USDA Forest Service National BMP Program: Implementation and Monitoring Results

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Objectives of the Forest Service National BMP Monitoring Program

Aerial view of Aquatic Management Zone adjacent to a clearcut, Tongass National Forest, Alaska
Photo credit: USDA Forest Service

Establish a consistent process to monitor and evaluate Forest Service efforts to implement BMPs and the effectiveness of those BMPs at protecting water quality at national, regional, and forest scales

Establish a consistent and creditable process to document and report BMP implementation and effectiveness

The monitoring program includes: 42 monitoring protocols, a data management system and a scoring/rating system

Structure of the Forest Service National BMP Monitoring Program

Monitoring sites are selected according to direction in the protocol instructions

Most sites are randomly selected

Sites are evaluated for BMP implementation first and then BMP effectiveness

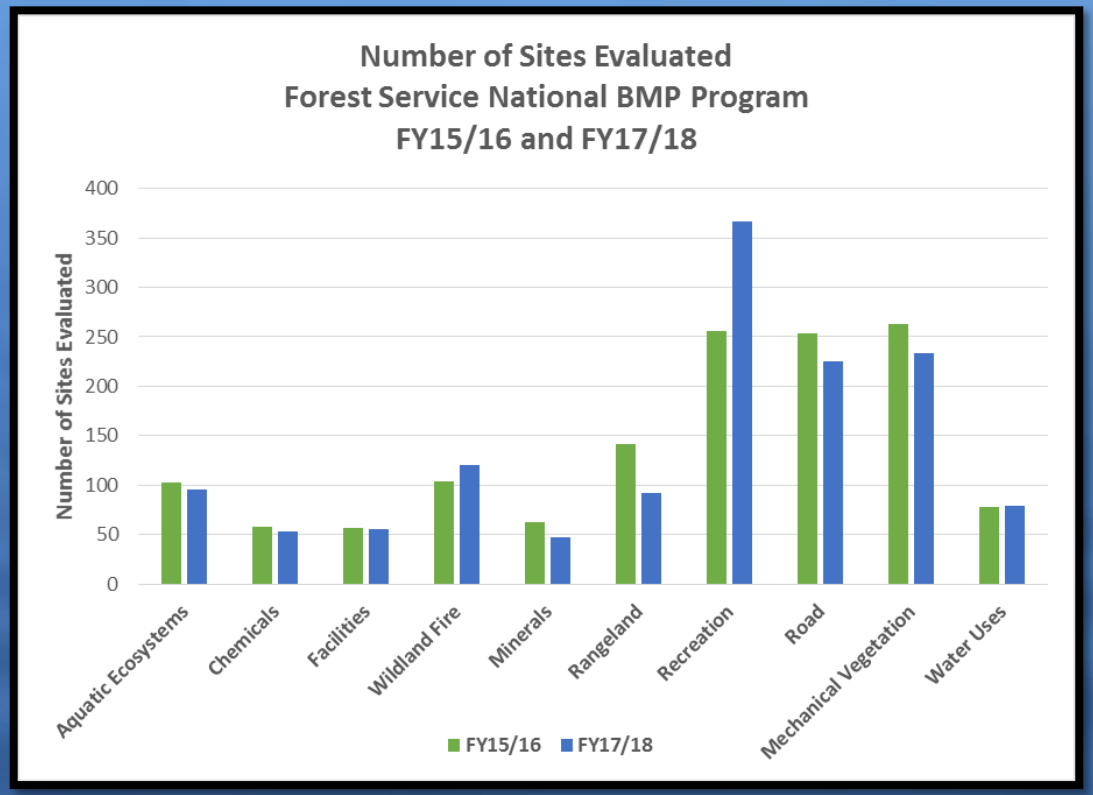
Each administrative unit completes a small number of site evaluations each year

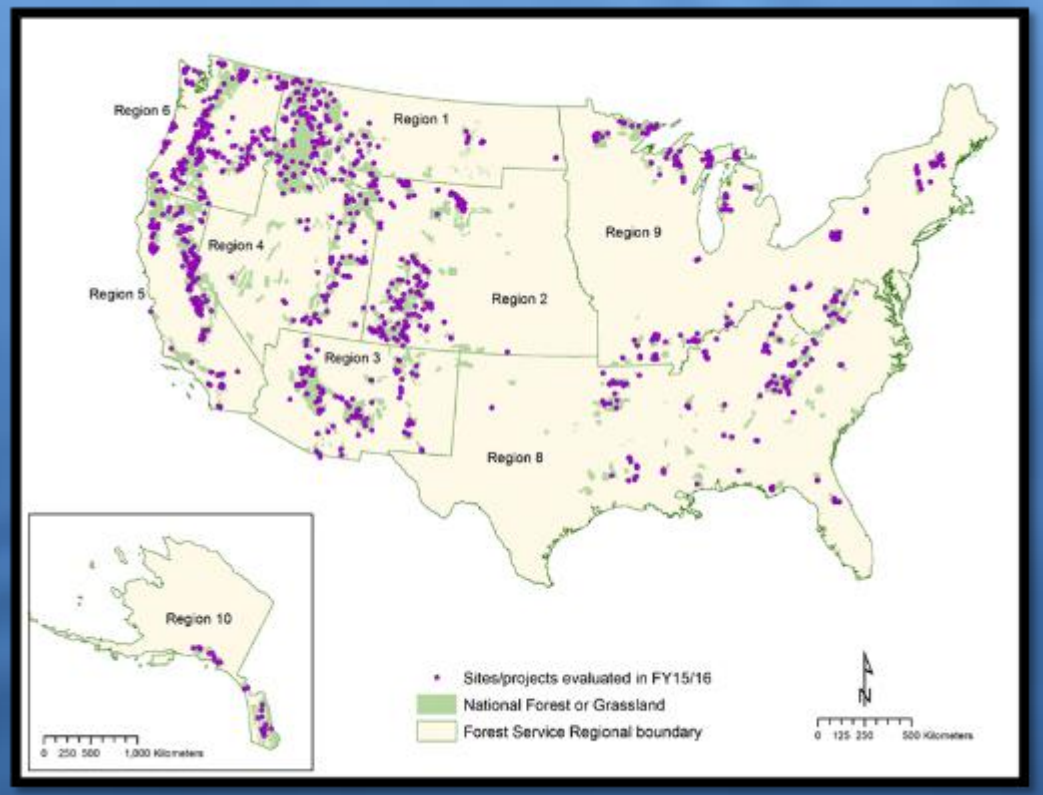
Data will be aggregated and analyzed at larger scales

Restoration of a ford stream crossing and replacement with a bridge on a snowmobile trail, Green Mountain National Forest, Vermont
Photo credit: USDA Forest Service

Reporting Period	Number of Sites Evaluated	Percentage of Sites Randomly Selected	Percentage of Administrative Units Participating
FY15/16	1,394	77	95
FY17/18*	1,368	79	94

* FY17/18 data is provisional





Implementation Rating – were site-specific BMP prescriptions implemented as designed or planned?

