FINAL REPORT: SOLAR FORECASTING DATA CHARACTERIZATION

Contract No. AGJ-1-11854-01 Alliance for Sustainable Energy

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Objective

NREL is assisting the U.S. Department of Energy in preparing an interconnection-wide transmission plan for the Western US. NREL and other participants have identified solar forecasting and various other methods to lower the cost of integrating variable generation, as critical issues.

It is therefore important to characterize the accuracy of solar irradiance forecasts, hence the objective of this project: to characterize the accuracy of current state-of-the-art regional numerical weather prediction-based models as a function of predicted insolation conditions.

Approach

This study builds upon a recently completed project also commissioned by NREL [1, 2]. The objective of this project was to intercompare the performance of numerical weather prediction models in the US using standardized performance benchmarks including the overall Root Mean Square Error (RMSE), Mean Bias Error (MBE), Mean Absolute Error, (MAE) and Kolmogorov-Smirnov Integral statistics (KSI). Seven models were intercompared, including:

1. The Global Environmental Multiscale (GEM) model from Environment Canada in its regional deterministic configuration [3],
2. An application of the European Center for Medium Range Weather Forecasts (ECMWF) model ,
3. A research version of the Weather Research Forecast (WRF) model used as part of an operational air quality forecasting program,
4. A commercial version of the WRF model,
5. A proprietary mesoscale model, the MASS model,
6. The Advanced Multiscale Regional Prediction System (ARPS) model
7. A model based on cloud cover predictions from the US National Forecast Data Base (NDFD) [4].

For this project we selected two of the above models: the GEM model[1] and the NDFD model[1] to further evaluate their operational performance as a function of predicted insolation conditions in selected western US sites, where quality reference data are available. The reference sites are part of NOAA's SURFRAD network [5]. They include:

- Boulder, Colorado
- Desert Rock, Nevada
- Sioux Falls, South Dakota
- Fort Peck, Montana

The first task of this project was to prepare time series of predicted and reference hourly irradiances for one calendar year. Predicted irradiances include same day and next day forecasts originating at 0:00 GMT. Time series for each test location, forecast model, and time horizon were delivered to the NREL team on 10/24.

The second task focuses on model error characterization. For each model, time horizon, and location we looked at the frequency distribution of GHI model vs. reference bias as a function (1) of predicted clear sky index[2] and (2) of predicted GHI.

Table 1 shows an example of error distribution as a function of predicted clear-sky index for the same-day GEM model in Desert Rock, Nevada. Complete results for all sites and models are presented in the appendix. The result tables are also provided in a spreadsheet accompanying this report (*result summary export.xlsx*).

[1] The GEM model [3] was selected because it performed best overall against all the other models. The NDFD model [4] was also selected because of its availability and level of performance is likely representative of the GFS-based models made available to NREL in the Western integration study

[2] The clear sky index is a measure of clearness quantified as the ratio between GHI and GHI_{clear}

TABLE 1

BIAS DISTRIBUTION AS A FUNCTION PREDICTED CLEAR SKY INDEX (GEM MODEL – DESERT ROCK)

BIAS	All cases	Kt* from 0.95 to 1	Kt* from 0.90 to 0.95	Kt* from 0.8 to 0.9	Kt* from 0.7 to 0.8	Kt* from 0.6 to 0.7	Kt* from 0.5 to 0.6	Kt* from 0.4 to 0.5	Kt* from 0.3 to 0.4	Kt* from 0.2 to 0.3	Kt* from 0.1 to 0.2	Kt* from 0.0 to 0.1
Less than -600	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from -600 to -550	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from -550 to -500	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%
from -500 to -450	0%	0%	0%	0%	0%	0%	1%	0%	2%	0%	0%	0%
from -450 to -400	0%	0%	0%	0%	0%	1%	2%	0%	0%	0%	0%	0%
from -400 to -350	0%	0%	0%	0%	0%	0%	0%	1%	0%	4%	0%	0%
from -350 to -300	0%	0%	0%	0%	0%	2%	4%	1%	0%	0%	0%	0%
from -300 to -250	1%	0%	0%	0%	2%	4%	3%	5%	2%	0%	0%	0%
from -250 to -200	1%	0%	0%	0%	3%	3%	4%	9%	0%	4%	0%	0%
from -200 to -150	1%	0%	0%	2%	3%	7%	5%	4%	0%	4%	8%	0%
from -150 to -100	2%	0%	1%	3%	4%	5%	7%	6%	2%	4%	8%	0%
from -100 to -50	5%	2%	5%	9%	10%	7%	6%	7%	9%	0%	0%	0%
from -50 to 0	42%	56%	46%	33%	23%	13%	17%	17%	11%	15%	46%	0%
from 0 to 50	32%	35%	33%	30%	22%	23%	32%	17%	40%	26%	31%	0%
from 50 to 100	7%	3%	5%	9%	14%	16%	10%	10%	22%	37%	8%	0%
from 100 to 150	3%	1%	4%	5%	6%	9%	2%	18%	4%	7%	0%	0%
from 150 to 200	2%	1%	2%	4%	4%	5%	5%	2%	7%	0%	0%	0%
from 200 to 250	1%	1%	2%	2%	2%	2%	1%	2%	0%	0%	0%	0%
from 250 to 300	1%	0%	1%	1%	3%	2%	2%	0%	0%	0%	0%	0%
from 300 to 350	0%	0%	0%	1%	1%	1%	0%	0%	0%	0%	0%	0%
from 350 to 400	0%	0%	1%	1%	1%	1%	0%	0%	0%	0%	0%	0%
from 400 to 450	0%	0%	0%	1%	1%	1%	0%	0%	0%	0%	0%	0%
from 450 to 500	0%	0%	1%	0%	1%	0%	0%	0%	0%	0%	0%	0%
from 500 to 550	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from 550 to 600	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
More than 650	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%
Number of occurences	**4,261**	**1,672**	**986**	**782**	**344**	**182**	**127**	**82**	**45**	**27**	**13**	**-**

The overall trend of the site/model/metric-specific results presented tables 1-32 are graphically summarized in figs. 1 to 4

Figure 1 plots the all-site mean distribution of errors for the GEM model for three predicted conditions: clear, intermediate and overcast (respectively kt*>0.95, 0.7>kt*>0.6. and 0.3>kt*>0.2). The figure also includes the distribution curve across all cases.

Figure 2 is analogous to figure 1 for the NDFD model.

Figures 3 and 4 compare the prediction error distributions for same-day and next-day forecasts for the GEM and NDFD models, respectively.

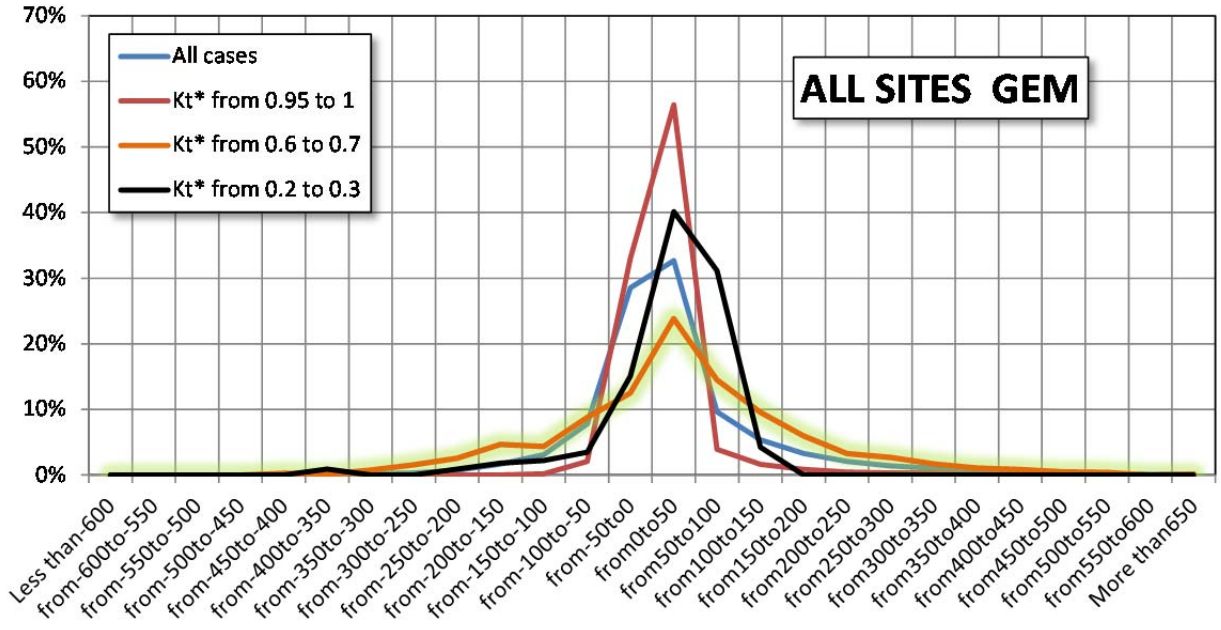
ALL SITES GEM
All cases
Kt* from 0.95 to 1
Kt* from 0.6 to 0.7
Kt* from 0.2 to 0.3
70%
60%
50%
40%
30%
20%
10%
0%
Less than-600
from-600to-550
from-550to-500
from-500to-450
from-450to-400
from-400to-350
from-350to-300
from-300to-250
from-250to-200
from-200to-150
from-150to-100
from-100to-50
from-50to0
from0to50
from50to100
from100to150
from150to200
from200to250
from250to300
from300to350
from350to400
from400to450
from450to500
from500to550
from550to600
More than650

Figure 1

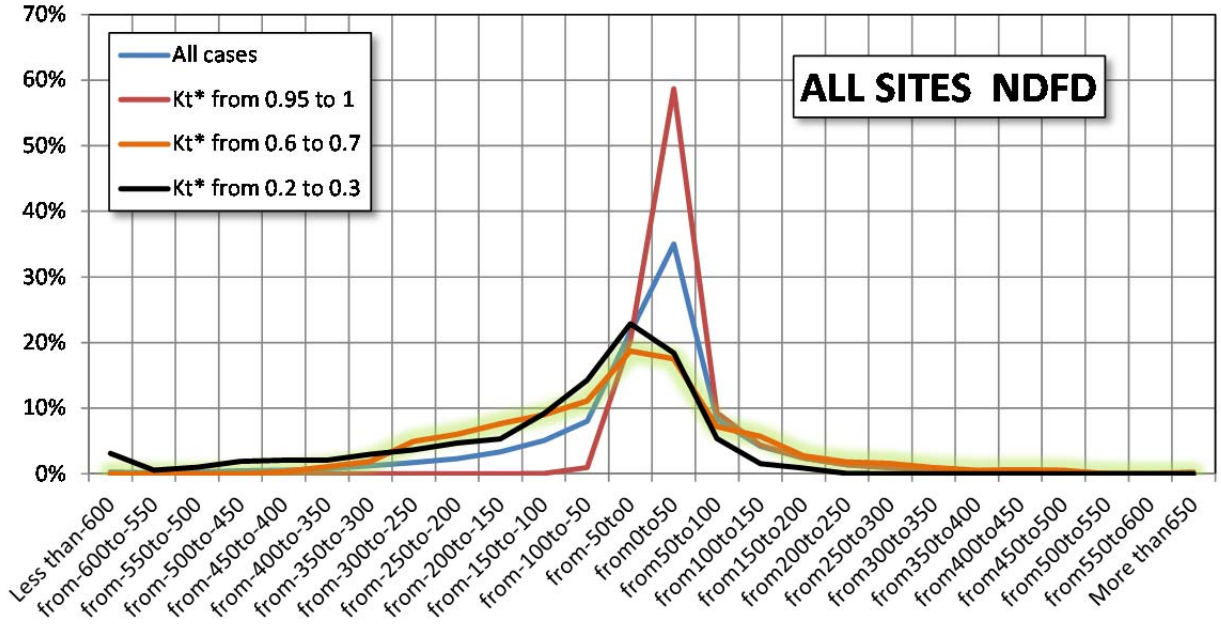
ALL SITES NDFD
All cases
Kt* from 0.95 to 1
Kt* from 0.6 to 0.7
Kt* from 0.2 to 0.3
70%
60%
50%
40%
30%
20%
10%
0%
Less than-600
from-600to-550
from-550to-500
from-500to-450
from-450to-400
from-400to-350
from-350to-300
from-300to-250
from-250to-200
from-200to-150
from-150to-100
from-100to-50
from-50to0
from0to50
from50to100
from100to150
from150to200
from200to250
from250to300
from300to350
from350to400
from400to450
from450to500
from500to550
from550to600
More than650

