

# What's An NHL Draft Pick Worth? A Value Pick Chart for the National Hockey League

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## ***Introduction***

Each year the National Hockey League (NHL), a North American professional ice hockey league, assigns eligible players to its 30 teams via the NHL Entry Draft. For each of seven rounds, each team has one selection though these selections or picks may be traded for other players, for other draft picks or for a combination of these two. Additional picks may be awarded by the NHL to a team for losing a restricted free agent. In this paper we analyze data related to the National Hockey League draft and develop a value pick chart for establishing the value of a given selection. Thus, from the proposed value pick chart in this paper we can calculate the combinations of picks required to get equal value for the 1<sup>st</sup> or 3<sup>rd</sup> or 5<sup>th</sup> pick in the NHL Entry Draft.

## ***Data***

The analyses in this paper are based upon players selected in the NHL Entry Drafts from 1988 to 1997. These data were obtained from [www.hockey-reference.com](http://www.hockey-reference.com) with additional information from [www.nhl.com](http://www.nhl.com) and [www.eliteprospects.com](http://www.eliteprospects.com). The choice of this ten-year period is based on a balance of two differing interests. We want to ensure that we base our metrics on career performance for players. Thus, we want players whose careers are complete or very nearly so. On the other hand, we want to construct our analyses on the most recently available information. For each of the ten years from 1988 to 1997 we have the first 215 players selected in each NHL Entry Draft. We restricted our interest to the first 215 players selected since the last five NHL drafts have had between 210 and 213 players selected. It is noteworthy that there were changes to player eligibility occurred in 1991 which is during the period of these data (NHL.com, 2008).

For each player, we have their selection number, the position they play, the NHL team that selected them, the amateur team from whom they were drafted and a variety of career performance metrics. The selection number is the place in the order of the selected players. That is, the fourth player taken in a given draft will have a value for selection of 4; the 137<sup>th</sup> selection taken will have a value for selection of 137. The players position is broken into one of three categories: forward (F), defenseman (D) and goalie (G). The performance metrics that we have for forwards and defensemen include the number of career NHL games played, the career number of goals, the career number of assists, the career points which is goals plus assists, and the career plus/minus which is a measure of even strength goals scored minus goals given up when a given player is on the ice. For goalies we have the following career performance metrics: number of career NHL games, wins, losses, overtime or shootout losses, career save percentage and career goals against per game average.

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In the analyses of the next section we will focus on games played as it will give us a metric that will allow for straightforward comparisons of players across positions. This is primarily because our ultimate goal in this paper is to produce an assessment of the value of each NHL draft pick. In doing this we follow Schuckers (2011) who used a similar measure for National Football League players. There have been some attempts at an NHL draft pick chart, see Anonymous (2011) and Tango (2007) but their approach is not as detailed as the one we propose here.

### *Analyses*

In this section we analyze and summarize the observations and the data from the first 210 selections in each of the NHL Entry Drafts from 1988 to 1997. During that time there were 696 D's, 1212 F's and 192 G's selected. A typical NHL roster will include 12 F's, 6 D's and 2 G's. Defensemen seem to be taken at a slightly proportion than rosters would indicate would be the case. Using the current 30 picks per round, Table 1 has the number of selections by position in each of the first seven rounds. From that table we can see that the distribution of positions by rounds is roughly consistent though there seems to be a tendency to take fewer D's and more F's in the second round than in other rounds.

**Table 1: Distribution of Position by Round**

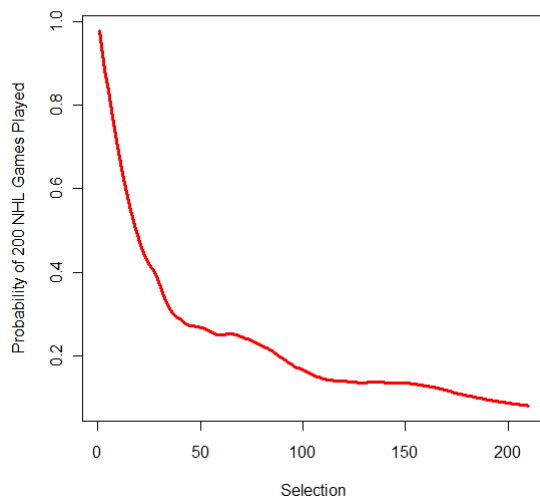
Round	Number of D's Selected	Number of F's Selected	Number of G's Selected
1	105	175	20
2	78	192	30
3	97	181	22
4	110	156	34
5	103	166	31
6	95	181	24
7	108	161	31

