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Wetland Function Scoring – User Guide

This document provides instructions to help decision makers systematically identify wetlands for protection and restoration actions using the New Jersey Wetland Function Scores and the Wetland Function Scores Map. The Wetland Function Scores provide a standardized method to assess the ecological value of all freshwater and coastal wetlands in the State, while the map (Figure 1) provides a user friendly means of exploring and identifying wetland scores throughout the State. These scores, and the underlying scoring protocols, were developed by Rutgers University in collaboration with the New Jersey Departemnent of Environmental Protection (NJDEP) and in consultation with various wetland experts throughout New Jersey. Find the full wetland function map at: https://rutgers.maps.arcgis.com/home/item.html?id=dcce35800c874f7a87174d13752ffb49.

A detailed explanation of the specific improvement actions possible based on these scores will be made available in the WatershedNJ improvements module.

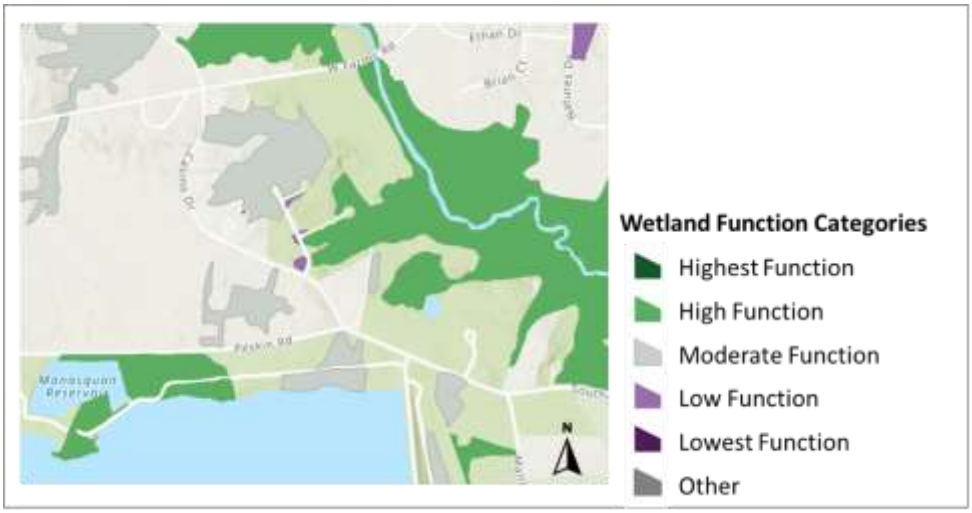

Figure 1. A snapshot of all six wetland function categories adjacent to Manasquan Reservoir in central Jersey. Map is a snapshot of the statewide map, which includes the wetland function categories and underlying OCSSs for every freshwater and coastal wetland and wetland complex in New Jersey.

Background

Wetlands scored under the New Jersey Wetland Function Scoring System are awarded points based on the quantity, and quality, of benefits the wetland is providing to its local ecosystem. More specifically, a wetland is awarded points based on its "wetland function." Wetland functions are processes that take place within a wetland and provide benefits to surrounding ecosystems. These wetland functions include water quality improvement, flood protection, and habitat creation.

The New Jersey Wetland Function Scores and Map provide a state-wide, state-specific system for assessing wetland function to support robust wetland management decisions. These materials were developed over a period of two years (2022-2024) and are the result of a collaboration among Rutgers University, NJDEP, and various wetland experts. The New Jersey wetland scoring schema is based on the West Virginia Rapid Assessment Method established in 2019 and incorporates the most up to date science on wetland function.

Interpreting the Scores

The New Jersey Wetland Function Scoring System assigns every freshwater and coastal wetland in New Jersey with a score referred to as the "***Overall Composite Score service score***" between 0-100. 0 indicates the lowest level of wetland function, while 100 represents a wetland performing the highest level of function compared to other New Jersey wetlands. In other words, a high composite service score indicates high (*i.e.,* good) wetland function.

The Overall Composite Score service score can be greater than 100 in special circumstances. Scores above 100 are reserved for wetlands of special conservation concern. For example, a wetland that is known to be inhabited by a threatened or endangered species would be eligible to receive a score above 100 to reflect the ecological importance of protecting those species.

