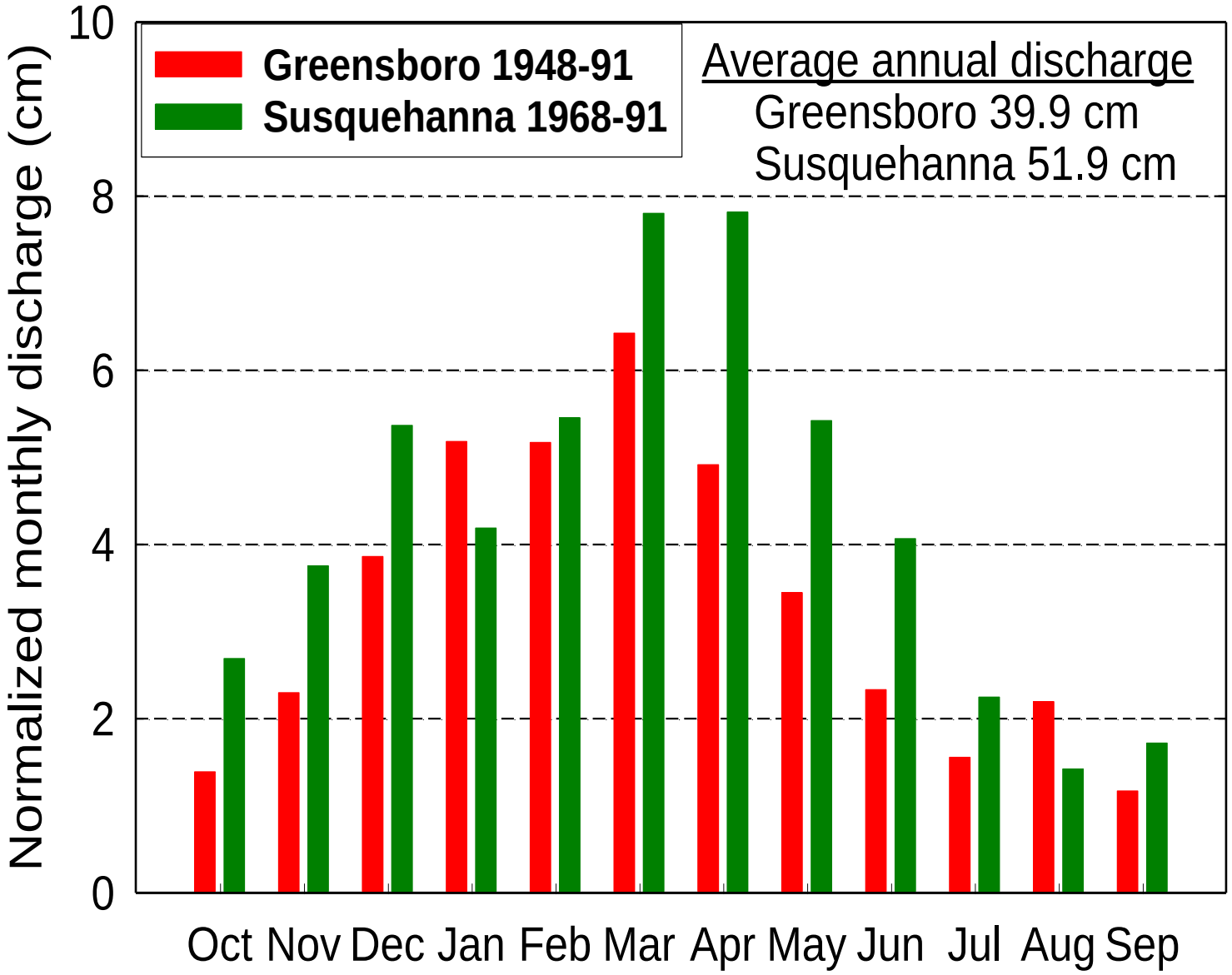
Membership-Phase 6 Cover Crop Panel

Name	Affiliation	Role
Ken Staver	University of Maryland	Panel Chair
Charlie White	Penn State University	Panel Member
Jack Meisinger	USDA – Agriculture Research Service	Panel Member
Paul Salon	USDA-Natural Resources Conservation Service	Panel Member
Wade Thomason	Virginia Tech	Panel Member
Jason Keppler	*Maryland Department of Agriculture*	*Watershed Technical Workgroup representative*
David Wood	*Chesapeake Bay Program Office*	*Modeling Team representative*
Mark Dubin	*University of Maryland*	*AgWG Coordinator*
Lindsey Gordon	*Chesapeake Research Consortium*	*Staff*


Greensboro 1948-91
Susquehanna 1968-91
Average annual discharge
Greensboro 39.9 cm
Susquehanna 51.9 cm
Normalized monthly discharge (cm)
10
8
6
4
2
0
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep

The essential cover crop effect on N losses

- Reduce soil nitrate pool outside of summer growing season to minimize potential for nitrate leaching, which is the major route of N loss from cropland in many parts of the Bay watershed.
- Pretty simple in traditional case of pure stands planted in otherwise winter fallow settings with no fall nutrients (basically the 5.3.2 approach).
- P6, considering real world situations where nitrate pool is adjusted (up for fall manure, down for commodity cover crops), and cover crop uptake potential is reduced by reducing grass content in mixtures with legumes.

P6 CC panel three main tasks (May 19-2016)

- Use 5.3.2 panel table efficiencies for traditional cover crops as base and …

1. Modify efficiencies for mixtures based on new data from PSU and VT, probably a little higher.
2. Modify table to apply to cropland where manure is applied in fall, mostly corn silage.
3. Modify table to apply to winter cereal production fields (commodity) with no fall nutrients applied.

