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Groundwater Trading in Virginia

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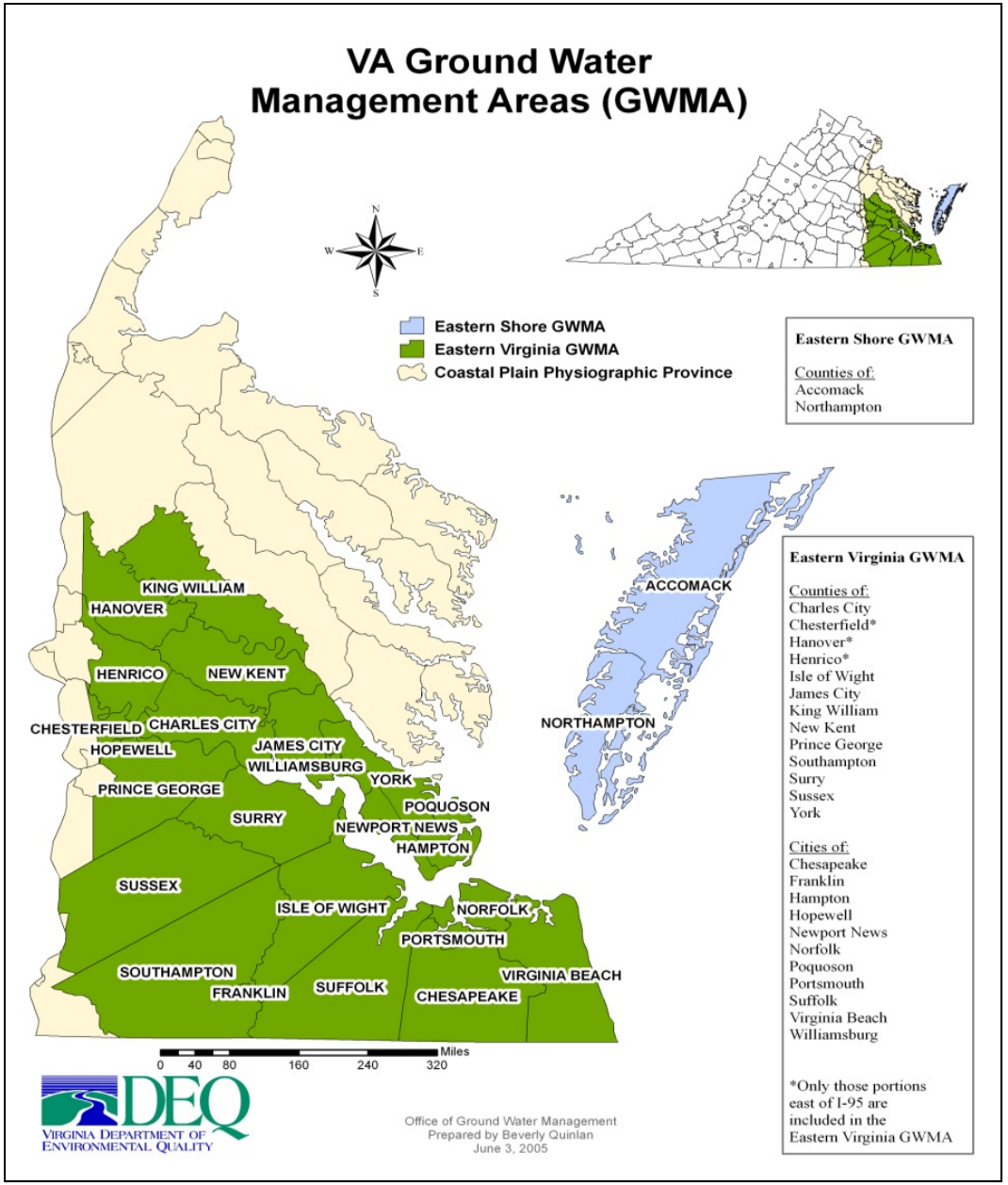
Background

Original Groundwater Management Areas (est. 1992)



