

**APPENDIX D**  
**SURVEYOR RESUME**

Jeffrey J. Park is an Ecologist with Kleinschmidt Associates. He received an M.A. in Biology from Harvard University (1998) (*Thesis: The Effects of Gap-Phase Heterogeneity on Stand Dynamics within a Chamaecyparis thyoides Forest*) and a B.A. in Anthropology from the University of Maine (Orono) (1993). Mr. Park has 8 years of experience.

Mr. Park joined Kleinschmidt Associates in early 2006. Prior to joining Kleinschmidt, Mr. Park was an Ecologist/Biostatistician for TRC Environmental Corporation, where he worked for seven years. During that seven-year period, Mr. Park designed and conducted numerous aquatic and terrestrial ecological studies within the northeast and Mid-Atlantic States. Studies quantitatively assessed spatial and temporal patterns in abundance, distribution, and species composition within plant, fish, amphibian, benthic macroinvertebrate, phytoplankton/zooplankton, and macroalgal communities. Biota were evaluated with respect to biotic properties, e.g., competitive interactions, and abiotic properties, e.g., soil/water physico-chemical attributes, substrate types, and light intensity. Aquatic resource analyses have also included quantifying CWIS entrainment/impingement (E/I) impacts, providing an analysis of thermal plume impacts, assessing population, community, and ecosystem-level effects associated with heated cooling water discharges and E/I, and discussing species-specific biology. This work was conducted in association with Hydro re-licensing projects, National Pollutant Discharge Elimination System (NPDES) permits, and State Pollutant Discharge Elimination System (SPDES) permits, e.g., the Bowline Facility (Hudson River). Impact analyses have also included the identification of sensitive aquatic resources and critical aquatic habitats.

In addition to applying fundamental ecological principles, Mr. Park has extensive experience with various univariate/multivariate biostatistical analyses, experimental design, and hypothesis testing. Standard quantitative ecological analyses have included, amongst others, rarefaction analysis, similarity/dissimilarity indices, diversity indices, and spatial pattern/coefficients of dispersion. With respect to statistical analyses, Mr. Park has used data transformations and a suite of goodness-of-fit tests, along with quantile:quantile plots, frequency distribution histograms, and basic descriptive statistics. Nonparametric and parametric univariate statistics have included the Mann-Whitney *U*-test, two-sample Kolmogorov-Smirnov *D*-test, simple linear regression, Mann-Kendall test for trend, and one-way ANOVA. Multivariate methods have included Detrended Correspondence Analysis (DCA), Two-way Indicator Species Analysis (TWINSPAN), Principle Factors Analysis (PFA), and agglomerative/hierarchical Cluster Analysis. Mr. Park has also modeled fish (closed systems) and benthic macroinvertebrate populations. Quantitative analyses have included simple linear regression, one way ANOVA, equivalent adult loss calculations, and manipulating Conditional Entrainment Mortality Rate (CEMR) based modeling results. Population size estimates have utilized maximum weighted likelihood estimates, mark/recapture studies, and software programs including MARK/CAPTURE.

The following summaries present a sampling of the experience types that Mr. Park has generated over the past seven years. Experience types discussed include ecological studies; ecological risk assessment; aquatic resource analyses; biostatistics; ACOE wetland functions & values assessments; wetland design and construction; and rare, threatened, and endangered species/habitat assessments.

