

# **State Water Plan**

## **Surface Water Availability Assessment**

Georgia EPD

Hydrology Unit

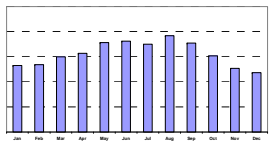
October 27, 2009

# Overarching Questions

- How much water are we using?
- How much water has Mother Nature provided us?
  - How much water is naturally available?
- How much water can we reliably use without compromising the in-stream flow needs?
  - What are the in-stream flow needs?
  - How much water use can be sustained subject to these needs?

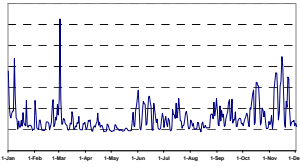
# Demand Data Compilation

\* Contractor (EPD Assistance)



# Observed Flow Data Compilation

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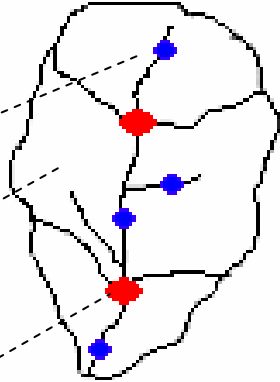
# River Basin Delineation

\* EPD

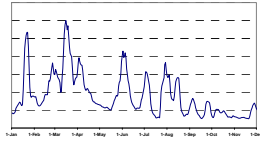
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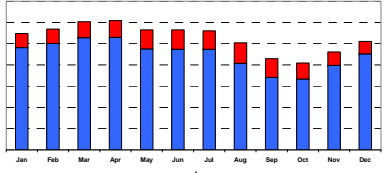


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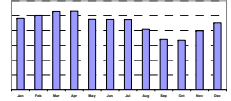
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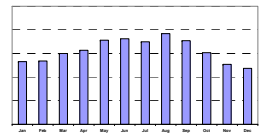
# Desired Flow Regime

\* EPD



# Future Demands

\*EPD



# Future Assessment (Planning)

\* EPD/ Contractor

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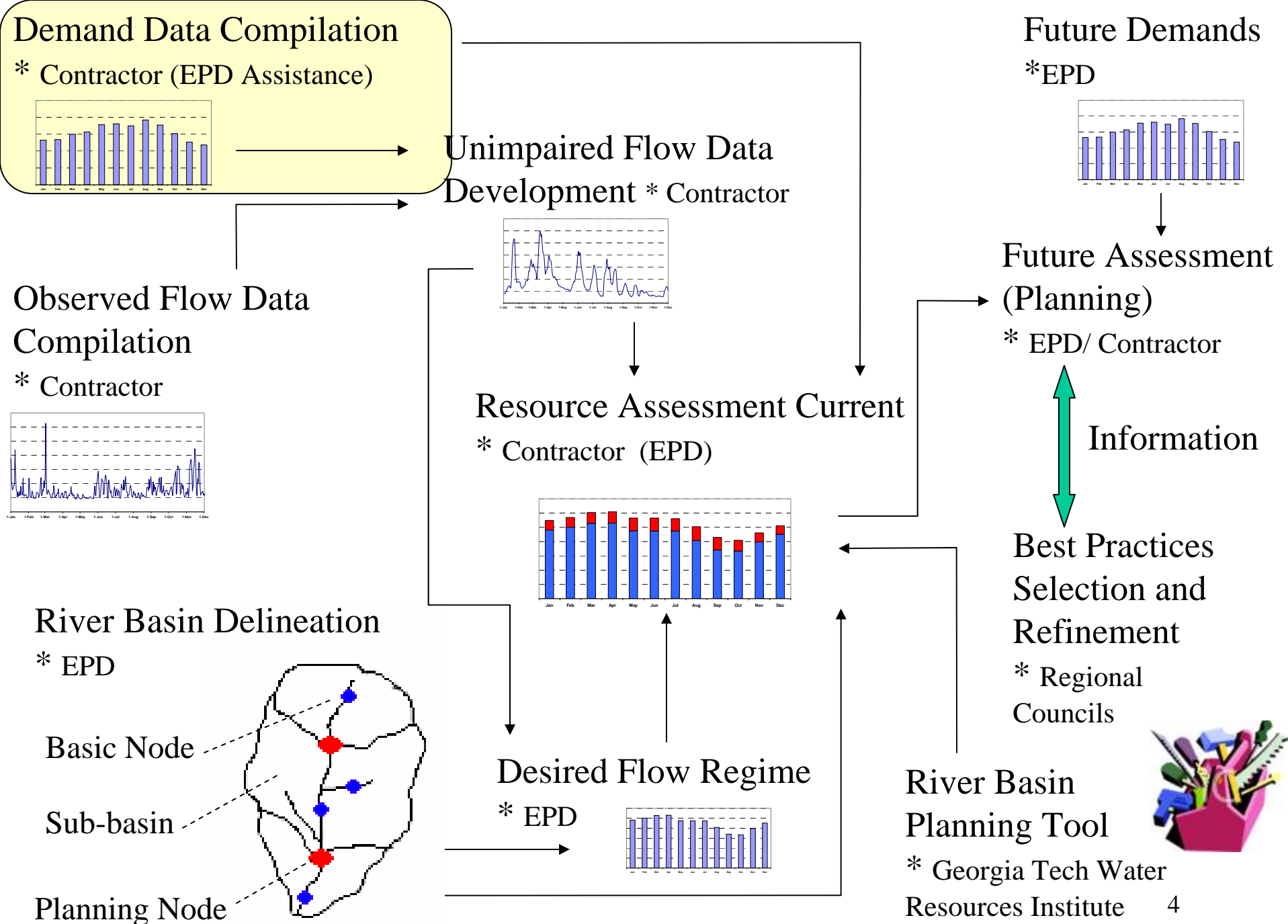
# Best Practices Selection and Refinement

\* Regional Councils

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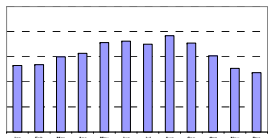
\* Georgia Tech Water Resources Institute





