Great Lakes Fish and Wildlife Restoration Act
FINAL Project Report

***Project Title: Genetic Population Structure of Lake Whitefish (*Coregonus clupeaformis*) in Lake Huron**

***Project Sponsor: Tammy Newcomb, Michigan Department of Natural Resources**

***FWS Agreement Number: 30181G020**

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Study Objectives:
1) We will identify the number and location of genetic stocks of lake whitefish in Lake Huron.

2) We will compare these results to existing stock boundaries to identify areas of agreement and discordance in stock designations.

3) We will compare our results to those from an ongoing tagging study of lake whitefish in northern Lake Huron and to previous genetic analyses and try to reconcile differences. We have included in our sample sites areas that have been sampled during recent studies of Lake Michigan (VanDeHey et al. 2009) and Lake Huron; this will allow us to compare and integrate our results with other studies. The integration of various data sets will allow us to examine the consistency of results and to put the variation observed in Lake Huron into a broader geographic scale.

4) While there are several spawning grounds on the lake, sites at Alpena and the Fishing Islands are believed to be the primary sources of recruitment (Bence and Ebener 2002). To examine this, we will use collections of lake whitefish from Great Lakes Science Center assessment trawls performed in the spring and fall as a mixed sample and use assignment tests to determine the contribution of spawning grounds to the mixed sample.

Description of Tasks:
Year 1 Tasks:
Task 1 Description. Genotype existing samples of lake whitefish (approx. 600). ***Status:*** Complete.

Details: We updated the genotypes of 697 lake whitefish that we had collected previously by genotyping 9 additional loci (*CoclLav*27, *CoclLav*32, *CoclLav*4, *CoclLav*45, *CoclLav*52, *CoclLav*6, *CoclLav*68, *Cocl Lav*8 and *Str*-60)(Table 1). DNA was extracted using the DNeasy

kit manufactured (Qiagen[1]). DNA was quantified using fluorometry and a working solution with a concentration of 100 ng/ul was prepared for each sample. Six different multiplex reactions were used in polymerase chain reactions (PCR) and the amplicons from these reactions were then pooled for genotyping (Table 1). The final volume of each PCR reaction was 15 ul, including 0.20mM each dNTP, 0.08 to 0.30 uM of each primer, 1.3 to 2.0 mM $MgCl_2$, and 0.25 to 0.75 Units *Taq* polymerase. One of each primer pair was labeled with a fluorescent dye. Temperature profiles for the PCRs varied with each multiplex (Table 1). Working solutions for genotyping were made by diluting 1ul of each PCR product in 9 ul of water and further diluting 1 ul of this solution in 9 ul of formamide and a 400 bp size standard (GS 400 ROX, Applied Biosystems, Foster City CA) labeled with a fluorescent dye. This mixture was heated to 95 ºC for 4 min. and then chilled on ice for 3 min. Fragment size data were collected using the ABI 3130 Genetic Analyzer. GeneScan (Applied Biosystems, Foster City CA) software was used to collect data and the Genemapper (Applied Biosystems, Foster City CA) software package was used to calculate fragment sizes. Raw and binned genotypes and the details of all the laboratory analyses are stored in a database maintained by the genetics laboratory at the Great Lakes Science Center-US Geological Survey (GLSC-USGS).

Task 2 Description. Acquire field collections to fill in spatial gaps. ***Status:*** Complete.

Details: Additional samples from Lake Huron were added to those already in the sample archive at the GLSC-USGS. Lake whitefish from South Bay Mouth, Burnt Island, Owen Sound, Thessalon, the southern main basin of Lake Huron were collected (Figure 1). Samples from eastern Lake Superior were also collected (Table 2, Figure 1). DNA was extracted from 377 lake whitefish from the new sites and genotyping of DNA was started on the new collections.

Task 3 Description: Prepare a presentation for International Symposium on the Biology and Management of Coregonid Fishes in Winnipeg (tentatively-comparison among samples genotyped to date for Michigan, Superior, and Huron). ***Status:*** Complete.

Details: A presentation entitled '*Contributions of Lake Whitefish Stocks from Northern Lake Huron to Assessment Surveys'* by W. Stott, J. Schaeffer, E. Roseman, L. Mohr, M. Ebener, and W. Harford was given at the 10th International Symposium on the Biology Management of Coregonid Fishes in Winnipeg Canada in August 2008.

A paper entitled '*Genetic structure of lake whitefish populations in the northern main basin of Lake Huron*' by W. Stott, M. Ebener, L. Mohr, J. Schaeffer, E. Roseman, W. Harford, J. Johnson, and C.-L. Fietsch was submitted to the conference proceedings which are published in Advances in Limnology. In this paper, a genetic analysis of spawning lake whitefish from six sites in the main basin of Lake Huron was conducted to determine population structure. Samples from fishery-independent assessment surveys in the northwest main basin were analyzed to determine the relative contributions of lake whitefish genetic populations (see objective 4). Genetic population structure was identified using data from seven microsatellite DNA loci. One population was identified at Manitoulin Island, one to two were observed in the east-central main basin (Fishing Island and Douglas Point), and one to two populations were found in the

[1] Use of trade names does not signify endorsement by the US government.

northwest (Thunder Bay and Duncan Bay). The genetic identity of collections from Duncan Bay and Thunder Bay was not consistent among methods used to analyze population structure. Low genetic distances suggested that they comprised one population, but genic differences indicated that they may constitute separate populations. Simulated data indicated that the genetic origins of samples from a mixed-fishery could be accurately identified, but accuracy could be improved by incorporating additional microsatellite loci. Mixture analysis and individual assignment tests performed on mixed-stock samples collected from the western main basin suggested that genetic populations from the east-central main basin contributed less than those from the western main basin and that the proportional contribution of each baseline population was similar in each assessment sample. Analysis of additional microsatellite DNA loci may be useful to help improve the precision of the estimates, thus increasing our ability to manage and protect this valuable resource.

Year 2 Tasks

Task 1 Description: Continue genotyping lake whitefish. ***Status:*** Complete

Details: We genotyped over 800 lake whitefish at 18 microsatellite DNA loci (*Bwf*1, *Bwf*2, *Cocl*22, *Cocl*23, *C2*-157, *Sfo*8 (2 loci amplified), *Sfo*23, *CoclLav*27, *CoclLav*32, *CoclLav*4, *CoclLav*45, *CoclLav*52, *CoclLav*6, *CoclLav*68, *CoclLav*72 *CoclLav*8 and *Str*-60).

Task 2 Description: Field collections to fill in spatial gaps-if necessary ***Status:*** Complete

Details: We received samples from 9 additional sites, including sites in Georgian Bay and Lake Superior (Table 2, Figure 1). The samples from Georgian Bay were not originally included in the study plan, but we were able to acquire them from biologists with Chippewas of Nawash Unceded First Nation, thus increasing our spatial coverage for the project beyond what was originally planned. In addition we received temporal replicates for 4 sites (Duncan Bay, Epoufette Island, La Salle Island Reef, and Little Hump).

A presentation entitled *'Genetic diversity of lake whitefish in lakes Michigan and Huron; sampling, standardization, and research priorities*' by W. Stott, J.A. VanDeHey, and B.A. Sloss was given at the American Fisheries Society Annual Meeting in Pittsburgh PA in September 2010.

A paper entitled *'Genetic diversity of lake whitefish in Lakes Michigan and Huron; sampling, standardization, and research priorities'* by W. Stott, J.A. VanDeHey, and B.A. Sloss was published in a special issue of the Journal of Great Lakes Research that examined the health and status of lake whitefish populations in the Laurentian Great Lakes. The issue focused on several areas including: pathogens, movement and stock intermixing, feeding, recruitment potential, and natural mortality (Brenden et al. 2010). The paper compared the results of genetic analyses from two research laboratories to the results of recent tagging studies conducted in lakes Huron and Michigan (see objective 3). We combined data from the Great Lakes Science Center (USGS-Ann Arbor MI) and the Wisconsin Cooperative Fishery Research Unit (University of Wisconsin – Stevens Point, Stevens Point WI) to increase the spatial extent of a genetic data set for lake whitefish from lakes Huron and Michigan and saw that genetic diversity was greatest between lakes, but that there was also structuring within lakes. Adding additional collections to the calibrated set will allow further examination of diversity in other Great Lakes, answer questions

regarding movement among lakes, and estimate contributions of stocks to commercial and tribal fisheries. Low diversity among stocks may be a reflection of relatively recent colonization of the Great Lakes, but other factors such as recent population fluctuation and localized stresses such as lamprey predation or heavy exploitation may also have a homogenizing effect. Our data suggested that there is asymmetrical movement of lake whitefish between Lake Huron and Lake Michigan; more genotypes associated with Lake Michigan were observed in Lake Huron. As the picture of genetic diversity and population structure of lake whitefish in the Great Lakes region emerges, we need to develop methods to combine data types to help identify important areas for biodiversity and thus conservation. Adding genetic data to existing models will increase the precision of predictions of the impacts of new stresses and changes in existing pressures on an ecologically and commercially important species.

Task 3 Description: DNA extraction of any remaining samples. ***Status:*** Complete

Details: We extracted DNA from over 1,100 lake whitefish samples.

Year 3 Tasks
Task 1 Description: Finish genotyping lake whitefish. ***Status:*** Complete.

Details: We genotyped more than 1,500 lake whitefish using 17 microsatellite DNA primer sets to collect data at18 microsatellite DNA loci; one primer set (*Sfo*8) appeared to amplify two loci (Table 1). Close to 3,000 lake whitefish were genotyped over the course of the project.

Task 2 Description: Quality analysis and quality control (QAQC) of data set and database entries. ***Status:*** Complete.
Details: The initial dataset contained genotypes at 18 loci for 2,993 lake whitefish.
The data set was first analyzed to determine if there were any substantial errors associated with the genotyping process by rerunning a sub-set of the samples and comparing the genotypes to ensure that they were consistent. The number of samples rerun per locus varied from 89 to 248. In total, 2,946 reactions were rerun; this represents 5.7% of the total number of genotypes collected over all loci (N=51,336). A small proportion (less than 1%) of the duplicate runs resulted in different genotypes; when these samples were rerun a third time, the genotype was the same as one of the earlier runs in every case. Discrepancies can be caused by operator error when samples are amplified or electrophoresed or by errors in the binning rules used to determine the genotype. As the error rate we observed was small and not prevalent in any single locus, all loci and corrected genotypes were used in the next phase of the QAQC. We then examined the data set to determine if genotypes were missing from more than 20% of the samples in any of the collections for each of the 18 loci. Low sample sizes may result in inaccurate estimates of allele frequencies and diversity estimates. More than 20% of the samples were missing data at four loci (*CoclLav*27, *CoclLav*72, *CoclLav*8, and *Str*-60); therefore these loci were removed from the data set. The genotypes of the samples were then examined and any sample missing data for more than 2 loci was removed from the data set. Incomplete genotypes can produce errors in analyses that make use of genotypic frequencies such as Bayesian based analyses or multivariate analyses. A total of 233 samples were missing data at more than 2 loci, these were removed from the data set, leaving a total of 2,760 lake whitefish genotypes to be analyzed.

Task 3 Description: Data analysis. ***Status:*** Complete.
Details:

Methods

Hardy-Weinberg Equilibrium and Descriptive Statistics

Most lake whitefish collected for this project were collected during the spawning season on known spawning grounds (with the exception of Inner South Bay and Thunder Bay-Superior which were sampled in October and September respectively)(Goodyear et al. 1982) based on the assumption that lake whitefish home to natal spawning grounds (Ebener and Copes 1985). Therefore a collection from a spawning ground may represent a distinct gene pool and potential genetic stock (Ihssen et al. 1981). A collection of lake whitefish that represents a distinct gene pool is expected to be in Hardy-Weinburg equilibrium (HWE). Departures from HWE may occur if a distinct gene pool is incompletely sampled, if multiple gene pools are included in a sample, or if the locus is experiencing selective pressure. We used the program GENEPOP 4.0.7 (Raymond and Rousset 1995) to test for departures from HWE. The Markov chain (Guo and Thompson 1992) was run with 10,000 batches of 1,000 iterations to ensure that standard error values were minimized for the significance estimator which was calculated using Fisher's exact test. Probability values were adjusted using a sequential Bonferroni method (Rice 1989). Locus-collection combinations that had significant departures from HWE were further tested for heterozygote excess and deficiency using GENEPOP. A deficiency of heterozygotes across all loci in a collection may indicate that multiple gene pools were sampled and a deficiency at a locus across all collections may indicate an error in genotyping due to allelic drop out, the presence of null alleles, or operator error. GENEPOP 4.0.7 was also used to test for linkage disequilibrium among all loci.

Once conformation to HWE was confirmed, descriptive diversity statistics were calculated for the microsatellite DNA loci, including allele frequencies, observed and expected heterozygosity, average number of alleles per locus and allelic richness. Allelic richness was calculated using the program FSTAT 2.9.3.2 (Goudet 2002) according to the method of Petit et al. (1998).

Temporal stability of allele frequencies must also be considered as it may affect population structure. Recent work on lake whitefish in northern Lake Michigan has demonstrated temporal stability among collections from two different years at two sites (VandeHey et al. 2009). In this study we analyzed temporal replicates at four sites (two from Lake Michigan-Little Hump and Epoufette Island and two from Lake Huron-Duncan Bay and La Salle Island, Table 2).

Genetic Stock Identification

A series of tests were used to determine if the collections of lake whitefish represented a single genetic unit or represented more than one stocks and/or groups of stocks. Allele frequency distributions were first compared among the temporal replicates to determine whether or not allele frequencies were stable over the two years. Collections with exhibiting no significant difference between years were combined for subsequent analyses. Genic differentiation among the collections was tested using GENPOP 4.0.7, using 10,000 dememorization steps and 200 batches of 5,000 iterations per batch (Raymond and Rousset 1995). A second statistic, Weir and Cockerham's (1984) θ was calculated. An analog of Fst (Wright 1931), θ (hereafter called Fst(θ)) can be used to test for the degree of variance among collections. Fst(θ) was calculated

and the values were tested for deviation from zero using 1,000 permutations of the data set using the program ARLEQUIN 3.1 (Excoffier et al. 2005). A third approach using a genetic distance measure was also employed; chord distances (Dc; Cavalli-Sforza and Edwards 1967) were calculated using the program POPULATIONS 1.2.3 (Langella 2002) and a neighbor-joining (NJ) tree (Saitou and Nei 1987) was plotted with bootstrap support calculated over 1000 pseudo-replicates and visualized using TREEVIEW (Page 1996). Potential stocks and groups of stocks were tested using an analysis of molecular variance (AMOVA; Excoffier et al. 1992) in ARLEQUIN 3.1. Well supported groupings that may correspond to genetic stocks or groups of stocks will be characterized by a low within group variance and a high among group variance.

We used a regression analysis to determine if distance among sites might play a role in the observed population structure (*i.e.* an isolation-by-distance model). The distance among all pairs of collection sites was compared to the values of Fst(θ). Over water distances were calculated in ArcMap 9.2 (Environmental Systems Research Institute, Redlands CA) using the shortest over water distance between each pair of collection sites. The regression was performed using the Microsoft Excel Add-on XLSTAT 2010.3.09 (Addinsoft, New York NY) and the significance of the test was determined using a Mantel test (Mantel 1967).

Results

Hardy-Weinberg Equilibrium and Descriptive Statistics

Allele frequencies among the temporal replicates were not significantly different; therefore they were combined, resulting in a total of 37 collections that were used for the rest of the analyses. Before the Bonferroni adjustment was applied, 89 of 574 (15.5%) exact tests deviated from HWE (initial α=0.05) and after the adjustment 15 (2.6%) of the tests still indicated a deviation (adjusted α=0.0001). The 15 tests were all consistent with heterozygote deficiency; no collection was significantly out of HWE at more than 2 loci indicating that the excess was likely not due to sampling of partial or multiple gene pools. Three loci had significant departures from HWE at more than one collection site (*Bwf*1-7 sites, *CoclLav*6-4 sites, and *Sfo*23-3 sites). Most of the sites with significant departures at the locus *Bwf*1 had significantly more missing data than the other loci, which may account for the discrepancy. Given the low number of significant tests we made no further adjustment to the data and considered all collections to be in HWE. A total of 91 tests were made to determine if the loci displayed linkage disequilibrium, 9 tests (9.9%) suggested dependent segregation before the Bonferroni correction was applied and none of the tests were significant after the correction (adjusted α=0.0005).

