Sustainable Livelihoods from
Fluctuating Fisheries

Annex 2
Bioeconomic Simulation Models

Rob Tinch

DFID Fisheries Management Science Programme
(R7336)

Annex 2 Bioeconomic simulation modelling

The fisheries of primary interest to this project are characterised by a relatively poor level of knowledge of key parameters and variables, including stock size and harvesting capacity, with infrequent and unreliable data. Therefore management strategies must be simple, not heavily data dependent, and ideally robust to a wide range of possible realities.

While standard models which determine an optimal threshold above which all stock is to be harvested can yield interesting theoretical results, it is clear that such policies cannot practically be implemented in poorly observed and fluctuating fisheries.

Therefore the approach taken in the bioeconomic simulation modelling is to create a simple underlying model with a number of possible forms, with the actual form and parameters of the model unknown from the perspective of management. Different strategies are tested against the suite of possible underlying models in a series of simulations. This approach is further driven by the absence of data with which to construct a coupled economic-ecological model representing one of the actual fisheries under consideration.

A2.1 Background to Simulation Approach

For non-linear stochastic systems, optimal control solutions are hard to derive, and even more difficult if observation error or parameter uncertainty is considered (Ludwig and Walters 1982). This does not mean that useful results can not be derived. For example, McKelvey (1983) shows in a general model of a fluctuating resource that coexistence of specialist and generalist vessels is optimal. Danielsson (2002) compares quotas and effort limits under risk using a stochastic dynamic programming approach, finding that effort control is superior in terms of maximising NPV of profits, but that harvest control outperforms in terms of NPV of welfare if the price elasticity of demand for the product is low. The analysis focusses on the conditions under which one policy is superior for all possible values of the stochastic variables, because: (a) analytical solutions to the general problem can not be found; (b) the results are interesting; and (c) a practical conclusion can be derived in many cases. But for other, more complex cases, numerical methods such as those employed here are needed.

Just as important, though, is that the optimisation approach aims to find an optimal solution with respect to a single objective function for a given model and set of assumptions about the dynamics. In a practical sense a policy which is suboptimal but robust to varying assumptions (including model form) and determined with respect to multiple criteria is likely to be more useful.

The use of Bayesian and risk analysis methods allow assessments to be cast in probabilistic terms. For policy analysis purposes, this can be used to give a quantitative range of possible scenarios, for example as the result of employing a constant effort or quote policy at a given level. Cooke (1999) argues, however, that "the relevant issue is the risk associated with following a given management policy or procedure over time, rather than a single measure." (p.798) And the performance indices of policies could be many and varied. One approach is to simulate the operation of various prospective policies under various assumptions. McAllister et al (1999) note that the use of structurally different operating models to account for fundamental uncertainties about model form is becoming more widespread, reflecting the fact that "the key task in fisheries managment is to choose the correct action, not to try to predict uncertain quantities like catch or biomass" (Kuikka et al 1999).

The simulation approach dates back to De la Mare (1986), who shows in an application to whale stocks that the International Whaling Commission's (IWC) "new management procedure", based on finding a catch limit as a function of estimated MSY and current stock, would perform poorly in terms of yield, variance of yield and risks to stocks. This in turn links back to the earlier work of, *inter alia*, Beddington and May (1977), Ludwig (1980) and May *et al.* (1978), who identified that "what seems really needed is not further mathematical refinement, but rather robustly self-correcting strategies that can operate with only fuzzy knowledge about stock levels and recruitment curves."

The IWC Scientific Committee have followed this up in their development of a revised management procedure. This has involved a comprehensive re-examination of management objectives, an acceptance of uncertainties, and testing through Monte Carlo simulation of the robustness of strategies in dealing with uncertainty (Kirkwood 1997).

The IWC (1988) stated its objectives as:

1. stability of catch limits
2. "acceptable" risk of a stock being depleted below a chosen level, so the risk of extinction is not "seriously increased" by exploitation.
3. ensuring the highest continuing yield from the stock

Of course, these are partially incompatible; the IWC took the approach of weighting of the objectives. The second objective (conservation) was taken as an absolute constraint, within which the third (yield) could be maximised subject to satisfactory performance in the first (stability). The conservation objective was set in terms of the risk of setting a non-zero catch limit when in fact the stock was below the old `protected status' threshold, 54% of its unexploited level.

With many trials and many statistics, the comparison of the policies was complex. All were considered adequate; multi-criteria approaches to ranking the policies were tried, but failed. Nonetheless, consensus was reached in deciding the "best" procedure, the

"catch limit algorithm". Details can be found in IWC (1992). The key point is that the model used "does not claim to give an accurate representation of real baleen whale population dynamics" and similarly the prior distributions "are not intended actually to reflect prior beliefs about the true values of these parameters" (Kirkwood 1997). Rather, they have been shown by trials to give robust estimates of catch limits. In other words, it's not how well the model fits the data which matters, but rather how well it performs in determining policy. Better information therefore should be used to change the *trials* and thence the tuning of the algorithm, not the algorithm directly.

One major strength of this approach over true Bayesian estimation is the extent to which a wide range of possibilities (uncertainties) can be incorporated in the assessment. As Kirkwood (1997) points out, "computers may be fast, but we are a very long way from being able to allow for all the factors examined in the robustness trials described here."

The simulation approach also has major advantages over true adaptive management, as identified by Cooke (1999). These include rapidity and vastly greater sample size relative to field trials, the ease of diagnosis of causes for observed failure, and the lack of costs connected with failure. There is clearly scope for extending these ideas into multispecies management, by incorporating different assumptions on interspecific interactions into the scenarios used for testing the harvest algorithms.

More recent studies include Milner-Gulland *et al.* (2001) who construct a simulation model for harvesting of an ungulate population with limited information available to managers. They test a number of strategies, evaluated on several criteria including a conservation constraint, yields and variability within and between runs, and show that "the performance of a strategy under the best estimate of parameter values is not an adequate representation of its performance under a feasible range of parameter values" [p166].

There are a wide range of possible uses of simulation modelling techniques for management strategy evaluation. They can be used to find out which measurements are of most use to management: Punt et al (2001) use simulations to evaluate different indicators, finding for the broadbill swordfish fishery off eastern Australia that indicators based on mean length or weight of catch perform better than indicators based on catch rates.

Simulations can show which forms of uncertainty have most bearing on resource management. For example, Christensen (1997) shows for a model of Greenland shrimp fishing that the losses associated with implementation errors, such as high-grading of catches, could be more significant than the losses associated with uncertainty about the system structure. Spencer (1997) used optimal control theory with autocorrelated environmental variability, finding that optimal policy fluctuated between conservative behaviour in poor years and exploitative behaviour in good years. In his simulations, the optimal policy returned more than double the NPV of the constant fishing rate policy, providing "motivation to consider carefully what objective should be sought from highly fluctuating fish stocks". Megrey et al (1994) construct a stochastic age-structured model for strategy evaluation with a number of different formulations of risk. They show that the estimates of optimal fishing mortality and economic return are sensitive to the definition of risk used, but that the assumed form of recruitment is more important than the form of risk.

Frederick and Peterman (1995) used simulations to model the conditions under which uncertainty is important for fisheries management. They argue that "uncertainty by itself is not typically a sufficient condition to warrant a departure from the deterministic strategy unless it can also be shown that the costs of overharvest and underharvest are asymmetric or that the probability density function for an uncertain component is asymmetric." They point out that the situation in which the deterministic strategy is most likely to underperform is when there is a threshold beyond which stock collapse or recruitment failure occurs, creating a highly asymmetric loss function and correspondingly "a large conservative uncertainty adjustment." They conclude that there are no general rules for determining the extent of adjustment required.

On a slightly different tack, Basson (1999) uses simulations to study the value of incorporating environmental factors into recruitment predictions, finding this is only worthwhile if the environmental factor can be well predicted - and in particular that it can be very dangerous if the predictions are out of phase with the actual series. He stresses the importance of using simulation studies to "check whether any gains are likely to be made from expending vast amount of long-term effort" which would be required fully to incorporate environmental factors within management schemes. Importantly, he stresses that the key question, from the management perspective, is the benefit in terms of yield and stock conservation (and any other objectives of management) rather than better predictions of stock dynamics per se.

Sainsbury et al (2000) use management strategy evaluation methods to study management options at the ecosystem level, showing how models can move away from species-based management.

A key aspect of MSE simulations is often the range of possible performance criteria used, and the methods used for their derivation. McDaniels (1995), for example, uses simulations based on expert-derived subjective probability distributions and a utility function elicited from a fisheries manager to illustrate how objectives other than those conventionally assumed in fisheries modelling can be important to determining optimal outcomes. Some work focusses on actual applications to real management decisions. For example, DiNardo and Wetherall (1999) apply the MSE method to the Northern Hawaiian Islands lobster trap fishery, describing how simulations evaluated against the combination of industry objectives (high average catch, catch stability) and low risk of recruitment overfishing led to the adoption of a policy of a constant 13% harvest rate, consistent with a 10% risk of overfishing, and a "no discards" rule.

Collie and Walters (1993) stress that "modelling is no substitue for experience, but models do help to determine what type of data to collect and the worth of managment options." They argue that incorporating learning within simulations is a potentially valuable means of increasing the worth of the simulations. McAllister and Peterman (1992) do this in an application to pink salmon management, showing that the expected NPV of an experimental (learning) management strategy exceeded the expected NPV of status-quo management for most of the parameter permutations examined.

Finally, MSE simulations can be used to investigate which parameters have most influence over optimal poilcy. Butterworth and Punt (1999) review progress in MSE techniques and discuss those factors which have the greatest bearing on results for a number of species. Included in this list are, inter alia, future recruitment variability, the form of the stock-recruitment function, future changes in fishing efficiency and bias in

survey estimates. The model presented here aims to explore some such issues in the context of highly fluctuating resources.

A2.2 Key questions

The approach adopted here is based on a theoretical fisheries model rather than on a model derived from data for the fisheries of interest, simply because the required data is not available. There is therefore no "base case" as such. Rather the intention is to look at a fairly wide range of possible scenarios, partly to determine the conditions under which given policies function acceptably, and partly to check the robustness of policies to a wide range of possible scenarios.

It might also be added that, for some fisheries of interest, increasing stock and recruitment surveys may not be feasible for reasons of expense. This is especially true if frequent surveys might be required: in a study of reef fisheries, Robertson and Kaufmann (1998) argue that for short-lived, rapidly maturing species, especially those with broad and variable settlement seasons and with substantial population fluctuations, annual surveys are of limited use: surveys must be at intervals linked to short-term settlement dynamics, for example monthly if settlement is lunar periodic.

McAllister et al (1999) discuss the interpretation of each possible parameter set in a set of simulations as one alternative hypothesis. Here, I take a slightly different approach. Because I have no particular system in mind, but rather a set of possible systems of a certain type, there is no base case as such. My interest is not so much harvest strategy evaluation for a particular case, as a more general investigation into which system parameters have a major impact on the harvest strategy evaluation. In particular, I am interested in the effects of stochasticity and the interactions of this with other parameters.

There are a huge number of potential questions on the general theme of how to manage fluctuating fisheries in the absence of good data.

One objective is to test the robustness of simple strategies in the face of pervasive uncertainty about the true mechanics of the fishery, and in the presence of possibly strong stochastic fluctuations.

A more specific, but related, objective is to test the hypothesis put forward by Cochrane (2000) that "the greater the uncertainty, the more conservative should be the approach". Cochrane suggests specifically that the realised yield as a proportion of estimated maximum average yield should be lower when uncertainty is greater. This sounds sensible, but there are many different kinds of uncertainty. And cutting realised yields may impact heavily on fishing communities. So it is important to test the conditions under which Cochrane's proposition is appropriate.

A2.3 The model

The model used as the underlying fishery is a fairly simple single species model. There are six growth variants, via three different possible relationships: recruitment independent of stock; a shallow-domed Ricker curve; and a steeply-domed Ricker curve,

coupled with two possible thresholds for recruitment failure: 1% and 5% of the theoretical virgin stock. Recruitment is subject to mutiplicative stochastic fluctuations which may be autocorrelated. In addition to the recruitment, there is survivorship from the previous year's escapement. The stock is harvested using a simple function relating harvest to stock and effort.

This approach is similar to that used by Kuikka et al (1999) for simulations using real cod stock data, where recruitment was modelled by (a) random sampling from historical values, independent of SSB (b) a Ricker curve and (c) an environmentally-perturbed Ricker model.

The estimates for thresholds of 1% and 5% are based on the American Fisheries Society decline thresholds for classifying as "vulnerable" a distinct population segment of a high or medium productivity species respectively. The criteria used to define high or medium productivity are intended to be conservative, and there are two levels of threat beyond "vulnerable", namely "threatened" and "endangered". The categories and criteria were originally derived during a workshop involving 14 fisheries scientists, and subsequently widely commented on, justifying the AFS statement that the work "reflects a major effort involving many scientists around the world".

In the model, stock is normalised such that a pristine stock under "mean" environmental conditions is measured as 1, and the price variable is likewise 1. This facilitates analysis and comparison, and helps interpretation of statistics such as net present value.

Mackinson et al. (1997) point out that small schooling pelagics may be especially vulnerable to overexploitation because of their schooling behaviour. This can be reflected via a coefficient B on the stock variable in the harvest function. Estimates for B are reported by Mackinson et al (1997), the lowest being McCall's (1976) estimate of 0.611 for the Californian sardine. Earlier simulations showed the very strong effect between values of 1 and 0.5, so in these simulations a more realistic range of 1, 0.85, 0.7 has been chosen.

An anonymous reviewer pointed out that it might be expected that the error associated with estimating the "optimal" policy should rise with the level of fluctuations displayed by the stock. This has been incorporated here.

Uniform distributions have been used, following Lewis (1982) and for ease of analysis. An anonymous reviewer pointed out that skewed distributions would be a more usual choice, for example the lognormal. I agree that it is important to analyse the case of skewed distributions and am taking this forward in further work. I also need to expand the range of fluctuations considered.

To summarise, the variables which take different values according to the scenario include (values in parentheses):

- the cost of effort (normalised for catchability): 0.02, 0.06, 0.1.
- the stock concentration coefficient in the harvest function: 1, 0.85, 0.7
- the level of poaching beyond policy targets: 0.25, 0.75
- the threshold for recruitment failure : 0.01, 0.05
- the form of recruitment: independent, or normalised Ricker parameter (3,12)

- the stochastic influence distribution and error in estimating the optimal policy for the "equivalent" deterministic system: Uniform[0.9,1.1] for both, Uniform[0.9,1.1] fluctuations and Uniform[0.6,1.4] error estimate, Uniform[0.6,1.4] for both.
- the degree of autocorrelation: 0 or 0.4

In addition there are a number of parameters which have not been varied. These include the discount rate (5%), and the survivorship from spawning stock (0) which in prior simulations was varied. Previous simulations also varied catchability, but this was seen to be unnecessary as this can be incorporated within the cost variable.

It is assumed that the starting state for the fishery is equal to the open access escapement level; this assumption creates is a level playing field for comparing policies, though it also creates problems, in particular for any fishery which has an open access equilibrium below the recruitment failure threshold. This will be addressed in future work.

Two of the recruitment scenarios modelled show a stock-recruitment relationship, a highly domed and a shallow domed Ricker. The independent case shows no such relationship, with the same distribution of recruitment arising provided the stock remains above a small recruitment failure threshold (1% or 5% of virgin biomass).

Do stocks with recruitment essentially independent of biomass, and the ability to bounce back from extremely low stocks, exist? Spencer and Collie (1997) classify fish stocks into a number of categories, observing that the suitable management strategies depend on the category and in most cases do not correspond to the steady-state assumptions of classical models. In particular, their `spasmodic' and `high variability, high frequency' stocks are relevant to this work. They suggest possible strategies alternating between periods of active exploitation and rebuilding, "a process enhanced by the existence of alternative fisheries". In this context, a relevant argument made is by Allison et al. (2001) who point out that community based management preventing fisher migration between different stocks may be dangerous, by encouraging continued exploitation of depleted stocks rather than movement to more productive areas. Of course, this depends on the pattern of good and bad years being independent for the different stocks, which may or may not be the case.

Powles et al (2000) note that "declines and increases up to 10-fold are relatively common in exploited fish stocks" and that "collapses of small pelagic stocks and subsequent recovery after many years of apparent near extirpation are well documented". They suggest that "grouping species by resilience as indicated by life-history traits, ecological characteristics, and habitat requirements could be used as a screening procedure to identify species at particular risk." Such screening might also be used to identify species not at particular risk, provided the harvesting technology and costs are also taken into consideration.

Mace and Sissenwine (1993) examined replacement percentage SSB per recruit in 83 fish stocks among 27 species, finding that in some stocks SSB per recruit could be reduced by 98% without recruitment overfishing, and it has also been observed that "interannual natural fluctuations of fishes towards the r end of the spectrum may approach two orders of magnitude" (Musick 1999). Beverton (1990) points out that some pelagic populations can be reduced to less than 1/1000 of their peak sizes for

prolonged periods (more than 20 years for Californian sardine) but nevertheless exhibit resurgence when favourable conditions return.

The Norwegian herring stock displayed a dramatic collapse, with spawning stock biomass falling to .01% of its 1950 level in 1972. The carrying capacity is unknown (and difficult to define), but the 1972 stock was only .04% of the mean stock over the 1950 to 1996 period, so the proportion of carrying capacity reached must be even smaller. Nevertheless, the following year the stock increased to 2.1% of the mean stock, five years' later it was 9.8%, and ten years after that rose above the mean (Myers 2000).

The North Sea stock displayed a similar pattern, with a low in 1977 equal to 1.3% of 1947 spawning stock biomass, or 4.2% of the mean over the 1947 to 1989 series, and bounced back to 21% of the mean within 5 years, 73% within 10, and 111% by the end of the series (Myers 2000). A similar tale can be told for the gold-spotted grenadier anchovy: 20-fold increase in SSB from 1960–61, 25-fold from 1964–66. (Myers 2000).

Other exploited marine animals may also fit the bill. For example, McLachlan et al (1996) say of beach clam fisheries that "many populations exhibit resurgences - considerable fluctuations in abundance coupled to variable recruitment and/or mass mortalities" while Berghahn (1996) cites repeated outbreaks of heavy predation reducing shrimp numbers in the Wadden Sea to almost zero, followed by "the complete recovery of the shrimp stock in each case within one year".

There are of course many well-known cases in which stocks have failed to recover following collapse. And Myers and Barrowman (1996) argue strongly that recruitment is related to spawner abundance, and there seems little doubt (a) that this is the case for most fish, most of the time and (b) that for all species, there must be some lower threshold below which recruitment failure occurs. However, it is likely that some species show very low failure thresholds. I am not arguing that all, or most, or even many, stocks can recover quickly from very low levels, merely that it seems possible that some can. These stocks are the highly fluctuating, r-selected species, adapted to strongly variable environments, identified as highly resilient in Musick's (1999) analysis. That such recoveries can take place even when fishing pressure is ongoing, as in the Norwegian herring case, can only strengthen the view that recovery is possible in the absence of fishing. It might also be added that the very species most likely to display resilience of this sort are those which have survived exploitation, as "fish with life histories and spatial behaviour inimical to harvesting are selectively removed" (Pitcher 2001).

This does not address the question of genetic effects of very low population "bottlenecks". Although intuitition might suggest that the number of individuals in question for pelagic fish may remain sufficiently high even through a collapse for loss of alleles to be a minor consideration in comparison to the wider effects of fishing pressure on phenotypic selection (Law 2000), in fact Ryman et al. (1995) stress that the effects of population crashes on allelic diversity are more pronounced for species with normally large populations. Nevertheless, it seems that some stocks routinely undergo periods of very low abundance, when they are displaced by other species, but nonetheless retain their ability to bounce back if the conditions are right.

A2.4 Strategies

The strategies modelled are all very simple, based on a modification of an estimate of the deterministic "optimal" policy - by which I mean the optimal steady-state effort or harvest from a deterministic analogue of the specific model under consideration. This is the basis for the policies in the simulations - an "educated guess" as to what a suitable target might be, which for simplicity I model as a multiple of the deterministic analogue optimum.

Koslow (1989) simulated policy in fisheries in which fluctuations were autocorrelated rather than purely random, finding that while neither constant escapement nor constant effort could maintain stability in high-risk fisheries, constant escapement policies minimised collapse risk. However constant escapement is an extremely unrealistic policy, especially for fisheries characterised by strong fluctuations and limited surveying and management data. A more realistic comparison is between quota-based and effort-based restrictions.

The simulations are run only for 10 periods each, and there is no rule for updating the policy. The data available for updating policy - essentially periodic frame surveys and estimates of catches - are difficult to use directly without assuming more knowledge of the underlying model than is warranted. The perspective here is to consider short to medium term goals for fisheries management, seeking robust and resilient policies which can achieve these goals under a wide range of scenarios.

According to Cochrane's suggestion, the realised yield should be reduced when uncertainty is greater. I simulate this by setting the actual target to a multiple of 1, 0.8 or 0.5 of the "optimal" target calculated. I also consider a moratorium of 0 or 2 periods. These degrees of caution are applied to effort and quota based management policies, and open access is also considered.

