

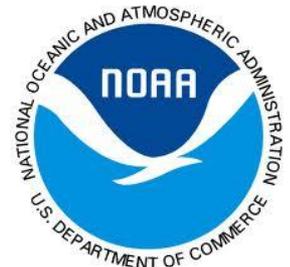
Moving from impacts to action: How can climate information better support adaptation planning?

Erin L. Towler, Ph.D.

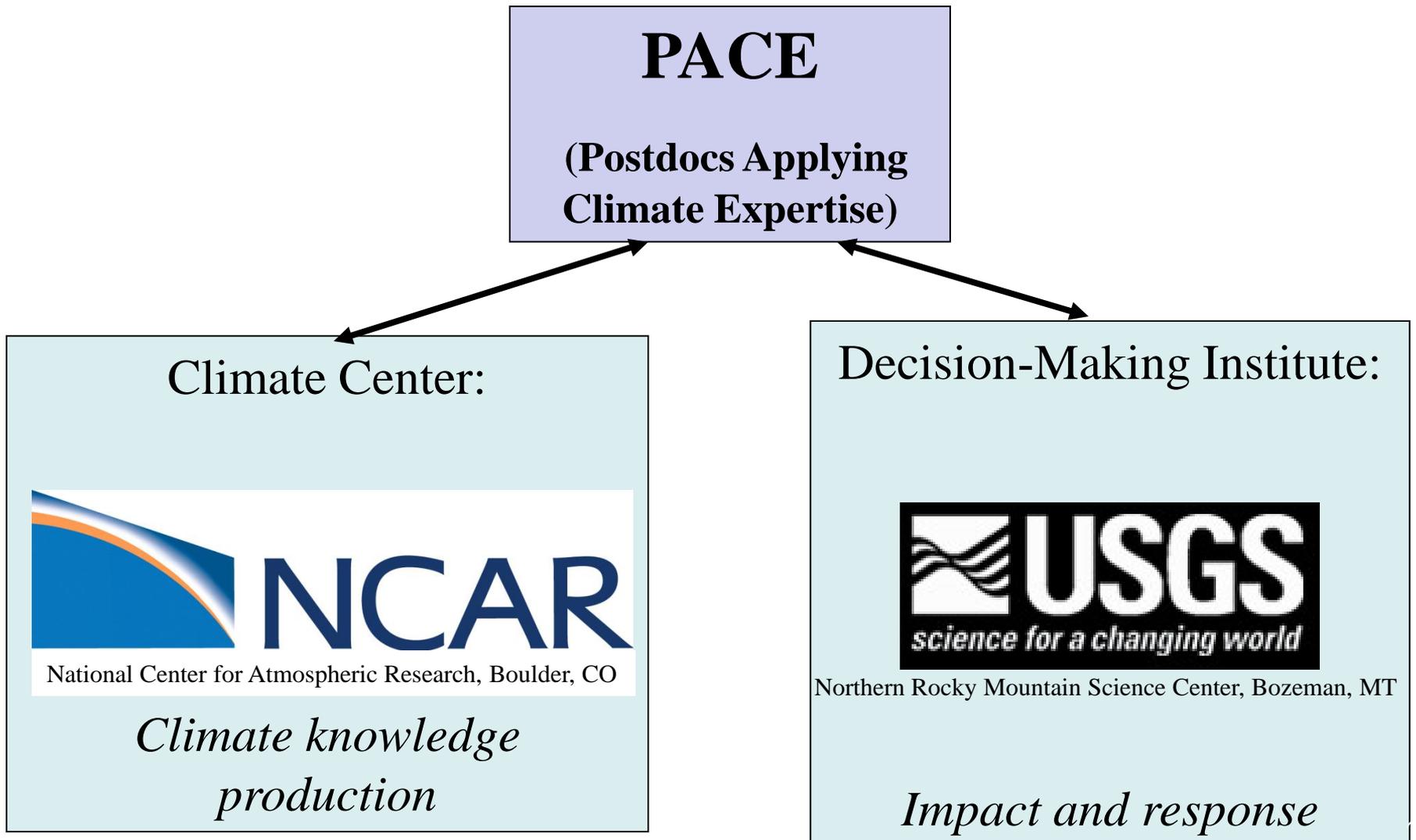
PACE Postdoctoral Fellow (NCAR)

GYCC Climate Change Adaptation Subcommittee

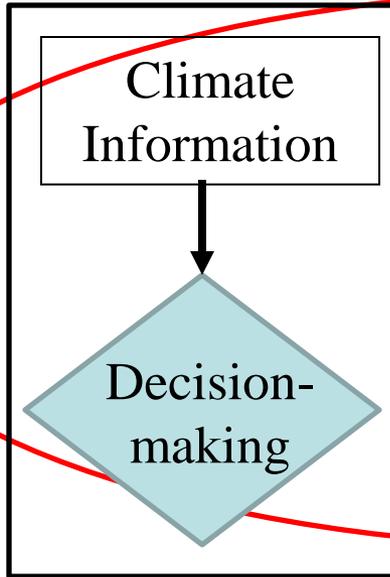
Webinar Meeting, March 9th, 2011



Goal of PACE fellowship is to connect climate information with decision-making



Webinar Agenda

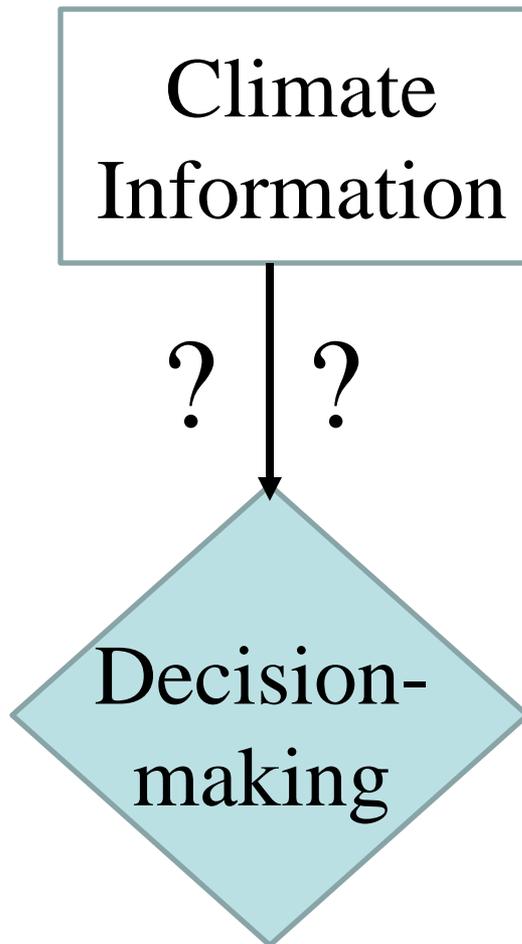


1. How can climate information better support adaptation planning?



2. Examples of using climate information in adaptation planning

How can climate information better support adaptation planning?



By being
interactive,
starting *now*!

Quick Exercise

Directions are to *either*:

- Open an email to towler@ucar.edu or use chat function (people on webinar)
- Grab a pen and paper (group offices on video)

Let's take 1 minute to do the following:

List words or phrases that come to mind when you hear the term:

“climate information”

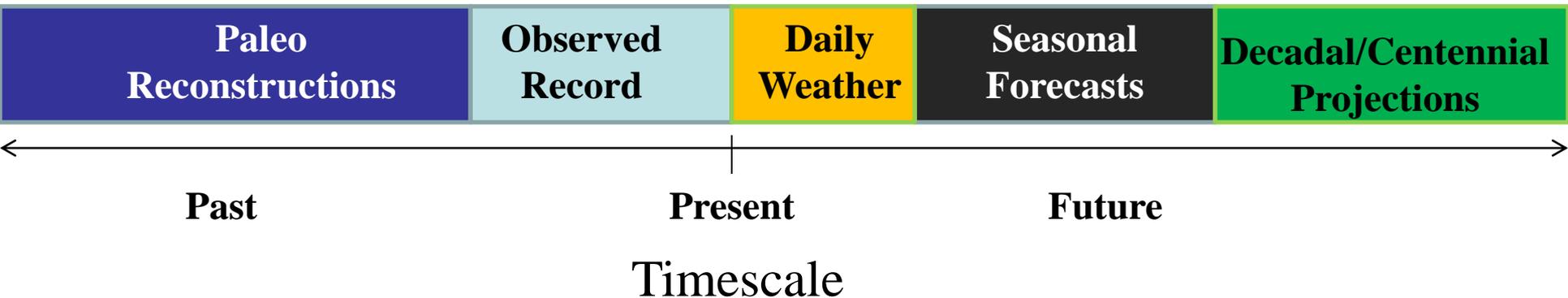
Climate information can mean many things!

Types

Decadal/Centennial Climate: Jet stream, ocean currents, landscape, trends
(climate change, Pacific Decadal Oscillation)

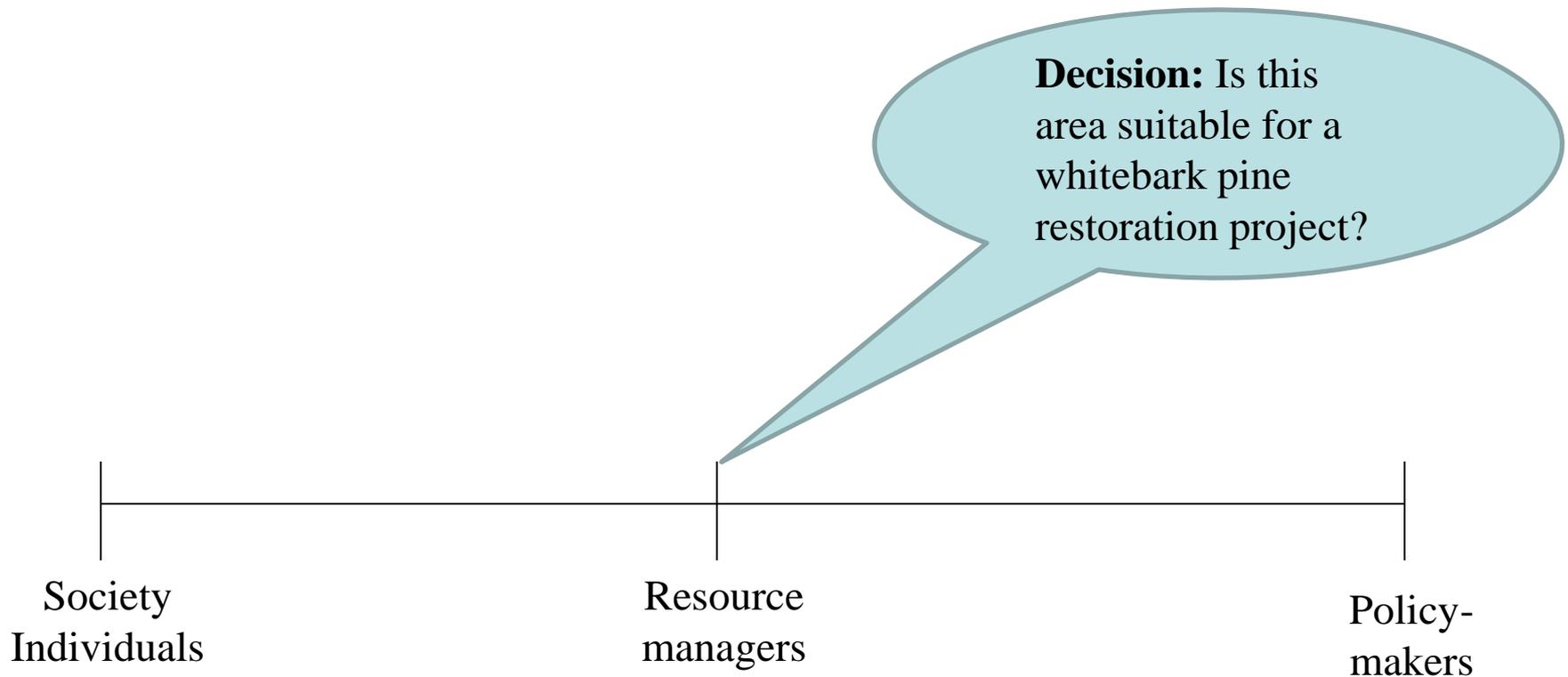
Seasonal Climate: *Descriptors:* Averages, variability, extremes
Predictors: Sea Surface Temps (El Nino), Atmospheric Pressure

Daily Weather: Precipitation, temperature, wind, humidity, streamflow, etc.



