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WELL-MANAGED ENVIRONMENTAL COMPLIANCE PROGRAM SUPPORTS DELIVERING SUSTAINABLE ENERGY FROM A LARGE HYDROELECTRIC DEVELOPMENT IN LABRADOR

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Abstract: A 824 MW Hydroelectric Development Project on the Lower Churchill River in Labrador (LCP), is a multiyear project designed to generate and transmit power throughout Newfoundland and Labrador and further, supplying the Maritime provinces and New England states. Before commencement of this complex construction project, regulatory matters affecting the undertaking needed to be addressed. The Environmental Assessment identified requirements and commitments to manage, mitigate and monitor the impact of the LCP and establish appropriate strategies and plans for compliance. This paper discusses the experiences of one Aboriginal partnership company tasked with a Regulatory Compliance and Environmental Compliance Program (Program) it undertook to assist the client in meeting its commitments to regulators. The Program, which started in 2013 and scheduled for completion in early 2018, comprises 3 overlapping components: Avifauna Management, Historic Resources Mitigation, and Environmental Effects Monitoring. Program complexities included multi-year seasonal and overlapping cyclical nature of work attuned to breeding patterns of sensitive indicator species, ability to do weather dependent work in remote locations, working ahead of the main construction activities, inclusion of local communities and service providers, training, health and safety issues, and high visibility as a major project permanently changing the landscape and surrounding communities. Program management best practices were established from the outset and refined and enhanced over the duration of the work. This paper presents and overview of the Program and the results its achieved.

1 INTRODUCTION

A primary goal of this paper is to highlight some of the considerations that engineers and managers must address as exploration and development of Canada's North continues. The program provides valuable management lessons and insights that are applicable to large scale, multi-year, seasonally impacted engineering infrastructure projects in remote locations. The Lower Churchill Project or Muskrat Falls Hydroelectric Development Project (LCP), a new sustainable energy source currently under construction by Nalcor Energy (Client), is a multiyear project on the lower Churchill River in Labrador, Canada (Figure 1). It consists of an 824MW facility with two dams and one powerhouse, a 60km reservoir and over 1,600km of associated transmission lines (with two undersea links: 30km under the Strait of Belle Isle and 180km under Cabot Strait). The LCP, when completed will generate power and transmit it to the Island of Newfoundland, Nova Scotia, and the New England states. Regulatory compliance is one aspect of the LCP and extensive baseline studies and management plans were undertaken by the Client prior to its sanctioning on December 17, 2012 by the Province of Newfoundland and Labrador (Government of NL 2012) and as construction began, sampling, and monitoring activities to comply with regulations were

implemented. To support the LCP, the Client released a public Request for Proposals in 2013 for services of consultants to undertake several scopes of work relating to environmental regulatory compliance.

