THE LANDSCAPE OF 2025 AND BEYOND

Clay Antieau, MS, PhC

Botanist, Horticulturist, Science Communicator, Environmental Educator

Realities We Don’t Talk About

First Reality:

Population growth in Salishland will continue unabated, both driving and constraining the future of the Salish Sea.

Or, aggressive growth management (immigration, internal birth rates, etc.) is off the table.

Realities We Don’t Talk About

Second Reality:

Standards of living must be maintained, if not enhanced.

“*Mother Earth and humanity are dying, lashed by the environmental, climatic, financial, and food crisis that has been generated by an inhumane and predatory capitalism that converts human life and Mother Earth into merchandise*.”

President Evo Morales, Bolivia, addressing 69th Session,
UN General Assembly, September 24, 2014

Realities We Don’t Talk About

Third Reality:

Changing climate will alter both the Salish Sea and Salishland.

Or, we will surpass climate change tipping points.

What About the Last 37 Years?

- ✓ diversification, specialization, and consolidation
- ✓ technological innovation (GIS, barcoding, radio frequency ID; automated data collection, remote sensing, telemetry…)
- ✓ workforce changes
- ✓ native plants
- ✓ wildlife habitat; beneficial insect support
- ✓ water and soil conservation
- ✓ urban forests, green infrastructure, stormwater management
- ✓ pesticide and fertilizer use (education; reduction of use)
- ✓ edible landscaping
- ✓ greater diversity of plant materials; landscape plant selection
- ✓ weed and pest management (diagnosis; integrated management)
- ✓ management of invasive species
- ✓ more and diverse training/education opps for public and professionals
- ✓ recycling of green wastes and biomass
- ✓ Organic, climate-appropriate gardening (enviro. issues; sustainability….)

Realities We Don’t Talk About

First Reality:

Population growth in Salishland will continue unabated, both driving and constraining the future of the Salish Sea.

Or, aggressive growth management (immigration, internal birth rates) is off the table.

DEMOGRAPHICS

INCREASING U.S. POPULATION, BUT AT SLOWER RATE:

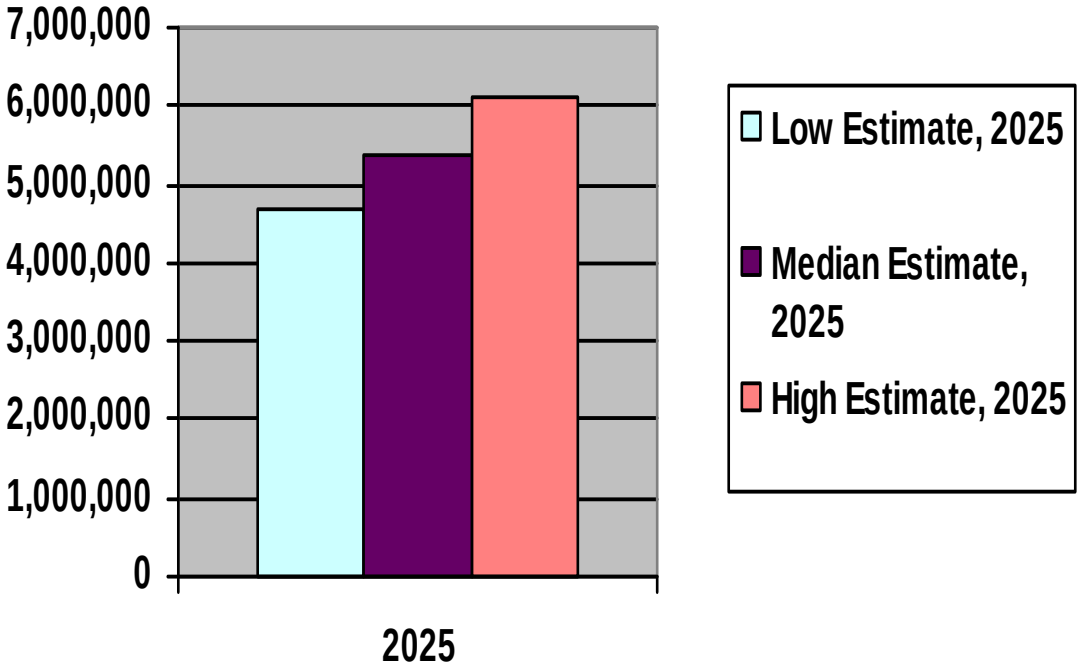
- **1960–2005: 116M people (↑64%)**
- **2005–2050: 142M (from 296M to 438M;↑48%)**
- **Nearly all increase from 2005 to 2050 will be due to new immigrants and their U.S.-born descendants**

- **Nation's elderly population will more than double in size from 2005 to 2050 as baby-boomers enter traditional retirement years. Number of working-age Americans and children will grow more slowly than elderly population and will shrink as a share of total population.**