The sample sizes of the 37 collections (after combination of the temporal replicates) ranged from 29 to 229 (average sample size was 74). The average observed heterozygosity over the loci ranged from moderate to high values. The lowest value (0.571) was observed in the Colpoys Bay collection and the highest value (0.655) was observed in the Beavertail Point and Stevenson Bay collections (Table 3). The mean value over the Lake Huron samples was 0.615 (95% CI=0.607 to 0.623). The average number of alleles per locus ranged from 6.4 (Sagamok) to 11.1 (Duncan Bay) and the mean number was 8.3. When the number of alleles per locus was standardized for sample size (allelic richness), the range of values was 5.1 (Sagamok) to 6.1 (Carroll Wood Bay) and the mean number was 5.7 (Table 3).

Genetic Stock Identification

The tests of genic differentiation showed that allele frequency differences did exist among some of the collections. Significant differences in allele frequency distribution were observed among 85% of the tests (566 of 666 tests, adjusted α=0.00008; Table 4). Fst(θ) estimates were not significantly different from zero for the same comparisons that did not display significant allele frequency differences. Values of Fst(θ) ranged from -0.005 to 0.057 (Table 4). The average values within a single lake ranged from 0.001 to 0.019 and was lowest within Lake Michigan (0.001) and highest within Lake Huron (0.019). Much of the variability occurred within Georgian Bay. When average values of Fst(θ) among Georgian Bay, the other two lakes and the main basin of Lake Huron were calculated, the estimates between Georgian Bay and the other collections were generally larger than the comparisons among basins (Table 5). Genetic distance measures ranged from 0.106 to 0.262 with the smallest differences occurring between La Salle Island and Duncan Bay and the largest between Sagamok and Fishing Island. Nodes on the NJ tree with the strongest support corresponded to samples from eastern Lake Superior, Big Bay de Noc (Lake Michigan) Georgian Bay (Lake Huron), and north western Lake Huron (Figure 2).

A series of AMOVAs were performed using groups based on geographic boundaries, management units, results of the genic differentiation tests, NJ tree groups, and a combination of the genetic analyses. The majority of genetic variance was observed within collections in all tests. The grouping based on the genic differentiation tests had the lowest within group variance and the largest between group variance (Table 6), however only the test using groups based on the three lakes had a value of among group variance that was significantly different from zero, suggesting that there may be several levels of population structuring and the differentiation among the lakes masking variation within a single lake. Therefore, data from the collections from lakes Superior and Michigan were removed and the AMOVA analysis was repeated using groups based on management units, geographic divisions within Lake Huron, results of the genic differentiation tests, NJ tree groups, and a combination of the genetic analyses. Again, most of the variation was observed within populations (97.22% to 97.54%) and the comparison using a consensus data set based on both the NJ tree and genetic differentiation had the lowest within group variation (0.00%, p=0.482, Table 6). This test was performed using 19 genetic population units in Lake Huron; Inner South Bay, South Bay Mouth, Sagamok, Blind River, Thessalon, northern Georgian Bay (Britt, Killarney East), southwestern Georgian Bay (Cape Croker South, Colpoys Bay), southeastern Georgian Bay (Georgian Bay, Owen Sound, Meaford), Cape Croker West, Saginaw Bay, Fishing Island, Douglas Point, Tobermory, Thunder Bay (Lake Huron), Southern Main Basin, Cape Hurd, northwestern Lake Huron (La Salle Island Reef, Boot Island, Stevenson Bay, Beavertail Point) southern Manitoulin (Carroll Wood Bay, Burnt Island), and Duncan Bay/Hammond Bay Harbor (see objective 1). Population units identified in Lake Superior and Lake Michigan were Thunder Bay (Lake Superior), southeastern Lake Superior (Tahquamenon Island, Iroquois Island, Birch Point), Bay de Noc (Big Hump/Bay de Noc south, Little Hump), and northern Lake Michigan (Naubinway, Biddle Point, Epoufette Island). These sites were mapped against the existing management units to identify areas of similarity and differences (Figure 3, see objective 2).

The results of the regression analysis indicated that genetic diversity in lake whitefish from the upper Great Lakes followed an isolation-by-distance model. The regression analysis and Mantel test were significant (p<0.0001, r=0.186, R^2=0.035).

Four of the genetic population units we identified in northern lakes Michigan and Huron represent major spawning stocks and productive fishing grounds (Ebener et al. 2008). The Big Bay de Noc (represented by Big Hump/Bay de Noc south and Little Hump), Naubinway (represented by Naubinway, Biddle Point, and Epoufette Island), Detour (represented by Stevenson Bay, Beavertail Point, Boot Island, and La Salle Island), and Cheboygan (represented by Duncan Bay and Hammond Bay Harbor) stocks were examined in a mark-recapture study of lake whitefish in northern lakes Michigan and Huron (Ebener et al. 2010). A portion of the lake whitefish sampled for the tagging study was also sampled for the current genetic analysis. The four stocks described above varied in how far fish moved, when the movement occurred during the year, and there were annual differences in the extent of migration (Ebener et al. 2010). For example, lake whitefish tagged in the Big Bay de Noc moved to southern Lake Michigan and into Lake Huron, while the others were more often recaptured close to their tagging site. The stocks used by Ebener et al. (2010) as experimental units were supported by their results and regression analysis of the data suggested that stock effects were the most important factor in explaining differences in movement (Ebener et al. 2010). The stock units used in the Ebener et al. (2010) study are similar to those observed in the current genetic analysis (see objective 3). One of the stocks, Detour, spans two management units (WFH-01 and WFH-04, Figure 3). Three other genetic populations observed in this study spanned more than one management unit; the southeastern Georgian Bay population spans management units 5-8 and 5-7, the southwestern Georgian Bay population spans management units 5-6 and 5-8, and the southeastern Lake Superior population spans management units WFS-07 and WFS-08. Four of the existing management units in Lake Huron appear to have more than one genetic population in them; Blind River, Thessalon, and Sagamok were identified as separate populations in management unit 6-1, Inner South Bay was identified as distinct from South Bay Mouth in management unit 4-3, Fishing Island and Douglas Point, Cape Croker West was identified as distinct from Cape Croker south in 5-6 (Figure 3, see objective 2).

Task 4 Description: Prepare presentation and possibly manuscript for AFS meeting. ***Status:*** Complete

Details: A presentation entitled *'Visualizing Genetic Diversity Across an Aquatic Ecosystem: A Case Study Using Lake Whitefish from Lake Huron'* by W. Stott, D. Bennion, M. Ebener, and L. Mohr will be given at the American Fisheries Society Annual Meeting in Seattle WA in September 2011. No manuscript will be submitted to the symposium proceedings as tentatively planned.

Task 5 Description: Preparation of final reports and manuscripts. ***Status:*** Ongoing.
Details: In additional to the final report we have one manuscript published in a special issue of the Journal of Great Lakes Research that examined the health and status of lake whitefish populations in the Laurentian Great Lakes (publication #2 below). The manuscript based on our presentation at the 2008 International Symposium on the Biology Management of Coregonid Fishes has been accepted and should be published by the end of 2011 (publication #1 below). Up to three other manuscripts are planned, one based on the presentation given at the 2011 International Symposium on the Biology Management of Coregonid Fishes (publication #3 below), a second will describe the genetic stock identification analysis in Lake Huron

(publication #4 below), and the final manuscript will describe temporal changes in northern Lake Huron (publication #5 below). Publications 3 and 5 were not part of the original project, but as they make use of sub-sets of the data collected during the course of this project they have been included here.

Major findings and accomplishments:
We analyzed lake whitefish from 37 different sites in lakes Huron, Michigan, and Superior. The collection sites on Lake Huron represented the majority of the current management units including sites in Georgian Bay and the North Channel that were not included in the original study plan.

Using an analysis of microsatellite DNA loci (Appendix 1), we identified 19 potential genetic population units in Lake Huron (Figure 3). Putative genetic population units are represented by the following collections or groups of collections: Inner South Bay, South Bay Mouth, Sagamok, Blind River, Thessalon, northern Georgian Bay (Britt, Killarney East), southwestern Georgian Bay (Cape Croker South, Colpoys Bay), southeastern Georgian Bay (Georgian Bay, Owen Sound, Meaford), Cape Croker West, Saginaw Bay, Fishing Island, Douglas Point, Tobermory, Thunder Bay (Lake Huron), Southern Main Basin, Cape Hurd, northwestern Lake Huron (La Salle Island Reef, Boot Island, Stevenson Bay, Beavertail Point) southern Manitoulin (Carroll Wood Bay, Burnt Island), and Duncan Bay/Hammond Bay Harbor. Population units identified in Lake Superior and Lake Michigan were Thunder Bay (Lake Superior), southeastern Lake Superior (Tahquamenon Island, Iroquois Island, Birch Point), Bay de Noc (Big Hump/Bay de Noc south, Little Hump), and northern Lake Michigan (Naubinway, Biddle Point, Epoufette Island). While genetic differences were identified among all three lakes the largest amount of genetic divergence was associated with sites in Georgian Bay.

Genetic populations identified in this study were generally consistent with existing management units. The Duncan Bay/Hammond Bay Harbor grouping spans two management units (WFH-01 and WFH-04, Figure 3), the southeastern Georgian Bay population spans management units 5-8 and 5-7, the southwestern Georgian Bay population spans management units 5-6 and 5-8, and the southeastern Lake Superior population spans management units WFS-07 and WFS-08. Four of the existing management units in Lake Huron appear to have more than one genetic population in them; Blind River, Thessalon, and Sagamok were identified as separate populations in management unit 6-1, Inner South Bay was identified as distinct from South Bay Mouth in management unit 4-3, Fishing Island and Douglas Point, Cape Croker West was identified as distinct from Cape Croker south in 5-6.

Management implications of your work:
Genetic populations identified in this study were generally consistent with existing management units, but if any reconsideration of the current management units is planned, genetic data could be included and further examination of the few areas of discordance could be conducted.

Additional restoration work needed and/or areas for future research:
1) The current data set could be combined with additional fisheries data (e.g. tagging data, abundance data, growth data) to help managers better understand the characteristics of lake whitefish stocks in the existing management framework.

2) Adding a temporal component to the analysis of microsatellite DNA variation may help improve our understanding of the impacts of harvest, habitat alteration, and other stresses such as the decline of *Diporeia* on the genetic diversity of lake whitefish in the Great Lakes. Archival scale collections maintained by State, Provincial, and Federal agencies may provide genetic material for the analysis.
3) In order to create a comprehensive data set of genetic diversity of lake whitefish on the Great Lakes, additional sites in lakes Superior and Erie should be sampled. A calibration exercise could be performed using an existing data set for Lake Ontario (Bernard et al. 2009) similar to the one performed as part of this study (Stott et al. 2010).

List of presentations delivered and outreach activities:

1) Stott, W., Schaeffer, J., Roseman, E., Mohr, L., Ebener, M. and Harford W. 2008. Contributions of lake whitefish stocks from northern Lake Huron to assessment surveys. 10th International Symposium on the Biology Management of Coregonid Fishes, Winnipeg Canada August 2008.
2) Stott, W., VanDeHey, J.A., and Sloss, B.A. 2010. Genetic diversity of lake whitefish in lakes Michigan and Huron; sampling, standardization, and research priorities. American Fisheries Society Annual Meeting Pittsburgh PA September 2010.
3) Stott, W. Bennion, D., Ebener, M., Mohr, L. 2011. Visualizing genetic diversity across an aquatic ecosystem: a case study using lake whitefish from Lake Huron. American Fisheries Society Annual Meeting Seattle WA September 2011.
4) Stott, W., Ebener, M., Lloyd, M., Roseman, E., and Hartman, T. 2011 Spatial and temporal genetic diversity of lake whitefish from northern Lake Huron and western Lake Erie. 11th International Symposium on the Biology Management of Coregonid Fishes, Salzburg Austria September 2011.

***Include relevant pictures or images associated with the project:**

See Figures 2 and 3.

Geographic region project occurred in or effects:

Thirty-seven sites from lakes Huron (28 sites), Michigan (5 sites), and Superior (4 sites) were sampled during the course of the project (Table 2, Figure 1).

***List of reports and peer-reviewed papers completed or in-progress:**

1. Stott, W., VanDeHey, J.A., and Sloss, B.L. 2010. Genetic diversity of lake whitefish in Lakes Michigan and Huron; sampling, standardization, and research priorities. Journal of Great Lakes Research. 36(Supl. 1):59-65.
2. Stott, W., Ebener, M.P., Mohr, L., Schaeffer, J., Roseman, E.F., Harford, W.J., Johnson, J.E., and Fietsch, C.-L. Accepted. Genetic structure of lake whitefish populations in the northern main basin of Lake Huron. Advances in Limnology.
3. Stott, W., Ebener, M., Lloyd, M., Roseman, E., and Hartman, T. Submitted. Spatial and temporal genetic diversity of lake whitefish from northern Lake Huron and western Lake Erie. Advances in Limnology.
4. Stott, W., Ebener, M.P., Mohr, L., Johnson, J.E., Crawford, S. In Preparation. Genetic Population Structure of Lake Whitefish (*Coregonus clupeaformis*) in Lake Huron. Canadian Journal of Fisheries and Aquatic Sciences.

5. Stott, W., Casselman, J.M., Ebener, M.P., Mohr, L. In Preparation. Spatial and temporal genetic diversity of lake whitefish (*Coregonus clupeaformis*) in northern Lake Huron. Transactions of the American Fisheries Society.

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Bence, J.R. and Ebener, M.P. 2002. Summary and status of lake trout and lake whitefish populations in the 1836 treaty-ceded waters of Lakes Superior, Huron, and Michigan in 2000, with recommended yield and effort levels for 2001. Report to the Technical Fisheries Committee, 1836 treaty-ceded waters of Lakes Superior, Huron, and Michigan

Bernard, A.M., Ferguson, M.M., Noakes, D.L.G., Morrison, B.J., and Wilson, C.C. 2009. How different is different? Defining management and conservation units for a problematic exploited species. Canadian Journal of Aquatic Sciences, 66:1617-1630.

Bernatchez, L., Vuorinen, J.A., Bodaly, R.A., and Dodson, J.J. 1996. Genetic evidence for reproduction isolation and multiple origins of sympatric trophic ecotypes of whitefish (*Coregonus*). Evolution. 50:624-635.

Brenden, T.O., Ebener, M. P., and Sutton, T.M. 2010. Assessing the health of lake whitefish populations in the Laurentian Great Lakes: Foreword. Journal of Great Lakes Research. 36(Supl. 1):1-5.

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Table 1. Loci used in analysis of lake whitefish from lakes Superior, Michigan, and Huron, their PCR conditions, fluorescent labels, observed allele size range in base pairs, and number of alleles observed.

Locus	Multiplex/ PCR Cycle	$MgCl_2$ (mM)	Concentration of Each Primer (uM)	Label	Allele Size Range	Total Number of Alleles	Reference
*Bwf*1	1a	1.25	0.10	56FAM	196-268	18	Patton et al. 1997
*Bwf*2	2b	1.5	0.15	56FAM	139-167	15	Patton et al. 1997
C2-157	1a	1.25	0.15	5HEX	130-184	27	Turgeon et al. 1999
*Cocl*22	3c	1.5	0.25	56FAM	95-147	19	Bernatchez 1996
*Cocl*23	2b	1.5	0.30	56FAM	247-289	21	Bernatchez 1996
*CoclLav*27	12b	1.3	0.20	5HEX	176-192	5	Rogers et al. 2004
*CoclLav*32	5d	1.5	0.10	56FAM	245-273	7	Rogers et al. 2004
*CoclLav*4	6d	2	0.20	5HEX	139-159	10	Rogers et al. 2004
*CoclLav*45	7e	1.25	0.08	56FAM	236-260	12	Rogers et al. 2004
*CoclLav*52	7e	1.25	0.10	5HEX	94-156	31	Rogers et al. 2004
*CoclLav*6	8d	1.4	0.10	5HEX	123-159	13	Rogers et al. 2004
*CoclLav*68	6d	2	0.10	NED	167-181	8	Rogers et al. 2004
*CoclLav*72	8d	1.4	0.10	NED	142-182	11	Rogers et al. 2004
*CoclLav*8	13f	1.5	0.20	5HEX	207-251	20	Rogers et al. 2004
*Sfo*23	10f	2	0.25	56FAM	147-201	27	Angers et al. 1995
*Sfo*8*	11f	2	0.25	NED	163-193	14	Angers et al. 1995
					205-259	14	
Str-60	5d	1.5	0.10	56FAM	104-140	7	Estoup et a. 1993

*More than one locus amplified with the primer set

a 95°C for 3 min; 15 cycles of 94°C for 1 min, 60°C for 45 s, 72°C for 10 s, then 20 cycles of 94°C for 30 s, 60°C for 30 s, 72° for 10 s, then a final elongation at 72°C for 5 min.

b 95°C for 3 min; 15 cycles of 94°C for 1 min, 55°C for 45 s, 72°C for 10 s, then 20 cycles of 94°C for 30 s, 55°C for 30 s, 72° for 10 s, then a final elongation at 72°C for 5 min.

c 95°C for 3 min; 15 cycles of 94°C for 1 min, 52°C for 45 s, 72°C for 10 s, then 20 cycles of 94°C for 30 s, 52°C for 30 s, 72° for 10 s, then a final elongation at 72°C for 5 min.

d 95°C for 3 min; 35 cycles of 95°C for 1 min, 60°C for 30 s, 72°C for 1 min, then a final elongation at 72°C for 5 min.

e 95°C for 3 min; 35 cycles of 95°C for 1 min, 62°C for 30 s, 72°C for 1 min, then a final elongation at 72°C for 5 min.

f 94°C for 2 min; 35 cycles of 94°C for 45 s, 56°C for 45 s, 72°C for 1.5 min, then a final elongation at 72°C for 5 min.

