

ECOSYSTEM SERVICES IN NATIONAL FOREST PLANS

~December 2016



Kawa Ng, Regional Economist
US Forest Service Rocky Mountain Region Headquarter. Golden, CO

Chris Miller, Economist
US Forest Service Ecosystem Management Coordination Staff. SLC, UT



Overview

- How are ecosystem services being considered in National Forest Land Management plans under the 2012 Planning Rule?

Which ES are
explicitly
included?

How are they being
incorporated into
the Forest Plans?

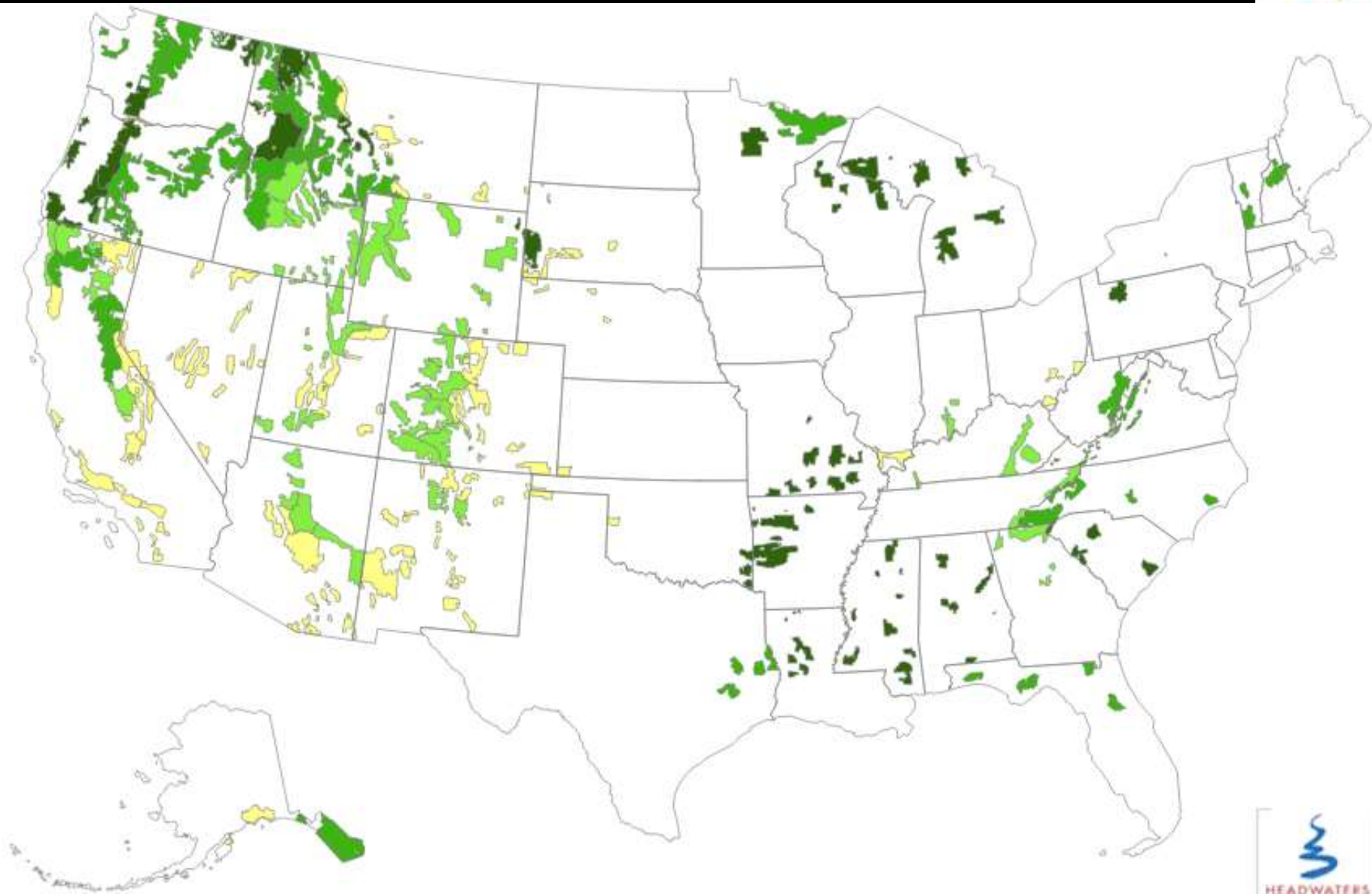
What indicators or
approach are used
in the analysis
(EIS).



