

Sampling for potential endocrine-disrupting compounds

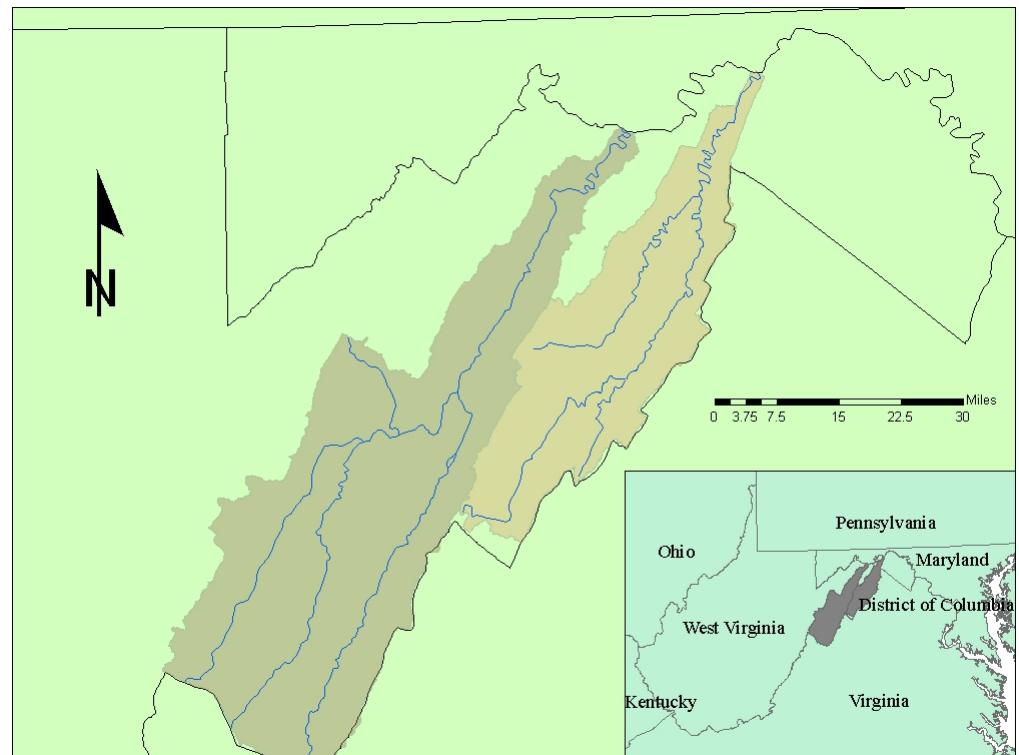
USGS West Virginia Water Science Center

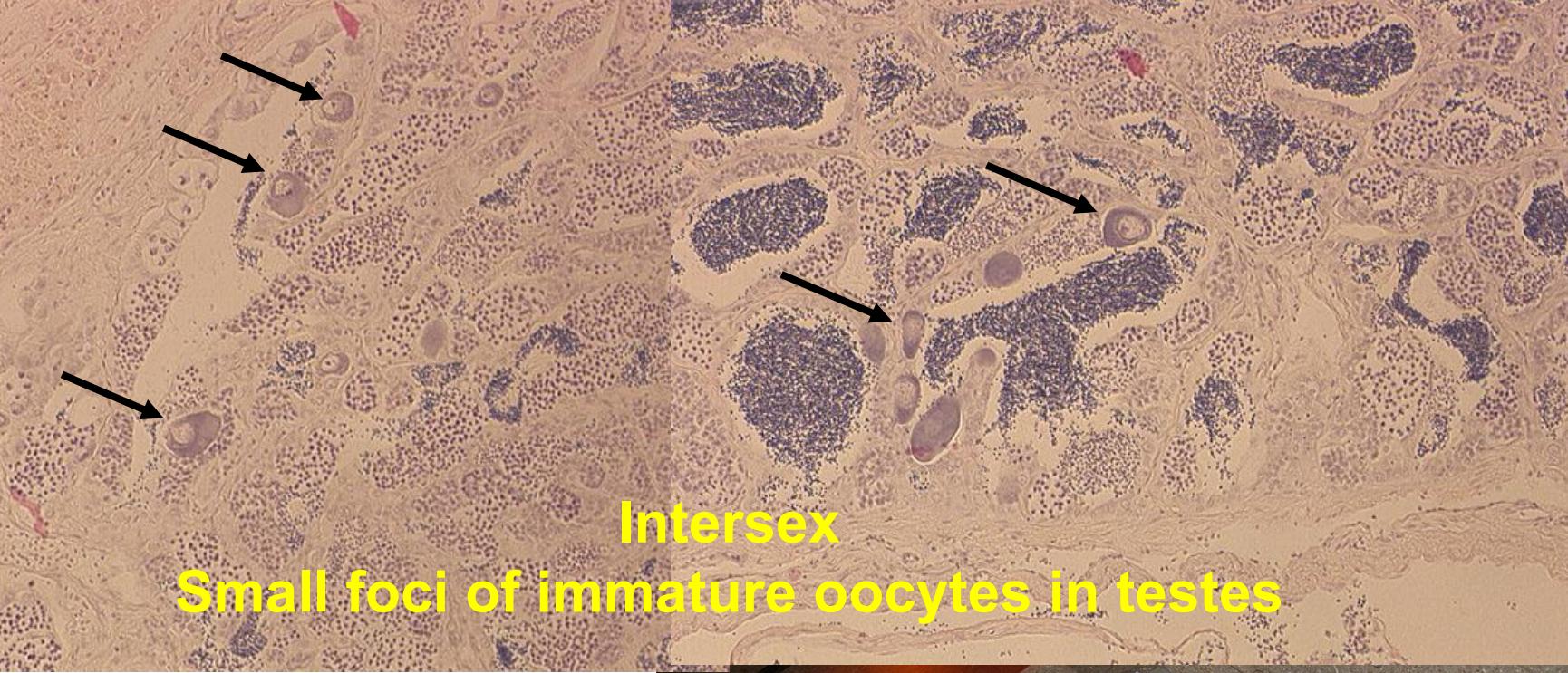
Collaborators

- West Virginia DEP, Division of Water and Waste Management
- West Virginia DNR
- USGS-BRD, Leetown Science Center, Fish Health Branch
- USGS-WRD, National Water Quality Laboratory, Methods Research and Development Section
- Tennessee Tech Univ., Water Resources Center

