

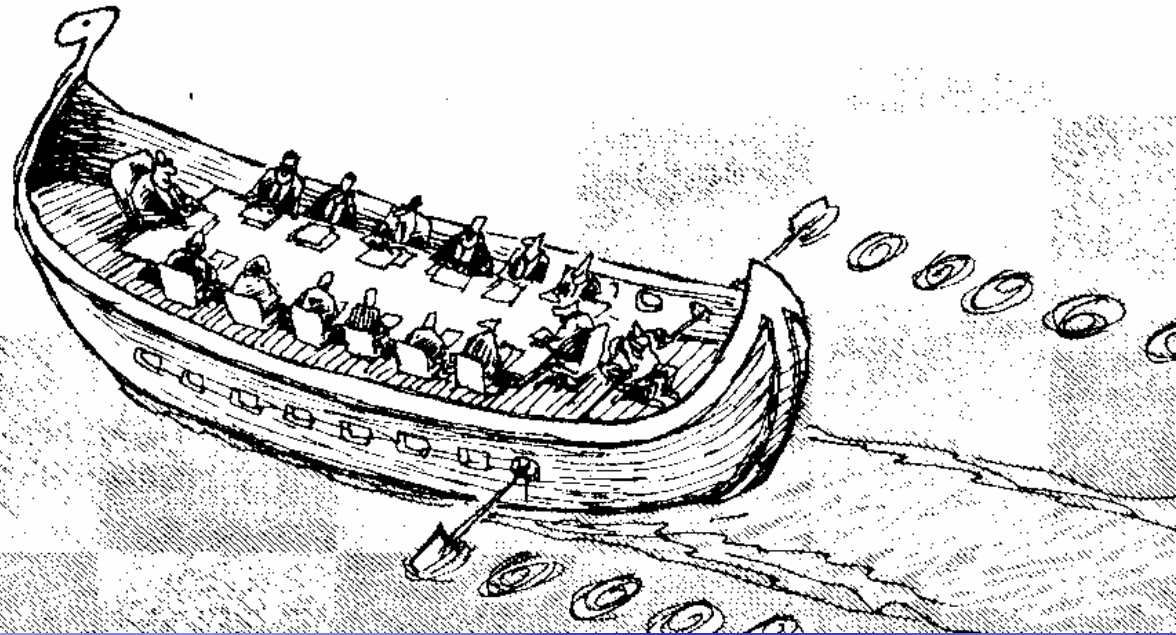
Towards a Tool for the Toolkit

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Can You Relate?

NON SEQUITUR *Wiley Miller*

MAYBE WE
SHOULD HIRE
A CONSULTANT
TO FIGURE
OUT WHY
PRODUCTION
HAS SLOWED
DOWN



What Toolkit?

- **Recently accepted research project – “A Toolkit for Adapting to Climate Change on Western National Forests: Incorporating Climate into Resource Management and Planning”**
- ***Connie Millar, Linda Joyce, Ron Neilson, Dave Peterson; *corresponding PI**

Research Project Tasks

- Task 1. *Develop adaptation management resource materials in multiple formats.*
- Task 2. *Conduct replicate case studies.*
 - Product 1. *Develop a **rapid-audit tool** to screen projects for climate-change implications.*
 - Product 2. *Develop and evaluate an approach for evaluating the compatibility of resource management approaches with climate change adaptation.*
 - Product 3. *Develop and evaluate a process for addressing uncertainty in national forest projects and plans.*
- Task 3. *Extend and refine case-study results for broader applications.*
- Task 4. *Intensively develop the Climate Change Resource Center website.*

Aim of This PowerPoint – Suggest a Tool (perhaps part of the rapid-audit tool) that:

- Allows manager to know where a forested site is within today's climate envelope
- Allows manager to know where species on that site are within today's climate envelope
- Identifies likely change in forest type and species occurrence in the next 30 – 100 yrs.

