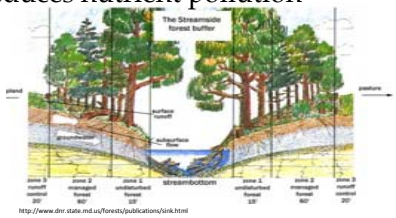
Getting the Most for Federal Dollars:

Optimally Incentivizing Riparian Buffers

By James Manley & Jason Mathias

What is a Buffer?

- A buffer is an area of vegetation adjacent to water
  - Either grass or trees
- Reduces nutrient pollution



http://www.dnr.state.md.us/forests/publications/sink.html

The above diagram gives a view of how buffers work to reduce nutrient pollution. Pollution, in the form of water runoff from rain, flows from fields and pastures into streams. A buffer acts to reduce the amount of pollutants entering the stream both in the surface flow and subsurface flow through direct absorption by the vegetation or increased denitrification

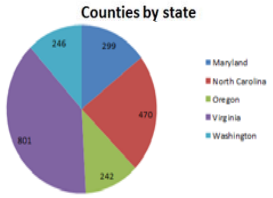
CREP-CP22

- The Conservation Reserve Enhancement Program became part of USDA's CRP in 2002
- CP22 within CREP focuses on river buffers
- Goal: create 10-15 year contracts with farmers for buffer plantings along waterways
- Contracts pay an annual rate based on soil rental rate per acre & a per acre incentive
- Other incentives tied to installation costs

Landowner Demand

- Relatively few options for land use and fewer options for temporary retirement mean that the market mechanism cannot be effective
- Also, owners of high quality land have no incentive to reveal their WTP
- Previous empirical research has shown that auctions do not work well, so optimal offers by USDA are critical

Data: 2058 county-years in five states



Sample Statistics	Mean	Std. Dev.	Min	Max
Annual payment (present value, in $thousands)	1.35	0.62	0.3	3.5
Up-front payment ($thousands /acre)	1.58	1.52	0.1	22.2
State % cost share	28.3	5.5	25	37.5
Livestock sales ($thousands /acre)	0.28	0.60	0	8.74
Mean acres per farm	0.10	0.20	0.002	2.33
Share of land irrigated	0.27	0.25	0	0.995
Average Farm Income ($thousands /acre)	30.5	49.1	-49	508
Share owner operated	0.71	0.17	0	1
Average age	57.1	2.1	50.2	64.4
% with Bachelor's	20.7	10.2	4.8	58.4
Rural/ Urban code	4	2.6	1	9
Average Taxes ($/acre)	18	37.5	0	1400
CRP acres	0.008	0.03	0	0.22
Total Expenses ($/acre)	0.6	1.74	0	73.89
Total Gov. Payments per acre	10.6	11.3	0	129.6
County sells less than one head of cattle per acre	0.08		0	1

Variable	Regression 1 Coefficient (SE)	Regression 2 Coefficient (SE)
Annual payment (present value)	0.008 (0.004)*	0.007 (0.004)*
Up-front payment	0.007 (0.001)***	0.008 (0.001)***
Up-front, in areas without cattle sales		-0.006 (0.004)*
State-provided up-front payment	0.003 (0.000)***	0.003 (0.000)***
Livestock sales per acre	0.003 (0.004)	0.003 (0.004)
Acres of farmland	0.013 (0.009)	0.010 (0.009)
Share of land irrigated	-0.028 (0.013)**	-0.027 (0.013)**
Average Farm Income	0.000 (0.000)	0.000 (0.000)
Share of farmland owned by operator	-0.037 (0.012)***	-0.035 (0.012)***
Average age in county	-0.002 (0.001)*	-0.002 (0.001)
Share of population with Bachelor's degrees	-0.000 (0.000)	-0.000 (0.000)
Rural/ Urban code	0.003 (0.001)***	0.003 (0.001)***
Average taxes paid	-0.000 (0.006)	-0.000 (0.000)
Acres in CRP	0.063 (0.092)	0.083 (0.094)
Year after 1997	-0.005 (0.000)***	-0.005 (0.001)***
Total expenses	0.001 (0.002)	0.001 (0.003)
Total government expenditures per acre	0.001 (0.000)***	0.001 (0.000)***
North Carolina indicator	-0.000 (0.006)	-0.001 (0.006)
Oregon indicator	-0.009 (0.010)	-0.011 (0.010)
Washington indicator	-0.044 (0.009)***	-0.044 (0.009)***

Specification

$$P_{i22} = \beta_0 + \beta_a X'_{ia} + B_c X'_{ic} + \beta_y X'_{iy} + u_i$$

P_{i22} : proportion of eligible riparian acres enrolled in CP22 in a county-year

X_{ia}, X_{ic}, and X_{iy}, are factors affecting decisions. a represents opportunity costs, c represents county level factors, and y represents incentives offered, all for county i. β_0 is the intercept while β_a, β_c, and β_y represent the coefficients on those variables. We use the Tobit estimator to address the large number of zeros in the dependent variable.

Key Findings

- Previous work found that up-front payments had extraordinary importance: we do not find this (accounting for full incentives key)
- Cattle production increases incentives and participation
- Washington State has low participation, given other characteristics

More $$ for cattle?

- The current set of incentives offers much more to cattle producers than to other types of agriculture
- "Allowable costs" include fencing, bridges, and provision for watering livestock
- This is for the best: watersheds with concentrated livestock have 5-10x the nutrient discharge

(Hubbard, R.K., G. L. Newton, and G. M. Hill. 2004. "Water Quality and the Grazing Animal," *Journal of Animal Science* 82 (13, supplemental): E255-E263.)

What's up with Washington?

- All else equal, Washington's participation in CREP is significantly lower than other states
- Participation in CRP as a whole is high
- Government vs. rural "culture"?
- High intensity cattle production here as opposed to the other 4 states?

http://www.edf.org/content_images/RiparianBuffers_NRCSA99642_250.JPG

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