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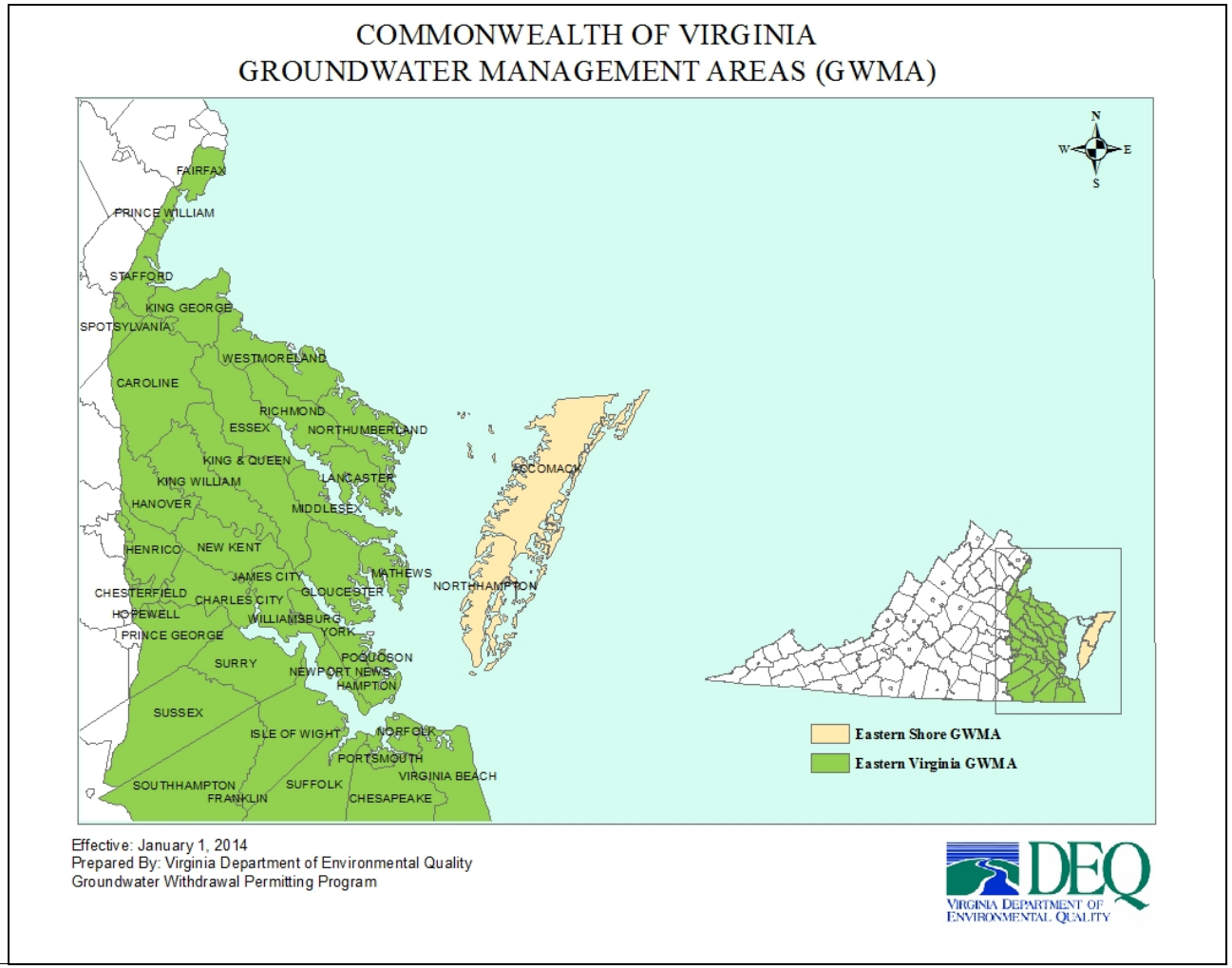
Eastern Virginia Groundwater Management Areas

Coastal plain aquifers: largely confined aquifers with limited recharge.

Groundwater permitting system (> 300,000 gallon / month). VDEQ issues 10 yr permits

Over 110 mgd permitted withdrawals with an average withdrawal of ~78 mgd (2003-2012) in original GWMA. Unpermitted withdrawals ~30 mgd.