Table 2. Geographic coordinates and collection site names for sources of lake whitefish collected for stock assessment. Coordinates are in decimal degrees and were calculated using GCS_WGS_1984.

Collection Site	Waterbody	Map Code	Short Code	Longitude	Latitude
Beavertail Point	Lake Huron	1	BTP	-84.167	45.967
Blind River	Lake Huron	2	BLR	-82.994	46.161
Boot Island	Lake Huron	3	BIS	-84.276	45.960
Britt	Lake Huron	4	BRI	-80.719	45.794
Burnt Island	Lake Huron	5	BUI	-82.966	45.816
Cape Croker South	Lake Huron	6	CCS	-80.992	44.900
Cape Croker West	Lake Huron	7	CCW	-81.068	44.929
Cape Hurd	Lake Huron	8	CAH	-81.759	45.224
Carroll Wood Bay	Lake Huron	9	CWB	-82.837	45.797
Colpoys Bay	Lake Huron	10	COB	-81.076	44.797
Douglas Point	Lake Huron	11	DOP	-81.622	44.386
Fishing Island	Lake Huron	12	FIS	-81.345	44.800
Thessalon Grid 0211	Lake Huron	13	THE	-83.554	46.229
Owen Sound Grid 2040	Lake Huron	14	OWS	-80.832	44.748
Georgian Bay Grid 2050	Lake Huron	15	GBG	-80.221	44.766
Southern Main Basin Grid 3724	Lake Huron	16	SMB	-82.303	43.298
Hammond Bay Harbor	Lake Huron	17	HBH	-84.167	45.600
Inner South Bay	Lake Huron	18	ISB	-81.785	45.683
Killarney East	Lake Huron	19	KIE	-80.988	45.917
La Salle Island Reef	Lake Huron	20	LSI	-84.326	45.960
Meaford	Lake Huron	21	MEA	-80.404	44.606
Sagamok	Lake Huron	22	SAG	-82.125	46.100
Saginaw Bay	Lake Huron	23	SAB	-83.371	43.941
South Bay Mouth	Lake Huron	24	SBM	-82.023	45.543
Stevenson Bay	Lake Huron	25	STB	-84.123	45.974
Thunder Bay	Lake Huron	26	TBH	-83.317	45.004
Tobermory	Lake Huron	27	TOB	-81.668	45.322
Biddle Point	Lake Michigan	28	BID	-85.379	46.067
Big Hump/Bay de Noc Shoal South	Lake Michigan	29	BHB	-86.700	45.750
Duncan Bay	Lake Huron	30	DUB	-84.435	45.660
Epoufette Island	Lake Michigan	31	EPI	-85.202	46.040
Little Hump	Lake Michigan	32	LIH	-86.750	45.833
Naubinway Shoal	Lake Michigan	33	NAU	-85.433	46.050
Birch Point	Lake Superior	34	BIP	-84.520	46.441
Iroquois Island	Lake Superior	35	IRI	-84.675	46.500
Tahquamenon Island	Lake Superior	36	TEI	-84.946	46.533
Thunder Bay	Lake Superior	37	TBS	-88.981	48.421

Table 3. Summary of diversity statistics for lake whitefish collections from the upper Great Lakes, including sample size (n), expected heterozygosity (He), observed heterozygosity (Ho), mean number of alleles observed per locus (A), and allelic richness (Ar). Collection site abbreviations are in Table 2.

Collection Site	n	He	Ho	A	Ar
BTP	51	0.652	0.655	7.93	5.74
BID	31	0.630	0.593	7.36	5.76
BHBN	38	0.648	0.618	7.00	5.61
BIP	60	0.657	0.648	8.29	5.81
BLR	69	0.663	0.635	8.86	6.04
BIS	108	0.648	0.630	9.43	5.76
BRI	69	0.644	0.620	8.07	5.65
BUI	59	0.652	0.630	8.50	5.74
CCS	75	0.614	0.593	8.93	5.64
CCW	80	0.610	0.607	7.64	5.29
CAH	79	0.631	0.603	8.43	5.70
CWB	34	0.671	0.634	7.93	6.13
COB	72	0.613	0.571	7.86	5.48
DOP	58	0.656	0.592	8.00	5.80
DUB	229	0.633	0.629	11.07	5.77
EPI	175	0.640	0.627	10.29	5.77
FIS	172	0.621	0.608	10.29	5.83
THE	29	0.640	0.652	6.57	5.36
OWS	50	0.618	0.611	7.29	5.45
GBG	32	0.618	0.591	6.71	5.54
SMB	48	0.647	0.610	7.43	5.63
HBH	60	0.638	0.629	8.57	5.88
ISB	80	0.619	0.611	7.86	5.41
IRI	50	0.645	0.624	8.21	5.77
KIE	78	0.632	0.614	8.21	5.51
LSI	104	0.638	0.633	9.64	5.76
LIH	71	0.622	0.618	8.07	5.51
MEA	76	0.590	0.573	7.07	5.22
NAU	45	0.643	0.629	7.93	5.83
SAG	55	0.629	0.608	6.36	5.12
SAB	92	0.643	0.615	8.79	5.83
SBM	63	0.644	0.584	8.64	5.77
STB	58	0.636	0.655	8.43	5.72
TEI	48	0.656	0.631	8.50	5.90
TBH	140	0.636	0.608	10.57	5.86

TBS	43	0.631	0.607	8.14	6.07
TOB	79	0.635	0.614	9.07	5.65

Table 4. Pairwise Fst(θ) values (above diagonal) and probability values from Fisher's exact test of genic differentiation. Significant values are in bold above the diagonal and in italics below the diagonal. Abbreviations for collection sites are defined in Table 2.

	LSI	BIS	BTP	STB	DUB	HBH	TBH	THE	BLR	BUI	CWB	SBM	ISB	SAG	CAH	TOB	KIE	BRI	CCW	CCS
LSI	-	0.001	0.000	0.004	0.002	0.001	**0.008**	0.011	**0.017**	**0.026**	0.003	**0.013**	**0.015**	**0.027**	**0.005**	**0.005**	**0.013**	**0.010**	**0.022**	**0.006**
BIS	0.405	-	0.001	0.003	0.001	0.001	**0.011**	0.011	**0.014**	**0.026**	0.004	**0.012**	**0.014**	**0.026**	**0.007**	**0.005**	**0.012**	**0.012**	**0.025**	**0.008**
BTP	0.680	0.358	-	0.010	0.004	0.003	**0.011**	0.011	0.011	**0.030**	0.002	**0.019**	**0.019**	**0.032**	**0.007**	0.005	**0.012**	0.007	**0.032**	**0.011**
STB	0.039	0.134	0.013	-	0.007	0.006	**0.011**	0.015	**0.016**	**0.022**	0.003	**0.011**	**0.013**	**0.026**	**0.010**	0.006	**0.016**	**0.018**	**0.019**	0.003
DUB	0.008	0.006	0.003	*0.000*	-	0.000	**0.010**	**0.013**	**0.019**	**0.026**	0.006	**0.011**	**0.012**	**0.032**	**0.007**	**0.008**	**0.015**	**0.014**	**0.027**	**0.009**
HBH	0.120	0.026	0.060	*0.001*	0.083	-	**0.006**	0.012	**0.019**	**0.026**	0.005	**0.008**	**0.010**	**0.032**	0.003	0.003	**0.013**	**0.010**	**0.021**	**0.007**
TBH	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	-	0.016	**0.024**	**0.025**	0.010	**0.015**	**0.019**	**0.042**	**0.005**	**0.007**	**0.019**	**0.017**	**0.027**	**0.010**
THE	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	-	0.012	**0.022**	0.006	**0.013**	**0.021**	**0.049**	**0.016**	0.007	0.010	0.007	**0.037**	0.011
BLR	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	-	**0.021**	0.015	**0.017**	**0.023**	**0.030**	**0.019**	**0.012**	**0.010**	**0.013**	**0.040**	**0.018**
BUI	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	-	0.011	0.003	**0.034**	**0.052**	**0.023**	**0.020**	**0.033**	**0.027**	**0.044**	**0.026**
CWB	*0.001*	*0.000*	0.010	0.017	*0.000*	*0.000*	*0.000*	0.131	*0.000*	*0.000*	-	0.008	**0.019**	**0.030**	0.009	0.003	0.016	0.010	**0.025**	0.005
SBM	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	0.336	*0.000*	-	**0.015**	**0.041**	**0.009**	**0.008**	**0.021**	**0.018**	**0.026**	**0.010**
ISB	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	-	**0.036**	**0.014**	**0.013**	**0.017**	**0.020**	**0.024**	**0.016**
SAG	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	-	**0.042**	**0.032**	**0.034**	**0.036**	**0.041**	**0.032**
CAH	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	0.001	*0.000*	*0.000*	*0.000*	-	0.002	**0.012**	**0.013**	**0.022**	**0.011**
TOB	*0.000*	*0.000*	*0.000*	0.001	*0.000*	*0.000*	*0.000*	0.008	*0.000*	*0.000*	0.003	*0.000*	*0.000*	*0.000*	0.174	-	**0.006**	**0.005**	**0.019**	0.004
KIE	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	-	0.003	**0.034**	**0.019**
BRI	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	-	**0.034**	**0.015**
CCW	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	-	**0.017**
CCS	*0.000*	*0.000*	*0.000*	0.001	*0.000*	*0.000*	*0.000*	0.003	*0.000*	*0.000*	0.003	*0.000*	*0.000*	*0.000*	*0.000*	0.002	*0.000*	*0.000*	*0.000*	-
COB	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	0.047
OWS	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*
MEA	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*
GBG	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	0.013	*0.000*	*0.000*	*0.000*	*0.000*	0.006	*0.000*	*0.000*	*0.000*	0.105
FIS	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*
DOP	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	0.001	*0.000*	0.001	*0.000*	*0.000*	0.003	*0.000*	*0.000*	*0.000*	*0.000*	0.011	*0.000*	*0.000*	*0.000*	*0.000*
SAB	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*
SMB	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	0.001	*0.000*	*0.000*	0.053	*0.000*	*0.000*	*0.000*	*0.000*	0.001	*0.000*	*0.000*	*0.000*	*0.000*
BHB	0.229	0.003	0.012	0.001	0.014	0.030	*0.000*	0.011	*0.000*	*0.000*	0.055	*0.000*	*0.000*	*0.000*	*0.000*	0.002	*0.000*	*0.000*	*0.000*	*0.000*
LIH	0.059	*0.000*	0.017	0.002	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*
BID	*0.000*	*0.000*	*0.000*	*0.000*	0.001	0.009	*0.000*	*0.000*	*0.000*	*0.000*	0.015	0.058	*0.000*	*0.000*	*0.000*	0.014	*0.000*	*0.000*	*0.000*	0.006
NAU	0.007	*0.000*	*0.000*	*0.001*	0.036	0.946	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*
EPI	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	0.023	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*
BIP	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*
IRI	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*
TEI	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*
TBS	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	0.009	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*

Table 4. cont'd

	COB	OWS	MEA	GBG	FIS	DOP	SAB	SMB	BHB	LIH	BID	NAU	EPI	BIP	IRI	TEI	TBS
LSI	**0.010**	**0.020**	**0.026**	0.017	**0.019**	0.010	**0.021**	**0.010**	0.001	0.001	0.003	0.002	**0.004**	**0.009**	**0.011**	**0.019**	**0.007**
BIS	**0.014**	**0.025**	**0.028**	**0.021**	**0.023**	0.009	**0.024**	**0.012**	0.005	**0.005**	0.006	0.004	**0.005**	**0.013**	**0.013**	**0.020**	**0.012**
BTP	**0.016**	**0.028**	**0.032**	0.030	**0.021**	**0.009**	**0.023**	**0.008**	0.001	0.004	0.009	0.006	**0.007**	**0.007**	**0.010**	**0.014**	**0.016**
STB	**0.008**	**0.019**	**0.022**	0.012	**0.027**	0.008	**0.024**	**0.017**	0.008	0.006	**0.010**	0.006	**0.010**	**0.018**	**0.017**	**0.027**	**0.013**
DUB	**0.015**	**0.026**	**0.029**	0.022	**0.024**	**0.014**	**0.028**	**0.013**	0.003	**0.004**	0.004	0.001	**0.003**	**0.018**	**0.018**	**0.027**	**0.011**
HBH	**0.011**	**0.025**	**0.026**	0.018	**0.017**	0.006	**0.020**	**0.011**	0.001	0.003	0.002	-0.005	0.001	**0.015**	**0.018**	**0.026**	**0.011**
TBH	**0.012**	**0.023**	**0.025**	0.020	**0.010**	**0.009**	**0.010**	**0.014**	0.010	**0.009**	**0.010**	**0.007**	**0.011**	**0.019**	**0.023**	**0.033**	**0.016**
THE	**0.022**	**0.030**	**0.038**	0.024	**0.031**	0.008	**0.023**	0.012	0.005	0.009	0.014	0.011	**0.010**	0.008	**0.010**	**0.017**	**0.022**
BLR	**0.026**	**0.040**	**0.043**	0.033	**0.035**	**0.016**	**0.036**	**0.019**	0.017	**0.020**	0.021	0.017	**0.023**	**0.014**	**0.012**	**0.018**	**0.026**
BUI	**0.032**	**0.023**	**0.039**	**0.032**	**0.040**	**0.021**	**0.032**	0.013	**0.020**	**0.027**	0.017	**0.023**	**0.028**	**0.030**	**0.030**	**0.038**	**0.026**
CWB	0.009	0.010	0.017	0.008	**0.020**	0.006	0.018	0.004	0.000	0.006	0.007	0.008	0.008	0.013	0.013	0.020	0.009
SBM	**0.016**	**0.016**	**0.024**	0.015	**0.029**	**0.009**	**0.025**	0.010	0.008	**0.013**	0.002	0.006	**0.012**	**0.021**	**0.022**	**0.030**	0.013
ISB	**0.019**	**0.034**	**0.032**	**0.019**	**0.028**	**0.017**	**0.031**	**0.022**	0.013	**0.018**	**0.012**	**0.007**	**0.014**	**0.033**	**0.031**	**0.043**	**0.019**
SAG	**0.034**	**0.054**	**0.058**	**0.038**	**0.057**	**0.040**	**0.059**	**0.040**	**0.042**	**0.042**	**0.041**	**0.034**	**0.041**	**0.035**	**0.042**	**0.045**	**0.045**
CAH	**0.010**	**0.020**	**0.022**	0.017	**0.017**	0.007	**0.018**	**0.013**	0.005	**0.003**	0.002	0.002	**0.004**	**0.017**	**0.017**	**0.026**	**0.009**
TOB	**0.007**	**0.019**	**0.020**	0.011	**0.019**	0.001	**0.018**	0.007	0.003	**0.003**	0.004	**0.005**	**0.005**	**0.012**	**0.015**	**0.022**	**0.015**
KIE	**0.027**	**0.045**	**0.044**	0.028	**0.031**	**0.011**	**0.029**	**0.023**	**0.017**	**0.012**	0.012	0.012	**0.014**	**0.016**	**0.017**	**0.028**	**0.024**
BRI	**0.022**	**0.034**	**0.036**	0.023	**0.028**	**0.009**	**0.028**	**0.017**	0.010	**0.012**	0.013	**0.014**	**0.012**	**0.014**	**0.016**	**0.024**	**0.022**
CCW	**0.009**	**0.028**	**0.022**	**0.014**	**0.040**	**0.023**	**0.038**	**0.027**	**0.030**	**0.026**	**0.023**	**0.019**	**0.027**	**0.038**	**0.045**	**0.056**	**0.028**
CCS	0.000	**0.011**	**0.011**	0.005	**0.024**	0.010	**0.025**	**0.017**	0.011	**0.009**	0.007	0.008	**0.010**	**0.019**	**0.022**	**0.031**	**0.014**
COB	-	**0.009**	0.005	0.004	**0.027**	**0.015**	**0.027**	**0.020**	0.015	**0.013**	**0.012**	**0.011**	**0.015**	**0.027**	**0.029**	**0.040**	**0.015**
OWS	*0.000*	-	**0.005**	0.005	**0.040**	**0.024**	**0.037**	**0.018**	**0.020**	**0.024**	**0.019**	**0.025**	**0.025**	**0.036**	**0.035**	**0.044**	**0.024**
MEA	*0.000*	*0.000*	-	0.005	**0.040**	**0.026**	**0.042**	**0.027**	**0.029**	**0.029**	**0.023**	**0.028**	**0.031**	**0.047**	**0.046**	**0.056**	**0.029**
GBG	0.006	0.013	0.021	-	**0.034**	0.017	**0.032**	0.027	0.019	0.022	0.012	0.017	0.018	**0.040**	**0.038**	**0.052**	0.020
FIS	*0.000*	*0.000*	*0.000*	*0.000*	-	**0.021**	**0.010**	**0.027**	**0.019**	**0.022**	**0.024**	**0.021**	**0.025**	**0.034**	**0.035**	**0.044**	**0.020**
DOP	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	-	**0.013**	0.009	0.009	**0.010**	0.010	0.007	**0.010**	**0.013**	**0.020**	**0.024**	**0.018**
SAB	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	-	**0.024**	**0.017**	**0.023**	**0.024**	**0.021**	**0.025**	**0.030**	**0.036**	**0.044**	**0.024**
SMB	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	-	0.004	**0.010**	0.009	**0.012**	**0.016**	**0.010**	**0.015**	**0.016**	**0.021**
BHB	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	-	-0.002	0.001	0.001	0.002	**0.010**	0.012	**0.018**	**0.014**
LIH	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	0.539	-	0.002	0.002	**0.002**	**0.011**	**0.012**	**0.022**	**0.012**
BID	*0.000*	*0.000*	*0.000*	0.001	*0.000*	*0.000*	*0.000*	0.007	0.053	0.001	-	-0.001	0.000	**0.017**	0.018	**0.029**	0.009
NAU	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	0.001	*0.000*	*0.000*	0.139	0.003	0.047	-	0.000	**0.017**	**0.018**	**0.029**	0.007
EPI	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	0.007	*0.000*	*0.000*	0.377	-	**0.017**	**0.019**	**0.028**	**0.013**
BIP	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	-	0.001	0.001	**0.024**
IRI	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	0.495	-	-0.001	**0.019**
TEI	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	0.070	0.687	-	**0.033**
TBS	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	-

