Benefits of Drones for Restoration Initiatives in Sensitive Aquatic and Upland Habitat


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PROJECT BACKGROUND

Drones have evolved and developed rapidly over the past few years and now provide specialists working in a variety of ecosystems with a low-cost and effective solution for conducting site inventory and monitoring for sensitive aquatic and upland habitat. This poster summarizes the benefits of drone-based aerial surveys for an industrial property and adjacent undeveloped land located in Mission, British Columbia, Canada.

A Development Plan (DP) is currently being developed for this area with the intent to revitalize a previously high impact and low value industrial site into an environmentally sustainable site with a balance between the natural environment and commercial development in a tidal area of the lower Fraser River.

PROJECT OBJECTIVES

- Removal of all wood waste and debris from upland areas of the site.
- Re-establishment of a riparian corridor along the foreshore that will allow for industrial access to the Fraser River and provide habitat for wildlife that use the river foreshore.
- Removal of wood waste and other debris in the slough that have degraded the water quality as a viable aquatic habitat for salmon, sturgeon and other aquatic species.
- Creation of a barge loading terminal that is designed to minimize the environmental impacts on both the upland and aquatic receiving environments.
- Greening of the industrial site and adjacent spit to provide wildlife, aquatic, and community access to the Fraser River.

METHODOLOGY

The project site is a approximately 45 hectares in size and is adjacent to the Fraser River. The site is bordered by farmland, a river slough, several sandbars, and an industrial site. Efforts to date to inventory the site have included bathymetric and hydrology surveys, geotechnical and fisheries studies, and drone aerial surveys.

A total of 10 drone aerial surveys were conducted during two separate time periods, 5 surveys in 2017 and another 5 surveys in 2018. The duration of each individual survey was approximately 20 minutes. Aerial surveys were conducted using a DJI Phantom 4 Pro drone equipped with a 20 megapixel camera. Automated flight planning and mapping software was used to pre-program the drone with flight paths that included 75% side overlap and 65% front overlap. A total of 1,675 (2017 survey) and 1,297 (2018 survey) images were captured by the drone flown at a height of 75 meters above the ground. Individual images were post-processed and mosaiced into seamless orthoimages using both DroneDeploy and Pix4Dmapper software.

Ground control points (GCPs) were incorporated into the surveys to maximize positional accuracy. GCPs were distributed throughout the site and measured with a GNSS receiver at an accuracy of +/- 2cm.

CONCLUSIONS

Rapid advances in drone technology combined with lower barriers of entry make their use in conducting inventory and monitoring of restoration projects more attractive.

The costs to acquire a mapping-enabled drone is dropping and is now obtainable to most. Drones are also becoming easier to fly, they can easily be pre-programmed with flight paths, and include advanced features such as automatic return-to-home and obstacle-avoiding sensors. Extensive resources including how-to guides, forums, video tutorials, and white papers, are readily available online.

Furthermore, applications used to gather and compile mapping imagery are widely available.

Overall, the use of drones for conducting aerial surveys has provided additional information for this project that was previously unavailable or limited to other studies. We recommend the use of drones for conducting site inventory and monitoring of project areas undergoing restoration efforts.

ACKNOWLEDGEMENT

Special thanks to the Catherwood family for providing support for this project.

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