

APPENDIX A

San Diego County Bacteria Source Prioritization Process

APPENDIX A-1

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SOURCE PRIORITIZATION PROCESS

For BACTERIA

Rev. DRAFT 1-23-2012

Overview of Process Development

This process was developed by a workgroup of San Diego County Stormwater Copermittee representatives and their consultants, principally via stakeholder workshops held in late 2011 and early 2012. Two of the workshops were devoted to development of conceptual models for bacteria sources, fate and transport. A literature review also was performed (see separate memorandum). Based on the conceptual models and the literature review results, in the third workshop (11/29/11) the workgroup focused on developing a process for prioritizing bacteria sources within watersheds. A draft prioritization process was constructed and several test runs were performed, after which the group met in a fourth workshop to evaluate the test results and make decisions regarding process and format.

The workgroup determined that the conceptual models should make two overarching, categorical distinctions:

- Wet weather *vs.* dry weather conditions, and
- Watersheds (incl. MS4s, creek and river systems) *vs.* Lagoons (incl. beaches)

The workgroup recognized also that bacteria sources should be identified by their relationship to human activity, and established the following broad categories for bacteria sources:

- Human origin (i.e., from the human body)
- Anthropogenic, non-human origin (resulting from human activities, but not the human body), and
- Non-anthropogenic origin (independent of human activity)

In its initial meeting, the workgroup produced a lengthy list of potential bacteria sources, which was used to inform construction of the conceptual model diagrams. The list was sub-divided into the three main source type categories (human, anthropogenic non-human, non-anthropogenic). Only sources with a potential pathway into an MS4 or a receiving water (creek, river, lagoon, ocean) were allowed on the list. The potential sources were further aggregated according to common characteristics, and grouped accordingly into a draft list of sources. The draft lists of sources were then incorporated into the conceptual model diagrams (attached).

Upon evaluation, most of the identified potential sources were considered to be available for transport to MS4s or receiving waters during both wet and dry weather. This was confirmed by the results of a poll of workgroup participants regarding the potential sources list. The current list of potential sources is attached, organized first by major sources type (human, anthropogenic non-human, non-anthropogenic) and then by subcategory.

The workgroup agreed that, to support the goal of reducing discharges of pollutants to the maximum extent practicable (MEP), it is important to prioritize sources for further investigation re: possible application of BMPs, and that, to be effective, the source prioritization must be done on a constituent-specific basis – in this case, for a type of pollutant (fecal indicator bacteria).

Prioritization Factors

The workgroup agreed that prioritization criteria ought to include additional factors other than simply magnitude alone. The group engaged in an idea-generation session regarding the considerations/impediments/challenges involved in effectively identifying and implementing BMPs for bacteria treatment or source control. A raw list of issues generated and discussed by the group was compiled.

The list of BMP implementation considerations/impediments/challenges was used as the basis for generating a list of potential factors to be used in developing source prioritization criteria. This list of potential factors was aggregated under the following themes:

- Human Health Risk
- Magnitude
- Transport Feasibility/Proximity to REC-1 Use
- Frequency
- Controllability/Implementability

The aggregated list of potential criteria/factors identified by the workgroup is attached. [Note that the “Transport Feasibility” factor was originally referred to as “Geographical Distribution”.]

Human Health Risk and Magnitude were identified as the most important of the five thematic factors for bacteria source prioritization. Within the scoring scheme, these two factors were given the highest weight, with possible score ranges of 1-10. The other three factors (Transport Feasibility, Controllability, and Frequency) were allocated possible score ranges of 1-5.

Note: following the initial “test drives” of the scoring system, it was determined that the controllability factor was too complex for inclusion in the scoring matrix, and would be instead used as an additional factor to supplement the source scoring.

The scoring system developed by the workgroup is shown in tabular form below.

Factor	Scoring	Scores (enter)
Human Health Risk	(Very low risk) 1 - 10 (Very high risk)	
Magnitude	(Low Conc./Low Load) 1 - 10 (High Conc./High Load)	
Transport Feasibility	(Far from REC-1 use) 1 - 5 (Very near REC-1 use)	
Frequency	(Infrequent) 1 - 5 (Very frequent)	

Score Sum:

Controllability	(Difficult to control) 1 - 5 (Readily controllable)	
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Sources that are not found within a given watershed are given zero scores for all factors. Sources with no apparent transport mechanism from source to MS4 or receiving waters also are given zero scores for all factors.

Prioritization Process

The prioritization process should be undertaken on a watershed-specific basis, drawing on available information about that watershed and its potential bacteria sources, to the extent possible. Where watershed-specific information is lacking, use available information from the literature, and when necessary, best professional judgment.

Consistent with the conceptual models, the issue of *Temporal Variation* was identified as a top-level consideration; i.e., the prioritization process would be performed separately for dry weather and wet weather sources. Also consistent with the conceptual models, the issue of *Source Type* (human, anthropogenic non-human, non-anthropogenic) was deemed to be a top-level consideration, to be included as a primary organizing factor in the prioritization process.

Prior to commencing source scoring for a particular watershed, it is essential to compile available information on the features of the watershed, including infrastructure, land uses, and significant features and facilities.

A spreadsheet tool is provided for the scoring process. A separate workbook should be used for each watershed or sub-watershed.

Source Scores Worksheet

The Source Scores worksheet is a scoring table for Dry and Wet conditions (with the DRY table situated directly above the WET table), and each worksheet contains a full set of the potential sources as identified by San Diego Copermittees. The scoring factors are shown in the rows of the spreadsheet, and the sources are in the columns. Users enter a set of scores as described below for each source, separately for 'Dry' and 'Wet' conditions, for the subject watershed. The Source Scores worksheet is the only place where users will typically enter data.

How to Score Sources

After all available source information has been compiled for the potential bacteria sources within a given watershed, complete the following steps:

- 1) Open the 'Bacteria Source Prioritization Template' Excel file and "save as" a new filename that reflects the watershed being scored.
- 2) In cell A1 of the Source Scores worksheet, enter the name of the watershed being scored. [The watershed name will automatically populate relevant cells in other worksheets.]
- 3) Beginning with the DRY table (dry weather conditions) in the Source Scores worksheet, for each likely source, proceed with scoring as follows:
 - a. **Human Health Risk:** assign score along a range of 1 for sources with very low human health risk, to 10 for sources with very high risk. [Note that health risk here refers to potential effects that may accrue upon contact with the bacteria produced by the source, not whether the bacteria derive from a human source. Human Health Risk scores may be the same or similar from watershed to watershed, and can be copied from one Source Scores worksheet to another.]