PROJECT/CLIENT	DATE	RESPONSIBILITY
Plainfield Renewable Energy, LLC New Cooling Water Intake Aquatic Ecology Assessment Canterbury, CT	ongoing	Project Manager for a study that characterized fish communities within the Quinebaug River. Mr. Park collected the fish data through a combination of electrofishing and hoopnet sampling, conducted all data analyses, and wrote the environmental impact assessment. The impact assessment discussed impacts to larval and adult fishes with respect to suspended solids, waste stream physico-chemical properties, entrainment, and impingement. Mr. Park also assessed baseline fish health by assessing the effects of parasites on juvenile redbreast sunfish, calculating a fish condition factor, and constructing linear length:weight regression plots for juvenile fishes
Niantic River Restoration Plan Niantic River Ecology Niantic, CT	ongoing	Using data sets collected by the University of Connecticut and the Millstone Environmental Laboratory, Mr. Park developed an aquatic ecology assessment for the Niantic River estuary that quantitatively assessed the effects of nutrient loading, light attenuation $K_d$ , and chlorophyll $a$ densities on macroalgal and eelgrass biomass, in addition to macroalgal community composition. Mr. Park also examined the effects of changes in eelgrass biomass on benthic macroinvertebrates, and fishes. Data analyses included a non-parametric Mann-Kendall test for trend, a $t$ -test for independent samples, and the Shannon-Weiner Diversity Index (including evenness).
Long-term Forested Wetland Vegetation Monitoring FAA Atlantic City, NJ	ongoing	Lead ecologist presently conducting a long-term study designed to monitor and assess the effects of changes in groundwater elevation on the vertical distribution of forested wetland seedlings. The target species included in the analysis will include <i>Chamaecyparis thyoides</i> (Atlantic white cedar), <i>Acer rubrum</i> (red maple), and <i>Clethra alnifolia</i> (sweet pepperbush). By establishing baseline conditions, drawdown effects will be distinguished from natural variation using statistically based analyses.
Benthic Macroinvertebrate Population Modeling and Measures of Effect Study FAA Atlantic City, NJ	2006	Aquatic macroinvertebrates were collected in contaminated and uncontaminated portions of the mercury-impacted South branch of Absecon Creek. Population estimates were calculated using a maximum weighted likelihood (MLE) estimate developed by Carle and Strub (1978), which is a multiple pass depletion method. Statistical analyses included Cluster Analysis and a Kruskal-Wallis ANOVA. Mr. Park conducted the data analysis for one of the co-authors of the MLE Method (Dr. Frank Carle of Rutgers University).

Stream Bioassessment using Benthic Macroinvertebrates FAA Atlantic City, NJ	2006	Assessed the Index of Biotic Integrity (IBI) within a stream community using benthic macroinvertebrates collected from riffle and pool habitats. Variables examined included % Ephemeroptera, % Plecoptera, % Trichoptera, % Dicronota, % Trichoptera, in addition to functional feeding group, the Coastal Plain Macroinvertebrate Index (CPMI), species richness (R), Shannon-Weiner diversity (H), evenness (J), and a MLE generated population size. Abiotic properties examined included total/filtered surface water Hg, DO, temperature, total dissolved solids, conductivity, pH, and flow volume/velocity/depth. Cluster Analysis was used to segregate sites on the basis of H, J, R, and the MLE estimate. A Spearman Rank Order correlation analysis was used to associate community metrics with abiotic properties.
Avian Foraging/Avian Migrant Study Kibby Windpower Project ME	2006	Using existing avian community data, Mr. Park calculated a Morisita coefficient of similarity, the Shannon-Weiner diversity coefficient (H), and an index of community equitability (J). Statistically significant differences in the <i>H</i> index for species were assessed with a Mann-Whitney U-test. Variability in avian data was linked with temperature. Using existing avian community data, Mr. Park calculated a species-specific coefficient of estimated turbine exposure, and conducted a statistical evaluation of avian flight vectors. Mr. Park also provided critical review of an avian radar study conducted by Woodlot Alternatives, Inc.
Geostatistical Modeling of Hg Distribution in Reservoir Sediments FAA Atlantic City, NJ	2005	Mr. Park provided statistical support for an analysis of the spatial distribution of Hg contaminated sediments present in the FAA wetland/open water complex. The complex was partitioned into hydraulic units including the South and North Branches of Absecon Creek, in addition to the Upper and Lower reservoirs. The analysis included the assessment of the distribution of the data, in addition to modeling of Hg distribution using an empirical semivariogram and kriging. The effort resulted in surface maps identifying Hg concentration contours by hydraulic unit which facilitated a calculation of the total estimated volume of Hg in the FAA wetlands/reservoirs.
Breeding Anuran Measures of Effect Study FAA Atlantic City, NJ	2005	Mr. Park was responsible for designing and writing the results up for a study that examined the effects of Hg contamination and habitat parameters on breeding anuran populations. Habitat properties were sampled within a total of 14 breeding sites and included: conductivity, dissolved oxygen, pH, oxidation/reduction potential, total dissolved solids, total suspended solids, temperature, conductivity; aluminum (Al), total mercury (Hg), understory light intensity, and estimated percent cover of substrate types. Principal Factor Analysis (PFA) was used to reduce the large set of habitat variables to a smaller set of underlying variables, which would account for the common variance in the total data set. Habitat variables, auditory call scores, and breeding anuran numbers were associated with PFA axis scores with a Spearman Rank correlation coefficient. The results of the study indicate that light levels, water temperature, and pH are more proximate to the distribution of anurans than surface water Hg concentrations.

