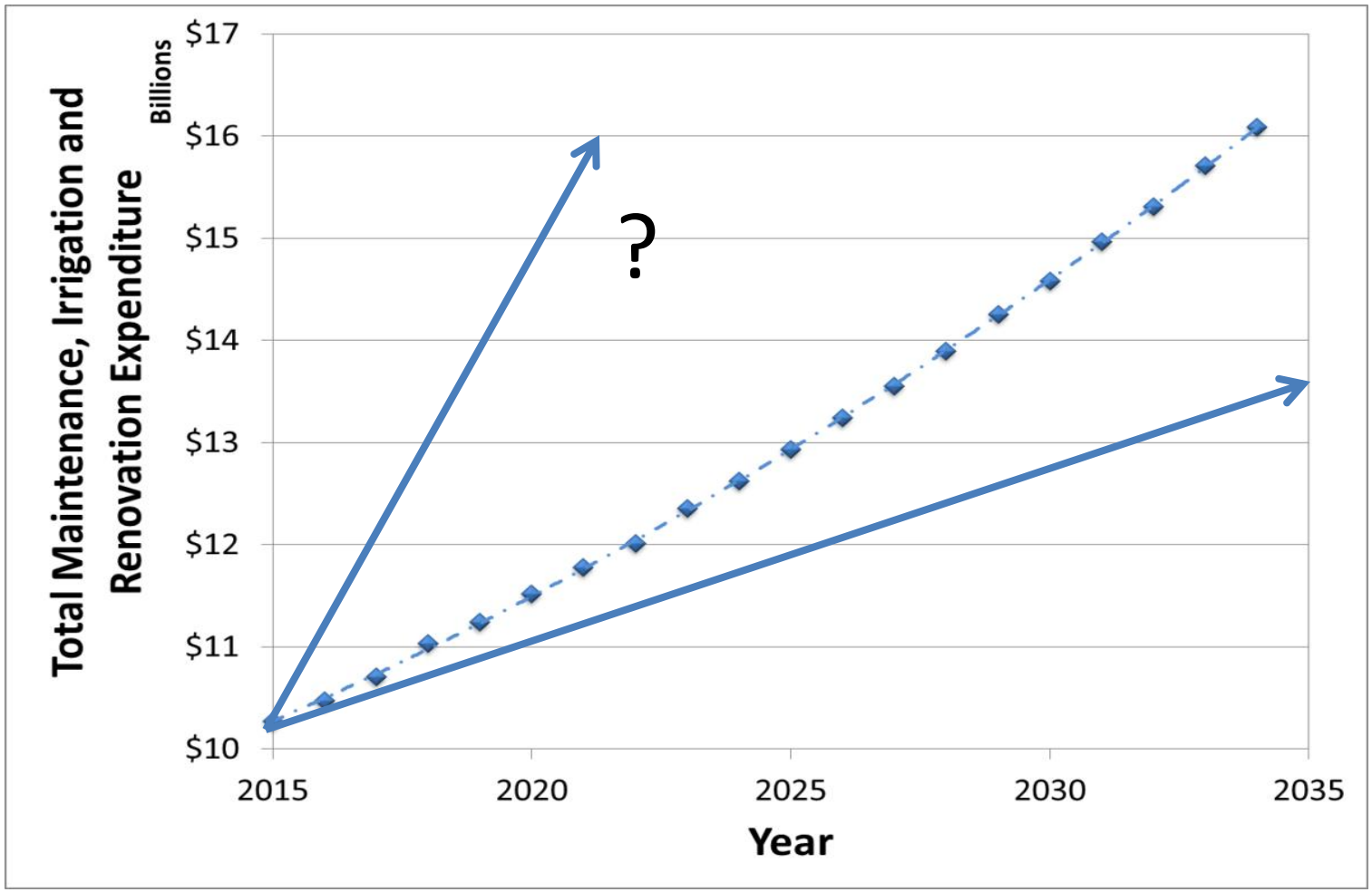
Cost escalation – 2012-2015

- Water – 38% (11.4% annualized)
- Nutrients – 15.9% (5.0% annualized)
- Energy – 11.4% (3.7% annualized)
- Chemicals – 6.9% (2.2% annualized)
- Equipment - -14.9% (-4.9% annualized)