Pew Research Center http://pewhispanic.org/files/reports/85.pdf

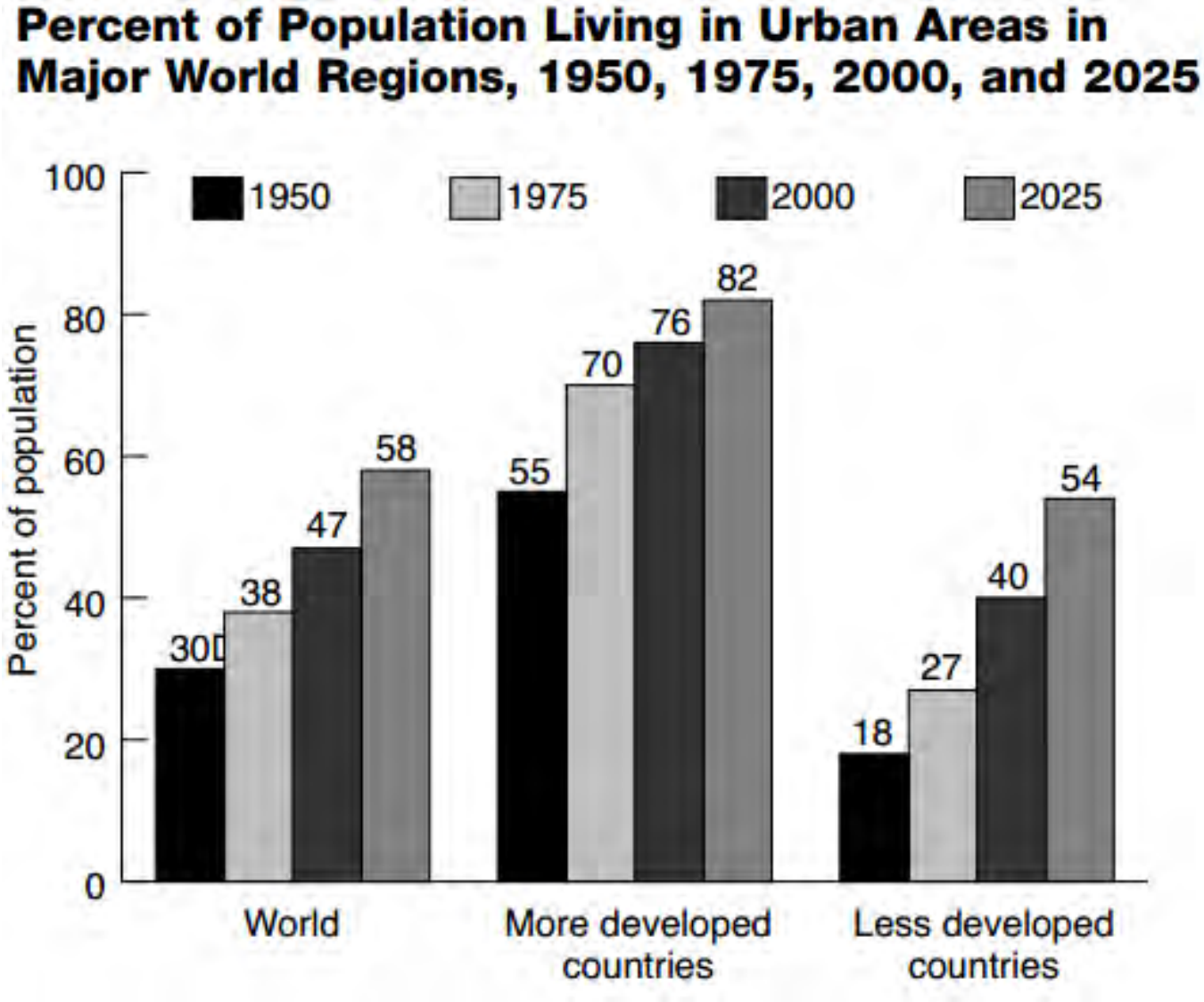
DEMOGRAPHICS

- 9M today in Salishland; 25 to 30M in 2100. A tripling—or more....
- Choices regarding land and water are critical, but land use planning is still based on an "Endless Frontier" vision that considers ecosystems a subset of the economy, capable of sustaining never-ending "growth"



Puget Sound Population 2025
(projected by WA Office of Financial Management)

DEMOGRAPHICS



Population Reference Bureau http://www.prb.org/source/acfac3f.pdf

NEW GENERATIONS OF GARDENERS

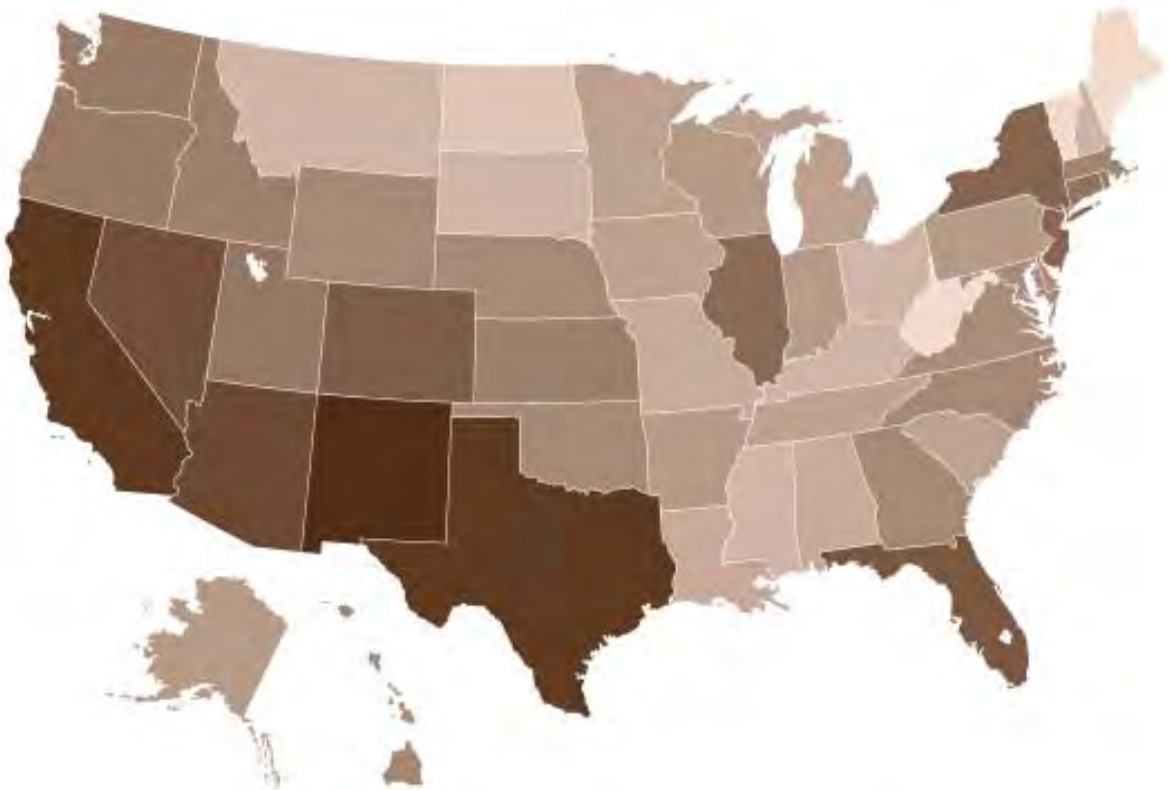
- Fewer consumers interested in gardening, with smaller gardens??
- Less consumer interest in environmental awareness, landscape appreciation, sense of place??
- Changing consumer expectations: from purchasing "way of life" products to "instantaneous gratification" products (Greenhouse Grower; May 11, 2006)
- Increasingly "zero" attention spans (technology and faster pace of life)??
- More people living in increasingly densifying urban areas, but fewer able-bodied and interested folk??