Quick Background on U.S. National Forest Plans

- 127 administrative unit-level **Forest Plans**
 - A Forest Plan does not prescribe site-specific actions or projects.
 - It provides broad, long-term goals and priorities. Standards, guidelines, suitability, etc.
- NFS Land Management **Planning Rule** (36 CFR Part 219)
 - Sets forth process and content requirements to guide the revision of land management plans
 - The latest rule became effective in May 2012





Ecosystem Services Requirements under the 2012 National Forest System Land Management Planning Rule



Assessment

- o (b) Content of the assessment...shall identify and evaluate existing information relevant to the plan area for the following: ... **Benefits people obtain from the NFS planning area (ecosystem services)...**; (36 CFR 219.6)

New plan development or plan revision (Plan Components)

- o ... the plan must provide for **ecosystem services** and multiple uses ... (36 CFR 219.10)



Ecosystem Services in Forest Plan Revision under the 2012 Planning Rule

- No specific requirement on
 - Which ES to assess or include
 - How ES should be incorporated into the plan itself
 - What approach / indicators to use in the analysis (EIS)



So how are we doing it?

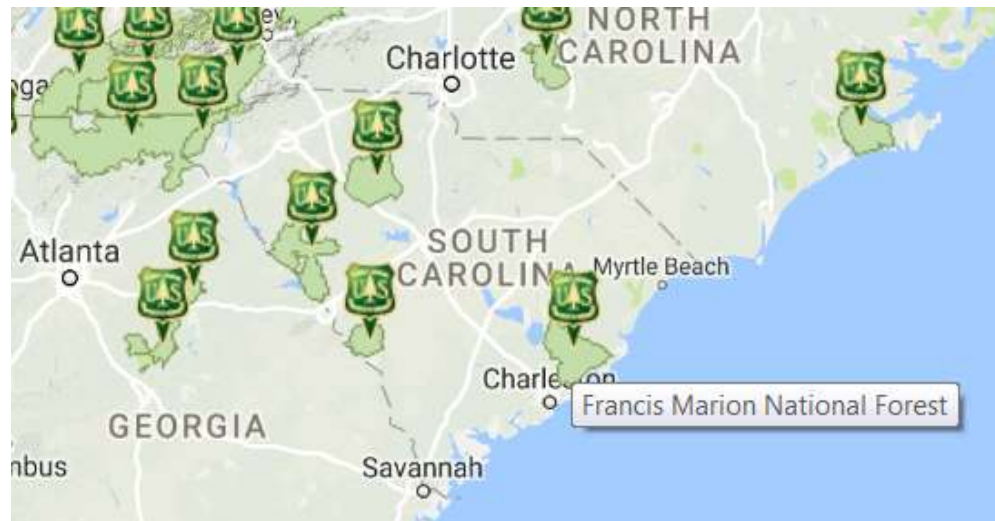
A brief overview of Forest Plans revision efforts under the 2012 Rule, focusing on those National Forest units with a published draft or final EIS as of 2016:

- **Francis Marion National Forest (SC)**
- **Flathead National Forest (MT)**
- **Inyo National Forest (CA)**
- **Sequoia National Forest (CA)**
- **Sierra National Forest (CA)**



Francis Marion National Forest

- 1 hr. drive from Charleston, SC
- 259,000 acres along South Carolina's coast
- In 1989 Hurricane Hugo's 130-mph winds leveled more than a third of the forest
- Home to the endangered red-cockaded woodpecker.
- Existing Forest Plan from 1996



Francis Marion National Forest – Which ES are included in the Assessment?

