Update on

Fully Appropriated Evaluation Methodology Modifications

UNL Water Conference

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Outline

- Project Background and Goals
- Project Activities
  - Literature Review
  - Potential Methodology Refinements and Testing
  - Recommendations
- Next Steps

Project Background

- LB 962 passed in 2004
  - DNR fully appropriated evaluation by Jan 1 each year
  - If fully appropriated – IMP developed (within 3-5 yrs)
  - IMPs
    - Manage GW and SW to sustain subbasin/reach
    - Identify difference between over appropriated (OA) and fully appropriated (FA)

Project Background

- Project History
  - Statutes link OA-FA difference to evaluation
    - Current evaluation methodology does not provide OA-FA difference
  - Result: CPNRD and NDNR lead effort to look at methodology
  - **Goals:**
    - Best represent supplies and uses in basins
    - Link evaluation to the IMP process.

Scope of Project

- From minor tweaks to wholesale revisions were on the table
- Possible changes to rules and procedures
- Approach:
  - Research what's being done elsewhere – not necessarily looking to reinvent the wheel
  - Identify desired elements of methodology
  - Develop methodology for testing
  - Final recommendations

Literature Review

- Sources
  - State Statutes
  - Administrative Rules
  - Special Management Areas
  - Compacts and their accounting methods

Result = No "off-the-shelf" solution

Literature Review

- Findings:
  - Most basin closures by decree
  - Most have SW and GW under common authority – administer both under priority system
  - Lack of integrated SW/GW approach
  - Some elements may be applicable to Nebraska
    - Oregon Frequency Curve
    - Texas' 75/75 rule
    - Accounting Methods of Republican River and Pecos River compacts
- No off-the-shelf solution

Methodology

- Key Desirable Characteristics of Method
  - Flexible time period – reflect cyclical nature of water budget
  - Reflect seasonal variations
  - Independently accounts for SW/GW use and supply
  - Considers variation in water supply from year to year
  - Evaluate/consider conservation measures
  - Consumptive/Non-consumptive use
  - Utilize existing datasets when possible

Methodology- Overview

- Methodology for Testing
  - **Supply** - Virgin Flow Hydrograph for Supply
  - **Demand** - Identify SW and GW consumptive and non-consumptive uses
  - **SW/GW Integration** - Best available technology for SW-GW interaction (analytic, numerical modeling, etc.)
- Flexibility in tools for analysis

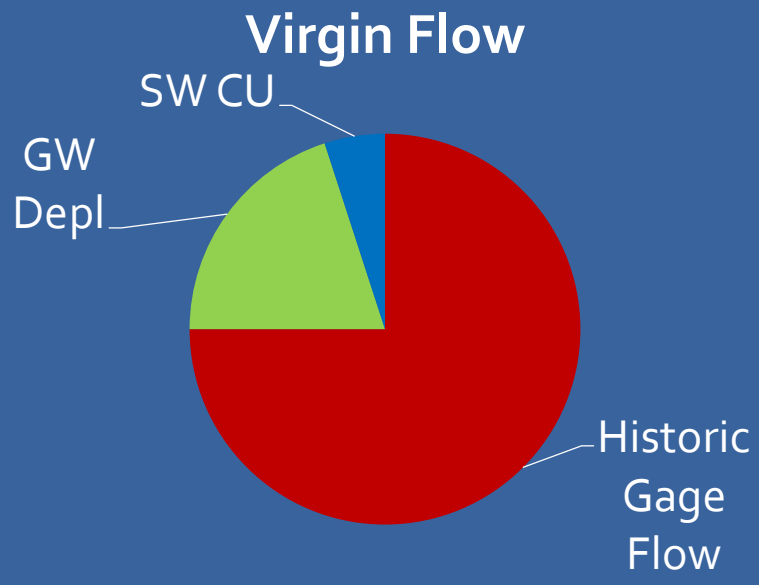
Comparison of Methodology Differences

Current Methodology	Proposed Methodology
Uses Historic gage records adjusted for lag effects as supply	Estimates Virgin Water Supply
Looks at single point user (most junior water right)	Better represents GW and SW supplies as well as demands
Uses 25-yr period to project lag effect of GW use	Compares GW depletions to GW CU to account for lag effect
For instream flow test, uses static 20-yr period	Statistical analysis to determine period of analysis
Instream flow test uses historic gage records (lag-adjusted) for comparison	Historic gage records adjusted for consumptive use at time of appropriation and current level of depletions
No direct linkage of Evaluation to IMP Process	Evaluation provides better support for the IMP process