NEW GENERATIONS OF RESIDENTS

Making the Connection Between Human Activity on Land and Its Effects on Puget Sound

Over 30 years, concerted effort has aligned the scientific, social, and political tools necessary to begin cleanup of Chesapeake Bay watershed. That's not happened quickly in the Puget Sound/Salish Sea watershed.

WORKFORCE



Washington

Hispanic Population **790,000**	Among Hispanics Share Foreign Born **35%**
Share Hispanic Among Population **12%**	Among Under 18, Share Hispanic **20%**

- More than 35%
- 20 to 34%
- 10 to 19%
- Less than 10%

http://www.pewhispanic.org/states/

Numbers are likely underestimates due to census methods and numerous undocumented immigrants.

"Latino population, already the nation's largest minority group, will triple in size and will account for most of the nation's population growth from 2005 through 2050. Hispanics will make up 29% of the U.S. population in 2050, compared with 14% in 2005."

Pew Research Center http://pewhispanic.org/files/reports/85.pdf

WORKFORCE CHALLENGES

- **Attracting** the brightest and best talent to fill critical skilled labor gaps in the industry; encouraging and embracing diversity;
- **Connecting** minorities with skilled technical and management positions;
- **Mentoring** employees in professional practice; encouraging others different than you, who may be pursuing different tracks (going back to school, pursuing different career tracks);
- **Articulating,** clearly, the industry in terms of opportunities for advancement and compensation.

Realities We Don’t Talk About

Second Reality:

Standards of living must be maintained, if not enhanced.

“*Mother Earth and humanity are dying, lashed by the environmental, climatic, financial, and food crisis that has been generated by an inhumane and predatory capitalism that converts human life and Mother Earth into merchandise*.”

President Evo Morales, Bolivia, addressing 69th Session,
UN General Assembly, September 24, 2014

SOPHISTICATION: KNOWLEDGE AND USE OF PLANT MATERIALS

- Creatively solve design challenges, particularly plant combinations designed for maintenance, extended seasonal interest….
- Species diversity can be at odds with uniformity, which is often a key element in landscape design; but urban sites are custom-made for plant diversity
- “Landscape as Infrastructure” (green infrastructure; ecological urbanism)
- Restoring the urban forest
- Beware the rapid evolution of new, showy introductions that demand high levels of resources and maintenance (hydrangeas that bloom all summer, for example).

SOPHISTICATION: KNOWLEDGE AND USE OF PLANT MATERIALS

Roadside Raingarden, Greenwood Neighborhood, Seattle, WA

Roadside Raingarden, Loyal Heights Neighborhood, Seattle, WA

INVASIVE SPECIES

The Green Industry continues to introduce countless species, some of which are becoming or will prove to be future invasive species that cause significant ecological and economic damage.

What Invasive Species??

DISEASES

- Sudden Oak Death
- Potato Spindle Tuber Viroid
- Powdery Mildews (various)
- Tomato Chlorotic Dwarf Viroid
- Dutch Elm Disease
- Chestnut Blight
- Beech-bark Disease
- E. White Pine Canker/Dieback
- Boxwood Blight

HIGHER PLANTS

- *Cortaderia* spp.
- *Arundo donax*
- *Aegilops triuncialis*
- *Nardus stricta*

MOSSES, LIVERWORTS, LICHENS

MUSSELLS

- Quagga mussel
- Zebra mussel

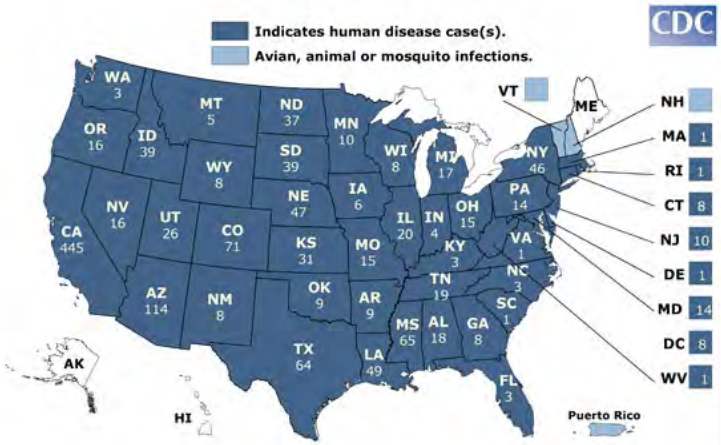
INSECTS

- Emerald Ash Borer
- Japanese Beetle
- European Gypsy Moth
- Asian Gypsy Moth
- Mimosa Webworm
- False Codling Moth
- Chilli Thrips
- Light Brown Apple Moth
- Various Longhorn (wood-boring) Beetles (e.g. Japanese Cedar Longhorned Beetle, MD in 2013)
- Brown Marmorated Stinkbug
- Cypress Tip Moth
- Dogwood Borer
- European Fire Ant
- Horse chestnut leaf miners (Europe)
- Day-lily Gall Midge
- Spotted Wing Drosphila

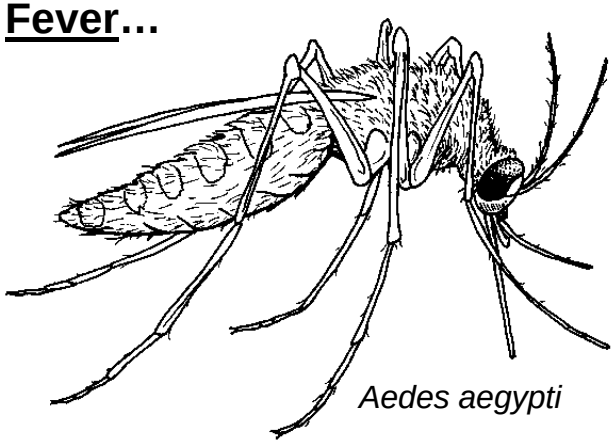
EARTHWORMS

HUMAN AND ANIMAL DISEASE

West Nile Virus
(*Flavivirus* sp.)

