Technical Memorandum: 2020 Sampling Report

Lower Beaverdam Creek Polychlorinated Biphenyl (PCB) Source Trackdown Study

Land Restoration Program

Maryland Department of the Environment

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1. Introduction

This technical memorandum presents a summary of the sampling for polychlorinated biphenyls (PCBs) conducted in 2020 in Lower Beaverdam Creek (LBC), in Prince George's County, Maryland by the Maryland Department of the Environment (MDE) Land Restoration Program (LRP). Field activities for this investigation included sediment, surface water, and fish sampling. The objective of this sampling is to further refine the conceptual site model for the PCB contamination that was found previously in LBC sediment and surface water in November 2019, and to aid in the ongoing source track-down effort in the LBC watershed.

MDE conducted surface water and sediment sampling for PCBs along the entire length of LBC in November 2019 (MDE, 2021). Both surface water and sediment data indicated two primary areas of concern for PCBs in LBC: the stretch of LBC parallel to Pennsy Drive (just north of the Landover Road/Route 202 bridge), and the area adjacent to the I-295-US-50 Interchange. To further delineate these two areas of concern, additional sediment and surface water sampling was conducted in these areas in August and September 2020. In addition, in October of 2020, small fish were collected for analysis of PCBs in fish tissue.

2. Sampling Effort and Laboratory Analysis

Sediment and Surface Water Sampling

Locations for further sampling were identified in LBC and several of its tributaries based on results of previous work completed in 2019 (MDE, 2021). Two sampling events occurred for sediment and surface water along LBC in 2020, one in August and the second in September. Sample locations, rationale, and identification are provided in Tables 1 and 2, and sample locations are shown on Figures 1, 2, and 4.

Several different methods of sediment sampling occurred during the 2020 mobilizations. For outfall samples, sediment samples were taken directly from the outfall. If no sediment was present in the outfall, sediment samples were taken just below the outfall, or from the sediment in the creek bed where the outfall would spill. In addition, several core samples were taken in the middle of the LBC creek bed to investigate the potential for long-term storage of PCB-rich sediments in the creek bed. For these samples, a coring device was driven down 15-18" into the creek bed. Two types of core samples were taken. Composite core samples were taken by compositing material from three intervals: 0-6", 6-12", and greater than 12". Discrete core samples were taken by collecting samples for analysis at 3 intervals for PCB analysis: 0-6", 6-12", and greater than 12". Composite bed sediment samples were taken by homogenizing sediment taken from top 6 inches of the left-, mid-, and right-stream bed. All samples were held on ice until being transferred to the courier for delivery to the laboratory (ALS in Middletown, PA).

Each team was provided a field blank of PCB-free water supplied by the contract laboratory. This water was transported to the field the day of sample collection and transferred to the appropriate sample containers. In addition, each team collected an aqueous equipment rinsate blank prior to the start of sample collection. Duplicate samples were taken at 3 locations: SED-21 (surface water and sediment), Outfall 17 (sediment), and SED-26 (sediment).

For the August mobilization, samples were taken in the field on August 6th, 2021. Samples were received at the laboratory on August 7th, and analyses were completed by August 27th. It should be noted that on August 4th, 2021, Prince George's County received 5 inches of rain due to Tropical Storm Isaias. For the September mobilization, field work was completed on September 10th, samples were received at the

laboratory on September 11th, and analyses were completed by September 21st. There were no significant rain events in the week prior to the September mobilization. Aqueous samples were analyzed for PCB congeners via United States Environmental Protection Agency (EPA) Method 1668c. Sediment samples were analyzed for PCB congeners (EPA Method 1668c) or PCB Aroclors (EPA Method 8082).

Fish Sampling

Minnow traps and electroshocking were used for capturing small fish species in Cattail Branch, which is a tributary of LBC that enters just below the Pennsy Drive area. Two areas of Cattail Branch yielded enough fish for laboratory analysis. In the Upper Cattail Branch, field personnel with an electroshocker walked a length of stream. For the Lower Cattail Branch, minnow traps were deployed on October 28, 2020. Minnow traps were retrieved on October 29th. Samples were held on ice while being transported to the lab, where mummichogs were organized by species, weight and length. Mummichogs were the only species that were recovered with enough mass to sample. The fish were divided into composite samples to be submitted to the lab. Each composite sample consisted of at least 18 grams of fish, and the shortest fish in any composite was at least 75% the length of the longest fish. Samples were shipped, frozen, to the lab (SGS-AXYS, in Sidney, British Columbia, Canada) for analysis via SGS AXYS Method MLA-007 LRMS (congeners, homologs, and total PCBs). Numbers, length, and weight of mummichogs in each composite sample are shown below in Table 3.