Overall there are 648 different scenarios managed in 13 different ways, which is just under 8500 simulations. Some scenarios gave starting stocks which were already beyond the failure threshold, and these were discarded. The remainder have each been run 75 times over 10 periods, with results presented in the tables at the end of this annex.

A2.5 Critique of assumptions

The simplifying assumptions underlying the model could be criticised on a number of grounds. In particular, using only 2 or 3 values for most of the varied parameters does not allow full exploration of the relationships. However, the computing time requirements are not trivial and rise geometrically with each new variable. The results presented here will be used to identify the key parameters, which can then be simulated more widely in a model with less interesting parameters fixed. Likewise, the number of runs of each simulation is rather low, and will need to be increased prior to publication of results, but I am still engaged in refining the parameter sets to be used in the final simulations.

The model treats effort as being constant throughout the season. This is very much a shortcut. In reality, an open access situation is likely to lead to higher efforts early in the

season as fishers compete for the most productive shoals. This is a kind of "race for fish", but would probably not be as severe as that created by fleet quotas. The end result in terms of escapement will not differ, but the profits and therefore net present values will. An open access situation is likely to lead to overcapitalisation in the industry, with higher efforts early in the season and underutilisation of capital towards the end of the season. This must be considered in interpreting the net present value figures, which do not take into account the fixed costs of capital. Against this must be set the fact that we are dealing with some pretty low-tech fisheries, with but modest capital investments, and the observation that in highly fluctuating fisheries some redundant capacity in average years may be needed to take advantage of the good years.

There are two principal objections to basing targets on an estimate of the "deterministic" optimum. This optimum may mean little in a stochastic setting, and in any case maximising NPV does not take into consideration all the possible objectives. However, the estimates are perturbed, and have the advantage of simplicity while allowing somewhat for the variation across the different parameter combinations, reflecting the assumption that management might be expected to have some knowledge, albeit rough, about desirable states for the fishery.

McAllister et al (1999) point out the value of modelling the harvest desicion process and the management implementation process, factors which are to an extent missing from the analysis presented here. I have assumed that fishers will "aim" for open access, in the sense of a certain level of poaching beyond policy constraints, and that management is essentially a "one-shot" measure, reflecting the paucity of data available and the lack of funds for continuous assessment. However both these assumptions can be criticised, and I have not modelled capital dynamics; future work needs to address these questions more fully.

Treating the harvest function as deterministic is a further simplification which might be relaxed. On the other hand, we are dealing with a large number of trips by a large number of boats over an entire season, and it could be argued that the randomness will average out. However there remains the specific case in which the catchability / concentration of the stock is partly environmentally determined, with influence on both the harvest function and recruitment. This is the case, for example, for the Peruvian anchoveta, where the width and depth of the cool waters it favours are highly variable year-on-year. Similar effects may apply to many fluctuating stocks. Future research will focus on adding stochasticity to the harvest function, and introducing an investment submodel. This will also enable the development of policies taking account of occasional frame surveys, one of the few bits of relatively reliable and cheap information available to managers.

The economic assumptions in this model, such as they are, are rather unrealistic. In particular, the assumption of a constant value per unit harvest may be inappropriate, especially for regions in which processing, storage and transport facilities are limited. Capital dynamics are not incorporated, and the assumption of constant effort cost may not hold. Clearly, there is a need to introduce a submodel describing economic behaviour. Mackinson et al. (1997), for example, find that the profits arising during depletion of a schooling stock lead to excessive investment, because the imminent collapse of the stock is hidden by the effect of schooling on maintaining levels of CPUE.

Finally, the models constructed are exclusively single-species models. Given that many of the fluctuating stocks exist in multi-species fisheries, often swimming in the same shoals, this is a shortcoming which needs to be addressed.

A2.6 Results

The raw output from the simulations gives a wide range of performance statistics, including means and variances within and between runs for harvests, profits, effort, NPV, information on lowest stocks / escapements reached, and the mean and variance of number of periods during which profits, harvest and effort fall below an *ad hoc* figure of 50% of the "optimum" in the deterministic analogue.

These raw results could be combined and analysed in a number of ways. One of the simplest and most intuitive is to look at the ranks in terms of certain performance indicators of different policies under given scenarios. In this report I have focussed on performance in terms of mean and between-run variance of Net Present Value, within-run variance of harvests, and whether or not a policy is successful in ensuring no falls to below 5% of virgin stock. Future work will examine the use of multi-criteria assessment methods for combining the different results into an overall assessment.

The performance ranks in terms of these indicators are given in the technical annex, presented in tables for each set of parameters so that sub-divided within that for degree of stochasticity and autocorrelation. This allows examination of the extent to which additional precaution is warranted by increasing stochasticity.

Net present values

The mean harvests and profits in the independent open access case tend to exceed the "deterministic" optima. This is quite simply explained. The first reason is that the escapement has no impact on recruitment, and therefore little influence on the next season's stock. The second reason is that the gains in good recruitment years tend to outweigh on average the losses in bad recruitment years, because the costs of fishing are not linear.

It must be kept in mind that, as discussed above, there is no capital investment model, and that therefore the actual profits derived from open access may be overstated. This is probably of lesser significance for the fisheries of interest than for most, but is nevertheless an important criticism. Therefore the observation that open access tends to score quite highly on NPV, in the independent recruitment case, needs to be somewhat discounted.

The overall picture from the independent recruitment simulations is that open access and effort control policies outperform quota policies on NPV, and this finding is not sensitive to the level of stochasticity. Moratorium policies tend either to perform very well or very badly - they perform well when the moratorium allows a remnant stock to recover to outside the collapse zone, and so could be warranted if recruitment failure is suspected.

The performance of the other form of caution, percentage reduction in targets, depends on the parameters of the model. Higher shoaling, higher ricker curves and higher poaching all favour caution. But this effect does not seem to depend on the level of fluctuations directly. It does depend on the range of error in estimating optimal policy, so to the extent that this depends on fluctuations, there is an indirect link.

The picture for Ricker recruitment is similar, with the exception that open access performs poorly. Effort control is better than quota. Moratoria can be successful in allowing the stock to recover to a level at which recruitment and continuing yields are stronger, but seem less desirable when there is autocorrelation, due to the risk of a sequence of bad years preventing the moratorium from achieving its goals. However this results needs further testing with a wider range of moratorium lengths as it may be an artefact of the particular parameter choices made.

Variance of NPV

The variance of NPV is quite difficult to interpret, because low variances can be associated with very low NPVs and need not imply a desirable characteristic. Obviously, the moratorium options tend to show higher variance (this holds for other characteristics) simply because of the two years with no harvesting. Quota policies perform as well as effort in the high stochasticity, independent recruitment scenarios, but there is no evidence that a cautious target reduces variability, in fact the opposite seems to be true. For Ricker recruitment, quota policies do have lower variance in NPV, but again it seems that caution tends to increase variance.

Low Escapements

Musick (1999) defines stocks of "high" resilience as at risk of extinction should the biomass fall below 1% of its virgin value for the longer of 10 years or three generations. "Medium" resilience has a threshold of 5%. To be conservative, I have focussed on the 5% threshold here. *Economic* overexploitation is entirely possible, but will be reflected in other statistics.

In earlier simulations, it took a particular combination of low harvesting cost and high stock concentration to make harvesting to below 1% of the "virgin" stock possible. The question of interest is whether or not a particular policy is successful in avoiding low escapements should these cost and harvest function conditions hold in reality. In this respect, open access is the poorest performer, for the obvious reason that a zero profit level lying beneath the threshold will cause the threshold to be breached. Beyond that, it is clear that both caution and moratoria have a strong impact, however there is no evidence that these impacts are greater under stronger stochasticity or autocorrelation. The same is true of both independent and Ricker recruitment.

In the simulations presented here, more cautious policies can be needed to prevent crossing the 5% threshold in the high error in estimating policy scenarios. But the effect does not seem to depend on the level of fluctuations directly. Again, to the extent that the range of error in estimating optimal policy depends on fluctuations, there is an indirect link.

While these fisheries may be thought relatively safe from biological overexploitation, if relative costs are being reduced over time, which could be through falling real costs of technology, greater efficiency, or rising product prices, then it may be that open access will come to threaten the resilience criterion. It may be that all that is required for resilience is policy to ensure that these cost-related changes do not occur, without the need directly to interfere with the harvesting using current technologies.

A2.7 Conclusions

The results of this preliminary analysis suggest that there clearly are indicators on which cautious approaches outperform less cautious policies, but there are equally other indicators where the reverse is true. Crucially, there is no evidence for variation in these relative performances depending directly on the fluctuations in recruitment. There is evidence that caution is more warranted the more the error range in estimating the optimal policy. This seems to suggest that, while cautious approaches may be warranted in certain situations, this does not depend on the level of stochasticity directly, but only indirectly. However this is not a firm conclusion. Rather, it motivates further study of a wider range of stochasticity and autocorrelation conditions to check the findings under a much greater number of scenarios.

There are many ways in which the assumptions underlying this model could be altered, but the general approach seems useful. In particular, sensitivity to different targets should be tested. There is also a need to examine a wider range of possible strategies. To this end the model will be further developed, including a economic behaviour submodel, allowing better specification of the effort variable and use of strategies which react to periodic frame survey and catch data.

It is very important to bear in mind that these are preliminary results derived for a particular subset of fisheries, with high fluctuations and strong resilience properties. These results may only apply to a few fisheries and in any case require much more checking and simulations over wider parameter sets and longer runs before confidence can be placed in the results.

A2.8. References

Allison, E. H., F. Ellis, P. M. Mvula, and L. F. Mathieu (2001), "Fisheries management and uncertainty: The causes and consequences of variability in inland fisheries in Africa, with special reference to Malawi", in Weyl, O. (ed.), *Proceedings of the National Fisheries Management Symposium*, Lilongwe, Malawi, June 5-9, PO Box 27, Monkey Bay, Malawi, National Aquatic Resource Management Programme.

Basson, M. (1999), "The importance of environmental factors in the design of management procedures", *ICES Journal of Marine Science*, 56, 933–942.

Beddington, J. R. and May, R. M., (1977). Harvesting Natural Populations in a Randomly Fluctuating Environment. *Science*, 197: 463--465

Berghahn, R. (1996), "Episodic mass invasions of juvenile gadoids into the Wadden sea and their consequences for the population dynamics of brown shrimp *Cragnon cragnon*", *Marine Ecology – Pubblicazioni della Statzione Zoologica di Napoli*, 17(1–3), 251–260.

Butterworth, D. S. and Punt, A. E. (1999), "Experiences in the evaluation and implementation of management procedures", *ICES Journal of Marine Science*, 56(6), 985–998.

Christensen, S. (1997), "Evaluation of managment strategies: A bioeconomic approach applied to the Greenland shrimp fishery", *ICES Journal of Marine Science*, 54(3), 412–426.

Cochrane, K. L. (2000), Reconciling sustainability, economic efficiency and equity in fisheries: The one that got away? *Fish and Fisheries*, 1, 3–21.

Collie, J. S. and C. J. Walters (1993), Models that learn to distinguish among alternative hypotheses, *Fisheries Research*, 18(3–4), 259–275.

Cooke, J. G. (1999). Improvement of fishery-management advice through simulation testing of harvest algorithms. *ICES Journal of Marine Science* 56: 797-810.

Danielsson, A. (2002), Efficiency of catch and effort quotas in the presence of risk, *Journal of Environmental Economics and Environmental Management*, 43, 20–33.

De la Mare, W. K., (1986), Simulation Studies on Management Procedures, *Report of the International Whaling Commission*, 36: 429--450

DiNardo, G. and J. Wetherall (1999), Accounting for uncertainty in the development of harvest strategies for the Northwestern Hawaiian islands lobster trap fishery, *ICES Journal of Marine Science*, 56(6), 943–951.

Frederick, S. W. and R. M. Peterman (1995), Choosing fisheries harvest policies: When does uncertainty matter? *Canadian Journal of Fisheries and Aquatic Sciences,* 52, 291–306.

Hutchings, J. A. (2001), Influence of population decline, fishing, and spawner variability on the recovery of marine fishes, *Journal of Fish Biology*, 59(Supplement A), 306–322.

International Whaling Commission, (1988), Report of the Scientific Committee, IWC 38th Report.

International Whaling Commission, (1992), Report of the Scientific Committee, IWC 42nd Report.

Kirkwood, G. P. (1997) "The Revised Management Procedure of the International Whaling Commission" in Pikitch, E. K., Huppert, D. D. and Sissenwine, M. P. (eds) *Global Trends: Fisheries Management*, American Fisheries Society, Bethesda, MD.

Koslow, J. A. (1989), Managing nonrandomly varying fisheries, *Canadian Journal of Fisheries and Aquatic Sciences*, 46, 1302–1308.

Law, R. (2000), Fishing, selection and phenotypic evolution, *ICES Journal of Marine Science*, 57, 659–668.

MacCall, A. D. (1976), Density dependence and catchability coefficient in the California sardine, *Sardinops sagax caerula*, purse-seine fishery, *California Cooperative Oceanic Fisheries Investigations Reports*, 18, 136–148.

Ludwig, D. (1980), Harvesting Strategies for a Randomly Fluctuating Population. *J. Cons. int. Explor. Mer.* 39(2):168--174

Ludwig, D. and Walters, C.J., (1982), Optimal Harvesting with Imprecise Parameter Estimates *Ecological Modelling*, 14 , pp.273--292

Mackinson, S., U. R. Sumaila, and T. J. Pitcher (1997), Bioeconomics and catchability: fish and fishers behaviour during stock collapse, *Fisheries Research*, 31, 11–17.

May, R. M., Beddington, J. R., Horwood, J. W. and Shepherd, J. G., (1978). Exploiting Natural Populations in an Uncertain World. *Mathematical Biosciences*, 42: 219—252

McAllister, M. K. and R. M. Peterman (1992), Decision analysis of a large scale fishing experiment designed to test for a genetic effect of size-selective fishing on British-Columbia pink salmon, *Canadian Journal of Fisheries and Aquatic Sciences*, 49(7), 1305–1314.

McAllister, M. K., P. J. Starr, V. R. Restrepo, and G. P. Kirkwood (1999), Formulating quantitative methods to evaluate fishery-management systems: What fishery processes should be modelled and what trade-offs should be made? *ICES Journal of Marine Science,* 56, 900–916.

McDaniels, T. L. (1995), Using judgement in resource management: A multiple-objective analysis of a fisheries management decision, *Operations Research*, 43(3), 415–426.

McKelvey, R. (1983), The fishery in a fluctuating environment: Coexistence of specialist and generalist fishing vessels in a multipurpose fleet, *Journal of Environmental Economics and Management*, 10, 287–309.

McLachlan, A, J. E. Dugan, O. Defeo, A. D. Ansell, D. M. Hubbard, E. Jaramillo, and P. E. Penchaszadeh (1996), "Beach clam fisheries" *Oceanography and Marine Biology*, 34, 163–232.

Megrey, B., A. Hollowed, and R. Baldwin (1994), Sensitivity of optimum harvest strategy estimates to alternative definitions of risk, *Canadian Journal of Fisheries and Aquatic Science*, 51, 2695–2704.

Musick, J. A. (1999), Criteria to define extinction risk in marine fisheries, *Fisheries*, 24(12), 6–14.

Myers, R. (2000), Stock recruitment database, http://www.mscs.dal.ca/ myers/welcome.html.

Pitcher, T. J. (2001), Fisheries managed to rebuild ecosystems? Reconstructing the past to salvage the future, *Ecological Applications*, 11(2), 601–617.

Pontecorvo, G. (2001), Supply side uncertainty and the management of commercial fisheries: Peruvian anchovetta, an illustration, *Marine Policy*, 25, 169–172.

Punt, A. E., R. A. Campbell, and A. D. M. Smith (2001), Evaluating empirical indicators and reference points for fisheries management: Application to the broadbill swordfish fishery off eastern australia, *Marine and Freshwater Research.*, 52(6), 819–832.

Robertson, D. R. and K. C. Kaufmann (1998), Assessing early recruitment dynamics and its demographic consequences among tropical reef fishes: Accomodating variation in recruitment seasonality and longevity, *Australian Journal of Ecology*, 23(3), 226–233.

Sainsbury, K., A. Punt, and A. Smith (2000), Design of operational management strategies for achieving fishery ecosystem objectives, *ICES Journal of Marine Science*, 57(3), 731–741.

Spencer, P. D. (1997), Optimal harvesting of fish populations with nonlinear rates of predation and autocorrelated environmental variability, *Canadian Journal of Fisheries and Aquatic Science*, 54, 59–74.

Vaca-Rodriguez, J. and M. Dreyfus-Leon (2000), Analysis of the fishing strategies of the yellowfin tuna (\textitThunnus albacares) eastern Pacific fishery based on Monte Carlo simulations of a density-dependent matrix model, *Sciencies Marinas*, 66(3), 745–757.

A2.9 Ranks of policies under different scenarios

The tables on the following pages show the performance of the 13 policies simulated across all the scenarios, divided up to control for the amount of stochasticity and presence / absence of autocorrelation in the stochastic variable. The policies are open access, effort control, and quota control, in the latter two cases with a "degree of caution" equal to 1, 0.8 or 0.5 (this being the multiple applied to the "deterministic optimum" when setting the policy target) and an initial moratorium of 2 years in some cases.

The top hand corner of each table details the scenario in question, as described below.

The column headings describe the policy, where E is effort, Q is quota, OA is open access, 1,.8 and .5 are the degrees of caution (multiples on estimated "optimal" policy for equivalent deterministic model) and M is a two-year moratorium at the start of the period. Thus, "E .8M" refers to the effort control policy set at 80% of the estimated deterministic optimum after a 2 year moratorium, and so on.

The row labels describe the level of stochasticity, where L is low fluctuations, H is high fluctuations, N is a narrow range of policy estimation error, W is a wide range of policy estimation error, and A is autocorrelation.

Within each cell, the three numbers represent the rank of that policy in that scenario for mean NPV, variance of mean NPV (between runs), and mean variance of harvest (within runs). The letter "v" (for veto) then appears if, for any one of the runs, the stock fell below 5% of the virgin stock size.