Let's break down how the Overall Composite Score service score is calculated. Each Overall Composite Score service score is the sum of six composite service scores, as well as any additional points awarded when a wetland is of special conservation concern (Table 1). Each composite service score represents one ecosystem service provided (*i.e.,* water quality improvement, flood control, and conservation of biodiversity and providsion of habitat) and one pathway of providing that ecosystem service (*i.e.,* internal or external). This scoring schema for the "pathway" of ecosystem service was developed to ensure points were awareded based on (1) a wetland's intrinsic ability to provide an ecosystem service (*e.g.,* soil type, native flora, etc. that contribute to wetland function) and (2) the area just outside of the wetland's boundary that impacts the wetland's ability to provide an ecosystem service (*e.g.,* presence of invasive species, nearby urban development, habitat degredation).

Table 1. A breakdown of the scoring for the overal composite service score. The greyed boxes indicate the six composite service scores which sum to 100 points. An additional 100 points may be added for wetlands of special conservation concern. Internal characteristics include attributes of a wetland that contribute to wetland function (*e.g.,* vegetation density, poximity to headwater). External factors include natural and human-made stressors that could influnece the ability of a wetland to function properly (*e.g.,* proxmity to a pollutant discharge, abundance of land use disturbance within 50m of a wetland).

Ecosystem Service	**Internal Characteristics that Contribute to Wetland Function** (Maximum Points Possible)	**External Factors that Influence Wetland Function** (Maximum Points Possible)	**Ecosystem Service Score** (Maximum Points Possible)	**Overall Composite Score Service Score** (Maximum Points Possible)	**Overall Composite Score Service Score With Wetlands of Special Conservation Concern** (Add up to 50 bonus points)
Water Quality Improvement	19	6	25	—	—
Flood Control	18	7	25	—	—
Conservation of biodiversity and provision of habitat	25	25	50	—	—
Totals	62	38	—-	100	150

Users have the ability to use the Overall Composite Score service score for a big-picture idea of what is happening in a given wetland: wetlands providing a high level of function could be targeted for protection while wetlands that are currently performing lower levels of function could be targeted for restoration actions. Users also have the ability to reference the individual water quality, flood control, or habitat scores if there is a specific planning question in mind that relates to those categories.

Using Scores to Inform Actions

The Overall Composite Score Service Score serves as an easy to understand starting point to help decision makers in their wetland management decisions. Generally, the following actions may be generally applicable to each of the five categories:

1. Lowest Function Wetland – these wetlands are generally small with the lowest level of wetland function relative to other wetlands, and would greatly benefit from restoration activities.
2. Low Function Wetland – these wetlands are generally small with poor wetland function and would benefit from restoration activities.
3. Moderate Function Wetland – these wetlands have adequate wetland function that could be improved, but also have functions that should be conserved.
4. High Function Wetland – these wetlands have good function and should be protected.
5. Highest Function Wetland – these wetlands have the highest level of valuable functions and should be protected.

However, choosing wetlands to prioritize restoration or protection actions requires careful consideration of the site specific conditions of a given wetland or wetland complex. Some site specific conditions to consider when identifying a wetland for action include:

1. Size and location of wetland – While a larger wetland inherintly can generate more ecosystem benefits than a small wetland, a smaller wetland in a polluted area could be more important to maintain/restore given the important services the wetland provides to the area.
2. Regional wetland health– Restoring a wetland located in an area dominated by moderate to reference wetland function may not achieve a similar magnitude of environmental benefits as restoring a wetland in an area dominated by lowest, low, and moderate wetland function. For a breakdown of regional wetland function, see Table 2 below.

A detailed explanation of the specific restoration and improvement actions possible based on the individual metrics (e.g., buffer characteristics, potential pollutants, connectivity...) will be made available in the WatershedNJ improvements module. For more information, contact kate.douthat@rutgers.edu.

Table 2. Summary of the total acreage (see "Total Acres") of wetlands and wetland complexes per Watershed Management Areas.

