EU Project WESTHER

Third Co-ordination Meeting

7-9 December 2004

Palma de Mallorca, Spain

EU-Project WESTHER

A multidisciplinary approach to the identification of herring (*Clupea harengus* L.) stock components west of the British Isles using biological tags and genetic markers.
Q5RS-2002-01056 (2003-2005)

Third co-ordination meeting held at
Hotel Palladium Palma de Mallorca, Spain, 7 - 9 December 2004

Minutes

Participants (for contact details see Table 1 at end of minutes):

Emma Hatfield (Co-ordinator)	FRS, UK (Scotland)
John Boyd	MI, Ireland
Neil Campbell	University of Aberdeen, UK (Scotland)
Jimmy Chubb	University of Liverpool, UK (England)
Marcus Cross	University of Liverpool, UK (England)
Tom Cross	NUIC, Ireland
Audrey Geffen	University of Bergen, Norway
Soenke Jansen	BFA-Fi, Germany
Suzanne Kay	University of Liverpool, UK (England)
Ken MacKenzie	University of Aberdeen, UK (Scotland)
Richard Nash	University of Liverpool, UK (England)
Dave O'Leary	NUIC, Ireland
Jürgen Schlickeisen	BFA-Fi, Germany
Pieter-Jan Schön	DARDNI, UK (Northern Ireland)
Phill Watts	University of Liverpool, UK (England)
Christopher Zimmermann	BFA-Fi, Germany
Alain Zuur	FRS, UK (Scotland)

Tuesday 9th December

Welcome and introductions

Emma Hatfield (EH) opened the meeting. All participants were welcomed, and each introduced themselves briefly, stating their affiliation and their role within the project. Pieter-Jan Schön and Chris Zimmermann (CZ) agreed to act as rapporteurs. John Boyd (JB) from the Marine Institute, Ireland was delayed, and Steven Beggs from Liverpool was unable to make the meeting due to travel difficulties. Ciaran Kelly from the Marine Institute, Ireland was unable to attend and sent his apologies.

EH distributed the draft publications agreement document to inform later discussion.

Audrey Geffen (AG) and Richard Nash (RN) informed the group of the situation with Liverpool University and IMR/Bergen University due to their relocation. To avoid a redraft of the Technical Annex, which could take a year (according to Commission), the proposed strategy is for Liverpool University to subcontract IMR to centralise administration responsibilities. IMR in turn will then channel funds back to Liverpool University (WP04) and University of Bergen (WP06) to complete work. RN, based at IMR, will continue to co-ordinate additional sampling requirements.

Each institution involved in project needs to sign a document stating that they will not hold to subcontracting rules with regards to intellectual property rights and access to data (something for DARD to follow-up too).

Action: Bergen will send these letters to contracting partners ASAP.

Presentation of work packages detailing progress to date

EH requested copies of all the presentations for publication on the website and for abstracts of the presentations to be included in meeting minutes (See Appendix 1). Presentations were then given by each partner on work carried out on different workpackages during reporting period 2 and the main points covered are given below.

WP01: Sampling - Emma Hatfield
Target sampling numbers: adults (100), juveniles (100), non-spawning 'mixed groups' (500).

A summary was given of samples collected during 2004, highlighting problems and coverage. Noted a significant improvement in sampling intensity and coverage from 2003 levels.

Adults: Marine Institute western Irish samples: 4 were collected (S01, S02, S03 and S04A, 1 not by the time of the meeting, but probably by the end of the year. LIV: S05 was unable to be sampled as no fish were found; S06 was collected, larvae (small sample) were taken in the Irish Sea. FRS samples: 2 out of 6 were collected - S07, S08 and S09 were not as, again, no spawning fish were found in those areas (as last year, which is disappointing), S10A and S10B were collected. Total of 7 out of 12.
Juveniles: MI 1 out of 2 sampled (J01 not J02), DARD: 3 out of 4 sampled, the one missing was also lost last year (J03B, J04A and J04B). FRS all 3 samples taken (J05A, J05B & J06A), but one from a different Loch and one with only 50 specimens. BFA-Fi sample taken as planned (J07). Total of 9 out of 10.
Mixed adults: all 4 have been taken, but two of them with less than 200 fish (M01 & M03). Total of 4 out of 4.
Outliers: all 4 samples taken. Finclips and intestine would be available for all of them. Genetics WP need internal organs from spawning fish – finclips cannot be used because they might be/are contaminated. Part of the liver should be used for the genetics. Total of 4 out of 4.
Temporal sampling in the Irish Sea: First two sampled, third not possible, very short spawning season this year. Finclips were taken from these spawning fish and these might therefore not usable!

WP02.1: Soenke Jansen - morphometry
Reiterates aims – to validate the hypothesis of a correlation between fish morphology and stock identification.

21 distance measurements per fish taken from photos. Quality of photos is reasonable by now. Slight modification on standard length measurement – excluding photos with open jaws etc. Good agreement between length measured at sea and those taken from photos. Mean length: small for juveniles, large for mixed and adults, largest for Rügen outliers. Issues on normal distribution of measurements in different samples – some measurements are not normally distributed maybe because of low sample size. Dorsal fin length can't be used – no differences visible. Head length and preorbital length much more promising among 5 other distances (7 out of 20 measurements seem promising for discrimination).

Discussion: Alain Zuur (AZ) highlighted potential problems with regards to the multivariate analysis. Due to the high number of morphometric variables, preliminary data exploration indicates a high degree of cross correlation between variables (co-linearity problems), thus might have to choose between variables to include prior to performing analysis.

WP02.2: Soenke Jansen - otolith morphology
No juveniles, only spawners, mixed and outliers being processed and analysed. A number of basic parameters are taken, plus Fourier analysis (30 descriptors taken, first 20 useful) - results in 77 parameters per otolith. Comparison of primary data by group and sex and length (both absolute and relative). Relative values show bigger differences. Rügen herring has lightest otoliths (but are biggest fish)! Fourier descriptors: little differences in 2-dimensional MDS graphs. Mean otolith outline indicates slight differences, no correlation between EFA and fish length.

WP02.3 Marcus Cross - caeca
Expectation: temperature and caeca count are inversely correlated. Colder = more caeca. 12-31 caeca per fish. No major problems with obtaining samples and sample quality; more than 1200 samples processed so far; caeca count range narrower than in previous investigations, median 21. Significant differences between some samples if outliers are taken into consideration. Very low number of abnormalities (looped/bifurcated). Normalisation needs to be done once age info is available. At present, some statistically important assumptions seem to be violated, which requires a normalisation.

Discussion: AG raised the issue of whether the aim of the WP is to assign individuals to groups or discriminate between groups. What will be possible will probably be restricted by data.