Figure 2

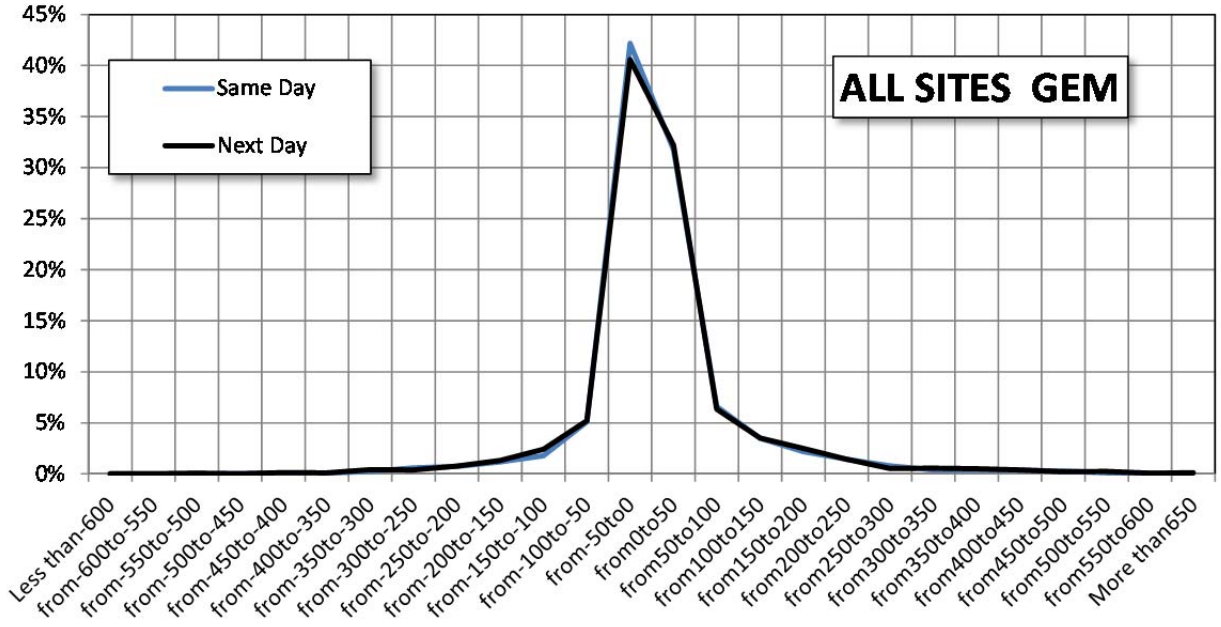

Figure 3

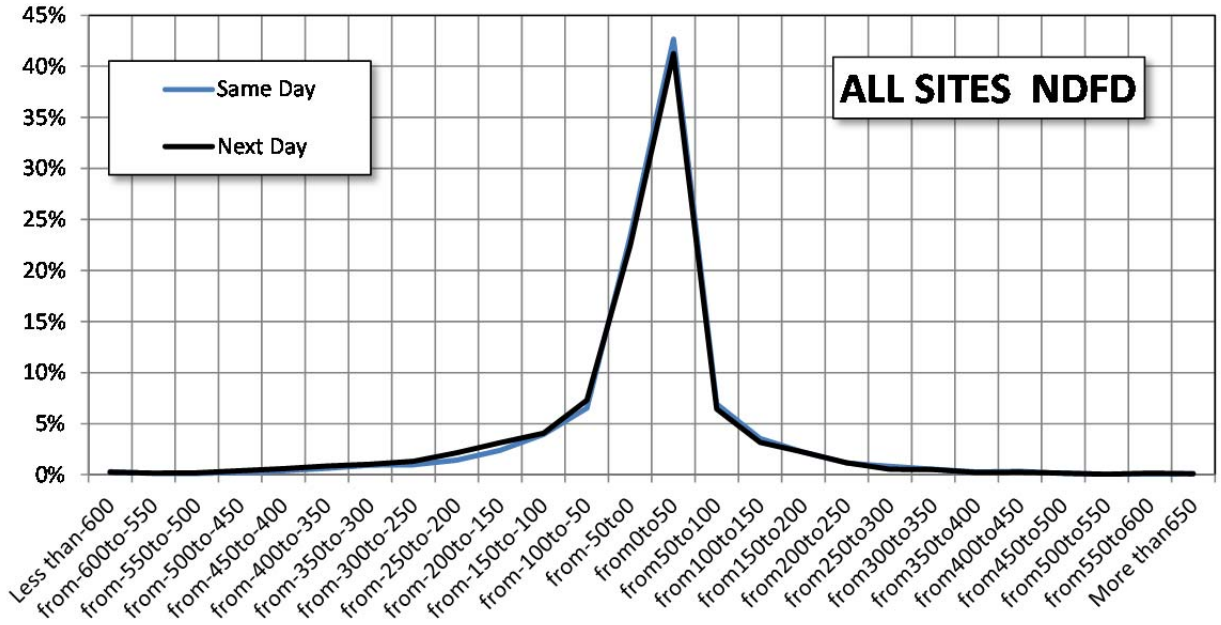

Figure 4

The trends are consistent with the results of [2] identifying the GEM as the best model: bias errors are distributed more evenly than the NDFD model for all conditions. The NDFD model trends are skewed to the negative for predicted intermediate and overcast conditions and are slightly skewed toward a positive bias for predicted clear conditions (i.e., a stronger propensity to systematically miss some of the forecasts). The GEM does not exhibit this skewness although the distribution tails are comparable to the NDFD's, particularly on the positive bias side.

Figures 3 and 4 indicate a small degradation in performance from same-day to next-day forecast for both models. This degradation is representative of a 24 hour difference in the prediction originating time. This quantitative indicator may be used to gauge the additional performance gain that could occur when using an evolving prediction originating reference time, e.g., the one, two or three hours ahead NWP forecasts used in the integration study. The results show that such gain would be small if applying the NWP model without using real time external information (i.e., corresponding to the integration study's forecasts).

Reference

1. NREL Subcontract No. AGJ04029001
2. Perez, R., M. Beauharnois, K. Hemker Jr., S. Kivalov, E. Lorenz, S. Pelland, J. Schlemmer, G. Van Knowe, (2011): Evaluation of Numerical Weather Prediction Solar Irradiance Forecasts in the US. Proc. Solar 2011, American Solar Energy Society's annual conference
3. Mailhot J, Bélair S, Lefaivre L, Bilodeau B, Desgagné M, Girard C, Glazer A, Leduc AM, Méthot A, Patoine A, Plante A, Rahill A, Robinson T, Talbot D, Tremblay A, Vaillancourt PA and Zadra A, 2006. The 15-km version of the Canadian regional forecast system. Atmosphere-Ocean, 44, 133-149
4. Perez R., S. Kivalov, J. Schlemmer, K. Hemker Jr., D. Renné and T. Hoff (2010): Validation of Short and Medium Term Operational Solar Radiation Forecasts in the US. Solar Energy 84, 12, 2161-2172
5. SURFRAD (2010): Surface Radiation Network, NOAA http://www.srrb.noaa.gov/surfrad/

APPENDIX BIAS ERROR DISTRIBUTION TABLES

TABLE 1 DESERT ROCK GEM, SAME DAY FORECAST, AS A FUNCTION OF PREDICTED KT*

BIAS	All cases	Kt* from 0.95 to 1	Kt* from 0.90 to 0.95	Kt* from 0.8 to 0.9	Kt* from 0.7 to 0.8	Kt* from 0.6 to 0.7	Kt* from 0.5 to 0.6	Kt* from 0.4 to 0.5	Kt* from 0.3 to 0.4	Kt* from 0.2 to 0.3	Kt* from 0.1 to 0.2	Kt* from 0.0 to 0.1
Less than -600	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from -600 to -550	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from -550 to -500	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%
from -500 to -450	0%	0%	0%	0%	0%	0%	1%	0%	2%	0%	0%	0%
from -450 to -400	0%	0%	0%	0%	0%	1%	2%	0%	0%	0%	0%	0%
from -400 to -350	0%	0%	0%	0%	0%	0%	0%	1%	0%	4%	0%	0%
from -350 to -300	0%	0%	0%	0%	0%	2%	4%	1%	0%	0%	0%	0%
from -300 to -250	1%	0%	0%	0%	2%	4%	3%	5%	2%	0%	0%	0%
from -250 to -200	1%	0%	0%	0%	3%	3%	4%	9%	0%	4%	0%	0%
from -200 to -150	1%	0%	0%	2%	3%	7%	5%	4%	0%	4%	8%	0%
from -150 to -100	2%	0%	1%	3%	4%	5%	7%	6%	2%	4%	8%	0%
from -100 to -50	5%	2%	5%	9%	10%	7%	6%	7%	9%	0%	0%	0%
from -50 to 0	42%	56%	46%	33%	23%	13%	17%	17%	11%	15%	46%	0%
from 0 to 50	32%	35%	33%	30%	22%	23%	32%	17%	40%	26%	31%	0%
from 50 to 100	7%	3%	5%	9%	14%	16%	10%	10%	22%	37%	8%	0%
from 100 to 150	3%	1%	4%	5%	6%	9%	2%	18%	4%	7%	0%	0%
from 150 to 200	2%	1%	2%	4%	4%	5%	5%	2%	7%	0%	0%	0%
from 200 to 250	1%	1%	2%	2%	2%	2%	1%	2%	0%	0%	0%	0%
from 250 to 300	1%	0%	1%	1%	3%	2%	2%	0%	0%	0%	0%	0%
from 300 to 350	0%	0%	0%	1%	1%	1%	0%	0%	0%	0%	0%	0%
from 350 to 400	0%	0%	1%	1%	1%	1%	0%	0%	0%	0%	0%	0%
from 400 to 450	0%	0%	0%	1%	1%	1%	0%	0%	0%	0%	0%	0%
from 450 to 500	0%	0%	1%	0%	1%	0%	0%	0%	0%	0%	0%	0%
from 500 to 550	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from 550 to 600	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
More than 650	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%
Number of occurences	**4,261**	**1,672**	**986**	**782**	**344**	**182**	**127**	**82**	**45**	**27**	**13**	**-**

TABLE 2 DESERT ROCK GEM, NEXT DAY FORECAST, AS A FUNCTION OF PREDICTED KT*

BIAS	All cases	Kt* from 0.95 to 1	Kt* from 0.90 to 0.95	Kt* from 0.8 to 0.9	Kt* from 0.7 to 0.8	Kt* from 0.6 to 0.7	Kt* from 0.5 to 0.6	Kt* from 0.4 to 0.5	Kt* from 0.3 to 0.4	Kt* from 0.2 to 0.3	Kt* from 0.1 to 0.2	Kt* from 0.0 to 0.1
Less than -600	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from -600 to -550	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from -550 to -500	0%	0%	0%	0%	0%	0%	0%	3%	0%	0%	0%	0%
from -500 to -450	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%
from -450 to -400	0%	0%	0%	0%	0%	1%	0%	1%	4%	0%	0%	0%
from -400 to -350	0%	0%	0%	0%	0%	1%	0%	2%	0%	0%	0%	0%
from -350 to -300	0%	0%	0%	0%	2%	2%	3%	5%	4%	0%	0%	0%
from -300 to -250	0%	0%	0%	0%	2%	4%	1%	1%	2%	0%	8%	0%
from -250 to -200	1%	0%	0%	0%	3%	4%	9%	3%	4%	0%	8%	0%
from -200 to -150	1%	0%	0%	2%	4%	5%	9%	3%	8%	5%	8%	0%
from -150 to -100	2%	0%	1%	3%	9%	9%	5%	12%	2%	0%	0%	0%
from -100 to -50	5%	3%	6%	6%	9%	7%	10%	6%	10%	5%	0%	0%
from -50 to 0	41%	50%	49%	35%	16%	13%	19%	19%	12%	14%	17%	0%
from 0 to 50	32%	38%	28%	29%	26%	21%	23%	23%	24%	52%	50%	0%
from 50 to 100	6%	3%	6%	8%	12%	13%	9%	3%	16%	19%	8%	0%
from 100 to 150	4%	1%	3%	6%	7%	7%	3%	8%	12%	5%	0%	0%
from 150 to 200	2%	1%	2%	4%	3%	5%	7%	4%	4%	0%	0%	0%
from 200 to 250	1%	1%	2%	2%	3%	3%	1%	2%	0%	0%	0%	0%
from 250 to 300	1%	1%	0%	0%	1%	1%	0%	2%	0%	0%	0%	0%
from 300 to 350	1%	0%	1%	1%	1%	0%	1%	0%	0%	0%	0%	0%
from 350 to 400	0%	0%	0%	1%	1%	1%	0%	1%	0%	0%	0%	0%
from 400 to 450	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%
from 450 to 500	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%
from 500 to 550	0%	0%	0%	0%	1%	1%	0%	0%	0%	0%	0%	0%
from 550 to 600	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
More than 650	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Number of occurences	**4,261**	**1,772**	**880**	**818**	**314**	**187**	**91**	**93**	**51**	**42**	**12**	**-**

TABLE 3 DESERT ROCK GEM, SAME DAY FORECAST, AS A FUNCTION OF PREDICTED GHI

BIAS	All cases	GHI > 950	GHI from 850 to 950	GHI from 750 to 850	GHI from 650 to 750	GHI from 550 to 650	GHI from 450 to 550	GHI from 350 to 450	GHI from 250 to 350	GHI from 150 to 250	GHI from 50 to 150	GHI < 50
Less than -600	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from -600 to -550	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from -550 to -500	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from -500 to -450	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from -450 to -400	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%
from -400 to -350	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from -350 to -300	0%	0%	0%	0%	1%	1%	0%	0%	0%	0%	0%	0%
from -300 to -250	1%	0%	0%	0%	1%	1%	1%	0%	1%	0%	0%	0%
from -250 to -200	1%	0%	0%	1%	1%	1%	1%	1%	1%	0%	0%	0%
from -200 to -150	1%	0%	1%	1%	2%	2%	2%	2%	1%	1%	0%	0%
from -150 to -100	2%	1%	3%	2%	2%	2%	2%	3%	2%	1%	1%	0%
from -100 to -50	5%	6%	6%	9%	6%	8%	6%	6%	5%	3%	1%	0%
from -50 to 0	42%	80%	67%	61%	55%	51%	46%	39%	32%	29%	15%	6%
from 0 to 50	32%	5%	6%	10%	16%	14%	25%	26%	35%	42%	70%	94%
from 50 to 100	7%	2%	2%	4%	3%	5%	6%	8%	10%	13%	11%	0%
from 100 to 150	3%	0%	2%	4%	3%	4%	4%	5%	6%	6%	1%	0%
from 150 to 200	2%	1%	2%	2%	2%	4%	2%	4%	3%	3%	0%	0%
from 200 to 250	1%	0%	4%	1%	4%	3%	1%	2%	2%	0%	0%	0%
from 250 to 300	1%	1%	1%	1%	1%	1%	1%	2%	1%	0%	0%	0%
from 300 to 350	0%	0%	1%	1%	1%	2%	0%	0%	0%	0%	0%	0%
from 350 to 400	0%	1%	1%	1%	1%	1%	1%	0%	0%	0%	0%	0%
from 400 to 450	0%	0%	1%	1%	1%	0%	1%	0%	0%	0%	0%	0%
from 450 to 500	0%	1%	1%	1%	1%	0%	0%	0%	0%	0%	0%	0%
from 500 to 550	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from 550 to 600	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
More than 650	0%	1%	1%	0%	1%	0%	0%	0%	0%	0%	0%	0%
Number of occurences	**4,261**	**259**	**326**	**356**	**376**	**396**	**483**	**423**	**423**	**425**	**588**	**206**