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| Peatland Restoration<br>Lockheed-Martin/Former GE Site<br>North Reading, MA | 2005 | Mr. Park was responsible for designing a shrub-dominated bog restoration of a metals-contaminated portion of a wetland that was dominated by the invasives <i>Phragmites australis</i> and <i>Lythrum salicaria</i> . Once the invasives were removed, and the contaminated soils excavated, Mr. Park specified the wetland soil type, plant species list, and designed the wetland restoration hummock-hollow micro-topography. Mr. Park was responsible for quantitative post-construction monitoring, data analysis, and reporting.   |
| Fish Population Measures of<br>Effect Study<br>FAA<br>Atlantic City, NJ     | 2005 | Mr. Park helped design and execute a fish mark/recapture study that utilized line sampling and hoop nets. All fishes caught were tagged (dorsally), identified to species, weighed, and measured (TL mm). Mr. Park was also responsible for using simple linear regression of log transformed length-weight data in order to identify possible Hg related effects on growth. In addition, Mr. Park calculated fish condition factors. Differences in fish growth between the contaminated and reference sites were assessed with a Kolmogorov- Smirnov D-test. Population estimates were conducted with the software program MARK/RECAPTURE. Mr. Park was responsible for summarizing all results in a technical report that was included in the Supplemental Ecological Risk Assessment.  |
| Dendrochemical Dating Study<br>FAA<br>Atlantic City, NJ                     | 2005 | Mr. Park developed and conducted a study designed to identify the timing of the deposition of elemental Hg (mercury) within the forested wetlands associated with the South Branch of the Absecon Creek (SBAC). Specifically, Mr. Park used increment cores extracted from <i>Chamaecyparis thyoides</i> (Atlantic white cedar), and Hg concentrations contained within five-year increments to determine the date of Hg deposition. A Mann-Kendall test was used to examine trends with time, while box plots and a Mann-Whitney U- test was used to assess spatial trends. This investigation was used as an ancillary study to sediment dating analyses conducted by Rensselaer Polytechnic Institute (RPI) with critical review being provided by the Massachusetts Institute of Technology (MIT). All analyses of Hg in wood tissue followed USEPA approved protocols and were conducted by a USEPA approved laboratory. The results of the dendrochemical study closely matched the results of the sediment dating study and effectively pinpointed a timeframe for the initial input of Hg into the SBAC forested wetlands. |
| Tree Swallow Measures of Effect<br>Study<br>FAA<br>Atlantic City, NJ        | 2005 | Mr. Park was responsible for conducting all data analysis on tree swallow nestling growth and egg tissue Hg concentrations. Data analysis included generating predicted nestling weights, comparing median nestling weights with a Mann-Whitney U-test, and assessing the effects of hatch date, location, and egg tissue Hg levels with Principal Factors Analysis (PFA). Mr. Park was responsible for all data analysis and summarized the findings in a brief technical report that was included in the Supplemental Ecological Risk Assessment.  |

