Citation	Article summary	Test Method Used	Characterization of sources	Road Type & ADT (vehicles / day)	Particle Size Ranges (µm unless otherwise noted)	Impacts to Waterbodies	Pollutants mentioned	BMPs	Influence on Stormwater Chemistry
Anta, 2006	This article presents methods and results of field surveys to characterize the pollutants associated with stormwater runoff from urban catchment.	Coulter LS-120 laser particle analyzer	Roadway in Spain; urban area, 70% impervious	Not listed	<63, 63-125, 125-250, >250	N/A	TSS, VSS, TDS, VDS, TS, COD, BOD, TOC,	N/A	The particle size distribution of the samples from rainfall events allowed a determination of the relationship between sediment diameter and the flow.
Aryal, 2010	Stormwater runoff from urban areas such as parks, commercial areas, industrial and road/highways all generate pollutants. The type of land use and human activities are largely dependent on these. This article discusses the manner in which characteristics and sources of pollutants occur as a synthesis of literature.	N/A	N/A	N/A	<250, >250	N/A	Pb, Cu, Mn, Cd, Zn, Cu, Fe; PAH,	N/A	This compares metals of particles from past sources with particle distribution of <250 µm or >250 µm
Boogaard, 2014	This study monitored at over 150 locations in Netherlands with a total of 7652 individual events making it the largest stormwater quality database in Europe. This discusses information on stormwater quality such as pollutant types, sediment particle size distributions, and others.	N/A	N/A	N/A	<75	N/A	TSS, BOD, COD (Chemical oxygen), TKN, TP, Pb, Zn, Cu, E. Coli	N/A	Analyzed % bound to particles
Brodie, 2009	Looked at different types of impervious surfaces and performed PSD from 35 storms. Findings have runoff treatment implications as settling processes are influenced by particle size.	Modified SSC Test	Impervious surfaces including Roof, Carpark, and Roads	Residential Area & ADT 3,500	<8, 8-63, 63-500	N/A	Particulate Mass	N/A	N/A
Cha, 2013	Study from stream in Korea measuring non point source pollutants in an agricultural setting. ~~Has~~ Provides statistical correlation relating particle size distribution and stormwater chemistry.	Particle Size Analyzer	Agricultural site going into stream.	N/A	<0.002, 0.002-0.006, 0.006-0.02, 0.02-0.1 mm	N/A	Total Nitrogen, Total Phosphorus	N/A	Compares Total Nitrogen and Total phosphorous and puts them into soil groups
Ferreira, 2013	Highway runoff provides a large portion of pollutants, especially metals. This study focuses on monitoring results of six metals: Cadmium, Chromium, Copper, Lead, Zinc, and Nickel. The soluble phase (passing .45 µm) and particulate phase concentrations (.45 µm to 100 µm) are also reported. Provides further context on the importance of PSD when selecting treatment alternatives.	Optical Particle Size Analyzer	Urban (3,917 to 1,618 m^2 catchment area)	300,000 AADT	<0.45, 0.45-8. 8-20, 20-100, >100	N/A	Cadmium, Chromium, Copper, Lead, Zinc, and Nickel	N/A	Has concentration (µg/L) graphic within particle ranges
German, 2002	Street sweeping as a pollutant control has increased. Particle size distribution and heavy metal concentration has been measured for street sweeping waste. It shows that concentrations of metals are a function of particle diameter and proportional to the inverse of the particle diameter (highest concentration found in finest fractions).	N/A	N/A	AADT 11,200	N/A	N/A	Zinc, copper, Nickel, Lead, Chromium	Street Sweeping	Zinc and Copper attributed to particle ranges are analyzed before and after street sweeping