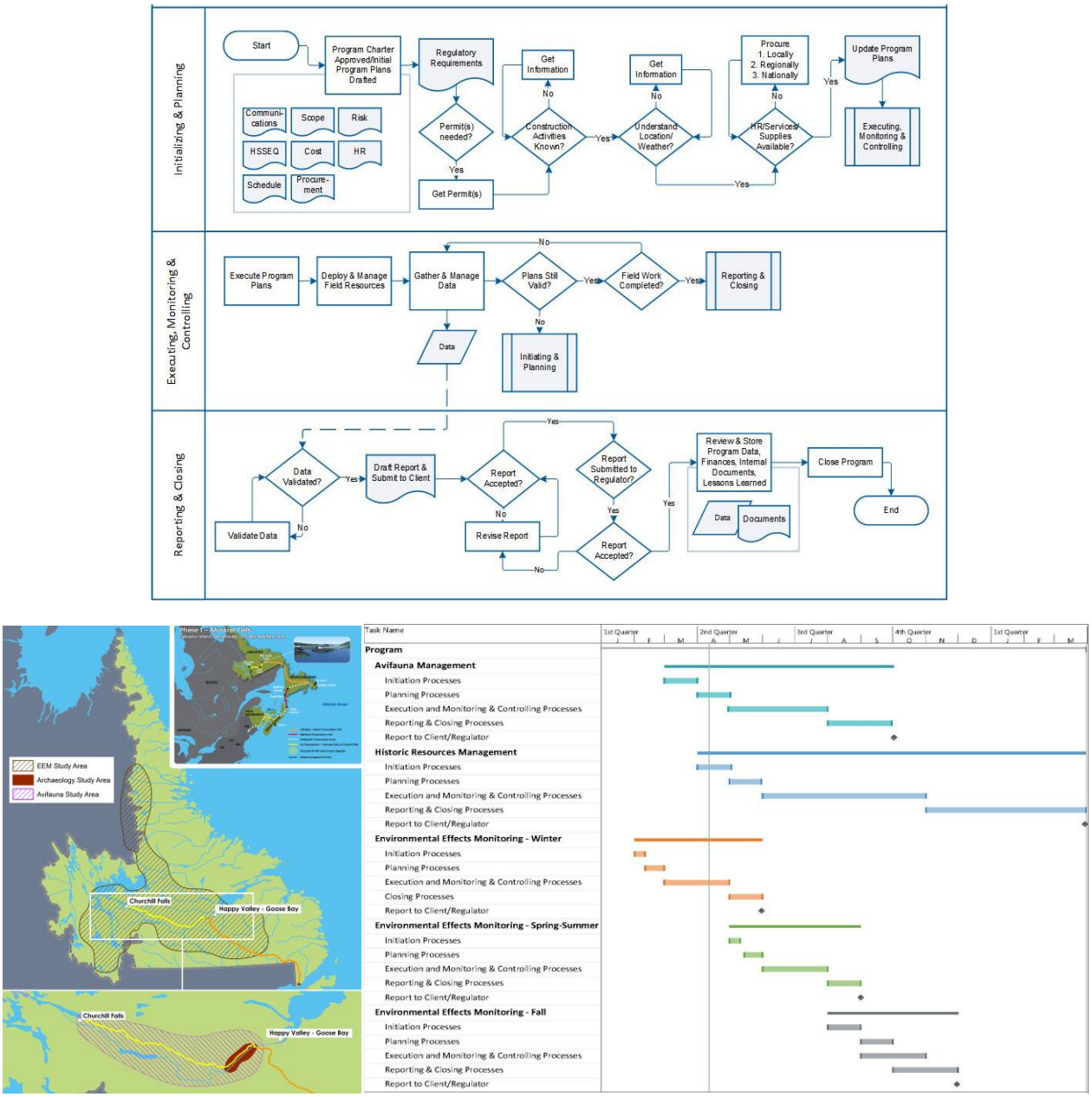

Figure 1: Program at a Glance –Overall Program Flowchart, Location, and "Typical" Gantt Chart

One company, Stassinu Stantec Limited Partnership (Consultant) was initially awarded two scopes: Avifauna Management and Historic Resources Management with Environmental Effects Monitoring added in late 2013. Stassinu Stantec is an Aboriginal partnership company formed between Stassinu Services Inc. (an Innu owned business) established in Happy Valley – Goose Bay, NL, and Stantec Consulting Ltd. a design engineering company established in 1954, headquartered in Edmonton AB and with offices in St. John's, Corner Brook, and Happy Valley – Goose Bay, NL. Stassinu Stantec has decades of consulting experience in Newfoundland and Labrador. This paper discusses its experiences with the Environmental Regulatory Compliance program (Program) it undertook for the Client.