A couple of key changes from 5.3.2

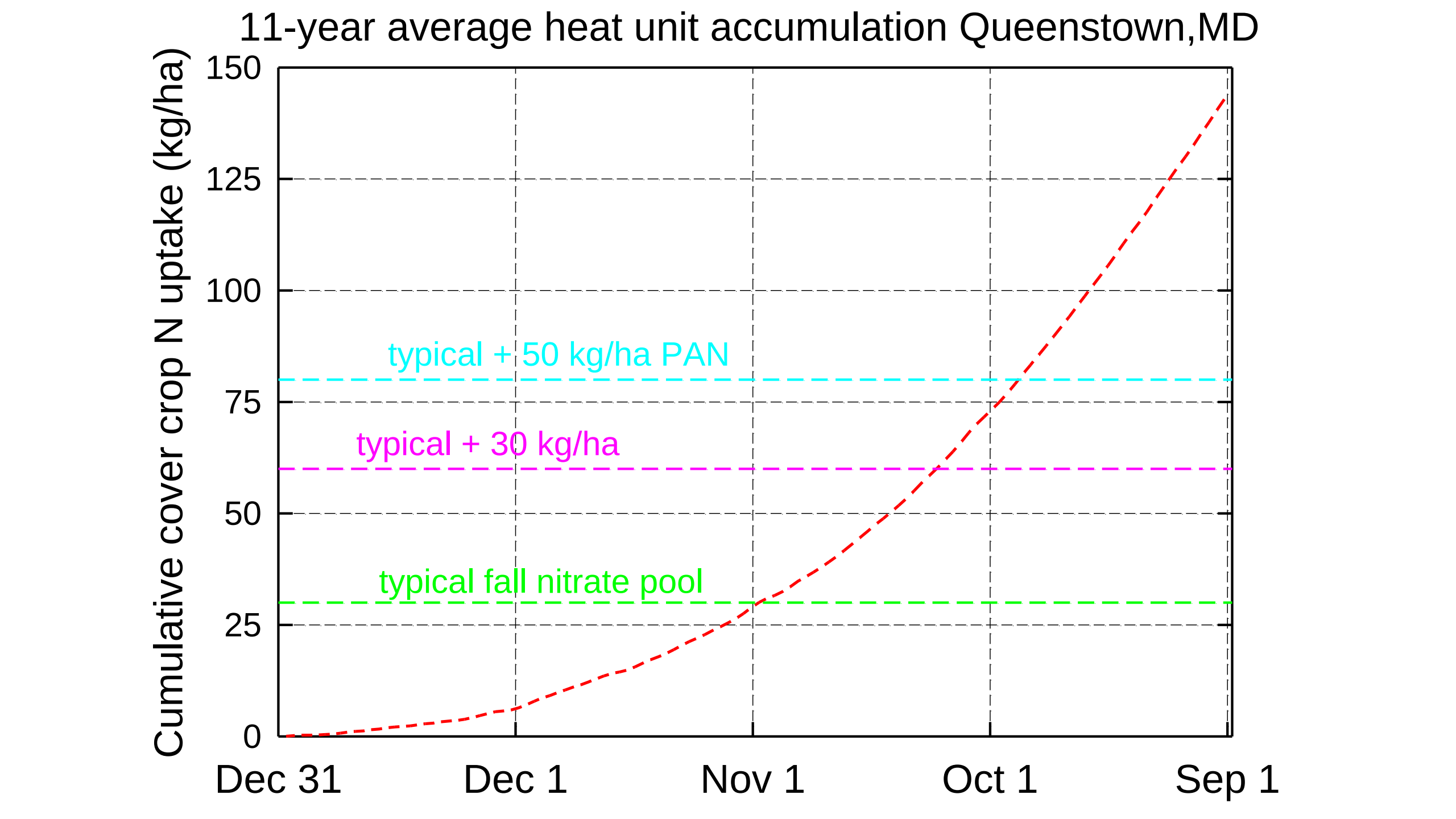
- Traditional and commodity cover crops can be applied to all row crop land uses except for some minor specialty crops (e.g., spinach)
- Cover crop efficiencies will be applied to specific land uses, rather than the average crop acre
- Commodity cover crop effect will only consider impact of no fall nutrient applications. After Jan. 1 dealt with in the winter cereals land use with NM

One more key change from 5.3.2

- The low-till and high-till land uses that were a part of all earlier model versions do not exist in P6.
- Different sediment and P cover crop reductions for these two land uses no longer relevant.
- Conservation tillage BMP deals with this issue.
- But not possible to have exclusionary BMPs.
- Solution: sediment and P reductions for cover crop only apply to silage, other agronomic crop, and high input specialty crops.

Many studies but many gaps. Consistent findings:

- Winter cereals respond to higher soil N, producing more biomass and moving more soil nitrate-N into above-ground biomass as soil N availability increases.
- The reference cover crop used in past panel reports (cereal rye planted at 2 bu/acre) when planted in early or standard planting periods is capable of taking more N out of the soil than is generally available post-harvest in summer annual row crop settings.
- Reducing cover crop uptake potential by reducing planting rates, or delaying planting, increases the likelihood that nitrate will be leached out of reach of cover crop roots before uptake can occur.
- Increasing the fall soil nitrate pool by applying manure or inorganic N will increase winter cereal N uptake but also increase the potential for nitrate leaching.


11-year average heat unit accumulation Queenstown,MD
Cumulative cover crop N uptake (kg/ha)
150
125
100
75
50
25
0
typical + 50 kg/ha PAN
typical + 30 kg/ha
typical fall nitrate pool
Dec 31
Dec 1
Nov 1
Oct 1
Sep 1

P6 Cover crop panel recommendations

- All coefficients developed so far for traditional single species cover crops left unchanged, but P6 land use changes will lead to some changes in load reductions.
- Fall manure and mixture cover crop BMPs working off of traditional cover crop table values
- Commodity cover crop a limited data best-professional-judgement recommendation.