Hall, 1999	Runoff metals from the Brunette River watershed. Focuses on non point pollutant sources. No Particle Size Distributions.	N/A	N/A	N/A	N/A	Considers non-point source contamination as a case study of the Brunette River. Includes stream contaminants	Pb, Cu, Zn, Hg, Mn, Ni, Cd; Organic Contaminants, PAHs	None, Filter Strip, Bioretention cell, Permeable paving	N/A
Herngren, 2010	This article compares Residential, commercial, and industrial sources and analyzes them in particle sizes. This article also compares many types of PAHs and puts them into particle size	N/A	Residential. Industrial, commercial sites	N/A	<.45, .45-75, 75-150, >150	N/A	TSS, PAHs	N/A	Puts different PAHs into particle sizes and source parameters
Hong, 2016	This article looks at how urban areas affect stormwater pollutant characteristics. It accurately provides data for urban wash-off phenomenons.	Laser Diffractometer	Urban roadway in France. 2,661 m^2	Collector 30,000 AADT	0.01-2000	N/A	TSS	N/A	N/A
Hongtao, 2009	Has a size distribution and diffuse pollution impacts of PAHs in street dust in urban streams.	Not listed	The street dust in Commercial, Industrial, New Residential, Old residential, main traffic roads are categorized	Not listed	>900, 250-900, 125-250, 63-125, <63	N/A	Street Dust	N/A	N/A
Jeng, 2004	Urban stormwater runoff can contribute to the deterioration of water quality to a receiving water body. In this study, field studies and lab experiments were conducted to assess the microbial contamination resulting from urban runoff. Fecal coliform, e. coli, and enterococci were measured. Little on PSD.	Sieve	Urban	N/A	<0.45-30, >30	Measures E. coli, enterococci, and fecal coliform in a lake based on contamination of urban runoff.	E. coli, Enterococci, fecal coliform	N/A	N/A

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Karamalegos, 2005	This study includes methodology, particle size distributions related to concentrations of pollutants, and site / source related to PSD.	Pipette Method and sieve	Bridge, Bridge Highway Approach, VFS, Extended detention basin	Not Listed	Total Range, <125, <105 , <75	N/A	TSS and Suspended Sediment Concentration	Extended Detention Basin	N/A
Kayhanian and Mckenzie, 2012	Compares Metals in dry vacuumed particles, centrifuged runoff particles, and settled detention basin particles. Also compares a shoulder and a parking lot and divides their mass distribution in particle size ranges in a graph.	Wet sieve and laser methods	Shoulder, parking lot	AADT 130,000	<38, 37-75, 75-125, 125-250, 250-425, 425-600, 600-1000, >1000	N/A	Metals	N/A	Compares different metals but does not include PSD as a parameter. Particle mass distribution and particle size ranges are in a graphic.
Kayhanian, 2012	This review analyzes many highway runoff studies performed from different continents to compare differences and also find correlations between the water quality parameters.	N/A	Highway Runoff sediment & Street Sweeping	N/A	150, 150-250, 250-425, 425-850, 850-2000; <50, 50-100, 100-200, 200-500, 500-1000; <75, 75-125, 125-250, 250-500, 500-1000;	Contains information on concentrations of pollutants being delivered to water bodies. This includes Pb, Cu Zn, Hg, Mn, and Fe.	Pb, Cu, & Zn	N/A	Relates metal concentration In (µg/g) to size ranges (µm) of particulates.
