



DAMAGE ASSESSMENT, REMEDIATION, and
RESTORATION PROGRAM (DARRP)



The Concept of Baseline in Natural Resource Damage Assessment under the U.S. Oil Pollution Act

Les Enjeux des Etats de Reference du Littoral
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Natural Resource Damage Assessment Objectives of OPA

- *Make the environment and **public** whole for injury to or loss of natural resources and services from the discharge or threat of discharge of oil (the incident)*
- *Primary restoration is achieved through returning injured natural resources and services to the condition they would have been in if the incident had not occurred, i.e. **Baseline***
- *Compensatory restoration for interim losses from the date of the incident until recovery to **Baseline** is undertaken to make the **public** whole*
- *Achieve compensation through the restoration, rehabilitation, replacement, or acquisition of equivalent (to that which was lost) natural resources and/or services*

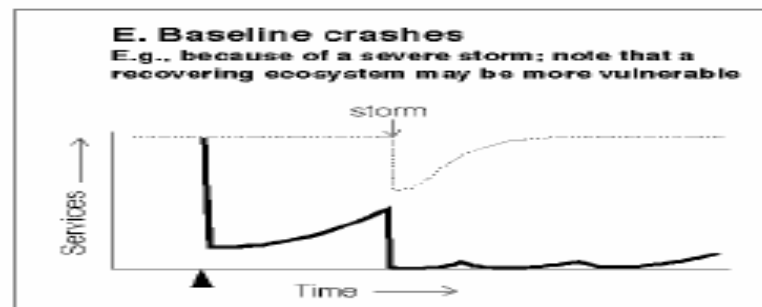
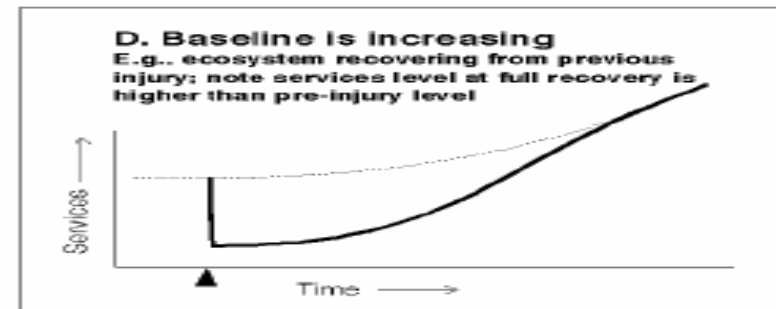
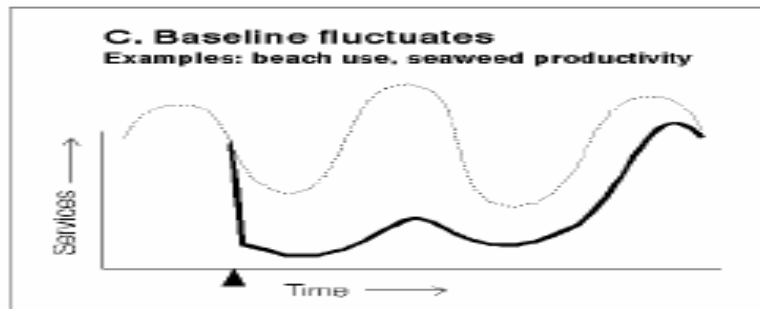
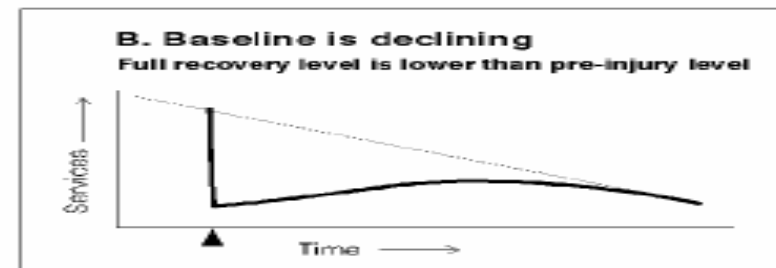