Collaborate to identify **types** and **timescales** of climate information that are *possible* and *useful* for decisions.

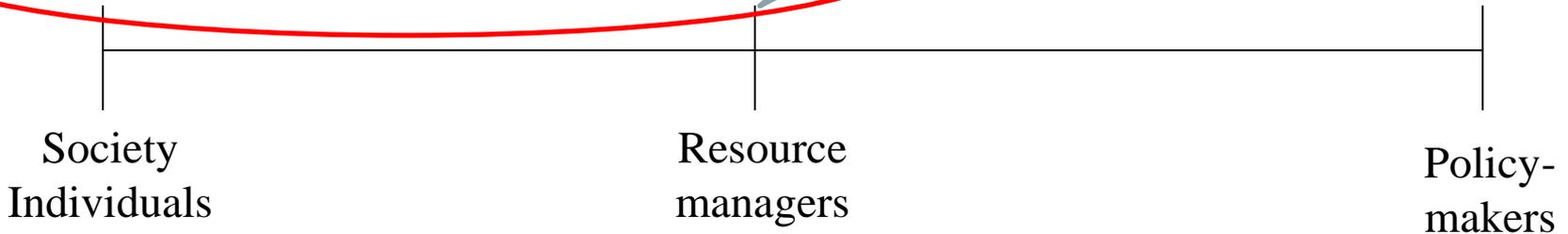
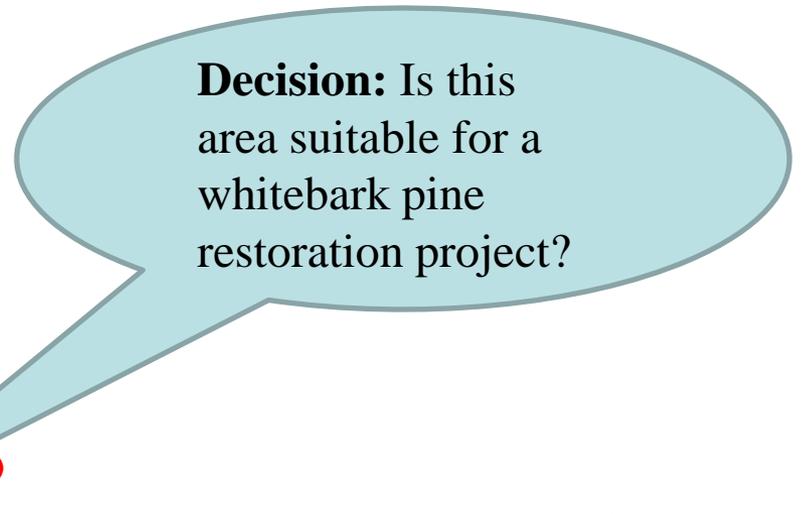
Why focus on natural resource managers?



Users of Climate Information

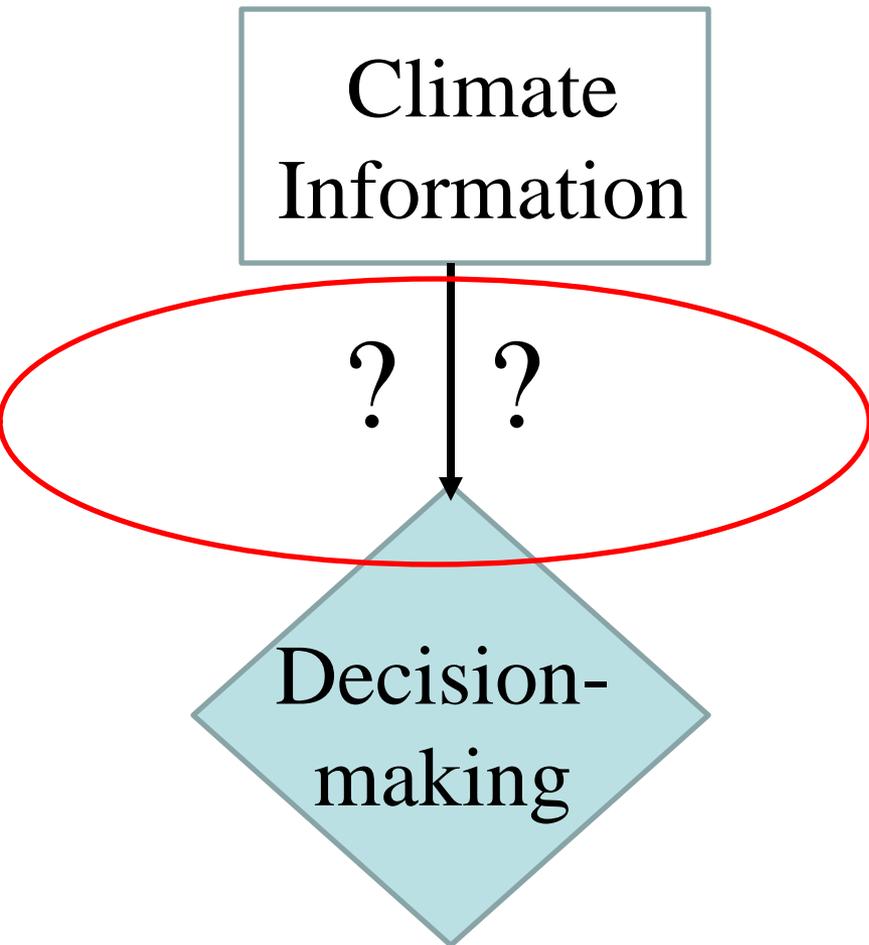
Because resource managers make decisions that are:

- regionally** influential
- important** for ecosystems & societal benefits
- achievable** and executed in finite timeframe
- requiring only **key climate info needs**

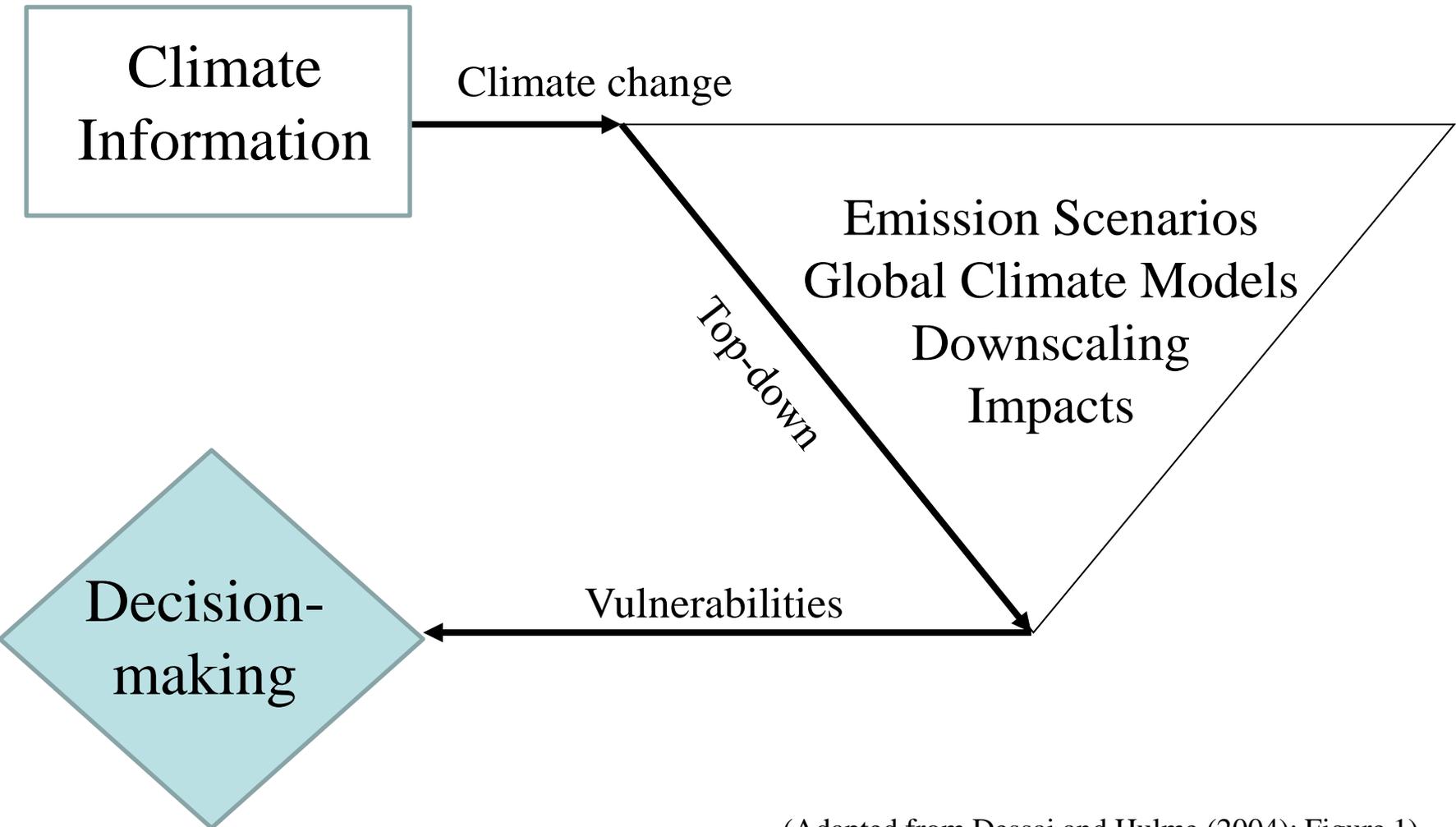


Users of Climate Information

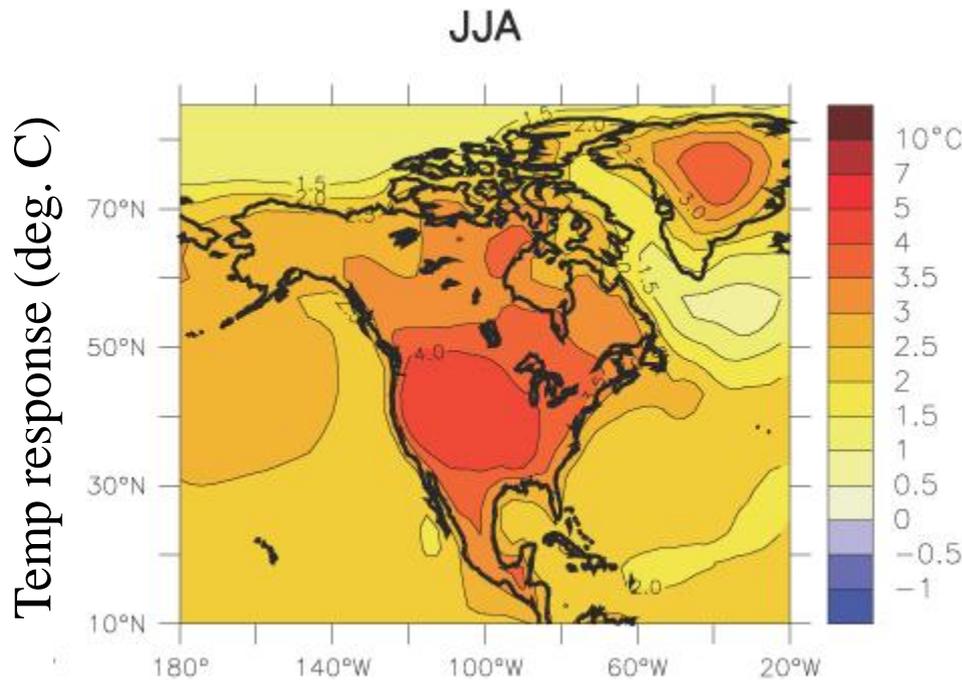
How can climate information better support adaptation planning?