**Table 2: Summary of the Distribution of Games Played by Position**

	D	F	G
25 <sup>th</sup> percentile	0	0	0
50 <sup>th</sup> percentile	0	0	0
75 <sup>th</sup> percentile	69	193	83
90 <sup>th</sup> percentile	644	749	357
95 <sup>th</sup> percentile	834	970	535
99 <sup>th</sup> percentile	1148	1243	742
Mean	143	183	95

Table 2 has summaries of the distribution of games played for each position. The NHL regular season is 82 games. From Table 2 we see that over 50% of drafted players at each position never played one game in the NHL. By position, 40.5% of drafted D's played at least one NHL game while 49.7% of F's and 46.4% of G's play at least one game in the NHL. It is clear that the concentration of talent based upon games played for NHL players is in the top 10% of draft picks. These are the first 21 picks. The distribution of each position is heavily right skewed. The average number of games played by drafted forward exceeds that of defensemen whose average in turn exceeds that of goalies. Similarly the top 25% of drafted forwards played more than 193 games while the top 25% of defensemen and goalies played 69 and 83 games, respectively. It is worth noting that the 90<sup>th</sup> percentile for drafted D's is substantially larger than the 90<sup>th</sup> percentile for drafted G's.

By round the percent of players that play at least one NHL game, appearing in the NHL, is 91.7% (Round 1), 65.0% , 56.7% , 38.0% , 32.3% , 27.3% , and 21.0%, respectively. For determination of value we further investigate the probability of playing more than 200 NHL games. Figure 1 has a smoothed plot (via LOESS regression) of the probability that a given draft selection will play at least 200 NHL games. To build that curve we fit and splined together two non-parametric regression curves using the `loess` function in R software to regress games played onto selection for each. The first line was fit with a small window for curve-fitting (`span=0.2`) while the second was fit with a larger window (`span=0.5`) to ensure monotonicity and smoothness. This was done to be sure to accurately capture the edge effects present for smaller selection numbers. We used the first LOESS curve to fit the change in probability of playing 200 games through the first 45 selections and the second LOESS curve was fit to the remaining selections through 215 though here we only plot the predicted values through selection 210. For the 1<sup>st</sup> overall draft pick there is a very high fitted probability, approximately 98%, of playing more than 200 games. That probability decreases in an steeply linear manner until approximately the 45<sup>th</sup> pick and then drops approximately in a linear though less steep fashion through the 210<sup>th</sup> pick which only has an 8% change of playing 200 NHL games.



**Figure 1: Probability of Playing 200 NHL Games by Selection**

**Table 3: Summary of Probability of Playing More Than 200 NHL Games by Position**

Position	Round 1	Round 2	Round 3	Round 4	Round 5	Round 6	Round 7	Total	Overall Probability
F	0.35	0.18	0.17	0.08	0.10	0.09	0.03	306	25%
D	0.43	0.12	0.14	0.08	0.06	0.09	0.08	145	21%
G	0.33	0.25	0.08	0.11	0.09	0.06	0.08	36	19%

Table 3 gives a breakdown of when players who played more than 200 NHL games were drafted. Note that this is not a table of probabilities of success but rather a table describing what percentage of players that appeared in more than 200 games came from each round. It does not account for the total number of each type of player selected in a given round. The overall rate of playing 200 games by position is given in the last column of Table 3. Of the F's that were selected 25% played more than 200 games, while 21% of D's and 19% of G's played more than 200 games. We note that there are differences between the positions in where players that played more than 200 games are selected. This is especially true among the first three rounds. Among the D's that played more than 200 games, 43% were selected in the 1<sup>st</sup> round while only 35% of comparable F's and 33% of comparable G's came from that same round. A higher percentage of the G's that played 200 games were selected in the 2<sup>nd</sup> round, 25%, than F's (18%) or D's (12%) taken in that same round. After the 3<sup>rd</sup> round the portions of

each position that played more than 200 games is just under 10% and seems to be roughly the same for each position. Note that total number of players that have played more than 200 games closely matches the percentages for a typical NHL roster of 12 F's, 6 D's and 2 G's.

We next consider career games played. A graph plotting the number of games played (GP) against the selection number is given in Figure 2. As we saw in Table 2 the distribution at each selection number has long tails to the