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<i>Saxifraga pennsylvanica</i> survey Proposed Subdivision Kennebunkport, ME	2005	Mr. Park's responsibilities included the design and execution of a field survey for the state listed (threatened) swamp saxifrage ( <i>Saxifraga pennsylvanica</i> ). Sampling included establishing randomly placed 5 meter radial plots; identifying all plant species within the plots; estimating percent canopy cover and measuring understory light levels. All data were presented in a technical memorandum. Mr. Park presented the plant survey results at a public hearing before the Kennebunkport Planning Board and discussed impacts to the swamp saxifrage, which was identified on the site.
Terrestrial Ecology Analysis North Bellport Energy Facility EA Long Island, NY	2005	Mr. Park was responsible for the characterization of natural resources on a 90-acre parcel in Long Island, NY. Natural resource characterization included a quantitative study of terrestrial forest communities, identification of forest successional trends, a wildlife survey, and a rare species survey (tiger salamander). An impact assessment was also conducted. Mr. Park summarized the findings in the Terrestrial Ecology section of an EA under New York State's SEQRA process.
Reservoir Plankton Mercury Study FAA Atlantic City, NJ	2005	In order to more accurately identify mercury transfer with the aquatic food web present in the Atlantic City Reservoirs (Upper and Lower), plankton were collected with a tow-net for quantitative analysis and analyzed for both mercury and methylmercury. Mr. Park developed the quantitative approach used to compare impacted plankton populations with non-impacted populations. Preliminary data analyses included correlation, and a test for the mean.
MCP Stage I Ecological Risk Characterization Brownfield Site Gardner, MA	2005	Mr. Park conducted a Stage I Ecological Risk Characterization (ERC) in accordance Massachusetts Contingency Plan (MCP) rules and regulations at a Brownfields site located in Gardner, Massachusetts. Mr. Park characterized all habitat types, identified ecological receptors, and identified complete exposure pathways with existing soil and sediment PAH data. The results of the Stage I ERC indicated that PAH concentrations were elevated throughout the brook located on the site, in addition to associated tributaries. A "Local Conditions" argument was used to suggest that the association between site contamination and brook contamination was confounded by outside sources of PAHs. It was concluded that a Stage II ERC was not warranted and that the removal of the brook sediments would do little to remedy the PAH problem, given that PAH input may be ongoing.
Wetland Restoration Woodbury Development Associates, Woodbury, NY	2001-2005	Mr. Park was responsible for the oversight of a 4.7-acre wetland restoration, post-construction monitoring, and reporting to the ACOE District Engineer. Data analysis reflected an interaction between TRC and the ACOE District Office. The agreed upon analysis included absolute and relative dominance, absolute and relative frequency, and finally absolute and relative percent cover. Assessment of tree survival was assessed in the field. Mr. Park conducted all analyses and submitted the final monitoring report in 2005.

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Screening Level Ecological Risk Assessment (SLERA) GE Silicones Facility-Hazardous Waste Incinerators Waterford, NY	2004	Mr. Park was responsible for identifying ecological receptors and characterizing the ecological setting. All work was conducted in accordance with Screening Level Ecological Risk Assessment Protocol for Hazardous Waste Combustion Facilities (EPA, August 1999). Mr. Park also provided guidance to the lead risk assessor with respect to assessment endpoints and ingestion rates. Ingestion rate data were obtained from the Wildlife Exposure Factors Handbook (USEPA, 1993).
Wetland Restoration KC Realty Trust Siting Plan Newburyport, MA	2000-2004	Designed a 2.6-acre wetland restoration at a previously filled site. The design included preparing a plan that specified excavation depths, volume of material to be removed, a planting plan, and a post-construction monitoring protocol. Data analyses included simple percent cover and an examination of species richness with time. The restoration plan was submitted to the MA DEP Northeast regional office and the Newburyport Conservation Commission. Both agencies approved the plan. Mr. Park submitted the Final Monitoring Report to the ACOE in 2004 and received a certificate of compliance from the Newburyport Conservation Commission.
Benthic Macroinvertebrate Community Characterization Idaho Power Company Snake River Facility Hydro Re-licensing Project Idaho	2003	Mr. Park conducted an analysis of benthic invertebrate data collected over a seven-year period within the Snake River. Data analyses included rarefaction curves, Shannon-Weiner diversity indices (H), Sorenson's index of similarity ( $C_N$ ), Renkonen Similarity index, and a Hilsenhoff biotic index. Statistical analyses included Multivariate hierarchical and agglomerative Cluster Analysis; non-parametric Kruskal-Wallis ANOVA; a two sample Kolmogorov-Smirnov D-test; and using 95% confidence intervals around the actual mean to determine a required sample size to characterize under-sampled portions of the river. Mr. Park was responsible for interpreting results and presenting the discussion in reports that were incorporated into the overall report for each year.
Statistical Analysis of Toxicity Data FAA Atlantic City, NJ	2003	Mr. Park collected toxicity data and statistically assessed significant differences in mean toxicity values with a one-way Analysis of Variance (ANOVA). The raw toxicity data used in the ANOVA included the eight laboratory runs of (1) <i>Hyallela azteca</i> survival fraction; (2) <i>Hyallela azteca</i> length; (3) <i>Hyallela azteca</i> weight; and (4) <i>Chironomus tentans</i> survival fraction. Prior to the ANOVA analysis, all raw survival fraction data were subjected to a Shapiro-Wilk $W$ -test for normality. Following the $W$ -test, all non-normally distributed survival fraction data were arcsine ((square root (x))) transformed to achieve normality. Following the ANOVA analysis, a <i>post-hoc</i> pairwise comparison of site means was conducted with a Tukey HSD (honestly significantly different) test, which is based upon the studentized range distribution. Mr. Park also conducted an analysis of Rapid Bioassessment Protocol (RBP) data using a Pearson product-moment correlation coefficient with corresponding 0.05 $\alpha$ probability levels.