Scenario	Cost	Shoaling	Poaching	Failure	SR model	Scenario	Cost	Shoaling	Poaching	Failure	SR model
1, 1, 1, 1, 1	0.02	1	0.25	0.01	Indep.	2, 3, 2, 1, 1	0.06	0.7	0.75	0.01	Indep.
1, 1, 1, 1, 2	0.02	1	0.25	0.01	Ricker 3	2, 3, 2, 1, 2	0.06	0.7	0.75	0.01	Ricker 3
1, 1, 1, 1, 3	0.02	1	0.25	0.01	Ricker 12	2, 3, 2, 1, 3	0.06	0.7	0.75	0.01	Ricker 12
1, 1, 2, 1, 1	0.02	1	0.75	0.01	Indep.	3, 1, 1, 1, 1	0.1	1	0.25	0.01	Indep.
1, 1, 2, 1, 2	0.02	1	0.75	0.01	Ricker 3	3, 1, 1, 1, 2	0.1	1	0.25	0.01	Ricker 3
1, 1, 2, 1, 3	0.02	1	0.75	0.01	Ricker 12	3, 1, 1, 1, 3	0.1	1	0.25	0.01	Ricker 12
1, 2, 1, 1, 1	0.02	0.85	0.25	0.01	Indep.	3, 1, 1, 2, 1	0.1	1	0.25	0.05	Indep.
1, 2, 1, 1, 2	0.02	0.85	0.25	0.01	Ricker 3	3, 1, 1, 2, 2	0.1	1	0.25	0.05	Ricker 3
1, 2, 1, 1, 3	0.02	0.85	0.25	0.01	Ricker 12	3, 1, 1, 2, 3	0.1	1	0.25	0.05	Ricker 12
1, 2, 2, 1, 1	0.02	0.85	0.75	0.01	Indep.	3, 1, 2, 1, 1	0.1	1	0.75	0.01	Indep.
1, 2, 2, 1, 2	0.02	0.85	0.75	0.01	Ricker 3	3, 1, 2, 1, 2	0.1	1	0.75	0.01	Ricker 3
1, 2, 2, 1, 3	0.02	0.85	0.75	0.01	Ricker 12	3, 1, 2, 1, 3	0.1	1	0.75	0.01	Ricker 12
2, 1, 1, 1, 1	0.06	1	0.25	0.01	Indep.	3, 1, 2, 2, 1	0.1	1	0.75	0.05	Indep.
2, 1, 1, 1, 2	0.06	1	0.25	0.01	Ricker 3	3, 1, 2, 2, 2	0.1	1	0.75	0.05	Ricker 3
2, 1, 1, 1, 3	0.06	1	0.25	0.01	Ricker 12	3, 1, 2, 2, 3	0.1	1	0.75	0.05	Ricker 12
2, 1, 1, 2, 1	0.06	1	0.25	0.05	Indep.	3, 2, 1, 1, 1	0.1	0.85	0.25	0.01	Indep.
2, 1, 1, 2, 2	0.06	1	0.25	0.05	Ricker 3	3, 2, 1, 1, 2	0.1	0.85	0.25	0.01	Ricker 3
2, 1, 1, 2, 3	0.06	1	0.25	0.05	Ricker 12	3, 2, 1, 1, 3	0.1	0.85	0.25	0.01	Ricker 12
2, 1, 2, 1, 1	0.06	1	0.75	0.01	Indep.	3, 2, 1, 2, 1	0.1	0.85	0.25	0.05	Indep.
2, 1, 2, 1, 2	0.06	1	0.75	0.01	Ricker 3	3, 2, 1, 2, 2	0.1	0.85	0.25	0.05	Ricker 3
2, 1, 2, 1, 3	0.06	1	0.75	0.01	Ricker 12	3, 2, 1, 2, 3	0.1	0.85	0.25	0.05	Ricker 12
2, 1, 2, 2, 1	0.06	1	0.75	0.05	Indep.	3, 2, 2, 1, 1	0.1	0.85	0.75	0.01	Indep.
2, 1, 2, 2, 2	0.06	1	0.75	0.05	Ricker 3	3, 2, 2, 1, 2	0.1	0.85	0.75	0.01	Ricker 3
2, 1, 2, 2, 3	0.06	1	0.75	0.05	Ricker 12	3, 2, 2, 1, 3	0.1	0.85	0.75	0.01	Ricker 12
2, 2, 1, 1, 1	0.06	0.85	0.25	0.01	Indep.	3, 2, 2, 2, 1	0.1	0.85	0.75	0.05	Indep.
2, 2, 1, 1, 2	0.06	0.85	0.25	0.01	Ricker 3	3, 2, 2, 2, 2	0.1	0.85	0.75	0.05	Ricker 3
2, 2, 1, 1, 3	0.06	0.85	0.25	0.01	Ricker 12	3, 2, 2, 2, 3	0.1	0.85	0.75	0.05	Ricker 12
2, 2, 2, 1, 1	0.06	0.85	0.75	0.01	Indep.	3, 3, 1, 1, 1	0.1	0.7	0.25	0.01	Indep.
2, 2, 2, 1, 2	0.06	0.85	0.75	0.01	Ricker 3	3, 3, 1, 1, 2	0.1	0.7	0.25	0.01	Ricker 3
2, 2, 2, 1, 3	0.06	0.85	0.75	0.01	Ricker 12	3, 3, 1, 1, 3	0.1	0.7	0.25	0.01	Ricker 12
2, 3, 1, 1, 1	0.06	0.7	0.25	0.01	Indep.	3, 3, 2, 1, 1	0.1	0.7	0.75	0.01	Indep.
2, 3, 1, 1, 2	0.06	0.7	0.25	0.01	Ricker 3	3, 3, 2, 1, 2	0.1	0.7	0.75	0.01	Ricker 3
2, 3, 1, 1, 3	0.06	0.7	0.25	0.01	Ricker 12	3, 3, 2, 1, 3	0.1	0.7	0.75	0.01	Ricker 12

1, 1, 1, 1, 1	E1	E1M	E.8	E.8M	E.5	E.5M	Q1	Q1M	Q.8	Q.8M	Q.5	Q.5M	OA
LN	3, 2, 11, v	1, 4, 12, v	5, 3, 9, v	4, 5, 10, v	9, 6, 7	8, 7, 8	7, 8, 5, v	6, 9, 6, v	11, 12, 1, v	10, 13, 1, v	13, 11, 1	12, 10, 1	2, 1, 13, v
LNA	3, 2, 11, v	1, 4, 12, v	5, 3, 9, v	4, 5, 10, v	9, 6, 7	8, 7, 8	7, 8, 5, v	6, 9, 6, v	11, 13, 1	10, 12, 1	13, 11, 1	12, 10, 1	2, 1, 13, v
LW	3, 2, 11, v	2, 3, 12, v	5, 5, 9, v	4, 4, 10, v	9, 7, 7	8, 6, 8	7, 10, 5, v	6, 11, 6, v	11, 12, 3, v	10, 13, 4, v	13, 8, 1	12, 9, 1	1, 1, 13, v
LWA	3, 2, 10, v	2, 3, 11, v	5, 5, 9, v	4, 4, 12, v	9, 7, 7	8, 6, 8	7, 10, 5, v	6, 11, 6, v	11, 12, 3, v	10, 13, 4, v	13, 9, 1	12, 8, 1	1, 1, 13, v
HW	3, 2, 11, v	1, 3, 13, v	5, 5, 9, v	4, 4, 10, v	7, 7, 7, v	6, 6, 8, v	9, 10, 5, v	8, 11, 6, v	11, 12, 4, v	10, 13, 3, v	13, 8, 2, v	12, 9, 1, v	2, 1, 12, v
HWA	3, 2, 10, v	1, 3, 13, v	5, 5, 9, v	4, 4, 11, v	7, 7, 7, v	6, 6, 8, v	9, 10, 5, v	8, 11, 6, v	10, 12, 3, v	11, 13, 4, v	13, 9, 2, v	12, 8, 1, v	2, 1, 12, v

1, 1, 1, 1, 2	E1	E1M	E.8	E.8M	E.5	E.5M	Q1	Q1M	Q.8	Q.8M	Q.5	Q.5M	OA
LN	7, 11, 11, v	1, 12, 7	4, 8, 13, v	2, 10, 8	6, 5, 9, v	3, 9, 6	10, 1, 2, v	9, 6, 12, v	10, 1, 2, v	8, 13, 10, v	10, 1, 2, v	5, 7, 1	10, 1, 2, v
LNA	7, 10, 11, v	1, 12, 7	4, 7, 13, v	2, 11, 8	6, 5, 9, v	3, 9, 6	10, 1, 2, v	9, 6, 12, v	10, 1, 2, v	8, 13, 10, v	10, 1, 2, v	5, 8, 1	10, 1, 2, v
LW	7, 9, 11, v	1, 6, 7	4, 5, 13, v	2, 8, 8	6, 7, 10, v	3, 10, 6	10, 1, 1, v	9, 12, 12, v	10, 1, 1, v	8, 13, 9, v	10, 1, 1, v	5, 11, 5, v	10, 1, 1, v
LWA	7, 9, 11, v	1, 6, 7	4, 5, 13, v	2, 8, 8	6, 7, 10, v	3, 10, 6	10, 1, 1, v	9, 12, 12, v	10, 1, 1, v	8, 13, 9, v	10, 1, 1, v	5, 11, 5, v	10, 1, 1, v
HW	6, 8, 12, v	1, 11, 8	4, 6, 13, v	2, 10, 9	5, 5, 11, v	3, 7, 6	10, 1, 1, v	9, 12, 10, v	10, 1, 1, v	8, 13, 7, v	10, 1, 1, v	7, 9, 5, v	10, 1, 1, v
HWA	6, 8, 12, v	1, 11, 8	4, 6, 13, v	2, 10, 9	5, 5, 11, v	3, 7, 6	10, 1, 1, v	9, 13, 10, v	10, 1, 1, v	8, 12, 7, v	10, 1, 1, v	7, 9, 5, v	10, 1, 1, v

1, 1, 1, 1, 3	E1	E1M	E.8	E.8M	E.5	E.5M	Q1	Q1M	Q.8	Q.8M	Q.5	Q.5M	OA
LN	4, 12, 13, v	1, 13, 12	3, 8, 11	2, 9, 10	6, 11, 9	5, 10, 8	10, 1, 1, v	7, 5, 5, v	10, 1, 1, v	7, 5, 5, v	10, 1, 1, v	7, 5, 5, v	10, 1, 1, v
LNA	4, 12, 13, v	1, 13, 12	3, 8, 11	2, 9, 10	6, 11, 9	5, 10, 8	10, 1, 1, v	7, 5, 5, v	10, 1, 1, v	7, 5, 5, v	10, 1, 1, v	7, 5, 5, v	10, 1, 1, v
LW	4, 13, 13, v	3, 12, 11, v	2, 8, 12, v	1, 9, 10	6, 11, 9	5, 10, 8	10, 1, 1, v	8, 5, 6, v	10, 1, 1, v	8, 5, 6, v	10, 1, 1, v	7, 7, 5, v	10, 1, 1, v
LWA	4, 13, 13, v	3, 12, 11, v	2, 8, 12, v	1, 9, 10	6, 11, 9	5, 10, 8	10, 1, 1, v	8, 5, 6, v	10, 1, 1, v	8, 5, 6, v	10, 1, 1, v	7, 7, 5, v	10, 1, 1, v
HW	4, 12, 13, v	2, 13, 10, v	3, 7, 12, v	1, 8, 11, v	6, 10, 9	5, 9, 8, v	10, 1, 1, v	9, 6, 7, v	10, 1, 1, v	8, 5, 6, v	10, 1, 1, v	7, 11, 5, v	10, 1, 1, v
HWA	4, 12, 13, v	2, 13, 11, v	3, 6, 12, v	1, 9, 10, v	6, 8, 9	5, 7, 8, v	10, 1, 1, v	8, 10, 7, v	10, 1, 1, v	9, 5, 6, v	10, 1, 1, v	7, 11, 5, v	10, 1, 1, v

1, 1, 2, 1, 1	E1	E1M	E.8	E.8M	E.5	E.5M	Q1	Q1M	Q.8	Q.8M	Q.5	Q.5M	OA
LN	2, 2, 12, v	1, 3, 13, v	5, 4, 9, v	4, 5, 11, v	9, 7, 7	8, 6, 8	7, 8, 5, v	6, 9, 6, v	11, 12, 1, v	10, 13, 1, v	13, 11, 1	12, 10, 1	3, 1, 10, v
LNA	2, 1, 10, v	1, 3, 13, v	5, 4, 9, v	4, 5, 11, v	9, 7, 7	8, 6, 8	7, 8, 5, v	6, 9, 6, v	11, 13, 1	10, 12, 1	13, 11, 1	12, 10, 1	3, 2, 12, v
LW	3, 3, 11, v	2, 2, 13, v	5, 5, 9, v	4, 4, 10, v	9, 7, 7	8, 6, 8	7, 10, 5, v	6, 11, 6, v	11, 12, 3, v	10, 13, 4, v	13, 8, 1	12, 9, 1	1, 1, 12, v
LWA	3, 3, 10, v	2, 2, 13, v	5, 5, 9, v	4, 4, 11, v	9, 7, 7	8, 6, 8	7, 10, 5, v	6, 11, 6, v	11, 12, 3, v	10, 13, 4, v	13, 9, 1	12, 8, 1	1, 1, 12, v
HW	3, 2, 11, v	1, 3, 13, v	5, 5, 9, v	4, 4, 10, v	7, 7, 7, v	6, 6, 8, v	9, 10, 5, v	8, 11, 6, v	11, 12, 4, v	10, 13, 3, v	13, 8, 2, v	12, 9, 1, v	2, 1, 12, v
HWA	3, 2, 10, v	1, 3, 13, v	5, 5, 9, v	4, 4, 11, v	7, 7, 7, v	6, 6, 8, v	9, 10, 5, v	8, 11, 6, v	10, 12, 3, v	11, 13, 4, v	13, 9, 2, v	12, 8, 1, v	2, 1, 12, v

1, 1, 2, 1, 2	E1	E1M	E.8	E.8M	E.5	E.5M	Q1	Q1M	Q.8	Q.8M	Q.5	Q.5M	OA
LN	7, 11, 11, v	1, 12, 7	4, 8, 13, v	2, 10, 8	6, 5, 9, v	3, 9, 6	10, 1, 2, v	9, 6, 12, v	10, 1, 2, v	8, 13, 10, v	10, 1, 2, v	5, 7, 1	10, 1, 2, v
LNA	7, 10, 11, v	1, 12, 7	4, 7, 13, v	2, 11, 8	6, 5, 9, v	3, 9, 6	10, 1, 2, v	9, 6, 12, v	10, 1, 2, v	8, 13, 10, v	10, 1, 2, v	5, 8, 1	10, 1, 2, v
LW	7, 9, 11, v	1, 6, 7	4, 5, 13, v	2, 8, 8	6, 7, 10, v	3, 10, 6	10, 1, 1, v	9, 12, 12, v	10, 1, 1, v	8, 13, 9, v	10, 1, 1, v	5, 11, 5, v	10, 1, 1, v
LWA	7, 9, 11, v	1, 6, 7	4, 5, 13, v	2, 8, 8	6, 7, 10, v	3, 10, 6	10, 1, 1, v	9, 12, 12, v	10, 1, 1, v	8, 13, 9, v	10, 1, 1, v	5, 11, 5, v	10, 1, 1, v
HW	6, 8, 12, v	1, 11, 8	4, 6, 13, v	2, 10, 9	5, 5, 11, v	3, 7, 6	10, 1, 1, v	9, 12, 10, v	10, 1, 1, v	8, 13, 7, v	10, 1, 1, v	7, 9, 5, v	10, 1, 1, v
HWA	6, 8, 12, v	1, 11, 8	4, 6, 13, v	2, 10, 9	5, 5, 11, v	3, 7, 6	10, 1, 1, v	9, 13, 10, v	10, 1, 1, v	8, 12, 7, v	10, 1, 1, v	7, 9, 5, v	10, 1, 1, v

1, 1, 2, 1, 3	E1	E1M	E.8	E.8M	E.5	E.5M	Q1	Q1M	Q.8	Q.8M	Q.5	Q.5M	OA
LN	4, 12, 13, v	1, 13, 12	3, 8, 11	2, 9, 10	6, 11, 9	5, 10, 8	10, 1, 1, v	7, 5, 5, v	10, 1, 1, v	7, 5, 5, v	10, 1, 1, v	7, 5, 5, v	10, 1, 1, v
LNA	4, 12, 13, v	1, 13, 12	3, 8, 11	2, 9, 10	6, 11, 9	5, 10, 8	10, 1, 1, v	7, 5, 5, v	10, 1, 1, v	7, 5, 5, v	10, 1, 1, v	7, 5, 5, v	10, 1, 1, v
LW	4, 13, 13, v	3, 12, 11, v	2, 8, 12, v	1, 9, 10	6, 11, 9	5, 10, 8	10, 1, 1, v	8, 5, 6, v	10, 1, 1, v	8, 5, 6, v	10, 1, 1, v	7, 7, 5, v	10, 1, 1, v
LWA	4, 13, 13, v	3, 12, 11, v	2, 8, 12, v	1, 9, 10	6, 11, 9	5, 10, 8	10, 1, 1, v	8, 5, 6, v	10, 1, 1, v	8, 5, 6, v	10, 1, 1, v	7, 7, 5, v	10, 1, 1, v
HW	4, 12, 13, v	2, 13, 10, v	3, 7, 12, v	1, 8, 11, v	6, 10, 9	5, 9, 8, v	10, 1, 1, v	9, 6, 7, v	10, 1, 1, v	8, 5, 6, v	10, 1, 1, v	7, 11, 5, v	10, 1, 1, v
HWA	4, 12, 13, v	2, 13, 11, v	3, 6, 12, v	1, 9, 10, v	6, 8, 9	5, 7, 8, v	10, 1, 1, v	8, 10, 7, v	10, 1, 1, v	9, 5, 6, v	10, 1, 1, v	7, 11, 5, v	10, 1, 1, v

1, 2, 1, 1, 1	E1	E1M	E.8	E.8M	E.5	E.5M	Q1	Q1M	Q.8	Q.8M	Q.5	Q.5M	OA
LN	2, 2, 12, v	1, 3, 13, v	5, 4, 9, v	4, 5, 10, v	9, 7, 7	8, 6, 8	7, 8, 5, v	6, 9, 6, v	11, 12, 1, v	10, 13, 1, v	13, 11, 1	12, 10, 1	3, 1, 11, v
LNA	2, 1, 10, v	1, 3, 13, v	5, 4, 9, v	4, 5, 11, v	9, 7, 7	8, 6, 8	7, 8, 5, v	6, 9, 6, v	11, 13, 1	10, 12, 1	13, 11, 1	12, 10, 1	3, 2, 12, v
LW	3, 3, 11, v	2, 2, 13, v	5, 5, 9, v	4, 4, 10, v	9, 7, 7	8, 6, 8	7, 10, 5, v	6, 11, 6, v	11, 12, 3, v	10, 13, 4, v	13, 8, 1	12, 9, 1	1, 1, 12, v
LWA	3, 3, 10, v	2, 2, 13, v	5, 5, 9, v	4, 4, 11, v	9, 7, 7	8, 6, 8	7, 10, 5, v	6, 11, 6, v	11, 12, 3, v	10, 13, 4, v	13, 9, 1	12, 8, 1	1, 1, 12, v
HW	3, 2, 11, v	1, 3, 13, v	5, 5, 9, v	4, 4, 10, v	8, 7, 7, v	6, 6, 8, v	9, 10, 5, v	7, 11, 6, v	11, 12, 4, v	10, 13, 3, v	13, 8, 2, v	12, 9, 1, v	2, 1, 12, v
HWA	3, 2, 10, v	1, 3, 13, v	5, 5, 9, v	4, 4, 11, v	9, 7, 7, v	8, 6, 8, v	7, 10, 5, v	6, 11, 6, v	10, 12, 3, v	11, 13, 4, v	13, 9, 2, v	12, 8, 1, v	2, 1, 12, v

1, 2, 1, 1, 2	E1	E1M	E.8	E.8M	E.5	E.5M	Q1	Q1M	Q.8	Q.8M	Q.5	Q.5M	OA
LN	9, 8, 5, v	2, 13, 11	5, 11, 7, v	1, 10, 12	4, 7, 13, v	3, 9, 8	10, 1, 1, v	7, 5, 9, v	10, 1, 1, v	7, 5, 9, v	10, 1, 1, v	6, 12, 6, v	10, 1, 1, v
LNA	9, 8, 5, v	2, 13, 11	5, 11, 7, v	1, 10, 12	4, 7, 13, v	3, 9, 8	10, 1, 1, v	7, 5, 9, v	10, 1, 1, v	7, 5, 9, v	10, 1, 1, v	6, 12, 6, v	10, 1, 1, v
LW	7, 11, 6, v	2, 10, 10, v	5, 12, 11, v	1, 8, 12	4, 7, 13, v	3, 9, 7	10, 1, 1, v	9, 5, 9, v	10, 1, 1, v	8, 6, 8, v	10, 1, 1, v	6, 13, 5, v	10, 1, 1, v
LWA	7, 11, 6, v	2, 10, 10, v	5, 12, 11, v	1, 8, 12	4, 7, 13, v	3, 9, 7	10, 1, 1, v	9, 5, 9, v	10, 1, 1, v	8, 6, 8, v	10, 1, 1, v	6, 13, 5, v	10, 1, 1, v
HW	7, 7, 6, v	2, 13, 11, v	5, 10, 10, v	1, 12, 13	4, 6, 12, v	3, 9, 9	10, 1, 1, v	9, 5, 8, v	10, 1, 1, v	8, 8, 7, v	10, 1, 1, v	6, 11, 5, v	10, 1, 1, v
HWA	7, 7, 6, v	2, 13, 11, v	5, 10, 10, v	1, 12, 12	4, 6, 13, v	3, 8, 9	10, 1, 1, v	9, 5, 8, v	10, 1, 1, v	8, 9, 7, v	10, 1, 1, v	6, 11, 5, v	10, 1, 1, v

1, 2, 1, 1, 3	E1	E1M	E.8	E.8M	E.5	E.5M	Q1	Q1M	Q.8	Q.8M	Q.5	Q.5M	OA
LN	9, 9, 5, v	1, 10, 9	4, 11, 13, v	2, 8, 8	5, 6, 11, v	3, 7, 7	10, 1, 1, v	8, 5, 12, v	10, 1, 1, v	7, 12, 10, v	10, 1, 1, v	6, 13, 6, v	10, 1, 1, v
LNA	9, 9, 5, v	1, 10, 9	4, 11, 13, v	2, 8, 8	5, 6, 10, v	3, 7, 7	10, 1, 1, v	8, 5, 12, v	10, 1, 1, v	7, 12, 11, v	10, 1, 1, v	6, 13, 6, v	10, 1, 1, v
LW	7, 13, 12, v	2, 11, 8, v	5, 12, 13, v	1, 6, 7	4, 5, 11, v	3, 7, 5	10, 1, 1, v	9, 8, 10, v	10, 1, 1, v	8, 10, 9, v	10, 1, 1, v	6, 9, 6, v	10, 1, 1, v
LWA	7, 13, 12, v	2, 11, 8, v	5, 12, 13, v	1, 6, 7	4, 5, 11, v	3, 7, 5	10, 1, 1, v	9, 8, 10, v	10, 1, 1, v	8, 10, 9, v	10, 1, 1, v	6, 9, 6, v	10, 1, 1, v
HW	6, 12, 12, v	2, 13, 7, v	5, 11, 13, v	1, 7, 9, v	4, 5, 11, v	3, 6, 6	10, 1, 1, v	9, 9, 10, v	10, 1, 1, v	7, 10, 8, v	10, 1, 1, v	8, 8, 5, v	10, 1, 1, v
HWA	6, 12, 12, v	2, 13, 7, v	5, 11, 13, v	1, 7, 8, v	4, 5, 10, v	3, 6, 6	10, 1, 1, v	9, 9, 11, v	10, 1, 1, v	8, 10, 9, v	10, 1, 1, v	7, 8, 5, v	10, 1, 1, v