- b. **Magnitude:** assign score along a range of 1 for sources with very low concentration and/or load in discharges to MS4s or receiving waters, to 10 for sources with very high concentration and/or load. [Note that magnitude here refers to the *relative* amount of bacteria available from a particular source during either dry or wet conditions, watershed-wide, when the source is present and discharging. The Frequency factor addresses how often a source may discharge.]
 - c. **Transport Feasibility/Proximity to REC-1 Use:** assign score along a range of 1 for sources that have a low likelihood of reaching REC-1 receiving water uses, to 5 for sources that are highly likely to reach REC-1 uses, accounting for feasibility of transport from source to REC-1 receiving waters. For sources that are not located in or near REC-1 waterways, this factor will generally be higher in wet weather, as long as there is a runoff pathway (incl. via the MS4) to the receiving water during wet weather. During dry weather, over-irrigation is a possible transport mechanism for some sources (typically would be via the MS4).
 - d. **Frequency:** assign score along a range of 1 for sources that are infrequently present in MS4s or receiving waters, to 5 for sources that are frequently present in MS4s or receiving waters. [Note that this factor is used to account for both spatial (number of locations) and temporal (number of occasions) frequency.]
 - e. **Controllability:** assign score along a range of 1 for sources that are deemed difficult to control, to 5 for sources deemed to be readily controllable. Assume the current level of BMP implementation in the watershed at the time of scoring. [Note that Controllability is shown on the row below the scoring table, as this secondary factor is not included in the scoring.]
- 4) Sources that are not found within a given watershed are given zero scores for all factors (add note below Score Sum cell).
 - 5) Sources for which there is no viable transport mechanism to receiving waters within a given watershed are given zero scores for all factors (add note below Score Sum cell).
 - 6) The four primary factor scores (a – d, above) are automatically summed for the particular source in the ‘Score Sum’ row.
 - 7) Repeat scoring process (Step 3) for the same source during wet weather conditions in the WET table (directly below the DRY table).
 - 8) Repeat for each source, moving from left to right through the DRY and WET tables, until all sources are scored. Save the file.
 - 9) Within the Source Scores worksheet, freely annotate decisions, insert questions, and make notes in unused cells (be careful not to do so in the scoring cells or in the ‘Score Sum’ cells). Use color highlighting to flag scores where substantial uncertainty exists. [See examples in SDR Lower test run file.]
 - 10) When all watershed sources have been scored for both dry and wet conditions, the compiled scores may be viewed in printable, tabular form in the Score Summaries worksheet. The score summaries are formatted to print as a table on one page.
 - 11) The scored sources are automatically ranked according to final scores, within each of the major source categories (Human, Anthropogenic/non-human, Non-anthropogenic) as

seen in the Ranked Sources worksheet. The ranked score tables are formatted to print on two pages (page 1 – Dry, page 2 – Wet).

- 12) Review results and check for incongruities and anomalous scores or rankings. Return to Source Scores worksheet to make adjustments as needed, in particular to account for appropriate differences between dry and wet weather conditions. When done, save file.

Score Summaries Worksheet

This worksheet will be automatically populated with values from the Source Scores worksheet. The complete set of scores for the subject watershed are automatically compiled and organized in a printable table. [The first several columns in this spreadsheet are devoted to computing source rankings; these columns are not printed.] Users will normally not edit this worksheet.

Ranked Sources Worksheet

This worksheet will be automatically populated with values from the Score Summaries worksheet. The ranked sources for the subject watershed are automatically compiled and organized in a printable, two-page table. Users will normally not edit this worksheet.

Lookup Table Worksheet

This table is used to automatically populate the Ranked Sources table. Users will normally not edit this worksheet.

Source Scoring Notes

Importance of Relative Scoring

While proceeding through the scoring, it is essential to assign scores for wet conditions relative to dry conditions, to consider comparative scores for sources within a given source category, and to continue the relative scoring for the sources within various source categories. Each watershed also should be scored relative to other nearby watersheds. Consistency in approach is essential.

Some sources appear under both the Human and Anthropogenic Non-Human categories, because in some cases they may contain human-generated bacteria, and in others not. Score these differentially based on their likelihood of containing human vs. non-human bacteria.

Tips Before Starting

It is helpful to know locations of key features, such as areas served by sanitary sewer, areas served by septic systems, landfills, homeless encampments, commercial and residential land uses. Landfills can be active or closed, lined or unlined (unlined would be much more likely to be a pollutant source). The annual homeless persons census may be useful in assessing homeless encampments as a potential source.

If there is a need to reduce level of effort, the following approach can be used:

- a) Based on available information, divide potential sources list into two groups: “likely sources” (those considered likely to be present and potential contributors to a regulatory

violation) and “unlikely sources” (those considered to be very small and unlikely to contribute to a regulatory violation).

- b) In the spreadsheet, shade the columns containing only those sources identified as “likely sources” above. Score only those sources. (*Do not delete the un-scored source columns.*)