P6 Cover crop panel recommendations

- 5.3.2 grass/legume mixture values should apply to mixtures that are 25-50% of the monoculture grass planting rate (from 50-100%)
- Grass/legume mixture category added to include mixtures that are 50-100% of the monoculture grass planting rate. N reduction credit 0.7 of monoculture grass planting rate.
- 50-100% monoculture grass planting eligible for this credit in early and standard planting period.

P6 Cover crop panel recommendations–II

- Crop land where fall manure application is unavoidable are a high priority for cover crop use and should be eligible for the cover crop BMP.
- The N reductions from cover crops planted where fall manure is applied are estimated as 0.7 of existing values for traditional full rate monoculture winter hardy grass and brassica cover crops (did not create new BMPs !).

P6 Cover crop panel recommendations–III

- Baseline condition is summer crop followed by a winter cereal for production that receives a 30 lb/acre N application.
- Commodity cover crop BMP is elimination of fall N application.
- N reduction credit increases moving later as N uptake capacity of crop decreases and fraction of applied N leached increases.

P6 Cover crop panel recommendations–IV

- Limited data on this specific case
- Withholding fall N application from a winter cereal crop planted for harvest credited to reduce annual N losses from from land use where planted by 5, 10, and 15% for early, standard and late planting dates in Coastal Plain/Piedmont Crystalline/Karst regions and 4, 8, and 12 % in Mesozoic Lowlands/Valley and Ridge Siliciclastic regions.

Comment from PA-There should be P and sediment reduction credits for cover crops.

Response: Text in report misrepresented P reduction credits. In fact, P and sediment reduction credit values remained unchanged in tables, except that these values are applied to a different land use group as a result of P5.3.2 to P 6 land use changes. These credits now apply to corn silage, high input specialty, and other agronomic crops land use categories.

Situation on P reduction values

- No change in existing cover crop BMP sediment and P reduction values.
- But, P6 land uses have changed so that old hi-till/lo-till land uses are gone.
- P5.3.2 Hi-till reduction values now apply to corn silage, other agronomic crops, high input specialty crops landuses.
- P5.3.2 Lo-till 0 P reduction values for cover crops now apply to other landuses which are eligible for CT credits. Only way to avoid double counting.

Comment from CBF-Mixtures should receive full N reduction credit of full rate grass options.