TABLE 4 DESERT ROCK GEM, NEXT DAY FORECAST, AS A FUNCTION OF PREDICTED GHI

BIAS	All cases	GHI > 950	GHI from 850 to 950	GHI from 750 to 850	GHI from 650 to 750	GHI from 550 to 650	GHI from 450 to 550	GHI from 350 to 450	GHI from 250 to 350	GHI from 150 to 250	GHI from 50 to 150	GHI < 50
Less than -600	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from -600 to -550	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from -550 to -500	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from -500 to -450	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from -450 to -400	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%
from -400 to -350	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from -350 to -300	0%	0%	0%	0%	2%	1%	0%	1%	1%	0%	0%	0%
from -300 to -250	0%	0%	0%	1%	1%	1%	1%	0%	0%	0%	0%	0%
from -250 to -200	1%	0%	0%	1%	1%	1%	2%	1%	2%	0%	0%	0%
from -200 to -150	1%	0%	1%	2%	2%	2%	1%	1%	3%	2%	0%	1%
from -150 to -100	2%	2%	3%	2%	2%	3%	3%	5%	3%	2%	1%	0%
from -100 to -50	5%	8%	8%	10%	7%	7%	4%	6%	4%	4%	1%	0%
from -50 to 0	41%	74%	65%	61%	59%	51%	43%	34%	31%	25%	15%	3%
from 0 to 50	32%	4%	9%	8%	13%	14%	28%	29%	36%	42%	71%	96%
from 50 to 100	6%	3%	3%	4%	4%	5%	6%	7%	8%	13%	10%	0%
from 100 to 150	4%	1%	2%	3%	3%	3%	3%	5%	6%	7%	2%	0%
from 150 to 200	2%	1%	2%	2%	2%	5%	3%	4%	3%	3%	0%	0%
from 200 to 250	1%	0%	3%	1%	1%	4%	1%	3%	2%	0%	0%	0%
from 250 to 300	1%	1%	1%	1%	1%	1%	1%	1%	0%	0%	0%	0%
from 300 to 350	1%	0%	1%	1%	1%	1%	0%	1%	0%	0%	0%	0%
from 350 to 400	0%	1%	0%	1%	1%	1%	1%	0%	0%	0%	0%	0%
from 400 to 450	0%	2%	1%	0%	1%	0%	1%	0%	0%	0%	0%	0%
from 450 to 500	0%	1%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%
from 500 to 550	0%	0%	0%	1%	1%	0%	0%	0%	0%	0%	0%	0%
from 550 to 600	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
More than 650	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Number of occurences	**4,261**	**254**	**319**	**373**	**364**	**400**	**481**	**423**	**436**	**428**	**597**	**186**

TABLE 5 DESERT ROCK NDFD, SAME DAY FORECAST, AS A FUNCTION OF PREDICTED KT*

BIAS	All cases	Kt* from 0.95 to 1	Kt* from 0.90 to 0.95	Kt* from 0.8 to 0.9	Kt* from 0.7 to 0.8	Kt* from 0.6 to 0.7	Kt* from 0.5 to 0.6	Kt* from 0.4 to 0.5	Kt* from 0.3 to 0.4	Kt* from 0.2 to 0.3	Kt* from 0.1 to 0.2	Kt* from 0.0 to 0.1
Less than -600	0%	0%	0%	0%	0%	0%	1%	1%	2%	8%	0%	0%
from -600 to -550	0%	0%	0%	0%	0%	0%	0%	3%	2%	1%	0%	0%
from -550 to -500	0%	0%	0%	0%	0%	0%	0%	1%	2%	2%	0%	0%
from -500 to -450	0%	0%	0%	0%	0%	0%	1%	4%	1%	3%	0%	0%
from -450 to -400	0%	0%	0%	0%	1%	0%	7%	1%	2%	3%	0%	0%
from -400 to -350	1%	0%	0%	0%	0%	4%	2%	5%	5%	3%	2%	0%
from -350 to -300	1%	0%	0%	0%	3%	3%	3%	3%	9%	5%	0%	0%
from -300 to -250	1%	0%	0%	0%	2%	5%	7%	8%	5%	2%	0%	0%
from -250 to -200	1%	0%	0%	1%	5%	6%	5%	4%	8%	5%	4%	0%
from -200 to -150	2%	0%	0%	6%	8%	7%	8%	8%	7%	6%	2%	0%
from -150 to -100	4%	0%	1%	12%	12%	10%	6%	5%	7%	10%	7%	0%
from -100 to -50	7%	1%	15%	16%	11%	13%	11%	7%	10%	11%	2%	0%
from -50 to 0	23%	25%	29%	19%	16%	18%	20%	22%	18%	19%	30%	0%
from 0 to 50	43%	62%	26%	18%	18%	14%	14%	7%	11%	16%	49%	0%
from 50 to 100	7%	6%	10%	9%	9%	7%	7%	7%	8%	3%	5%	0%
from 100 to 150	4%	2%	6%	6%	5%	6%	3%	7%	3%	2%	0%	0%
from 150 to 200	2%	1%	5%	3%	4%	1%	3%	5%	0%	1%	0%	0%
from 200 to 250	1%	1%	2%	3%	2%	1%	1%	0%	1%	0%	0%	0%
from 250 to 300	1%	0%	2%	2%	1%	2%	1%	0%	0%	0%	0%	0%
from 300 to 350	1%	0%	1%	1%	2%	1%	0%	0%	0%	0%	0%	0%
from 350 to 400	0%	0%	1%	1%	1%	0%	0%	0%	0%	0%	0%	0%
from 400 to 450	0%	0%	1%	1%	0%	1%	0%	0%	0%	0%	0%	0%
from 450 to 500	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from 500 to 550	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from 550 to 600	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
More than 650	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Number of occurences	**4,234**	**2,332**	**366**	**523**	**315**	**219**	**100**	**73**	**131**	**118**	**57**	**-**

TABLE 6 DESERT ROCK NDFD, NEXT DAY FORECAST, AS A FUNCTION OF PREDICTED KT*

BIAS	All cases	Kt* from 0.95 to 1	Kt* from 0.90 to 0.95	Kt* from 0.8 to 0.9	Kt* from 0.7 to 0.8	Kt* from 0.6 to 0.7	Kt* from 0.5 to 0.6	Kt* from 0.4 to 0.5	Kt* from 0.3 to 0.4	Kt* from 0.2 to 0.3	Kt* from 0.1 to 0.2	Kt* from 0.0 to 0.1
Less than -600	0%	0%	0%	0%	0%	0%	0%	0%	2%	3%	0%	0%
from -600 to -550	0%	0%	0%	0%	0%	0%	1%	1%	1%	2%	0%	0%
from -550 to -500	0%	0%	0%	0%	0%	0%	0%	1%	2%	1%	0%	0%
from -500 to -450	0%	0%	0%	0%	0%	0%	0%	3%	3%	4%	0%	0%
from -450 to -400	1%	0%	0%	0%	0%	1%	3%	6%	4%	5%	0%	0%
from -400 to -350	1%	0%	0%	0%	0%	4%	7%	7%	6%	3%	0%	0%
from -350 to -300	1%	0%	0%	0%	1%	6%	4%	4%	5%	3%	2%	0%
from -300 to -250	1%	0%	0%	0%	4%	7%	7%	6%	5%	4%	0%	0%
from -250 to -200	2%	0%	0%	2%	7%	7%	5%	7%	6%	10%	2%	0%
from -200 to -150	3%	0%	0%	7%	10%	9%	9%	10%	7%	7%	2%	0%
from -150 to -100	4%	0%	1%	12%	11%	9%	15%	14%	7%	9%	7%	0%
from -100 to -50	7%	2%	13%	18%	12%	10%	10%	9%	8%	12%	9%	0%
from -50 to 0	22%	26%	25%	17%	20%	16%	15%	14%	16%	17%	23%	0%
from 0 to 50	41%	61%	34%	17%	19%	15%	13%	14%	11%	12%	50%	0%
from 50 to 100	6%	5%	9%	8%	7%	8%	7%	3%	9%	3%	5%	0%
from 100 to 150	3%	2%	5%	7%	3%	2%	0%	0%	2%	2%	0%	0%
from 150 to 200	2%	1%	6%	4%	3%	1%	2%	2%	2%	1%	0%	0%
from 200 to 250	1%	1%	3%	3%	2%	1%	0%	0%	0%	0%	0%	0%
from 250 to 300	1%	0%	1%	1%	0%	1%	1%	1%	0%	0%	0%	0%
from 300 to 350	0%	0%	1%	2%	1%	0%	0%	0%	0%	0%	0%	0%
from 350 to 400	0%	0%	0%	1%	0%	1%	1%	1%	0%	0%	0%	0%
from 400 to 450	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from 450 to 500	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from 500 to 550	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from 550 to 600	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
More than 650	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Number of occurences	**4,234**	**2,172**	**416**	**509**	**300**	**358**	**92**	**145**	**247**	**121**	**56**	**-**

TABLE 7 DESERT ROCK NDFD, SAME DAY FORECAST, AS A FUNCTION OF PREDICTED GHI

BIAS	All cases	GHI > 950	GHI from 850 to 950	GHI from 750 to 850	GHI from 650 to 750	GHI from 550 to 650	GHI from 450 to 550	GHI from 350 to 450	GHI from 250 to 350	GHI from 150 to 250	GHI from 50 to 150	GHI < 50
Less than -600	0%	0%	0%	0%	0%	0%	0%	0%	1%	1%	0%	0%
from -600 to -550	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from -550 to -500	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%
from -500 to -450	0%	0%	0%	0%	0%	0%	0%	0%	1%	1%	0%	0%
from -450 to -400	0%	0%	0%	0%	0%	1%	0%	1%	0%	1%	0%	0%
from -400 to -350	1%	0%	0%	0%	0%	2%	0%	0%	2%	1%	1%	0%
from -350 to -300	1%	0%	0%	0%	3%	1%	0%	0%	2%	2%	1%	0%
from -300 to -250	1%	0%	0%	0%	2%	2%	1%	2%	1%	2%	0%	0%
from -250 to -200	1%	0%	1%	2%	2%	2%	2%	1%	2%	2%	2%	0%
from -200 to -150	2%	0%	4%	3%	4%	4%	1%	2%	3%	3%	2%	0%
from -150 to -100	4%	0%	8%	5%	4%	6%	5%	4%	4%	3%	3%	0%
from -100 to -50	7%	14%	9%	10%	7%	6%	9%	5%	6%	5%	4%	2%
from -50 to 0	23%	71%	53%	40%	27%	17%	13%	14%	12%	9%	14%	33%
from 0 to 50	43%	11%	14%	24%	34%	43%	47%	52%	44%	48%	63%	65%
from 50 to 100	7%	2%	2%	3%	4%	5%	8%	8%	11%	14%	10%	0%
from 100 to 150	4%	2%	1%	4%	5%	4%	4%	5%	6%	6%	0%	0%
from 150 to 200	2%	1%	3%	2%	2%	3%	4%	3%	4%	2%	0%	0%
from 200 to 250	1%	0%	3%	1%	1%	1%	2%	3%	2%	0%	0%	0%
from 250 to 300	1%	0%	1%	3%	1%	1%	2%	1%	0%	0%	0%	0%
from 300 to 350	1%	1%	0%	1%	0%	1%	2%	0%	0%	0%	0%	0%
from 350 to 400	0%	0%	1%	0%	1%	0%	0%	0%	0%	0%	0%	0%
from 400 to 450	0%	1%	2%	0%	1%	1%	0%	0%	0%	0%	0%	0%
from 450 to 500	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%
from 500 to 550	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from 550 to 600	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
More than 650	0%	1%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%
Number of occurences	**4,234**	**200**	**313**	**331**	**406**	**447**	**441**	**425**	**420**	**482**	**536**	**233**

TABLE 8 DESERT ROCK NDFD, NEXT DAY FORECAST, AS A FUNCTION OF PREDICTED GHI

BIAS	All cases	GHI > 950	GHI from 850 to 950	GHI from 750 to 850	GHI from 650 to 750	GHI from 550 to 650	GHI from 450 to 550	GHI from 350 to 450	GHI from 250 to 350	GHI from 150 to 250	GHI from 50 to 150	GHI < 50
Less than -600	0%	0%	0%	0%	0%	0%	0%	0%	2%	0%	0%	0%
from -600 to -550	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%
from -550 to -500	0%	0%	0%	0%	0%	0%	0%	0%	1%	1%	0%	0%
from -500 to -450	0%	0%	0%	0%	0%	0%	0%	0%	1%	2%	0%	0%
from -450 to -400	1%	0%	0%	0%	0%	1%	0%	1%	1%	2%	0%	0%
from -400 to -350	1%	0%	0%	0%	1%	1%	0%	1%	1%	2%	1%	0%
from -350 to -300	1%	0%	0%	1%	2%	2%	1%	1%	1%	2%	1%	0%
from -300 to -250	1%	0%	0%	1%	2%	2%	2%	1%	1%	2%	1%	0%
from -250 to -200	2%	0%	2%	4%	3%	3%	1%	3%	1%	3%	2%	0%
from -200 to -150	3%	1%	3%	7%	5%	2%	3%	4%	5%	2%	2%	0%
from -150 to -100	4%	1%	4%	6%	4%	6%	4%	4%	5%	3%	4%	0%
from -100 to -50	7%	15%	11%	10%	10%	7%	8%	8%	6%	5%	4%	3%
from -50 to 0	22%	67%	50%	37%	25%	19%	14%	11%	12%	10%	15%	35%
from 0 to 50	41%	10%	16%	23%	34%	40%	43%	50%	42%	47%	60%	62%
from 50 to 100	6%	2%	2%	2%	3%	5%	9%	6%	8%	13%	10%	0%
from 100 to 150	3%	1%	1%	4%	5%	4%	3%	3%	6%	5%	0%	0%
from 150 to 200	2%	1%	3%	2%	1%	3%	5%	4%	4%	2%	0%	0%
from 200 to 250	1%	0%	3%	1%	1%	2%	2%	2%	2%	0%	0%	0%
from 250 to 300	1%	0%	0%	1%	1%	1%	1%	0%	1%	0%	0%	0%
from 300 to 350	0%	1%	1%	1%	1%	1%	1%	0%	0%	0%	0%	0%
from 350 to 400	0%	0%	1%	0%	1%	0%	0%	0%	0%	0%	0%	0%
from 400 to 450	0%	0%	2%	1%	0%	0%	0%	0%	0%	0%	0%	0%
from 450 to 500	0%	1%	0%	1%	1%	0%	0%	0%	0%	0%	0%	0%
from 500 to 550	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from 550 to 600	0%	2%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%
More than 650	0%	0%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%
Number of occurences	**4,234**	**193**	**298**	**326**	**373**	**448**	**425**	**446**	**427**	**515**	**544**	**239**