EVGWMA Expanded in 2014



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Groundwater Management Challenges

Groundwater levels declining throughout GWMA

Consequences:

- Reduction of future availability of water supply
- Loss of GW storage capacity
- Land subsidence
- Declining GW quality (ex. saltwater intrusion)

State desire to reduce overall amount of GW withdrawals

Eastern Virginia Groundwater Management Advisory Committee (SB1341, 2015)

EVGWAC shall examine

- options for developing long-term alternative water sources
- funding options
- *"alternative management structures, such as a water resource trading program"*
- potential future ground water permitting criteria

Recommendations *to VDEQ by August 2017*

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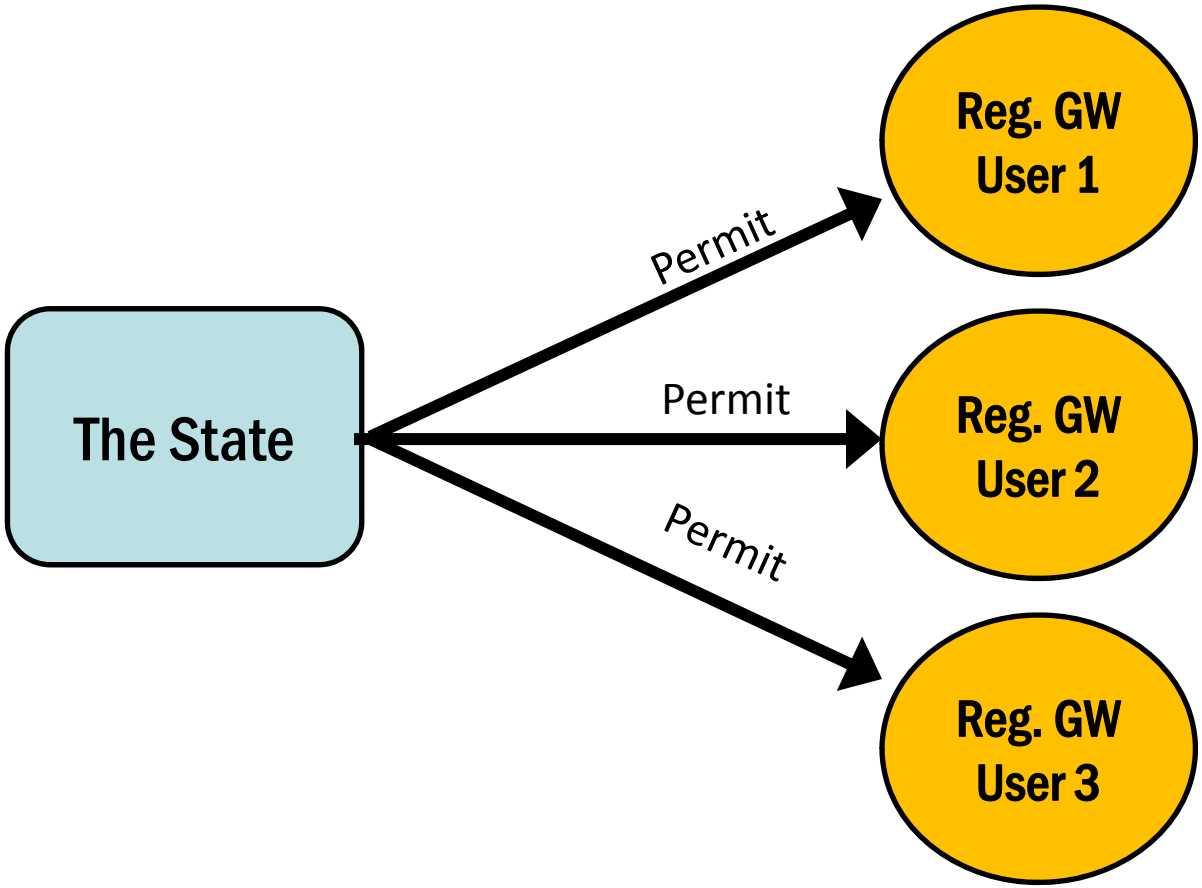
Administered Permit System



