Iowa Nutrient Reduction Strategy, Measures of Success Process Report

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Overview

- Iowa's Strategy
- Measurement approach
- Progress to date

What is the Iowa Nutrient Reduction Strategy?

- Voluntary, science-based program to reduce Nitrogen and Phosphorous impact on water
- Includes cities, industry and agriculture
- A practice-based approach to show meaningful and measureable progress
- A framework for innovation and verification of new practices and technologies

How it was developed

- Policy section
  - Led by IDALS and IDNR with input from point and nonpoint source stakeholders who will make the investments
- Science Assessment
  - Led by ISU with scientists from IDALS, IDNR, USDA- ARS and NRCS, and other institutions
  - Point source technical assessment by wastewater engineers and cities

Point source goals

- 102 cities/facilities
  - Serve 55--60% of Iowa's population
  - Treat over 80% of wastewater
- 28 permitted industrial facilities
- Required to implement technically and economically feasible process changes for nutrient removal.
  - Designed to achieve targeted reductions of at least 67% of N and 75% of P current levels discharged
  - This accounts for 4%N and 16%P of the 45%

Non-point source Goals

- Implement science-based practices to achieve the remaining reduction to 45%.
  - 41% N and 29% P
- Action items identified
  - Strengthen outreach, education, collaboration
  - Setting priorities
  - Funding cost share
  - Research and technology
  - Documenting progress

Iowa Water Quality Initiative

IOWA DEPARTMENT OF AGRICULTURE & LAND STEWARDSHIP

Nitrogen Practices

Nitrogen moves primarily as nitrate-N with water

	Practice	Comments	% Nitrate-N Reduction*	% Corn Yield Change**
			Average (SD*)	Average (SD*)
Nitrogen Management	Timing	Moving from fall to spring pre-plant application	6 (25)	4 (16)
		Spring pre-plant/sidedress 40-60 split Compared to fall-applied	5 (28)	10 (7)
		Sidedress – Compared to pre-plant application	7 (37)	0 (3)
		Sidedress – Soil test based compared to pre-plant	4 (20)	13 (22)**
	Source	Liquid swine manure compared to spring-applied fertilizer	4 (11)	0 (13)
		Poultry manure compared to spring-applied fertilizer	-3 (20)	-2 (14)
	Nitrogen Application Rate	Nitrogen rate at the MRTN (0.10 N:corn price ratio) compared to current estimated application rate. (ISU Corn Nitrogen Rate Calculator – http://extension.agron.iastate.edu/soilfertility/nrate.aspx can be used to estimate MRTN but this would change Nitrate-N concentration reduction)	10	-1
	Nitrification Inhibitor	Nitrapyrin in fall – Compared to fall-applied without Nitrapyrin	9 (19)	6 (22)
	Cover Crops	Rye	31 (29)	-6 (7)
		Oat	28 (2)	-5 (1)
	Living Mulches	e.g. Kura clover – Nitrate-N reduction from one site	41 (16)	-9 (32)
Land Use	Perennial	Energy Crops – Compared to spring-applied fertilizer	72 (23)	
		Land Retirement (CRP) – Compared to spring-applied fertilizer	85 (9)	
	Extended Rotations	At least 2 years of alfalfa in a 4 or 5 year rotation	42 (12)	7 (7)
	Grazed Pastures	No pertinent information from Iowa – assume similar to CRP	85	
Edge-of-Field	Drainage Water Mgmt.	No impact on concentration	33 (32)	
	Shallow Drainage	No impact on concentration	32 (15)	
	Wetlands	Targeted water quality	52	
	Bioreactors		43 (21)	
	Buffers	Only for water that interacts with the active zone below the buffer. This would only be a fraction of all water that makes it to a stream.	91 (20)	
	Saturated Buffers	Divert fraction of tile drainage into riparian buffer to remove Nitrate-N by denitrification.	50 (13)	