1.1 Geography, Terrain, Weather, and Climate

Challenges for the LCP included large and remote geographic area with limited road access requiring extensive use of helicopters and off-road all-terrain vehicles, and occasional water craft to access ground sites of interest. The closest large community, Happy Valley – Goose Bay, has approximately 3000 permanent residents which increases depending on seasonal construction demand. This put pressure on accommodations, restaurants, business, police, medical facilities and other infrastructure. Due to its size, Labrador has a varied climate throughout. The LCP area experiences long cold winters and warm sunny summers in the Lake Melville area and variable conditions along the eastern coast due to effects of the Labrador Sea yielding extremes of temperature during offshore winds.

1.2 Human Resources, Services, and Supplies

The local area had limited availability to meet the demands of the LCP. The Client emphasized using local resources wherever possible, implemented training programs to prepare local people, and generally encouraged businesses to establish local offices in Happy Valley – Goose Bay. Human resources were drawn locally, regionally, and beyond with professionals, technical staff, and skilled labourers on the Program. The Consultant had an established office (over 2 decades) in Happy Valley – Goose Bay and was able to draw staff from the community and from resources throughout the company with the majority coming from the Atlantic provinces. The gender ratio was an approximately even split and the percentage of staff who self-identified as Aboriginal (Innu, Inuit, or Mi'kmaq) or Métis was 40%. The local area had limited availability to meet the demands of the LCP. The Client emphasized using local resources wherever possible, implemented training programs to prepare local people, and generally encouraged businesses to establish local offices in Happy Valley – Goose Bay. Human resources were drawn locally, regionally, and beyond with professionals, technical staff, and skilled labourers on the Program. The Consultant's staff were drawn from resources throughout the company with the majority coming from the Atlantic provinces. The gender ratio was an approximately even split and the percentage of staff who self-identified as Aboriginal (Innu, Inuit, or Mi'kmaq) or Métis was 40%.

Table 1: Employee Numbers and Total Field Hours % Ratios

Year	Male	Female	Aboriginal	Non-Aboriginal	Labradorean	Non-Labradorean
Employee Numbers						
2013	21	22	26	17	28	15
2014	36	26	25	37	34	28
2015	23	19	24	18	31	11
2016	29	20	31	18	36	13
Total	109	87	106	90	129	67
% Ratio*	56	44	54	46	66	34
Employee Total Field Hours						
2013	6894.0	6,929.0	8,196.0	5,627.0	9,057.0	4,766.0
2014	13,122.5	11,153.5	12,134.0	12,142.0	15,437.5	8,838.5
2015	9,295.0	6,424.5	8,633.0	7,036.5	10,471.0	5,248.5
2016	13,160.5	7,629.0	13,314.0	7,475.5	15,156.0	5,633.5
Total	42,472.0	32,136.0	42,327.0	32,281.0	50,121.5	24,486.5
% Ratio*	57	43	57	43	67	33

* Ratios are determined for pairs - Male:Female; Aboriginal:Non-Aboriginal; and, Labradorean:Non-Labradorean

1.3 Regulatory Compliance Aspects

The aspects undertaken comprised Avifauna Management, Historic Resources Management, and Environmental Effects Monitoring. Each of these programs is discussed: Avifauna Management – this portion of the Program was built on early work by the Consultant, the Client, and others (Jacques Whitford Environmental, Ltd. (1998), LGL Limited (2008), Minaskuat Inc. (2005, 2008b, 2009), and Nalcor Energy (2009a, 2009b, 2012). This work identified key areas and species to be managed during important biological seasons (primarily breeding and migration) when construction activities might also interact with these species. An Avifauna Management Plan (AMP) had been developed by the Consultant for the Client