WP03: Ken Mackenzie - Parasites

An overview of the objectives was given. A list of 14 species found so far was presented. Digenea most numerous (one new host record). 6 are selected as tags (3 digeneans, 2 nematodes, one cestode). 2 cercarians are useful as fingerprints (can infect herring only during the first year of life but live on in herring for a number of years. The limitation to infection in first year of life may be due to feeding habits/diet of young herring, or alternatively, the ability of the parasites to penetrate through pyloric caecae may be limited to young herring.). Others live not longer than a year and might be used to track in-year migrations. Anisakids cumulate with age. Some species can only be distinguished by molecular techniques. 574 juvenile herring examined to date. Preliminary results indicate that there is a significant difference in prevalence and abundance of parasites between juveniles from the eastern and western Irish Sea. Abundance of both parasite species are high in juvenile herring in west and low in eastern Irish Sea with no incidence of *C. pythionike*. No prevalence of 2 species in spawning fish was found in the Irish Sea.
Based on preliminary results, a number of hypotheses were proposed:

- Irish Sea spawners sampled were not recruited from western Irish Sea nurseries, but could have been at least in part recruited from eastern Irish Sea.
- Clyde spawners not recruited from western Irish Sea nursery or from Scottish coastal or offshore waters
- Evidence of two components, recruited from different nursery areas, in samples of Celtic Sea spawners

Discussion: RN showed the results from Brophy and Danilowicz (2002, ICES Journal of Marine Science, 59: 1305–1313) who attempted tracing populations of Atlantic herring in the Irish and Celtic Seas using otolith microstructure. The paper provides some support to the proposed hypotheses relating to Celtic and Irish Sea.

An in depth discussion followed on the validity of using a particular statistical analysis. Specific techniques will work for specific types of data, but might run into problems when combining these data sets into one multivariate analysis – conflicting data requirements. This is an issue that needs to be addressed by the different subgroups in consultation with AZ.

WP03: Neil Campbell - parasite genetics

Genomic regions used for development of markers were presented, which consisted of the ribosomal gene array and the mitochondrial genome. The internal transcribed spacer (ITS) region of the ribosomal array is a good marker for identifying parasites at the species level and for identification of hybrid species, as has been seen with *Anisakis* parasites. The mitochondrial DNA (mtDNA) has higher levels of variation than the ITS region and as such is good for closely related species and as potential population markers. Genes isolated to date - ITS and COI from *Anisakis* and *C .pythionike*, and ITS from *C. doricha*. These molecular markers have been identified for a number of previously un-studied parasites, taken from fish (2^{nd} host) and birds (final host). They have allowed the identification of a number of junior synonyms (from cercaria to adult parasites). Anisakis was investigated from 5 different sites. Clear distinction between herring populations based on anisakis haplotypes. However, half the fish examined had no anisakis; 25% from 3% of the fish. Proper subsampling appears to be an issue.

WP04: Dave O'Leary – herring mcrosatellites

Ten samples have been fully analysed to date, the delay arising from contamination of spawner fin-clips by spawning products (non-visible milt probably). Up to 17 loci have been examined, and 9 of these have been used in the preliminary analysis of testing both intra- and inter-sample statistics. Intra-sample tests have examined the number of alleles at each locus, and shown that each locus looks OK and tested for deviations from the expected heterozygosity of samples. One locus – Cpa 106 – looks odd and a decision on its inclusion made in the genetics sub-group meeting. Inter-sample comparisons made using Fisher's test. Only 10 of 405 pairwise comparisons were statistically significant after Bonferroni corrections. The F_{st} values are low but highly significant. So, the genetic distance measurements show that there is significant difference between some populations but the bootstrapped values are very low. However, only 15% of the individual fish were properly assigned to their correct population of origin. Outliers have still to be processed. Problems: because of the fin-clip contamination of spawners internal liver tissue is being used instead, delivered by UNIABDN and LIV to NUIC and LIV. Fin-clips remain OK for juvenile and mixed adult samples.; failure to amplify certain loci consistently; 2 base pair shifts in some loci. Discussion on contaminated finclips – no problems obtained in HERGEN while there are problems in WESTHER. No simple explanation for this, some researchers at Hull Univ. appear to have had similar problems while others didn't. Temporal samples should not further analysed (because internal samples are not available) but finclips should be stored to allow future investigation. UCC and LIV have different preferences for loci – there are some that UCC can amplify and LIV not and vice versa – this is not a problem and will be resolved during the genetics sub-group meeting.

Phill Watts - herring microsatellites
LIV have used 14 loci to date and done the same tests for independence as UCC. The 14 loci have been tested in 3 pools. Same problems with contamination of spawner finclips. Intercalibration with Univ. Hull samples. A number of loci should be dropped – will be discussed in detail in the genetics subgroup tomorrow. Preliminary results show mostly very weak differences, but outliers are slightly more different. Differences between tribes of salmon taken from one river are usually higher than for Rügen and west of the British Isles herring! Poor assignment success. Some of the samples could be missing alleles – pooling might help to overcome this problem for preliminary stock assessment purposes. But this requires large sample sizes (>50 fish?).

WP05: Soenke Jansen - otolith microstructure
Problems with non-circular growth; determination of proper radius; in some areas the rings are not visible (preparation problem?). Some samples did not meet the expectations (much more scatter), it might be even difficult to determine autumn- and spring spawners unambiguously – or this is an indication that fish spawned in autumn might not necessarily spawn in the same season? Or it is just a misinterpretation of the results (those data from above 100 µm away from the nucleus should not be used for the determination of spawning season but for growth rates only).

WP06: Audrey Geffen - otolith microchemistry / aka chemistry
No samples have been analysed yet. Bergen will be processing a large number of otoliths at once to avoid machine effect. Contamination of otoliths is crucial – whenever you handle them, never with bare hands, and keep them dry!

Gave background of otolith microchemistry (otolith chemistry) work and what to expect based on results from CODTRACE. Different techniques can be used to get at the otolith core; WESTHER will use laser ablation to sample the otolith core, along with a surface technique – WDS. Strontium and sodium relatively high concentration in otoliths and also good for group concentrations. Highlighted a number of low concentration elements (eg. Cu, Rb, etc) that are very characteristic in some areas, but difficult in terms of detection. Some such as Ba and Mn better in terms of detection.

WP07: Alain Zuur - multivariate statistics
Only one month work assigned to 2004, 3 months to 2005 for AZ, others also have time assigned to the WP. AZ has been collating spawner data in preparation of the Hamburg workshop in January and to get a feeling for the kind of data to be expected for the final analysis. Techniques that have been explored to early December were general data exploration, classification trees, discriminant analysis and multi-nomial logistic regression. Problems might appear with datasets containing a large number of variables (use PCA axes instead to summarise WPs), reduce auto-correlation. AZ would like to wait with processing the data until all data is available (which will not happen prior to Sept 2005) – evaluation should definitely start earlier.

Preparation of the Hamburg workshop: suggestion to start with half a day basic data exploration and transformation techniques, followed by 2.5 days advanced statistics and 2 days work on own data and cleaning up the database. Discussion on if basics should be skipped completely and what was the original intention of that workshop.