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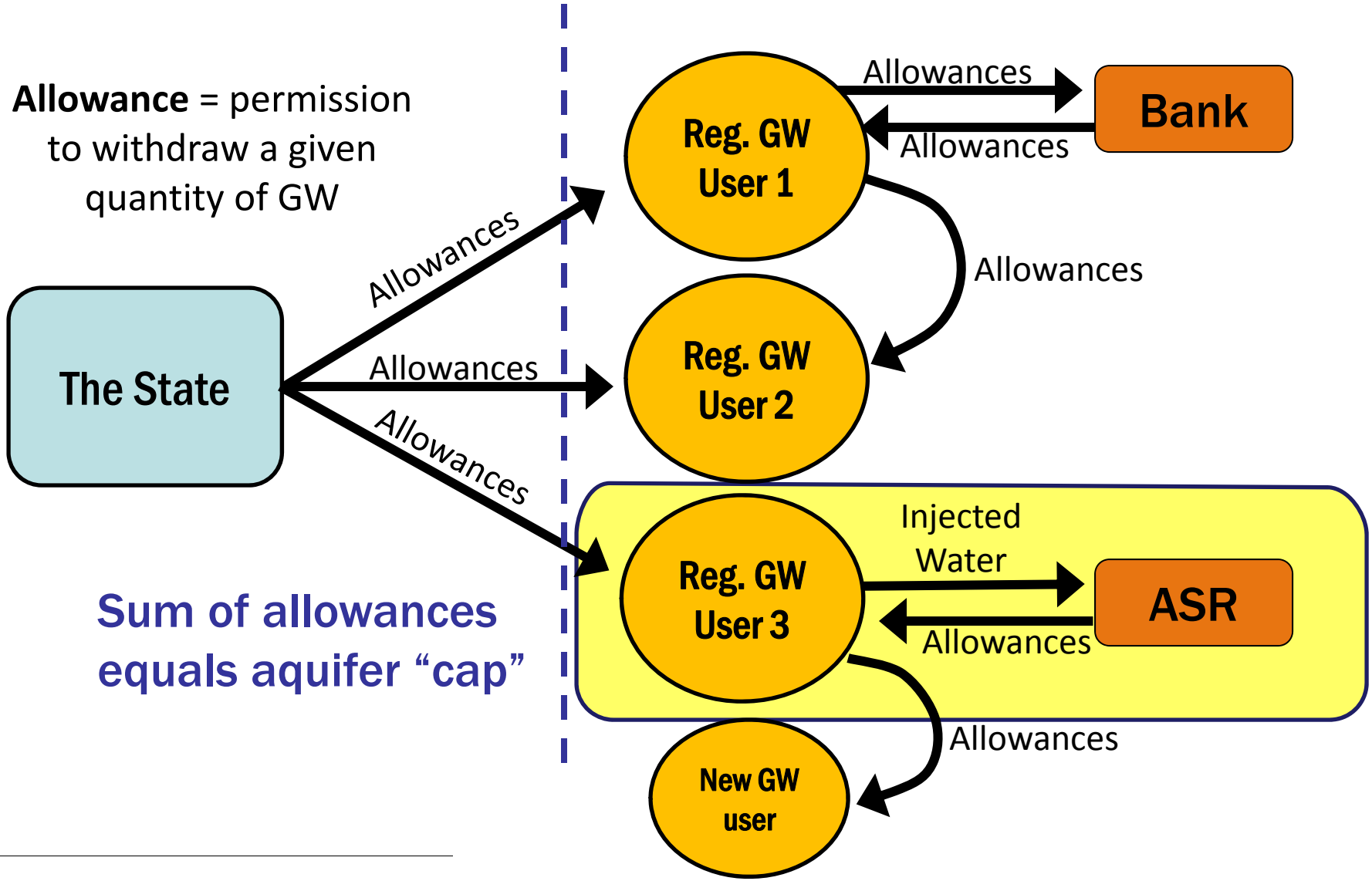
Groundwater Trading



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Aquifer Storage and Recovery (ASR)

Interest in creating incentives for “banking” surplus water in aquifer for later use and/or recharging GW levels.

