United States Department of the Interior
BUREAU OF INDIAN AFFAIRS
NATIONAL INTERAGENCY FIRE CENTER
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September 3, 2008

Memorandum

To: Regional Directors, All Regional Offices
Attention: Regional Fuels Specialists

From: Director, Branch of Wildland Fire Management

Subject: Hazardous Fuels Risk Assessment Framework

The Bureau of Indian Affairs, National Interagency Fire Center has produced a risk assessment framework for hazardous fuels treatment prioritization. The methodology and application are addressed in detail in the attached document titled *FRAMEWORK for Regional Risk Assessments*. This framework is similar to the process used in the Hazardous Fuels Priority Allocation System (HFPAS) formerly referred to as Ecosystem Management Decision System (EMDS).

Risk assessments are necessary to assure resources are applied to the highest priority projects. The newly amended and soon to be released Fuels Management Business Rules (formerly Fuels Program Business Management Handbook) will require each region to complete a regional risk assessment by October 1, 2009. Use of the framework described herein is optional. Regions may adopt or modify this process, or produce an independent assessment of their choosing.

The attached framework provides a process to develop risk ratings and set treatment selection priorities, but it is not a budget allocation model. The risk assessment is only a management tool to support the selection of high priority HFR treatments at a specified landscape or geographic scale.

The data required to run this application is described and referenced in a metadata table located in the appendices. Most of the data is available through LANDFIRE or Wildland Fire Management Information (WFMI). A GIS analyst will be required to assist the fuels specialist in interpretation and application of the data. Assistance from this office is available upon request. I have encouraged fuels staff to support the regions in the development of risk assessments as needed. Data for the Eastern Oklahoma, Southern Plains and Alaska Regions is not included as it was insufficient for the exercise performed.

Feedback from the regions is necessary to improve the risk assessment process. I encourage regions to share any suggestions to improve this framework and successes resulting from the use of other models with the fuels staff here at NIFC. Our goal is to provide an effective risk assessment framework for regions to use, yet provide flexibility and foster creativity for future risk assessment work.

If you have any question about acquiring the national dataset or about the processes in the attached documents please contact Mr. Gerald Barnes at 208.387.5834.

FRAME WORK for Regional Risk Assessments

Purpose

The purpose of this template is to provide a frame work for regional risk assessments in order to justify and ensure that resources are being applied to the highest priority regional projects.

Methodology

The eleven datasets used in the framework are similar to those data used in the Hazardous Fuels Priority Allocation System (HFPAS) formerly known as EMDS. The datasets were processed into three classes (low, moderate, high). See examples in Appendix D. The classification definitions are defined on the attached metadata table. High, Moderate and Low risk classes were chosen based on logical breaks as represented on histograms for all datasets except for the four fire behavior datasets acquired from the RMRS.

All datasets were manipulated at a national scale to provide an example how this framework would work on a national scale. The assessment utilized national level datasets that are consistent and contiguous across the U.S.

The geospatial manipulations were preformed within ArcGIS. The analysis utilized the weighted overlay tool. Weighted overlay is a technique for applying a common scale of values to diverse and dissimilar input to create an integrated analysis.

This geographic problem required the analysis of eleven different factors and these factors are not of equal importance. The weighted overlay tool takes all the factors into consideration and reclassifies values in the input rasters onto a common evaluation scale of risk. The input rasters are weighted by importance and added together to produce an output raster. The output raster created is of overall risk raster.

The weighted overlay tool was run with three different set of influences. The attached weighted overlay table (Appendix B) illustrates the scale values and influences (weights) used for each run. The third run was developed after peer review of the first two runs.

Once the geospatial data was classified into risks, two analyses were performed to produce an example of a national risk rating system. The first example (Appendix C- Table 1) evaluates risk based on a region's contribution of risk acres to the national total. High and Moderate Risk acres are ranked nationally and averaged to determine a final risk rating. This process generally favors larger regions.

The second analysis (Appendix C- Table 2) gives smaller regions, especially with larger proportions high risk acres, a better chance to compete with large regions. It evaluates risk based on the region's contribution of high risk acres to the national total (as above) and ranks each region's high risk acres based on its proportion of regional totals (often referred to as normalized data). The ranking of each region's contribution to national high risk acres is averaged with each region's proportional high risk acres to determine a final risk rating.