Western stocks, a short overview: Richard Nash
Summary of expectations from project based on historical knowledge. Summary of western herring stocks in terms of stock sizes of assessed stocks – data from HAWG 2004. Giving a summary of populations in terms of location and size relative to one another. Short summary of historical trends and stock dynamics. Expectations based on the limit of knowledge of feeding grounds for different stocks (adults) and juveniles based on larval drift.
Few points highlighted to think about:

- VIaN by far largest
- tendency for fish to move from N-S
- Celtic sea stock at southern end of distribution of a northern species

Recent 'preliminary' analysis based on productivity showed that Irish Sea stock cannot be sustained at current fishing levels – implies that assessment is wrong by factor of 2.5 or being fed from somewhere else i.e., VIaN?? Learning of spawning grounds hypothesis i.e., concept of herring being return spawners rather than homing spawners as most small pelagics.

TC: Where would you expect separation/differentiation of groups in WESTHER area?
RN: Conflicting results from past studies – can discriminate between groups but not able to assign individual fish to specific group/stock.

AG: Expect to be distinction between autumn & spring spawning fish
JC: Any changes in distributions based on survey data related to year class strength?
RN & CZ: No – just change in concentrations.

Wednesday 8th December 2004.

Subgroups

The partners divided into subgroups for most of the day to discuss progress and problems with sampling, fish genetics and parasite workpackages.

Outcome of sub-group meetings and to discuss matters arising.

Sampling-Emma Hatfield FRS

An overview of samples, what has and has not been sampled, sampling for 2005, possibilities of compensating for samples not taken in 2004? Data exchange

Samples not taken in 2004
Spawners:

S04B Donegal November – expected to be collected by the end of the year
S05A Clyde March – 'Aora' was on standby out of Millport but a combination of poor weather and a lack of available spawning aggregations resulted in no sample
S07A Barra Head Sept/Oct; S09A Northern Hebrides Sept/Oct – arrangements were made with small prawn boats fishing out of Mallaig and Portree respectively to collect these samples. Weather conditions were atrocious throughout much of the time fish should have been aggregating to spawn and no samples were able to be collected.
S08A Western Hebrides November – personnel were available on the FRS vessel 'Scotia' but no spawning herring were caught in the area.

Juveniles

J01A Baltimore September – no herring found in the mixed sprat fishery
J03A Irish Sea East March – communication problems resulted in no-one being present to take samples on the first half of the Irish Sea survey

Sampling in 2005

S01A – should be sampled
S04A – should be sampled
S05A – from 'Aora'. Details to be sorted out by RN. FRS (EH) will try to set up contacts in Clyde as back-up.
S10A – should be sampled

J03A – space on DARD groundfish survey OK – personnel from LIV?
J04A - space on DARD groundfish survey OK – personnel from LIV?
J05A – no problems anticipated – but is sample required, or a priority?

M01A – might be a chance for sampling on MI acoustic survey – personnel?
M03A – will try to collect any adults while out on the DARD survey

X01A – not important in the third year
X03A – EH taking care of this in early Jan 2005, as only 2004 sample collected

Money for additional sampling kits? No need to acid wash vials since washed at lab anyway – just forceps and gloves necessary. Pots for parasite sampling – samplers have their own. SJ has money in budget to buy eppindorf vials – could distribute these to samplers.

Discussion on outliers: genetics WPs would like to process all of them as that would increase their chance to publish papers from the project. EH made clear that Rügen samples X01 will have the priority for being processed by all WPs, all others are just voluntary.

1500 fish less than originally planned will have been sampled (and processed) by the end of the sampling period (March 2005), even if all 2005 samples can be taken. Suggestion to increase processing effort on mixed aggregations, which would be preferable over further analysis of spawners or juveniles. It appears to be very difficult for some WPs (genetics LIV, parasitology) to work up the reduced number by mid 2005, so there is little scope for additional processing. WP02.2, 04 UCC, 05 and 06 could put more effort in the

M-samples. 3-M04A (Celtic Sea) could not be used for parasitology, so that sample should be processed with lower priority

Sampling overview WESTHER (per Dec 2004)

	planned	2002	2003	2004	2005		Sampling deficit
Spawners							
S01	100	*	100	105	**100**	*MI*	
S02	100	*	*	105	*		
S03	100	*	*	105	*		
S04A	100	*	*	105	**100**	*MI*	
S04B	100	*	105	?	*		
S05	100	*	44	*	**100**	*LIV/UNIABDN*	
S06	100	*	120	140	*		
S07	100	*	*	*	*		
S08	100	*	*	*	*		
S09	100	*	*	*	*		
S10A	100	*	*	101	**100**	*FRS*	
S10B	100	*	102	101	*		
Sum	1200	0	471	762	400		767
Juveniles							
	planned	2002	2003	2004	2005		
J01	100	*	*	105	*		
J02	100	*	*	*	*		
J03A	100	*	*	*	**100**	*LIV*	
J03B	100	*	78	87	*		
J04A	100	*	*	122	**100**	*LIV*	
J04B	100	*	114	120	*		
J05A	100	*	100	105	*		
J05B	100	100	100	105	*		
J06	100	*	85	50	*		
J07	100	*	110	120	*		
Sum	1000	100	587	814	200		299
Mixed Aggregations							
	planned	2002	2003	2004	2005		
M01	500	*	*	161	**150**	*LIV??*	
M02	500	*	480	445	*		
M03	500	*	120	153	**150**	*LIV??*	
M04	0	*	350	485	*		
Sum	1500	0	950	1244	300		506
Outliers							
	planned	2002	2003	2004	2005		
X01	100	*	104	102	*		
X02	50	*	50	118	*		
X03	50	*	*	50	**50**	*FRS*	
X04	50	*	50	50	*		
Sum	250	0	204	320	50		-74
Total	**3950**	**100**	**2212**	**3140**	**950**		**1498**

Priorities to the end of the project: 2003 samples first, then 2004, then 2005 J03 and J04, then extra samples from mixed aggregations. All 2003 samples have to be worked up by 31st March 2005 AND DATA SUBMITTED TO EH!

Clearing houses - actions

- Sampling flatfiles – samplers should put a 0 in the flatfile under all the otolith workpackages until the flatfile can be updated – this will indicate a lower priority fish
- SJ will send EH the otolith clearing house information after each sample is finished to enable sampling flatfile information to be updated.
- A list of missing data for information currently held has been distributed to all WP PIs. This information must be checked against individual fish for each WP and the information returned to EH ASAP.
- All sampling flatfiles are now on the WESTHER web site in the password protected area. They need to be updated with the info from WP PIs.
- A list of all samples collected to date, and tissue delivery, is on the WESTHER web site in the password protected area.
- A list of all samples worked up to date for the various WPs is on the WESTHER web site in the password protected area. N.B. this list will be updated when the “missing list” information is returned to EH.
- The sub-sampling protocols for all mixed samples are also on the WESTHER web site in the password protected area.
- Each time new or updated data are put on the WESTHER web site an e-mail alert will be issued on the yahoo list server.

Herring genetics - Tom Cross UCC

Chosen markers: in 2004, 17 microsatellite loci have been screened. TA states that we will use 12 to 15 loci. Each locus was considered in terms of reliable scoring, possible presence of null alleles and apparent linkage to other loci, and on this basis four loci will not be considered further. Added to these 13 loci is a microsatellite recently provided to TC, which is linked to a functional gene. The initial aim with these loci is to screen all available samples for the lower number of individuals listed in the TA (50 spawners or juveniles; 250 mixed).