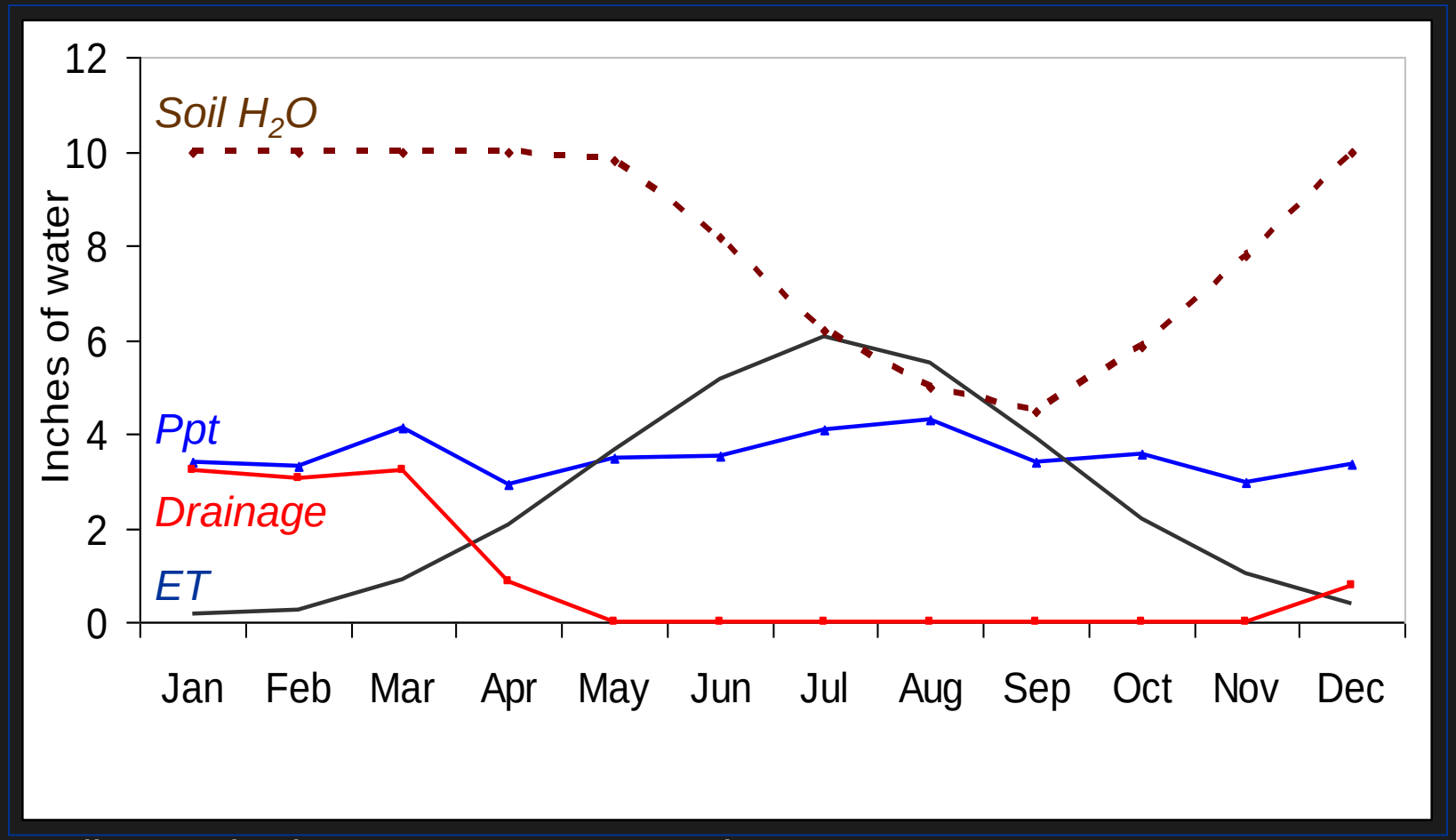
Response: Panel already raised mixture credit in 5.3.2 report from 0.5 to 0.7 and created a new mixture category that allows grass content of 25% of full rate grass planting. While mixtures provide additional benefits, panels charge is strictly to address nutrient reduction impacts. Reducing grass content of mixture slows rate of depletion of soil nitrate and increases potential for leaching relative to full rate grass cover crops. Keep as is.

Comment from PA and CBP- More consolidated tracking and reporting.

Response: This and past panels have focused on relative effectiveness of cover crop options partly for crediting, but also for guiding implementation. Panels have been asked to consider cover crop options used in the watershed. Not part of panel mission to specify reporting requirements or how reported data is used in modeling process. But panel stands by need to provide clear distinction on effectiveness of various cover crop options.

How does the General Hydrologic Cycle affect N Losses over a Calendar Year?