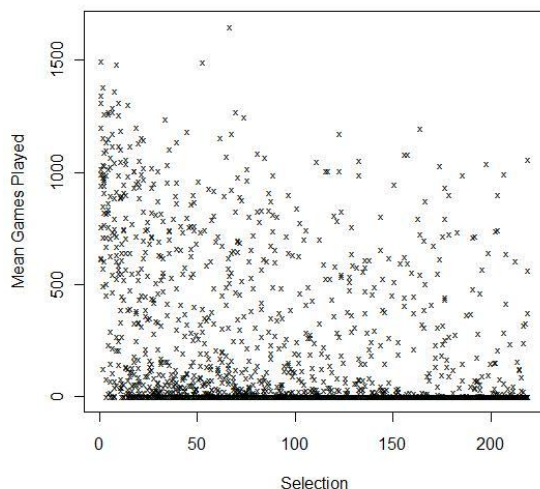


Figure 2: Games Played versus Selection

higher values of GP. With some attention it is possible to notice that a higher density of higher values for GP are found at lower selection values. That is, lower selections, on average, have higher numbers of games played. We note that GP is an imperfect measure of comparison and that not all games played are equivalent; 500 games by a first line forward who scores 30 goals per season is not the same as 500 by a third line checking forward. For example, Ziggy Palffy a forward played 684 games and had 713 points while Kent Manderville, also a forward, played in 646 games but had only 104 points. However GP is the chosen measure since it allows for a comparison of careers across positions.

Table 4: Summary of Distribution of Games Played by Selection Round

	1 <sup>st</sup> Round	2 <sup>nd</sup> Round	3 <sup>rd</sup> Round	4 <sup>th</sup> Round	5 <sup>th</sup> Round	6 <sup>th</sup> Round	7 <sup>th</sup> Round
25 <sup>th</sup> percentile	45	0	0	0	0	0	0
50 <sup>th</sup> percentile	436	22	10	0	0	0	0
75 <sup>th</sup> percentile	878	281	208	32	22	3	0
90 <sup>th</sup> percentile	1071	736	691	293	381	393	80
95 <sup>th</sup> percentile	1200	859	892	594	580	628	372
99 <sup>th</sup> percentile	1363	1135	1175	901	989	1032	903
Mean	482	192	182	84	86	87	50

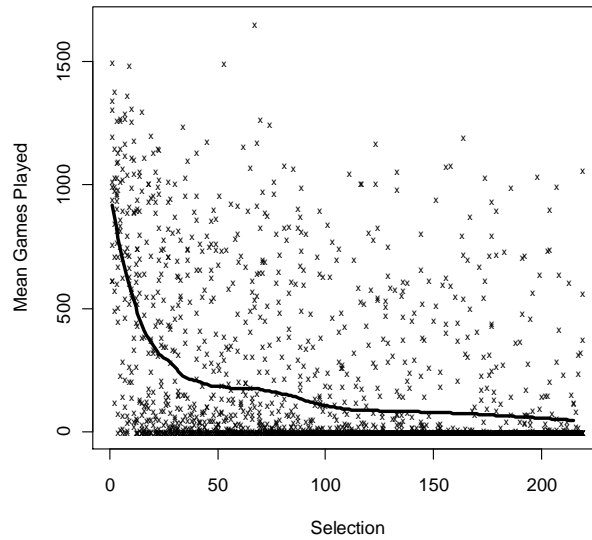


Figure 3: Fitted LOESS line for Predicting Games Played from Selection

Table 5 further breaks down GP by position and round. The mean is given for each combination followed by the standard deviation in ( )'s. Forwards in a given round average more games played than D's or G's but they also have similarly large standard deviations through the first six rounds. The general trend that we saw for the mean GP of all players in Table 4 is present here for F's and D's. That is, there is a steep drop-off in performance through the middle of the 2<sup>nd</sup> round which is then followed by a bit of a leveling which is then followed by a gradual decrease in games played. Goalies do not follow this trend. There is a sharp drop-off in performance in the early rounds but there does not seem to be a gradual descent in performance after the 2<sup>nd</sup> round. Rather performance seems to be level for goalies for rounds 3 through 7.

Table 5: Mean (and Standard Deviation) of Games Played by Position and Round

Position	Round 1	Round 2	Round 3	Round 4	Round 5	Round 6	Round 7
F	530 (457)	210 (316)	207 (330)	104 (223)	110 (227)	93 (233)	31 (119)
D	435 (398)	163 (306)	167 (307)	64 (172)	57 (186)	89 (228)	72 (218)
G	320 (305)	148 (218)	42 (83)	59 (140)	45 (120)	36 (101)	68 (174)

### NHL Draft Value Pick Chart

Having summarized the NHL draft data in the previous section, we now propose a value pick chart for the NHL draft based upon player performance. The goal of a pick chart is to allow teams to have a single currency for the trading of draft selections, cf Schuckers (2011). To build the NHL Pick Value Draft Chart that we give below we fit and splined together two non-parametric regression curves using the `loess` function in R software to regress games played onto selection. We take the same basic approach for the relationship between games played and selection as we did for predicting the probability of playing at least 200 games. We used the first loess curve to fit the change in games played through the first 45 selections and the second loess curve was fit to the remaining selections through 215 though here we only report the predicted values through selection 210. This type of model was fit to players selected before and after the change in eligibility of players for the 1992 draft and found that the

differences between these two models was not substantial. Figure 3 plots our combined curve through the observed values of games played and selection.