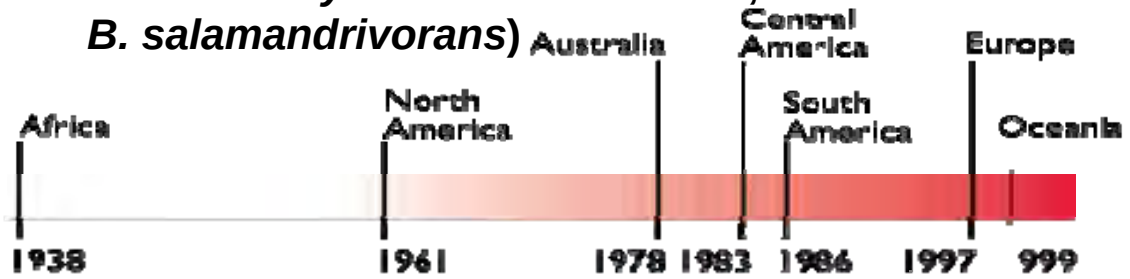


Arthropod-borne Viruses:
Dengue, Chikungunya, Yellow Fever…



Aedes aegypti

Chytridiomycosis (fungii:
***Batrachochytrium dendrobatidis*;**
***B. salamandrivorans*)**



Cryptocossosis gattii
(fungus)

Rat Lungworm
(parasitic nematode:
***Angiostrongylus* spp.)**

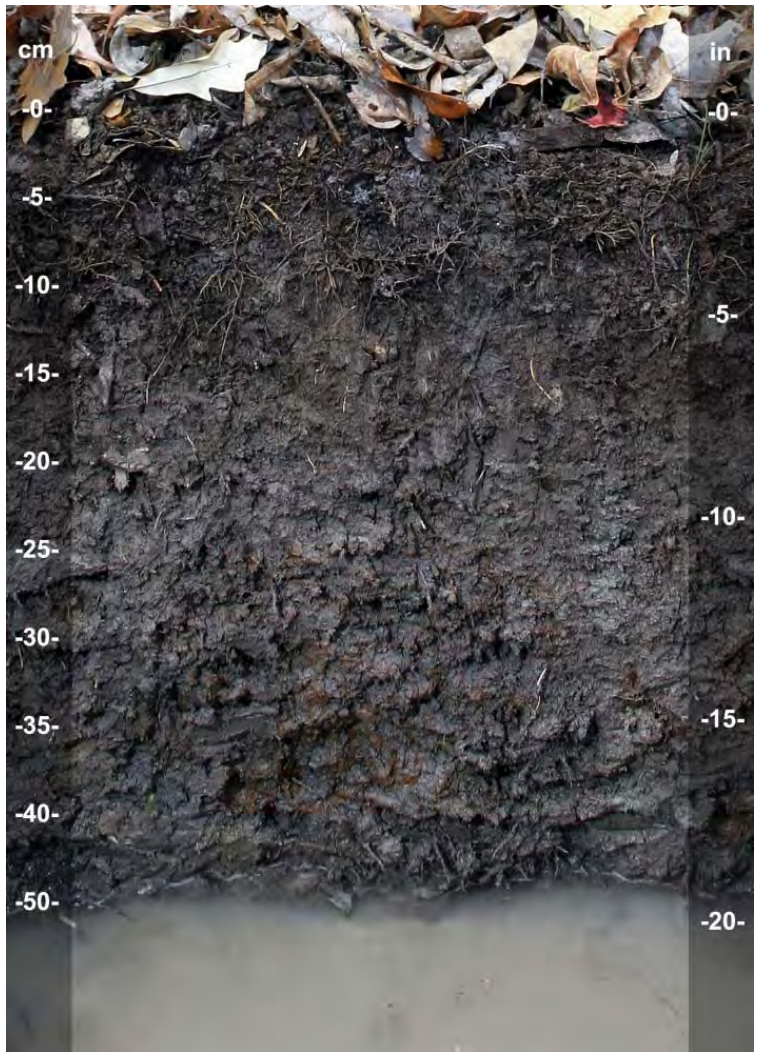
CONSEQUENCES OF CLIMATE CHANGE FOR INVASIVE SPECIES[1]

1. Altered mechanisms of transport and introduction of invasive species
2. Altered climatic constraints on invasive species
3. Altered distributions of invasive species
4. Altered impact of existing invasive species
5. Altered effectiveness of management strategies

[1]Hellmann, J., J. Byers, B. Bierwagen, and J. Dukes. 2008. Five potential consequences of climate change for invasive species. Conservation Biology 22(3):534-543.

CROSS-DISCIPLINE INTEGRATION AND USE OF SCIENCE

- Trends toward deeper understanding in biology, ecology, AND increasing integration among horticulture, landscape design/maintenance, and ecology (ecological landscape design)
- Stronger appreciation of the science underlying the natural world allows us to do our jobs more successfully: *soilfoodwebs, soil health, organic matter*
- Integration and appreciation produce more multi-dimensional and multi-functional landscapes beneficial to humans and many other species



