FINAL REPORT

Annual Report
2009 Biological Resource Monitoring
Coeur d'Alene Basin Operable Unit 3

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1.0 Background and Objectives

This report summarizes activities and results of U.S. Fish and Wildlife Service (Service) Northern Idaho Field Office (NIFO) biological resource monitoring conducted at the Bunker Hill Mining and Metallurgical Complex Operable Unit 3 (OU-3) during 2009. The Service is responsible for conducting biological resource monitoring to assist the U.S. Environmental Protection Agency (USEPA) in evaluating the progress of remedial actions implemented to improve ecological conditions. This work was supported through an Interagency Agreement with USEPA and follows the framework of the Basin Environmental Monitoring Plan (BEMP) (USEPA, 2004).

The BEMP was designed to evaluate two hypotheses:

- There is an improving trend toward biotic benchmarks from pre-remediation conditions.
- There has been progress toward achieving benchmarks of selected remedy.

Biotic benchmarks were established in the OU-3 Record of Decision (ROD) (USEPA, 2002) and focus on indicators such as fish, songbirds, waterfowl and habitat. Biological benchmark monitoring under the BEMP is intended to evaluate improvements in biological resources through the monitoring of habitat and contaminant-specific indicators. Habitat indicators include:

- Riverine habitat – aquatic macroinvertebrates, fish, aquatic habitat;
- Lacustrine/palustrine habitat – waterfowl;
- Riparian habitat – songbirds, amphibians, terrestrial macroinvertebrates, riparian vegetation.

The Service conducted biological resource monitoring in 2009 in accordance with Upper Columbia Fish and Wildlife Office (UCFWO) Standard Operating Procedures (SOPs) and the BEMP (USEPA, 2004), both designed for data continuity and comparability with existing studies. The only biological resource monitoring project completed in 2009 was waterfowl surveys.

2.0 Waterfowl Surveys

Thousands of migratory waterfowl utilize the Basin floodplain (USFWS, 2006; USFWS, 2007). Of the estimated 19,200 acres of floodplain habitat available to migrating waterfowl, 95% have lead concentrations exceeding adverse effect levels for tundra swans (*Cygnus columbianus*) (530 mg/kg, USEPA, 2002), and 80% have lead concentrations considered to be lethal to tundra swans (>1,800 mg/kg; Beyer et al., 2000; USEPA, 2002). Ingestion of lead-contaminated sediment has been shown to be the cause of the majority of waterfowl mortality within the Basin (Beyer et al., 2000; Stratus, 2000; USEPA, 2002). Remedial actions identified in the OU-3 ROD include reducing lead in floodplain soil and sediment and reducing metals exposure of wildlife to levels that are protective of the ecosystem, thereby reducing waterfowl mortalities (USEPA, 2002). The ROD proposes to accomplish this by using a combination of removal, capping, and soil

amendments in high priority use areas and by providing additional safe waterfowl feeding habitat through the conversion of agricultural areas to wetlands (USEPA, 2002).

The BEMP was designed to provide data to aid in the evaluation of improvements in biological resources on a habitat-specific basis through monitoring habitat and contaminant-specific indicators. Waterfowl were identified as a biological indicator for ecological exposure in lacustrine/palustrine habitats (USEPA, 2004). We conducted waterfowl surveys in 2009 to augment data on relative wetland use patterns, primary waterfowl feeding areas, and relative waterfowl abundance during the spring migration through the Basin. Information will be used to help evaluate progress toward achieving remedial action goals as they pertain to reducing waterfowl exposure to metals of concern. Wetland-specific waterfowl use data will also provide information to help guide the selection of wetland areas for remediation to efficiently meet the waterfowl toxicity reduction goal.

2.1 Methods

Service personnel conducted 12 waterfowl surveys, one per week between February 10 and April 28, 2009 in accordance with UCFWO SOP #1020.1013. This protocol details a survey of 24 major wetlands, marshes, sloughs, and lakes from Whiteman's Slough to Coeur d'Alene Lake. In 2008, two additional wetland units located on the Schlepp conservation easement were added to the survey route (i.e., Schlepp East and West Field) (Figure 2-1). Counts and behavior (e.g., feeding, loafing, resting, and nesting) for all tundra swan, mallard (*Anas platyrhynchos*) and Canada goose (*Branta canadensis*) observed were recorded. Selection of these species was based on their use in previous waterfowl surveys conducted in the Basin (i.e., Audet et al., 1999), known area use, feeding behavior, and previous mortality investigations (Beyer et al., 1998; Audet et al., 1999). Data regarding other waterfowl using surveyed wetlands was also recorded, this included species, numbers, and behavior.

2.2 Results

The highest number of waterfowl was observed at Lane Marsh (n = 17,935). The highest mean number of waterfowl per survey was observed at Lane Marsh ($\bar{X}$ =1,495), followed by Canyon Marsh ($\bar{X}$ = 804) and Schlepp East Field ($\bar{X}$ = 648) (Table 2-1). The most common species of waterfowl observed included tundra swan, mallard, Canada goose, American wigeon (*Anas americana*), common goldeneye (*Bucephala clangula*), northern pintail (*Anas acuta*) ring-necked duck (*Aythya collaris*) , and lesser scaup (*Aythya affinis*)(Figure 2-2).