3. Results

August 2020 Sampling Results (Sediment and Surface Water)

Surface water and sediment samples were collected for analysis of PCBs via EPA Method 1668 at two locations in a small tributary of LBC adjacent to the I-295/US-50 Interchange. Moderate concentrations of PCBs were found in the two surface water samples taken from this tributary (24 nanograms per liter (ng/L) and 4.6 ng/L), and low levels of PCBs were found in sediment samples (5.2 micrograms per kilogram (μg/kg) and 31 μg/kg). Locations of samples from the I-295/US-50 Interchange are shown in Figure 1.

In the section of LBC adjacent to Penny Drive, all samples were analyzed for PCB Aroclors via EPA Method 8082. Locations of all samples taken in August in the Pennsy Drive are shown in Figure 2. Sediment samples were collected in or just downstream of 16 outfalls. Six (6) of these outfall sediment samples had detections, with the highest being 920 μg/kg total PCBs in Outfall (OF)-08. The detection in OF-08 was a combination of Aroclor-1254 (230 μg/kg) and Aroclor-1248 (650 μg/kg).

Streambed sediment samples were collected at 3 locations in LBC in this area, and one sample from the small tributary just upstream of the Landover Road/Route 202 bridge. All streambed samples were non-detect for PCBs.

Composite core samples were taken at 4 locations. For the composite core samples, a core of sediment was taken down to 15-18" below the surface. One sample was taken over this entire depth and submitted to the lab for PCB analysis via EPA Method 8082. Three of these four composite core samples were non-detect for PCBs. The fourth sample, SED-28, had a detection of only one Aroclor, Aroclor-1248, at 100 μg/kg. Total PCB concentrations for all samples collected in August along Pennsy Drive are shown in Figure 3. Coordinates, sample descriptions, and results for the August sampling event are provided in Table 1.

Attempts were made by Prince George's County field staff to find sediment in manholes in the MS4 system, to further delineate areas where land-based sources might exist. However, not enough sediment was found to prepare a lab sample in the 30 manholes that were inspected.

September 2020 Sampling Results (Sediment)

In September, field crews conducted more detailed sampling at the one core location with a PCB detection in August 2020, location SED-28. Discrete samples were collected at 0-6", 6-12", and greater than 12" below the creek bed. In addition, 4 outfalls that were sampled in August 2020 were re-sampled during the September mobilization. LBC sediments just downstream of 4 outfalls of concern were sampled. Lastly, discrete samples were taken from the left-, mid-, and right-stream bed sediments for individual analysis at 4 locations of interest based on previous sampling efforts. These include SED-12, SED-13, and SED-14, originally sampled in November of 2019, and OF-12, originally sampled in August 2020. A total of 22 samples were collected for analysis of PCBs by EPA Method 8082. Locations of all samples taken in September are shown in Figure 4. Coordinates, sample descriptions, and results for the September sampling event are provided in Table 2.

All three of the discrete depth intervals taken at location SED-28 were non-detect for PCBs. Of the four outfalls resampled, PCBs concentrations ranged from non-detect in OF-09 to a maximum detection of 400 μg/kg in OF-08. For the creek bed sediments sampled just downstream from outfalls, four locations were sampled, ranging from non-detect in the creek adjacent to OF-02 to 470 μg/kg in the creek adjacent to OF-07. Total PCB concentrations for each sample are shown in Figure 4.

October 2020 Sampling Results (Fish)

Two locations yielded enough mass for lab analysis of PCBs in fish tissue during the October 2020 field mobilization. Both locations are in Cattail Branch, a tributary of LBC whose confluence is just downstream of Landover Road/Route 202 bridge. The results of the samples from both locations are presented in Table 3, and their locations shown in Figure 5. Concentrations of total PCBs in mummichog tissue in Cattail Branch range from 47 μg/kg to 81 μg/kg.

4. Findings and Recommendations

The focus of field work in 2020 was to narrow down areas where elevated levels of PCBs may be entering LBC in the Pennsy Drive area, and to broaden characterization efforts in the I-295/US-50 interchange area.

Sediment data adjacent to outfalls in the Pennsy Drive area indicate there are several outfalls of concern: OF-07, OF-08, OF-09, and OF-12. Additional characterization of the MS4 storm sewer network that drains to these outfalls is recommended. Outfalls OF-07 and OF-08 had the highest detections of PCBs in sediment in both the August and September sampling events. SED-14 L, which was sampled in September, was the highest stream bed sediment detection of PCBs during the sampling events in 2020. This location is just upstream of OF-08, indicating that there may be an additional potential source upstream of this outfall.