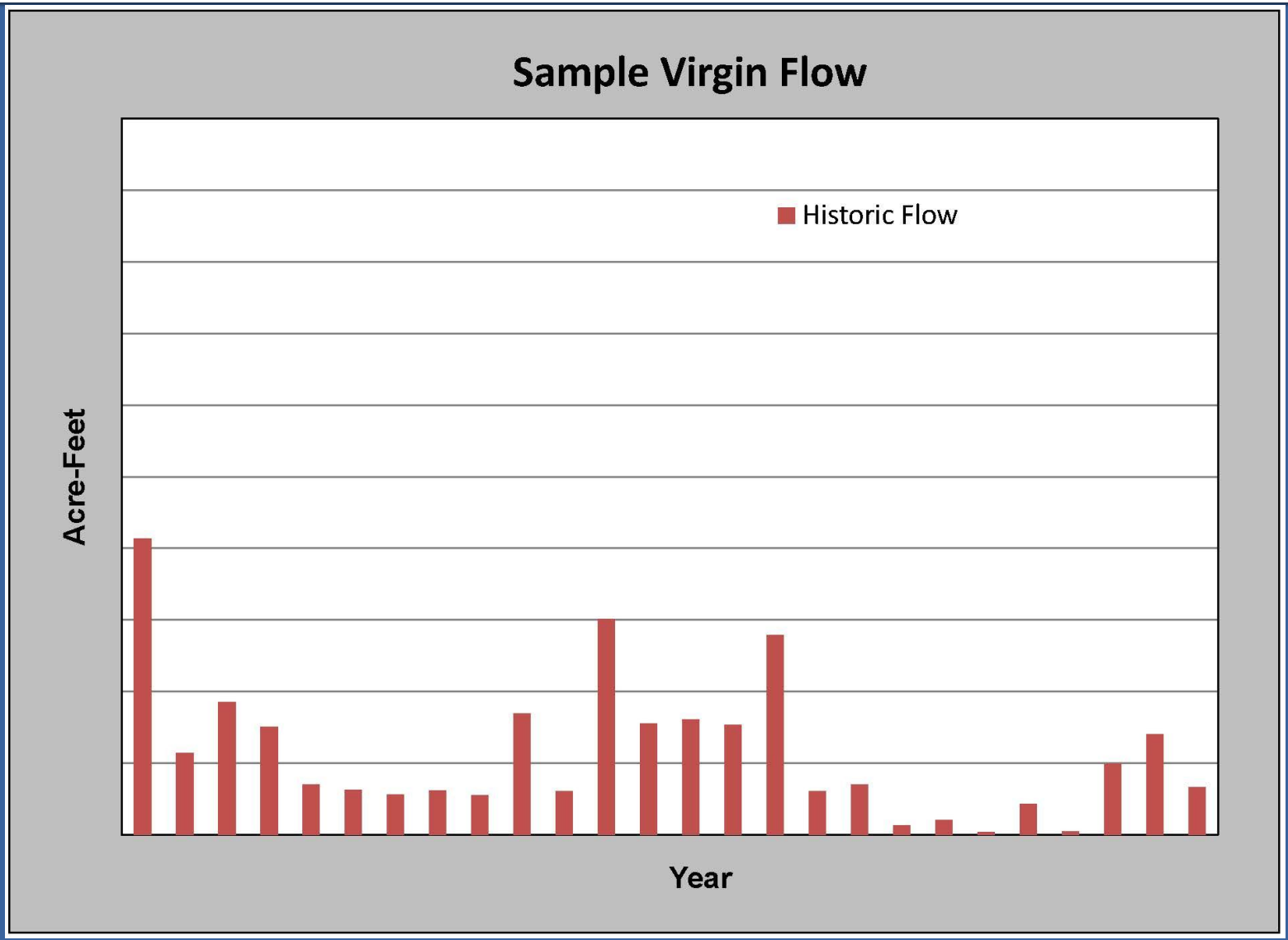
Methodology - Supply

- Virgin Flow Hydrograph
  - Estimate of streamflow hydrograph "undepleted by activities of man"
  - Historic gaged flows + upstream consumptive uses:

Virgin Flow = Historic flow
+ historic SW CU
+ estimated GW depletions



Methodology – Building the Virgin Flow Hydrograph



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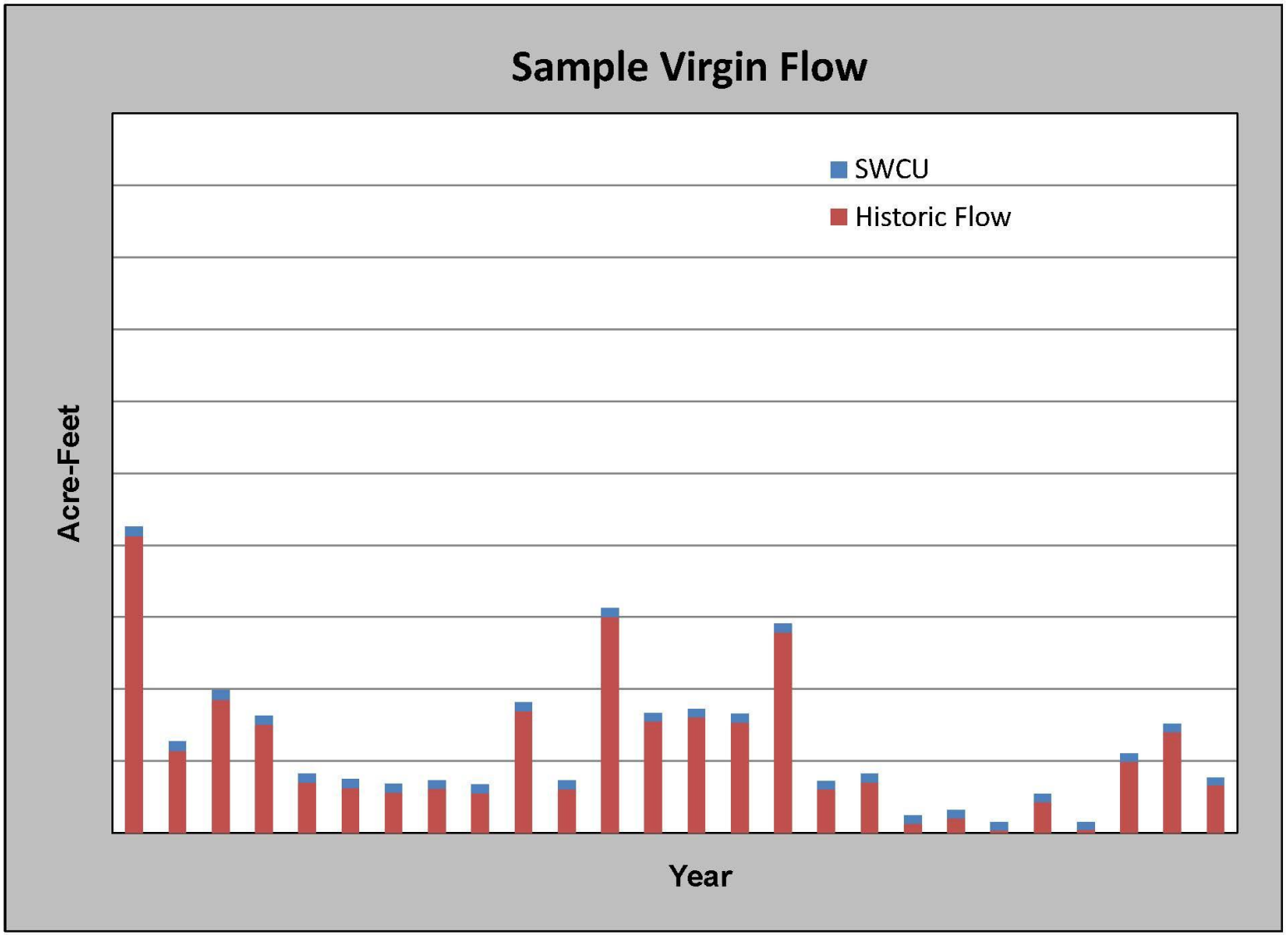