Caution – Do Not Edit Worksheets Other Than ‘Source Scores’ Worksheet

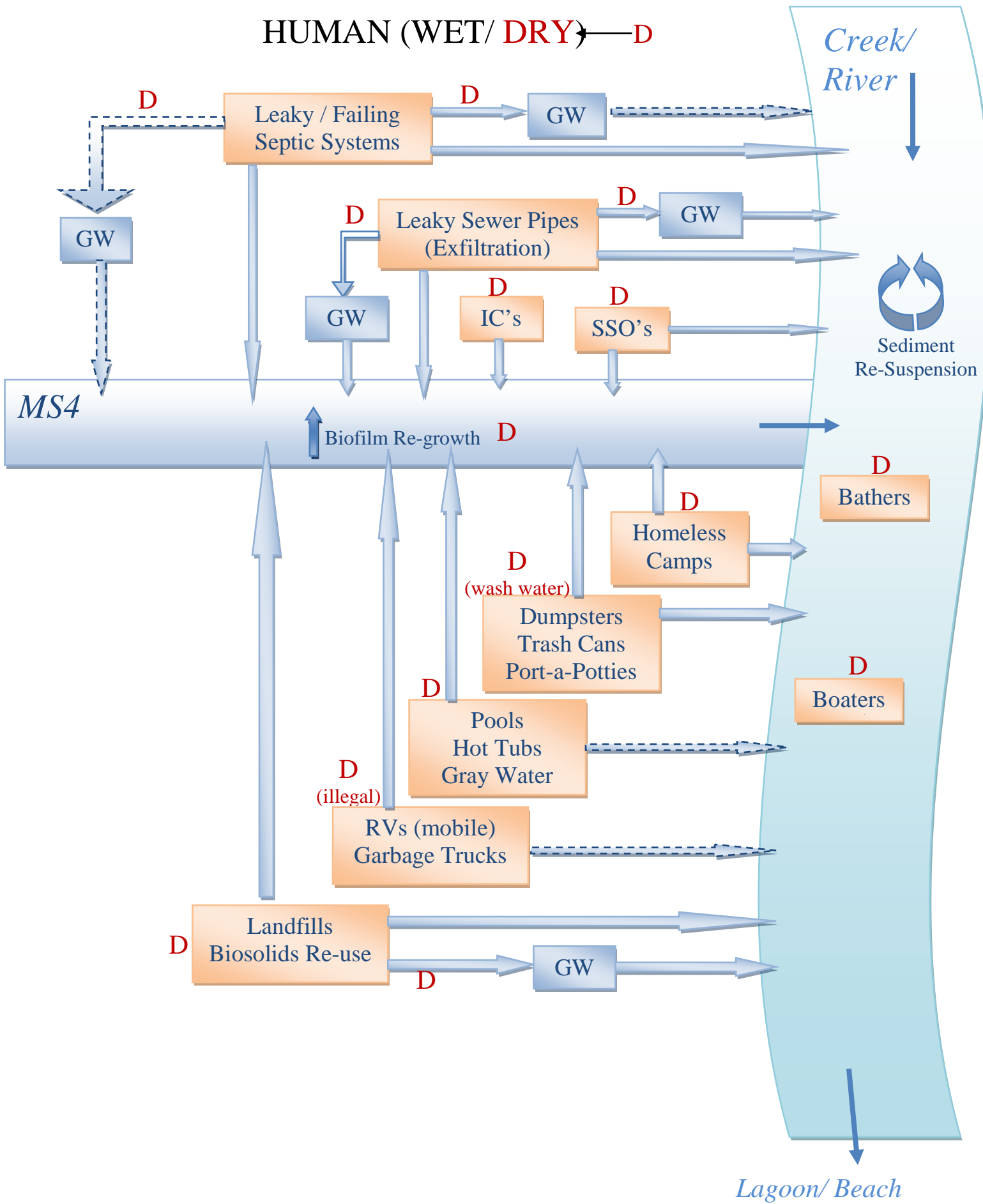
Users should only enter scores in the appropriate cells in the Source Scores worksheet. The Score Summaries, Ranked Sources, and Lookup Table worksheets are all automatically populated or pre-populated, and contain formulae and references to other worksheets, so those worksheets should not be edited by users. The only exception generally would be if there is a need to add additional sources; see instructions below.

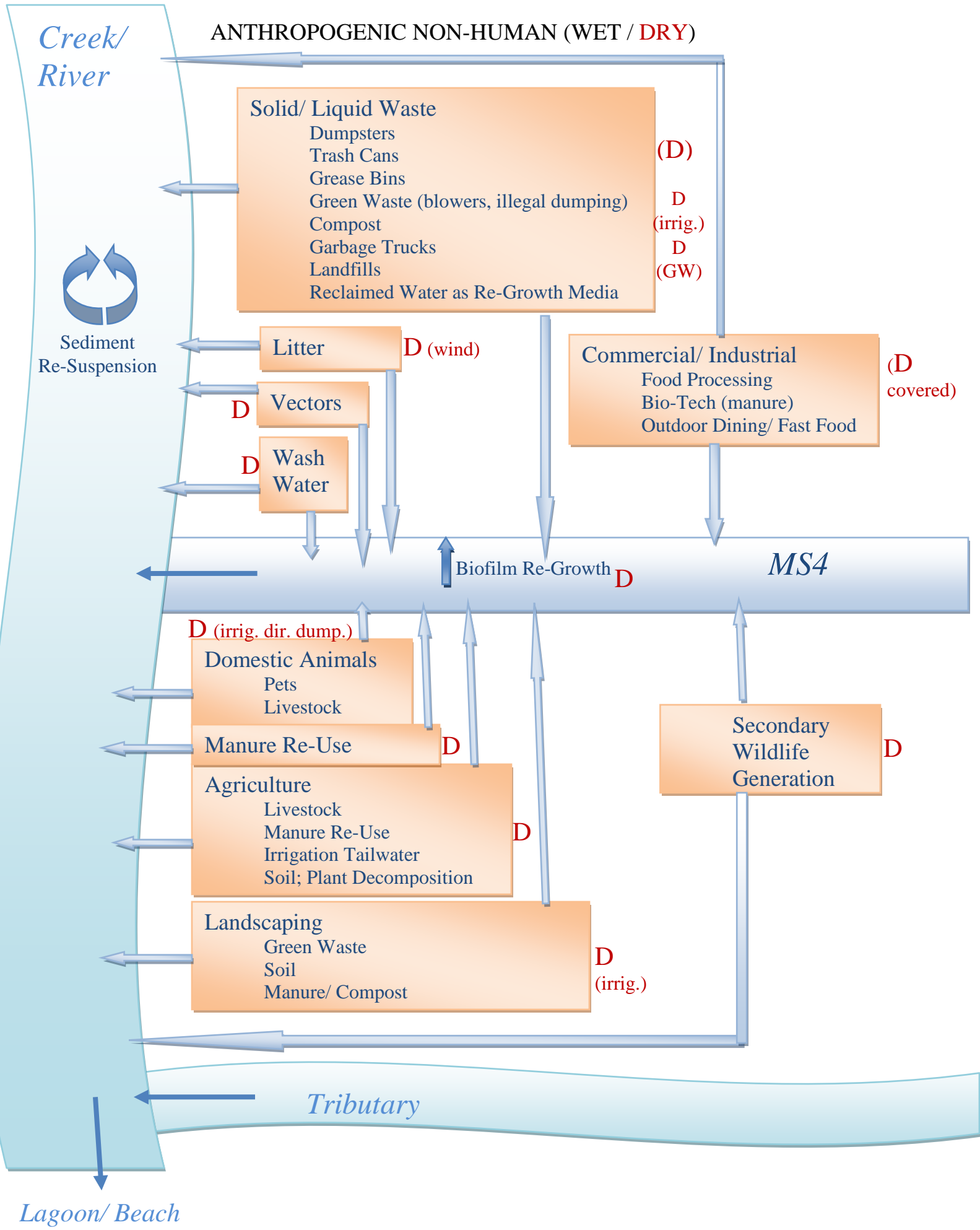
Adding Sources

Sources should be added only by experienced Excel users. If it is necessary to add additional sources, the following steps must be taken:

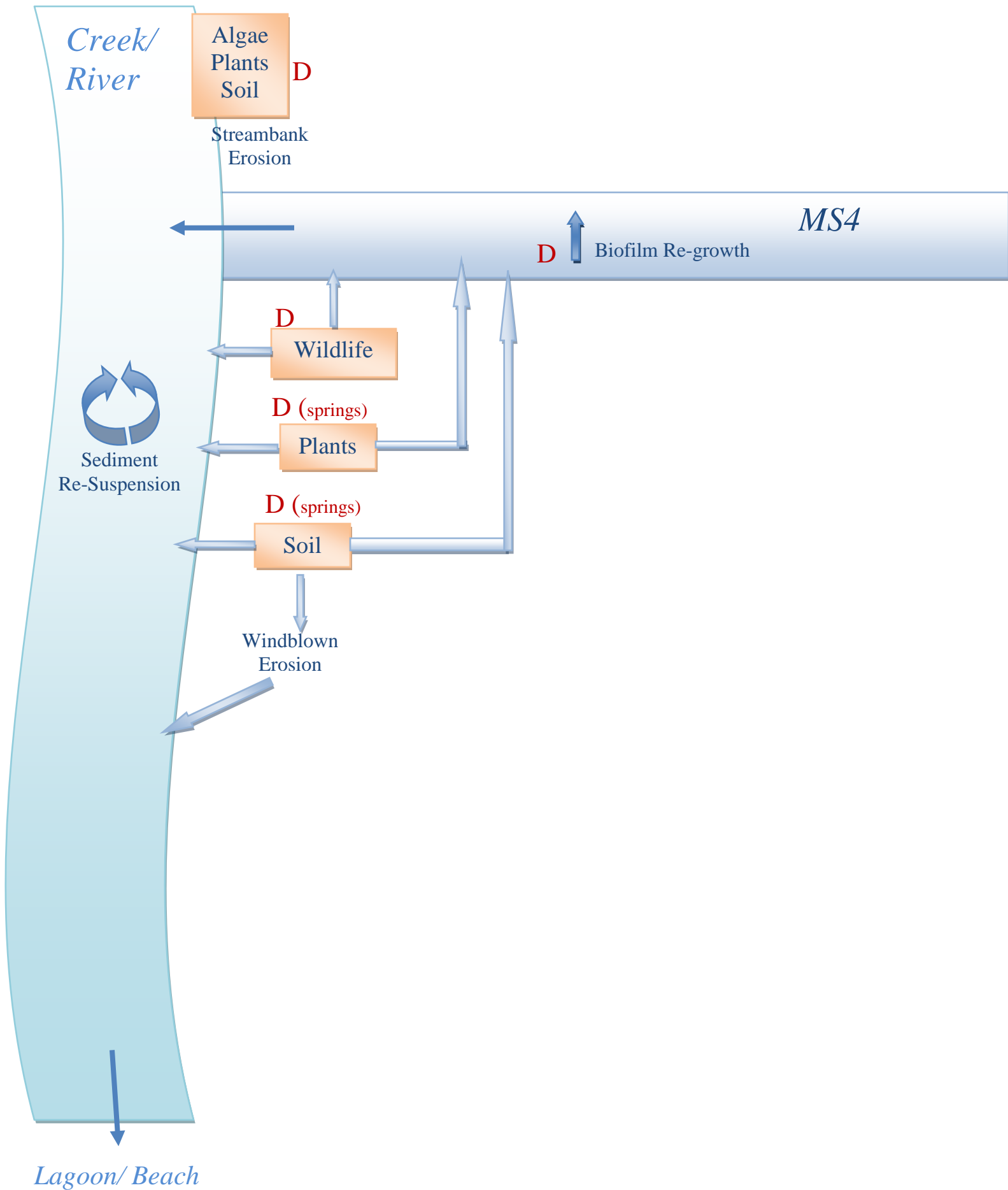
- 1) In the Source Scores worksheet, insert a new column for the new source. The new column should be added at the end of the subcategory to which it applies. If the source represents a new subcategory, it should be added to the end of the major category to which it belongs (human, anthropogenic non-human, non-anthropogenic). To add a source column: a) highlight the column to the right of the location for the new entry, b) ‘copy’ the highlighted column, c) ‘insert’ a new column at the location of the highlighted column (the new entry will appear to the left, in the desired position for the new source entry), d) move the cursor to the new (inserted) column, e) type in the name of the new source in row 3 (Dry section) of the inserted column (it will automatically be reprinted in the Wet section), f) delete the scores in the new column (*but not the formulae in the Score Sum rows!*) and enter new scores for the new source.
- 2) In the Score Summaries worksheet, insert a blank row in the corresponding location (matching exactly the placement of the new source in the order it was inserted into the Source Scores worksheet). Copy down the cells from the row above into the new row. In the formula for the Source entry (col. G), change the column reference to the new source; i.e., \$BI\$3 should be changed to \$BJ\$3 (re: location in Source Scores worksheet).
- 3) In the Ranked Scores worksheet, insert a blank row at the end of the appropriate category (human, anthropogenic non-human, non-anthropogenic). Copy down the cells from the row above into the new row. Type the next highest (new) rank # in the Rank columns for Dry (col. A) and Wet (col. F). [Don’t be concerned about error values that appear for the new source in this worksheet until completing Step 4.]
- 4) In the Lookup Table worksheet, insert a blank row in the corresponding location (matching the placement of the new source in the order it was inserted into the Source Scores and Score Summaries worksheets). Copy down the cells from the row above into the new row. In col. A change the column reference to the new source; i.e., \$BI\$3 should be changed to \$BJ\$3; do the same for Subcategory in col. B (be sure to reference the correct subcategory heading column from the Source Scores worksheet).