(Stantec Consulting Ltd 2013) that reduced the effort required from protecting and monitoring all species all the time everywhere within the LCP area to managing the interactions to breeding and migration events and tight on the ground locations where construction was occurring or imminent (within a week). As a mitigation strategy, the AMP balanced species protection and construction impacts and costs in a sustainable way. Historic Resources Management – this portion of the Program was built on early work by the Consultant, the Client, and others (IED/JWEL (1998), Joint Review Panel (2011), Minaskuat Inc. (2008a), JWEL/IELP (2001a, 2001b, 2001c), and Tuck (1981)). This body of work identified key areas of cultural and human use within the LCP area. The Lower Churchill River is the longest river in Atlantic Canada. It has been variously known as the Hamilton River before its renaming by Premier Smallwood, the Grand River (by NunatuKuvut, Nunatsiavut, and Settlers peoples) and the Mishtashipu (by the Innu). It is 856 km long and drains a 79,800 km^2 watershed. For several millennia, it has been the "super highway" for transportation, trade, and communication, a source of food and water, and is an obvious cultural link between the past and the present for peoples along its length. Environmental Effects Monitoring – this portion of the Program was established to address the Environmental Assessment (EA) commitments of the Client to monitor the impacts of construction activities for the entire Project footprint through observations and sampling of identified indicator species prior to, during and after (as required). Any landscape development project as extensive as this one is, involves extensive planning and coordination of activities with regulatory requirements over the entire LCP footprint.

Table 2: Regulatory Entities and Acts

Government Level	Act or Entity
Canada - Federal	Canadian Wildlife Service (CWS)
	Committee on the Status of Endangered Wildlife in Canada (COSEWIC)
	Environment Canada (EC)
	Migratory Birds Convention Act (MBCA)
	Species at Risk Act. 2002 (SARA)
Newfoundland and Labrador - Provincial	Historic Resources Act (HRA)
	Mineral Explorations Standards Regulations
	Newfoundland and Labrador Wildlife Division
	Provincial Archaeology Office (PAO)
	Wildlife Act

2 AVIFAUNA MANAGEMENT

Avifauna in Newfoundland and Labrador are managed by both federal and provincial regulatory agencies. For certain species, there are policies and regulations governing development activities. As there was a risk that construction activities associated with the Lower Churchill Hydroelectric Development Project might cause disturbance to bird species, an Avifauna Management Plan (AMP) was approved in 2013 to manage the potential effects. Because there is no regulatory mechanism to permit the required tree clearing activities in light of the potential effects to nesting birds, the AMP details specific methods reflective of contractor protocols to mitigate potential effects through timely identification of active nests and the establishment of buffer or no cut zones during the nesting season as established by Environment Canada (Environment Canada 2016). During the nesting season we initially proposed 8 teams of 3 people (years 1-3) and 2 teams of 3 people (year 4) to conduct ground nest searches and participate in the relocation of inactive raptor nests as required. With experience in the field and of construction progress this was modified to more efficiently survey ahead of cutting contractors. Team configurations were adjusted to maximize efficacy on the ground and to the remote work locations via truck and helicopter. Annually the teams ranged from 6 teams per day with 5 members each to a single three-person team, depending on the cutting priorities. All teams were lead by a trained biologist with experience with this type of work. As the project evolved, we were able to increase the skillsets and knowledge of returning local staff to a point where they moved from field assistants to field leads. The work plan focussed on three areas: the Muskrat Falls Hydroelectric Development including the reservoir clearing; the overhead HVac transmission lines including power distribution sites, access road and ancillary areas and 315kV HVac Transmission Line (Muskrat Falls to Churchill Falls); and, the Labrador - Island Transmission Link including HVac transmission line (Muskrat

Falls to Forteau), Strait of Belle Isle (SOBI) Subsea Cable Installation and Access Road and Ancillary Areas and followed methods developed in association with the Newfoundland and Labrador Wildlife Division (Jacques Whitford Environmental, Ltd. 1998).

