

# Ecosystem Service Benefits from Public and Private Conservation Lands

L. Scott<sup>1</sup>, J. Gillespie<sup>1</sup>, A. Villamagna<sup>2</sup>

<sup>1</sup>Environmental Science Program, <sup>2</sup>Dept of Fish & Wildlife Conservation, Virginia Tech

## INTRODUCTION

- Publicly Protected Areas (PPAs) and private conservation easements are used for in-situ land conservation and to protect vital **ecosystem services** (ES)<sup>1</sup>
- PPA growth has slowed since 1970<sup>2</sup> and private conservation easement ES capacity is unknown
- ES Capacity** is the biophysical capacity of the landscape to produce goods, regulate functions, and provide non-material benefits<sup>3</sup>

### Research Objective

- To quantify and compare ES capacity for PPAs and private conservation easements

## METHODS

- Study area:** State and Federal PPAs and private conservation easements in NC and VA
- Developed and used existing ES capacity models to quantify ES capacity using GIS (Table 1)
- Focal ES:** Surface water regulation, groundwater protection, water quality regulation, erosion control, recreational fishing, carbon storage, and biodiversity support

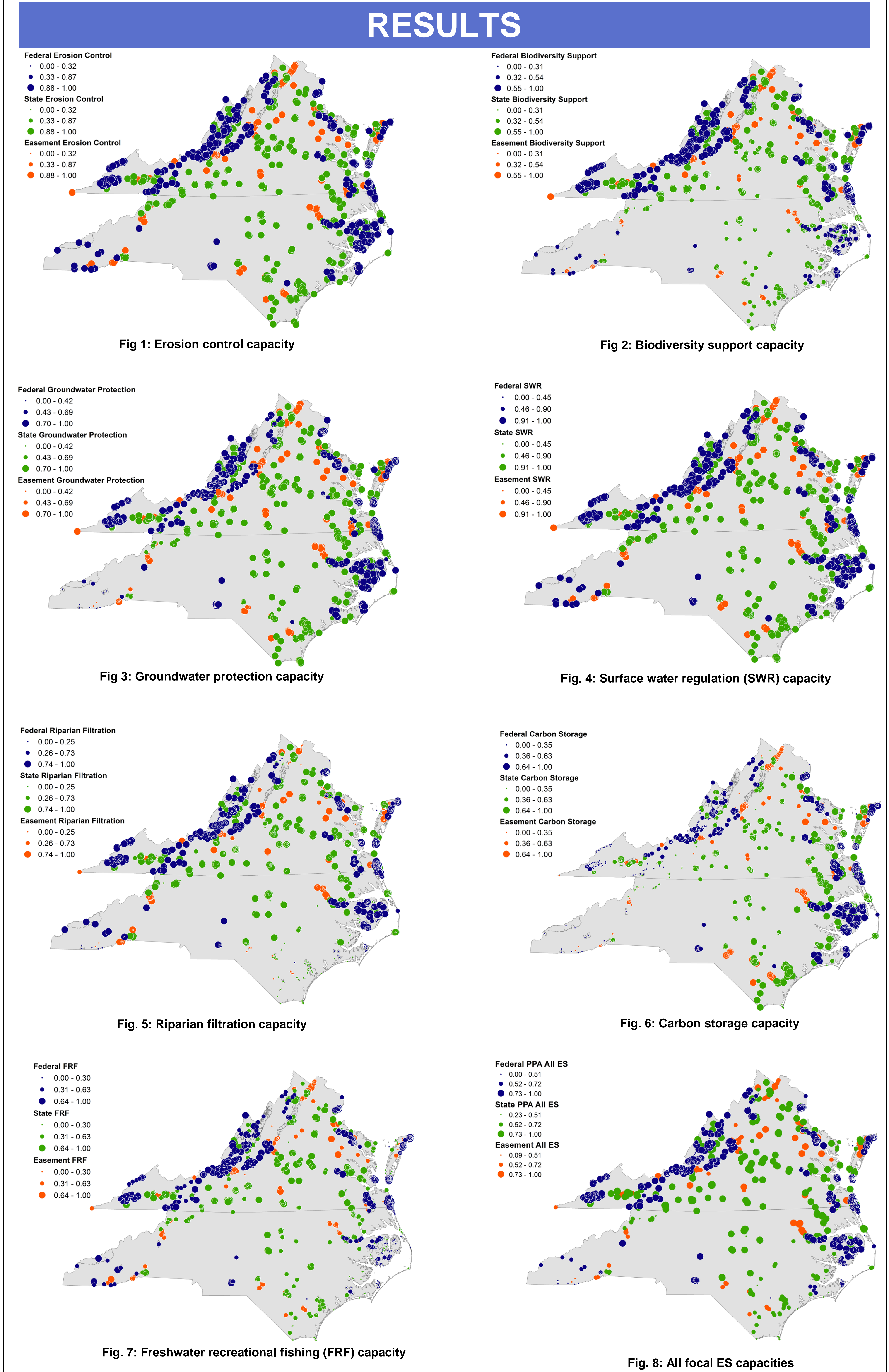
Ecosystem Service	Data Inputs
Surface water regulation	Daily precipitation, soil hydrologic group, land cover <sup>4</sup>
Groundwater protection	Monthly precipitation, soil hydrologic group <sup>5</sup>
Riparian Filtration	Surface water, land cover <sup>6</sup>
Freshwater recreational fishing	Surface water, land cover, fish species diversity, water quality impairments, fish stocking, boat ramps, public use areas, agency-supported fishing spots, watershed boundaries <sup>7</sup>
Biodiversity support	Species richness <sup>8</sup>
Carbon Storage	Soil carbon below and above ground carbon stocks <sup>9</sup>
Erosion Control	Slope, slope length, rainfall erosivity, cover factor, soil erodibility <sup>10</sup>

