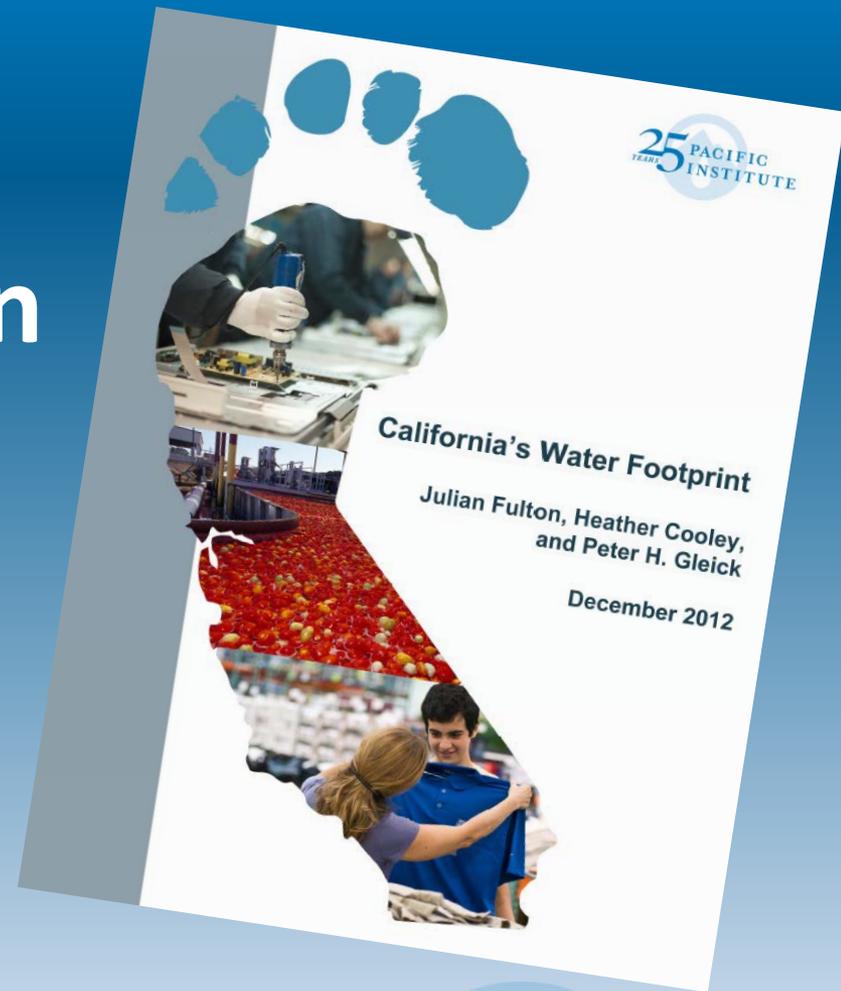


Statewide Water Footprint Estimation

Concept, preliminary findings, and current research



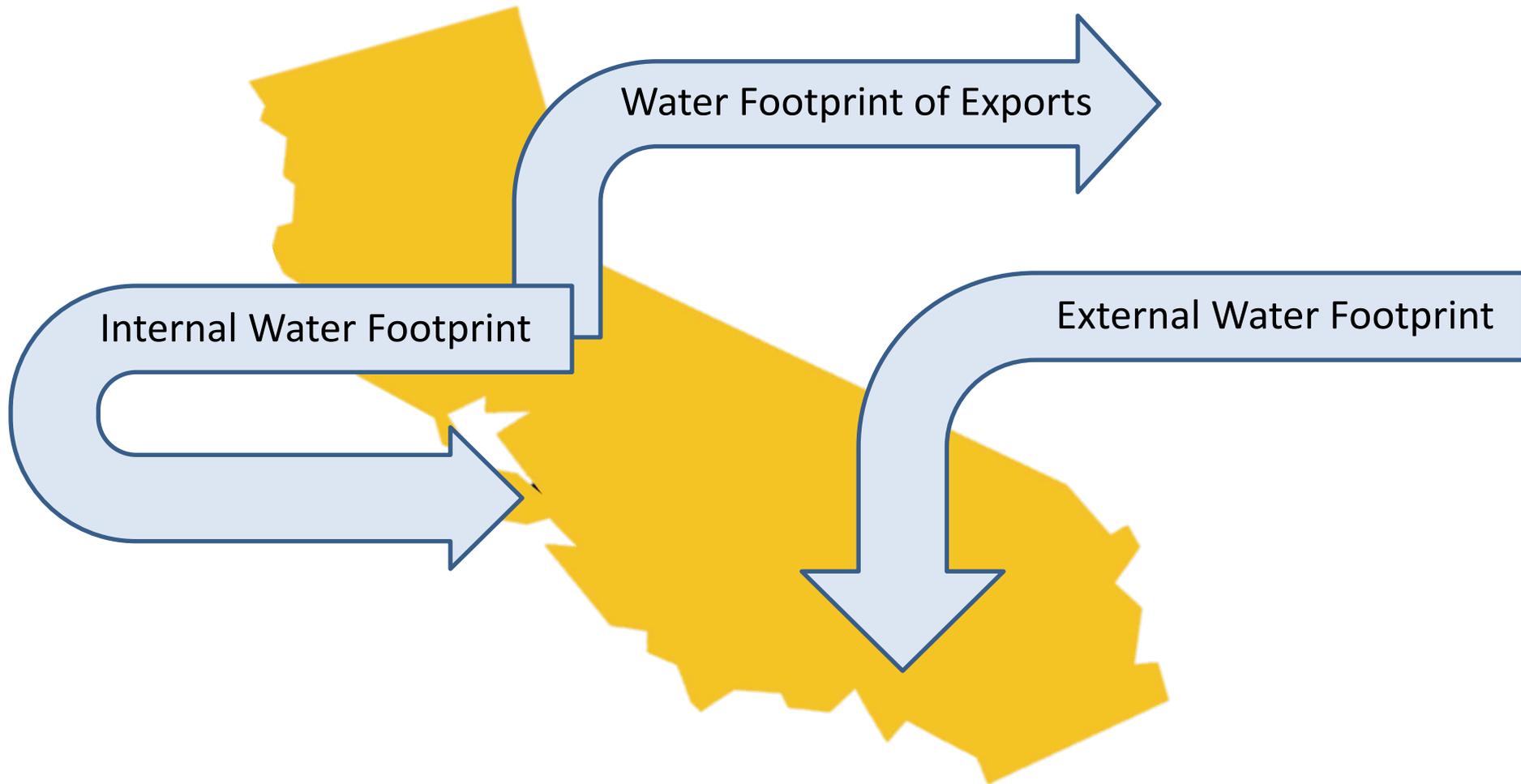
Heather Cooley and Julian Fulton
California Water Plan, Update 2013
Public Advisory Committee Meeting
February 14, 2013, 8:45AM- 4:30PM
Department of Public Health Services



Definitions

Term	Definition
Water footprint	The total volume of water consumed and needed to assimilate pollutants in the production of goods and services used by an individual or jurisdiction (e.g., state, country).
Internal water footprint (of consumption)	The portion of a jurisdiction's water footprint that originates from <u>within</u> that jurisdiction.
External water footprint (of consumption)	The portion of a jurisdiction's water footprint that originates from <u>outside</u> that jurisdiction.