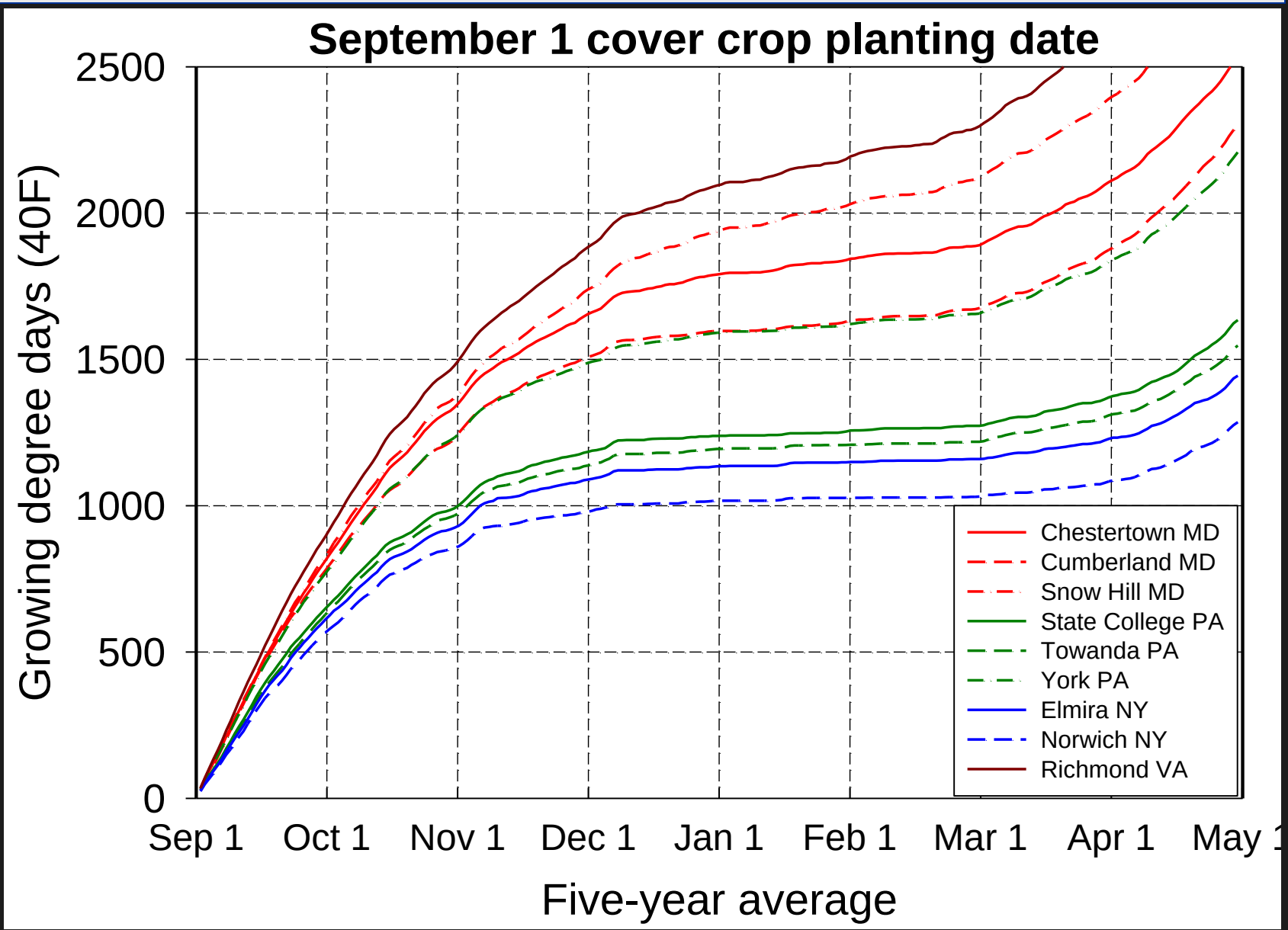
(Meisinger & Delgado, 2002)