1, 2, 2, 1, 1	E1	E1M	E.8	E.8M	E.5	E.5M	Q1	Q1M	Q.8	Q.8M	Q.5	Q.5M	OA
LN	2, 2, 12, v	1, 3, 13, v	5, 4, 9, v	4, 5, 10, v	9, 6, 7	8, 7, 8	7, 8, 5, v	6, 9, 6, v	11, 12, 1, v	10, 13, 1, v	13, 11, 1	12, 10, 1	3, 1, 11, v
LNA	1, 1, 10, v	2, 4, 13, v	3, 3, 9, v	5, 5, 11, v	8, 6, 7	9, 7, 8	7, 8, 5, v	6, 9, 6, v	11, 13, 1	10, 12, 1	13, 11, 1	12, 10, 1	4, 2, 12, v
LW	2, 3, 11, v	1, 2, 13, v	5, 5, 9, v	4, 4, 10, v	9, 7, 7	8, 6, 8	7, 10, 5, v	6, 11, 6, v	11, 12, 3, v	10, 13, 4, v	13, 8, 1	12, 9, 1	3, 1, 12, v
LWA	1, 2, 10, v	2, 3, 13, v	4, 5, 9, v	5, 4, 11, v	8, 7, 7	9, 6, 8	7, 10, 5, v	6, 11, 6, v	11, 12, 3, v	10, 13, 4, v	13, 9, 1	12, 8, 1	3, 1, 12, v
HW	2, 2, 11, v	1, 3, 13, v	4, 4, 9, v	3, 5, 10, v	7, 7, 7, v	6, 6, 8, v	9, 10, 5, v	8, 11, 6, v	11, 12, 4, v	10, 13, 3, v	13, 8, 2, v	12, 9, 1, v	5, 1, 12, v
HWA	1, 2, 10, v	2, 3, 13, v	3, 4, 9, v	4, 5, 11, v	6, 6, 7, v	7, 9, 8, v	9, 10, 5, v	8, 11, 6, v	10, 12, 3, v	11, 13, 4, v	13, 8, 2, v	12, 7, 1, v	5, 1, 12, v

1, 2, 2, 1, 2	E1	E1M	E.8	E.8M	E.5	E.5M	Q1	Q1M	Q.8	Q.8M	Q.5	Q.5M	OA
LN	9, 8, 5, v	2, 13, 11	5, 12, 7, v	1, 10, 12	4, 7, 13, v	3, 9, 8	10, 1, 1, v	7, 5, 9, v	10, 1, 1, v	7, 5, 9, v	10, 1, 1, v	6, 11, 6, v	10, 1, 1, v
LNA	9, 8, 5, v	2, 13, 11	5, 12, 7, v	1, 10, 12	4, 7, 13, v	3, 9, 8	10, 1, 1, v	7, 5, 9, v	10, 1, 1, v	7, 5, 9, v	10, 1, 1, v	6, 11, 6, v	10, 1, 1, v
LW	7, 10, 5, v	2, 11, 7, v	6, 13, 8, v	1, 8, 12	4, 7, 13, v	3, 9, 11	10, 1, 1, v	9, 5, 10, v	10, 1, 1, v	8, 6, 9, v	10, 1, 1, v	5, 12, 6, v	10, 1, 1, v
LWA	7, 10, 5, v	2, 11, 7, v	6, 13, 8, v	1, 8, 12	4, 7, 13, v	3, 9, 11	10, 1, 1, v	9, 5, 10, v	10, 1, 1, v	8, 6, 9, v	10, 1, 1, v	5, 12, 6, v	10, 1, 1, v
HW	7, 9, 6, v	2, 13, 11, v	5, 10, 9, v	1, 12, 12	4, 6, 13, v	3, 8, 10	10, 1, 1, v	9, 5, 8, v	10, 1, 1, v	8, 7, 7, v	10, 1, 1, v	6, 11, 5, v	10, 1, 1, v
HWA	7, 9, 6, v	2, 13, 11, v	5, 11, 10, v	1, 12, 12	4, 6, 13, v	3, 8, 9	10, 1, 1, v	9, 5, 8, v	10, 1, 1, v	8, 7, 7, v	10, 1, 1, v	6, 10, 5, v	10, 1, 1, v

1, 2, 2, 1, 3	E1	E1M	E.8	E.8M	E.5	E.5M	Q1	Q1M	Q.8	Q.8M	Q.5	Q.5M	OA
LN	9, 8, 5, v	1, 10, 9	4, 11, 13, v	2, 9, 8	5, 6, 12, v	3, 7, 7	10, 1, 1, v	8, 5, 11, v	10, 1, 1, v	7, 12, 10, v	10, 1, 1, v	6, 13, 6, v	10, 1, 1, v
LNA	9, 6, 5, v	1, 10, 9	4, 11, 13, v	2, 9, 8	5, 7, 11, v	3, 8, 7	10, 1, 1, v	8, 5, 12, v	10, 1, 1, v	7, 12, 10, v	10, 1, 1, v	6, 13, 6, v	10, 1, 1, v
LW	8, 13, 10, v	2, 12, 7, v	6, 11, 13, v	1, 6, 8	4, 5, 12, v	3, 7, 5	10, 1, 1, v	9, 8, 11, v	10, 1, 1, v	7, 10, 9, v	10, 1, 1, v	5, 9, 6, v	10, 1, 1, v
LWA	8, 13, 10, v	2, 12, 7, v	6, 11, 13, v	1, 7, 8	4, 5, 12, v	3, 8, 6	10, 1, 1, v	9, 6, 11, v	10, 1, 1, v	7, 10, 9, v	10, 1, 1, v	5, 9, 5, v	10, 1, 1, v
HW	7, 12, 8, v	2, 13, 7, v	5, 11, 13, v	1, 9, 11, v	4, 5, 12, v	3, 6, 6	10, 1, 1, v	9, 8, 10, v	10, 1, 1, v	6, 10, 9, v	10, 1, 1, v	8, 7, 5, v	10, 1, 1, v
HWA	8, 12, 9, v	2, 13, 7, v	5, 11, 13, v	1, 7, 10, v	4, 5, 12, v	3, 6, 6	10, 1, 1, v	9, 9, 11, v	10, 1, 1, v	7, 10, 8, v	10, 1, 1, v	6, 8, 5, v	10, 1, 1, v

2, 1, 1, 1, 1	E1	E1M	E.8	E.8M	E.5	E.5M	Q1	Q1M	Q.8	Q.8M	Q.5	Q.5M	OA
LN	2, 2, 11	1, 5, 13	5, 3, 9	4, 6, 10	9, 8, 7	8, 9, 8	7, 4, 5	6, 7, 6	11, 12, 1	10, 13, 1	13, 11, 1	12, 10, 1	3, 1, 12
LNA	1, 1, 11	2, 5, 13	4, 3, 9	5, 7, 10	8, 8, 7	9, 9, 8	7, 4, 5	6, 6, 6	11, 13, 1	10, 12, 1	13, 11, 1	12, 10, 1	3, 2, 12
LW	2, 3, 11	1, 2, 12	5, 5, 9	4, 4, 10	9, 7, 7	8, 6, 8	7, 8, 5	6, 9, 6	11, 12, 3	10, 13, 4	13, 10, 1	12, 11, 1	3, 1, 13
LWA	1, 2, 11	2, 3, 12	4, 5, 9	5, 4, 10	8, 7, 7	9, 6, 8	7, 8, 5	6, 9, 6	11, 12, 3	10, 13, 4	13, 11, 1	12, 10, 1	3, 1, 13
HW	2, 2, 11	1, 3, 12	4, 4, 9	3, 5, 10	7, 9, 7	6, 8, 8	9, 10, 5	8, 11, 6	11, 12, 4	10, 13, 3	13, 6, 2	12, 7, 1	5, 1, 13
HWA	1, 2, 11	2, 3, 12	3, 4, 9	4, 5, 10	6, 8, 7	7, 10, 8	9, 9, 5	8, 11, 6	11, 12, 3	10, 13, 4	13, 7, 2	12, 6, 1	5, 1, 13

2, 1, 1, 1, 2	E1	E1M	E.8	E.8M	E.5	E.5M	Q1	Q1M	Q.8	Q.8M	Q.5	Q.5M	OA
LN	7, 9, 12	1, 12, 8	6, 7, 13	2, 10, 9	8, 5, 11	5, 8, 7	10, 1, 3	3, 13, 10	10, 1, 3	4, 11, 1	10, 1, 3	9, 6, 1	10, 1, 3
LNA	7, 8, 12	1, 12, 7	6, 7, 13	2, 11, 9	8, 5, 11	5, 9, 8	10, 1, 3	3, 13, 10	10, 1, 3	4, 10, 1	10, 1, 3	9, 6, 1	10, 1, 3
LW	7, 8, 12	1, 7, 8	6, 5, 13	2, 10, 7	8, 6, 10	5, 11, 6	11, 1, 3	4, 13, 11	11, 1, 3	3, 12, 9	10, 4, 2	9, 9, 1	11, 1, 3
LWA	7, 7, 11	1, 8, 8	6, 5, 13	2, 10, 7	8, 6, 10	5, 11, 6	11, 1, 3	4, 13, 12	11, 1, 3	3, 12, 9	10, 4, 2	9, 9, 1	11, 1, 3
HW	5, 9, 12	1, 11, 9	4, 7, 13	2, 10, 8	8, 5, 10	3, 8, 7	11, 1, 3	7, 13, 11	11, 1, 3	6, 12, 6	10, 4, 2	9, 6, 1	11, 1, 3
HWA	5, 9, 12	1, 11, 9	4, 7, 13	2, 10, 8	8, 6, 11	3, 8, 6	11, 1, 3	7, 13, 10	11, 1, 3	6, 12, 7	10, 4, 2	9, 5, 1	11, 1, 3

2, 1, 1, 1, 3	E1	E1M	E.8	E.8M	E.5	E.5M	Q1	Q1M	Q.8	Q.8M	Q.5	Q.5M	OA
LN	1, 8, 11	4, 13, 13	2, 9, 10	3, 11, 12	5, 12, 8	6, 10, 9	7, 1, 1	11, 5, 5	7, 1, 1	11, 5, 5	7, 1, 1	11, 5, 5	7, 1, 1
LNA	1, 8, 11	4, 13, 13	2, 10, 10	3, 12, 12	5, 11, 8	6, 9, 9	7, 1, 1	11, 5, 5	7, 1, 1	11, 5, 5	7, 1, 1	11, 5, 5	7, 1, 1
LW	2, 13, 10	4, 11, 12	1, 9, 11	3, 8, 13	5, 12, 8	6, 10, 9	8, 1, 2	12, 4, 6	8, 1, 2	12, 4, 6	7, 7, 1	11, 6, 5	8, 1, 2
LWA	2, 13, 10	4, 11, 12	1, 9, 11	3, 8, 13	5, 12, 8	6, 10, 9	8, 1, 2	12, 4, 6	8, 1, 2	12, 4, 6	7, 7, 1	11, 6, 5	8, 1, 2
HW	2, 12, 10	4, 13, 12	1, 11, 11	3, 10, 13	5, 9, 8	6, 8, 9	12, 1, 3	10, 7, 7	8, 3, 2	11, 4, 6	7, 5, 1	9, 6, 5	12, 1, 3
HWA	2, 12, 11	4, 13, 12	1, 11, 10	3, 10, 13	5, 9, 8	6, 8, 9	11, 1, 3	9, 7, 7	10, 3, 2	13, 4, 6	7, 5, 1	8, 6, 5	11, 1, 3

2, 1, 1, 2, 1	E1	E1M	E.8	E.8M	E.5	E.5M	Q1	Q1M	Q.8	Q.8M	Q.5	Q.5M	OA
LN	2, 2, 11	1, 5, 13	5, 3, 9	4, 6, 10	9, 8, 7	8, 9, 8	7, 4, 5	6, 7, 6	11, 12, 1	10, 13, 1	13, 11, 1	12, 10, 1	3, 1, 12
LNA	1, 1, 11	2, 5, 13	4, 3, 9	5, 7, 10	8, 8, 7	9, 9, 8	7, 4, 5	6, 6, 6	11, 13, 1	10, 12, 1	13, 11, 1	12, 10, 1	3, 2, 12
LW	2, 3, 11	1, 2, 12	5, 5, 9	4, 4, 10	9, 7, 7	8, 6, 8	7, 8, 5	6, 9, 6	11, 12, 3	10, 13, 4	13, 10, 1	12, 11, 1	3, 1, 13
LWA	1, 2, 11	2, 3, 12	4, 5, 9	5, 4, 10	8, 7, 7	9, 6, 8	7, 8, 5	6, 9, 6	11, 12, 3	10, 13, 4	13, 11, 1	12, 10, 1	3, 1, 13
HW	2, 2, 11	1, 3, 12	4, 4, 9	3, 5, 10	7, 9, 7	6, 8, 8	9, 10, 5	8, 11, 6	11, 12, 4	10, 13, 3	13, 6, 2	12, 7, 1	5, 1, 13
HWA	1, 2, 11	2, 3, 12	3, 4, 9	4, 5, 10	6, 8, 7	7, 10, 8	9, 9, 5	8, 11, 6	11, 12, 3	10, 13, 4	13, 7, 2	12, 6, 1	5, 1, 13

2, 1, 1, 2, 2	E1	E1M	E.8	E.8M	E.5	E.5M	Q1	Q1M	Q.8	Q.8M	Q.5	Q.5M	OA
LN	7, 9, 12	1, 12, 8	6, 7, 13	2, 10, 9	8, 5, 11	5, 8, 7	10, 1, 3	3, 13, 10	10, 1, 3	4, 11, 1	10, 1, 3	9, 6, 1	10, 1, 3
LNA	7, 8, 12	1, 12, 7	6, 7, 13	2, 11, 9	8, 5, 11	5, 9, 8	10, 1, 3	3, 13, 10	10, 1, 3	4, 10, 1	10, 1, 3	9, 6, 1	10, 1, 3
LW	7, 8, 12	1, 7, 8	6, 5, 13	2, 10, 7	8, 6, 10	5, 11, 6	11, 1, 3	4, 13, 11	11, 1, 3	3, 12, 9	10, 4, 2	9, 9, 1	11, 1, 3
LWA	7, 7, 11	1, 8, 8	6, 5, 13	2, 10, 7	8, 6, 10	5, 11, 6	11, 1, 3	4, 13, 12	11, 1, 3	3, 12, 9	10, 4, 2	9, 9, 1	11, 1, 3
HW	5, 9, 12	1, 11, 9	4, 7, 13	2, 10, 8	8, 5, 10	3, 8, 7	11, 1, 3	7, 13, 11	11, 1, 3	6, 12, 6	10, 4, 2	9, 6, 1	11, 1, 3
HWA	5, 9, 12	1, 11, 9	4, 7, 13	2, 10, 8	8, 6, 11	3, 8, 6	11, 1, 3	7, 13, 10	11, 1, 3	6, 12, 7	10, 4, 2	9, 5, 1	11, 1, 3

2, 1, 1, 2, 3	E1	E1M	E.8	E.8M	E.5	E.5M	Q1	Q1M	Q.8	Q.8M	Q.5	Q.5M	OA
LN	1, 8, 11	4, 13, 13	2, 9, 10	3, 11, 12	5, 12, 8	6, 10, 9	7, 1, 1	11, 5, 5	7, 1, 1	11, 5, 5	7, 1, 1	11, 5, 5	7, 1, 1
LNA	1, 8, 11	4, 13, 13	2, 10, 10	3, 12, 12	5, 11, 8	6, 9, 9	7, 1, 1	11, 5, 5	7, 1, 1	11, 5, 5	7, 1, 1	11, 5, 5	7, 1, 1
LW	2, 13, 10	4, 11, 12	1, 9, 11	3, 8, 13	5, 12, 8	6, 10, 9	8, 1, 2	12, 4, 6	8, 1, 2	12, 4, 6	7, 7, 1	11, 6, 5	8, 1, 2
LWA	2, 13, 10	4, 11, 12	1, 9, 11	3, 8, 13	5, 12, 8	6, 10, 9	8, 1, 2	12, 4, 6	8, 1, 2	12, 4, 6	7, 7, 1	11, 6, 5	8, 1, 2
HW	2, 12, 10	4, 13, 12	1, 11, 11	3, 10, 13	5, 9, 8	6, 8, 9	12, 1, 3	10, 7, 7	8, 3, 2	11, 4, 6	7, 5, 1	9, 6, 5	12, 1, 3
HWA	2, 12, 11	4, 13, 12	1, 11, 10	3, 10, 13	5, 9, 8	6, 8, 9	11, 1, 3	9, 7, 7	10, 3, 2	13, 4, 6	7, 5, 1	8, 6, 5	11, 1, 3

2, 1, 2, 1, 1	E1	E1M	E.8	E.8M	E.5	E.5M	Q1	Q1M	Q.8	Q.8M	Q.5	Q.5M	OA
LN	2, 2, 11	1, 5, 13	5, 3, 9	4, 6, 10	9, 8, 7	8, 9, 8	7, 4, 5	6, 7, 6	11, 12, 1	10, 13, 1	13, 11, 1	12, 10, 1	3, 1, 12
LNA	1, 1, 11	2, 5, 13	4, 3, 9	5, 7, 10	8, 8, 7	9, 9, 8	7, 4, 5	6, 6, 6	11, 13, 1	10, 12, 1	13, 11, 1	12, 10, 1	3, 2, 12
LW	2, 3, 11	1, 2, 12	5, 5, 9	4, 4, 10	9, 7, 7	8, 6, 8	7, 8, 5	6, 9, 6	11, 12, 3	10, 13, 4	13, 10, 1	12, 11, 1	3, 1, 13
LWA	1, 2, 11	2, 3, 12	4, 5, 9	5, 4, 10	8, 7, 7	9, 6, 8	7, 8, 5	6, 9, 6	11, 12, 3	10, 13, 4	13, 11, 1	12, 10, 1	3, 1, 13
HW	2, 2, 11	1, 3, 12	4, 4, 9	3, 5, 10	7, 9, 7	6, 8, 8	9, 10, 5	8, 11, 6	11, 12, 4	10, 13, 3	13, 6, 2	12, 7, 1	5, 1, 13
HWA	1, 2, 11	2, 3, 12	3, 4, 9	4, 5, 10	6, 8, 7	7, 10, 8	9, 9, 5	8, 11, 6	11, 12, 3	10, 13, 4	13, 7, 2	12, 6, 1	5, 1, 13

2, 1, 2, 1, 2	E1	E1M	E.8	E.8M	E.5	E.5M	Q1	Q1M	Q.8	Q.8M	Q.5	Q.5M	OA
LN	7, 9, 12	1, 12, 8	6, 7, 13	2, 10, 9	8, 5, 11	5, 8, 7	10, 1, 3	3, 13, 10	10, 1, 3	4, 11, 1	10, 1, 3	9, 6, 1	10, 1, 3
LNA	7, 8, 12	1, 12, 7	6, 7, 13	2, 11, 9	8, 5, 11	5, 9, 8	10, 1, 3	3, 13, 10	10, 1, 3	4, 10, 1	10, 1, 3	9, 6, 1	10, 1, 3
LW	7, 8, 12	1, 7, 8	6, 5, 13	2, 10, 7	8, 6, 10	5, 11, 6	11, 1, 3	4, 13, 11	11, 1, 3	3, 12, 9	10, 4, 2	9, 9, 1	11, 1, 3
LWA	7, 7, 11	1, 8, 8	6, 5, 13	2, 10, 7	8, 6, 10	5, 11, 6	11, 1, 3	4, 13, 12	11, 1, 3	3, 12, 9	10, 4, 2	9, 9, 1	11, 1, 3
HW	5, 9, 12	1, 11, 9	4, 7, 13	2, 10, 8	8, 5, 10	3, 8, 7	11, 1, 3	7, 13, 11	11, 1, 3	6, 12, 6	10, 4, 2	9, 6, 1	11, 1, 3
HWA	5, 9, 12	1, 11, 9	4, 7, 13	2, 10, 8	8, 6, 11	3, 8, 6	11, 1, 3	7, 13, 10	11, 1, 3	6, 12, 7	10, 4, 2	9, 5, 1	11, 1, 3

2, 1, 2, 1, 3	E1	E1M	E.8	E.8M	E.5	E.5M	Q1	Q1M	Q.8	Q.8M	Q.5	Q.5M	OA
LN	1, 8, 11	4, 13, 13	2, 9, 10	3, 11, 12	5, 12, 8	6, 10, 9	7, 1, 1	11, 5, 5	7, 1, 1	11, 5, 5	7, 1, 1	11, 5, 5	7, 1, 1
LNA	1, 8, 11	4, 13, 13	2, 10, 10	3, 12, 12	5, 11, 8	6, 9, 9	7, 1, 1	11, 5, 5	7, 1, 1	11, 5, 5	7, 1, 1	11, 5, 5	7, 1, 1
LW	2, 13, 10	4, 11, 12	1, 9, 11	3, 8, 13	5, 12, 8	6, 10, 9	8, 1, 2	12, 4, 6	8, 1, 2	12, 4, 6	7, 7, 1	11, 6, 5	8, 1, 2
LWA	2, 13, 10	4, 11, 12	1, 9, 11	3, 8, 13	5, 12, 8	6, 10, 9	8, 1, 2	12, 4, 6	8, 1, 2	12, 4, 6	7, 7, 1	11, 6, 5	8, 1, 2
HW	2, 12, 10	4, 13, 12	1, 11, 11	3, 10, 13	5, 9, 8	6, 8, 9	12, 1, 3	10, 7, 7	8, 3, 2	11, 4, 6	7, 5, 1	9, 6, 5	12, 1, 3
HWA	2, 12, 11	4, 13, 12	1, 11, 10	3, 10, 13	5, 9, 8	6, 8, 9	11, 1, 3	9, 7, 7	10, 3, 2	13, 4, 6	7, 5, 1	8, 6, 5	11, 1, 3