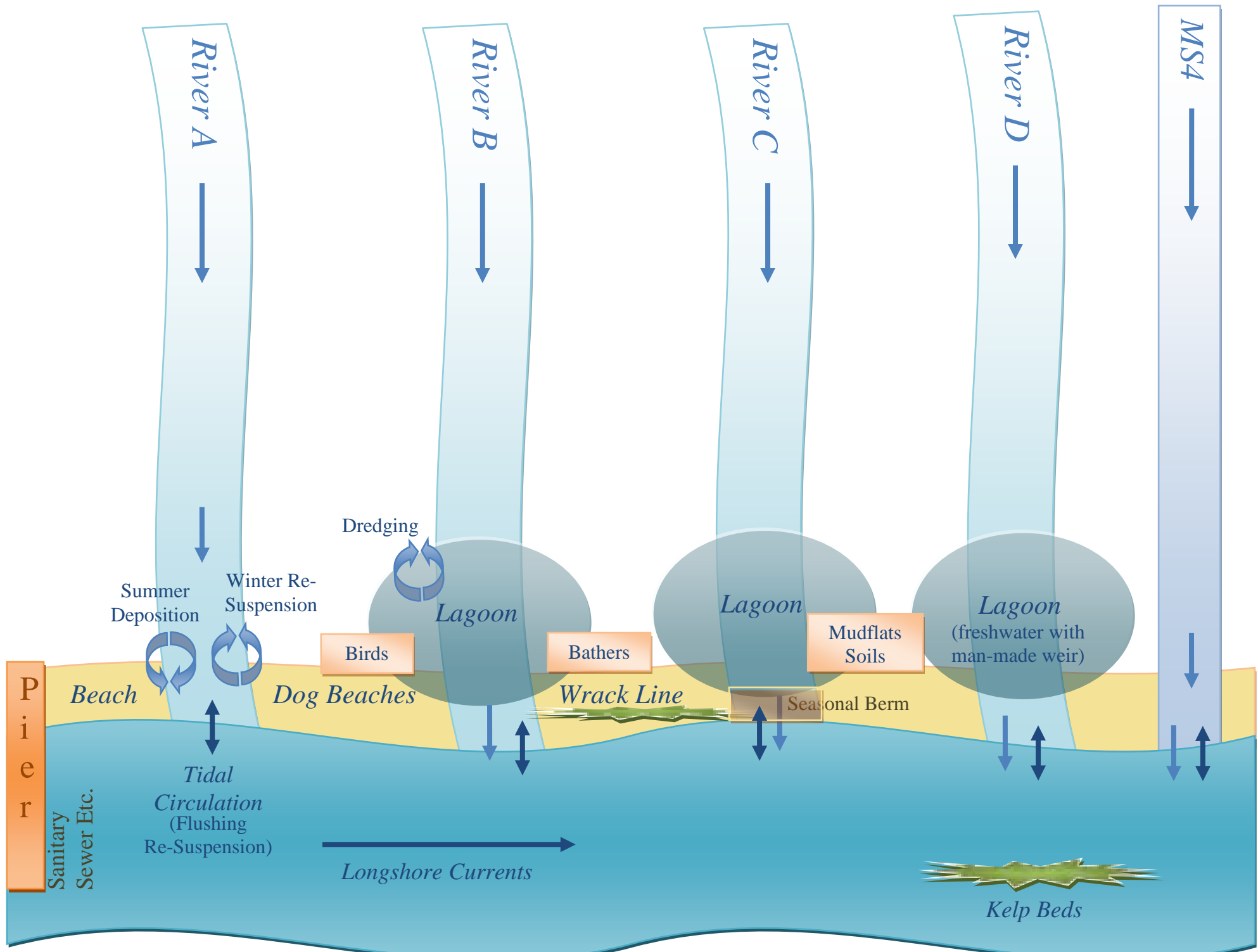
HUMAN (WET/ DRY) → D





NON-ANTHROPOGENIC WET/ DRY





List of Potential Sources by Category (per Copermittee Workgroup)

HUMAN WASTE
Sewage Infrastructure
<i>Leaky Failing Septic Systems</i>
<i>Leaky Sewer Pipes (Exfiltration)</i>
<i>Sanitary sewer overflows (SSOs)</i>
Other Wastewater
<i>Illegal Discharges</i>
<i>Illicit Connections</i>
<i>Porta-Potties</i>
Mobile Sources
<i>Homeless Encampments</i>
<i>Bathers</i>
<i>Boaters</i>
<i>RVs (mobile)</i>
Re-use of Wastewater and BioSolids
<i>Biosolids Re-use</i>
<i>Gray Water Discharges</i>
Sources related to Garbage
<i>Landfills</i>
<i>Garbage trucks</i>
<i>Dumpsters</i>
<i>Trash cans</i>
<i>Illegal Dumping</i>
Non-stormwater Discharges
<i>Pools</i>
<i>Hot Tubs</i>
ANTHROPOGENIC NON-HUMAN
Domestic Animals
<i>Pets</i>
<i>Livestock</i>
Manure Re-use Non-Ag
Landscaping
<i>Green Waste</i>
<i>Soil</i>
<i>Manure/Compost</i>
Solid/Liquid Waste
<i>Landfills</i>
<i>Garbage Trucks</i>
<i>Dumpsters</i>

<i>Trash Cans</i>
<i>Litter</i>
<i>Grease Bins</i>
<i>Vectors</i>
<i>Washwater</i>
Agriculture
<i>Livestock</i>
<i>Manure Re-use</i>
<i>Irrigation Tailwater</i>
<i>Soil and Decaying Plant Matter</i>
Secondary Wildlife
<i>Rodents (Mice, Rats), Rabbits, etc.</i>
<i>Birds (Gulls, Pigeons, etc.)</i>
Commercial/ Industrial
<i>Food Processing</i>
<i>Bio-Tech Manure Management</i>
<i>Outdoor Dining/ Fast Food</i>
Reclaimed Water
Contaminated Soil (incl. Dredge Spoils)
MS4s Infrastructure - Biofilm/Regrowth
NON-ANTHROPOGENIC
Wildlife (Birds and Others)
Wrackline (Flies and Decaying Plants)
Plants
Algae
Soil

Aggregated List of Potential Prioritization Criteria/Factors (per Copermittee Work Group)

SOURCE CATEGORIES

TEMPORAL

Temporal Distribution of sources: wet weather vs. dry weather

PRIORITIZATION CRITERIA

HUMAN HEALTH RISK

Potential for human pathogens to be present

Potential for human exposure

Dose

MAGNITUDE

Concentration and/or loading

Frequency of occurrence

Variability

GEOGRAPHICAL

Spatial distribution of sources; discrete locations (can map location) or spread out or distributed (e.g., pet waste, soil)

Proximity to REC-1 Uses (beaches)

Proximity to MS4

Impermeable surfaces

Land uses, hydrology, soil types, population (design Parameters)