Implementation Rating	Interpretation
Fully Implemented	Prescriptions are identified in project planning documents, All prescriptions are translated into action documents, All specified prescriptions are implemented fully, and All necessary corrective actions identified during the project are implemented fully.
Mostly Implemented	Prescriptions are identified in project planning documents, Some prescriptions are translated into action documents, All specified prescriptions are implemented fully, and All or Some necessary corrective actions identified during the project are implemented fully.
Marginally Implemented	Prescriptions are identified in project planning documents, All or Some prescriptions are translated into action documents, and Some specified prescriptions are implemented fully, and All or Some necessary corrective actions identified during the project are implemented fully.
Not Implemented	Prescriptions are identified in project planning documents, No prescriptions are translated into action documents, or No specified prescriptions are implemented fully, or No necessary corrective actions identified during the project are implemented.
No BMPs	Site-specific BMP prescriptions were not developed or identified during project planning.

Planning

On-the-ground Execution

Project Oversight

Implementation Rating

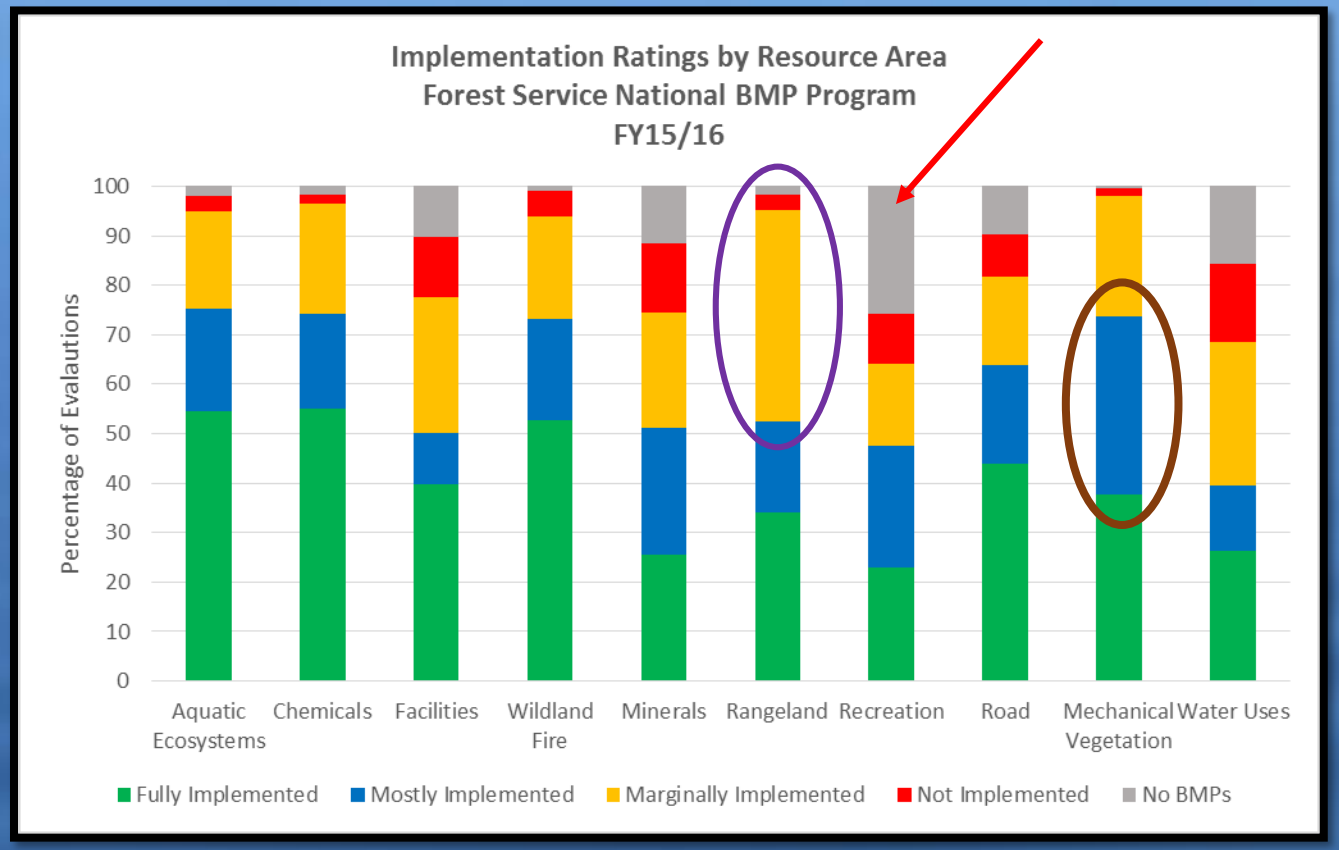
Implementation Rating	Planning	On-the-ground Execution	Project Oversight
Fully Implemented (all are true)	All	All	All
Mostly Implemented* (all are true)	Some	All	All or Some
Marginally Implemented (all are true)	All or Some	Some	All or Some
Not Implemented (any one is true)	None	None	None
No BMPs	No BMPs	--	--

* Combination of: Planning = All, On-the-ground Execution = All, and Project Oversight = Some is also Mostly Implemented

Interpretation of "Marginally Implemented" rating is the deficiency was primarily in the On-the-ground Execution phase and not all site-specific BMPs in the project implementing documents were implemented fully on-the-ground.

Interpretation of "Mostly Implemented" rating is the deficiency was in the Planning phase and all site-specific BMPs in the project implementing documents were implemented fully on-the-ground.