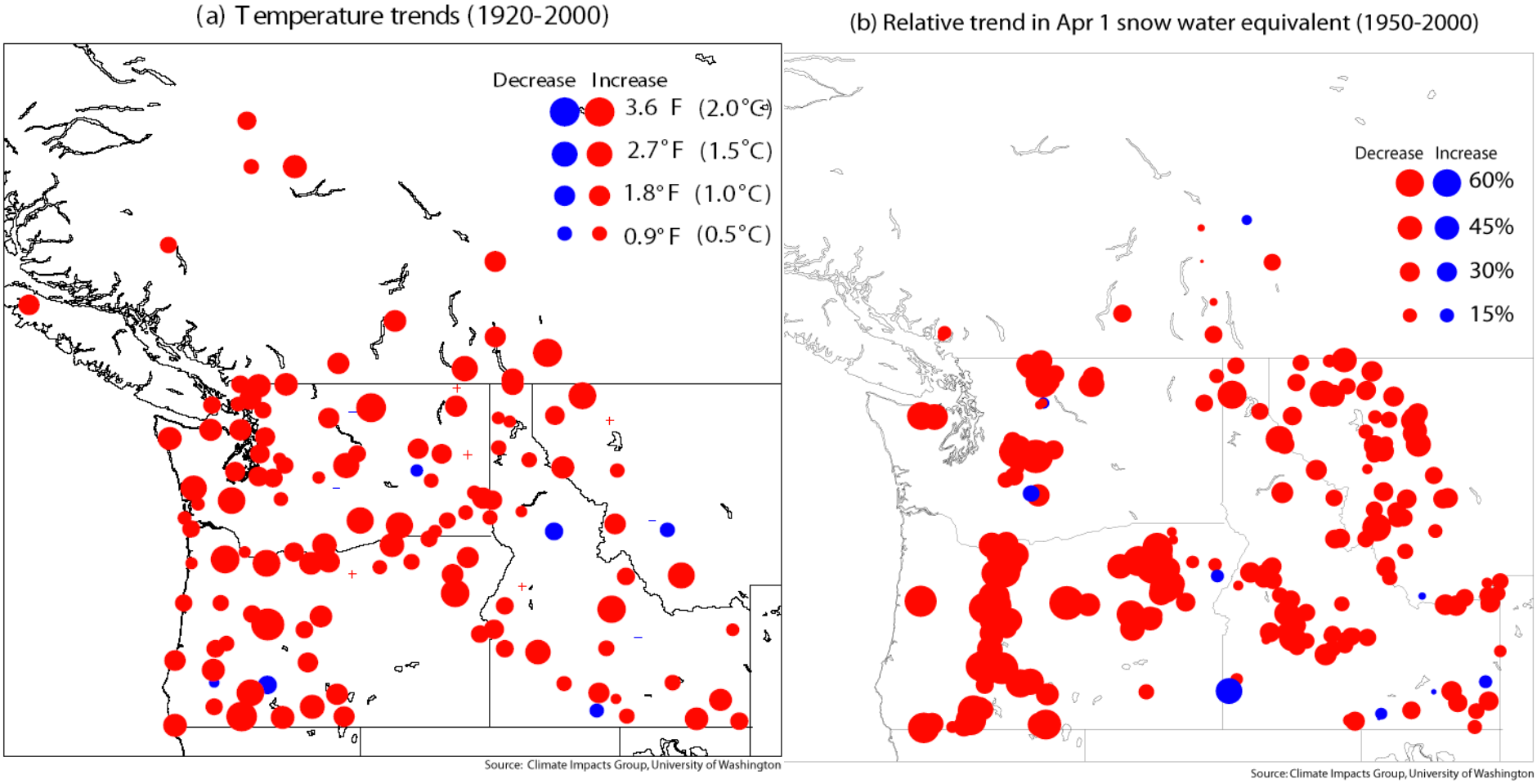
Chastain Soil Series, NC (hydric)

Realities We Don’t Talk About

Third Reality:

Changing climate will alter both the Salish Sea and Salishland.

Or, we will surpass climate change tipping points.



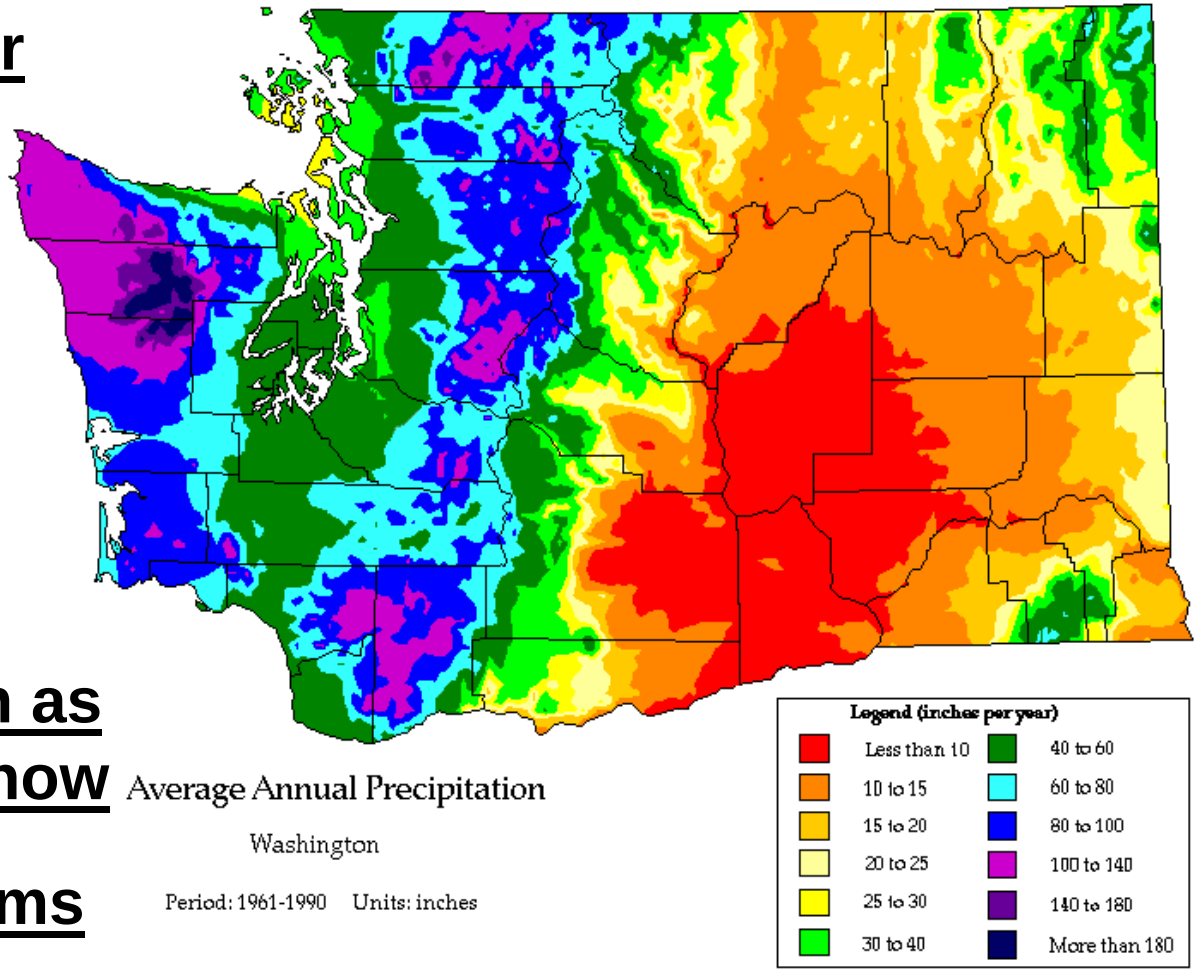
Average annual temp increased 1.5°F (0.7-0.8°C) 1920 to 2003 (largest January to March).