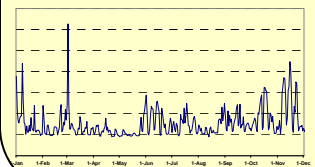
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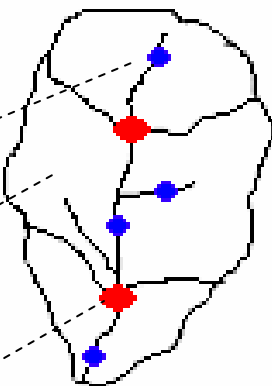
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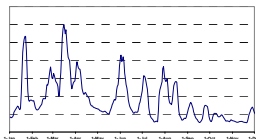
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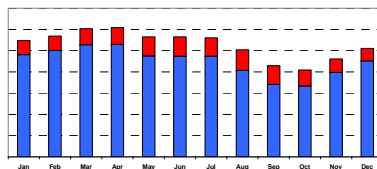


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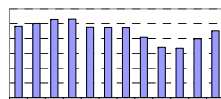
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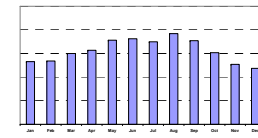
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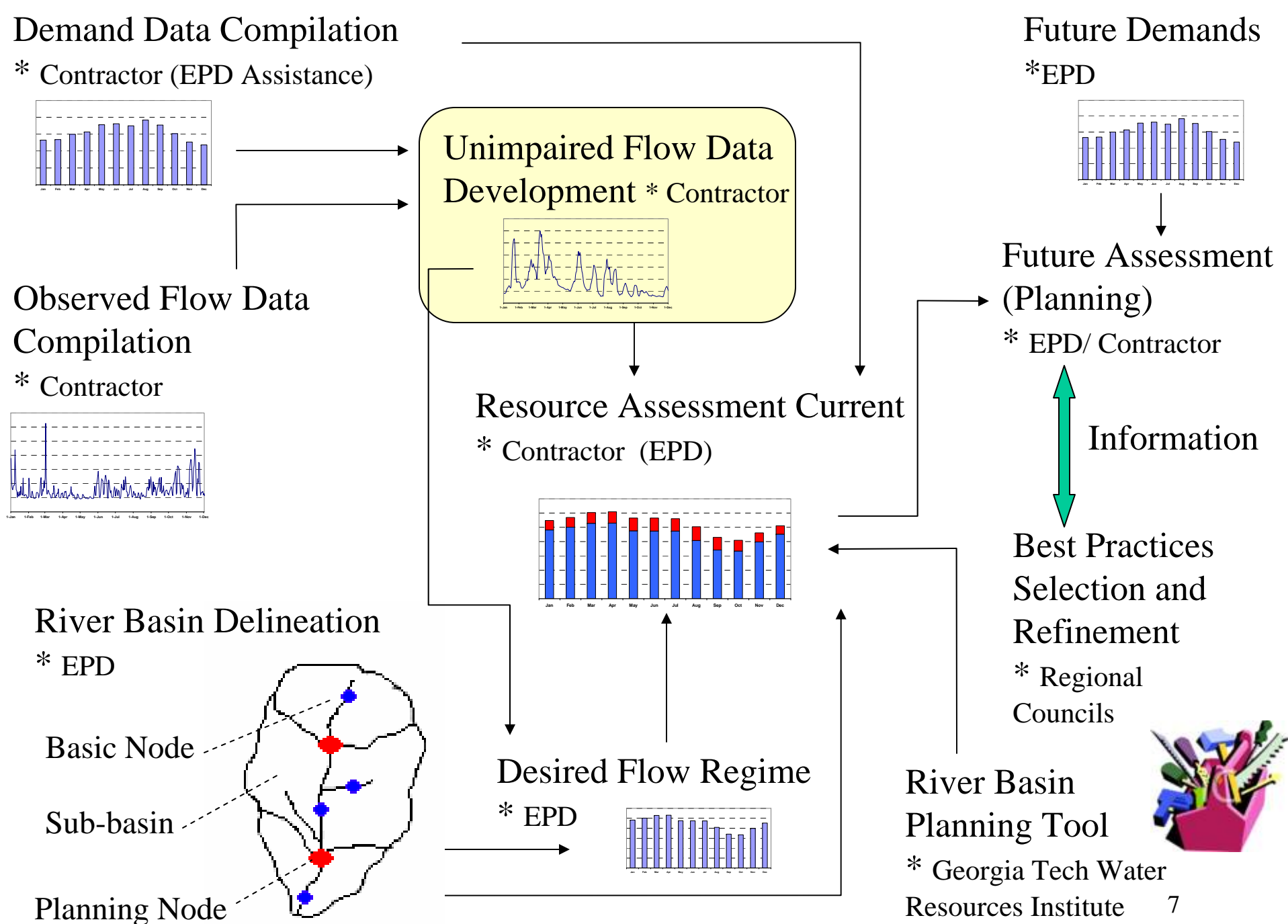
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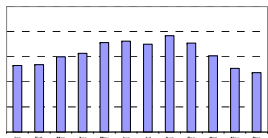
# Definitions

- Unimpaired flow:
  - Natural flow
    - No reservoir regulations,
    - No reservoir evaporations, and
    - No withdrawals and returns by water users
  - Used for all water resources analyses



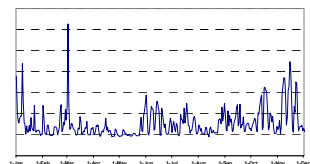
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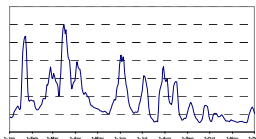


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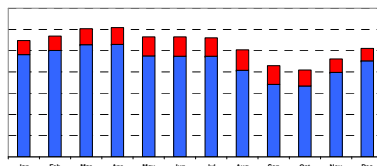