Watershed Management Area (WMA) Name	WMA Number	**Total Acres**	**Total** Floodplain **Acres**	**Total** Non-Floodplain **Acres**	**Total Acres** of Wetlands of Special Conservation Concern	**Percent** Wetlands of Special Conservation Concern
Arthur Kill	7	3528	3002	526	0	0
Assiscunk, Crosswicks, and Doctors	20	39,101	33087	6014	1831	5
Barnegat Bay	13	65301	61675	3626	9622	5
Cape May	16	32568	31214	1354	15429	63
Central Delaware	11	23516	15967	7549	356	2
Great Egg Harbor	15	76150	73374	2776	5600	3
Hackensack, Hudson, and Pascack	5	3941	3491	450	0	0
Lower Delaware	18	30911	26518	4393	1222	2
Lower Passaic and Saddle	4	3667	2940	727	0	0
Lower Raritan, South River, and Lawrence	9	36796	30921	5875	1402	1
Maurice, Salem, and Cohansey	17	99708	88225	11484	14995	5
Millstone	10	33055	27124	5931	201	0
Monmouth	12	35785	29928	5857	419	1
Mullica	14	105839	101254	4586	58035	33
North and South Branch Raritan	8	25592	16507	9085	2071	1
Pompton, Pequannock, Wanaque, Ramapo	3	14012	8438	5575	644	4
Rancocas	19	62927	60066	2862	7591	3
Upper Delaware	1	48092	27348	20744	5819	7
Upper Passaic, Whippany, and Rockaway	6	38410	32169	6241	6813	3
Wallkill	2	21939	12890	9049	2539	6

Table 3. Summary of wetland functional values for each Wetland Management Areas. Each row represents different elements of the Overall Composite Score service score, including (in order): the Overall Composite Score service score; the Overall Composite Score service score (including the 100 point wetlands of special conservation concern); the points awarded within the 100 points possible for wetlands of special conservation concern; the sum of the internal and external water quality scores (WQ Composite); the sum of the internal and external flood attenuation scores (FC Composite); the sum of the internal and external habitat and ecosystem integrity scores (HE Composite Max); the sum of the internal Water Quality Improvement, Flood Attenuation, and Habitat and Ecosystem Integrity composite service scores (Internal Composite); and the sum of the external Water Quality Improvement, Flood Attenuation, and Habitat and Ecosystem Integrity composite service scores (External Composite). For each score (*i.e.,* row), the mean, median, minimum, maximum, and standard deviation value for each watershed management area is provided. Also included in each row is a "rank" value which indicates where among the 20 watershed management areas each watershed management area stands for each score such that 1=the highest ranking, 20=the lowest ranking, and 10=the middle ranking. For example, WMA #7 (the Authur Kill) is ranked 20 for Overall Composite Score score, meaning it has the lowest Overall Composite Score Score of all 20 WMAs.

Score Type Order	Mean Score	Median Score	Minimum Score	Maximum Score	Standard Deviation	Rank Among WMAs
Watershed Management Area #7 – Arthur Kill						
Overall Composite Score	43.3	45	17	68	9.4	20
Overall Composite Score with WSCC Bonus	43.3	45	17	68	9.4	20
Wetlands of Special Conservation Concern	0	0	0	0	0	18.5
Water Quality Composite Score	15.1	16	4	22	3.6	12.5
Flood Control Composite Score	14.5	15	5	22	3.3	13.5
Habitat and Ecological Integrity Composite Score	13.7	13	3	29	4.4	20
Internal Composite Score	30.4	32	4	55	8.5	16.5
External Composite Score	12.9	12	7	24	2.9	20
Watershed Management Area #20 - Assiscunk, Crosswicks, and Doctors						
Overall Composite Score	49.3	49.9	18	83.5	13.2	10
Overall Composite Score with WSCC Bonus	50.1	50	18	113.5	14.7	12
Wetlands of Special Conservation Concern	0.8	0	0	30	4	9.5
Water Quality Composite Score	14.8	15	3	24	4	14.5
Flood Control Composite Score	14.4	15	4	23	3.9	15