JEFFREY J. PARK (CONT.)

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Statistical Analysis of RBP Data Ecological Risk Assessment, BNSF Site	2003	Mr. Park was responsible for conducting a non-parametric correlation analysis of RBP scores, benthic invertebrate community indices, and various surface water and sediment chemical properties. All data were first subjected to a Shapiro-Wilk $W$ -test for normality. The non-normally distributed data were then analyzed with a Spearman Rank Order correlation coefficient matrix. Mr. Park summarized all findings in a technical report that was incorporated into the Risk Assessment.
Assessment of Benthic Macroinvertebrate Assemblages Ecological Risk Assessment Montello Site	2003	The non-parametric Wilcoxon Matched Pairs test was used to explore the possibility of significant differences in benthic macroinvertebrate community metrics between Rapid Bioassessment Protocol (RBP) Site Pairs. A necessary additional step in the analysis of the benthic community was to investigate exactly how species composition changed between sites. This was achieved with the use of the Morisita Index of Similarity ( $MS_{ij}$ ). Mr. Park summarized all findings in a technical report that was incorporated into the Risk Assessment.
<i>Carex bullata</i> Survey Islander East Proposed Gas Pipeline Long Island, NY	2003	In response to NYSDEC concerns over impacts to four plant species within a proposed gas pipeline right-of-way (ROW), Mr. Park developed and executed a quantitative rare plant survey. The sample methodology employed was submitted to the NYSDEC before any work was conducted. During the course of the survey, a small population of the state-listed plant <i>Carex bullata</i> (button sedge) was identified. The plant population was identified, a quantitative assessment of population e.g. densities was conducted, and the plant population was surveyed. All findings were presented in a report that was submitted to the NYSDEC.
Disturbance-mediated Forested Wetland Dynamics FAA Atlantic City, NJ	2003	Mr. Park designed and conducted a study as part of the FAA Ecological Risk Assessment eco-values studies that identified differences in contaminated versus uncontaminated stand composition and structure, <i>Acer rubrum</i> (red maple) and <i>Chamaecyparis thyoides</i> (Atlantic white cedar) growth rates, and understory species richness. The study also characterized the effects of allogenic processes including hurricanes, the channelization of the SBAC, and mechanical timber removal on vegetation dynamics. The study employed historic aerial photographs (1932-1974), age-structure analysis, tree-ring chronologies, stand structure analysis, understory photosynthetic photon flux density (PPFD) intensity, and understory vegetation characterization. Data analyses included Kolmogorov-Smirnov test; Kruskal-Wallis ANOVA; Principal Factors Analysis; G-test for spatial pattern, Coefficient of Dispersion, and the Fisher Exact Probability test.