Climate change information is often considered from the top-down



Top-down does address vulnerability questions...



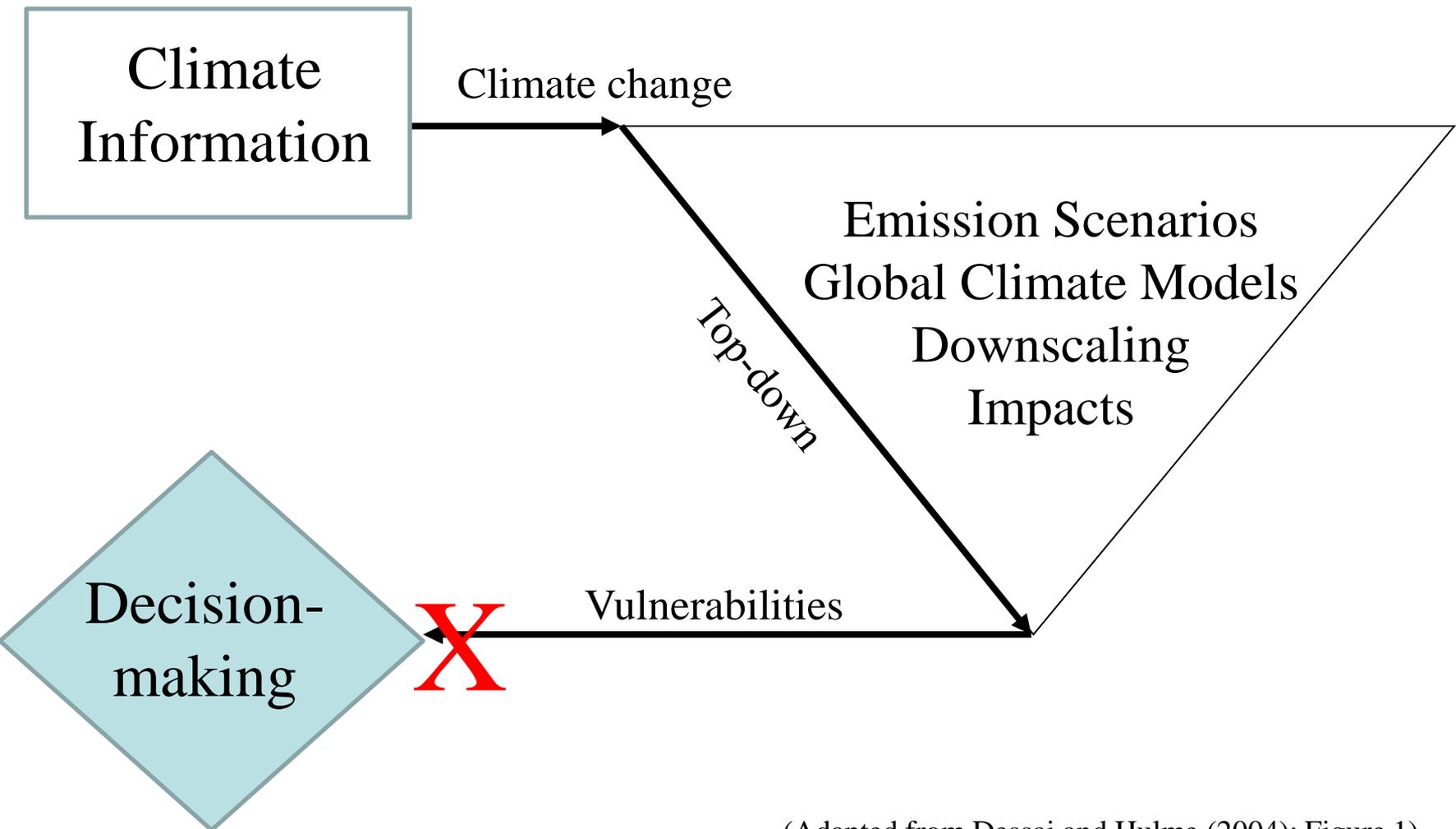
(Source: IPCC (2007); Figure 11.12)

...but issues still exist:

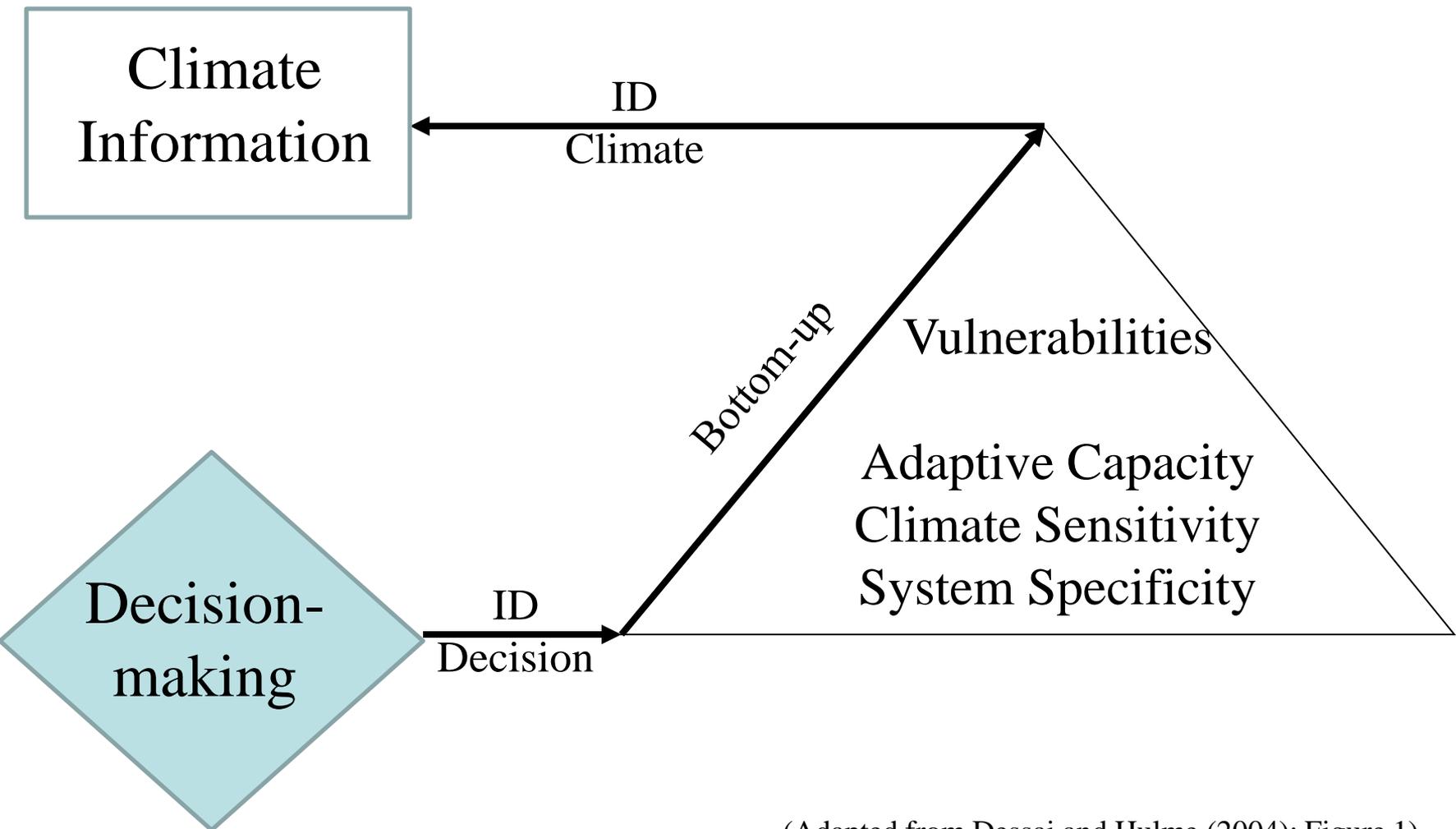
-Scale, uncertainty, and variability

-Applicability to decisions or actions

Few top-down approaches result in adaptation measures



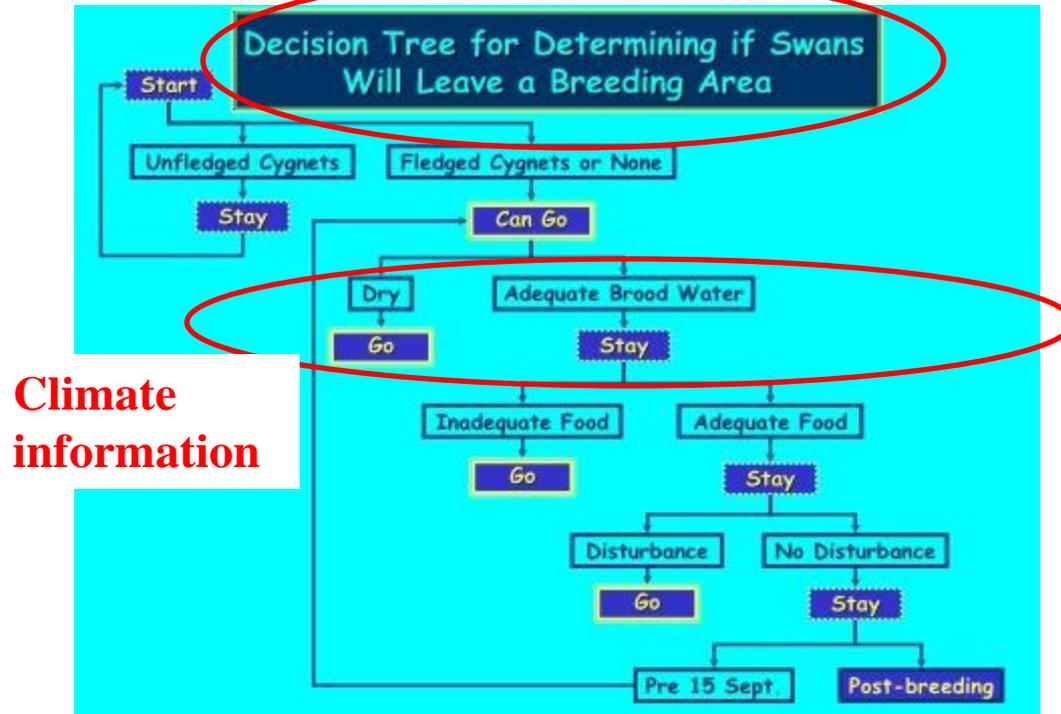
Bottom-up methods provides a complementary approach



(Adapted from Dessai and Hulme (2004); Figure 1)