TABLE 9 BOULDER GEM, SAME DAY FORECAST, AS A FUNCTION OF PREDICTED KT*

BIAS	All cases	Kt* from 0.95 to 1	Kt* from 0.90 to 0.95	Kt* from 0.8 to 0.9	Kt* from 0.7 to 0.8	Kt* from 0.6 to 0.7	Kt* from 0.5 to 0.6	Kt* from 0.4 to 0.5	Kt* from 0.3 to 0.4	Kt* from 0.2 to 0.3	Kt* from 0.1 to 0.2	Kt* from 0.0 to 0.1
Less than -600	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from -600 to -550	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%
from -550 to -500	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%
from -500 to -450	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%
from -450 to -400	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%
from -400 to -350	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%
from -350 to -300	0%	0%	0%	0%	0%	1%	1%	1%	0%	0%	0%	0%
from -300 to -250	0%	0%	0%	0%	1%	1%	0%	1%	0%	0%	0%	0%
from -250 to -200	1%	0%	0%	0%	2%	4%	2%	2%	0%	0%	0%	0%
from -200 to -150	2%	0%	0%	1%	6%	4%	4%	3%	2%	0%	0%	0%
from -150 to -100	4%	1%	2%	8%	6%	4%	4%	3%	5%	0%	0%	0%
from -100 to -50	9%	3%	11%	12%	9%	10%	7%	8%	7%	0%	0%	0%
from -50 to 0	27%	34%	43%	30%	17%	12%	12%	16%	5%	18%	0%	0%
from 0 to 50	26%	52%	20%	17%	18%	19%	17%	22%	24%	55%	0%	0%
from 50 to 100	9%	4%	7%	9%	11%	14%	16%	11%	24%	27%	0%	0%
from 100 to 150	6%	2%	4%	5%	8%	11%	10%	14%	11%	0%	0%	0%
from 150 to 200	4%	1%	2%	4%	7%	7%	8%	8%	13%	0%	0%	0%
from 200 to 250	3%	0%	3%	3%	4%	3%	5%	5%	4%	0%	0%	0%
from 250 to 300	2%	1%	2%	2%	3%	3%	4%	2%	5%	0%	0%	0%
from 300 to 350	2%	1%	1%	2%	3%	2%	3%	3%	0%	0%	0%	0%
from 350 to 400	1%	0%	1%	1%	2%	1%	3%	1%	0%	0%	0%	0%
from 400 to 450	1%	0%	1%	1%	2%	1%	0%	0%	0%	0%	0%	0%
from 450 to 500	0%	0%	0%	1%	1%	1%	0%	0%	0%	0%	0%	0%
from 500 to 550	1%	0%	0%	1%	1%	1%	0%	0%	0%	0%	0%	0%
from 550 to 600	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
More than 650	0%	0%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%
Number of occurences	**4,110**	**883**	**675**	**892**	**662**	**493**	**279**	**160**	**55**	**11**	**-**	**-**

TABLE 10 BOULDER GEM, NEXT DAY FORECAST, AS A FUNCTION OF PREDICTED KT*

BIAS	All cases	Kt* from 0.95 to 1	Kt* from 0.90 to 0.95	Kt* from 0.8 to 0.9	Kt* from 0.7 to 0.8	Kt* from 0.6 to 0.7	Kt* from 0.5 to 0.6	Kt* from 0.4 to 0.5	Kt* from 0.3 to 0.4	Kt* from 0.2 to 0.3	Kt* from 0.1 to 0.2	Kt* from 0.0 to 0.1
Less than -600	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from -600 to -550	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from -550 to -500	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from -500 to -450	0%	0%	0%	0%	0%	0%	1%	1%	0%	0%	0%	0%
from -450 to -400	0%	0%	0%	0%	0%	0%	1%	1%	0%	0%	0%	0%
from -400 to -350	0%	0%	0%	0%	0%	1%	1%	0%	0%	0%	0%	0%
from -350 to -300	0%	0%	0%	0%	0%	1%	1%	2%	0%	0%	0%	0%
from -300 to -250	1%	0%	0%	0%	1%	2%	3%	3%	0%	0%	0%	0%
from -250 to -200	1%	0%	0%	0%	4%	3%	4%	2%	0%	0%	0%	0%
from -200 to -150	3%	0%	0%	2%	6%	5%	3%	4%	0%	0%	0%	0%
from -150 to -100	5%	1%	3%	8%	7%	6%	3%	5%	4%	0%	0%	0%
from -100 to -50	10%	4%	15%	15%	11%	8%	6%	10%	9%	6%	0%	0%
from -50 to 0	25%	34%	41%	29%	18%	10%	17%	14%	4%	11%	0%	0%
from 0 to 50	25%	54%	20%	16%	17%	20%	16%	18%	30%	56%	0%	0%
from 50 to 100	9%	3%	7%	8%	11%	15%	12%	13%	21%	11%	0%	0%
from 100 to 150	6%	1%	3%	5%	8%	10%	11%	12%	14%	11%	0%	0%
from 150 to 200	4%	1%	2%	5%	5%	6%	5%	4%	13%	0%	0%	0%
from 200 to 250	3%	1%	2%	4%	2%	5%	4%	9%	4%	6%	0%	0%
from 250 to 300	2%	0%	2%	2%	3%	3%	5%	2%	2%	0%	0%	0%
from 300 to 350	1%	1%	1%	1%	3%	2%	2%	1%	0%	0%	0%	0%
from 350 to 400	1%	0%	1%	2%	1%	1%	3%	2%	0%	0%	0%	0%
from 400 to 450	1%	0%	1%	1%	1%	1%	1%	0%	0%	0%	0%	0%
from 450 to 500	1%	0%	0%	1%	1%	1%	1%	0%	0%	0%	0%	0%
from 500 to 550	0%	0%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%
from 550 to 600	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
More than 650	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%
Number of occurences	**4,110**	**792**	**576**	**911**	**697**	**579**	**299**	**182**	**56**	**18**	**-**	**-**

TABLE 11 BOULDER GEM, SAME DAY FORECAST, AS A FUNCTION OF PREDICTED GHI

BIAS	All cases	GHI > 950	GHI from 850 to 950	GHI from 750 to 850	GHI from 650 to 750	GHI from 550 to 650	GHI from 450 to 550	GHI from 350 to 450	GHI from 250 to 350	GHI from 150 to 250	GHI from 50 to 150	GHI < 50
Less than -600	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from -600 to -550	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from -550 to -500	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from -500 to -450	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%
from -450 to -400	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from -400 to -350	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%
from -350 to -300	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%
from -300 to -250	0%	0%	0%	0%	1%	0%	1%	1%	0%	0%	0%	0%
from -250 to -200	1%	0%	0%	1%	2%	3%	2%	2%	1%	0%	0%	0%
from -200 to -150	2%	0%	2%	1%	3%	4%	4%	3%	2%	1%	0%	0%
from -150 to -100	4%	1%	6%	7%	7%	6%	4%	6%	4%	2%	0%	0%
from -100 to -50	9%	8%	19%	13%	12%	10%	9%	11%	10%	8%	2%	0%
from -50 to 0	27%	49%	31%	33%	27%	29%	34%	27%	26%	29%	21%	3%
from 0 to 50	26%	23%	13%	11%	9%	10%	12%	14%	18%	22%	56%	97%
from 50 to 100	9%	6%	4%	6%	6%	4%	7%	7%	11%	16%	19%	0%
from 100 to 150	6%	1%	3%	4%	6%	7%	5%	7%	11%	14%	2%	0%
from 150 to 200	4%	5%	1%	5%	5%	3%	4%	8%	9%	5%	0%	0%
from 200 to 250	3%	0%	3%	4%	1%	5%	4%	6%	5%	1%	0%	0%
from 250 to 300	2%	2%	4%	2%	3%	4%	4%	5%	2%	0%	0%	0%
from 300 to 350	2%	3%	3%	5%	3%	3%	4%	3%	1%	0%	0%	0%
from 350 to 400	1%	0%	1%	1%	3%	4%	3%	1%	0%	0%	0%	0%
from 400 to 450	1%	0%	2%	1%	5%	3%	1%	0%	0%	0%	0%	0%
from 450 to 500	0%	0%	0%	1%	2%	2%	0%	0%	0%	0%	0%	0%
from 500 to 550	1%	0%	2%	2%	3%	2%	0%	0%	0%	0%	0%	0%
from 550 to 600	0%	1%	0%	1%	1%	0%	0%	0%	0%	0%	0%	0%
More than 650	0%	0%	2%	3%	1%	0%	0%	0%	0%	0%	0%	0%
Number of occurences	**4,110**	**87**	**208**	**282**	**286**	**368**	**477**	**518**	**563**	**455**	**595**	**271**

TABLE 12 BOULDER GEM, NEXT DAY FORECAST, AS A FUNCTION OF PREDICTED GHI

BIAS	All cases	GHI > 950	GHI from 850 to 950	GHI from 750 to 850	GHI from 650 to 750	GHI from 550 to 650	GHI from 450 to 550	GHI from 350 to 450	GHI from 250 to 350	GHI from 150 to 250	GHI from 50 to 150	GHI < 50
Less than -600	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from -600 to -550	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from -550 to -500	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from -500 to -450	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from -450 to -400	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%
from -400 to -350	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%
from -350 to -300	0%	0%	0%	0%	0%	1%	0%	1%	0%	0%	0%	0%
from -300 to -250	1%	0%	0%	0%	1%	3%	1%	1%	2%	0%	0%	0%
from -250 to -200	1%	0%	1%	3%	3%	3%	2%	3%	1%	0%	0%	0%
from -200 to -150	3%	0%	2%	6%	6%	6%	3%	2%	3%	1%	0%	0%
from -150 to -100	5%	0%	11%	7%	7%	9%	6%	5%	5%	3%	0%	0%
from -100 to -50	10%	15%	21%	14%	11%	15%	12%	15%	10%	8%	1%	0%
from -50 to 0	25%	53%	27%	30%	28%	22%	29%	25%	24%	31%	23%	4%
from 0 to 50	25%	22%	9%	11%	9%	9%	11%	13%	18%	21%	55%	96%
from 50 to 100	9%	5%	3%	4%	5%	6%	8%	6%	10%	17%	17%	0%
from 100 to 150	6%	2%	5%	2%	7%	4%	4%	7%	11%	13%	3%	0%
from 150 to 200	4%	4%	3%	4%	4%	4%	5%	7%	7%	3%	0%	0%
from 200 to 250	3%	0%	3%	3%	4%	4%	4%	5%	7%	1%	0%	0%
from 250 to 300	2%	0%	3%	2%	3%	3%	5%	4%	1%	0%	0%	0%
from 300 to 350	1%	0%	3%	3%	2%	3%	3%	3%	0%	0%	0%	0%
from 350 to 400	1%	0%	2%	2%	2%	5%	2%	1%	0%	0%	0%	0%
from 400 to 450	1%	0%	2%	1%	2%	2%	2%	0%	0%	0%	0%	0%
from 450 to 500	1%	0%	3%	2%	2%	1%	0%	0%	0%	0%	0%	0%
from 500 to 550	0%	0%	2%	1%	2%	1%	0%	0%	0%	0%	0%	0%
from 550 to 600	0%	0%	0%	2%	1%	0%	0%	0%	0%	0%	0%	0%
More than 650	0%	0%	3%	2%	1%	0%	0%	0%	0%	0%	0%	0%
Number of occurences	**4,110**	**55**	**190**	**261**	**303**	**374**	**475**	**534**	**567**	**477**	**602**	**272**

TABLE 13 BOULDER NDFD, SAME DAY FORECAST, AS A FUNCTION OF PREDICTED KT*

BIAS	All cases	Kt* from 0.95 to 1	Kt* from 0.90 to 0.95	Kt* from 0.8 to 0.9	Kt* from 0.7 to 0.8	Kt* from 0.6 to 0.7	Kt* from 0.5 to 0.6	Kt* from 0.4 to 0.5	Kt* from 0.3 to 0.4	Kt* from 0.2 to 0.3	Kt* from 0.1 to 0.2	Kt* from 0.0 to 0.1
Less than -600	1%	0%	0%	0%	0%	0%	0%	0%	3%	3%	0%	0%
from -600 to -550	0%	0%	0%	0%	0%	0%	0%	1%	1%	0%	0%	0%
from -550 to -500	1%	0%	0%	0%	0%	0%	0%	3%	3%	1%	0%	0%
from -500 to -450	1%	0%	0%	0%	0%	0%	3%	4%	3%	1%	1%	0%
from -450 to -400	1%	0%	0%	0%	0%	1%	3%	5%	2%	1%	1%	0%
from -400 to -350	1%	0%	0%	0%	0%	1%	5%	5%	2%	2%	2%	0%
from -350 to -300	2%	0%	0%	0%	0%	4%	7%	4%	4%	3%	4%	0%
from -300 to -250	3%	0%	0%	0%	2%	7%	7%	6%	6%	6%	7%	0%
from -250 to -200	3%	0%	0%	1%	7%	3%	6%	4%	4%	5%	7%	0%
from -200 to -150	4%	0%	0%	3%	8%	8%	7%	9%	5%	7%	6%	0%
from -150 to -100	6%	0%	3%	14%	10%	9%	5%	6%	9%	9%	8%	0%
from -100 to -50	9%	1%	16%	17%	10%	10%	7%	7%	11%	14%	14%	0%
from -50 to 0	22%	25%	29%	25%	17%	17%	19%	13%	21%	21%	23%	0%
from 0 to 50	28%	55%	26%	17%	17%	17%	12%	16%	12%	17%	22%	0%
from 50 to 100	7%	7%	7%	7%	10%	7%	7%	5%	7%	7%	4%	0%
from 100 to 150	4%	4%	5%	3%	7%	5%	5%	3%	4%	1%	1%	0%
from 150 to 200	2%	2%	2%	5%	3%	2%	2%	3%	2%	1%	0%	0%
from 200 to 250	2%	2%	2%	4%	3%	2%	2%	2%	1%	0%	0%	0%
from 250 to 300	1%	1%	4%	2%	2%	2%	1%	1%	0%	0%	0%	0%
from 300 to 350	1%	1%	1%	1%	2%	1%	0%	1%	0%	0%	0%	0%
from 350 to 400	1%	1%	1%	0%	1%	1%	1%	0%	0%	0%	0%	0%
from 400 to 450	0%	0%	2%	1%	0%	1%	1%	0%	0%	0%	0%	0%
from 450 to 500	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%
from 500 to 550	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from 550 to 600	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
More than 650	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Number of occurences	**4,045**	**1,178**	**268**	**351**	**325**	**344**	**311**	**290**	**397**	**355**	**225**	**-**

