
DEVELOPING FLOW STANDARDS IN VIRGINIA

JOHN KAUFFMAN

DECEMBER 2, 2009



APPROACH

- USE IFIM MODEL DATA FROM VA STUDIES
 - PICK THE SPECIES LIFE STAGE THAT REQUIRES THE MOST WATER
 - FOCUS ON THE SUMMER HABITAT
-
- USE EMPIRICAL DATA FROM VARIOUS STUDIES
 - SMALLMOUTH DATA FROM JAMES AND OTHER RIVERS
 - LARGEMOUTH DATA FROM TIDAL JAMES RIVER
 - AMERICAN SHAD DATA FROM TIDAL PAMUNKEY RIVER

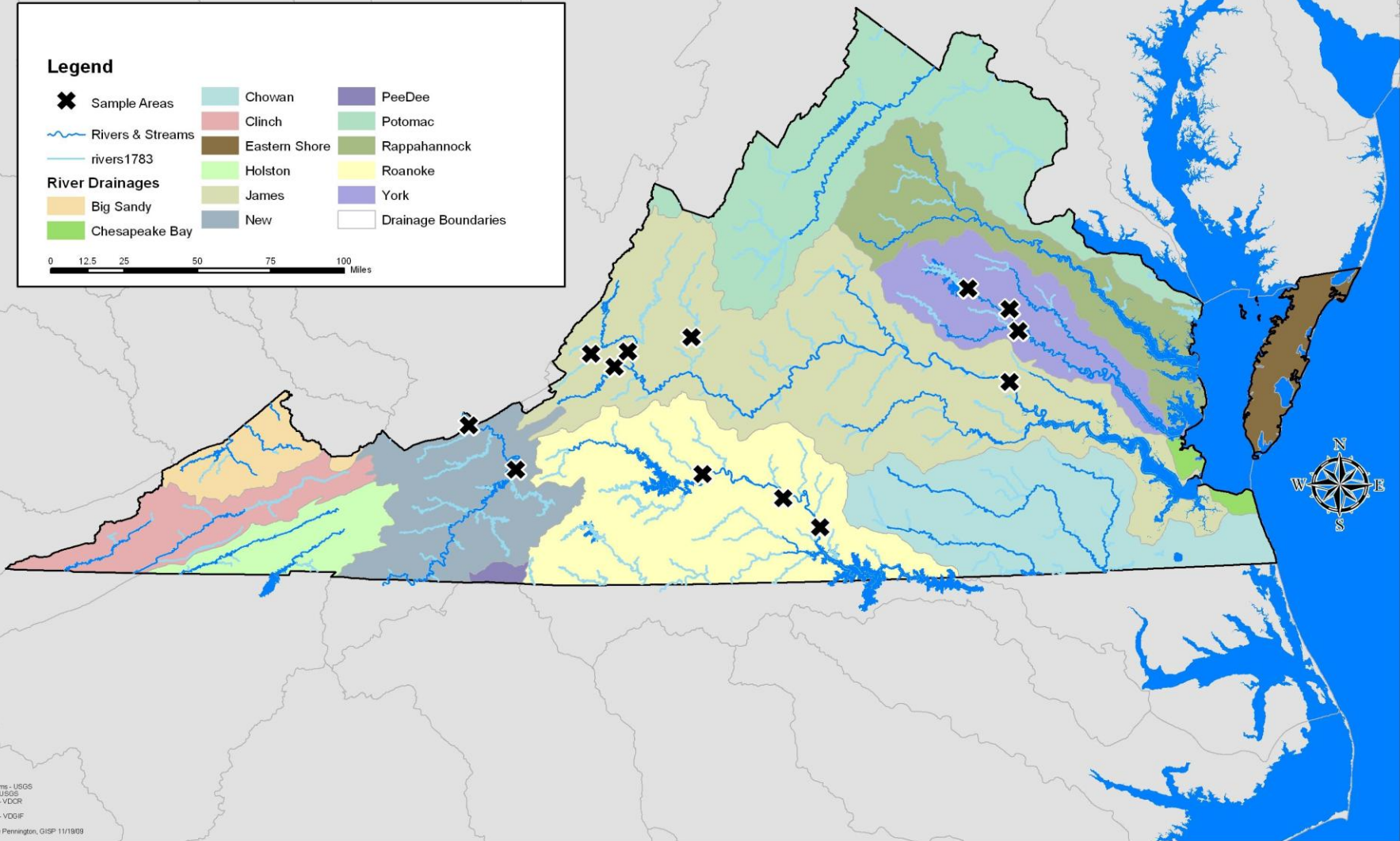


Virginia's Watersheds

Legend

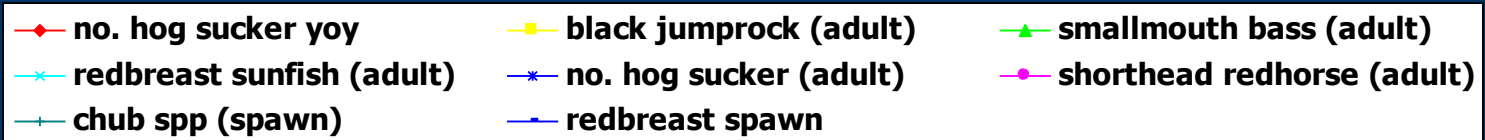
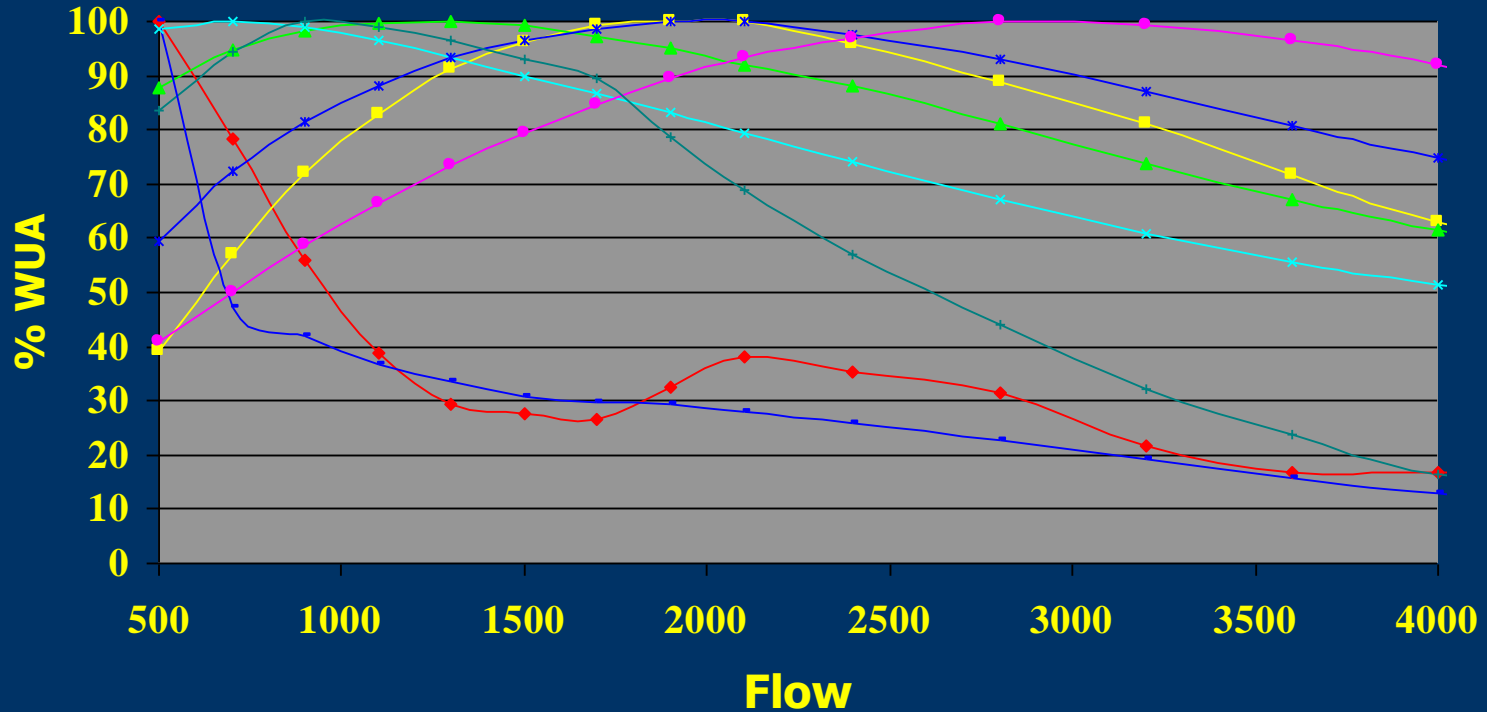
✕ Sample Areas	Chowan	PeeDee
~ Rivers & Streams	Clinch	Potomac
— rivers1783	Eastern Shore	Rappahannock
River Drainages	Holston	Roanoke
Big Sandy	James	York
Chesapeake Bay	New	Drainage Boundaries