- Natural Fibers; Food Production
- Purification of Water and Air
- Carbon Sequestration
- Pollination; Natural Hazard Regulation
- Cultural and Heritage Values; Spiritual, Inspirational, and Aesthetic Services
- Nutrient Cycling



Francis Marion National Forest – How are ES incorporated into the proposed Forest Plan? (sample)

- The **Proposed Plan** is not explicitly organized in an ES framework as identified in the **Assessment**, but integrated into specific resource areas:
- **Desired Condition Example:**
 - **Species Diversity: DC-F-1(r). Wildlife Snag and Large Diameter Hollow Tree Associates.** Snags or hollow trees are maintained at a density of approximately 2 to 4 per acre. Artificial bat and bird houses provide habitat needs where snags and hollow trees are absent.
- **Objective Example:**
 - **Watershed.** Within 10 years of plan approval, improve soil and water conditions on 400 acres of wetlands and 25 miles of stream aquatic habitat



What are the components of a Forest Plan?

- Desired Conditions
- Objectives
- Standards
- Guidelines
- Suitability
- Monitoring questions and monitoring indicators
- Other management areas
- Optional plan components: goals, etc.



Francis Marion National Forest –

How are ES incorporated into the proposed Forest Plan?

- **Standard Example:**

- **Standards for Soil and Water and Aquatics:** S16: Do not allow livestock to expose mineral soil or displace soil by trampling on more than 10% of the area

- **Suitability Example:**

- **Outdoor Recreation Suitability.** Francis Marion National Forest lands are suitable for outdoor recreation. Wilderness is unsuitable for motorized and developed recreation. Off-highway vehicle use is limited to the designated road and trail system.



Francis Marion National Forest – How are ES analyzed in the EIS?

- Montréal Process (MP) indicator # 6 used to introduce the connection between ecosystem services with socioeconomic sustainability
- Effects analysis: a series of qualitative discussions, in the contexts of **communities of interest**.
 - Timber and Forest Products
 - Subsistence
 - Protection and Access to Resources
 - Educator, Student and Researcher
 - Government, Municipal and Residential
 - Non-Use Values
 - Recreational
- Forest Economic Contributions (IMPLAN model with quantitative results: jobs, income, etc.)



Flathead National Forest

- Existing plan from 1986
- 2.4 million acres
- Home to lynx, grizzly bear, bull trout, and the famous Bob Marshall Wilderness Area



Flathead National Forest –

How are ES Incorporated into the Plan? (example)

- Key ecosystem services identified in the **Assessment:**
 - Water quality and quantity
 - Clean air – particulate matter, scenic quality/haze
 - Inspiration – spiritual values and solitude
 - Cultural/heritage values
 - Carbon sequestration and climate regulation
 - Recreation
 - Other Multiple Uses
 - timber, grazing, fish and wildlife...
 - Flood control.
- In the **Proposed Forest Plan:**
 - Clearly stated that there is not an “Ecosystem Services Section”
 - Integrated into other resource areas

Flathead National Forest –

How are ES Incorporated into the Plan? (example)

- Desired Condition
 - **Recreation setting and access (FW-DC-REC)** : Recreation activities across the seasonal settings contribute to jobs and income in the local economy, community stability or growth, and the quality of lifestyles in the area.
- Objective
 - **Recreation setting and access (FW-OBJ-REC)**: Add 2-4 recreational cabin rentals on to the National Reservation System
- Standard
 - **Recreation setting and access (FW-STD-REC)**: New motorized routes or areas available to the public shall not be designated in primitive or semiprimitive non-motorized desired recreation opportunity spectrum settings (winter and summer).
- Guideline
 - **Recreation setting and access (FW-GDL-REC)**: To protect resources, new and reconstructed solid and sanitary waste facilities should be located outside of RMZs.