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| <p>Pilot Mitigation Program:<br/>Shrubland Restoration<br/>FAA<br/>Atlantic City, NJ</p>  | <p>2003</p> | <p>Mr. Park designed and conducted a shrubland study that recorded data on dominant herbs, tree and shrub seedlings, depth of the A/A<sub>p</sub> horizon and underlying strata, and A-layer physical and chemical properties. In addition, soil data were collected at the bases of <i>Andropogon scoparius</i>, <i>Lyonia mariana</i>, and <i>Baptisia tinctorum</i>. These plants have been documented to be important to the life cycles of various endangered moth and butterfly species. The baseline study will assess what factors comprise the driving mechanisms behind the reference butterfly plant community and the individual plant species. The results of the baseline study will be used to generate a barren area restoration plan, the construction of which will be overseen by Mr. Park. Mr. Park is presently writing the report and will also be responsible for post-construction monitoring and reporting. Data analyses included 95% confidence intervals, Kolmogorov-Smirnov one sample <i>D</i>-test and the Mann-Whitney <i>U</i>-test.</p> |
| <p>Terrestrial Ecology<br/>Indian Point Peaking Facility<br/>Article X<br/>Buchanan, NY</p>   | <p>2002</p> | <p>Mr. Park was responsible for the characterization of natural resources on a 102-acre parcel in Buchanan, NY. Natural resource characterization included a quantitative study of terrestrial forest communities, a delineation of wetlands, and a wildlife assessment. An impact assessment was also conducted. Mr. Park summarized the findings in the Terrestrial Ecology section in accordance with Article X of the New York State Public Service Law.</p>  |
| <p>Islander East Proposed Gas<br/>Pipeline<br/><i>Helianthum propinquum</i> and<br/><i>Floerkea prosepinaoides</i> Surveys<br/>Various Sites, CT.</p> | <p>2002</p> | <p>The Connecticut Department of Environmental Protection (CTDEP) identified four areas intersected by the proposed pipeline alignment potentially containing seven rare plant species. It was determined that three of the four areas would not be affected by the proposed project and that of the seven plant species both <i>Helianthum propinquum</i> (frostweed) (endangered) and <i>Floerkea prosepinaoides</i> (false mermaid-weed) (endangered) exhibited the potential to occur in the pipeline ROW. All upland and wetland habitats were initially screened with a meander survey. Walk-through survey methods involved two paired individuals walking in a zig-zag fashion so as to cover the entire extent of the right-of-way, while simultaneously noting immediately adjacent habitat. The survey indicated that while a rich floral assemblage occurred in the ROW, the two plant species of interest did not. The CTDEP concurred with the findings of the survey.</p>  |
| <p>Forest Mitigation Bank Study<br/>FAA<br/>Atlantic City, NJ</p>   | <p>2002</p> | <p>Mr. Park designed and conducted a forest attributes study that recorded data on dominant herbs, tree and shrub seedlings and substrate cover type present within each of the forest mitigation areas. In addition, the number and species composition of basal sprouts, discrete saplings, and mature shrubs were also assessed. The objectives of the study were to extrapolate from evidence gleaned from germinated and recruited woody tree species, shrubs, and herbaceous species and predict future forested stand composition. Based upon the data collected in the field, management strategies, i.e. selective thinning, will be identified that would accelerate desirable vectors and that will optimize forested habitat for the ovenbird, hairy woodpecker, and the scarlet tanager. Mr. Park was responsible for all data analysis and writing the Methods, Results, and portions of the Discussion sections of the report.</p>   |

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Review of Statistical Analysis of Groundwater Data Laurel Park Landfill Naugatuck, CT	2002	Mr. Park critically reviewed a statistical analysis of groundwater data conducted by others relative to the assessment of cap effectiveness under EPA jurisdiction. Upon the completion of the review Mr. Park identified several problems with the analysis, offered up suggested analyses and conducted an independent assessment of the data. Specifically a linear regression analysis, parametric prediction interval analysis, and a non-parametric tolerance interval analysis were conducted. Additional analyses included a Kolmogorov-Smirnov D-test. All analyses and interpretations of data were presented in a report that was appended to the overall 5-year Multi-Site Review report.
Review of Statistical Analysis of Groundwater Data Beacon Heights Landfill Beacon Falls, CT	2002	Mr. Park critically reviewed a statistical analysis of groundwater data conducted by others relative to the assessment of cap effectiveness under EPA jurisdiction. Upon the completion of the review Mr. Park identified several problems with the analysis, offered up suggested analyses and conducted an independent assessment of the data using CHEMSTAT. Specifically a linear regression analysis, parametric prediction interval analysis, and a non-parametric tolerance interval analysis were conducted. Additional analyses included a Mann-Whitney U-test. All analyses and interpretations of data were presented in a report that was appended to the overall 5-year Multi-Site Review report.
Wetland Functions/Values Assessment and Designed Wetland Development CRRA Wallingford, CT	2001	Mr. Park conducted a Wetland Functions and Values Assessment of onsite wetlands present upon a contaminated 45-acre property adjacent to the Wallingford Landfill for the Connecticut Resources Recovery Authority (CRRA). The functional assessment was conducted in accordance with the ACOE Highway Methodology and utilized surface water and shallow groundwater data to assess the degree to which onsite wetlands processed the landfill leachate plume. Mr. Park wrote the Wetland Functions and Values Assessment Report, which summarized all data, impacts, and compensation. Mr. Park designed a conceptual wetland mitigation plan that provided for the processing of a landfill leachate plume.
Aquatic Resources Calpine Energy Proposed Power Plant Lawrence, OH	2001	Mr. Park was responsible for summarizing water quality, electro-fishing, and Hester-Dendy invertebrate sampling results within the Greenup Pool portion of the Ohio River. Quantitative analyses included correlation, Shannon-Weiner diversity index (H), and an equitability index (J).
Wetland Functional Assessment Millenium Industrial Park Middletown, CT.	2001	Mr. Park conducted a survey of wetland plant communities on an 80-acre parcel situated in central Connecticut. In addition to identifying major plant communities, Mr. Park conducted a wetland Functions and Values Assessment in accordance with the ACOE Highway Methodology. Mr. Park wrote the Wetland Functions and Values Assessment Report, which summarized all data, impacts, and compensation.
Aquatic Resources Calpine Energy Lawrence Energy Center Lawrence, OH	2001	Mr. Park was responsible for summarizing water quality, electro-fishing, and Hester-Dendy invertebrate sampling results within the Greenup Pool portion of the Ohio River. Quantitative analyses included correlation, Shannon-Weiner diversity index (H), and an equitability index (J). Mr. Park also compiled CORMIX input parameters.

