Chart A: Nitrogen loading reductions in proposed rule

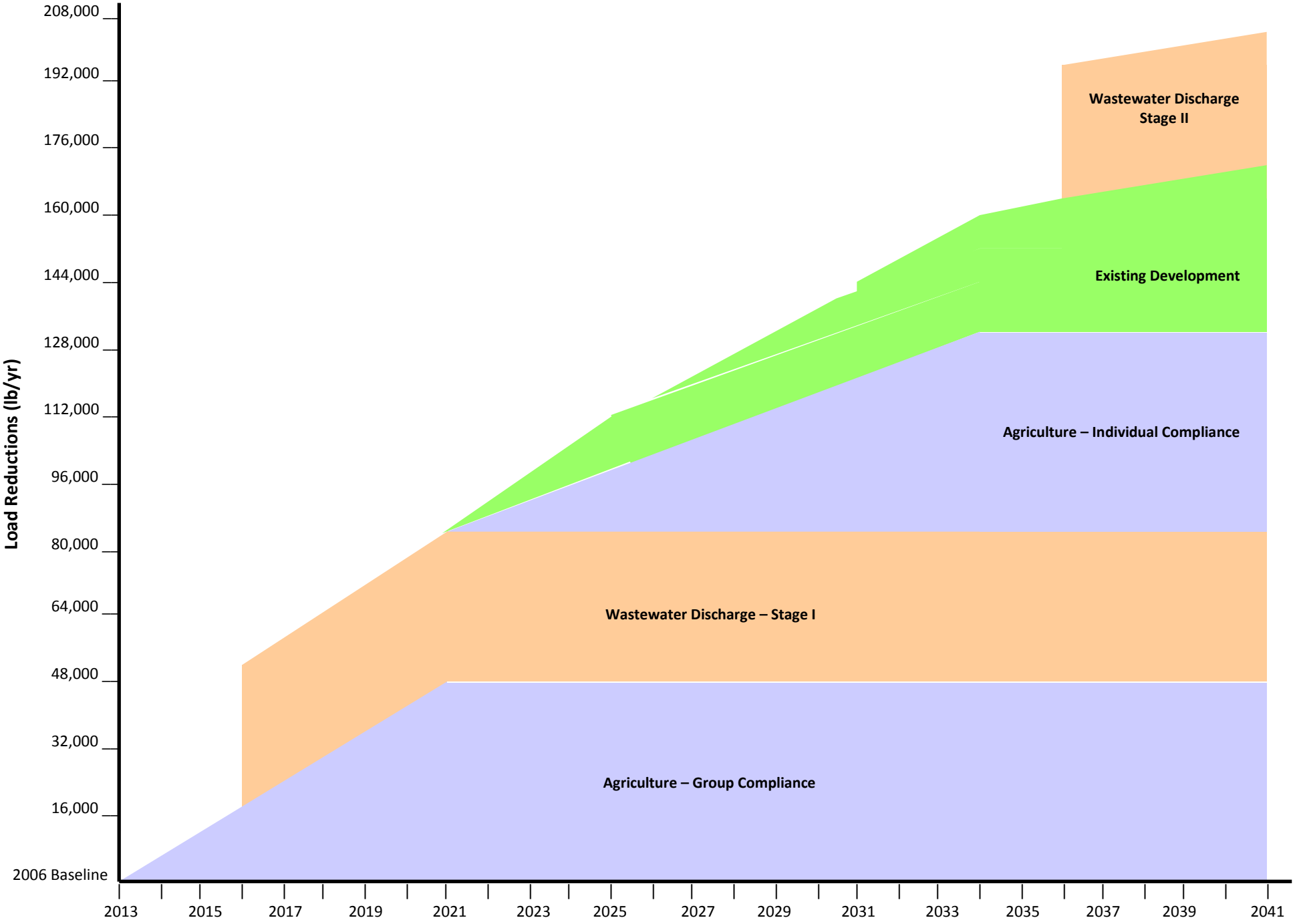