FY15/16 Implementation Ratings

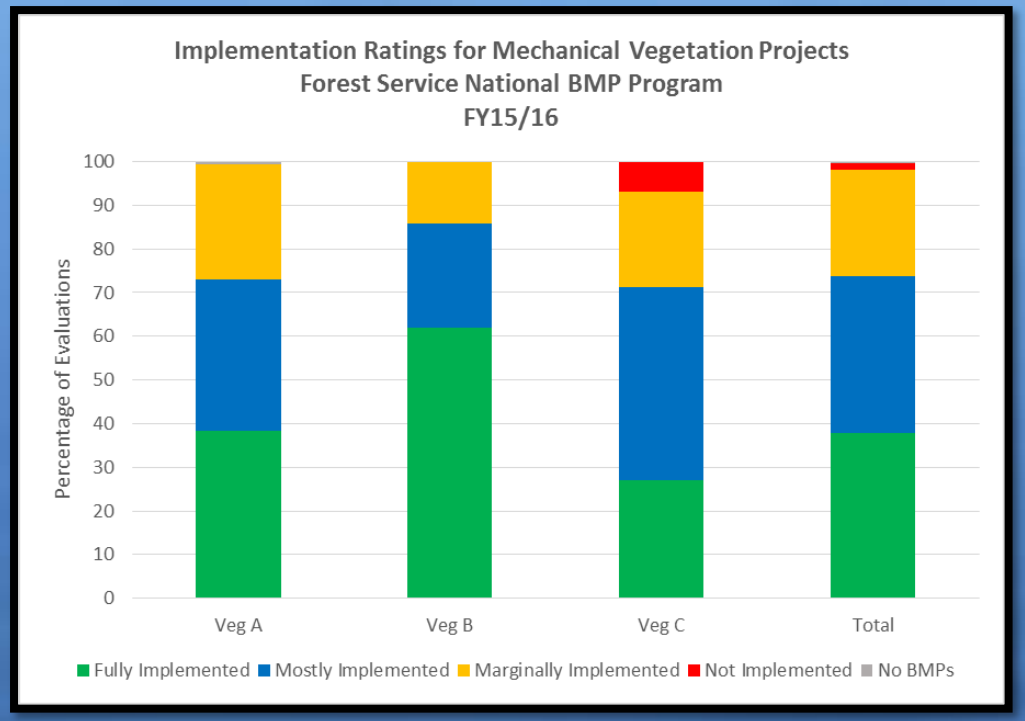


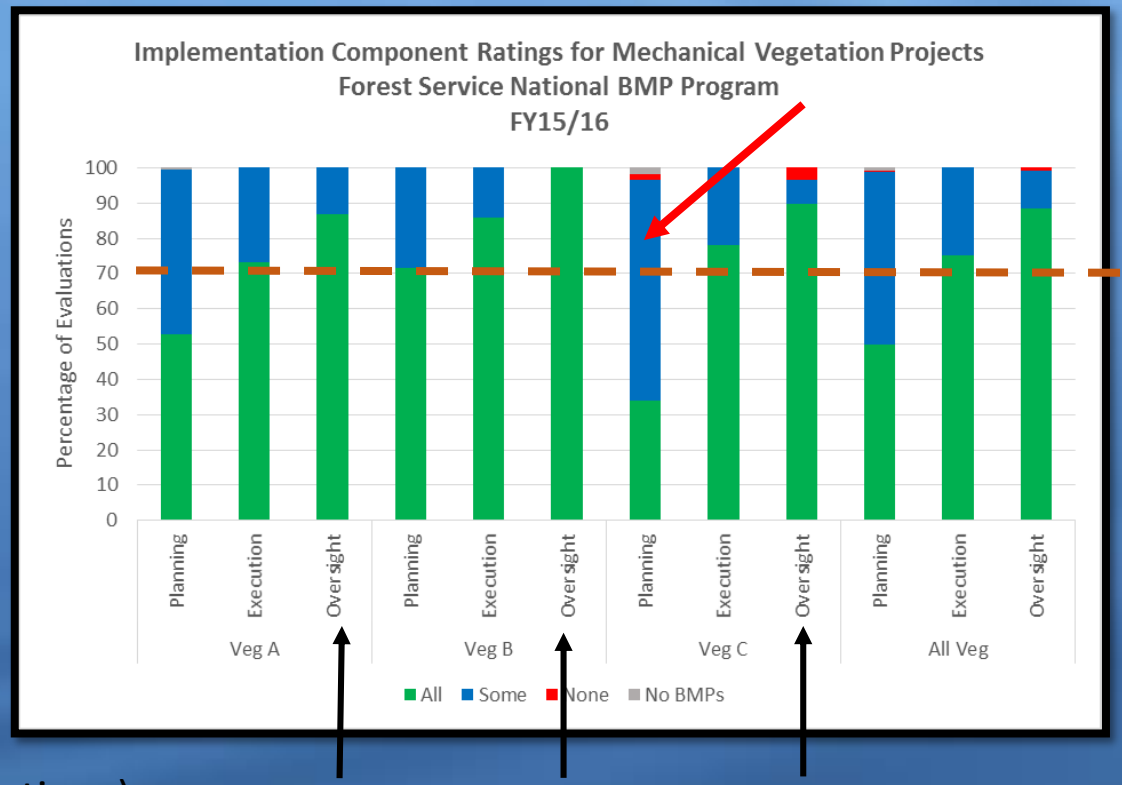
Resource areas with high percentage of "No BMPs" primarily existing facilities that may not have had recent planning efforts

Resource areas with high percentage of "Marginally Implemented" indicates deficiency in On-the-ground Execution

Resource areas with high percentage of "Mostly Implemented" indicates deficiency in Planning

Mechanical Vegetation Implementation Rating





Veg A – Ground based skidding and harvesting projects (182 evaluations)
Veg B – Cable or aerial yarding projects (21 evaluations)
Veg C – Mechanical site treatment projects (59 evaluations)

Project Oversight is pretty good

On-the-ground Execution above 70 %

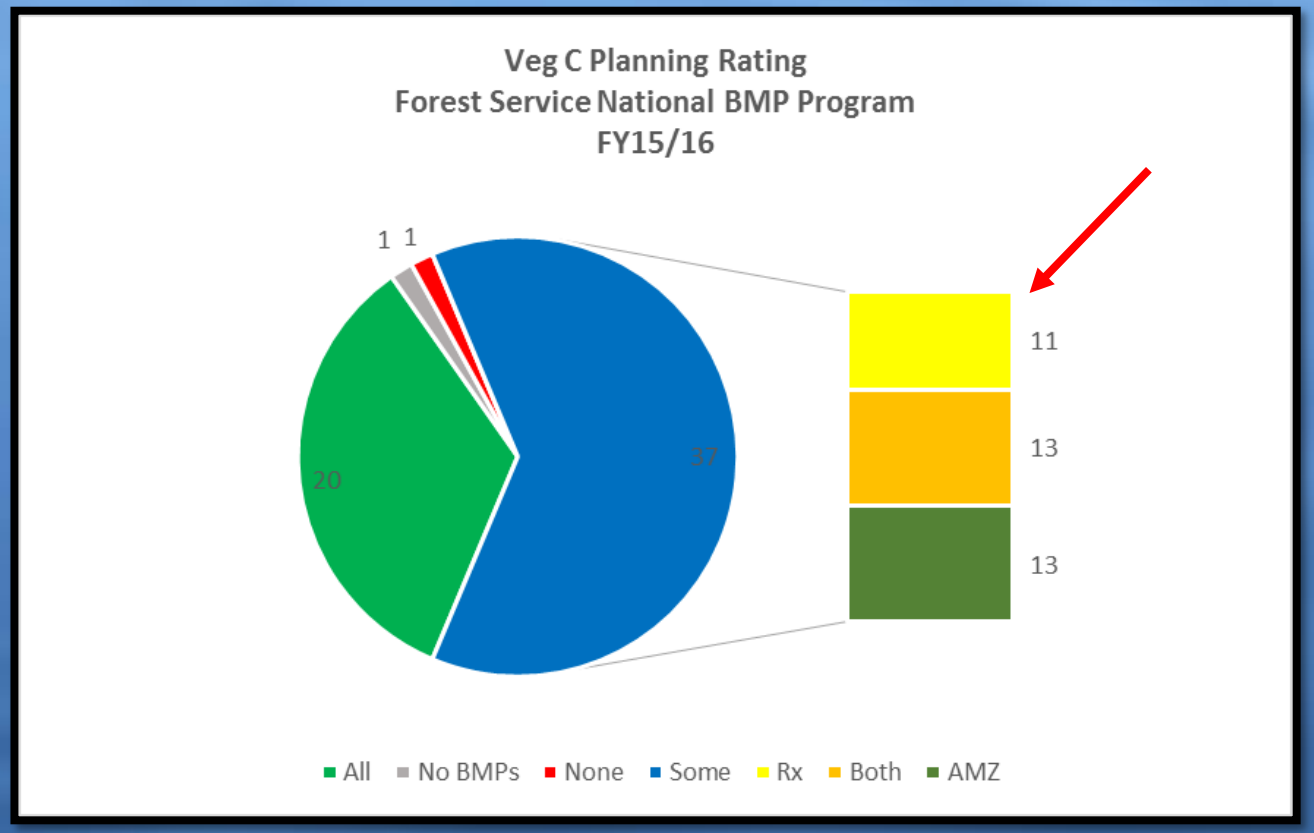
Veg C is deficient in Planning

Veg C Planning Rating

Two factors in the Veg C Planning Rating:

BMPs prescribed in the planning documents and included in the contract (Rx)

Aquatic Management Zone (AMZ) marked on the sale area map or on-the-ground as required



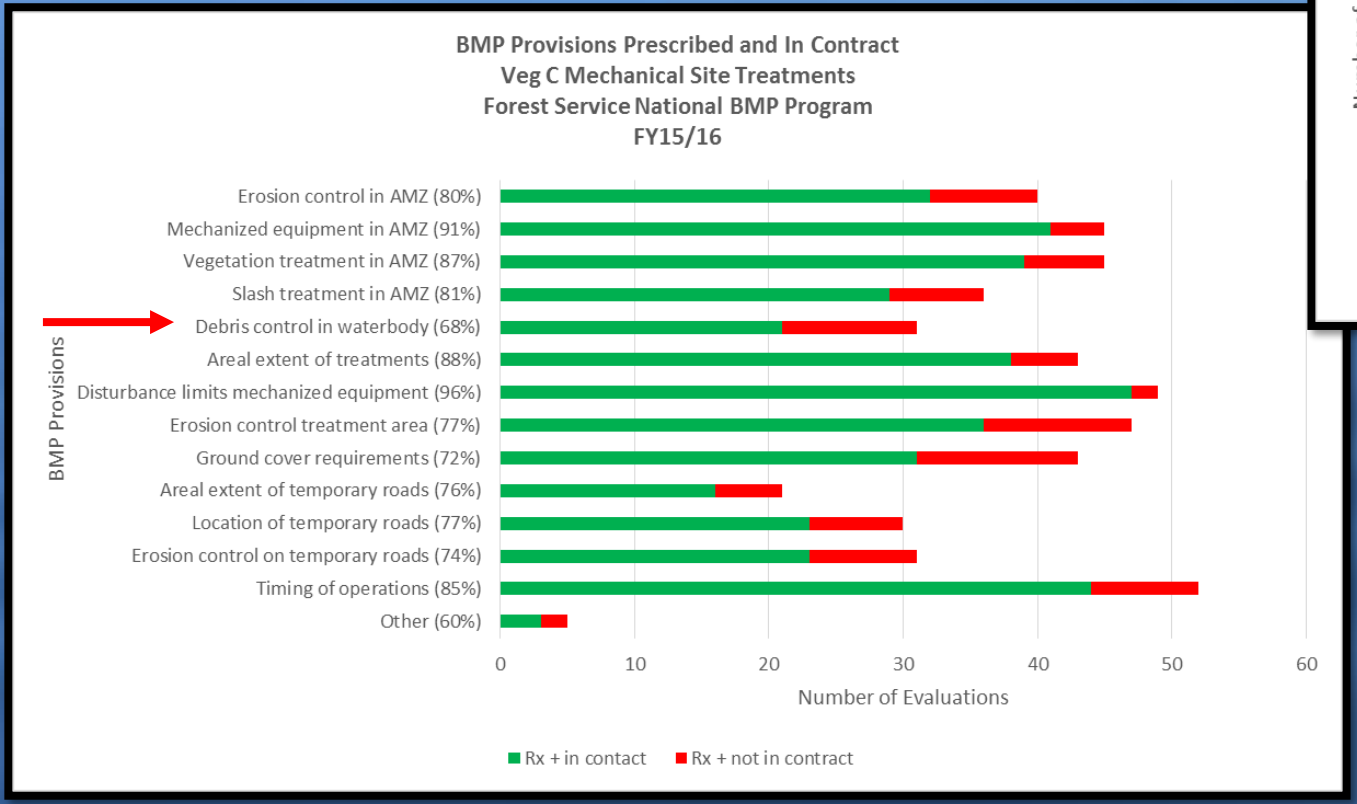
About 1/3 of the 59 Veg C evaluations have no deficiency in Planning

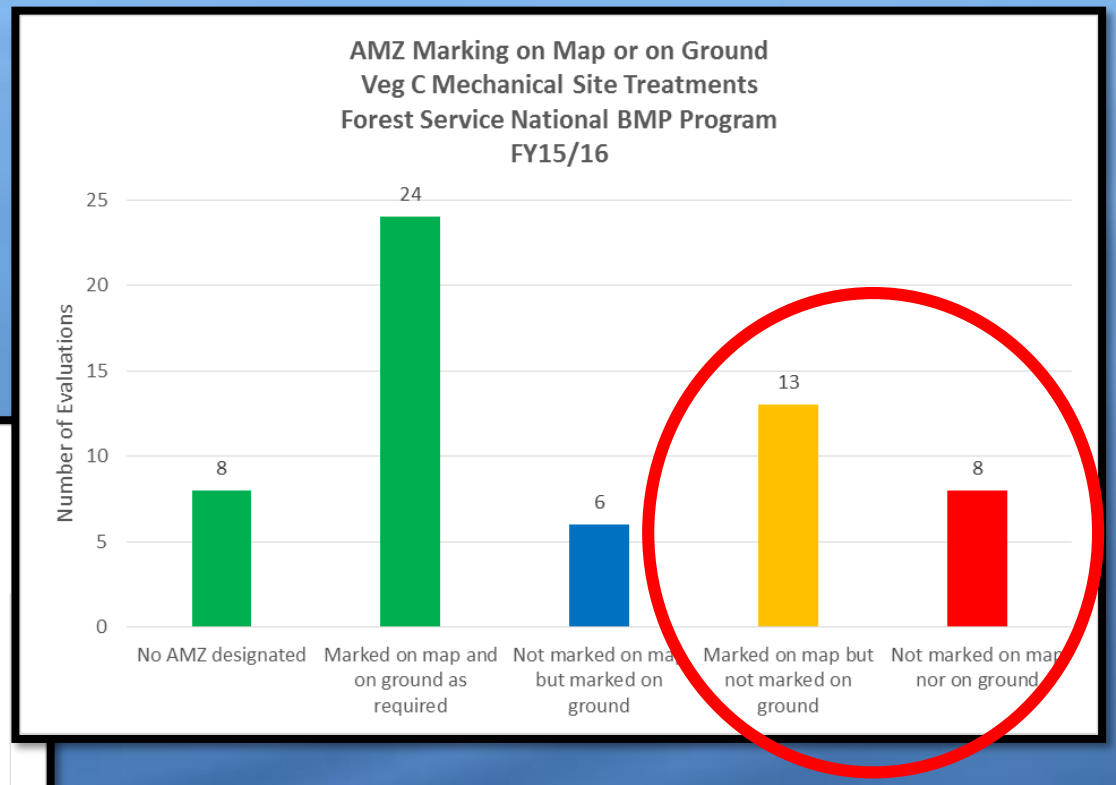
2/3 of evaluations have deficiency in Planning
These are evenly split between those evaluations where the deficiency is in BMPs translated into the contract (Rx), those where the deficiency is in marking the AMZ (AMZ) and those where there are deficiency in both Rx and AMZ (Both)

Veg C Planning Rating

We can see which BMP provisions are most often prescribed but not translated into the contracts or plans

Debris control in the waterbody BMPs were not included in 1/3 of the contracts when prescribed





We can see if the AMZ was not marked on the sale map or if it was not marked on the ground.