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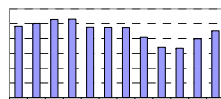
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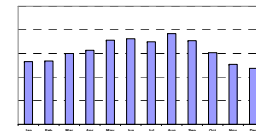
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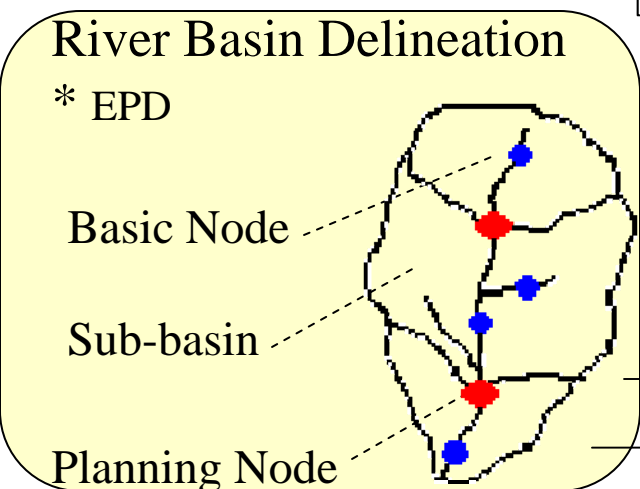
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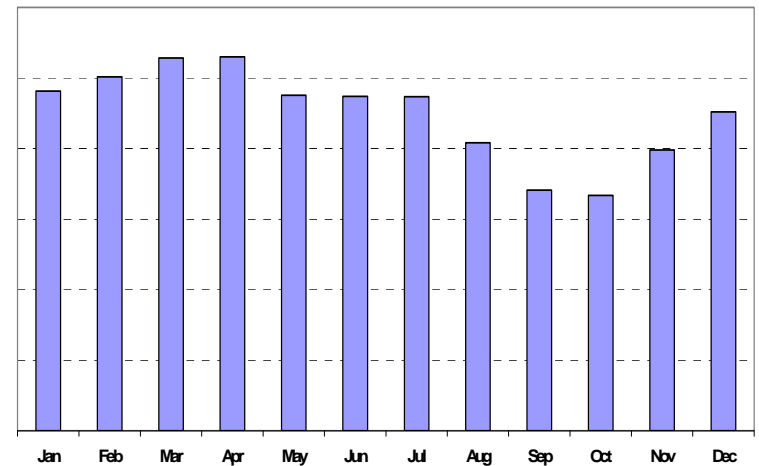
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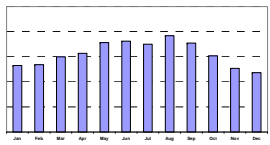
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- Desired “Flow Regime”
  - A description of the pattern of flow variability for an individual surface water source
  - Flow Regime involves the magnitude, timing, duration, frequency and rate of water movement



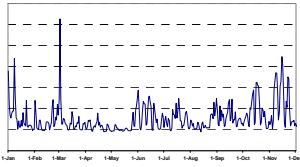
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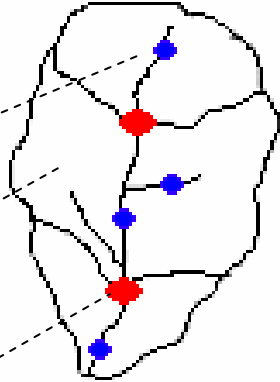
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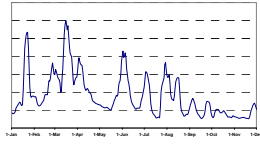
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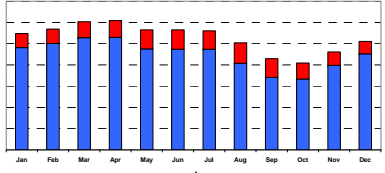