3 HISTORIC RESOURCES MANAGEMENT

Through the Environmental Assessment (EA) process several commitments and requirements were made by Nalcor for the protection of historic resources both archaeological and ethnographic. We executed a Historic Resources Management program consisting of Limited Stage 1 Assessment (desktop review, potential mapping reporting) for Muskrat Falls and Labrador Transmission Assets footprint not previously identified or assessed; Limited Stage 2 Assessment (field testing, reporting) for areas identified as having high potential; and, Stage 3 Assessment (site recording and recovery, reporting), primarily to support reservoir preparation, and consisting of recovery of known historic sites as outlined in the EA, conducted and reported to the satisfaction of the regulator: Provincial Archaeology Office (PAO) and to support the project schedule. The objective of Historic Resource Management was to ensure regulatory compliance by completing recovery of all registered archaeological sites with which the Project will interact, including both registered sites identified as of 2012 and any registered sites identified during subsequent Stage 2 Assessment. Submission and receipt of necessary permits from the PAO was required and the approaches used were subject to change based on guidance from the PAO. All Historic Resources recovery and assessment fieldwork was completed in a manner that supported the schedule as well as local and provincial economic benefits. Field teams were lead by experienced archaeologists who were approved by the PAO and capable of holding a permit to work in Labrador. Field assistants were local to the area. The excavation work occurred prior to tree clearing and ground preparation contractors.

Regulatory Compliance with the Historic Resources Act (HRA) included, within the Project footprint: completion of remaining Stage 1 and Stage 2 Assessments required to identify historic resources, and recovery of registered archaeological sites including detailed recording of historic resources in field notes, photographs, site plans and profiles, and recorded collection of artifacts and scientific samples as appropriate; and for the PAO: return of recovered artifacts cleaned and catalogued, return of detailed records, and submission of preliminary, annual and final multi-year interpretive summary reports in addition to client reporting needs. The following additional scheduling constraints, assumptions, and opportunities increased the Historic Resources Management team's effectiveness in the field: concurrent cataloguing – meant that the cataloguing team (including a supervisor) was consistently available during the Recovery Program season to respond rapidly and effectively to any requests by the client for Stage 1 / Stage 2 Assessments on an as-needed basis; clustering – where possible within specified project schedule constraints, recovery work was undertaken considering site sizes and site clustering. Work at site clusters was combined so that a single supervisor could oversee multiple sites and teams could share a single helicopter landing pad; and, training and retention – every effort was made to re-employ field staff, many of whom were from neighbouring communities, to gain the advantage of the experience they acquired in previous years' field work and through training/orientation sessions. This benefited the communities by developing and employing local people and building capacity, and the LCP by reducing a portion of costs relating to travel. Many local field assistants worked consecutive years on the project and a few have worked in the field for more than three field seasons, sometimes moving into office based work at the end of field activities.

Table 3: Historic Resources Artifacts and Finds Totals

Year	Artifacts	Finds
2013	11,205	51,763
2014	7,123	32,337
2015	17,290	125,462
2016	16,545	36,595
Total	52,072	246,157

4 ENVIRONMENTAL EFFECTS MONITORING

Starting from baseline work, expectations based on EA commitments, Environmental Effects Monitoring (EEM) was undertaken in various elements: Furbearers: Avifauna – breeding bird point count and the ashkui/Surf Scoter survey; Moose; Black Bear (later removed); Caribou; Small Mammals; Herpetiles; and, Methylmercury Eco-risk. The overarching goal of the EEM was to compare the impact of the construction activities on each element by comparing observations and samples over the course of construction with pre-construction baseline data. The data serve to assess the change in habitat, change in health and change in mortality of the element indicator species. Pre- and post-inundation impacts were or will be captured and analyzed. While all elements of the EEM are focused on the ability to detect change because of LCP activities, should one exist, each had an independent hypothesis to be tested and unique methods and study design applied to each element. With such a complex array of species grouping, a vast landscape both wide ranging migratory species and localized populations, identifying study efficiencies was a critical task. Through scheduling, seasonal visits, and the retention of local field technicians for support, many saving were realized through travel and the deployment of equipment.