78 % of evaluations where there is a deficiency in AMZ marking – the AMZ was not marked on the ground as required.

Effectiveness Rating – Was water quality protected?

Effectiveness Rating	Interpretation	
Effective	No pollutants reached in the water and there is no potential threat evident --and-- No adverse effects to waterbody from the project or activity (e.g. physical disturbance)	
Mostly Effective	Minor amounts of pollutants reached the waterbody or there is a potential threat evident --and/or-- Waterbody received minor adverse effects from the project or activity --and— Impacts to water quality are temporary, lasting less than one year	
Marginally Effective	Minor amounts of pollutants reached the waterbody or there is a potential threat evident --and/or-- Waterbody received minor adverse effects from the project or activity --and-- Impacts to water quality are prolonged, lasting more than one year	Major amounts of pollutants reached the waterbody or there is a potential threat evident --and/or-- Waterbody received major adverse effects from the project or activity --and-- Impacts to water quality are temporary, lasting less than one year
Not Effective	Major amounts of pollutants reached the waterbody or are very close to entering the waterbody --or-- Waterbody received major adverse effects from the project or activity --and-- Impacts to water quality are prolonged, lasting more than one year	

Effective: ***No Evidence*** **of effects**

Mostly Effective: **Observed effects are *Minor* and *Temporary***

Marginally Effective: **Observed effects are *Minor* and *Prolonged* OR *Major* and *Temporary***

Not Effective: **Observed effects are *Major* and *Prolonged***

Effectiveness Rating – Erosion and Sedimentation

Erosion and Sedimentation Effectiveness Rating	Interpretation
Effective	No evidence of erosion OR Small or moderate amounts of erosion (sheet or rill erosion) far (> 50 ft) from the waterbody
Mostly Effective	Small amounts of erosion (sheet or rill erosion) very near (< 10 ft) or in the waterbody
Marginally Effective	Large amounts of erosion (gully or mass wasting) far from the waterbody OR Moderate amounts of erosion very near or in the waterbody
Not Effective	Large amounts of erosion very near or in the waterbody

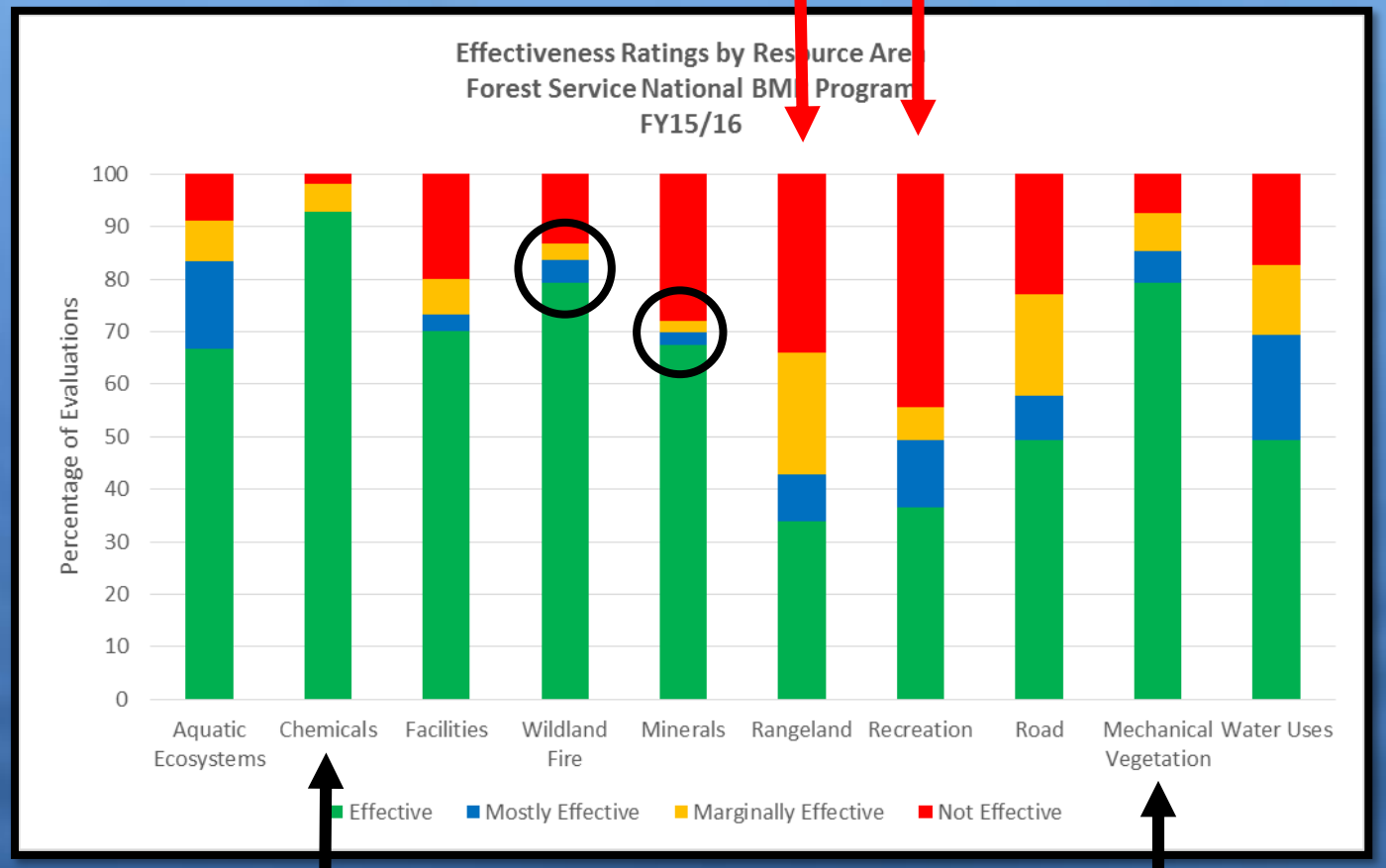
Effectiveness Rating – Components

Each protocol has several Effectiveness Components – combinations of pollutant and locations in the project area

Rec A Developed Recreation Sites	MoE	Road C Road Operation and Maintenance	E	Veg A Ground-based Skidding and Harvesting	NE
▪ Erosion along the Waterbody	E	▪ Waterbody Crossing Condition	E	▪ Waterbody Protection (Physical Damage)	MoE
▪ Trash/Waste along the Waterbody	MoE	▪ Erosion along Road Segment	E	▪ Erosion in the AMZ	E
▪ Erosion along Trails	E	▪ Chemicals and Fuels	E	▪ Erosion on the Skid Trails	NE
▪ Trash/Waste along Trails	E			▪ Erosion at the Landing	E
▪ Chemicals and Fuels	E			▪ Erosion at Waterbody Crossing	MoE
				▪ Chemicals and Fuels	E