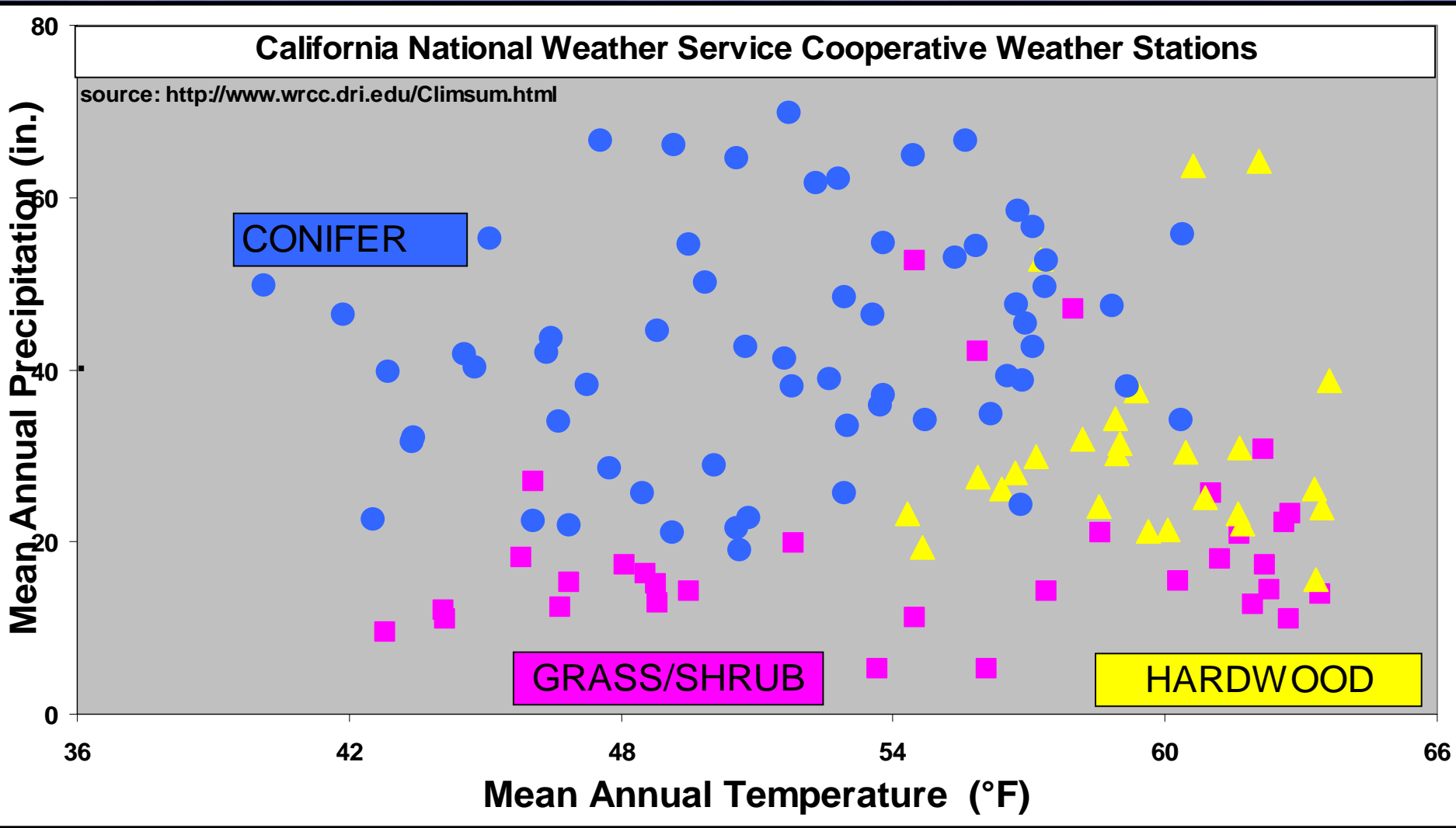
Here's my first crack at developing a tool

- I'll call it the "Climate Envelope Tool"
- I used the National Weather Service Coop weather station histories found at <http://www.wrcc.dri.edu/climsum.html>
- I used species info I got from Hugh Safford which he got from the publication:
 - Thompson, Robert S.; Anderson, Katherine H.; Bartlein, Patrick J. 1999. Atlas of relations between climatic parameters and distributions of important trees and shrubs in North America. USGS Professional Paper 1650-A, B.