Chart B: Phosphorus loading reductions in proposed rule

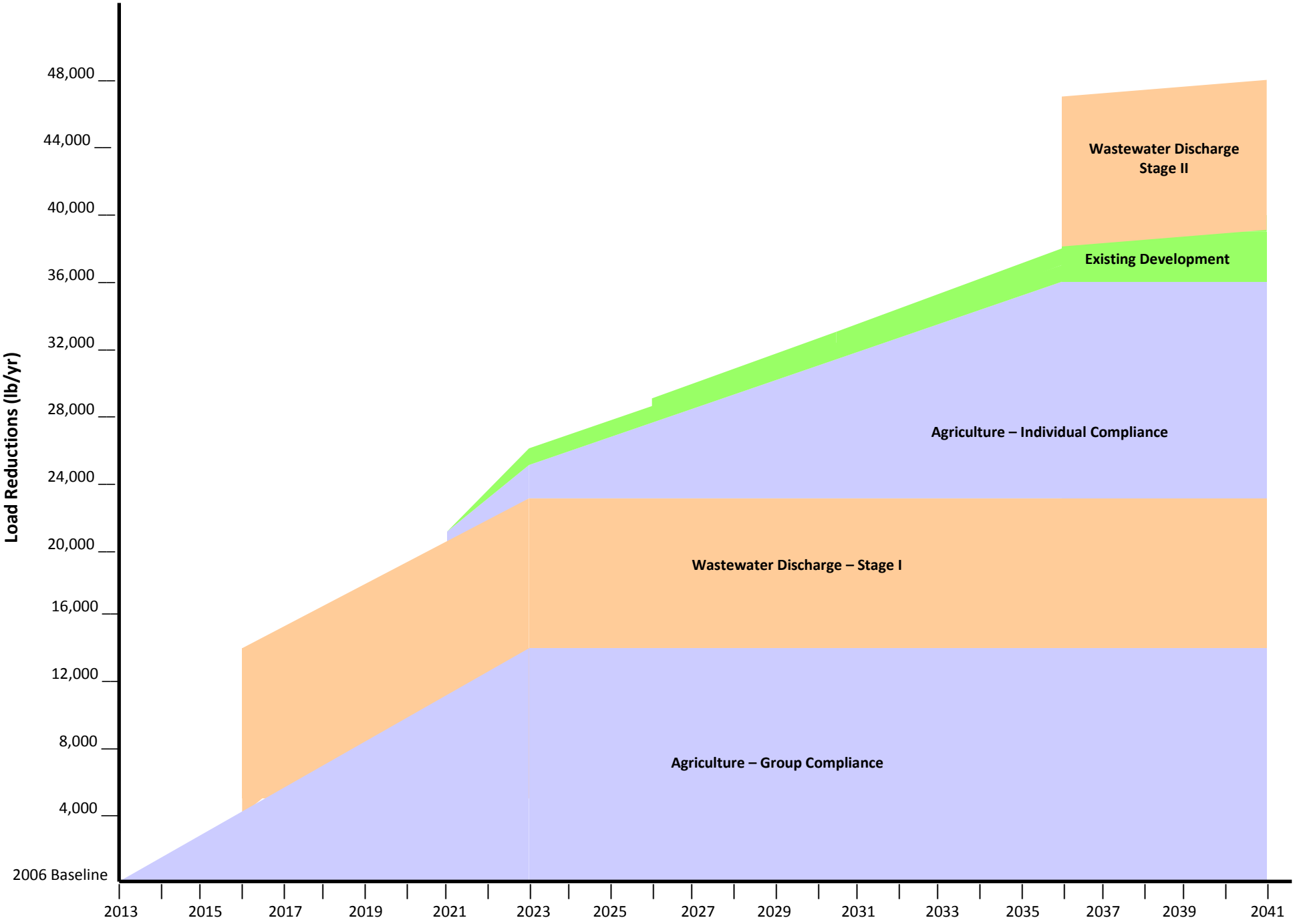


Chart C: Recommended nitrogen loading reductions