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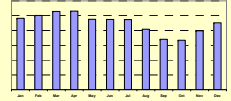
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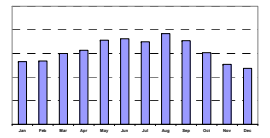
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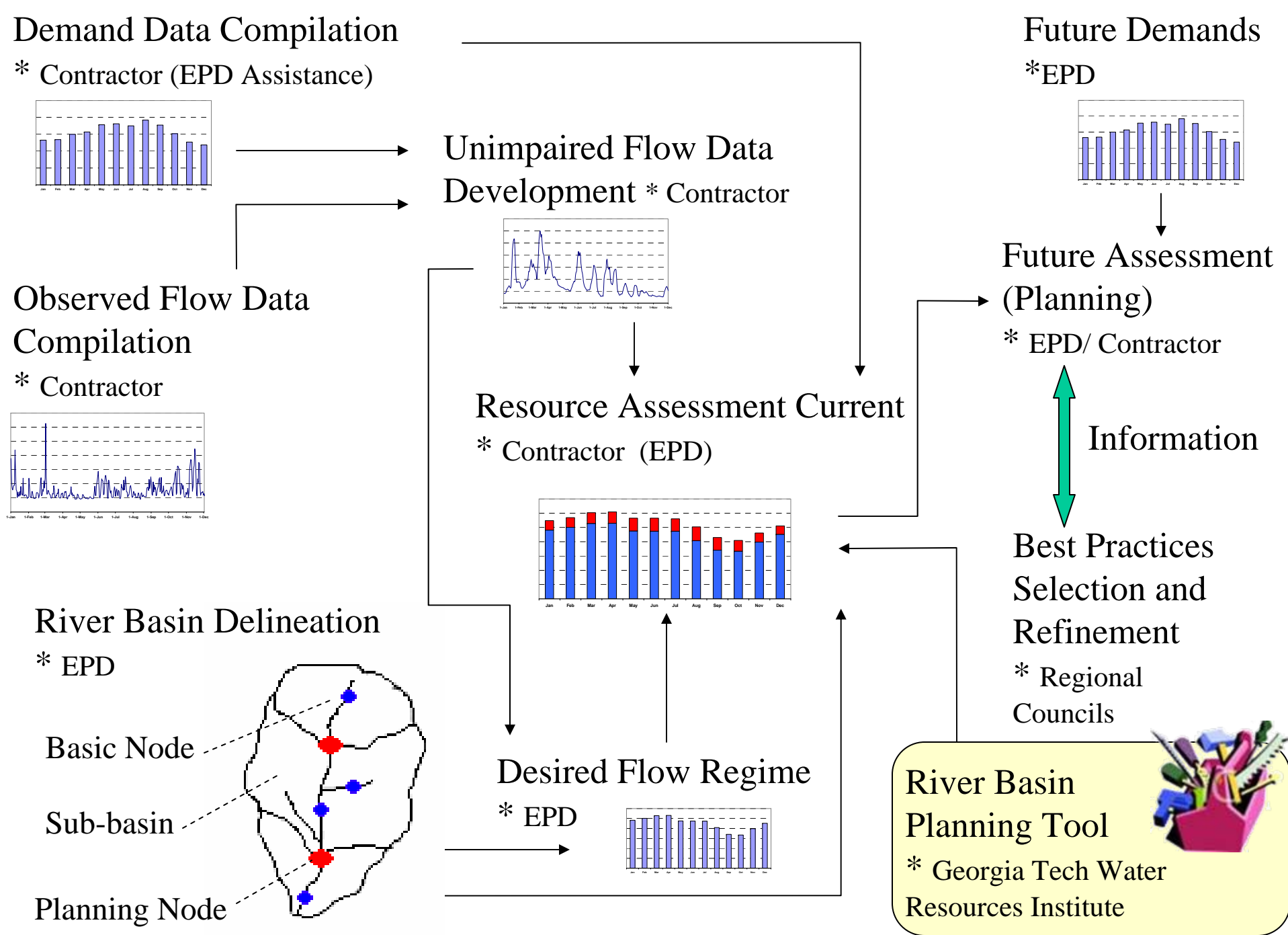
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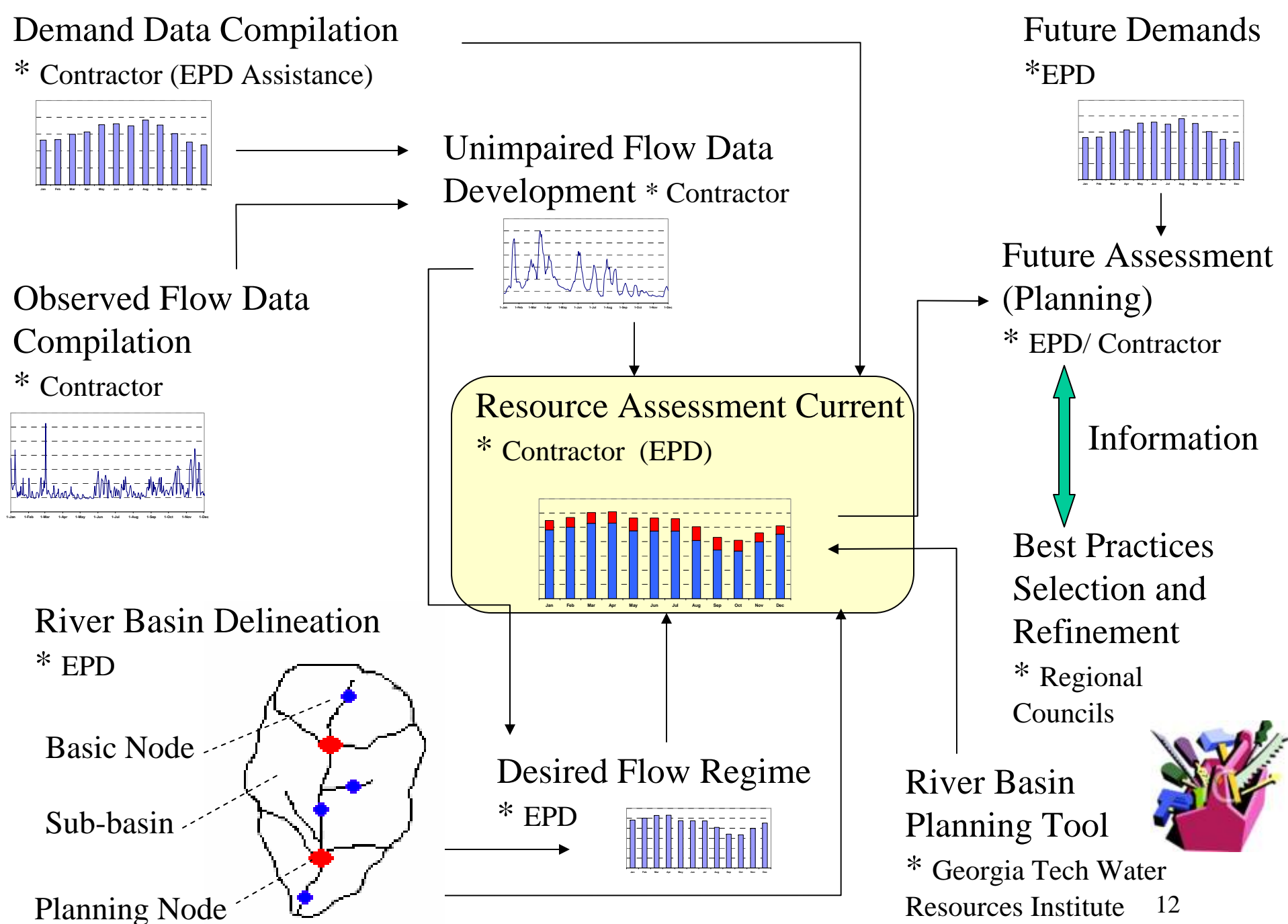
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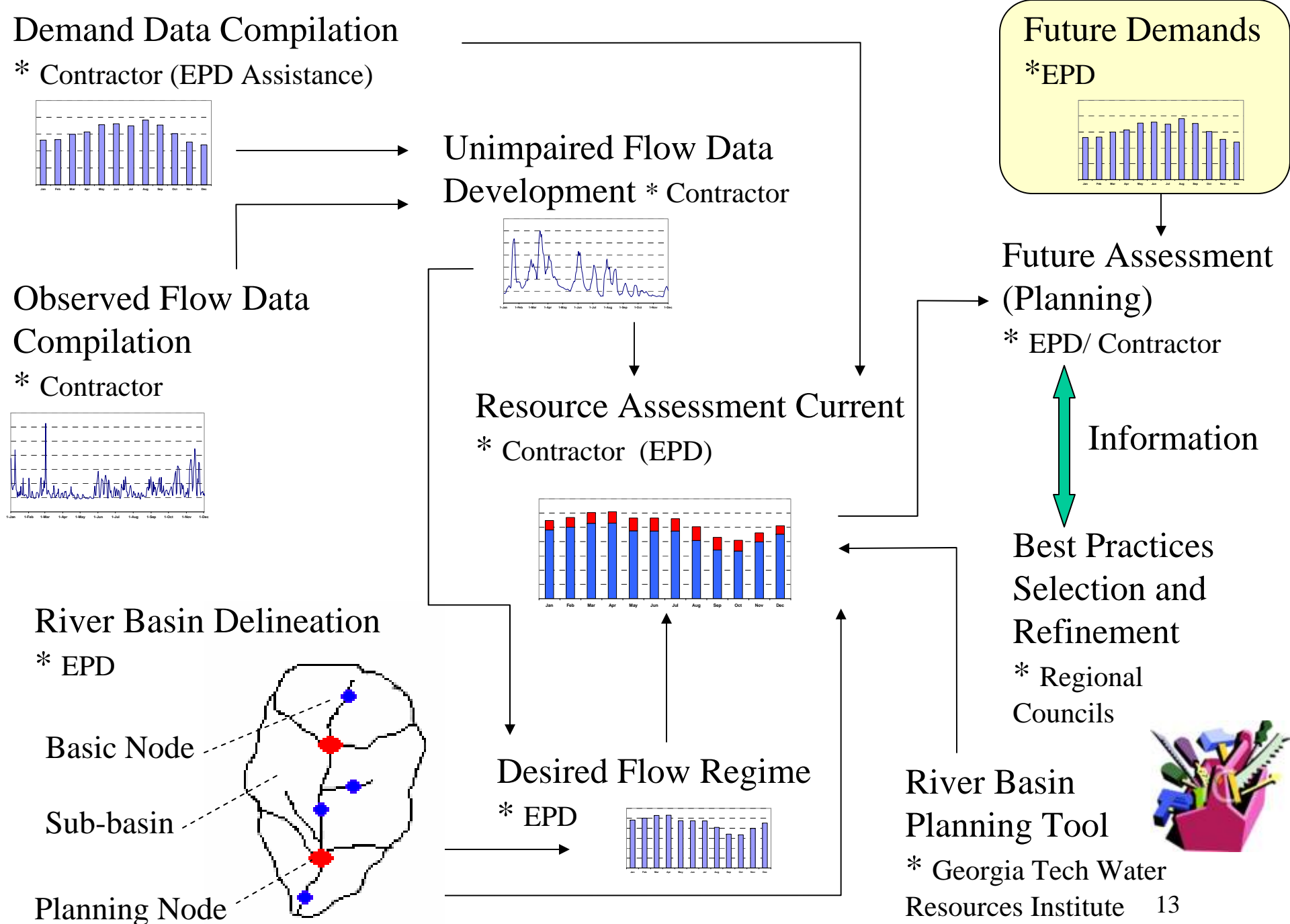
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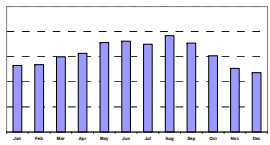