Background

- Fish kills
- Lesions
- Perceived decline in fishery





Intersex

Small foci of immature oocytes in testes

Internal and External
Lesions

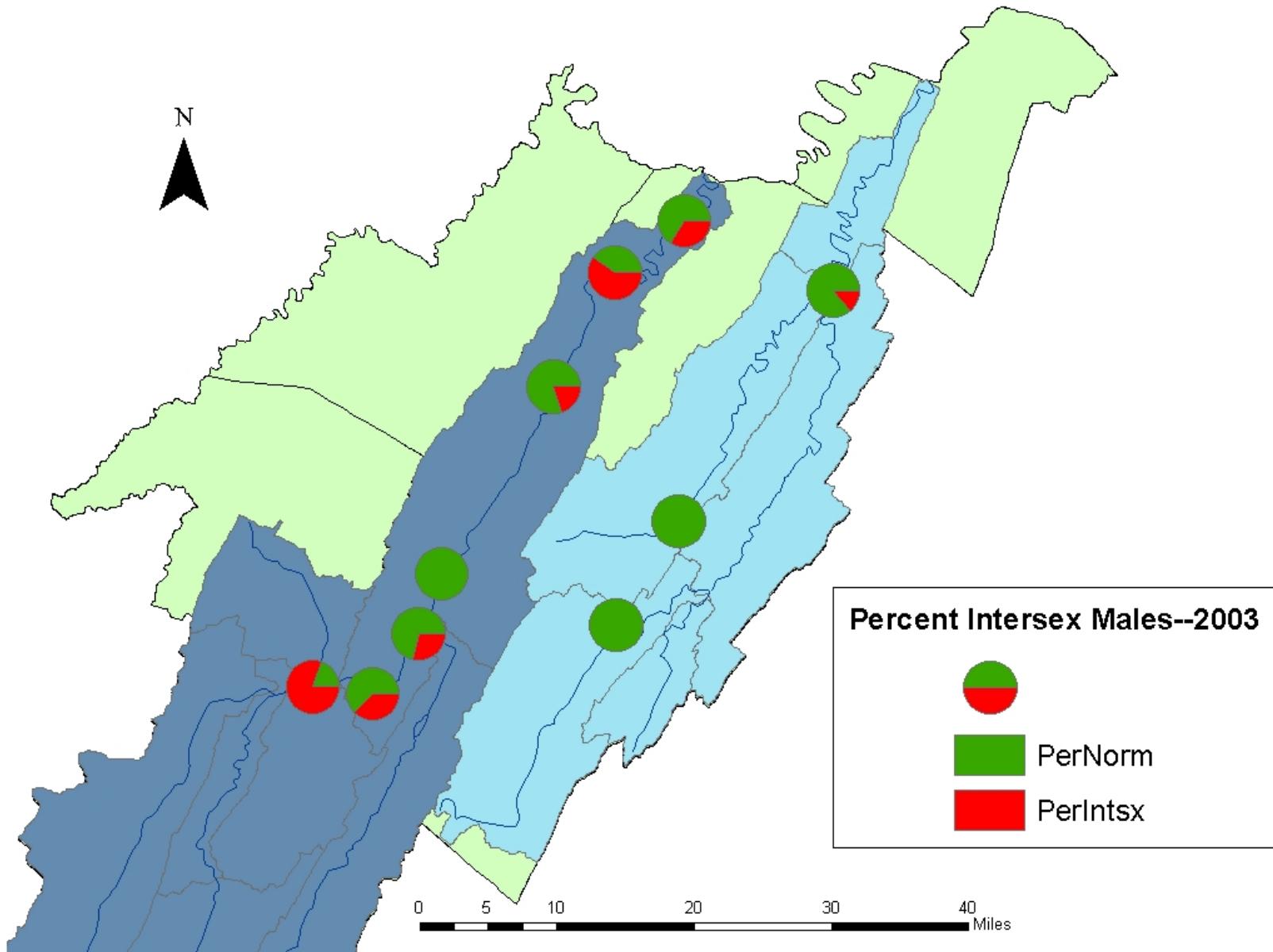
Internal and External
Parasites

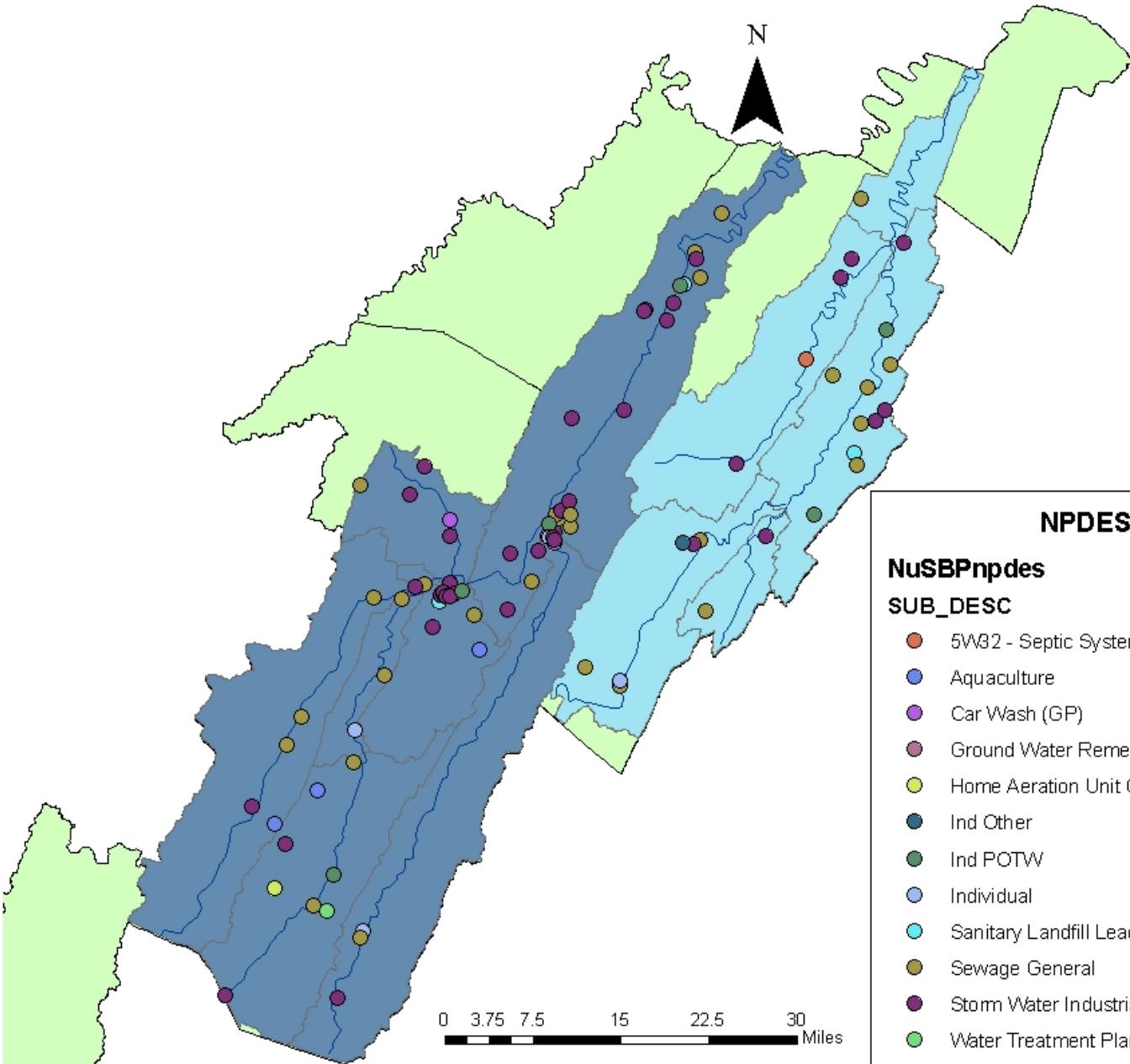