Table 1: Geospatial models used to quantify mean capacity of ES for private conservation easements, and federal and state PPAs

### Mapping conservation areas

- National Conservation Easement Database<sup>11</sup>** was used to map private conservation easements with *environmental systems, recreation and education, open forest, and open farm purposes with a gap status of 1, 2, or unknown*
- USGS National Inventory of Protected Areas (PAD-US)** was used to map State and Federal PPAs with a *gap status 1 or 2*
- All ES capacities were standardized on a scale of 0-1 for comparison

## RESULTS



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Biodiversity support was significantly greater in federal PPAs, especially throughout VA (Figs 3 & 9)

Surface water regulation was the only ES where federal and state PPA capacity was significantly greater than private conservation easements (Fig 5)

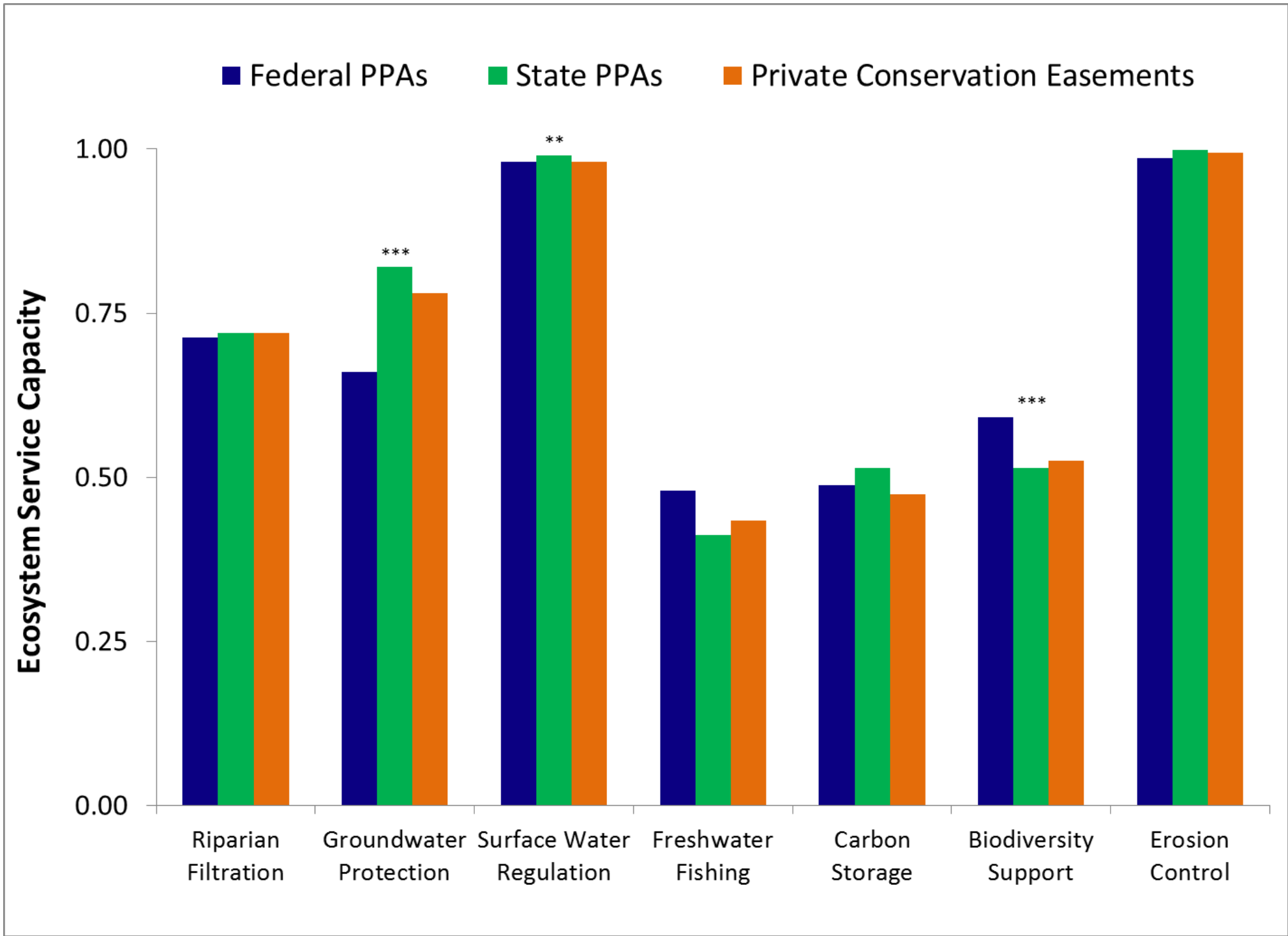


Fig 9: Summary of ES capacities for state & federal PPAs and easements (\*\*\*)  $p < 0.001$ , \*\*  $p < 0.01$

## DISCUSSION

**Ecosystem service capacity** for private conservation easements was **equal or greater** to federal and state PPAs for all services except surface water regulation

**Private** land conservation protects **ES** and may have positive **regional impacts** where PPAs are not present

Although smaller, private **easements can protect ES in more diffuse areas** throughout the region

**Existing ES capacity** can be used to identify conservation areas with potential to enhance ES protection

**Riparian filtration, erosion control, carbon storage, and surface water regulation capacity** are the most practical services to **incentivize ES protection** on private lands<sup>12</sup>

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