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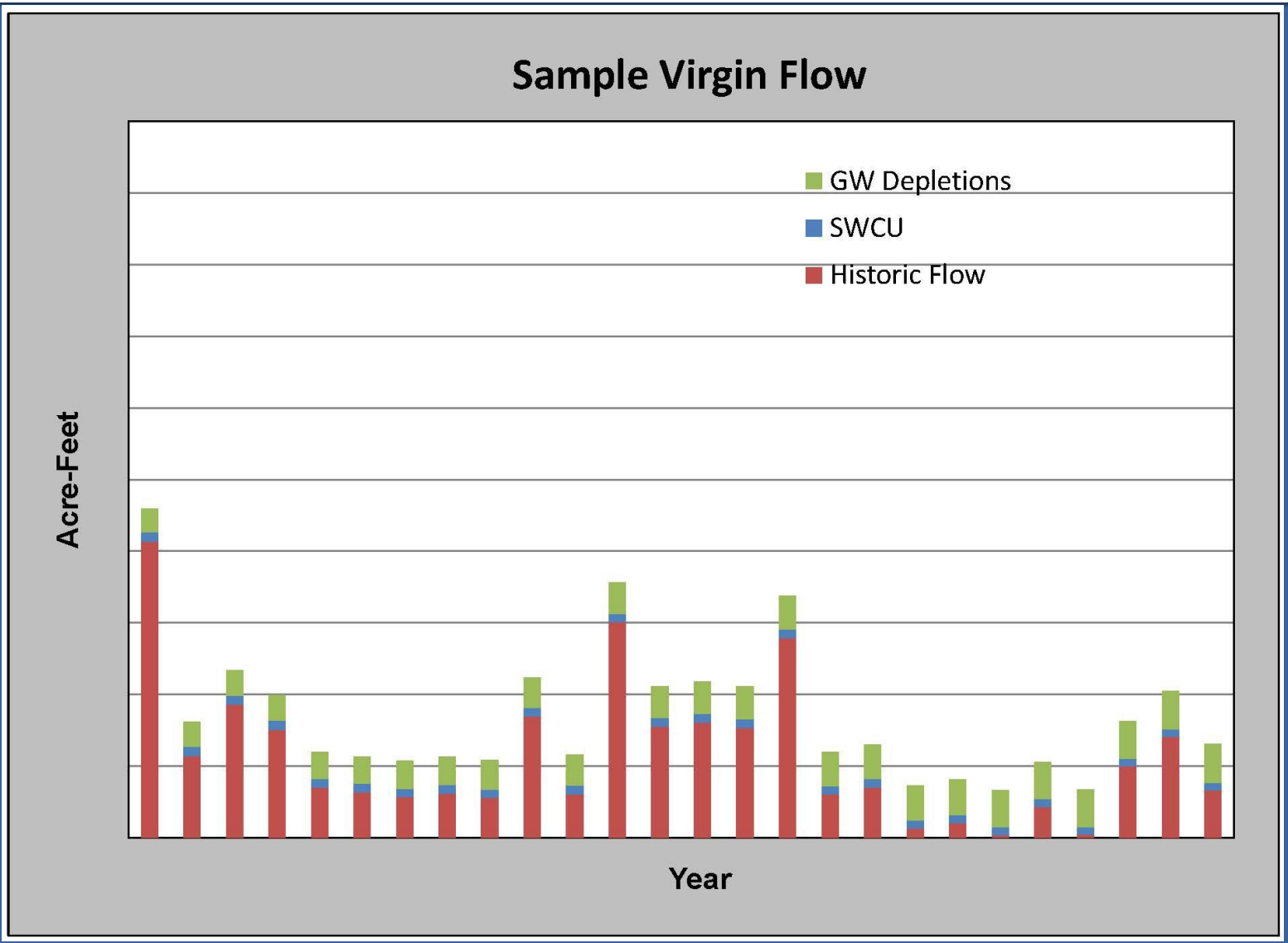