Definitions



Water Footprint Components

Green water footprint

- ▶ volume of rainwater evaporated



Blue water footprint

- ▶ volume of surface or groundwater evaporated

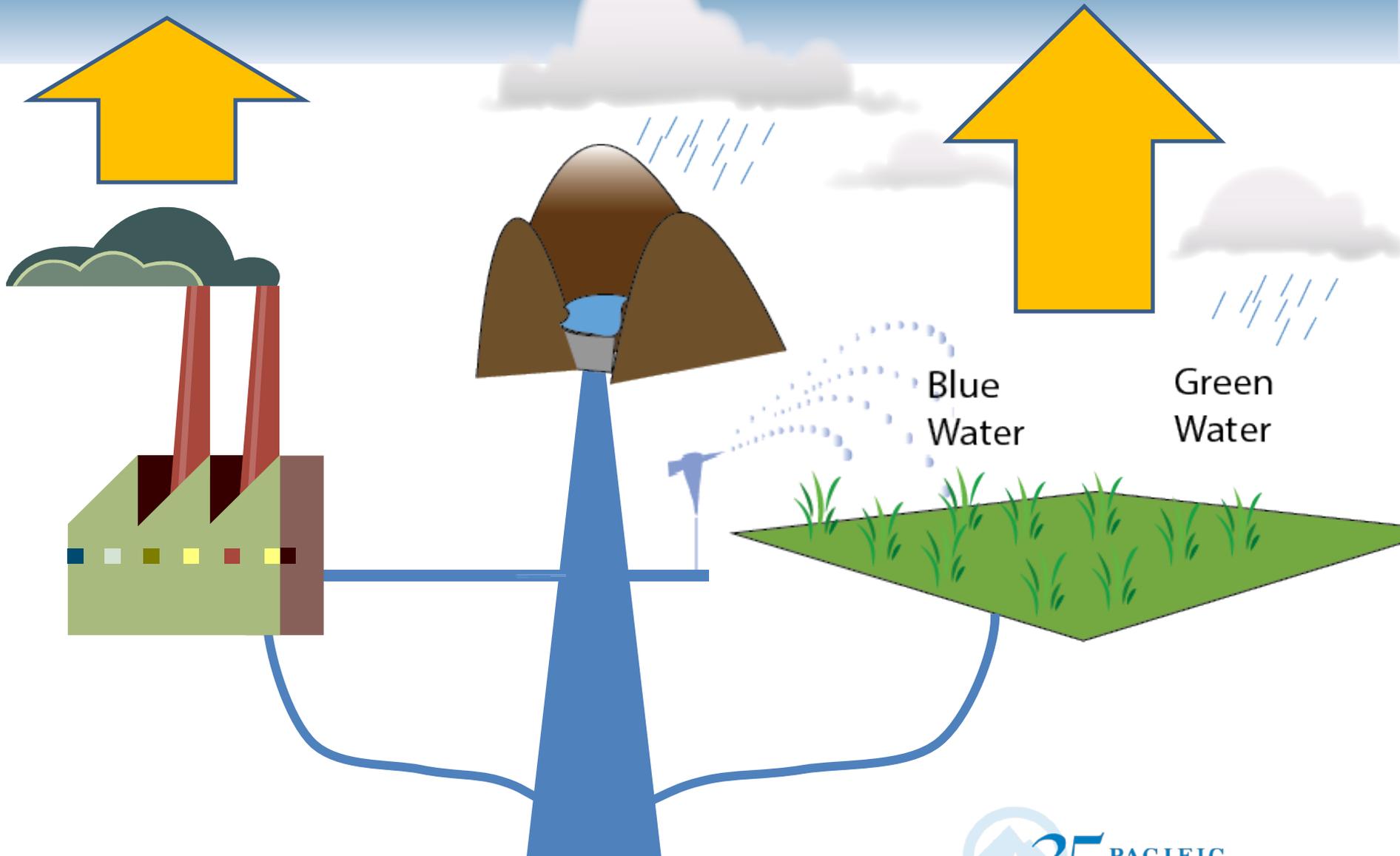


Grey water footprint

- ▶ volume of polluted water.



Consumptive Use



Examples

WATER FOOTPRINT

Virtual water embedded in products

One water follows the illustration is equivalent to **10 litres of virtual water** (production rate definition). All figures shown on this poster are based on **exemplary calculations and may vary** depending on the origin and production process of the product.

The **water footprint** of a product is commonly given or stated as the **volume of freshwater used to produce the product**, measured at the place where the product was actually made. It refers to the amount of the water used in the various steps of the production chain.

For the full poster featuring more than 100 products and to draft information, visit www.virtualwater.eu

note: **Evolution, A.F., Chapuisin, A.K.** (2010) Globalization of water: Sharing the planet's freshwater resources. *Water Resources Research*, 46(12), 1242. www.waterfootprint.org
version: **Thomas Kuhnle**, www.virtualwater.eu
Thomas and Thutler, London, UK (2010)



650 Barley
litres of water for one pound (500g)



650 Wheat
litres of water for one pound (500g)



1400 Sorghum
litres of water for one pound (500g)



2500 Millet
litres of water for one pound (500g)



650 Toast
litres of water for one package (500g)



750 Cane Sugar
litres of water for one package (500g)



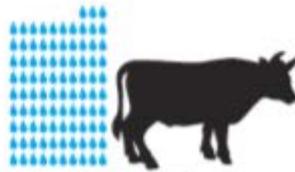
90 Tea
litres of water for one pot (750ml)



840 Coffee
litres of water for one pot (750ml)



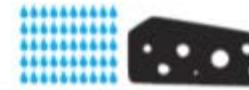
2500 Burger
litres of water for one burger (150g beef)



4650 Beef
litres of water for one steak (500g)



1000 Milk
litres of water for one litre

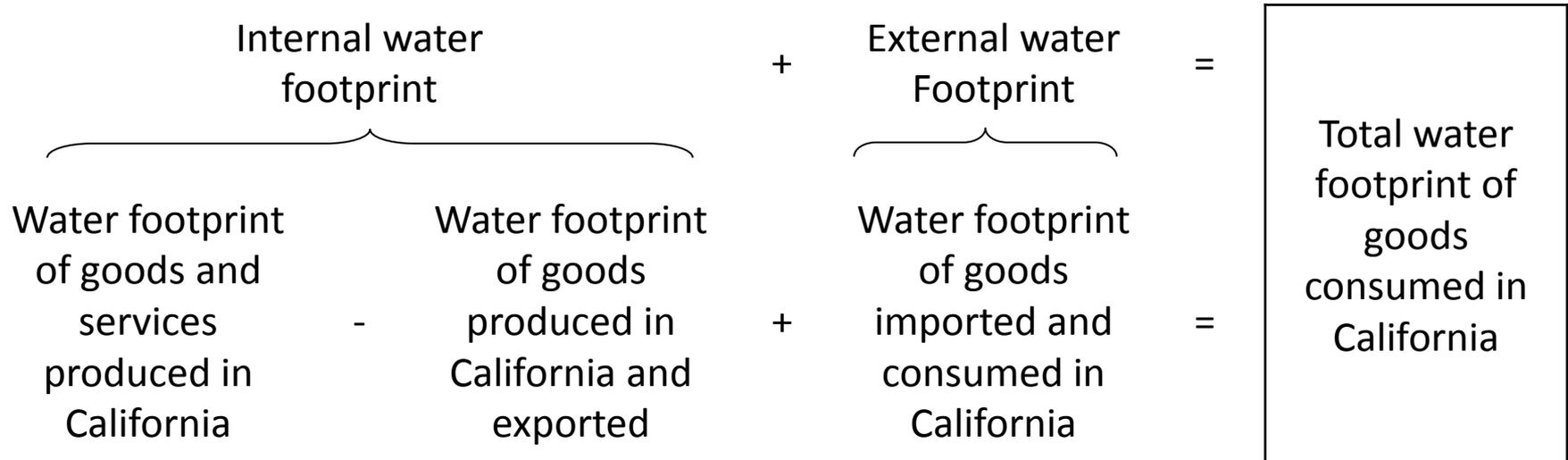


2500 Cheese
litres of water for one big piece (500g)

Source: <http://virtualwater.eu/>

Methods

- Accounting Framework:



- Includes agricultural and industrial goods and residential, commercial and, institutional direct uses
- 3 components: **Green**, **Blue**, and **Grey**
- Target Year: 2007

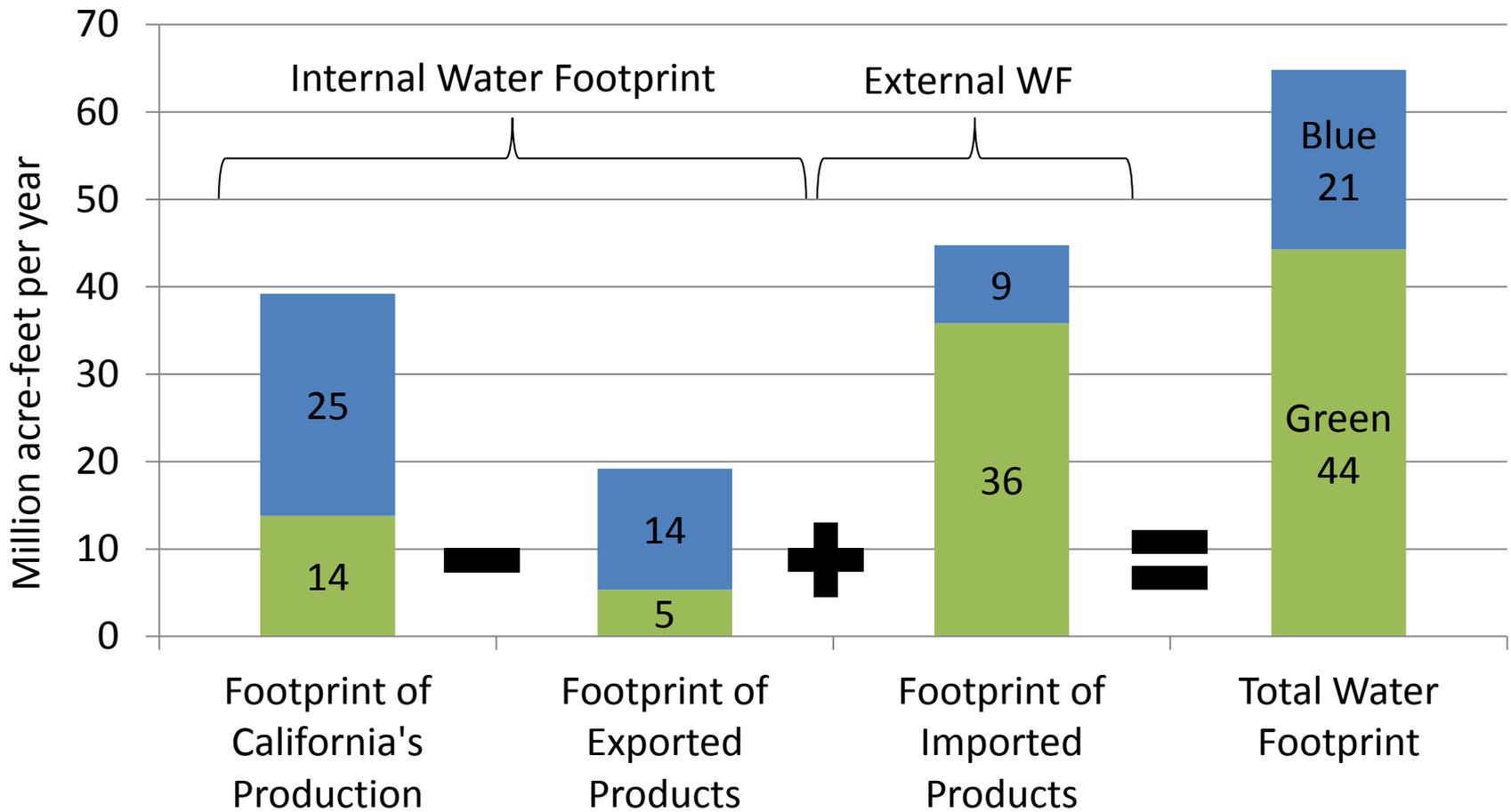
Data Sources

Term	Data Source
Footprint of California's production	DWR Land and Water Use Surveys, 1998-2005 DWR Commercial, Industrial, Institutional water use survey , 1995 DWR Water Plan Update 2009 USDA County Agricultural Commissioners' Production Data, 2007 US Census Bureau, Economic Census, 2007 USGS Estimated Water Use in the US, 2005 Water Footprint Network, avg. industrial grey water factors, 1996-2005
Footprint of products produced in California and exported	As above, combined with: US Census Bureau, Commodity Flow Survey, 2007 US Census Bureau, Foreign Trade Statistical Program, 2007
Footprint of products imported and consumed in California	US Census Bureau, Commodity Flow Survey, 2007 US Census Bureau, Foreign Trade Statistical Program, 2008 Water Footprint Network, WaterStat Database, 1996-2005

Results: major findings

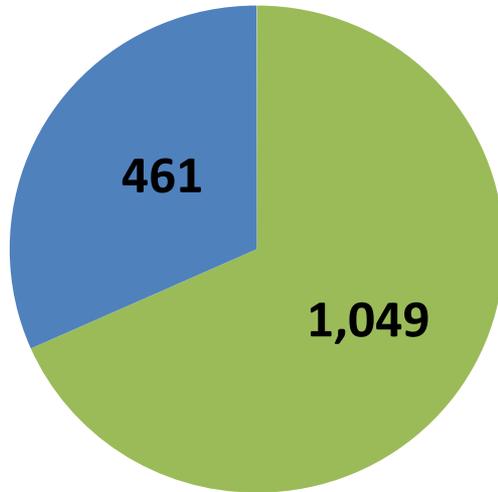
- Californians, compared to the average American...
 - ...have about the same total WF, related to same products
 - ...rely much more on blue water
 - ...have a much larger external footprint
- California, as a whole...
 - ...is a net virtual water importer
 - ...exports half of the blue water that goes into production
 - ...imports more green water than statewide applied agricultural water

Blue and green water footprint



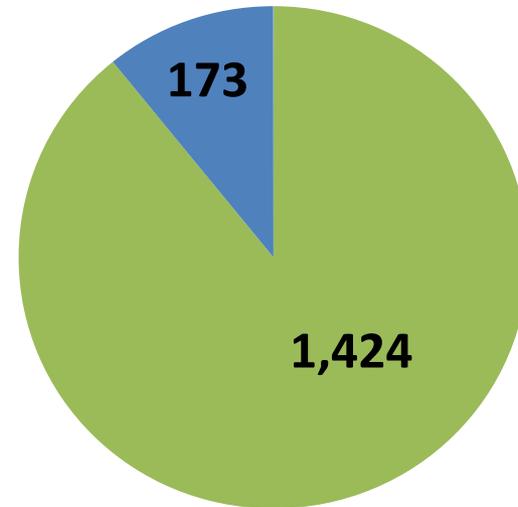
Blue and green water footprint

Water footprint for average Californian (gpcd) (Total = 1,510)



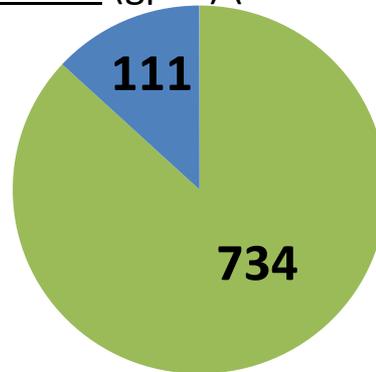
Source: Pacific Institute analysis

Water footprint for average American (gpcd) (Total = 1,597)