Data - 122 Weather Stations

- I pulled mean annual temperature and mean annual precipitation from the website for the entire history available for each station
- I assigned an existing forest type to each:
 - conifer
 - hardwood
 - grass/shrub

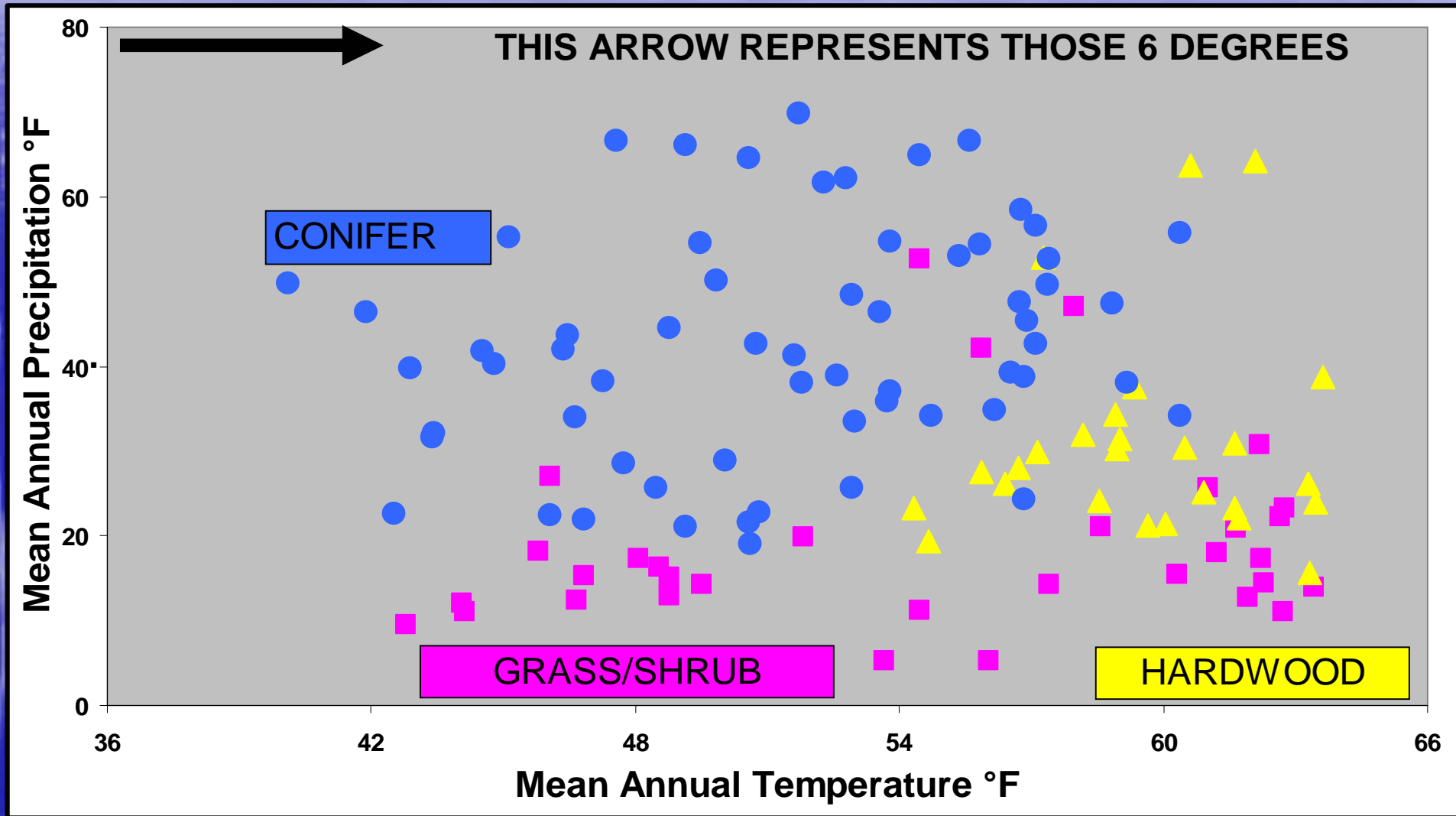
Resulting Forest Type Climate Envelope