TABLE 14 BOULDER NDFD, NEXT DAY FORECAST, AS A FUNCTION OF PREDICTED KT*

BIAS	All cases	Kt* from 0.95 to 1	Kt* from 0.90 to 0.95	Kt* from 0.8 to 0.9	Kt* from 0.7 to 0.8	Kt* from 0.6 to 0.7	Kt* from 0.5 to 0.6	Kt* from 0.4 to 0.5	Kt* from 0.3 to 0.4	Kt* from 0.2 to 0.3	Kt* from 0.1 to 0.2	Kt* from 0.0 to 0.1
Less than -600	1%	0%	0%	0%	0%	0%	0%	0%	5%	4%	1%	0%
from -600 to -550	0%	0%	0%	0%	0%	0%	0%	2%	1%	0%	1%	0%
from -550 to -500	1%	0%	0%	0%	0%	0%	0%	4%	2%	1%	1%	0%
from -500 to -450	1%	0%	0%	0%	0%	0%	3%	4%	1%	0%	0%	0%
from -450 to -400	1%	0%	0%	0%	0%	0%	4%	3%	2%	2%	1%	0%
from -400 to -350	1%	0%	0%	0%	0%	2%	4%	4%	2%	1%	3%	0%
from -350 to -300	2%	0%	0%	0%	0%	5%	6%	4%	5%	2%	7%	0%
from -300 to -250	3%	0%	0%	0%	2%	5%	5%	6%	5%	4%	9%	0%
from -250 to -200	4%	0%	0%	1%	8%	7%	7%	7%	5%	6%	7%	0%
from -200 to -150	4%	0%	0%	3%	8%	6%	7%	6%	6%	8%	10%	0%
from -150 to -100	6%	0%	4%	11%	11%	8%	5%	6%	9%	5%	7%	0%
from -100 to -50	9%	1%	13%	18%	10%	11%	7%	11%	12%	12%	17%	0%
from -50 to 0	21%	26%	29%	23%	18%	17%	13%	16%	18%	20%	18%	0%
from 0 to 50	27%	55%	34%	19%	15%	14%	14%	12%	11%	17%	18%	0%
from 50 to 100	7%	6%	6%	6%	9%	9%	9%	7%	8%	12%	2%	0%
from 100 to 150	4%	4%	4%	6%	7%	6%	5%	2%	4%	3%	0%	0%
from 150 to 200	3%	1%	1%	5%	5%	4%	4%	3%	2%	3%	0%	0%
from 200 to 250	2%	1%	3%	3%	2%	3%	2%	1%	1%	0%	0%	0%
from 250 to 300	1%	1%	1%	1%	3%	3%	2%	0%	0%	0%	0%	0%
from 300 to 350	1%	1%	2%	2%	1%	2%	1%	0%	1%	0%	0%	0%
from 350 to 400	1%	1%	1%	1%	1%	1%	1%	0%	0%	0%	0%	0%
from 400 to 450	0%	1%	1%	2%	0%	0%	1%	0%	0%	0%	0%	0%
from 450 to 500	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from 500 to 550	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from 550 to 600	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
More than 650	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%
Number of occurences	**4,044**	**1,087**	**234**	**393**	**443**	**317**	**384**	**255**	**487**	**277**	**167**	**-**

TABLE 15 BOULDER NDFD, SAME DAY FORECAST, AS A FUNCTION OF PREDICTED GHI

BIAS	All cases	GHI > 950	GHI from 850 to 950	GHI from 750 to 850	GHI from 650 to 750	GHI from 550 to 650	GHI from 450 to 550	GHI from 350 to 450	GHI from 250 to 350	GHI from 150 to 250	GHI from 50 to 150	GHI < 50
Less than -600	1%	0%	0%	0%	0%	0%	0%	1%	3%	1%	0%	0%
from -600 to -550	0%	0%	0%	0%	0%	0%	0%	1%	1%	0%	0%	0%
from -550 to -500	1%	0%	0%	0%	0%	0%	1%	2%	1%	1%	0%	0%
from -500 to -450	1%	0%	0%	0%	0%	0%	3%	2%	1%	1%	0%	0%
from -450 to -400	1%	0%	0%	0%	0%	2%	2%	2%	2%	1%	1%	0%
from -400 to -350	1%	0%	0%	0%	0%	2%	2%	2%	2%	2%	1%	0%
from -350 to -300	2%	0%	0%	0%	3%	3%	4%	2%	2%	3%	2%	0%
from -300 to -250	3%	0%	0%	1%	2%	4%	3%	3%	5%	6%	3%	0%
from -250 to -200	3%	0%	1%	3%	3%	3%	2%	4%	3%	4%	3%	0%
from -200 to -150	4%	0%	4%	2%	6%	5%	3%	7%	6%	5%	4%	0%
from -150 to -100	6%	2%	3%	9%	6%	7%	6%	3%	8%	6%	8%	0%
from -100 to -50	9%	2%	12%	13%	10%	8%	6%	9%	6%	10%	11%	6%
from -50 to 0	22%	57%	43%	32%	22%	20%	19%	16%	10%	14%	21%	49%
from 0 to 50	28%	14%	13%	16%	24%	26%	26%	23%	23%	29%	36%	45%
from 50 to 100	7%	10%	3%	5%	5%	5%	5%	5%	11%	10%	10%	0%
from 100 to 150	4%	2%	3%	5%	5%	3%	4%	5%	7%	7%	1%	0%
from 150 to 200	2%	0%	3%	1%	3%	3%	2%	5%	5%	2%	0%	0%
from 200 to 250	2%	0%	5%	5%	2%	2%	4%	2%	3%	0%	0%	0%
from 250 to 300	1%	3%	0%	1%	6%	2%	3%	2%	1%	0%	0%	0%
from 300 to 350	1%	2%	1%	3%	2%	2%	1%	1%	0%	0%	0%	0%
from 350 to 400	1%	0%	2%	2%	2%	1%	2%	0%	0%	0%	0%	0%
from 400 to 450	0%	0%	3%	1%	3%	1%	1%	0%	0%	0%	0%	0%
from 450 to 500	0%	3%	1%	1%	1%	1%	0%	0%	0%	0%	0%	0%
from 500 to 550	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from 550 to 600	0%	2%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%
More than 650	0%	3%	3%	1%	1%	0%	0%	0%	0%	0%	0%	0%
Number of occurences	**4,044**	**58**	**120**	**190**	**199**	**319**	**406**	**461**	**545**	**594**	**786**	**366**

TABLE 16 BOULDER NDFD, NEXT DAY FORECAST, AS A FUNCTION OF PREDICTED GHI

BIAS	All cases	GHI > 950	GHI from 850 to 950	GHI from 750 to 850	GHI from 650 to 750	GHI from 550 to 650	GHI from 450 to 550	GHI from 350 to 450	GHI from 250 to 350	GHI from 150 to 250	GHI from 50 to 150	GHI < 50
Less than -600	1%	0%	0%	0%	0%	0%	0%	2%	4%	1%	0%	0%
from -600 to -550	0%	0%	0%	0%	0%	0%	0%	1%	1%	0%	0%	0%
from -550 to -500	1%	0%	0%	0%	0%	0%	0%	2%	1%	0%	0%	0%
from -500 to -450	1%	0%	0%	0%	0%	1%	2%	2%	1%	0%	0%	0%
from -450 to -400	1%	0%	0%	0%	0%	3%	1%	2%	2%	1%	0%	0%
from -400 to -350	1%	0%	0%	0%	2%	2%	4%	1%	1%	1%	1%	0%
from -350 to -300	2%	0%	0%	0%	2%	2%	4%	2%	3%	3%	2%	0%
from -300 to -250	3%	0%	0%	1%	3%	2%	4%	4%	3%	4%	3%	0%
from -250 to -200	4%	0%	1%	3%	10%	4%	6%	3%	4%	4%	4%	0%
from -200 to -150	4%	0%	1%	2%	5%	6%	4%	4%	5%	5%	6%	0%
from -150 to -100	6%	5%	7%	12%	6%	7%	7%	6%	7%	5%	6%	1%
from -100 to -50	9%	11%	13%	9%	9%	8%	6%	10%	9%	11%	10%	6%
from -50 to 0	21%	51%	44%	31%	23%	20%	15%	13%	11%	15%	19%	48%
from 0 to 50	27%	11%	13%	18%	17%	26%	23%	22%	20%	25%	37%	45%
from 50 to 100	7%	11%	3%	4%	5%	5%	5%	5%	11%	11%	11%	0%
from 100 to 150	4%	3%	3%	6%	5%	3%	4%	6%	5%	9%	1%	0%
from 150 to 200	3%	0%	1%	2%	2%	2%	4%	5%	6%	3%	0%	0%
from 200 to 250	2%	3%	3%	2%	2%	3%	3%	4%	3%	0%	0%	0%
from 250 to 300	1%	0%	1%	2%	2%	3%	3%	3%	1%	0%	0%	0%
from 300 to 350	1%	0%	0%	3%	1%	2%	3%	2%	1%	0%	0%	0%
from 350 to 400	1%	0%	2%	1%	1%	3%	2%	0%	0%	0%	0%	0%
from 400 to 450	0%	0%	2%	2%	1%	2%	1%	0%	0%	0%	0%	0%
from 450 to 500	0%	3%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%
from 500 to 550	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from 550 to 600	0%	0%	1%	0%	1%	0%	0%	0%	0%	0%	0%	0%
More than 650	0%	3%	4%	1%	0%	0%	0%	0%	0%	0%	0%	0%
Number of occurences	**4,044**	**37**	**99**	**177**	**222**	**320**	**425**	**526**	**536**	**634**	**712**	**356**

TABLE 17 FORT PECK GEM, SAME DAY FORECAST, AS A FUNCTION OF PREDICTED KT*

BIAS	All cases	Kt* from 0.95 to 1	Kt* from 0.90 to 0.95	Kt* from 0.8 to 0.9	Kt* from 0.7 to 0.8	Kt* from 0.6 to 0.7	Kt* from 0.5 to 0.6	Kt* from 0.4 to 0.5	Kt* from 0.3 to 0.4	Kt* from 0.2 to 0.3	Kt* from 0.1 to 0.2	Kt* from 0.0 to 0.1
Less than -600	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from -600 to -550	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from -550 to -500	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from -500 to -450	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from -450 to -400	0%	0%	0%	0%	0%	0%	1%	1%	0%	0%	0%	0%
from -400 to -350	0%	0%	0%	0%	0%	0%	1%	1%	0%	0%	0%	0%
from -350 to -300	0%	0%	0%	0%	0%	0%	1%	2%	0%	0%	0%	0%
from -300 to -250	0%	0%	0%	0%	0%	1%	1%	1%	0%	0%	0%	0%
from -250 to -200	1%	0%	0%	0%	0%	1%	2%	3%	0%	0%	0%	0%
from -200 to -150	2%	0%	0%	1%	3%	3%	3%	2%	1%	4%	0%	0%
from -150 to -100	3%	0%	0%	4%	7%	4%	4%	5%	1%	4%	0%	0%
from -100 to -50	8%	1%	11%	11%	11%	10%	6%	7%	4%	11%	0%	0%
from -50 to 0	24%	24%	38%	31%	22%	15%	12%	12%	10%	18%	0%	0%
from 0 to 50	37%	68%	32%	29%	30%	29%	28%	32%	42%	36%	0%	0%
from 50 to 100	11%	4%	9%	11%	13%	13%	16%	17%	27%	29%	0%	0%
from 100 to 150	5%	2%	3%	5%	5%	7%	11%	6%	10%	0%	0%	0%
from 150 to 200	3%	1%	2%	2%	3%	7%	6%	5%	3%	0%	0%	0%
from 200 to 250	2%	0%	1%	1%	2%	3%	3%	4%	0%	0%	0%	0%
from 250 to 300	1%	0%	1%	1%	1%	2%	2%	2%	1%	0%	0%	0%
from 300 to 350	1%	0%	1%	1%	0%	2%	2%	1%	0%	0%	0%	0%
from 350 to 400	0%	0%	0%	1%	0%	0%	1%	0%	0%	0%	0%	0%
from 400 to 450	0%	0%	0%	1%	0%	1%	1%	0%	0%	0%	0%	0%
from 450 to 500	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%
from 500 to 550	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from 550 to 600	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
More than 650	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Number of occurences	**4,254**	**823**	**543**	**972**	**730**	**548**	**345**	**188**	**77**	**28**	**-**	**-**