Several samples were taken in an upstream area that had a high detection of total PCBs (1,100 μg/kg) in sediment in 2012 (MDE, 2012). Multiple samples of both surface water and sediment were taken in the immediate vicinity of these elevated sample in 2019 and 2020. None of the recent samples were able to reproduce the previous elevated detection in this area. There does not appear to be a remaining source

in the upstream section of the Pennsy Drive area. However, small fish sampling is recommended in this area to confirm the recent sediment and surface water results.

In the I-295/US-50 Interchange area, two samples were taken from a small tributary that joins LBC just upstream of the I-295 bridge over LBC. While the Pennsy Drive and JSS areas appear to be more significant sources, surface water concentrations in this small tributary downstream of JSS indicate that there may be potential sources in this small watershed. This may be an area of further investigation in the future.

5. Acknowledgements

MDE's Chemical and Biological Monitoring Division, out of the Annapolis Field Office, provided all the field expertise, sampling equipment, and manpower for collection of the sediment and surface water samples presented in this report.

The United States Fish and Wildlife Service staff, specifically Dr. Fred Pinkney, assisted in the fish collection effort by sharing expertise and allowing MDE to borrow minnow traps. In addition, Dr. Pinkney gave recommendations for which lab to use for the analysis of PCBs in fish tissue and helped with international shipping.

The District of Columbia's Council of Governments staff was instrumental in the fish collection effort. Phong Trieu was generous with his time and knowledge of small fish in the tributaries of the tidal Anacostia and demonstrated excellence in electroshocking.

6. References

MDE, 2012. Expanded Site Inspection of the 3100 Block Pennsy Drive Area Beaverdam Creek PCB Study, MD-476. Land Management Administration of the Maryland Department of the Environment. March.

MDE, 2021. Lower Beaverdam Creek PCB Investigation. Land Restoration Program of the Maryland Department of the Environment. February. https://mde.maryland.gov/programs/LAND/MarylandBrownfieldVCP/Documents/Final%20LBC%20Results%20Nov%2019%20Sampling%2002-2021.pdf

Table 1: August 2020 Sample Identification, Locations, and Results

Sample ID	Latitude	Longitude	Description	Total PCBs (µg/kg)	Aroclor
OF-01	38.927579	-76.896903	Outfall (left bank)	ND	
OF-02	38.927902	-76.895814	Outfall (left bank)	160	Aroclor-1254: 67 µg/kg, Aroclor-1248: 97 µg/kg
OF-03	38.928548	-76.894056	Outfall (rip rap ditch left bank)	ND	
OF-05	38.929454	-76.893108	Outfall (left bank)	ND	
OF-06	38.93123	-76.891416	Outfall (left bank)	ND	
OF-07	38.93144	-76.890907	Outfall (left bank)	380	Aroclor-1254: 82 µg/kg, Aroclor-1248: 300 µg/kg
OF-08	38.932139	-76.889621	Outfall (left bank)	920	Aroclor-1254: 230 µg/kg, Aroclor-1248: 650 µg/kg
OF-09	38.932278	-76.889173	Outfall (left bank)	ND	
OF-11	38.932501	-76.888452	Outfall (left bank)	86	Aroclor-1248: 51 µg/kg
OF-12	38.93295	-76.888447	Outfall (right bank)*	280	Aroclor-1254: 93 µg/kg, Aroclor-1248: 160 µg/kg
OF-13	38.932914	-76.888	Outfall (left bank)	ND	ND
OF-15	38.933631	-76.887855	Outfall (left bank)	170	Aroclor-1254: 67 µg/kg, Aroclor-1248: 87 µg/kg
OF-17	38.935453	-76.886081	Outfall (left bank)	ND	ND
OF-19	38.936644	-76.884819	left bank	72	Aroclor-1248: 45 µg/kg
OF-20	38.936063	-76.880777		ND	
SED-21	38.91763	-76.929735	Tributary near I-295/US-50 interchange	30.9**	
SED-22	38.921616	-76.924893	Tributary near I-295/US-50 interchange	5.24**	
SED-23	38.929906	-76.893017	Tributary just downstream of Pennsy area, bed sediment	ND	
SED-24	38.937138	-76.884995	LBC bed sediment	ND	
SED-25	38.936822	-76.88505	LBC bed sediment	ND	
SED-26	38.936701	-76.885333	LBC bed sediment	ND	
SED-27	38.926932	-76.897781	LBC bed sediment depth profile	ND	
SED-28	38.92909	-76.893368	LBC bed sediment depth profile	100	Aroclor-1248: 100 µg/kg
SED-29	38.9318	-76.890306	LBC bed sediment depth profile	ND	
SED-30	38.934551	-76.887113	LBC bed sediment depth profile	ND	
SW-21	38.91763	-76.929735	Surface water grab sample at SED-21	4.5 ng/L**	
SW-22	38.921616	-76.924893	Surface water grab sample at SED-22	24.3 ng/L**	

* A sample was not able to be collected from OF-12, or between the outfall and the stream, so this sample was taken in creek sediments where the outfall spills.