Phosphorus Practices

Phosphorus moves primarily with eroded soil

	Practice	Comments	% P Load Reduction[a]	% Corn Yield Change[b]
			Average (SD[c])	Average (SD[c])
Phosphorus Management Practices	Phosphorus Application	Applying P based on crop removal – Assuming optimal STP level and P incorporation	0.6[d]	0
		Soil-Test P – No P applied until STP drops to optimum or, when manure is applied, to levels indicated by the P Index[f]	17[e]	0
	Source of Phosphorus	Liquid swine, dairy, and poultry manure compared to commercial fertilizer – Runoff shortly after application	46 (45)	-1 (13)
		Beef manure compared to commercial fertilizer – Runoff shortly after application	46 (96)	
	Placement of Phosphorus	Broadcast incorporated within 1 week compared to no incorporation, same tillage	36 (27)	0
		With seed or knifed bands compared to surface application, no incorporation	24 (46)	0
	Cover Crops	Winter rye	29 (37)	-6 (7)
	Tillage	Conservation till – chisel plowing compared to moldboard plowing	33 (49)	0 (6)
		No till compared to chisel plowing	90 (17)	-6 (8)
Land Use Change	Perennial Vegetation	Energy Crops	34 (34)	
		Land Retirement (CRP)	75	
		Grazed pastures	59 (42)	
Erosion Control and Edge-of-Field Practices	Terraces		77 (19)	
	Buffers		58 (32)	
	Control	Sedimentation basins or ponds	85	

ISU Extension and Outreach:
SP 435, September 2014

Measures of success committee

Measurable indicators of desirable change

Specific indicators in attached text

Inputs

People

Funding

Agency resources

Private sector resources

Human

Partner Organizations

Partner Agribusinesses

Farmer knowledge and attitude

Point source communities and management knowledge and attitude

Land

Land use changes

- Net acres cover crops
- Net acres perennials
- Etc.

Practice adoption

- Acres of practice X
- Acres of practice Y
- Etc.

Point source implementation

- Feasibility studies
- Permit applications
- Construction

Water

Calculated load reduction

Measured loads in priority watersheds

Organized watersheds reported load changes

Measured loads at existing monitoring stations

Annual Progress Report 2014-2015

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Inputs

2015 Public Investment

	Million $
Iowa Dept of Ag and Land Stewardship	17.9
State Revolving Fund	35.7
Natural Resource Conservation Service	34.0
Iowa Nutrient Research Center	1.3

NGO Investment 2015

Iowa Farm Bureau Federation SHARE Grants/Partnerships in various other projects	$72,350
Iowa Pork Producers Association IAWA/Partnership in other projects	$210,000
Iowa Soybean Association Various research, outreach, conservation planning, practice installation, and monitoring programs	$1,594,303

Raising Awareness and Education Reported by WRCC/WPAC June 1, 2014 - May 30th, 2015

Description	Number	Attendance
Field Days	637	23,366
Presentations	239	14,887
Conferences	16	3,842
Workshops/Meetings	168	3,266
Print or Media	252	975,258
Radio & Television	258	4,300,000
Newsletters	240	489,845
Awards/Recognition Activities	21	116
Surveys**	6	1,033

Human

Iowa Learning Farms

- Farmers attending Iowa Learning Farms field days report they successfully influence 65% more farmers to try conservation practices.
  - 88% of farmers attending ILF field days have made a change in their behavior between 2010-2014
  - An average of 373 new acres with no-till or strip-till per survey respondent since 2010
  - 38% of farmers responding increased surface residue management (no-till/strip-till) on 97,331 new acres since 2010
  - 47% of farmers responding increased cover crop usage since 2010, on 77,492 acres

NRS Farmer Survey

- Funded by IDALS, Conducted by ISU
- Survey objectives:
  - 1) measure farmer knowledge, attitudes, and behavior,
  - 2) identify barriers to and facilitators of behavior change
  - 3) measure change in these over time.
- Sampling approach:
  - 5-year annual rotating longitudinal survey.
  - Six HUC6 watersheds, survey 2/year
    - Compare over time,
    - across watersheds and
    - Targeted v. non-targeted watersheds

Survey Response as of June 12, 2015.