Redevelopment opportunities

Ease of transport pathway to receiving waters

CONTROLLABILITY/IMPLEMENTABILITY

Cost, social impact, technological barriers, organizational barriers

Challenge of changing behavior/culturally

How many application sites for BMPs

Repetitive nature of behavioral changes

POTENTIAL BENEFITS

Ability to maximize human health improvement

Potential for multiple (secondary/additional) benefits

Other water quality issues

Other benefits (e.g., flood control)

Ability to target underlying water quality issues

Consideration of the benefits of source activities (e.g., Flood control)

TECHNICAL/DESIGN

Structural: siting, costs, maintenance

Site-specific flow conditions

POTW capacity for diversions

ORGANIZATIONAL

Regulatory imperative
Code barriers, conflicts w/state-federal regs
Political opposition/pushback; public support/lack
Organizational ease of implementation
Benefit to public (per cost)

FREQUENCY

APPENDIX A-2

Bacteria Source Prioritization Template

Factor	Scoring	Scores (enter)
Human Health Risk	(Very low risk) 1 - 10 (Very high risk)	
Magnitude	(Low Conc./Low Load) 1 - 10 (High Conc./High Load)	
Transport Feasibility	(Far from REC-1 use) 1 - 5 (Very near REC-1 use)	
Frequency	(Infrequent) 1 - 5 (Very frequent)	

Score Sum:

Controllability	(Difficult to control) 1 - 5 (Readily controllable)	
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REVISED SOURCE LIST FOR SCORING
BACTERIA SOURCES
HUMAN WASTE
Sewage Infrastructure
<i>Leaky Failing Septic Systems</i>
<i>Leaky Sewer Pipes (Exfiltration)</i>
<i>Sanitary sewer overflows (SSOs)</i>
Other Wastewater
<i>Illegal Discharges</i>
<i>Illicit Connections</i>
<i>Porta-Potties</i>
Mobile Sources
<i>Homeless Encampments</i>
<i>Bathers</i>
<i>Boaters</i>
<i>RVs (mobile)</i>
Re-use of Wastewater and BioSolids
<i>Biosolids Re-use</i>
<i>Gray Water Discharges</i>
Sources related to Garbage
<i>Landfills</i>
<i>Garbage trucks</i>
<i>Dumpsters</i>
<i>Trash cans</i>
<i>Illegal Dumping</i>
Non-stormwater Discharges
<i>Pools</i>
<i>Hot Tubs</i>
ANTHROPOGENIC NON-HUMAN
Domestic Animals
<i>Pets</i>
<i>Livestock</i>
Manure Re-use Non-Ag
Landscaping
<i>Green Waste</i>
<i>Soil</i>
<i>Manure/Compost</i>
Solid/Liquid Waste
<i>Landfills</i>
<i>Garbage Trucks</i>
<i>Dumpsters</i>
<i>Trash Cans</i>
<i>Litter</i>
<i>Grease Bins</i>
<i>Vectors</i>
<i>Washwater</i>
Agriculture
<i>Livestock</i>
<i>Manure Re-use</i>
<i>Irrigation Tailwater</i>
<i>Soil and Decaying Plant Matter</i>
Secondary Wildlife
<i>Rodents (Mice, Rats), Rabbits, etc.</i>
<i>Birds (Gulls, Pigeons, etc.)</i>
Commercial/ Industrial
<i>Food Processing</i>
<i>Bio-Tech Manure Management</i>
<i>Outdoor Dining/ Fast Food</i>
Reclaimed Water
Contaminated Soil (incl. Dredge Spoils)
MS4 Infrastructure - Biofilm/Regrowth
NON-ANTHROPOGENIC
Wildlife (Birds and Others)
Wrackline (Flies and Decaying Plants)
Plants
Algae
Soil

ENTER WATERSHED NAME in 'SOURCE SCORES' cell A1

Factor	Scoring	Scores (enter for each source at right)
Human Health Risk	(Very low risk) 1 - 10 (Very high risk)	
Magnitude	(Low Conc./Low Load) 1 - 10 (High Conc./High Load)	
Transport Feasibility	(Far from REC-1 use) 1 - 5 (Very near REC-1 use)	
Frequency	(Infrequent) 1 - 5 (Very frequent)	

Score Sum:

Controllability	(Difficult to control) 1 - 5 (Readily controllable)	
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Factor	Scoring	Scores (enter for each source at right)
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Frequency	(Infrequent) 1 - 5 (Very frequent)	

Score Sum:

Controllability	(Difficult to control) 1 - 5 (Readily controllable)	
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DRY

HUMAN WASTE	Sewage Infrastructure	Leaky Failing Septic Systems	Leaky Sewer Pipes (Exfiltration)	Sanitary sewer overflows (SSOs)	Other Wastewater	Illegal Discharges	Illicit Connections	Porta-Potties	Mobile Sources	Homeless Encampments	Bathers	Boaters	RVs (mobile)

WET

HUMAN WASTE	Sewage Infrastructure	Leaky Failing Septic Systems	Leaky Sewer Pipes (Exfiltration)	Sanitary sewer overflows (SSOs)	Other Wastewater	Illegal Discharges	Illicit Connections	Porta-Potties	Mobile Sources	Homeless Encampments	Bathers	Boaters	RVs (mobile)

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Score Sum:

Controllability	(Difficult to control) 1 - 5 (Readily controllable)	
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Factor	Scoring	Scores (enter for each source at right)
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Frequency	(Infrequent) 1 - 5 (Very frequent)	

Score Sum:

Controllability	(Difficult to control) 1 - 5 (Readily controllable)	
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DRY

HUMAN WASTE	Re-use of Wastewater and BioSolids	Biosolids Re-use	Gray Water Discharges	Sources related to Garbage	Landfills	Garbage trucks	Dumpsters	Trash cans	Illegal Dumping	Non-stormwater Discharges	Pools	Hot Tubs

WET

HUMAN WASTE	Re-use of Wastewater and BioSolids	Biosolids Re-use	Gray Water Discharges	Sources related to Garbage	Landfills	Garbage trucks	Dumpsters	Trash cans	Illegal Dumping	Non-stormwater Discharges	Pools	Hot Tubs

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Controllability	(Difficult to control) 1 - 5 (Readily controllable)	
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Transport Feasibility	(Far from REC-1 use) 1 - 5 (Very near REC-1 use)	
Frequency	(Infrequent) 1 - 5 (Very frequent)	

Score Sum:

Controllability	(Difficult to control) 1 - 5 (Readily controllable)	
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DRY

ANTHROPOGENIC NON-HUMAN	Domestic Animals	Pets	Livestock	Manure Re-use Non-Ag	Landscaping	Green Waste	Soil	Manure/Compost	Solid/Liquid Waste	Landfills	Garbage Trucks	Dumpsters	Trash Cans