Each analysis produced the same results for "Very High" Risk/Priority regions. However, their assessment of "High" Risk regions varied slightly. The results are not as important as the methodology used. And there are numerous other ways to conduct a risk assessment. These two examples provide a process with a suitable framework for risk

assessment on regional scales. For further examples on Risk Assessment Map Layers refer to Appendix D.

Alaska and Eastern Oklahoma regions were excluded due to lack of accurate reservation boundaries. In addition, most of the data used as primary and secondary allocation criteria is missing for Alaska.

Application

The purpose of the National Risk Assessment is to provide a framework for regional risk assessments in order to justify and ensure that resources are being applied to the highest priority projects. The regions may use the national dataset, but if there is a dataset more appropriate it terms of content, accuracy, and scale, it's recommended that the regions utilize those datasets as long as they are consistent and contiguous across region.

Regional Risk Assessments may be used to inform the budget process. For example, a Region may choose to allocate 30% of its total project funds to the highest priority reservations first to assure the highest priorities acres are treated in the Region. The remaining 70% would be distributed to fund high priority projects throughout the Region.

Another option is to fund high priority projects on the highest priority reservations, then distribute the remaining funds among tribes based on their highest priorities and according to their capability.

Data Information

The data sources are list in Dataset Developed and Utilized table (Appendix A). Any questions of the sources, acquisition or processes used in the development of the frame work for the regional risk assessments, please call Gerald Barnes at (208)387-5834. Mr. Barnes is also available to assist in the replication of this process at a regional level.

Appendices

Appendix A: BIA Risk Assessment- Dataset Developed and Utilized

Primary/Secondary Allocation Criteria	Description	Source Methods	Classifications
Wildfire Potential/Crown Fire Potential	L, M & H CFP based on heat intensity, spotting and difficulty to control – 1k Grid	Cohen assigned relative CFP based on cover types developed in MODIS	Combined Cohen's 5 class rating to 3 classes(1-1, 2;3-3, 4;5-3)
Surface Fire Potential	L, M & H surface fire potential – 1k Grid	Average relative values of predicted flame lengths & ROS calculated from FCCS	Combined RMRS 5 Classes to 3 Classes(1-1, 2;3-3, 4;5-3)
Fire Season	Ave # of days per year RERC is above 95% based on generated daily RERC map from 1980 - 2005, then adjusted based on weather zones for none errors – 1k Grid	RMRS - Matt Jolly & Jim Menakis	Classified into 3 classes based the following < 10 - Low , 11 to 30 - Moderate, 30 > - High
Problem Fire Days	Ave # of days a year that experience extreme fire weather based on thresholds of temp., wind, and humidity from 1982 to 1997. – 1k Grid	RMRS - Jim Menakis	Classified into 3 classes based on the following < 14-Low, 15-34 - Moderate, 34 > - High
Fire Starts - Natural	Count of all fires 1/10 acre or larger within 1 mile buffer of the Reservation boundary	NIFC fire occurrence data base, 2001 to 2007, Filtered all 5,16,26 & 37	Classifies into 3 classes based on the following < 80-Low, 81-280 - Moderated, 281 > - High
Fire Starts - Human & Other	Count of all fires 1/10 acre or larger within 1 mile buffer of the Reservation boundary	NIFC fire occurrence data base, 2001 to 2007, Filtered all 5,16,26 & 37	Classified into 3 classes based on the following < 150-Low,151-500 - Moderated, 501 > - High
Large Fires	Counts of all fire > 100 acres than clipped to Reservation boundaries.	MODIS data acquired by the USDA Forest Service Remote Sensing Application data base, 2001 to 2007,	Classified into 3 classes based on the following <1000 -Low, 1,001-20,000 -Moderate, 20,001> -High
Ecosystem Consequences/WUI	Housing Densities of L, M, & H (excluding all other classifications) – 30m grid	SILVIS WUI: Buffered by 2 kilometer then clipped to the Reservation boundaries.	Classified into one class of High
Ecosystem Vulnerability	FRCC 2 and 3 for all Reference Fire Regimes – 30m grid	Landfire Rapid Assessment	Classified FRCC 2 to Moderate & FRCC 3 to High
Performance/Ecological Maintenance	All FRCC in all Reference Fire Regimes, outside the SILVIS WUI with buffer – 30m grid	Landfire Rapid Assessment	Classified FRCC 1 to Low, FRCC 2 to Moderate, FRCC 3 to High
Restoration Opportunities / Vegetation Restoration	FRCC 2 for all Reference Fire regime – 30m grid	Landfire Rapid Assessment	Classified FRCC 2 to Moderate