TABLE 18 FORT PECK GEM, NEXT DAY FORECAST, AS A FUNCTION OF PREDICTED KT*

BIAS	All cases	Kt* from 0.95 to 1	Kt* from 0.90 to 0.95	Kt* from 0.8 to 0.9	Kt* from 0.7 to 0.8	Kt* from 0.6 to 0.7	Kt* from 0.5 to 0.6	Kt* from 0.4 to 0.5	Kt* from 0.3 to 0.4	Kt* from 0.2 to 0.3	Kt* from 0.1 to 0.2	Kt* from 0.0 to 0.1
Less than -600	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from -600 to -550	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from -550 to -500	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from -500 to -450	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from -450 to -400	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%
from -400 to -350	0%	0%	0%	0%	0%	0%	1%	2%	0%	0%	0%	0%
from -350 to -300	0%	0%	0%	0%	0%	0%	2%	1%	0%	0%	0%	0%
from -300 to -250	0%	0%	0%	0%	0%	1%	3%	0%	0%	0%	0%	0%
from -250 to -200	1%	0%	0%	0%	1%	2%	2%	5%	3%	0%	0%	0%
from -200 to -150	2%	0%	0%	1%	4%	5%	1%	5%	1%	0%	0%	0%
from -150 to -100	4%	0%	0%	5%	7%	5%	3%	6%	5%	0%	0%	0%
from -100 to -50	9%	1%	7%	14%	10%	12%	6%	9%	8%	5%	0%	0%
from -50 to 0	25%	25%	39%	31%	25%	17%	14%	15%	10%	25%	0%	0%
from 0 to 50	35%	68%	32%	26%	26%	27%	32%	26%	42%	35%	0%	0%
from 50 to 100	10%	3%	9%	10%	12%	11%	15%	17%	15%	28%	0%	0%
from 100 to 150	5%	1%	4%	5%	5%	8%	8%	9%	9%	8%	0%	0%
from 150 to 200	3%	1%	3%	3%	3%	5%	5%	2%	4%	0%	0%	0%
from 200 to 250	2%	1%	2%	2%	2%	3%	2%	2%	3%	0%	0%	0%
from 250 to 300	1%	0%	1%	2%	2%	2%	1%	0%	1%	0%	0%	0%
from 300 to 350	1%	0%	1%	1%	2%	2%	2%	0%	0%	0%	0%	0%
from 350 to 400	1%	0%	1%	1%	0%	1%	1%	0%	0%	0%	0%	0%
from 400 to 450	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%
from 450 to 500	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%
from 500 to 550	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from 550 to 600	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
More than 650	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Number of occurences	**4,254**	**761**	**494**	**1,034**	**783**	**531**	**295**	**235**	**79**	**40**	**-**	**-**

TABLE 19 FORT PECK GEM, SAME DAY FORECAST, AS A FUNCTION OF PREDICTED GHI

BIAS	All cases	GHI > 950	GHI from 850 to 950	GHI from 750 to 850	GHI from 650 to 750	GHI from 550 to 650	GHI from 450 to 550	GHI from 350 to 450	GHI from 250 to 350	GHI from 150 to 250	GHI from 50 to 150	GHI < 50
Less than -600	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from -600 to -550	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from -550 to -500	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from -500 to -450	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from -450 to -400	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from -400 to -350	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from -350 to -300	0%	0%	0%	0%	0%	0%	1%	1%	0%	0%	0%	0%
from -300 to -250	0%	0%	0%	0%	0%	1%	1%	0%	0%	0%	0%	0%
from -250 to -200	1%	0%	0%	0%	1%	1%	1%	2%	1%	0%	0%	0%
from -200 to -150	2%	0%	0%	1%	3%	4%	2%	3%	2%	1%	0%	0%
from -150 to -100	3%	0%	0%	3%	4%	7%	9%	6%	4%	2%	0%	0%
from -100 to -50	8%	0%	11%	13%	12%	12%	13%	13%	10%	8%	2%	0%
from -50 to 0	24%	100%	38%	39%	33%	32%	21%	27%	26%	24%	18%	7%
from 0 to 50	37%	0%	32%	24%	23%	14%	20%	19%	26%	36%	64%	93%
from 50 to 100	11%	0%	7%	5%	8%	9%	9%	8%	13%	20%	15%	0%
from 100 to 150	5%	0%	5%	3%	3%	5%	5%	6%	8%	8%	1%	0%
from 150 to 200	3%	0%	2%	3%	3%	4%	5%	5%	6%	3%	0%	0%
from 200 to 250	2%	0%	2%	0%	3%	2%	3%	5%	2%	0%	0%	0%
from 250 to 300	1%	0%	1%	1%	1%	1%	3%	2%	2%	0%	0%	0%
from 300 to 350	1%	0%	2%	1%	1%	2%	3%	2%	0%	0%	0%	0%
from 350 to 400	0%	0%	0%	0%	1%	2%	1%	0%	0%	0%	0%	0%
from 400 to 450	0%	0%	0%	0%	1%	2%	1%	0%	0%	0%	0%	0%
from 450 to 500	0%	0%	0%	1%	1%	1%	0%	0%	0%	0%	0%	0%
from 500 to 550	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%
from 550 to 600	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%
More than 650	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Number of occurences												

TABLE 20 FORT PECK GEM, NEXT DAY FORECAST, AS A FUNCTION OF PREDICTED GHI

BIAS	All cases	GHI > 950	GHI from 850 to 950	GHI from 750 to 850	GHI from 650 to 750	GHI from 550 to 650	GHI from 450 to 550	GHI from 350 to 450	GHI from 250 to 350	GHI from 150 to 250	GHI from 50 to 150	GHI < 50
Less than -600	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from -600 to -550	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from -550 to -500	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from -500 to -450	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from -450 to -400	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from -400 to -350	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%
from -350 to -300	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%
from -300 to -250	0%	0%	0%	0%	0%	1%	2%	1%	0%	0%	0%	0%
from -250 to -200	1%	0%	0%	0%	1%	1%	2%	2%	2%	0%	0%	0%
from -200 to -150	2%	0%	0%	2%	4%	3%	4%	4%	2%	1%	0%	0%
from -150 to -100	4%	0%	0%	7%	5%	3%	10%	7%	5%	2%	0%	0%
from -100 to -50	9%	0%	6%	11%	17%	12%	10%	14%	10%	9%	2%	0%
from -50 to 0	25%	100%	52%	42%	32%	34%	23%	23%	27%	24%	22%	9%
from 0 to 50	35%	0%	25%	18%	14%	15%	20%	16%	24%	35%	61%	91%
from 50 to 100	10%	0%	7%	4%	6%	8%	7%	8%	13%	16%	14%	0%
from 100 to 150	5%	0%	5%	3%	6%	4%	4%	5%	8%	10%	1%	0%
from 150 to 200	3%	0%	2%	3%	3%	5%	4%	6%	5%	2%	0%	0%
from 200 to 250	2%	0%	1%	3%	3%	2%	3%	4%	3%	0%	0%	0%
from 250 to 300	1%	0%	1%	2%	1%	3%	4%	3%	1%	0%	0%	0%
from 300 to 350	1%	0%	0%	1%	3%	3%	3%	1%	0%	0%	0%	0%
from 350 to 400	1%	0%	0%	1%	1%	2%	2%	1%	0%	0%	0%	0%
from 400 to 450	0%	0%	0%	1%	1%	1%	0%	0%	0%	0%	0%	0%
from 450 to 500	0%	0%	0%	0%	1%	1%	1%	0%	0%	0%	0%	0%
from 500 to 550	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%
from 550 to 600	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%
More than 650	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%
Number of occurences	**4,254**	**1**	**84**	**212**	**294**	**339**	**392**	**465**	**658**	**707**	**729**	**373**

TABLE 21 FORT PECK NDFD, SAME DAY FORECAST, AS A FUNCTION OF PREDICTED KT*

BIAS	All cases	Kt* from 0.95 to 1	Kt* from 0.90 to 0.95	Kt* from 0.8 to 0.9	Kt* from 0.7 to 0.8	Kt* from 0.6 to 0.7	Kt* from 0.5 to 0.6	Kt* from 0.4 to 0.5	Kt* from 0.3 to 0.4	Kt* from 0.2 to 0.3	Kt* from 0.1 to 0.2	Kt* from 0.0 to 0.1
Less than -600	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from -600 to -550	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from -550 to -500	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from -500 to -450	0%	0%	0%	0%	0%	0%	0%	2%	0%	1%	0%	0%
from -450 to -400	0%	0%	0%	0%	0%	0%	0%	1%	1%	2%	0%	0%
from -400 to -350	0%	0%	0%	0%	0%	0%	3%	1%	3%	1%	0%	0%
from -350 to -300	0%	0%	0%	0%	0%	0%	2%	3%	3%	1%	0%	0%
from -300 to -250	1%	0%	0%	0%	0%	1%	3%	3%	4%	3%	2%	0%
from -250 to -200	2%	0%	0%	0%	2%	5%	7%	6%	7%	5%	3%	0%
from -200 to -150	3%	0%	0%	1%	6%	6%	7%	6%	9%	3%	9%	0%
from -150 to -100	4%	0%	0%	6%	6%	9%	9%	8%	10%	8%	12%	0%
from -100 to -50	7%	0%	4%	12%	10%	11%	8%	14%	11%	20%	29%	0%
from -50 to 0	19%	12%	24%	21%	20%	21%	25%	22%	20%	31%	35%	0%
from 0 to 50	38%	61%	37%	24%	22%	23%	20%	20%	18%	20%	9%	0%
from 50 to 100	11%	11%	16%	15%	10%	9%	9%	8%	8%	3%	0%	0%
from 100 to 150	5%	6%	6%	6%	7%	6%	4%	3%	4%	2%	0%	0%
from 150 to 200	3%	3%	3%	4%	3%	5%	2%	3%	1%	1%	0%	0%
from 200 to 250	2%	2%	1%	3%	3%	2%	1%	0%	0%	0%	0%	0%
from 250 to 300	1%	1%	3%	2%	2%	1%	0%	1%	0%	0%	0%	0%
from 300 to 350	1%	1%	2%	1%	2%	0%	0%	0%	0%	0%	0%	0%
from 350 to 400	0%	0%	1%	0%	1%	1%	0%	0%	0%	0%	0%	0%
from 400 to 450	0%	0%	0%	1%	1%	0%	0%	0%	0%	0%	0%	0%
from 450 to 500	1%	0%	1%	1%	2%	0%	0%	0%	0%	0%	0%	0%
from 500 to 550	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%
from 550 to 600	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%
More than 650	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Number of occurences	**4,191**	**1,666**	**294**	**561**	**329**	**233**	**241**	**177**	**270**	**299**	**121**	**-**

TABLE 22 FORT PECK NDFD, NEXT DAY FORECAST, AS A FUNCTION OF PREDICTED KT*

BIAS	All cases	Kt* from 0.95 to 1	Kt* from 0.90 to 0.95	Kt* from 0.8 to 0.9	Kt* from 0.7 to 0.8	Kt* from 0.6 to 0.7	Kt* from 0.5 to 0.6	Kt* from 0.4 to 0.5	Kt* from 0.3 to 0.4	Kt* from 0.2 to 0.3	Kt* from 0.1 to 0.2	Kt* from 0.0 to 0.1
Less than -600	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from -600 to -550	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%
from -550 to -500	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%
from -500 to -450	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%	0%	0%
from -450 to -400	1%	0%	0%	0%	0%	0%	2%	2%	1%	5%	0%	0%
from -400 to -350	1%	0%	0%	0%	0%	0%	2%	3%	2%	3%	0%	0%
from -350 to -300	0%	0%	0%	0%	0%	0%	2%	2%	1%	1%	0%	0%
from -300 to -250	1%	0%	0%	0%	1%	2%	3%	7%	2%	5%	2%	0%
from -250 to -200	2%	0%	0%	0%	3%	5%	3%	3%	4%	4%	0%	0%
from -200 to -150	3%	0%	0%	1%	4%	6%	9%	6%	8%	6%	9%	0%
from -150 to -100	5%	0%	1%	6%	9%	7%	9%	8%	10%	7%	11%	0%
from -100 to -50	8%	0%	5%	13%	12%	9%	13%	10%	16%	15%	29%	0%
from -50 to 0	20%	14%	23%	24%	24%	19%	21%	18%	28%	27%	36%	0%
from 0 to 50	35%	61%	34%	23%	21%	23%	25%	20%	18%	17%	13%	0%
from 50 to 100	11%	12%	18%	13%	10%	9%	6%	12%	6%	5%	0%	0%
from 100 to 150	5%	5%	5%	7%	5%	7%	4%	6%	3%	0%	0%	0%
from 150 to 200	2%	3%	3%	4%	3%	4%	1%	1%	0%	1%	0%	0%
from 200 to 250	2%	2%	2%	3%	1%	2%	0%	2%	0%	0%	0%	0%
from 250 to 300	1%	1%	3%	3%	2%	2%	0%	0%	0%	0%	0%	0%
from 300 to 350	1%	1%	2%	1%	1%	1%	0%	0%	0%	0%	0%	0%
from 350 to 400	1%	0%	0%	1%	2%	1%	0%	1%	0%	0%	0%	0%
from 400 to 450	0%	0%	1%	1%	1%	1%	0%	0%	0%	0%	0%	0%
from 450 to 500	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%
from 500 to 550	0%	0%	1%	1%	1%	0%	0%	0%	0%	0%	0%	0%
from 550 to 600	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%
More than 650	0%	0%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%
Number of occurences	**4,191**	**1,417**	**336**	**615**	**468**	**292**	**216**	**172**	**299**	**281**	**95**	**-**