Table 5. Average pairwise Fst(θ) values (above diagonal) for lakes Huron, Michigan, the main basin of Lake Huron and Georgian Bay. Values along the diagonal are within basin averages.

	Lake Superior	Lake Michigan	Lake Huron Main Basin	Lake Huron-Georgian Bay
Lake Superior	0.013	0.001	0.021	0.031
Lake Michigan		0.001	0.011	0.018
Lake Huron Main Basin			0.017	0.022
Lake Huron-Georgian Bay				0.020

Table 6. Analysis of Molecular Variance (AMOVA) for different groupings of lake whitefish collections from lakes Huron, Michigan, and Superior. The percent variance, variance component, and probability for each source of variation are included. Abbreviations for collection sites are defined in Table 2.

Group	Source of Variation	Percent of Variance	Variance Component	*p* Value
All Collection Sites				
Lake Huron	Among Groups	0.34	0.003	0.078
Lake Superior	Among Populations within Groups	2.80	0.021	<0.0001
Lake Michigan	Within Populations	97.59	0.024	<0.0001
Lake Huron main basin	Among Groups	0.54	0.005	0.003
Lake Huron-Georgian Bay	Among Populations within Groups	1.87	0.019	<0.0001
Lake Superior	Within Populations	97.59	0.024	<0.0001
Lake Michigan				
(CCW,CCS)(COB,OWS,MEA)GBG(BRI,KIE)TOB	Among Groups	1.21	0.012	0.001
CAH(DOP,FIS)(ISB,SBM)(CWB,BUI)(SAG,BLR,THE)	Among Populations within Groups	1.03	0.01	<0.0001
DUB(LSI,BIS,BTP,STB)HBH,TBH,SAB,SMB	Within Populations	97.76	0.022	<0.0001
(BID,NAU,EPI)(BHB,LIH)(BIP,IRI)TEI,TBS				
SAB,FIS,ISB,SAG,KIE,TBH,BLR,BRI,CCW,TBS,DOP	Among Groups	2.41	0.024	<0.0001
(LSI,BIS,BTP,STB,DUB,HBH)(IRI,TEI,BIP)(BUI,SBM)	Among Populations within Groups	-0.08	-0.001	<0.0001
(BHB,LIH)(BID,NAU,EPI)(CWB,TOB,CAH,THE)	Within Populations	97.67	0.023	<0.0001
SMB(CCS,COB)				
DOP,BID(STB,BIP,BIS,LSI,DUB)(BHB,LIH)(EPI,HBH,NAU)	Among Groups	2.04	0.02	<0.0001
(ISB,TBS)SMB(BUI,SBM)(BIP,IRI,TEI)SAG,BLR(BRI,KIE)	Among Populations within Groups	0.27	0.003	<0.0001
(CWB,THE)(CCS,CCW,COB)(GBG,OWS,MEA)	Within Populations	97.69	0.023	<0.0001
TOB,CAH,TBH(SAB,FIS)				
(BHB,LIH)DOP,FIS,SAG,TBH,TBS,SMB,CAH,TOB(BRI,KIE)	Among Groups	2.22	0.022	<0.0001
(BID,EPI,NAU)(BUI,SBM,CWB,THE)ISB(GBG,MEA,OWS)	Among Populations within Groups	0.08	0.001	<0.0001
(COB,CCW)CCS(TEI,BIP,IRI)SAG,BLR,HBH	Within Populations	97.70	0.023	<0.0001
(BIS,STB,DUB,LSI,BTP)				

Lake Huron Collection Sites Only				
Georgian Bay, North Channel, Manitoulin Island	Among Groups	0.93	0.009	<0.0001
Main Basin	Among Populations within Groups	1.85	0.019	<0.0001
	Within Populations	97.22	0.028	<0.0001
(CCW,CCS)(COB,OWS,MEA)GBG(BRI,KIE)TOB,CAH	Among Groups	0.96	0.010	0.038
(DOP,FIS)(ISB,SBM)(CWB,BUI)(SAG,BLR,THE)DUB	Among Populations within Groups	1.50	0.015	<0.0001
(LSI,BIS,BTP,STB)HBH,TBH,SAB,SMB	Within Populations	97.54	0.025	<0.0001
DOP,FIS,SAG,TBH,SMB,CAH,TOB(BRI,KIE)	Among Groups	2.28	0.025	<0.0001
(BUI,SBM,CWB,THE)ISB(GBG,MEA,OWS)(COB,CCW)	Among Populations within Groups	0.28	0.007	0.231
SAB,BLR(LSI,BIS,STB,BTP,DUB)HBH,CCS	Within Populations	97.44	0.026	<0.0001
ISB,SAG,BLR,THE(KIE,BRI)(COB,CCS)SAB,SBM,DOP	Among Groups	2.50	0.025	<0.0001
TBH,SMB,TOB,CAH,CCW(BIS,BTP,STB,LSI)	Among Populations within Groups	0.00	0.000	0.482
(CWB,BUI)(DUB,HBH)FIS(GBG,MEA,OWS)	Within Populations	97.50	0.025	<0.0001

Figure 1. Sample sites where lake whitefish were collected for genetic analysis. Numerical codes for collection sites are defined in Table 2.

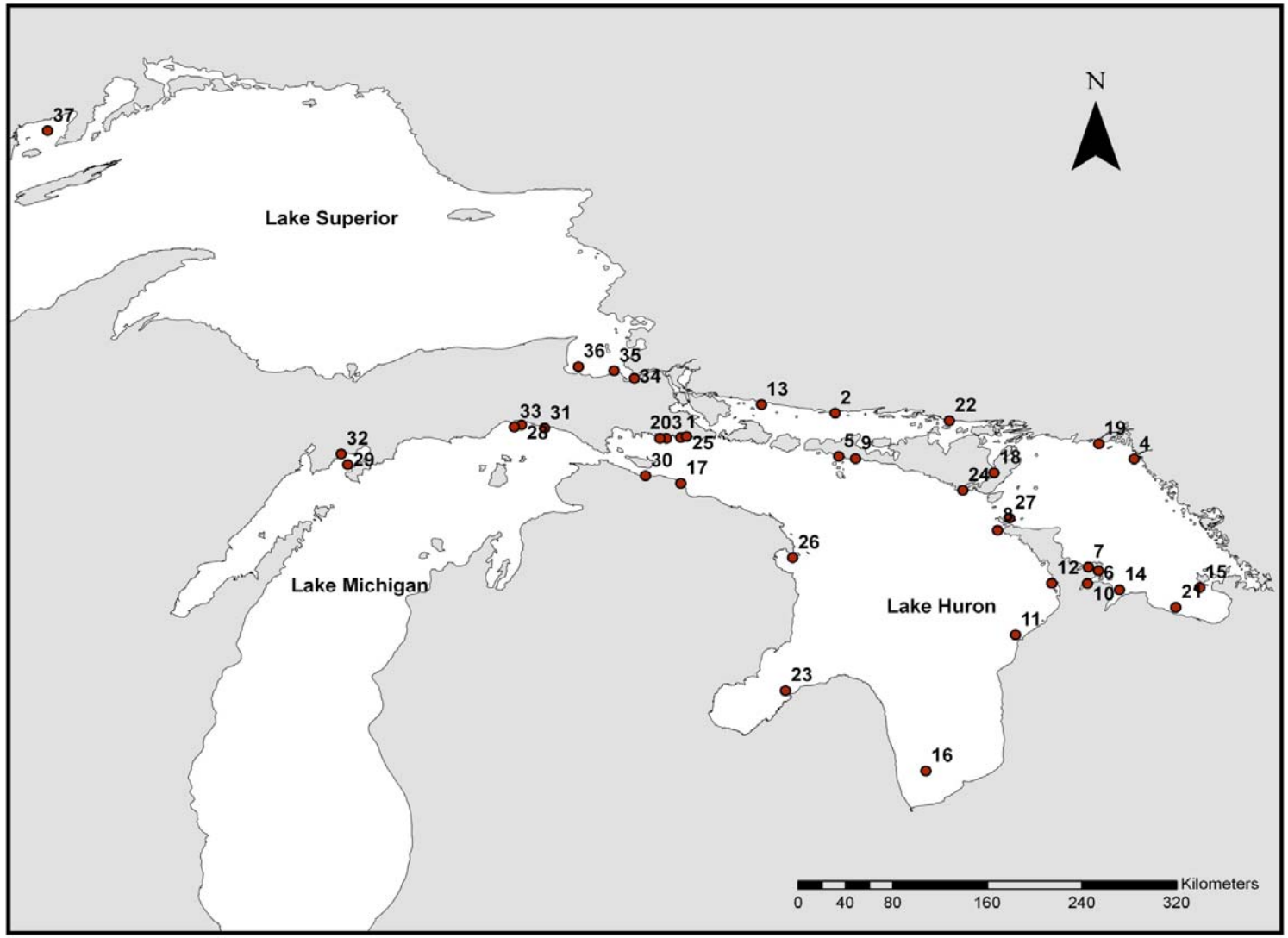


Figure 2. Neighbor-joining tree based on the Cavalli-Sforza and Edwards (1967) distance for all lake whitefish collections. Nodes are labeled with the level of boot strap support obtained over 1000 pseudo-replicates. Only branches with 60% or greater support are labeled. Codes for collections are found in Table 2.

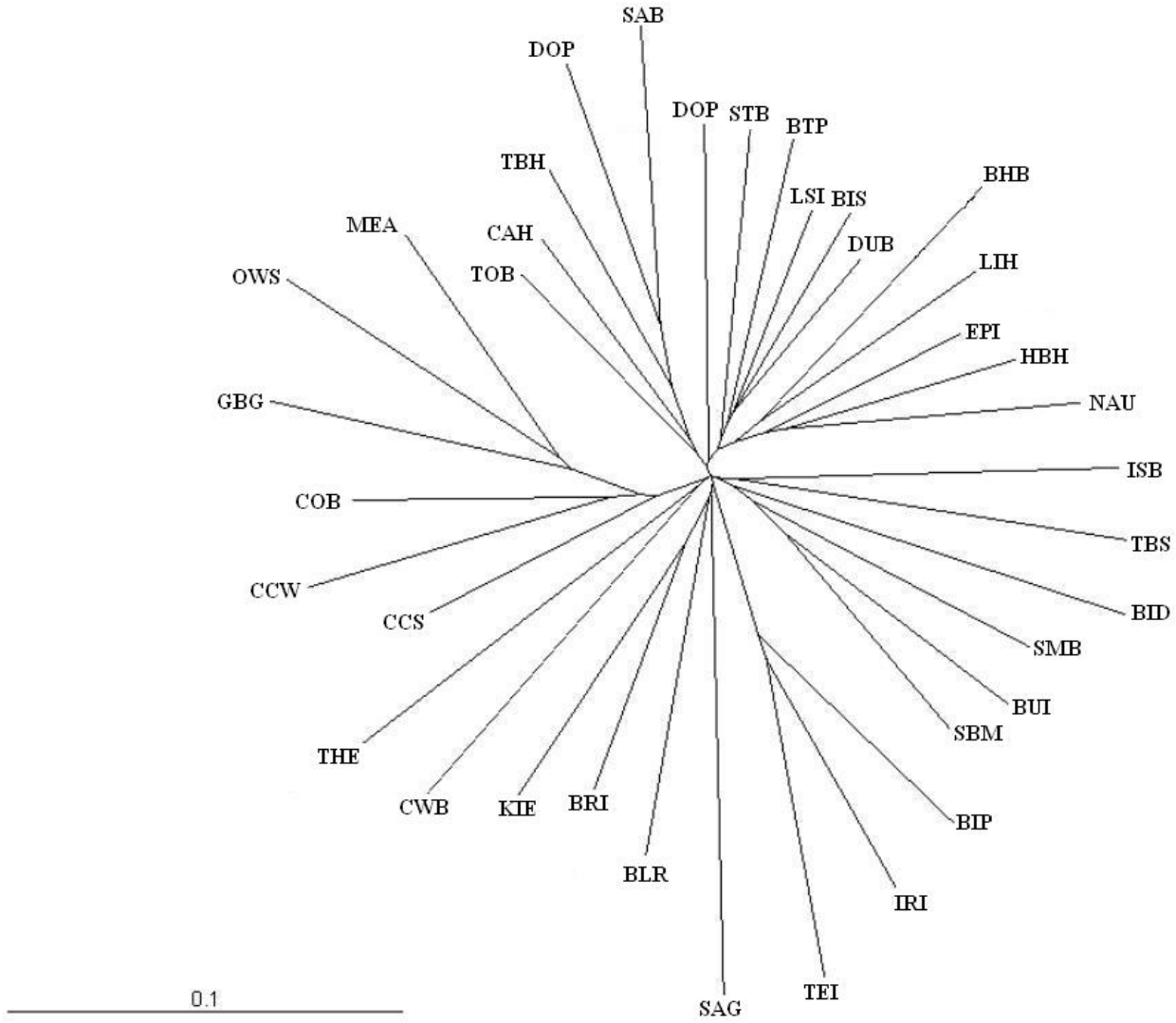
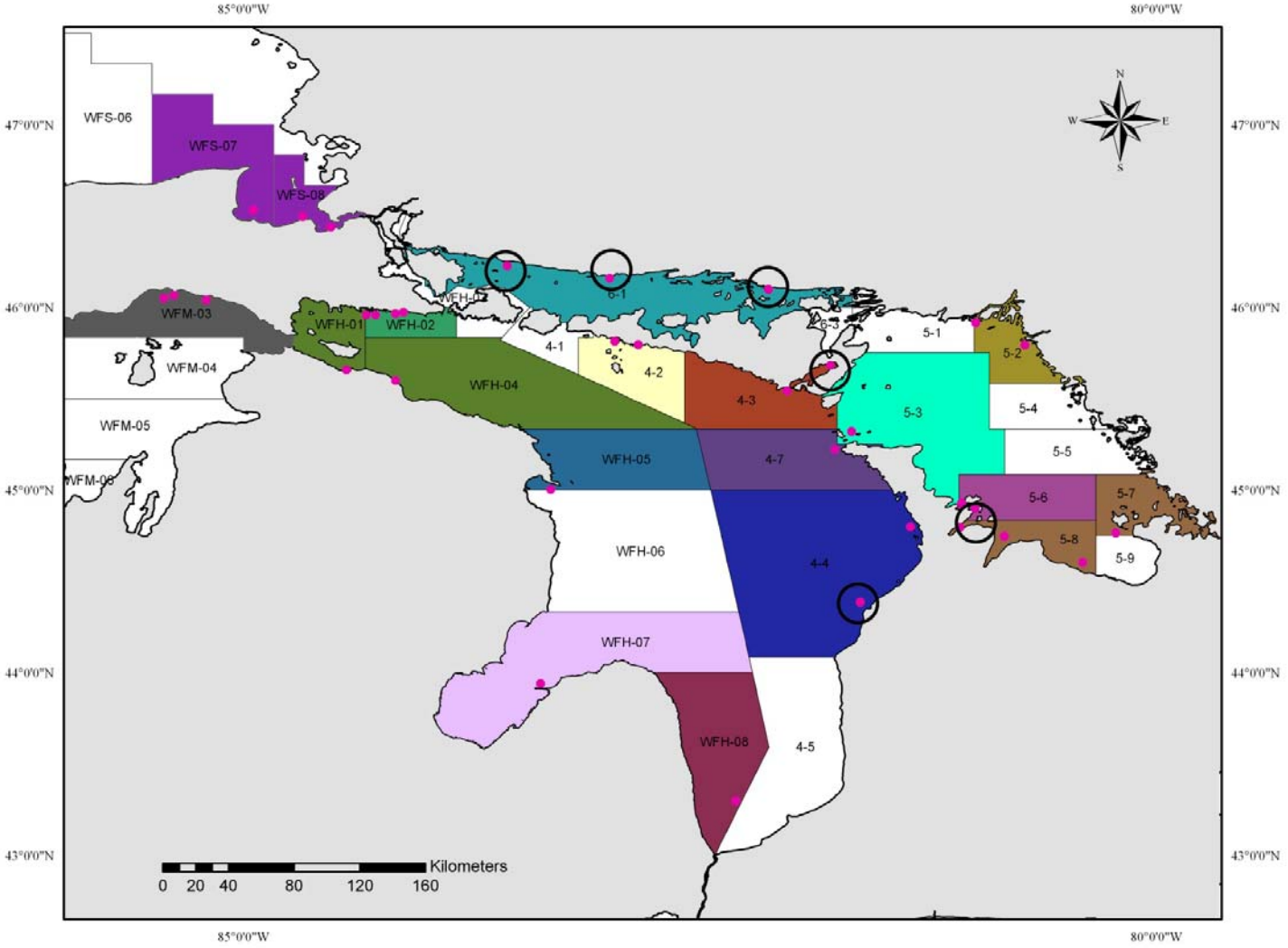