Abnormal gonads



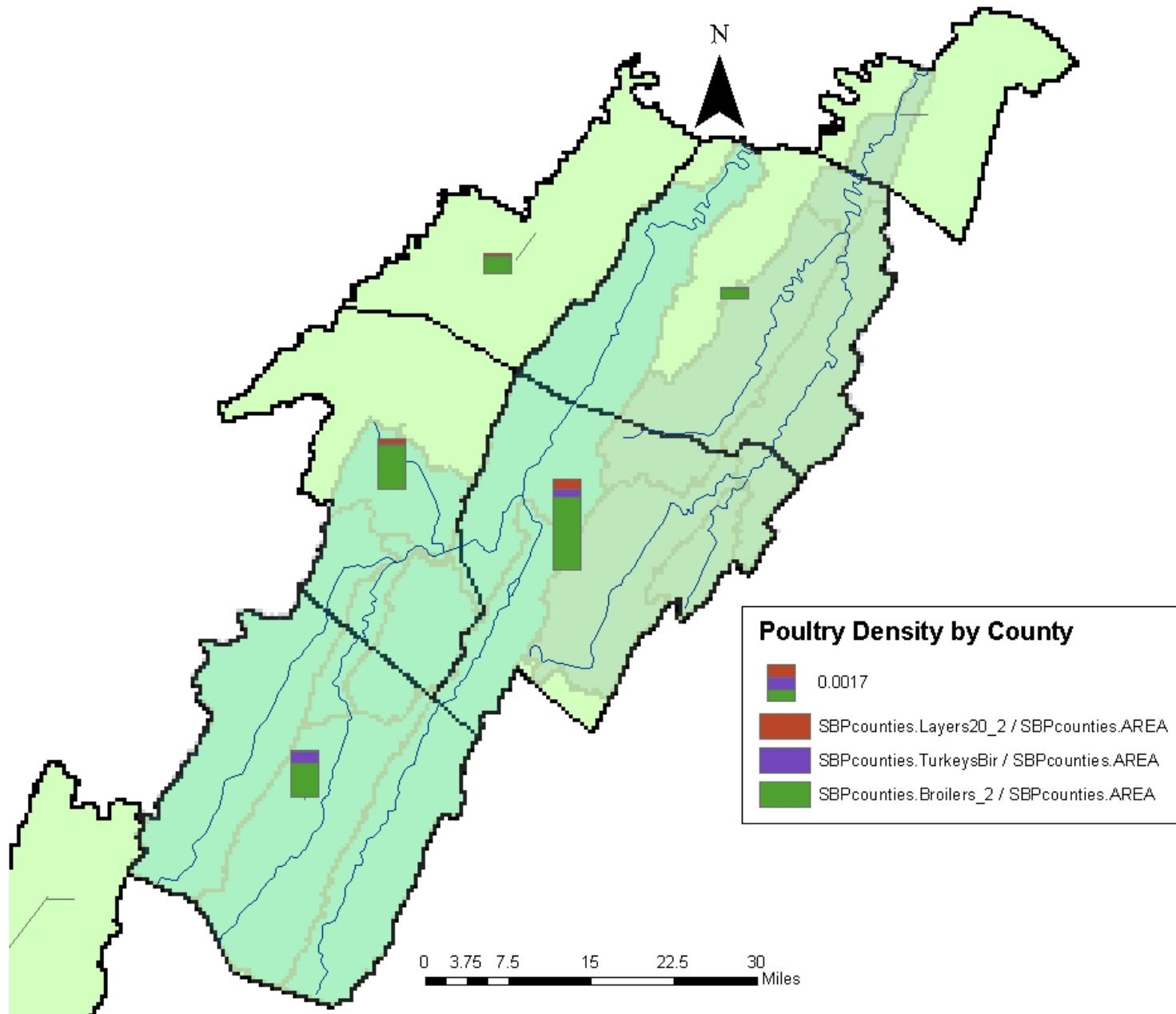
**External Lesions
South Branch
Smallmouth Bass**

