

**DWR-CE-P-01-NRD Assessment-05152019**  
**Natural Resource Damage Assessment for Surface Waters**

DISCLAIMER: This document is policy only and does not create legal rights or obligations. Agency decisions in any particular case will be made applying applicable laws and regulations to the specific facts.

**1) EFFECTIVE DATE:** SEPTEMBER 1, 2022

**2) SIGNATURES:**

\_\_\_\_\_  
Debbie Duren, Natural Resource Trustee Program Manager, Preparer

\_\_\_\_\_  
Stephanie Durman, Senior Associate Counsel, Reviewer

\_\_\_\_\_  
Jennifer Dodd, Director, Division of Water Resources

Natural Resource Damage Assessment (NRDA) is applied in the context of formal enforcement to compensate for injury to Tennessee's natural resources. These funds are then applied to restoration projects to offset natural resource damages. NRDA matrices are intended to assist the department in determining a monetary value for these damages. This matrix is focused on injury caused by illicit activities affecting surface waters of the State, including both streams and wetlands.

Once an injury to surface water occurs and has been initially investigated, a decision is made by the appropriate Division of Water Resources staff, after consultation with the natural resource trustee program manager and OGC, on whether or not to pursue NRD. In making this decision, staff will follow the process outlined in the NRDA flow chart, and submit a completed NRDA checklist with any Enforcement Action Request.

If NRD is to be pursued, department staff will identify all injured stream reaches and/or wetlands and will determine appropriate inputs for the four matrix elements needed to calculate damage amounts.

For linear watercourses, the first step is to determine whether the watercourse was a stream prior to impact. Where feasible, this is done by applying the hydrologic determination methodology set out in Department rules within that water feature. Sometimes, the hydrologic determination may need to be conducted immediately upstream or downstream of the impacted area if the damage to the water feature is extensive.

## **DWR-CE-P-01-NRD Assessment-05152019**

### **Natural Resource Damage Assessment for Surface Waters**

For wetlands that have been severely impacted, determinations of the wetland status can be made based on digging pits to find hydric soils, by evaluating adjacent or nearby wetland features, through soil mapping, and other means.

Streams that have suffered injury should be divided into distinct reaches having a similar degree of injury from the activity, and similar resource quality (i.e., common matrix element input variables). For each stream reach, inputs to the matrix will yield a per functional-foot NRD value based on the department's current estimation of per functional-foot cost to replace lost resource value.<sup>1</sup> The per functional-foot value is then multiplied by the number of feet in the injured reach to determine the NRD for that particular segment. Finally, the values for all injured stream reaches are summed for the total stream NRD.

Wetlands that have suffered injury should be evaluated individually. For each wetland a mitigation ratio of 2:1 will be applied to determine the credits needed to offset injury. Inputs to the matrix will yield a per credit NRD value based on the department's estimation of the current per acre cost to perform wetland mitigation sufficient to replace lost resource value. The per acre value is then multiplied by the number of acres needed to offset injury to determine the NRD for that particular wetland. Finally, the values for all injured wetlands are summed for the total wetland NRD. If there are both stream and wetland impacts, those two subtotals are added to determine the total NRD.

#### ELEMENTS

##### A. Gravity

The gravity of injury is a composite element which classifies the degree of injury to the resource by assigning it to one of three injury categories. The gravity of injury is derived through a combination of direct measurement and observation of the injury, in conjunction with pre-existing knowledge of the specific natural resource affected and the area (e.g., soil types, gradient, climate, ecoregion-based stream functions, etc). In cases where Tennessee Department of Environment and Conservation (TDEC) staff were not able to measure and observe the injury soon after it occurred, staff will determine gravity using best professional judgment based on factors such as those listed in this section.

---

<sup>1</sup> If corrective action is taking place, 3% per year will be used to calculate temporal loss.

## **DWR-CE-P-01-NRD Assessment-05152019**

### **Natural Resource Damage Assessment for Surface Waters**

The three gravity of injury categories are:

#### Minor

Observable and/or measurable increase in sediment depositional features<sup>2</sup> from a sediment release, physical alteration, or other pollution that has or is likely to adversely affect ecological services when compared with pre-injury baseline conditions.

