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REVIEW OF PROPOSED DOT/API METHODOLOGY FOR IDENTIFYING "UNUSUALLY SENSITIVE AREAS"

Introduction

The purpose of this review is to evaluate the API/OPS methodology for identifying areas that ecologically are "Unusually Sensitive Areas" or Ecological USAs. Once areas along existing hazardous liquid pipelines are designated as USA they may receive additional risk analysis, safeguards and response planning.

This efficacy of this methodology hinges critically on three definitions and criteria. These critical distinctions are:

1. The definition of "unusually sensitive".
2. The decision to use only databases that are publicly available and have associated national or international sensitivity rankings.
3. The choice of buffer distances around point locations of ecological resources.

I will address these issues below and discuss the relative advantages and disadvantages of these particular choices. Overall, the methodology appears adequate to the task at hand. The ultimate success of the method at identifying USAs hinges upon the quality of the spatial databases used in the analyses. To the extent that the proposed rule codifies the necessity for periodic incorporation of new databases and subsequent reanalysis, and specifies the complete range of data that are appropriate, I believe it will do an adequate job in the long-term of identifying USAs.

Definition of 'Unusually Sensitive" for ecological resources

As defined in the Notice of Proposed Rulemaking, USAs contain "…ecological resources that by their character are irreplaceable and may be subject to irreparable and irreversible injury or irretrievable loss if they are exposed to the effects of an accidental hazardous liquids release." With regard to biological

diversity the concept of “irretrievable loss” invokes the prospect of species extinction. As the cliche goes, “extinction is forever”. The most reliable indicator of extinction risk is population size. Risk from a spill should be gauged by the proportion of the population that is potentially impacted. Clearly an area that if damaged would significantly increase the probability of species extinction would result in a potentially irretrievable loss. So, in part, the ecological criteria should address extinction risk. Correctly, this is explicitly addressed in the draft of the proposed rule. Also, the emphasis on critically imperiled and imperiled species implicitly emphasizes extinction risk. By virtue of their small population sizes these, in general, are the species that would be most in danger of extinction due to a pipeline spill. Conceptually, I am in agreement with the emphasis on extinction risk outlined in the draft rule.

I think that it is critical that the methodology explicitly defines what types of areas would create significant extinction risk to species if a spill occurred. Currently the definition of “unusual” is somewhat data-driven. That is, the types of ecological features mapped in the available databases shape the definition. Currently that definition includes:

1. The location of a critically imperiled species
2. An unusual concentration of imperiled species, threatened and endangered and depleted marine mammal species.
3. Unusual concentrations of migratory waterbirds.

This is not a comprehensive list of all types of areas that might significantly impact species extinction probabilities or other irreparable harm to ecological resources. It also does not address all types of aggregations of organisms that could create the potential for a heightened risk of irreparable harm due to a spill. For instance, the WHSRN and RAMSAR databases are used because they identify concentrations of waterfowl and shorebirds. Similar aggregations for breeding, feeding or migrating occur in a variety of other types of organisms (e.g. breeding aggregations in amphibians), but these have not been explicitly addressed in the definition of USAs. These categories also only address ecological resources at the species level and not the community or ecosystem level. There may be rare and unique ecosystem types that do not contain imperiled species that would be ignored with this methodology.

I think it is vital that a comprehensive definition of ecological “unusually sensitive areas” be incorporated into the rule. I propose the following preliminary list of criteria that is more inclusive than the list above. Data sources, meeting the data acceptance criteria, may not currently exist for some of these categories. However, I believe that it is important at this juncture to explicitly define the types of data that would be incorporated into the process if and when they become available.

<u>Suggested list of criteria for Ecological USAs</u>

1. The location of a critically imperiled species
2. An unusual concentration of imperiled species, threatened and endangered and depleted marine mammal species.
3. Rare ecological communities or ecosystems
4. Unusual aggregations of vertebrate species of any status, including feeding, breeding and migratory aggregations.
5. Areas of unusual "contagion" of spills. (This is currently handled for surface waters by placing a larger buffer around those USA than around terrestrial USAs. However, there may be terrestrial areas that due to topography or soil type would tend to spread the effects of a spill more widely and rapidly.

The most important purpose of this expanded definition is that it would promote the creation of databases meeting the acceptance criteria that map these additional categories of ecological sensitive areas.

Database Acceptance Criteria

The methodology defines the types of databases that will be used in the designation process. There are three criteria:

1. Data must be spatially explicit.
2. Data must be readily available to the public.
3. Data and sensitivity rankings must be uniform across the U.S.

There are of course good reasons to have these criteria. They simplify the process, they promote equity across the regions of the US, they make the process more transparent, and they allow a semi-automated designation process. However, it must be acknowledged that, in the interest of having uniform criteria for USA designation, considerable local information is precluded from the process. Thus in the near term, these criteria eliminate data sources that could be very useful in identifying USAs. In particularly, these rules preclude the use of local, state and regional databases that may in many cases be more detailed and accurate than the national and international standardized databases currently used. Again, this points to the importance of specifying the types of data and the characteristics of those data that would be acceptable to this methodology. This would encourage local, state and regional bodies possessing important data on ecological resources to create appropriate databases or place this information into existing appropriate databases. Thus this would help ensure that the data on which USA designations are based would improve over time.