JEFFREY J. PARK (CONT.)

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Confidential Pipeline Client,  
*Betula nigra* and *Gentiana*  
*crinata* surveys, Various sites,  
NH.

2000

The New Hampshire Natural Heritage Bureau identified several areas intersected by the proposed pipeline alignment potentially containing state listed threatened plant species. Mr. Park conducted quantitative surveys for both *Betula nigra* (river birch) and *Gentiana crinata* (fringed gentian) within the areas of interest. Mr. Park located both species and quantitatively sampled percent cover, in addition to numbers of associated plant species. The population of each plant species was flagged off and subsequently surveyed prior to pipeline construction.

Article X Aquatic Resources  
Impact Assessment  
New York Power Authority  
500 MW Charles Poletti Power  
Project  
Long Island City, NY

2000

Mr. Park wrote the Aquatic Resources section of an Article X application that discussed fish biology/life history, entrainment impacts and impingement impacts. Mr. Park also identified all historical studies conducted within the vicinity of the facility. Mr. Park conducted an assessment of diel trends in entrainment with a one-way ANOVA. In addition, general patterns in both entrainment and impingement were discussed.

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Article X Aquatic Resources Impact Assessment Mirant Energy Proposed 750 MW Bowline Unit 3 Haverstraw, NY	1999-2000	Mr. Park wrote the Aquatic Resources section of an Article X application that discussed fish biology/life history, entrainment impacts, impingement impacts, and thermal plume impacts. Data analysis included simple linear regression to obtain predicted Bowline Unit 3 100% CMR (Conditional Mortality Rate) values from CEMR model generated CMR values; flow-weighting CMR values through ontogenetic progression (eggs, YSL, PYSL, JUV), and developing a total length (TL) adjustment factor for each fish to reflect the percentage of a given lifestage susceptible to entrainment with the use of a Johnson wedge-wire screen, i.e. <15mm TL. In this manner, conditional entrainment mortality rates were developed for the seven fishes of concern. In addition to the manipulation of CMR values, a thermal assessment analysis and an Equivalent Adult Loss calculation were also conducted. This power plant was successfully permitted.
Article X Terrestrial Resources Impact Assessment Mirant Energy Proposed 750 MW Bowline Unit 3 Haverstraw, NY	1999-2000	Mr. Park was responsible for the characterization of natural resources on the Bowline parcel in Haverstraw, NY. Natural resource characterization included a quantitative study of terrestrial plant communities, wetlands, and a wildlife characterization, including an impact assessment. Mr. Park summarized the findings in the Terrestrial Ecology section of a permit application submitted under New York State's Article X process.
EFH Impact Assessment Mirant Energy Proposed 750 MW Bowline Unit 3 Haverstraw, NY	1999-2000	Mr. Park developed an Essential Fish Habitat (EFH) Impact Assessment report that discussed EFH fish biology/life history, entrainment impacts, impingement impacts, Equivalent adult losses, thermal plume impacts, and included an assessment of Best Technology Available (BTA).
<i>Helonias bullata</i> Survey AES Red Oaks Power Plant Facility Sayreville, NJ	1999	Mr. Park's responsibilities included designing and executing a field survey for the federally listed (threatened) swamp pink ( <i>Helonias bullata</i> ) with data analysis. Sampling included establishing non-randomized 10 meter radial plots along linear transects; identifying all plant species within the plots; constructing species-area curves to ensure adequate sampling; characterizing wetland sub-communities with Sorenson's index of similarity ( $C_N$ ); and presenting an analysis of the field data in a technical report. The final report was submitted to the U.S. Fish and Wildlife Service who agreed with the conclusion that the swamp pink was not present on the AES site.
Muddy River Restoration Project Boston Parks & Recreation Dept. Boston, MA	1998	Mr. Park conducted a feasibility study associated with the proposed restoration of the Muddy River. The study results were presented in an Environmental Notification Form (ENF), which was presented to MEPA. The study included a characterization of wetland and aquatic resources in addition to a dredging feasibility assessment, including dredged material volumes, and dredged material treatment.
Aquatic Macrophyte Study Franklin Park Ponds and Lakes Study Grant Boston Parks & Recreation Dept. Boston, MA	1998	Mr. Park developed and conducted a study that assessed the effects of nutrient loading and sediment thickness on the distribution of aquatic macrophytes. Sampling was conducted along linear transects within 1m x 1m PVC quadrat. Data collection included identifying all macrophytes, estimating % cover, measuring water depths, taking secchi disk readings, and collecting sediment samples. Sediment samples were measured for TKN, total N and total P, ammonium, and phosphates.