Provisional
Subject to change





Provisional Data
Subject to change or revision



2004 Study Plan

Continued collection and analysis of
smallmouth bass

- Condition, HSI, GSI
- Histological analysis
- Plasma analysis
 - Reproductive hormones
 - Vitellogenin
 - Contaminants

2004 Study Plan – cont.

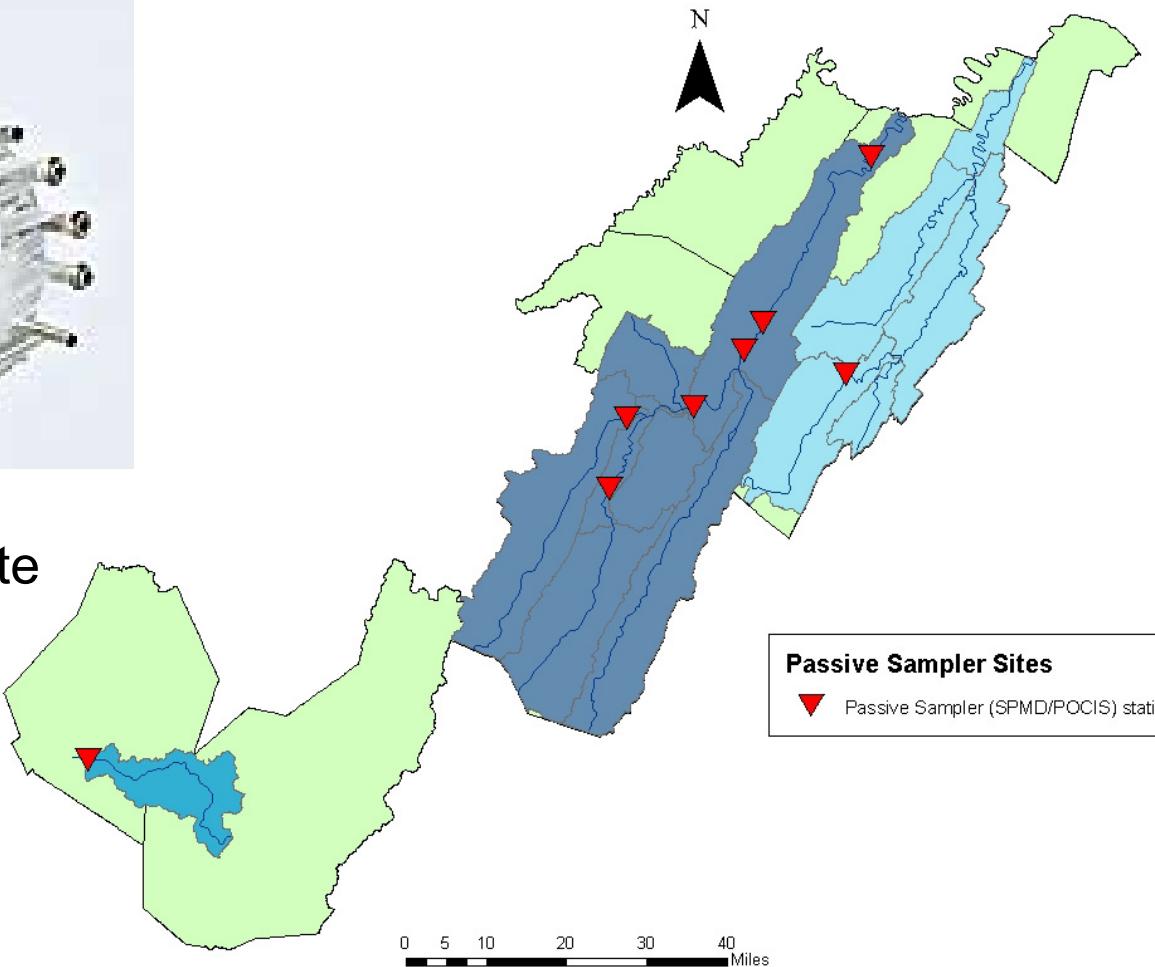
Water sampling

- Passive sampling devices
- Storm sampling for roxarsone
- Selected discharge sampling
- Grab samples during fish collections