Flathead National Forest – What indicators are used in the analysis (EIS)?

- An EIS discloses and analyze the effects of a proposed action and its alternatives.
- The majority of the Flathead plan components do not differ by alternative (4 total), except for some of the plan components pertaining to grizzly bear, recommended wilderness suitability plan components, and motorized over-snow vehicle use suitability.
- Qualitative descriptions of benefits from Ecosystem Services.
- IMPLAN model results (jobs, income) for Multiple Uses indicators

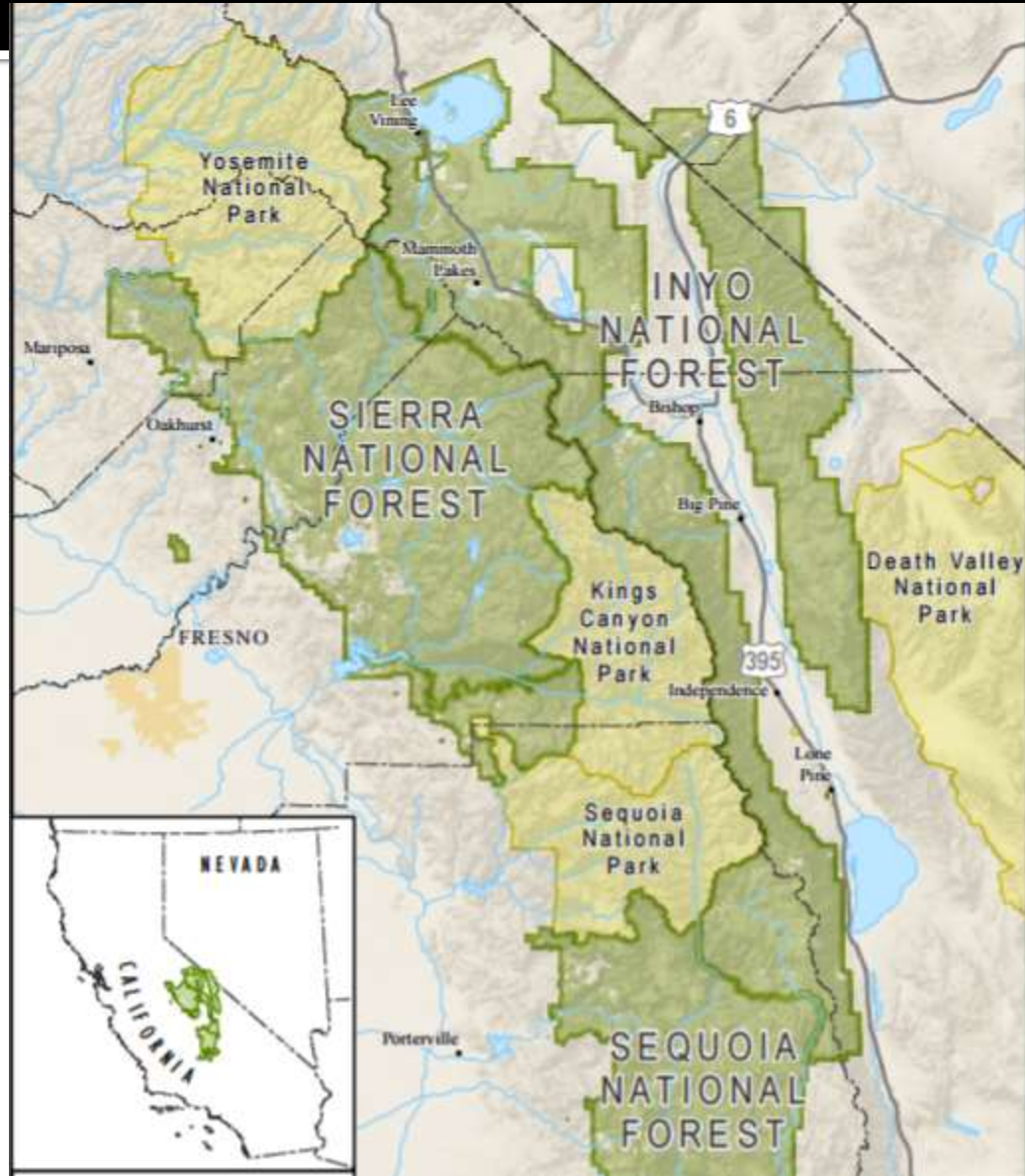


Key Forest Benefit to Society	Income	Jobs	Well-being	Health and Safety	Traditional, Cultural, Spiritual values
Water quality and quantity				X	
Clean air – particulate matter /haze				X	
Inspiration – spiritual values and solitude					X
Cultural/heritage values					X
Carbon sequestration and climate regulation				X	
Flood control				X	
Forest products/Veg Management/Forage	X	X			X
Outdoor recreation	X	X	X	X	X
Scenery	X		X	X	X
Fish and Wildlife	X	X			X
Research/Education			X	X	X
Other Income/jobs(PILT, indirect, induced, income/jobs)	X	X	X		
Direct Income and Jobs (FS employment and contractors)	X	X		X	
Fire Suppression	X	X		X	



Inyo, Sequoia and Sierra National Forest

- **Exiting Plans:**
 - Inyo (1988)
 - Sequoia (1988)
 - Sierra (1991)