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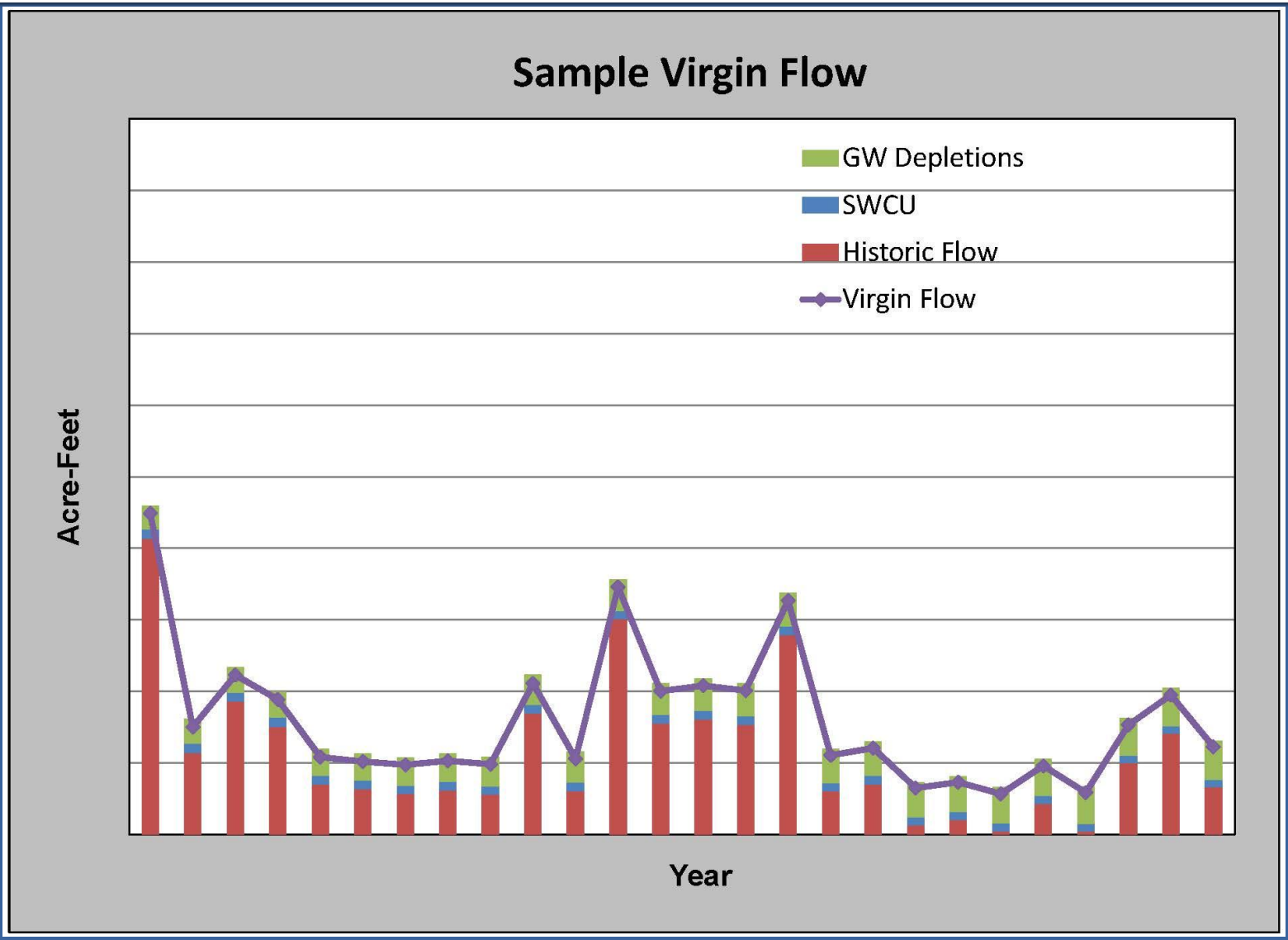


Methodology - Demands

- Differentiate between SW and GW uses

GROUND WATER DEMANDS

Ground water irrigation (CU)
M & I wellfields (CU)

SURFACE WATER DEMANDS

Irrigation Canal Diversions (CU)
Individual irrigation appropriators (CU)
Hydropower (NonCU)
Instream flow appropriations (NonCU)
Reservoir evaporation (CU)