WET

ANTHROPOGENIC NON-HUMAN	Domestic Animals	Pets	Livestock	Manure Re-use Non-Ag	Landscaping	Green Waste	Soil	Manure/Compost	Solid/Liquid Waste	Landfills	Garbage Trucks	Dumpsters	Trash Cans

ENTER WATERSHED NAME in 'SOURCE SCORES' cell A1

Factor	Scoring	Scores (enter for each source at right)
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Frequency	(Infrequent) 1 - 5 (Very frequent)	

Score Sum:

Controllability	(Difficult to control) 1 - 5 (Readily controllable)	
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DRY

ANTHROPOGENIC NON-HUMAN	Litter	Grease Bins	Vectors	Washwater	Agriculture	Livestock	Manure Re-use	Irrigation Tailwater	Soil and Decaying Plant Matter	Secondary Wildlife	Rodents (Mice, Rats and Rabbits)	Birds (Gulls, Pigeons, etc.)	Commercial/Industrial

WET

ANTHROPOGENIC NON-HUMAN	Litter	Grease Bins	Vectors	Washwater	Agriculture	Livestock	Manure Re-use	Irrigation Tailwater	Soil and Decaying Plant Matter	Secondary Wildlife	Rodents (Mice, Rats and Rabbits)	Birds (Gulls, Pigeons, etc.)	Commercial/Industrial

ENTER WATERSHED NAME in 'SOURCE SCORES' cell A1

Factor	Scoring	Scores (enter for each source at right)
Human Health Risk	(Very low risk) 1 - 10 (Very high risk)	
Magnitude	(Low Conc./Low Load) 1 - 10 (High Conc./High Load)	
Transport Feasibility	(Far from REC-1 use) 1 - 5 (Very near REC-1 use)	
Frequency	(Infrequent) 1 - 5 (Very frequent)	

Score Sum:

Controllability	(Difficult to control) 1 - 5 (Readily controllable)	
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Factor	Scoring	Scores (enter for each source at right)
Human Health Risk	(Very low risk) 1 - 10 (Very high risk)	
Magnitude	(Low Conc./Low Load) 1 - 10 (High Conc./High Load)	
Transport Feasibility	(Far from REC-1 use) 1 - 5 (Very near REC-1 use)	
Frequency	(Infrequent) 1 - 5 (Very frequent)	

Score Sum:

Controllability	(Difficult to control) 1 - 5 (Readily controllable)	
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DRY

ANTHROPOGENIC NON-HUMAN	<i>Food Processing</i>	<i>Bio-Tech Manure Management</i>	<i>Outdoor Dining/ Fast Food</i>	Reclaimed Water	Contaminated Soil (incl. Dredge Spoils)	MS4 Infrastructure - Biofilm/ Regrowth
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DRY

NON-ANTHROPOGENIC	Wildlife (Birds and Others)	Wrackline (Flies and Decaying Plants)	Plants	Algae	Soil
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WET

ANTHROPOGENIC NON-HUMAN	<i>Food Processing</i>	<i>Bio-Tech Manure Management</i>	<i>Outdoor Dining/ Fast Food</i>	Reclaimed Water	Contaminated Soil (incl. Dredge Spoils)	MS4 Infrastructure - Biofilm/ Regrowth
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WET

NON-ANTHROPOGENIC	Wildlife (Birds and Others)	Wrackline (Flies and Decaying Plants)	Plants	Algae	Soil
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ENTER WATERSHED NAME in 'SOURCE SCORES' cell A1

RANKINGS OF SOURCE SCORES - DRY			
Rank *	Source	Subcategory	Score
HUMAN WASTE			
1	#N/A	#N/A	#N/A
2	#N/A	#N/A	#N/A
3	#N/A	#N/A	#N/A
4	#N/A	#N/A	#N/A
5	#N/A	#N/A	#N/A
6	#N/A	#N/A	#N/A
7	#N/A	#N/A	#N/A
8	#N/A	#N/A	#N/A
9	#N/A	#N/A	#N/A
10	#N/A	#N/A	#N/A
11	#N/A	#N/A	#N/A
12	#N/A	#N/A	#N/A
13	#N/A	#N/A	#N/A
14	#N/A	#N/A	#N/A
15	#N/A	#N/A	#N/A
16	#N/A	#N/A	#N/A
17	#N/A	#N/A	#N/A
18	#N/A	#N/A	#N/A
19	#N/A	#N/A	#N/A
ANTHROPOGENIC NON-HUMAN			
1	#N/A	#N/A	#N/A
2	#N/A	#N/A	#N/A
3	#N/A	#N/A	#N/A
4	#N/A	#N/A	#N/A
5	#N/A	#N/A	#N/A
6	#N/A	#N/A	#N/A
7	#N/A	#N/A	#N/A
8	#N/A	#N/A	#N/A
9	#N/A	#N/A	#N/A
10	#N/A	#N/A	#N/A
11	#N/A	#N/A	#N/A
12	#N/A	#N/A	#N/A
13	#N/A	#N/A	#N/A
14	#N/A	#N/A	#N/A
15	#N/A	#N/A	#N/A
16	#N/A	#N/A	#N/A
17	#N/A	#N/A	#N/A
18	#N/A	#N/A	#N/A
19	#N/A	#N/A	#N/A
20	#N/A	#N/A	#N/A
21	#N/A	#N/A	#N/A
22	#N/A	#N/A	#N/A
23	#N/A	#N/A	#N/A
24	#N/A	#N/A	#N/A
25	#N/A	#N/A	#N/A
26	#N/A	#N/A	#N/A
NON-ANTHROPOGENIC			
1	#N/A	#N/A	#N/A
2	#N/A	#N/A	#N/A
3	#N/A	#N/A	#N/A
4	#N/A	#N/A	#N/A
5	#N/A	#N/A	#N/A

* Ranks are shown within each category (Human, Anthropogenic Non-Human, Non-Anthropogenic)