2, 1, 2, 2, 1	E1	E1M	E.8	E.8M	E.5	E.5M	Q1	Q1M	Q.8	Q.8M	Q.5	Q.5M	OA
LN	2, 2, 11	1, 5, 13	5, 3, 9	4, 6, 10	9, 8, 7	8, 9, 8	7, 4, 5	6, 7, 6	11, 12, 1	10, 13, 1	13, 11, 1	12, 10, 1	3, 1, 12
LNA	1, 1, 11	2, 5, 13	4, 3, 9	5, 7, 10	8, 8, 7	9, 9, 8	7, 4, 5	6, 6, 6	11, 13, 1	10, 12, 1	13, 11, 1	12, 10, 1	3, 2, 12
LW	2, 3, 11	1, 2, 12	5, 5, 9	4, 4, 10	9, 7, 7	8, 6, 8	7, 8, 5	6, 9, 6	11, 12, 3	10, 13, 4	13, 10, 1	12, 11, 1	3, 1, 13
LWA	1, 2, 11	2, 3, 12	4, 5, 9	5, 4, 10	8, 7, 7	9, 6, 8	7, 8, 5	6, 9, 6	11, 12, 3	10, 13, 4	13, 11, 1	12, 10, 1	3, 1, 13
HW	2, 2, 11	1, 3, 12	4, 4, 9	3, 5, 10	7, 9, 7	6, 8, 8	9, 10, 5	8, 11, 6	11, 12, 4	10, 13, 3	13, 6, 2	12, 7, 1	5, 1, 13
HWA	1, 2, 11	2, 3, 12	3, 4, 9	4, 5, 10	6, 8, 7	7, 10, 8	9, 9, 5	8, 11, 6	11, 12, 3	10, 13, 4	13, 7, 2	12, 6, 1	5, 1, 13

2, 1, 2, 2, 2	E1	E1M	E.8	E.8M	E.5	E.5M	Q1	Q1M	Q.8	Q.8M	Q.5	Q.5M	OA
LN	7, 9, 12	1, 12, 8	6, 7, 13	2, 10, 9	8, 5, 11	5, 8, 7	10, 1, 3	3, 13, 10	10, 1, 3	4, 11, 1	10, 1, 3	9, 6, 1	10, 1, 3
LNA	7, 8, 12	1, 12, 7	6, 7, 13	2, 11, 9	8, 5, 11	5, 9, 8	10, 1, 3	3, 13, 10	10, 1, 3	4, 10, 1	10, 1, 3	9, 6, 1	10, 1, 3
LW	7, 8, 12	1, 7, 8	6, 5, 13	2, 10, 7	8, 6, 10	5, 11, 6	11, 1, 3	4, 13, 11	11, 1, 3	3, 12, 9	10, 4, 2	9, 9, 1	11, 1, 3
LWA	7, 7, 11	1, 8, 8	6, 5, 13	2, 10, 7	8, 6, 10	5, 11, 6	11, 1, 3	4, 13, 12	11, 1, 3	3, 12, 9	10, 4, 2	9, 9, 1	11, 1, 3
HW	5, 9, 12	1, 11, 9	4, 7, 13	2, 10, 8	8, 5, 10	3, 8, 7	11, 1, 3	7, 13, 11	11, 1, 3	6, 12, 6	10, 4, 2	9, 6, 1	11, 1, 3
HWA	5, 9, 12	1, 11, 9	4, 7, 13	2, 10, 8	8, 6, 11	3, 8, 6	11, 1, 3	7, 13, 10	11, 1, 3	6, 12, 7	10, 4, 2	9, 5, 1	11, 1, 3

2, 1, 2, 2, 3	E1	E1M	E.8	E.8M	E.5	E.5M	Q1	Q1M	Q.8	Q.8M	Q.5	Q.5M	OA
LN	1, 8, 11	4, 13, 13	2, 9, 10	3, 11, 12	5, 12, 8	6, 10, 9	7, 1, 1	11, 5, 5	7, 1, 1	11, 5, 5	7, 1, 1	11, 5, 5	7, 1, 1
LNA	1, 8, 11	4, 13, 13	2, 10, 10	3, 12, 12	5, 11, 8	6, 9, 9	7, 1, 1	11, 5, 5	7, 1, 1	11, 5, 5	7, 1, 1	11, 5, 5	7, 1, 1
LW	2, 13, 10	4, 11, 12	1, 9, 11	3, 8, 13	5, 12, 8	6, 10, 9	8, 1, 2	12, 4, 6	8, 1, 2	12, 4, 6	7, 7, 1	11, 6, 5	8, 1, 2
LWA	2, 13, 10	4, 11, 12	1, 9, 11	3, 8, 13	5, 12, 8	6, 10, 9	8, 1, 2	12, 4, 6	8, 1, 2	12, 4, 6	7, 7, 1	11, 6, 5	8, 1, 2
HW	2, 12, 10	4, 13, 12	1, 11, 11	3, 10, 13	5, 9, 8	6, 8, 9	12, 1, 3	10, 7, 7	8, 3, 2	11, 4, 6	7, 5, 1	9, 6, 5	12, 1, 3
HWA	2, 12, 11	4, 13, 12	1, 11, 10	3, 10, 13	5, 9, 8	6, 8, 9	11, 1, 3	9, 7, 7	10, 3, 2	13, 4, 6	7, 5, 1	8, 6, 5	11, 1, 3

2, 2, 1, 1, 1	E1	E1M	E.8	E.8M	E.5	E.5M	Q1	Q1M	Q.8	Q.8M	Q.5	Q.5M	OA
LN	2, 2, 11, v	1, 4, 13, v	5, 3, 9	4, 5, 10	9, 9, 7	8, 8, 8	7, 6, 5, v	6, 7, 6, v	11, 12, 1	10, 13, 1	13, 11, 1	12, 10, 1	3, 1, 12, v
LNA	1, 1, 11, v	2, 4, 13, v	4, 3, 9	5, 5, 10	8, 8, 7	9, 9, 8	7, 6, 5, v	6, 7, 6, v	11, 13, 1	10, 12, 1	13, 11, 1	12, 10, 1	3, 2, 12, v
LW	3, 3, 11, v	2, 2, 12, v	5, 5, 9, v	4, 4, 10, v	9, 7, 7	8, 6, 8	7, 8, 5, v	6, 9, 6, v	11, 12, 3, v	10, 13, 4, v	13, 10, 1	12, 11, 1	1, 1, 13, v
LWA	1, 3, 11, v	3, 2, 12, v	4, 5, 9, v	5, 4, 10, v	8, 7, 7	9, 6, 8	7, 8, 5, v	6, 9, 6, v	11, 12, 3, v	10, 13, 4, v	13, 11, 1	12, 10, 1	2, 1, 13, v
HW	2, 2, 11, v	1, 3, 12, v	4, 4, 9, v	3, 5, 10, v	7, 9, 7	6, 8, 8	9, 10, 5, v	8, 11, 6, v	11, 12, 4, v	10, 13, 3, v	13, 6, 2, v	12, 7, 1, v	5, 1, 13, v
HWA	1, 2, 11, v	2, 3, 12, v	3, 4, 9, v	4, 5, 10, v	8, 8, 7	9, 10, 8	7, 9, 5, v	6, 11, 6, v	11, 12, 3, v	10, 13, 4, v	13, 7, 2, v	12, 6, 1, v	5, 1, 13, v

2, 2, 1, 1, 2	E1	E1M	E.8	E.8M	E.5	E.5M	Q1	Q1M	Q.8	Q.8M	Q.5	Q.5M	OA
LN	9, 11, 10, v	1, 10, 8	5, 7, 12, v	2, 9, 9	8, 5, 11	4, 8, 6	10, 1, 2, v	7, 13, 13, v	10, 1, 2, v	3, 12, 7, v	10, 1, 2, v	6, 6, 1	10, 1, 2, v
LNA	9, 11, 10, v	1, 10, 7	5, 7, 12, v	2, 9, 9	8, 5, 11	4, 8, 6	10, 1, 2, v	6, 13, 13, v	10, 1, 2, v	3, 12, 8, v	10, 1, 2, v	7, 6, 1	10, 1, 2, v
LW	9, 12, 9, v	1, 6, 7	8, 7, 12, v	2, 8, 8	7, 5, 11	3, 10, 6	10, 1, 2, v	5, 13, 13, v	10, 1, 2, v	4, 11, 10, v	10, 1, 2, v	6, 9, 1	10, 1, 2, v
LWA	9, 12, 9, v	1, 7, 6	8, 6, 12, v	2, 9, 8	7, 5, 11	3, 10, 7	10, 1, 2, v	5, 13, 13, v	10, 1, 2, v	4, 11, 10, v	10, 1, 2, v	6, 8, 1	10, 1, 2, v
HW	9, 10, 10, v	1, 11, 9	5, 8, 13, v	2, 9, 8	6, 5, 11, v	3, 7, 6	10, 1, 1, v	8, 13, 12, v	10, 1, 1, v	4, 12, 7, v	10, 1, 1, v	7, 6, 5, v	10, 1, 1, v
HWA	9, 10, 10, v	1, 11, 8	5, 8, 13, v	2, 9, 7	6, 5, 11, v	3, 7, 6	10, 1, 1, v	7, 13, 12, v	10, 1, 1, v	4, 12, 9, v	10, 1, 1, v	8, 6, 5, v	10, 1, 1, v

2, 2, 1, 1, 3	E1	E1M	E.8	E.8M	E.5	E.5M	Q1	Q1M	Q.8	Q.8M	Q.5	Q.5M	OA
LN	3, 13, 12, v	6, 12, 11, v	1, 8, 10	2, 11, 13, v	4, 10, 8	5, 9, 9	7, 1, 1, v	11, 5, 5, v	7, 1, 1, v	11, 5, 5, v	7, 1, 1, v	11, 5, 5, v	7, 1, 1, v
LNA	3, 13, 12, v	6, 12, 11, v	1, 8, 10	2, 10, 13, v	4, 11, 8	5, 9, 9	7, 1, 1, v	11, 5, 5, v	7, 1, 1, v	11, 5, 5, v	7, 1, 1, v	11, 5, 5, v	7, 1, 1, v
LW	5, 13, 9, v	6, 12, 10, v	1, 11, 12, v	2, 10, 13, v	3, 9, 8	4, 8, 11	7, 1, 1, v	11, 5, 5, v	7, 1, 1, v	11, 5, 5, v	7, 1, 1, v	11, 5, 5, v	7, 1, 1, v
LWA	5, 13, 9, v	6, 12, 10, v	1, 11, 12, v	2, 10, 13, v	3, 9, 8	4, 8, 11	7, 1, 1, v	11, 5, 5, v	7, 1, 1, v	11, 5, 5, v	7, 1, 1, v	11, 5, 5, v	7, 1, 1, v
HW	5, 13, 9, v	6, 12, 11, v	1, 10, 12, v	2, 11, 13, v	3, 9, 8	4, 8, 10, v	11, 1, 2, v	9, 5, 7, v	11, 1, 2, v	8, 6, 6, v	10, 4, 1, v	7, 7, 5, v	11, 1, 2, v
HWA	5, 13, 9, v	6, 12, 11, v	1, 10, 12, v	2, 11, 13, v	3, 9, 8	4, 8, 10, v	11, 1, 2, v	9, 5, 7, v	11, 1, 2, v	8, 6, 6, v	10, 4, 1, v	7, 7, 5, v	11, 1, 2, v

2, 2, 2, 1, 1	E1	E1M	E.8	E.8M	E.5	E.5M	Q1	Q1M	Q.8	Q.8M	Q.5	Q.5M	OA
LN	2, 2, 11, v	1, 4, 13, v	5, 3, 9	4, 5, 10	9, 9, 7	8, 8, 8	7, 6, 5, v	6, 7, 6, v	11, 12, 1	10, 13, 1	13, 11, 1	12, 10, 1	3, 1, 12, v
LNA	1, 1, 11, v	2, 4, 13, v	4, 3, 9	5, 5, 10	8, 8, 7	9, 9, 8	7, 6, 5, v	6, 7, 6, v	11, 13, 1	10, 12, 1	13, 11, 1	12, 10, 1	3, 2, 12, v
LW	3, 3, 11, v	2, 2, 12, v	5, 5, 9, v	4, 4, 10, v	9, 7, 7	8, 6, 8	7, 8, 5, v	6, 9, 6, v	11, 12, 3, v	10, 13, 4, v	13, 10, 1	12, 11, 1	1, 1, 13, v
LWA	1, 3, 11, v	3, 2, 12, v	4, 5, 9, v	5, 4, 10, v	8, 7, 7	9, 6, 8	7, 8, 5, v	6, 9, 6, v	11, 12, 3, v	10, 13, 4, v	13, 11, 1	12, 10, 1	2, 1, 13, v
HW	2, 2, 11, v	1, 3, 12, v	4, 4, 9, v	3, 5, 10, v	7, 9, 7	6, 8, 8	9, 10, 5, v	8, 11, 6, v	11, 12, 4, v	10, 13, 3, v	13, 6, 2, v	12, 7, 1, v	5, 1, 13, v
HWA	1, 2, 11, v	2, 3, 12, v	3, 4, 9, v	4, 5, 10, v	8, 8, 7	9, 10, 8	7, 9, 5, v	6, 11, 6, v	11, 12, 3, v	10, 13, 4, v	13, 7, 2, v	12, 6, 1, v	5, 1, 13, v

2, 2, 2, 1, 2	E1	E1M	E.8	E.8M	E.5	E.5M	Q1	Q1M	Q.8	Q.8M	Q.5	Q.5M	OA
LN	9, 11, 10, v	1, 10, 8	5, 7, 12, v	2, 9, 9	8, 5, 11	4, 8, 6	10, 1, 2, v	7, 13, 13, v	10, 1, 2, v	3, 12, 7, v	10, 1, 2, v	6, 6, 1	10, 1, 2, v
LNA	9, 11, 10, v	1, 10, 7	5, 7, 12, v	2, 9, 9	8, 5, 11	4, 8, 6	10, 1, 2, v	6, 13, 13, v	10, 1, 2, v	3, 12, 8, v	10, 1, 2, v	7, 6, 1	10, 1, 2, v
LW	9, 12, 9, v	1, 6, 7	8, 7, 12, v	2, 8, 8	7, 5, 11	3, 10, 6	10, 1, 2, v	5, 13, 13, v	10, 1, 2, v	4, 11, 10, v	10, 1, 2, v	6, 9, 1	10, 1, 2, v
LWA	9, 12, 9, v	1, 7, 6	8, 6, 12, v	2, 9, 8	7, 5, 11	3, 10, 7	10, 1, 2, v	5, 13, 13, v	10, 1, 2, v	4, 11, 10, v	10, 1, 2, v	6, 8, 1	10, 1, 2, v
HW	9, 10, 10, v	1, 11, 9	5, 8, 13, v	2, 9, 8	6, 5, 11, v	3, 7, 6	10, 1, 1, v	8, 13, 12, v	10, 1, 1, v	4, 12, 7, v	10, 1, 1, v	7, 6, 5, v	10, 1, 1, v
HWA	9, 10, 10, v	1, 11, 8	5, 8, 13, v	2, 9, 7	6, 5, 11, v	3, 7, 6	10, 1, 1, v	7, 13, 12, v	10, 1, 1, v	4, 12, 9, v	10, 1, 1, v	8, 6, 5, v	10, 1, 1, v

2, 2, 2, 1, 3	E1	E1M	E.8	E.8M	E.5	E.5M	Q1	Q1M	Q.8	Q.8M	Q.5	Q.5M	OA
LN	3, 13, 12, v	6, 12, 11, v	1, 8, 10	2, 11, 13, v	4, 10, 8	5, 9, 9	7, 1, 1, v	11, 5, 5, v	7, 1, 1, v	11, 5, 5, v	7, 1, 1, v	11, 5, 5, v	7, 1, 1, v
LNA	3, 13, 12, v	6, 12, 11, v	1, 8, 10	2, 10, 13, v	4, 11, 8	5, 9, 9	7, 1, 1, v	11, 5, 5, v	7, 1, 1, v	11, 5, 5, v	7, 1, 1, v	11, 5, 5, v	7, 1, 1, v
LW	5, 13, 9, v	6, 12, 10, v	1, 11, 12, v	2, 10, 13, v	3, 9, 8	4, 8, 11	7, 1, 1, v	11, 5, 5, v	7, 1, 1, v	11, 5, 5, v	7, 1, 1, v	11, 5, 5, v	7, 1, 1, v
LWA	5, 13, 9, v	6, 12, 10, v	1, 11, 12, v	2, 10, 13, v	3, 9, 8	4, 8, 11	7, 1, 1, v	11, 5, 5, v	7, 1, 1, v	11, 5, 5, v	7, 1, 1, v	11, 5, 5, v	7, 1, 1, v
HW	5, 13, 9, v	6, 12, 11, v	1, 10, 12, v	2, 11, 13, v	3, 9, 8	4, 8, 10, v	11, 1, 2, v	9, 5, 7, v	11, 1, 2, v	8, 6, 6, v	10, 4, 1, v	7, 7, 5, v	11, 1, 2, v
HWA	5, 13, 9, v	6, 12, 11, v	1, 10, 12, v	2, 11, 13, v	3, 9, 8	4, 8, 10, v	11, 1, 2, v	9, 5, 7, v	11, 1, 2, v	8, 6, 6, v	10, 4, 1, v	7, 7, 5, v	11, 1, 2, v

2, 3, 1, 1, 1	E1	E1M	E.8	E.8M	E.5	E.5M	Q1	Q1M	Q.8	Q.8M	Q.5	Q.5M	OA
LN	2, 2, 11, v	1, 3, 13, v	5, 4, 9, v	4, 5, 10, v	11, 9, 7	10, 8, 8	7, 6, 5, v	6, 7, 6, v	9, 12, 1, v	8, 13, 1, v	13, 11, 1	12, 10, 1	3, 1, 12, v
LNA	1, 1, 11, v	2, 3, 13, v	4, 4, 9, v	5, 5, 10, v	10, 8, 7	11, 11, 8	7, 6, 5, v	6, 7, 6, v	9, 13, 1	8, 12, 1	13, 10, 1	12, 9, 1	3, 2, 12, v
LW	3, 3, 11, v	2, 2, 12, v	5, 5, 9, v	4, 4, 10, v	9, 7, 6	8, 6, 8	7, 8, 5, v	6, 9, 7, v	11, 12, 3, v	10, 13, 4, v	13, 10, 1	12, 11, 1	1, 1, 13, v
LWA	2, 3, 11, v	3, 2, 12, v	4, 5, 9, v	5, 4, 10, v	8, 7, 5	9, 6, 8	7, 8, 6, v	6, 9, 7, v	11, 12, 3, v	10, 13, 4, v	13, 11, 1	12, 10, 1	1, 1, 13, v
HW	2, 2, 11, v	1, 3, 12, v	5, 4, 9, v	4, 5, 10, v	9, 10, 7, v	8, 8, 8, v	7, 9, 5, v	6, 11, 6, v	11, 12, 4, v	10, 13, 3, v	13, 6, 2, v	12, 7, 1, v	3, 1, 13, v
HWA	1, 2, 11, v	2, 3, 12, v	3, 4, 9, v	5, 5, 10, v	8, 9, 7	9, 10, 8	7, 8, 5, v	6, 11, 6, v	11, 12, 3, v	10, 13, 4, v	13, 7, 2, v	12, 6, 1, v	4, 1, 13, v

2, 3, 1, 1, 2	E1	E1M	E.8	E.8M	E.5	E.5M	Q1	Q1M	Q.8	Q.8M	Q.5	Q.5M	OA
LN	9, 5, 5, v	2, 13, 9	8, 6, 6, v	1, 10, 10	5, 8, 11, v	3, 9, 8	10, 1, 1, v	7, 7, 13, v	10, 1, 1, v	6, 11, 12, v	10, 1, 1, v	4, 12, 7, v	10, 1, 1, v
LNA	9, 1, 1, v	2, 13, 9	8, 6, 6, v	1, 10, 10	5, 8, 11, v	3, 9, 8	10, 2, 2, v	7, 7, 13, v	10, 2, 2, v	6, 11, 12, v	10, 2, 2, v	4, 12, 7, v	10, 2, 2, v
LW	9, 5, 5, v	2, 12, 9, v	8, 9, 7, v	1, 7, 10	5, 6, 11, v	3, 8, 8	10, 1, 1, v	7, 10, 13, v	10, 1, 1, v	6, 13, 12, v	10, 1, 1, v	4, 11, 6, v	10, 1, 1, v
LWA	9, 5, 5, v	2, 12, 9, v	8, 9, 7, v	1, 7, 10	5, 6, 11, v	3, 8, 8	10, 1, 1, v	7, 10, 13, v	10, 1, 1, v	6, 13, 12, v	10, 1, 1, v	4, 11, 6, v	10, 1, 1, v
HW	9, 5, 5, v	2, 13, 9, v	8, 8, 7, v	1, 10, 10, v	5, 6, 12, v	3, 7, 8	10, 1, 1, v	7, 11, 13, v	10, 1, 1, v	6, 12, 11, v	10, 1, 1, v	4, 9, 6, v	10, 1, 1, v
HWA	9, 5, 5, v	2, 13, 9, v	8, 8, 8, v	1, 10, 10, v	5, 6, 12, v	3, 7, 7	10, 1, 1, v	7, 11, 13, v	10, 1, 1, v	6, 12, 11, v	10, 1, 1, v	4, 9, 6, v	10, 1, 1, v