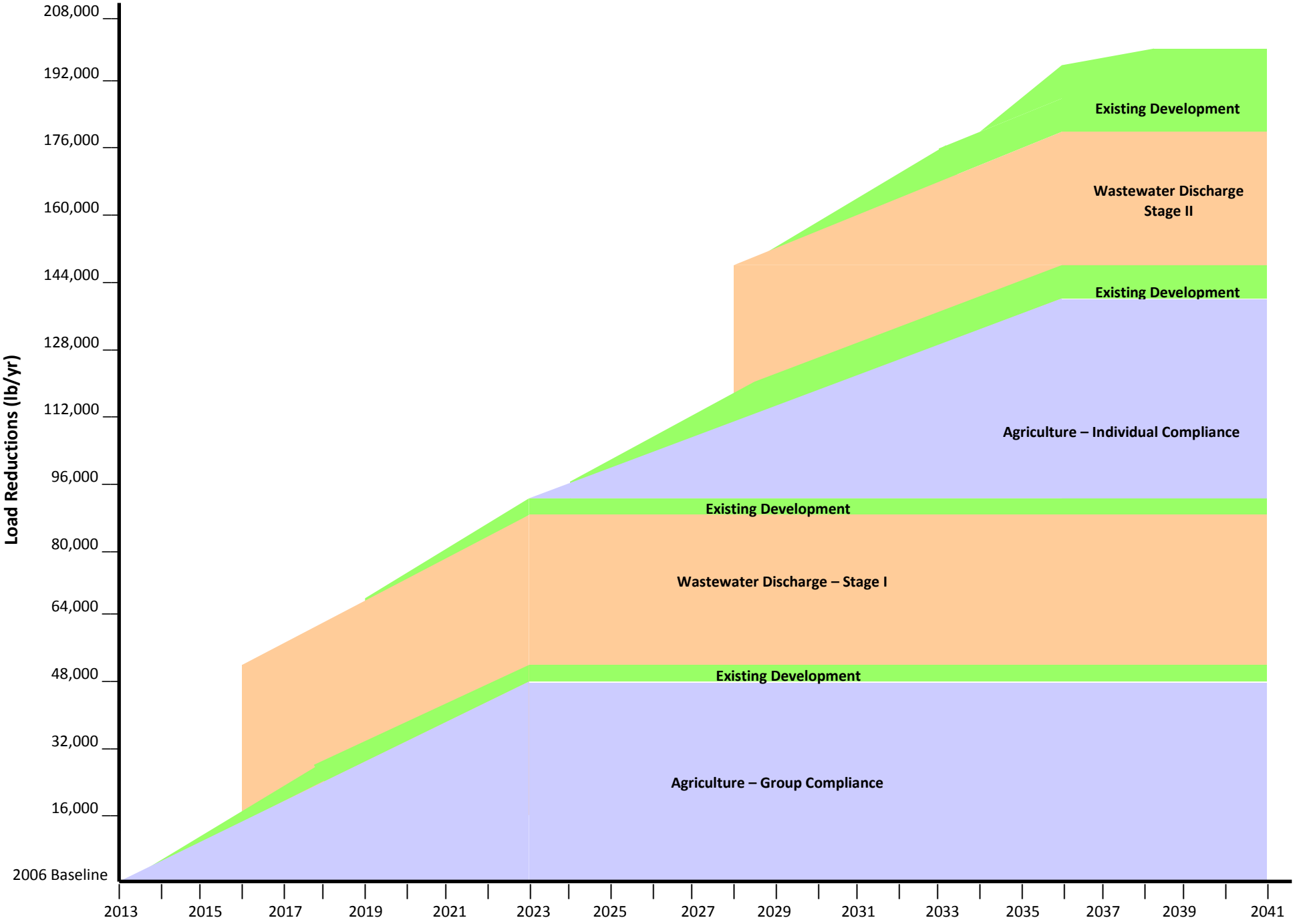


Chart D: Recommended phosphorus loading reductions