Intercalibration between UCC and LIV who use different sequencing instruments: This has now been achieved with all 24 currently available samples and data can now be merged; the 2nd year report will contain a combined analysis but treating spawners (and outliers), juveniles and mixed samples individually. New samples may be split by loci but this requires reciprocal testing between the two organisations. This will be done in January 2005 and EH notified of the outcome.

EH has provided TC with a complete list of all samples collected, which also cites uncollected samples. Will feed back ASAP as to whether all collected samples were delivered to UCC. Exceptions are the Northern Norway and North Sea outliers, which intended only for parasite analysis but will now be sent to UCC.

Requirements to complete the contracted genetic work: The last samples should arrive to UCC by the end of May 05 (preferably by the end April) and should be dispatched regularly and ASAP after collection. Livers are needed from spawners.

Six person months remain to LIV, but 16 to UCC. However, screening is twice as labour intensive in the latter because of degree of automation.

Publications will be produced on genetics of a) spawners and outliers, b) DNA pooling and its use in fisheries, and possibly (depending on degree of discrimination observed in a)) on c) juveniles and d) mixed fisheries. A potential list of publications will be included in the 2nd Annual Report.

Report formats will be similar to last year with UCC and LIV producing individual reports of results, but with combined analysis in the WP4 report.

An earlier web based document produced by TC will be re-worked to produce an item to explain fisheries genetics to non-specialists.

A discussion with AZ, which also included AG, covered the presently used statistical methods in genetics. Alain asked that we produce two types of matrix for the statistics workshop on a) classification of fish by allele within the four selected samples, and b) where relationships of all fish screened are identified by MDS co-ordinates.

The geneticists might benefit from a formal meeting with HERGEN (as might the project in general, from discussions with CODTRACE).

PW requested another sample of herring slurry from samples for which spawning adults would be analysed, to fill in some gaps. JB agreed to collect this sample.

Thursday 9th December 2004.
Outcome of sub-group meetings and to discuss matters arising - continued.

Parasites - Ken Mackenzie UNIABDN
General Discussion

- Distribution of 3-X04 sample – It was agreed that 20 fish should be sent to Liverpool.
- MC queried who is taking the age readings as this is integral to the project and is needed before any meaningful analysis can take place. Age reading is being carried out by FRS. These data are to be available to project participants from 9.12.04 on the WESTHER web site.
- Partners confirmed that 3-M04 sample is in too poor condition to conduct meaningful examinations.
- Costs of transporting large numbers of samples to Liverpool. NC confirmed that couriers refuse to carry samples containing more than 1 litre of ethanol in a single package. Samples need to be split into a number of packages containing 1 litre. NC to check on the cost of transporting gut samples in the post. Could well be cheaper to hire a van and deliver to Liverpool. Edinburgh/Glasgow? MC could collect.
- Check plans for sampling of 5-J05A. Loch Hourn or Loch Carron? This sample will not be collected in 2005. Although it is interesting from a parasitological viewpoint, there are already two samples extant, which show good temporal consistency, so a further sample is considered to be a misappropriation of project time.
- Manpower available to the project. MC to has 7 months remaining, NC has 12, but is spending 6 of those on WP3.2 work. It may be possible to extend MC's contract. Should have a better idea of how the workload is panning out in Feb/March. In 2004, MC has lost 1.5 months to sampling NC 3 weeks. This was not anticipated. MC and NC need to spend as much time as possible on gut examinations. MC and NC may both be involved in further sampling in early 2005. This was considered to be unavoidable.
- Check liver sample has been received in good condition and DNA successfully extracted by geneticists before disposing of gut tissues. (copy email to EH). Livers to be retained from all juvenile and mixed samples.

Update of Progress in WP3

WP 3.1 - Progress in this work package was covered in KM's presentation. KM is to write abstract for general circulation and the presentation is to be made available to project partners on the website. Generally it is considered that this work is proceeding at an appropriate rate.

WP 3.2 - NC to write abstract for presentation in consultation with Catherine Collins and Carey Cunningham, FRS Marine Laboratory, and the presentation is to be made available to project partners on the website. NC raised CC's concerns that this WP is behind schedule, and that he will need to devote more time to this work in 2005.

- Finishing counts of parasites are priority for MC due to limited time remaining on project. He will be able to help with genetics if time available.
- NC reported on problems subsampling Anisakis. Currently it is possible that variations are being hidden by small sample sizes, or highly infected fish skewing the results of a sample. It has been suggested that we could look at the population variation from a single sample – perhaps 100 replicate worms – and see what level of variation is present in a single sample
- MC mentioned that if generating sequences is a problem, there is the possibility of using the sequencing machine at LIV. MC is to check with PW on this.
- JC suggested raising in plenary session that the time available for parasite genetic work is going to be limited by the number of samples to be collected in 2005. Examination of guts has to take priority,
- It is highly unlikely that there is time available in the project to complete the parasite microsatellite deliverable (3.8). TC suggested that the microsatellites could be developed but not applied and this would satisfy the requirements of the project. It was also suggested that it might be a possibility buy a "library" from a commercial company, if the finds were available (estimates about £6,000). Neil will talk to CC at FRS about the budget.

Stats Workshop

From this workshop, those involved in WP3 aim to develop understanding of the statistical tools used to overcome the problem with overdispersal in parasite data.

Organisation of the project
Working Arrangements:

Data Exchange/Data Format

- The sampling flatfile for each sample will indicate where a fish has a lower priority in the first instance indicated by a 0 under the otolith WPs. These flatfiles will be placed online immediately after receipt (available online the day after placement) and the list server notified (of availability and lower priority fish).

- NC and MC to co-ordinate the order of work-up of gut samples to ensure complete samples worked up within a reasonable time between the labs.
- All flatfiles for each WP must contain all fish Ids, even if particular fish not analysed – i.e., no missing rows should be present
- 3-M04A was incorrectly labelled as 3-S04A – this has been noted and should be dealt with by all WP PIs
- the TIP will provide the platform to state how WESTHER participants deal with the use of project data outside of publications (e.g., if AZ wanted to use project data for stats courses etc.).
- ALL DATA FILES FOR EACH WP SHOULD BE SENT TO EH AS SOON AS THE SAMPLES ARE WORKED UP
- It was agreed that all data relating to the project was for common use between the partners, but confidential until published (provisionally until the end of the project).

Database

Ownership of data and intellectual property rights: AG mentioned that she would not be prepared to deliver any raw data before a subcontractor agreement would be signed between LIV and Bergen. She would also like to have that signed by AZ in case he plans to use the data delivered to him for the development of (commercial) stats course material (see TIP comment above).

- Database and web access to data: originally FRS were set to develop a database. Short discussion on accessibility of raw data, time limits until data access is restricted. Different perception who finally owns the data after the end of the project (individuals, WESTHER group, EU commission, public).
- The original restrictions on the various outcomes of all WPs were summarised in Part C of project proposal.