Tundra swan, mallard, and Canada goose densities were highest during March (Figure 2-2). Highest single day counts were 6,271 tundra swans and 10,547 mallards on March 17, and 1,119 mallards on April 3 . Densities for all three species of waterfowl decreased significantly in late March and April (Figure 2-3). The highest overall numbers of feeding Canada goose (n =4,286) were observed in Lane Marsh. The highest overall numbers of feeding tundra swan were observed in Lane Marsh (n = 4,301), followed by

Strobl Marsh (n = 1,467) and Killarney Lake (n = 1,034). The highest overall numbers of feeding mallards (n = 487) were observed in Canyon Marsh (Figure 2-4). The highest total number of feeding waterfowl were observed in Lane Marsh (n = 10,630), then Canyon Marsh (n = 4,081), Cave Lake (n = 3,896), and Harrison Slough (n =3,896) (Figure 2-5).

2.3 Discussion

Data from 2009 constitute the fifth year of waterfowl population monitoring under the BEMP (USEPA, 2004). These data demonstrate that thousands of waterfowl continue to utilize Basin habitats during spring migration. For example, total overall numbers of waterfowl observed in 2005, 2006, 2007, 2008 and 2009 were 68,402 (USFWS, 2006), 78,478 (USFWS, 2007), 60,786 (USFWS, 2008), 93,488 (USFWS, 2009) and 103,242 (this study), respectively[1] (Figure 2-6). Data also demonstrate that while relative wetland use patterns and primary feeding areas of migratory waterfowl utilizing the Basin may fluctuate annually, Canyon Marsh, Lane Marsh and Harrison Slough constitute the highest waterfowl feeding areas over the five year survey period (USFWS, 2006; USFWS, 2007; USFWS, 2008; USFWS, 2009, this study)(Figure 2-7). Frequent use of these wetlands is likely driven by habitat quality, preferred feeding habitat (e.g., shallow water depths), and the subsequent accessibility to food resources by waterfowl.

Although waterfowl feeding areas change somewhat over time, waterfowl continue to feed in areas of the Basin with lead concentrations considered to be toxic to waterfowl (>530 mg/kg; Beyer et al., 2000). Mean sediment lead concentrations in Canyon Marsh, Lane Marsh and Harrison Slough have been observed at 4,433 mg/kg, 3,422 mg/kg, and 4,515 mg/kg, respectively (Campbell, 1999; USFWS, 2005 unpublished data). These concentrations are 6.4 to 8.5 times higher than the clean-up level established for waterfowl (530 mg/kg; USEPA, 2002). We would expect injuries to waterfowl, including death, to continue as waterfowl continue to feed in contaminated wetland areas.

Lower Basin wetland areas were prioritized for remedial activities based on potential for contributing to lead poisoning of wildlife, high use by waterfowl, high levels of lead in sediments, relatively low potential for recontamination and site access (USEPA, 2002). Lane Marsh wetland area is identified in the OU-3 ROD for remedial activities. Continued high use of this wetland by waterfowl supports its identification as a quality remedial investment for reducing waterfowl exposure to mining-related lead.

Information on waterfowl relative abundance and wetland-specific use and behavior, especially when used in conjunction with waterfowl toxicity trends, will continue to provide valuable data guiding efficient remedial strategies and the success of remedial activities as they pertain to reducing waterfowl exposure to mining-related metals of concern in OU-3.

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[1] It is likely that individual waterfowl remain within the Basin for over a week at a time during migration. These waterfowl may be counted as an individual during more than one survey. Total seasonal numbers may therefore overestimate actual waterfowl in the area.

In addition to ecological remediation, the ROD also identifies a benchmark of increasing safe waterfowl feeding areas by 1,500 acres through conversion of agricultural land to wetland habitat (USEPA, 2002). USEPA purchased the Schlepp conservation easement in the lower Coeur d'Alene Basin in 2006, and continues to convert the majority of the easement area to palustrine habitat with acceptable lead concentrations in sediment. Flooding of the east field portion of the easement began in winter 2007, with waterfowl use surveys beginning spring 2008. Data from 2008 and 2009 demonstrate that this area attracts some of the highest use (Table 2-1), highest number of feeding waterfowl (Figures 2-4 and 2-5), and highest diversity of waterfowl in the Basin. These are positive early indications that this project is a high-quality investment toward reaching ROD goals. Use by waterfowl within the easement area is expected to increase as post-remediation restoration proceeds.

3.0 References

Audet, D.J., L.H. Creekmore, L. Sileo, M.R. Snyder, J.C. Franson, M.R. Smith, J.K. Campbell, C.U. Meyetyer, L.N. Locke, L.I. McDonald, T.L. McDonald, D. Strickland, and S. Deeds. 1999. Wildlife use and mortality investigation in the Coeur d'Alene Basin; 1992-97. USFWS report.

Beyer, W.N. D.J. Audet, A. Morton, J.K. Campbell, and L. LeCaptain. 1998. Lead exposure of waterfowl ingesting Coeur d' Alene River Basin sediments. Journal of Environmental Quality 27: 1533-1538.

Beyer, W.N., D.J. Audet, G.H. Heinz, D.J. Hoffman, and D. Day. 2000. Relation of waterfowl poisoning to sediment lead concentrations in the Coeur d' Alene River Basin. Ecotoxicology 9: 207-218.