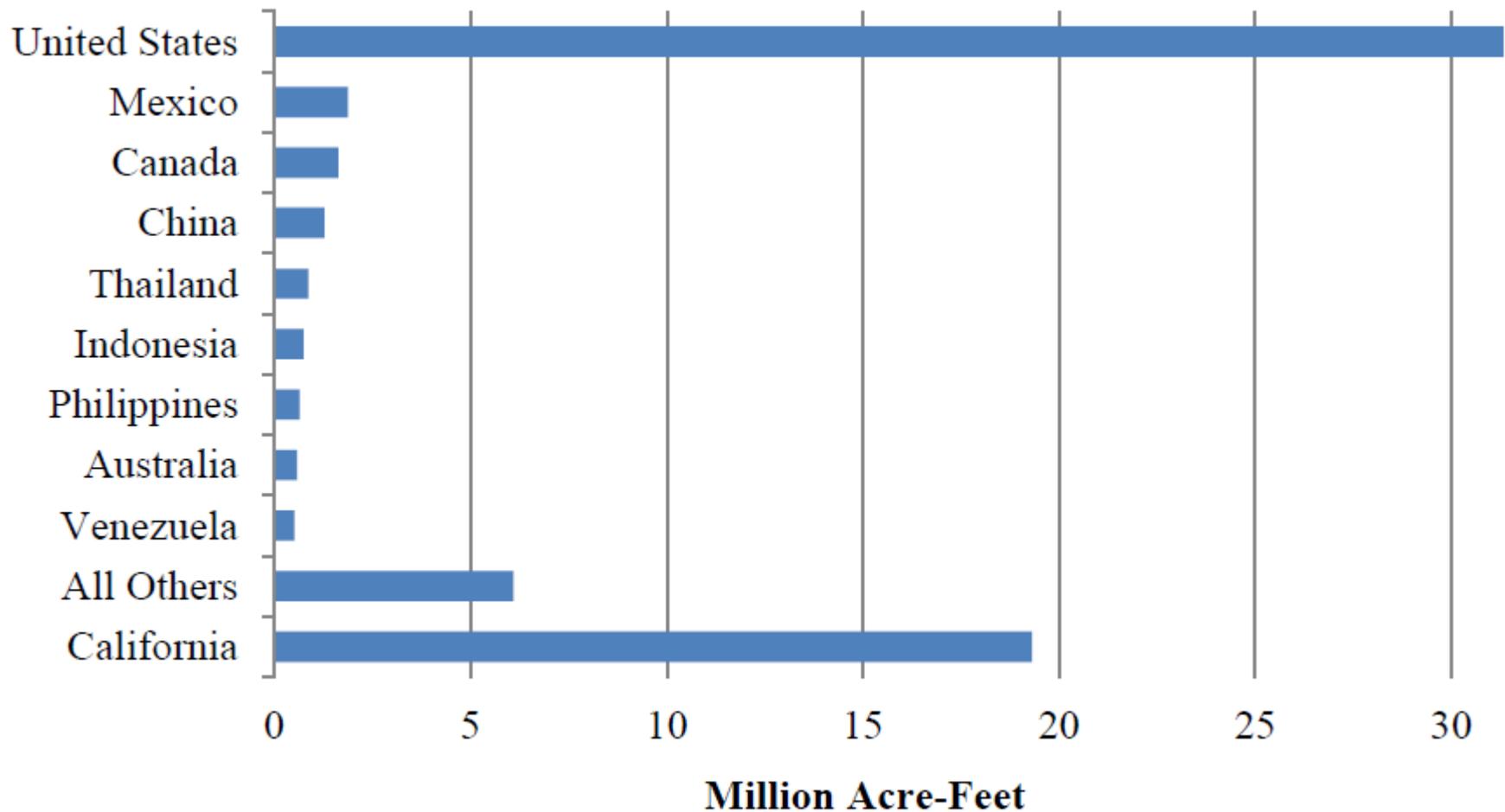
Source: Water Footprint Network

Water footprint for average human (gpcd) (Total = 845)