Appendix B: Weight Overlay Tables

Raster Dataset	Value	Scale Value	Run 1 Influence	Run 2 Influence	Run 3 Influence
Crown Fire Pot	1	1	9	9	11
	2	2			
	3	3			
	NoData	0			
Surface Fire Pot	1	1	9	6	9
	2	2			
	3	3			
	NoData	0			
Hazard			**18**	**15**	**20**
Rerc95day	1	1	9	8	8
	2	2			
	3	3			
	NoData	0			
WX fire Days	1	1	9	7	8
	2	2			
	3	3			
	NoData	0			
Fire Occ Natural	1	1	9	8	9
	2	2			
	3	3			
	NoData	0			
Fire Occ Human & other	1	1	9	4	5
	2	2			
	3	3			
	NoData	0			
Large Fire	1	1	9	8	9
	2	2			
	3	3			
	NoData	0			
Probability			**45**	**35**	**39**
Silvis Wui 2k Buffer	4	3	10	30	20
	NoData	0			
Ecos Vul	2	2	9	5	6
	3	3			
	NoData	0			
Values/Consequences			**19**	**35**	**26**
Perform & Ecolog Maint	1	1	9	7	7
	2	2			
	3	3			
	NoData	0			
Rest Opp & Veg Opp	2	2	9	8	8
	NoData	0			
Performance/Opportunity			**18**	**15**	**15**
			100	100	100

Appendix C: Risk Assessment Table Examples

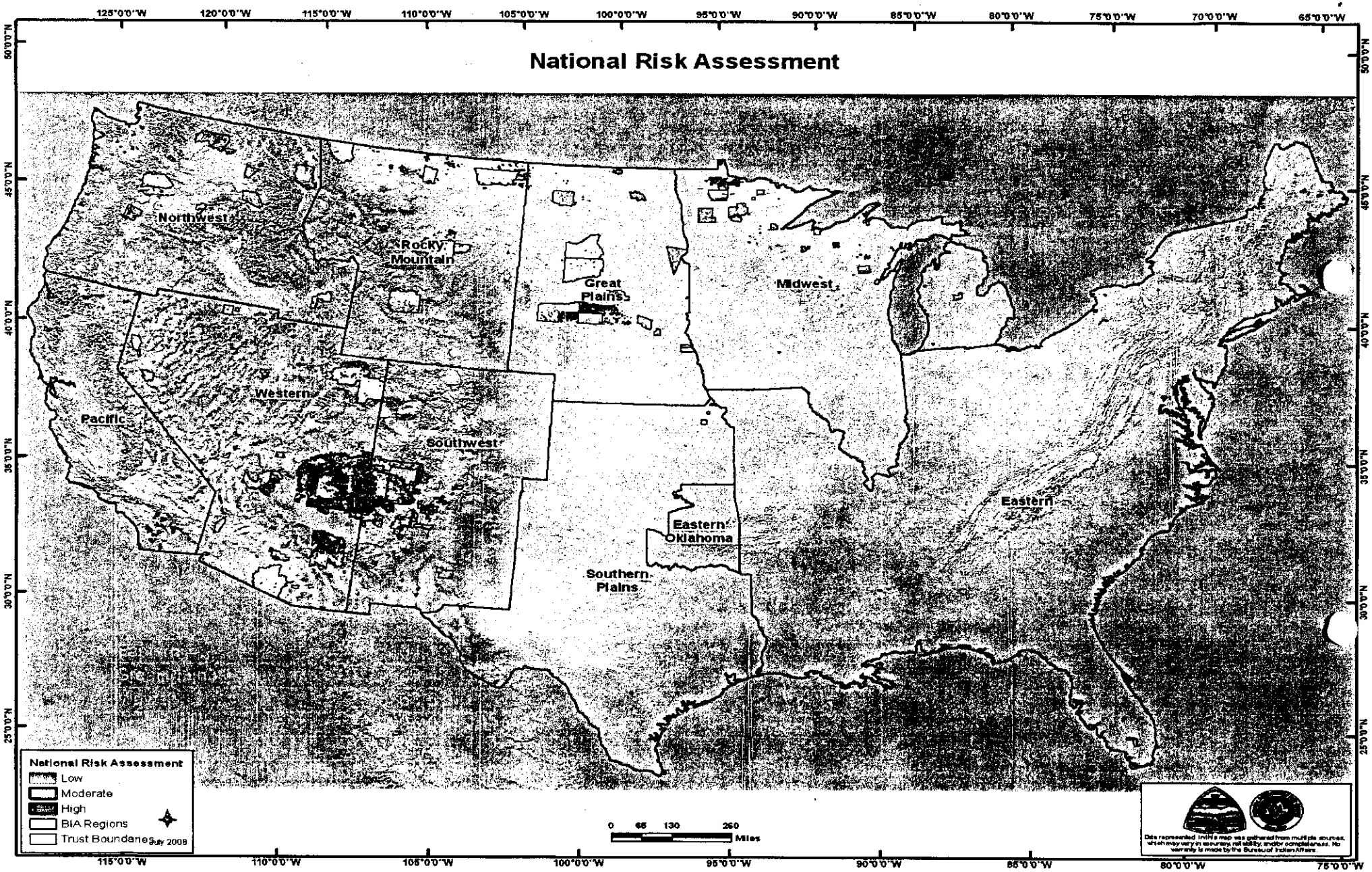
Table 1 - Risk Rating based on National Totals of High and Moderate Risk Acres.