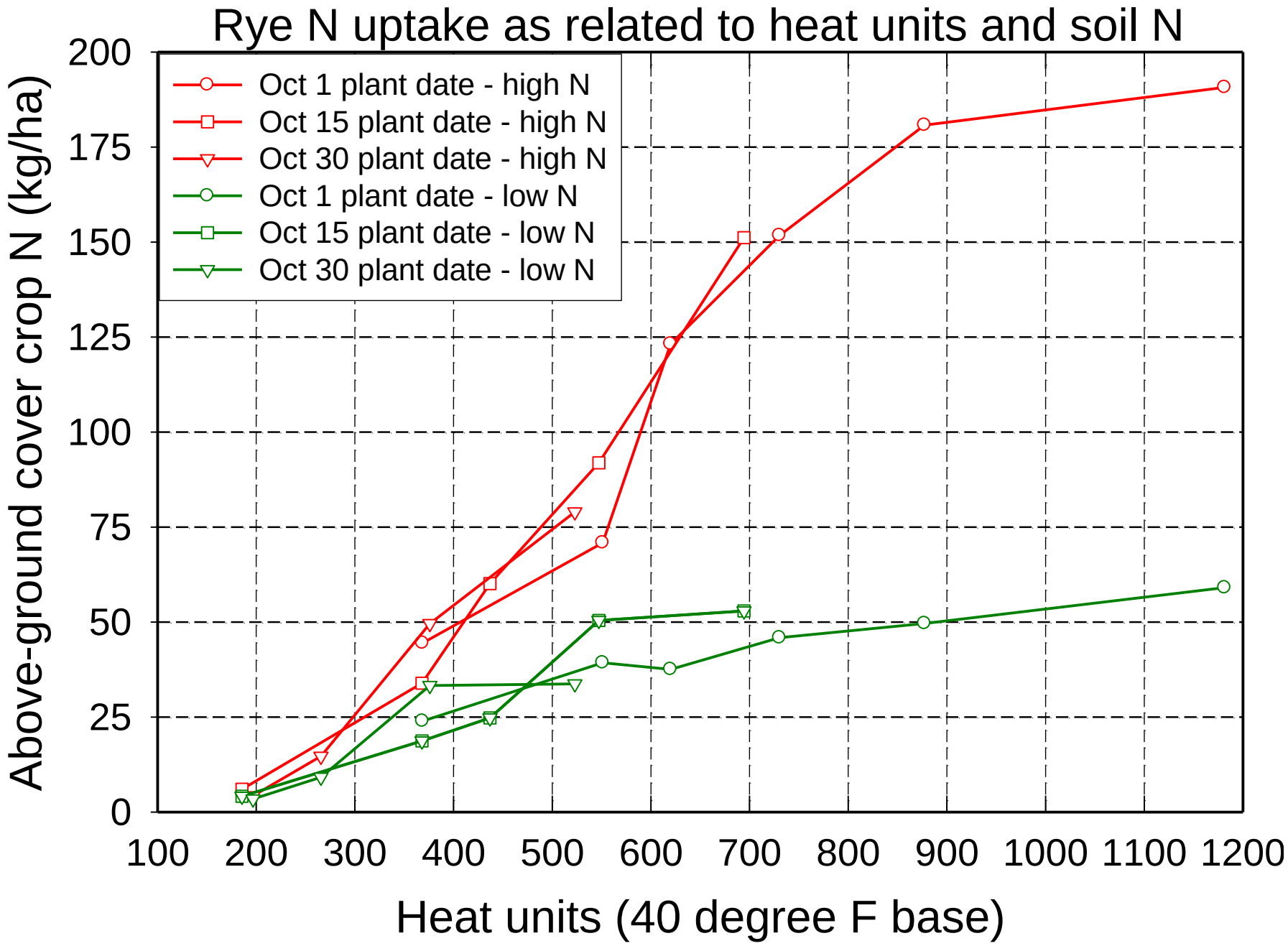


Soil water budget – Lower eastern shore

The Bay watershed has large north-south differences in growing season, how do fall heat units vary within the watershed?

(Staver, Pers. Comm. 2008)




Rye N uptake as related to heat units and soil N
Above-ground cover crop N (kg/ha)
Heat units (40 degree F base)
Oct 1 plant date - high N
Oct 15 plant date - high N
Oct 30 plant date - high N
Oct 1 plant date - low N
Oct 15 plant date - low N
Oct 30 plant date - low N
0
25
50
75
100
125
150
175
200
100
200
300
400
500
600
700
800
900
1000
1100
1200