Figure 3. Genetic populations and collection sites mapped with existing lake whitefish management units. Circles indicate sites that were identified as distinct genetic populations that are currently in single management units.



Appendix 1. Allele frequencies at 14 loci for 37 collections of lake whitefish from lakes Huron, Michigan, and Superior. Codes for collections are found in Table 2.

		Collection																	
Locus	Allele	BTP	BID	BHB	BI	BLR	BIS	BRI	BUI	CCS	CCW	CAH	CWB	COB	DOP	DUB	EPI	FIS	THE
*Bwf*1	196	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	198	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.015	0.000	0.000	0.000	0.006	0.000	0.000
	200	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.019
	202	0.000	0.000	0.022	0.000	0.000	0.000	0.007	0.000	0.000	0.000	0.000	0.015	0.000	0.000	0.004	0.000	0.003	0.019
	204	0.074	0.067	0.000	0.069	0.052	0.128	0.015	0.052	0.047	0.025	0.025	0.074	0.063	0.086	0.076	0.094	0.059	0.037
	206	0.019	0.000	0.000	0.017	0.007	0.000	0.000	0.009	0.020	0.006	0.000	0.015	0.042	0.017	0.002	0.003	0.015	0.019
	208	0.037	0.033	0.000	0.095	0.000	0.036	0.030	0.009	0.027	0.050	0.013	0.029	0.007	0.043	0.038	0.047	0.018	0.000
	210	0.074	0.100	0.065	0.060	0.030	0.087	0.082	0.103	0.113	0.131	0.095	0.059	0.104	0.112	0.071	0.113	0.065	0.037
	212	0.241	0.500	0.391	0.293	0.284	0.250	0.284	0.397	0.300	0.469	0.487	0.221	0.389	0.353	0.271	0.358	0.300	0.296
	214	0.463	0.283	0.391	0.431	0.567	0.352	0.493	0.302	0.413	0.300	0.297	0.353	0.382	0.276	0.396	0.289	0.350	0.444
	216	0.037	0.017	0.065	0.000	0.030	0.066	0.030	0.103	0.040	0.013	0.063	0.103	0.007	0.078	0.080	0.038	0.165	0.111
	218	0.037	0.000	0.065	0.026	0.030	0.036	0.045	0.017	0.027	0.006	0.013	0.103	0.007	0.026	0.040	0.041	0.018	0.000
	220	0.000	0.000	0.000	0.000	0.000	0.000	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.009	0.003	0.003	0.000
	222	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.009	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.006	0.000
	224	0.019	0.000	0.000	0.009	0.000	0.046	0.007	0.000	0.013	0.000	0.006	0.015	0.000	0.009	0.009	0.006	0.000	0.019
	226	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000
	230	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	268	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
*Bwf*2	139	0.000	0.000	0.013	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.014	0.000	0.000	0.000	0.000	0.000
	141	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	143	0.098	0.081	0.118	0.100	0.045	0.028	0.116	0.034	0.040	0.063	0.095	0.044	0.077	0.043	0.068	0.083	0.081	0.017
	145	0.029	0.032	0.013	0.050	0.067	0.037	0.014	0.042	0.020	0.025	0.044	0.015	0.056	0.052	0.039	0.026	0.032	0.017
	147	0.000	0.000	0.013	0.000	0.000	0.000	0.000	0.000	0.013	0.000	0.000	0.000	0.000	0.026	0.002	0.006	0.006	0.000
	149	0.000	0.000	0.000	0.025	0.000	0.000	0.000	0.008	0.013	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.000
	151	0.578	0.629	0.566	0.608	0.679	0.657	0.688	0.636	0.680	0.513	0.614	0.559	0.570	0.517	0.689	0.691	0.555	0.724
	153	0.000	0.016	0.026	0.008	0.015	0.000	0.000	0.017	0.013	0.031	0.019	0.059	0.000	0.034	0.002	0.017	0.020	0.017
	155	0.010	0.032	0.000	0.008	0.007	0.000	0.007	0.017	0.007	0.006	0.006	0.029	0.014	0.009	0.011	0.009	0.003	0.017
	157	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.019	0.000	0.000	0.021	0.009	0.007	0.000	0.006	0.000
	159	0.284	0.210	0.250	0.183	0.187	0.264	0.174	0.237	0.207	0.344	0.215	0.279	0.246	0.284	0.178	0.166	0.291	0.207
	161	0.000	0.000	0.000	0.000	0.000	0.009	0.000	0.000	0.000	0.000	0.000	0.015	0.000	0.026	0.000	0.003	0.000	0.000
	163	0.000	0.000	0.000	0.008	0.000	0.005	0.000	0.008	0.000	0.000	0.006	0.000	0.000	0.000	0.004	0.000	0.003	0.000
	165	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	167	0.000	0.000	0.000	0.008	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

C2-157	130	0.011	0.032	0.000	0.000	0.000	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	132	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.000
	136	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.003	0.000
	138	0.011	0.000	0.000	0.000	0.000	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.003	0.000
	140	0.000	0.000	0.000	0.000	0.007	0.000	0.000	0.000	0.013	0.000	0.000	0.000	0.000	0.000	0.002	0.006	0.003	0.000
	142	0.267	0.226	0.258	0.300	0.203	0.227	0.225	0.339	0.227	0.225	0.348	0.221	0.317	0.259	0.234	0.229	0.128	0.250
	144	0.033	0.016	0.016	0.008	0.051	0.046	0.087	0.025	0.027	0.025	0.019	0.015	0.035	0.034	0.020	0.006	0.125	0.071
	146	0.011	0.016	0.016	0.000	0.029	0.014	0.029	0.025	0.027	0.013	0.019	0.015	0.021	0.017	0.028	0.026	0.029	0.036
	148	0.100	0.097	0.081	0.100	0.065	0.116	0.065	0.085	0.093	0.156	0.051	0.118	0.113	0.069	0.076	0.089	0.038	0.107
	150	0.067	0.032	0.065	0.125	0.101	0.060	0.109	0.136	0.060	0.050	0.114	0.103	0.049	0.129	0.068	0.094	0.090	0.036
	152	0.033	0.016	0.000	0.008	0.043	0.023	0.043	0.008	0.047	0.006	0.025	0.059	0.021	0.026	0.011	0.023	0.041	0.018
	154	0.122	0.065	0.081	0.075	0.116	0.088	0.087	0.076	0.147	0.144	0.108	0.118	0.162	0.155	0.153	0.066	0.070	0.143
	156	0.111	0.016	0.177	0.100	0.065	0.065	0.087	0.085	0.053	0.100	0.057	0.103	0.077	0.069	0.083	0.086	0.096	0.071
	158	0.033	0.145	0.161	0.100	0.087	0.116	0.080	0.110	0.140	0.056	0.133	0.118	0.077	0.121	0.068	0.131	0.125	0.143
	160	0.000	0.161	0.048	0.025	0.051	0.056	0.058	0.042	0.053	0.100	0.032	0.015	0.014	0.043	0.066	0.094	0.087	0.036
	162	0.089	0.032	0.048	0.042	0.072	0.065	0.043	0.025	0.040	0.056	0.032	0.059	0.028	0.043	0.096	0.049	0.052	0.036
	164	0.044	0.065	0.000	0.000	0.014	0.032	0.022	0.017	0.020	0.000	0.006	0.000	0.000	0.017	0.024	0.017	0.049	0.018
	166	0.000	0.048	0.016	0.033	0.043	0.023	0.022	0.000	0.007	0.006	0.013	0.015	0.007	0.017	0.009	0.017	0.006	0.000
	168	0.011	0.000	0.016	0.008	0.007	0.005	0.007	0.008	0.000	0.000	0.006	0.000	0.000	0.000	0.007	0.009	0.012	0.018
	170	0.022	0.016	0.000	0.033	0.014	0.014	0.007	0.008	0.000	0.031	0.006	0.000	0.007	0.000	0.011	0.006	0.006	0.000
	172	0.011	0.016	0.016	0.017	0.022	0.032	0.014	0.000	0.027	0.006	0.019	0.029	0.049	0.000	0.015	0.020	0.017	0.000
	174	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.006	0.006	0.018
	176	0.000	0.000	0.000	0.017	0.000	0.009	0.007	0.008	0.000	0.025	0.006	0.015	0.007	0.000	0.017	0.003	0.009	0.000
	178	0.011	0.000	0.000	0.008	0.000	0.000	0.007	0.000	0.007	0.000	0.006	0.000	0.007	0.000	0.004	0.003	0.000	0.000
	180	0.000	0.000	0.000	0.000	0.007	0.000	0.000	0.000	0.007	0.000	0.000	0.000	0.007	0.000	0.002	0.000	0.000	0.000
	182	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.006	0.000
	184	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.014	0.000	0.000
*Cocl*22	95	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	101	0.000	0.000	0.000	0.000	0.007	0.000	0.000	0.000	0.000	0.000	0.006	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	103	0.157	0.155	0.095	0.263	0.145	0.245	0.130	0.153	0.173	0.169	0.173	0.167	0.188	0.138	0.204	0.198	0.123	0.207
	105	0.000	0.000	0.000	0.000	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.017	0.000	0.000	0.000	0.000	0.000	0.000
	111	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.013	0.006	0.006	0.000	0.000	0.000	0.002	0.000	0.000	0.000
	113	0.059	0.017	0.081	0.008	0.051	0.032	0.058	0.008	0.027	0.031	0.032	0.000	0.035	0.025	0.026	0.043	0.033	0.000
	115	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.000
	117	0.010	0.000	0.000	0.000	0.000	0.009	0.000	0.008	0.007	0.000	0.006	0.000	0.000	0.000	0.002	0.009	0.018	0.000
	119	0.216	0.121	0.176	0.169	0.138	0.134	0.181	0.025	0.080	0.119	0.077	0.117	0.083	0.063	0.135	0.080	0.060	0.086
	121	0.471	0.569	0.541	0.475	0.522	0.523	0.551	0.669	0.647	0.606	0.609	0.617	0.618	0.675	0.552	0.560	0.704	0.586
	123	0.000	0.000	0.000	0.017	0.000	0.005	0.000	0.000	0.000	0.000	0.006	0.000	0.000	0.000	0.005	0.000	0.003	0.000
	125	0.039	0.086	0.041	0.017	0.051	0.028	0.043	0.076	0.027	0.013	0.045	0.050	0.035	0.075	0.050	0.072	0.027	0.017
	127	0.020	0.000	0.000	0.025	0.022	0.000	0.014	0.034	0.007	0.038	0.026	0.017	0.042	0.025	0.019	0.014	0.021	0.052

	129	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	131	0.000	0.000	0.014	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000
	133	0.010	0.034	0.041	0.017	0.014	0.014	0.007	0.000	0.007	0.006	0.000	0.017	0.000	0.000	0.002	0.020	0.009	0.000
	135	0.020	0.000	0.014	0.008	0.043	0.005	0.014	0.017	0.007	0.013	0.013	0.000	0.000	0.000	0.000	0.000	0.003	0.052
	141	0.000	0.017	0.000	0.000	0.000	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	147	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.008	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
*Cocl*23	247	0.010	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.006	0.006	0.000	0.007	0.000	0.000	0.000	0.000	0.000
	249	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.021	0.000
	251	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	253	0.140	0.206	0.158	0.317	0.176	0.156	0.246	0.254	0.243	0.469	0.158	0.156	0.250	0.241	0.164	0.233	0.006	0.333
	255	0.050	0.059	0.158	0.067	0.081	0.094	0.043	0.110	0.081	0.069	0.146	0.000	0.125	0.093	0.092	0.096	0.262	0.146
	257	0.030	0.000	0.039	0.017	0.015	0.009	0.014	0.000	0.061	0.000	0.038	0.000	0.037	0.028	0.004	0.000	0.119	0.021
	259	0.180	0.176	0.184	0.150	0.213	0.231	0.232	0.212	0.257	0.219	0.209	0.281	0.235	0.194	0.229	0.215	0.244	0.229
	261	0.070	0.088	0.066	0.067	0.125	0.094	0.196	0.186	0.054	0.025	0.076	0.031	0.037	0.194	0.076	0.064	0.113	0.021
	263	0.040	0.000	0.053	0.042	0.029	0.024	0.058	0.034	0.020	0.006	0.025	0.125	0.044	0.028	0.043	0.038	0.012	0.021
	265	0.100	0.176	0.039	0.117	0.118	0.028	0.101	0.034	0.101	0.013	0.038	0.031	0.037	0.120	0.047	0.067	0.030	0.104
	267	0.200	0.176	0.158	0.192	0.103	0.179	0.080	0.068	0.108	0.125	0.158	0.219	0.169	0.065	0.200	0.174	0.113	0.104
	269	0.170	0.118	0.132	0.033	0.110	0.175	0.029	0.093	0.074	0.056	0.114	0.156	0.044	0.028	0.137	0.105	0.064	0.021
	271	0.000	0.000	0.013	0.000	0.015	0.000	0.000	0.008	0.000	0.000	0.019	0.000	0.000	0.009	0.004	0.006	0.015	0.000
	273	0.010	0.000	0.000	0.000	0.000	0.009	0.000	0.000	0.000	0.000	0.006	0.000	0.000	0.000	0.004	0.003	0.000	0.000
	274	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	275	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.006	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	277	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	279	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.013	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	285	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	287	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	289	0.000	0.000	0.000	0.000	0.015	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.015	0.000	0.000	0.000	0.000	0.000
*CoclLav*32	245	0.000	0.000	0.000	0.008	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.000
	249	0.735	0.790	0.816	0.708	0.522	0.715	0.681	0.669	0.727	0.525	0.699	0.706	0.662	0.655	0.747	0.770	0.724	0.759
	253	0.265	0.210	0.184	0.275	0.449	0.285	0.319	0.322	0.267	0.475	0.295	0.265	0.338	0.319	0.249	0.212	0.262	0.224
	257	0.000	0.000	0.000	0.008	0.029	0.000	0.000	0.008	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.009	0.003	0.017
	261	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.007	0.000	0.006	0.000	0.000	0.026	0.004	0.006	0.006	0.000
	265	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.006	0.000
	273	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.029	0.000	0.000	0.000	0.000	0.000	0.000
*CoclLav*4	139	0.000	0.000	0.000	0.000	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	141	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.000	0.000	0.000
	143	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	145	0.000	0.000	0.000	0.000	0.007	0.005	0.000	0.017	0.000	0.000	0.000	0.000	0.000	0.009	0.000	0.003	0.000	0.000