Table 4: Field Team & Field vs. Project Hours Breakdowns for all Components

Field Team Breakdown				
Year	Tech Hours	Team Lead Hours	Total Field Hours	% Lead vs. Total
2013	9,668.5	4,145.5	13,823.0	30
2014	17,731.0	6,545.0	24,276.0	27
2015	9,874.0	5,845.5	15,719.5	37
2016	16,552.5	4,237.0	20,789.5	20
Total	53,826.0	20,782.0	74,608.0	28

Field vs. Project Hours Breakdown				
Year	Tech Hours	Team Lead Hours	Total Field Hours	% Field vs. Total
2013	13,823.0	10,408.2	24,231.2	57
2014	24,276.0	18,560.5	42,836.5	57
2015	15,719.5	13,764.3	29,483.8	53
2016	20,789.5	11,834.5	32,640.0	64
Total	74,608.0	32,136.0	129,175.4	58

5 SUSTAINABILITY ASPECTS

Definition: Sustainability – “meets the needs of the present without compromising the ability of future generations to meet their own needs” from Our Common Future (also called the Brundtland Report) (WCED 1987). In November 1996, in Bellagio Italy, an international group of measurement practitioners met to synthesize practical ongoing efforts to assess sustainable development on a global stage. They developed principles of assessment that embodied “choice and design of indicators, their interpretation and communication”. They set out 10 principles (the “Bellagio Principles”): Guiding Vision and Goals; Holistic Perspective; Essential Elements; Adequate Scope; Practical Focus; Openness; Effective Communication; Broad Participation; Ongoing Assessment; and Institutional Capacity (The International Institute for Sustainable Development 1997). Since then the Bellagio Principles have been used to assess a wide variety of projects around the world including, for example: urban planning; infrastructure; solid waste management; land-use; transportation; wind energy; and policy development. Recently the Institute for Sustainable Infrastructure, published its rating system, Envision®, outlining standardized metrics, called credits, to “foster a dramatic and necessary improvement in sustainability performance and resiliency of physical infrastructure” (Institute for Sustainable Infrastructure 2015). Credits are assigned to levels of achievement (Conventional, Improved, Enhanced, Superior, Conserving and Restorative) to each category of the five aspects of sustainability: Quality of Life; Leadership; Resource Allocation; Natural World and Climate and Risk. Such an assessment system was not available at the start of the Project however it may be informative at the end of the Project to consider how the credits for the Project might be assigned. Locally, a researcher postulated a sustainability indicator (SI_{HEP}) that was applied to the Muskrat Falls Hydroelectric Project that involved four primary factors: Social; Environmental; Economic: and,

Governance. SI_{HEP} was derived from a PESTLE (Political, Economic, Social, Technological, Legal, and Environmental) framework. Using SI_{HEP} LCP achieved a 0.61 score in sustainability overall (moderately sustainable) (Boksh 2015). The overarching goal of the LCP, once completed, is to provide clean, renewable energy to homes and businesses throughout Newfoundland and Labrador and beyond, and provide long-term stable electricity rates, reduced dependence on oil-generated energy, support for industrial growth, and access to North America's electricity grid for export of energy. The LCP is anticipated to provide 98% sustainable energy (Nalcor Energy 2017). Approaches exist or may be developed that will quantify sustainability on major projects such as the LCP. At the start of the Consultant's work, sustainability was conceived of as using best practices to assist the Client to manage effects that its Project had on the environment. Both the Consultant and the Client worked together to develop plans that balanced the needs of the Project construction activities with safeguarding natural, cultural, and historic resources in a manner that would not adversely impact the overall budget of the Project. The Client secured the services of an experienced Consultant that understood the complexities of the environmental regulatory regime and could provide insights to maintaining compliance, key to the success of the LCP's goal to construct a large hydroelectric facility in Labrador that would ultimately deliver sustainable energy.

5.1 Management of the Environmental Compliance Program – Consultant Assignment

The Consultant was responsible for the overall planning and design leadership for the Environmental Compliance of 3 Project programs: Avifauna Management, Historic Resources Management, and Environmental Effects Monitoring. A project management framework, closely aligned with the Project Management Body of Knowledge (PMBoK®) (Project Management Institiute Inc. 2013) was established and followed throughout.