April 1 snow water equivalent (SWE) declined at nearly all sites 1950 to 2000; declines strongest at low and middle elevations.

Timing, center of mass, annual river runoff in snowmelt basins 0-20 days earlier 1948 to 2002.

PREDICTED CLIMATE CHANGE IN THE PACIFIC NORTHWEST

- **Increased summer temperature**
- **Increased winter temperature**
- **Drier summers**
- **Wetter winters**
- **More precipitation as rain rather than snow**
- **More intense storms**



Average Annual Precipitation

Washington

Period: 1961-1990 Units: inches

CALIFORNIA AGRICULTURAL PRODUCTION STATISTICS (2012)

- 80,500 farms/ranches: $42.6B revenue
- #1, cash farm receipts: 11.3% US total
- 15% of US revenue, crops
- 7.1% of US revenue, livestock and livestock products
- Exports: $18.18B (↑8% over 2011)
- More than 400 commodities
- nearly half of all US-grown fruits, nuts, vegetables
- US consumers regularly purchase several crops produced only in California (figs, pistachios, raisins…)

WATER USAGE
California's Top 10 Valued Commodities

#1 Milk ($6.9B): **40 gal/ one slice cheese**

#3 Almonds ($4.347B): **1 gal/one almond**

#5 Cattle, Calves ($3.299B): **660 gal/1/3 lb**

#7 Lettuce ($1.448B): **0.19 gal/one leaf**

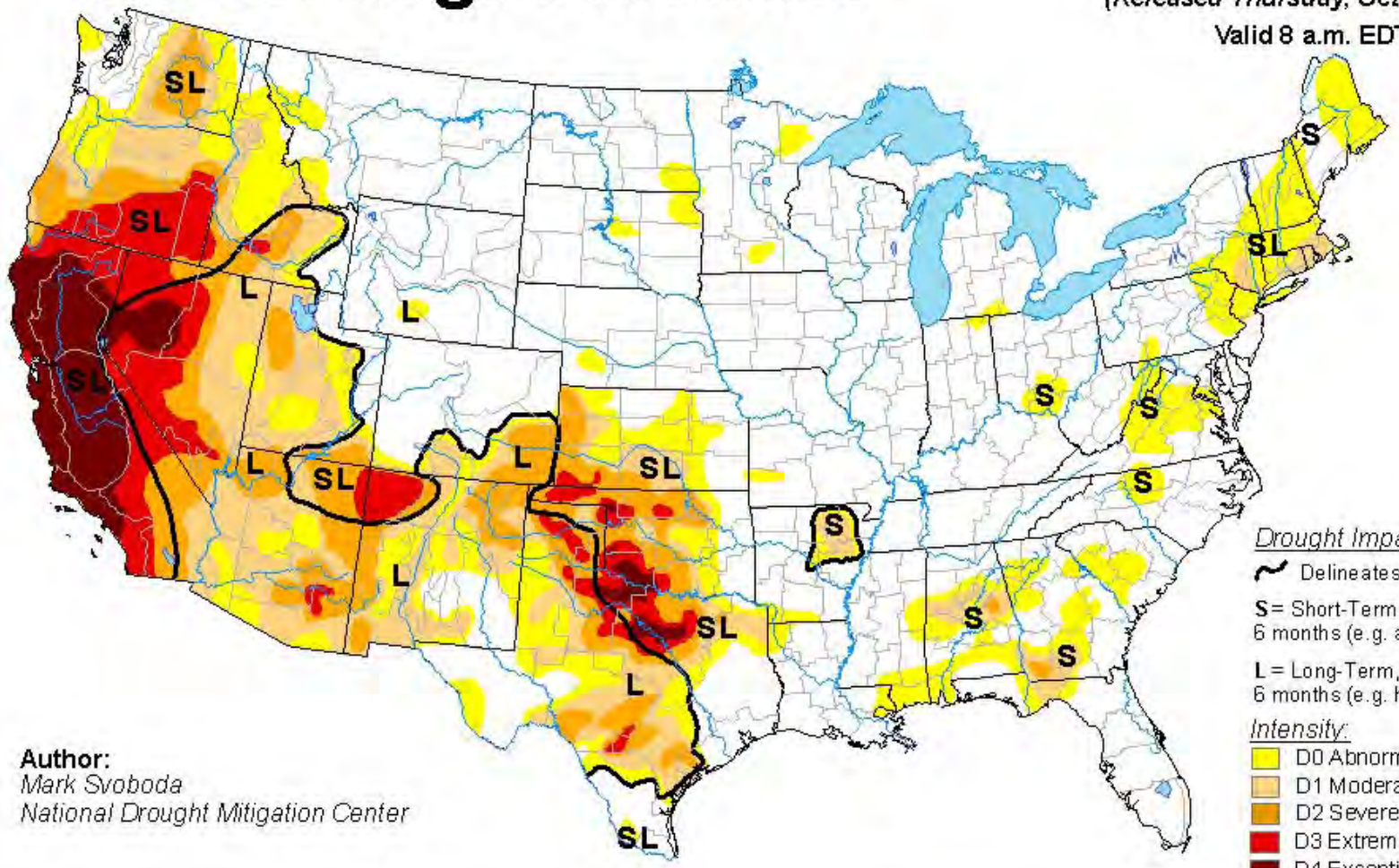
#10 Tomatoes ($1.170B): **1 gal/two slices**