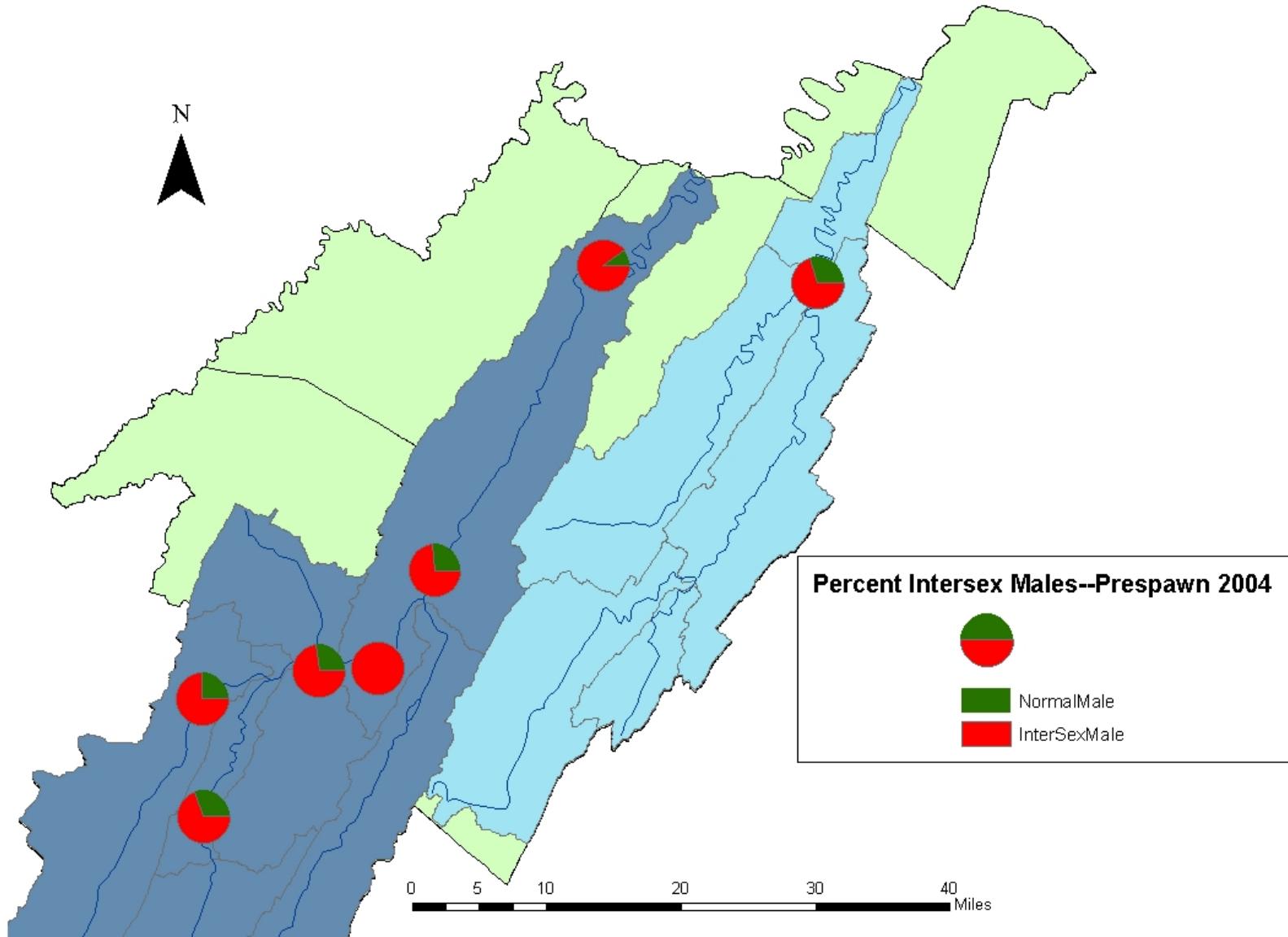
Passive samplers

- Semi permeable Membrane Devices (SPMDs)-accumulate hydrophobic compounds
- Polar Organic Compound Integrative Samplers (POCIS)—accumulate hydrophilic compounds



Plasma from smallmouth bass

- Plasma collected by USGS-BRD LSC
- Analyzed for both hydrophobic and hydrophilic compounds
 - Polybrominated diphenyl ethers
 - Limited PCB congener set
 - PPCP
 - Antimicrobials
- Hormones
- Vitellogenin
- Link chemistry to effect



SPMD results

	So Br. Upper Tract	N. Fk So. Br. Cabins	Petersburg Gap	Moorefield/ Old Fields	Sycamore	Springfield	Williams @ Dyer	Lost River Baker
Trifluralin	nd	nd	detected	detected	detected	detected	nd	nd
HCB	detected	detected	detected	detected	detected	detected	detected	detected
PCA	detected	detected	detected	detected	detected	detected	detected	detected
gamma-HCH	detected	detected	detected	detected	nd	detected	nd	nd
Chlorpyrifos	nd	detected	detected	nd	detected	nd	nd	detected
trans-Chlordane	detected	detected	detected	detected	detected	detected	nd	detected
cis-Chlordane	detected	detected	detected	detected	detected	detected	nd	nd
trans-Nonachlor	detected	detected	detected	detected	detected	detected	nd	nd
cis-Nonachlor	nd	nd	detected	nd	detected	nd	nd	nd
BDE 47	detected	detected	detected	detected	detected	detected	detected	detected
BDE 99	detected	detected	detected	detected	detected	detected	detected	detected
BDE 100	detected	nd	detected	nd	nd	detected	nd	nd

Compounds in POCIS

- **Triclosan**

Antimicrobial,
incorporated in many
products; soaps,
kitchen utensils, baby
products. Can
interfere with thyroid
hormones

- **Ethynodiol-Duo**

Synthetic estrogen, oral
contraceptive. A very
strong estrogen.