Campbell, J.K., D.J. Audet, J.W. Kern, M. Reyes, and L.L. McDonald. 1999. Metal Contamination of Palustrine and Lacustrine Habitats in the Coeur d'Alene Basin, Idaho. Final Report. U.S. Fish and Wildlife Service, Spokane Washington.

Stratus Consulting. 2000. Report of injury assessment and injury determination: Coeur d'Alene Basin natural resource damage assessment. Prepared for the U.S. Department of the Interior, U.S. Department of Agriculture, and Coeur d'Alene Tribe by Stratus Consulting Inc., Boulder, Colorado.

USEPA. 2001. Final Ecological Risk Assessment. Coeur d'Alene Basin Remedial Investigation/Feasibility Study. Prepared by CH2M Hill and URS Corporation. Region 10 EPA, Seattle, Washington.

USEPA. 2002. Record of Decision, Bunker Hill Mining and Metallurgical Complex Operable Unit 3. U.S. Environmental Protection Agency Report.

USEPA. 2004. Basin Environmental Monitoring Plan, Bunker Hill Facility Mining and Metallurgical Complex Operable Unit 3. URS Group, Inc and CH2Mhill, contract no. 68-W-98-228. Seattle, Washington.

USEPA. 2006. Innovative technology verification report: XRF technologies for measuring trace elements in soil and sediment. EPA/540/R-06/002. U.S. Environmental Protection Agency Office of Research and Development, Washington, D.C.

USFWS. 2005. Annual report: 2004 Biological resource monitoring, Coeur d'Alene Basin Operable Unit 3. Final Report. USFWS, Spokane, Washington.

USFWS. 2006. Annual report: 2005 Biological resource monitoring, Coeur d'Alene Basin Operable Unit 3. Final Report. USFWS, Spokane, Washington.

USFWS. 2007. Annual report: 2006 Biological resource monitoring, Coeur d'Alene Basin Operable Unit 3. Final Report. USFWS, Spokane, Washington.

USFWS. 2008. Annual report: 2006 Biological resource monitoring, Coeur d'Alene Basin Operable Unit 3. Final Report. USFWS, Spokane, Washington.

USFWS, 2009. Annual report, 2008 Biological resource monitoring, Coeur d'Alene Basin Operable Unit 3. Final Report. USFWS, Spokane, Washington.

Figure 2-1. BEMP waterfowl survey points, 2009, Coeur d"Alene Basin, Idaho.