Source: Golf Course Industry Magazine, January 2015

Projected expense growth



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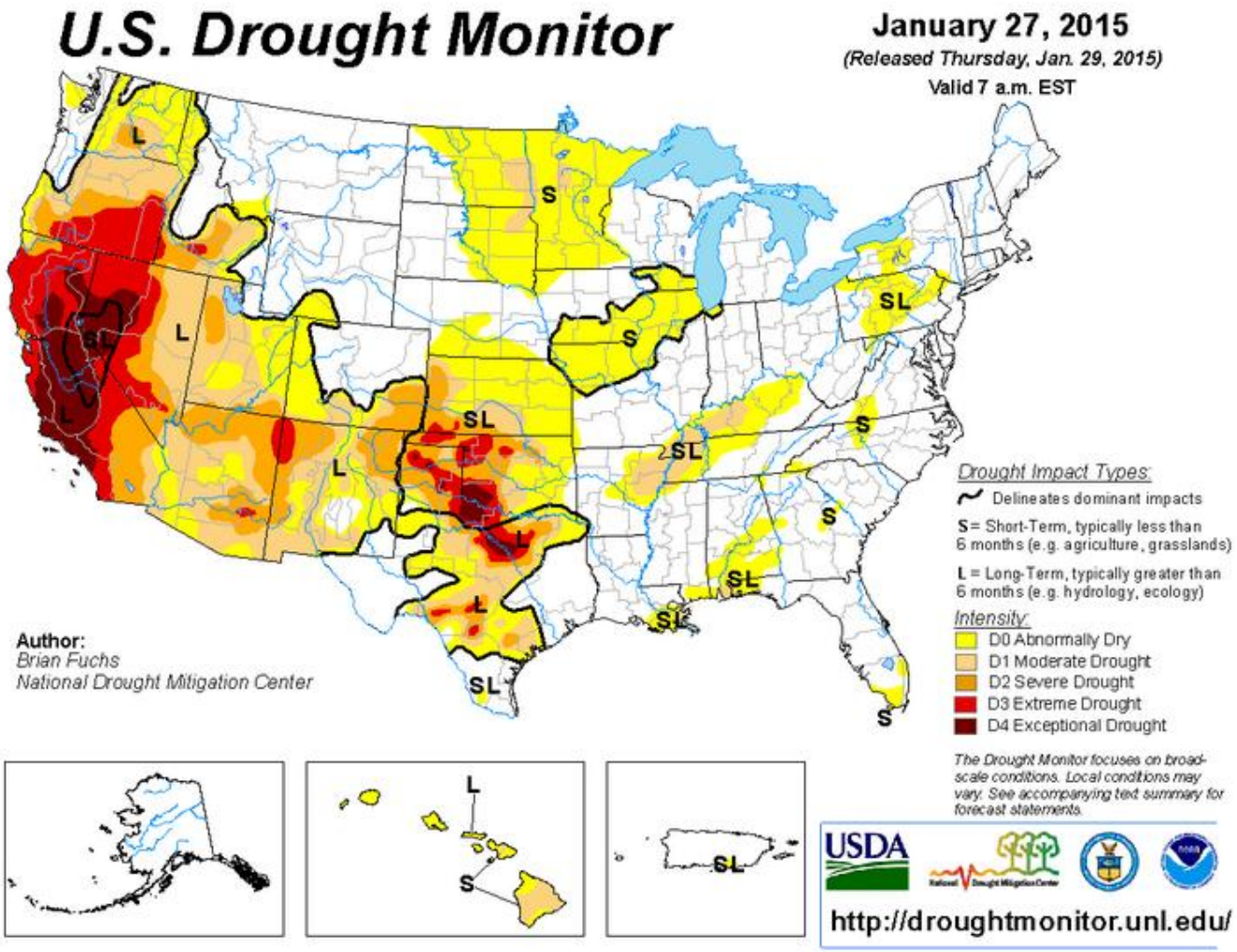
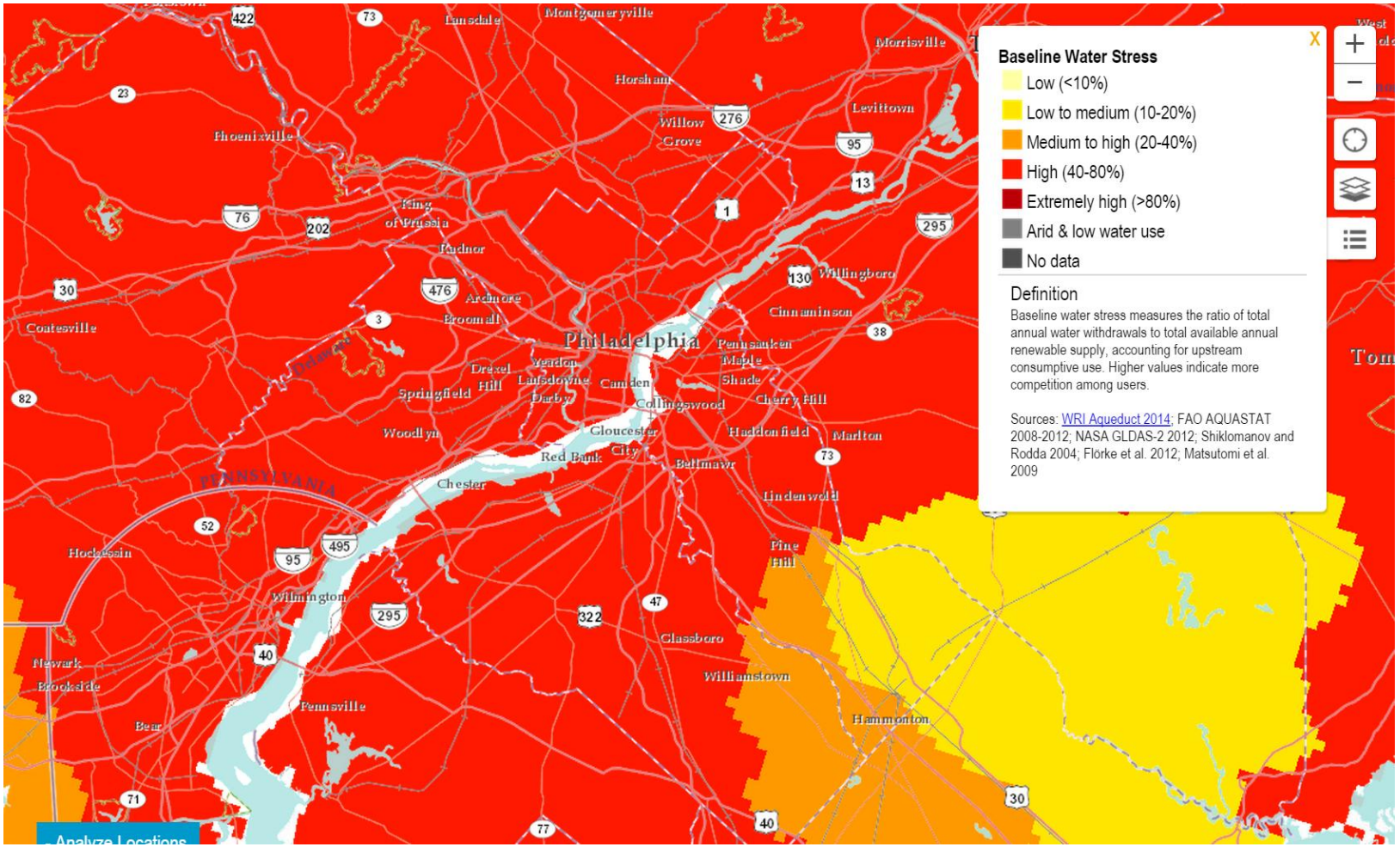
Extraordinary challenges

