

NVSL DIVE SEEDING COMMITTEE OPERATING PROCEDURES

I. GOVERNANCE

A. Northern Virginia Swim League BYLAWS

1. Article XII - Diving Each member pool which participates in League diving competition shall designate a Diving Representative. The Diving Representatives shall hold meetings, elect the Vice-President of Diving and other positions as necessary to form a Board of Officers for diving, and enact rules for League diving competition under the guidance of the Board of Officers for diving.
2. Article V.C, The League shall be grouped annually in divisions of member pools as determined by the Seeding Committee.
3. Article VIII.A.1.m., Seeding – this committee shall assign the member pools to divisions and shall report the seedings to the League.

B. OPERATING GUIDELINES FOR NVSL DIVING

1. Article 4.B.1., Seeding – Shall assign the member pools to divisions and shall report the seedings to the EXCOM and Diving Team Representatives.

C. GUIDING PRINCIPLES FOR NVSL DIVE SEEDING

1. The NVSL Dive Seeding Committee shall assign member pools to divisions to ensure equitable competition within each division. The Committee shall assign teams to divisions based on their demonstrated performance. Division 1 shall consist of the highest performing teams followed by the teams in the rest of the league.
2. The Committee shall use a mathematical model to rank the teams in the league from 1-N based on the prior year's performance. The model shall form the basis for discussion among the Committee members for the final determination of division assignments.
3. Divisions shall consist of 6 teams as a rule. When the total number of teams is not divisible by 6, then the lowest Division shall have 5 teams, and next lowest Divisions shall have 5 or 6 teams and so forth to complete the division assignments. No Division shall have less than 5 teams. For example, if there are 49 dive teams in the league, there would be 9 Divisions with Divisions 1-4 having 6 teams and Divisions 5-9 having 5 teams. (See Attachment - NVSL Dive Schedule Matrix)
4. The Committee shall also consider any objective comments provided prior to the Committee meeting by the Team Representatives in the NVSL Dive Survey.

5. Geography shall not be a factor in seeding, since there are a limited number of NVSL Dive Teams.
6. Analysis is insight, not answers. The Committee shall determine the final seeding of the NVSL Dive teams based on all available information.

II. DATA REQUIREMENTS

- A. NVSL Dive Standings and Win/Loss/Tie Records
- B. Margin of Victory/Defeat for each dive meet (dual meet scores)
- C. Number of divers who qualify for All-Stars by team (no alternates)
- D. Results of the All-Star events (including alternates who participated)
- E. NVSL Dive Survey

III. NVSL DIVE SEEDING PROCESS

- A. Develop, refine (as needed), and populate the performance-based model used to rank the teams in NVSL Diving from I-N.
 1. The current model used for seeding is a linear model, where points are awarded for each variable. The variables are: current division, number of wins, average margin of victory/defeat, number of All-Star Qualifiers, and score of Team All-Star Participants.
 2. The weights of each variable were empirically determined.
 3. The model provides a ranking of I-N for all teams in the league, and thus, an initial divisional assignment for each team.
- B. The Chair provides the ranking to the committee members for deliberation
- C. The Committee meets to decide the final rankings and determine the division compositions.

IV. DEFINING THE MODEL

- A. Teams are awarded points IAW the following model:
 $Ax + By + Cz + Du + Ev = P$

Where P is the total points awarded by the model, A, B, C, D, E are the weights assigned to each variable and

- I. $x =$ the normalized current “division”
Formula: $x = 100 \times (\# \text{ of divisions} + 1 - \text{current division}) / (\# \text{ of divisions})$
Example: $\# \text{ of divisions} = 8$ and current team division = 1, so $x = 100 \times (8 + 1 - 1) / 8 = 100$

Example 2: # of divisions = 8 and current team division = 5, so $x = 100 \times (8+1-5)/8 = 50$

2. y = the normalized number of wins
 Formula: $y = 100 \times \# \text{ of wins} / (\# \text{ of possible wins in that division})$

Example: team with 4 wins in a 6-team division, $y = 100 \times 4 / 5 = 80$

Example 2: team with 3 wins in a 5-team division, $y = 100 \times 3 / 4 = 75$

3. z = the normalized average margin of victory/defeat
 Formula: $z = 100 \times (\text{average margin} - \text{Min (average margin)}) / (\text{Max (average margin)} - \text{Min (average margin)})$

Example: team average margin is +5, Min (average margin) is -20 and Max (average margin) is +20, so $z = 100 \times (5 - (-20)) / (20 - (-20)) = 100 \times 25 / 40 = 62.5$

4. u = the normalized number of All-Star Qualifiers
 Formula: $u = 100 \times (\# \text{ of All-Star Qualifiers} - \text{Min} (\# \text{ of All-Star Qualifiers})) / (\text{Max}(\# \text{ of All-Star Qualifiers}) - \text{Min}(\# \text{ of All-Star Qualifiers}))$. This variable includes only All-Star Qualifiers, not Alternates.

Example: team has 3 All-Star Qualifiers, Min (# of All-Star Qualifiers) is 0, Max(# of All-Star Qualifiers) is 7, so $u = 100 \times (3 - 1) / (7-0) = 42.857$

5. v = the normalized score of the All-Star Participants

Each event in All-Stars is ordered by finish. The number of actual participants in each event are listed and the maximum number of participants by event is determined (e.g. FG, FB, JB, IG, IB, SG, SB all have 18 participants, but JG has 19, the maximum is 19). The first place in each event is awarded (max +1) points, in this case each event winner is awarded 20 points. Second place is awarded 19 points, etc. This ensures equivalence among the events. Then, total points are calculated for each team participating in All-Stars; these are the team All-Star scores. If a team had no actual All-Star competitors, its score is zero. This variable includes Alternates who actually competed in All-Stars.