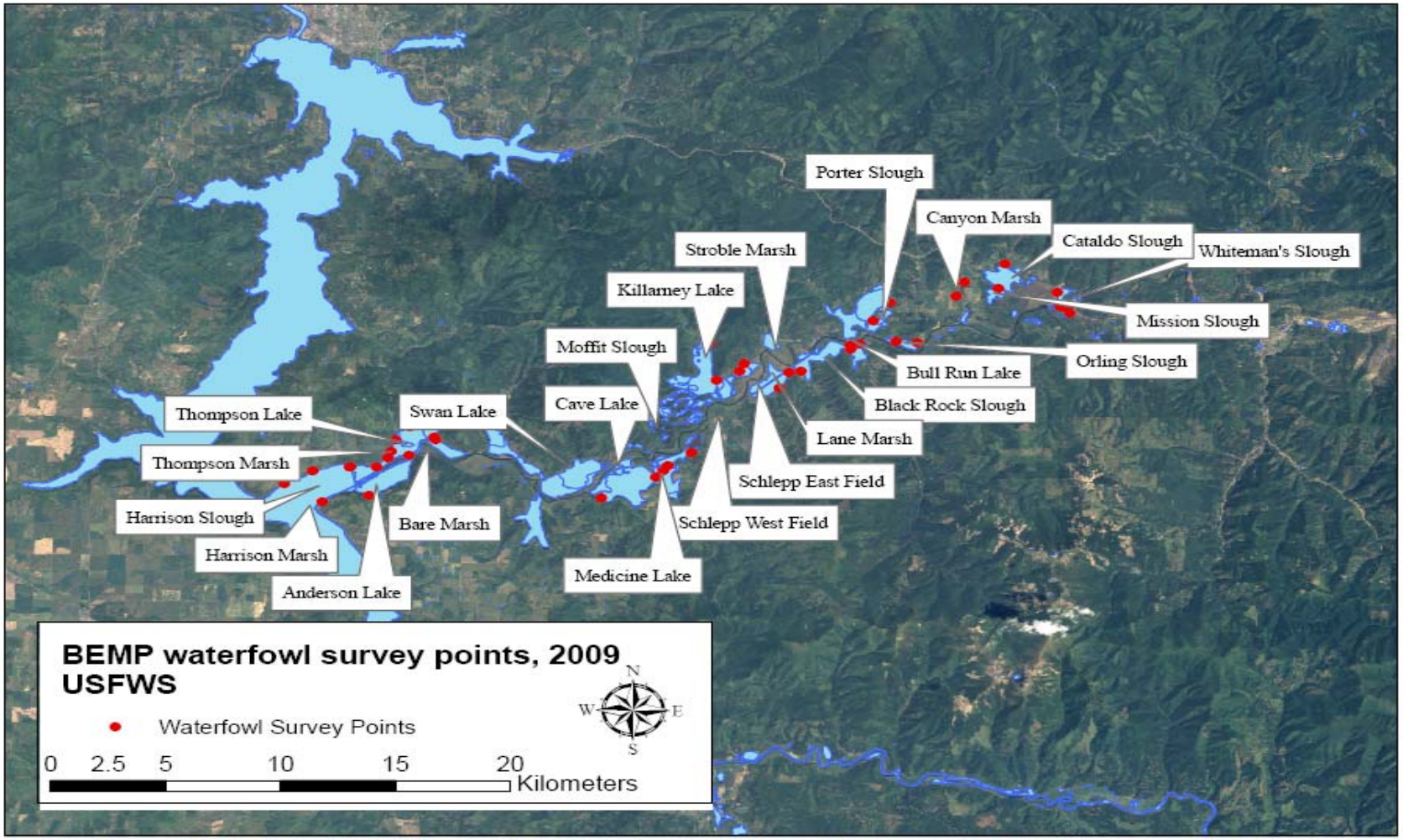

Table 2-1. Wetland, total number of waterfowl observed, average number of waterfowl per survey, and number of waterfowl species observed per wetland, Coeur d'Alene Basin, Idaho, 2009.

Wetland[a]	**Total Number of Waterfowl Observed**	**Average Number of Waterfowl Observed / Survey**	**Number of Species Observed / Wetland**
Mission Slough	2405	200	19
Whiteman's Slough	261	22	15
Cataldo Slough	142	12	16
Canyon Marsh	9652	804	19
Orling Slough	1905	159	17
Porter Slough	275	23	11
Bull Run Lake	104	9	10
Black Rock Lake	3453	288	15
Stroble Marsh	6974	581	12
Killarney Lake	7257	605	14
Lane Marsh	17935	1495	13
Schlepp East Field	7774	648	**21**[b]
Schlepp West Field	1844	154	15
Moffitt Slough	2108	176	9
Medicine Lake	2621	218	**20**
Cave Lake	7601	633	18
Swan Lake	7716	643	11
Anderson Lake	785	65	9
Bare Marsh	604	50	8
Thompson Marsh	2704	225	**20**
Thompson Lake	4409	367	17
Harrison Marsh	1690	141	15
Harrison Slough	5703	475	18

[a] Highlighted areas indicate wetland unit with highest number of waterfowl observed.
[b] Bold numbers indicate wetland unit with highest number of waterfowl species observed.

Figure 2-2. Number of common waterfowl observed per survey, Coeur d'Alene Basin, Idaho, 2009.