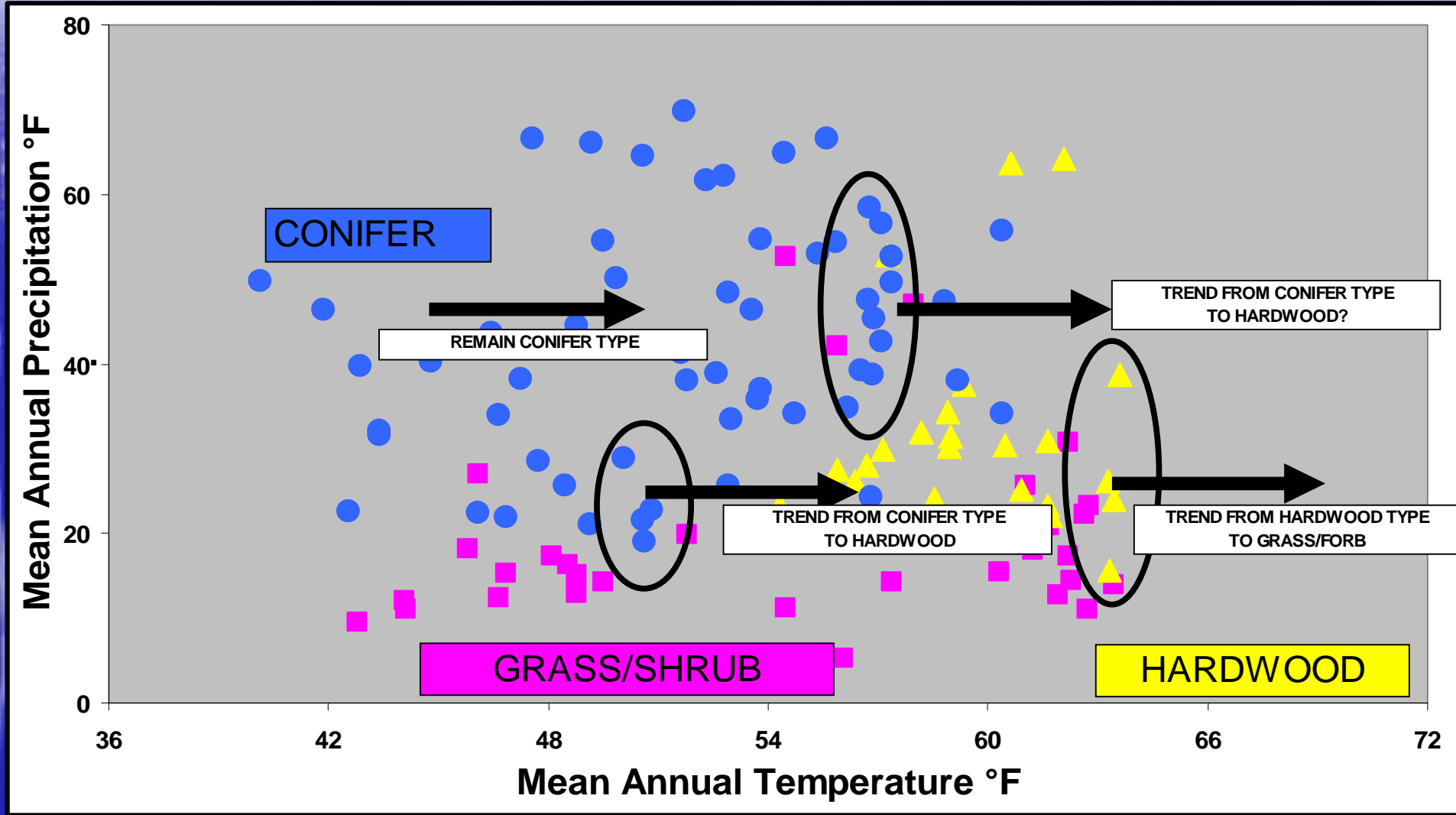
How much hotter is it going to get?

- “projected 2.5 to 10.4 °F rise in global average temperature above current by 2100” – source: Connie Millar briefing paper for 1/23/07 REMCG/WODG meeting
- So let's work with 6 °F for this presentation.....