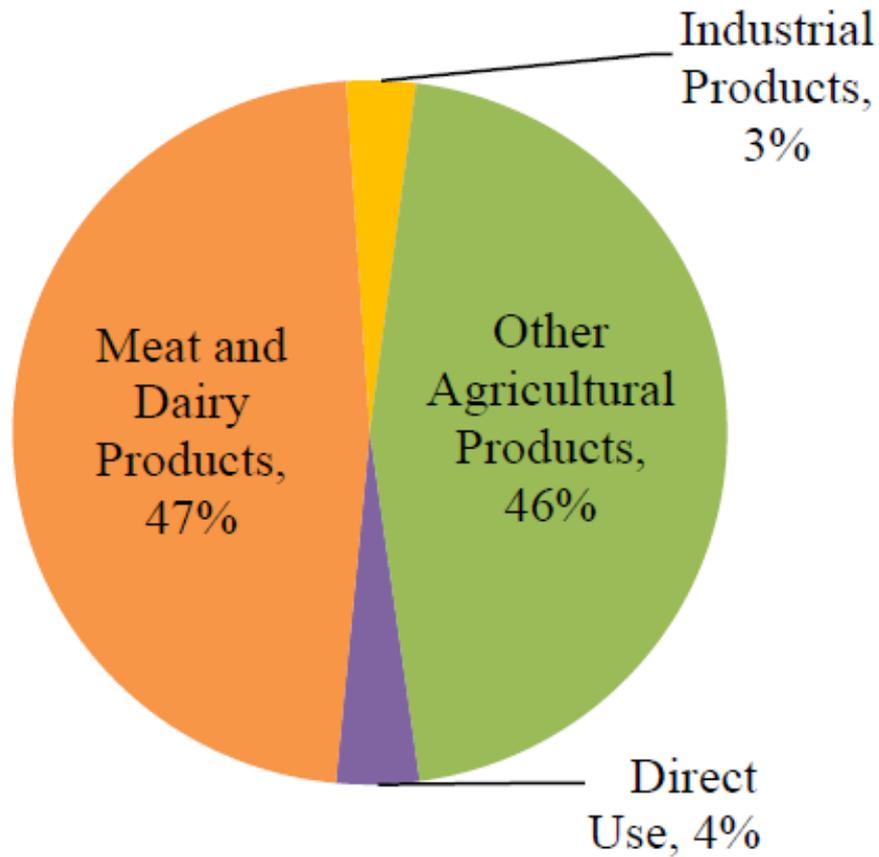


Source: Water Footprint Network

Water footprint, by location

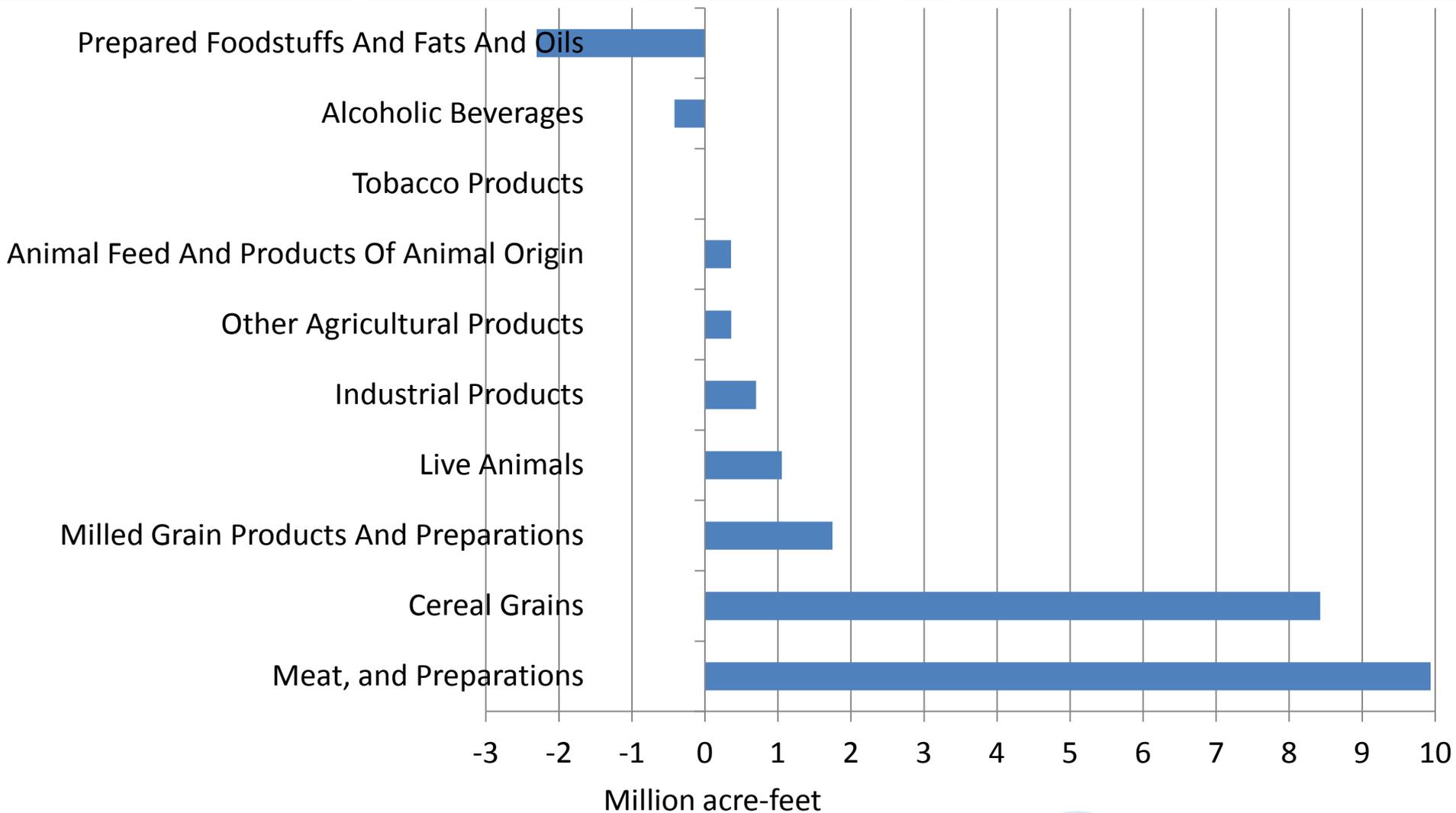


Water footprint, by sector

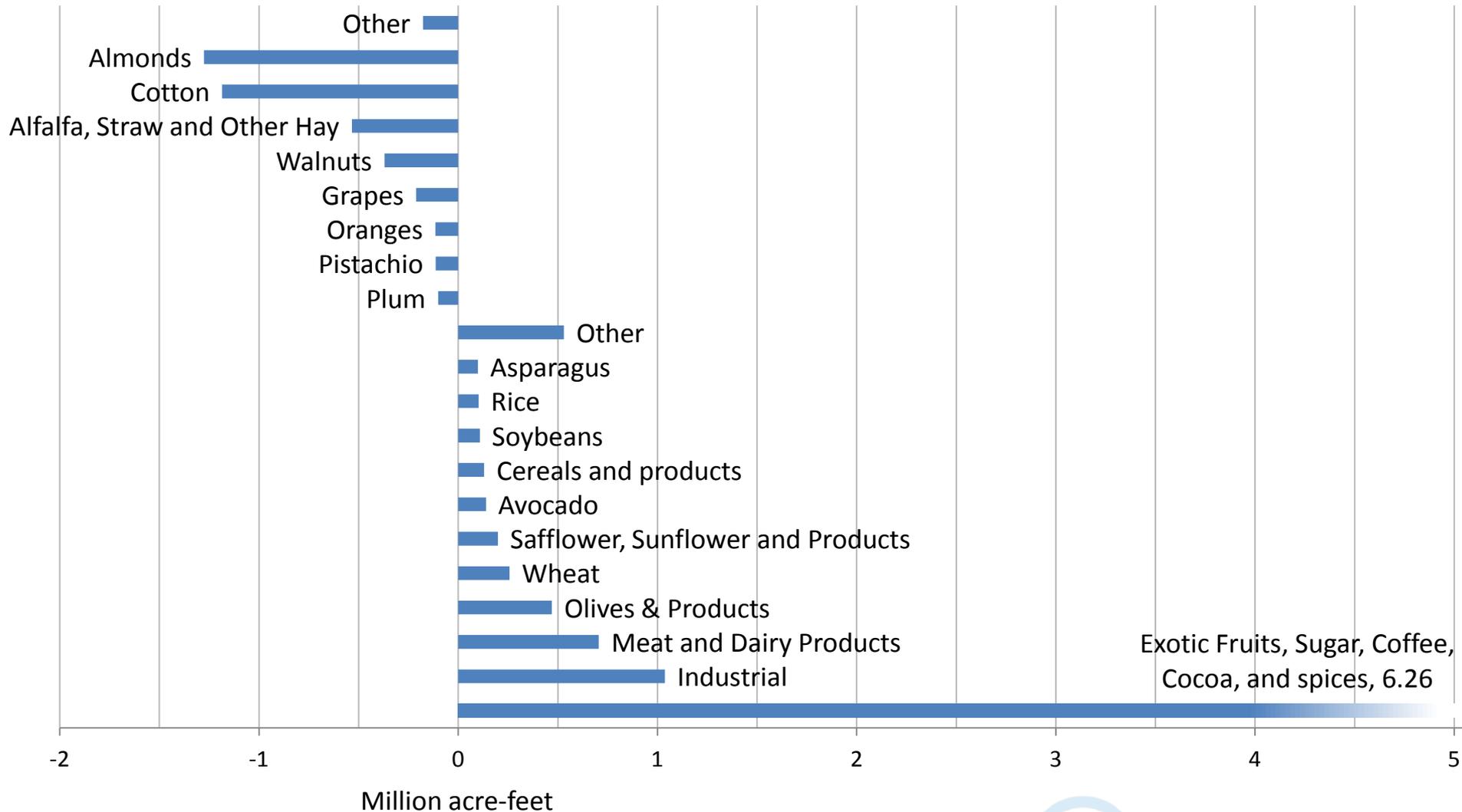


Total Water Footprint =
64 million acre-feet

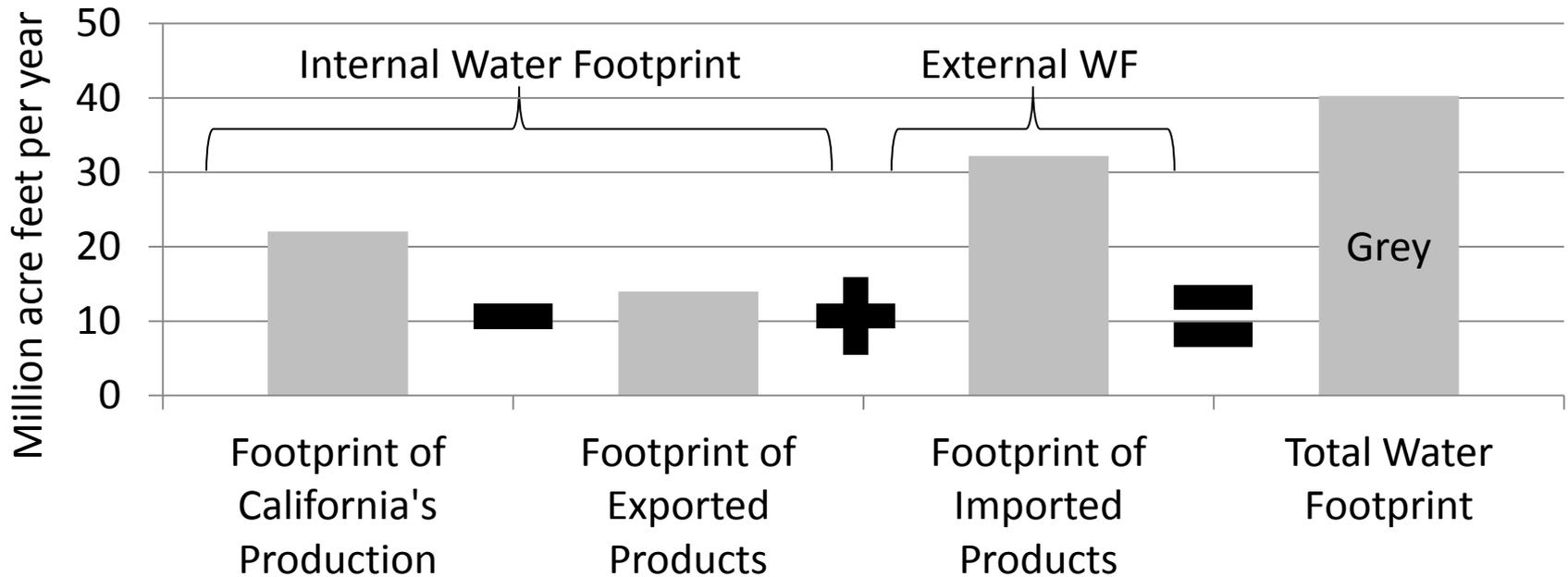
Domestic net water imports/exports, by product



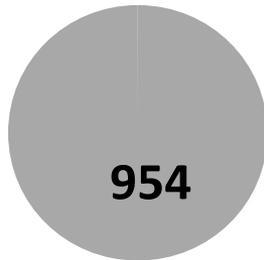
International net water imports/exports, by product



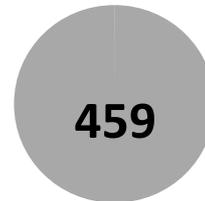
Grey water footprint



Source: Pacific Institute analysis



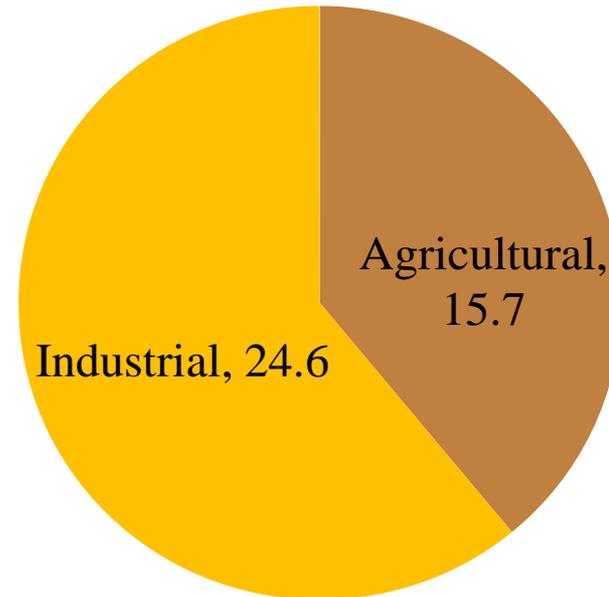
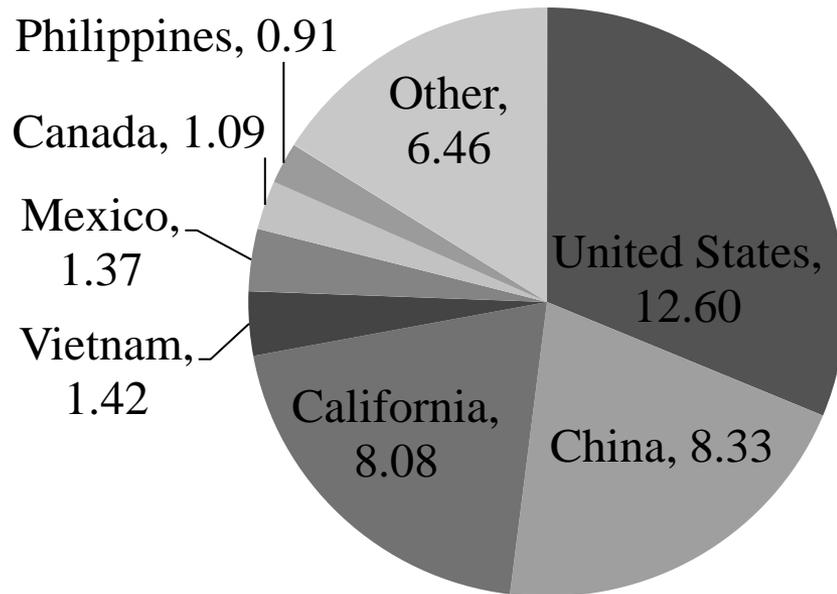
Footprint for average Californian (gpcd)



Footprint for average American (gpcd)

Source: Water Footprint Network

Grey water footprint



Conclusions

- Californians, compared to the average American...
 - ...have about the same total WF, related to same products
 - ...rely much more on blue water
 - ...have a much larger external footprint
- California, as a whole...
 - ...is a net virtual water importer
 - ...exports half of the blue water that goes into production
 - ...imports more green water than statewide applied agricultural water

Next Steps

Pacific Institute Lead:

- Calculating the Water Footprint of Energy Products
- Water Footprint Trends Analysis: 1990-2010
- Regional Water Footprints and Inter-Regional Flows