** These samples were analyzed via EPA Method 1668.

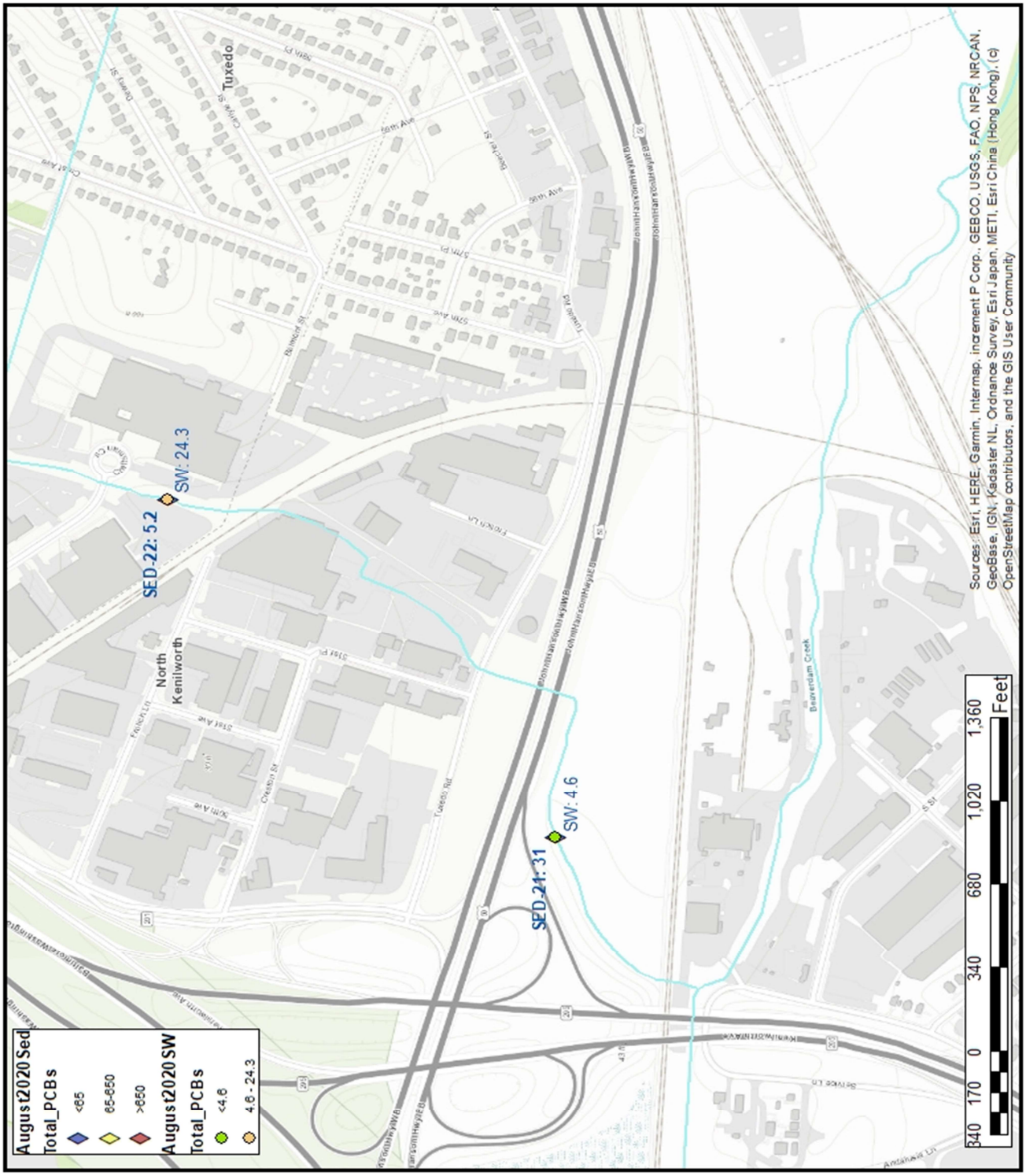
Table 2: September 2020 Sample Identification, Locations, and Results