Storage is a key limiting factor

In EGMA water must be injected (permitting issues)

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Interest in Aquifer Storage and Recovery/Replenishment in Virginia

City of Chesapeake ASR project (nearly 3 billion gallons injected since 2006 from its Northwest River System). First (and only) injection operation in VA.

Other potential interested parties

HRSD “Aquifer Replenishment System” Proposal

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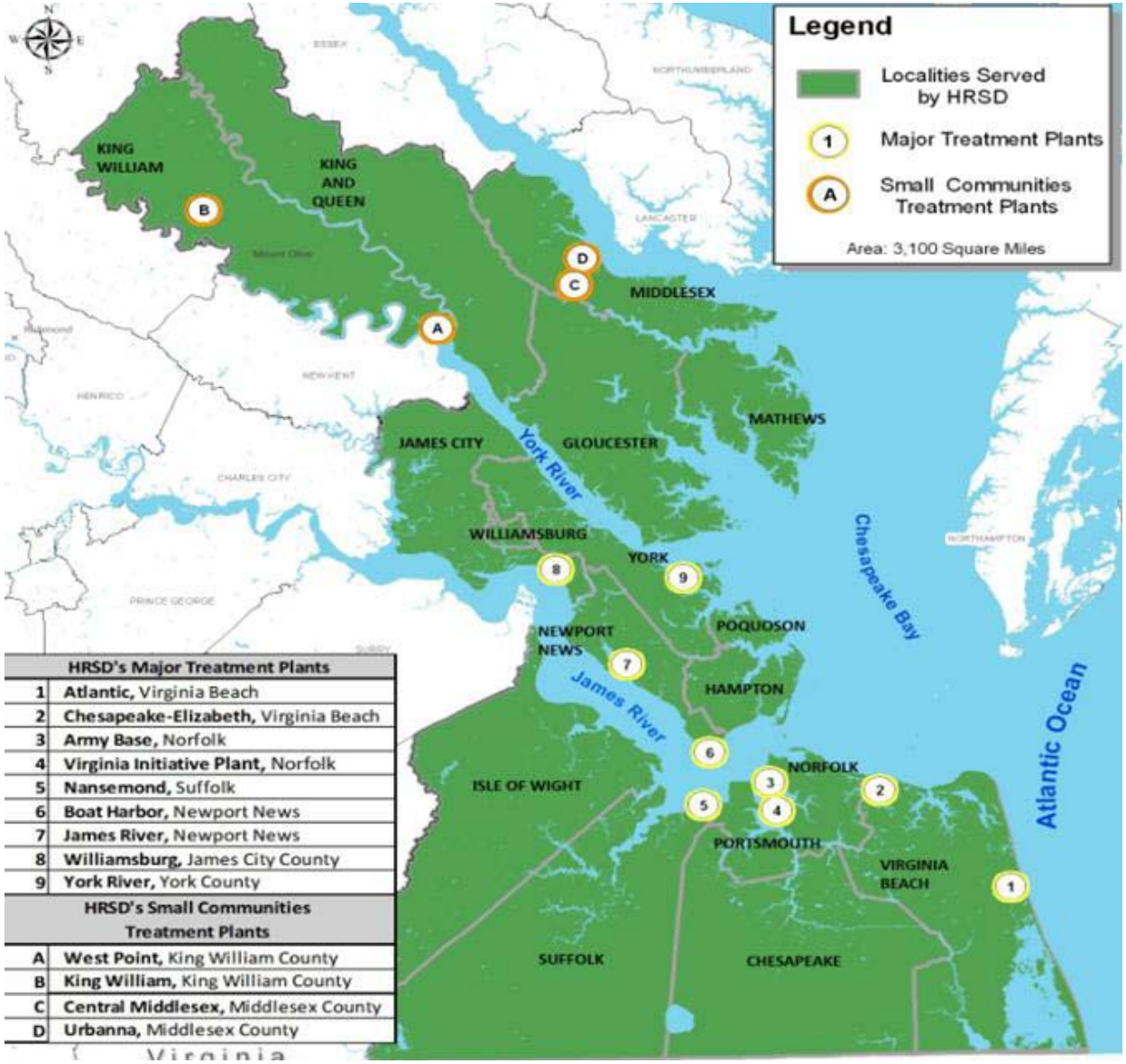
Hampton Roads Sanitation District