Plasma Results

- Polybrominated diphenylethers#
- 4-tert-octylphenol#
- D-limonene
- Naphthalene
- 2-methylnaphthalene
- Diethyl phthalate*
- Diethylhexyl phthalate*

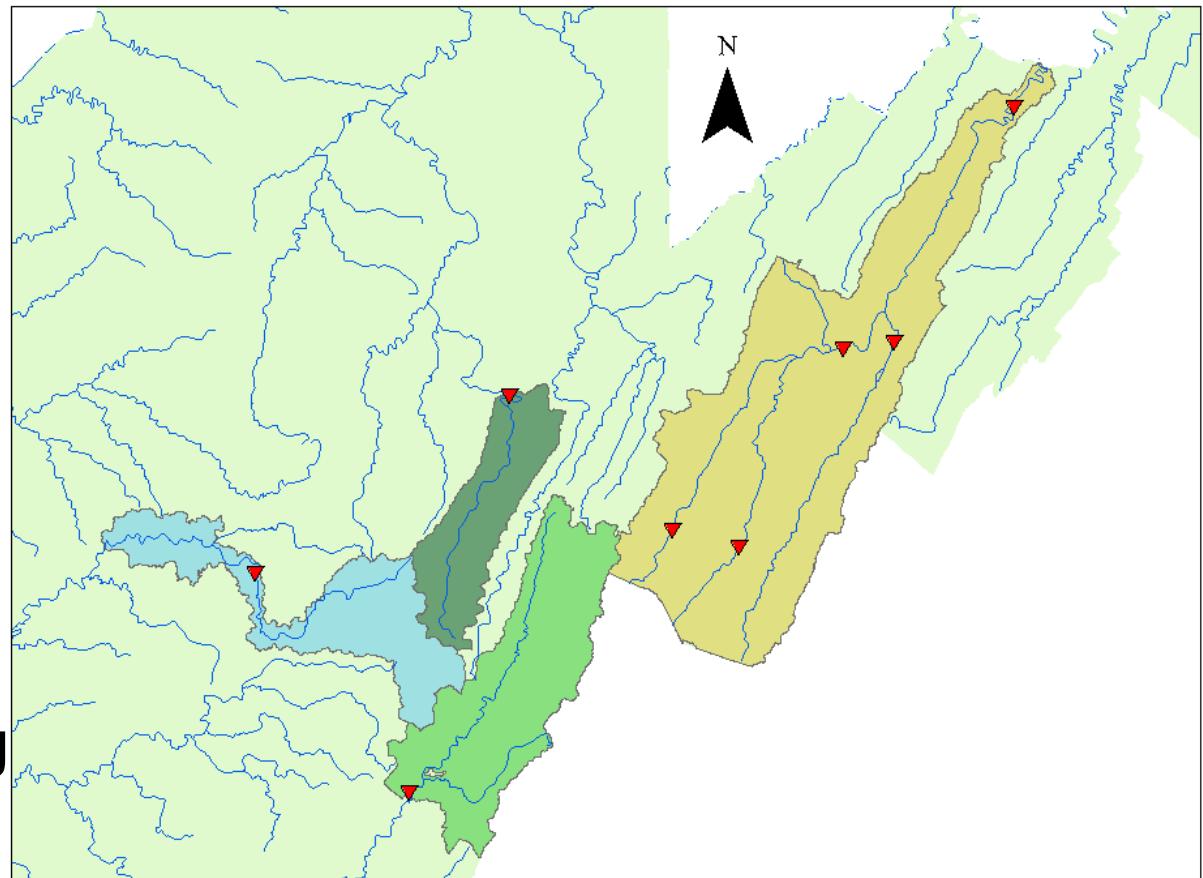
Further Studies

- More passive sampling
- High-volume sampling
- Whole body analysis
- Plasma analysis

Passive Sampling

Fall 2005

- Passive sampling at 8 sites
 - 5 So. Branch Potomac site
 - 3 out of basin reference sites
- Extracts used for:
 - Chemical analyses
 - *In vitro* assays
- Limited high-volume sampling



E-screen

- *In vitro* assay for estrogenicity
- Based on human MCF-7 breast cancer cell line
 - Estrogenic compounds induce cell proliferation
 - Results are expressed as ethynodiol equivalents
- Results will focus efforts

2006 study plan

- Prespawn Fish collections at selected sites
 - Histopathologic analysis
 - Condition, GSI, HSI
 - Plasma analysis
 - Chemical analysis
 - Vitellogenin analysis
 - Reproductive hormone analysis

2006 study plan

- Passive sampling at selected sites
- During prespawn period
- During low-flow period
 - Chemical analysis
 - E-screen