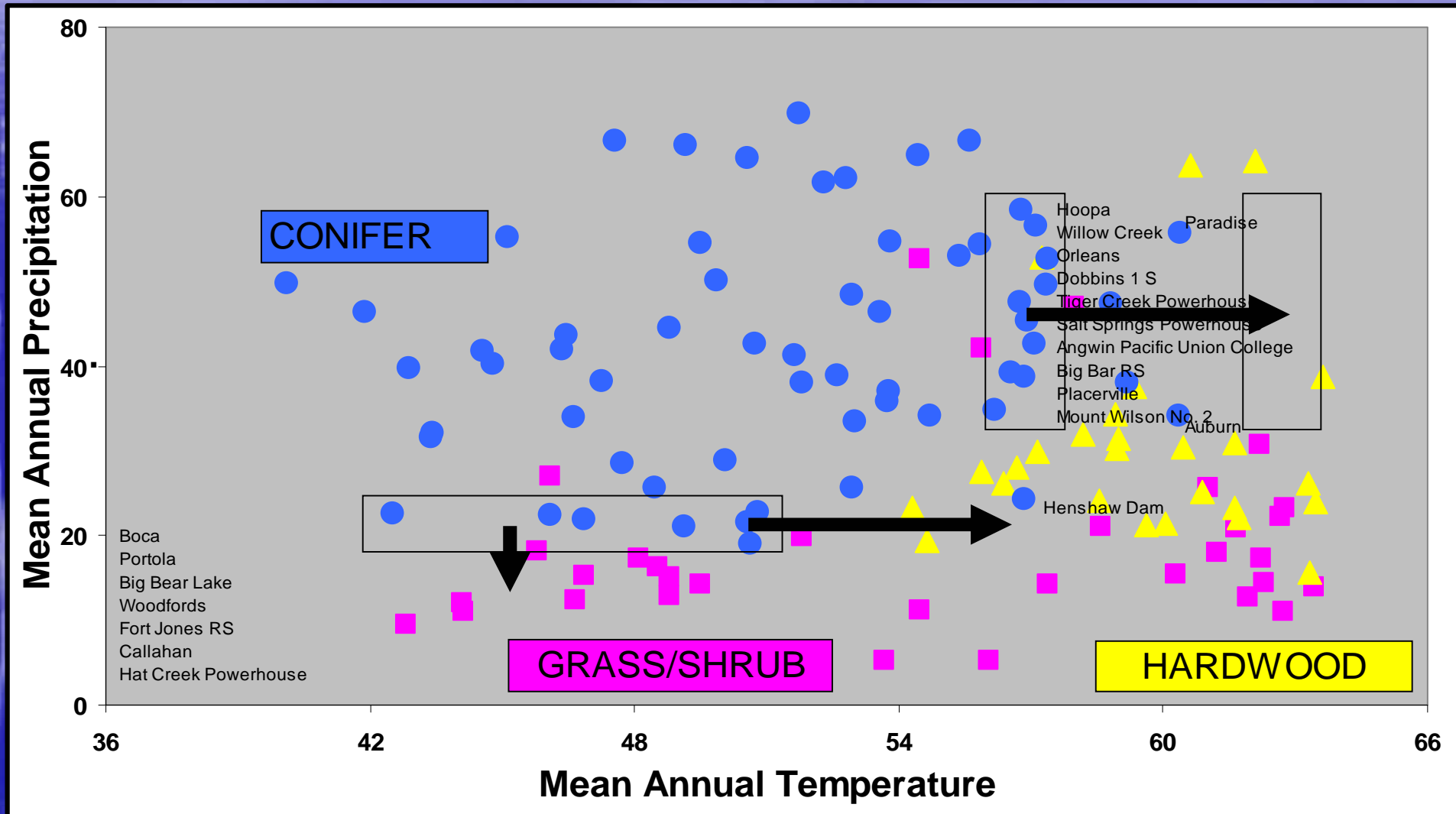
Add an Arrow



Likely Trends



I like this because these are real places that I can relate to



Knowing This.....

- I might prioritize different landscapes for treatment
- I might adjust species preference in a thinning
- I might adjust species composition in a planting

Research Project Should Refine This Idea

- Is mean annual temp./precip. too simple to be useful?
- Is my characterization of forest type accurate enough or adequate enough?
- Can 6 degrees by 2100 be refined?
- Can precipitation forecasts be added?

Species Envelopes/Niches

- USGS Professional Paper 1650-A, B. can be found at <http://geochange.er.usgs.gov/info/holdings.html>
- Used weather stations and species range maps (example: Atlas of U.S. Trees, Elbert Little, 1971) to build algorithms that predict presence on a widely spaced grid.