Sample ID	Latitude	Longitude	Description	Total PCBs (µg/kg)	Aroclor
OF-02 LBC	38.927902	-76.895814	LBC bed sediments just downstream of outfall	ND	
OF-03	38.928548	-76.894056	Outfall (left bank)	130	Aroclor-1248: 76 µg/kg
OF-07	38.93144	-76.890907	Outfall (left bank)	180	Aroclor-1248: 180 µg/kg
OF-07 LBC	38.93144	-76.890907	LBC bed sediments just downstream of outfall	470	Aroclor-1248: 470 µg/kg
OF-08	39.932139	-76.889621	Outfall (left bank)	400	Aroclor-1248: 400 µg/kg
OF-08 LBC	39.932139	-76.889621	LBC bed sediments just downstream of outfall	250	Aroclor-1248: 250 µg/kg
OF-09	38.932278	-76.889173	Outfall (left bank)	ND	
OF-09 LBC	38.932278	-76.889173	LBC bed sediments just downstream of outfall	230	Aroclor-1248: 230 µg/kg
OF-12 LBCL	38.93295	-76.888447	LBC bed sediments, near left bank, just downstream of OF-12	78	Aroclor-1248: 78 µg/kg
OF-12 LBCR	38.93295	-76.888447	LBC bed sediments, near right bank, just downstream of OF-12	96	Aroclor-1248: 96 µg/kg
SED-12 L	38.927312	-76.897489	Bed sediments, near left bank	ND	
SED-12 M	38.927312	-76.897489	Bed sediments, middle of creek	44	Aroclor-1248: 44 µg/kg
SED-12 R	38.927312	-76.897489	Bed sediments, near right bank	ND	
SED-13 L	38.92976	-76.892905	Bed sediments, near left bank	ND	
SED-13 M	38.92976	-76.892905	Bed sediments, middle of creek	340	Aroclor-1248: 340 µg/kg
SED-13 R	38.92976	-76.892905	Bed sediments, near right bank	ND	
SED-14 L	38.932173	-76.889447	Bed sediments, near left bank	730	Aroclor-1248: 730 µg/kg
SED-14 M	38.932173	-76.889447	Bed sediments, middle of creek	240	Aroclor-1248: 240 µg/kg
SED-14 R	38.932173	-76.889447	Bed sediments, near right bank	ND	
SED-28 A	38.92909	-76.893368	LBC bed sediments 0-6”	ND	
SED-28 B	38.92909	-76.893368	LBC bed sediments 6-12”	ND	
SED-28 C	38.92909	-76.893368	LBC bed sediments >12”	ND	

Table 3: October 2020 Fish Sample Results

Sample ID	Latitude	Longitude	Location	Number of Fish in sample	Length Range (mm)	Combined sample weight (g)	Total PCBs (ng/g wet weight basis)
LBLCMC01	38.92827	-76.8941	Lower Cattail Branch	3	77-84	19.3	52.2
LBLCMC02	38.92827	-76.8941	Lower Cattail Branch	5	66-73	20.75	73.3
LBLCMC03	38.92827	-76.8941	Lower Cattail Branch	6	60-67	20.8	81.4
LBLCMC04	38.92827	-76.8941	Lower Cattail Branch	10	50-60	22.93	81
LBUCMC01	38.92199	-76.88208	Upper Cattail Branch	4	71-75	19.62	60.4
LBUCMC02	38.92199	-76.88208	Upper Cattail Branch	5	64-72	20.39	47.5

Figure 1: August 2020 Sample Locations – I-295/US-50 Interchange



Note: Surface water (SW) concentrations are in ng/L. Sediment (SED) concentrations are in µg/kg