Score Type Order	Mean Score	Median Score	Minimum Score	Maximum Score	Standard Deviation	Rank Among WMAs
Habitat and Ecological Integrity Composite Score	20.1	19.8	5	43.5	7	12
Internal Composite Score	31.6	33	5	64	11.8	12
External Composite Score	17.7	17.9	8	27.8	3.3	10
Watershed Management Area #13 – Barnegat Bay						
Overall Composite Score	55.5	56	18	90	12	4
Overall Composite Score with WSCC Bonus	58	56	18	140	18.4	4
Wetlands of Special Conservation Concern	2.5	0	0	50	10.7	5
Water Quality Composite Score	16.3	17	3	24	3.6	5
Flood Control Composite Score	15.5	16	5	23	3.4	5
Habitat and Ecological Integrity Composite Score	23.6	23.1	3	50	8.4	8
Internal Composite Score	37.7	38	7	66	10.3	3
External Composite Score	17.8	18	7	30	3.3	9
Watershed Management Area #16 – Cape May						
Overall Composite Score	64.5	65.8	23	93	12.6	2
Overall Composite Score with WSCC Bonus	90.2	92.3	23	143	26.4	1
Wetlands of Special Conservation Concern	25.7	30	0	50	21.4	1
Water Quality Composite Score	18	19	3	24	4.2	1
Flood Control Composite Score	16.2	17	5	24	3.6	3
Habitat and Ecological Integrity Composite Score	30.3	30	8	50	7.6	2
Internal Composite Score	36.8	38	9	64	11.4	4
External Composite Score	27.8	28	14	39.9	4.9	1
Watershed Management Area #11 – Central Delaware						
Overall Composite Score	44.9	45	15	74.9	11.3	18
Overall Composite Score with WSCC Bonus	45.5	45	15	123.8	13	18
Wetlands of Special Conservation Concern	0.7	0	0	50	4.8	11.5
Water Quality Composite Score	13.3	13	3	23	4.1	17
Flood Control Composite Score	12.2	12	2	23	3.8	18
Habitat and Ecological Integrity Composite Score	19.4	19	2	39.1	6.5	14

Score Type Order	Mean Score	Median Score	Minimum Score	Maximum Score	Standard Deviation	Rank Among WMAs
Internal Composite Score	29.1	29	5	55	10.4	20
External Composite Score	15.8	16	6	25.9	3	17
Watershed Management Area #15 – Great Egg Harbor						
Overall Composite Score	60.3	61	23	93	11.9	3
Overall Composite Score with WSCC Bonus	61	61	23	123	13.4	3
Wetlands of Special Conservation Concern	0.7	0	0	30	4.6	11.5
Water Quality Composite Score	17.9	19	4	25	3.8	2
Flood Control Composite Score	16.3	17	6	24	3.1	2
Habitat and Ecological Integrity Composite Score	26	27	6	50	7.4	3.5
Internal Composite Score	38.6	40	5	66	10.2	2
External Composite Score	21.7	22	11	32	3.6	3
Watershed Management Area #5 – Hackensack, Hudson, and Pascack						
Overall Composite Score	46.1	48	15	69.6	9.2	17
Overall Composite Score with WSCC Bonus	46.1	48	15	69.6	9.2	17
Wetlands of Special Conservation Concern	0	0	0	0	0	18.5
Water Quality Composite Score	15.6	17	4	21	3.8	7
Flood Control Composite Score	15.2	16	3	23	3.7	6
Habitat and Ecological Integrity Composite Score	15.4	15	4	38.1	5.6	18
Internal Composite Score	32	34	4	52	8.5	10.5
External Composite Score	14.1	13	7	29.4	3.7	18
Watershed Management Area #18 – Lower Delaware						
Overall Composite Score	48.9	49	16	83	12	13
Overall Composite Score with WSCC Bonus	49.3	49	16	107.9	12.6	13
Wetlands of Special Conservation Concern	0.3	0	0	30	2.6	14.5
Water Quality Composite Score	14.8	16	2	22	3.8	14.5
Flood Control Composite Score	15	16	5	22	3.8	7.5
Habitat and Ecological Integrity Composite Score	19.1	18	4	43	6.5	15
Internal Composite Score	32	33	5	60	10.4	10.5