ENTER WATERSHED NAME in 'SOURCE SCORES' cell A1

RANKINGS OF SOURCE SCORES - WET			
Rank *	Source	Subcategory	Score
HUMAN WASTE			
1	#N/A	#N/A	#N/A
2	#N/A	#N/A	#N/A
3	#N/A	#N/A	#N/A
4	#N/A	#N/A	#N/A
5	#N/A	#N/A	#N/A
6	#N/A	#N/A	#N/A
7	#N/A	#N/A	#N/A
8	#N/A	#N/A	#N/A
9	#N/A	#N/A	#N/A
10	#N/A	#N/A	#N/A
11	#N/A	#N/A	#N/A
12	#N/A	#N/A	#N/A
13	#N/A	#N/A	#N/A
14	#N/A	#N/A	#N/A
15	#N/A	#N/A	#N/A
16	#N/A	#N/A	#N/A
17	#N/A	#N/A	#N/A
18	#N/A	#N/A	#N/A
19	#N/A	#N/A	#N/A
ANTHROPOGENIC NON-HUMAN			
1	#N/A	#N/A	#N/A
2	#N/A	#N/A	#N/A
3	#N/A	#N/A	#N/A
4	#N/A	#N/A	#N/A
5	#N/A	#N/A	#N/A
6	#N/A	#N/A	#N/A
7	#N/A	#N/A	#N/A
8	#N/A	#N/A	#N/A
9	#N/A	#N/A	#N/A
10	#N/A	#N/A	#N/A
11	#N/A	#N/A	#N/A
12	#N/A	#N/A	#N/A
13	#N/A	#N/A	#N/A
14	#N/A	#N/A	#N/A
15	#N/A	#N/A	#N/A
16	#N/A	#N/A	#N/A
17	#N/A	#N/A	#N/A
18	#N/A	#N/A	#N/A
19	#N/A	#N/A	#N/A
20	#N/A	#N/A	#N/A
21	#N/A	#N/A	#N/A
22	#N/A	#N/A	#N/A
23	#N/A	#N/A	#N/A
24	#N/A	#N/A	#N/A
25	#N/A	#N/A	#N/A
26	#N/A	#N/A	#N/A
NON-ANTHROPOGENIC			
1	#N/A	#N/A	#N/A
2	#N/A	#N/A	#N/A
3	#N/A	#N/A	#N/A
4	#N/A	#N/A	#N/A
5	#N/A	#N/A	#N/A

* Ranks are shown within each category (Human, Anthropogenic Non-Human, Non-Anthropogenic)

Source	Subcategory	Category
Leaky Failing Septic Systems	Sewage Infrastructure	HUMAN WASTE
Leaky Sewer Pipes (Exfiltration)	Sewage Infrastructure	HUMAN WASTE
Sanitary sewer overflows (SSOs)	Sewage Infrastructure	HUMAN WASTE
Illegal Discharges	Other Wastewater	HUMAN WASTE
Illicit Connections	Other Wastewater	HUMAN WASTE
Porta-Potties	Other Wastewater	HUMAN WASTE
Homeless Encampments	Mobile Sources	HUMAN WASTE
Bathers	Mobile Sources	HUMAN WASTE
Boaters	Mobile Sources	HUMAN WASTE
RVs (mobile)	Mobile Sources	HUMAN WASTE
Biosolids Re-use	Re-use of Wastewater and BioSolids	HUMAN WASTE
Gray Water Discharges	Re-use of Wastewater and BioSolids	HUMAN WASTE
Landfills	Sources related to Garbage	HUMAN WASTE
Garbage trucks	Sources related to Garbage	HUMAN WASTE
Dumpsters	Sources related to Garbage	HUMAN WASTE
Trash cans	Sources related to Garbage	HUMAN WASTE
Illegal Dumping	Sources related to Garbage	HUMAN WASTE
Pools	Non-stormwater Discharges	HUMAN WASTE
Hot Tubs	Non-stormwater Discharges	HUMAN WASTE
Pets	Domestic Animals	ANTHROPOGENIC NON-HUMAN
Livestock	Domestic Animals	ANTHROPOGENIC NON-HUMAN
Manure Re-use Non-Ag	Manure Re-use Non-Ag	ANTHROPOGENIC NON-HUMAN
Green Waste	Landscaping	ANTHROPOGENIC NON-HUMAN
Soil	Landscaping	ANTHROPOGENIC NON-HUMAN
Manure/ Compost	Landscaping	ANTHROPOGENIC NON-HUMAN
Landfills	Solid/ Liquid Waste	ANTHROPOGENIC NON-HUMAN
Garbage Trucks	Solid/ Liquid Waste	ANTHROPOGENIC NON-HUMAN
Dumpsters	Solid/ Liquid Waste	ANTHROPOGENIC NON-HUMAN
Trash Cans	Solid/ Liquid Waste	ANTHROPOGENIC NON-HUMAN
Litter	Solid/ Liquid Waste	ANTHROPOGENIC NON-HUMAN
Grease Bins	Solid/ Liquid Waste	ANTHROPOGENIC NON-HUMAN
Vectors	Solid/ Liquid Waste	ANTHROPOGENIC NON-HUMAN
Washwater	Solid/ Liquid Waste	ANTHROPOGENIC NON-HUMAN
Livestock	Agriculture	ANTHROPOGENIC NON-HUMAN
Manure Re-use	Agriculture	ANTHROPOGENIC NON-HUMAN
Irrigation Tailwater	Agriculture	ANTHROPOGENIC NON-HUMAN
Soil and Decaying Plant Matter	Agriculture	ANTHROPOGENIC NON-HUMAN
Rodents (Mice, Rats and Rabbits)	Secondary Wildlife	ANTHROPOGENIC NON-HUMAN
Birds (Gulls, Pigeons, etc.)	Secondary Wildlife	ANTHROPOGENIC NON-HUMAN
Food Processing	Commercial/ Industrial	ANTHROPOGENIC NON-HUMAN
Bio-Tech Manure Management	Commercial/ Industrial	ANTHROPOGENIC NON-HUMAN
Outdoor Dining/ Fast Food	Commercial/ Industrial	ANTHROPOGENIC NON-HUMAN
Reclaimed Water	Reclaimed Water	ANTHROPOGENIC NON-HUMAN
Contaminated Soil (incl. Dredge Spoils)	Contaminated Soil (incl. Dredge Spoils)	ANTHROPOGENIC NON-HUMAN
MS4 Infrastructure - Biofilm/ Regrowth	MS4 Infrastructure - Biofilm/ Regrowth	ANTHROPOGENIC NON-HUMAN
Wildlife (Birds and Others)	Wildlife (Birds and Others)	ANTHROPOGENIC NON-HUMAN
Wrackline (Flies and Decaying Plants)	Wrackline (Flies and Decaying Plants)	ANTHROPOGENIC NON-HUMAN
Plants	Plants	ANTHROPOGENIC NON-HUMAN
Algae	Algae	ANTHROPOGENIC NON-HUMAN
Soil	Soil	ANTHROPOGENIC NON-HUMAN