U.S. Drought Monitor

October 14, 2014

(Released Thursday, Oct. 16, 2014)

Valid 8 a.m. EDT



Author:
Mark Svoboda
National Drought Mitigation Center

Drought Impact Types:

Delineates dominant impacts

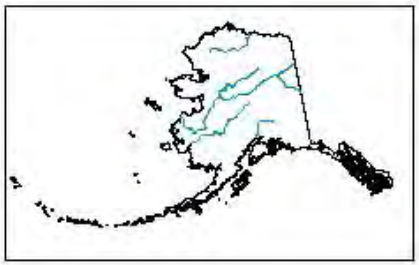
S = Short-Term, typically less than 6 months (e.g. agriculture, grasslands)

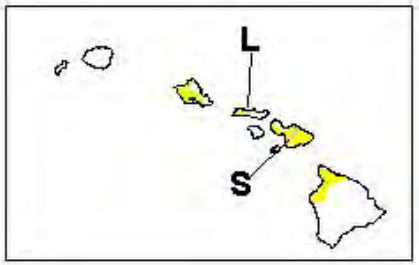
L = Long-Term, typically greater than 6 months (e.g. hydrology, ecology)

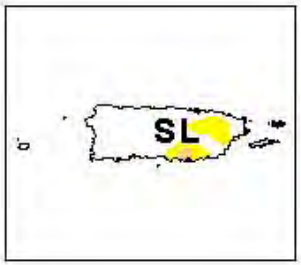
Intensity:

- 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.