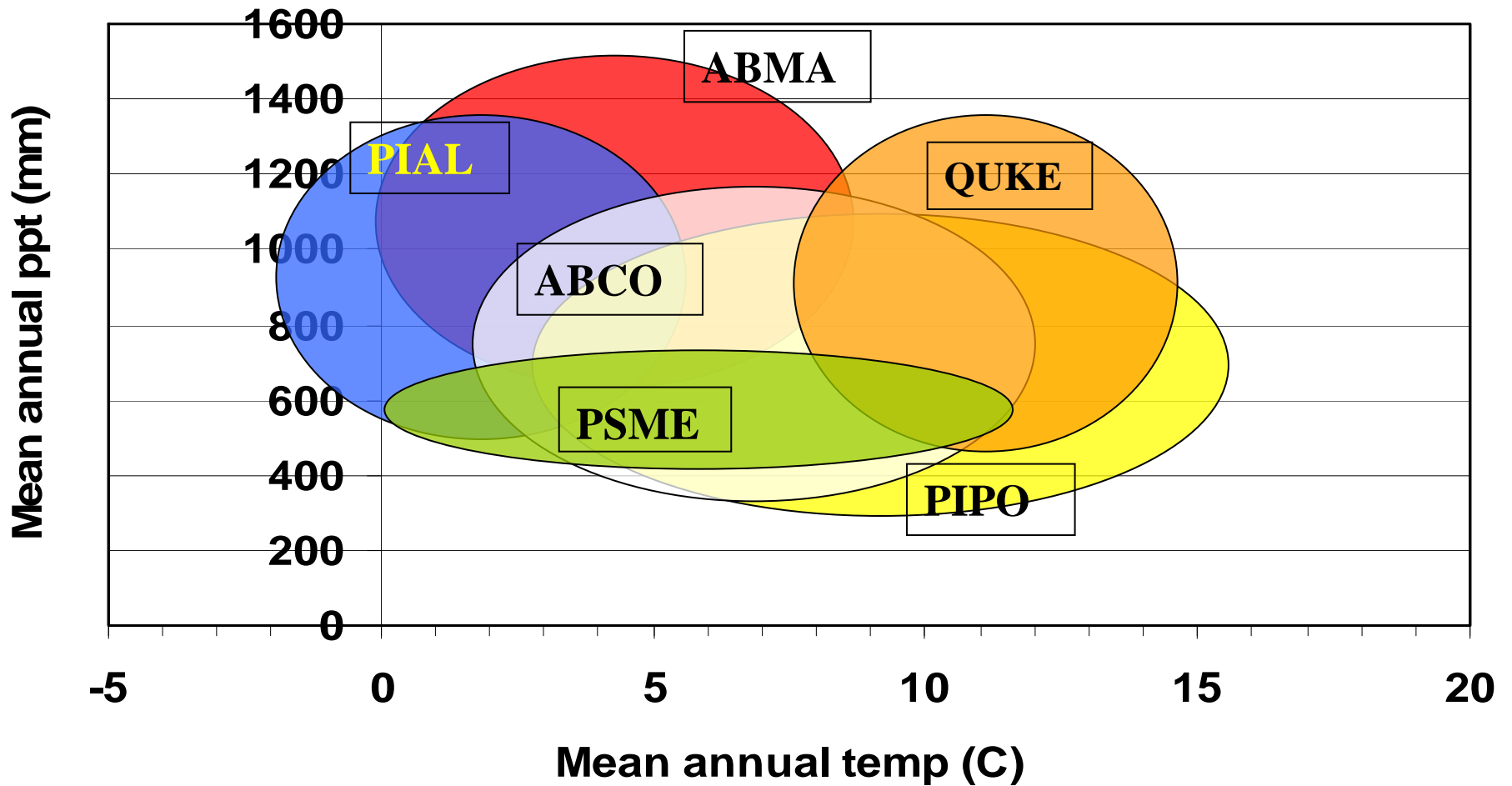
Percentile Predictions of Occurrence

Annual Temperature (°C)				
	10%	50%	90%	Range
Abies concolor	1.6	7.4	11.8	10.2
Abies magnifica	5.2	7.5	8.6	3.4
Pinus albicaulis	-2.0	1.1	5.4	7.4
Pinus contorta	-2.8	1.2	6.3	9.1
Pinus flexilis	-1.3	1.9	6.1	7.4
Pinus jeffreyi	6.3	8.3	13.7	7.4
Pinus lambertiana	6.5	9.4	12.9	6.4
Pinus monticola	0.1	5.4	9.3	9.2
Pinus ponderosa	2.7	7.5	15.2	12.5
Pinus sabiniana	10.9	13.9	15.8	4.9
Pseudotsuga menziesii	0.0	4.1	11.5	11.5
Quercus kelloggii	7.4	10.6	14.5	7.1