TABLE 23 FORT PECK NDFD, SAME DAY FORECAST, AS A FUNCTION OF PREDICTED GHI

BIAS	All cases	GHI > 950	GHI from 850 to 950	GHI from 750 to 850	GHI from 650 to 750	GHI from 550 to 650	GHI from 450 to 550	GHI from 350 to 450	GHI from 250 to 350	GHI from 150 to 250	GHI from 50 to 150	GHI < 50
Less than -600	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from -600 to -550	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from -550 to -500	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from -500 to -450	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from -450 to -400	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%
from -400 to -350	0%	0%	0%	0%	0%	0%	2%	1%	0%	1%	0%	0%
from -350 to -300	0%	0%	0%	0%	0%	0%	1%	1%	1%	1%	0%	0%
from -300 to -250	1%	0%	0%	0%	0%	0%	2%	1%	1%	2%	1%	0%
from -250 to -200	2%	0%	0%	0%	0%	2%	3%	2%	4%	2%	2%	0%
from -200 to -150	3%	0%	0%	1%	4%	2%	3%	2%	3%	4%	4%	0%
from -150 to -100	4%	0%	0%	3%	5%	4%	6%	3%	4%	5%	6%	2%
from -100 to -50	7%	0%	2%	4%	5%	7%	9%	8%	6%	6%	11%	8%
from -50 to 0	19%	0%	29%	28%	15%	15%	13%	13%	13%	15%	18%	44%
from 0 to 50	38%	100%	39%	33%	36%	32%	28%	38%	33%	34%	47%	47%
from 50 to 100	11%	0%	6%	10%	10%	9%	11%	12%	14%	17%	9%	0%
from 100 to 150	5%	0%	5%	5%	7%	7%	9%	4%	11%	8%	1%	0%
from 150 to 200	3%	0%	5%	4%	3%	5%	3%	6%	6%	2%	0%	0%
from 200 to 250	2%	0%	1%	4%	3%	3%	3%	4%	1%	0%	0%	0%
from 250 to 300	1%	0%	2%	3%	1%	4%	3%	3%	1%	0%	0%	0%
from 300 to 350	1%	0%	2%	1%	4%	2%	2%	1%	0%	0%	0%	0%
from 350 to 400	0%	0%	2%	0%	2%	1%	1%	0%	0%	0%	0%	0%
from 400 to 450	0%	0%	1%	1%	1%	2%	1%	0%	0%	0%	0%	0%
from 450 to 500	1%	0%	1%	2%	1%	3%	0%	0%	0%	0%	0%	0%
from 500 to 550	0%	0%	1%	1%	2%	0%	0%	0%	0%	0%	0%	0%
from 550 to 600	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%
More than 650	0%	0%	4%	1%	0%	0%	0%	0%	0%	0%	0%	0%
Number of occurences	**4,191**	**1**	**150**	**251**	**299**	**296**	**359**	**413**	**528**	**648**	**822**	**424**

TABLE 24 FORT PECK NDFD, NEXT DAY FORECAST, AS A FUNCTION OF PREDICTED GHI

BIAS	All cases	GHI > 950	GHI from 850 to 950	GHI from 750 to 850	GHI from 650 to 750	GHI from 550 to 650	GHI from 450 to 550	GHI from 350 to 450	GHI from 250 to 350	GHI from 150 to 250	GHI from 50 to 150	GHI < 50
Less than -600	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from -600 to -550	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from -550 to -500	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from -500 to -450	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%
from -450 to -400	1%	0%	0%	0%	0%	0%	1%	1%	1%	2%	0%	0%
from -400 to -350	1%	0%	0%	0%	0%	0%	1%	0%	1%	1%	0%	0%
from -350 to -300	0%	0%	0%	0%	0%	0%	0%	1%	0%	1%	0%	0%
from -300 to -250	1%	0%	0%	0%	1%	2%	1%	1%	2%	3%	1%	0%
from -250 to -200	2%	0%	0%	0%	3%	3%	4%	2%	1%	2%	2%	0%
from -200 to -150	3%	0%	0%	0%	1%	4%	4%	3%	4%	5%	3%	0%
from -150 to -100	5%	0%	0%	3%	6%	5%	6%	6%	5%	5%	5%	1%
from -100 to -50	8%	0%	6%	8%	7%	10%	8%	8%	8%	7%	12%	6%
from -50 to 0	20%	0%	35%	27%	17%	15%	14%	14%	16%	17%	19%	44%
from 0 to 50	35%	100%	30%	29%	31%	28%	26%	35%	31%	32%	46%	49%
from 50 to 100	11%	0%	9%	7%	9%	7%	11%	11%	15%	17%	11%	0%
from 100 to 150	5%	0%	4%	4%	6%	6%	7%	6%	10%	7%	1%	0%
from 150 to 200	2%	0%	7%	4%	3%	2%	4%	4%	4%	2%	0%	0%
from 200 to 250	2%	0%	1%	5%	3%	3%	3%	3%	2%	0%	0%	0%
from 250 to 300	1%	0%	2%	3%	3%	3%	4%	2%	1%	0%	0%	0%
from 300 to 350	1%	0%	1%	1%	3%	3%	3%	1%	0%	0%	0%	0%
from 350 to 400	1%	0%	2%	1%	1%	1%	2%	0%	0%	0%	0%	0%
from 400 to 450	0%	0%	0%	1%	1%	3%	1%	0%	0%	0%	0%	0%
from 450 to 500	0%	0%	0%	1%	1%	2%	0%	0%	0%	0%	0%	0%
from 500 to 550	0%	0%	2%	2%	3%	1%	0%	0%	0%	0%	0%	0%
from 550 to 600	0%	0%	0%	1%	1%	0%	0%	0%	0%	0%	0%	0%
More than 650	0%	0%	2%	2%	0%	0%	0%	0%	0%	0%	0%	0%
Number of occurences	**4,191**	**1**	**125**	**230**	**302**	**307**	**364**	**427**	**513**	**683**	**830**	**409**

TABLE 25 SIOUX FALLS GEM, SAME DAY FORECAST, AS A FUNCTION OF PREDICTED KT*

BIAS	All cases	Kt* from 0.95 to 1	Kt* from 0.90 to 0.95	Kt* from 0.8 to 0.9	Kt* from 0.7 to 0.8	Kt* from 0.6 to 0.7	Kt* from 0.5 to 0.6	Kt* from 0.4 to 0.5	Kt* from 0.3 to 0.4	Kt* from 0.2 to 0.3	Kt* from 0.1 to 0.2	Kt* from 0.0 to 0.1
Less than -600	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from -600 to -550	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from -550 to -500	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from -500 to -450	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from -450 to -400	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%
from -400 to -350	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from -350 to -300	0%	0%	0%	0%	0%	1%	1%	0%	0%	0%	0%	0%
from -300 to -250	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%
from -250 to -200	0%	0%	0%	0%	1%	1%	1%	0%	0%	0%	0%	0%
from -200 to -150	2%	0%	0%	1%	5%	4%	3%	2%	1%	0%	0%	0%
from -150 to -100	3%	0%	0%	6%	8%	3%	4%	2%	2%	2%	0%	0%
from -100 to -50	9%	2%	9%	17%	13%	9%	5%	5%	4%	3%	0%	0%
from -50 to 0	21%	18%	37%	29%	22%	10%	15%	7%	9%	10%	37%	0%
from 0 to 50	36%	71%	35%	25%	21%	24%	23%	24%	32%	44%	63%	0%
from 50 to 100	12%	5%	10%	9%	11%	15%	20%	26%	17%	32%	0%	0%
from 100 to 150	7%	2%	5%	5%	7%	11%	13%	14%	17%	10%	0%	0%
from 150 to 200	4%	1%	2%	2%	4%	5%	6%	8%	11%	0%	0%	0%
from 200 to 250	2%	0%	0%	2%	3%	4%	2%	4%	6%	0%	0%	0%
from 250 to 300	2%	0%	1%	1%	1%	5%	3%	4%	1%	0%	0%	0%
from 300 to 350	1%	0%	0%	1%	2%	2%	2%	1%	0%	0%	0%	0%
from 350 to 400	1%	0%	0%	1%	1%	2%	1%	0%	0%	0%	0%	0%
from 400 to 450	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%
from 450 to 500	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%
from 500 to 550	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%
from 550 to 600	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
More than 650	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Number of occurences	**4,258**	**896**	**473**	**913**	**693**	**434**	**327**	**268**	**172**	**63**	**19**	**-**

TABLE 26 SIOUX FALLS GEM, NEXT DAY FORECAST, AS A FUNCTION OF PREDICTED KT*

BIAS	All cases	Kt* from 0.95 to 1	Kt* from 0.90 to 0.95	Kt* from 0.8 to 0.9	Kt* from 0.7 to 0.8	Kt* from 0.6 to 0.7	Kt* from 0.5 to 0.6	Kt* from 0.4 to 0.5	Kt* from 0.3 to 0.4	Kt* from 0.2 to 0.3	Kt* from 0.1 to 0.2	Kt* from 0.0 to 0.1
Less than -600	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from -600 to -550	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from -550 to -500	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%
from -500 to -450	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from -450 to -400	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from -400 to -350	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%
from -350 to -300	0%	0%	0%	0%	0%	1%	0%	1%	1%	0%	0%	0%
from -300 to -250	1%	0%	0%	0%	0%	2%	2%	1%	0%	0%	0%	0%
from -250 to -200	1%	0%	0%	0%	2%	4%	2%	1%	2%	0%	0%	0%
from -200 to -150	2%	0%	0%	1%	6%	6%	3%	3%	1%	0%	0%	0%
from -150 to -100	4%	0%	1%	7%	8%	5%	3%	3%	2%	0%	0%	0%
from -100 to -50	10%	2%	10%	18%	15%	8%	7%	5%	6%	5%	0%	0%
from -50 to 0	20%	15%	42%	32%	19%	13%	9%	9%	8%	5%	32%	0%
from 0 to 50	35%	72%	28%	26%	23%	23%	22%	25%	28%	57%	58%	0%
from 50 to 100	11%	5%	8%	8%	12%	12%	19%	21%	24%	27%	11%	0%
from 100 to 150	6%	2%	4%	3%	6%	8%	12%	14%	15%	5%	0%	0%
from 150 to 200	4%	1%	3%	2%	4%	6%	6%	10%	12%	0%	0%	0%
from 200 to 250	2%	0%	0%	1%	2%	3%	6%	3%	3%	0%	0%	0%
from 250 to 300	1%	0%	2%	1%	1%	3%	1%	2%	0%	0%	0%	0%
from 300 to 350	1%	0%	1%	0%	1%	2%	2%	1%	0%	0%	0%	0%
from 350 to 400	0%	0%	0%	0%	0%	1%	1%	0%	0%	0%	0%	0%
from 400 to 450	0%	0%	0%	0%	1%	1%	1%	0%	0%	0%	0%	0%
from 450 to 500	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%
from 500 to 550	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from 550 to 600	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
More than 650	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Number of occurences	**4,258**	**852**	**424**	**880**	**689**	**429**	**363**	**348**	**198**	**56**	**19**	**-**

TABLE 27 SIOUX FALLS GEM, SAME DAY FORECAST, AS A FUNCTION OF PREDICTED GHI

BIAS	All cases	GHI > 950	GHI from 850 to 950	GHI from 750 to 850	GHI from 650 to 750	GHI from 550 to 650	GHI from 450 to 550	GHI from 350 to 450	GHI from 250 to 350	GHI from 150 to 250	GHI from 50 to 150	GHI < 50
Less than -600	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from -600 to -550	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from -550 to -500	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from -500 to -450	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from -450 to -400	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from -400 to -350	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from -350 to -300	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%
from -300 to -250	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%
from -250 to -200	0%	0%	0%	0%	2%	1%	1%	1%	0%	0%	0%	0%
from -200 to -150	2%	0%	0%	0%	6%	3%	5%	2%	2%	1%	0%	0%
from -150 to -100	3%	0%	0%	8%	8%	5%	6%	6%	4%	1%	0%	0%
from -100 to -50	9%	0%	3%	10%	15%	16%	14%	15%	11%	6%	2%	0%
from -50 to 0	21%	8%	32%	35%	26%	22%	23%	26%	21%	20%	17%	6%
from 0 to 50	36%	85%	45%	24%	22%	18%	20%	19%	19%	32%	61%	94%
from 50 to 100	12%	0%	7%	9%	5%	7%	8%	7%	15%	21%	18%	0%
from 100 to 150	7%	0%	7%	4%	4%	7%	5%	7%	12%	15%	2%	0%
from 150 to 200	4%	8%	3%	2%	4%	4%	4%	6%	9%	3%	0%	0%
from 200 to 250	2%	0%	1%	2%	3%	3%	3%	4%	6%	1%	0%	0%
from 250 to 300	2%	0%	0%	0%	2%	4%	4%	3%	2%	0%	0%	0%
from 300 to 350	1%	0%	0%	0%	2%	2%	3%	3%	0%	0%	0%	0%
from 350 to 400	1%	0%	1%	2%	0%	4%	2%	0%	0%	0%	0%	0%
from 400 to 450	0%	0%	0%	0%	0%	1%	1%	0%	0%	0%	0%	0%
from 450 to 500	0%	0%	1%	0%	0%	1%	0%	0%	0%	0%	0%	0%
from 500 to 550	0%	0%	0%	1%	1%	1%	0%	0%	0%	0%	0%	0%
from 550 to 600	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%
More than 650	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Number of occurences	**4,258**	**13**	**111**	**214**	**310**	**342**	**383**	**543**	**620**	**657**	**720**	**345**