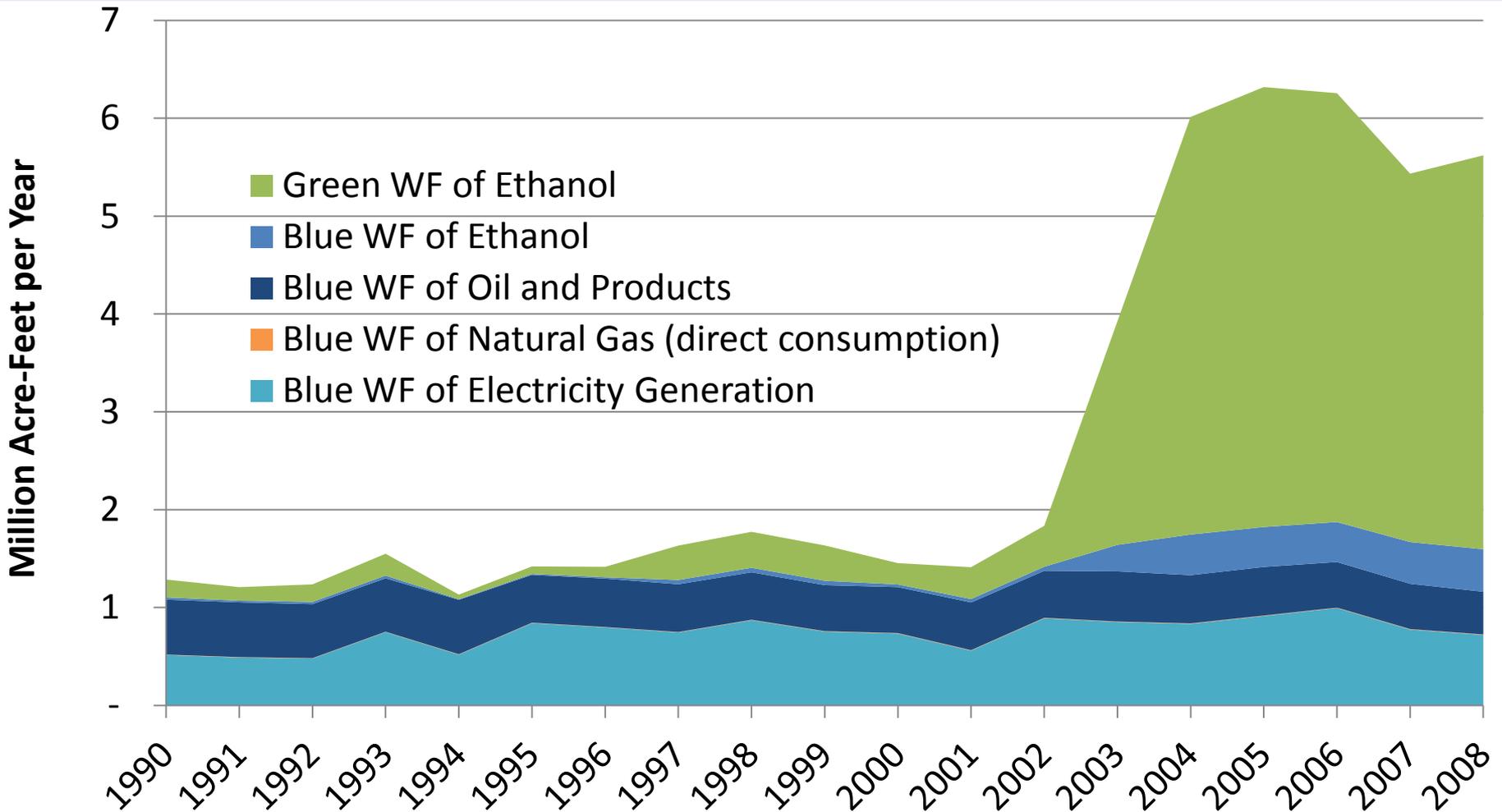
UC Davis Lead:

- Water Footprint Variance and Error Propagation Analysis
- Illustrate the Business Case for Water Footprint

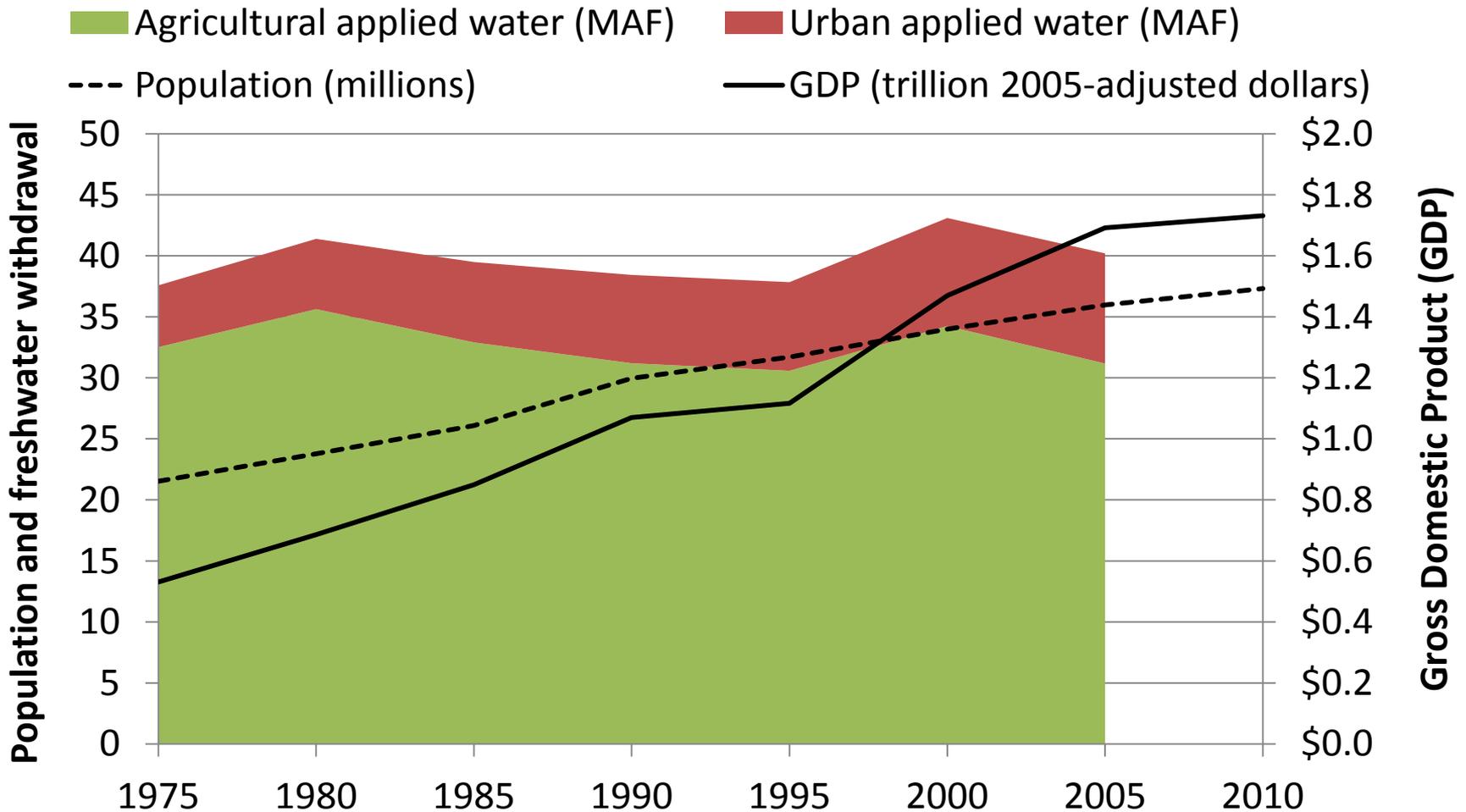
Policy Questions

- How does the water footprint indicator affect our working definition of sustainability?
- How broadly should water management in California consider water resources elsewhere? Are there risks?
- How should the water related costs and benefits of exports be considered alongside other water management criteria?