2, 3, 1, 1, 3	E1	E1M	E.8	E.8M	E.5	E.5M	Q1	Q1M	Q.8	Q.8M	Q.5	Q.5M	OA
LN	9, 2, 6, v	4, 12, 7, v	8, 1, 5, v	1, 13, 13, v	3, 10, 12, v	2, 11, 11	10, 3, 1, v	5, 7, 8, v	10, 3, 1, v	5, 7, 8, v	10, 3, 1, v	5, 7, 8, v	10, 3, 1, v
LNA	8, 1, 1, v	4, 12, 7, v	8, 1, 1, v	1, 13, 13, v	3, 10, 12, v	2, 11, 11	10, 3, 3, v	5, 7, 8, v	10, 3, 3, v	5, 7, 8, v	10, 3, 3, v	5, 7, 8, v	10, 3, 3, v
LW	6, 10, 9, v	4, 12, 8, v	5, 11, 10, v	3, 13, 11, v	2, 9, 13, v	1, 8, 12	10, 1, 1, v	8, 5, 6, v	10, 1, 1, v	8, 5, 6, v	10, 1, 1, v	7, 7, 5, v	10, 1, 1, v
LWA	6, 10, 9, v	4, 12, 8, v	5, 11, 11, v	3, 13, 10, v	2, 8, 13, v	1, 9, 12	10, 1, 1, v	8, 5, 6, v	10, 1, 1, v	8, 5, 6, v	10, 1, 1, v	7, 7, 5, v	10, 1, 1, v
HW	7, 10, 7, v	4, 12, 9, v	5, 11, 10, v	3, 13, 11, v	2, 7, 13, v	1, 8, 12, v	10, 1, 1, v	9, 5, 8, v	10, 1, 1, v	8, 6, 6, v	10, 1, 1, v	6, 9, 5, v	10, 1, 1, v
HWA	7, 10, 9, v	4, 12, 7, v	5, 11, 10, v	3, 13, 11, v	2, 5, 13, v	1, 7, 12, v	10, 1, 1, v	9, 6, 8, v	10, 1, 1, v	8, 8, 6, v	10, 1, 1, v	6, 9, 5, v	10, 1, 1, v

2, 3, 2, 1, 1	E1	E1M	E.8	E.8M	E.5	E.5M	Q1	Q1M	Q.8	Q.8M	Q.5	Q.5M	OA
LN	2, 2, 11, v	1, 3, 13, v	5, 4, 9, v	4, 5, 10, v	11, 9, 7	10, 8, 8	7, 6, 5, v	6, 7, 6, v	9, 12, 1, v	8, 13, 1, v	13, 11, 1	12, 10, 1	3, 1, 12, v
LNA	1, 1, 11, v	2, 3, 13, v	4, 4, 9, v	5, 5, 10, v	10, 8, 7	11, 11, 8	7, 6, 5, v	6, 7, 6, v	9, 13, 1	8, 12, 1	13, 10, 1	12, 9, 1	3, 2, 12, v
LW	3, 3, 11, v	2, 2, 12, v	5, 5, 9, v	4, 4, 10, v	9, 7, 6	8, 6, 8	7, 8, 5, v	6, 9, 7, v	11, 12, 3, v	10, 13, 4, v	13, 10, 1	12, 11, 1	1, 1, 13, v
LWA	2, 3, 11, v	3, 2, 12, v	4, 5, 9, v	5, 4, 10, v	8, 7, 5	9, 6, 8	7, 8, 6, v	6, 9, 7, v	11, 12, 3, v	10, 13, 4, v	13, 11, 1	12, 10, 1	1, 1, 13, v
HW	2, 2, 11, v	1, 3, 12, v	5, 4, 9, v	4, 5, 10, v	9, 10, 7, v	8, 8, 8, v	7, 9, 5, v	6, 11, 6, v	11, 12, 4, v	10, 13, 3, v	13, 6, 2, v	12, 7, 1, v	3, 1, 13, v
HWA	1, 2, 11, v	2, 3, 12, v	3, 4, 9, v	5, 5, 10, v	8, 9, 7	9, 10, 8	7, 8, 5, v	6, 11, 6, v	11, 12, 3, v	10, 13, 4, v	13, 7, 2, v	12, 6, 1, v	4, 1, 13, v

2, 3, 2, 1, 2	E1	E1M	E.8	E.8M	E.5	E.5M	Q1	Q1M	Q.8	Q.8M	Q.5	Q.5M	OA
LN	9, 5, 5, v	2, 13, 9	8, 6, 6, v	1, 10, 10	5, 8, 11, v	3, 9, 8	10, 1, 1, v	7, 7, 13, v	10, 1, 1, v	6, 11, 12, v	10, 1, 1, v	4, 12, 7, v	10, 1, 1, v
LNA	9, 1, 1, v	2, 13, 9	8, 6, 6, v	1, 10, 10	5, 8, 11, v	3, 9, 8	10, 2, 2, v	7, 7, 13, v	10, 2, 2, v	6, 11, 12, v	10, 2, 2, v	4, 12, 7, v	10, 2, 2, v
LW	9, 5, 5, v	2, 12, 9, v	8, 9, 7, v	1, 7, 10	5, 6, 11, v	3, 8, 8	10, 1, 1, v	7, 10, 13, v	10, 1, 1, v	6, 13, 12, v	10, 1, 1, v	4, 11, 6, v	10, 1, 1, v
LWA	9, 5, 5, v	2, 12, 9, v	8, 9, 7, v	1, 7, 10	5, 6, 11, v	3, 8, 8	10, 1, 1, v	7, 10, 13, v	10, 1, 1, v	6, 13, 12, v	10, 1, 1, v	4, 11, 6, v	10, 1, 1, v
HW	9, 5, 5, v	2, 13, 9, v	8, 8, 7, v	1, 10, 10, v	5, 6, 12, v	3, 7, 8	10, 1, 1, v	7, 11, 13, v	10, 1, 1, v	6, 12, 11, v	10, 1, 1, v	4, 9, 6, v	10, 1, 1, v
HWA	9, 5, 5, v	2, 13, 9, v	8, 8, 8, v	1, 10, 10, v	5, 6, 12, v	3, 7, 7	10, 1, 1, v	7, 11, 13, v	10, 1, 1, v	6, 12, 11, v	10, 1, 1, v	4, 9, 6, v	10, 1, 1, v

2, 3, 2, 1, 3	E1	E1M	E.8	E.8M	E.5	E.5M	Q1	Q1M	Q.8	Q.8M	Q.5	Q.5M	OA
LN	9, 2, 6, v	4, 12, 7, v	8, 1, 5, v	1, 13, 13, v	3, 10, 12, v	2, 11, 11	10, 3, 1, v	5, 7, 8, v	10, 3, 1, v	5, 7, 8, v	10, 3, 1, v	5, 7, 8, v	10, 3, 1, v
LNA	8, 1, 1, v	4, 12, 7, v	8, 1, 1, v	1, 13, 13, v	3, 10, 12, v	2, 11, 11	10, 3, 3, v	5, 7, 8, v	10, 3, 3, v	5, 7, 8, v	10, 3, 3, v	5, 7, 8, v	10, 3, 3, v
LW	6, 10, 9, v	4, 12, 8, v	5, 11, 10, v	3, 13, 11, v	2, 9, 13, v	1, 8, 12	10, 1, 1, v	8, 5, 6, v	10, 1, 1, v	8, 5, 6, v	10, 1, 1, v	7, 7, 5, v	10, 1, 1, v
LWA	6, 10, 9, v	4, 12, 8, v	5, 11, 11, v	3, 13, 10, v	2, 8, 13, v	1, 9, 12	10, 1, 1, v	8, 5, 6, v	10, 1, 1, v	8, 5, 6, v	10, 1, 1, v	7, 7, 5, v	10, 1, 1, v
HW	7, 10, 7, v	4, 12, 9, v	5, 11, 10, v	3, 13, 11, v	2, 7, 13, v	1, 8, 12, v	10, 1, 1, v	9, 5, 8, v	10, 1, 1, v	8, 6, 6, v	10, 1, 1, v	6, 9, 5, v	10, 1, 1, v
HWA	7, 10, 9, v	4, 12, 7, v	5, 11, 10, v	3, 13, 11, v	2, 5, 13, v	1, 7, 12, v	10, 1, 1, v	9, 6, 8, v	10, 1, 1, v	8, 8, 6, v	10, 1, 1, v	6, 9, 5, v	10, 1, 1, v

3, 1, 1, 1, 1	E1	E1M	E.8	E.8M	E.5	E.5M	Q1	Q1M	Q.8	Q.8M	Q.5	Q.5M	OA
LN	2, 2, 11	1, 7, 13	5, 4, 9	4, 6, 10	11, 8, 7	10, 9, 8	7, 3, 5	6, 5, 6	9, 12, 1	8, 13, 1	13, 11, 1	12, 10, 1	3, 1, 12
LNA	1, 1, 11	2, 6, 12	4, 4, 9	5, 7, 10	10, 8, 7	11, 10, 8	7, 3, 5	6, 5, 6	9, 13, 1	8, 12, 1	13, 11, 1	12, 9, 1	3, 2, 13
LW	3, 3, 11	2, 2, 12	5, 5, 9	4, 4, 10	9, 7, 7	8, 6, 8	7, 8, 5	6, 9, 6	11, 12, 3	10, 13, 4	13, 10, 1	12, 11, 1	1, 1, 13
LWA	1, 2, 11	3, 3, 12	4, 5, 9	5, 4, 10	8, 7, 7	9, 6, 8	7, 8, 5	6, 9, 6	11, 12, 3	10, 13, 4	13, 11, 1	12, 10, 1	2, 1, 13
HW	2, 2, 11	1, 3, 12	4, 4, 9	3, 7, 10	8, 11, 7	7, 10, 8	9, 8, 5	6, 9, 6	11, 12, 4	10, 13, 3	13, 5, 2	12, 6, 1	5, 1, 13
HWA	1, 2, 11	2, 3, 12	3, 4, 9	4, 7, 10	8, 10, 7	9, 11, 8	7, 8, 5	6, 9, 6	11, 12, 3	10, 13, 4	13, 6, 1	12, 5, 2	5, 1, 13

3, 1, 1, 1, 2	E1	E1M	E.8	E.8M	E.5	E.5M	Q1	Q1M	Q.8	Q.8M	Q.5	Q.5M	OA
LN	6, 8, 13	1, 11, 10	5, 6, 12	3, 9, 9	8, 5, 11	7, 7, 7	11, 1, 4	2, 12, 8	11, 1, 4	4, 10, 1	10, 13, 3	9, 4, 1	11, 1, 4
LNA	6, 7, 13	1, 11, 10	5, 6, 12	2, 10, 8	8, 5, 11	7, 8, 7	11, 1, 4	3, 13, 9	11, 1, 4	4, 9, 1	10, 12, 3	9, 4, 1	11, 1, 4
LW	7, 6, 12	1, 7, 9	6, 5, 13	2, 10, 8	8, 8, 10	5, 11, 7	12, 1, 5	3, 12, 11	11, 3, 4	4, 13, 3	10, 4, 2	9, 9, 1	12, 1, 5
LWA	7, 6, 12	1, 7, 9	6, 5, 13	2, 10, 8	8, 8, 10	5, 11, 6	12, 1, 4	3, 12, 11	11, 3, 3	4, 13, 7	10, 4, 2	9, 9, 1	12, 1, 4
HW	5, 9, 13	1, 12, 11	3, 7, 12	2, 11, 9	8, 6, 10	4, 8, 6	12, 2, 5	6, 13, 8	11, 3, 4	7, 10, 3	10, 4, 2	9, 5, 1	13, 1, 7
HWA	4, 9, 13	1, 12, 10	3, 7, 12	2, 11, 8	8, 6, 11	5, 8, 7	12, 2, 5	6, 13, 9	11, 3, 3	7, 10, 4	10, 4, 2	9, 5, 1	13, 1, 6

3, 1, 1, 1, 3	E1	E1M	E.8	E.8M	E.5	E.5M	Q1	Q1M	Q.8	Q.8M	Q.5	Q.5M	OA
LN	1, 6, 11	2, 13, 13	3, 10, 10	4, 12, 12	5, 9, 8	6, 11, 9	7, 1, 3	11, 4, 7	7, 1, 3	10, 5, 6	12, 8, 1	13, 7, 2	7, 1, 3
LNA	1, 6, 11	2, 13, 13	3, 10, 10	4, 12, 12	5, 9, 8	6, 11, 9	7, 1, 3	12, 4, 6	7, 1, 3	11, 5, 7	10, 7, 1	13, 8, 2	7, 1, 3
LW	3, 10, 10	4, 8, 12	1, 11, 11	2, 9, 13	5, 13, 8	6, 12, 9	9, 2, 4	10, 4, 7	7, 3, 3	8, 5, 6	13, 6, 1	12, 7, 2	11, 1, 5
LWA	3, 9, 10	4, 8, 12	1, 11, 11	2, 10, 13	5, 13, 8	6, 12, 9	9, 2, 4	10, 4, 7	7, 3, 2	8, 5, 6	12, 6, 1	13, 7, 3	11, 1, 5
HW	4, 11, 10	2, 13, 13	1, 10, 11	3, 12, 12	5, 8, 8	6, 9, 9	9, 2, 4	8, 4, 7	10, 3, 3	7, 5, 6	12, 6, 1	13, 7, 2	11, 1, 5
HWA	2, 11, 11	4, 13, 13	1, 10, 10	3, 12, 12	5, 8, 7	6, 9, 8	10, 2, 4	8, 4, 9	9, 3, 3	7, 7, 6	12, 5, 1	13, 6, 2	11, 1, 5

3, 1, 1, 2, 1	E1	E1M	E.8	E.8M	E.5	E.5M	Q1	Q1M	Q.8	Q.8M	Q.5	Q.5M	OA
LN	2, 2, 11	1, 7, 13	5, 4, 9	4, 6, 10	11, 8, 7	10, 9, 8	7, 3, 5	6, 5, 6	9, 12, 1	8, 13, 1	13, 11, 1	12, 10, 1	3, 1, 12
LNA	1, 1, 11	2, 6, 12	4, 4, 9	5, 7, 10	10, 8, 7	11, 10, 8	7, 3, 5	6, 5, 6	9, 13, 1	8, 12, 1	13, 11, 1	12, 9, 1	3, 2, 13
LW	3, 3, 11	2, 2, 12	5, 5, 9	4, 4, 10	9, 7, 7	8, 6, 8	7, 8, 5	6, 9, 6	11, 12, 3	10, 13, 4	13, 10, 1	12, 11, 1	1, 1, 13
LWA	1, 2, 11	3, 3, 12	4, 5, 9	5, 4, 10	8, 7, 7	9, 6, 8	7, 8, 5	6, 9, 6	11, 12, 3	10, 13, 4	13, 11, 1	12, 10, 1	2, 1, 13
HW	2, 2, 11	1, 3, 12	4, 4, 9	3, 7, 10	8, 11, 7	7, 10, 8	9, 8, 5	6, 9, 6	11, 12, 4	10, 13, 3	13, 5, 2	12, 6, 1	5, 1, 13
HWA	1, 2, 11	2, 3, 12	3, 4, 9	4, 7, 10	8, 10, 7	9, 11, 8	7, 8, 5	6, 9, 6	11, 12, 3	10, 13, 4	13, 6, 1	12, 5, 2	5, 1, 13

3, 1, 1, 2, 2	E1	E1M	E.8	E.8M	E.5	E.5M	Q1	Q1M	Q.8	Q.8M	Q.5	Q.5M	OA
LN	6, 8, 13	1, 11, 10	5, 6, 12	3, 9, 9	8, 5, 11	7, 7, 7	11, 1, 4	2, 12, 8	11, 1, 4	4, 10, 1	10, 13, 3	9, 4, 1	11, 1, 4
LNA	6, 7, 13	1, 11, 10	5, 6, 12	2, 10, 8	8, 5, 11	7, 8, 7	11, 1, 4	3, 13, 9	11, 1, 4	4, 9, 1	10, 12, 3	9, 4, 1	11, 1, 4
LW	7, 6, 12	1, 7, 9	6, 5, 13	2, 10, 8	8, 8, 10	5, 11, 7	12, 1, 5	3, 12, 11	11, 3, 4	4, 13, 3	10, 4, 2	9, 9, 1	12, 1, 5
LWA	7, 6, 12	1, 7, 9	6, 5, 13	2, 10, 8	8, 8, 10	5, 11, 6	12, 1, 4	3, 12, 11	11, 3, 3	4, 13, 7	10, 4, 2	9, 9, 1	12, 1, 4
HW	5, 9, 13	1, 12, 11	3, 7, 12	2, 11, 9	8, 6, 10	4, 8, 6	12, 2, 5	6, 13, 8	11, 3, 4	7, 10, 3	10, 4, 2	9, 5, 1	13, 1, 7
HWA	4, 9, 13	1, 12, 10	3, 7, 12	2, 11, 8	8, 6, 11	5, 8, 7	12, 2, 5	6, 13, 9	11, 3, 3	7, 10, 4	10, 4, 2	9, 5, 1	13, 1, 6

3, 1, 1, 2, 3	E1	E1M	E.8	E.8M	E.5	E.5M	Q1	Q1M	Q.8	Q.8M	Q.5	Q.5M	OA
LN	1, 6, 11	2, 13, 13	3, 10, 10	4, 12, 12	5, 9, 8	6, 11, 9	7, 1, 3	11, 4, 7	7, 1, 3	10, 5, 6	12, 8, 1	13, 7, 2	7, 1, 3
LNA	1, 6, 11	2, 13, 13	3, 10, 10	4, 12, 12	5, 9, 8	6, 11, 9	7, 1, 3	12, 4, 6	7, 1, 3	11, 5, 7	10, 7, 1	13, 8, 2	7, 1, 3
LW	3, 10, 10	4, 8, 12	1, 11, 11	2, 9, 13	5, 13, 8	6, 12, 9	9, 2, 4	10, 4, 7	7, 3, 3	8, 5, 6	13, 6, 1	12, 7, 2	11, 1, 5
LWA	3, 9, 10	4, 8, 12	1, 11, 11	2, 10, 13	5, 13, 8	6, 12, 9	9, 2, 4	10, 4, 7	7, 3, 2	8, 5, 6	12, 6, 1	13, 7, 3	11, 1, 5
HW	4, 11, 10	2, 13, 13	1, 10, 11	3, 12, 12	5, 8, 8	6, 9, 9	9, 2, 4	8, 4, 7	10, 3, 3	7, 5, 6	12, 6, 1	13, 7, 2	11, 1, 5
HWA	2, 11, 11	4, 13, 13	1, 10, 10	3, 12, 12	5, 8, 7	6, 9, 8	10, 2, 4	8, 4, 9	9, 3, 3	7, 7, 6	12, 5, 1	13, 6, 2	11, 1, 5

3, 1, 2, 1, 1	E1	E1M	E.8	E.8M	E.5	E.5M	Q1	Q1M	Q.8	Q.8M	Q.5	Q.5M	OA
LN	2, 2, 11	1, 7, 13	5, 4, 9	4, 6, 10	11, 8, 7	10, 9, 8	7, 3, 5	6, 5, 6	9, 12, 1	8, 13, 1	13, 11, 1	12, 10, 1	3, 1, 12
LNA	1, 1, 11	2, 6, 12	4, 4, 9	5, 7, 10	10, 8, 7	11, 10, 8	7, 3, 5	6, 5, 6	9, 13, 1	8, 12, 1	13, 11, 1	12, 9, 1	3, 2, 13
LW	3, 3, 11	2, 2, 12	5, 5, 9	4, 4, 10	9, 7, 7	8, 6, 8	7, 8, 5	6, 9, 6	11, 12, 3	10, 13, 4	13, 10, 1	12, 11, 1	1, 1, 13
LWA	1, 2, 11	3, 3, 12	4, 5, 9	5, 4, 10	8, 7, 7	9, 6, 8	7, 8, 5	6, 9, 6	11, 12, 3	10, 13, 4	13, 11, 1	12, 10, 1	2, 1, 13
HW	2, 2, 11	1, 3, 12	4, 4, 9	3, 7, 10	8, 11, 7	7, 10, 8	9, 8, 5	6, 9, 6	11, 12, 4	10, 13, 3	13, 5, 2	12, 6, 1	5, 1, 13
HWA	1, 2, 11	2, 3, 12	3, 4, 9	4, 7, 10	8, 10, 7	9, 11, 8	7, 8, 5	6, 9, 6	11, 12, 3	10, 13, 4	13, 6, 1	12, 5, 2	5, 1, 13