TABLE 28 SIOUX FALLS GEM, NEXT DAY FORECAST, AS A FUNCTION OF PREDICTED GHI

BIAS	All cases	GHI > 950	GHI from 850 to 950	GHI from 750 to 850	GHI from 650 to 750	GHI from 550 to 650	GHI from 450 to 550	GHI from 350 to 450	GHI from 250 to 350	GHI from 150 to 250	GHI from 50 to 150	GHI < 50
Less than -600	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from -600 to -550	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from -550 to -500	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from -500 to -450	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from -450 to -400	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from -400 to -350	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%
from -350 to -300	0%	0%	0%	0%	0%	1%	1%	1%	0%	0%	0%	0%
from -300 to -250	1%	0%	0%	0%	0%	2%	1%	2%	0%	0%	0%	0%
from -250 to -200	1%	0%	0%	0%	4%	2%	3%	2%	1%	0%	0%	0%
from -200 to -150	2%	0%	0%	1%	6%	3%	5%	4%	3%	1%	0%	0%
from -150 to -100	4%	0%	0%	4%	13%	11%	6%	7%	3%	1%	0%	0%
from -100 to -50	10%	0%	5%	14%	14%	12%	17%	16%	14%	7%	3%	0%
from -50 to 0	20%	8%	31%	35%	23%	22%	22%	23%	20%	22%	16%	5%
from 0 to 50	35%	85%	43%	23%	24%	19%	17%	15%	18%	31%	60%	95%
from 50 to 100	11%	0%	5%	8%	3%	6%	8%	7%	13%	21%	19%	0%
from 100 to 150	6%	8%	5%	5%	5%	4%	7%	7%	12%	10%	2%	0%
from 150 to 200	4%	0%	3%	3%	3%	3%	3%	6%	8%	6%	0%	0%
from 200 to 250	2%	0%	0%	0%	1%	3%	2%	4%	5%	0%	0%	0%
from 250 to 300	1%	0%	1%	1%	2%	2%	3%	3%	1%	0%	0%	0%
from 300 to 350	1%	0%	2%	1%	0%	3%	2%	2%	0%	0%	0%	0%
from 350 to 400	0%	0%	1%	1%	0%	1%	2%	1%	0%	0%	0%	0%
from 400 to 450	0%	0%	2%	0%	1%	2%	2%	0%	0%	0%	0%	0%
from 450 to 500	0%	0%	1%	0%	0%	1%	0%	0%	0%	0%	0%	0%
from 500 to 550	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%
from 550 to 600	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%
More than 650	0%	0%	0%	1%	1%	0%	0%	0%	0%	0%	0%	0%
Number of occurences	**4,258**	**13**	**97**	**205**	**288**	**329**	**373**	**534**	**640**	**700**	**720**	**359**

TABLE 29 SIOUX FALLS NDFD, SAME DAY FORECAST, AS A FUNCTION OF PREDICTED KT*

BIAS	All cases	Kt* from 0.95 to 1	Kt* from 0.90 to 0.95	Kt* from 0.8 to 0.9	Kt* from 0.7 to 0.8	Kt* from 0.6 to 0.7	Kt* from 0.5 to 0.6	Kt* from 0.4 to 0.5	Kt* from 0.3 to 0.4	Kt* from 0.2 to 0.3	Kt* from 0.1 to 0.2	Kt* from 0.0 to 0.1
Less than -600	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	1%	0%
from -600 to -550	0%	0%	0%	0%	0%	0%	0%	0%	1%	1%	0%	0%
from -550 to -500	0%	0%	0%	0%	0%	0%	0%	1%	1%	1%	0%	0%
from -500 to -450	1%	0%	0%	0%	0%	0%	0%	3%	1%	2%	1%	0%
from -450 to -400	1%	0%	0%	0%	0%	0%	0%	3%	2%	2%	1%	0%
from -400 to -350	1%	0%	0%	0%	0%	0%	1%	3%	4%	3%	1%	0%
from -350 to -300	2%	0%	0%	0%	0%	0%	2%	6%	6%	3%	3%	0%
from -300 to -250	2%	0%	0%	0%	0%	7%	5%	7%	6%	4%	2%	0%
from -250 to -200	3%	0%	0%	0%	5%	10%	8%	7%	5%	4%	4%	0%
from -200 to -150	4%	0%	0%	2%	9%	9%	11%	6%	7%	5%	7%	0%
from -150 to -100	6%	0%	1%	6%	14%	9%	8%	10%	8%	10%	10%	0%
from -100 to -50	10%	1%	7%	16%	18%	10%	9%	6%	13%	12%	15%	0%
from -50 to 0	22%	18%	33%	25%	19%	19%	18%	13%	20%	20%	32%	0%
from 0 to 50	32%	57%	34%	24%	16%	15%	20%	17%	12%	21%	23%	0%
from 50 to 100	8%	13%	11%	10%	5%	6%	9%	6%	7%	8%	2%	0%
from 100 to 150	4%	5%	6%	6%	5%	6%	2%	3%	4%	2%	0%	0%
from 150 to 200	2%	3%	3%	3%	4%	2%	3%	3%	1%	1%	0%	0%
from 200 to 250	1%	2%	1%	2%	1%	1%	3%	3%	0%	0%	0%	0%
from 250 to 300	1%	1%	1%	2%	1%	2%	1%	1%	0%	0%	0%	0%
from 300 to 350	1%	0%	2%	1%	1%	2%	0%	1%	0%	0%	0%	0%
from 350 to 400	0%	0%	0%	1%	0%	0%	1%	0%	0%	0%	0%	0%
from 400 to 450	0%	0%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%
from 450 to 500	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from 500 to 550	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from 550 to 600	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
More than 650	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Number of occurences	**4,168**	**1,235**	**264**	**425**	**338**	**215**	**157**	**144**	**270**	**555**	**565**	**-**

TABLE 30 SIOUX FALLS NDFD, NEXT DAY FORECAST, AS A FUNCTION OF PREDICTED KT*

BIAS	All cases	Kt* from 0.95 to 1	Kt* from 0.90 to 0.95	Kt* from 0.8 to 0.9	Kt* from 0.7 to 0.8	Kt* from 0.6 to 0.7	Kt* from 0.5 to 0.6	Kt* from 0.4 to 0.5	Kt* from 0.3 to 0.4	Kt* from 0.2 to 0.3	Kt* from 0.1 to 0.2	Kt* from 0.0 to 0.1
Less than -600	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	1%	0%
from -600 to -550	0%	0%	0%	0%	0%	0%	0%	0%	1%	1%	0%	0%
from -550 to -500	0%	0%	0%	0%	0%	0%	0%	1%	1%	1%	0%	0%
from -500 to -450	1%	0%	0%	0%	0%	0%	0%	3%	5%	3%	0%	0%
from -450 to -400	1%	0%	0%	0%	0%	0%	1%	3%	3%	1%	0%	0%
from -400 to -350	1%	0%	0%	0%	0%	0%	5%	4%	5%	3%	1%	0%
from -350 to -300	2%	0%	0%	0%	0%	3%	7%	4%	3%	3%	2%	0%
from -300 to -250	2%	0%	0%	0%	0%	6%	5%	4%	5%	3%	3%	0%
from -250 to -200	3%	0%	0%	0%	4%	6%	9%	6%	4%	6%	3%	0%
from -200 to -150	4%	0%	0%	2%	10%	8%	11%	9%	3%	6%	6%	0%
from -150 to -100	6%	0%	1%	7%	13%	9%	10%	7%	6%	9%	11%	0%
from -100 to -50	10%	2%	8%	16%	16%	7%	10%	16%	13%	11%	15%	0%
from -50 to 0	21%	17%	30%	29%	18%	13%	13%	14%	21%	22%	32%	0%
from 0 to 50	30%	57%	32%	23%	17%	18%	13%	16%	15%	21%	24%	0%
from 50 to 100	8%	13%	11%	8%	6%	6%	6%	6%	6%	8%	2%	0%
from 100 to 150	5%	5%	8%	5%	7%	7%	2%	3%	4%	3%	0%	0%
from 150 to 200	2%	3%	4%	3%	4%	5%	1%	3%	2%	0%	0%	0%
from 200 to 250	1%	1%	1%	2%	2%	3%	2%	2%	0%	0%	0%	0%
from 250 to 300	1%	1%	1%	1%	2%	3%	1%	3%	0%	0%	0%	0%
from 300 to 350	1%	1%	1%	1%	2%	1%	1%	1%	0%	0%	0%	0%
from 350 to 400	0%	1%	1%	1%	1%	1%	0%	0%	0%	0%	0%	0%
from 400 to 450	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from 450 to 500	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%
from 500 to 550	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%
from 550 to 600	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
More than 650	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Number of occurences	**4,168**	**1,079**	**271**	**469**	**399**	**269**	**248**	**200**	**271**	**557**	**405**	**-**

TABLE 31 SIOUX FALLS NDFD, SAME DAY FORECAST, AS A FUNCTION OF PREDICTED GHI

BIAS	All cases	GHI > 950	GHI from 850 to 950	GHI from 750 to 850	GHI from 650 to 750	GHI from 550 to 650	GHI from 450 to 550	GHI from 350 to 450	GHI from 250 to 350	GHI from 150 to 250	GHI from 50 to 150	GHI < 50
Less than -600	0%	0%	0%	0%	0%	0%	0%	0%	1%	1%	0%	0%
from -600 to -550	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%
from -550 to -500	0%	0%	0%	0%	0%	0%	0%	0%	1%	1%	0%	0%
from -500 to -450	1%	0%	0%	0%	0%	0%	0%	2%	0%	2%	0%	0%
from -450 to -400	1%	0%	0%	0%	0%	0%	0%	1%	1%	2%	1%	0%
from -400 to -350	1%	0%	0%	0%	0%	0%	0%	1%	2%	2%	1%	0%
from -350 to -300	2%	0%	0%	0%	0%	0%	0%	2%	2%	3%	3%	0%
from -300 to -250	2%	0%	0%	0%	1%	3%	2%	2%	3%	4%	3%	0%
from -250 to -200	3%	0%	0%	1%	3%	4%	3%	3%	3%	4%	4%	0%
from -200 to -150	4%	0%	0%	2%	8%	4%	5%	2%	4%	5%	6%	1%
from -150 to -100	6%	0%	0%	5%	6%	6%	8%	6%	5%	6%	9%	2%
from -100 to -50	10%	0%	3%	13%	10%	16%	7%	8%	9%	8%	12%	8%
from -50 to 0	22%	31%	27%	25%	16%	17%	18%	19%	14%	13%	19%	51%
from 0 to 50	32%	38%	39%	26%	28%	21%	33%	31%	30%	26%	36%	38%
from 50 to 100	8%	8%	11%	12%	9%	10%	7%	9%	8%	16%	7%	0%
from 100 to 150	4%	15%	5%	6%	6%	3%	4%	6%	8%	6%	0%	0%
from 150 to 200	2%	0%	4%	2%	5%	4%	4%	4%	5%	2%	0%	0%
from 200 to 250	1%	8%	2%	2%	2%	5%	2%	2%	2%	0%	0%	0%
from 250 to 300	1%	0%	3%	1%	1%	2%	3%	2%	1%	0%	0%	0%
from 300 to 350	1%	0%	2%	0%	2%	3%	2%	1%	0%	0%	0%	0%
from 350 to 400	0%	0%	1%	3%	1%	0%	1%	0%	0%	0%	0%	0%
from 400 to 450	0%	0%	1%	2%	1%	0%	0%	0%	0%	0%	0%	0%
from 450 to 500	0%	0%	0%	1%	0%	1%	0%	0%	0%	0%	0%	0%
from 500 to 550	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from 550 to 600	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
More than 650	0%	0%	1%	2%	0%	0%	0%	0%	0%	0%	0%	0%
Number of occurences	**4,168**	**13**	**127**	**193**	**258**	**268**	**299**	**389**	**416**	**624**	**1,039**	**542**

TABLE 32 SIOUX FALLS NDFD, NEXT DAY FORECAST, AS A FUNCTION OF PREDICTED GHI

BIAS	All cases	GHI > 950	GHI from 850 to 950	GHI from 750 to 850	GHI from 650 to 750	GHI from 550 to 650	GHI from 450 to 550	GHI from 350 to 450	GHI from 250 to 350	GHI from 150 to 250	GHI from 50 to 150	GHI < 50
Less than -600	0%	0%	0%	0%	0%	0%	0%	0%	1%	1%	0%	0%
from -600 to -550	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%
from -550 to -500	0%	0%	0%	0%	0%	0%	0%	0%	1%	1%	0%	0%
from -500 to -450	1%	0%	0%	0%	0%	0%	0%	2%	0%	2%	0%	0%
from -450 to -400	1%	0%	0%	0%	0%	0%	0%	1%	1%	2%	1%	0%
from -400 to -350	1%	0%	0%	0%	0%	0%	0%	1%	2%	2%	1%	0%
from -350 to -300	2%	0%	0%	0%	0%	0%	0%	2%	2%	3%	3%	0%
from -300 to -250	2%	0%	0%	0%	1%	3%	2%	2%	3%	4%	3%	0%
from -250 to -200	3%	0%	0%	1%	3%	4%	3%	3%	3%	4%	4%	0%
from -200 to -150	4%	0%	0%	2%	8%	4%	5%	2%	4%	5%	6%	1%
from -150 to -100	6%	0%	0%	5%	6%	6%	8%	6%	5%	6%	9%	2%
from -100 to -50	10%	0%	3%	13%	10%	16%	7%	8%	9%	8%	12%	8%
from -50 to 0	22%	31%	27%	25%	16%	17%	18%	19%	14%	13%	19%	51%
from 0 to 50	32%	38%	39%	26%	28%	21%	33%	31%	30%	26%	36%	38%
from 50 to 100	8%	8%	11%	12%	9%	10%	7%	9%	8%	16%	7%	0%
from 100 to 150	4%	15%	5%	6%	6%	3%	4%	6%	8%	6%	0%	0%
from 150 to 200	2%	0%	4%	2%	5%	4%	4%	4%	5%	2%	0%	0%
from 200 to 250	1%	8%	2%	2%	2%	5%	2%	2%	2%	0%	0%	0%
from 250 to 300	1%	0%	3%	1%	1%	2%	3%	2%	1%	0%	0%	0%
from 300 to 350	1%	0%	2%	0%	2%	3%	2%	1%	0%	0%	0%	0%
from 350 to 400	0%	0%	1%	3%	1%	0%	1%	0%	0%	0%	0%	0%
from 400 to 450	0%	0%	1%	2%	1%	0%	0%	0%	0%	0%	0%	0%
from 450 to 500	0%	0%	0%	1%	0%	1%	0%	0%	0%	0%	0%	0%
from 500 to 550	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%
from 550 to 600	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
More than 650	0%	0%	1%	2%	0%	0%	0%	0%	0%	0%	0%	0%
Number of occurences	**4,168**	**13**	**127**	**193**	**258**	**268**	**299**	**389**	**416**	**624**	**1,039**	**542**