	147	0.431	0.483	0.355	0.442	0.575	0.468	0.449	0.371	0.426	0.354	0.479	0.313	0.403	0.396	0.429	0.406	0.353	0.448
	149	0.324	0.379	0.382	0.383	0.216	0.315	0.360	0.405	0.432	0.449	0.329	0.500	0.458	0.377	0.306	0.323	0.374	0.293
	151	0.245	0.138	0.263	0.175	0.187	0.204	0.191	0.207	0.142	0.196	0.192	0.172	0.139	0.217	0.252	0.269	0.272	0.241
	153	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.000	0.000	0.000
	155	0.000	0.000	0.000	0.000	0.007	0.005	0.000	0.000	0.000	0.000	0.000	0.016	0.000	0.000	0.002	0.000	0.000	0.017
	159	0.000	0.000	0.000	0.000	0.000	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000
*CoclLav*45	236	0.010	0.016	0.026	0.058	0.015	0.037	0.000	0.034	0.014	0.019	0.026	0.045	0.014	0.009	0.020	0.031	0.015	0.000
	238	0.098	0.113	0.079	0.175	0.082	0.079	0.148	0.127	0.076	0.089	0.104	0.121	0.080	0.054	0.111	0.126	0.120	0.130
	240	0.000	0.016	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000
	242	0.118	0.194	0.197	0.008	0.127	0.150	0.115	0.119	0.076	0.158	0.123	0.091	0.080	0.116	0.173	0.183	0.081	0.111
	244	0.000	0.000	0.000	0.008	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.009	0.002	0.000	0.000	0.000
	246	0.000	0.016	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.009	0.000	0.006	0.000	0.000
	248	0.000	0.000	0.000	0.000	0.015	0.000	0.000	0.000	0.007	0.000	0.000	0.015	0.007	0.000	0.000	0.000	0.000	0.000
	250	0.500	0.355	0.447	0.600	0.470	0.393	0.451	0.415	0.326	0.222	0.448	0.379	0.283	0.455	0.362	0.366	0.503	0.481
	252	0.275	0.274	0.250	0.150	0.291	0.341	0.287	0.305	0.500	0.513	0.299	0.348	0.536	0.348	0.329	0.289	0.278	0.278
	254	0.000	0.016	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	258	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.000
	260	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
*CoclLav*52	94	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	98	0.196	0.150	0.146	0.140	0.145	0.189	0.228	0.220	0.134	0.156	0.184	0.167	0.067	0.121	0.195	0.145	0.202	0.130
	100	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.006	0.000
	102	0.000	0.000	0.000	0.010	0.000	0.005	0.000	0.000	0.000	0.000	0.006	0.000	0.000	0.000	0.002	0.006	0.006	0.000
	104	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	106	0.000	0.000	0.000	0.000	0.000	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	108	0.010	0.017	0.000	0.010	0.056	0.029	0.009	0.059	0.007	0.000	0.032	0.015	0.015	0.052	0.035	0.022	0.026	0.000
	110	0.000	0.000	0.042	0.020	0.000	0.005	0.000	0.000	0.007	0.038	0.032	0.045	0.022	0.026	0.022	0.022	0.041	0.000
	112	0.010	0.017	0.000	0.010	0.024	0.010	0.009	0.042	0.000	0.000	0.025	0.015	0.015	0.017	0.020	0.025	0.009	0.000
	114	0.049	0.167	0.188	0.120	0.089	0.117	0.088	0.110	0.077	0.181	0.139	0.061	0.075	0.078	0.131	0.123	0.117	0.167
	116	0.235	0.200	0.271	0.320	0.234	0.180	0.219	0.220	0.268	0.194	0.165	0.333	0.209	0.345	0.206	0.228	0.205	0.426
	118	0.108	0.017	0.021	0.030	0.056	0.078	0.026	0.059	0.028	0.013	0.025	0.030	0.045	0.043	0.031	0.025	0.020	0.056
	120	0.010	0.000	0.021	0.000	0.024	0.005	0.026	0.017	0.007	0.000	0.019	0.030	0.000	0.017	0.009	0.015	0.006	0.000
	122	0.010	0.017	0.021	0.100	0.073	0.019	0.026	0.034	0.007	0.013	0.070	0.015	0.015	0.026	0.040	0.015	0.032	0.000
	124	0.137	0.183	0.063	0.070	0.073	0.097	0.096	0.068	0.134	0.038	0.057	0.076	0.097	0.095	0.069	0.086	0.088	0.074
	126	0.029	0.050	0.042	0.030	0.040	0.049	0.026	0.034	0.014	0.031	0.032	0.045	0.030	0.043	0.029	0.028	0.050	0.019
	128	0.010	0.050	0.021	0.020	0.032	0.019	0.061	0.008	0.042	0.025	0.013	0.030	0.052	0.009	0.011	0.034	0.006	0.000
	130	0.020	0.017	0.021	0.000	0.008	0.005	0.000	0.008	0.014	0.000	0.000	0.000	0.007	0.000	0.004	0.019	0.012	0.000
	132	0.000	0.017	0.000	0.000	0.024	0.005	0.000	0.025	0.056	0.000	0.032	0.015	0.000	0.000	0.007	0.028	0.012	0.019
	134	0.010	0.017	0.000	0.020	0.008	0.015	0.009	0.017	0.099	0.044	0.013	0.000	0.097	0.026	0.011	0.009	0.003	0.000
	136	0.010	0.050	0.021	0.040	0.040	0.044	0.044	0.034	0.070	0.181	0.076	0.045	0.127	0.009	0.046	0.049	0.079	0.093

	138	0.069	0.000	0.063	0.040	0.032	0.039	0.053	0.017	0.035	0.044	0.082	0.045	0.075	0.052	0.066	0.065	0.056	0.019
	140	0.049	0.017	0.063	0.000	0.024	0.058	0.044	0.008	0.000	0.044	0.000	0.015	0.052	0.034	0.042	0.040	0.018	0.000
	142	0.000	0.000	0.000	0.020	0.016	0.005	0.000	0.008	0.000	0.000	0.000	0.000	0.000	0.009	0.013	0.003	0.000	0.000
	144	0.020	0.000	0.000	0.000	0.000	0.024	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.003	0.003	0.000
	146	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.008	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	148	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	150	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.015	0.000	0.000	0.000	0.000	0.000	0.000
	152	0.000	0.017	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	154	0.000	0.000	0.000	0.000	0.000	0.000	0.035	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.003	0.003	0.000
	156	0.020	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.006	0.003	0.000
*CoclLav*6	123	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000
	125	0.000	0.138	0.026	0.000	0.162	0.010	0.037	0.458	0.014	0.000	0.032	0.129	0.000	0.017	0.032	0.000	0.003	0.017
	127	0.720	0.690	0.618	0.608	0.531	0.683	0.746	0.322	0.690	0.812	0.797	0.565	0.754	0.733	0.679	0.774	0.804	0.569
	129	0.010	0.000	0.000	0.042	0.000	0.010	0.000	0.000	0.007	0.000	0.006	0.016	0.000	0.017	0.020	0.003	0.024	0.000
	131	0.000	0.000	0.000	0.000	0.038	0.000	0.000	0.102	0.007	0.000	0.000	0.000	0.000	0.000	0.007	0.000	0.000	0.034
	133	0.200	0.086	0.250	0.192	0.146	0.192	0.157	0.034	0.092	0.117	0.089	0.161	0.101	0.086	0.174	0.126	0.098	0.190
	135	0.000	0.017	0.026	0.042	0.015	0.014	0.007	0.025	0.042	0.032	0.000	0.000	0.014	0.009	0.011	0.017	0.009	0.000
	137	0.000	0.000	0.026	0.008	0.000	0.010	0.000	0.000	0.000	0.000	0.006	0.000	0.007	0.017	0.002	0.006	0.006	0.000
	139	0.000	0.034	0.000	0.100	0.000	0.000	0.022	0.051	0.014	0.000	0.000	0.016	0.014	0.000	0.009	0.003	0.000	0.000
	141	0.070	0.034	0.026	0.008	0.092	0.077	0.030	0.008	0.127	0.039	0.070	0.097	0.109	0.095	0.054	0.071	0.027	0.172
	143	0.000	0.000	0.026	0.000	0.015	0.005	0.000	0.000	0.007	0.000	0.000	0.016	0.000	0.026	0.009	0.000	0.027	0.017
	145	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	159	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.000
*CoclLav*68	167	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.015	0.000	0.000	0.000	0.000	0.000	0.000
	169	0.000	0.000	0.000	0.000	0.000	0.000	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	171	0.000	0.017	0.053	0.050	0.015	0.014	0.022	0.017	0.000	0.000	0.000	0.000	0.007	0.018	0.009	0.040	0.009	0.000
	173	0.235	0.117	0.145	0.233	0.265	0.190	0.096	0.147	0.176	0.138	0.211	0.162	0.139	0.232	0.154	0.171	0.146	0.121
	175	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	177	0.765	0.867	0.803	0.700	0.720	0.782	0.875	0.836	0.818	0.850	0.789	0.824	0.854	0.750	0.835	0.780	0.845	0.879
	179	0.000	0.000	0.000	0.017	0.000	0.005	0.000	0.000	0.007	0.013	0.000	0.000	0.000	0.000	0.002	0.009	0.000	0.000
	181	0.000	0.000	0.000	0.000	0.000	0.009	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
*Sfo*23	147	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	149	0.000	0.000	0.000	0.000	0.036	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	151	0.010	0.000	0.013	0.000	0.000	0.009	0.000	0.000	0.007	0.000	0.000	0.000	0.021	0.011	0.015	0.009	0.012	0.000
	153	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.008	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.000
	155	0.098	0.167	0.171	0.183	0.174	0.093	0.065	0.093	0.147	0.125	0.089	0.103	0.148	0.096	0.110	0.140	0.015	0.261
	157	0.020	0.017	0.000	0.042	0.014	0.019	0.007	0.017	0.000	0.013	0.000	0.000	0.000	0.000	0.002	0.000	0.077	0.000
	159	0.098	0.067	0.211	0.100	0.217	0.102	0.152	0.144	0.160	0.050	0.133	0.190	0.190	0.074	0.085	0.131	0.024	0.152

	161	0.059	0.000	0.000	0.000	0.014	0.014	0.029	0.008	0.027	0.031	0.032	0.017	0.014	0.000	0.020	0.020	0.095	0.000
	163	0.255	0.283	0.263	0.258	0.152	0.370	0.225	0.220	0.233	0.281	0.241	0.207	0.169	0.298	0.371	0.300	0.047	0.217
	165	0.176	0.183	0.197	0.142	0.188	0.171	0.130	0.246	0.193	0.213	0.196	0.207	0.204	0.181	0.195	0.189	0.284	0.217
	167	0.049	0.050	0.053	0.058	0.036	0.028	0.022	0.008	0.027	0.075	0.038	0.052	0.021	0.021	0.034	0.009	0.183	0.000
	169	0.108	0.100	0.039	0.067	0.051	0.074	0.203	0.085	0.093	0.050	0.120	0.086	0.134	0.117	0.046	0.089	0.018	0.022
	171	0.039	0.000	0.000	0.050	0.029	0.023	0.007	0.059	0.007	0.044	0.032	0.052	0.007	0.032	0.015	0.014	0.071	0.043
	173	0.000	0.017	0.000	0.017	0.043	0.009	0.043	0.008	0.013	0.006	0.019	0.000	0.021	0.011	0.012	0.009	0.059	0.000
	175	0.039	0.017	0.000	0.000	0.007	0.009	0.000	0.008	0.007	0.006	0.000	0.000	0.000	0.000	0.002	0.011	0.012	0.000
	177	0.010	0.000	0.000	0.000	0.000	0.005	0.014	0.025	0.020	0.044	0.032	0.034	0.014	0.000	0.010	0.020	0.015	0.022
	179	0.029	0.033	0.026	0.025	0.014	0.028	0.051	0.042	0.007	0.013	0.038	0.017	0.014	0.117	0.041	0.037	0.044	0.022
	181	0.010	0.050	0.000	0.017	0.007	0.009	0.000	0.008	0.000	0.006	0.000	0.000	0.000	0.021	0.002	0.003	0.021	0.000
	183	0.000	0.000	0.026	0.008	0.000	0.028	0.000	0.008	0.007	0.013	0.019	0.000	0.000	0.021	0.029	0.006	0.003	0.022
	185	0.000	0.000	0.000	0.000	0.007	0.000	0.014	0.008	0.007	0.013	0.000	0.000	0.007	0.000	0.007	0.006	0.012	0.000
	187	0.000	0.000	0.000	0.000	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.000
	191	0.000	0.000	0.000	0.000	0.000	0.009	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000
	193	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.013	0.000	0.006	0.034	0.000	0.000	0.000	0.003	0.003	0.000
	195	0.000	0.000	0.000	0.017	0.000	0.000	0.029	0.000	0.007	0.000	0.006	0.000	0.000	0.000	0.000	0.003	0.003	0.000
	197	0.000	0.000	0.000	0.017	0.000	0.000	0.000	0.000	0.027	0.019	0.000	0.000	0.035	0.000	0.000	0.000	0.000	0.022
	199	0.000	0.017	0.000	0.000	0.000	0.000	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	201	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
*Sfo8*L	163	0.000	0.000	0.000	0.000	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	165	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	169	0.000	0.016	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	171	0.000	0.000	0.000	0.000	0.000	0.000	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.017	0.002	0.003	0.000	0.000
	173	0.108	0.065	0.079	0.108	0.043	0.065	0.109	0.052	0.107	0.131	0.032	0.059	0.139	0.034	0.066	0.080	0.041	0.125
	175	0.510	0.500	0.513	0.633	0.616	0.565	0.457	0.517	0.633	0.550	0.468	0.426	0.549	0.569	0.502	0.463	0.555	0.500
	177	0.000	0.000	0.000	0.017	0.000	0.005	0.007	0.017	0.000	0.006	0.051	0.029	0.035	0.000	0.007	0.011	0.108	0.036
	179	0.294	0.355	0.342	0.150	0.232	0.222	0.261	0.302	0.200	0.125	0.304	0.279	0.201	0.224	0.317	0.383	0.183	0.250
	181	0.059	0.048	0.053	0.067	0.087	0.125	0.080	0.086	0.040	0.069	0.076	0.118	0.042	0.121	0.076	0.046	0.055	0.089
	183	0.000	0.016	0.000	0.000	0.000	0.000	0.007	0.000	0.013	0.069	0.013	0.015	0.021	0.000	0.009	0.011	0.000	0.000
	185	0.029	0.000	0.013	0.025	0.007	0.019	0.072	0.026	0.007	0.050	0.057	0.044	0.014	0.034	0.022	0.003	0.058	0.000
	187	0.000	0.000	0.000	0.000	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.015	0.000	0.000	0.000	0.000	0.000	0.000
	189	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	193	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.015	0.000	0.000	0.000	0.000	0.000	0.000
*Sfo8*U	205	0.000	0.000	0.000	0.000	0.000	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	209	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000
	211	0.000	0.000	0.000	0.000	0.000	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	213	0.000	0.000	0.013	0.000	0.000	0.000	0.007	0.000	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.006	0.000	0.000
	215	0.696	0.774	0.697	0.617	0.638	0.701	0.507	0.669	0.780	0.825	0.734	0.691	0.847	0.569	0.771	0.697	0.765	0.482