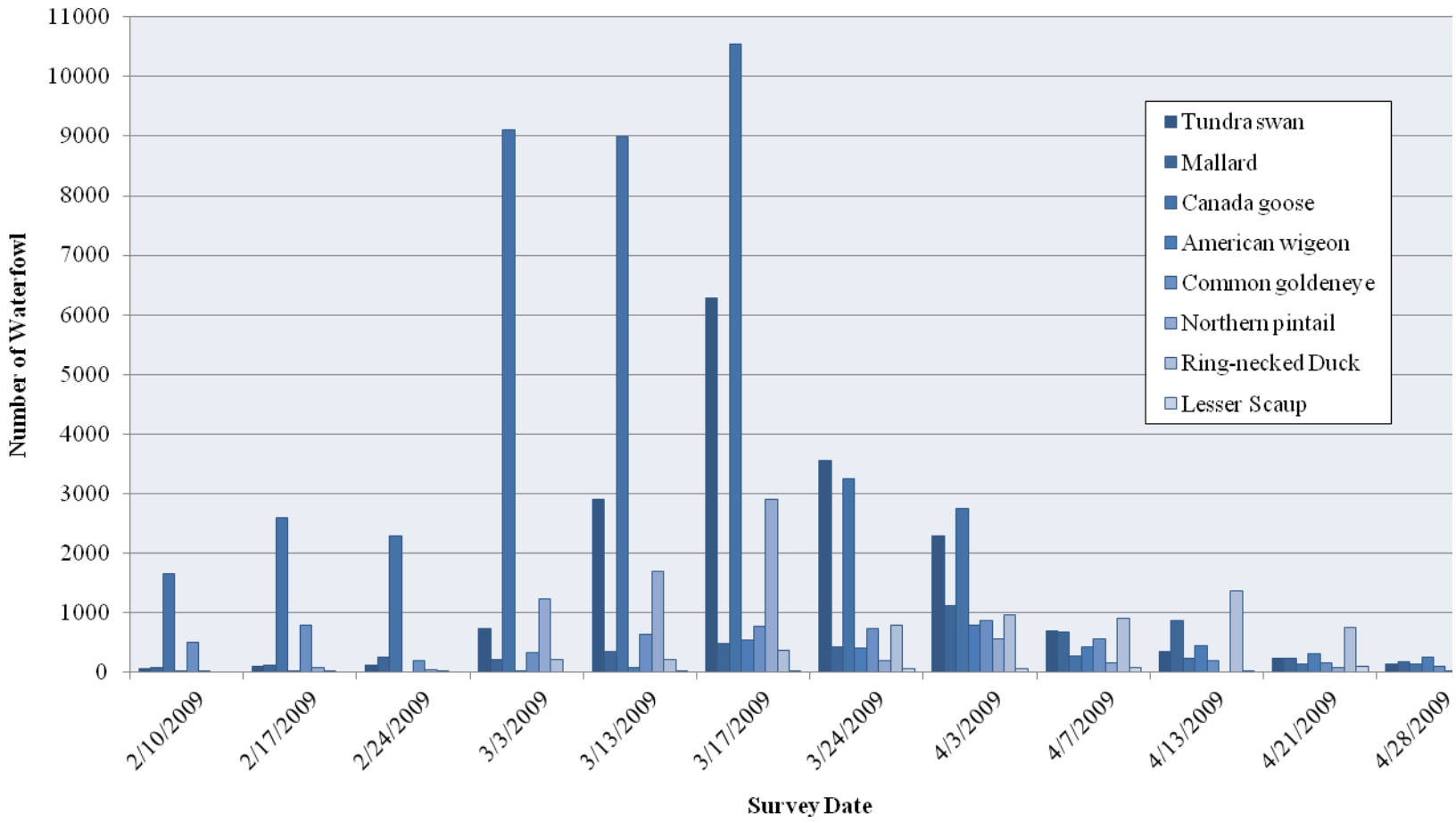

Figure 2-3. Number of tundra swan, mallard and Canada goose observed per survey, Coeur d'Alene Basin, Idaho, 2009.

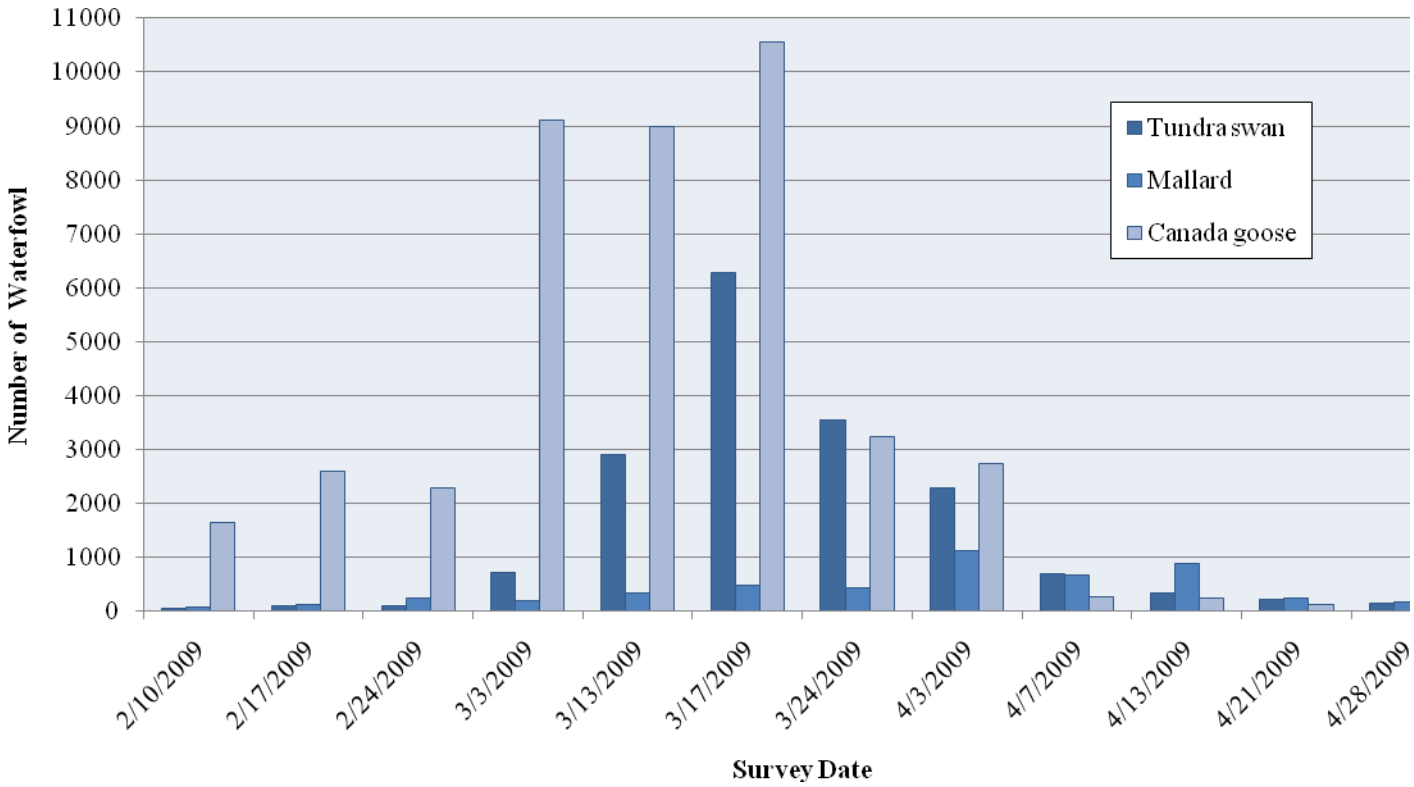

Figure 2-4. Number of feeding tundra swan, mallard, and Canada goose observed among wetland areas, Coeur d'Alene Basin, Idaho, 2009.