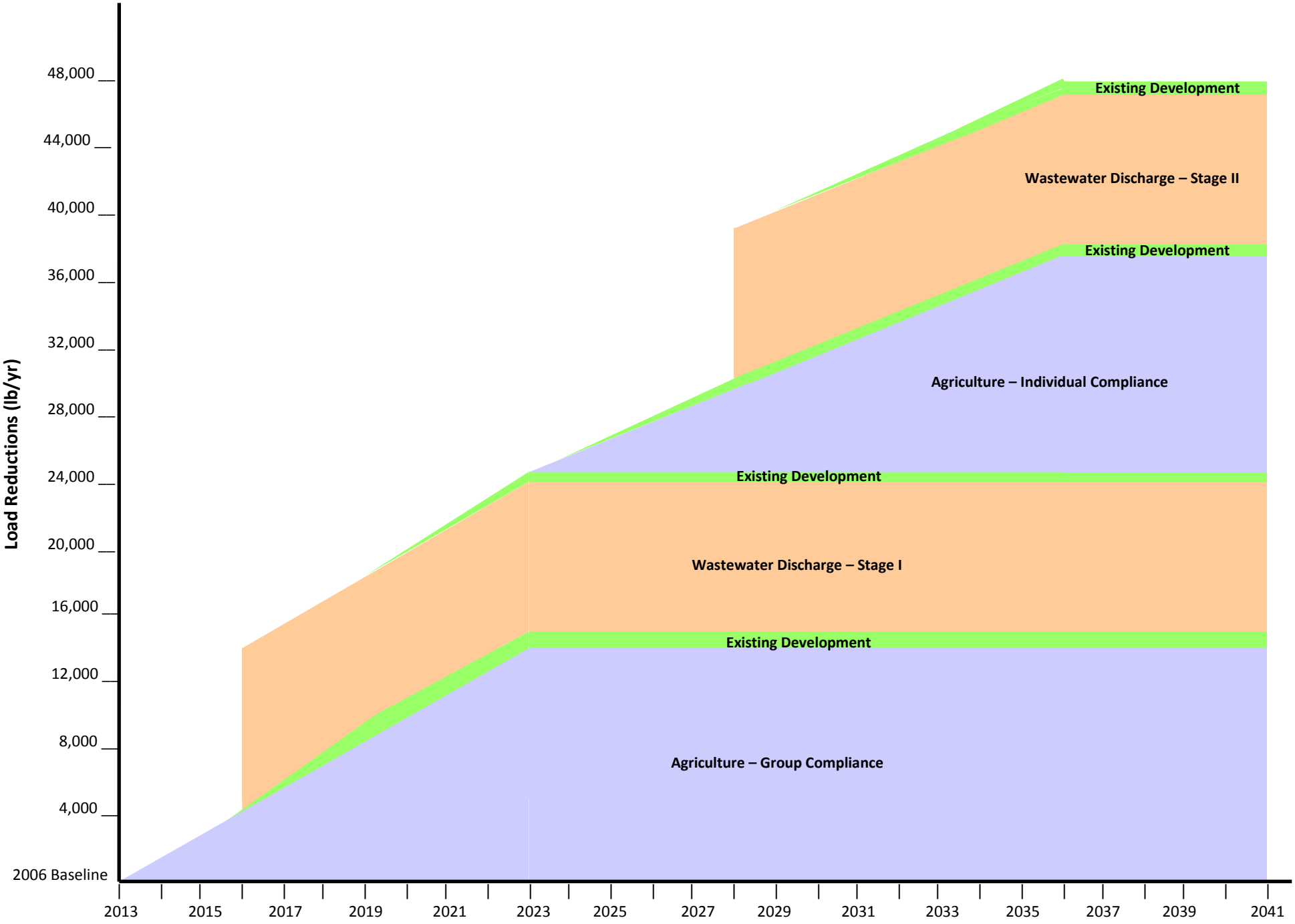


Chart E: Nitrogen loading reductions – comparison