Inyo, Sequoia and Sierra National Forest – Which ES are considered?

- Key ecosystem services identified in the **Forest Assessment**:
 - **Sierra National Forest**: water supply, hydropower, timber, carbon, recreation, cultural resources, biodiversity
 - **Sequoia National Forest**: water, hydropower, timber, carbon, recreation, cultural resources, biodiversity
 - **Inyo National Forest**: water, timber, grazing, fish/game, energy, recreation, aesthetics, cultural heritage and sense of place, education, science and health, water quality, water regulation, carbon sequestration and regulation, ecosystem resilience, biodiversity, watersheds, at-risk species



Inyo, Sequoia and Sierra National Forests– What indicators are used in the analysis (Assessment)?

Spatial data and mapping focus (with other qualitative information)

- Mapped areas of service provision: Relative capacity for:
 - Flood protection (based on land cover)
 - Assets for providing water supply (CA Dep. Forestry+Fire index)
 - Water quality (based on land cover)
 - Assets for providing water quality (CA Dep. Forestry+Fire index)
 - Importance to Drinking Water (“Forests to Faucets”)
- Mapped areas of service provision at risk from stressors:
 - Climate change (changing snowpack; seasonal flows; peak flows)
 - Development/impervious surfaces
 - Uncharacteristic (Large) wildfire
 - Impaired waterbodies (EPA 303(d) listed)