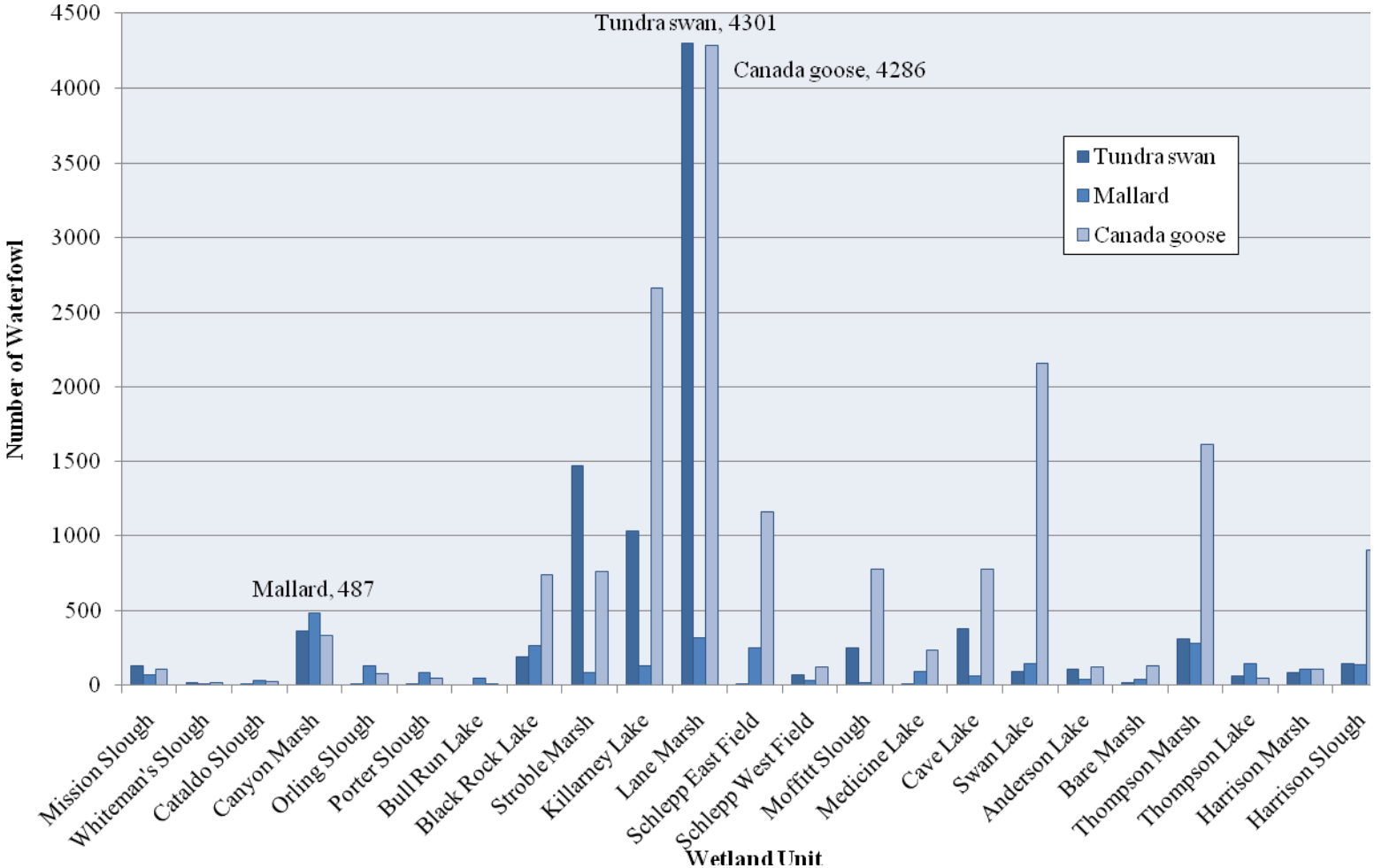

Figure 2-5. Number of feeding waterfowl observed among wetland areas, Coeur d'Alene Basin, Idaho, 2005-2009..