Figure 2: August 2020 Samples Locations – Pennsy Drive area

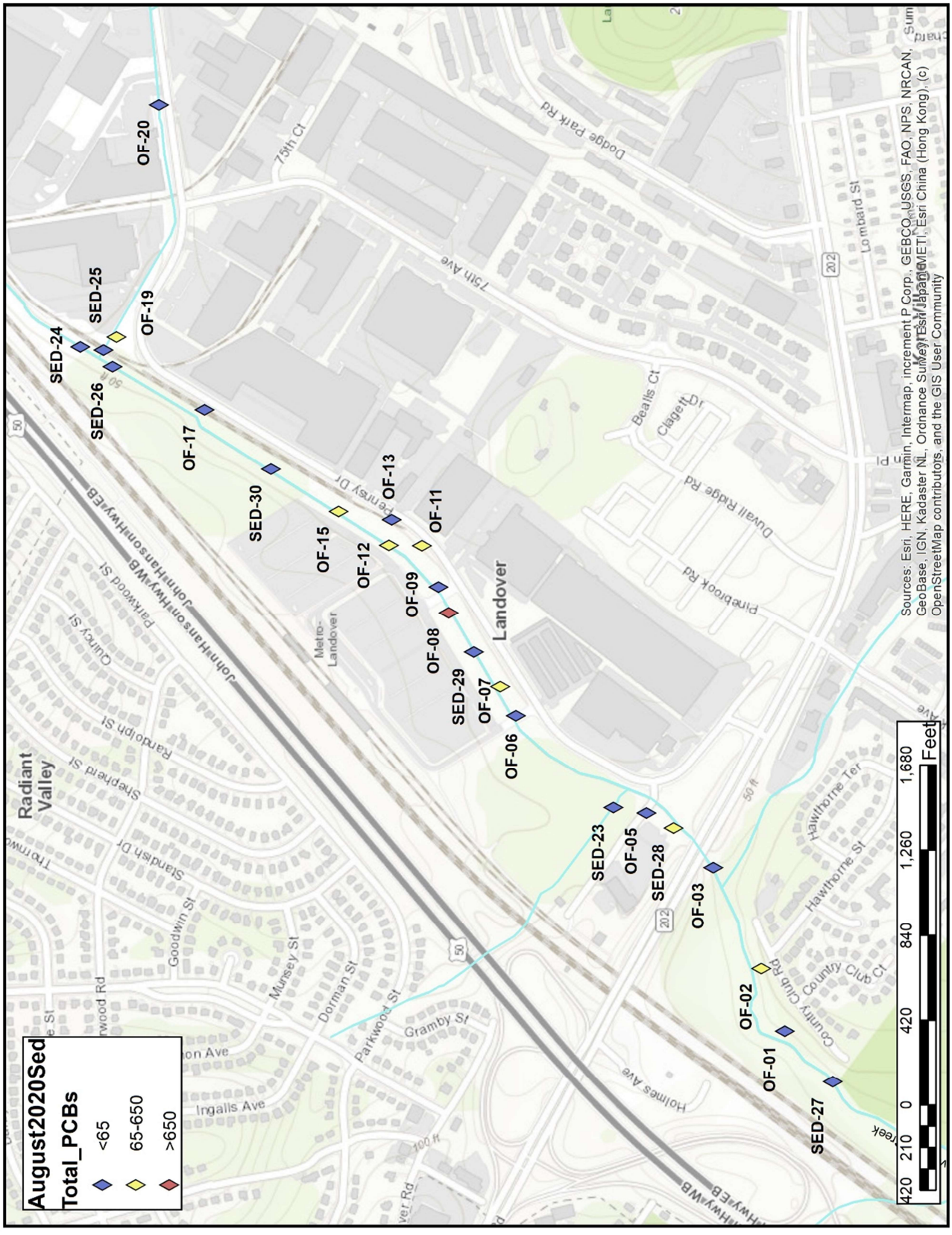