Bottom-up identifies specific decisions and needed climate information

Specific Decision



Climate information

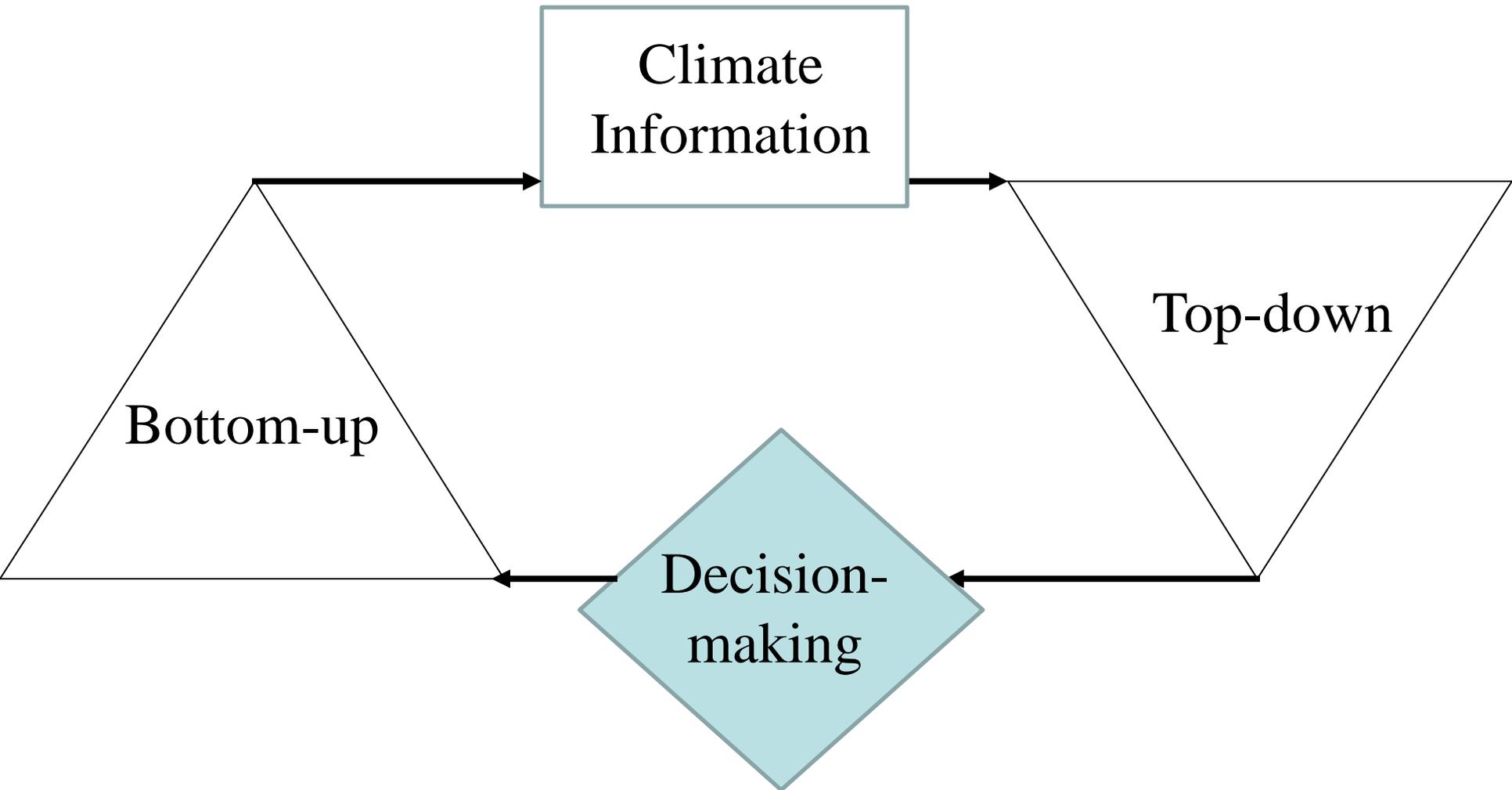
...but issues still exist:

-Climate is only part of the decision

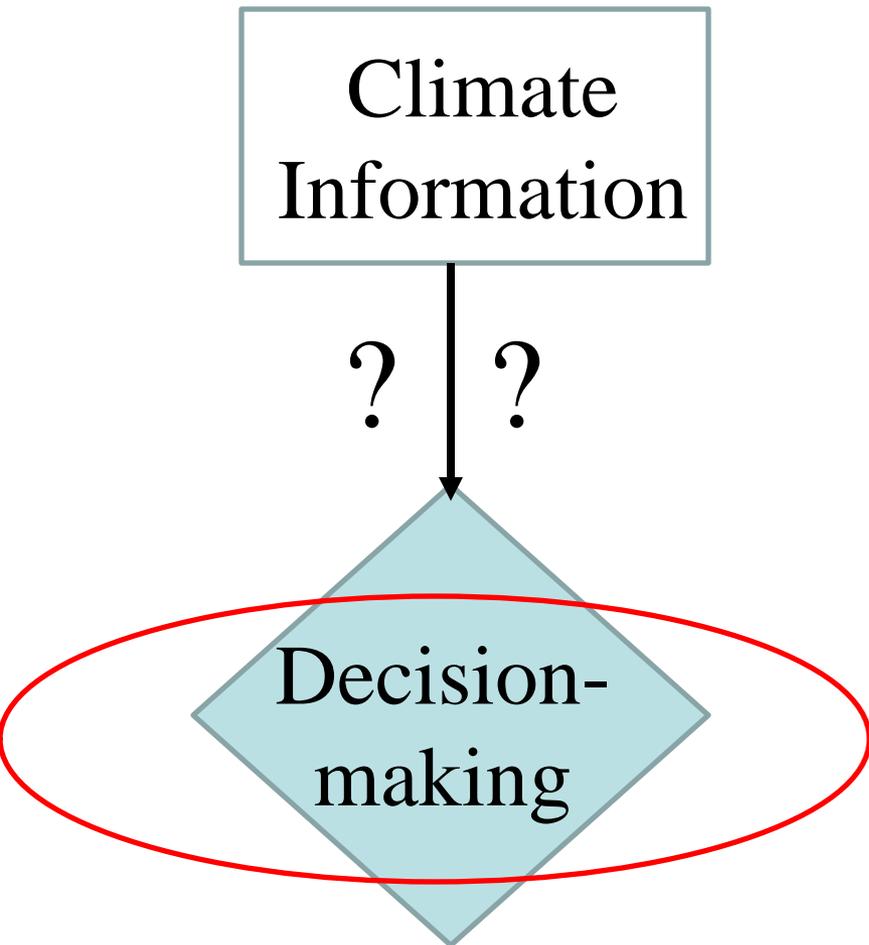
-Requires in-depth system knowledge

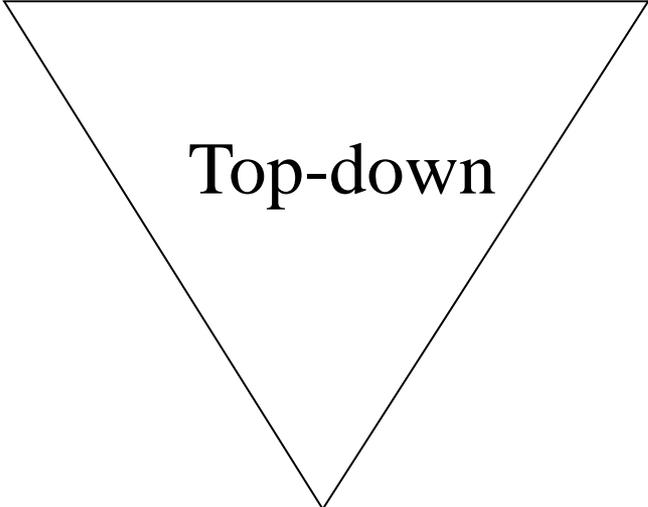
(Sojda 2002)

Adaptation planning will benefit from a combined approach



How can climate information better support adaptation planning?





Top-down

Need to identify decisions
and associated climate

Decision: How will likely shifts in

temp and precip

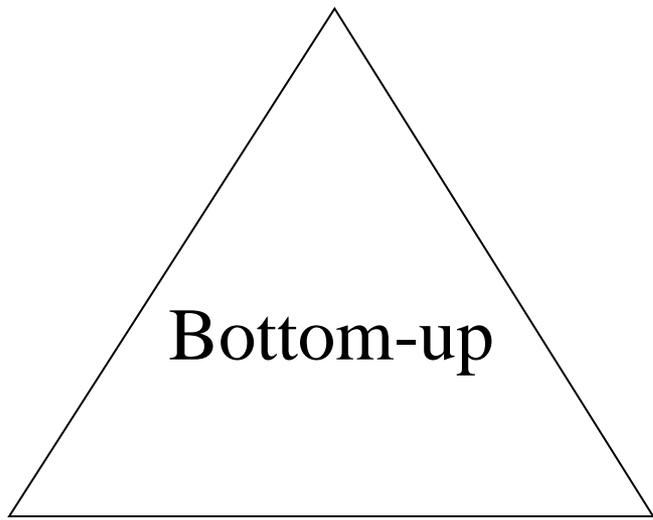
affect my

climate variable

forest

management goals?

decision variable



Flip decision to investigate climate sensitivity

How do current shifts in

Decision: ~~How will likely shifts in~~

temp and precip

climate variable

affect how I manage my

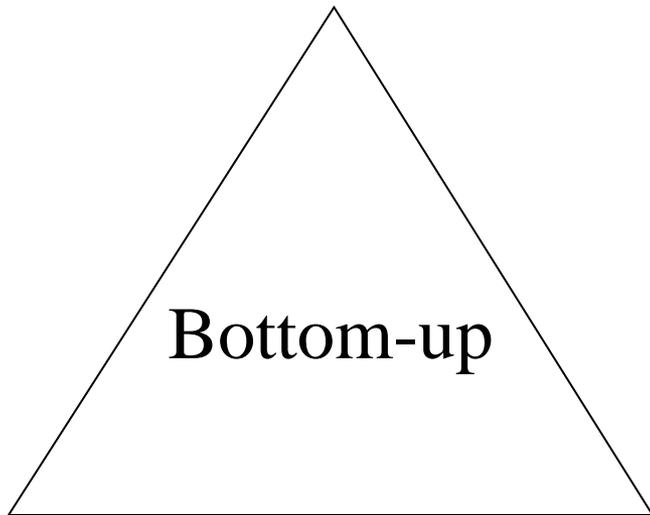
~~affect my~~

forest ?

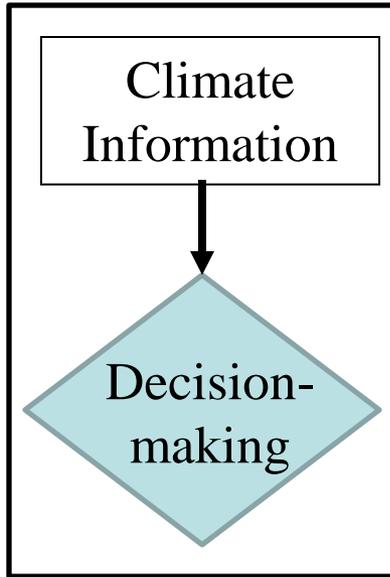
decision variable

~~management goals?~~

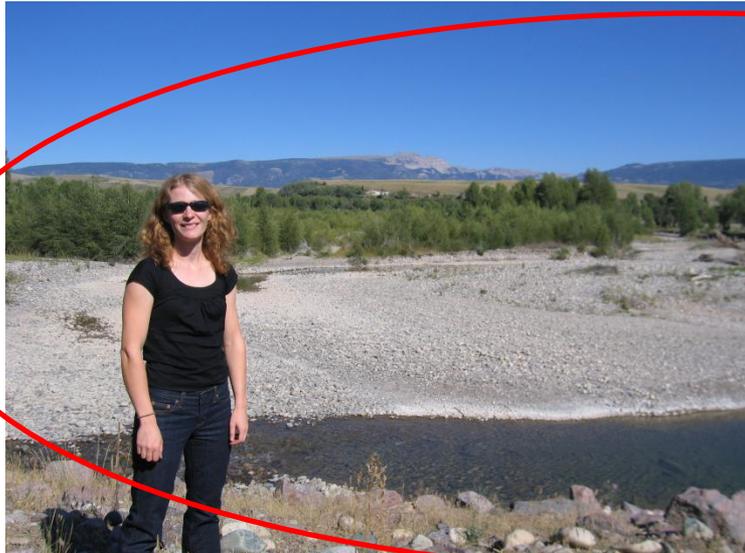
Identifying bottom-up decisions requires **your** expert knowledge