Next Steps: Energy

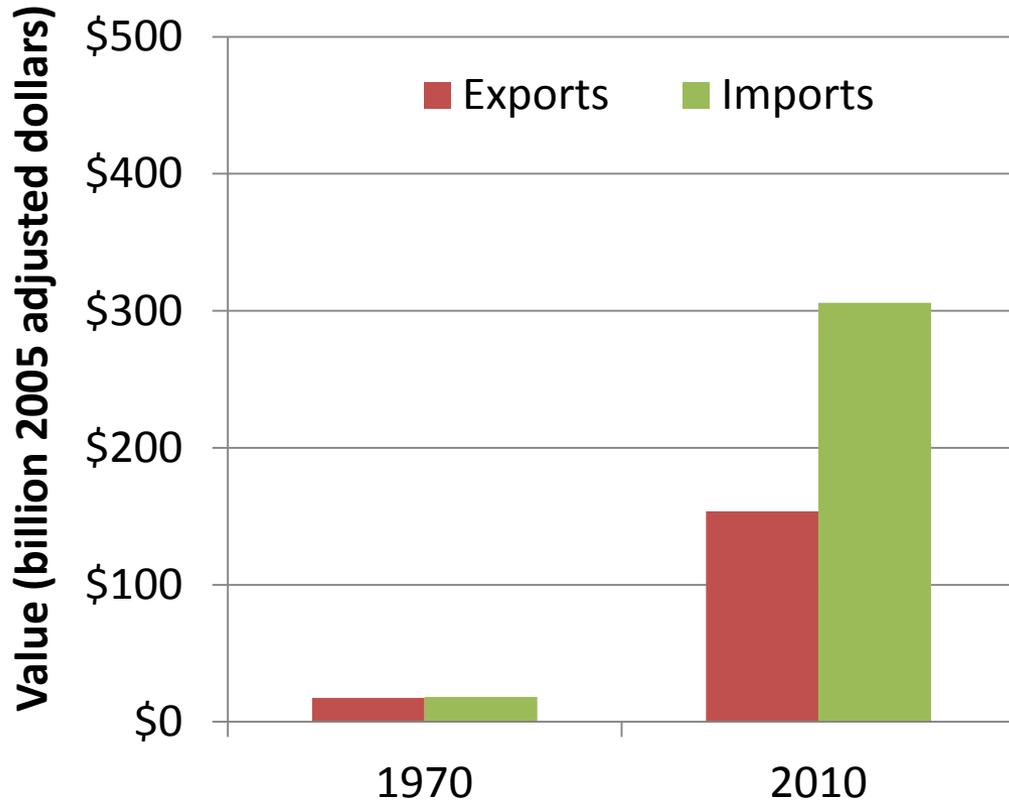


Next Steps: Trends

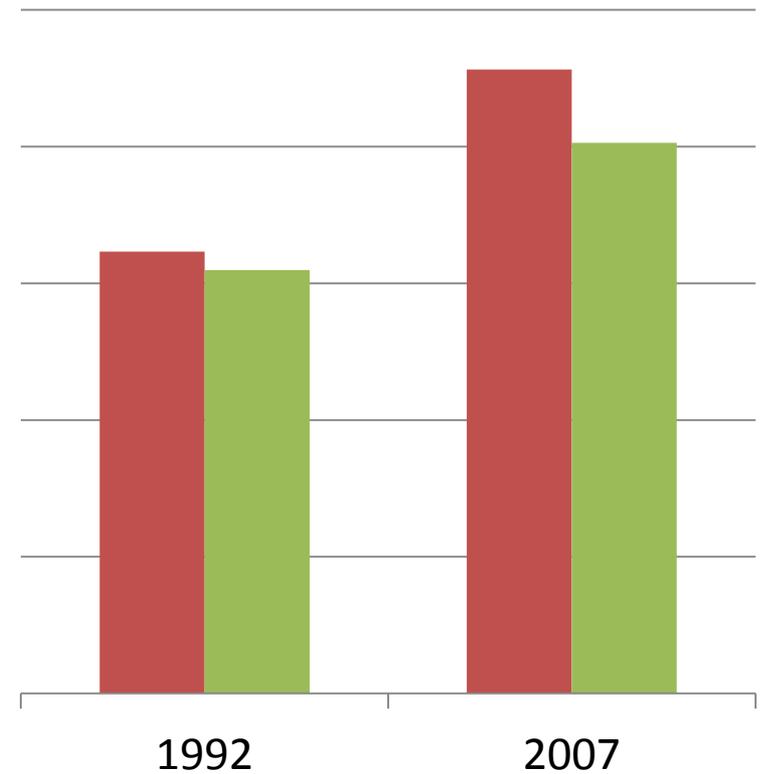


Next Steps: Trends

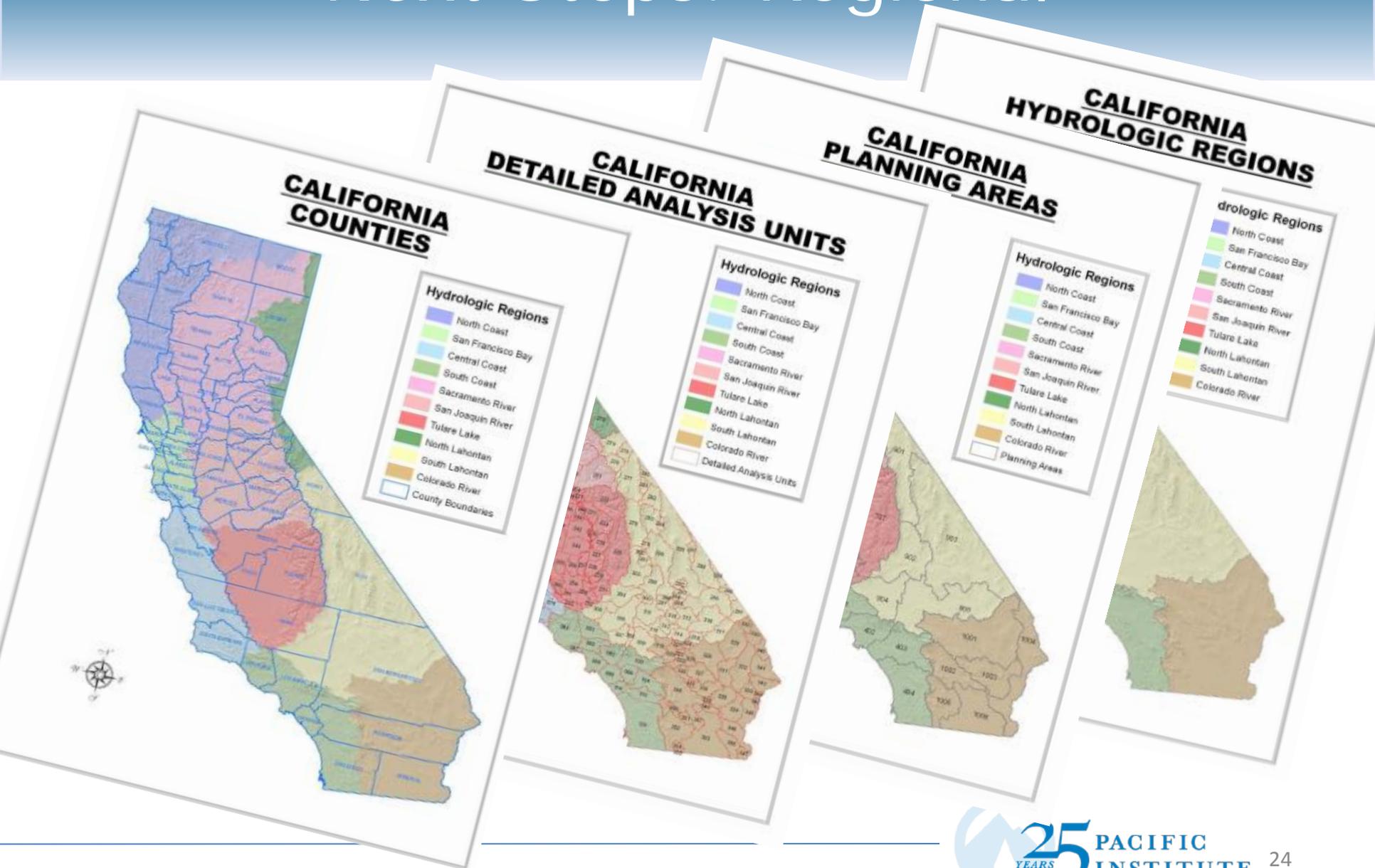
International Trade



Domestic Trade



Next Steps: Regional





654 13th Street, Preservation Park, Oakland, CA 94612

Phone: (510) 251-1600 Email: jfulton@pacinst.org Web: www.pacinst.org
hcooley@pacinst.org