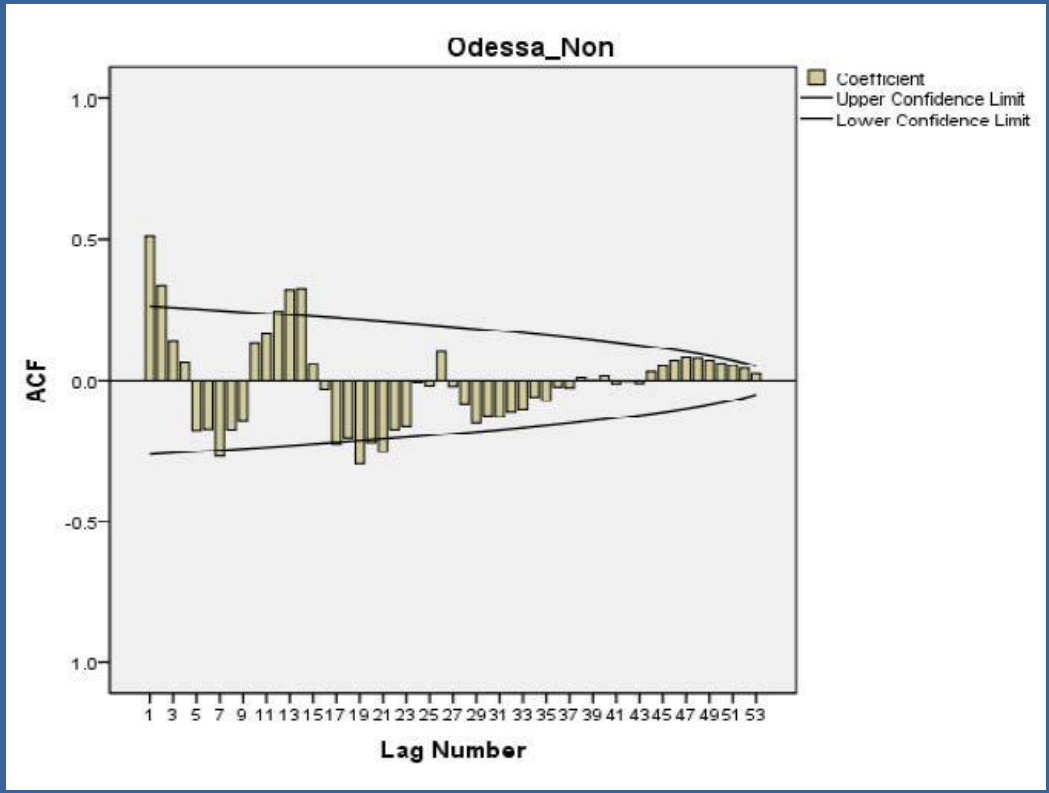
Methodology - Demands

- Two levels of groundwater demands
  1) GW use represented by Depletions (current level of impacts)
  2) Full GW consumptive use (accounts for lag effect)

Snapshot of where we are and where we are headed

Methodology Tools- Statistical Analysis

- Statistical Analysis to select time periods
  - Kendal Tau
    - Trends
  - Auto-Correlation
    - Cycles



Methodology-Testing

- First test of methods in the Upper Niobrara River Basin
  - Surface consumptive use
  - Groundwater consumptive use/depletion
  - Reservoir storage