0 12.5 25 50 75 100 Miles



Sources:
Rivers & Streams - USGS
8-digit HUCs - USGS
14-digit HUCs - VDOIF
States - ESRI
All Other Data - VDOIF

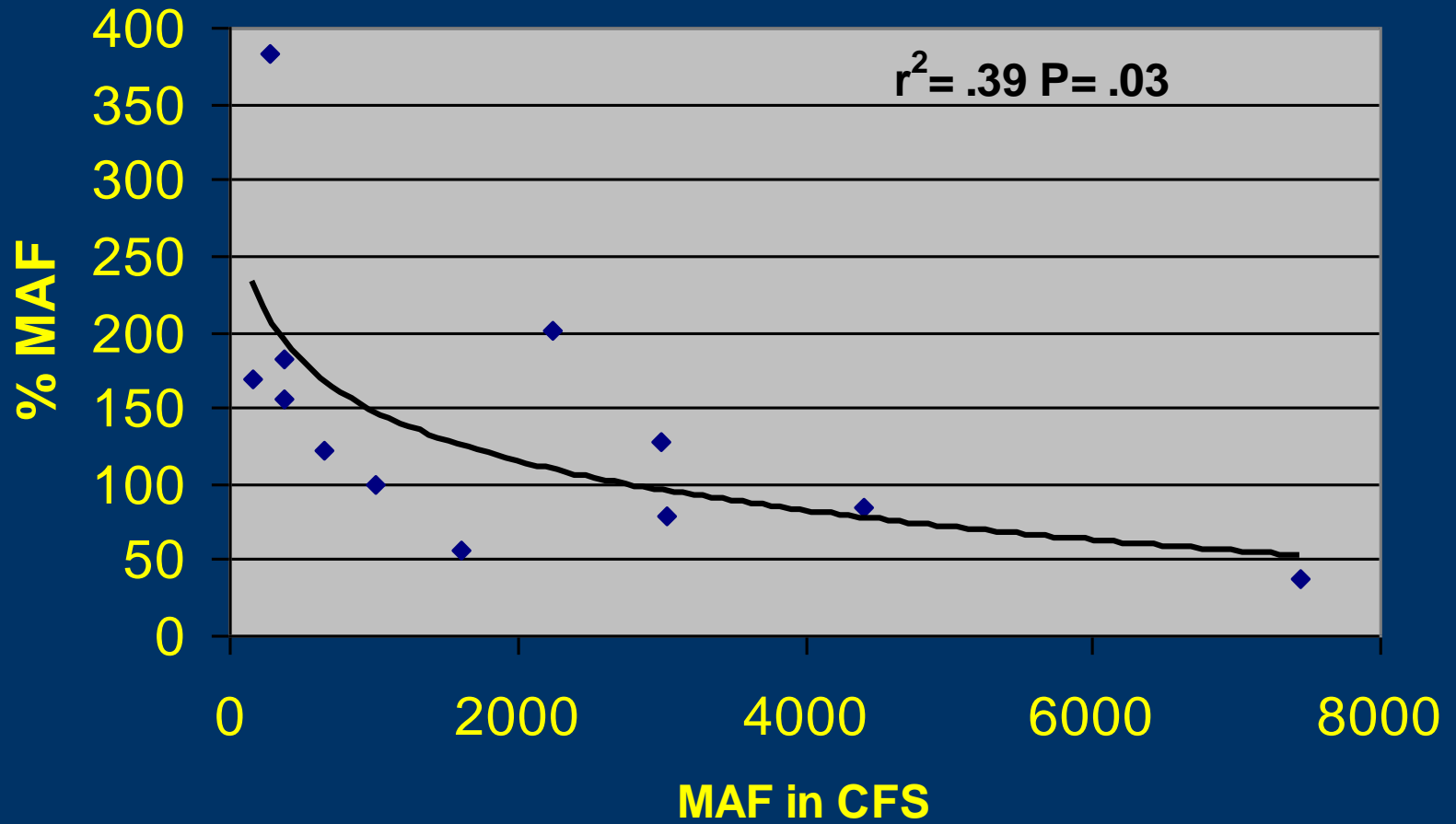
TYPICAL IFIM HABITAT FLOW RESPONSE CURVES



IFIM STUDIES AND SPECIES LIFESTAGE

DA	MAF	Op flow	% MAF	Species	Location
166	166	280	169	No. Hog sucker	Dunlap
329	384	600	182	No. Hog sucker	Craig Cr
342	287	1100	322	No. Hog sucker	North Anna- upper
450	383	700	156	No. Hog sucker	North Anna- coastal
646	655	800	124	No. Hog sucker	Mauy
1081	1007	1000	93	No. Hog sucker	Pamunkey- coastal
1373	1603	900	66	No. Hog sucker	James- upper
2096	2989	3800	181	Shorthead redhorse	Roanoke - Alta/Brookneal
2682	2241	4500	168	Shorthead redhorse	Roanoke- Clarkston
2977	3037	2400	81	Golden redhorse	Roanoke- Randolph
3258	4414	3750	115	No. hog sucker	New River Radford/glen Lyn
6758	7447	2800	41	Redhorse adult	James- lower

% OPTIMUM SUMMER HABITAT VS MAF



MODEL DATA RESULTS

- FOCUS IS ON SUMMER HABITAT
- SMALL STREAMS REQUIRE MORE WATER THAN LARGER STREAMS
- SUMMER HABITAT IS RARELY AT OPTIMUM FOR MOST FLOW SENSITIVE SPECIES
- NOT USABLE FOR STANDARD SETTING EXCEPT IN VERY LARGE STREAMS