CZ showed an update of all the data and files that are currently on the WESTHER web page, with project data only available in the password protected sections.

- It was agreed that as and when age data become available they will be put into the sampling flatfiles and the list server informed.
- It was agreed that all participants would send the completed flatfiles for each sample analysed, through the clearing houses for each WP, to EH for archiving, and placement on the WESTHER website, in the password protected area, as soon as possible after completion of that WP on that sample.

Communication among partners.

Thanks were given to NC for running the WESTHER email list.

- NC reminded all participants that an archive of all list server communication is available to all participants through the Yahoo website. Access requires registration on the yahoo page.

Milestones and Deliverables for reporting period 2

EH went through the list in detail, wherever delivery month will not be met, an explanation (in written format) will be needed. A heads-up was given of results expected by Month 30, as a reminder to the group of expectations for the first half of 2005.

Discussion on dissemination of preliminary results within the group, as a sort of (scientific) preparation of the final meeting. EH suggested to deliver a short analysis together with the mid-term deliverables (Month 30, halfway through 2005). The usual 6 monthly report was requested, include interesting outcomes, results, etc.

Accounting

EH reminded participants that timesheets for work carried out on the project need to have been kept by all in 2004. The amount of time spent on the project must be worked out on an individual basis, so that the information can be included in the report, as required.

- EH asked KM to speak to the UNIABDN finance departments to ask that they would contact all partners' finance departments in early January for cost statements.

All information on cost statements should be sent to Donna Kidd (UNIABDN), and not to EH.

Subsequent meeting dates and venues

A data exploration and multivariate statistics course will be given in Hamburg by AZ from 17-21 January, hosted by BFA-Fi.

The group discussed the possibility of an additional project meeting halfway through 2005. Subgroup meetings – genetics and parasite subgroup meetings – with a plenary meeting possibly afterwards in July

2005, Liverpool (1-2 days). However it was decided that that option would produce too many meetings for 2005 – restricted by both budget and lab time.

EH – monthly news update necessary on progress of each WP, these include interesting preliminary results. This was not considered necessary by the group.

Final Project Meeting
This will be held in early November (2nd week) 2005. Potential venues include Faro, Bergen or UCC, Ireland. It will be a four-day meeting, concentrating on the scientific outcomes of the project.
- TC and AG will contact colleagues on Faro about the possibility of holding a meeting there, and investigate their own local options too.

The venue needs to be decided by the end of January and arrangements confirmed at that stage.

Publicising the project.
CZ was thanked again for setting up and maintaining the WESTHER website. He had earlier given a demonstration of the sampling and meta-data now available on the web and encouraged participants to use to website to keep themselves updated on changes and progress.

Conferences and ICES Working Groups
- EH gave a presentation on the project to the ICES Herring Assessment Working Group in March 2004. She will prepare a presentation for the next HAWG, in March 2005.
- The ICES annual science conference will be held in Aberdeen in 2005. There will be a themed session on small pelagic fish. EH is co-convenor. All WESTHER participants will be e-mailed the details. Deadline for abstracts is early May 2005. EH encouraged participation by all members of the project.
- There will be an FSBI meeting on fish population structure in Aberdeen in July 2006.
- There will be a Herring Symposium in Galway, Ireland in 2007 or 2008.
- The Scandinavian and Baltic Society of Parasitology Meeting is in Vilnius, May 2005. Deadline for submission of abstracts is thought to be end of February. The parasite group intend to present a talk on parasite WP3.1 and a poster on WP3.2.
- European Association of Fish Pathologists having a meeting in Copenhagen, September 2005. This includes a Myxosporean workshop. KM is going to be in attendance anyway.
- The International Congress of Parasitology in Glasgow, July 2006, provides a high profile meeting for presentation of final results and conclusions of the project. KM to chair a symposium on parasites as tags in fish populations.
- The POP group (UK population genetics group) meets in December of each year.
- The EMBS meeting in Cork in 2006 will have a genetics session.
- There is a larval fish conference in Barcelona in June 2005 at which AG might present the larval otolith work, if it is ready.

Publications
The draft agreement on publications, circulated on the first day of the meeting, was discussed.

TC stated that he felt it was very important that there should be a set of rules for people to follow, and that the Publications Committee should only become active in the event of a difficulty arising. This seemed to be a general consensus.

The numbers bulleted below refer to the original numbered paragraphs in the draft publications agreement:

1) This agreement covers submission of refereed and unrefereed papers. … Put in "(partners and subcontractors)" behind "contributors on the WESTHER project" in second last line.
   Comment: Using material for teaching is not explicitly covered, but people should be aware that WESTHER-related primary data can not be lifted (e.g. from graphs) and used for other purposes.
2) a) should start with "substantial material, …"

Comment: Umbrella papers emerging from WP 07 should have all partners on, papers with a wider scope on stock separation of herring should have authors of more than one WP including fisheries biologists (to add their expertise and make the paper more valuable – also for the funding agency which is primarily interested in the practical output for management purposes), only very isolated papers covering tangential or technical aspects, or very limited aspects should have only members of a single WP on it. Common sense has to be applied to pick appropriate co-authors, and sampling agencies should certainly be appropriately included.

3) a) replace "running the procedure" with "procedures" and delete in b) "from the procedure"
4) discussion on the importance of last authorship and how different this is perceived in the US and in Norway…
7) comment: TC as chair of the publication committee is the first to be approached in case of a conflict.

Replace “for ensuring … within a reasonable agreed time with “for ensuring the completion of a manuscript within an agreed specified time and steering of the manuscript through to publication. It may be necessary to appoint a separate corresponding author.”

8) becomes para 12. Replace “WESTHER project, advance notice… publication.” with “WESTHER project, such manuscripts shall be circulated to all WESTHER participants (comments to be returned within 3 weeks) following the rule in paragraph 8.”

Para 10 becomes para 8. Remove “in the interest… WESTHER project”. Add a time limit of 3 weeks for replies but make sure that the co-ordinator has replied.
Old 9. replace “database” with “source of data storage”
Old 11 (now 10). add “during its lifetime” at the end.
Add 13. This agreement is binding for perpetuity.

An updated version of this agreement will be annexed to these meeting minutes as Appendix II and placed on the website.

FP6 SSP4- Task 13.2.1 Exploitation of results of the 5th and 6th framework program:
150,000 EURO available for combination of results of different individual research projects. Suggestion to first finding out how much work would be involved and what the chances were to get the funding – EH, RN and CZ to find out what is being put out in the fisheries community as submissions for this money and to report back to the group.

Report
Two types of report; technical and financial. EH responsible for compiling the technical report

- It is the responsibility of each workpackage PI to contact people working on the workpackage and to draw the information together.

The report should be in Times Roman, 11 font, and unformatted text. It will follow exactly the same format as the first annual report and deviate only where really unavoidable. Progress report per WP, person months devoted per WP, scientific team per partner, deliverables, difficulties and delays and remedial action, discussions and conclusions from second year activities, future actions, annexes.