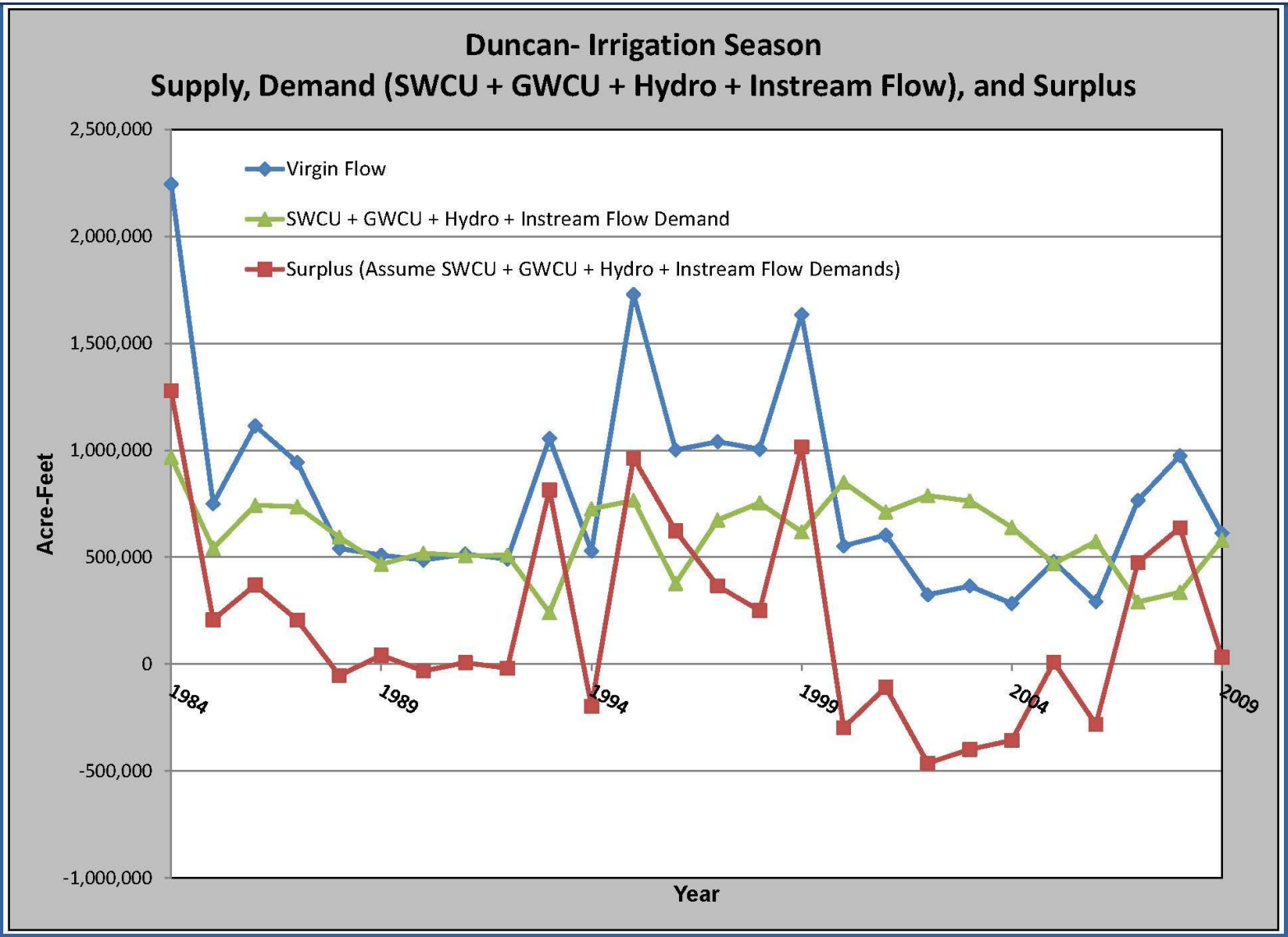
Methodology- Testing

- Second test of methods the Lower Platte River Basin
  - Surface consumptive use
  - Groundwater consumptive use/depletion
  - Reservoir storage
  - Hydropower
  - Instream Flows
  - Downstream demands

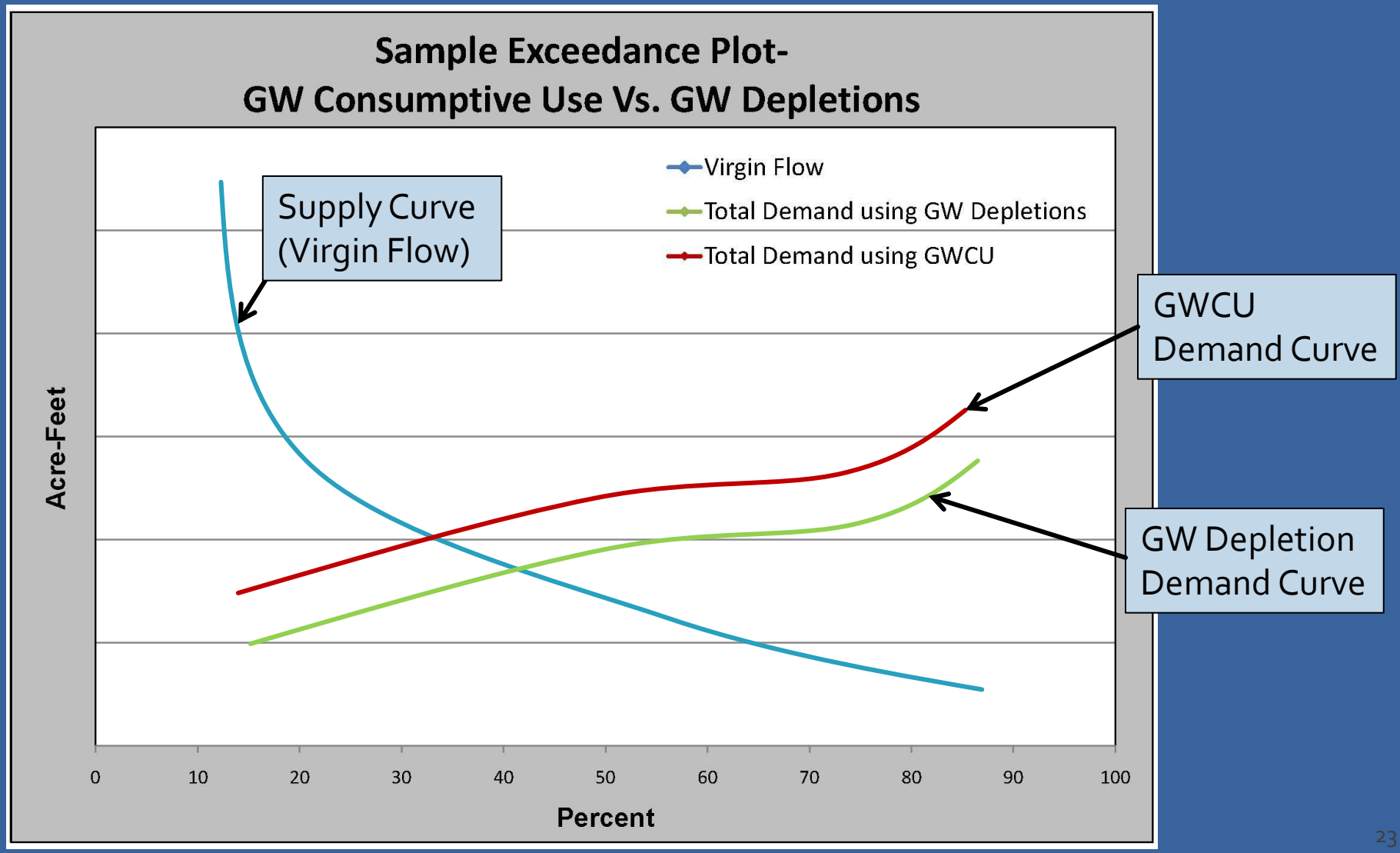
Methodology- Instream Flow Test

- Statute ties appropriation to that available at time of granting.
- Two time periods (chosen by statistical analysis)
  - 1) Analysis Period Prior to Water Right Issued
    - Corrections made to account for level of development at time water right issued.
  - 2) Current Analysis Period
    - Correction made to account for current level of depletions.
- Lesser of adjusted flows ("reasonably expected") or instream flow appropriation.