The NHL Draft Value Pick Chart that we propose here is based upon the curve given in Figure 3. The complete details of this chart are given in the Appendix to this paper. The maximal value given to the first selection is 917 while the smallest value is 51 given to the 210<sup>th</sup> selection. This chart assigns value to each pick based upon the predicted number of games that a given player will play in their career. Consequently, based upon this chart the first pick is about 18 times more valuable than the last pick. The chart like the curve in Figure 3 has large changes in value for early draft picks, i.e. those from lower selections, and smaller changes in value for later draft picks. Thus, the values assigned to the 10<sup>th</sup>, 50<sup>th</sup>, 100<sup>th</sup> and 200<sup>th</sup> picks are 565, 185, 107 and 57, respectively which represent the predicted number of games that we expect those picks will play in the NHL.

### *Discussion*

In this paper we have proposed a new draft value pick chart for the National Hockey League. This chart is based upon the observed performance of players selected in the 1988 to 1997 NHL Entry Draft. Utilizing non-parametric regression we smoothed the games played for each of the first 210 selections in the NHL Entry Draft. This chart provides a common currency for teams to evaluate the value of the draft selections for trading those selections or for trading those selections for players. For example, if a team would like to trade for the 2<sup>nd</sup> overall draft selection, another team might offer the 8<sup>th</sup> overall selection and the 32<sup>st</sup> overall selection to give a total value of  $629+246=875$  which is close to the value for the 2<sup>nd</sup> overall pick of 871. Or a team might offer the 14<sup>th</sup>, 44<sup>th</sup>, 104<sup>th</sup> and 164<sup>th</sup> selections with a total value of  $456+196+101+75=828$  for the 3<sup>rd</sup> overall selection which has approximately the same value of 826. We recognize that predicted performance is not the only criterion for the value of a draft selection. Team needs, financial constraints and other considerations might suggest adjustments to the values for this chart. We have based our valuation of selections purely on games played, a metric that is common and consistent for all positions. One significant advantage to using this metric is that we can evaluate trades including current players and determine if the number of predicted games played is the same for each team involved in the trade.

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APPENDIX

**Proposed NHL Draft Value Pick Chart**

Round 1	Value	Round 2	Value	Round 3	Value	Round 4	Value	Round 5	Value	Round 6	Value	Round 7	Value
1	917	31	255	61	175	91	128	121	88	151	79	181	67
2	871	32	246	62	176	92	125	122	88	152	79	182	66
3	826	33	237	63	176	93	122	123	87	153	79	183	66
4	783	34	228	64	177	94	119	124	87	154	78	184	65
5	741	35	222	65	177	95	117	125	86	155	78	185	65
6	702	36	217	66	177	96	114	126	86	156	78	186	64
7	665	37	213	67	176	97	113	127	85	157	77	187	64
8	629	38	211	68	176	98	111	128	85	158	77	188	63
9	596	39	209	69	174	99	109	129	85	159	77	189	63
10	565	40	208	70	173	100	107	130	85	160	77	190	62
11	535	41	206	71	171	101	106	131	84	161	76	191	62
12	507	42	203	72	169	102	104	132	84	162	76	192	61
13	481	43	199	73	167	103	103	133	84	163	76	193	60
14	456	44	196	74	165	104	101	134	84	164	75	194	60
15	433	45	192	75	164	105	99	135	84	165	75	195	59
16	413	46	189	76	162	106	98	136	84	166	75	196	59
17	395	47	188	77	160	107	97	137	83	167	74	197	58
18	379	48	186	78	158	108	95	138	83	168	74	198	58
19	364	49	186	79	156	109	94	139	83	169	73	199	57
20	350	50	185	80	155	110	93	140	83	170	73	200	57
21	336	51	185	81	153	111	92	141	82	171	72	201	56
22	324	52	184	82	151	112	91	142	82	172	72	202	55
23	315	53	183	83	149	113	90	143	82	173	71	203	55
24	308	54	182	84	147	114	89	144	82	174	70	204	54
25	302	55	180	85	145	115	89	145	81	175	70	205	54
26	297	56	178	86	142	116	89	146	81	176	69	206	53
27	291	57	176	87	140	117	89	147	81	177	69	207	53
28	283	58	176	88	137	118	88	148	80	178	68	208	52
29	275	59	175	89	134	119	88	149	80	179	68	209	52
30	265	60	175	90	131	120	88	150	80	180	67	210	51