Score Type Order	Mean Score	Median Score	Minimum Score	Maximum Score	Standard Deviation	Rank Among WMAs
External Composite Score	16.9	17	7	30	3.4	13
Watershed Management Area #4 – Lower Passaic and Saddle						
Overall Composite Score	44.1	46	18	68	8.9	19
Overall Composite Score with WSCC Bonus	44.1	46	18	68	8.9	19
Wetlands of Special Conservation Concern	0	0	0	0	0	18.5
Water Quality Composite Score	15.1	17	5	21	3.7	12.5
Flood Control Composite Score	14.5	15	5	22	3.6	13.5
Habitat and Ecological Integrity Composite Score	14.4	14	6	29	3.5	19
Internal Composite Score	30.5	33	5	52	8.2	15
External Composite Score	13.5	13	7	21	1.9	19
Watershed Management Area #9 – Lower Raritan, South River, and Lawrence						
Overall Composite Score	47	47	18	84	11.5	15
Overall Composite Score with WSCC Bonus	47.3	47	18	112.8	12	15
Wetlands of Special Conservation Concern	0.2	0	0	30	2.2	16
Water Quality Composite Score	15.3	16	3	23	3.9	10.5
Flood Control Composite Score	14.8	15	5	24	3.7	9.5
Habitat and Ecological Integrity Composite Score	16.9	16	5	41.8	5.7	17
Internal Composite Score	29.8	30	4	60	10	19
External Composite Score	17.2	17	8	29.3	3.4	12
Watershed Management Area #17 – Maurice, Salem, and Cohansey						
Overall Composite Score	54.2	55.8	17	93	15.1	5
Overall Composite Score with WSCC Bonus	55.4	56	17	143	17.4	5
Wetlands of Special Conservation Concern	1.3	0	0	50	5.8	8
Water Quality Composite Score	15.3	16	1	24	4.3	10.5
Flood Control Composite Score	14.7	16	4	23	4	11
Habitat and Ecological Integrity Composite Score	24.1	24.8	3	50	9	7
Internal Composite Score	35.5	37	5	68	12.8	6
External Composite Score	18.7	19	7	31.6	4.3	5.5

Score Type Order	Mean Score	Median Score	Minimum Score	Maximum Score	Standard Deviation	Rank Among WMAs
Watershed Management Area #10 – Millstone						
Overall Composite Score	49.1	49	18	83.4	12	12
Overall Composite Score with WSCC Bonus	49.1	49	18	125.1	12.1	14
Wetlands of Special Conservation Concern	0	0	0	50	1	18.5
Water Quality Composite Score	16	17	3	23	4	6
Flood Control Composite Score	14.6	15	3	25	3.8	12
Habitat and Ecological Integrity Composite Score	18.4	17.9	5	39.4	6.3	16
Internal Composite Score	30.3	31	5	57	10.8	18
External Composite Score	18.7	18.9	8	30	3.3	5.5
Watershed Management Area #12– Monmouth						
Overall Composite Score	50	50	19	84.6	11.4	9
Overall Composite Score with WSCC Bonus	50.3	50	19	134.6	12.4	10.5
Wetlands of Special Conservation Concern	0.3	0	0	50	3.4	14.5
Water Quality Composite Score	15.5	16	2	23	3.9	8
Flood Control Composite Score	15	15	5	24	3.8	7.5
Habitat and Ecological Integrity Composite Score	19.5	18	6	46.6	6.1	13
Internal Composite Score	31	31	5	60	10	13
External Composite Score	19	19	9	31.9	3.7	4
Watershed Management Area #14 – Mullica						
Overall Composite Score	64.8	65	24	95	12.7	1
Overall Composite Score with WSCC Bonus	81.1	68	24	145	31.8	2
Wetlands of Special Conservation Concern	16.3	0	0	50	23.2	2
Water Quality Composite Score	17.1	17	6	25	3.7	3
Flood Control Composite Score	16.4	17	7	24	3.2	1
Habitat and Ecological Integrity Composite Score	31.3	31	7	50	9.4	1
Internal Composite Score	42.7	43	9	68	12	1
External Composite Score	22.1	22	13	31	2.8	2
Watershed Management Area #8 – North and South Branch Raritan						