Webinar Agenda



1. How can climate information better support adaptation planning?



2. Examples of using climate information in adaptation planning

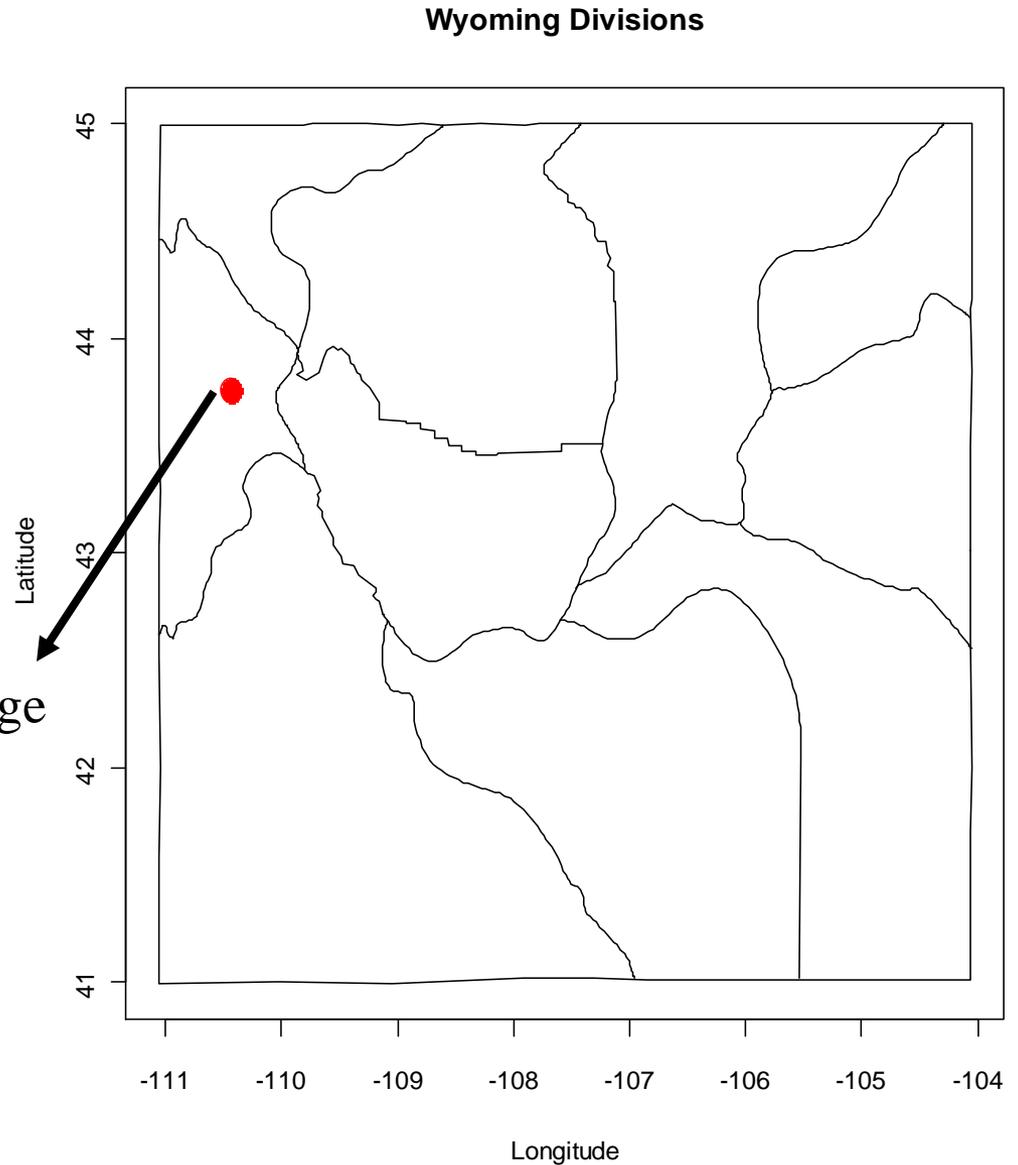
Example #1: Gros Ventre R. flows



USGS Gros Ventre River at Zenith gage

Variable	Flow
Time	Daily
Space	Gage
Dates	1987-present*

* No winter records



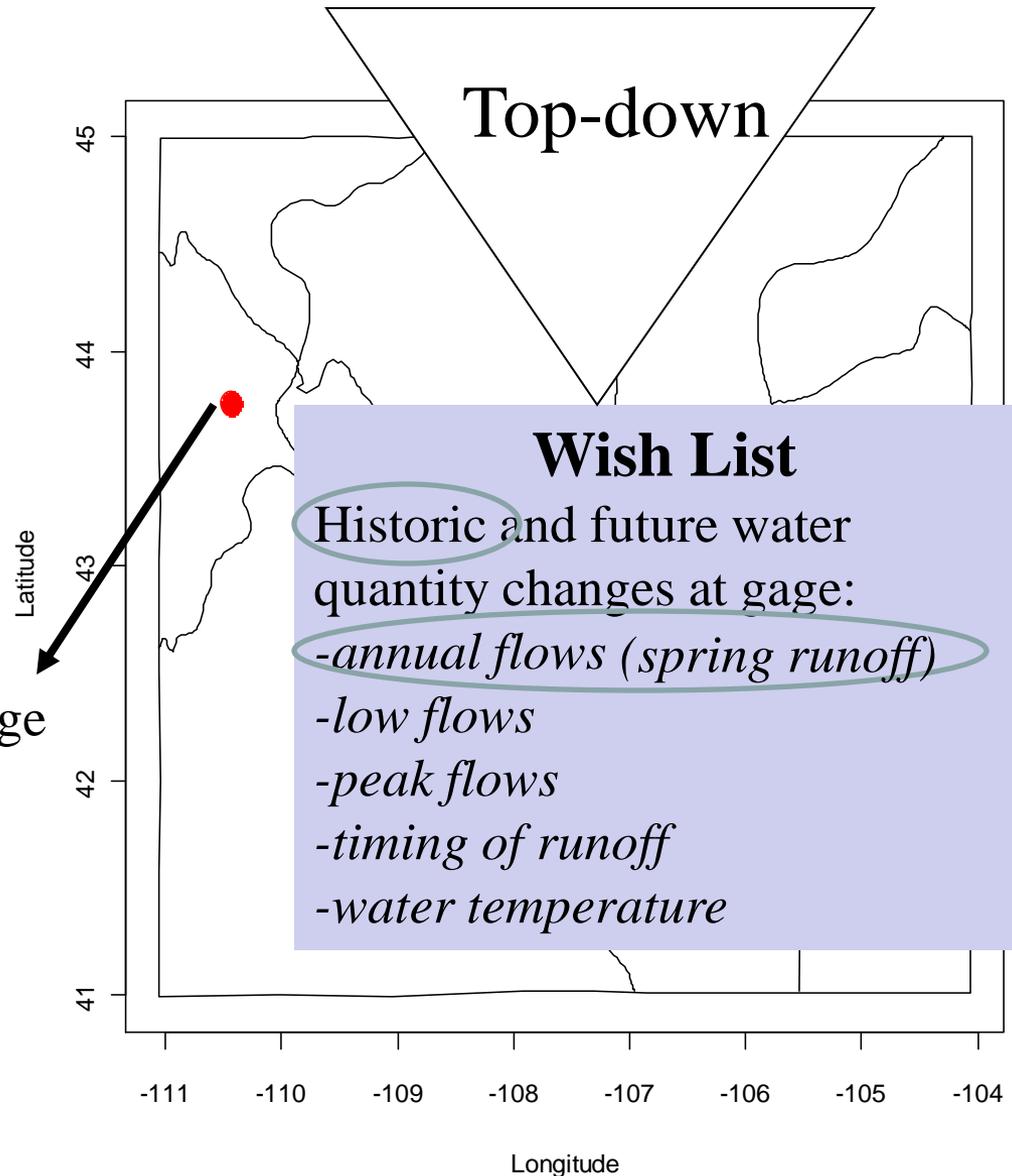
Example #1: Gros Ventre R. flows



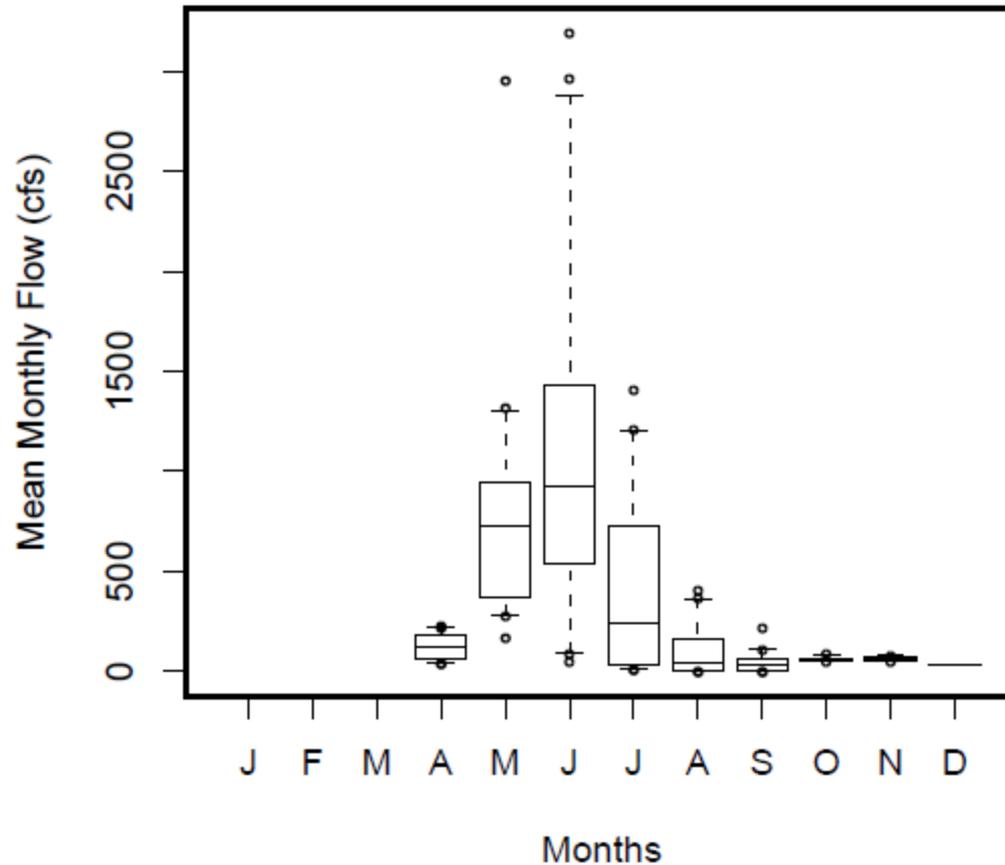
USGS Gros Ventre River at Zenith gage

Variable	Flow
Time	Daily
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Dates	1987-present*