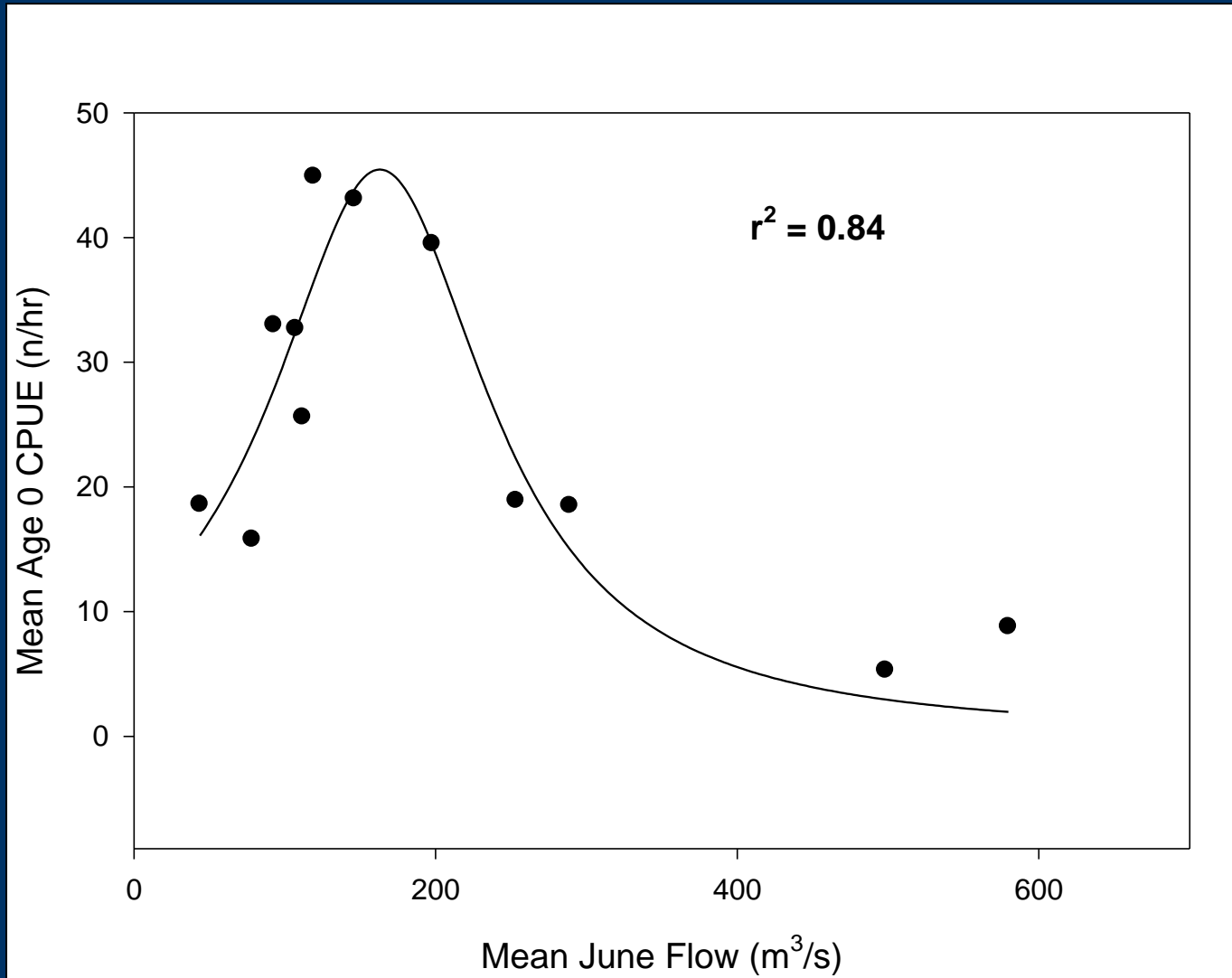
MODEL DATA RESULTS- CONTINUED

- **PREFERRED METHOD IS TO ALLOW WITHDRAWALS AS A % OF INSTANTEOUS FLOW**
- **IF WE ALLOW A 10% TOTAL INSTANTEOUS WITHDRAWAL HAVE A 95% CHANCE OF NOT ALTERING HABITAT MORE THAN +/- 10%**