Example of Water Supply Assets

CAL FIRE - FRAP

Combined Assets

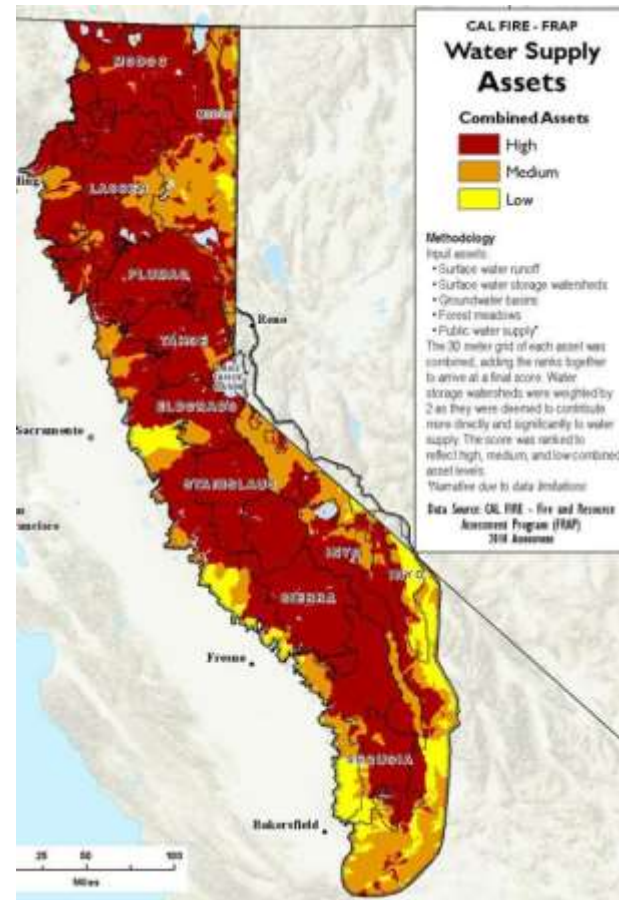


Methodology

Input assets:

- Surface water runoff
- Surface water storage watersheds
- Groundwater basins
- Forest meadows
- Public water supply*

The 30 meter grid of each asset was combined, adding the ranks together to arrive at a final score. Water



Inyo, Sequoia and Sierra National Forests– What indicators are used in the analysis (Assessment)?

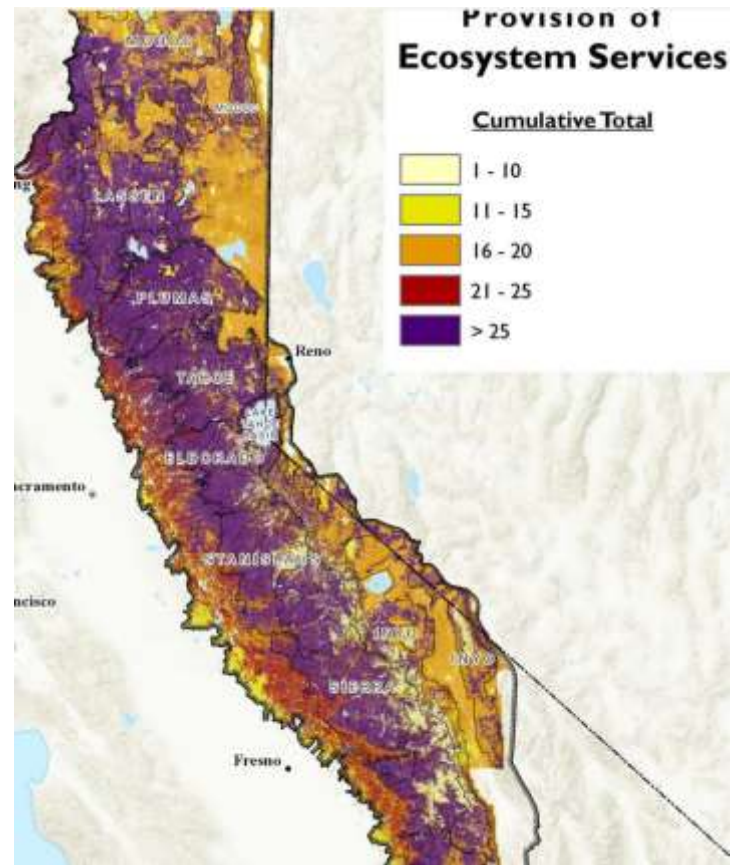
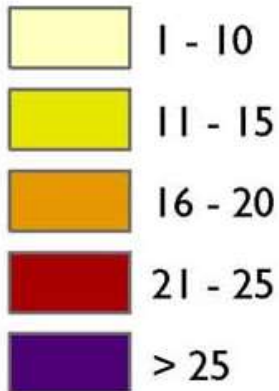
- **Timber** –Areas of high capacity based on land cover critical for provision
 - Locations of primary wood product manufacturers
- **Grazing – Areas critical for provision of grazing**
 - Permitted AUMs
- **Energy** – Potential areas of fuel treatment (source of biomass)
 - Proximity to biomass energy generating facilities
 - Critical areas of potential hydropower, geothermal, wind, solar (CEC)
- **Recreation** - “Recreation Opportunity Spectrum”; Recreation sites
 - NVUM – visitor numbers; origins of visitors
- **Aesthetics** – Existing condition based on “Visual Quality Objectives”
- **Cultural services** – Historic areas/lands by Tribe
 - Locations of important species for hunting, medicine, and food
- **Carbon Sequestration** – Forests could become net emitters by mid-century
 - Land cover critical in providing capacity for carbon sequestration
- **Biodiversity** – Areas critical for terrestrial and aquatic biodiversity provision