Definition of Baseline

- *The condition that would have existed in the assessment area/affected area had the discharge not occurred (same in OPA and CERCLA)*
- *Baseline is dynamic in that it is not only the condition of the resource before the release, but also the condition over time had the resource not been exposed to the release*
- *Baseline can differ from pre-release conditions regardless of the effect of the release at issue because of other **actionable** and **non-actionable** events (anthropogenic and naturally occurring)*



Possible Baseline Dynamics





OPA Guidance on Baseline

- *Characterization or estimation of baseline should include normal ranges of physical, chemical, biological conditions and human use of an area*
- *Restrict data and information collection on baseline to that which is necessary for conducting the assessment and do it in a cost-effective manner*
- *Evaluate all possible sources of baseline data, including: scientific literature; available databases and resource inventories; data from resource users, i.e. commercial fishermen, recreational organizations, etc.; governmental and academic research projects*
- *Reference/control areas should be selected on the basis of comparability to the affected area and should be demonstrated (at least for key variables)*
- *Reference/control areas can be used to estimate baseline for more than one type of resource or service*



OPA Guidance on Baseline (continued)

- *Regulations state that baseline may be estimated using any of the following (alone or in combination):*
 - *Historical data*
 - *Reference or control area/data*
 - *Incremental change, e.g. counts of dead fish to quantify fish injury*

Note: It is often helpful to use multiple lines of evidence



OPA Guidance on Baseline (continued)

- *OPA regulations do not recommend which method or methods for establishing baseline are the most preferred – requires best professional judgment for each case*

- *Types of data that may be useful for estimating baseline:*
 - *time series data collected systematically or a single inventory from the same area prior to the incident or data collected from a reference or control area*
 - *descriptions of historical patterns or trends in the natural resources of interest in the area of the incident*
 - *data/information from control or reference areas*
 - *data/information from the affected area after certain natural resources have recovered, i.e. estimated to have returned to baseline*



Some Key Questions

- *For a given incident is it better to set up control/reference sites or to refer to historical data for the area of impact if both options are available?*
- *How to choose which metrics/measures of baseline to focus on?*
- *If we choose to establish control/reference sites how many is enough?*
- *How to best take into consideration exogenous factors such as natural variability and weather and other sources of anthropogenic injury/degradation?*
- *How to establish baseline for localized injuries in the midst of a larger, highly degraded environment (e.g. an urban estuary) where there is little or no relevant historical environmental/resource/human use data?*
- *How much effort/expense should be incurred to estimate baseline and to what degree of accuracy?*



Examples of Estimated Baselines

- *Athos Oil Spill (1 million liters of crude oil) in the Delaware River – November, 2004*
 - *Tidal river system near Philadelphia*
 - *Historical background contamination and toxicity data for benthic organisms in sediment*
 - *Toxicity data for amphipods showed their biomass was reduced by approximately 10% (compared to uncontaminated baseline) prior to Athos spill*
 - *Using amphipods as the indicator species/metric, a 10% reduction in the total benthic biomass baseline is being considered for purposes of benthic injury quantification (weight of biomass lost)*
- *Chalk Point Oil Spill (500K liters bunker/diesel oil) in the Chesapeake Bay – April, 2000*
 - *Estuarine system near Baltimore/Wash. D.C.*
 - *Historical and post-spill data on recreational shoreline and boating use (trips per day) in a small (private) portion of the affected area by the spill (spill area)*
 - *Assumed area with recreational use data was representative of behavioral change for water-based recreationists in the entire affected area for 1 year following the spill*
 - *Multiplied post-spill recreational use (based on helicopter overflight user counts) for entire affected area by ratio of pre-spill to post-spill rec. use in representative area to estimate baseline*
 - *Statistically adjusted/controlled for weather – which in this case reduced baseline (wet summer)*



Observations and Suggestions

- *Under the best of circumstance baseline usually only approximates a portion of reality for any given area or ecosystem for any given time period*
- *Uncertainty is prevalent in NRDA, not only in baseline estimation*
- *Through pre-planning consider establishing baselines for highly vulnerable and/or particularly valuable areas before spills occur*
 - *link the metric(s) used to the most probable types of injuries*
- *Consider establishing “sentinel” control/reference areas and monitor over time*
- *Level of cooperation between RP(s) and trustees affects degree of scientific rigor that must be applied to estimates of baseline*
- *Document assumptions carefully, and explicitly and be “reasonable”*



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