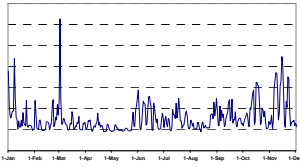
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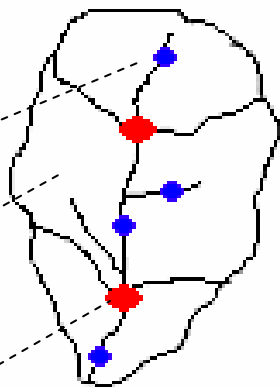
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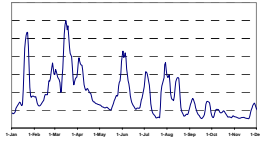
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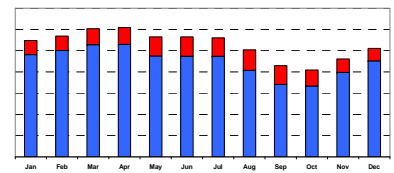


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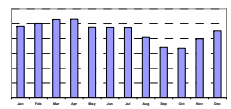
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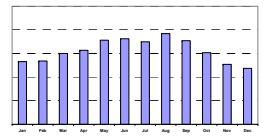
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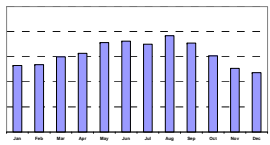
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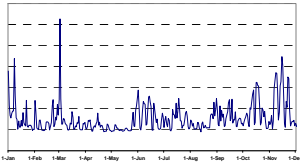
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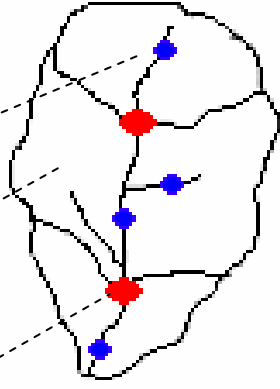
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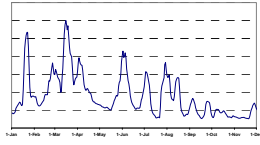
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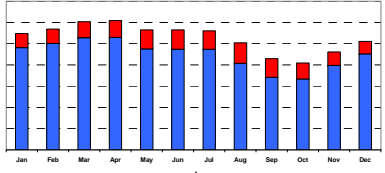


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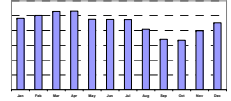
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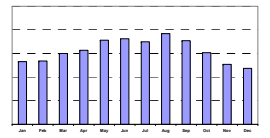
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# Irrigated Acreage Comparison between 2004 and 2009 Studies

- 2004 Study refers to mapping efforts by EPD and University of Georgia around 2004. This study served as the basis for the Flint River Basin Regional Water Development and Conservation Plan.
- 2009 Study refers to mapping work done by University of Georgia in the State Water Plan's Agricultural Forecasting task.



# ACF Irrigated Acreage Comparison between 2004 and 2009 Studies

Source of Water	2004 Study (acres)	2009 Study (acres)
Surface Water	200,337	145,405
Groundwater	539,384	477,404
Well-to-Pond	9,763	21,928
Unknown Source		39,311
Total	749,483	684,048

# Notes:

- In the 2004 Study, mapping of irrigated acreage took place only for parts of the Chattahoochee Basin and the Upper Flint HUC-8 unit. So, permitted acreage was used in conjunction with mapped acreage for these hydrologic units.