Aggregate Provision of Ecosystem Services

Provision of Ecosystem Services

Cumulative Total



Inyo, Sequoia and Sierra National Forests – How are ES Incorporated into the Plan? (example)

- **Inyo: Aspen (TERR-ASPN-DC)**
 - The structure, function and distribution of aspen are within the natural range of variation; there is a wide age and size distribution of aspen and it is contributing to habitat and biodiversity. Aspen is successfully regenerating and growing into larger sized trees.
- **Sequoia: Watershed Condition (WTR-FW-STD)**
 - Restore the watershed, through thinning, restoration of floodplain connectivity and shallow groundwater storage, to enhance instream flows.
- **Sierra: Sustainable Recreation (REC-FW-OBJ)**
 - Within 10 years of plan approval, convert 5 percent of existing recreation sites to group sites



Inyo, Sequoia and Sierra National Forests– What indicators are used in the analysis (EIS)?

- Qualitative analysis of six services and potential effects to benefits to people and communities.
- Effects are evaluated based on:
 - Economic context or conditions affected by the ES contribution (e.g., local economies; quality of life)
 - Intensity of the effect based on geographic extent and duration of effect.
- Financial analysis results (funding) are considered



Inyo, Sequoia and Sierra National Forests– What indicators are used in the analysis (EIS)?

	Alternative A		Alternative B		Alternative C*		Alternative D	
	st	lt	st	lt	st	lt	st	lt
<u>Water</u>								
Water Quantity	s	s	-	m	-	s	-	s
Water Quality	s	s	m	m	m	s	m	s
<u>Recreation</u>								
Recreational Setting	s	s	m	m	m	m	m	s
Recreational Opportunity	s	s	m	m	m	m	m	s
Dispersed vs Developed	-	-	-	-	-	m	-	m
<u>Air Quality</u>								
Human Health	s	s	m	m	m	m	m	s
Recreation Visitation	s	s	m	m	m	m	m	m
<u>Energy Generation</u>								
Biomass Energy	-	s	m	m	s	s	s	s
Hydropower	m	m	-	n	-	m	-	m
<u>Forest Products</u>								
Economic Contributions	n	s	m	m	s	s	s	s
Biomass Utilization	-	s	m	m	s	s	s	s
<u>Biodiversity</u>								
	-	s	m	s	m	s	m	s