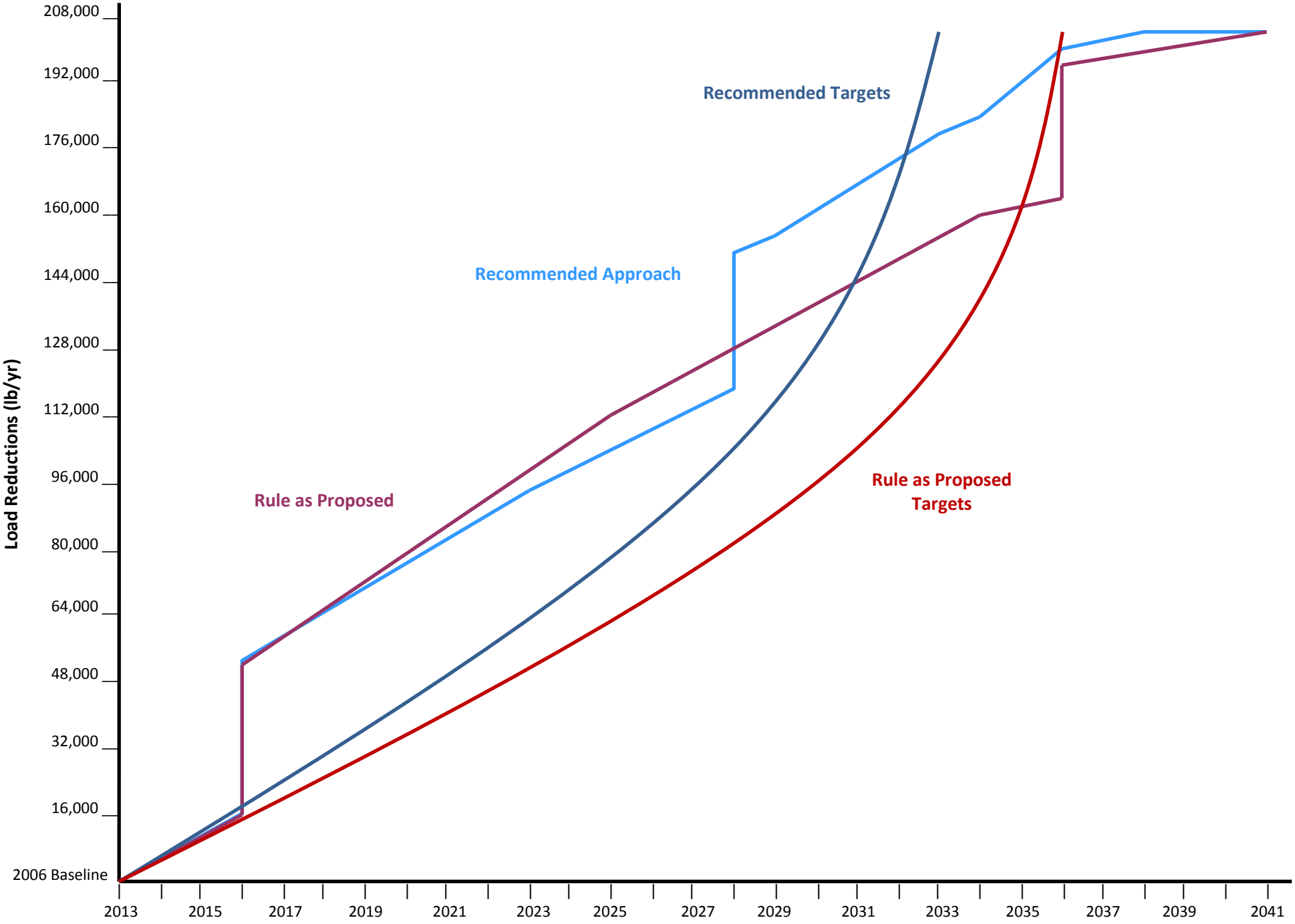
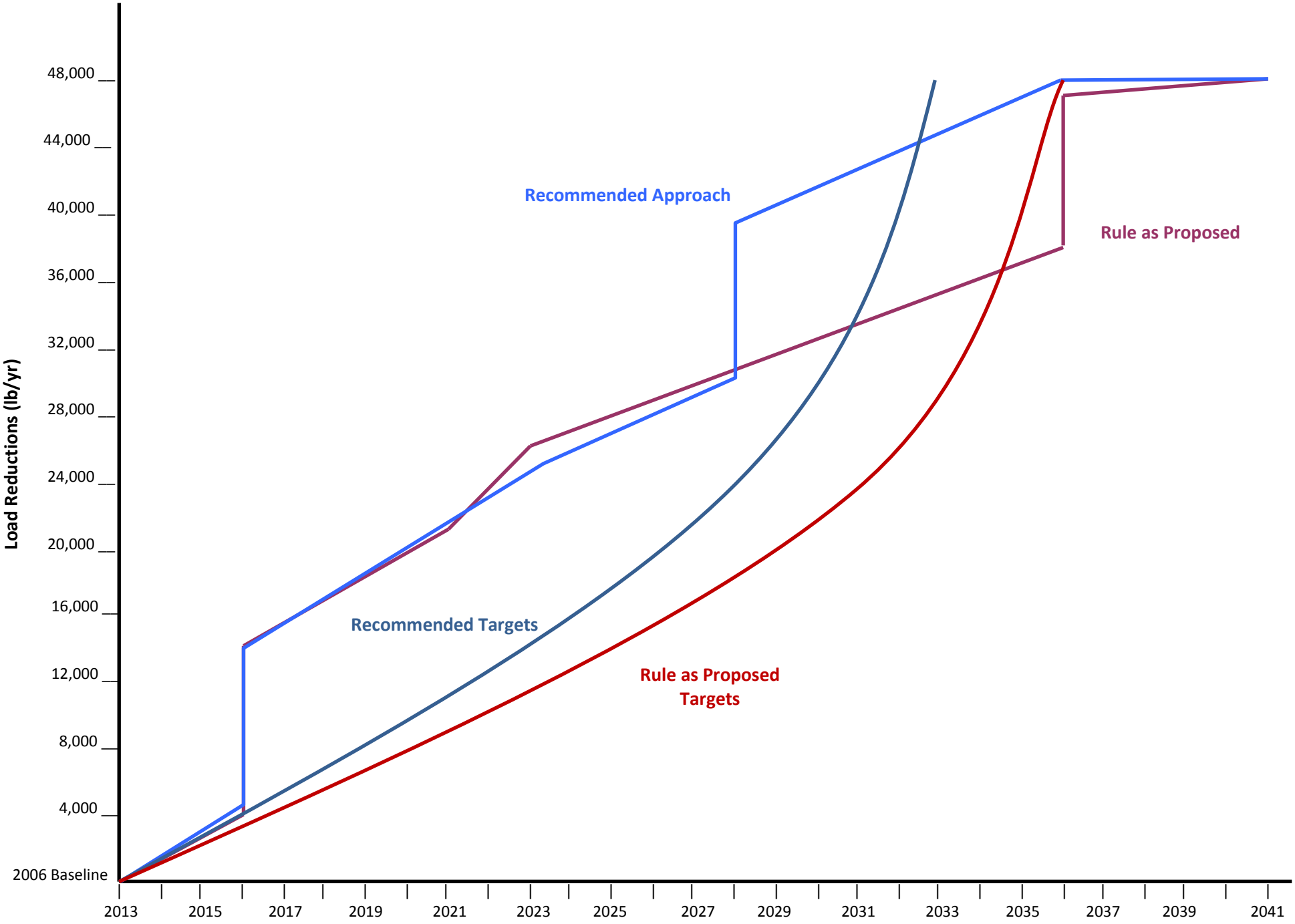