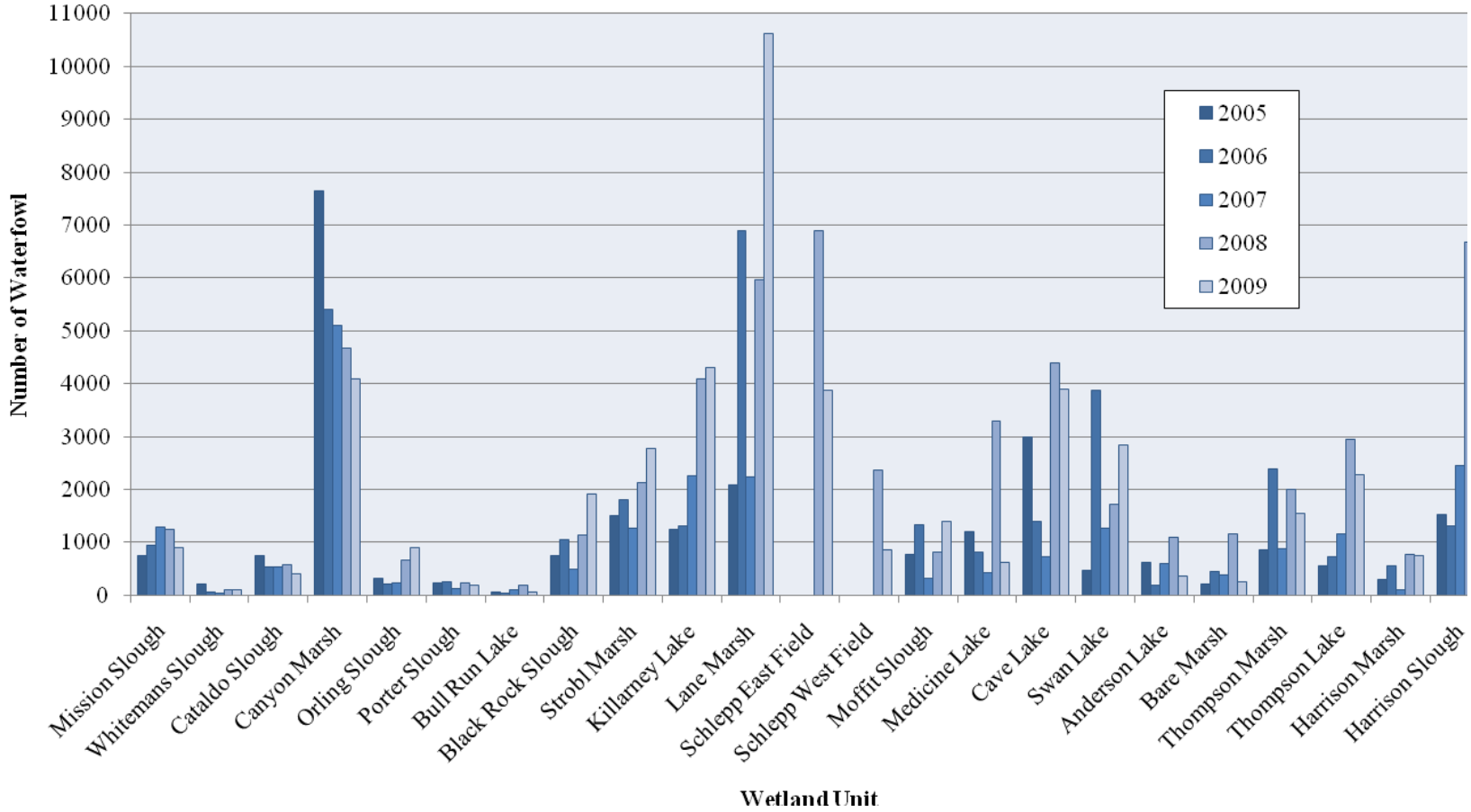

Figure 2-6. Number of waterfowl observed among wetland areas, Coeur d'Alene Basin, Idaho, 2005-2009.