Table 5: 10-Point Project Management Framework

Step	Task
1	Prepare a proposal that includes a preliminary Project Plan including scope, project budget, resources, deliverables, and schedule with a documented independent review.
2	Obtain written instructions to proceed and execute an approved contract, including written subconsultant agreements (if applicable).
3	Prepare a Project Plan to an appropriate level of detail, with documented independent review.
4	Establish hard copy and/or electronic project record directories and file project records.
5	Complete a Health, Safety, Security & Environment (HSSE) risk management assessment and documentation for all projects involving field work.
6	Monitor the Project Management Dashboard Indicators on a regular basis. Follow best practices for managing project financials, including time charges, work in progress (WIP), accounts receivable (AR), estimates-to-complete (ETC), and Earned Value (EV).
7	Obtain the client's written approval on scope of service changes in a timely manner.
8	Conduct and document a final quality assurance review of final documents prior to issue. Where applicable, conduct multidisciplinary coordination reviews between disciplines and sub-consultants. Keep completed and signed-off checklists, document sets, etc. in project files.
9	Conduct and document an independent review of all final deliverables prior to issue.
10	Close off the project financials and close out the project file.

As part of the Consultant's ISO 9001:2008 commitments, the work was managed within a 10-point framework (Table 5) to ensure it captured the best project management practices of Initiating, Planning, Executing, Monitoring, and Controlling, and Closing Out. Of importance for the entire project and revisited annually at the start of each year, the project management team developed comprehensive plans to govern the work. Major plans developed initially for the work were: Project Plan; Health and Safety Plan; Risk Management – Risk Register; Communication Plan; Schedule; Cost Management; and, Quality Management Plan. The Project Plan, a living document and under which all the other plans were organized, was an essential document and the foundation for all other project related documentation and deliverables. It detailed all aspects of the project from start to finish with critical milestones of achievement and deliverables to meet project schedule and deadlines. Typically, the schedule format was a Gantt chart showing interrelations between the critical activities identified and this was developed based on a work

breakdown structure developed for each of the compliance programs with input from those performing the work. Progress was reported plotted against the critical path schedule and information on the schedule was shared with all team members so mitigation efforts can be proactively identified and implemented to keep the project on target. At the start of each year, the team reviewed and updated the plans to reflect lessons learned and improvements gains the previous year (season). These plans were coordinated with the Client's overall LCP plans to ensure regulatory compliance activities in the field were synchronized with construction activities planned by other contractors throughout the footprint of the Project. Pre-established communications processes and procedures were instrumental in minimizing rework and conflicts in the field and facilitated adaptable responses to changing conditions. Work against the plans were contractually mandated at regular intervals and presented in the contractually specified monthly report. However, as the Project evolved and the Consultant continued to seek Client feedback, a much simpler reporting structure was implemented that reduced both contractual reporting duplication and overall project management effort, while continuing to provide timing appropriate levels of information.

6 LESSONS LEARNED – REGULATORY COMPLIANCE SUPPORTS SUSTAINABILITY

In general, regulation can serve to protect people and the environment, be a mechanism for eco-friendly practices, and promote sustainable practices through raising levels of awareness in issues and through evolution of policies, processes, and procedures create a foundation that can drive innovative solutions (Malmberg 2013). Using "law for sustainability" includes governance for sustainability by providing essential tools and institutions that are "designed and drafted with care to achieve particular results, and they must be evaluated carefully afterwards to see if they have actually achieved the desired results. For sustainability laws, the availability of credible and widely applicable assessment tools and institutions is especially important" (Dernbach and Mintz 2011). Components of sustainable development include governance arrangements (strategy, leadership, accountability), mechanism (performance management frameworks, delivery, monitoring and reporting), themes (operations and procurement, people, policy), and enablers (capability building and engagement) form part of the principles of good practice for sustainable development (Ullah and Shields 2011). The LCP provided many ongoing opportunities to incorporate concepts and philosophies operationally.