3, 1, 2, 1, 2	E1	E1M	E.8	E.8M	E.5	E.5M	Q1	Q1M	Q.8	Q.8M	Q.5	Q.5M	OA
LN	6, 8, 13	1, 11, 10	5, 6, 12	3, 9, 9	8, 5, 11	7, 7, 7	11, 1, 4	2, 12, 8	11, 1, 4	4, 10, 1	10, 13, 3	9, 4, 1	11, 1, 4
LNA	6, 7, 13	1, 11, 10	5, 6, 12	2, 10, 8	8, 5, 11	7, 8, 7	11, 1, 4	3, 13, 9	11, 1, 4	4, 9, 1	10, 12, 3	9, 4, 1	11, 1, 4
LW	7, 6, 12	1, 7, 9	6, 5, 13	2, 10, 8	8, 8, 10	5, 11, 7	12, 1, 5	3, 12, 11	11, 3, 4	4, 13, 3	10, 4, 2	9, 9, 1	12, 1, 5
LWA	7, 6, 12	1, 7, 9	6, 5, 13	2, 10, 8	8, 8, 10	5, 11, 6	12, 1, 4	3, 12, 11	11, 3, 3	4, 13, 7	10, 4, 2	9, 9, 1	12, 1, 4
HW	5, 9, 13	1, 12, 11	3, 7, 12	2, 11, 9	8, 6, 10	4, 8, 6	12, 2, 5	6, 13, 8	11, 3, 4	7, 10, 3	10, 4, 2	9, 5, 1	13, 1, 7
HWA	4, 9, 13	1, 12, 10	3, 7, 12	2, 11, 8	8, 6, 11	5, 8, 7	12, 2, 5	6, 13, 9	11, 3, 3	7, 10, 4	10, 4, 2	9, 5, 1	13, 1, 6

3, 1, 2, 1, 3	E1	E1M	E.8	E.8M	E.5	E.5M	Q1	Q1M	Q.8	Q.8M	Q.5	Q.5M	OA
LN	1, 6, 11	2, 13, 13	3, 10, 10	4, 12, 12	5, 9, 8	6, 11, 9	7, 1, 3	11, 4, 7	7, 1, 3	10, 5, 6	12, 8, 1	13, 7, 2	7, 1, 3
LNA	1, 6, 11	2, 13, 13	3, 10, 10	4, 12, 12	5, 9, 8	6, 11, 9	7, 1, 3	12, 4, 6	7, 1, 3	11, 5, 7	10, 7, 1	13, 8, 2	7, 1, 3
LW	3, 10, 10	4, 8, 12	1, 11, 11	2, 9, 13	5, 13, 8	6, 12, 9	9, 2, 4	10, 4, 7	7, 3, 3	8, 5, 6	13, 6, 1	12, 7, 2	11, 1, 5
LWA	3, 9, 10	4, 8, 12	1, 11, 11	2, 10, 13	5, 13, 8	6, 12, 9	9, 2, 4	10, 4, 7	7, 3, 2	8, 5, 6	12, 6, 1	13, 7, 3	11, 1, 5
HW	4, 11, 10	2, 13, 13	1, 10, 11	3, 12, 12	5, 8, 8	6, 9, 9	9, 2, 4	8, 4, 7	10, 3, 3	7, 5, 6	12, 6, 1	13, 7, 2	11, 1, 5
HWA	2, 11, 11	4, 13, 13	1, 10, 10	3, 12, 12	5, 8, 7	6, 9, 8	10, 2, 4	8, 4, 9	9, 3, 3	7, 7, 6	12, 5, 1	13, 6, 2	11, 1, 5

3, 1, 2, 2, 1	E1	E1M	E.8	E.8M	E.5	E.5M	Q1	Q1M	Q.8	Q.8M	Q.5	Q.5M	OA
LN	2, 2, 11	1, 7, 13	5, 4, 9	4, 6, 10	11, 8, 7	10, 9, 8	7, 3, 5	6, 5, 6	9, 12, 1	8, 13, 1	13, 11, 1	12, 10, 1	3, 1, 12
LNA	1, 1, 11	2, 6, 12	4, 4, 9	5, 7, 10	10, 8, 7	11, 10, 8	7, 3, 5	6, 5, 6	9, 13, 1	8, 12, 1	13, 11, 1	12, 9, 1	3, 2, 13
LW	3, 3, 11	2, 2, 12	5, 5, 9	4, 4, 10	9, 7, 7	8, 6, 8	7, 8, 5	6, 9, 6	11, 12, 3	10, 13, 4	13, 10, 1	12, 11, 1	1, 1, 13
LWA	1, 2, 11	3, 3, 12	4, 5, 9	5, 4, 10	8, 7, 7	9, 6, 8	7, 8, 5	6, 9, 6	11, 12, 3	10, 13, 4	13, 11, 1	12, 10, 1	2, 1, 13
HW	2, 2, 11	1, 3, 12	4, 4, 9	3, 7, 10	8, 11, 7	7, 10, 8	9, 8, 5	6, 9, 6	11, 12, 4	10, 13, 3	13, 5, 2	12, 6, 1	5, 1, 13
HWA	1, 2, 11	2, 3, 12	3, 4, 9	4, 7, 10	8, 10, 7	9, 11, 8	7, 8, 5	6, 9, 6	11, 12, 3	10, 13, 4	13, 6, 1	12, 5, 2	5, 1, 13

3, 1, 2, 2, 2	E1	E1M	E.8	E.8M	E.5	E.5M	Q1	Q1M	Q.8	Q.8M	Q.5	Q.5M	OA
LN	6, 8, 13	1, 11, 10	5, 6, 12	3, 9, 9	8, 5, 11	7, 7, 7	11, 1, 4	2, 12, 8	11, 1, 4	4, 10, 1	10, 13, 3	9, 4, 1	11, 1, 4
LNA	6, 7, 13	1, 11, 10	5, 6, 12	2, 10, 8	8, 5, 11	7, 8, 7	11, 1, 4	3, 13, 9	11, 1, 4	4, 9, 1	10, 12, 3	9, 4, 1	11, 1, 4
LW	7, 6, 12	1, 7, 9	6, 5, 13	2, 10, 8	8, 8, 10	5, 11, 7	12, 1, 5	3, 12, 11	11, 3, 4	4, 13, 3	10, 4, 2	9, 9, 1	12, 1, 5
LWA	7, 6, 12	1, 7, 9	6, 5, 13	2, 10, 8	8, 8, 10	5, 11, 6	12, 1, 4	3, 12, 11	11, 3, 3	4, 13, 7	10, 4, 2	9, 9, 1	12, 1, 4
HW	5, 9, 13	1, 12, 11	3, 7, 12	2, 11, 9	8, 6, 10	4, 8, 6	12, 2, 5	6, 13, 8	11, 3, 4	7, 10, 3	10, 4, 2	9, 5, 1	13, 1, 7
HWA	4, 9, 13	1, 12, 10	3, 7, 12	2, 11, 8	8, 6, 11	5, 8, 7	12, 2, 5	6, 13, 9	11, 3, 3	7, 10, 4	10, 4, 2	9, 5, 1	13, 1, 6

3, 1, 2, 2, 3	E1	E1M	E.8	E.8M	E.5	E.5M	Q1	Q1M	Q.8	Q.8M	Q.5	Q.5M	OA
LN	1, 6, 11	2, 13, 13	3, 10, 10	4, 12, 12	5, 9, 8	6, 11, 9	7, 1, 3	11, 4, 7	7, 1, 3	10, 5, 6	12, 8, 1	13, 7, 2	7, 1, 3
LNA	1, 6, 11	2, 13, 13	3, 10, 10	4, 12, 12	5, 9, 8	6, 11, 9	7, 1, 3	12, 4, 6	7, 1, 3	11, 5, 7	10, 7, 1	13, 8, 2	7, 1, 3
LW	3, 10, 10	4, 8, 12	1, 11, 11	2, 9, 13	5, 13, 8	6, 12, 9	9, 2, 4	10, 4, 7	7, 3, 3	8, 5, 6	13, 6, 1	12, 7, 2	11, 1, 5
LWA	3, 9, 10	4, 8, 12	1, 11, 11	2, 10, 13	5, 13, 8	6, 12, 9	9, 2, 4	10, 4, 7	7, 3, 2	8, 5, 6	12, 6, 1	13, 7, 3	11, 1, 5
HW	4, 11, 10	2, 13, 13	1, 10, 11	3, 12, 12	5, 8, 8	6, 9, 9	9, 2, 4	8, 4, 7	10, 3, 3	7, 5, 6	12, 6, 1	13, 7, 2	11, 1, 5
HWA	2, 11, 11	4, 13, 13	1, 10, 10	3, 12, 12	5, 8, 7	6, 9, 8	10, 2, 4	8, 4, 9	9, 3, 3	7, 7, 6	12, 5, 1	13, 6, 2	11, 1, 5

3, 2, 1, 1, 1	E1	E1M	E.8	E.8M	E.5	E.5M	Q1	Q1M	Q.8	Q.8M	Q.5	Q.5M	OA
LN	2, 2, 11	1, 6, 12	5, 4, 9	4, 7, 10	11, 9, 7	10, 8, 8	7, 3, 5	6, 5, 6	9, 12, 1	8, 13, 1	13, 11, 1	12, 10, 1	3, 1, 13
LNA	1, 1, 11	2, 6, 12	4, 4, 9	5, 7, 10	10, 8, 7	11, 9, 8	7, 3, 5	6, 5, 6	9, 13, 1	8, 12, 1	13, 11, 1	12, 10, 1	3, 2, 13
LW	3, 3, 11	2, 2, 12	5, 5, 9	4, 4, 10	9, 7, 7	8, 6, 8	7, 8, 5	6, 9, 6	11, 12, 3	10, 13, 4	13, 10, 1	12, 11, 1	1, 1, 13
LWA	2, 3, 11	3, 2, 12	4, 5, 9	5, 4, 10	8, 9, 5	9, 7, 8	7, 6, 6	6, 8, 7	11, 12, 3	10, 13, 4	13, 11, 1	12, 10, 1	1, 1, 13
HW	2, 2, 11	1, 3, 12	4, 4, 9	3, 5, 10	9, 11, 7	8, 10, 8	7, 8, 5	6, 9, 6	11, 12, 4	10, 13, 3	13, 6, 2	12, 7, 1	5, 1, 13
HWA	1, 2, 11	2, 3, 12	3, 4, 9	4, 5, 10	8, 10, 7	9, 11, 8	7, 8, 5	6, 9, 6	11, 12, 3	10, 13, 4	13, 7, 2	12, 6, 1	5, 1, 13

3, 2, 1, 1, 2	E1	E1M	E.8	E.8M	E.5	E.5M	Q1	Q1M	Q.8	Q.8M	Q.5	Q.5M	OA
LN	7, 12, 12	1, 11, 9	6, 7, 13	2, 9, 8	8, 5, 11	5, 8, 7	10, 1, 3	3, 13, 10	10, 1, 3	4, 10, 1	10, 1, 3	9, 6, 1	10, 1, 3
LNA	7, 12, 12	1, 11, 8	6, 7, 13	2, 10, 9	8, 5, 11	5, 8, 7	10, 1, 3	3, 13, 10	10, 1, 3	4, 9, 1	10, 1, 3	9, 6, 1	10, 1, 3
LW	9, 12, 11	1, 7, 8	6, 5, 12	2, 9, 7	7, 6, 10	5, 10, 6	11, 1, 3	4, 13, 13	11, 1, 3	3, 11, 9	10, 4, 2	8, 8, 1	11, 1, 3
LWA	9, 12, 11	1, 7, 8	6, 5, 12	2, 10, 7	7, 6, 10	5, 9, 6	11, 1, 3	4, 13, 13	11, 1, 3	3, 11, 9	10, 4, 2	8, 8, 1	11, 1, 3
HW	8, 10, 12	1, 12, 9	6, 8, 13	2, 9, 8	7, 5, 10	3, 7, 6	12, 1, 4	4, 13, 11	11, 3, 3	5, 11, 7	10, 4, 2	9, 6, 1	12, 1, 4
HWA	7, 10, 12	1, 12, 9	5, 7, 13	2, 9, 8	8, 5, 10	3, 8, 6	11, 1, 3	4, 13, 11	11, 1, 3	6, 11, 7	10, 4, 2	9, 6, 1	11, 1, 3

3, 2, 1, 1, 3	E1	E1M	E.8	E.8M	E.5	E.5M	Q1	Q1M	Q.8	Q.8M	Q.5	Q.5M	OA
LN	2, 12, 11	4, 13, 13	1, 8, 10	3, 9, 12	5, 11, 8	6, 10, 9	8, 1, 2	12, 4, 6	8, 1, 2	12, 4, 6	7, 7, 1	11, 6, 5	8, 1, 2
LNA	2, 12, 11	4, 13, 13	1, 10, 10	3, 11, 12	5, 8, 8	6, 9, 9	8, 1, 2	12, 4, 5	8, 1, 2	12, 4, 5	7, 7, 1	11, 6, 7	8, 1, 2
LW	3, 13, 9	5, 12, 12	1, 10, 11	2, 8, 13	4, 11, 8	6, 9, 10	8, 1, 2	12, 4, 6	8, 1, 2	12, 4, 6	7, 7, 1	11, 6, 5	8, 1, 2
LWA	3, 13, 9	6, 12, 12	1, 10, 11	2, 8, 13	4, 11, 8	5, 9, 10	8, 1, 2	12, 4, 6	8, 1, 2	12, 4, 6	7, 7, 1	11, 6, 5	8, 1, 2
HW	3, 12, 10	4, 13, 12	1, 11, 11	2, 10, 13	5, 9, 8	6, 8, 9	12, 2, 5	11, 5, 7	8, 3, 3	7, 6, 6	10, 4, 1	9, 7, 2	13, 1, 4
HWA	3, 13, 10	4, 12, 12	1, 11, 11	2, 10, 13	5, 9, 8	6, 8, 9	12, 1, 3	11, 5, 7	10, 3, 2	8, 6, 6	9, 4, 1	7, 7, 5	12, 1, 3

3, 2, 1, 2, 1	E1	E1M	E.8	E.8M	E.5	E.5M	Q1	Q1M	Q.8	Q.8M	Q.5	Q.5M	OA
LN	2, 2, 11	1, 6, 12	5, 4, 9	4, 7, 10	11, 9, 7	10, 8, 8	7, 3, 5	6, 5, 6	9, 12, 1	8, 13, 1	13, 11, 1	12, 10, 1	3, 1, 13
LNA	1, 1, 11	2, 6, 12	4, 4, 9	5, 7, 10	10, 8, 7	11, 9, 8	7, 3, 5	6, 5, 6	9, 13, 1	8, 12, 1	13, 11, 1	12, 10, 1	3, 2, 13
LW	3, 3, 11	2, 2, 12	5, 5, 9	4, 4, 10	9, 7, 7	8, 6, 8	7, 8, 5	6, 9, 6	11, 12, 3	10, 13, 4	13, 10, 1	12, 11, 1	1, 1, 13
LWA	2, 3, 11	3, 2, 12	4, 5, 9	5, 4, 10	8, 9, 5	9, 7, 8	7, 6, 6	6, 8, 7	11, 12, 3	10, 13, 4	13, 11, 1	12, 10, 1	1, 1, 13
HW	2, 2, 11	1, 3, 12	4, 4, 9	3, 5, 10	9, 11, 7	8, 10, 8	7, 8, 5	6, 9, 6	11, 12, 4	10, 13, 3	13, 6, 2	12, 7, 1	5, 1, 13
HWA	1, 2, 11	2, 3, 12	3, 4, 9	4, 5, 10	8, 10, 7	9, 11, 8	7, 8, 5	6, 9, 6	11, 12, 3	10, 13, 4	13, 7, 2	12, 6, 1	5, 1, 13

3, 2, 1, 2, 2	E1	E1M	E.8	E.8M	E.5	E.5M	Q1	Q1M	Q.8	Q.8M	Q.5	Q.5M	OA
LN	7, 12, 12	1, 11, 9	6, 7, 13	2, 9, 8	8, 5, 11	5, 8, 7	10, 1, 3	3, 13, 10	10, 1, 3	4, 10, 1	10, 1, 3	9, 6, 1	10, 1, 3
LNA	7, 12, 12	1, 11, 8	6, 7, 13	2, 10, 9	8, 5, 11	5, 8, 7	10, 1, 3	3, 13, 10	10, 1, 3	4, 9, 1	10, 1, 3	9, 6, 1	10, 1, 3
LW	9, 12, 11	1, 7, 8	6, 5, 12	2, 9, 7	7, 6, 10	5, 10, 6	11, 1, 3	4, 13, 13	11, 1, 3	3, 11, 9	10, 4, 2	8, 8, 1	11, 1, 3
LWA	9, 12, 11	1, 7, 8	6, 5, 12	2, 10, 7	7, 6, 10	5, 9, 6	11, 1, 3	4, 13, 13	11, 1, 3	3, 11, 9	10, 4, 2	8, 8, 1	11, 1, 3
HW	8, 10, 12	1, 12, 9	6, 8, 13	2, 9, 8	7, 5, 10	3, 7, 6	12, 1, 4	4, 13, 11	11, 3, 3	5, 11, 7	10, 4, 2	9, 6, 1	12, 1, 4
HWA	7, 10, 12	1, 12, 9	5, 7, 13	2, 9, 8	8, 5, 10	3, 8, 6	11, 1, 3	4, 13, 11	11, 1, 3	6, 11, 7	10, 4, 2	9, 6, 1	11, 1, 3

3, 2, 1, 2, 3	E1	E1M	E.8	E.8M	E.5	E.5M	Q1	Q1M	Q.8	Q.8M	Q.5	Q.5M	OA
LN	2, 12, 11	4, 13, 13	1, 8, 10	3, 9, 12	5, 11, 8	6, 10, 9	8, 1, 2	12, 4, 6	8, 1, 2	12, 4, 6	7, 7, 1	11, 6, 5	8, 1, 2
LNA	2, 12, 11	4, 13, 13	1, 10, 10	3, 11, 12	5, 8, 8	6, 9, 9	8, 1, 2	12, 4, 5	8, 1, 2	12, 4, 5	7, 7, 1	11, 6, 7	8, 1, 2
LW	3, 13, 9	5, 12, 12	1, 10, 11	2, 8, 13	4, 11, 8	6, 9, 10	8, 1, 2	12, 4, 6	8, 1, 2	12, 4, 6	7, 7, 1	11, 6, 5	8, 1, 2
LWA	3, 13, 9	6, 12, 12	1, 10, 11	2, 8, 13	4, 11, 8	5, 9, 10	8, 1, 2	12, 4, 6	8, 1, 2	12, 4, 6	7, 7, 1	11, 6, 5	8, 1, 2
HW	3, 12, 10	4, 13, 12	1, 11, 11	2, 10, 13	5, 9, 8	6, 8, 9	12, 2, 5	11, 5, 7	8, 3, 3	7, 6, 6	10, 4, 1	9, 7, 2	13, 1, 4
HWA	3, 13, 10	4, 12, 12	1, 11, 11	2, 10, 13	5, 9, 8	6, 8, 9	12, 1, 3	11, 5, 7	10, 3, 2	8, 6, 6	9, 4, 1	7, 7, 5	12, 1, 3

3, 2, 2, 1, 1	E1	E1M	E.8	E.8M	E.5	E.5M	Q1	Q1M	Q.8	Q.8M	Q.5	Q.5M	OA
LN	2, 2, 11	1, 6, 12	5, 4, 9	4, 7, 10	11, 9, 7	10, 8, 8	7, 3, 5	6, 5, 6	9, 12, 1	8, 13, 1	13, 11, 1	12, 10, 1	3, 1, 13
LNA	1, 1, 11	2, 6, 12	4, 4, 9	5, 7, 10	10, 8, 7	11, 9, 8	7, 3, 5	6, 5, 6	9, 13, 1	8, 12, 1	13, 11, 1	12, 10, 1	3, 2, 13
LW	3, 3, 11	2, 2, 12	5, 5, 9	4, 4, 10	9, 7, 7	8, 6, 8	7, 8, 5	6, 9, 6	11, 12, 3	10, 13, 4	13, 10, 1	12, 11, 1	1, 1, 13
LWA	2, 3, 11	3, 2, 12	4, 5, 9	5, 4, 10	8, 9, 5	9, 7, 8	7, 6, 6	6, 8, 7	11, 12, 3	10, 13, 4	13, 11, 1	12, 10, 1	1, 1, 13
HW	2, 2, 11	1, 3, 12	4, 4, 9	3, 5, 10	9, 11, 7	8, 10, 8	7, 8, 5	6, 9, 6	11, 12, 4	10, 13, 3	13, 6, 2	12, 7, 1	5, 1, 13
HWA	1, 2, 11	2, 3, 12	3, 4, 9	4, 5, 10	8, 10, 7	9, 11, 8	7, 8, 5	6, 9, 6	11, 12, 3	10, 13, 4	13, 7, 2	12, 6, 1	5, 1, 13