Watershed	Sample	Completed Surveys	Response Rate
HUC6 Iowa	2375	900	43.9%
HUC8 Lower Iowa	1175	412	40.2%
HUC8 Middle Cedar	1200	488	47.6%
HUC6 Missouri-Little Sioux	2027	734	40.6%
HUC8 Big Papillion-Mosquito & Boyer	1011	332	37.2%
HUC8 Floyd	1016	402	43.9%
TOTAL	4402	1634	42.4%
Unknown Watershed (Case ID removed)	--	22	--
TOTAL + UNKNOWN WATERSHED	4402	1656	42.9%

Land

Point source procedures

- Feasibility studies submitted
- Permits amended with nutrient removal/ reduction construction schedules
- Nutrient removal/reduction facilities in place/in design/under construction
- Facilities monitoring nutrient in their effluent
- Nitrogen and phosphorus loads discharged

Point Sources

- Weekly monitoring now are being submitted by the 54 facilities whose permits have been issued since the strategy was released.

Non-Point Sources

- Land use changes
- Edge-of-field practices
- In-field management

NPS Public data

- Land Use
- FSA reported data

Iowa Crop Reporting District	Corn	Soybeans	Alfalfa	Oats & Small Grains	Forage & Grazing Crops	Alternative Agricultural Crops and Practices	CRP	Prevent Plant, Left Standing & Failed
Northwest	2,041,319	1,435,589	30,082	8,951	40,129	5,864	94,599	82,213
North Central	1,706,198	1,090,862	16,821	10,473	22,869	6,511	132,733	391,039
Northeast	1,594,102	722,649	135,771	48,052	102,215	6,262	206,448	172,318
West Central	2,125,863	1,404,368	39,399	11,892	139,724	12,344	142,380	96,231
Central	1,913,802	1,328,168	37,784	11,280	75,831	6,486	142,274	115,267
East Central	1,407,880	896,048	61,337	21,129	107,557	5,583	153,345	52,691
Southwest	1,085,809	956,697	37,857	15,516	237,763	810	160,585	58,352
South Central	536,096	554,269	59,156	24,907	462,994	4,492	318,638	126,679
Southeast	877,903	787,753	36,910	152,200	1,189,082	4,139	293,419	1,094,790
Statewide	13,288,972	9,176,403	455,117	304,400	2,378,164	52,491	1,644,421	2,189,580