# **PLAINFIELD RENEWABLE ENERGY, LLC**

**RARE, THREATENED, AND ENDANGERED SPECIES  
SURVEY**

**FOR A**

**PROPOSED 37.5MW BIOMASS FACILITY  
(Cooling Water Intake Structure and Pipeline)**

*DECEMBER 2006*

*Prepared by:*

***Kleinschmidt***  
*Energy & Water Resource Consultants*

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**PLAINFIELD RENEWABLE ENERGY, LLC**

**RARE, THREATENED, AND ENDANGERED  
SPECIES SURVEY**

**FOR A  
PROPOSED 37.5MW BIOMASS FACILITY  
(Cooling Water Intake Structure and Pipeline)**

***EXECUTIVE SUMMARY***

Plainfield Renewable Energy, LLC wishes to construct a new 37.5MW Biomass Facility and withdraw cooling water for the facility from the Quinebaug River. As proposed, the cooling water intake structure will be situated on a 15.5 acre parcel of land situated in the Town of Canterbury. Water extracted from the river will travel through a 2.5 mile long cooling water pipeline before reaching the biomass facility. The cooling water pipeline will be constructed entirely within the shoulder of Mill Brook Road and Packer Road.

With respect to rare, threatened, and endangered wildlife species present on the cooling water intake site, written correspondence received from the CTDEP (Franklin Swamp Wildlife Management Area – Julie Victoria) on October 11, 2006 indicated that the state endangered eastern spadefoot toad and the state species of special concern Savannah sparrow have been observed in the vicinity of the intake site. This survey was conducted in order to evaluate the presence of these two species, and, in the event that any are located, to identify appropriate measures to mitigate any potential impacts. As such, the objectives of this study are to (1) characterize habitat types; (2) document the presence/absence of the endangered and special concern species potentially present on the site; and (3) describe the nature of the impacts to terrestrial biota associated with the construction of the cooling water system as they occur on the intake site. Impacts to aquatic biota, e.g. fishes and benthic macroinvertebrates, have been addressed in a separate report. Furthermore, rare, threatened, endangered, and species of special concern present on the 29 acre biomass facility site have also been addressed in a separate report.

The proposed cooling water pipeline interconnect route and the 15.5 acre intake site were surveyed for potentially suitable habitat for the species of interest by a Kleinschmidt Associates (Kleinschmidt) ecologist on October 16, 2006. A meander survey was used to characterize

dominant plant species within the habitat types encountered. The results of the survey indicate that by locating the cooling water pipeline entirely within the disturbed environment of the shoulder of the road, all impacts to plant communities associated with the installation of the pipeline will be temporary in nature, and that adverse impacts to the rare, threatened, and endangered species and associated habitats identified in this report will not occur. With respect to the intake site, it can be expected that the more commonly occurring herptiles and avian species will be habitat generalists without any acute habitat specificity. Given the lack of suitable habitat on the intake site, neither the eastern spadefoot toad nor the Savannah sparrow were observed or are expected to occur directly upon the site. Consequently, adverse impacts to the state endangered and species of special concern identified in the vicinity of the site will not occur.