#### Moderate

Measurable increase in sediment depositional features from a sediment or other pollutant release, or physical alteration sufficient to cause significant impairment of ecological services including, but not limited to, a reduction in abundance, diversity, or population balance of the native aquatic biota.

#### Severe

Overwhelming increase in sediment depositional features from a sediment or other pollutant release, or physical alteration that has caused a catastrophic loss of ecological services.

Methodologies used in the observation, documentation, and measurement of sediment or other pollution injury to affected stream reaches or wetlands may vary due to the diversity of stream or wetland types in Tennessee, and the range of injury scenarios. The methodologies used should be appropriate to the resource and incident and be well-documented.

Factors for assigning a gravity category may include, but are not limited to, the following:

- total quantities of sediment or other pollutant released in consideration of the size of receiving waters;
- effects upon instream/wetland habitat quality, including the degree of embeddedness of natural substrate; the extent of pool deposition;
- extent of fill or the depth, width, and length of sediment bars resulting from the activity;
- changes in flow status, patterns and stability due to the activity;
- change in wetlands area, function or hydrology; and
- impacts to the quantity and diversity of aquatic life due to the activity.

---

<sup>2</sup> Examples of depositional features include center and point bars, benches, pool deposition, and substrate embeddedness.

## **DWR-CE-P-01-NRD Assessment-05152019**

### **Natural Resource Damage Assessment for Surface Waters**

#### B. Duration

The duration of injury is the actual or estimated length of time it will take the injured resource to fully recover to pre-impact conditions, including the reestablishment of faunal populations. If pre-impact conditions are unknown, the department will use an appropriate reference reach or conservatively assume the water body was fully supporting prior to the injury.

Estimates of recovery duration are based upon the best professional judgment of department staff. Factors for assigning a duration category may include, but are not limited to the following:

- the initial severity and geographic scale of the injury;
- remediation efforts that have taken place;
- geomorphic nature of the injured resource, including channel size, gradient, sinuosity, and floodplain characteristics;
- hydrologic nature of the injured resource, including size of upstream drainage basin, annual flow regime, instream velocities, and local precipitation patterns; and
- impediments to faunal recolonization, such as location in the watershed, barriers to migration, rarity<sup>3</sup> of pre-injury species.

Four categories have been established for purposes of this matrix:

>1 year, but ≤5 years

>5 years, but ≤10 years

>10 years, but ≤30 years

>30 years

This matrix allows for input of an estimated value to predict duration of injury. However, long-term monitoring of resource recovery may be performed by the department or other agency, or may be required of the violator in some cases. As with the gravity element, methodologies used in the monitoring of injury duration, or documentation of resource recovery may vary due to the diversity of stream or wetland types in Tennessee, and the range of injury scenarios. The methodologies used should be appropriate to the resource and activity and be well-documented.

---

<sup>3</sup> State or federal status

## DWR-CE-P-01-NRD Assessment-05152019

### Natural Resource Damage Assessment for Surface Waters

In many cases, the person(s) responsible for the natural resource damages will be required to restore the impacted waterbody to pre-impact conditions. This determination is typically made by evaluating whether the activity would have been likely to qualify for permit coverage, whether the injury is so severe that restoration is not possible or there is a high risk of additional injury that may result from attempting corrective actions.

#### C. Resource Quality

The measure of resource quality is based upon the current formal assessment of the injured resource (as reflected in the DWR Assessment Database), or an evaluation of an appropriate reference resource. In the absence of sufficient pre-injury data or an appropriate reference, the department will assume the injured water body was fully supporting of its classified uses prior to the activity.

The formal designation categories are:

Outstanding Natural Resource Waters

Exceptional Tennessee Waters

Fully Supporting \*

Not Supporting \*

\* Note: For sediment NRDA purposes, waterbodies may exceed the pathogen criterion and still be considered Fully Supporting, if all other uses are supported.