Percentile Predictions of Occurrence

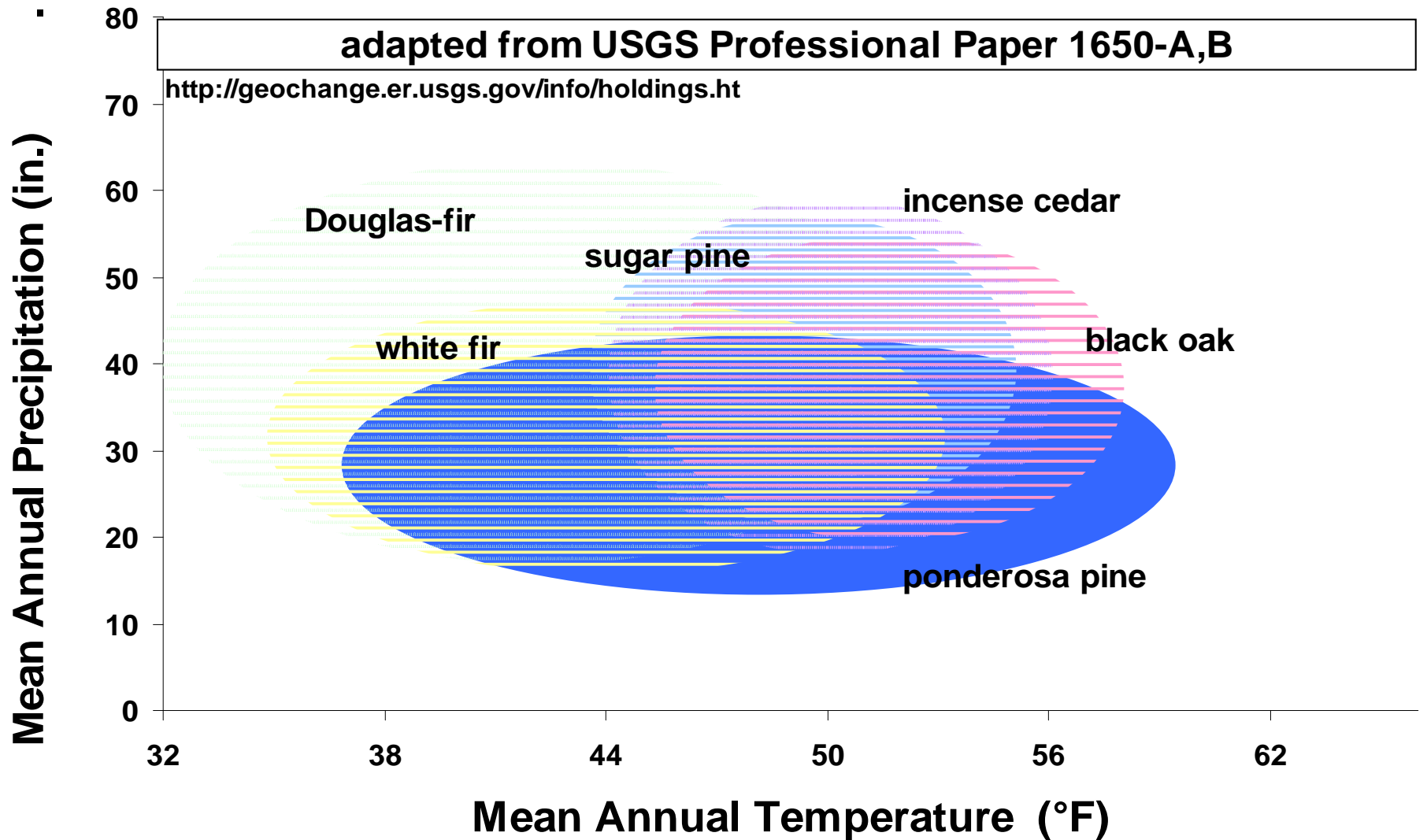
Annual Precipitation (mm)				
	10%	50%	90%	Range
Abies concolor	375	585	1185	810
Abies magnifica	635	1015	1495	860
Pinus albicaulis	565	865	1350	785
Pinus contorta	425	620	1675	1250
Pinus flexilis	365	595	910	545
Pinus jeffreyi	345	815	1605	1260
Pinus lambertiana	550	1000	1450	900
Pinus monticola	610	1125	2190	1580
Pinus ponderosa	335	530	1085	750
Pinus sabiniana	265	595	1050	785
Pseudotsuga menziesii	415	745	1620	1205
Quercus kelloggii	495	940	1380	885