HRSD's Major Treatment Plants	
1	**Atlantic,** Virginia Beach
2	**Chesapeake-Elizabeth,** Virginia Beach
3	**Army Base,** Norfolk
4	**Virginia Initiative Plant,** Norfolk
5	**Nansemond,** Suffolk
6	**Boat Harbor,** Newport News
7	**James River,** Newport News
8	**Williamsburg,** James City County
9	**York River,** York County
HRSD's Small Communities Treatment Plants	
A	**West Point,** King William County
B	**King William,** King William County
C	**Central Middlesex,** Middlesex County
D	**Urbanna,** Middlesex County

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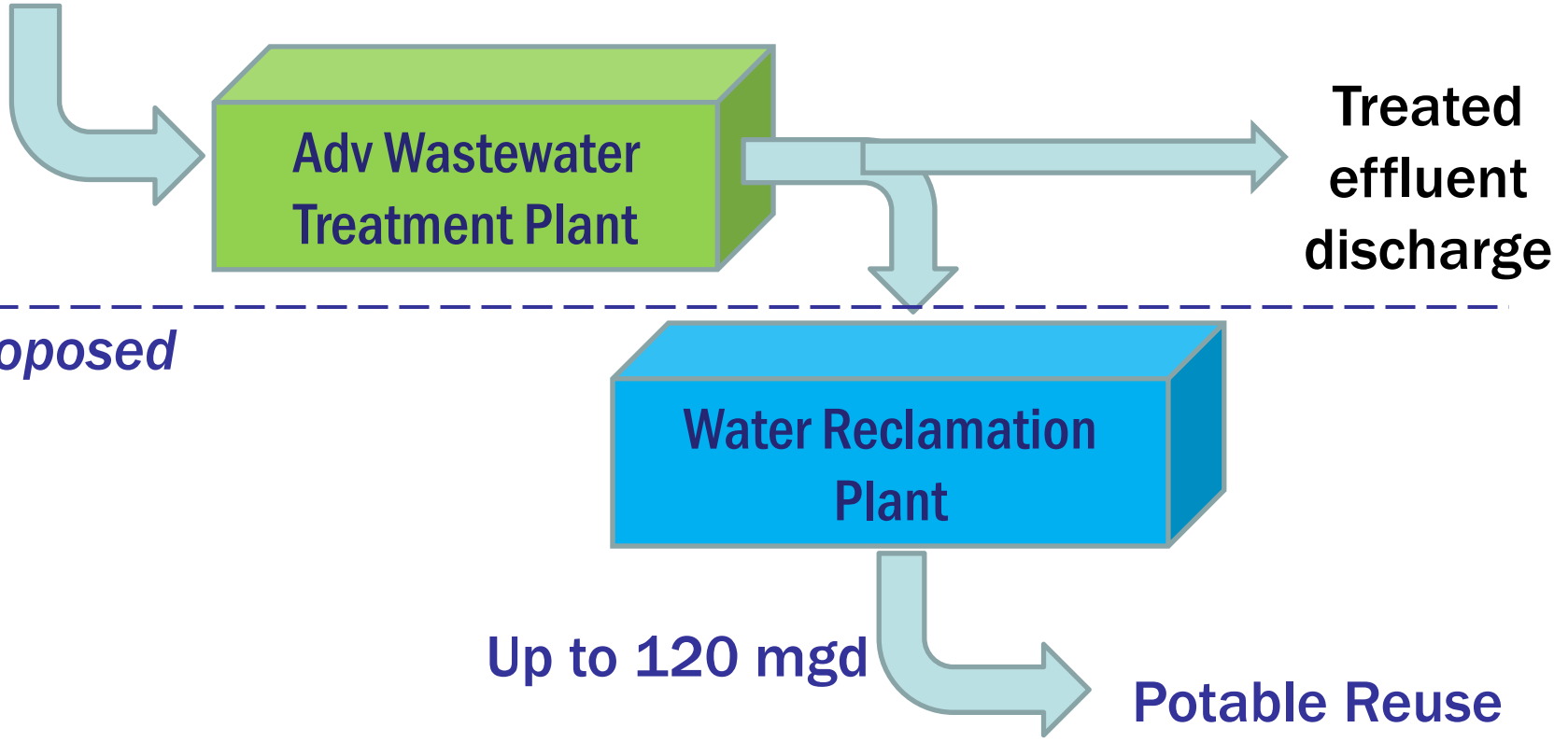
Aquifer Replenishment System