217	0.020	0.016	0.013	0.042	0.007	0.023	0.014	0.051	0.020	0.006	0.051	0.015	0.007	0.017	0.011	0.020	0.026	0.036
219	0.216	0.065	0.171	0.192	0.254	0.182	0.297	0.203	0.140	0.113	0.139	0.191	0.118	0.276	0.105	0.157	0.137	0.286
221	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000
223	0.010	0.016	0.013	0.025	0.000	0.014	0.000	0.017	0.000	0.000	0.000	0.015	0.000	0.009	0.028	0.031	0.006	0.036
225	0.039	0.129	0.092	0.125	0.087	0.065	0.174	0.059	0.053	0.056	0.076	0.088	0.028	0.129	0.070	0.089	0.067	0.161
227	0.020	0.000	0.000	0.000	0.000	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.000
235	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
257	0.000	0.000	0.000	0.000	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
259	0.000	0.000	0.000	0.000	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Appendix 1. cont'd

		Collection																	
Locus	Allele	OWS	GBG	SMB	HBH	ISB	IRI	KIE	LSI	LIH	MEA	NAU	SAG	SAB	SBM	STB	TEI	TBH	TBS	TOB
*Bwf*1	196	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.000
	198	0.000	0.000	0.000	0.000	0.006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.000	0.000
	200	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.008	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.012	0.000
	202	0.000	0.000	0.000	0.000	0.019	0.000	0.000	0.000	0.000	0.000	0.021	0.000	0.000	0.000	0.000	0.011	0.011	0.000	0.000
	204	0.010	0.000	0.044	0.048	0.025	0.073	0.038	0.048	0.058	0.040	0.042	0.020	0.090	0.067	0.042	0.053	0.040	0.083	0.057
	206	0.000	0.000	0.022	0.019	0.000	0.010	0.032	0.000	0.017	0.027	0.000	0.080	0.017	0.025	0.010	0.011	0.014	0.012	0.019
	208	0.050	0.036	0.011	0.038	0.013	0.135	0.006	0.074	0.050	0.020	0.021	0.110	0.045	0.000	0.083	0.106	0.025	0.060	0.019
	210	0.170	0.143	0.056	0.087	0.063	0.104	0.032	0.059	0.108	0.020	0.104	0.020	0.067	0.092	0.083	0.085	0.083	0.131	0.089
	212	0.380	0.429	0.333	0.308	0.354	0.292	0.365	0.340	0.375	0.427	0.417	0.180	0.444	0.425	0.333	0.255	0.344	0.393	0.342
	214	0.210	0.250	0.378	0.404	0.335	0.354	0.423	0.351	0.325	0.347	0.333	0.540	0.242	0.292	0.292	0.447	0.333	0.155	0.405
	216	0.140	0.071	0.100	0.019	0.127	0.010	0.013	0.064	0.033	0.093	0.042	0.020	0.028	0.083	0.063	0.011	0.109	0.107	0.032
	218	0.030	0.071	0.056	0.019	0.038	0.000	0.071	0.043	0.017	0.027	0.021	0.030	0.051	0.008	0.063	0.011	0.022	0.048	0.019
	220	0.010	0.000	0.000	0.010	0.019	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.008	0.000	0.000	0.011	0.000	0.000
	222	0.000	0.000	0.000	0.000	0.000	0.010	0.000	0.000	0.000	0.000	0.000	0.000	0.006	0.000	0.000	0.000	0.000	0.000	0.000
	224	0.000	0.000	0.000	0.048	0.000	0.010	0.019	0.016	0.008	0.000	0.000	0.000	0.011	0.000	0.021	0.000	0.004	0.000	0.019
	226	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	230	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	268	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.010	0.000	0.000	0.000	0.000
*Bwf*2	139	0.000	0.000	0.000	0.000	0.000	0.000	0.006	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	141	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.013	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	143	0.030	0.078	0.052	0.083	0.056	0.070	0.064	0.058	0.099	0.053	0.133	0.145	0.065	0.079	0.017	0.094	0.104	0.035	0.063
	145	0.020	0.000	0.031	0.058	0.031	0.040	0.019	0.024	0.007	0.079	0.011	0.009	0.043	0.032	0.052	0.021	0.057	0.023	0.051
	147	0.010	0.000	0.000	0.000	0.000	0.000	0.000	0.005	0.000	0.020	0.022	0.000	0.005	0.000	0.000	0.000	0.000	0.000	0.000
	149	0.010	0.000	0.010	0.000	0.038	0.000	0.006	0.000	0.000	0.013	0.000	0.000	0.000	0.032	0.000	0.000	0.000	0.035	0.000
	151	0.580	0.641	0.469	0.625	0.669	0.680	0.724	0.683	0.683	0.447	0.644	0.673	0.522	0.619	0.724	0.594	0.607	0.709	0.595
	153	0.000	0.016	0.021	0.000	0.000	0.000	0.000	0.010	0.007	0.000	0.000	0.000	0.038	0.008	0.017	0.021	0.007	0.000	0.006
	155	0.010	0.000	0.000	0.033	0.000	0.000	0.006	0.005	0.014	0.000	0.011	0.000	0.022	0.008	0.000	0.000	0.004	0.012	0.000
	157	0.000	0.000	0.010	0.000	0.000	0.000	0.000	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.009	0.000	0.000	0.000	0.006
	159	0.340	0.266	0.396	0.192	0.206	0.190	0.167	0.197	0.183	0.375	0.178	0.173	0.299	0.214	0.181	0.219	0.207	0.186	0.272
	161	0.000	0.000	0.010	0.008	0.000	0.000	0.006	0.005	0.000	0.000	0.000	0.000	0.005	0.000	0.000	0.000	0.011	0.000	0.000
	163	0.000	0.000	0.000	0.000	0.000	0.020	0.000	0.005	0.007	0.000	0.000	0.000	0.000	0.008	0.000	0.042	0.000	0.000	0.006
	165	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.000	0.000
	167	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.010	0.000	0.000	0.000
C2-157	130	0.000	0.000	0.010	0.008	0.025	0.000	0.000	0.005	0.049	0.000	0.000	0.000	0.005	0.000	0.000	0.000	0.007	0.000	0.000
	132	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

	136	0.000	0.000	0.010	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.012	0.000	0.022	0.000	0.000	0.000	0.000	0.035	0.006
	138	0.000	0.000	0.000	0.000	0.006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.005	0.000	0.009	0.000	0.000	0.000	0.006
	140	0.000	0.000	0.000	0.008	0.000	0.000	0.013	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.010	0.000	0.000	0.019
	142	0.380	0.141	0.333	0.233	0.194	0.260	0.218	0.255	0.268	0.296	0.244	0.182	0.190	0.222	0.267	0.208	0.339	0.105	0.266
	144	0.030	0.016	0.052	0.033	0.044	0.010	0.058	0.045	0.035	0.026	0.000	0.000	0.049	0.016	0.026	0.031	0.021	0.047	0.038
	146	0.020	0.063	0.052	0.008	0.013	0.000	0.038	0.020	0.049	0.039	0.024	0.145	0.016	0.016	0.026	0.000	0.018	0.023	0.051
	148	0.070	0.047	0.135	0.050	0.169	0.120	0.090	0.060	0.092	0.086	0.061	0.055	0.120	0.063	0.121	0.146	0.079	0.023	0.108
	150	0.060	0.047	0.115	0.100	0.144	0.120	0.115	0.060	0.056	0.079	0.049	0.145	0.136	0.087	0.095	0.198	0.125	0.058	0.127
	152	0.010	0.016	0.010	0.008	0.031	0.010	0.064	0.025	0.014	0.020	0.000	0.000	0.022	0.024	0.009	0.021	0.025	0.012	0.013
	154	0.130	0.078	0.042	0.142	0.094	0.090	0.083	0.130	0.077	0.178	0.195	0.082	0.092	0.159	0.095	0.094	0.096	0.256	0.044
	156	0.070	0.063	0.073	0.083	0.038	0.050	0.038	0.080	0.120	0.072	0.085	0.036	0.076	0.063	0.095	0.010	0.086	0.116	0.044
	158	0.080	0.219	0.052	0.125	0.056	0.130	0.109	0.130	0.120	0.066	0.098	0.155	0.109	0.127	0.121	0.104	0.086	0.116	0.146
	160	0.060	0.094	0.063	0.075	0.050	0.030	0.077	0.050	0.035	0.046	0.098	0.036	0.033	0.079	0.026	0.010	0.036	0.058	0.019
	162	0.030	0.125	0.031	0.025	0.094	0.050	0.058	0.070	0.042	0.072	0.049	0.136	0.071	0.071	0.043	0.031	0.029	0.058	0.025
	164	0.000	0.000	0.000	0.025	0.013	0.010	0.006	0.010	0.014	0.000	0.012	0.027	0.005	0.024	0.026	0.010	0.014	0.000	0.013
	166	0.000	0.016	0.000	0.017	0.019	0.010	0.006	0.015	0.007	0.000	0.037	0.000	0.005	0.008	0.009	0.031	0.000	0.012	0.006
	168	0.010	0.000	0.010	0.017	0.006	0.030	0.000	0.000	0.007	0.000	0.000	0.000	0.005	0.000	0.000	0.031	0.004	0.000	0.006
	170	0.000	0.016	0.000	0.008	0.000	0.020	0.019	0.000	0.000	0.000	0.000	0.000	0.000	0.008	0.000	0.031	0.007	0.000	0.013
	172	0.030	0.016	0.010	0.008	0.000	0.040	0.006	0.005	0.014	0.007	0.012	0.000	0.005	0.016	0.017	0.000	0.018	0.000	0.019
	174	0.000	0.016	0.000	0.008	0.000	0.010	0.000	0.010	0.000	0.000	0.000	0.000	0.011	0.008	0.000	0.010	0.000	0.012	0.013
	176	0.000	0.000	0.000	0.008	0.000	0.010	0.000	0.010	0.000	0.007	0.012	0.000	0.011	0.008	0.009	0.021	0.004	0.023	0.006
	178	0.000	0.031	0.000	0.000	0.000	0.000	0.000	0.010	0.000	0.000	0.012	0.000	0.000	0.000	0.009	0.000	0.004	0.023	0.013
	180	0.020	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.012	0.000
	182	0.000	0.000	0.000	0.008	0.000	0.000	0.000	0.010	0.000	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.012	0.000
	184	0.000	0.000	0.000	0.000	0.006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.000
*Cocl*22	95	0.000	0.000	0.000	0.000	0.000	0.000	0.006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	101	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.010	0.000	0.000	0.000
	103	0.173	0.125	0.177	0.142	0.088	0.180	0.186	0.202	0.150	0.132	0.190	0.427	0.193	0.121	0.178	0.292	0.199	0.128	0.114
	105	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.004	0.000	0.013
	111	0.000	0.000	0.021	0.000	0.006	0.000	0.026	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	113	0.031	0.047	0.021	0.050	0.025	0.000	0.013	0.053	0.043	0.033	0.083	0.000	0.074	0.024	0.033	0.021	0.008	0.035	0.082
	115	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	117	0.000	0.031	0.010	0.017	0.000	0.000	0.006	0.010	0.000	0.000	0.012	0.000	0.023	0.008	0.011	0.010	0.004	0.012	0.013
	119	0.133	0.078	0.188	0.058	0.150	0.220	0.128	0.178	0.107	0.053	0.036	0.155	0.051	0.040	0.067	0.146	0.039	0.116	0.089
	121	0.612	0.656	0.510	0.608	0.619	0.500	0.519	0.490	0.579	0.743	0.583	0.318	0.625	0.653	0.667	0.458	0.637	0.605	0.595
	123	0.031	0.016	0.010	0.000	0.000	0.020	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.008	0.000	0.010	0.016	0.000	0.000
	125	0.010	0.016	0.063	0.083	0.025	0.030	0.077	0.034	0.036	0.007	0.083	0.091	0.034	0.032	0.022	0.031	0.051	0.047	0.070
	127	0.010	0.031	0.000	0.008	0.075	0.020	0.006	0.014	0.050	0.033	0.000	0.000	0.000	0.081	0.000	0.021	0.023	0.035	0.006
	129	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.000	0.000
	131	0.000	0.000	0.000	0.008	0.000	0.010	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.008	0.000	0.000	0.000	0.000	0.000

	133	0.000	0.000	0.000	0.000	0.000	0.010	0.000	0.005	0.021	0.000	0.012	0.000	0.000	0.008	0.011	0.000	0.004	0.012	0.006
	135	0.000	0.000	0.000	0.025	0.013	0.010	0.032	0.010	0.014	0.000	0.000	0.009	0.000	0.008	0.000	0.000	0.012	0.012	0.013
	141	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.008	0.000	0.000	0.000	0.000	0.000
	147	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
*Cocl*23	247	0.010	0.000	0.000	0.000	0.000	0.000	0.006	0.000	0.007	0.000	0.000	0.000	0.000	0.016	0.017	0.000	0.000	0.000	0.000
	249	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	251	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.000	0.000
	253	0.292	0.250	0.273	0.200	0.165	0.280	0.201	0.196	0.214	0.285	0.211	0.137	0.021	0.286	0.181	0.298	0.085	0.141	0.215
	255	0.094	0.058	0.136	0.100	0.095	0.070	0.032	0.074	0.171	0.069	0.078	0.039	0.322	0.119	0.086	0.053	0.192	0.064	0.120
	257	0.083	0.058	0.011	0.008	0.000	0.010	0.006	0.020	0.021	0.049	0.022	0.000	0.137	0.016	0.017	0.043	0.077	0.013	0.025
	259	0.271	0.365	0.148	0.275	0.304	0.240	0.214	0.191	0.114	0.299	0.233	0.353	0.178	0.254	0.198	0.181	0.204	0.205	0.234
	261	0.063	0.058	0.159	0.067	0.082	0.040	0.169	0.088	0.043	0.042	0.078	0.118	0.144	0.119	0.043	0.043	0.173	0.064	0.127
	263	0.021	0.038	0.023	0.025	0.032	0.020	0.071	0.025	0.043	0.028	0.011	0.020	0.034	0.032	0.043	0.011	0.038	0.077	0.013
	265	0.010	0.096	0.080	0.025	0.146	0.060	0.078	0.039	0.029	0.083	0.044	0.010	0.048	0.024	0.043	0.085	0.085	0.038	0.044
	267	0.094	0.058	0.114	0.158	0.139	0.160	0.149	0.196	0.257	0.097	0.211	0.245	0.082	0.087	0.181	0.149	0.088	0.333	0.158
	269	0.063	0.019	0.057	0.125	0.038	0.120	0.071	0.162	0.093	0.049	0.100	0.078	0.034	0.048	0.155	0.117	0.046	0.064	0.038
	271	0.000	0.000	0.000	0.008	0.000	0.000	0.000	0.005	0.007	0.000	0.011	0.000	0.000	0.000	0.026	0.000	0.004	0.000	0.025
	273	0.000	0.000	0.000	0.008	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	274	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.000	0.000
	275	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	277	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.000
	279	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	285	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.000
	287	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.009	0.000	0.000	0.000	0.000
	289	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
*CoclLav*32	245	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	249	0.770	0.625	0.698	0.741	0.638	0.680	0.590	0.721	0.736	0.717	0.689	0.455	0.777	0.746	0.629	0.685	0.736	0.709	0.665
	253	0.230	0.375	0.302	0.241	0.350	0.290	0.410	0.274	0.257	0.276	0.278	0.545	0.223	0.246	0.362	0.272	0.261	0.291	0.323
	257	0.000	0.000	0.000	0.000	0.013	0.030	0.000	0.000	0.000	0.007	0.000	0.000	0.000	0.008	0.009	0.043	0.004	0.000	0.013
	261	0.000	0.000	0.000	0.017	0.000	0.000	0.000	0.005	0.007	0.000	0.033	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	265	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	273	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
*CoclLav*4	139	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	141	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	143	0.010	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.008	0.000	0.000	0.000	0.012	0.000
	145	0.000	0.000	0.010	0.000	0.000	0.000	0.000	0.000	0.028	0.000	0.000	0.000	0.000	0.000	0.009	0.000	0.004	0.000	0.000
	147	0.340	0.375	0.344	0.383	0.450	0.551	0.591	0.375	0.430	0.453	0.400	0.343	0.330	0.435	0.414	0.500	0.389	0.427	0.443
	149	0.540	0.531	0.396	0.325	0.281	0.286	0.318	0.399	0.352	0.480	0.267	0.537	0.392	0.355	0.422	0.333	0.351	0.305	0.399