Score Type Order	Mean Score	Median Score	Minimum Score	Maximum Score	Standard Deviation	Rank Among WMAs
Overall Composite Score	46.6	47	16	90.1	11.7	16
Overall Composite Score with WSCC Bonus	47.2	47	16	140.1	14	16
Wetlands of Special Conservation Concern	0.6	0	0	50	5.4	13
Water Quality Composite Score	13.7	14	3	22	4	16
Flood Control Composite Score	12.5	13	3	22	3.5	16
Habitat and Ecological Integrity Composite Score	20.4	20	6	49.1	6.3	11
Internal Composite Score	30.4	31	4	70	10.6	16.5
External Composite Score	16.2	16	7	27	2.9	16
Watershed Management Area #3– Pompton, Pequannock, Wanaque, Ramapo						
Overall Composite Score	49.2	49	22.1	80	9.1	11
Overall Composite Score with WSCC Bonus	51	49	22.1	130	13.8	9
Wetlands of Special Conservation Concern	1.8	0	0	50	9.1	6
Water Quality Composite Score	12.5	12	5	22	4.4	19
Flood Control Composite Score	12.3	12	4	23	3.8	17
Habitat and Ecological Integrity Composite Score	24.4	25	8	48	6.9	6
Internal Composite Score	32.5	33	7	63	8.3	8.5
External Composite Score	16.7	17	8	28	2.2	14.5
Watershed Management Area #19 – Rancocas						
Overall Composite Score	53.7	54.1	17	87	12	6
Overall Composite Score with WSCC Bonus	54.6	54.2	17	137	14.2	6
Wetlands of Special Conservation Concern	0.8	0	0	50	5.5	9.5
Water Quality Composite Score	16.4	17	4	23	3.9	4
Flood Control Composite Score	15.6	16	6	23	3.4	4
Habitat and Ecological Integrity Composite Score	21.7	21	5	45	7.4	9
Internal Composite Score	35.7	37	5	65	10.7	5
External Composite Score	18	18	8	27.8	3.1	8
Watershed Management Area #1 – Upper Delaware						
Overall Composite Score	50.9	50.8	17	85	10.7	7

Score Type Order	Mean Score	Median Score	Minimum Score	Maximum Score	Standard Deviation	Rank Among WMAs
Overall Composite Score with WSCC Bonus	53.5	51	17	135	16.6	7
Wetlands of Special Conservation Concern	2.7	0	0	50	10.2	4
Water Quality Composite Score	13.1	13	3	22	3.8	18
Flood Control Composite Score	11.7	11	2	23	3.5	19
Habitat and Ecological Integrity Composite Score	26	26	7	50	6.9	3.5
Internal Composite Score	33.5	33	4	69	10	7
External Composite Score	17.4	17	8	29	2.6	11
Watershed Management Area #6 – Upper Passaic, Whippany and Rockaway						
Overall Composite Score	50.7	50	14	84.4	11	8
Overall Composite Score with WSCC Bonus	52.3	50.1	14	134.1	15.3	8
Wetlands of Special Conservation Concern	1.6	0	0	50	8.8	7
Water Quality Composite Score	15.4	16	3	24	4.1	9
Flood Control Composite Score	14.8	15	4	25	3.8	9.5
Habitat and Ecological Integrity Composite Score	20.5	19	6	49	7.3	10
Internal Composite Score	32.5	33	4	65	9.5	8.5
External Composite Score	18.2	18	8	29.7	3.4	7
Watershed Management Area #2 – Wallkill						
Overall Composite Score	47.4	46	17	85	10.7	14
Overall Composite Score with WSCC Bonus	50.3	46	17	133	18.1	10.5
Wetlands of Special Conservation Concern	2.8	0	0	50	11.5	3
Water Quality Composite Score	12.2	12	3	22	3.8	20
Flood Control Composite Score	10.6	10	3	22	3.2	20
Habitat and Ecological Integrity Composite Score	24.6	24.7	7.2	50	6.9	5
Internal Composite Score	30.7	30	4	67	9.9	14
External Composite Score	16.7	16.7	9	25	2.3	14.5