#### D. Reach Length and Wetland Acreage

For each injured stream reach, a total linear length should be directly measured, or closely approximated using appropriately scaled maps. For each injured wetland, a total acreage should be determined.

**DWR-CE-P-01-NRD Assessment-05152019**  
**Natural Resource Damage Assessment for Surface Waters**

MATRIX

Each resource quality category has an individual matrix table. Duration is represented on the vertical axis, gravity on the horizontal axis. The tables are used to generate a per functional-foot NRD value for each injured stream reach and a per acre NRD value for each injured wetland.<sup>4</sup> At this time, the department estimates a per functional-foot cost for replacement of stream resource value of \$1,750 and a per acre cost for replacement of wetland resource value of \$45,000.<sup>5</sup>

(Note: the value of x equals the current per functional-foot stream replacement cost or the current per acre wetland replacement cost.)

Stream Tables

For ONRW

	minor	moderate	severe
>1≤5 yrs	0.05x	0.10x	0.18x
>5≤10 yrs	0.10x	0.18x	0.36x
>10≤30 yrs	0.18x	0.36x	0.72x
>30 yrs		0.60x	1.20x

For Exceptional Tennessee Waters

	minor	moderate	severe
>1≤5 yrs	0.04x	0.08x	0.15x
>5≤10 yrs	0.08x	0.15x	0.30x
>10≤30 yrs	0.15x	0.30x	0.60x
>30 yrs		0.50x	1.00x

<sup>4</sup> Alternatively, if corrective action is taking place, or has taken place, 3% per year may be used to calculate temporal loss. This valuation may also be used when damages have been naturally attenuated.

<sup>5</sup> Replacement costs are average costs determined at least biennially by the department, in part through review of the current costs for third-party stream and wetland mitigation credits in Tennessee.

**DWR-CE-P-01-NRD Assessment-05152019**  
**Natural Resource Damage Assessment for Surface Waters**

For Fully Supporting

	minor	moderate	severe
>1≤5 yrs	0.02x	0.05x	0.09x
>5≤10 yrs	0.05x	0.09x	0.18x
>10≤30 yrs	0.09x	0.18x	0.36x
>30 yrs		0.30x	0.60x

For Not Supporting

	minor	moderate	severe
>1≤5 yrs	0.02x	0.03x	0.06x
>5≤10 yrs	0.03x	0.06x	0.12x
>10≤30 yrs	0.06x	0.12x	0.24x
>30 yrs		0.24x	0.40x

Wetland Tables

For ONRW

	minor	moderate	severe
>1≤5 yrs	0.06x	0.12x	0.23x
>5≤10 yrs	0.12x	0.23x	0.45x
>10≤30 yrs	0.23x	0.45x	0.90x
>30 yrs		0.75x	1.50x

For Exceptional Tennessee Waters

	minor	moderate	severe
>1≤5 yrs	0.05x	0.09x	0.19x
>5≤10 yrs	0.09x	0.19x	0.38x
>10≤30 yrs	0.19x	0.38x	0.75x
>30 yrs		0.63x	1.25x

For Fully Supporting

	minor	moderate	severe
>1≤5 yrs	0.04x	0.08x	0.15x
>5≤10 yrs	0.08x	0.15x	0.30x
>10≤30 yrs	0.15x	0.30x	0.60x
>30 yrs		0.50x	1.00x

**DWR-CE-P-01-NRD Assessment-05152019**  
**Natural Resource Damage Assessment for Surface Waters**

For Not Supporting

	minor	moderate	severe
>1≤5 yrs	0.03x	0.06x	0.11x
>5≤10 yrs	0.06x	0.11x	0.23x
>10≤30 yrs	0.11x	0.23x	0.45x
>30 yrs		0.38x	0.75x

Revision Number	Date	Brief Summary of Change
1	08/01/22	Updated variables for consistency and accuracy. Informed stream resource quality variable using TN SQT. Updated stream replacement for stream resource value from a linear-foot to functional-foot cost.
0	05/24/19	Initial issuance of the policy