* No winter records



Flow records show variability in spring runoff

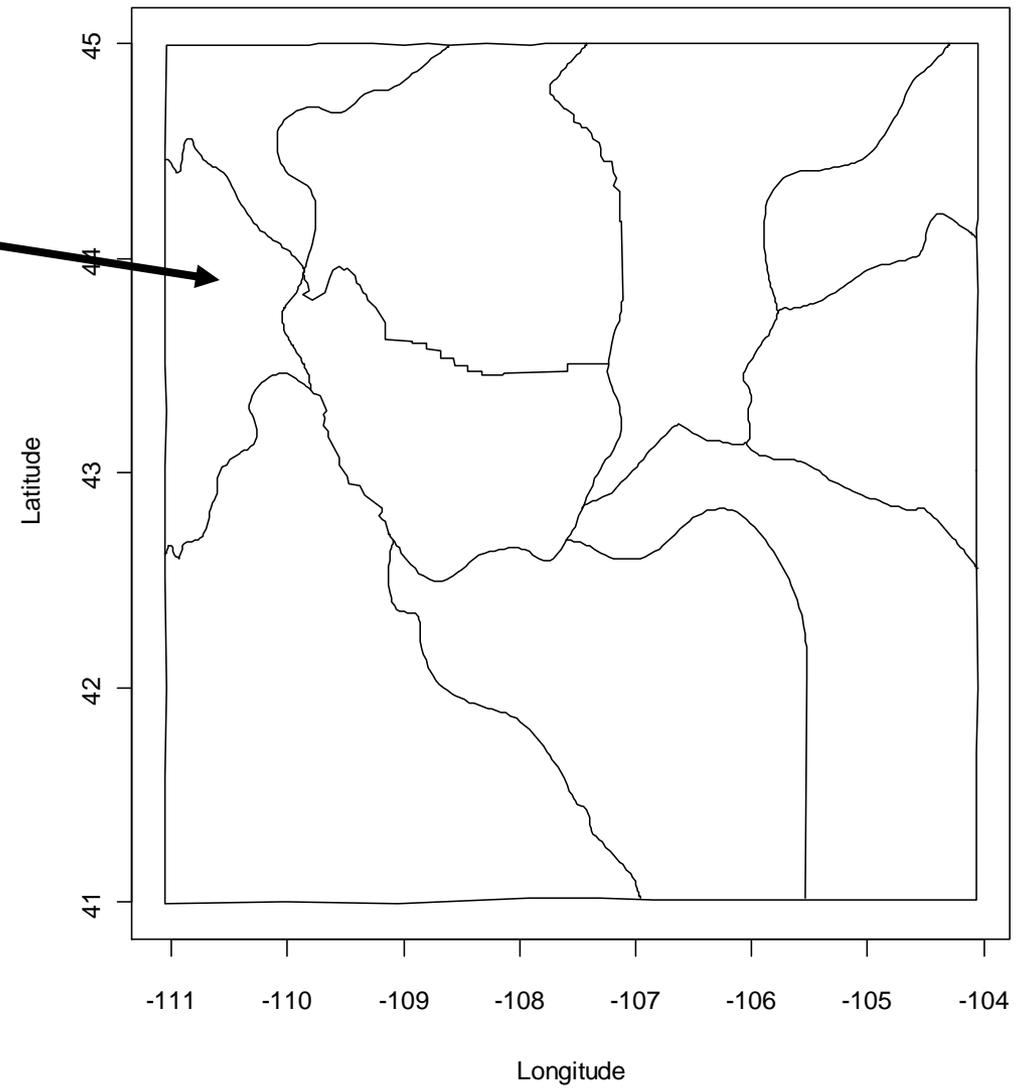


Explore associated historic precipitation

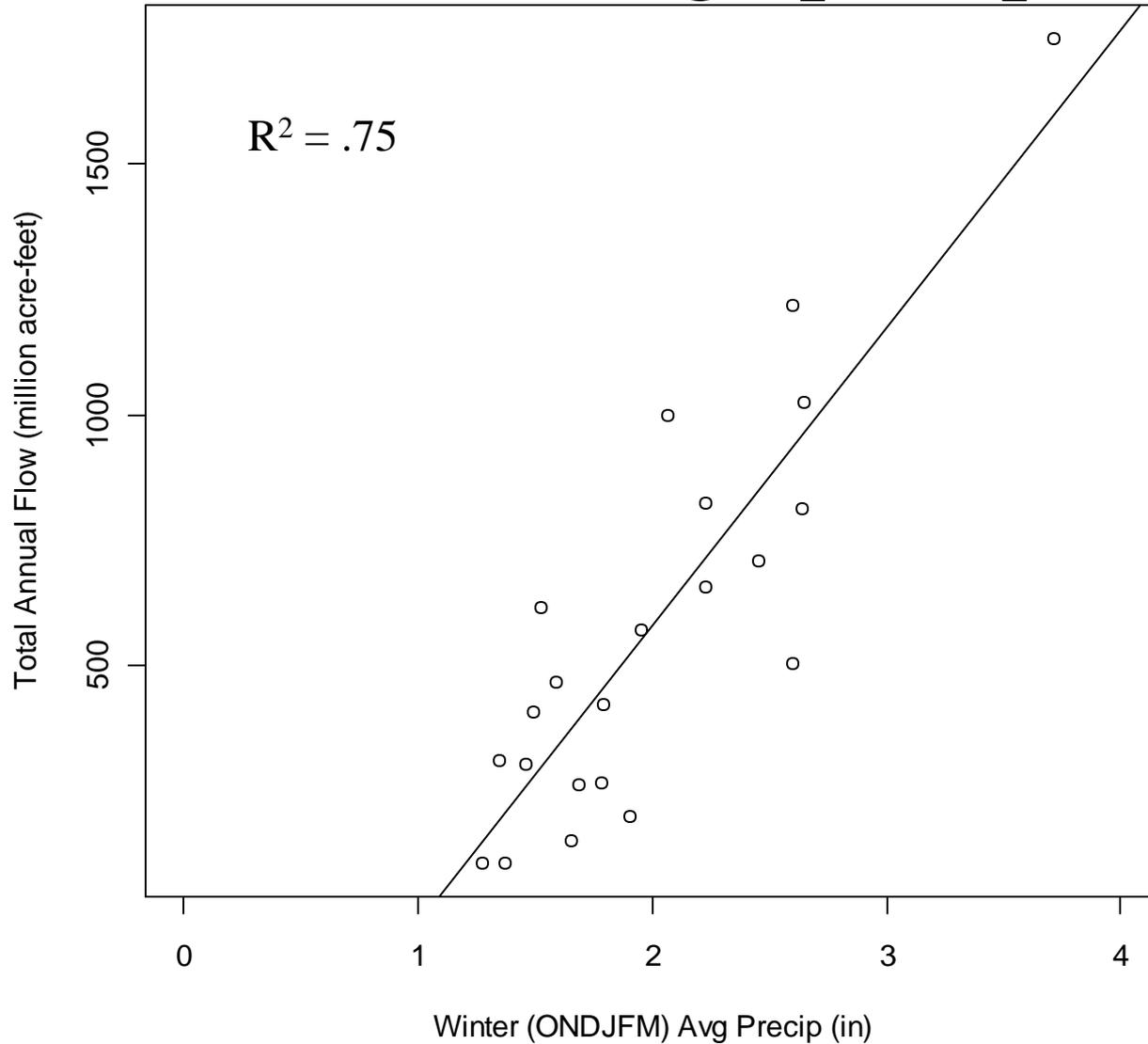
Wyoming Divisions

NOAA Wyoming Division 2
(Snake Drainage)