Resulting Graph for Some Species



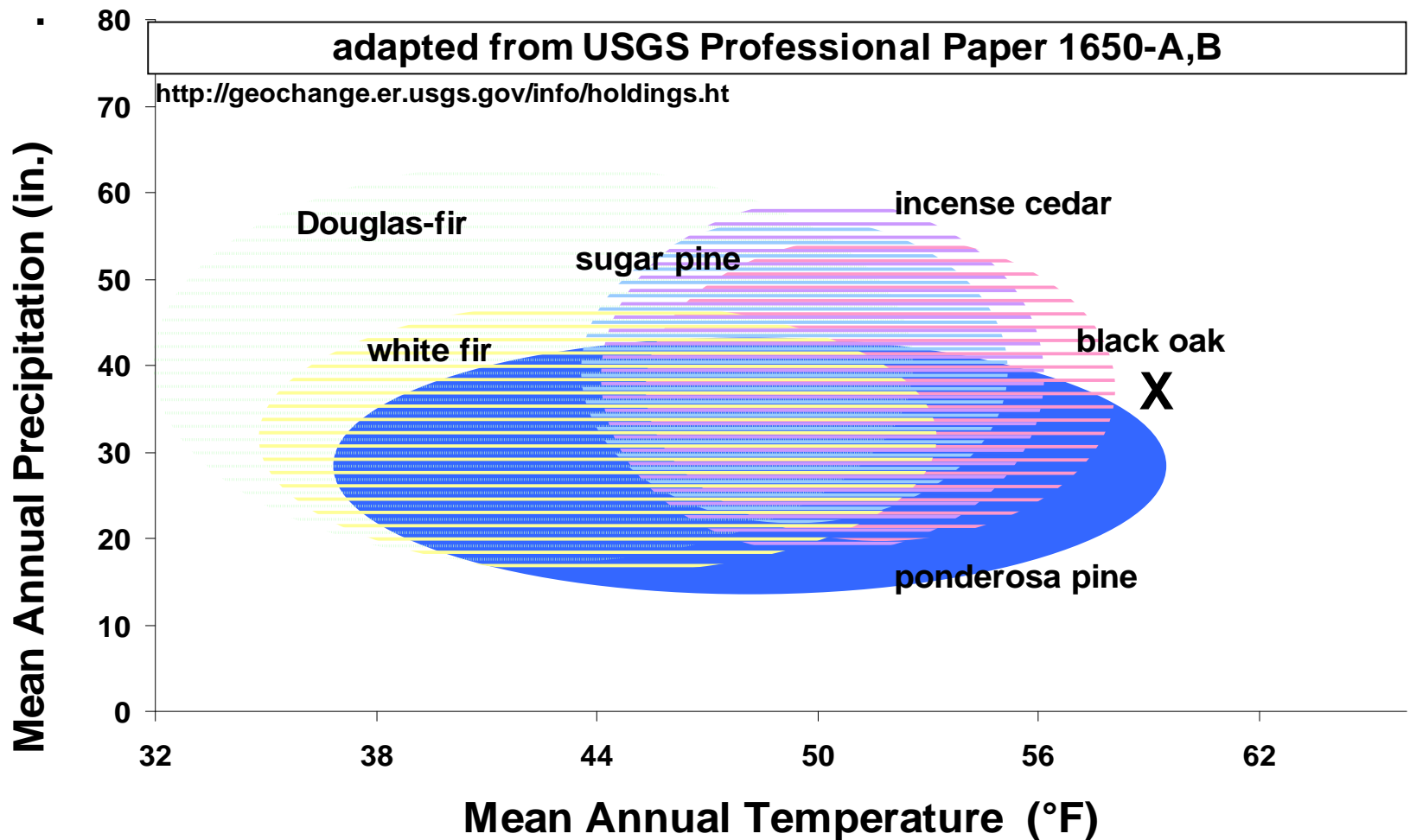
Source: Hugh's Graph

Typical Sierra mixed-conifer (my graph)



So "X" marks Placerville

What's up with that?



Research Project Should Refine This Idea

- In California, does Douglas-fir really live in colder environments than white fir?
- In California, can ponderosa pine really live in drier environments than black oak?
- Does Placerville really not support trees?
- Can we adapt methods started in USGS Professional Paper 1650-A, B and create a product that is accurate and adequate enough to support management decisions?

Is this tool worth further
development?

Can we get it down out of these
clouds?