Another important issue is the decision that ecological sensitivity should be assessed against a national or international scale rather than a regional scale.

This will result in areas that are regionally “unusual” not being designated as USAs because in comparison to national diversity levels they are not “unusual”. I am of the view that biodiversity is a significant resource at the local and regional levels as well as at the national level. This is a philosophical point, not a scientific one, but I think a ranking of “unusual” at the regional level should be incorporated into the process.

There are at least two solutions that are possible that would allow regional adjustments yet still apply a uniform set of criteria:

1. Moving window analysis. Each candidate USA could be ranked in comparison to the other potential USAs in a region of fixed area (window) surrounding the candidate. If it ranks high in regard to that regional sample of sites it would be designated a USA. The next site is then evaluated with regard to sites within an equal area surrounding it (moving window). Thus the procedure and criteria remain the same between regions but low diversity regions would produce as many USAs as high diversity regions.

2. A hierarchical analysis. A cutoff value could be established for the ranking of sites at the national scale. For instance the top 5% of national sites ranked in order of ecological sensitivity could be designated. Following the national ranking process, a bioregional ranking could be done with the top 5% of sites in that region designated as USAs. In nationally diverse regions (e.g. California) this should not result in many additional sites (they would have already been identified in the national rankings), in low diversity regions (e.g. the Midwest) this procedure would add sites. This method still designates more USAs in nationally diverse areas and thus I would consider it preferable to the moving window analysis.

I want to reiterate that this is a philosophical or value judgement, not a scientific one. This criticism has no bearing on how well the proposed methodology works for identifying nationally significant USAs.

The choice of buffer distances

Currently the model employs buffer distances of one mile around terrestrial locations and five miles around surface water locations. If a pipeline intersects these buffers the site is designated a USA. The choice of these distances is to a large degree arbitrary. The extent to which these distances will be adequate depends on a number of factors including:

1. The spatial accuracy of the databases. To the extent the databases are very accurate, smaller buffers could be used. If they are relatively inaccurate, then larger buffer distances would be called for. The one mile buffer distance was chosen based on the level of accuracy of the databases used.

2. The degree to which these point locations really indicate polygonal distributions. For many of these databases point locations are given for resources that occupy a larger area. How large that area is in part will depend upon the species in question. For many rare plants the point might be a relatively accurate descriptor of the distribution of the species at that location. For mobile organisms the point is a poor predictor and larger buffers might be better.
3. The spatial "contagion" of the spill. How widely do spills affect the terrestrial and aquatic environments. To what distance from the pipeline are environments affected. If this is on the order of hundreds of meters than a one mile buffer might be insufficient.

I cannot directly evaluate the efficacy of these buffer distances with the information presented in the proposed method. I think more work is needed here to justify the choices. I think it wouldn't be too hard to find data for point #3 and possibly point #1 to use to evaluate these buffer distances. Point # 2 would probably require detailed data on each species that is not available in the acceptable databases. However, it probably would not be too difficult to categorize all the candidate species into "mobility" categories.

One mile for terrestrial point locations strikes me as a reasonable first approximation if the databases are spatially accurate, most of the resources are truly distributed as points, and spills don't spread far from the pipeline. If most are actually distributed as polygons or spills tend to spread widely, one mile may be inadequate.

The five-mile buffer for aquatic locations is harder for me to evaluate. The critical questions seem to be: how fast does a spill spread through lakes and streams and is it possible to contain a spill to only part of a larger contiguous body of water?

VI. Overview and conclusions

The reliance on high-quality, spatially-explicit, GIS-based databases is the strength of this methodology. The use of these databases in this methodology provides a demonstrable use and value for these databases which should promote their refinement and expansion. If that presumption is true, the databases and thus the accuracy of the USA identification process should improve through time.

The process is as good as the databases it uses, and over the near term the reliance on standardized databases may preclude the use of valuable data. Over the entire United States these standardized databases are probably the best databases available. However, at any given location more or better data might be available from non-standard sources. These data may not have yet entered into the Heritage databases or other standardized databases. Thus, in the short-

term, the reliance on standardized databases might decrease the accuracy of the process. That is why I feel that it is crucial for a “reanalysis” period to be specified as part of the method. And that the rule should include a list of all types of ecological resources that would be “unusually sensitive”, even if databases of these features are not currently available.

The one mile and five-mile radii and the insurance against “irreparable harm” they provide cannot be thoroughly assessed given the information available. The adequacy of these buffer distances will differ between locations and species. Are these sufficient as a general prescription? Obviously a larger radius would be more conservative, however, as a first pass they seem adequate to me. I would recommend that USAs that occur near pipelines would also be subject to risk analysis as well as those pipelines that actually intersect the USAs. This would allow the risk analysis to consider the site and species-specific characteristics that determine the adequacy of those buffer distances.

Overall, this methodology seems to have been thoughtfully and reasonably designed. The use of standardized databases and GIS is forward-looking and should ensure that the process improves through time.