Variable	Precipitation
Time	Monthly
Space	Divisional
Dates	1895-present

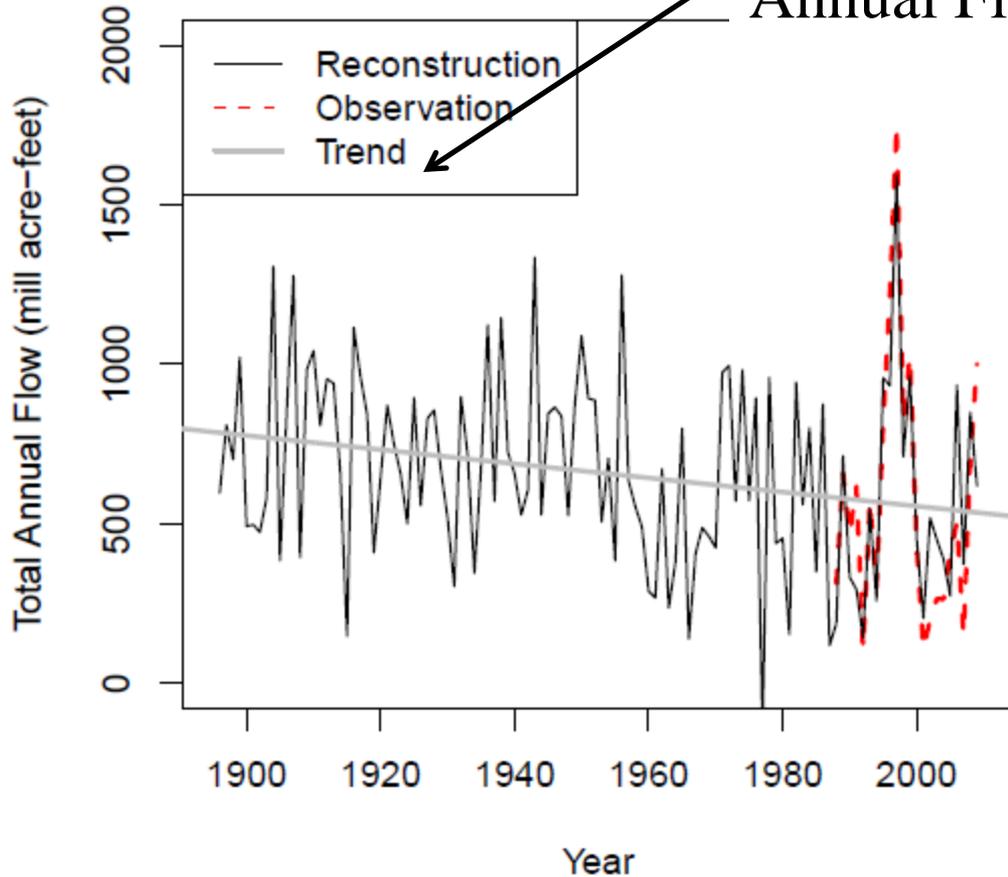


Annual flows track linearly with Ex. #1 winter average precip



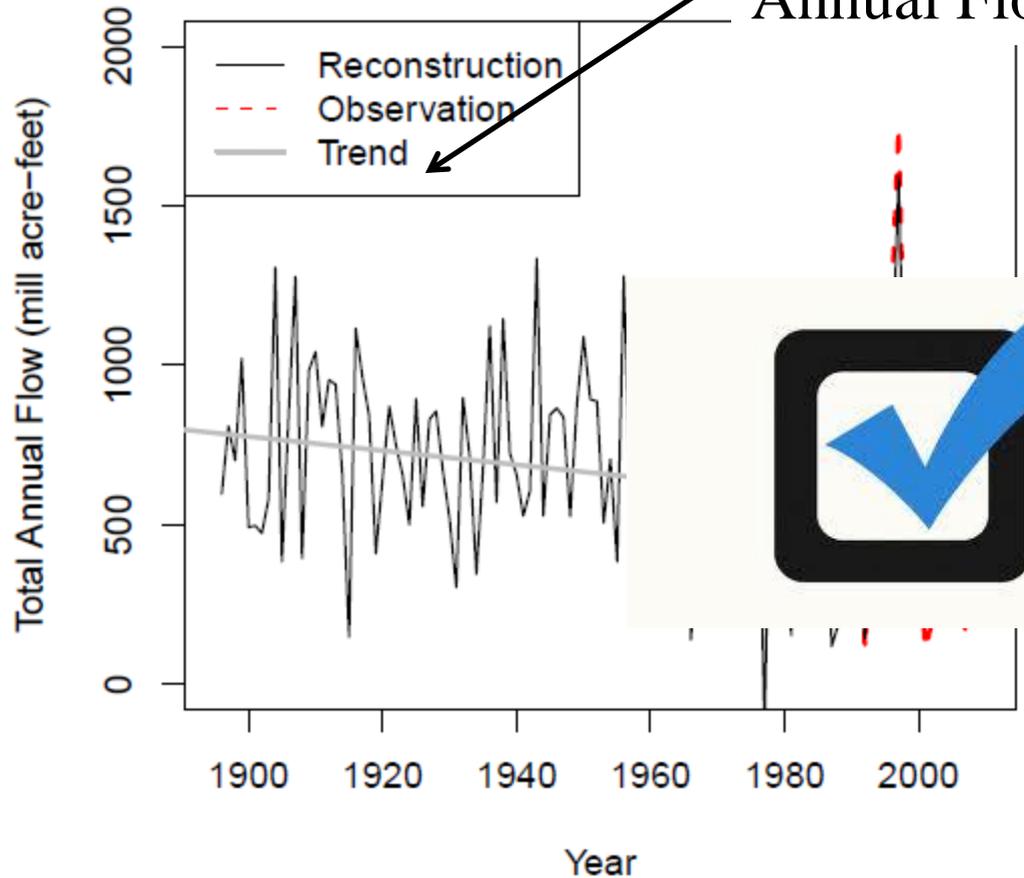
Reconstruct annual flows from precip

-30% Linear Trend (Decrease) in Annual Flows between 1896 & 2009



Reconstruct annual flows from precip

-30% Linear Trend (Decrease) in Annual Flows between 1896 & 2009

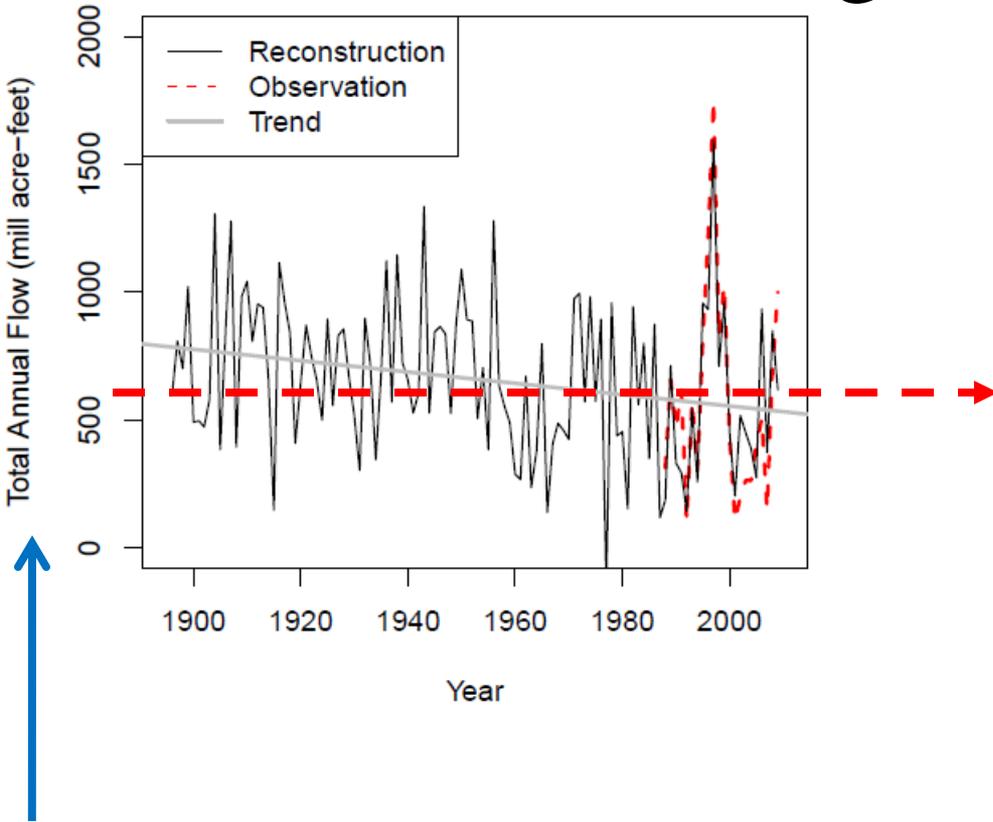


Wish List

Historic and future water quantity changes at gage:

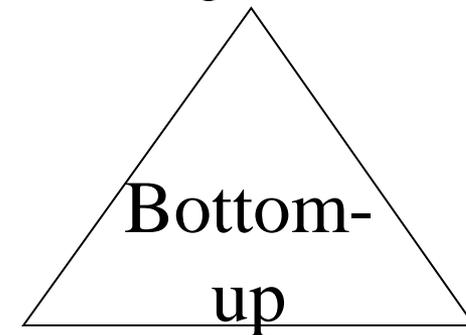
- annual flows (*spring runoff*)
- low flows
- peak flows
- timing of runoff
- water temperature

Need to identify how (and if) decisions change with these results



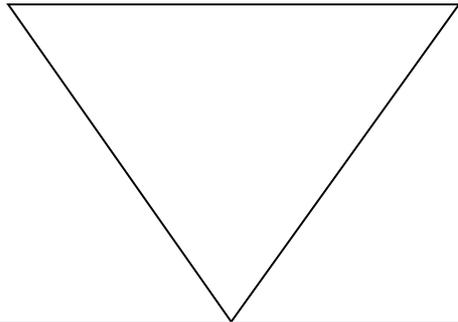
Is there a **threshold** that causes an **impact** (e.g., disease outbreak) or **action** (e.g., decrease diversions)?

Identify **impacts** (e.g., ecological changes) or **actions** (e.g., management decisions) from decreasing trend



Or, do **impacts** and **actions** depend on a different time of year (e.g., summer) or shorter time step (e.g., daily)?

Limited resources require identifying key climate information needs

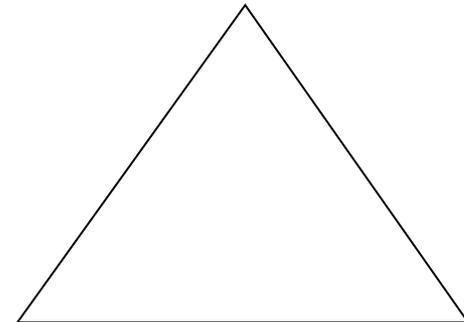


Wish List

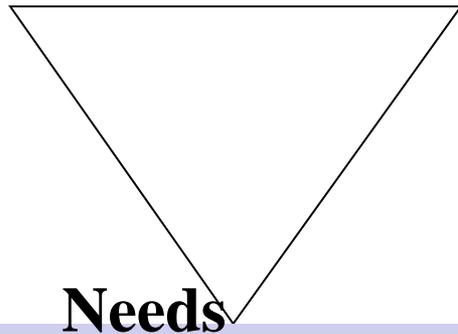
- Overwhelming amount of information*
- Time-consuming to produce*
- May or may not be useful to decisions*

Fish are adversely affected (**impact**) when daily flows are <5 cfs (**threshold**) for 3 days in a row in summer (**time scale**), so I reduce upstream diversions (**action**).

Identify needs



Limited resources require identifying key climate information needs



~~Wish List~~

-Relationship between fish and flow

-Daily low flows (summer)

-Past/future risk of <5 cfs for three days

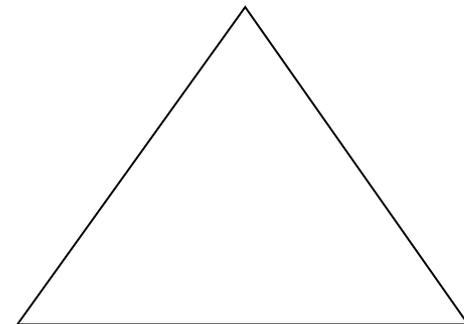
-Adaptive capacity

(available alternatives past/future)

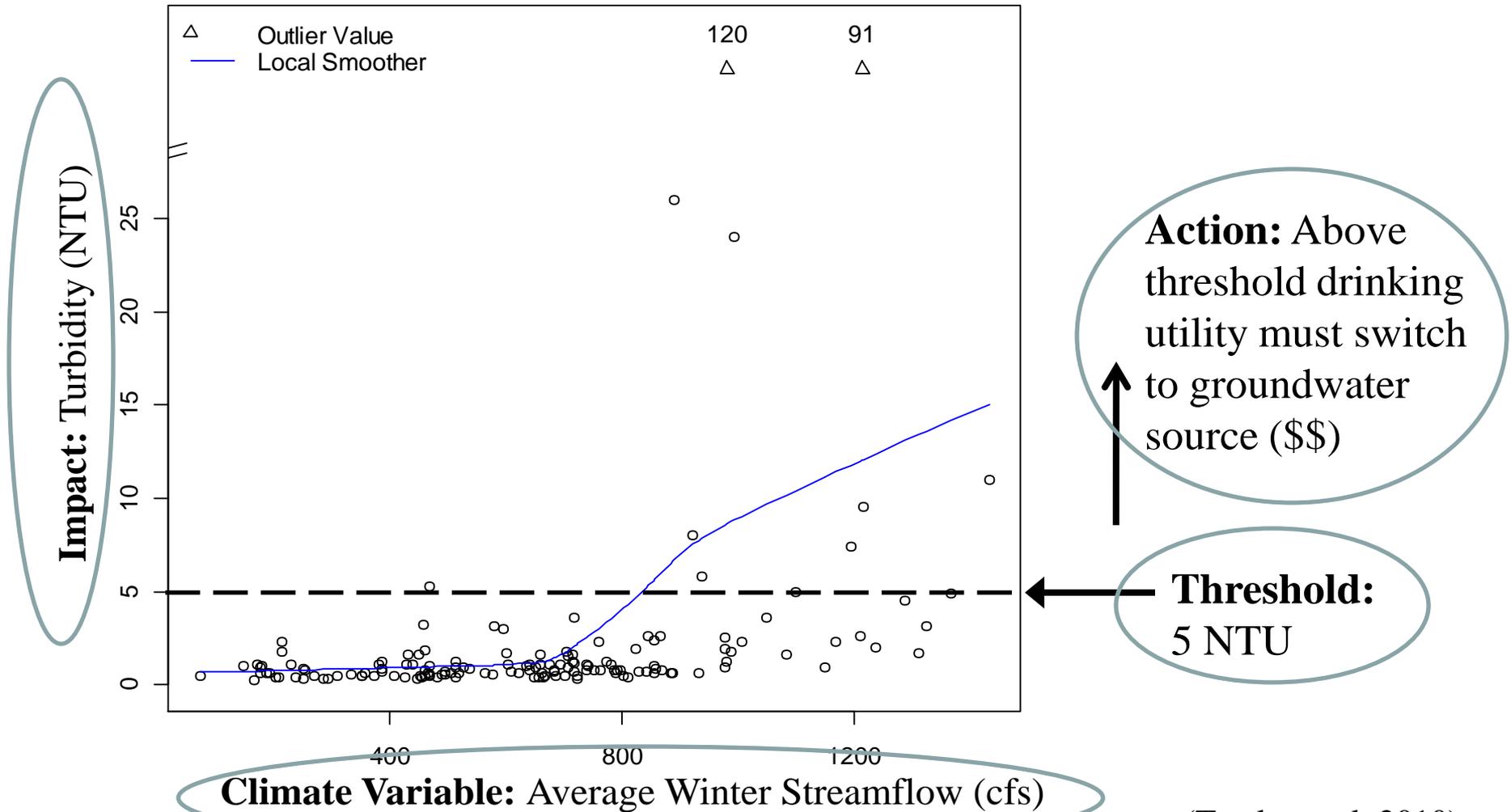


Fish are adversely affected (**impact**) when daily flows are <5 cfs (**threshold**) for 3 days in a row in summer (**time scale**), so I reduce upstream diversions (**action**).