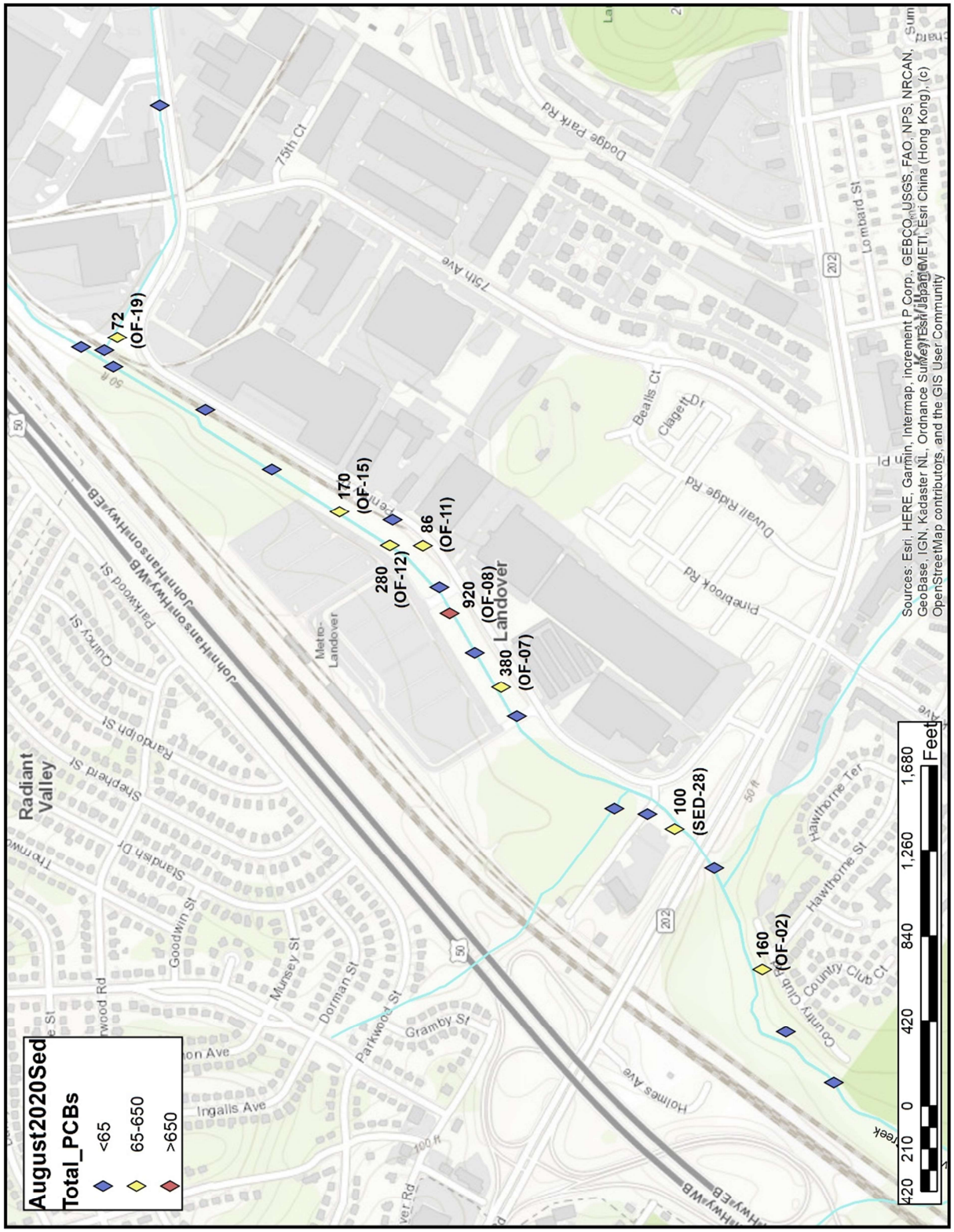
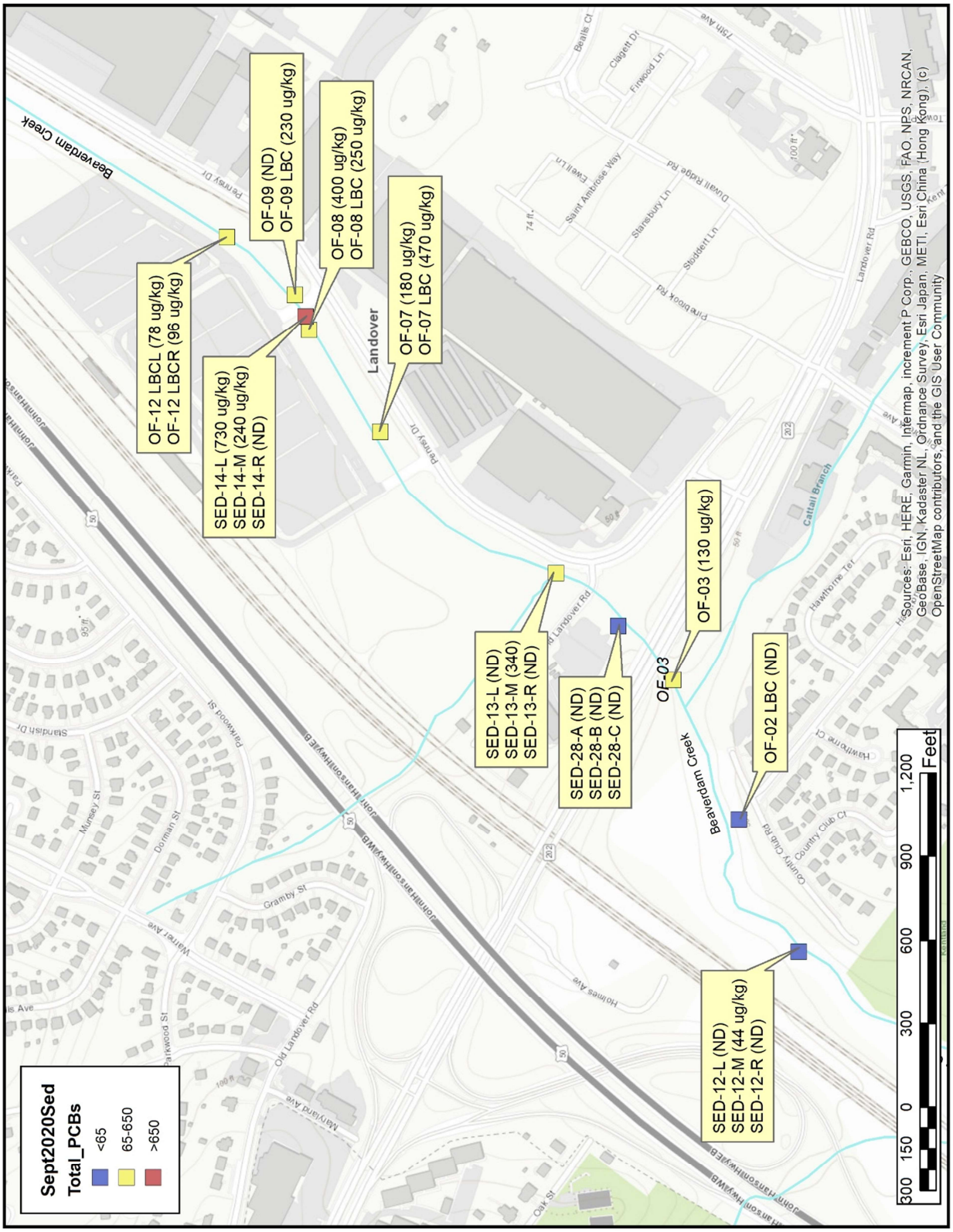