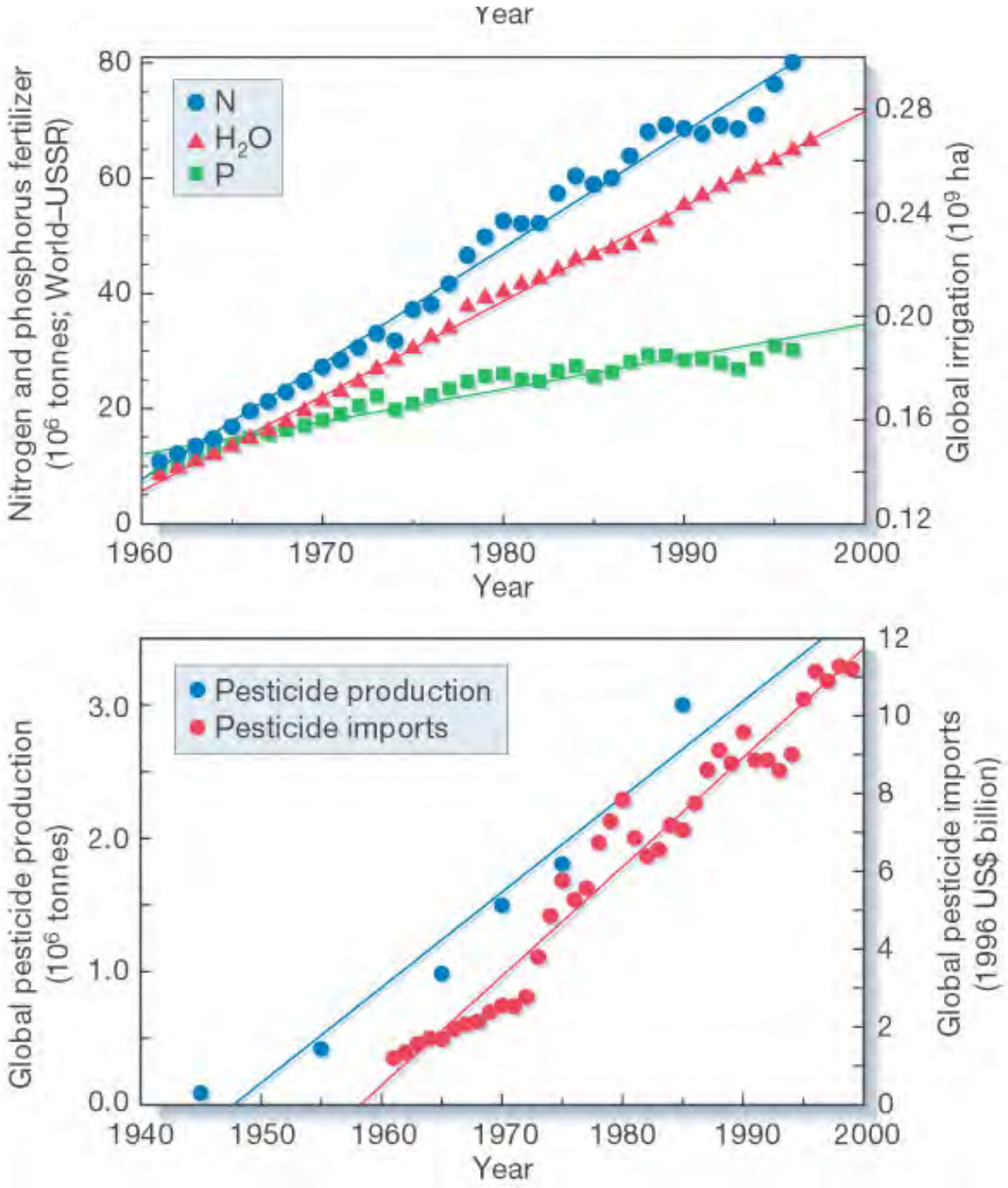






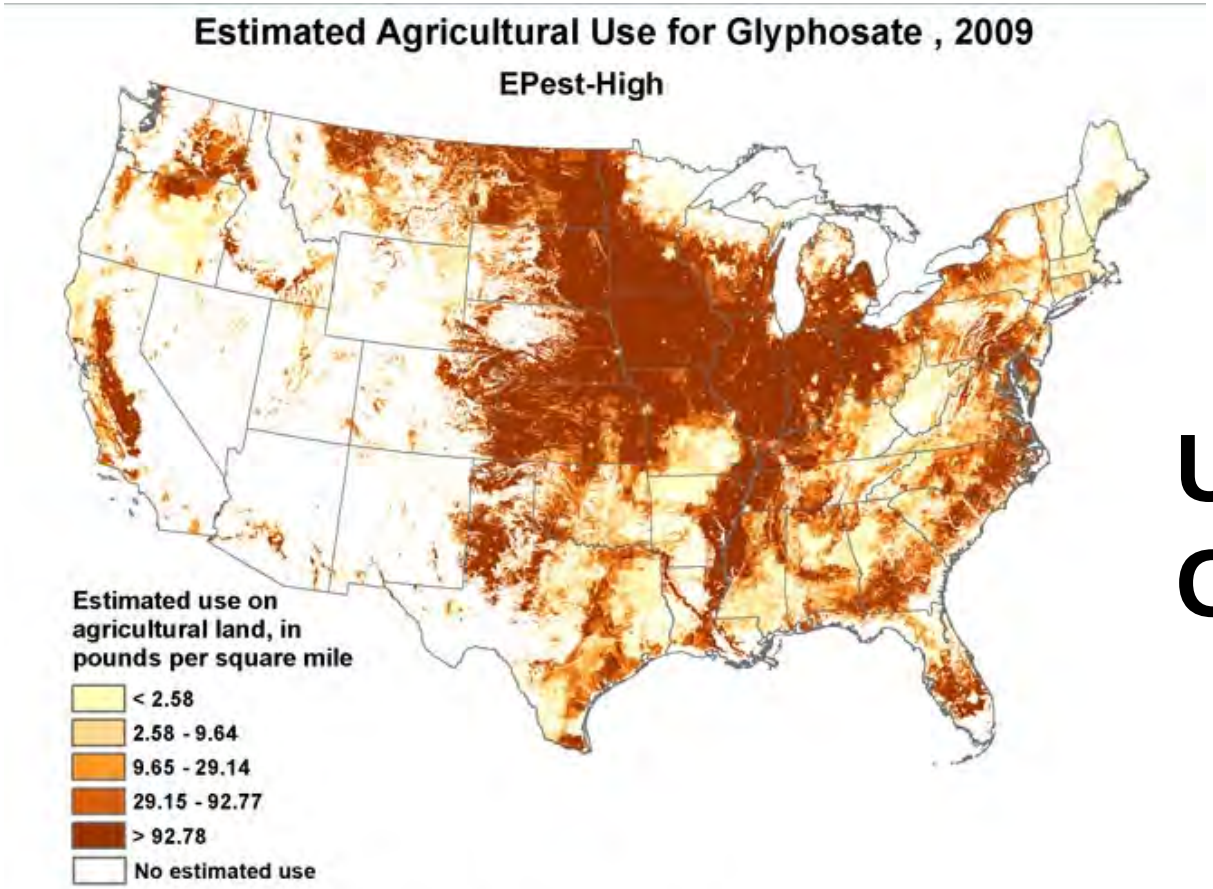
USDA National Drought Mitigation Center

http://droughtmonitor.unl.edu/

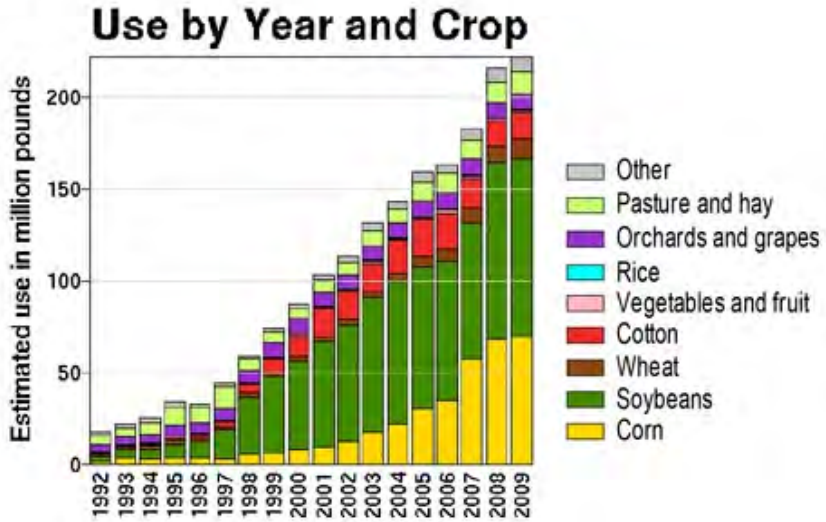


GLOBAL USAGE OF WATER, FERTILIZER, AND PESTICIDES

From: Tilman, D. ; K.G. Cassman, P.A. Matson, R.Naylor and S. Polasky. 2002. Agricultural sustainability and intensive production practices *Nature* 418, 671-677(8 August).



U.S. USAGE OF GLYPHOSATE



Thelin, G.P., and Stone, W. W., 2013, Estimation of annual agricultural pesticide use for counties of the conterminous United States, 1992-2009: U.S. Geological Survey Scientific Investigations Report 2013–5009, 54 p.
http://pubs.usgs.gov/sir/2013/5009/

http://water.usgs.gov/nawqa/pnsp/usage/maps/

http://water.usgs.gov/nawqa/pnsp/usage/maps/compound_listing.php

THE FUTURE?

"…it's worth noting that, all the insanity around us notwithstanding, there will be a moment when this age will start to make sense: That brave new world will look very different than it does now..."

Joshua Cooper Ramo, author of The Age of the Unthinkable