6.1 Essential Tools: Communication and Relationships

External – Consultant and Regulator: The Client and Consultant engaged early with regulators to draft management plans and refine observational and monitoring techniques while balancing practical field operations, budget, and schedule considerations with a duty to protect the environment and people. Communications and relationships facilitated sharing of understandings, concerns, and successes that that expanded technical and scientific knowledge of the environment. Site-specific assessment tools and techniques were adapted from similar environments and large projects, to gain greater insight on the integrity of the environment in the footprint of the LCP. Practical experience gained over four years provided valuable feedback embodying client-consultant-regulator interconnectedness in the overall protection of the environment for present and future generations. Client and Consultant were unified continuous communications focussed on problem-solving; Important was the development of a strong relationship based on honest solutions rather than trying to "get more work". Internal – Consultant's Team: Internally, the Consultant demonstrated principles of leadership and empowerment for the individual, the team, the supervisor, and the manager. Crucial to success was attaining commitment by all staff on the importance of obligations to the environment and was achieved from the outset through setting clear expectations on roles and responsibilities of each member, providing all-inclusive training in key areas (health and safety, project governance, schedule, and budget), continual feedback incorporating suggestions and ideas for improvement of processes and techniques by maintaining supportive and open communications at all levels throughout the entire staff complement, and addressing issues in a direct and timely manner to reach respectful resolutions. Leadership and accountability were as important in the field as well as in the office. The Consultant considers that investment in developing staff on projects such as this, has immediate and long-lasting benefits. Performance improvements were measurable year over year (e.g. recovering more artifacts in a given time interval, providing more monitoring coverage "just-in-time") as confidence and experience grew. These which were directly recorded in budget savings, throughput, and schedule gains.

6.2 Local Employment, Capacity, and Relationship Building

One of the Consultant's corporate priorities is to be in the communities in which it works. The local office in Happy Valley – Goose Bay was critical to delivering the project, contributing important cultural, historical, terrain, and wildlife knowledge. Specialists, from across province and the country supplemented the local office, and field assistants were almost exclusively from the local communities. Field assistants represented approximately 58% of all project time (Table 4), with local Aboriginals making up for approximately 57% of all field time (Table 1). The direct local benefits provided meaningful employment and training, resulting in individuals moving into leadership roles within the Consultant's delivery team.

6.3 Designed for Efficiencies – Work Scope, Budgets, Staffing

The scale of the LCP and breadth of the consultant's contract allowed for various efficiencies to be readily realized, the most obvious in human resources. With the large complement of local staff combined with the overlapping seasonal nature of the programs (Avifauna focused between May and July and Historic Resources between July and October), the Consultant could move individuals between programs as necessary or as various daily demands arose increasing flexibility and responsiveness to LCP needs. In addition, with the design of multiple EEM projects, seasonal efficiencies, leadership roles, and equipment were all considered when scheduling activities.

7 CONCLUSIONS

The multiyear 824 MW Hydroelectric Development Project on the Lower Churchill River in Labrador (LCP), is a complex construction project demanding environmental regulatory requirements. One Aboriginal partnership company, tasked with a Regulatory Compliance and Environmental Compliance Program, assisted the Client in meeting its commitments to regulators. The Program, which started in 2013 and scheduled for completion in early 2018, comprised 3 overlapping components: Avifauna Management; Historic Resources Mitigation; and, Environmental Effects Monitoring. Program complexities included multi-year seasonal and overlapping cyclical nature of work attuned to breeding patterns of sensitive indicator species, ability to do weather dependent work in remote locations, working ahead of the main construction activities, inclusion of local communities and service providers, training, health and safety issues, and high visibility as a major project permanently changing the landscape and surrounding communities. Program management best practices that were established from the outset and refined and enhanced over the duration of the work assisted the Client to meet regulatory requirements, provided local benefits, and added to scientific and technical knowledge.

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