# Notes:

- Irrigated acreage associated with groundwater use (539,384 acres in the 2004 Study and 477,404 acres in the 2009 Study) reflects water use from ALL aquifers in the ACF Basin.
- Only groundwater pumping from the Floridan Aquifer has known and significant impacts on stream flows in the Flint River and its tributaries.

# Sub-area 4 Groundwater Irrigation Acreage Comparison

Geographic Scope (Floridan Aquifer)	2004 Study (acres)	2009 Study (acres)
Sub-area 4 overlapping ACF Basin	382,901	363,200
Sub-area 4 outside ACF Basin	18,313	11,297
Total	401,214	374,497

# Notes:

- These numbers do not include source water categorized as “well-to-pond.”
- In the 2004 Study, there was 9,763 acres in this category, and 1/3 of the water use is attributed to groundwater use.
- In the 2009 Study, there was 21,928 acres in this category, and 70% of the water use is attributed to groundwater use.

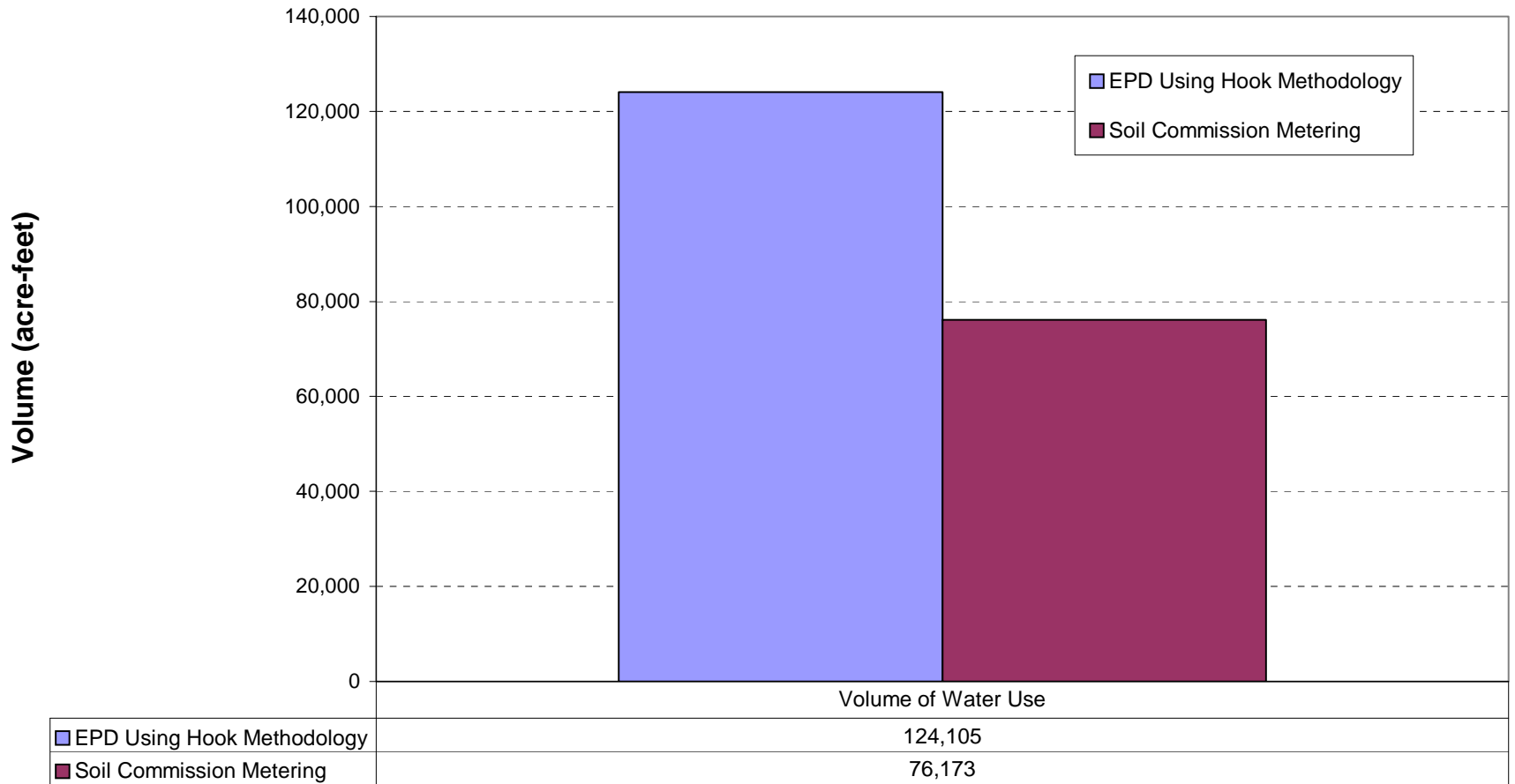
# Volume Comparison between EPD Estimate and Soil Commission Metering

- EPD estimate is based on Jim Hook methodology, which uses both irrigated acreage and regional average application pattern to quantify the volume of water used in irrigation practice.
- This comparison applies to 2007 Soil Commission metering data

# Agricultural Surface Water Use in ACF Basin

Methodology	Irrigation Volume (acre-feet)	Irrigated Acreage (acre)	Corresponding Application Rate (inches)
EPD Estimate Based on Hook Methodology	<b>124,105</b>	<b>166,781</b>	<b>8.9</b>
Soil Conservation Commission Metering Data (2007)	76,173	105,876 (linked to systems with metering data)	5.5 ~ 8.6 (depending on total acreage or linked acreage)