	151	0.110	0.094	0.250	0.292	0.269	0.153	0.091	0.221	0.183	0.067	0.333	0.120	0.273	0.202	0.155	0.167	0.252	0.256	0.158
	153	0.000	0.000	0.000	0.000	0.000	0.010	0.000	0.005	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.000	0.000
	155	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.006	0.000	0.000	0.000	0.000	0.000	0.000
	159	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
*CoclLav*45	236	0.041	0.032	0.042	0.008	0.006	0.100	0.006	0.049	0.051	0.016	0.045	0.000	0.016	0.008	0.035	0.021	0.030	0.000	0.006
	238	0.020	0.065	0.104	0.142	0.031	0.150	0.083	0.132	0.072	0.041	0.080	0.150	0.110	0.105	0.044	0.063	0.138	0.183	0.064
	240	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	242	0.051	0.113	0.104	0.192	0.325	0.020	0.224	0.093	0.138	0.057	0.261	0.210	0.132	0.185	0.149	0.000	0.093	0.012	0.109
	244	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	246	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.005	0.000	0.000	0.000	0.004	0.000	0.000
	248	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.009	0.021	0.004	0.000	0.000
	250	0.347	0.194	0.531	0.367	0.300	0.620	0.455	0.417	0.457	0.287	0.341	0.250	0.401	0.355	0.316	0.771	0.373	0.463	0.436
	252	0.541	0.597	0.219	0.292	0.338	0.110	0.231	0.304	0.268	0.598	0.273	0.390	0.335	0.347	0.447	0.125	0.351	0.341	0.385
	254	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.000	0.000
	258	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.000	0.000
	260	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
*CoclLav*52	94	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	98	0.173	0.150	0.106	0.164	0.109	0.132	0.242	0.167	0.200	0.159	0.136	0.115	0.154	0.151	0.123	0.070	0.206	0.113	0.162
	100	0.000	0.000	0.000	0.000	0.000	0.000	0.008	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.009	0.023	0.004	0.000	0.000
	102	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	104	0.020	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.012	0.011	0.000	0.000	0.000	0.000	0.000	0.004	0.000	0.014
	106	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.012	0.000	0.000	0.000
	108	0.000	0.000	0.053	0.026	0.043	0.000	0.023	0.025	0.023	0.000	0.057	0.000	0.022	0.063	0.009	0.023	0.048	0.025	0.041
	110	0.000	0.000	0.000	0.000	0.014	0.044	0.008	0.010	0.038	0.000	0.011	0.000	0.016	0.032	0.035	0.023	0.007	0.013	0.014
	112	0.000	0.017	0.021	0.034	0.029	0.029	0.015	0.010	0.000	0.000	0.034	0.000	0.011	0.024	0.000	0.000	0.015	0.013	0.000
	114	0.082	0.167	0.138	0.129	0.312	0.029	0.129	0.126	0.062	0.049	0.114	0.167	0.110	0.151	0.096	0.105	0.085	0.138	0.108
	116	0.265	0.283	0.362	0.233	0.167	0.265	0.280	0.232	0.315	0.207	0.239	0.154	0.341	0.198	0.263	0.279	0.283	0.125	0.270
	118	0.041	0.033	0.000	0.043	0.007	0.015	0.008	0.071	0.008	0.037	0.023	0.064	0.044	0.024	0.018	0.012	0.022	0.050	0.027
	120	0.000	0.000	0.000	0.000	0.000	0.015	0.000	0.010	0.031	0.000	0.000	0.038	0.011	0.000	0.009	0.035	0.018	0.000	0.014
	122	0.102	0.050	0.074	0.026	0.007	0.132	0.030	0.015	0.000	0.049	0.023	0.077	0.049	0.056	0.035	0.105	0.033	0.088	0.041
	124	0.061	0.033	0.064	0.095	0.051	0.088	0.098	0.126	0.100	0.085	0.102	0.115	0.060	0.063	0.149	0.081	0.129	0.075	0.088
	126	0.010	0.033	0.032	0.017	0.036	0.059	0.030	0.020	0.038	0.024	0.011	0.064	0.022	0.024	0.053	0.012	0.033	0.050	0.027
	128	0.031	0.033	0.000	0.026	0.007	0.015	0.015	0.020	0.008	0.049	0.034	0.077	0.005	0.024	0.018	0.012	0.007	0.038	0.027
	130	0.000	0.000	0.000	0.009	0.022	0.000	0.000	0.015	0.023	0.012	0.034	0.000	0.005	0.008	0.009	0.000	0.004	0.013	0.000
	132	0.020	0.017	0.021	0.000	0.014	0.000	0.008	0.000	0.000	0.000	0.023	0.026	0.005	0.008	0.000	0.012	0.007	0.025	0.014
	134	0.133	0.067	0.011	0.000	0.007	0.000	0.000	0.020	0.015	0.183	0.000	0.013	0.000	0.024	0.026	0.000	0.007	0.025	0.014
	136	0.041	0.050	0.085	0.017	0.043	0.059	0.038	0.025	0.023	0.098	0.000	0.026	0.066	0.056	0.000	0.058	0.040	0.113	0.088
	138	0.020	0.050	0.021	0.103	0.072	0.088	0.053	0.025	0.085	0.024	0.080	0.038	0.055	0.079	0.070	0.105	0.026	0.038	0.034
	140	0.000	0.017	0.000	0.060	0.029	0.000	0.000	0.035	0.023	0.012	0.045	0.000	0.016	0.008	0.035	0.012	0.000	0.013	0.007

	142	0.000	0.000	0.000	0.000	0.029	0.015	0.000	0.005	0.000	0.000	0.000	0.013	0.005	0.000	0.018	0.023	0.018	0.025	0.000
	144	0.000	0.000	0.011	0.009	0.000	0.015	0.000	0.020	0.000	0.000	0.000	0.013	0.000	0.000	0.018	0.000	0.004	0.000	0.007
	146	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	148	0.000	0.000	0.000	0.009	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	150	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	152	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	154	0.000	0.000	0.000	0.000	0.000	0.000	0.015	0.000	0.000	0.000	0.011	0.000	0.000	0.008	0.000	0.000	0.000	0.025	0.007
	156	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.010	0.008	0.000	0.011	0.000	0.000	0.000	0.009	0.000	0.000	0.000	0.000
*CoclLav*6	123	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	125	0.080	0.016	0.185	0.000	0.000	0.000	0.000	0.000	0.000	0.026	0.000	0.055	0.067	0.270	0.000	0.000	0.026	0.081	0.044
	127	0.520	0.688	0.565	0.763	0.724	0.510	0.788	0.728	0.746	0.671	0.700	0.618	0.725	0.500	0.595	0.479	0.752	0.663	0.753
	129	0.000	0.000	0.000	0.018	0.000	0.030	0.013	0.005	0.000	0.000	0.022	0.000	0.011	0.000	0.026	0.021	0.007	0.000	0.006
	131	0.110	0.000	0.043	0.000	0.000	0.000	0.006	0.000	0.000	0.000	0.000	0.009	0.000	0.071	0.000	0.000	0.000	0.012	0.000
	133	0.060	0.109	0.130	0.132	0.115	0.310	0.096	0.204	0.194	0.112	0.100	0.191	0.079	0.032	0.259	0.333	0.115	0.105	0.114
	135	0.000	0.000	0.000	0.026	0.000	0.020	0.000	0.010	0.022	0.013	0.078	0.000	0.006	0.000	0.026	0.021	0.007	0.023	0.006
	137	0.000	0.000	0.000	0.000	0.038	0.000	0.000	0.005	0.007	0.000	0.011	0.055	0.006	0.008	0.000	0.010	0.004	0.023	0.006
	139	0.080	0.000	0.011	0.000	0.019	0.060	0.000	0.000	0.000	0.000	0.011	0.027	0.000	0.071	0.000	0.094	0.004	0.023	0.013
	141	0.150	0.188	0.065	0.053	0.096	0.070	0.090	0.039	0.030	0.178	0.078	0.045	0.022	0.040	0.095	0.042	0.074	0.058	0.057
	143	0.000	0.000	0.000	0.009	0.006	0.000	0.006	0.010	0.000	0.000	0.000	0.000	0.073	0.008	0.000	0.000	0.011	0.012	0.000
	145	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.000
	159	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
*CoclLav*68	167	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	169	0.000	0.000	0.000	0.000	0.000	0.000	0.019	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	171	0.010	0.016	0.021	0.025	0.025	0.010	0.013	0.010	0.007	0.007	0.022	0.000	0.000	0.008	0.000	0.021	0.015	0.000	0.000
	173	0.140	0.078	0.135	0.150	0.081	0.153	0.122	0.168	0.148	0.087	0.133	0.218	0.161	0.167	0.207	0.266	0.162	0.107	0.171
	175	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.000
	177	0.850	0.891	0.844	0.800	0.894	0.827	0.846	0.822	0.838	0.907	0.833	0.782	0.828	0.825	0.784	0.713	0.813	0.881	0.823
	179	0.000	0.016	0.000	0.025	0.000	0.010	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.000	0.009	0.000	0.011	0.012	0.006
	181	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
*Sfo*23	147	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.006
	149	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	151	0.033	0.016	0.000	0.008	0.013	0.000	0.000	0.010	0.000	0.033	0.033	0.000	0.000	0.008	0.009	0.031	0.007	0.000	0.013
	153	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.010	0.000	0.000	0.000	0.000	0.000	0.008	0.000	0.000	0.000	0.000	0.000
	155	0.067	0.156	0.083	0.075	0.081	0.146	0.110	0.107	0.148	0.059	0.156	0.118	0.038	0.111	0.079	0.125	0.100	0.060	0.133
	157	0.011	0.000	0.000	0.017	0.006	0.021	0.026	0.029	0.014	0.000	0.011	0.027	0.049	0.000	0.000	0.021	0.022	0.000	0.006
	159	0.322	0.234	0.146	0.067	0.144	0.177	0.097	0.121	0.169	0.263	0.078	0.045	0.027	0.127	0.096	0.198	0.067	0.143	0.127
	161	0.022	0.016	0.042	0.017	0.013	0.010	0.058	0.019	0.021	0.053	0.056	0.018	0.027	0.032	0.035	0.021	0.033	0.024	0.019
	163	0.178	0.172	0.344	0.342	0.256	0.177	0.240	0.257	0.324	0.211	0.289	0.309	0.076	0.317	0.333	0.250	0.233	0.190	0.266

	165	0.122	0.125	0.156	0.158	0.188	0.208	0.227	0.199	0.190	0.125	0.211	0.082	0.337	0.167	0.228	0.146	0.259	0.286	0.209
	167	0.000	0.031	0.031	0.033	0.000	0.031	0.039	0.034	0.042	0.007	0.022	0.018	0.152	0.016	0.026	0.031	0.085	0.000	0.006
	169	0.144	0.188	0.083	0.100	0.069	0.125	0.065	0.107	0.063	0.184	0.056	0.164	0.049	0.103	0.079	0.135	0.067	0.143	0.108
	171	0.000	0.016	0.021	0.042	0.006	0.010	0.019	0.039	0.000	0.007	0.022	0.009	0.141	0.016	0.009	0.021	0.033	0.024	0.032
	173	0.033	0.031	0.000	0.000	0.000	0.010	0.013	0.015	0.000	0.026	0.000	0.036	0.016	0.008	0.009	0.010	0.022	0.036	0.019
	175	0.011	0.000	0.000	0.000	0.000	0.000	0.006	0.005	0.007	0.000	0.000	0.018	0.005	0.000	0.000	0.000	0.022	0.012	0.006
	177	0.033	0.016	0.031	0.025	0.013	0.000	0.000	0.000	0.000	0.013	0.000	0.009	0.011	0.000	0.009	0.000	0.015	0.060	0.019
	179	0.000	0.000	0.031	0.075	0.200	0.010	0.058	0.024	0.014	0.020	0.044	0.136	0.049	0.056	0.053	0.010	0.011	0.024	0.019
	181	0.000	0.000	0.031	0.008	0.006	0.010	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.016	0.000	0.000	0.000	0.000	0.006
	183	0.011	0.000	0.000	0.025	0.006	0.010	0.000	0.019	0.007	0.000	0.000	0.009	0.011	0.008	0.026	0.000	0.011	0.000	0.006
	185	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.005	0.000	0.000	0.011	0.000	0.000	0.008	0.009	0.000	0.007	0.000	0.000
	187	0.000	0.000	0.000	0.000	0.000	0.000	0.006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	191	0.000	0.000	0.000	0.000	0.000	0.000	0.006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	193	0.000	0.000	0.000	0.000	0.000	0.010	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	195	0.000	0.000	0.000	0.008	0.000	0.010	0.026	0.000	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.004	0.000	0.000
	197	0.000	0.000	0.000	0.000	0.000	0.021	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	199	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	201	0.011	0.000	0.000	0.000	0.000	0.010	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
*Sfo8*L	163	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	165	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.012	0.000
	169	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	171	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.004	0.012	0.000
	173	0.140	0.109	0.083	0.067	0.075	0.060	0.045	0.082	0.079	0.112	0.056	0.036	0.098	0.032	0.078	0.094	0.071	0.060	0.038
	175	0.480	0.453	0.542	0.533	0.606	0.620	0.545	0.548	0.529	0.454	0.544	0.727	0.549	0.619	0.603	0.583	0.514	0.536	0.551
	177	0.050	0.063	0.010	0.000	0.000	0.050	0.000	0.005	0.000	0.053	0.011	0.000	0.092	0.000	0.009	0.031	0.154	0.000	0.019
	179	0.260	0.281	0.250	0.258	0.238	0.190	0.256	0.231	0.314	0.237	0.267	0.127	0.092	0.286	0.216	0.208	0.146	0.179	0.323
	181	0.050	0.094	0.083	0.117	0.050	0.030	0.077	0.096	0.064	0.132	0.100	0.109	0.120	0.040	0.086	0.042	0.054	0.143	0.057
	183	0.020	0.000	0.010	0.000	0.000	0.000	0.026	0.005	0.000	0.000	0.000	0.000	0.005	0.000	0.000	0.000	0.004	0.000	0.000
	185	0.000	0.000	0.021	0.025	0.031	0.040	0.051	0.034	0.014	0.013	0.011	0.000	0.043	0.024	0.009	0.021	0.050	0.060	0.013
	187	0.000	0.000	0.000	0.000	0.000	0.010	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.010	0.004	0.000	0.000
	189	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.010	0.000	0.000	0.000
	193	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
*Sfo8*U	205	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	209	0.000	0.000	0.000	0.000	0.000	0.000	0.006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	211	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.000	0.000
	213	0.000	0.000	0.000	0.008	0.000	0.010	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.008	0.000	0.000	0.004	0.000	0.000
	215	0.860	0.781	0.771	0.750	0.763	0.670	0.526	0.750	0.743	0.895	0.756	0.782	0.599	0.698	0.733	0.625	0.736	0.798	0.652
	217	0.000	0.000	0.021	0.025	0.031	0.040	0.006	0.014	0.007	0.007	0.011	0.000	0.027	0.048	0.017	0.125	0.039	0.024	0.019
	219	0.070	0.094	0.115	0.100	0.175	0.170	0.276	0.115	0.136	0.079	0.100	0.173	0.264	0.135	0.198	0.125	0.093	0.107	0.203

221	0.000	0.000	0.000	0.000	0.006	0.000	0.000	0.005	0.000	0.000	0.000	0.000	0.022	0.000	0.000	0.000	0.004	0.000	0.006
223	0.010	0.000	0.031	0.033	0.006	0.000	0.000	0.029	0.036	0.000	0.022	0.000	0.000	0.000	0.000	0.000	0.039	0.000	0.000
225	0.060	0.125	0.063	0.083	0.019	0.110	0.186	0.082	0.079	0.020	0.111	0.045	0.088	0.111	0.043	0.104	0.082	0.071	0.120
227	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.009	0.000	0.000	0.000	0.000
235	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.010	0.000	0.000	0.000
257	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.010	0.000	0.000	0.000
259	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000