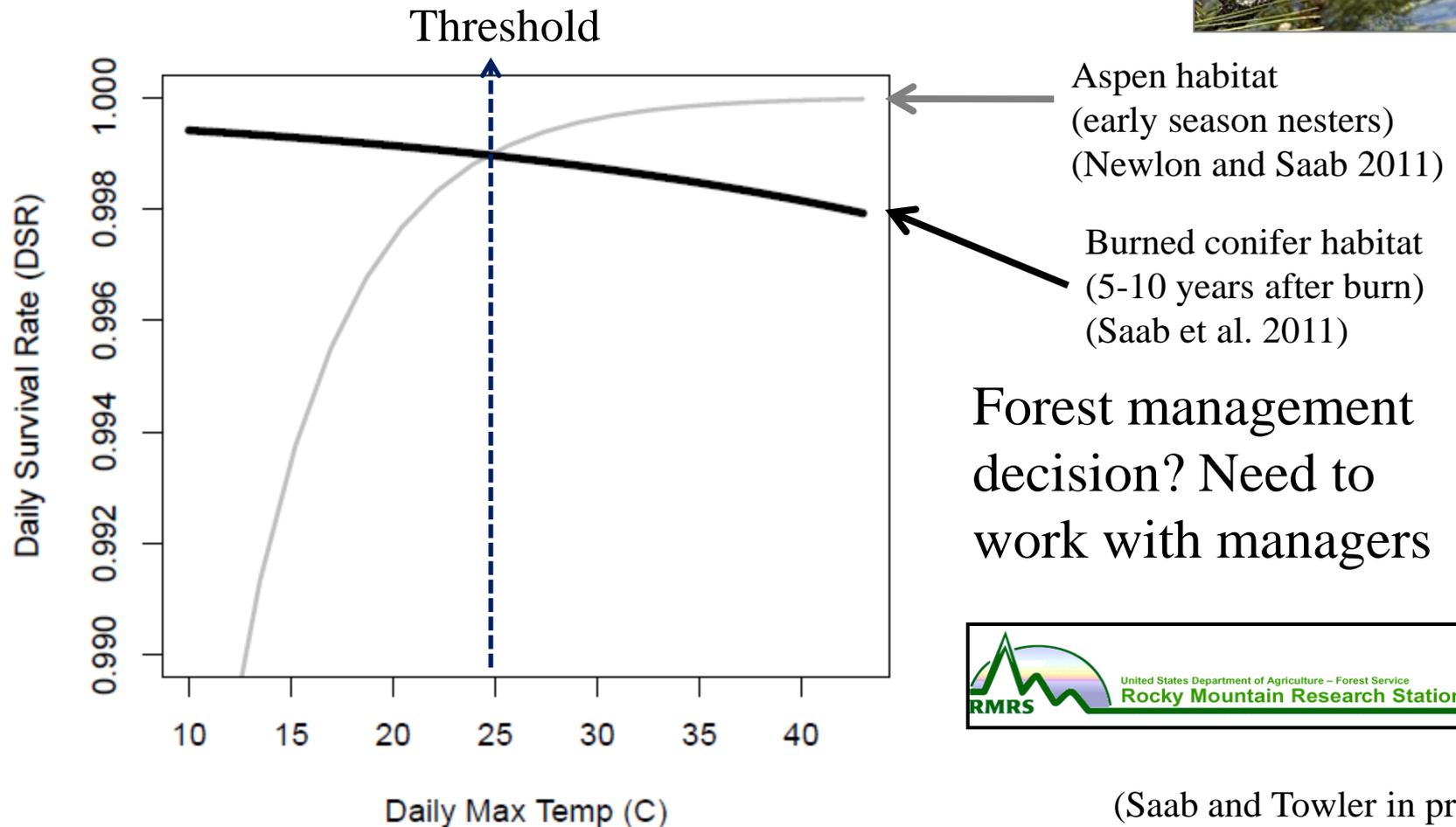
Identify needs



Example #2: Risk of a water quality (turbidity) exceedance

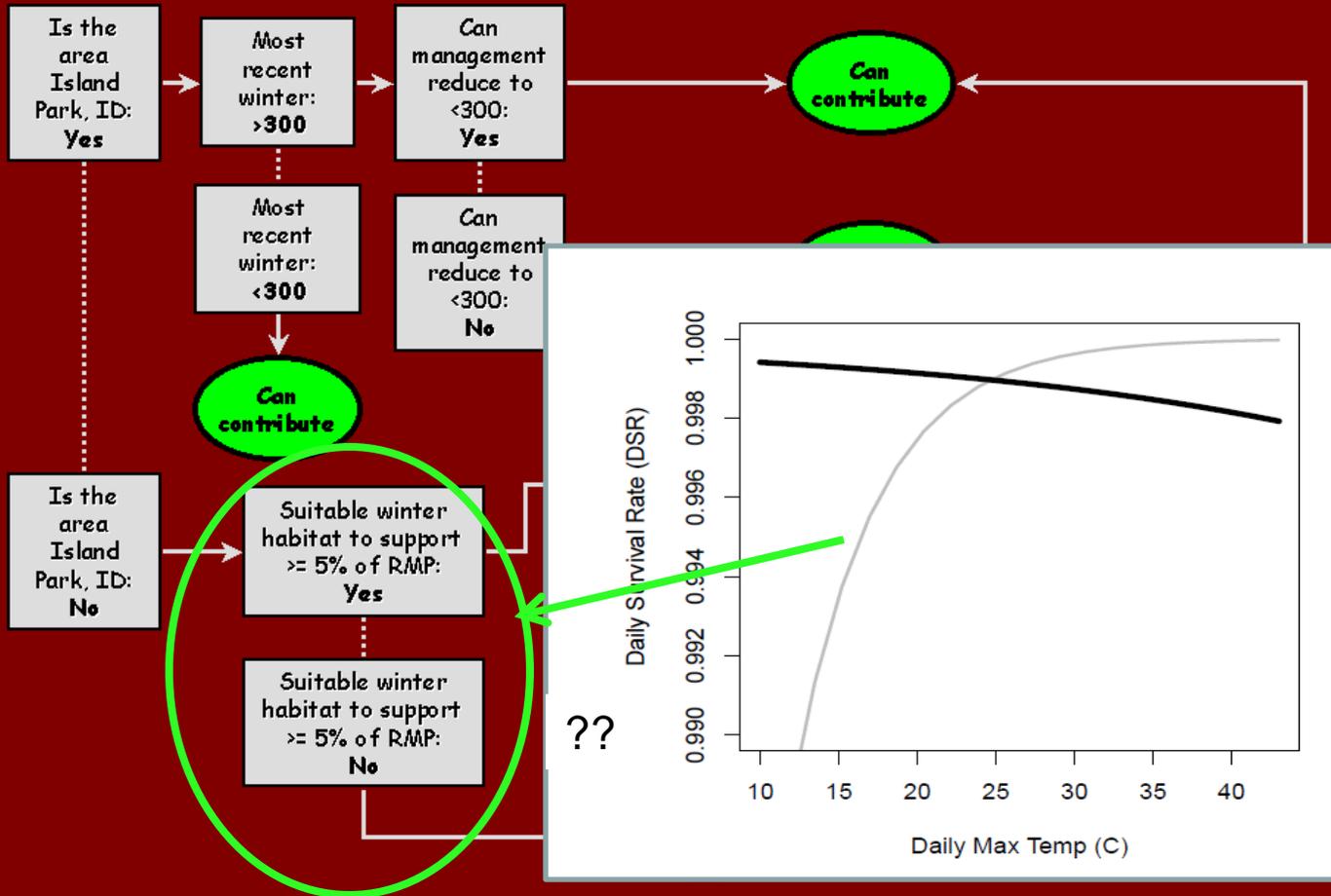


Example #3: Daily Survival Rate for Lewis's Woodpecker nests in different habitats

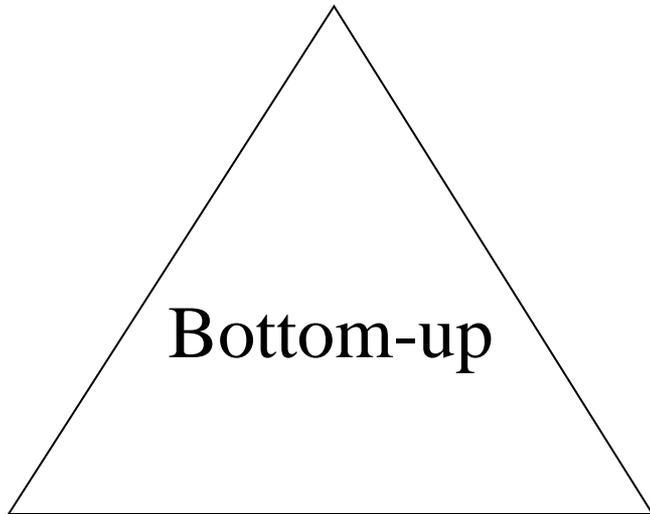


Example #4: How managers of Pacific Flyaway Council decide how to redistribute winter swans

Decision: Can this area contribute to the RMP Plan's objective of redistributing winter swans?



Identifying bottom-up decisions requires **your** expert knowledge



Looking for volunteers for phone interviews (30 - 60 minutes) in April/May on how you currently use climate information in decisions.

Email: towler@ucar.edu

Interviews will help understand and address climate information deficiencies for adaptation

Manager
Interview
(n>10)

Qualitative Goals:

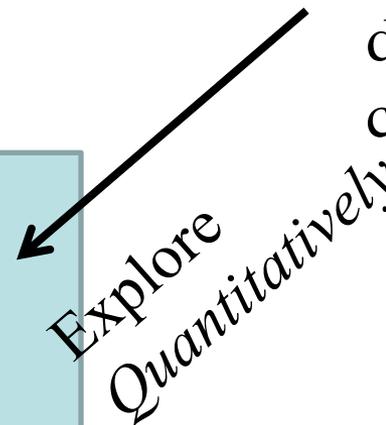
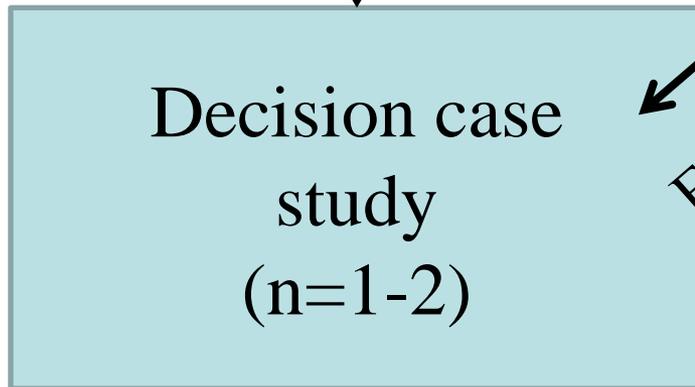
- (1) Work together to understand climate information that is *possible* and *useful*

(See Dilling and Lemos in press, Figure 1)

Interviews will help understand and address climate information deficiencies for adaptation

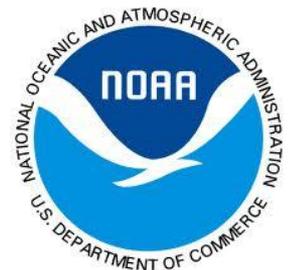
Qualitative Goals:

- (1) Work together to understand climate information that is *possible* and *useful*
- (2) Discover bottom-up decisions that have key climate needs



Questions?

towler@ucar.edu



References

Dessai, S., Hulme, M. (2004), Does climate adaptation policy need probabilities? *Climate Policy*, 4, 107-128.

Dilling, L., Lemos, M.C. (2010), Creating usable science: Opportunities and constraints for climate knowledge use and their implications for science policy. *Global Environ. Change*, doi:10.1016/j.gloenvcha.2010.11.006

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