- Delivery date to EH Jan 5th she has only 4 weeks then until it has to be delivered to the commission and 2 of those weeks will have to be devoted to the stats course and preparatory work for this.
- Annexes: 1. primary data /flatfiles, presentation to HAWG;
  2. publications (can be lifted from Website);
  3. clearing house information (all 3).

Table 1. Participants at the December 04 meeting of EU Project WESTHER Q5RS-2002-01056

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APPENDIX I

Presentation abstracts

WP01: Sampling of Atlantic herring *Clupea harengus* L.

A summary was given of samples collected during 2004, highlighting problems and coverage. Noted a significant improvement in sampling intensity and coverage from 2003 levels. Target sampling numbers: adults (100), juveniles (100), non-spawning 'mixed groups' (500).

Adults: MI western Irish samples: 4 were collected (S01, S02, S03 and S04A, 1 not by the time of the meeting, but probably by the end of the year. LIV: S05 was unable to be sampled as no fish were found; S06 was collected, larvae (small sample) were taken in the Irish Sea. FRS samples: 2 out of 6 were collected - S07, S08 and S09 were not as, again, no spawning fish were found in those areas (as last year, which is disappointing) when weather permitted fishing, S10A and S10B were collected. Total of 7 out of 12.

Juveniles: MI 1 out of 2 sampled (J01 not J02), DARD: 3 out of 4 sampled, the one missing was also lost last year (J03B, J04A and J04B collected). FRS all 3 samples taken (J05A, J05B & J06A), but one from a different Loch and one with only 50 specimens. BFA-Fi sample taken as planned (J07). Total of 8 out of 10.

Mixed adults: all 4 have been taken, but two of them with less than 200 fish (M01 & M03). Total of 4 out of 4.

Outliers: all 4 samples taken. Finclips and intestine would be available for all of them. Genetics WP need internal organs from spawning fish – finclips cannot be used because they might be/are contaminated. Only 4-X01A is a spawning sample. Part of the liver should be used for the genetics. Total of 4 out of 4.

Temporal sampling in the Irish Sea: First two sampled, third not possible, very short spawning season this year. Finclips were taken from these spawning fish and these might therefore not usable!

WP 02.1: Morphometric and meristic techniques: body morphometry

The objective of the WP is to deliver metric data of the external body dimensions of the fish, to determine their central tendencies and variances for the spawning aggregations and to validate the hypothesis of a correlation between fish morphometry and stock-identity. To this end a set of 20 landmark points has been chosen that whose coordinates are taken from the images of all herring of the S, M and J samples and one outlier. From these coordinates a total of 47 length measurements is calculated.

To date, all samples of 2002 and 2003 have been worked up (2050 fish) and the resulting data entered into the database. A first evaluation showed a large span in the size of the fish sampled, even in the adults (21-32cm). Samples of the same designation of consecutive years can have widely varying length compositions. In many cases the lengths are not normally distributed in the samples. The proxy used for fish length in the following evaluations will be the “modifies standard length (LSM, from the anterior tip of the maxilla to the end of the fleshy part of the caudal peduncle) as this measure is robust with respect to the different way in which the caudal fins are laid out and the occasional dropping jaw found in the photos. 7 out of 20 measurements hold promise for a good differentiation between the samples of spawners.

WP 02.2: Morphometric and meristic techniques: otolith shape morphometry

The objective of the WP is to analyse the external features of the otoliths in order to determine possible differences between the spawning aggregations in these. To this end the weight, length, width, the aspect area and the perimeter length are measured and an index of the circularity of the outline is calculated. The shape of the otoliths is then described by elliptic fourier analysis resulting in a set of 77 descriptors per otolith which are to be fed into the multivariate statistical evaluation.

Up to now, the otoliths of all fish of 2003 and 4 samples of 2004 have been worked up and the data inserted into the WestHer database. A preliminary analysis showed otolith weight, length, width, perimeter and area to differ significantly from sample to sample when they are adjusted to fish length, thus presumably offering a basis for stock discrimination. The descriptors of the fourier analysis show comparatively little dependence on fish length, their value for discrimination of the samples is yet to be determined but the otolith shapes reconstructed from the by-sample-means of the descriptors indicate small but noticeable differences in otolith shapes between the spawning locations.

WP 02.3: Morphometric and meristic techniques: pyloric caeca counts

Meristic variations in pyloric caeca numbers of *Clupea harengus* (L.) were recorded during dissection and examination of the viscera for parasitic infection (WP3.0).

To date <1,200 fish have been examined and the number of caeca counted from 20 samples that include; spawning aggregations; juveniles; mixed stock aggregations; outliers from the Eastern Baltic Sea and Northern Norway.

A range of from 10 to 31 caeca was recorded which is similar but slightly lower than previous (unpublished) studies on herring from the northern North Sea and the West of Scotland (13 to 34 caeca). Overall the sample mean was 20.76 (SD ± 2.59) whilst individual sample means ranged from 19.64 for VIaS, VIIb mixed adult sample (3-M01A) to 24.00 from the North Norwegian outlier (3-X04A). Very few abnormalities (bifurcated and looped) were recorded.

Caeca counts will continue until all samples have been processed.

WP 03: Parasites as biological tags: traditional parasitology studies

To date the total numbers of herring examined for parasites are: 574 juveniles from seven samples, 254 spawners from five samples, 139 adults from two mixed-stock samples, and 126 outliers from three samples. Fifteen parasite species, one of which is a new host record, were recorded. Six species were selected as potentially useful biological tags, the most common species being the renicolid metacercariae *Cercaria doricha* and *C. pythionike,* both of which have previously been shown to be good biological tags for herring. Based on the occurrence and distribution of these tag parasites the following working hypotheses are proposed.

1. Donegal spawners, VIaS/VIIb mixed-stock herring and Stanton Bank juveniles may belong to the same stock.
2. There was evidence of two components, recruited from different nursery areas, in the sample of Celtic Sea spawners.
3. Clyde spawners may have recruited from the eastern Irish Sea.
4. Irish Sea spawners sampled were not recruited from western Irish Sea nurseries, but could have been at least in part recruited from the eastern Irish Sea
5. Cape Wrath spawners sampled were not recruited from coastal nurseries on either the east or west coasts of Scotland. These fish probably originated from the eastern North Sea (Bloden).
6. The VIaN mixed-stock sample included no more than 10% recruits from Scottish coastal nursery areas, with the majority probably having recruited from the eastern North Sea.

WP 03: Parasites as biological tags: molecular studies

The objectives of this work package are to use parasites infecting the visceral organs of herring as “biological tags” for stock identification and to follow recruitment and seasonal migrations. This will be approached in three steps: through development of molecular markers for identification of parasite species, through development of molecular markers for identification of parasite populations and through the use of these markers for herring stock identification

For identification of parasite species, work has focussed on the ITS region of the ribosomal genome. ITS shows high levels of interspecific variation and low-level intraspecific variation, making it useful for the identification of species. Because it is inherited from both parents, it has allowed the existence of hybrids to be detected.