Krishnappan, 1999	This study analyzed pollutants entering a stormwater management pond. It also caught the runoff of a shopping plaza.	Submersible Laser Particle Size Analyzer	Commercial Area	N/A	3.5-212	N/A	Flocs	Stormwater Management Pond was used	N/A
Li, 2005	Particulates between 2-1000 µm were quantified for three rainfall events at three highway sites. Quantification included the concentration using inversion and stirring methods in each particle size range.	Particle Size Analyzer	Highway runoff	3 Highways AADT : 328,000, 266,000, 322,000	2-3, 3-5, 5-7, 7-10, 10-20, 20-30, 30-50, 50-100, 100-200, 200-1000	N/A	Suspended Sediment Concentration	N/A	N/A
Li, 2006	Compares metal concentrations in highway runoff from multiple sources.	Particle sizer module	Urban stormwater suspension, highway runoff sediments, Street sweeping	AADT > 260,000	0.45-2, 2-10, 10-45, 45-106, 106-250, >250; 25-38, 38-45, 45-63, 63-75, 75-150, 150-250, 250-425, 425-850, 850-2000; <50, 50-100, 100-200, 200-500, 500-1000; <43, 43-100,	N/A	Cu, Fe, Pb, Zn. Cd, Al, Cr, Ni,	N/A	Lists heavy metal concentrations in highway runoff within multiple sources
Liebens, 2001	Involved heavy metal contamination in stormwater management systems.	Sieve	Residential and Commercial	N/A	Sand, Silt, & clay	N/A	Metals include Aluminum, arsenic, barium, beryllium, cadmium, copper,	Retention ponds, swales, street sweeping	N/A
Ma, 2018	Analyzes pollutant transport and source apportionment of non-point source pollution processes in separate sewer systems.	Not listed	RDS, Roadway Runoff, Sewer Runoff	Not Listed	<20, 20-44, 44-62, 62-105, 105-149, 149-250, 250-450, 450-1000, 1000-2000	Completes analysis of nonpoint source pollution processes in separate sewer systems by comparing Road deposited sediment, road runoff, and sewer runoff percentages within different particle size	PSD	N/A	N/A
Markiewicz, 2019	Tests were performed on roadway runoff, using lab prepared mixtures with PAHs, alkylphenols and their ethoxylates, phthalates, diesel oil. The samples were analyzed for particle size distribution and concentrations of particles in size range 10nm -100 µm.	Coulter Counter	Roadway	80,000 & 20,000 ADT	2-6, 6-10, 10-16	N/A	Diesel, acetone, phthalates, Fe, PAHs,	N/A	Compares OP & colloid mixtures and differentiates between short time stabilization and mixed directly before measurement.
Monrabal-Martinez, 2016	Contains seasonal variation in pollutant concentrations and particle size distribution in urban stormwater.	Coulter Counter	N/A	AADT 10,500	Total (Entire Range), <5	N/A	Lead, Nickel, Copper, Zinc, TDS, TSS	N/A	Includes total and <5 µm parameters for lead, nickel, copper, zinc, TDS, and TSS.

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Pitt, 2005	This article describes sources of pollutants and the quantity of certain pollutants found at each source.	N/A	Residential / Commercial Land Uses: Roofs, Paved parking, Unpaved driveways, paved driveways, dirt footpath, paved sidewalk, garden soil, road shoulder; Industrial Land Uses: Paved Parking, Unpaved parking/ storage, paved footpath, bare around	Not listed	<31, <45, <63, <125	N/A	P, TKN, COD, Cu, Pb, Zn, Cd, Cr, Alkalinity, Manganese, mercury, fluoride, nitrate and nitrite, phosphate,	N/A	Compares metals and nutrients in different size categories with different sources including residential, commercial, and industrial
Revitt, 2014	The source focuses on he pollutants from runoff of car parks. The source lists options for bmps as treatment options.	N/A	Residential, Mixed, Commercial, Supermarket car park	N/A	<0.45, 0.45-75,75- 150, 150- 300, >300	N/A	Metals, Organics, particulates/solids, hydrocarbons, nutrients,	Street Cleaning	Contains information relating Particle size distribution and pollutant amount. "The increased surface area associated with finer particles, combined with a higher cation exchange capacity, provides them with a greater affinity for pollutants, such as metals."
Roger, 1998	This study does a physical and chemical study of runoff water from a motorway catchment area. The physical, chemical, and mineral characteristics of the sediment contained in the runoff water were analyzed for rainfall.	N/A	Roadway with basin area 13,000 m^2;	ADT 30,000 veh/day	500-1000, 100-500, 50-100, <50	N/A	TSS	N/A	N/A
Sansalone, 1997	This study measured physical characteristics of solids from an urban highway. They were sorted with PSD from 1 to 10,000 µm. Particles larger than 25 were mechanically sieved to generate PSD. Correlations between metals and PSD was performed.	Mechanical sieve	Urban highways	Highway 150,000 ADT	25-38, 38-45, 45-63, 63-75, 75-150, 150 -250, 250 - 425, 425 - 850, 850 -2000, 2000 - 4750, 4750 - 9500	N/A	Zn, Pb, Cu, and Cd	N/A	Metal concentrations were directly compared to each particle size distribution above 25 µm.