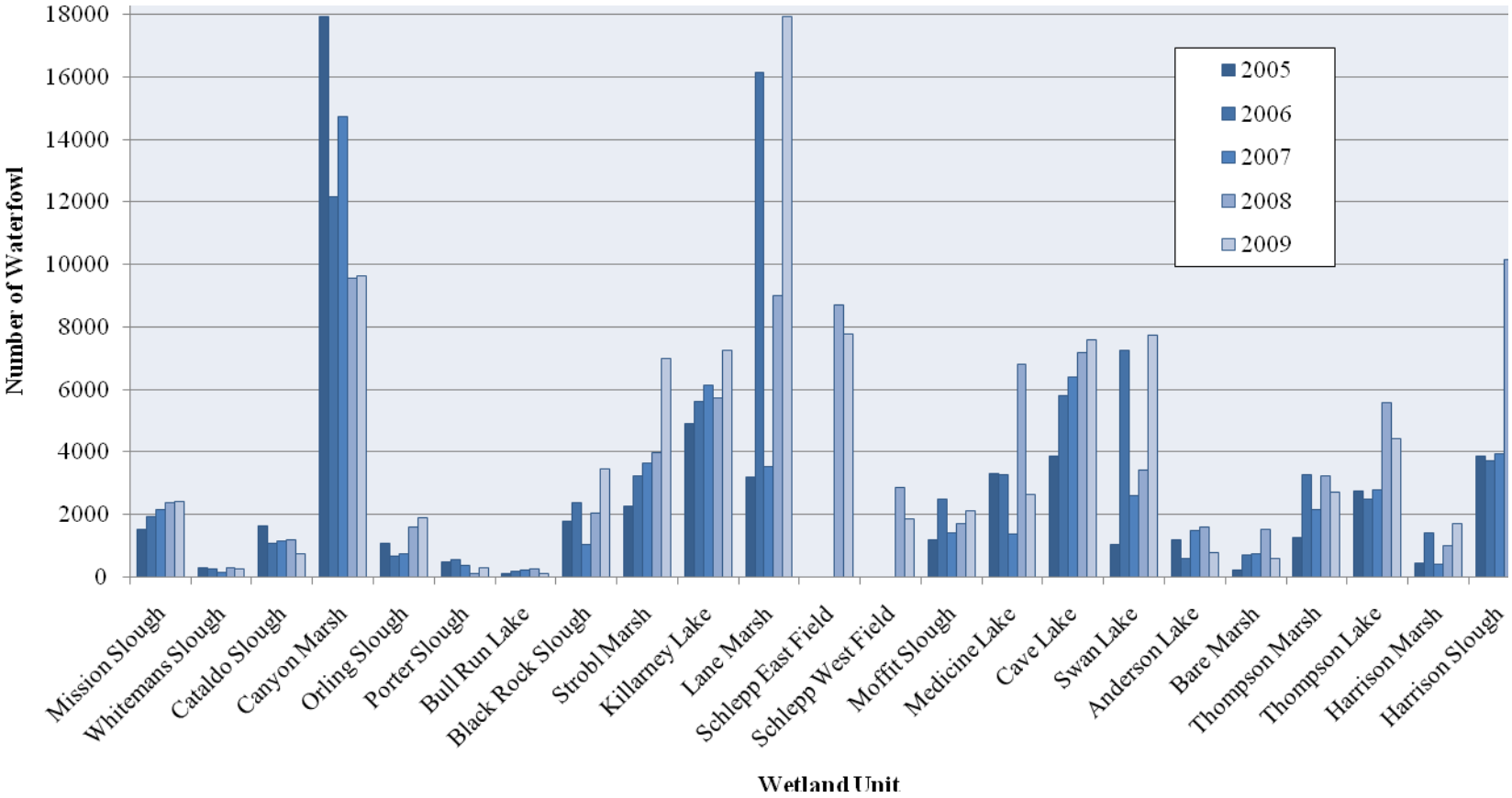
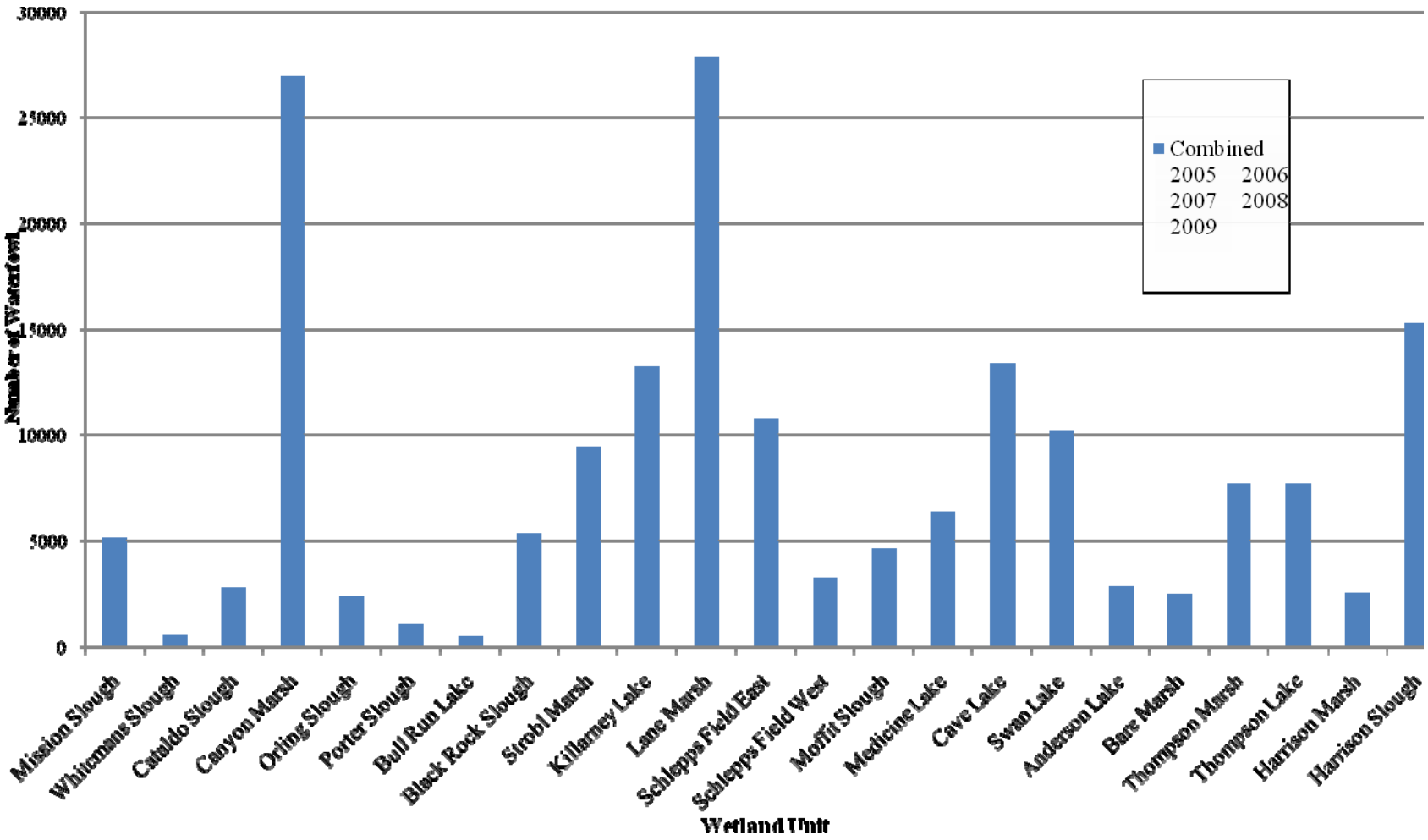
Figure 2-7. Five year (2005-2009) total number of feeding waterfowl observed among wetland areas, Coeur d'Alene Basin, Idaho.