The Cytochrome Oxidase 1 (CO1) region of the mitochondrial genome has been used to examine relationships between parasite populations. This region evolves faster than ribosomal (ITS) DNA. It is useful for identifying and determining relationships between closely related species, and useful for identifying different populations of the same species.

To date, ITS sequences have been generated for *Anisakis* spp., *Renicola* cercaria *doricha* and *Renicola* cercaria *pythionike*. CO1 sequences have been generated for *Anisakis* spp., *Renicola* cercaria *pythionike* and *Hemiuris luehei.* In addition to this, the mitochondrial ND1 region of the mitochondrial genome of *Anisakis* spp. has been sequenced.

Results of ITS sequences from renicolid metacercariae have shown that it is highly likely that a number of *Renicola* sp. are synonymous. Further work is being carried out on individuals obtained from seabirds.

Anisakis C01 haplotypes show an apparent clear distinction between spawning herring populations, however, this distinction based on unique haplotypes with a frequency of one within the population. If the number of different haplotypes is high, then different haplotypes may be found by chance and analysis of greater numbers of parasites may eliminate the difference seen between the herring populations.

Although results from this section of WP3 are promising in terms of stock separation, there are problems with over dispersal and low prevalence of parasites. It is unlikely that the data generated by these methods will be suitable for integration with an overall multidisciplinary data set, as over half of all fish examined are not infected with *Anisakis* spp.

WP 04: Genetic characterisation of western herring stocks

UCC is continuing its agreed work as the designated clearing-house for the genetic samples. It should be noted that due to the difficulties caused by contamination of the spawning samples all of the spawning samples (which includes outliers from Rügen Island in the Baltic) are now being screened using liver tissue, to circumvent the problem of gamete contamination on fin clips. Fin clips are also being collected from spawning fish and are being archived while attempts continue to find an extraction technique to eliminate gamete contamination. Also there are samples which could not be collected, and samples which have been received in Cork but not yet genotyped.

During the second reporting period, a total of 10 samples were studied by UCC. These included five spawning, three juvenile samples and two mixed aggregations. These samples underwent preliminary analysis using nine microsatellite loci. These nine loci are those which give clear unambiguous results in the system used in Cork. The only locus where significant departures from HWE are observed in nearly all samples is *Cpa*106. It will be excluded from further screening. The microsatellite loci *Cpa*7 and *Cha*1202 appear to be out of linkage disequilibrium and *Cpa*7will be excluded from further analysis. *Cpa*27 will be excluded because of the extremely large allele size range and the associated difficulties in scoring alleles accurately. It is intended that *Cha*1045 will also be dropped from the analysis. This is due to the difficulties that both UCC and LIV partners experienced in scoring this locus. All of these issues have been discussed and resolved between Cork and Liverpool at the December 2004 meeting in Palma, and a suite of at least 12 common loci will be used for screening during 2005. For indicative inter sample statistical analysis the spawner samples and the Baltic outlier samples were prioritised. These samples (seven in total – five spawners (screened by UCC) and two outliers (screened by LIV)) were analysed statistically using GENEPOP, F-STAT and DISPAN software, which revealed information on pairwise heterogeneity, F-statistics and genetic distance between each pair of samples. Number of alleles ranged from 8 (*Cpa*107) to 30 (C*pa*113). There was no evidence of physical linkage between loci and no significant deviation from Hardy-Weinberg expected genotype proportions. Overall F_{ST} though low (0.2%) was significantly different from zero ($p=0.006$). The majority of significant results are between most core WESTHER samples and the outliers, where all loci except *Cpa*112 show significant differences. It should be noted that the two outlier samples appear temporally stable. Within the WESTHER area, small but significant differences at a single locus ($p<0.05$) are evident in certain comparisons spatially (between Cape Wrath and the Celtic Sea) and temporally (between winter and spring samples from the Celtic Sea). However, it should be noted that the significance of these differences have not been tested using the Bonferroni correction, and are not evident in F_{ST} values combined over all six loci where the only significant differences occur between the core samples and the outliers. Another way of looking at relationships between samples is using genetic distances to produce a neighbour-joining dendrogram. The only node in this dendrogram with a robust bootstrap value (>90%) is between the two outlier samples, which are spring spawners from the same location in consecutive years.

No meaningful pattern within the WESTHER area is apparent, though it is interesting that the temporal samples from Cape Wrath and the Celtic sea do not cluster together. The difference between these temporal samples and the outliers is that they represent winter and spring samples, *i.e*. they are not taken at the same time of year. Earlier studies using allozymes have indicated that there can be more difference between winter and spring spawners from a particular area than between spatial samples in western European waters. During 2005 the number of loci being analysed will be more than doubled and the rest of the spawning samples will be included, optimising the chance of detecting population differences, if such exist. Mixed Stock Analysis will also be applied to juvenile and mixed stock samples.

WP 04: Genetic characterisation of western herring stocks: pooling techniques

LIV have genotyped approximately 2,000 herring samples at up to 14 microsatellite loci. Here, we present the results from a preliminary genetic data exploration using the 7 adult, spawning stocks (comprising 4 WESTHER sites, 2 outlying samples and 1 extra, 'inter-project' calibration site; $n=409$) and the 4 juvenile samples ($n=500$) that had been genotyped by December 2004.

Among the spawning samples, we identified significant linkage disequilibrium between two loci (*Cha*1202 & *Cpa*7) and deviations from expected Hardy-Weinberg Equilibrium (HWE) conditions at 4 loci (*Cpa*114, *Cha*1045, *Cpa*106 & *Cpa*7); deviations from HWE may indicate the presence of null alleles or unrecognised population structure. There were no significant pairwise genetic differences (F_{ST}) among all of the spawning samples situated to the west of the British Isles, however, it should be noted that the statistical power of this analysis is limited because of the small sample size at some sites. There is significant genetic differentiation between samples from Cape Wrath and Donegal and herring from the outlying area near Rugen Island (Baltic Sea). Generally weak genetic differentiation among most of the samples leads to poor population assignment success, although we are able to reasonably discriminate between samples from the Baltic and western British Isles. Bayesian modelling of the data provides greatest support for 2 distinct groups that separate stocks from the Baltic and western British Isles.

Pairwise genetic differentiation among all juvenile samples (all from the western British Isles) was weak (and non-significant) with a maximum F_{ST} of <1%. Consequently, we were not able to assign juveniles to their original sample and Bayesian modelling of the data set failed to find distinct clusters base on geography and provided greatest support for a single group.

Genomic DNA was also extracted from herring 'slurry' (a mixture of eggs, milt and mucus) that was collected after routing sampling at Donegal and the Celtic Sea. We used this 'total DNA' to estimate sample allele frequencies at a single locus - *Cpa*101 - after PCR. Our preliminary data indicate that the 'total DNA sample' provides a rough approximation to the sample allele frequencies (estimated from individual genotyping) and that this method may be used to highlight inadequate sampling by identifying missing alleles. Further work to correct for PCR bias (differential amplification of long and short alleles) is required to improve the accuracy of this technique.