## Comparison between Estimated Amount of Agricultural Surface Water Use and Metering Data

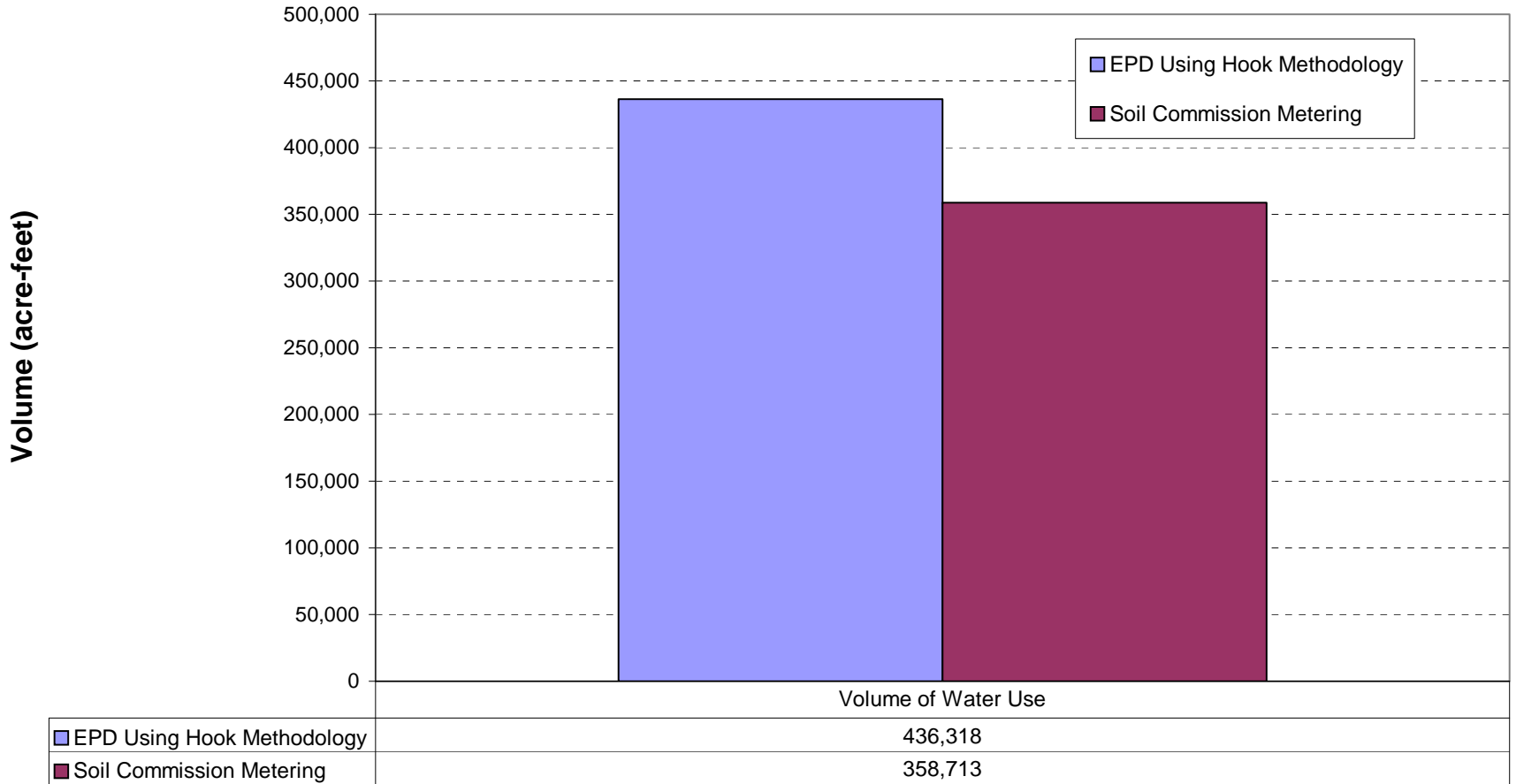




# Agricultural Groundwater Use from Floridan Aquifer in Sub-area 4

Methodology	Irrigation Volume (acre-feet)	Irrigated Acreage (acre)	Corresponding Application Rate (inches)
EPD Estimate Based on Hook Methodology	<b>436,318</b>	<b>378,875</b>	<b>13.8</b>
Soil Conservation Commission Metering Data (2007)	358,713	273,776 (linked to systems with metering data)	11.4 ~ 15.7 (depending on total acreage or linked acreage)

## Comparison between Estimated Amount of Agricultural Groundwater Use and Metering Data



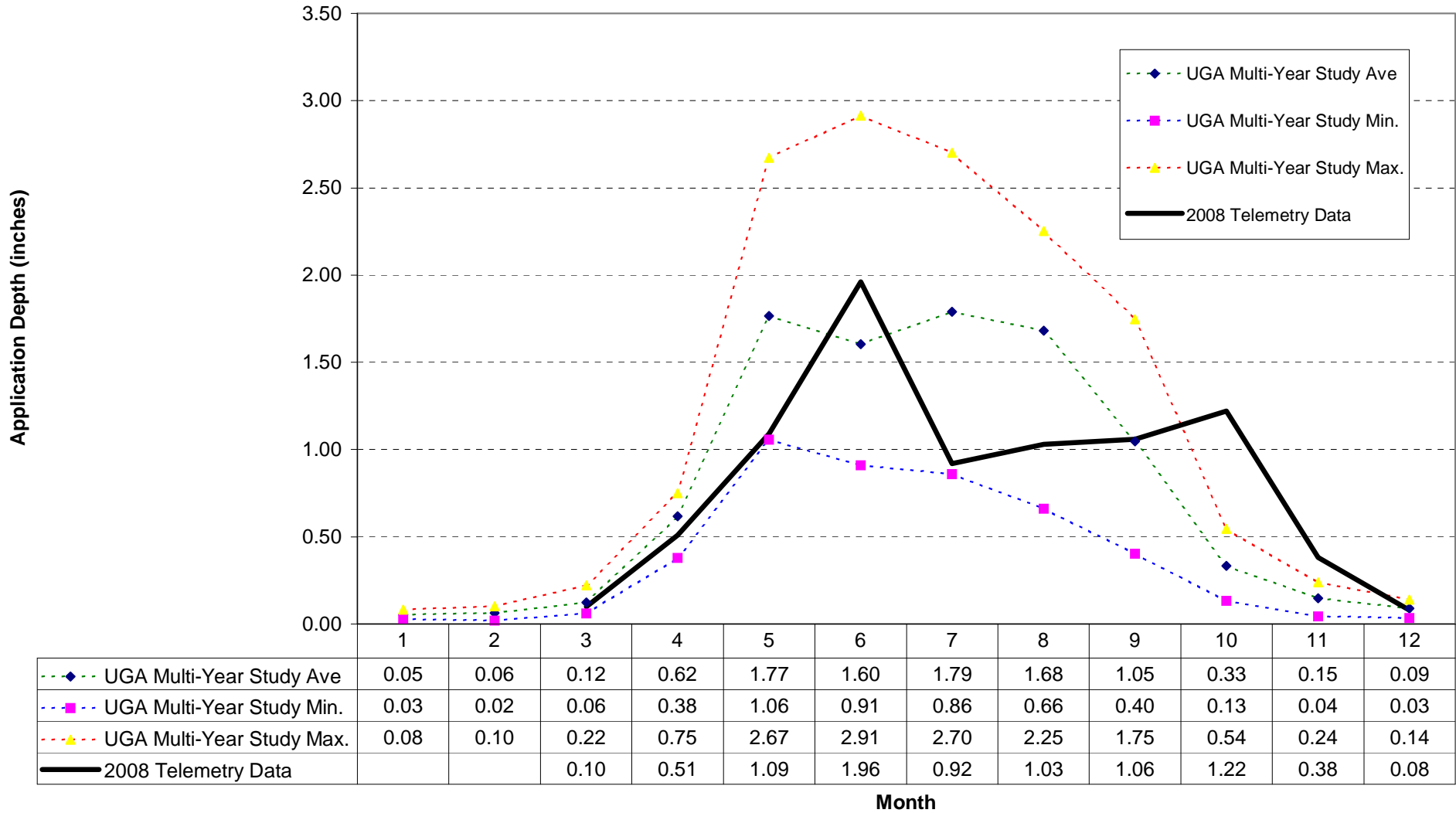
# Notes:

- By EPD estimate, the total amount of groundwater used in irrigation in a drought year is 436,318 acre-feet.
- This water use causes less discharge into the Flint River and its tributaries. The decrease amounts to 174,916 acre-feet on annual basis.

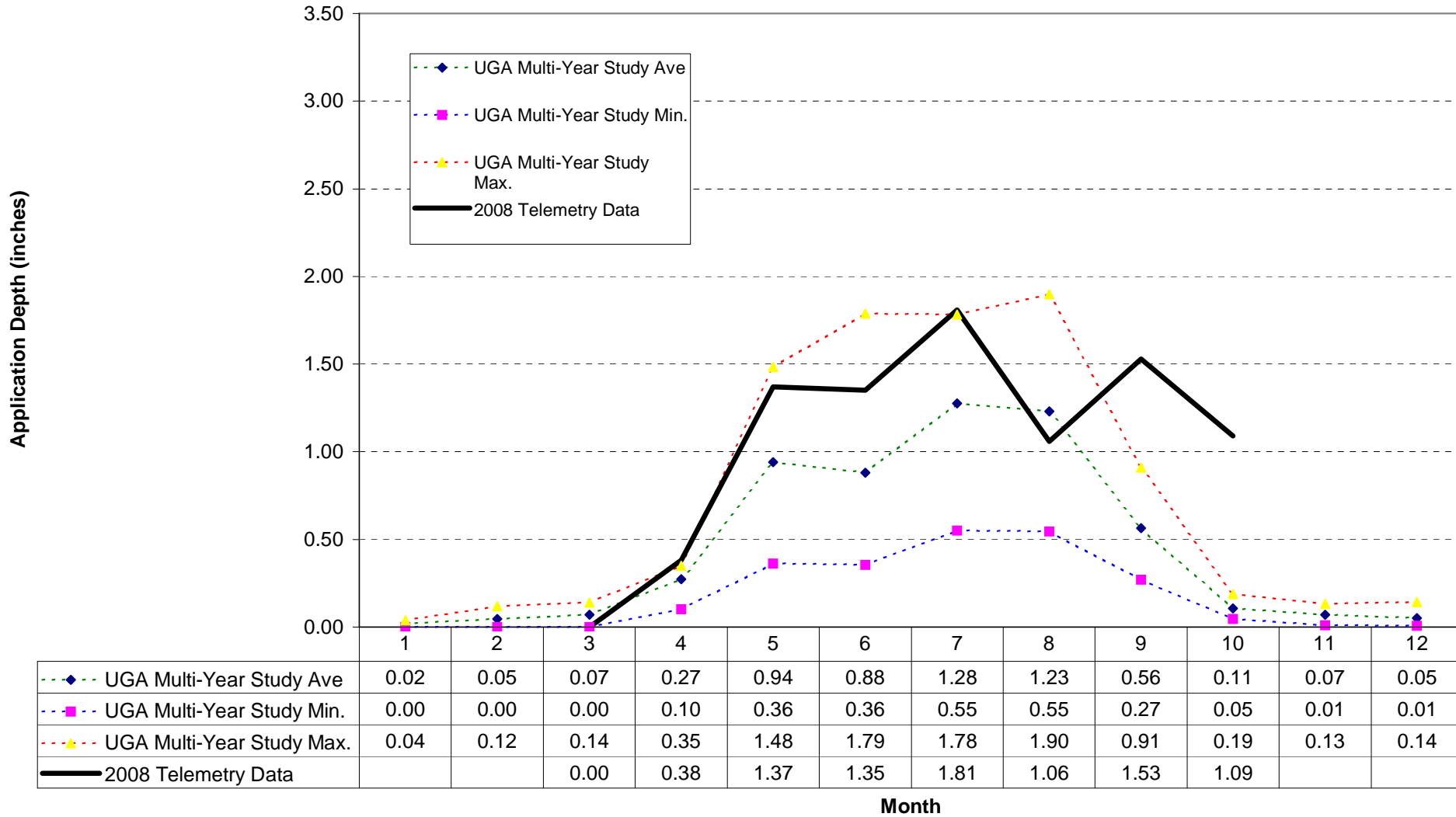
# Verification of Hook's Application Depth with Telemetry Data

- Telemetry data (monthly) collected in the Spring Creek HUC-8 Unit generally fall into the range provided by the Ag Pumping Report
- This applies to both surface water and groundwater sources

### Groundwater Application Depth Southwest GA



### Surface Water Application Depth Southwest GA



# Agricultural Total Water Use in ACF Basin 2009 Study

Source Water	Irrigated Acreage (acre)	Irrigation Volume (acre-feet)
Surface Water	166,781	124,105
Groundwater	517,267	620,720
Total	684,048	744,825