Chart F: Phosphorus Loading Reductions – comparison



Methodology for Nutrient Loading Reductions Graphs

In support of our comments on the Draft Falls Lake Rules (NC Register June 15, 2010), the North Carolina Conservation Network has prepared four graphs which illustrate the approximate timing and volume of load reductions that would be required. Two graphs show nitrogen (N) and phosphorus (P) reductions as described in the Draft Rules. Two graphs show N and P reductions using the stair step approach described in our comment letter. The following methodology describes how these graphs were produced. We think it likely that some of the numbers are not correct, but believe that their basic implications are accurate, and hope that the graphs are conceptually useful as the hearing officers review our and others' comments.

Loading to Lake – Existing Development and Agriculture

Using Figures III and IV (page iv) in the Fiscal Analysis for Proposed Nutrient Strategy for Falls of Neuse Reservoir (DWQ Planning Section June 11, 2010), we calculated baseline loading to the lake from each of the listed sources. Our graphs focus on existing development, wastewater discharge, and agriculture. Based on the information in Figure III, we calculated that of the baseline N loading to the lake (1018 kg/day = 819,154 lb/yr), existing development contributes 106,490 lb/yr (13%) and agriculture contributes 237,555 lb/yr (29%). We used a different method for determining point source contribution, as described below. From Figure IV, we calculated that total P loading to the lake is 76,447 lb/yr, with existing development contributing 3,822 lb/yr (5%) and agriculture contributing 35,165 lb/yr (46%).

Loading to Lake – Wastewater Discharge

We initially used the same process to calculate baseline loading from wastewater discharge, but ran into a problem. The rules prescribe ultimate mass load limits for dischargers in the upper watershed of 96,910 lb/yr of N and 5,403 lb/yr of P. When these quantities are subtracted from the baseline loading amounts that we calculated using Figures III and IV, the resulting reductions would have amounted to a 46% reduction in N discharges, which is inconsistent with the Rules' stated goals of a 40% reduction. This discrepancy might reflect loading from facilities in the lower watershed, but we did not feel confident making this assumption. Instead, we decided to work backwards from the mass limits. Assuming that 96,910 lb/yr is 60% of the baseline loading, we calculated that wastewater dischargers in the upper watershed contribute 161,517 lb/yr of N to the lake. Using the same methodology to calculate P loading, we obtained a baseline rate of 23,491 lb/yr.

Nutrient Reductions – Agriculture

The draft rules call for reductions of 20% of N loading and 40% of P loading (from baseline conditions) during Stage I. Using the rates calculated above, this requires a total reduction of 47,511 lb/yr of N and 14,066 lb/yr of P. Over the course of Stage II, agriculture must reduce its nutrient loading by an additional 47,511 lb/yr of N (40% of baseline) and 13,011 lb/yr of P (77% of baseline), for a total reduction over the 25 year life of the rule of 95,022 lb/yr of N and 27,077 lb/yr of P.

Our recommended timetable for agriculture differs from the draft rule's approach by pushing the potential initiation of individual compliance back two years, to 2023.

Nutrient Reductions – Existing Development

Implementation in the Draft Rule

As written, local governments spend Stage I reducing loading back to baseline levels. Because the rules are designed to achieve reductions of N and P relative to the baseline, this (reductions relative to the baseline) is what is shown in the graphs. Accordingly, the graphs show no reductions from existing development during Stage I.

During Stage II, local governments are to prepare and implement a load reduction program beginning in 2021 and update it every five years thereafter (in 2026, 2031, and 2036). We assumed that the needed reductions would begin accruing at the beginning of each of these periods, be completely achieved before the next period began (i.e. within five years), and would not degrade over time. For convenience, we divided the total reductions needed evenly among the five-year periods. The total reductions required from existing development over the life of the rule are 42,596 lb/yr N and 2,943 lb/yr P, resulting in four subsequent reductions of 10,649 lb/yr N and 736 lb/yr P each.