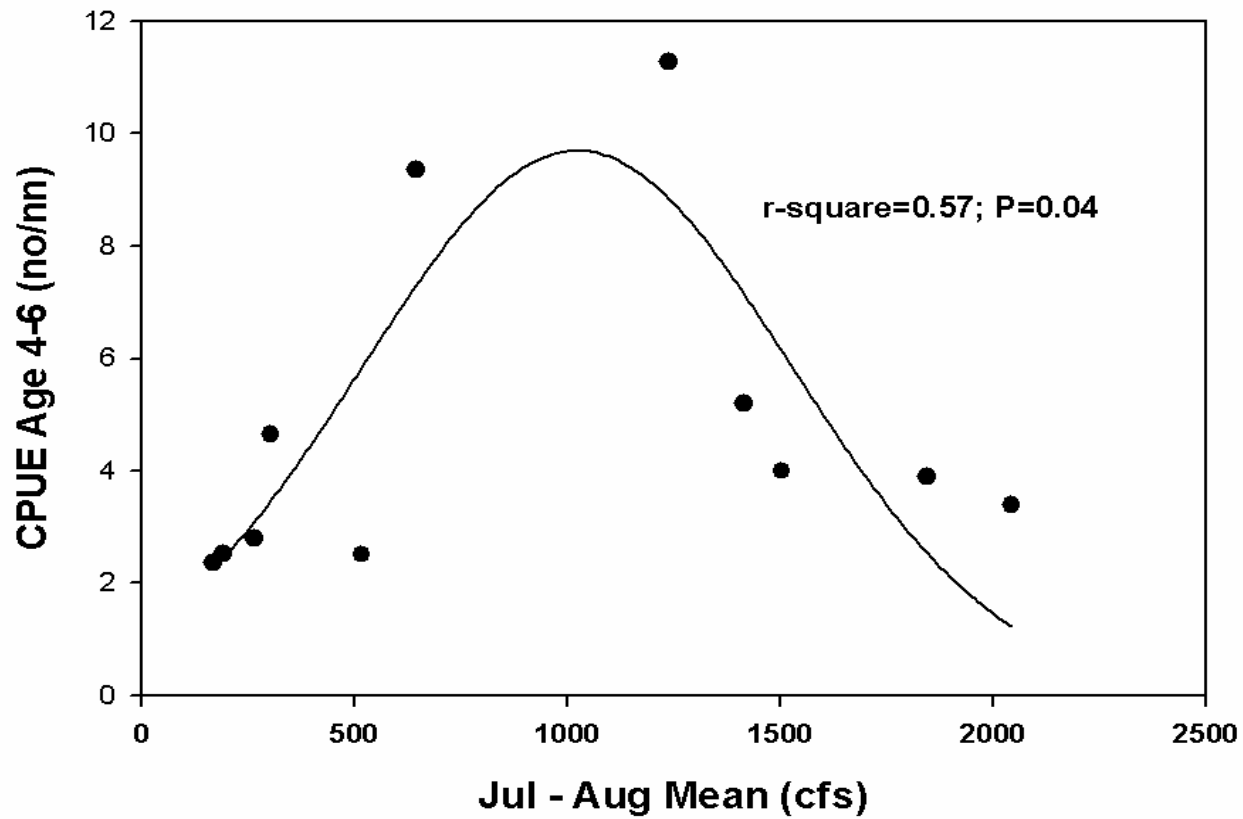
EMPIRICAL DATA

- **Better to base flows on actual instead of model data.**
- **Time consuming to produce**
- **Three studies of which two are tidal**
- **Start to address the issue of flows in tidal systems**