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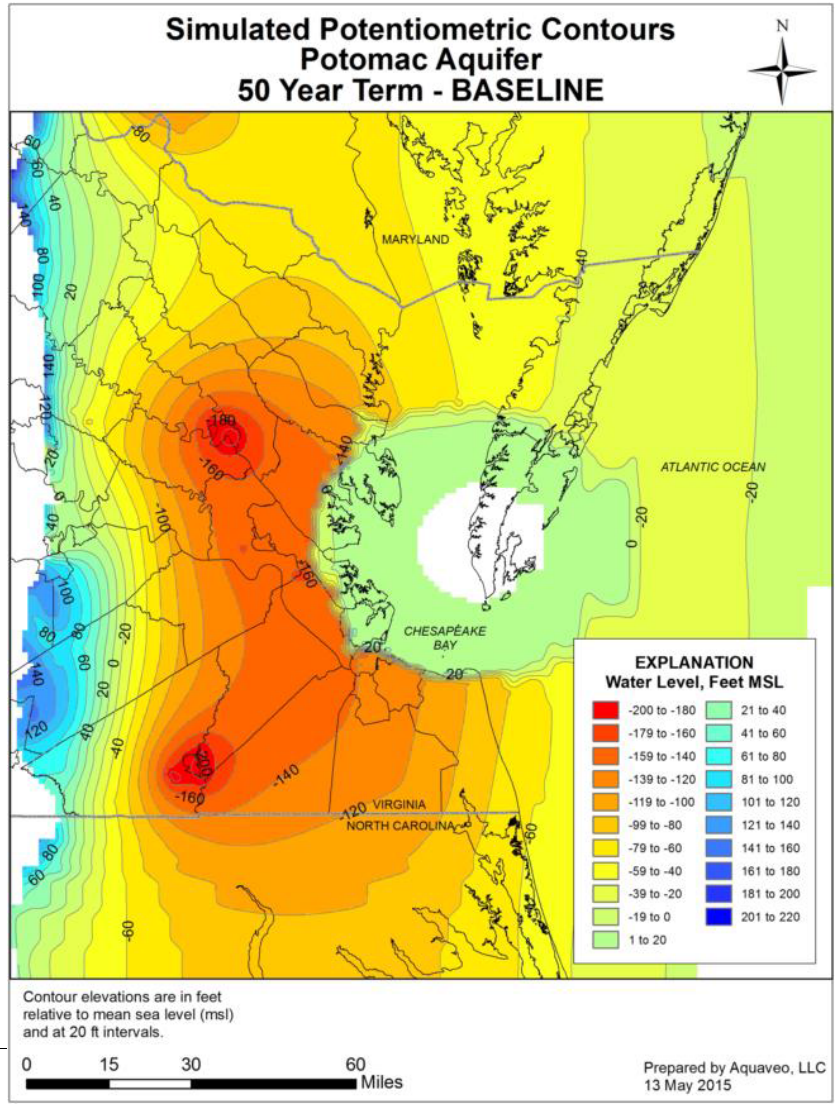
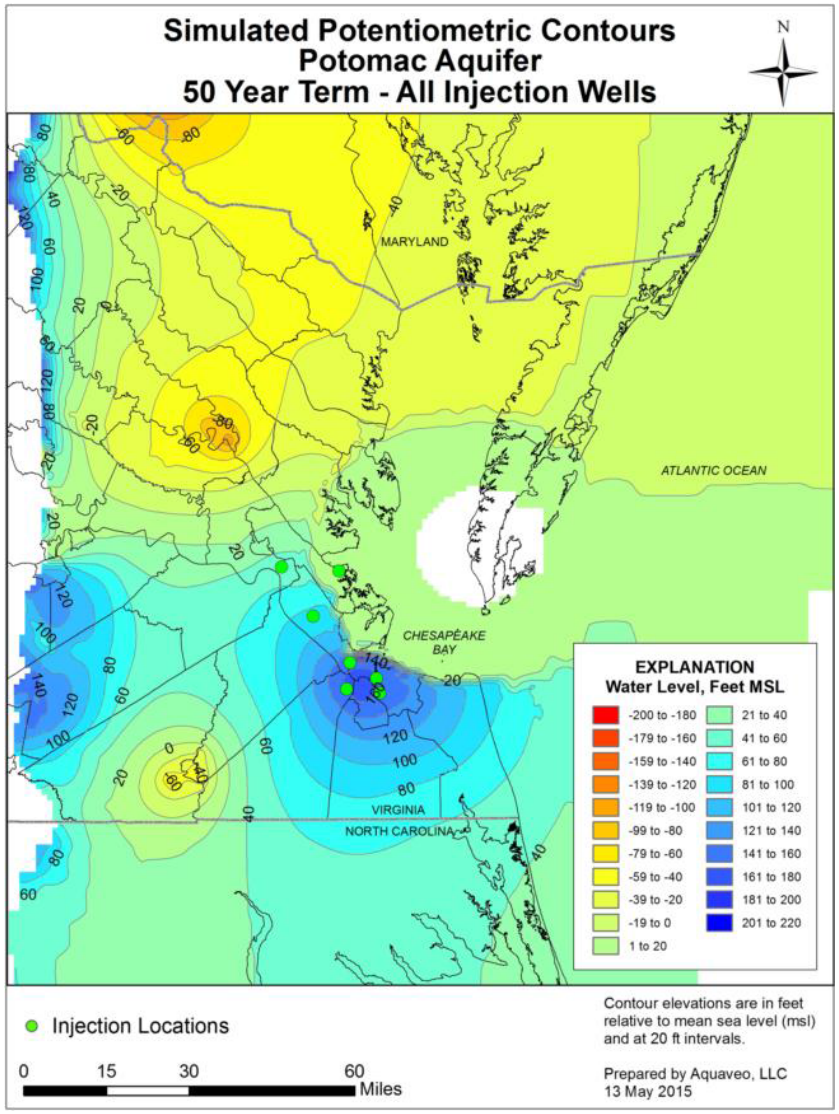
Potential Impact of Injection