- Some facilities in Southern California are now spending more than $2M annually on water.
- There are regions in Arizona, New Mexico and Texas where water rates have more than doubled over the past 5 years.
- Water supply infrastructure is deteriorating in many regions and costs to repair will be passed along to users.

Root cause


U.S. Drought Monitor
January 27, 2015
(Released Thursday, Jan. 29, 2015)
Valid 7 a.m. EST
Author:
Brian Fuchs
National Drought Mitigation Center
Drought Impact Types:
Delineates dominant impacts
S = Short-Term, typically less than 6 months (e.g. agriculture, grasslands)
L = Long-Term, typically greater than 6 months (e.g. hydrology, ecology)
Intensity:
D0 Abnormally Dry
D1 Moderate Drought
D2 Severe Drought
D3 Extreme Drought
D4 Exceptional Drought
The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.
USDA
http://droughtmonitor.unl.edu/

Water stress



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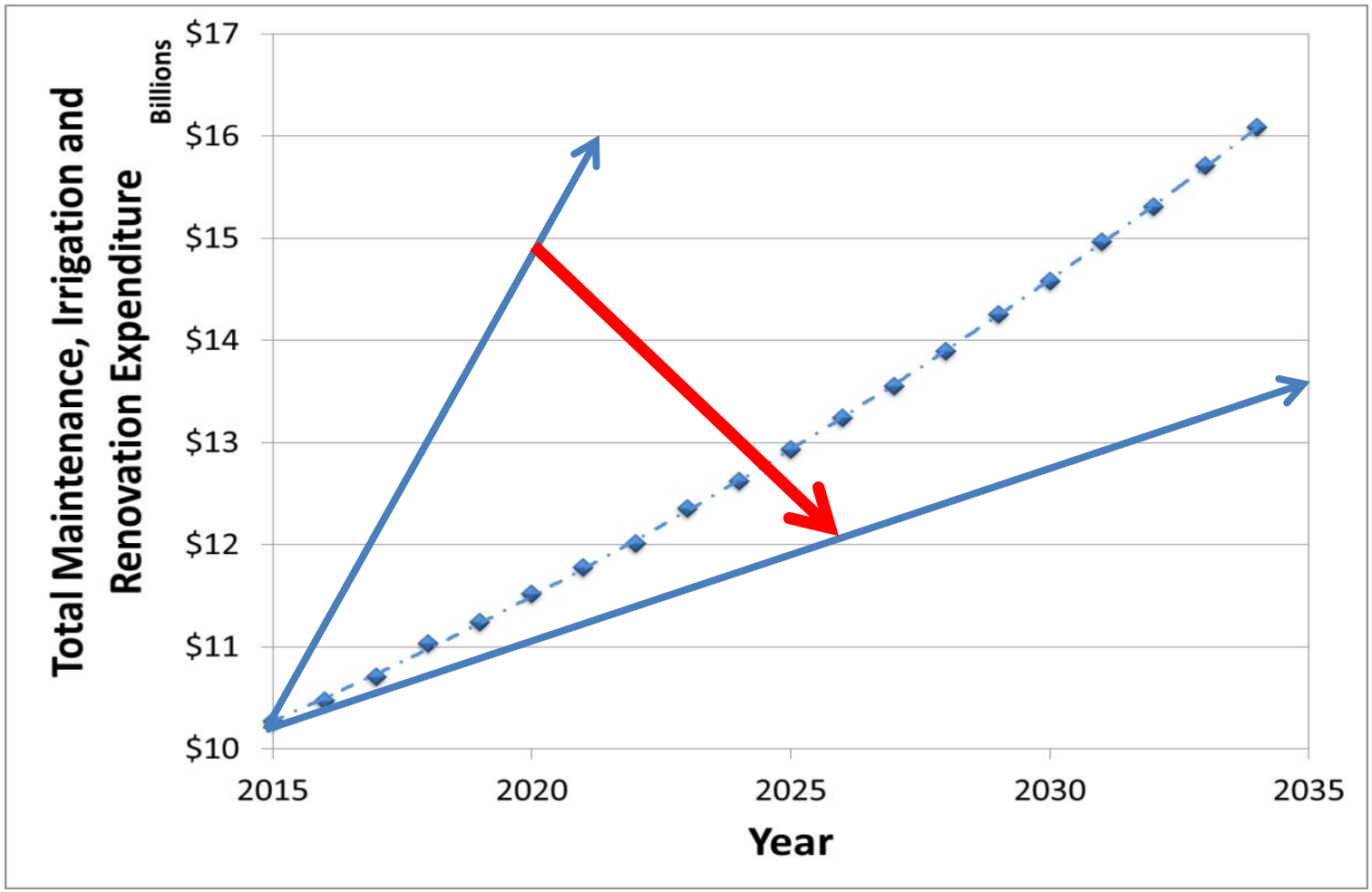
Changing trends

	Labor	Water	Nutrients	Chemicals	Energy	Impact to Players
Increased Green Speed	Significantly higher	None	Lower	Significantly higher	Higher	Longer rounds Higher scores
Lower Fairway Mowing Heights	Higher	None	Lower	Higher	Higher	Difficult to elevate ball; yips
Longer, uniform rough	Higher	Higher	Higher	Higher	Higher	Lost balls Longer rounds
Color and Aesthetics	Significantly higher	Higher	Significantly higher	Higher	Higher	None
Overseeding	Significantly higher	Significantly higher	Significantly higher	Significantly higher	Higher	None
Increased Length	Significantly higher	Significantly higher	Significantly higher	Significantly higher	Higher	Increased Length
Increased Footprint (various factors)	Higher	Higher	Higher	Higher	Higher	Longer rounds