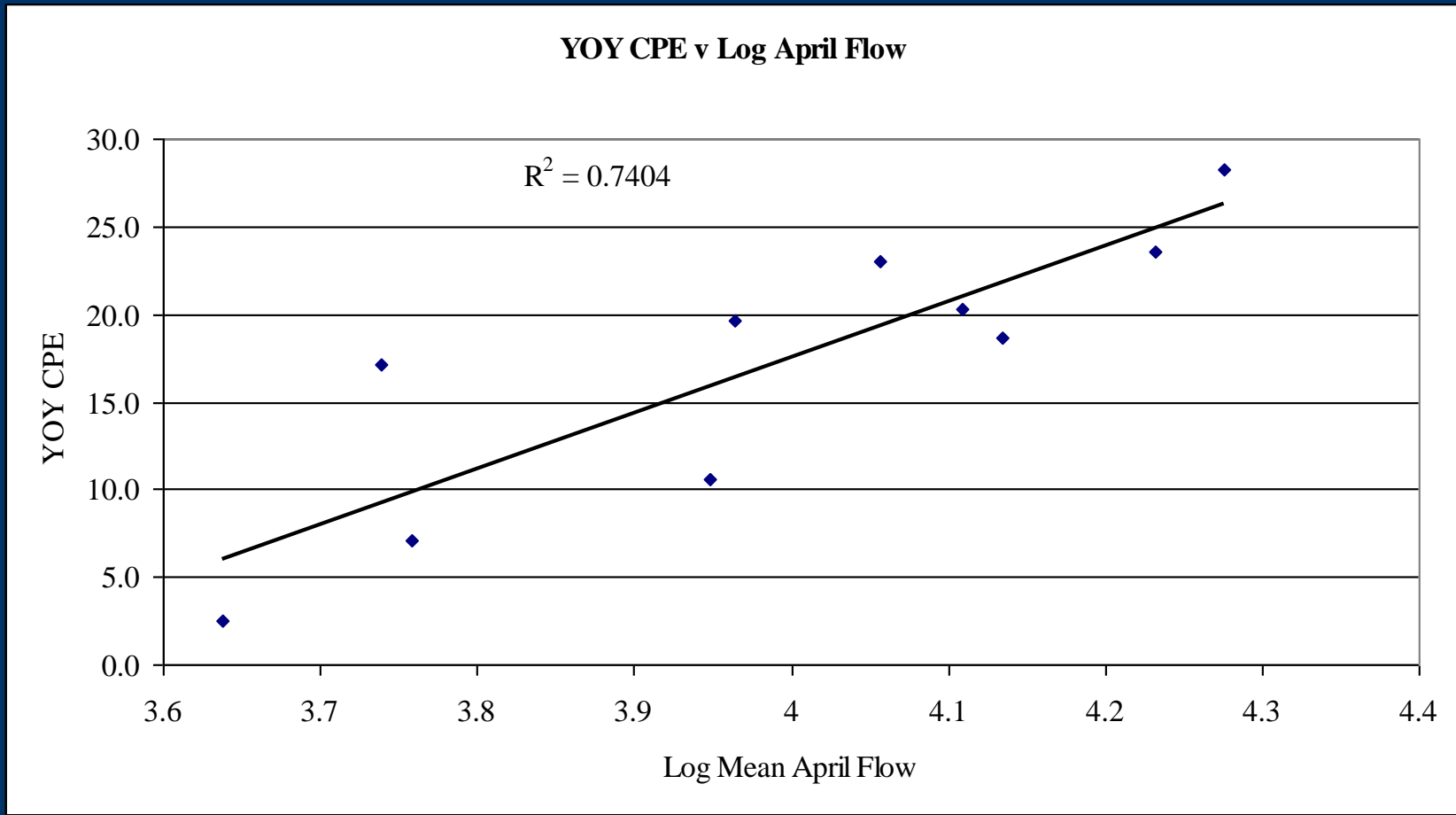
JAMES RIVER SMALLMOUTH RECRUITMENT



American Shad Catch vs. Flow (Jul-Aug vs. Age 4-6)



JAMES RIVER LARGEMOUTH BASS RECRUITMENT



Summary

- **When IFIM available calculated flows available for extraction that produced no more than 10% instantaneous habitat loss**
- **IFIM studies did not produce a usable standard**
- **IFIM studies gave us an indication of acceptable withdrawals 10% cumulative**

Summary continued

- **Empirical model produced recommendations for June flows for smallmouth bass**
- **Empirical data produced recommendations for tidal systems based upon April data for LMB and July August data for American shad**