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Aquifer Storage and Recovery

Explore opportunities to clarify “claims” (access and use) of injected water:

- % of injected water that may be recovered (after accounting for aquifer storage losses, uncertainty, recharge req, etc)
- Duration
- Spatial conditions (injection relative to recovery)
- Transfers between parties

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Illustration:

Water Banking in Arizona

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Arizona Water Banking

- Arizona Department of Water Resources (ADWR) issues water storage & recharge permits
- Storage occurs in designated GW "Active Management Areas (AMA)
- Arizona Water Banking Authority (AWBA)

  Arizona receives Colorado River water through the Central Arizona Project (CAP). AWBA created to store and deliver surplus CAP water for a number of purposes (costs paid for by pumping fees)

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Arizona Water Banking

Direct Recharge (Underground storage facility or USF) via infiltration basins or direct injection

Indirect Recharge (Groundwater Savings Facility or GSF). GW irrigators use surface water instead of GW

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Arizona Water Banking

ADWR certifies long-term storage credits.

Credit is given for water that reaches the aquifer (3-5% delivery loss) minus a 5% “cut to the aquifer”

Credits can be used to recover water anytime (subject to permit conditions) and can be traded.

Water recovery must occur in same AMA where recharge occurred

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Information on Advisory Committee Progress

Virginia DEQ, Eastern Virginia Groundwater Management Advisory Committee webpage

http://www.deq.virginia.gov/Programs/Water/WaterSupplyWaterQuantity/EasternVirginiaGroundwaterManagementAdvisoryCommittee.aspx