Recommended Implementation

Our comments recommend that local governments begin work gradually but immediately on the total reductions needed from existing development, rather than waiting to begin on them until Stage II. In keeping with the design of the draft rules, we propose that local governments prepare and implement load reduction programs that are updated every five years; however, we suggest they begin in 2014. Using the same assumptions described in the paragraph above, this results in the following reductions: 5,325 lb/yr N (5%) and 764 lb/yr P (20%) in 2014; 5,325 lb/yr N (5%) and 573 lb/yr P (15%) in 2019; 10,649 lb/yr N (10%) and 573 lb/yr P (15%) in 2024; 10,649 lb/yr N (10%) and 573 lb/yr P (15%) in 2029; and 10,649 lb/yr N (10%) and 459 lb/yr P (12%) in 2034. The disparity in curves between nitrogen and phosphorus reductions reflects our belief that significant reductions in phosphorus may be available at low cost early in the implementation period through adoption of ordinances restricting phosphorus application; while similar fast reductions may not be so readily available for nitrogen.

Nutrient Reductions – Wastewater Discharge

The draft rules provide separate mass load limits for facilities discharging < 1 MGD and those discharging $\geq$ 1 MGD. Our graphs do not show this distinction, and instead look at the collective allocations and reductions for facilities in the upper watershed. For convenience, the graphs do not show any of the load reductions that would accrue from facilities in the lower watershed, as these facilities are much smaller and are given concentration limits.

During Stage I, regulated facilities in the upper watershed must reduce their collective nutrient discharges by a total of 32,304 lb/yr N and 9,395 lb/yr P. Stage II requires additional reductions of 32,303 lb/yr N and 8,693 lb/yr P. This amounts to a total reduction of 64,607 lb/yr N and 18,088 lb/yr P over the life of the rule.

Our recommended approach for wastewater discharge differs from the draft rule by implementing the Stage II reductions eight years earlier, in 2028.

Table 1: Comparison of timelines for Falls Lake rule implementation

	Two stage approach	Stair step approach
2011	Riparian buffers already in place	
2012	Local govts adopt new-d ordinances	
2013	Agriculture starts collective compliance Fertilizer plans or training deadline	
		DWQ report to EMC/ Neuse basinwide plan
2014	Local govts start existing D stage I State & fed start existing D stage I	Local govts start existing D (target: 3% N, 15% P) State & fed start existing D
2015		*Beaverdam and NEU019P*
2016	Point source Stage 1 reductions	
	DWQ report to EMC	
2017		
2018	*Option A: lower half in compliance* [CP Proposed re-evaluation]	*Lower half (NEU019E, L)* DWQ report to EMC/ Neuse basinwide plan [evaluation limited to point source stage 2 upgrades?]
2019		Local govt existing D five year plan (6% N, 25% P)
2020		
2021	*Option B: lower half in compliance* 'Stage 2' starts Local govts start existing D stage 2 Ag may begin individual compliance DWQ report to EMC	
2022		
2023		*Lick Creek (NEU018E)* DWQ report to EMC/ Neuse basinwide plan Ag may begin individual compliance
2024		Local govt existing D five year plan (12% N, 35% P)
2025		

2026	*Lick Creek* Local govt existing D five year plan DWQ report to EMC	
2027		
2028		*Ledge & Little Lick Creek* DWQ report to EMC/ Neuse basinwide plan Point source Stage 2 reductions
2029		Local govt existing D five year plan (21% N, 50% P)
2030		
2031	*Ledge & Little Lick Creek* Local govt existing D five year plan DWQ report to EMC	
2032		
2033		*I-85 crossing (NEU013B)* DWQ report to EMC/ Neuse basinwide plan
2034		Local govt existing D five year plan (32% N, 70% P)
2035		
2036	*I-85 crossing* Point source Stage 2 reductions Local govt existing D five year plan DWQ report to EMC	
2037		
2038		*NEU010, ELL10* DWQ report to EMC/ Neuse basinwide plan
2039		Local govt existing D five year plan (40% N, 77% P)
2040		
2041	*Full lake*	*Full Lake*