iBOL DRAFT MANAGEMENT PLAN 2011-12

Background

DNA barcoding, the use of sequence diversity in standardized gene regions to identify species, is revolutionizing biodiversity science by shifting key practices, especially those linked to species identification and species discovery. It exerts this impact by ensuring the retention of voucher specimens so that taxonomic assignments can be validated, by adding geospatial information, and by preserving the trace files that underpin each sequence record. DNA barcoding is also gaining application in fields ranging from environmental monitoring to marketplace surveillance and forensics.

Vision and Mission

The full realization of DNA barcoding's impacts and its extension into more domains of science and society is the grand challenge of the International Barcode of Life Project, captured in iBOL's **vision** of *Managing Biodiversity for the Benefit of Society* and operationalized in its **mission** to *develop a rigorous DNA-based identification system for all eukaryotes, and to apply this new tool to better manage, discover and protect global biodiversity.*

Goals

The International Consortium Initiative (ICI) proposal submitted to Genome Canada in 2008 provided an overall strategic plan for iBOL. Three key goals emerge from the proposal:

A. Build a global, accessible library of DNA barcodes for eukaryotic species

The core target, to build a reliable, accessible library of 5 million barcode sequences from 500,000 taxonomically diverse and high-priority species by December 2015, has become even more compelling during the past three years, as concerns about loss of biodiversity and other global changes have grown and the tools of genomics have strengthened.

B. Promote applications of DNA barcode data for Science and Society

A critical step for iBOL is to take a strategic approach to tackling big questions with barcode data, with the aim of (a) undertaking excellent science, (b) generating good PR for barcoding, (c) engaging a broader set of scientists / enthusing existing scientists so that the barcode library itself gets built faster and more efficiently.

C. Engage and coordinate participating partners

The iBOL Project is funded and operated by globally-distributed network of partner nations ("nodes") that subscribes to iBOL's vision, mission and policies and contributes resources to its scientific goals. How the international network should function and interact in order to meet iBOL goals needs to be defined, and if necessary re-defined, as the project progresses.

Management Plan 2011-12

The purpose of the management plan that follows is to build on the experience of iBOL's first two years of operation, to respond to feedback from participants and funders, to address new challenges and opportunities, and to adjust resource allocations and activities accordingly. It has been developed in response to the recommendations of the Scientific Steering Committee Executive (SSCE), which assists and advises the Scientific Director on the overall research plans and deliverables of the iBOL Project.

Key Challenges

Challenges identified below for each of iBOL's three major goals need to be addressed by strategic actions in its five themes and associated working groups.

Goal A: Build a global, accessible library of DNA barcodes for eukaryotic species

Challenge:
Industrial-scale sample provision to match industrial-scale sequencing efforts
Industrial-scale processing of DNA barcode sequences is underway at iBOL-Canada's facility in Guelph. However, the returns from 'ad hoc', serendipitous sampling is asymptoting, and a critical limiting factor for the iBOL project will soon become the supply of large volumes of well identified high-quality material, with associated collateral data and vouchers. Attention needs to be given to further securing the sample supply chain, by identifying key sources of large numbers of well-identified samples that are amenable for sequencing and are linked to existing digitisation programmes. An example of this would be to explore brokering dealings with major taxonomic collections/ institutes, in order to barcode major swathes of their contemporary research collections.

Challenge:
Clear assessment and description of the receptivity of core facilities for samples
The *iBOL* project is dependent upon harnessing the distributed efforts of its working groups and nodes to provide samples to the sequencing facilities. This requires a clear statement of (a) the types of samples the sequencing facilities will accept, (b) their capacity to process these samples, (c) an approximation of the time from receipt of samples to delivery of sequence data, and (d) the format and content of meta-data that is pre-requisite for samples to be run. This 'receptivity statement' is needed from the major core facilities.

Challenge:
Making every barcode count
DNA barcoding is a major international endeavour, but much work on DNA barcoding only loosely conforms to the standards established by the iBOL and CBOL initiatives. One risk is that many/most non-Guelph generated DNA barcodes fail to meet barcode standards. We urgently need to drive home the importance of standardisation and data quality in the broader international community.

Challenge:
Provision of a clear and effective strategy to promote rapid data release
A major hurdle for the iBOL project is effective data release. Concerns about the preliminary nature of sample IDs, avoidance of academic piracy, and general lethargy, all contribute to a slower-than-is-desirable release of barcode data.

Challenge:
Restructuring of iBOL Themes 2, 3 and 4
The iBOL themes '2 Methodology and Technology development', and also '3 Informatics', are the most challenging themes to operationalize. The working groups within themes have been coalesced and rationalised with the aim of producing a more effective management structure. However, at present this restructuring remains a largely paper exercise. The immediate goal is to turn this paper exercise into a set of functioning working groups.

Goal B: *Promote applications of DNA barcode data for Science and Society*

Challenge:
Moving beyond identification: Addressing scientific questions with DNA barcode data
A densely populated reference database from a standardised set of gene regions forms a resource for studies of molecular evolution, ecological interactions and dynamics, understanding the distribution of inter- and intra-specific biodiversity, understanding the nature of species differences in relation to organismal attributes and their environmental/historical context, and also potentially providing insights into the speciation process itself. A critical step for iBOL is to take a strategic approach to tackling big questions with barcode data, with the aim of (a) undertaking excellent science, (b) generating good PR for barcoding, (c) engaging a broader set of scientists / enthusing existing scientists so that the barcode library itself gets built faster and more efficiently.

Goal C: *Engage and coordinate participating partners*

Challenge:
Effective organization of the distributed effort of iBOL
The iBOL project has many constituencies and many committees. There is a risk of 'freespinning-cogs', in which priorities and actions of one group, fail to influence another. A very clear statement and vision of the roles and relationships of this distributed team is required to minimise this risk.

Challenge:
Outreach to the broader community
There is a pressing need to create awareness of the iBOL Project among the scientific community in general and taxonomists in particular and, perhaps more importantly, to help iBOL nodes to harness new funds beyond their current capacities.

Challenge:
Engaging with the e-Biosphere
iBOL, together with CBOL, needs to develop its partnerships and synergies with other organizations engaged in the 'e-Biosphere' – notably the Global Biodiversity Information Facility (GBIF) and Encyclopaedia of Life (EoL).

Implementation: Organizational Requirements

iBOL's nodes, working groups and core facilities provide a flexible and accountable structure which can mobilize distributed funding from multiple organizations and ensure effective project co-ordination and delegated management. However, these constituencies have not yet been harnessed in support of the Management Plan articulated in this document. Further consultation is required with the SSC and its Executive (SSCE), with the iBOL Board of Directors and with individual funders at 'node' level, before the Management Plan can be implemented.