Figure 3. Summary of effects on forest contributions



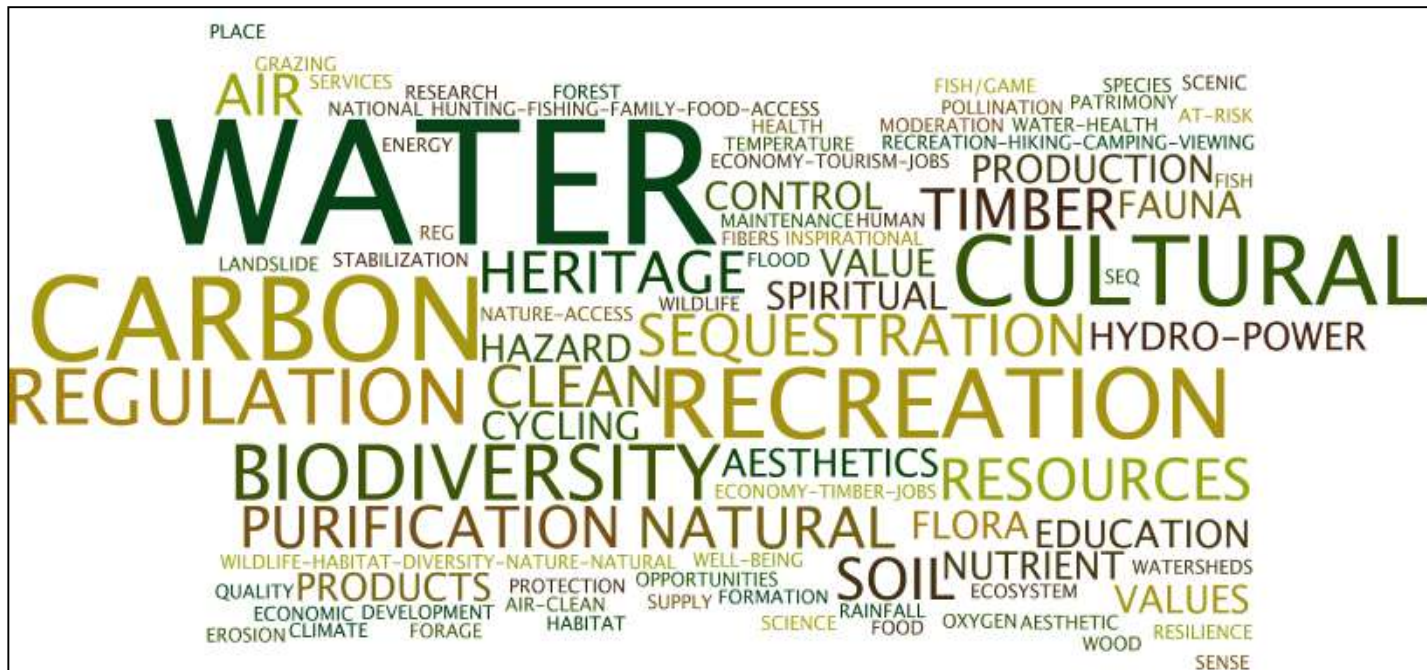
Inyo, Sequoia and Sierra National Forests– What indicators are used in the analysis (EIS)?

intensity of effect			
negligible	moderate	substantial	
n	m	s	= potential for considerable adverse effect
n	m	s	= potential for considerable beneficial effect
n	m	s	= unsure direction of potential considerable effect
		-	= no potential considerable effect
		*	=considerable funding uncertainty



Key Ecosystem Services Assessed

- Between 7 to 22 key services identified per assessment



<http://www.wordle.net/>

Initial Observations

- **Assessments**

- Key ES are identified explicitly and sometimes quantified in the

- **Proposed plans**

- ES are integrated into various resource specific plan components

- **EISs**

- Most effect analyses on ES are conducted qualitatively
 - Economic contributions modeled quantitatively

Questions/Discussions



The 2012 Planning Rule does not require:

- o Providing plan components for each and every ecosystem service.
- o Specific levels of ecosystem services be achieved
- o Valuation (including non-market values) of ecosystem services in land management plans.

Comparisons of Plan Components

- o **Comparative Benefits and Tradeoffs** [Rule preamble]

- o Under NEPA, effects analysis will be carried out for significant issues and environmental documents will discuss comparative benefits and tradeoffs associated with ecosystem services

Comparisons of Plan Components

- **Flexibility exists for discussing comparative benefits and tradeoffs** [Rule preamble]
 - NFMA and planning rule do not require that non-market values be determined or that non-market benefits be quantified.
 - Contributions to social and economic sustainability includes consideration of market and non-market benefits
- **Bottom line: Evaluate ecosystem services to try and show how sets of plan components can affect people and society**