Each Effectiveness Component is rated separately and the overall Effectiveness Rating is generally the “worst” of the individual Effectiveness Component ratings

FY 15/16 Effectiveness Ratings

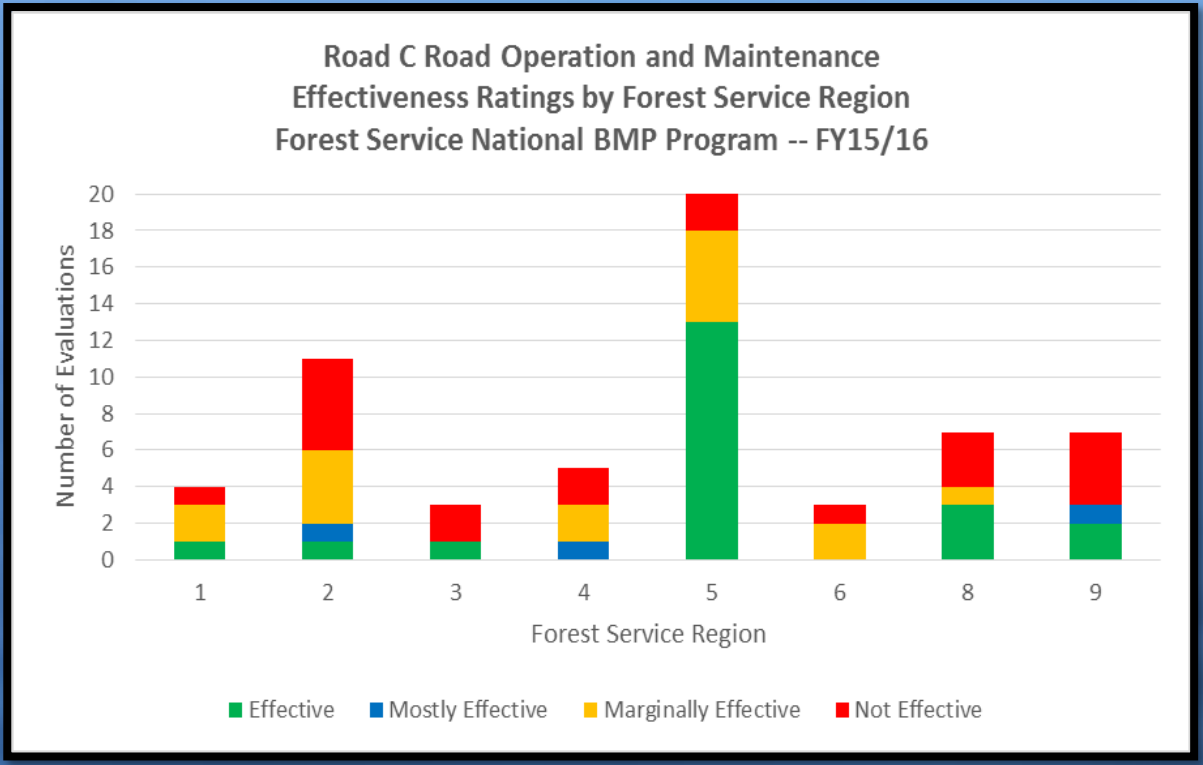


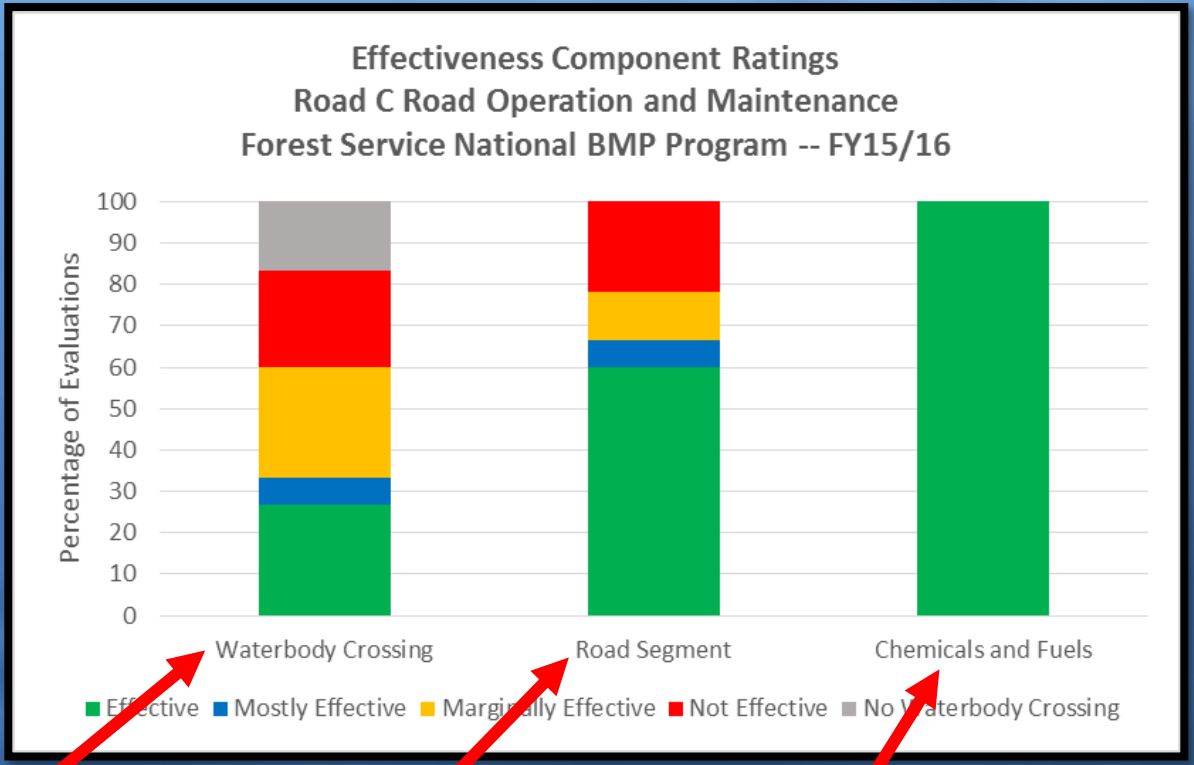
High percentage of “Effective” or “Mostly Effective” ratings

Effectiveness Ratings are either “Effective” or “Not Effective” with not a lot in the middle