3, 2, 2, 1, 2	E1	E1M	E.8	E.8M	E.5	E.5M	Q1	Q1M	Q.8	Q.8M	Q.5	Q.5M	OA
LN	7, 12, 12	1, 11, 9	6, 7, 13	2, 9, 8	8, 5, 11	5, 8, 7	10, 1, 3	3, 13, 10	10, 1, 3	4, 10, 1	10, 1, 3	9, 6, 1	10, 1, 3
LNA	7, 12, 12	1, 11, 8	6, 7, 13	2, 10, 9	8, 5, 11	5, 8, 7	10, 1, 3	3, 13, 10	10, 1, 3	4, 9, 1	10, 1, 3	9, 6, 1	10, 1, 3
LW	9, 12, 11	1, 7, 8	6, 5, 12	2, 9, 7	7, 6, 10	5, 10, 6	11, 1, 3	4, 13, 13	11, 1, 3	3, 11, 9	10, 4, 2	8, 8, 1	11, 1, 3
LWA	9, 12, 11	1, 7, 8	6, 5, 12	2, 10, 7	7, 6, 10	5, 9, 6	11, 1, 3	4, 13, 13	11, 1, 3	3, 11, 9	10, 4, 2	8, 8, 1	11, 1, 3
HW	8, 10, 12	1, 12, 9	6, 8, 13	2, 9, 8	7, 5, 10	3, 7, 6	12, 1, 4	4, 13, 11	11, 3, 3	5, 11, 7	10, 4, 2	9, 6, 1	12, 1, 4
HWA	7, 10, 12	1, 12, 9	5, 7, 13	2, 9, 8	8, 5, 10	3, 8, 6	11, 1, 3	4, 13, 11	11, 1, 3	6, 11, 7	10, 4, 2	9, 6, 1	11, 1, 3

3, 2, 2, 1, 3	E1	E1M	E.8	E.8M	E.5	E.5M	Q1	Q1M	Q.8	Q.8M	Q.5	Q.5M	OA
LN	2, 12, 11	4, 13, 13	1, 8, 10	3, 9, 12	5, 11, 8	6, 10, 9	8, 1, 2	12, 4, 6	8, 1, 2	12, 4, 6	7, 7, 1	11, 6, 5	8, 1, 2
LNA	2, 12, 11	4, 13, 13	1, 10, 10	3, 11, 12	5, 8, 8	6, 9, 9	8, 1, 2	12, 4, 5	8, 1, 2	12, 4, 5	7, 7, 1	11, 6, 7	8, 1, 2
LW	3, 13, 9	5, 12, 12	1, 10, 11	2, 8, 13	4, 11, 8	6, 9, 10	8, 1, 2	12, 4, 6	8, 1, 2	12, 4, 6	7, 7, 1	11, 6, 5	8, 1, 2
LWA	3, 13, 9	6, 12, 12	1, 10, 11	2, 8, 13	4, 11, 8	5, 9, 10	8, 1, 2	12, 4, 6	8, 1, 2	12, 4, 6	7, 7, 1	11, 6, 5	8, 1, 2
HW	3, 12, 10	4, 13, 12	1, 11, 11	2, 10, 13	5, 9, 8	6, 8, 9	12, 2, 5	11, 5, 7	8, 3, 3	7, 6, 6	10, 4, 1	9, 7, 2	13, 1, 4
HWA	3, 13, 10	4, 12, 12	1, 11, 11	2, 10, 13	5, 9, 8	6, 8, 9	12, 1, 3	11, 5, 7	10, 3, 2	8, 6, 6	9, 4, 1	7, 7, 5	12, 1, 3

3, 2, 2, 2, 1	E1	E1M	E.8	E.8M	E.5	E.5M	Q1	Q1M	Q.8	Q.8M	Q.5	Q.5M	OA
LN	2, 2, 11	1, 6, 12	5, 4, 9	4, 7, 10	11, 9, 7	10, 8, 8	7, 3, 5	6, 5, 6	9, 12, 1	8, 13, 1	13, 11, 1	12, 10, 1	3, 1, 13
LNA	1, 1, 11	2, 6, 12	4, 4, 9	5, 7, 10	10, 8, 7	11, 9, 8	7, 3, 5	6, 5, 6	9, 13, 1	8, 12, 1	13, 11, 1	12, 10, 1	3, 2, 13
LW	3, 3, 11	2, 2, 12	5, 5, 9	4, 4, 10	9, 7, 7	8, 6, 8	7, 8, 5	6, 9, 6	11, 12, 3	10, 13, 4	13, 10, 1	12, 11, 1	1, 1, 13
LWA	2, 3, 11	3, 2, 12	4, 5, 9	5, 4, 10	8, 9, 5	9, 7, 8	7, 6, 6	6, 8, 7	11, 12, 3	10, 13, 4	13, 11, 1	12, 10, 1	1, 1, 13
HW	2, 2, 11	1, 3, 12	4, 4, 9	3, 5, 10	9, 11, 7	8, 10, 8	7, 8, 5	6, 9, 6	11, 12, 4	10, 13, 3	13, 6, 2	12, 7, 1	5, 1, 13
HWA	1, 2, 11	2, 3, 12	3, 4, 9	4, 5, 10	8, 10, 7	9, 11, 8	7, 8, 5	6, 9, 6	11, 12, 3	10, 13, 4	13, 7, 2	12, 6, 1	5, 1, 13

3, 2, 2, 2, 2	E1	E1M	E.8	E.8M	E.5	E.5M	Q1	Q1M	Q.8	Q.8M	Q.5	Q.5M	OA
LN	7, 12, 12	1, 11, 9	6, 7, 13	2, 9, 8	8, 5, 11	5, 8, 7	10, 1, 3	3, 13, 10	10, 1, 3	4, 10, 1	10, 1, 3	9, 6, 1	10, 1, 3
LNA	7, 12, 12	1, 11, 8	6, 7, 13	2, 10, 9	8, 5, 11	5, 8, 7	10, 1, 3	3, 13, 10	10, 1, 3	4, 9, 1	10, 1, 3	9, 6, 1	10, 1, 3
LW	9, 12, 11	1, 7, 8	6, 5, 12	2, 9, 7	7, 6, 10	5, 10, 6	11, 1, 3	4, 13, 13	11, 1, 3	3, 11, 9	10, 4, 2	8, 8, 1	11, 1, 3
LWA	9, 12, 11	1, 7, 8	6, 5, 12	2, 10, 7	7, 6, 10	5, 9, 6	11, 1, 3	4, 13, 13	11, 1, 3	3, 11, 9	10, 4, 2	8, 8, 1	11, 1, 3
HW	8, 10, 12	1, 12, 9	6, 8, 13	2, 9, 8	7, 5, 10	3, 7, 6	12, 1, 4	4, 13, 11	11, 3, 3	5, 11, 7	10, 4, 2	9, 6, 1	12, 1, 4
HWA	7, 10, 12	1, 12, 9	5, 7, 13	2, 9, 8	8, 5, 10	3, 8, 6	11, 1, 3	4, 13, 11	11, 1, 3	6, 11, 7	10, 4, 2	9, 6, 1	11, 1, 3

3, 2, 2, 2, 3	E1	E1M	E.8	E.8M	E.5	E.5M	Q1	Q1M	Q.8	Q.8M	Q.5	Q.5M	OA
LN	2, 12, 11	4, 13, 13	1, 8, 10	3, 9, 12	5, 11, 8	6, 10, 9	8, 1, 2	12, 4, 6	8, 1, 2	12, 4, 6	7, 7, 1	11, 6, 5	8, 1, 2
LNA	2, 12, 11	4, 13, 13	1, 10, 10	3, 11, 12	5, 8, 8	6, 9, 9	8, 1, 2	12, 4, 5	8, 1, 2	12, 4, 5	7, 7, 1	11, 6, 7	8, 1, 2
LW	3, 13, 9	5, 12, 12	1, 10, 11	2, 8, 13	4, 11, 8	6, 9, 10	8, 1, 2	12, 4, 6	8, 1, 2	12, 4, 6	7, 7, 1	11, 6, 5	8, 1, 2
LWA	3, 13, 9	6, 12, 12	1, 10, 11	2, 8, 13	4, 11, 8	5, 9, 10	8, 1, 2	12, 4, 6	8, 1, 2	12, 4, 6	7, 7, 1	11, 6, 5	8, 1, 2
HW	3, 12, 10	4, 13, 12	1, 11, 11	2, 10, 13	5, 9, 8	6, 8, 9	12, 2, 5	11, 5, 7	8, 3, 3	7, 6, 6	10, 4, 1	9, 7, 2	13, 1, 4
HWA	3, 13, 10	4, 12, 12	1, 11, 11	2, 10, 13	5, 9, 8	6, 8, 9	12, 1, 3	11, 5, 7	10, 3, 2	8, 6, 6	9, 4, 1	7, 7, 5	12, 1, 3

3, 3, 1, 1, 1	E1	E1M	E.8	E.8M	E.5	E.5M	Q1	Q1M	Q.8	Q.8M	Q.5	Q.5M	OA
LN	2, 2, 11, v	1, 3, 12, v	5, 4, 9	4, 7, 10	11, 9, 7	10, 8, 8	7, 5, 5, v	6, 6, 6, v	9, 12, 1	8, 13, 1	13, 11, 1	12, 10, 1	3, 1, 13, v
LNA	1, 1, 11, v	2, 3, 12, v	4, 4, 9	5, 7, 10	10, 10, 5	11, 11, 7	7, 5, 6, v	6, 6, 8, v	9, 13, 1	8, 12, 1	13, 9, 1	12, 8, 1	3, 2, 13, v
LW	3, 3, 11, v	2, 2, 12, v	5, 5, 9, v	4, 4, 10, v	9, 9, 5	8, 8, 6	7, 6, 7, v	6, 7, 8, v	11, 12, 3, v	10, 13, 4, v	13, 10, 1	12, 11, 1	1, 1, 13, v
LWA	2, 3, 11, v	3, 2, 12, v	4, 5, 9, v	5, 4, 10, v	8, 9, 5	9, 8, 6	7, 6, 7, v	6, 7, 8, v	11, 12, 3, v	10, 13, 4, v	13, 11, 1	12, 10, 1	1, 1, 13, v
HW	2, 2, 11, v	1, 3, 12, v	5, 4, 9, v	4, 5, 10, v	9, 11, 7	8, 10, 8	7, 8, 5, v	6, 9, 6, v	11, 12, 4, v	10, 13, 3, v	13, 6, 2, v	12, 7, 1, v	3, 1, 13, v
HWA	1, 2, 11, v	2, 3, 12, v	3, 4, 9, v	5, 5, 10, v	8, 10, 5	9, 11, 7	7, 8, 6, v	6, 9, 8, v	11, 12, 3, v	10, 13, 4, v	13, 7, 2, v	12, 6, 1, v	4, 1, 13, v

3, 3, 1, 1, 2	E1	E1M	E.8	E.8M	E.5	E.5M	Q1	Q1M	Q.8	Q.8M	Q.5	Q.5M	OA
LN	9, 5, 6, v	1, 10, 8	8, 12, 11, v	2, 9, 10	7, 6, 12	4, 8, 7	10, 1, 2, v	5, 13, 13, v	10, 1, 2, v	3, 11, 9, v	10, 1, 2, v	6, 7, 1	10, 1, 2, v
LNA	9, 5, 6, v	1, 10, 8	8, 12, 11, v	2, 9, 10	7, 6, 12	4, 8, 7	10, 1, 2, v	5, 13, 13, v	10, 1, 2, v	3, 11, 9, v	10, 1, 2, v	6, 7, 1	10, 1, 2, v
LW	9, 10, 9, v	1, 9, 8, v	8, 12, 10, v	2, 7, 7	7, 5, 12, v	3, 8, 6	10, 1, 2, v	5, 13, 13, v	10, 1, 2, v	4, 11, 11, v	10, 1, 2, v	6, 6, 1	10, 1, 2, v
LWA	9, 10, 9, v	2, 9, 8, v	8, 12, 10, v	1, 7, 7	7, 5, 12, v	3, 8, 6	10, 1, 2, v	5, 13, 13, v	10, 1, 2, v	4, 11, 11, v	10, 1, 2, v	6, 6, 1	10, 1, 2, v
HW	9, 8, 8, v	1, 12, 10, v	8, 9, 11, v	2, 10, 7	6, 5, 12, v	3, 7, 6	10, 1, 1, v	7, 13, 13, v	10, 1, 1, v	4, 11, 9, v	10, 1, 1, v	5, 6, 5, v	10, 1, 1, v
HWA	9, 8, 9, v	1, 12, 8, v	8, 10, 11, v	2, 9, 7	6, 5, 12, v	3, 7, 6	10, 1, 1, v	5, 13, 13, v	10, 1, 1, v	4, 11, 10, v	10, 1, 1, v	7, 6, 5, v	10, 1, 1, v

3, 3, 1, 1, 3	E1	E1M	E.8	E.8M	E.5	E.5M	Q1	Q1M	Q.8	Q.8M	Q.5	Q.5M	OA
LN	5, 1, 5, v	10, 9, 9, v	1, 13, 12, v	4, 12, 13, v	2, 11, 10	3, 10, 11, v	6, 2, 1, v	11, 6, 6, v	6, 2, 1, v	11, 6, 6, v	6, 2, 1, v	11, 6, 6, v	6, 2, 1, v
LNA	5, 1, 1, v	10, 6, 9, v	1, 13, 12, v	4, 12, 13, v	2, 11, 10	3, 10, 11, v	6, 2, 2, v	11, 7, 6, v	6, 2, 2, v	11, 7, 6, v	6, 2, 2, v	11, 7, 6, v	6, 2, 2, v
LW	5, 13, 8, v	6, 10, 9, v	3, 12, 11, v	4, 11, 12, v	1, 9, 10	2, 8, 13, v	7, 1, 1, v	11, 5, 5, v	7, 1, 1, v	11, 5, 5, v	7, 1, 1, v	11, 5, 5, v	7, 1, 1, v
LWA	5, 13, 8, v	6, 10, 11, v	3, 12, 9, v	4, 11, 12, v	1, 9, 10	2, 8, 13, v	7, 1, 1, v	11, 5, 5, v	7, 1, 1, v	11, 5, 5, v	7, 1, 1, v	11, 5, 5, v	7, 1, 1, v
HW	5, 13, 8, v	6, 10, 9, v	4, 12, 11, v	2, 11, 13, v	1, 9, 10	3, 8, 12, v	11, 1, 2, v	10, 5, 7, v	11, 1, 2, v	8, 6, 6, v	9, 4, 1, v	7, 7, 5, v	11, 1, 2, v
HWA	5, 13, 8, v	6, 10, 10, v	3, 12, 11, v	4, 11, 12, v	1, 9, 9	2, 8, 13, v	11, 1, 2, v	9, 5, 7, v	11, 1, 2, v	8, 6, 6, v	10, 4, 1, v	7, 7, 5, v	11, 1, 2, v

3, 3, 2, 1, 1	E1	E1M	E.8	E.8M	E.5	E.5M	Q1	Q1M	Q.8	Q.8M	Q.5	Q.5M	OA
LN	2, 2, 11, v	1, 3, 12, v	5, 4, 9	4, 7, 10	11, 9, 7	10, 8, 8	7, 5, 5, v	6, 6, 6, v	9, 12, 1	8, 13, 1	13, 11, 1	12, 10, 1	3, 1, 13, v
LNA	1, 1, 11, v	2, 3, 12, v	4, 4, 9	5, 7, 10	10, 10, 5	11, 11, 7	7, 5, 6, v	6, 6, 8, v	9, 13, 1	8, 12, 1	13, 9, 1	12, 8, 1	3, 2, 13, v
LW	3, 3, 11, v	2, 2, 12, v	5, 5, 9, v	4, 4, 10, v	9, 9, 5	8, 8, 6	7, 6, 7, v	6, 7, 8, v	11, 12, 3, v	10, 13, 4, v	13, 10, 1	12, 11, 1	1, 1, 13, v
LWA	2, 3, 11, v	3, 2, 12, v	4, 5, 9, v	5, 4, 10, v	8, 9, 5	9, 8, 6	7, 6, 7, v	6, 7, 8, v	11, 12, 3, v	10, 13, 4, v	13, 11, 1	12, 10, 1	1, 1, 13, v
HW	2, 2, 11, v	1, 3, 12, v	5, 4, 9, v	4, 5, 10, v	9, 11, 7	8, 10, 8	7, 8, 5, v	6, 9, 6, v	11, 12, 4, v	10, 13, 3, v	13, 6, 2, v	12, 7, 1, v	3, 1, 13, v
HWA	1, 2, 11, v	2, 3, 12, v	3, 4, 9, v	5, 5, 10, v	8, 10, 5	9, 11, 7	7, 8, 6, v	6, 9, 8, v	11, 12, 3, v	10, 13, 4, v	13, 7, 2, v	12, 6, 1, v	4, 1, 13, v

3, 3, 2, 1, 2	E1	E1M	E.8	E.8M	E.5	E.5M	Q1	Q1M	Q.8	Q.8M	Q.5	Q.5M	OA
LN	9, 5, 6, v	1, 10, 8	8, 12, 11, v	2, 9, 10	7, 6, 12	4, 8, 7	10, 1, 2, v	5, 13, 13, v	10, 1, 2, v	3, 11, 9, v	10, 1, 2, v	6, 7, 1	10, 1, 2, v
LNA	9, 5, 6, v	1, 10, 8	8, 12, 11, v	2, 9, 10	7, 6, 12	4, 8, 7	10, 1, 2, v	5, 13, 13, v	10, 1, 2, v	3, 11, 9, v	10, 1, 2, v	6, 7, 1	10, 1, 2, v
LW	9, 10, 9, v	1, 9, 8, v	8, 12, 10, v	2, 7, 7	7, 5, 12, v	3, 8, 6	10, 1, 2, v	5, 13, 13, v	10, 1, 2, v	4, 11, 11, v	10, 1, 2, v	6, 6, 1	10, 1, 2, v
LWA	9, 10, 9, v	2, 9, 8, v	8, 12, 10, v	1, 7, 7	7, 5, 12, v	3, 8, 6	10, 1, 2, v	5, 13, 13, v	10, 1, 2, v	4, 11, 11, v	10, 1, 2, v	6, 6, 1	10, 1, 2, v
HW	9, 8, 8, v	1, 12, 10, v	8, 9, 11, v	2, 10, 7	6, 5, 12, v	3, 7, 6	10, 1, 1, v	7, 13, 13, v	10, 1, 1, v	4, 11, 9, v	10, 1, 1, v	5, 6, 5, v	10, 1, 1, v
HWA	9, 8, 9, v	1, 12, 8, v	8, 10, 11, v	2, 9, 7	6, 5, 12, v	3, 7, 6	10, 1, 1, v	5, 13, 13, v	10, 1, 1, v	4, 11, 10, v	10, 1, 1, v	7, 6, 5, v	10, 1, 1, v

3, 3, 2, 1, 3	E1	E1M	E.8	E.8M	E.5	E.5M	Q1	Q1M	Q.8	Q.8M	Q.5	Q.5M	OA
LN	5, 1, 5, v	10, 9, 9, v	1, 13, 12, v	4, 12, 13, v	2, 11, 10	3, 10, 11, v	6, 2, 1, v	11, 6, 6, v	6, 2, 1, v	11, 6, 6, v	6, 2, 1, v	11, 6, 6, v	6, 2, 1, v
LNA	5, 1, 1, v	10, 6, 9, v	1, 13, 12, v	4, 12, 13, v	2, 11, 10	3, 10, 11, v	6, 2, 2, v	11, 7, 6, v	6, 2, 2, v	11, 7, 6, v	6, 2, 2, v	11, 7, 6, v	6, 2, 2, v
LW	5, 13, 8, v	6, 10, 9, v	3, 12, 11, v	4, 11, 12, v	1, 9, 10	2, 8, 13, v	7, 1, 1, v	11, 5, 5, v	7, 1, 1, v	11, 5, 5, v	7, 1, 1, v	11, 5, 5, v	7, 1, 1, v
LWA	5, 13, 8, v	6, 10, 11, v	3, 12, 9, v	4, 11, 12, v	1, 9, 10	2, 8, 13, v	7, 1, 1, v	11, 5, 5, v	7, 1, 1, v	11, 5, 5, v	7, 1, 1, v	11, 5, 5, v	7, 1, 1, v
HW	5, 13, 8, v	6, 10, 9, v	4, 12, 11, v	2, 11, 13, v	1, 9, 10	3, 8, 12, v	11, 1, 2, v	10, 5, 7, v	11, 1, 2, v	8, 6, 6, v	9, 4, 1, v	7, 7, 5, v	11, 1, 2, v
HWA	5, 13, 8, v	6, 10, 10, v	3, 12, 11, v	4, 11, 12, v	1, 9, 9	2, 8, 13, v	11, 1, 2, v	9, 5, 7, v	11, 1, 2, v	8, 6, 6, v	10, 4, 1, v	7, 7, 5, v	11, 1, 2, v