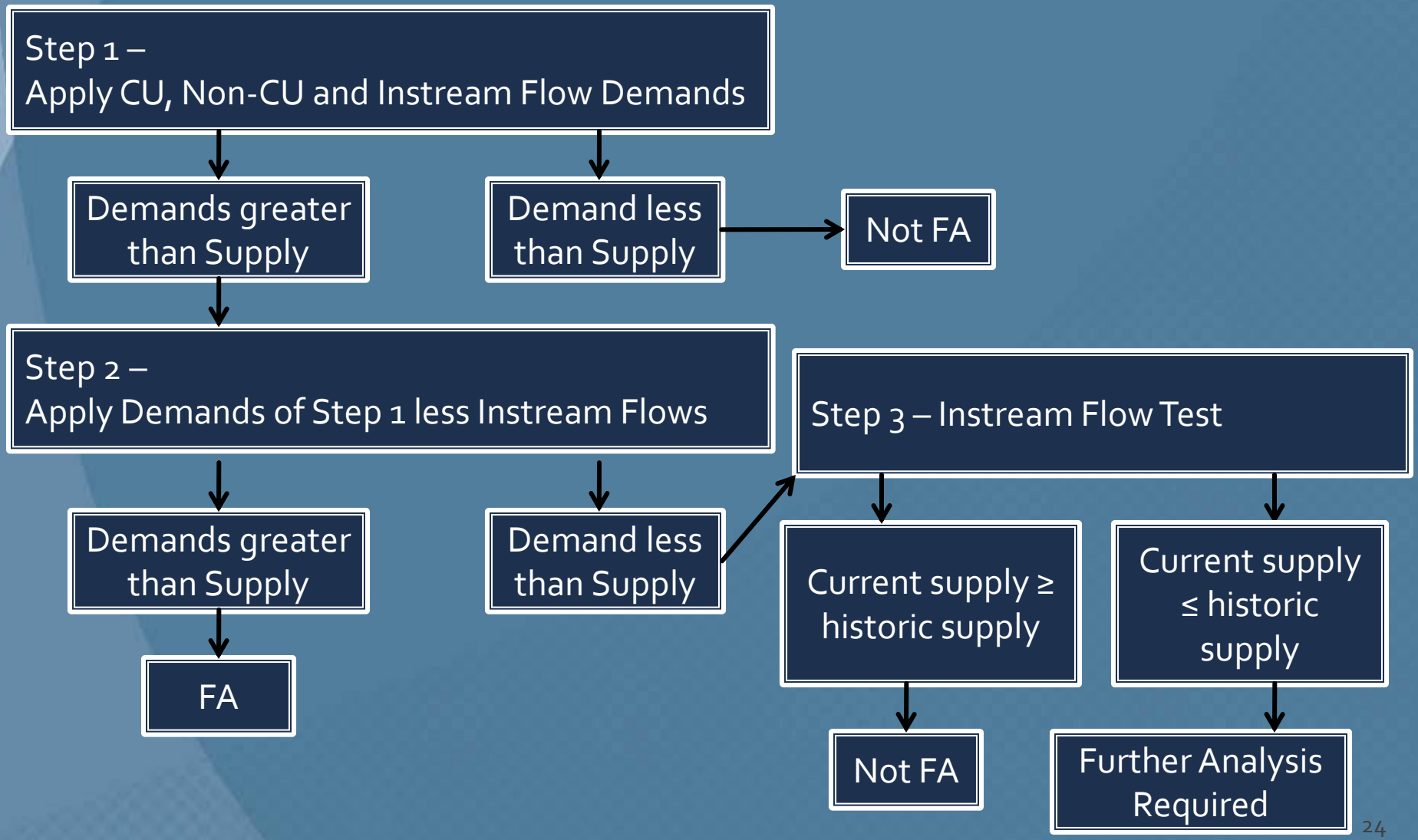
Supplies, Demands, and Surplus



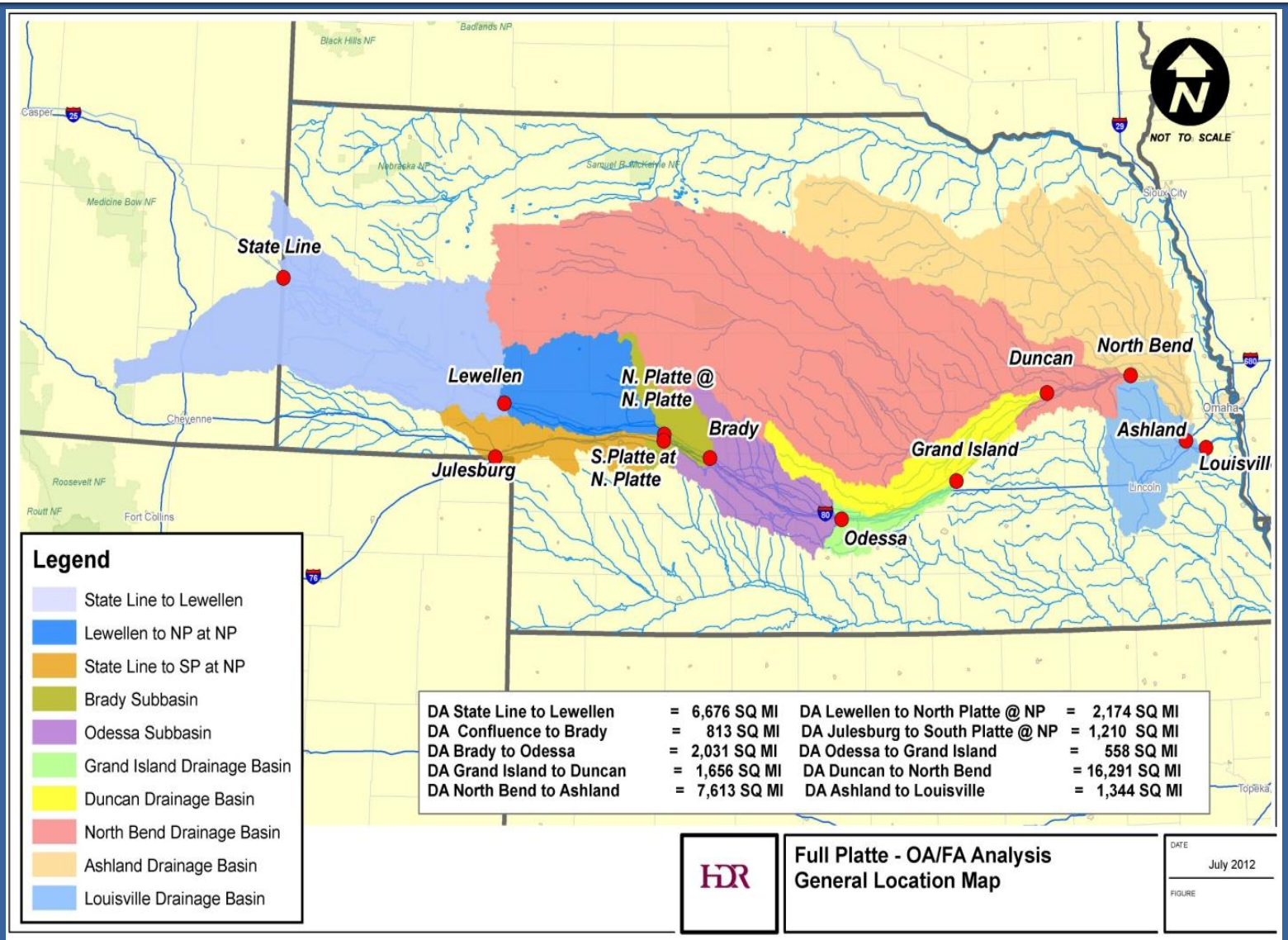
Methodology-
The Big Picture



Methodology – Process



Methodology Testing: Full Platte Analysis



Methodology Testing: Full Platte Analysis

- Addition of areas upstream of Overton
  - Estimate Virgin Flow at State Line
  - Addition of Irrigation Canals
  - Addition of Lake McConaughy

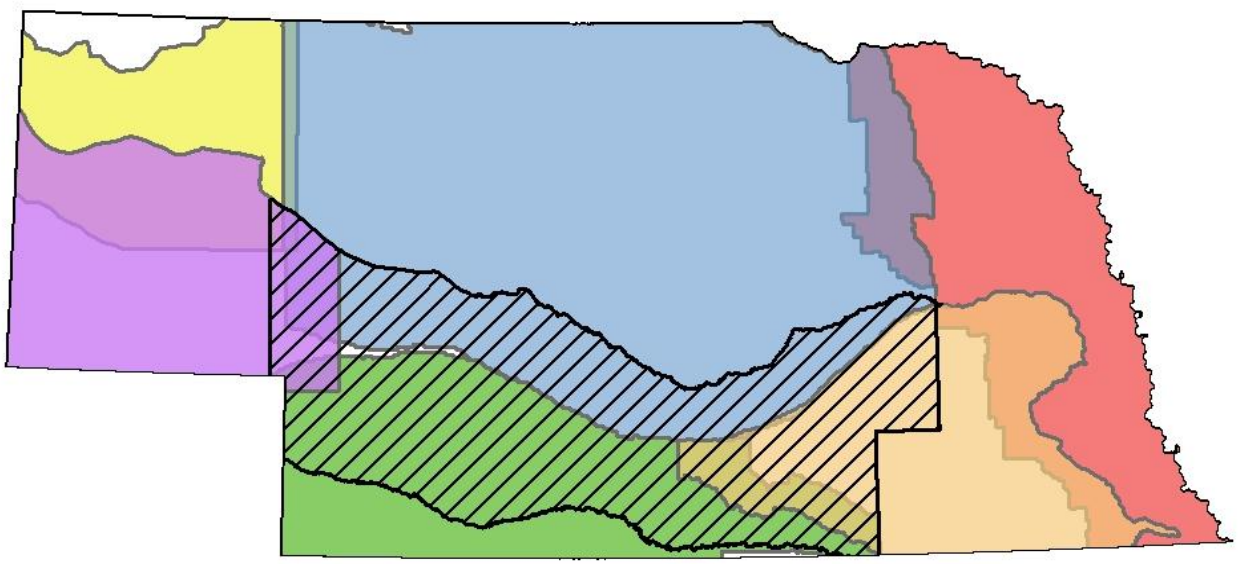
Methodology Testing: Full Platte Analysis

- Testing of Additional Refinements
  - Kingsley Hydropower
  - Large storage reservoir with multiple operational scenarios
  - Partitioning demands to North and South Platte Rivers

Next Steps

- Finishing the Full Platte River Analysis
- Final Recommendations by Consultants
- Department will draft methods and rules for review
- Department will hold public hearings for comment of the draft methods and rules
- Department to implement new rules for the evaluation at the end of 2013

Projects Supporting Implementation



Questions?