High percentage of “Not Effective” or “Marginally Effective” ratings

Effectiveness Rating
Road C Road Operation and Maintenance



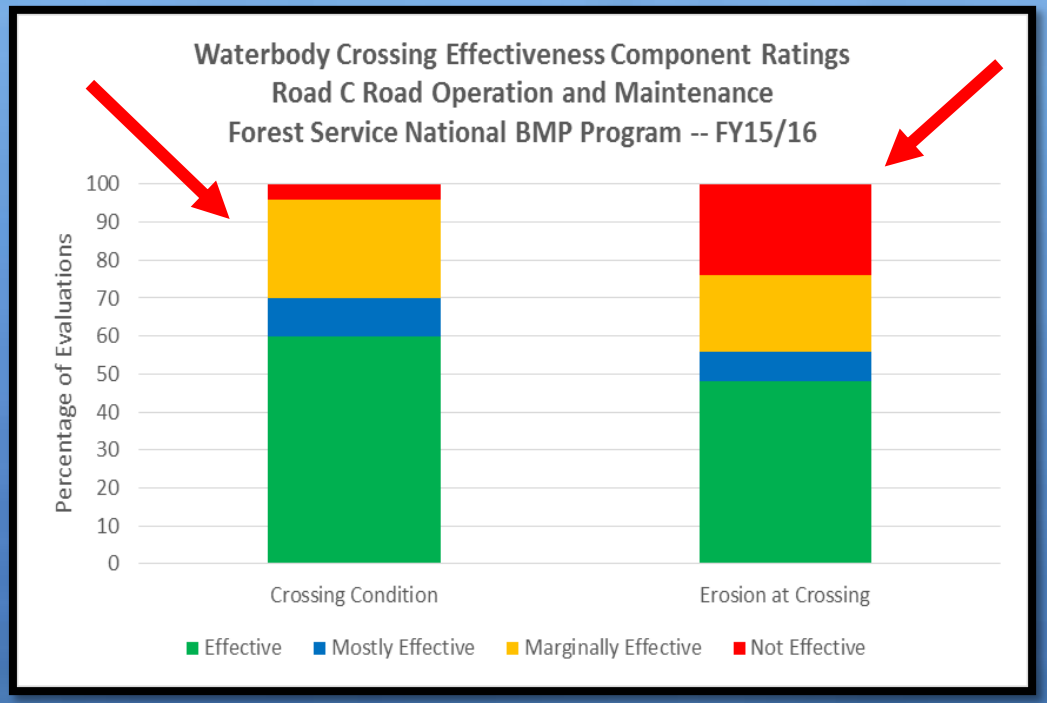


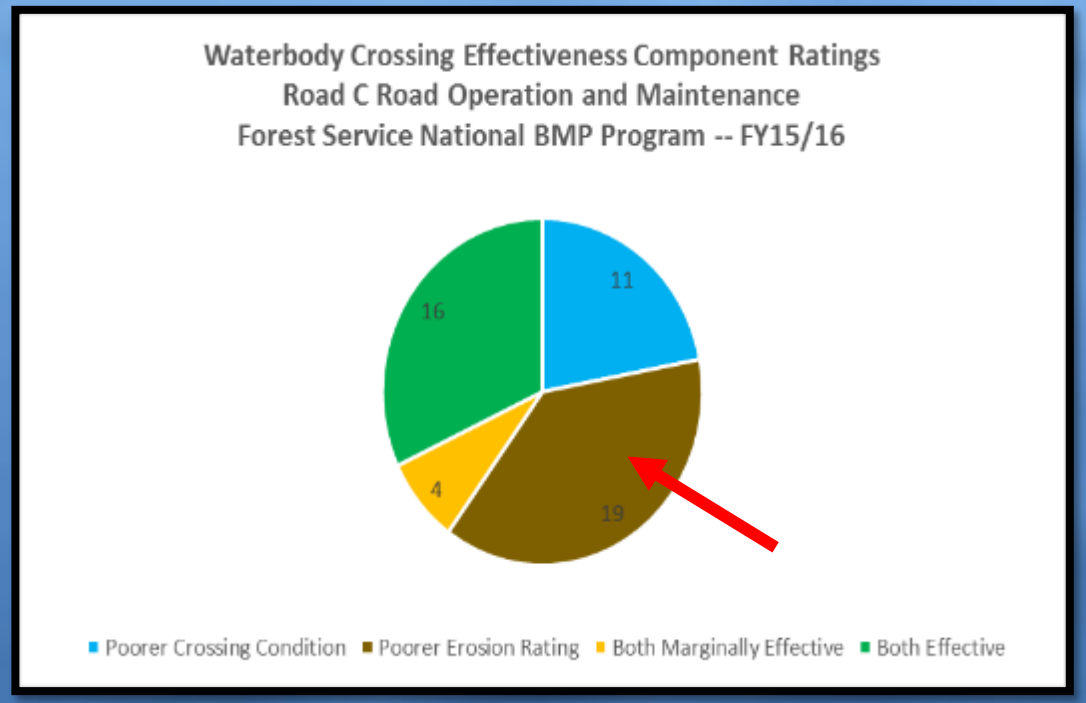
Condition of waterbody crossing

Erosion from road segment

Evidence of chemical or fuel spills

Road C Waterbody Crossing Effectiveness Component Rating



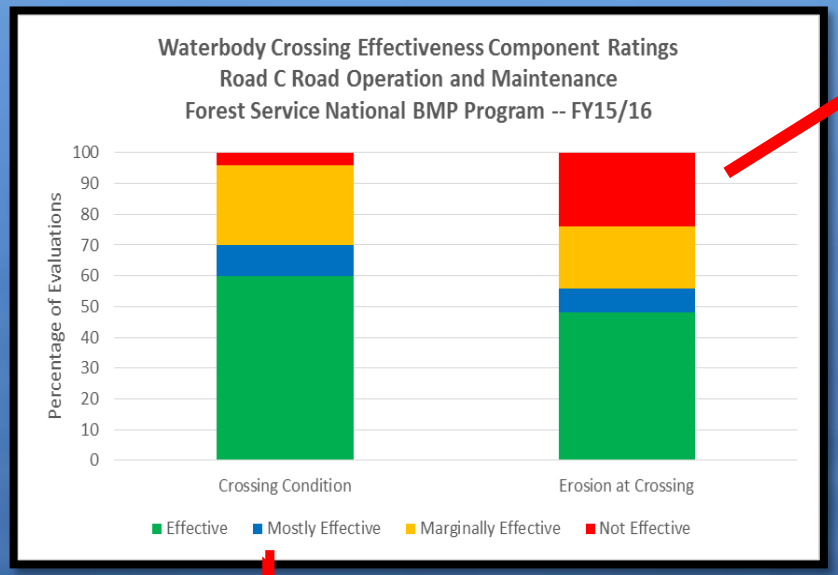


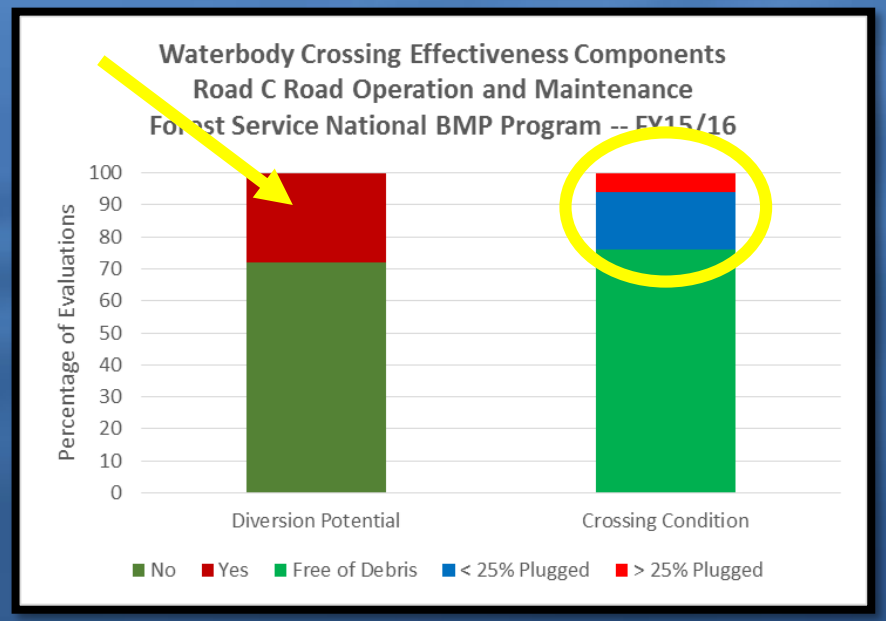
Waterbody crossing has two components: Crossing structure condition and Erosion at the waterbody crossing.

More evaluations had poorer Erosion ratings than Crossing Condition ratings

Road C Waterbody Crossing Effectiveness Component Rating

Erosion Observed	Type of Erosion Observed	Source of Erosion	Cause of Erosion
No Evidence (22 evaluations)	Localized sediment deposits in waterbody (16)	Road/crossing surface (23)	Drainage maintenance (13)
Within AMZ (14)	Traceable evidence to, but not in, waterbody (14)	Ditch (8)	Drainage spacing (11)
In Waterbody (14)	Rill erosion (11)	Waterbody bank or bed (4)	Lack of surface maintenance (9)
	Sheet erosion (10)	Drainage feature (4)	Lack of ditch maintenance (9)



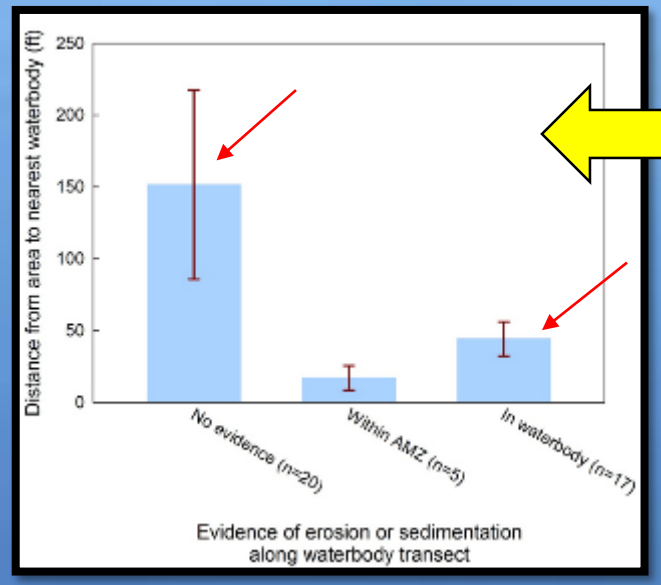


If BMPs were implemented, were they effective?

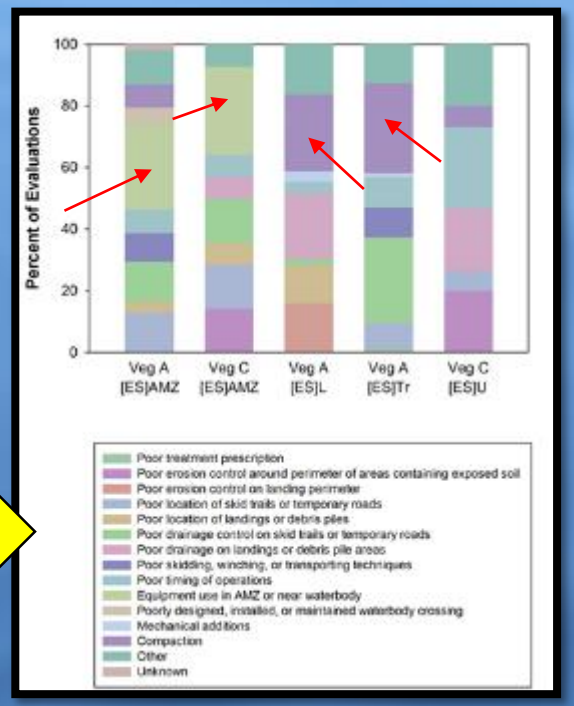
Veg A		Implementation Rating				