Figure 3: August 2020 Results



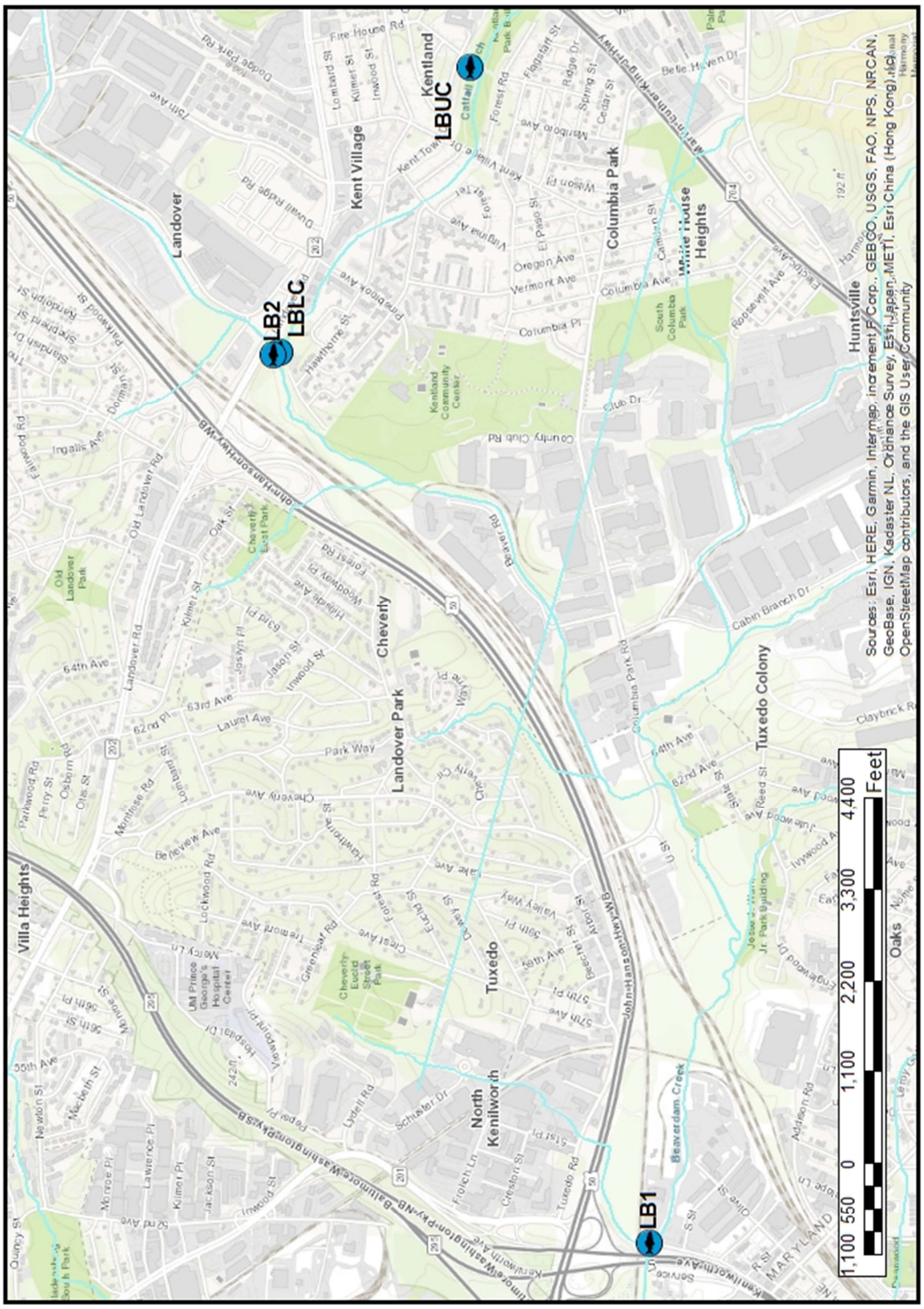
Note: Sediment concentrations are shown in µg/kg. Locations without labels were non-detect for PCBs via EPA Method 8082.

Figure 4: September 2020 Sample Locations and Results



Note: Please see Table 2 for explanation of sample nomenclature.

Figure 5: Fish Sample Locations



Note: LB1 and LB2 are locations of USFWS samples. Data for those samples are not presented in this report.