WP 05: Otolith microstructure analysis

The aim of this WP is to provide information about the hatching season of the individual fish. Apart from testing the hypothesis of the identity of spawning season for the samples of the reference collection, the relative distribution of hatch seasons in the aggregations of juvenile fish as well as in the samples of mixed adults is to be elucidated.

To this end the right otoliths of the fish are be ground down to a plane through the nucleus, etched and observed under a scanning electron microscope to determine ring widths of the microincrements of the first months of the fishes life, which should be correlated to the speed of growth and thus ultimately to water temperature.

There has been some considerable delay in this WP, mainly due to a very slow flow of samples. Up to now the samples of spawning fish of 2003 have been worked up and the a preliminary analysis of the results show a higher degree of variability in the width of the increments than expected.

WP 06: Otolith core microchemistry

The purpose of this workpackage is to determine the chemical composition of the core area of the otoliths, and to use differences to distinguish between the sampled groups. In the sub-package 6.2, the use of the core composition to uniquely identify spawning groups will be tested by comparing the core of spawning herring and larval herring sampled from the same grounds

Otoliths are composed primarily of calcium carbonate, precipitated in an organic matrix. Thus the main chemical components are Ca, C, O and the elements associated with proteins (C, H, N, O, P, S). These make up over 95% of the otolith by weight. The remaining elements of interests are usually present at concentrations of less than 1 $\mu g \cdot g^{-1}$, with a few exceptions, especially Sr and Na ($2000 \mu g \cdot g^{-1}$) and Mg ($200 \mu g \cdot g^{-1}$). These divalent cations are probably incorporated into the otolith by substitution, and reflect both differences in water mass conditions, and growth characteristics in the fish. The most useful elements for distinguishing between groups of fish are expected to be Sr, Mg, Na, Ba and Mn, though a wider range of elements will be measured throughout.

Experience in processing large numbers of samples in a standardised and efficient system was gained during the CodTrace project. This experience is being applied to the herring samples. The preparation of the herring otoliths has waited for enough samples to be returned in order to attain maximum mixing of samples in each analysis session. Results of the CodTrace analyses of otolith composition were presented as examples of success of discrimination, and also examples of combined analysis.

WP 07: Multivariate statistical analysis of combined techniques

FRS has been collating spawner data in preparation of the Hamburg workshop in January and to get a feeling for the kind of data to be expected for the final analysis. Techniques that have been explored to early December were general data exploration, classification trees, discriminant analysis and multi-nomial logistic regression. Problems might appear with datasets containing a large number of variables (use PCA axes instead to summarise WPs), reduce auto-correlation.

Preparation for the Hamburg workshop was then discussed: suggestion to start with half a day basic data exploration and transformation techniques, followed by 2.5 days advanced statistics and 2 days work on own data, allowing group discussions of problems encountered and for solutions to be put forward. Plus time for cleaning up the database would be available. This was agreed to be a good idea.

Western stocks – short overview (reminder)and questions that may be addressed during the analysis of the WESTHER data

There was a short overview of the spawning sites and landings data for the principal western herring stocks assessed by ICES. The current perception of spawning stock biomass and recruitment, over the assessment periods was also presented. Overall, with the exception of VIaN all stocks appear to be decreasing in size. The known and suggested feeding grounds are to the west out toward the shelf edge and nursery areas inshore. VIaN is by far the largest ‘stock’ in the area and there is a tendency for fish to ‘stray’ southward. The Irish sea stock appears to have a very low net production and may not be sustainable at its present harvest level. A short description of McQuinn’s ideas re year class twinning and movement between stocks and spring versus autumn spawners was given.

APPENDIX II

Publications Agreement

Concensus on publication of results from FP5 project
Q5RS-2002-01056 (WESTHER)

This agreement covers submission of manuscripts to refereeed and unrefereed publications

1. The WESTHER project comprises the following work packages: 01 sampling, 02 morphometric and meristic characterisation, 03 parasites as biological tags, 04 genetic characterisation, 05 otolith microstructure analysis, 06 otolith core microchemistry, 07 multivariate statistical analysis of combined techniques. It is anticipated that there will be a number of general papers giving the overall results of the project, plus more specialised contributions from each work package. It is the intention that all contributors (Partners and sub-contractors) to the WESTHER project shall be authors where appropriate. Paragraphs 2-7 outline the rules that shall apply.

2. To qualify as an author, a person should contribute to at least one of the following:
   a) substantial material, concept, design, analysis or interpretation of data and its relevance to the project objectives (see WESTHER Technical Annex 02 September 2002);
   b) drafting the article or critically revising it for important conceptual content.

3. To qualify as lead (=first) author on a paper, one of the following conditions should be met:
   a) responsibility for development of ideas, plans, procedures or writing the manuscript;
   b) responsibility for analysis and interpretation of data, and the major conclusions.

   It is recognised that post-doctoral fellows and post-graduate students have a particular need to be lead authors whenever appropriate.

4. The same broad qualifications, as in paragraph 3, apply for senior authorship (=last author in listing).

5. If more than one person qualifies according to paragraphs 3 and 4, all publications from the project (including potential future manuscripts) shall be considered so that lead and senior authorships are distributed fairly among the participants, both for the duration of the project and thereafter during the reporting period.

6. The order in which authors are listed shall be decided initially between the potential authors according to paragraphs 2 - 5. In the event of conflict the Publications Committee, in consultation with the Scientific Co-ordinator, shall adjudicate to determine who qualifies and the order in which authors should be listed, but following paragraphs 2 - 5.

7. Unless an alternative arrangement is agreed by the authors, the lead author shall have the responsibility for ensuring the completion and submission of a manuscript within an agreed specified time, and steering of the manuscript through to publication (it may be necessary to appoint a separate corresponding author). If a dispute arises, the matter should be drawn to the attention of the Publications Committee. If the Publications Committee decides that the lead author has not fulfilled his/her obligations, the Committee may change the order of authors or transfer the lead authorship to one of the other authors.

8. All manuscripts, abstracts and other written material shall be circulated among the partners for comments (to be returned within 3 weeks) before they are submitted for publication.

9. A common source of data storage shall be established to facilitate flow of information between WESTHER members and to provide ready access to data and results from the project. Data will be held by the Scientific Co-ordinator and be available on the secure area of the WESTHER website

10. A record of all conference presentations, abstracts and other publications shall be kept by the Scientific Co-ordinator and shall be accessible through the WESTHER web site during its lifetime.

11. Interviews and other public relations exercises referring to the overall WESTHER project should involve the Scientific Co-ordinator. Where publicity relates to particular work packages, the prior knowledge and approval of the Scientific Co-ordinator shall be obtained.

12. If studies arise within work packages that are tangential to the core aims of WESTHER (for example, contributions to parasite life cycles), but use data collected during the WESTHER project, such manuscripts shall be circulated to all WESTHER participants (comments to be returned within 3 weeks) following the rule in paragraph 8.

13. This agreement is binding for perpetuity.

NOTE: the Publications Committee currently comprises – Tom Cross (Chair), Jimmy Chubb, Audrey Geffen, and Ciaran Kelly.