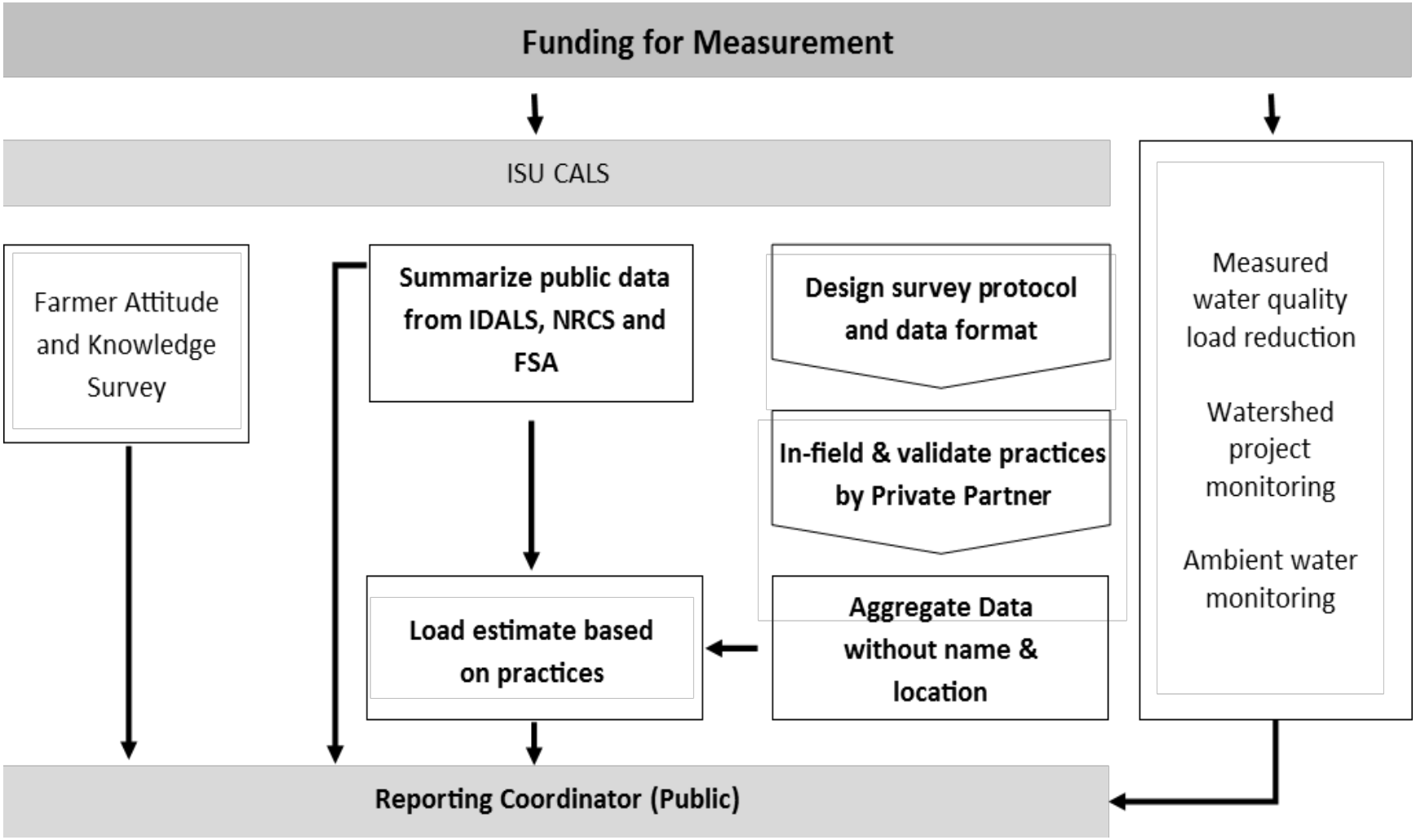
NPS Public data

- Edge-of-field practices
- NRCS and IDALS reported data
- Challenges
  - Consistency in reporting
  - Access to data (FOIA)
  - Duplication of reporting
  - Installed not existing

NPS Public data

- In-field management
- Private sector data = confidentiality worry
- Engage ag retailers in public-private project
  - Statistically sample fields to be surveyed
  - ISU involved in survey and sample design
  - Farmer permission to cooperate
  - CCA's collect the field level data
  - Return aggregated data to ISU
  - Audited process

Proposed funding-reporting plan



Water

Water Quality Monitoring Summary

- A technical work group working to define a standard method to calculate nutrient loads based on the existing ambient stream monitoring.
  - Representatives from: DNR, ISU, IDALS, ISA, USGS, and UI.
  - Nitrogen completed, working on Phosphorus

Water Quality Monitoring Summary

- Work was initiated in March 2015 to begin to coordinate public and NGO nutrient monitoring efforts.
- U of Iowa IIHR Flood Center real-time N monitors
  - Funding to add to current network
  - With USGS will have 40 state-wide

Load calculations

- Calculate load based on practices
- Change in practices produces an estimated change in loads

Summary

- The goal is difficult but not impossible
- Logic model approach has appeal, but
  - Some only want to focus on monitoring
  - Some want date benchmarks
- Measuring everything we can now and improve as we go
- Agriculture operates on an annual cycle, but the news cycle is 24/7/365