Formula: $v = 100 \times (\text{team All-Star score} - \text{Min (team All-Star score)}) / (\text{Max (team All-Star score)} - \text{Min (team All-Star score)})$

Example: team has an All-Star score = 25 points, Min (team All-Star score) is 0, Max (team All-Star score) is 80, so $v = 100 \times (25 - 0) / (80 - 0) = 31.250$

NOTE: Only intra-divisional dual meets are counted for seeding. No inter-divisional or tri-meets are counted for purposes of seeding.

NOTE 2: All variables, except division, are normalized on a scale of 0-100. The lowest division receives a normalized value of $100 / \# \text{ of divisions}$, rather than 0.

V. Model Characteristics

For 8 divisions, the weights for each variable are:

1. Current Division – 19.2
2. Number of Wins – 6.0
3. Average Margin – 5.0
4. Number of All-Star Qualifiers – 1.25
5. All-Star Score – 1.25

B. For 8 divisions, these are the points available

1. The difference between Division (N+1) and Division (N) is 240 points. Division 1 teams earn 19,200 points and Division 8 teams earn 240 points.
2. One win is worth 120 points; 5 wins are worth 600 points. Thus, a team with a 5-0-0 record in Division 4 would be equivalent with a team with a 3-2-0 record in Division 3.
3. The team with the highest “average margin” earns 500 points; the team with the lowest “average margin” earns 0 points.
4. The team with the largest number of All-Star Qualifiers earns 125 points; the team with the lowest earns 0 points.
5. The team with the largest All-Star Score earns 125 points; the team with the lowest earns 0 points.

C. Model Benchmarks

1. If all teams recorded a 3-2-0 or 2-3-0, there would be no change in seeding for the next year (i.e., near perfect seeding, assuming an equivalent margin distribution and All-Star Qualification and Scoring distribution). (See Attachment - SeedMaster Aggregate - Benchmark - 3-2 wins).
2. If all teams recorded a 4-1-0 or a 1-4-0 record, every team with a 4-1-0 record would move up one division (except for Division 1) and every team with a 1-4-0 record would move down one division (except for Division 8) (i.e., a seeding, assuming an equivalent relative margin distribution and All-Star Qualification and Scoring distribution) (see Attachment - SeedMaster Aggregate - Benchmark - 4-1 wins).
3. If the teams within each division score 5-0-0, 4-1-0, 3-2-0, 2-3-0, 1-4-0, 0-5-0, then most of the 5-0-0 will move up 2 divisions, most 4-1-0 teams will move up 1 division, most 1-4-0 teams will move down 1 division and most 0-5-0 teams will move down 2 divisions (see Attachment - SeedMaster Aggregate - Benchmark - 5-4-3-2-1-0).
4. The perfect seeding would occur when each team record was 2-2-1, the average margin for each team was 0, the number of All-Star Qualifiers was 4 for Divisions 1 and 2, and 3 for the rest of the Divisions (IAW NVSL Rules), and the All-Star Score was equal for each team. This would result in no change in division assignments.

5. If the number of divisions change, the weights may have to be adjusted to retain these equivalences

D. The model really reduces to a simple point count enumeration.

1. Total points = number of points for the current team division + total points awarded for the number of wins in the division + total points awarded for the team's relative average margin + the number of points awarded for the team's relative number of All-Star Competitors + the number of points awarded for the team's relative All-Star Score.

2. All teams are ranked by the total points calculated in this formula.

3. Each division is then determined by starting from the top and counting the number of teams allocated to each division.

Appendix I

NVSL Dive Schedule Matrix

NVSL Dive Division Assignment Matrix										
Number of Teams in:										
Number of Dive Teams	Division 1	Division 2	Division 3	Division 4	Division 5	Division 6	Division 7	Division 8	Division 9	Notes (for each week)
40	6	6	6	6	6	5	5	N/A	N/A	1 interdivisional meet (6-7)
41	6	6	6	6	6	6	5	N/A	N/A	1 BYE (7)
42	6	6	6	6	6	6	6	N/A	N/A	
43	6	6	6	5	5	5	5	5	N/A	1 interdivisional meet (4-5) and 1 trimeet (6-7-8)
44	6	6	6	6	5	5	5	5	N/A	2 interdivisional meets (5-6 and 7-8)
45	6	6	6	6	6	5	5	5	N/A	1 trimeet (6-7-8)
46	6	6	6	6	6	6	5	5	N/A	1 interdivisional meet (7-8)
47	6	6	6	6	6	6	6	5	N/A	1 BYE (8)
48	6	6	6	6	6	6	6	6	N/A	
49	6	6	6	6	5	5	5	5	5	1 interdivisional meet (5-6) and 1 trimeet (7-8-9)
50	6	6	6	6	6	5	5	5	5	2 interdivisional meets (6-7 and 8-9)
51	6	6	6	6	6	6	5	5	5	1 trimeet (7-8-9)
52	6	6	6	6	6	6	6	5	5	1 interdivisional meet (8-9)