Pebble Beach, 1977

Pebble Beach, 2014

Bringing the ecosystem into control



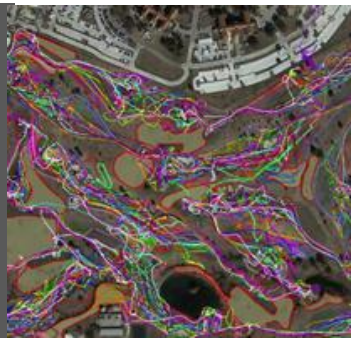
Mitigation strategies

1. Reduce maintained and irrigated acreage
2. Leverage E/T data to manage irrigation practices
3. Utilize moisture sensors
4. Embrace new turfgrass cultivars
5. Reduce maintenance of bunkers and rough
6. The Merion Experiment

Core Processes

Theoretical and Applied Research

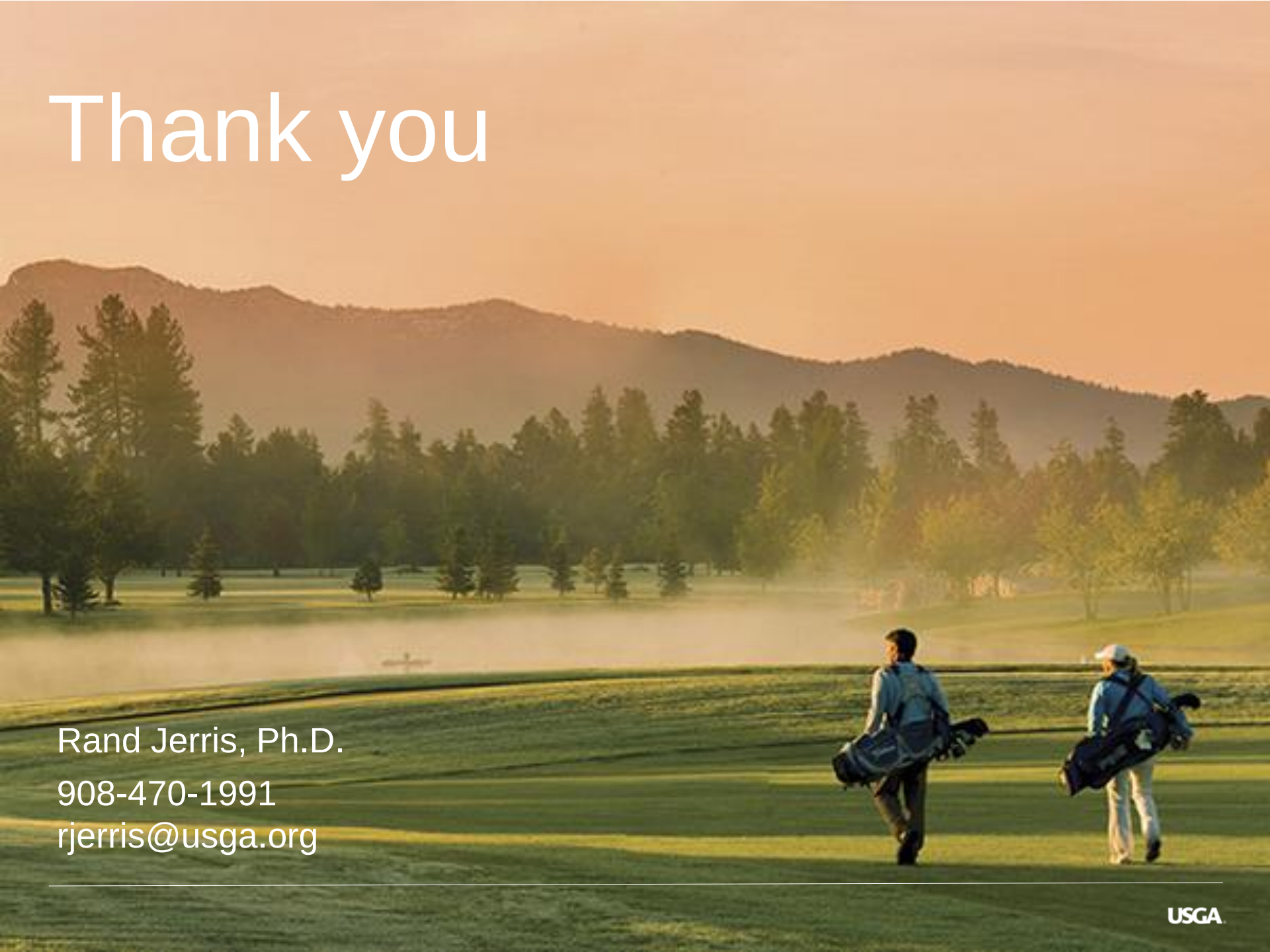
Product Development



Education

Measurement

Thank you



Rand Jerris, Ph.D.
908-470-1991
rjerris@usga.org

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