		Fully Implemented	Mostly Implemented	Marginally Implemented	Not Implemented	No BMPs
Effectiveness Rating	Effective	65 %		16 %		
	Mostly Effective					
	Marginally Effective	8 %		11 %		
	Not Effective					

Veg A Ground-based Skidding and Harvesting Evaluations completed in FY15/16

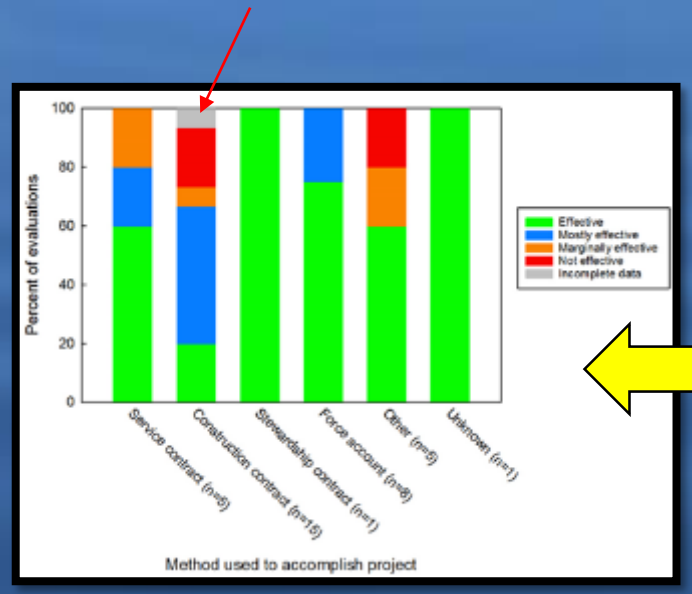
More examples of “mining” the BMP monitoring data



Mean distance between the dispersed recreation site by evidence of erosion observed along the waterbody (National FY15/16 data): Rec sites closer to a waterbody have greater amounts of erosion observed in the waterbody.



Causes of erosion observed in mechanical vegetation projects (National FY15/16 data): Equipment use in or near a waterbody and compaction on landings and skid trails.



Effectiveness ratings for Aquatic Ecosystem projects (National FY15/16 data): Projects completed using a construction contract have worse effectiveness ratings than other project implementing documents.

Questions?

Monitoring BMP implementation for a road construction project on the Pike and San Isabel National Forests, Colorado
Photo credit: USDA Forest Service

Monitoring BMP effectiveness in an AMZ following ground-based harvesting on the Monongahela National Forest, West Virginia
Photo credit: USDA Forest Service

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