Regions		High Risk Acres	High Risk Acres Rank	Moderate Risk Acres	High and Moderate Risk Acres	High and Moderate Rank	Final Risk Rating
Eastern		104,137	9	382,274	486,411	5	
Great Plains		289,451	7	10,342,675	10,632,126	1	High
Midwest		363,585	6	2,884,935	3,248,520	3	High
[redacted]		9,995,074	[redacted]	3,675,472			[redacted]
[redacted]		1,492,219	[redacted]	5,250,466			[redacted]
Pacific		134,867	8	413,969	548,836	4	
Rocky Mountain		560,652	5	8,833,073	9,393,725	2	High
Southern Plains		6,288	10	97,899	104,187	6	
[redacted]		3,626,554	[redacted]	4,630,156			[redacted]
[redacted]		4,272,253	[redacted]	12,944,698			[redacted]
Very High final risk ratings were based on logical breaks in the total High Risk acres.							
Final Risk Rating of "High" were based on logical breaks in the total High and Moderate Risk acres.							

Table 2 - Risk Rating based on regional totals and proportions of national risk acres.

Regions		*High Risk Acres*	*Moderate Risk Acres*	*Low Risk Acres*	*Nat'l High Risk Acres Rank*	*Regional Proportion of High Risk Acres W/I the Region*	*Proportional Rank*	*Composite Risk Score*	*Final Risk Rating*
Eastern		104,137	382,274	68,162	9	18.78%	6	8	
Great Plains		289,451	10,342,675	1,774,048	7	2.33%	10	9	
Midwest		363,585	2,884,925	364,327	6	10.06%	7	7	High
[redacted]		9,995,074	3,675,472	17,900	1	73.02%	1	[redacted]	
[redacted]		1,492,219	5,250,466	414,633	4	20.85%	5	[redacted]	
Pacific		134,867	413,969	19,841	8	23.72%	4	6	High
Rocky Mountain		560,652	8,833,073	111,947	5	5.90%	8	7	High
Southern Plains		6,288	97,899	33,694	10	4.56%	9	10	
[redacted]		3,626,554	4,630,156	21,630	3	43.81%	2	[redacted]	
[redacted]		4,272,253	12,944,698	57,516	2	24.73%	3	[redacted]	
The composite score (leading to a final risk rating) is the average of the National High Risk Acres Rank and the Proportional Rank.									

Appendix D: Risk Assessment Maps



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UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF INDIAN AFFAIRS

NIFC OFFICE ROUTE SLIP

SUBJECT: Risk assessment Memorandum		
FROM (NAME AND OFFICE) BUREAU OF INDIAN AFFAIRS-NATIONAL INTERAGENCY FIRE CENTER	PHONE 208/387-5378	DATE ROUTED August 13, 2008

ROUTE TO CODE	RELEASED		COMMENTS
	INITIAL	DATE	
Administration	TAW	8/13	Teresa Ann Wesley, Administrative Assistant
Administration	[illegible]	8/13	Administrative Officer Surname
Administration	[illegible]	[illegible]	Deputy Director- Branch of Wildland Fire Management SURNAME
Director	[illegible]	9/14	SIGNATURE - Director, Branch of Wildland Fire Management SURNAME
Administration			Teresa Ann Wesley, Administrative Assistant Distribution and Filing

ADDITIONAL COMMENTS

Redone by DD as requested

TAW

9/3/08

Changes completed

TAW

9/4/08

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