Selbig, 2012	Urban sediment can act as a transport mechanism for pollutants towards a receiving water body. Concentration of these pollutants often times exceed levels that are toxic to aquatic organisms. Study measured concentrations of select trace metals and PAHs in both silt and sand fractions of urban sediment from stormwater bed, stormwater suspended, street	N/A	Urban	40,000 ADT, arterial street	Silt, Sand	Compares silt fraction and sand fraction in categories including PAH concentration and metal concentration. Relates to toxicity levels	PAHs, metals	N/A	N/A
Selbig, 2015	This study sampled the particle sizes of runoff from many different types of roads in an urban environment.	Wet sieve, Coulter Counter	Includes Arterial Streets, Collector streets, feeder streets, parking lots, and mixed use.	Arterial 45,000 ADT, Collector 6,600, Feeder 1,600	32-63, 63-125, 125-250, 250-500, >500; <2, 2-5, 5-8, 8-14, 14-32	N/A	Particulate Matter	N/A	N/A
Smith, 2018	Stormwater runoff off of bridge decks were characterized in which concentrations of suspended sediments and total nutrients were monitored.	N/A	Bridge decks	Bridges, 21,000 to 124,000 AADT	>0.25 mm, 0.0624-.25 mm, <0.0625 mm	N/A	Particulate Carbon, TP, Dissolved Nitrogen and particulate nitrogen, Concentration of suspended sediment	N/A	Includes information with composite and replicate sample types with different metals and phosphorous within particle ranges >0.25 mm, 0.0625-0.25 mm, and <0.0625 mm
Wang, 2018	Stormwater particles washed from roads are traditionally characterized as total suspended solids. A ratio of Turbidity to TSS is proposed as a potential surrogate for bulk PSD and quality of stormwater runoff.	Dry sieve	Roadways	12,000 ADT	<22, 22-38.5, 38.5 - 76, 76 - 105, 105 - 150, 150 - 2000	N/A	TSS, Turbidity, Metals	N/A	Attributes heavy metals within ranges.
Winston, 2017	Particulate matter, nutrients, and gross solids contribute nonpoint source pollution to waterways. Particle size distributions were analyzed from eight road sites in North Carolina. Divides up pollutants in particle ranges.	N/A	Piedmont and Coastal Plain road runoff; 10% passing, 50% passing, 90% passing	Interstate highway 134,000 AADT, Primary Route 13,000, Secondary 16,000, Highway 14,000	N/A	N/A	TKN, NO, TN, TP	N/A	N/A
Ying, 2008	This study included particulate matter in source area runoff as a function of hydrologic transport and settling. Particulates were differentiated into suspended, settleable, and particle size distributed. Relationship to SSC and turbidity was also made	SM 2540, laser diffraction, mechanical sieve analysis	Roadways	141,000 AADT	Dissolved and colloidal: <1, Suspended: 1-25; Settleable: 25-75, Sediment: 75-4750; Total: 1-4750	Has a pollution index attributed with different treatment systems.	TDS, TSS	Filter Strips, Swales, Bioretention cells, retention ponds, and permeable pavement	N/A

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Yun, 2009	Runoff samples from road runoff at two sites were collected and PSD from 2-880 µm were measured. Relationships of PSD with other attributed such as turbidity, TSS, BOD, TN, and TP were analyzed.	Laser Diffraction	Roadways	Not listed	2-5, 5-7, 7-10, 10-20, 20-30, 30-50, 50-100, 100-200, 200-400, 400-800	N/A	TSS, BOD, TN, TP, Turbidity	N/A	N/A